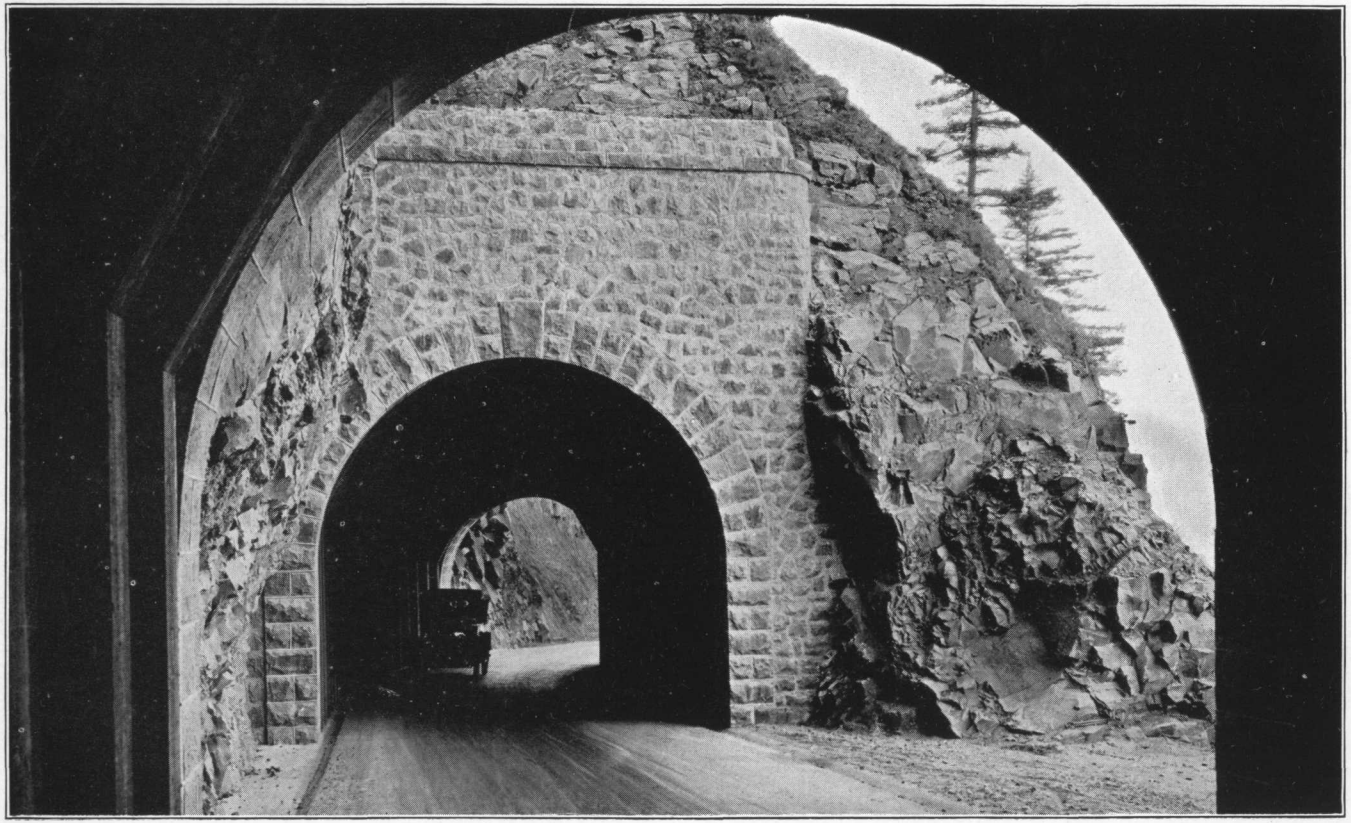
OR/
ODOT
BIENNL
1921-22
C.1

STATE OF OREGON

REPORT

STATE HIGHWAY COMMISSION

1921-1922



VIEW TAKEN FROM WITHIN THE EASTERLY OF THE TWIN TUNNELS ON THE COLUMBIA RIVER HIGHWAY EAST OF HOOD RIVER

Fifth Biennial Report

OF THE

Oregon State Highway Commission

Covering the period December 1, 1920,
to November 30, 1922

OREGON DEPARTMENT OF
TRANSPORTATION LIBRARY

OREGON STATE HIGHWAY COMMISSION

R. A. Booth, Chairman

J. B. Yeon, Commissioner; W. B. Barratt, Commissioner

E. E. Kiddle, Deceased

Herbert Nunn, State Highway Engineer

OREGON STATE HIGHWAY COMMISSION

FORMER MEMBERS AND TERMS

E. J. ADAMS, Eugene, Feb. 28, 1917, to March 31, 1918.

W. L. THOMPSON, Pendleton, Feb. 28, 1917, to Oct. 15, 1919

J. N. BURGESS, Pendleton, Oct. 16, 1919, to Nov. 21, 1919.

S. BENSON, Portland, Feb. 28, 1917, to Nov. 15, 1920.

E. E. KIDDLE, Island City, Nov. 26, 1919, to Dec. 28, 1920.

PRESENT MEMBERS

R. A. BOOTH, Eugene, appointed April 1, 1918.

J. B. YEON, Portland, appointed November 22, 1920.

W. B. BARRATT, Heppner, appointed January 8, 1921.

TABLE OF CONTENTS

	PAGE
Letter of Transmittal to the Governor	6
Report of the State Highway Commission	7
General Resume of the Work of the Biennium	7
Financial Statement, State Highway Fund	23
Statement of Receipts and Disbursements by Months	25
Receipts from Motor Vehicle License Fees Classified by Counties	26
Anticipated Income and Oligated Expenditures, 1923-1924	27
Summary of State Highway Bonds Sold	28
Proposals Received and Contracts Awarded	30
State Highway Engineer's Report to the State Highway Commission	39
Letter of Transmittal	40
Progress in State Highway Construction, 1921-1922	41
Funds Available and Expended, 1921-1922	42
Work Under Contract	42
Chart Showing Relative Incomes from Different Sources and Relative Expenditures for Different Purposes	43
Funds Available for Expenditure During 1923-1924	44
Post Road Projects	45
Map of the Approved Federal Aid System of Highways	47
Forest Road Work	49
Amounts of Federal Aid Apportioned to Oregon	50
County Cooperation in State Highway Work	51
State Aid to Counties in the Construction of Market Roads	51
State Funds Apportioned to Counties for Market Road Work	53
The Columbia River Highway	54
Pacific Highway Practically Completed	55
The Roosevelt Coast Highway	55
Paving	56
Broken Stone and Gravel Surfacing	58
Grading	59
Bridges	60
Maintenance	61
Elimination of Grade Crossings	62
Hauling With State Trucks, and Other State Force Construction Work	63
Regulation of Traffic, and Policing of State Highways	64
State Equipment Department	66
Record of Equipment Received and Disposed of	71
Testing Department	72
Office Organization	74
Report of the Legal Department	77
Financial Report (Detailed Tabulations of Receipts and Expenditures)	81
Table I. Statement of Receipts and Disbursements through the State Highway Fund	82
Table II. Grand Summary of Net Incomes, Net Expenditures, and Net Balances on Hand	84
Table III. Detailed Summary of Net Income from All Sources	85
Table IV. Detailed Summary of Net Expenditures	86
Table V. Expenditures of the State Highway Commission Summarized by Counties	87
Table VI. Detailed Statement of Expenditures for Construction (Except Post Road Projects)	88-A
Table VII. Detailed Statement of Expenditures upon 1916-1920 Series of Post Road Projects	88-H

TABLE OF CONTENTS—Continued

PAGE

Table VIII. Detailed Statement of Expenditures upon 1921-1922 Series of Post Road Projects 88-J
Table IX. Detailed Statement of Cooperation on Forest Road Work 88-L
Table X. Expenditures for Maintenance and Betterment Work 89
Table XI. Expenditures for Surveys 90
Table XII. Expenditures for Construction Engineering on County Work 93
Table XIII. Direct Expenditures upon Market Road Work..... 94
Table XIV. Expenditures for General and Miscellaneous Purposes 98

Statistical Information 101
Table No. 1. Mileages of State Highway Construction, 1913 to 1922 102
Table No. 2. State Funds Received and Expended, 1913 to 1922 102
Table No. 3. State, County, and Government Funds Expended, 1913 to 1922 103
Table No. 4. Continuing Equipment Account, 1917 to 1922.... 103
Table No. 5. Income from Different Sources, 1917 to 1922.... 104
Table No. 6. Expenditures for Different Purposes, 1917 to 1922 105
Table No. 7. Expenditures to Date upon Each of the State Highways 106
Table No. 8. Expenditures of State Funds in Each of the Counties, 1913 to 1922 107
Table No. 9. Road Expenditures of Counties, 1913 to 1922..... 108
Table No. 10. County Populations, Areas, Assessed Valuations, and Bonding Limits 109
Table No. 11. County Bond Issues 110
Table No. 12. Statistics Pertaining to Forest Road Work 112
Table No. 13. Motor Vehicle Registrations, by Counties 113
Table No. 14. Mileages of State Highways, by Counties 114
Table No. 15. Mileages of County Roads, by Counties 115
Table No. 16. Numbers and Mileages of State Highways with Map of State Highway System 116
Table No. 17. New State Highway Construction, by Counties.. 117
Table No. 18. New County Road Construction, by Counties 118
Table No. 19. New Market Road Construction, by Counties 119
Table No. 20. Apportionment of 1921 Market Road Funds 120
Table No. 21. Apportionment of 1922 Market Road Funds 121
Table No. 22. Market Road Receipts and Expenditures, 1920.. 122
Table No. 23. Market Road Receipts and Expenditures, 1921.. 123
Table No. 24. Market Road Receipts and Expenditures, 1922.. 124
Table No. 25. Mileages of New State Highway Construction, by Jobs 125
Table No. 26. Mileages of Surveys, by Jobs 131
Table No. 27. Bridge Design and Construction, by Jobs 134
Table No. 28. Bridges Designed for Counties, by Jobs 144
Table No. 29. Results of Traffic Counts, 1921 and 1922 146

Descriptions and Cost Statements for Individual Jobs Handled During 1921 and 1922 (Arranged by Counties in Alphabetical Order) 151

LETTER OF TRANSMITTAL

Salem, Oregon, December 1, 1922.

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

Dear Sir: In compliance with Section 4432, Title XXX, Oregon Laws, we have the honor to submit herewith the report of the State Highway Commission for the period December 1, 1920, to November 30, 1922.

During the biennium you have not only treated the Commission with the greatest consideration, but you have been helpful as a counselor in solving the problems involved. For this the members of the Commission make grateful acknowledgment. Thanks are also due and are hereby extended to other state officers who have graciously aided in the work.

The engineering force have not measured their service by compensation received but have given their best in talent and unstintingly of their time. The conduct of our entire force has been such as to gain our admiration and to them all we express our sincere appreciation for their loyalty to duty.

Respectfully submitted,

OREGON STATE HIGHWAY COMMISSION,
R. A. Booth, Chairman,
J. B. Yeon, Commissioner,
W. B. Barratt, Commissioner.

Attest:
Roy A. Klein, Secretary.

Fifth Biennial Report

OF THE

State Highway Commission

OF THE

State of Oregon

1921-1922

The work of the present biennium has, in a large measure, consisted of completing the contracts begun in the previous period, as well as closing up the gaps remaining on the main highways and also extending the improvement of the lateral and connecting highways. The end of the present year also marks the end of the sixth working season since the enactment of legislation providing for the present organization and program.

The state highway system consists of 4,450 miles, of which there has been improved by the Commission 695.1 miles of paving, of which 129.6 miles are of concrete type and 565.5 miles of bituminous type, 1,313.6 miles of gravel or crushed rock surfacing and 1,760.5 miles of grading. These figures do not include the forest roads, which are constructed under the supervision of the U. S. Bureau of Public Roads, who report a total of 99.8 miles of surfacing and 194.4 miles of grading. In addition, there are some counties who have graded or improved sections of state highways with their own forces or by direct contracts and of which this department does not have a record. To be added also are the state highways in Multnomah County and through incorporated cities of more than 2,000 population. Considering all these, the total figures for highway improvement in the entire state at this date are 838 miles paved, 1,197 miles graveled or macadam, and 475 miles graded earth road and 1,940 miles unimproved. It will be noted that the apparent discrepancy in figures is accounted for by the fact that graded roads have been graveled or paved and graveled roads paved.

The gross expenditures of the Commission, not including market roads, over the period have been $54,737,414.81, of which $6,747,047.94 is county funds, $4,546,530.65 government funds, $97,381.27 railroad funds and $43,346,454.95 state funds.

The work accomplished in the biennium by the Commission totals 276.3 miles of paving divided into 75.6 miles of concrete type and 200.7 miles of bituminous type, 831 miles of rock or gravel surfacing and 785.7 miles of grading. The forest road construction reported by the U. S. Bureau of Public Roads is 77.2 miles of surfacing and 71.1 miles of grading for the same period, which is in addition to the state figures.

The total amount of state funds expended in the biennium, excluding market roads, is $30,905,255.49; of which state funds total $22,799,650.57,

county $4,800,233.55, railroad $79,719.65, and government for post roads $3,225,651.72. Included in the above state funds there is $724,970.53 of state funds expended for forest roads to which should be added $67,142.21 of county cooperation and government forest funds of $836,765.18, making a total forest road expenditure of $1,628,877.92.

The outstanding features of the work accomplished are: The Pacific Highway, 345 miles in length, is paved or under contract for paving from the Columbia River to the California State Line with the exception of small gaps which have been left for future overcrossings of the railroad and the gap between Junction City and Harrisburg, which has been left a graveled road on account of overflow conditions in the Willamette River bottom. The completion of this highway gives Oregon the distinction of being the first state west of the Mississippi to have a paved highway the entire length of the state.

The West Side Pacific Highway is also paved or under contract for paving its entire length from Portland to Junction City except gaps for railroad overcrossings. The Columbia River Highway is paved from Portland to Astoria and beyond to Seaside on the west, and from Portland to The Dalles on the east. From The Dalles to Pendleton it is graded to standard and gravel surfaced, and when a single gap not over four miles in length on the summit of the Blue Mountains which is under contract is completed, the Old Oregon Trail will be completely graded and graveled between Pendleton and the Idaho state line at Ontario. The John Day Highway, with a few exceptions, is now graded and graveled from Arlington through Condon, Fossil and Spray to Prairie City and a beginning has been made toward opening the eastern end over the Blue Mountains with a $300,000 contract. The Dalles-California Highway has been further improved by construction work in every county through which it passes.

Rapid progress has been made on the northern and southern ends of the Roosevelt Coast Highway. In Curry County many bad sections have been eliminated and between Tillamook and Astoria all year travel is now possible. A start has also been made toward connecting Tillamook and Newport.

Important connecting highways between the Pacific Highway and the coast have been improved. The Corvallis-Newport Highway has been graded almost its entire length and many miles have been rocked. The Coos Bay-Roseburg Highway has been improved by grading and rocking and next year both of these roads will be opened for all year travel.

Connecting roads between the Pacific Highway and The Dalles-California Highway on which considerable improvement work has been done this biennium are the McKenzie, Crater Lake and Ashland-Klamath Falls Highways. The Oregon Caves have been opened up by the construction of the Oregon Caves Highway. The Mount Hood Loop is now all under contract from the Multnomah-Clackamas County line around the mountain to Hood River City for grading and rock surfacing except a ten-mile gap in the national forest which has not been placed under contract for surfacing.

The Oregon-Washington Highway is now completed except the section between Heppner and the head of Vinson Canyon. Also a noteworthy improvement which should be included is the La Grande-Joseph Highway now under contract or completed the entire distance from La Grande

to Joseph. An important road for Eastern Oregon is the Prineville-Mitchell Section, part of which is completed and the balance under contract. Also, good progress has been made on the Sherman Highway, the south end of the improvement now being at Grass Valley. These and many other improvements which are not mentioned will be found described in detail and shown in the progress maps in the State Highway Engineer's report which follows.

The personnel of the Commission has been changed but once and that was caused by the untimely death of Commissioner Kiddle, which occurred on December 28, 1920. Mr. Kiddle had the deep respect and confidence of his associates, and his removal by death was a distinct loss to the state. On January 8, 1921, Mr. W. B. Barratt of Heppner was appointed to fill the vacancy. On November 29, 1920, Commissioner Booth was elected chairman, succeeding Mr. Benson. Herbert Nunn has served as State Highway Engineer and Roy A. Klein as Secretary to the Commission and Assistant State Highway Engineer.

The Commission has held forty-seven meetings, occupying 100 days, for the transaction of its business during the biennium, as well as devoting a considerable amount of time to the study of local conditions and the members have frequently made individual investigation and inspection. Several inspection trips have been made by the Commission together, the longest of which was made in the summer of 1922, covering all sections of the state, traveling about 2,500 miles and occupying eighteen days.

The Commission has held its meetings in Portland and has been generously granted the free use of one of the courtrooms in the Multnomah County Courthouse by the Board of County Commissioners. This has proved a convenience to the many bidders and a central meeting point for the various county courts and county representatives, who have frequently conferred with the Commission on matters affecting their counties or localities.

A total of 2,125 bids has been received during the biennium and 296 contracts have been awarded. The competition has been keen throughout the period, but particularly so during the year 1921. Contractors from California, Washington, Idaho, Montana and Utah have been frequent bidders on the work which has been offered.

In the first year of the period, many of the changes which had been apparent in the latter part of the previous year became a reality. Wages dropped and labor became more plentiful and efficient. Food and clothing became cheaper, the cost of materials, supplies and equipment decreased and there were plenty of cars as well as material. Many jobs which had been carried over for one or two seasons were completed quickly, and many jobs let in that year were completed in the same season. In short, 1921 was the best year since the present program was inaugurated, a total expenditure of over eighteen million dollars being made, or over five million dollars more than in any other year.

In 1922, the previous surplus of labor became a shortage, particularly during the harvest season, and wages were generally higher. The railroad strike affected the car situation and there was a shortage of cars. The unprecedented building construction of the year, coupled with the shortage of cars, made a very severe cement shortage. The weather was good and the construction season long, but notwithstanding it has been necessary to carry many contracts over into the next season.

The funds at the disposal of the Commission were increased by the enactment of the seven-million-dollar bond fund by the 1921 session of the Legislature, five million of which have been sold. The new schedule of motor vehicle license fees, which first became effective in 1922, has also increased the resources of the Commission materially both on account of the increase in number of registrations and the new schedule rate. The proceeds from the additional 1-cent tax on gasoline, which became operative in 1921, have been in excess of the anticipated revenues. The new assessed valuation for 1923 reduces the constitutional 4 per cent bonded debt limit for highway purposes to $40,379,966.64, which, after deducting present bond sales, leaves $4,179,966.64 as the total amount of bonds which may be sold.

A total of $17,060,000 par value of bonds were sold during the period. All sales were made under sealed bids to the best bidder and very wide and active competition was secured. In all sales the leading financial houses of the country were represented and the prices received compare favorably with government securities in the same period. An average of eight bids was received for each block sold.

Sales were made as funds were needed, and in a rapidly changing bond market there is found considerable variation in the sales. In the serial bonds which mature one-twentieth each year after the fifth year the best bid was received on August 29, 1922, for $1,500,000 par value on a net interest rate of 4.286 per cent and the lowest bid was on a block of $1,500,000 sold June 28, 1921, which netted 5.71 per cent to the purchaser. Under authority given by the 1921 Legislature, a total of $3,000,000 par value were sold as short term bonds during the high interest rate period in 1921, which it is planned to refund at maturity. One million dollars of these bonds mature April 1, 1925, and $2,000,000 October 1 of the same year. A total of $36,200,000 highway bonds par value have been sold to date, and the average net interest rate on all sales including the short term bonds is 5.09 per cent. The first bonds to mature, in amount $125,000, became due and were paid in 1922.

STATE HIGHWAY BONDS AUTHORIZED AND SOLD

	Amounts Authorized	Sold to Date	Bonds Unsold Nov. 30, 1922
State Cooperative Bonds (Chapter 175, Laws 1917)	* $ 1,200,000.00	$ 1,200,000.00	$ .....
State Cooperative Bonds (Chapter 31, Laws 1920)..	† 6,179,966.64	4,000,000.00	2,179,966.64
Six Million Bonds (Chapter 423, Laws 1917)	6,000,000.00	6,000,000.00	.....
First Ten Million Bonds (Chapter 173, Laws 1919)	10,000,000.00	10,000,000.00	.....
Second Ten Million Bonds (Chapter 43, Laws 1920)..	10,000,000.00	10,000,000.00	.....
Seven Million Bonds (Chapter 383, Laws 1921)	7,000,000.00	5,000,000.00	2,000,000.00
	‡$40,379,966.64	$36,200,000.00	$ 4,179,966.64

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

† Authorizes bonds to match all Federal Aid offered excepting $1,200,000 previously sold. Total Federal Aid appropriated to 1925 is $12,400,271.76. On account constitutional debt limit, cooperative bonds are limited to $7,379,966.94.

‡ Equals constitutional debt limit of 4 per cent on assessed valuation for 1923, $1,009,499,160.38.

ON THE ROOSEVELT COAST HIGHWAY IN NORTHERN TILLAMOOK COUNTY AT A POINT WHERE THE HIGHWAY FOLLOWS CLOSELY THE SHORE LINE OF THE PACIFIC OCEAN

Federal aid for state highway construction has now become an important factor in the highway program of this state, as well as many others. The funds made available to the state reach into large figures and the state is fortunate thus far in having provided ample funds to match the government funds as required. The first appropriation was made July 11, 1916, and provided for a total of $75,000,000 divided over the years 1916, 1917, 1918, 1919 and 1920, with a provision also for $1,000,000 a year for the ten-year period beginning with 1916 for the improvement of roads within or partly within the national forests.

The second appropriation was made on February 28, 1919, and provided the sum of $50,000,000 for the fiscal year ending June 30, 1919, $75,000,000 for 1920 and $75,000,000 for 1921, and also provided $3,000,000 per year for the same years for forest roads. The third appropriation was made November 9, 1921, and provided $75,000,000 for the fiscal year 1922. The same act also provided a total of $15,000,000 for forest roads covering the fiscal years ending June 30, 1922, and June 30, 1923. This latter act provided also that 50 per cent or not over $3,000,000 per year of this appropriation be used on roads and trails or "forest development" roads as distinguished from "forest highways." This amounts to $5,500,000 for the period and is not available for use on the state highways.

The most recent act, passed June 19, 1922, authorized $50,000,000 for the fiscal year ending June 30, 1923, $65,000,000 for 1924, $75,000,000 for 1925 and also $6,500,000 for forest roads for each of the fiscal years 1924 and 1925. The appropriation for this bill was not made by the last Congress, but it is hoped that the new Congress will act promptly so that the federal aid program can be worked out early.

The total federal appropriations, including the above, amount to $540,000,000 for post roads and $47,000,000 for forest roads. Of this, Oregon's share is about 1½ per cent of the post road funds and 9.7 per cent of the forest road funds.

With the passage of the 1921 appropriation came the plan for a connected system of roads for the whole nation, which has become known as the 7 per cent system. The act requires the division of highways of this system into primary or interstate and secondary or intercounty highways, and limits the expenditure of all future federal aid apportionments to this system. The act prescribes that the primary highways shall not exceed three-sevenths of the total mileage which may receive federal aid and that the secondary highways shall connect or correlate with the primary system. It also indicates that the systems in adjoining states shall be correlated.

This Commission early submitted a tentative map outlining its ideas on this subject, and the whole matter has been the subject of several conferences with the local representatives of the U. S. Bureau of Public Roads. In November of 1922, after a further conference, the map as agreed upon was forwarded to the Secretary of Agriculture for his approval. This map is reproduced for this report.

The Federal Aid Post Road work accomplished since the beginning amounts to 423 miles grading, 346 miles rock or gravel surfacing and 104 miles of pavement, which have cost to date $10,842,979.33, divided into state payments of $5,245,384.78, county payments of $1,040,834.24, railroad payments of $10,229.66 and government payments of $4,546,530.65.

In the administration of the Forest Road Aid, an important change has been made in the biennium in that the new law provides that roads within or adjacent to the National Forests may be made cooperative forest projects. This has made it possible to secure cooperation on several roads adjacent to the National Forests which were formerly ineligible to receive Forest Aid but which are practically forest highways and whose improvement is of much importance to the Forest Service as well as the state.

In the administration of the Federal Act as it relates to the Forest Roads, the Secretary of Agriculture has required the State Highway Departments to submit a map of the roads within or adjacent to the National Forests of primary importance to the state or to the counties or communities, which in its judgment should be included in the Forest Highway System. Such a map is in course of preparation but has not yet been agreed upon in its entirety.

The total expenditure on the forest road projects to date is $1,534,-232.11 from state funds, $169,413.66 from county funds and $1,493,473.82 from government funds, making a total expenditure of $3,197,119.59. The total work completed is reported as 194.38 miles of grading, 99.76 miles of surfacing and 360.2 miles of location surveys.

FEDERAL FUNDS ALLOTTED TO OREGON FOR COOPERATIVE WORK

	For Post Roads	For Forest Roads	Totals
Act of July 11, 1916— Available July 1, 1916, to June 30, 1926	$1,181,416.49	$1,285,748.00	$ 2,467,164.49
Act of February 28, 1919— Available Feb. 28, 1919, to June 30, 1921	3,150,761.77	596,681.00	3,747,442.77
Act of November 9, 1921— Available Nov. 9, 1921, to June 30, 1923	1,182,663.90	1,157,109.00	2,339,772.90
Act of June 19, 1922— Available July 1, 1922, to June 30, 1925	2,995,891.60	850,000.00	3,845,891.60
Total funds appropriated	$8,510,733.76	$3,889,538.00	$12,400,271.76
Not available until 1925	.....	127,794.00	127,794.00
Balances available to Nov. 30, 1924	8,510,733.76	3,761,744.00	12,272,477.76
Less expenditures and obligations to complete present contracts and agreements	6,282,084.00	2,596,518.95	8,878,602.95
Balance available during biennium for new projects	$2,228,649.76	$1,165,225.05	$ 3,393,874.81

The Legislature authorized the Commission to make advances or loans to the counties on cooperative projects, taking their bonds as security, which has been done in a number of instances. This procedure made possible the beginning of many projects much earlier and thus advanced the completion dates of many gaps in the main highways which otherwise might not now have been completed. The counties which deposited bonds and the amounts are as follows:

Douglas	$ 44,000.00
Yamhill	290,000.00
Morrow	40,000.00
Clackamas	91,000.00
Jackson	320,000.00
Malheur	80,000.00
Baker	27,500.00
City of Rainier	6,697.37

In the latter part of 1921 when interest rates declined and par could be secured for the bonds, all of the counties sold their issues and from the proceeds paid their obligations to the state except that Douglas and

Clackamas Counties and the City of Rainier requested the state to sell their bonds, which was done under sealed bids on July 25, 1922. The Clackamas County $91,000 5 per cent bonds were sold to the Citizens Bank of Portland for 100.25, or a premium of $227.50. The successful bidders for the $44,000 Douglas County 4½ per cent bonds were E. H. Rollins & Sons at 97.85 or a total bid of $43,054 for the block of $44,000. The City of Rainier 6 per cent improvement bonds in the sum of $6,697.37 par value were sold to Blyth, Witter & Co. at 98, or $6,563.41.

The routing of state highways through cities and towns has been given considerable thought and study by the Commission. In every instance it has been the purpose of the Commission to use the most direct route, eliminating right-angle turns wherever possible and avoiding the congested business districts and the hazard of street car traffic.

In the location of the Pacific Highway through the city of Jefferson a new route was adopted which eliminated five right-angle turns but which did not pass through the main business street of the city. The location was contested and the city and county both refused to condemn the necessary right of way for the new location. After considerable delay the Commission by negotiation secured the necessary right of way and the work proceeded. The advantage of the direct location is apparent now that the work is completed.

The routing of the Pacific Highway at the south city limits of Oregon City is as yet unsettled, although negotiations have been under way for over a year. The present route along the river or basin is very unsatisfactory, being narrow and involving a grade crossing of the railroad and congestion between the mill properties and the street car tracks. A location was made providing for a crossing under the railroad on Fifth Street at Oregon City and a new grade on the east side of the railroad but parallel to it south to Canemah. A plan was worked out whereby the industries affected and the two railroads, in consideration of certain franchise rights and street vacations to be granted on the abandonment of the "basin" route, raised a fund sufficient to grade and pave the roadway to the south city limits as well as construct the undercrossing. It was agreed that the state would build from the south city limits to the connection with the Pacific Highway. Between Fifth Street and Seventh Street there has been disagreement as to the routing, the Commission holding for a new street paralleling the railroad between these points and with one right angle turn into Seventh Street and thence crossing the river to avoid the congestion on Main Street. The city authorities, however, contend for a route on Fifth to Main, and north on Main to Seventh. The matter is in disagreement at the present time.

Pursuant to authority given by the 1921 session of the Legislature, the Commission has improved highways through cities of less than 2,000 inhabitants by cooperation with the cities, the amount of cooperation being dependent on the population as given by the last federal census. In cities of 200 or less the percentage was fixed at 5 per cent; 201 to 400, 10 per cent; 401 to 600, 15 per cent; increasing in this ratio to a maximum of 50 per cent for cities of from 1,801 to 2,000. The counties have in some instances paid the city share or guaranteed the payment. This arrangement has worked out satisfactorily and by this method continuous pavement or other improvement has been carried direct through the cities. Several of the larger cities have paved the parts of the state high-

way route in their outlying districts, which is commendable, thus making attractive entrances into their cities. In others there is still much to be done.

State highway work in Polk County has been more or less interrupted on account of litigation instituted by citizens of the county, who have opposed the location of the West Side Highway. In an endeavor to resume construction operations which had been closed down the preceding year, the Commission entered into a written agreement with the County Court on the fourteenth day of May, 1921, whereby the county agreed to place approximately $40,000 from their market road fund in the hands of the Commission for the grading of the Monmouth South Section, also to make available to the Commission the $40,000 bond fund voted on the West Side Highway as well as to take up the balance of the cost of grading the other sections of the West Side Highway and the necessary bridges from tax funds.

Pursuant to this agreement contracts were awarded for the grading of the remaining sections and in addition a new contract was awarded for the paving of the uncompleted portion of the Salem-Dallas Highway between Brunk's Corner and Dallas. New litigation was then instituted to prevent the county from carrying out its part of the agreement, in which the contestants were successful. They also secured a court decision which prohibited the expenditure of market road funds on state highways. The next step on the part of the litigants was an attempt to invalidate the bonds voted for the West Side Highway in which they were not successful in the Circuit Court. In each of these cases the location was challenged but the court upheld the Commission's location in each instance.

In the meantime bids had been taken for the paving of the Monmouth South and Rickreall-Holmes Gap Section on May 10, 1922, but due to continuing litigation and controversy the Commission hesitated to award the contracts but held them pending. However, after considering the necessity and urgency of completing these remaining gaps in fairness to the adjoining counties who had cooperated generously in completing their highways, and the state as a whole, the Commission on November 24 made a definite award of these contracts, which are due to be completed during the 1923 working season.

Acting on the authority given by the 1921 Legislature, the Commission reports that some progress has been made in the matter of acquisition of parks and camping sites as well as the saving of trees along the roadside and the planting of young trees and shrubs. The response of many civic organizations to the latter feature is encouraging and it is expected and hoped that this local assistance will continue as the results accomplished become more noticeable.

It has been the thought of the Commission that in very many instances public-spirited citizens would be glad to donate park sites and thus conserve the state funds for improvements, and this expectation has been realized to a limited extent, several such gifts having been received which are gratefully acknowledged and which have been accepted for the state.

A gift of approximately 5½ acres on the West Side Highway in Polk County was received from Sarah, James and Amanda Helmick. Twenty acres at Clatsop Crest have been deeded to Clatsop County for a public

park by the Bradley heirs. A strip of land between the Pacific Highway and the Umpqua River south of Dillard, containing approximately 6.8 acres, has been donated to the state by J. H. and Catherine Booth of Roseburg.

The Commission has acquired by condemnation certain parcels of land on the Columbia River Highway loops just east of Hood River in order to prevent the erection of buildings which would cut off the sight distance around the curves. Another purpose was to protect the roadbed from being undermined by the removal of gravel on the adjoining property. Ten acres on the Salem-Dallas Highway near Eola have been acquired from Thomas Holman for $1,000 for a camping place, but no improvement work has been done. In order to improve the sight distance on a sharp curve near Rainier, two acres have been purchased from Dr. Ditto for $600, a dilapidated barn removed and the property otherwise improved.

There are many other spots along our highways which should be secured and preserved for future generations before the timber and shrubbery have been removed or destroyed or other physical features marred. Several donations of desirable property have been promised and are now in process of negotiation.

In Deschutes County, by means of close cooperation between the Deschutes County Court, the Brooks-Scanlon Lumber Company, the Forest Service and the Commission, arrangements were made to preserve the standing pine on a section of The Dalles-California Highway south of Bend. This was done under authority of the Deschutes Forest Exchange Bill recently passed by Congress under which the timber company was permitted to exchange their holdings for other areas in the national forest.

Drinking fountains have been erected, some of which are ornamental, at a few places where pure water could be obtained. It is the intention of the Commission to construct more of these fountains from time to time.

The Commission has continued its policy of removing all advertising signs illegally placed within the right of way limits and, by cooperation with property owners and some advertisers themselves, many objectionable signs have been removed. These advertising signs, besides being a blot on the landscape, constitute a hazard by diverting the attention of drivers when they should be watching the road.

The work of signing the state highways has been continued with the result that on the highways where construction operations are well advanced standard direction and distance signs have been placed throughout, and on others temporary wooden direction signs have been placed. Warning signs have been placed on many curves and, at dangerous points, red reflector danger signals have been installed which have received favorable comment. Warning signs have also been placed in the vicinity of school houses and at dangerous intersections.

Standard bituminous pavement construction consists of gravel or crushed rock subbase of not less than six inches thickness compacted, three-inch bituminous base and a two-inch bitulithic wearing surface. Standard cement concrete construction is seven inches thick over sand or gravel cushion not less than three inches thick on clay or adobe soils. Steel reinforcing has been used in locations where foundation conditions are unstable. The standard pavement section is sixteen feet wide with superelevation and extra width on curves. Two-foot gravel shoulders have been constructed on all pavements.

Some eighteen-foot pavement has been constructed, a section of the Pacific Highway from the Multnomah County line to West Linn being eighteen feet in width, seven inches thick, with light steel reinforcement. On a section of the Pacific Highway over Sexton Mountain in Josephine County, consisting mostly of 5 per cent grade, a combination type has been used which is finding favor, but which has not yet had sufficient use to determine its value. This consists of a strip of seven-inch concrete thirty inches wide laid on each side, serving as a header or flush curb with thirteen feet of five-inch bituminous pavement between. The outside concrete strip affords better traction under unfavorable weather conditions. Eighteen-foot pavement has also been laid between Astoria and Seaside in Clatsop County, and between Canyonville and Galesville in Douglas County.

Concrete pavement has been successfully laid in two strips on the Canyonville-Galesville Section of the Pacific Highway in Douglas County through the canyon where no detours are available. This method is expensive and slow but is unavoidable and necessary where detours can not be provided.

There have been three resurfacing projects undertaken during the period. The resurfacing of five miles of two-inch bituminous pavement laid in 1918 in Tillamook County was done by the addition of a binder course and a new top course which brings it up to the present standard bituminous type thickness. The resurfacing of the section of the West Side Highway between Multnomah County Line and Newberg is now under contract. This was originally a two-inch bituminous pavement sixteen feet wide laid on crushed rock base, which proved inadequate for the heavy traffic, being insufficient in thickness and width. The pavement was thickened to five inches by the addition of a binder course and a new two-inch wearing surface, except that on 3.6 miles where the grades were in excess of 5 per cent, in order to provide safety by better traction, seven-inch concrete was laid. The pavement width on the entire section was increased to eighteen feet.

The Rice Hill Section of the Pacific Highway south of Yoncalla 2.8 miles in length originally constructed as two-inch bituminous pavement has also been resurfaced, thus increasing the thickness to the same standard as the adjoining sections. The paving material was hauled from a paving plant on the Yoncalla project and a very low price was secured.

The heavy use of the roads has demonstrated that two-inch bituminous pavement is not adequate and many of the early pavements were strengthened by thickening to five inches during the course of construction. Six-inch concrete has also been found insufficient and seven-inch concrete is now standard.

Proper maintenance is a very important matter and close attention is necessary to this detail. Maintenance begins as a section is completed, keeping the ditches and culverts open for proper drainage, removing small slides which are inevitable, reshaping shoulders on pavement, continuous dragging of crushed rock or gravel surfaced and earth roads, reshaping shoulders, adding more rock to shoulders for pavement, patching bituminous pavements, filling cracks in concrete pavement, repairing broken guard rails, tightening bolts and truss rods on bridges, clearing bridge openings, etc., etc.

A new feature of maintenance work which has been lately undertaken is keeping the roads open in the winter. In order to do this, eleven snow

plows have been purchased and distributed to the various sections of the state ready for an emergency. These snow plows are designed to be used with tractors. Blade grading machines are also frequently used with trucks to remove light falls of snow. The Siskiyou Mountain section of the Pacific Highway has been kept open for two successive seasons now and it is confidently expected that with a reasonable effort other heavily traveled sections of the state highways may be kept open also. In order to decrease the maintenance expense of snow removal a few sections of snow fences are under construction on the Old Oregon Trail in Union County.

The Hillsboro-Multnomah County Line Section of six-inch concrete pavement, some panels of which have been cracked by heavy traffic, has been patched with concrete during the past year, and while there has been some inconvenience to travel the results are very satisfactory and better than bituminous patches. The entire cost of this work was $21,000 and covers 11.28 miles.

The oiling of slopes and certain areas adjacent to the Columbia River Highway between The Dalles and Pendleton to keep down drifting blow sand has been continued in a limited way and good results have been accomplished.

Through an understanding with the 1921 Legislature, represented by its Joint Committee on Roads and Highways, it was agreed that the state should undertake the maintenance on all finished sections of the state highways until the next regular session of the Legislature, to which it should report its expenditures. In harmony with that understanding, the Commission has assumed the entire maintenance costs without assistance from the counties since April 1, 1921, and has expended in the two-year period the sum of $1,052,268.31 for maintenance and $120,729.36 for betterment.

This is the third year of the operation of the Market Road Law. In that time a total of approximately $6,000,000 has been expended on market roads, considering both state and county shares. For this expenditure approximately 590 miles have been graded, 462 miles have been surfaced with crushed rock or gravel and 48 miles have been paved.

The Market Road Act provides large sums of money and the Commission feels that the law should be amended to more definitely fix the responsibility for its expenditure. The law as it now is permits divided responsibility; the construction is in the hands of the County Court but the plans and specifications must be approved by the State Highway Commission. The latter's authority does not extend to supervision of construction and consequently the plans may not be followed. The designation of the roads to be improved is rightfully in the hands of the County Court, but some counties have many market roads under construction at one time, thus spreading the fund over many projects like general tax money. They should be required to designate and construct these roads to connect the market centers with the producing districts in an orderly way so that the improvement would be a definite, substantial thing and thus avoid a series of disconnected sections.

As the law now stands, payment of the state share is made on a showing that the levy to match state funds has been made and after the plans and specifications have been approved by the engineer, but the matter of actual county expenditures in matching the state funds is an uncertain factor which is difficult to check.

In a test case in Lane County which was carried to the Supreme Court it was decided that, under the law as it now is, Market Road funds could not be expended on state highways. Many counties were cooperating with the state with these funds on state highways and the prohibition against its use for that purpose makes a difficult situation in some counties.

Fixing of the responsibility for the expenditure of Market Road funds as outlined above and their use on state highways for cooperative purposes either with the state or federal government is especially called to the attention of the Legislature for its careful consideration.

By action of the 1921 Legislature, Regular Session, the revolving or emergency fund was increased from $30,000 to $75,000 which has been very helpful in handling the large payroll accounts which the volume of work demanded and has made possible the securing of trade discounts for prompt payment of invoices. In the biennium a total of 31,377 checks and $2,527,016.22 passed through this fund.

The former policy of making partial payments on materials delivered on contracts such as culvert pipe, asphalt, cement, crushed rock, gravel, sand, steel, lumber, etc., has been followed and has resulted in lower bids, and also has encouraged shipping materials in the winter season when railroad cars are more plentiful and thus insured earlier completion.

As a consequence of the 1921 Legislature reducing the amount of retained percentage required by law, the Commission adopted a policy of withholding 15 per cent only until the progress payments had reached the sum of one-half of the contract price, which then remained constant until completion, making 7½ per cent retained when the contract price was reached. This is done on the theory that as the contract nears completion less security is needed. It is also the policy to reduce the retained percentage to 3 per cent after the work has been completed pending a final check. This has reduced the amount of capital required by the contractors and has no doubt been reflected in the bids.

A considerable saving has been made in the cost of cement for paving by reason of purchasing direct in large quantities and furnishing to the contractors direct at an agreed price in the contract. This saving has been further increased by the 20 per cent decrease in the freight rate on cement which became effective June 26, 1922, by order of the Public Service Commission following the petition of the State Highway Commission and others who were interested. The general decrease in freight rates also effected a saving to the Commission on such asphalt as the Commission had purchased direct and was shipped subsequent to July 1, 1922.

On the basis of the showing made by the Commission, a 20 per cent reduction in freight rates on crushed rock, gravel and sand was secured, effective on September 10, 1921, which has further reduced costs on jobs where it was necessary to ship in materials.

A further saving in construction costs would follow if the present royalty on sand and gravel taken from the beds of navigable streams and used for road building purposes by the state was waived by the State Land Board.

In order to acquaint tourists from other states and the people of our own state with road conditions, weekly road bulletins giving the condition of all state highways have been issued and distributed to the press, tourist bureaus, chambers of commerce and other agencies in order to secure the fullest publicity.

The distribution of surplus war materials allotted by the Government to the states for road building purposes, begun in 1919, has been continued,

and this state has received its proportionate share. The cost of these supplies and equipment has been the freight charges only from the storage point to the department shops at Salem. The major portion of equipment allotted was trucks, some of which came from Camp Lewis, Washington, so the freight charges were relatively small. Most of the trucks had been in open storage with consequent deterioration so that even though very little used some reconditioning and remodeling, as well as equipping with hoists and new bodies, is necessary before they can be used for road building work. Trucks to the number of 185 have been received during the biennium, of which 123 have been leased to the counties at cost plus a small percentage for handling. The total number of trucks now on hand, considering previous allotments and distribution, is 260. These have been largely used in maintenance work, for sprinkling tanks on macadam projects and for hauling materials on some of the large jobs where the hauling has been done by the department and for general utility purposes.

The Government allotment has also included 20 five-ton tractors, which are well suited for a variety of purposes in road construction and maintenance. Other supplies and equipment allotted consists of truck parts, small tools, pumping units, concrete mixers, etc.

It has been the policy of the Commission to convert the Government equipment into road value as soon as possible and, for that reason, equipment has been rented to contractors as well as counties and the proceeds turned into the state highway fund. Also the hauling on several macadam contracts has been done with state trucks, which have made a very satisfactory showing as to costs.

In some instances where either no bids have been received or the low bids seemed excessive, the work has been done by day labor with state forces, but these projects make a very small percentage of the whole.

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. The total expenditure for bridge construction maintenance and betterment work during the biennium is $2,659,965.79. A total of 540 bridges have been placed under construction since 1917, of which 318 have been put under construction in the last two years.

The most important bridges which have been constructed by the department are the Young's Bay Bridge near Astoria, completed in 1921, the bridge across the South Umpqua River at Myrtle Creek, the Coquille River Bridge at Coquille, and the Willamette River Bridge at Oregon City, which has just been completed. Also there is under construction at the present time a new reinforced concrete structure across the North Umpqua River at Winchester.

Traffic counts have been taken systematically on different days in the week in different months at important points on the state highways to determine actual traffic using the highways, divided into horse-drawn vehicles, motorcycles, automobiles, light and heavy trucks, etc. A further division was made between Oregon automobiles and those from other states. Valuable statistical data is secured, which is given in detail in the Engineer's report.

Telephone, telegraph and power lines on the state highways is a matter which has come under the jurisdiction of this Commission and to which it has given considerable study. The Commission realizes that these utili-

ties must have space upon the public highways and in granting permits the Commission has insisted that the lines be well built, avoid frequent crossing and recrossing of the highways and located as closely as possible to the right of way fences and outside of the ditches. Also poles must be placed so as not to obstruct sight distance on curves. Where there is more than one utility seeking privileges on the highway, common user poles and lines are required if possible to avoid multiplicity of poles, but in the case of power lines and telephone lines on the same highway, it is necessary, in order to avoid interference, that they be allotted opposite sides of the road.

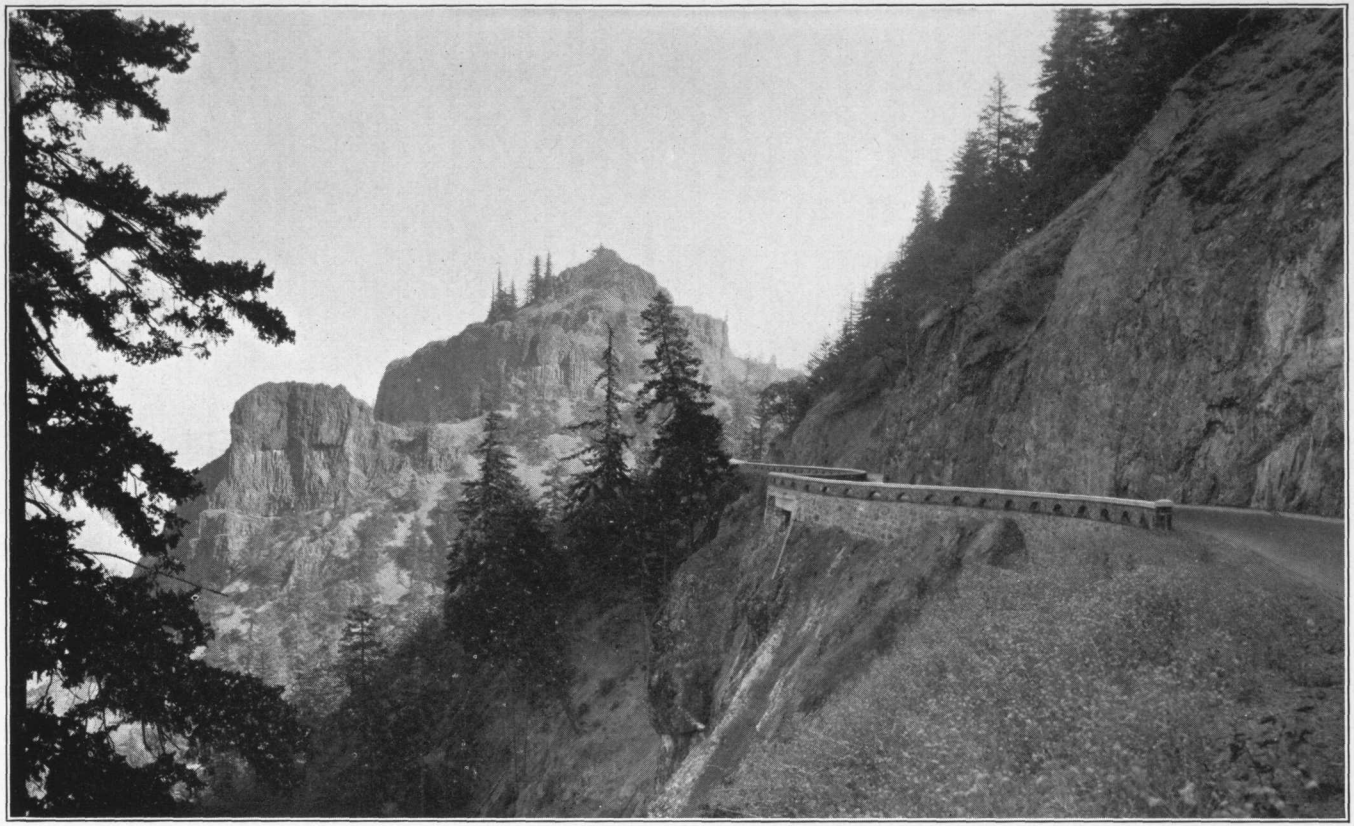
The authority and jurisdiction of the Highway Commission as to pole lines on state highways was defined by the Federal Court in a case brought by the Postal Telegraph Company denying the right of the Commission to stop the construction of their telegraph line between Astoria and Goble. The judge's decision favored the Commission and the Telegraph Company was required to follow the instructions of the Commission as to location of poles and standards of construction.

The matter of water pipe lines, gas pipe lines, sewers and drainage alongside of or under pavement or improved roads is also governed by permit and the work done under the supervision of an engineer of the department, so the rights of the public may be amply protected.

The 1921 Special Session of the Legislature enacted certain measures designed to increase the authority of the Commission in the matter of protection of the highways which have worked out satisfactorily. The moving of logs or piling on the highways without permit was made illegal because of the abuses which had developed. Fifty-two such permits have been issued in the present year. The Commission was given authority to reduce the legal load limit or close certain highways if circumstances made it desirable and this has been done in a few instances for the protection of the roadway.

The Highway Commission was also authorized to enforce the laws applicable to highways by the appointment of regular traffic officers or by deputizing regular employes. Six such traffic officers have been appointed who give their entire time to this work. These men work under the direction of the Chief Inspector of the Motor Vehicle Division of the Secretary of State's office. This arrangement assures that the work done by the two departments will harmonize and there will be no duplication of effort. The Commission has also deputized seventeen of its regular employes, who are working in various parts of the state, to enforce traffic regulation, without additional compensation. The Commission believes that it is of the utmost importance that an adequate force at all times patrol the roads for the purpose of enforcing the laws. It would appear reasonable that the fines imposed for violations of the law should be added to the State Highway Fund if the cost of such patrol is taken from it.

The policy of eliminating railroad grade crossings on the state highways has been consistently followed. No new highways have been located so as to require grade crossings of main line railroad systems. Thirty-three grade crossings have been eliminated by structures; in eleven locations the highway has crossed under the tracks and in twenty-two crossed over. Approximately fifty grade crossings have been eliminated by relocation: that is, avoid crossing the tracks and then crossing back again by construction of a section of new road. In some instances, several grade crossings have been eliminated by a general revision in plan such as build-



ON THE SECTION OF THE COLUMBIA RIVER HIGHWAY BETWEEN HOOD RIVER AND MOSIER

ing on the opposite side of a river. Applications for hearings before the Public Service Commission for three more grade eliminations are now in course of preparation and on four others the Highway Commission has asked for rehearings and a modified distribution of costs. The costs of grade separation are divided between the railroad, county and state, depending on the local conditions. A common division has frequently been: railroad, 40 per cent; county, 30 per cent; state, 30 per cent.

Since the last biennial report was made, Warren Brothers' Company instituted and prosecuted a suit against Oskar Huber for the purpose of establishing the company's alleged claim to royalty for the use and privilege of laying bitulithic pavement in the state of Oregon. This suit was diligently contested and a great volume of evidence not previously offered in any of the former suits prosecuted by Warren Brothers' Company was submitted by the defense. The decision of the Federal Court, however, sustained the patent, permitting the plaintiff to collect royalty on the basis of 25 cents per square yard. The total yardage involved in the Huber case was 74,542 square yards.

Under the act of the Legislature, this matter is in the hands of Attorney General, who advises that he is perfecting an appeal to the United States Circuit Court of Appeals. The total amount of pavement laid prior to the expiration of the patent on May 5, 1920, was 1,221,702.7 square yards, including the pavement laid by Huber.

It is the contention of the Attorney General that the decision in the Huber case does not affect the other contractors who may have laid bitulithic pavements during the same period, but that in order to reach other contractors subsequent cases will have to be filed against all whom it is intended to charge with liability.

A claim has been made by the Strauss Bascule Bridge Company for alleged infringement of their patent in the construction of the lift spans on the Young's Bay Bridge near Astoria. If litigation follows, it will be handled by the Attorney General.

Brief mention is made of the projects on which contractors have become bankrupt and given up their contracts. The Marshfield-Coquille paving contract was completed with state forces early in the spring of 1921, the surety on the bond paying the additional cost over the contract prices. The contract for the grading of the Remote-Camas Valley Section, which was taken over by the state at the request of the contractor, was reinstated in 1921 and finished by the contractor without extra cost to the state. The Pacific Foundation Company having failed, it was necessary to readvertise for the erection of the steel on the Nestucca River Bridge in Tillamook County. On another contract held by the same company for a bridge between Athena and Milton, the work was completed by the surety company. Geo. W. Breeding abandoned a bridge construction contract for a structure over the Long Tom near Goldson in Lane County, which was sublet by the surety company to another contractor. E. A. Palmer, who had the contract for rock surfacing the Sandy-Cherryville Section of the Mt. Hood Loop Highway, gave up his contract and the claims against the job have been paid by the surety. The project will be readvertised at an early date. The number of failures is a small percentage of the total contracts awarded during the biennium.

The diversion of the one-quarter mill tax to the Boys' Training School Building Fund has occasioned the loss of over one-half million dollars to the state highway fund. As the law now stands, the amount produced by

this tax will be a regular addition to the road fund hereafter. It has been the intention of the Commission to use this fund from now on for the retirement of the state highway bonds and the Commission recommends that it be used hereafter for that purpose.

The Commission believes that its policy of closing up the unimproved or uncompleted gaps on the main highways should be followed and that on the other highways as yet constructed only in part that the improvement should be extended out from the important cities or producing centers on a consecutive program until the whole shall be completed, and until this is accomplished no new roads should be added to the State Highway map.

From the report of the Engineer, which follows, it will be noted that the work on the entire state highway system is well advanced and many sections entirely completed. The road construction should continue until the benefits from the expenditures have been equalized and every section has received its due proportion. Anything less is unfair and should not be considered.

Federal aid for highways is now a well-established governmental policy which must certainly be continued. From this source it is reasonable to expect that the state will receive from seven and one-half to ten million dollars in the next five years. If this amount is matched directly with state funds or cooperation given by the counties, which is permissible under the amended law, the entire system covered by the present state highway map—or at least every important section of it—will be open to travel and most or all of it put in usable condition for continuous travel.

Highway betterment will be a constant and ever increasing demand and the importance of maintenance can not be overestimated. Furthermore, maintenance is a requirement of the Federal act and an essential to Federal cooperation. Ample provision should therefore be made for keeping the roads properly maintained.

By reports and in various ways in the past, the Commission has called attention to the necessity of speed and load limitation for the protection of the roads and for rules of safety for the protection of human life. It is gratifying that on these matters the public is becoming thoroughly aroused, but vigilance must be constant or we will lose all and more than we have gained.

At best, highway building for modern use is still in an experimental stage. The errors incidental to pioneering or for lack of precedent or any other reason should not be considered sufficient justification for discontinuing the great enterprise of highway improvement demanded and forced by modern industrial and social conditions.

Your Commission regrets that its accomplishments have not been more or its efficiency greater. Grateful, however, for the confidence given it by a patient people, it submits this report of its work for their considerate judgment.

FINANCIAL STATEMENT

RECEIPTS AND DISBURSEMENTS—STATE HIGHWAY FUND

DECEMBER 1, 1920, to NOVEMBER 30, 1922

RECEIPTS

Balance on hand December 1, 1920		*$1,822,589.86	
Sale of Bonds, 1921 (Includes Premium and Accrued Interest)	$10,957,359.33		
Sale of Bonds, 1922 (Includes Premium and Accrued Interest)	6,265,544.02		
		17,222,903.35	
Motor Vehicle License Fees, 1921, State share	$ 1,624,983.02		
Motor Vehicle License Fees, 1922, State share	2,358,987.02		
		3,983,970.04	
Gasoline and Distillate Tax, 1921	$ 948,509.66		
Gasoline and Distillate Tax, 1922	† 944,310.46		
		1,892,820.12	
Federal Aid Post Road Payments, 1921	$ 2,181,956.65		
Federal Aid Post Road Payments, 1922	1,043,695.07		
		3,225,651.72	
County Cooperative Payments, 1921, cash	$ 602,038.25		
County Cooperative Payments, 1922, cash	2,455,181.33		
County Cooperative Payments (Unpaid warrants)	120,192.16		
		3,177,411.74	
Railroad Cooperation, 1921	$ 45,955.26		
Railroad Cooperation, 1922	33,222.62		
		79,177.88	
Interest on Bank Balance, warrants, etc., 1921	$ 19,284.39		
Interest on Bank Balance, warrants, etc., 1922	40,124.95		
		59,409.34	
Market Road Tax, 1921	‡$1,009,685.51		
Market Road Tax, 1922	‖ 772,719.27		
		1,782,404.78	
Sales and Rentals of Equipment and Supplies, cash, 1921	$ 212,608.55		
Sales and Rentals of Equipment and Supplies, cash, 1922	146,257.72		
Sales and Rentals of Equipment and Supplies, (Unpaid County Warrants)	18,177.36		
		377,043.63	
Revolving Fund, 1921		45,000.00	
Total Receipts			$33,668,382.46

DISBURSEMENTS

State construction (state funds only)	$15,322,640.14	
Post Road construction (state funds only)	2,201,482.18	
Forest Road construction (state funds only)	724,970.53	
Interest and maturities on bonds	2,633,633.37	
Administration and general supervision	405,511.35	
Surveys	242,767.87	
Engineering on County Construction	35,088.49	
State Expenditures on Market Roads	74,136.96	
Market Road appropriation to Counties	1,494,617.97	
Equipment and Stock (Gross Disbursement)	761,421.51	
Equipment and Stock (Credits from Rentals and Sales)	864,375.97 Cr.	
Maintenance	1,052,268.31	
Betterment	120,729.26	
To establish Revolving Fund	45,000.00	
Road Signing	36,441.90	
Policing Highways	14,791.16	
Miscellaneous General Expense	38,143.51	
Federal Government Funds disbursed through Highway Fund	3,225,651.72	
County Funds disbursed through Highway Fund	3,177,411.74	
Railroad Company Funds disbursed through Highway Fund	79,177.88	
Receipts from Equipment and Supplies disbursed through Highway Fund	377,043.63	
Total expenditures		§$31,198,553.51
Balance on hand December 1, 1922		$ 2,469,828.95

* Includes 1919 Revolving Fund $80,000.00.

† Does not include $182,837.27 turned over after November 30, 1922, which properly belongs in 1922 accounts.

‡ $31,153.54 of 1921 appropriation received after November 30, 1921, and was included in 1922 accounts. Appropriation for 1921 was $1,040,839.05.

‖ $279,238.47 of 1922 appropriation received after November 30, 1922. Total appropriation for 1922 was $1,020,804.20.

§ Disbursements for 1921, $18,645,334.69, and for 1922, $12,553,218.82.

FINANCIAL STATEMENT—Continued

RECONCILIATION OF DISBURSEMENTS THROUGH THE STATE HIGHWAY FUNDS WITH NET EXPENDITURES ON STATE HIGHWAY WORK

Total disbursements through State Highway Fund			$31,198,553.51
Deduct for Market Road payments to Counties	$1,494,617.97		
Deduct for Revolving Fund	45,000.00		
Deduct for credits for equipment sales	377,043.63		
Total deductions		$1,916,661.60	
Add County payments made direct	$1,622,821.81		
Add Railroad payments made direct	541.77		
Total additions		1,623,363.58	
Difference			$ 293,298.02
Total net expenditures			$30,905,255.49

CERTIFICATES OF AUDIT

W. R. MACKENZIE & SON
CERTIFIED PUBLIC ACCOUNTANTS
Portland, Oregon

May 21, 1921.

Oregon State Highway Commission, Salem, Oregon.

We have audited the receipts and disbursements of the Oregon State Highway Commission for the period from 30th November, 1918, to 10th November, 1920, and

We hereby certify that the published report made 10th November, 1920, by the Oregon State Highway Commission is a true statement of the receipts and disbursements for the period as shown by the records and our reconciliation herewith, and that all income due the Highway Commission, as shown by the records of the Secretary of State, have been received and all disbursements by this Commission have been properly authorized.

(Signed) W. R. MACKENZIE & SON,
Certified Public Accountants.

W. R. MACKENZIE & SON
CERTIFIED PUBLIC ACCOUNTANTS
Portland, Oregon

March 23, 1922.

Oregon State Highway Commission, Salem, Oregon.

We have audited the receipts and disbursements of the Oregon State Highway Commission, including the Engineer's payroll for the period of 10 November, 1920, to 30 November, 1921; and

We hereby certify that all disbursements by the Commission were properly authorized and that the following statement of receipts and disbursements is in accord with the records of the Oregon State Highway Commission and our reconciliation, herewith; that it is in agreement with the records of the Secretary of State as herein reconciled and is, in our opinion, a true and accurate statement.

(Signed) W. R. MACKENZIE & SON,
Certified Public Accountants.

STATEMENT OF RECEIPTS AND DISBURSEMENTS BY MONTHS, STATE HIGHWAY FUND

December 1, 1920, to November 30, 1922

	Receipts	Disbursements
Balance December 1, 1920	*$1,822,589.86	
December, 1920	438,062.71	$ 1,970,844.66
January, 1921	605,046.42	881,012.49
February, 1921	1,039,651.80	681,249.74
March, 1921	673,320.81	1,020,093.18
April, 1921	1,101,612.10	817,252.47
May, 1921	2,133,166.36	919,181.86
June, 1921	1,204,737.17	1,464,803.05
July, 1921	223,635.33	2,086,857.27
August, 1921	3,811,046.86	2,408,389.98
September, 1921	1,935,107.29	2,807,948.98
October, 1921	2,101,830.41	1,670,240.61
November, 1921	2,335,163.36	1,917,460.40
December, 1921	780,335.93	1,331,938.09
January, 1922	1,138,126.97	1,456,741.54
February, 1922	1,196,669.62	1,273,868.05
March, 1922	1,447,280.82	392,111.23
April, 1922	2,114,502.28	284,548.29
May, 1922	725,347.10	458,168.53
June, 1922	286,388.18	1,065,992.36
July, 1922	371,672.13	988,026.44
August, 1922	1,386,259.40	1,432,464.24
September, 1922	1,476,825.70	1,868,965.34
October, 1922	1,623,955.83	1,298,868.31
November, 1922	1,512,678.50	701,526.40
Grand totals	$33,485,012.94	$31,198,553.51
Less expenditures	31,198,553.51	
Cash balance on hand, Nov. 30, 1922	*$ 2,286,459.43	
Revolving Fund, 1921	$ 45,000.00	
County warrants (Cooperative) unpaid	120,192.16	
County warrants (Miscellaneous) unpaid	18,177.36	
	183,369.52	
Total balance on hand, Nov. 30, 1922	†$ 2,469,828.95	

* Includes $30,000.00 in Revolving Fund.
† Includes $75,000.00 Revolving Fund.

RECEIPTS BY SECRETARY OF STATE FROM MOTOR VEHICLE AND MOTOR VEHICLE OPERATOR LICENSE FEES

For the Period from September 16, 1920, to September 15, 1922

COUNTY	Net Receipts Sept. 16, 1920, to Sept. 15, 1921	Net Receipts Sept. 16, 1921, to Sept. 15, 1922	Total Net Receipts Sept. 16, 1920, to Sept. 15, 1922	25 % Turned Over to Counties	75% Turned Over to State Highway Fund
Baker	$ 33,820.78	$ 48,115.77	$ 81,936.55	$ 20,484.14	$ 61,452.41
Benton	40,568.21	58,935.28	99,503.49	24,875.88	74,627.61
Clackamas	93,499.48	135,810.95	229,310.43	57,327.62	171,982.81
Clatsop	50,690.06	72,917.49	123,607.55	30,901.88	92,705.67
Columbia	25,400.71	37,981.03	63,381.74	15,845.43	47,536.31
Coos	40,794.73	63,423.79	104,218.52	25,804.63	78,413.89
Crook	9,653.11	11,941.19	21,594.30	5,398.57	16,195.73
Curry	5,778.21	8,933.54	14,711.75	3,677.93	11,033.82
Deschutes	30,190.66	42,779.36	72,970.02	18,242.51	54,727.51
Douglas	53,201.00	80,487.06	133,688.06	33,422.00	100,266.06
Gilliam	13,574.09	17,680.43	31,254.52	7,813.63	23,440.89
Grant	9,422.56	12,647.67	22,070.23	5,517.56	16,552.67
Harney	9,352.48	10,806.40	20,158.88	5,039.72	15,119.16
Hood River	30,386.08	45,927.21	76,313.29	19,328.35	56,984.94
Jackson	77,122.35	112,686.25	189,808.60	47,452.14	142,356.46
Jefferson	7,581.64	10,124.70	17,706.34	4,426.59	13,279.75
Josephine	26,131.62	37,125.60	63,257.22	15,814.29	47,442.93
Klamath	39,439.35	49,163.92	88,603.27	22,150.82	66,452.45
Lake	10,848.94	14,375.88	25,224.82	6,306.21	18,918.61
Lane	96,569.72	142,053.31	238,623.03	59,655.76	178,967.27
Lincoln	4,943.97	6,736.24	11,680.21	2,920.05	8,760.16
Linn	69,879.56	96,608.90	166,488.46	41,622.12	124,866.34
Malheur	22,921.31	26,168.21	49,089.52	12,272.38	36,817.14
Marion	145,147.44	201,997.62	347,145.06	86,786.27	260,358.79
Morrow	14,867.62	21,008.94	35,876.56	8,969.13	26,907.43
Multnomah	784,902.29	1,213,427.48	1,998,329.77	499,582.44	1,498,747.33
Polk	37,961.49	53,646.12	91,607.61	22,901.89	68,705.72
Sherman	17,386.80	22,540.83	39,927.63	9,981.90	29,945.73
Tillamook	28,382.93	37,800.96	66,183.89	16,545.98	49,637.91
Umatilla	93,316.45	120,793.17	214,109.62	53,527.41	160,582.21
Union	43,224.77	56,191.96	99,416.73	24,854.19	74,562.54
Wallowa	17,400.95	20,064.55	37,465.50	9,366.38	28,099.12
Wasco	41,012.66	57,672.67	98,685.33	24,671.33	74,014.00
Washington	75,341.74	107,234.46	182,576.20	45,644.04	136,932.16
Wheeler	6,307.26	7,719.89	14,027.15	3,506.79	10,520.36
Yamhill	59,621.01	81,787.20	141,408.21	35,352.06	106,056.15
Totals	$2,166,644.03	$3,145,316.03	$5,311,960.06	$1,327,990.02	$3,983,970.04

SUMMARY

PERIOD	Distributed to State and Counties as Above	Fees Refunded	Secretary of State's Administration Cost	Total Gross Amounts Collected
Sept. 15, 1920, to Sept. 15, 1921	$2,166,644.03	$ 5,018.00	$163,786.47	$2,335,448.50
Sept. 16, 1921, to Sept. 15, 1922	3,145,316.03	5,539.25	146,289.31	3,297,144.59
Totals for two year period	$5,311,960.06	$10,557.25	$310,075.78	$5,632,593.09

ANTICIPATED INCOME AND OBLIGATED EXPENDITURES, 1923 AND 1924

This table is an estimate of the amounts of money which will become available for expenditure under the supervision of the State Highway Commission during the years 1923 and 1924, and an estimate of the amounts of money which will be required to complete work under contract or obligated under agreements, as of November 30, 1922.

The revenues given contemplate the continuance in effect, without alteration, of all Acts of the Legislature and all Acts of Congress designating and allotting funds and revenues for expenditure under the supervision of the State Highway Commission. They contemplate, too, a reasonable amount of further cooperation by counties.

The obligated expenditures given include the turnover of Market Road funds to counties and reserves to cover contingencies and possible delays in the payment of federal and county cooperation.

ANTICIPATED INCOME FOR 1923 AND 1924

STATE FUNDS:			
Balance on hand, December 1, 1922		$ 2,469,828.95	
Unsold portion of Federal Aid Cooperative bonds $2,180,000 at 100		2,180,000.00	
Unsold portion of Seven Million Bonds $2,000,000.00 at 100		2,000,000.00	
Quarter Mill Tax 1923		252,374.79	
Quarter Mill Tax 1924		252,374.79	
Balance of 1922 Market Road Tax		279,238.47	
Market Road Tax for 1923		1,009,499.16	
Market Road Tax for 1924		1,009,499.16	
Gasoline Tax for 1923		1,200,000.00	
Gasoline Tax for 1924		1,300,000.00	
Motor License Fees, 1923		2,530,000.00	
Motor License Fees, 1924		2,670,000.00	
Earnings of Equipment Department and Shops		400,000.00	
Interest on Bank Balances		25,000.00	
Total State Funds Available		$17,577,815.32	
COUNTY COOPERATIVE FUNDS:			
Available under cooperative agreements	$2,824,528.89		
Anticipated cooperation	500,000.00		
		3,324,528.89	
FEDERAL COOPERATIVE FUNDS:			
Authorized under Post Road Acts to June 30, 1925		3,964,203.11	
RAILROAD COOPERATIVE FUNDS:			
Available under executed agreements	$139,541.16		
Anticipated Cooperation	70,000.00		
		209,541.16	
Grand Total Anticipated Income			$25,076,088.48

OBLIGATED EXPENDITURES FOR 1923 AND 1924

Interest and maturities on bonds, 1923	$ 2,000,000.00	
Interest and maturities on bonds, 1924	2,250,000.00	
Obligations under present state contracts	3,548,614.73	
Obligations under present post road agreements	*2,597,931.49	
Obligations under present forest road agreements	767,030.42	
Maintenance and Betterment	2,000,000.00	
Equipment	300,000.00	
Road Signing	10,000.00	
Policing Highways	44,000.00	
Administration	386,000.00	
Surveys	100,000.00	
Engineering for counties	20,000.00	
Miscellaneous General Expense	30,000.00	
Market Road payments due from 1922 tax	485,967.82	
Market Road payments due from 1923 tax	1,009,499.16	
Market Road payments due from 1924 tax	1,009,499.16	
Reserve for contingencies	750,000.00	
Reserve for revolving fund	75,000.00	
Reserve for federal cooperation unpaid at close of biennium	500,000.00	
Reserve for county cooperation unpaid at close of biennium	750,000.00	
Reserve for forest road cooperation	750,000.00	
		19,383,542.78
Balance available for new work		†$ 5,692,545.70

* Of this amount, approximately $450,000.00 was not under contract on November 30, 1922.

† Of this amount, approximately $3,500,000.00 must be used upon new post road projects, leaving only about $2,200,000.00 for new work other than post road work.

STATEMENT OF STATE HIGHWAY BOND SALES

JUNE, 1917, TO NOVEMBER 30, 1922

Date of Sale	Date of Bonds	PURCHASER	Par Value	Amount Bid	Per cent of Par	Coupon Interest Rate	Net Interest Rate	Accrued Interest	Total
		State Cooperative Federal Aid Bonds— (Chapter 175, Laws 1917), Chapter VII (a), Title XXX							
Aug. 18, 1917	Sept. 1, 1917	E. H. Rollins & Sons and Associates	$* 400,000.00	$ 337,640.00	96.91	4.00	4.50	$ 2,844.44	$ 390,484.44
July 15, 1919	Aug. 1, 1919	Henry Teal	† 800,000.00	762,320.00	95.29	4.00	4.53	1,511.11	763,831.11
		Totals	$ 1,200,000.00	$1,149,960.00	95.83	.....	4.55	$ 4,355.55	$ 1,154,315.55
		State Cooperative Federal Aid Bonds— (Chap. 31, Laws 1920), Chap. VII (b), Title XXX, amended Chap. 347, Laws 1921							
May 11, 1920	April 1, 1920	Lumbermen's Trust Co. and Associates	$ 1,000,000.00	$ 890,900.00	89.09	4.50	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	4.50	5.80	18,375.00	1,332,675.00
April 9, 1921	April 1, 1921	Ralph Schneeloch Co. and Associates	‡ 1,000,000.00	978,850.00	97.89	5.50	6.10	3,666.67	982,516.67
Mar. 17, 1922	April 1, 1922	Carstens & Earles and Associates	500,000.00	523,900.00	104.78	5.00	4.55	1,111.11	525,011.11
		Totals	$ 4,000,000.00	$3,707,950.00	92.70	.....	5.67	$ 30,152.78	$ 3,738,102.78
		Six Million Dollar Bonds— (Chap. 423, Laws 1917), Chap. IV, Title XXX, amended Chap. 384, Laws 1921							
Aug. 7, 1917	Aug. 1, 1917	Lumbermen's Trust Co.	$ 500,000.00	$ 471,300.00	94.26	4.00	4.53	$ 2,333.33	$ 473,633.33
Sept. 12, 1917	Sept. 1, 1917	E. H. Rollins & Sons and Associates	500,000.00	472,130.00	94.43	4.00	4.52	1,833.33	473,963.33
Mar. 15, 1918	April 1, 1918	Henry Teal	500,000.00	455,850.00	91.17	4.00	4.83	222.22	456,072.22
July 9, 1918	July 1, 1918	E. H. Rollins & Sons and Associates	690,000.00	643,770.00	93.30	4.00	4.62	2,606.54	646,376.54
Dec. 10, 1918	Dec. 1, 1918	Wm. Salomon & Co.	250,000.00	239,292.50	95.72	4.00	4.39	750.00	240,042.50
May 6, 1919	May 1, 1919	Loomis & Goss and Associates	500,000.00	467,900.00	93.58	4.00	4.59	2,722.22	470,622.22
June 10, 1919	June 1, 1919	Carstens & Earles and Associates	1,000,000.00	942,600.00	94.26	4.00	4.53	4,333.33	946,933.33
Oct. 25, 1921	Nov. 1, 1921	Ralph Schneeloch Co. and Associates	1,500,000.00	1,549,650.00	103.31	5.50	5.17	5,041.67	1,554,691.67
Dec. 15, 1921	Dec. 1, 1921	First and Old Detroit Nat'l Bank	560,000.00	615,496.00	109.91	5.50	4.55	3,507.76	619,003.76
		Totals	$ 6,000,000.00	$5,857,988.50	97.63	.....	4.73	$ 23,350.40	$ 5,881,338.90
		First Ten Million Dollar Bonds— (Chap. 173, Laws 1919), Chap. V, Title XXX							
Aug. 5, 1919	Aug. 1, 1919	Carstens & Earles and Associates	$ 1,000,000.00	$ 991,500.00	99.15	4.50	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	4.50	4.66	.....	1,965,600.00
Nov. 4, 1919	Nov. 1, 1919	Freeman, Smith & Camp and Associates	1,000,000.00	988,230.00	98.82	4.50	4.62	2,875.00	991,105.00
Dec. 20, 1919	Dec. 1, 1919	Ralph Schneeloch Co. and Associates	1,000,000.00	986,170.00	98.62	4.50	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	4.50	5.58	6,000.00	1,346,100.00
Aug. 24, 1920	Aug. 1, 1920	Lumbermen's Trust Co. and Associates	1,500,000.00	1,351,200.00	90.08	4.50	5.50	6,750.00	1,357,950.00
Sept. 28, 1920	Oct. 1, 1920	Ralph Schneeloch Co. and Associates	2,000,000.00	1,822,202.00	91.11	4.50	5.41	1,250.00	1,823,452.00
		Totals	$10,000,000.00	$9,445,002.00	94.45	.....	5.06	$ 24,625.00	$ 9,469,627.00

		Second Ten Million Dollar Bonds— (Chap. 43, Laws 1920), Chap. VI, Title XXX, amended Chaps. 245 and 348, Laws 1921						
Nov. 6, 1920	Nov. 1, 1920	Henry Teal	$ 1,500,000.00	$1,418,700.00	94.58	4.50	5.03	$ 3,375.00	$ 1,422,075.00
Jan. 4, 1921	Jan. 1, 1921	Carstens & Earles and Associates	500,000.00	453,550.00	90.71	4.50	5.43	1,000.00	454,550.00
Feb. 1, 1921	Jan. 1, 1921	Carstens & Earles and Associates	1,000,000.00	920,500.00	92.05	4.50	5.31	6,910.19	927,410.19
May 27, 1921	June 1, 1921	John E. Price & Co. and Associates	§ 1,000,000.00	1,000,300.00	100.03	6.00	5.99	3,500.00	1,003,800.00
June 28, 1921	July 1, 1921	A. M. Wright	1,500,000.00	1,506,100.00	100.41	5.75	5.71	7,187.50	1,513,287.50
July 28, 1921	Aug. 1, 1921	John E. Price & Co. and Associates	2,000,000.00	2,002,940.00	100.15	5.50	5.47	4,888.00	2,007,828.00
Aug. 30, 1921	Sept. 1, 1921	Security Sav. & Tr. Co. and Assoc.	1,500,000.00	1,501,050.00	100.07	5.50	5.49	5,958.30	1,507,008.30
Sept. 20, 1921	Oct. 1, 1921	Ralph Schneeloch Co. and Associates	§ 1,000,000.00	1,005,100.00	100.51	6.00	5.85	1,167.00	1,006,267.00
		Totals	$10,000,000.00	$9,808,240.00	98.08	.....	5.52	$ 33,985.99	$ 9,842,225.99
		Seven Million Dollar Bonds— (Chapter 383, Laws 1921).							
Jan. 10, 1922	Jan. 1, 1922	Ralph Schneeloch Co. and Associates	$ 1,000,000.00	$1,033,900.00	103.39	5.00	4.68	$ 8,541.65	$ 1,042,441.65
July 25, 1922	Aug. 1, 1922	Ralph Schneeloch Co.	1,000,000.00	1,012,900.00	101.29	4.50	4.382	1,875.00	1,014,775.00
Aug. 29, 1922	Sept. 1, 1922	Baillargeon, Winslow & Co. and Assoc.	1,500,000.00	1,534,650.00	102.31	4.50	4.286	5,250.00	1,539,900.00
Oct. 21, 1922	Oct. 1, 1922	Security Sav. & Tr. Co. and Assoc.	1,500,000.00	1,516,350.00	101.09	4.50	4.40	8,062.50	1,524,412.50
		Totals	$ 5,000,000.00	$5,097,800.00	101.96	.....	4.418	$ 23,729.15	$ 5,121,529.15

SUMMARY

	Par Value	Amount Bid	Discount	Per cent of Par	Net Interest Rate	Accrued Interest	Total
State Cooperative Bonds, Chap. 175, Laws 1917	$ 1,200,000.00	$ 1,149,960.00	$ 50,040.00	95.83	4.55	$ 4,355.55	$ 1,154,315.55
State Cooperative Bonds, Chap. 31, Laws 1920	4,000,000.00	3,707,950.00	292,050.00	92.70	5.67	30,152.78	3,738,102.78
Six Million Dollar Bonds, Chap. 473, Laws 1917	6,000,000.00	5,857,988.50	142,011.50	97.63	4.73	23,350.40	5,881,338.90
First Ten Million Dollar Bonds, Chap. 173, Laws 1919	10,000,000.00	9,445,002.00	554,998.00	94.45	5.06	24,625.00	9,469,627.00
Second Ten Million Dollar Bonds, Chap. 43, Laws 1920	10,000,000.00	9,808,240.00	191,760.00	98.08	5.52	33,985.99	9,842,225.99
Seven Million Dollar Bonds, Chap. 383, Laws 1921	5,000,000.00	5,097,800.00	‖ 97,800.00	101.96	4.42	23,729.15	5,121,529.15
Totals	¶$36,200,000.00	$35,066,940.50	$1,133,059.50	96.87	5.09	$140,198.87	$35,207,139.37

* Maturities $100,000.00 annually, 1922-1925 inclusive.
† Maturities $100,000.00 annually, 1926-1933 inclusive
‡ Maturity April 1, 1925.

§ Maturity October 1, 1925. All other bonds mature one-twentieth each year beginning with the sixth year after issuance.
‖ Premium.
¶ Total of $125,000.00 of these bonds have matured and have been paid.

OREGON DEPARTMENT OF TRANSPORTATION LIBRARY

JOBS ADVERTISED AND CONTRACTS AWARDED
Period December 1, 1920, to November 30, 1922

Date of Receiving Bids	Contract No.	PROJECT	Highway	Length in Miles	Kind of Improvement	No. of Bidders	Contract Awarded to
Jan. 4, 1921	316	Port Orford-Hubbard Creek	Roosevelt Coast	1.6	Grading	3	J. R. Hill
Jan. 4, 1921	317	Gilliam County Line-Morgan	Oregon-Washington	12.65	Surfacing	7	Oregon-Hassam Paving Co
Jan. 4, 1921	318	Arlington-Morrow County Line	Columbia River	1.08	Guard Fence	4	Soleim & Gustafson
Jan. 4, 1921	319	Nelson-Huntington	Old Oregon Trail	19.38	Grading	9	Copenhagen Brothers Co.
Jan. 4, 1921	320	Seufert-Deschutes River	Columbia River	12.5	Surfacing	7	A. D. Kern
Feb. 1, 1921	321	Monroe-Junction City	West Side	8.6	Bituminous Pavement	8	Pacific Bridge Company
Feb. 1, 1921	322	Walker-Divide	Pacific	6.3	Bituminous Pavement	6	Blake-Compton Company
Feb. 1, 1921	323	Roseburg-Dillard	Pacific	6.19	Bituminous Pavement	4	Oregon-Hassam Paving Co.
Feb. 1, 1921	324	Blalock-Arlington	Columbia River	0.71	Guard Fence	4	McCall & Sheerin
Feb. 1, 1921	325	Culverts, Bend-Horse Ridge	Central Oregon	.....	Seven Concrete Box Culverts	4	F. H. May
Feb. 1, 1921	.....	Oakland-South	Pacific	1.16	Paving	1	Rejected
Feb. 1, 1921	326	Bridges, Unit 4, Sarvice Crk.-Valades Ranch	John Day	.....	3 Wood Truss Spans & 1 Timber Trestle	2	Jas. F. Clarkson & Company
Feb. 1, 1921	327	Umpqua R. Bridge N. of Canyonville	Pacific	.....	220′ Steel Span & Trestle Approaches	7	Union Bridge Company
Feb. 1, 1921	328	Canyon Crk. Bridge at Canyonville	Pacific	.....	90′ Concrete Viaduct	12	Parker & Banfield
Feb. 1, 1921	329	Clackamas R. Br. N. of Oregon City*	County	.....	220′ Steel Span & Trestle Approaches	9	Parker & Banfield
Feb. 1, 1921	330	Tunnel Lining, Twin Tunnels near Mosier**	Columbia River	.....	Timber Tunnel Lining	...	Jas. F. Clarkson & Company
Feb. 1, 1921	331	Approaches to Messner Overcrossing**	Columbia River	.....	Completion of Approach Embankments	....	J. S. Mattoon
Mar. 8, 1921	332	Hood River-Mosier	Columbia River	10.55	Bituminous Pavement	2	A. D. Kern
Mar. 8, 1921	333	Salem-South	Pacific	8.57	Concrete Pavement	8	J. E. Bonnell
Mar. 8, 1921	334	Forest Grove-Gaston	Tualatin Valley	6.72	Bituminous Pavement	4	Warren Construction Co.
Mar. 8, 1921	335	Gaston-Yamhill	Tualatin Valley	7.68	Concrete Pavement	5	Cochran Brothers
Mar. 8, 1921	336	Canby-Molalla River	Pacific	1.79	1.25 m. Grading, 1.19 m. Surf.	8	V. R. Dennis Construction Co.
Mar. 8, 1921	337	Barclay Springs-Lamm's Mill	The Dalles-California	5.12	Grading	9	Warren Construction Co.
Mar. 8, 1921	338	Umpqua R. Bridge, south limits of Roseburg*	Pacific	.....	4-105′ Wood Spans	5	Rejected
Mar. 8, 1921	339	Overcrossing at Huntington	Old Oregon Trail	.....	120′ Steel Span & Concrete Approaches	9	Lindstrom & Feigenson
Mar. 8, 1921	340	Burnt R. Bridges, Nelson-Huntingt'n	Old Oregon Trail	.....	2 Steel Span Bridges	10	Illinois Steel Bridge Company
Mar. 8, 1921	341	Bridge & Overcrossing at Myrtle Ck	Pacific	.....	3-130′ Arches & Concrete Approach	10	Lindstrom & Feigenson
Mar. 8, 1921	342	McVeigh Overcrossing, S. of Eugene	Pacific	.....	321′ Concrete Viaduct	6	Lindstrom & Feigenson
Mar. 8, 1921	343	Redmond-Prineville	Ochoco	11.6	Surfacing	8	A. D. Kern
Mar. 8, 1921	.....	Klamath Falls-Dairy	Klamath Falls-Lakeview	.....	Dairy Overcrossing	1	Rejected

Mar. 8, 1921	.....	Altamont Canal Br., So. of Kl. Falls.	The Dalles-California	.....	56' Wood Span & Trestle Approaches	1	Rejected
April 5, 1921	344	Coquille River Bridge at Coquille*	Roosevelt Coast	.....	235' Steel Draw Span & Trestle Approaches	....	A. B. Gidley
April 5, 1921	345	Prineville-Ochoco Forest	Ochoco	17.05	Grading	8	Greenwood & Dann
April 5, 1921	346	Wallowa Canyon-Lostine	La Grande-Joseph	14.4	Grading & Surfacing	11	Porter & Conley
April 5, 1921	347	Wallowa Canyon	La Grande-Joseph	8.38	Surfacing	5	March & Bowers
April 5, 1921	348	Wolf Creek-Galesville	Pacific	14.1	Bituminous Pavement	4	Giebisch, Joplin & Eldon
April 5, 1921	.....	Oakland-South	Pacific	1.16	Paving	2	Rejected
April 6, 1921	349	Divide-Drain	Pacific	14.1	Bituminous Pavement	7	Warren Construction Co.
April 6, 1921	350	Goshen-Walker	Pacific	9.81	Concrete Pavement	8	Independent Asphalt Pav. Co
April 6, 1921	351	Kamela-Hilgard	Old Oregon Trail	12.75	Grading	7	Elliott & Scoggin
April 6, 1921	352	Hilgard-La Grande	Old Oregon Trail	6.3	Grading	15	Rajotte-Winters, Inc.
April 6, 1921	353	Weiser-Ontario	Old Oregon Trail	14.36	Grading & Surfacing	16	W. C. Stone
April 6, 1921	354	Deer Creek Bridge near Selma	Grants Pass-Crcs. City	.....	162' Concrete Viaduct	7	Lee's Dock Co.
April 5, 1921	355	Wolf Creek Bridge near Wolf Creek.	Pacific	.....	35' Concrete Span	11	J. Elmer Nelson
April 5, 1921	356	Painting Willamette Br. at Salem	Salem-Dallas	.....	Painting Steel Bridge & Approaches	6	A. J. Anderson
April 5, 1921	357	Altamont Canal Br. So. of Kl. Falls.	The Dalles-California	.....	56' Wood Span & Trestle Approaches	7	Marshall & Barhan
April 5, 1921	358	Overcrossing near Dairy	Klamath Falls-Lakeview	.....	57' Timber Trestle	7	Marshall & Barhan
April 5, 1921	.....	Sage Hen Summit-Burns	Central Oregon	14.52	Grading	7	Rejected
April 22, 1921	359	Jackson County Line-Grants Pass.	Pacific	3.76	Roadbed Widening	7	Grieve & Seymour
April 22, 1921	360	Mayville-Thirtymile Creek	John Day	6.9	Surfacing	3	Hauser Construction Co.
April 22, 1921	361	Canyonville-Myrtle Creek	Pacific	9.5	Surfacing	10	Hetrick & Cline
April 22, 1921	362	Enterprise-Joseph	La Grande-Joseph	6.23	Grading & Surfacing	5	Morrison-Knudsen Company
April 22, 1921	363	McMinnville-Amity	West Side	5.25	Grading	10	Thomas Hansen
April 22, 1921	364	Morgan-Lexington	Oregon-Washington	12.65	Surfacing	4	Warren Construction Co.
April 22, 1921	365	Mosier-The Dalles	Columbia River	12.6	Bituminous Pavement	5	Hauser Construction Co.
April 22, 1921	366	Union-Telocaset	Old Oregon Trail	6.01	Surfacing	8	Security Construction Co.
April 22, 1921	367	North Powder-Telocaset	Old Oregon Trail	9.1	Surfacing	8	W. C. Stone
April 22, 1921	368	Hot Lake-Union	Old Oregon Trail	5.03	Grading & Surfacing	9	Security Construction Co.
April 6, 1921	369	Elgin-Minam	Old Oregon Trail	9.35	Surfacing	2	Security Construction Co. (Bids Rec'd June 1, 1920)
Mar. 11, 1921	370	Scovell Bridge near Nehalem*	County	.....	100' Steel Span with Trestle Approach	....	Portland Bridge Company
May 26, 1921	371	Tum Tum	Corvallis-Newport	7.2	Surfacing	3	E. A. Palmer
May 26, 1921	372	Lexington-Heppner	Oregon-Washington	9.52	Grading	7	Oxman & Harrington
May 26, 1921	373	Sage Hen Summit-Burns	Central Oregon	14.52	Grading	8	Gus Carlson & Co.
May 26, 1921	374	Crooked Creek-Chandler's Station	Prineville-Lakeview	6.55	Grading & Surfacing	2	Lake County Court
May 26, 1921	375	Cold Springs-Holdman	Pendleton-Cold Springs	13.2	Grading & Surfacing	11	A. D. Kern
May 26, 1921	376	Sherman County	Columbia River	1.5	Guard Fence	3	A. Guthrie & Co.
May 26, 1921	377	Hilgard Overcrossing	Old Oregon Trail	.....	140' Steel Span, Concrete Approaches	7	Jas. F. Clarkson & Company
May 27, 1921	378	Wallowa Hill	La Grande-Joseph	5.48	Grading	15	A. D. Kern
May 27, 1921	379	Condon North	John Day	6.0	Grading & Surfacing	7	A. D. Kern
May 27, 1921	380	Trail-Agate	Medford-Crater Lake	14.35	Surfacing	7	Wm. von der Hellen
May 27, 1921	381	Thurston-Walterville	McKenzie	4.56	Grading & Surfacing	5	Lane County Court

* Project advertised for county.
** Special agreement.

JOBS ADVERTISED AND CONTRACTS AWARDED—Continued
Period December 1, 1920, to November 30, 1922

Date of Receiving Bids	Contract No.	PROJECT	Highway	Length in Miles	Kind of Improvement	No. of Bidders	Contract Awarded to
May 26, 1921	382	Heppner-Jones Hill	Oregon-Washington	9.03	Grading	8	Oxman & Harrington
May 26, 1921	383	Kamela-La Grande	Old Oregon Trail		Four Bridges	9	Kelly & Lilly
May 27, 1921	384	Long Tom Bridge near Goldson	Will. Valley-Florence		1-60′ Wood Span, 1-90′ Wood Span	4	Geo. W. Breeding
May 27, 1921	385	Chewaucan River Bridge at Paisley	Prineville-Lakeview		Concrete Viaduct	3	G. J. Hardy
May 27, 1921	386	Holmes Gap-Rickreall	West Side	4.94	Grading	6	H. J. Hildeburn
May 27, 1921	387	Monmouth-Luckiamute River	West Side	5 24	Grading	6	W. N. Trent
May 27, 1921	388	Luckiamute River-Suver	West Side	2.29	Grading	5	H. J. Hildeburn
May 27, 1921	389	Unit No. 1, Mult. Co. L.-Zig Zag	Mt. Hood Loop	11.86	Grading	6	Dixon & Howitt
May 27, 1921	390	Unit No. 2, Mult. Co. L.-Zig Zag	Mt. Hood Loop	7.58	Grading	4	Johnson Contract Company
May 27, 1921	391	Unit No. 3, Mult. Co. L.-Zig Zag	Mt. Hood Loop	4.77	Grading	6	Johnson Contract Company
May 27, 1921	392	Canby-Aurora	Pacific	3.75	Concrete Pavement	8	Cummins & La Pointe
May 27, 1921	393	Brunk's Corner-Dallas	Salem-Dallas	7.5	Grading & Bitum. Pavement	3	V. R. Dennis Construction Co
May 26, 1921	394	Toledo-Newport	Corvallis-Newport	7.25	Surfacing	3	A. D. Kern
May 27, 1921	395	Oakland-South	Pacific	1.16	Bituminous Pavement	7	United Contracting Company
May 26, 1921	396	Cline Falls-West	McKenzie	5.0	Surfacing	5	J. K Shotwell
May 26, 1921	397	Yamhill River Bridge at St. Joseph	West Side		80′ Steel Span, 280′ Concrete Viaduct	10	Gilpin Construction Co.
May 26, 1921	398	Yamhill River Br. near Grand Ronde	McMinnville-Tillamook		2-50′ Wood Spans	5	V. R. Dennis Construction Co.
May 27, 1921	399	Dallas City*	Salem Dallas	1.0	Grading & Bitum. Pavement	3	V. R. Dennis Construction Co
May 26, 1921	422	Overcrossing near Glover	Old Oregon Trail		129′ Concrete Viaduct	6	Heiselt Construction Company
May 27, 1921	416	Overcrossing near North Powder	Old Oregon Trail		197′ Concrete Viaduct	10	Jas. F. Clarkson & Company
May 27, 1921	423	Overcrossing near Telocaset	Old Oregon Trail		140′ Concrete Viaduct	10	Heiselt Construction Company
May 27, 1921	424	Overcrossing near Hot Lake	Old Oregon Trail		304′ Concrete Viaduct with Trestle Approach	9	Hauser Construction Company
May 27, 1921		Sheridan-Willamina	McMinnville-Tillamook	4.1	Grading & Paving	7	Rejected
May 27, 1921		North Bend-Marshfield	Roosevelt Coast	0.6	Concrete Pavement	1	Rejected
May 27, 1921	419	Grand Ronde-Alder Creek	McMinnville-Tillamook	6.8	Resurf. 13.6 Maint. Materials	1	Warren Construction Co.
May 27, 1921		Dolph-Hebo	McMinnville-Tillamook	10.5	Maintenance Materials	3	Rejected
May 27, 1921		Remote-Camas Valley	Coos Bay-Roseburg	14.2	Surfacing	1	Rejected
June 28, 1921	400	Sixes River-Denmark	Roosevelt Coast	4.97	Grading	5	Klockars, Padrick & Weber
June 28, 1921	401	Sixes River-Denmark	Roosevelt Coast	4.97	Surfacing	7	John Hakanson
June 28, 1921	402	Port Orford-Hubbard Creek	Roosevelt Coast	1.43	Surfacing	2	John Hakanson
June 28, 1921	403	Unit No. 1, Brush Crk.-Mussel Crk.	Roosevelt Coast	3.79	Grading	6	Bates & Rogers Const. Co.
June 29, 1921	404	Bridge-Remote	Coos Bay-Roseburg	7.98	Grading	4	A. Guthrie & Company
June 29, 1921	405	Vinson-Pilot Rock	Oregon-Washington	14.69	Grading	7	Oxman & Harrington
June 29, 1921	406	Tum Tum-Chitwood	Corvallis-Newport	9.71	Grading	4	Horning, Malone & McKy
June 29, 1921	407	Green Springs Mt. Summit	Ashland-Klamath Falls	7.75	Surfacing	5	A. D. Kern
June 29, 1921	408	McVeigh Point Overcrossing Appr.	Pacific	0.45	Grading	13	A. Guthrie & Company

June 29, 1921	409	Grants Pass-Sexton Mountain	Pacific	9.8	Bituminous Pavement	8	A. D. Kern
June 29, 1921	410	Newberg Viaduct & Chehalem Creek Trestle	West Side	0.19	Bituminous Pavement	1	Warren Construction Co.
June 28, 1921	411	Malheur River Bridge near Ontario	Old Oregon Trail	.....	300' Concrete Viaduct	6	Hauser Construction Company
June 28, 1921	412	3 Bridges on Ontario-Weiser Sec	Old Oregon Trail	.....	2 Concrete Bridges, 1 Culvert	6	Hauser Construction Company
June 28, 1921	413	Seven Culverts near Sandy	Mt. Hood Loop	.....	7 Concrete Culverts	9	Tobin & Pierce
June 28, 1921	414	Willamette R. Bridge at Oregon City	Pacific	.....	350' Concrete Arch & Apprs.	3	A. Guthrie & Company
June 28, 1921	415	Nestucca R. Bridge near Hebo	Roosevelt Coast	.....	Completion of 140' Steel Br.	3	Monson-Trierweiler Co.
June 28, 1921	.....	2 Bridges on Prineville-Frst. Bdy.	Ochoco	.....	2-40' A-Frame Spans	2	Rejected
June 28, 1921	439	Grand Ronde Bridge near Perry	Old Oregon Trail	.....	140' Steel Span	5	Union Bridge Company
June 28, 1921	.....	Culverts on Unit No. 2, Mt. Hood L.	Mt. Hood Loop	.....	5 Concrete Culverts	6	Rejected
June 29, 1921	417	Tillamook-South	Roosevelt Coast	5.0	Resurfacing & Repair	3	Warren Construction Co.
June 28, 1921	418	Summit-Blachly	Will. Valley-Florence	2.34	Grading	16	Iver J. Rosten Company
June 28, 1921	.....	Humbug Mountain	Roosevelt Coast	2.45	Surfacing	1	Rejected
June 29, 1921	.....	Broad Canyon-Sisters	McKenzie	9.9	Surfacing	2	Rejected
June 29, 1921	.....	Newberg-Multnomah County Line	West Side	15.7	Pavement Improvement	3	Rejected
June 22, 1921	420	Br. over Lit. Luckiamute near Burns Mill*	County	.....	80' Steel Span	....	Portland Bridge Company
June 22, 1921	421	Br. over Lit. Luckiamute near Hosford*	County	.....	80' Steel Span	....	E. C. Bushnell
July 28, 1921	425	Cummings Hill-Fossil	John Day	2.73	Grading & Surfacing	7	D. F. Murphy & Company
July 28, 1921	426	Chitwood-Toledo	Corvallis-Newport	10.62	Grading	21	A. Gic[illegible]ich
July 28, 1921	427	Shedd-Halsey	Pacific	7.83	Bituminous Pavement	10	A. [illegible]rn
July 28, 19[illegible]	428	Chandler's Sta.-Narrows & Paisley	Prineville-Lakeview	16.8	Grading	8	Lake County Court
July 28, 1[illegible]	429	Wilson River-Riverdale	Roosevelt Coast	1.46	Surfacing	1	Tillamook County Court
July 28, [illegible]	430	Tryon, Sucker & Molalla Brs.	Pacific	0.16	Paving	1	Warren Construction Co.
July 28 [illegible]21	431	Miles Crossing-Skipanon	Roosevelt Coast	1.3	Grad. & Surf., 2.9 Shoulder Construction	5	John Slotte & Company
July 28, 1921	432	Unit No. 2, Allen Rch.-Klamath County Line	The Dalles-California	9.33	Grading	8	Deschutes County Court
July 28, 1921	433	Oakland City	Pacific	0.5	Bituminous Pavement	2	United Contracting Co.
July 28, 1921	434	Catherine Crk. Bridges near Union	Old Oregon Trail	.....	2 Steel Span Bridges	8	C. A. Burnette
July 28, 1921	435	Jimmy Crk. & Wolf Crk. Br. near North Powder	Old Oregon Trail	.....	2 Concrete Bridges	9	Kenneth Oxman
July 28, 1921	437	Prairie Crk. Bridge near Enterprise	La Grande-Joseph	.....	133' Timber Trestle	6	Oskar Oberg
July 28, 1921	438	Repairing Gales Crk. Br. near Forest Grove	Tualatin Valley	.....	Repairing Steel Span Bridge	6	Beam Construction Company
July 28, 1921	.....	Bridges on Nelson-Huntington Sec.	Old Oregon Trail	.....	140' Steel Span & Concrete Approaches	4	Rejected
Aug. 30, 1921	440	Booth Hill	Mt. Hood Loop	5.0	Grading	16	Joplin & Eldon
Aug. 30, 1921	441	Ashland-Talent	Pacific	3.09	Roadbed Widening	1	Albert Anderson
Aug. 30, 1921	442	Prineville-Bear Creek	Crooked River	18.4	Surfacing	5	Crook County Court
Aug. 30, 1921	443	McMinnville-Amity	West Side	2.44	Surfacing	8	Fred Ruble
Aug. 30, 1921	444	Umatilla County Guard Fence	Various	7.56	Guard Fence	13	Frazier & Samuel
Aug. 30, 1921	445	Wolf Creek-Grave Creek	Pacific	2.61	Roadbed Widening	8	Washburn & Hall
Aug. 30, 1921	446	Gold Hill-Central Point	Pacific	2.32	Roadbed Widening	3	J. L. Calvert
Aug. 30, 1921	447	Wheeler County Line-East	John Day	11.36	Surfacing	10	S. C. Comerford
Aug. 30, 1921	448	Bend-Horse Ridge	Central Oregon	10.9	Surfacing	9	J. K. Shotwell
Aug. 30, 1921	449	Willamette R. Bridge near Latham	Pacific	.....	150' Steel Span & Trestle Approaches	5	Union Bridge Company
Aug. 30, 1921	450	Bridge over Bully Creek near Vale	Central Oregon	.....	90' Steel Span	4	United States Bridge Co.

* Project advertised for county.
** Special agreement.

JOBS ADVERTISED AND CONTRACTS AWARDED—Continued
Period December 1, 1920, to November 30, 1922

Date of Receiving Bids	Contract No.	PROJECT	Highway	Length in Miles	Kind of Improvement	No. of Bidders	Contract Awarded to
Aug. 30, 1921	451	Willow Crk. & Hinton Crk. Bridges in Heppner	Oregon-Washington		3 Concrete Bridges	7	Tobin & Pierce
Aug. 30, 1921	452	Black Horse Crk. Br. in Lexington	Oregon-Washington		30′ Concrete Bridge	7	Tobin & Pierce
Aug. 30, 1921	453	Bridges on Nelson Huntington Sec.	Old Oregon Trail		4 Culverts, 2 Timber Trestles	6	Rajotte-Winters, Inc.
Aug. 30, 1921	454	Stage Gulch Bridge at Stanfield	Old Oregon Trail		28′ Concrete Span	3	Parker & Banfield
Aug. 30, 1921	455	Scoggins Creek Bridge near Gaston	Tualatin Valley		75′ Concrete Viaduct	13	Ward Mayer
Aug. 30, 1921	456	Brogan-Jamieson	John Day	6.24	Grading	15	Morrison-Knudsen Co.
Aug. 30, 1921	457	Vale-Burrell	Central Oregon	6.47	Grading & Surfacing	14	Morrison-Knudsen Co.
Aug. 30, 1921	458	Barclay Springs-Lamm's Mill	The Dalles-California	5.12	Surfacing	5	Warren Construction Co.
Aug. 30, 1921	459	Jenny Creek-Klamath County Line	Ashland-Klamath Falls	4.46	Grading	4	John Hampshire
Aug. 30, 1921	460	Jackson County Line-Hayden Creek	Ashland-Klamath Falls	9.83	Grading	2	John Hampshire
Aug. 30, 1921	461	Yamhill City, Prop. No. 1	Tualatin Valley	0.22	Bituminous Pavement	1	Warren Construction Co.
Aug. 30, 1921	462	Yamhill City, Prop. No. 2	Tualatin Valley	0.3	Concrete Pavement	1	Cochran Brothers
Aug. 30, 1921	463	Sandy-Cherryville	Mt. Hood Loop	6.65	Surfacing	5	E. A. Palmer
Aug. 30, 1921	.....	Multnomah County Line-Sandy	Mt. Hood Loop	6.5	Surfacing	8	Rejected
Aug. 30, 1921	.....	Cherryville-Salmon River	Mt. Hood Loop	5.9	Surfacing	5	Rejected
Aug. 30, 1921	464	Youngs Bay Bridge & North Appr.	Roosevelt Coast	0.34	Bituminous Pavement	2	J. H. Tillman & Company
Aug. 30, 1921	465	Camas Hill-Winston	Coos Bay-Roseburg	11.54	Grading	11	H. J. Hildeburn
Sept. 20, 1921	466	Prineville-Ochoco Frst Bdy.	Ochoco	10.4	Surfacing	10	Greenwood & Dann
Sept. 20, 1921	.....	Deschutes County Line-Frst. Bdy.	The Dalles-California	18.48	Grading	5	Rejected
Oct. 25, 1921	467	Roseburg-Wilbur	Pacific	5.32	Concrete Pavement	16	S. A. Moceri
Oct. 25, 1921	468	Cottage Grove	Pacific	1.4	Concrete Pavement	5	Guy F. Pyle
Oct. 25, 1921	469	Murder Creek Section	Pacific	0.53	Grad., Surf. & Conc. Bridge	6	L. O. Herrold
Oct. 25, 1921	470	Baker County Line-Weiser	Old Oregon Trail	15.27	Grading	15	Hauser Construction Co.
Oct. 25, 1921	471	Lexington-Heppner	Oregon-Washington	10.6	Surfacing 2.14 Re-surfacing	22	More & Anderson
Oct. 25, 1921	472	Wasco-Moro	Sherman	7.5	Grading & Surfacing	18	Bauers & Bauers
Oct. 25, 1921	473	Moro-Grass Valley	Sherman	8.58	Grading & Surfacing	21	Bauers & Bauers
Oct. 25, 1921	474	Cow Canyon	The Dalles-California	7.83	Grading	17	McAuliffe & Healy
Oct. 25, 1921	475	Bridges on Winston-Camas Mt. Sec.	Roseburg-Coos Bay		3 Truss Spans & 2 Timber Trestles	7	J. W. & J. R. Hillstrom
Oct. 25, 1921	476	Yamhill R. Bridge near Whiteson	West Side		Approach Trestle & Repairs to Steel Span	9	Monson-Trierweiler Co.
Oct. 26, 1921	.....	Love Bridge-Black Bridge	Baker-Cornucopia	13.22	Grading	11	Rejected
Oct. 26, 1921	478	Drain-Yoncalla	Pacific	8.6	Bituminous Pavement	13	Oregon-Hassam Paving Co.
Oct. 26, 1921	479	Summit Springs Market Road*	County	8.14	Grading	6	Jetley Brothers
Oct. 26, 1921	480	Unit No. 1, Ochoco Frst. Bdy. Mitch.	Ochoco	1.99	Grading & Surfacing	3	Curtis Gardner
Oct. 26, 1921	481	West Dayton-St. Joseph	West Side	4.2	Concrete Pavement	14	Oregon Contract Company
Oct. 26, 1921	482	Madras-Wasco Co. Line, Units 2 & 4.	The Dalles-California	6.27	Grading	10	McAuliffe & Healy
Oct. 26, 1921	483	Madras-Wasco Co. Line, Unit 6	The Dalles-California	5.54	Grading & Surfacing	12	D. F. Murphy & Company
Nov. 5, 1921	477	Chandler's Station-North	Lapine-Lakeview	4.0	Surfacing	3	Warren Construction Co.

Dec. 15, 1921	484	Myrtle Creek Section	Pacific	0.27	Grading & Rubble Masonry Wall	6	H. J. Hildeburn
Dec. 15, 1921	485	Island City-Elgin	La Grande-Joseph	18.12	Grading	10	Union County Court
Dec. 15, 1921	486	Myrtle Point-Bridge	Coos Bay-Roseburg	10.0	Grading	7	Warren Construction Co.
Dec. 15, 1921	487	Medford-Agate	Medford-Crater Lake	8.5	Grading & Surfacing	12	W. C. Stone
Jan. 6, 1922	553	Love Bridge-Black Bridge*	Baker-Cornucopia	13.22	Grading	6	Oxman & Harrington
Feb. 21, 1922	488	Myrtle Creek-Canyonville	Pacific	10.5	Paving with 0.4 mile of Grading	14	J. C. Compton
Feb. 21, 1922	489	Camas Valley Section	Coos Bay-Roseburg	8.47	Grading	7	W. C. Stone
Feb. 21, 1922	490	Brogan-Jamieson	John Day	6.24	Surfacing	7	J. K. Shotwell
Feb. 21, 1922	491	Booth Hill-Hood River	Mt. Hood Loop	6.08	Grading	18	E. A. Webster & Company
Feb. 21, 1922	492	Booth Hill-Forest Boundary	Mt. Hood Loop	12.04	Grading	8	Johnson Contract Company
Feb. 21, 1922	493	City of Union	Old Oregon Trail	1.31	Paving	7	United Contracting Company
Feb. 21, 1922	494	Base Line-Shutler	John Day	7.94	Grading & Surfacing	17	Security Construction Co.
Mar. 23, 1922	495	Unit 1, Youngs Bay-Skipanon	Roosevelt Coast	0.33	Paving	11	Soleim & Gustafson
Mar. 23, 1922	496	Unit 2, Youngs Bay-Skipanon	Roosevelt Coast	4.20	Paving	4	J. H. Tillman Company
Mar. 23, 1922	497	Sarvice Creek Section	John Day	11.3	Surfacing with 9.7 miles of Grading	8	Montague-O'Reilley Company
Mar. 23, 1922	498	Kamela-Oro Dell	Old Oregon Trail	18.77	Surfacing	13	Porter & Conley
Mar. 23, 1922	499	Baker County Line-Weiser	Old Oregon Trail	15.54	Surfacing	7	March & Bowers
Mar. 23, 1922	500	Rainier City	Columbia River	0.09	Regrading & Surfacing	8	Soleim & Gustafson
Mar. 23, 1922	501	Nelson-Malheur County Line	Old Oregon Trail	24.09	Surfacing with 4.85 miles of Grading	12	Porter & Conley
Mar. 23, 1922	502	Coquille R. & Ten Mile Crk. Bridges near Camas Valley	Coos Bay-Roseburg		2 Wood Bridges	8	E. D. Olds
Mar. 23, 1922	503	Hood River & Evans Crk. Bridges near Parkdale	Mt. Hood Loop		1 Steel Bridge & 1 Concrete Culvert	7	Union Bridge Company
Mar. 23, 1922	504	Trout Crk. Bridge north of Madras	The Dalles-California		Concrete Bridge	7	Lindstrom & Feigenson
Mar. 23, 1922	505	Bridges between Newport & Benton County Line	Corvallis-Newport		13 Wood Trestle Bridges	4	A. Giebisch
Mar. 23, 1922	506	Grand Ronde R. & Dry Crk. Bridges near Elgin	La Grande-Enterprise		1 Steel Span & Timber Trestle	12	Union Bridge Company
Mar. 23, 1922	507	Tualatin R. Bridge near Gaston	Tualatin Valley		Concrete Viaduct	8	W. D. Hoffman
April 14, 1922	508	Cline Falls-Sisters	McKenzie	10.81	Surfacing	9	March & Bowers
April 14, 1922	509	Tumalo-Sisters	Bend-Sisters	14.96	Surfacing	9	March & Bowers
April 14, 1922	510	Canyonville-Galesville	Pacific	11.1	Paving	11	S. A. Moceri
April 14, 1922	512	McVeigh Pt. Overcrossing Approaches	Pacific	0.4	Surfacing	2	A. C. Mathews
April 14, 1922	513	Eddyville-Toledo	Corvallis-Newport	17.25	Surfacing with 0.8 mile of Grading	7	A. Giebisch
April 14, 1922	515	McMinnville-Amity	West Side	5.0	Paving	12	Cochran Construction Co.
April 14, 1922	524	Blodgett-Eddyville	Corvallis-Newport	17.2	Surfacing	5	Washburn & Hall
April 14, 1922	525	Baker-Nelson	Old Oregon Trail	26.95	Grading & Surfacing	8	Security Construction Co.
April 14, 1922	526	Arlington-Shutler	John Day	7.1	Grading & Surfacing	12	Security Construction Co.
April 14, 1922	528	Power Plant & Shell Rock Grades	McKenzie	2.06	Grading & Surfacing	11	A. F. Saar
April 14, 1922	.....	Deadmans Pass-Kamela	Old Oregon Trail	13.5	Grading & Surfacing	6	Rejected
April 14, 1922	517	Ash Swale Bridge at Amity	West Side		Concrete Viaduct	10	Tobin & Pierce
April 14, 1922	518	Birch Crk. Bridges near Pilot Rock	Oregon-Washington		2 Concrete Bridges	6	Tobin & Pierce
April 14, 1922	519	Lake Crk. & Oak Crk. Bridges near Albany	Pacific		2 Concrete Bridges	8	Tobin & Pierce
April 14, 1922	520	Deer Crk. Bridge near Bellevue	McMinnville-Tillamook		Concrete Viaduct	10	Ledoux & Ledoux
April 14, 1922	521	Yamhill River Br. near Willamina	McMinnville-Tillamock		Steel Span & Trestle Approaches	9	Marshall & Barhan
April 14, 1922	522	Bridges on Baker-Nelson Section	Old Oregon Trail		3 Concrete Bridges & 1 Steel Span	9	J. J. Burke & Co.

* Project advertised for county.
** Special agreement.

JOBS ADVERTISED AND CONTRACTS AWARDED—Continued
Period December 1, 1920, to November 30, 1922

Date of Receiving Bids	Contract No.	PROJECT	Highway	Length in Miles	Kind of Improvement	No. of Bidders	Contract Awarded to
April 14, 1922	523	Bridges on Bend-Sisters Sections	Bend-Sisters		2 Concrete Culverts & 2 Wood Spans.	6	F. H. May
April 14, 1922	531	Overcrossing near Unity	Old Oregon Trail		Concrete Overcrossing Sturucture	6	Lindstrom & Feigenson
April 15, 1922	511	Cummins Creek-Valades Ranch	John Day	14.73	Grading	8	Gus Carlson & Co.
April 15, 1922	514	Vinson Canyon-Pilot Rock	Oregon-Washington	10.71	Surfacing	13	General Construction Co.
April 15, 1922	516	Sexton Mountain	Pacific	7.5	Paving	7	A. D. Kern
April 15, 1922	527	The Dalles-Dufur	The Dalles-California	14.98	Grading & Surfacing	15	Clifton, Applegate & Toole
April 15, 1922	529	Goldson-Blachly	Will. Valley-Florence	13.63	Surfacing	4	A. D. Kern
April 15, 1922	530	Albany-Tangent	Pacific	7.3	Paving	12	V. R. Dennis Construction Co.
April 15, 1922	.....	Myrtle Point-Camas Valley	Coos Bay-Roseburg	34.8	Surfacing	2	Rejected
May 8, 1922	545	Siletz R. Bridge in Lincoln County*	County		Steel Span & Trestle Approaches	4	Monson-Trierweiler Co.
May 9, 1922	532	Myrtle Point-Coquille	Coos Bay-Roseburg	7.23	Surfacing with 1.78 miles of Grading	4	Scandia Shipbuilding Co.
May 9, 1922	533	Winston-Camas Mountain	Coos Bay-Roseburg	10.6	Surfacing	11	Metzger & Johnson
May 9, 1922	534	Walterville-Dearhorn & Doyle Hill	McKenzie	2.98	Grading & Surfacing	6	Albert Anderson
May 9, 1922	535	Halsey-Harrisburg	Pacific	7.94	Paving & 0.34 mile of Surfacing	10	Scandia Shipbuilding Co.
May 9, 1922	536	Rickreall-Holmes Gap	West Side	5.67	Paving	11	Oregon Contract Company
May 9, 1922	537	Biggs-Wasco	Sherman	9.45	Grading & Surfacing	10	Pat Lonergan
May 9, 1922	538	Units "A" & "C" Mohler-Clat. Co. Line	Tillamook	4.67	Grading & Surfacing	5	Tillamook County Court
May 9, 1922	539	Willamette R. Bridge south of Cottage Grove	Pacific		Steel Span & Trestle Approaches	5	Monson Trierweiler Co.
May 10, 1922	540	Unit 2, Myrtle Point-Camas Valley	Coos Bay-Roseburg	12.2	Surfacing	4	S. S. Schell
May 10, 1922	541	Unit 3, Myrtle Point-Camas-Valley	Coos Bay-Roseburg	10.76	Surfacing	5	L. B. Hickox & Co.
May 10, 1922	542	Hunters Head	Roosevelt Coast	4.28	Grading	17	John Hampshire
May 10, 1922	543	Harrisburg-Junction City	Pacific	3.46	Grading & Surfacing	13	Schell & McKy
May 10, 1922	544	Monmouth-Benton County Line	West Side	9.8	Paving	6	Cummins & La Pointe
May 10, 1992	.....	Unit 1, Myrtle Point-Camas Valley	Coos Bay-Roseburg	11.8	Surfacing	2	Rejected
May 31, 1922	546	Heppner Junction Morrow Co. Line	Oregon-Washington	9.6	Grading & Surfacing	5	Warren Construction Co.
May 31, 1922	547	Oregon City-Bolton	Pacific	0.3	Grading & Paving	7	Parker-Schram Co.
May 31, 1922	548	Unit 1, Myrtle Point-Camas Valley	Coos Bay-Roseburg	11.8	Surfacing	2	Warren Construction Co.
May 31, 1922	549	Merrill Section	The Dalles-California	2.6	Grading & Surfacing	5	Klamath County Court
May 31, 1922	550	Hebo-Neskowin	Roosevelt Coast	13.0	Grading & Surfacing	3	Tillamook County Court
May 31, 1922	.....	Deadmans Pass-Kamela	Old Oregon Trail	13.5	Grading & Surfacing	2	Rejected
May 31, 1922	551	Elk Creek Bridge at Drain	Pacific		Concrete Viaduct	6	Albert Anderson
May 31, 1922	552	2 Bridges on Valades Ranch-Dayville Section	John Day		2 Steel Bridges & Trestle Approaches	7	Lindstrom & Feigenson
May 31, 1922	.....	Basket Slough Br. north of Rickreall	West Side		Concrete Bridge	4	Rejected
June 28, 1922	555	Elk River-Sixes River	Roosevelt Coast	2.7	Grading	9	John Hakanson
June 28, 1922	558	Wallowa Hill	La Grande-Enterprise	5.4	Surfacing	3	Sloane Construction Co.
June 28, 1922	559	Unit 2, Ochoco Forest-Mitchell	Ochoco	12.0	Grading & Surfacing	7	Greenwood & Dann

June 28, 1922	.....	Holdman-Harps Ranch	Pendleton-Cold Springs	3.0	Grading & Surfacing	4	Rejected
June 28, 1922	.....	Myrtle Creek Bridge at Myrtle Crk.	Pacific	.....	Abutments & Repairs to Bridge	....	State Forces
June 28, 1922	561	John Day River Bridge near Rufus	Columbia River	.....	Reconstruction of Steel Bridge	5	Portland Bridge Company
June 28, 1922	567	Bridges over Siletz River, Lincoln County*	County	.....	3 Wood Truss Bridges	4	Monson-Trierweiler Co.
June 29, 1922	554	Cherryville-Forest Boundary	Mt. Hood Loop	10.7	Surfacing	3	A. D. Kern
June 29, 1922	556	Camas Mountain Section	Coos Bay-Roseburg	7.0	Surfacing	4	W. C. Stone
June 29, 1922	557	Rockaway-North	Roosevelt Coast	3.3	Surfacing	2	Tillamook County Court
June 29, 1922	560	Deadmans Pass-Kamela	Old Oregon Trail	13.5	Grading & Surfacing	2	Carlson & Nyberg
June 29, 1922	562	Multnomah County Line-Sandy	Mt. Hood Loop	6.2	Surfacing	5	Palmer Construction Co.
June 29, 1922	.....	Lostine-Enterprise	La Grande-Joseph	7.9	Grading and Surfacing	1	Rejected
June 29, 1922	564	Undercrossing near Durkee	Old Oregon Trail	.....	Abutments for Undercrossing Struc.	6	Union Bridge Company
June 29, 1922	565	Bridges on The Dalles-Dufur Sec.	The Dalles-California	.....	4 Concrete Bridges	4	Tobin & Pierce
June 29, 1922	566	Rhinehart Overcrossing	La Grande-Joseph	.....	Steel Span with Conc. Bridge Apprs.	4	Colonial Building Co.
July 14, 1922	563	Corvallis-South	West Side	0.2	Concrete Pavement	2	B. N. Bartlett
July 25, 1922	569	Unit 1, Island City-Elgin	La Grande-Joseph	6.57	Surfacing	6	Roscoe Neal
July 25, 1922	573	Umpqua R. Bridge at Winchester	Pacific	.....	7 Concrete Arch Spans with Apprs.	6	H. E. Doering
July 25, 1922	574	Bridges on Elk River-Sixes R. Sec.	Roosevelt Coast	.....	2 Steel Bridges & 1 Timber Trestle	3	Portland Bridge Company
July 25, 1922	575	Pudding River Relief Opening at Aurora	Pacific	.....	Concrete Viaduct	5	C. O. Engstrom
July 25, 1922	576	Bridges on Lostine-Enterprise Sec.	La Grande-Joseph	.....	1 Steel Span & 2 Timber Trestles	2	Wallowa County Court
July 25, 1922	577	Scoggins Creek Bridge Section	Tualatin Valley	.....	Bituminous Paving	2	Warren Construction Co.
July 25, 1922	578	Paving Yamhill River Bridge near Whiteson	West Side	.....	Bituminous Paving	2	V. R. Dennis Construction Co.
July 25, 1922	579	City of Jefferson Section	Pacific	0.9	Concrete Paving	8	B. N. Bartlett
July 25, 1922	580	Unit 2, Island City-Elgin	La Grande-Joseph	11.49	Surfacing	3	Sloane Construction Co.
July 25, 1922	581	Newberg-Multnomah County Line	West Side	12.04	Bituminous Resurface	5	Hauser Construction Co.
July 25, 1922	.....	Stices Gulch-Baker	Baker-Unity	15.5	Grading	6	Rejected
July 25, 1922	.....	Willow Creek Bridges near Heppner Junction	Oregon-Washington	.....	1 Steel Bridge & 1 Wood Truss Bridge	2	Rejected
July 26, 1922	568	Cummins Creek-Valades Ranch	John Day	14.7	Surfacing	6	Gus Carlson & Co.
July 26, 1922	570	Lostine-Enterprise	La Grande-Joseph	7.9	Grading & Surfacing	4	Wallowa County Court
July 26, 1922	571	Astoria-Goble	Columbia River	.....	Pavement Repairs & Widening	2	Warren Construction Co.
July 26, 1922	572	Baker-Haines	Old Oregon Trail	9.4	Ditching & Resurfacing	3	Newport Construction Co.
July 26, 1922	.....	Drews Valley Section	Klamath Falls-Lakeview	8.8	Grading & Surfacing	1	Rejected
Aug. 29, 1922	582	Yaquina River Bridge at Eddyville	Corvallis-Newport	.....	Steel Span, Trestle Approaches	3	Union Bridge Company
Aug. 29, 1922	583	Willow Creek Bridges near Heppner Junction	Oregon-Washington	.....	1 Steel Bridge & 1 Wood Bridge	2	Tobin & Pierce
Aug. 29, 1922	584	Yamhill R. Bridge near Willamina	McMinnville-Tillamook	.....	Steel Span & Trestle Approaches	6	Marshall & Barhan
Aug. 29, 1922	585	Units 1 & 2, Hood River-Frst. Bdy.	Mt. Hood Loop	17.04	Surfacing	9	Albert Anderson
Aug. 29, 1922	586	Unit 3, Hood River-Forest Boundary	Mt. Hood Loop	6 08	Surfacing	8	Root & Joslin
Aug. 29, 1922	587	Vinson Section	Oregon-Washington	4.0	Surfacing	1	General Construction Co.
Aug. 29, 1922	588	Holdman-Harps Ranch	Pendleton-Cold Springs	3.0	Grading & Surfacing	3	Carlson & Nyberg
Aug. 29, 1922	589	Newberg-Multnomah County Line	West Side	3.64	Concrete Resurface	6	Cummins & La Pointe
Aug. 29, 1922	590	Burns Section	Central Oregon	4.2	Grading & Surfacing	2	E. D. Larson
Sept. 1, 1922	591	Nebalem R. Bridge near Wheeler*	Roosevelt Coast	.....	Steel Draw Span & Trestle Apprs.	2	Portland Bridge Company
Aug. 29, 1922	592	Drews Valley Section	Klamath Falls-Lakeview	8.8	Grading & Surfacing	4	H. J. Hildeburn
Aug. 29, 1922	593	Valley Falls-Chewaucan Narrows	Bend-Lakeview	12.3	Surfacing	9	H. J. Hildeburn

* Project advertised for county.
** Special agreement.

JOBS ADVERTISED AND CONTRACTS AWARDED—Continued
Period December 1, 1920, to November 30, 1922

Date of Receiving Bids	Contract No.	PROJECT	Highway	Length in Miles	Kind of Improvement	No. of Bidders	Contract Awarded to
Sept. 9, 1922	594	Rock Creek Bridge near Gwendolyn*	County	.....	Steel Span & Trestle Approaches	4	Tobin & Pierce
Aug. 29, 1922	595	Prineville-Jones Mill	Ochoco	17.3	Surfacing	5	J. K. Shotwell
Aug. 29, 1922	.....	Powder River Bridge near Baker	Baker-Unity	.....	Concrete Bridge	1	Rejected
Aug. 29, 1922	.....	Calapooia R. Bridge near Tangent	Pacific	.....	Wood Trust Span	3	Rejected
Oct. 5, 1922	596	Alsea Mountain	Alsea	6.0	Grading	14	Joplin & Eldon
Oct. 5, 1922	597	Rice Hill	Pacific	2.8	Bituminous Resurface	4	J. H. Crane
Oct. 5, 1922	598	Unit 1, Lamms Mill-Fort Klamath	The Dalles-California	9.6	Grading & Surfacing	6	K. K. & K. E. Hodgman
Oct. 5, 1922	599	Unit 2, Lamms Mill-Fort Klamath	The Dalles-California	9.5	Grading & Surfacing	5	Dunn & Baker
Oct. 5, 1922	600	Unit "B," Clatsop Co. Line-Mohler	Roosevelt Coast	2.63	Grading & Surfacing	2	Tillamook County Court
Oct. 5, 1922	606	U. S. R. S. Canal Bridge near Echo	Columbia River	.....	Concrete Bridge	1	Union Bridge Company
Oct. 5, 1922	607	White River Bridge near Tygh	The Dalles-California	.....	Steel Span with Concrete Approaches	4	Union Bridge Company
Oct. 5, 1922	.....	Bear Creek Section	Oregon Caves	3.0	Grading	3	Rejected
Oct. 5, 1922	608	City of Fossil Section	John Day	0.59	Grading & Surfacing	....	Wheeler County
Oct. 5, 1922	610	Two Bridges near Dolph	McMinnville-Tillamook	.....	2 Trestle Bridges	....	Tillamook County
Oct. 5, 1922	.....	Deschutes R. Bridge near Shearar's*	County	.....	60' Steel Span with Trestle Apprs.	4	Rejected
Oct. 6, 1922	601	Madras-Wasco County Line	The Dalles-California	15.65	Surfacing with 9.35 miles of Grading	6	More & Anderson
Oct. 6, 1922	602	Keene Creek-Klamath County Line	Ashland-Klamath Falls	12.34	Surfacing	6	S. S. Schell
Oct 6, 1922	603	Jackson County Line-Hayden Creek	Ashland-Klamath Falls	9.83	Surfacing	6	W. C. Stone
Oct. 6, 1922	604	Hayden Creek-Keno	Ashland-Klamath Falls	12.12	Grading	2	John Hampshire
Oct. 6, 1922	605	Parkersburg Section	Roosevelt Coast	4.73	Grading	8	D. B. Plymale
Dec. 21, 1922	609	Unit 2, Sarvice Creek-Valades Rch	John Day	12.1	Surfacing	7	Metzger & Johnson
Dec. 21, 1922	611	Deschutes R. Bridge near Shearar's*	County	.....	60' Steel Span & Trestle Approaches	2	Union Bridge Company
Dec. 21, 1922	612	Malheur R. Bridge near Juntura*	County	.....	90' Steel Span & Trestle Approaches	4	Union Bridge Company
Dec. 21, 1922	.....	Oregon City-Canemah	Pacific	0.94	Grading	8	Action Pending

* Project advertised for county.
** Special agreement.

CONCRETE PAVEMENT AND BRIDGE ON THE PACIFIC HIGHWAY SOUTH OF COTTAGE GROVE

Report

of the

State Highway Engineer

to the

State Highway Commission

of the

State of Oregon

1921-1922

Herbert Nunn, State Highway Engineer

LETTER OF TRANSMITTAL

Salem, Oregon, December 1, 1922.

TO THE HONORABLE STATE HIGHWAY COMMISSION,

R. A. BOOTH, Chairman.

J. B. YEON, Commissioner.

W. B. BARRATT, Commissioner.

Gentlemen:

I have the honor to submit to you herewith the report of the State Highway Engineer for the fiscal period, December 1, 1920, to November 30, 1922.

At this time I desire, also, to express my appreciation of the excellent way in which you have at all times cooperated with your engineering department, and of the loyal and fearless way in which you have stood behind that department in its endeavor to carry out in a creditable manner the details of Oregon's state highway work, and to watch over and guard the best interests of the state in the expenditure of the many millions of dollars involved in that work. I wish, too, to add, that if any credit is due for the part in the work of the past two years which has been performed by the engineering department, such credit is due because of the loyal and efficient service of those by whom I have had the honor of being assisted. The work of your engineering department is not the work of one man, but it is the coordinated work of many faithful employes.

Respectfully submitted,

HERBERT NUNN,
State Highway Engineer.

Report of the

State Highway Engineer

to the

State Highway Commission

Dec. 1, 1920, to Nov. 30, 1922

PROGRESS IN STATE HIGHWAY CONSTRUCTION

During the biennium just closed, the carrying out of the extensive road building program commenced by the State of Oregon in 1917 has gone steadily on, with the result that a very considerable number of miles of completed highway has been added to the state's already creditable mileage of good roads, and with the result that a four thousand mile system of state highways, which six years ago existed on paper only, is now more than 50 per cent complete, with practically all of the more important and most expensive portions entirely completed.

The work performed during this two-year period has consisted of the construction of 300 bridges, 785 miles of graded roadway, 831 miles of rock and gravel surfacing, and 276 miles of pavement, all of this in addition to much improvement work of a minor nature such as the installation of an extensive system of road signs, the widening and otherwise bettering of many miles of previously constructed highway, the construction of guard fences, etcetera. This work, added to the work performed during previous years and to completed work within cities and towns and within Multnomah County, brings the state highway system to the following state of improvement: 837.7 miles paved; 1,197.3 miles surfaced with rock and gravel; 475.4 miles graded and ready for surfacing; and 1,940.2 miles unimproved, the term unimproved, as here used, meaning not yet graded to state highway standards of width, grade and alignment. Expressed on a percentage basis, the 4,450.6 miles of highways in the state highway system are now 18.8 per cent paved, 26.9 per cent surfaced with rock or gravel, 10.7 per cent graded and ready for surfacing, and 43.6 per cent unimproved.

A segregation of the mileages of work performed during the years 1921 and 1922, as between the mileages performed during each of the two years, is as follows:

CLASS OF WORK	Miles of construction work performed		
	1921	1922	Total
Concrete Pavements	51.0	24.6	75.6
Bituminous Pavements	125.0	75.7	200.7
Broken Stone and Gravel Surfacing	433.9	397.1	831.0
Grading	449.7	336.0	785.7

From the above tabulation, it will be noted that, for each class of work, the mileage performed during 1922 was less than that performed during 1921. This reduction represents a gradual tapering off of the work as the limit of funds available under authorized bond issues is approached, which reduction will continue until the work performed each year reaches such an amount as can be financed with the regular annual state highway income supplemented by such cooperation as may be received from the Federal Government and from counties.

FUNDS AVAILABLE AND EXPENDED

Under the several authorized bond issues, and from the several other sources of income, approximately $37,000,000.00 has become available since December 1, 1920, for expenditure under the supervision of the State Highway Commission. Of that amount, $28,900,000.00 was state funds, $4,800,000.00 was county funds, $3,220,000.00 was federal government funds, and $80,000.00 was railroad funds.

Of the whole amount, $30,905,255.49 was expended during the 1921-22 biennium, this expended amount comprising the following expenditures from each of the several classes of funds during each of the two years:

	1921	1922	Total
State Funds	$15,031,655.14	$ 7,767,995.43	$22,799,650.57
County Funds	985,831.42	3,814,402.13	4,800,233.55
Federal Government Funds	2,181,956.65	1,043,695.07	3,225,651.72
Railroad Funds	46,378.16	33,341.49	79,719.65
Totals	$18,245,821.37	$12,659,434.12	$30,905,255.49

This total expended amount is more than one and one-half times as great as the total amount expended during the 1919-1920 biennium, and is greater than the total amount expended for highway construction, under state jurisdiction, in all time prior to 1921.

The relative proportions of expenditures under the several main heads of expenditure classification are very clearly indicated in the chart on the opposite page, as are also the relative proportions of the main income items. For more detailed information as to the receipts and expenditures in connection with the work of the department, reference should be made to the section of this report devoted to financial statements.

WORK UNDER CONTRACT

Inclusive of uncompleted work under contracts let during the 1919-1920 biennium, there were under contract for construction during 1921 and 1922 a total of 304.7 miles of paving, 1,181.2 miles of rock and gravel surfacing and 974.4 miles of grading. Of these mileages, there remains uncompleted on November 30, 1922, 28.4 miles of paving, 350.2 miles of rock and gravel surfacing, and 187.7 miles of grading.

The total estimated cost of the work referred to in the above paragraph as work under contract during 1921 and 1922 is approximately $32,000,000.00, and for the part of this work completed during 1921 and 1922 there has been expended approximately $26,500,000.00, leaving a total obligation under uncompleted contracts of approximately $5,500,000.00.

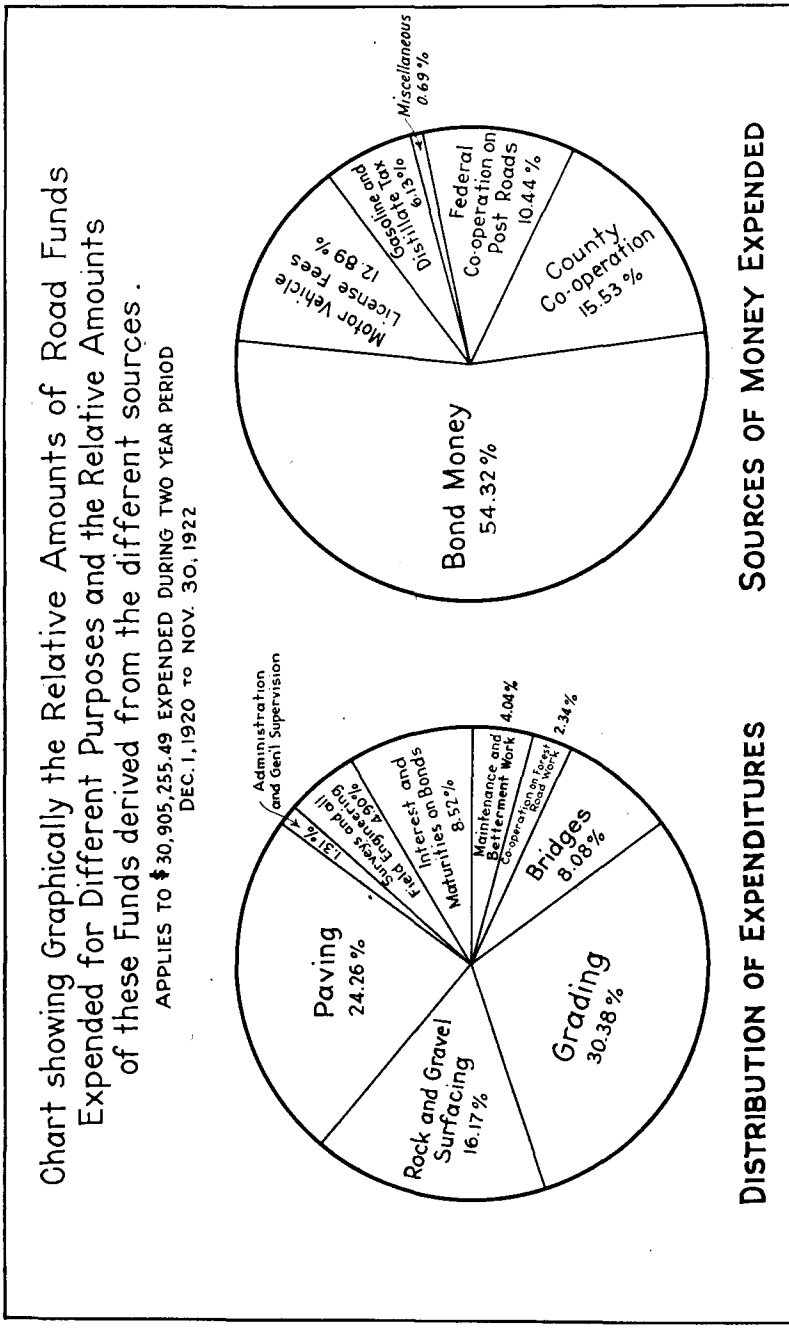


Chart showing Graphically the Relative Amounts of Road Funds Expended for Different Purposes and the Relative Amounts of these Funds derived from the different sources.
APPLIES TO $30,905,255.49 EXPENDED DURING TWO YEAR PERIOD
DEC. 1, 1920 TO NOV. 30, 1922
Paving 24.26 %
Rock and Gravel Surfacing 16.17 %
Grading 30.38 %
Bridges 8.08 %
Co-operation on Forest Road Work 2.34 %
Maintenance and Betterment Work 4.04 %
Maturities on Bonds and Interest 8.52 %
Field Engineering 4.90 %
Surveys and all 1.31 %
Administration and Genl Supervision
DISTRIBUTION OF EXPENDITURES
Bond Money 54.32 %
County Co-operation 15.53 %
Federal Co-operation on Post Roads 10.44 %
Miscellaneous 0.69 %
Distillate and Gasoline Tax 6.15 %
Motor Vehicle License Fees 12.89 %
SOURCES OF MONEY EXPENDED

FUNDS AVAILABLE FOR EXPENDITURE DURING 1923 AND 1924

At the beginning of the year 1923, there is in the State Highway Fund (exclusive of Market Road money) a balance of $2,256,179.10. There is available under authorized bond issues $4,180,000.00, and it is estimated that the total of the revenues during the two years 1923 and 1924 from the gasoline tax, the automobile license fees, the quarter-mill highway tax, interest on bank balances and earnings of the state highway equipment department, will aggregate not less than $8,575,000.00. Summarizing these figures, we have a total of more than $15,000,000.00 as the amount of state money that will be available for expenditure by the State Highway Commission during the 1923-24 biennium.

In addition to the $15,000,000.00 of available state money, there will become available several millions of dollars of federal, county and railroad money, the exact amount of which is difficult to estimate. Executed agreements call for $1,735,000.00 of federal money, $2,825,000.00 of county money, and $140,000.00 of railroad money. An additional $2,230,000.00 of federal money has been apportioned to the state, one million of which can to be drawn upon after July 1, 1923, and the balance after July 1, 1924. It is reasonable to expect that additional county cooperation to the extent of at least $500,000.00, and additional railroad cooperation to the extent of at least $70,000.00 will be obtainable during the biennium.

Adding the amounts of available cooperative funds to the $15,000,000.00 of state money available, would indicate an available total of $22,500,000.00. It must be taken into consideration, however, that some of the counties may fail to pay off their obligated cooperation during the biennium, and that it may be impossible to collect the full amounts of federal cooperation before the end of the two-year period. To be safe, it must be assumed that actually paid county cooperation will not exceed $2,600,000.00; that actually paid federal cooperation will not exceed $3,500,000.00, and that actually paid railroad cooperation will not exceed $150,000.00, which amounts, added to the $15,000,000.00 of state money, give a total of $21,250,000.00 as the probable cash income for the binennium.

Of this probable cash income of $21,250,000.00, $5,500,000.00 will be required to complete contracts in effect at the beginning of the fiscal year 1923, $4,250,000.00 will be required to pay interest and maturities on bonds. Approximately $800,000.00 must be reserved to cooperate with the Federal Government in the construction of forest roads. Approximately $2,000,000.00 must be reserved for maintenance and betterment work, about $300,000.00 for equipment and shop operation, and about $650,000.00 for such items as road signing, policing, surveys, administration and supervision, etcetera. Not less than $750,000.00 must be held for contingencies, overruns of estimates, and unforseen expense of all kinds. Subtracting these amounts from the probable cash income leaves a balance of $7,000,000.00, and this balance represents an estimate of the amount of money available for new work, that is, work in addition to that under contract on November 30, 1922.

Analyzing the situation further, we find that of the $7,000,000.00 available for new work approximately $750,000.00 must be turned over to the Federal Government as state cooperation in forest road construction, if the state is to secure the forest road money which has been allotted to it by the Government. There is also approximately $500,000.00 tied up

under post road agreements, which designate particular projects upon which this amount is to be spent, although the work involved still remains to be contracted. Taking these things into consideration, we find that the amount available for new contracts to be let by the State Highway Commission during 1923 and 1924 is approximately $6,250,000.00, of which amount $500,000.00 must be used in the contracting of certain post road work already agreed upon, leaving $5,750,000.00 for the contracting of projects which had not been decided upon up to November 30, 1922.

Analyzing the situation still further, we find that, in order to receive the Federal aid funds which we have included in the $21,500,000.00 of available funds, it will be necessary that of the new contracts to be let, contracts totaling approximately $3,500,000.00 must be for post road work, and must, therefore, be for projects located upon the Federal aid highway system and subject to approval by the Federal Bureau of Public Roads.

Summarizing all of the above, we arrive at the following conclusions:

(a) That the probable income during the 1923-24 biennium will be approximately $21,250,000.00.

(b) That of this income all but $7,000,000.00 is obligated in connection with contracts in force on November 30, 1922, and in connection with fixed expenses, such as maintenance, payment of interest and maturities on bonds, operating expense, etcetera.

(c) Of the $7,000,000.00 unobligated, $750,000.00 must go to the Federal Government for forest road work; $500,000.00 must be used in letting contracts to complete post road projects agreed upon prior to November 30, 1922; $3,500,000.00 must be used in letting contracts for post road projects not yet agreed upon; and $2,250,000.00 will be available for contracts upon work over which the Bureau of Public Roads will have no authority.

POST ROAD PROJECTS

On account of the more or less radical changes which have recently been made in the basis of Federal cooperation on post road projects, these projects are being handled by the department as of two separate series. The first series comprises projects numbers 1 to 53, inclusive, these being projects which are cooperated upon by the Federal Government under the Federal Aid acts of July 11, 1916, and February 28, 1919. The second series comprises all projects subsequent to project number 53, these being projects upon which Federal aid is granted under the Federal Aid acts of November 9, 1921, and June 19, 1922. In the discussion which follows, these two series of projects will be treated separately.

In the first series there were forty-seven projects involving 356 miles of grading, 292 miles of rock or gravel surfacing, and 83 miles of paving. All of this work is now entirely completed, and in connection with it there has been expended to date a total of $9,952,616.23. A balance of approximately $8,150.00 remains unpaid, which will bring the completed cost of the work to approximately $9,958,770.00, of which the Federal Government will contribute $4,292,476.77, the counties $1,088,621.27, the railroad companies $10,229.66, and the state the balance of approximately $4,567,-

440.00. Of the $4,292,476.77 to be contributed by the Federal Government, $4,266,233.78 has already been received, and the balance of $26,242.99 should be received within the next few weeks. Receipt of this payment will close the Federal cooperation in connection with this first series of projects, and all post road work from this time on will have to do with the projects in the second series.

Before taking up the projects which are being handled under the second series, it will be well to bring out some of the more important features in connection with the Federal Aid acts under which the Federal aid on these projects is authorized, as these acts have established a policy for government cooperation which is quite different from that under the prior acts. In the first place, the post road feature of the prior acts has been entirely abandoned, and it is no longer required that mail be carried over a road in order to make it eligible for Federal aid. Instead, the more recent acts provide for the designation of a Federal Aid system of highways, and limit the expenditure of Federal money to projects upon such a system. The section of the act making these provisions reads as follows:

"Sec. 6. That in approving projects to receive Federal aid under the provisions of this act, the Secretary of Agriculture shall give preference to such projects as will expedite the completion of an adequate and connected system of highways, interstate in character."

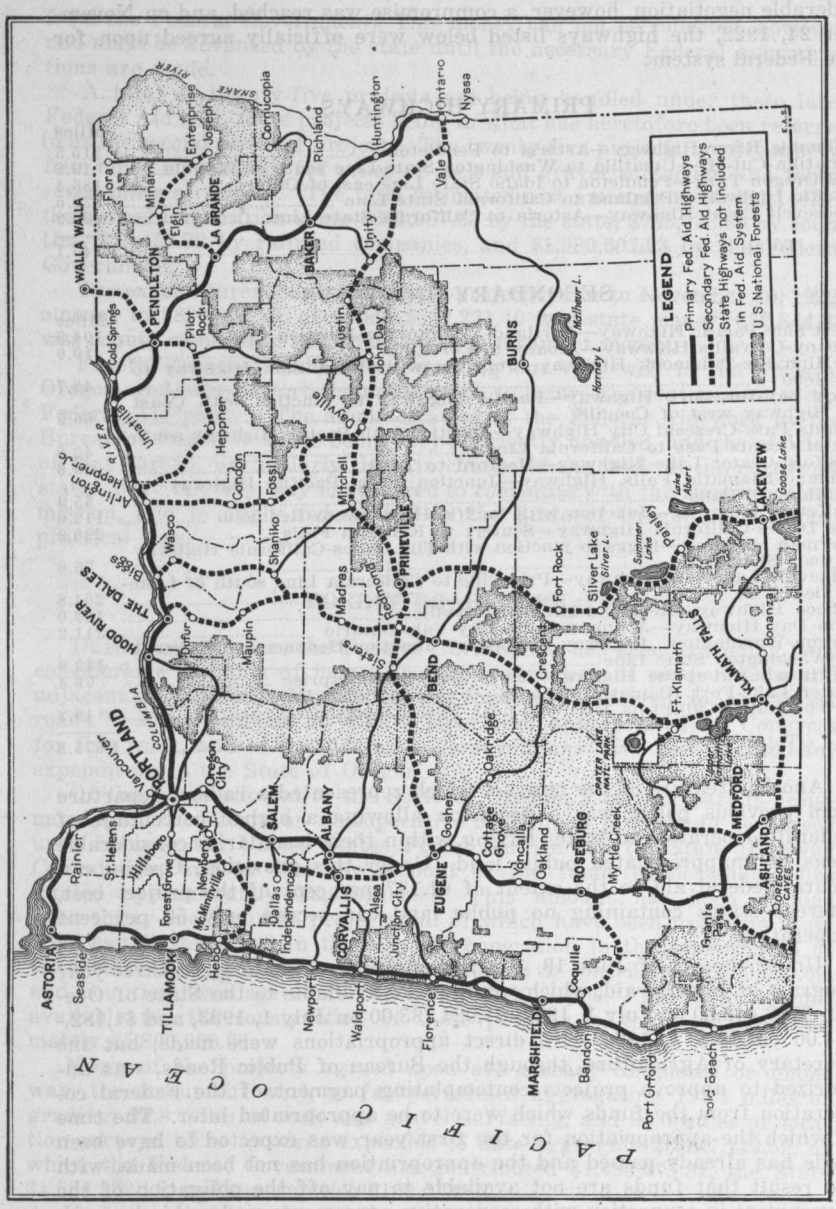
"Before any projects are approved in any state, such state, through its State Highway Department, shall select or designate a system of highways not to exceed seven per centum of the total highway mileage of such state as shown by the records of the State Highway Department at the time of the passage of this act."

"Upon this system all Federal aid apportionments shall be expended."

"Highways which may receive Federal aid shall be divided into two classes, one of which shall be known as primary or interstate highways, and shall not exceed three-sevenths of the total mileage which may receive Federal aid, and the other which shall connect or correlate therewith and be known as secondary or intercounty highways, and shall consist of the remainder of the mileage which may receive Federal aid."

"The Secretary of Agriculture shall have authority to approve in whole or in part the systems as designated or to require modifications or revisions thereof; provided, that the states shall submit to the Secretary of Agriculture for his approval any proposed revisions of the designated system of highways above provided for."

Under the above provisions the State of Oregon, having 41,825.7 miles of public roads, is entitled to a Federal system of highways having a total length not to exceed 2,927.8 miles, of which mileage not more than 1,254.8 miles may be primary highways and the balance must be secondary highways. Upon this basis the State Highway Commission selected and recommended to the Bureau of Public Roads certain highways which it favored having included in the Federal Aid system. While in general the recommendations of the Highway Commission were approved, the officials of the bureau would not agree to accept them in their entirety. After con-



MAP SHOWING THE FEDERAL AID HIGHWAY SYSTEM FOR THE STATE OF OREGON AS APPROVED BY THE U. S. BUREAU OF PUBLIC ROADS

Federal cooperation in the construction of highways can be obtained only upon projects which are on the Federal aid system. Note that the highways represented by the lighter solid black lines are not included in this system.

siderable negotiation, however, a compromise was reached, and on November 24, 1922, the highways listed below were officially agreed upon for the Federal system:

PRIMARY HIGHWAYS

	Miles
Columbia River Highway—Astoria to Pendleton	315.5
Umatilla Cut-off—Umatilla to Washington State Line south of Wallula	19.8
Old Oregon Trail—Pendleton to Idaho State Line east of Ontario	186.4
Pacific Highway—Portland to California State Line	322.5
Roosevelt Coast Highway—Astoria to California State Line	400.9
Total	1,245.1

SECONDARY HIGHWAYS

	Miles
West Side Pacific Highway—Portland-McMinnville-Junction City	104.9
Albany-Corvallis Highway—Albany to Corvallis	10.0
McMinnville-Tillamook Highway—Junction with West Side Highway to Hebo	48.7
Coos Bay-Roseburg Highway—Pacific Highway to junction with Coast Highway west of Coquille	65.5
Grants Pass-Crescent City Highway—Junction with Pacific Highway south of Grants Pass to California Line	42.8
Medford-Crater Lake Highway—Medford to Trail	23.6
Ashland-Klamath Falls Highway—Junction with Pacific Highway to Klamath Falls	55.9
McKenzie Highway—Junction with Pacific Highway to Redmond	112.6
The Dalles-California Highway—Seufert to Klamath Falls	290.3
Sherman Highway—Biggs to junction with The Dalles-California Highway near Shaniko	75.0
Prineville-Lakeview Highway—Prineville to California Line south of Lakeview	201.8
Ochoco Highway—Redmond-Mitchell-Dayville	113.0
John Day Highway—Arlington-John Day-Vale-Ontario	311.2
Oregon-Washington Highway—Heppner Junction-Heppner, Pendleton-Washington State Line	143.9
La Grande-Enterprise Highway—La Grande to Enterprise	66.4
Crater Lake-Fort Klamath Highway—Crater National Park Boundary to The Dalles-California Highway near Fort Klamath	10.2
Total	1,675.8

Another feature of the new act which represented a radical departure from previous policy was a provision allowing a higher percentage of Federal cooperation to states having within their boundaries considerable areas of unappropriated public land. Under this provision, Oregon can secure Federal aid to the extent of 61.137 per cent of the project cost, whereas states containing no public land can secure only 50 per cent cooperation.

Under the act of June 19, 1922, provision was made for a three-year program of Federal aid, which would make available to the State of Oregon $788,442.60 on July 1, 1922, $1,024,785.00 on July 1, 1923, and $1,182,664.00 on July 1, 1924. No direct appropriations were made, but the Secretary of Agriculture, through the Bureau of Public Roads, was authorized to approve projects contemplating payment of the Federal cooperation from the funds which were to be appropriated later. The time at which the appropriation for the first year was expected to have been made has already passed and the appropriation has not been made, with the result that funds are not available to pay off the obligation of the government in connection with cooperative agreements under this last act.

The State of Oregon has a number of projects under this last act, some of which are in the construction stage and have money due upon them

from the Federal Government. This money can not be collected, however, and must be advanced by the state until the necessary Federal appropriations are made.

A total of twenty-five projects are being handled under these later Federal Aid acts, these projects being in what has heretofore been referred to as the second series of projects. The twenty-five projects involve ninety-four miles of grading, 187 miles of rock and gravel surfacing, and forty-seven miles of paving. The total estimated cost amounts to $3,482,140.98, the agreed cooperation being $681,957.23 by the state, $735,123.80 by counties, $75,452.72 by railroad companies, and $1,989,607.23 by the Federal Government.

The expenditures made upon these projects prior to November 30, 1922, amount to $890,363.10, of which $537,221.40 was state money, $72,844.83 was county money and $280,296.87 was government money.

Federal cooperation has been working out very well in the State of Oregon, and every effort should be made to insure the continuance of the Federal Aid policy. The administration of the Federal Aid work by the Bureau of Public Roads is being very efficiently handled, and the officials of that bureau, particularly those in charge of the work in the northwest states, have in every way endeavored to cooperate with the Highway Commission, and to apply federal aid in the State of Oregon in the most practical way.

FOREST ROAD WORK

During recent years the Federal Government has been expending very considerable amounts of money in the construction of roads within and adjacent to National Forests, which roads are referred to as "forest roads." Many millions of dollars have been appropriated by Congress for this work, and of these funds several millions have been allotted for expenditure in the State of Oregon.

Of the funds allotted to the State of Oregon, a certain part is designated for expenditure on a cooperative basis upon projects to be agreed upon between the United States Forest Service and the State Highway Commission, and to date the amount of the funds so designated has totaled approximately $2,600,000.00. This amount has been applied upon thirty-one separate projects, all of which have been upon the State Highway System, and in the way of cooperation in the construction of these thirty-one projects the State has agreed to contribute $2,300,000.00, and counties have agreed to contribute $900,000.00. The total amount available for the construction of these projects is, therefore, approximately $5,800,000.00.

Many of the projects agreed upon are already completed or under way, the amount of work so far performed aggregating 194.4 miles of grading, 99.8 miles of rock and gravel surfacing, and 36.0 miles of location surveys. The amounts expended to date aggregate $3,197,119.59, of which the Federal Government has contributed $1,493,473.82, the State $1,534,232.11, and the counties $169,413.66.

Under acts of Congress authorizing forest road work, approximately $1,300,000.00 is expected to become available during the next two years for expenditure upon cooperative forest road work of the class above

described. To match this, it is estimated that approximately $750,000.00 of state money and approximately $750,000.00 of county money will be required. These amounts added to the $1,300,000.00 of government money will make the total amount available during 1923 and 1924 for new forest road projects about $2,800,000.00.

The forest road work comes under the control of the United States Forest Service, but the engineering and construction details are handled by the United States Bureau of Public Roads. The State Highway Commission has practically no authority in connection with forest road work other than to have a voice in the matter of the selection of projects. The state and county funds used in cooperation on forest road work are paid over to the Federal Government as they are required during the progress of the work.

For a complete list of the thirty-one forest road projects so far agreed upon, together with the estimated costs, cooperative shares, amounts expended, etc., see the table for forest road projects included in the part of this report devoted to financial statements.

FEDERAL AID APPORTIONED TO OREGON

The following tabulation shows the funds that have been apportioned to Oregon under the various Federal Aid Acts.

Period for Which Funds Are Apportioned	Post Roads	Forest Roads	Total
Act of July 11, 1916:			
July 11, 1916, to June 30, 1917	$ 78,687.37	$ 127,794.00	$ 206,481.37
July 1, 1917, to June 30, 1918	157,374.74	128,111.00	285,485.74
July 1, 1918, to June 30, 1919	236,332.74	132,796.00	369,128.74
July 1, 1919, to June 30, 1920	314,983.63	131,966.00	446,949.63
July 1, 1920, to June 30, 1921	394,038.01	130,071.00	524,109.01
July 1, 1921, to June 30, 1922	.....	128,661.00	128,661.00
July 1, 1922, to June 30, 1923	.....	122,967.00	122,967.00
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:			
February 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
Act of November 9, 1921:			
November 9, 1921, to June 30, 1922	1,182,663.90	310,749.00	1,493,412.90
July 1, 1922, to June 30, 1923	.....	846,360.00	846,360.00
Act of June 19, 1922:			
July 1, 1922, to June 30, 1923	788,442.60	.....	788,442.60
July 1, 1923, to June 30, 1924	*1,024,785.00	* 425,000.00	1,449,785.00
July 1, 1924, to June 30, 1925	*1,182,664.00	* 425,000.00	1,607,664.00
Total Funds Appropriated	$8,510,733.76	$3,889,538.00	$12,400,271.76
Expended to Date	4,546,530.65	1,493,473.82	6,040,004.47
Obligated to Complete Existing Projects	1,735,553.35	1,103,045.13	2,838,598.48
	$6,282,084.00	$2,596,518.95	$ 8,878,602.95
Total Balance Available	$2,228,649.76	$1,293,019.05	$ 3,521,668.81

* Approximate amounts. Definite apportionments not yet made.

COUNTY COOPERATION IN WORK ON STATE HIGHWAYS

Under cooperative agreements in effect at the beginning of the 1921-1922 biennium, and under cooperative agreements entered into during that biennium, a total of $7,624,762.44 of county money has been obligated for expenditure in cooperation with the State on construction work on state highways. Of this amount $4,800,233.55 was disbursed during the two-year period, of which amount $1,622,821.71 was paid out by counties upon vouchers drawn by the State Highway Department, and $3,177,-411.74 was paid into the State Highway Fund for disbursement by the State. Subtracting the amount of the disbursements from the amount of the obligations, leaves $2,824,528.89 as outstanding county obligation in connection with state highway work as of November 30, 1922. 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 amounts mentioned above, counties have obligated themselves to the extent of $794,185.66 in connection with the 1921-1922 forest road work. This work is all on state highways, but is handled under the supervision of the United States Bureau of Public Roads representing the United States Forest Service. County expenditures during 1921 and 1922 on this forest road work have amounted to $67,142.21, leaving an obligated balance payable by counties of $727,043.45.

STATE AID TO COUNTIES IN THE CONSTRUCTION OF MARKET ROADS

During the three-year period in which the "Market Road act" has been in operation, a total of $3,052,078.71 has been raised by means of the State Market Road tax for the purpose of aiding counties in the construction of their local roads. Of this amount $2,772,840.24 had, to November 30, been turned into the State Market Road fund, and $2,571,-190.39 had been paid out of that fund in the form of state aid.

Reports from the county officials in control of market road expenditures indicate that during the three-year period a total of $5,690,692.41 has been expended on market road work, which amount is inclusive of both the state money turned over to the counties and the county money with which the state money was matched.

The work accomplished by this expenditure of $5,690,692.41 is reported by the county officials to consist of 595 miles of grading, 462 miles of rock and gravel surfacing, and 48.4 miles of paving.

On November 30, 1922, there is a balance on hand in the State Market Road fund of $213.649.85, and on or before January 1, 1923, the balance of the 1922 State Market Road tax, which balance amounts to $279,238.47, will be paid into that fund, bringing the total amount in the fund as of January 1, 1923, to $492,888.32. Of this $492,888.32, $485,967.82 will be paid over to the counties as soon as available. This will complete the 1922 apportionment, and there will be carried over for apportionment with the 1923 funds a balance of $6,920.50.

For the information of those who may not be familiar with the operation of the Market Road act, it should be stated that the disbursement of market road money is entirely under the control of county officials. The State Highway Commission apportions the state's share of the market road money among the counties in accordance with the basis of apportionment outlined in the Market Road act, but further than this the Highway Commission has very little authority. The act requires that plans for market road work be submitted to the Highway Commission for approval, but it gives the Highway Commission no authority to require the counties to perform the work in accordance with the plans which they submit. On account of this lack of authority, the State Highway Commission can not and does not assume or accept any responsibility for the efficiency or inefficiency with which market road funds are expended.

On account of the inadequacy of the accounting systems in use by many of the counties, it is practically impossible to segregate expenditures for market road work from those made upon other road work, which fact, it is believed, has resulted in quite a considerable expenditure of market road money for the maintenance and improvement of roads which are not officially designated as market roads. On the other hand, it is a fact that much county road money other than market road money is used along with the market road money in the conduct of market road work. This condition results in making it practically impossible, in many counties, to secure an accurate accounting of market road expenditures.

The Market Road act is not as definite as it should be in regard to the basis to be used by the Highway Commission in apportionment of funds and as to the basis upon which the state money is to be matched by the counties. It has been the policy of the Commission in making the apportionments, to require at least fifty-fifty cooperation by the counties, and to accept the gross amount of the county market road levy as the amount of the county cooperation, regardless of whether or not that gross amount was actually later collected and used in market road work. The impossibility of determining prior to the making up of the county budgets the amounts of money which the counties may have apportioned to them, has resulted in some counties being unable to collect their full shares of state aid on account of not having made high enough market road levies, and in other counties being able to collect state money considerably in excess of what would have been available to them had the other counties been able to accurately estimate the amount of state money that they would have to match.

In spite of those features which have been referred to above, which tend to interfere with the most satisfactory and successful operation of the Market Road act, as it was intended by the Legislature, the market road work has gone ahead with dispatch, and, on the whole, has been efficiently handled. The act has undoubtedly encouraged very materially the construction of more and better county roads, and it is thus serving the purpose for which it was enacted. Every county in the state has availed itself of the benefits of the act and has endeavored to secure its full share of state aid.

The amounts of state aid money which have been apportioned to each of the several counties since the act went into effect are given in the following table, and complete, detailed information in regard to county and state market road levies, in regard to expenditures and in regard to mileages of work performed, is given in tables which appear in the section of this report which is devoted to statistical information.

STATE FUNDS APPORTIONED TO COUNTIES FOR MARKET ROAD WORK

(1920 to 1922, Inclusive)

COUNTY	Amount Apportioned			
	1920	1921	1922	Total
Baker	$ 33,042.66	$ 33,202.52	$ 30,923.50	$ 97,168.68
Benton	17,061.33	16,990.50	18,177.77	52,229.60
Clackamas	47,601.79	35,628.81	49,423.58	132,654.18
Clatsop	40,148.59	44,986.98	42,818.32	127,953.89
Columbia	20,433.77	41,808.56	21,733.14	83,975.47
Coos	31,149.76	24,459.41	32,190.86	87,800.03
Crook	8,477.15	9,993.55	8,323.86	26,794.56
Curry	5,304.40	5,418.96	5,391.25	16,114.61
Deschutes	14,190.06	10,856.50	15,413.31	40,459.87
Douglas	37,050.68	34,173.39	39,560.42	110,784.49
Gilliam	14,735.79	17,784.61	15,269.56	47,789.96
Grant	11,189.79	13,475.84	11,404.11	36,069.74
Harney	15,907.50	19,320.55	16,173.06	51,401.11
Hood River	13,764.65	15,929.40	14,170.89	43,864.94
Jackson	41,114.37	41,020.76	38,601.85	120,736.98
Jefferson	7,368.33	7,792.56	8,070.47	23,231.36
Josephine	11,527.61	12,276.32	10,974.85	34,578.78
Klamath	23,420.53	21,038.87	25,543.54	70,002.94
Lake	15,633.24	12,027.32	15,597.83	43,258.39
Lane	55,918.09	56,145.97	56,343.43	168,407.49
Lincoln	10,316.51	11,000.22	10,986.95	32,303.68
Linn	42,656.82	45,359.97	43,829.97	131,846.76
Malheur	20,813.50	24,328.09	23,948.62	69,090.21
Marion	58,455.99	62,673.91	60,602.44	181,732.34
Morrow	15,672.61	15,251.03	16,027.95	46,951.59
Multnomah	99,043.55	104,083.90	103,647.38	306,774.83
Polk	24,482.14	25,500.00	26,449.79	76,431.93
Sherman	15,414.52	19,618.91	16,939.75	51,973.18
Tillamook	22 696.60	27,372.71	24,372.04	74,441.35
Umatilla	62,465.43	66,113.94	66,006.14	194,585.51
Union	29,655.90	30,822.83	29,951.96	90,430.69
Wallowa	19,975.85	17,528.65	17,869.19	55,373.69
Wasco	23,211.88	26,205.24	24,677.09	74,094.21
Washington	41,253.66	41,934.48	42,899.15	126,087.29
Wheeler	7,305.95	6,574.60	7,236.73	21,117.28
Yamhill	32,174.46	21,862.75	33,007.19	87,044.40
Total amounts apportioned	$ 990,435.46	$1,020,562.61	$1,024,557.94	$3,035,556.01

THE COLUMBIA RIVER HIGHWAY

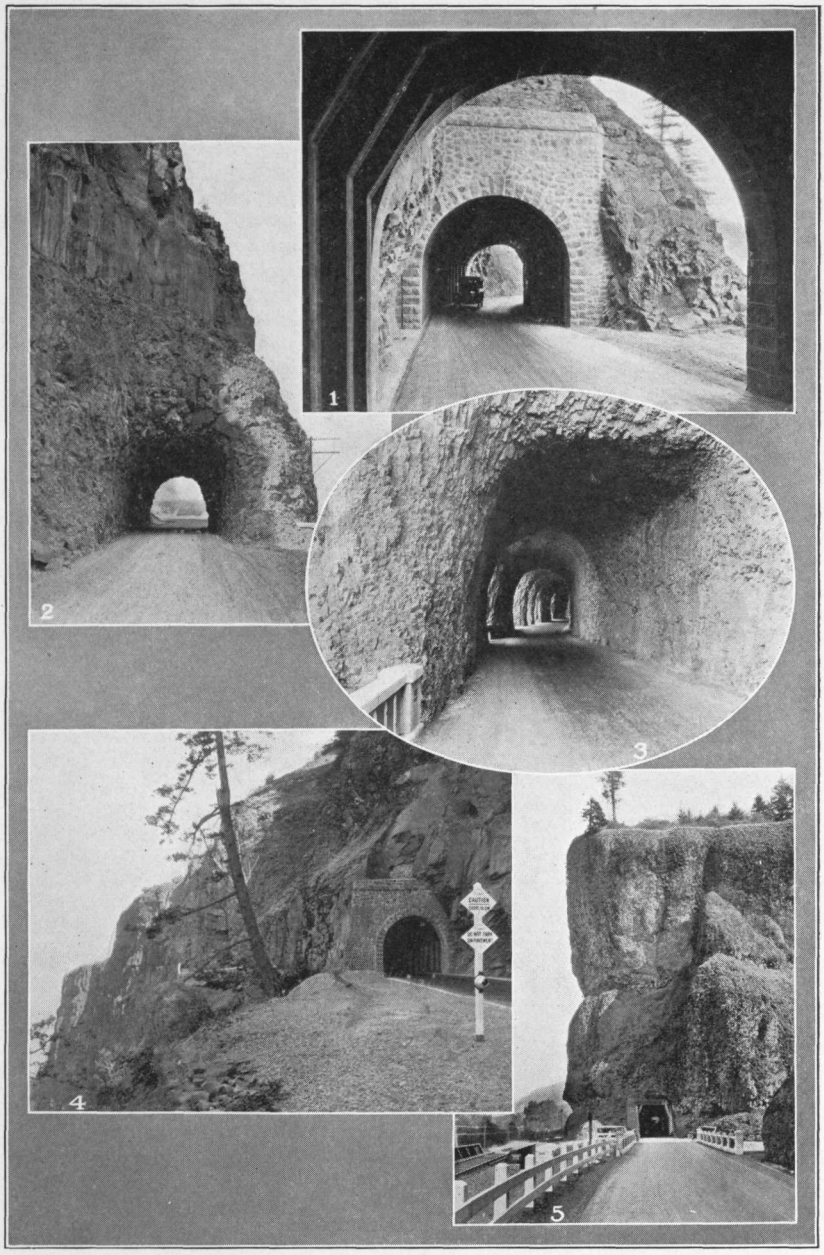
Except for the construction of one single mile of pavement, the Columbia River Highway is, at the end of the year 1922, a completed highway.

This highway, which parallels the Columbia River from Astoria, through Clatskanie, Rainier, St. Helens, Portland, Hood River and The Dalles, to Umatilla, where it turns up the Umatilla River to a junction with the Old Oregon Trail at Pendleton, is 340 miles in length. Except for one mile within the city of Rainier, it is paved continuously from Astoria to a point two miles east of The Dalles, a distance of 202 miles. It is paved also for a distance of two miles at the Pendleton end, the pavement extending from the terminus west to a point one mile west of Pendleton. The unpaved section between The Dalles and Pendleton is 136 miles in length, and is surfaced all the way with broken stone and gravel. The unpaved one mile in the city of Rainier is now surfaced with broken stone and will be paved during the 1923 season.

The completed cost of the Columbia River Highway, exclusive of the cost of those sections which are within towns and cities, will aggregate approximately $11,000,000.00. Of this amount approximately $7,600,000.00 will have been paid by the state, approximately $1,100,000.00 by the Federal Government, and the balance of $2,300,000.00 by the counties through which the highway passes. Of the county money, Multnomah County has contributed the major portion, that county having expended approximately $1,500,000.00 in the improvement of the part of the highway within its limits.

The Columbia River Highway is considered to be one of the finest and most scenic highways in existence, and its construction represents an achievement in road building which is not equaled anywhere. For many miles it has been necessary to construct the roadbed for this highway upon the precipitous and rugged walls of the Columbia River Gorge, and to literally carve the roadway out of the solid rock. In many places the rock bluffs overhang the finished highway, and at five 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 features of great interest from an engineering standpoint, as well as from a scenic standpoint. The natural scenery along the route is surpassed nowhere. Beautiful mountain streams are crossed at frequent intervals, many of the crossings being within full view of magnificent waterfalls, some of them hundreds of feet in height. Wonderful views are obtainable from the many points where the highway overlooks the great Columbia River from points many hundred feet above it. Excellent camping places have been developed at convenient intervals, and nothing has been left undone that would contribute to the comfort and pleasure of the traveler.

A very inadequate idea of some of the views to be obtained, and of some of the construction features, can be had from a few views of the highway shown in this report, which views are included primarily to show up some of the more recent work. Particular attention is called to the cut on the opposite page showing four of the five tunnels through which the highway passes on the section between Portland and The Dalles.



TUNNELS ON THE COLUMBIA RIVER HIGHWAY

1. Twin Tunnels East of Hood River
2. Tunnel Near Deschutes River Crossing
3. Mitchell Point Tunnel
4. The Westerly of the Twin Tunnels
5. Tunnel at Oneonta Gorge

PACIFIC HIGHWAY PRACTICALLY COMPLETED

At the close of the sixth year since the improvement of our most important state highway was commenced, this highway, 345 miles in length, stands practically completed. Three hundred and twenty-seven miles are paved and the remaining eighteen miles have been improved to the point where they form a very excellent all-season road.

Of the unpaved eighteen miles, six miles are unfinished portions of work under going contracts, and will be completed early in the coming season. An additional six and one-half miles are ready for paving during 1923, and will probably be placed under contract within the next few weeks. The remaining five and one-half miles consist of fourteen short gaps at points where future grade crossing elimination, future bridge construction and other considerations prevent the immediate construction of the highway to the final grade and alignment which the plans contemplate. Arrangements are under way which will lead to the completion of many of these gaps within the next year or two, but it will probably be five years or more before all of them will be taken care of.

The improvement of the Pacific Highway has cost to date approximately $13,000,000.00, of which $11,600,000.00 has been contributed by the state, $450,000.00 by the Federal Government, $70,000.00 by the Southern Pacific Railway Company, and $780,000.00 by the counties through which the highway passes.

In the Pacific Highway the State of Oregon has an asset which will pay ever-increasing dividends as time goes on. This highway has made the state accessible to the motor tourist, and in itself is an attraction which brings thousands of visitors within our borders. Already the produce transported over it equals in volume that transported by the average main line railway, and a passenger transportation service has been provided which no railroad could hope to supply. In addition to these things the highway has made possible all-year communication between many centers of population which prior to its construction were practically isolated from one another during the winter months. It has also supplied a most excellent market road for the many highly developed agricultural districts through which it passes.

THE ROOSEVELT COAST HIGHWAY

The Roosevelt Coast Highway, which is eventually to be one of the two or three most important highways in the State of Oregon, has, during the past few years, been extensively improved, and while this highway has not yet been opened up over its entire length, a very considerable part of it has been completed in accordance with modern state highway standards and much more of it is in very excellent traveling condition during the major portion of the year.

Owing to the rugged nature of much of the country through which this highway is being constructed, its completed cost is going to run into several millions of dollars. It is estimated that its final cost, when its grading and surfacing in accordance with the standards which have been laid out for it have been completed, will be in the neighborhood of ten million dollars, but as work to the value of approximately four and one-half million dollars has already been completed or placed under contract, the cost to complete it is not such as to place its completion beyond the expectations of a very few years.

The total length of the Roosevelt Coast Highway, from its northern termius at Astoria to its junction with the state highway system of the State of California, is 409 miles. Of this distance, 59.1 miles are, on November 30, 1922, paved; 64.1 miles are surfaced with rock and gravel, and 15.5 miles are graded ready for surfacing. These mileages are mileages of entirely completed work, and are not inclusive of the 30 miles of grading and 21.5 miles of surfacing which are under contract.

To complete the highway in accordance with present plans will require the construction of approximately 235 miles of grading and approximately 260 miles of surfacing, these mileages being in addition to the mileages referred to above as being under contract.

Of the $3,500,000.00 representing the approximate total of expenditures made in the construction of the Roosevelt Coast Highway since the improvement of this highway in accordance with present high standards was undertaken in about 1914, the State has contributed $2,250,000.00, the Federal Government $250,000.00, and the counties through which the highway passes $1,000,000.00. To complete the highway will require a total expenditure of approximately $6,500,000.00, of which approximately $1,000,000.00 is already obligated under executed contracts.

The standards to which it is proposed to complete the Roosevelt Coast Highway vary somewhat with the topographical conditions encountered and the relative importance of different portions of the highway. There are to be no grades in excess of 5 per cent. Over the major portion of the route the roadbed will have a minimum width of twenty-four feet and the surfacing will have a minimum width of sixteen feet. In a few places where the cost of construction is very high the width of roadbed will be cut to sixteen feet and the width of surfacing to twelve feet.

The estimates of cost to complete the highway do not include the cost of bridges which will some day be required at the crossings of the Rogue River, Coos Bay, Umpqua and Siletz Rivers, and Alsea, Yaquina and Siletz Bays. The present plans contemplate the use of ferries at these crossings.

For information as to the sections of the Roosevelt Coast Highway which have already been improved or which are under contract for improvement, and for information as to the types of improvement on these sections, reference should be made to the colored map of the State Highway System, which map is included in this report.

PAVING

Profiting by experience with lighter types of pavements and by more complete knowledge of the volume of traffic and weights of loads which our roads must carry, the State Highway Commission has, during the past biennium, constructed somewhat heavier pavements than had been constructed prevously. It has not confined itself to the construction of any one type of pavement, but has in each case used the type which, as far as it is possible to foretell, will give the longest and most satisfactory service under the particular conditions of subgrade and traffic involved on the section of highway to be paved. The Commission has satisfied itself that no one type of pavement is the best pavement, and that no one type can be successfully used under all conditions. Under some conditions one type will prove more satisfactory than another, while under certain other con-

ditions, the first type will not give the service that the second will. Often it is impossible to determine in advance which of two types of pavement will give the better service, and in cases of this kind the selection of type is controlled by relative costs.

Relative cost has, of course, a bearing in every case, as it is necessary that paving costs be held to a minimum. A fact that seems to be little appreciated is that the problem in road surfacing is not the problem of constructing a pavement which will successfully carry the traffic to which it will be subjected, but instead, it is the problem of determining the absolute minimum of thickness, strength, width and cost with which a pavement can be constructed and still stand up under the traffic for a long period of time. It is not at all difficult to build a pavement that will carry the load and have the desired length of life, but it is difficult to build such a pavement when the cost must be kept within the limits of what the public can afford to pay.

The Commission believes that the types of pavement which it has built during the past biennium are the lowest cost types that can be built with assurance that they will give proper service under the unfavorable conditions to which pavements are subjected in this state. The types of pavement here referred to are two in number, one being a five-inch bituminous pavement on a heavy macadam foundation, and the other being a seven-inch concrete pavement.

The macadam base course for the bituminous pavement is never less than six inches in thickness, and is much thicker under unfavorable subgrade and drainage conditions. The bituminous pavement itself, consists of a bituminous base course three inches in thickness with a bituminous wearing surface two inches in thickness.

The seven-inch concrete pavement is constructed of a concrete consisting of one part of Portland cement, two parts of sand and three parts of broken stone or gravel. This pavement is the same thickness over its entire width, and it is laid with or without a foundation course of sand or gravel, as the conditions involved may require.

Most of the pavements constructed during the past two years have had a width of sixteen feet, which width has been supplemented by a two-foot rock or gravel shoulder along each side for use in case it becomes necessary to turn off the pavement, and for the protection of the edges of the pavement. In a few instances where the volume of traffic to be carried was very great and where unusually circuituous alignment was involved, eighteen-foot pavements have been constructed.

A total of 276.3 miles of pavements were built during 1921 and 1922, this mileage consisting of 200.7 miles of bituminous pavement and 75.6 miles of concrete pavement. The total expenditure for pavement during this period amounted to approximately $7,500,000.00, giving an average per mile cost slightly in excess of $27,000.00. On the average, concrete pavements have cost approximately $2,500.00 more per mile than bituminous pavements.

It is to be noted that a considerably smaller mileage of pavements was laid during the 1921-1922 biennium than during the previous two-year period, the mileage for 1919 and 1920 having been 347.2 miles. The reduction will be even more marked in the next biennium during which period it is likely that not more than 50 or 75 miles of pavement will be laid.

The following table gives an interesting comparison of the numbers of miles of pavement constructed during each of the six years since paving work on a large scale was commenced.

YEAR	Miles of Bituminous Pavement	Miles of Concrete Pavement	Total Miles of Pavement
1917 and 1918	45.2	4.8	50.0
1919	144.6	18.5	163.1
1920	167.7	16.4	184.1
1921	125.0	51.0	176.0
1922	75.7	24.6	100.3

At the end of 1922, there are 837.7 miles of pavement on the State Highway System, and there are 179.0 miles of pavement on county roads, making a total of 1,016.7 miles of paved roads in the State.

BROKEN STONE AND GRAVEL SURFACING

A road in the State of Oregon can give its full measure of service only when it is surfaced. The climatic conditions in the State are such that an unsurfaced road can be traveled by motor vehicles for only a fractional part of the year; for not to exceed six months in some localities. This condition makes it absolutely necessary that roads of any considerable importance be surfaced.

On account of the high first cost of pavements, it is not within the financial ability of the State to surface with pavement any more than the most heavily traveled of the 4,450 miles of state highways; certainly the State can not pave more than one-quarter of this mileage for several years to come. This fact requires that the major portion of the state highway system be surfaced, at least temporarily, with some type of surfacing less expensive than pavement.

The most satisfactory type of low cost surfacing yet developed is the broken stone or gravel surfacing. A most excellent and easily maintained surfacing of this kind can be constructed at a cost of about $6,000.00 per mile. This type of surfacing has, therefore, been adopted by the Highway Commission as the type to be used upon those state highways and upon those sections of state highways which can not be paved.

During the 1921-1922 biennium a total of 831 miles of broken stone and gravel surfacing were constructed, 434 miles having been constructed in 1921 and 397 miles in 1922. For this class of improvement the Highway Commission expended during the two years approximately $5,000,000.00, giving a unit cost of almost exactly $6,000.00 per mile.

Most all of the broken stone and gravel surfacing constructed was sixteen feet in width, although on some of the more important sections widths of eighteen and twenty feet were used, and on some of the less important sections widths of twelve and fourteen feet were used. In general the surfacing has been constructed in two courses with a total thickness of eight inches. The best results have been obtained when broken

stone or crushed gravel having a maximum size of three-quarters of one inch was used in the top four inches of the surfacing, and the use of this fine material for the top course has been adopted as standard. It has been proved conclusively that a surfacing with this fine top material can be maintained better and at much less expense, than a surfacing with coarse material in the top. The first cost is somewhat greater, but this is much more than offset by the saving in maintenance cost.

The Oregon Highway Department claims the distinction of having discovered the advantages of using fine materials in the top of broken stone and gravel surfacing, and of having developed its use. That it is a distinct improvement over the usual practice has been proved by the fact that adjoining states have adopted it, and that officials of the Bureau of Public Roads have pronounced the results obtained by the Oregon Department in the construction of broken stone and gravel surfacing to be superior to those obtained in any other state.

At the close of 1922, there is under contract for construction during 1923 a total of 350 miles of broken stone and gravel surfacing.

GRADING

The first step in road improvement is, necessarily, the construction of the roadbed. It is not only the first step, but it is the most important step, for the roadbed is the only permanent part of the road structure, and unless it is properly constructed a good road can not result. The surfacing placed upon the roadbed, whether it be a rock surfacing or pavement, must depend upon the roadbed for its support, and it must follow the alignment and grade of the roadbed whether they be good or bad.

Realizing this fact, the Highway Commission has endeavored to build good roadbeds; to build them on lines and grades that will serve for all time; to drain them well so that they will last and so that they will be good foundations for the surfacings that they are to carry; and to construct them in such manner that they will be safe. More than 30 per cent of the money expended by the Highway Commission during the past two years went into the construction of roadbeds. More than $9,000,000.00 was expended during that period upon this one feature of highway work, and this expenditure has resulted in the addition of 786 miles to the mileage of standard roadbed on the state highway system. Contracts for an additional 188 miles are in force on November 30, 1922.

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 is 200 feet. The same standards of grade and curvature apply on highways of lesser importance except that in extreme cases 6 per cent grades and 100-foot radius curves are used.

To insure the safety of motorists, substantial wood guard fences are constructed on the outsides of sharp curves and along the shoulders of high embankments. Also, at the time the roadbed is graded all curves are banked or superelevated in anticipation of the superelevation of the surfacing when that is added.

BRIDGES

During 1921 and 1922, the Highway Commission has had under construction a total of 318 bridges, and upon bridge construction work it has expended approximately $2,500,000.00. As would be indicated by the average cost per structure, which is slightly less than $8,000.00, it is apparent that the majority of the structures were small, but nevertheless the work of the two-year period has included the construction of several large and expensive structures, chief among which are the bridge over Youngs Bay at Astoria, the bridge over the Willamette River at Oregon City, and the combined bridge and overhead crossing on the Pacific Highway at Myrtle Creek.

The Youngs Bay Bridge at Astoria is a draw bridge of the double-leaf trunnion bascule type, the draw giving a clear channel opening 150 feet in length. The total length of this structure inclusive of pile trestle approaches, is 1,765 feet, and its completed cost was $360,146.86. The design is clearly indicated in the three-view cut shown on the opposite page.

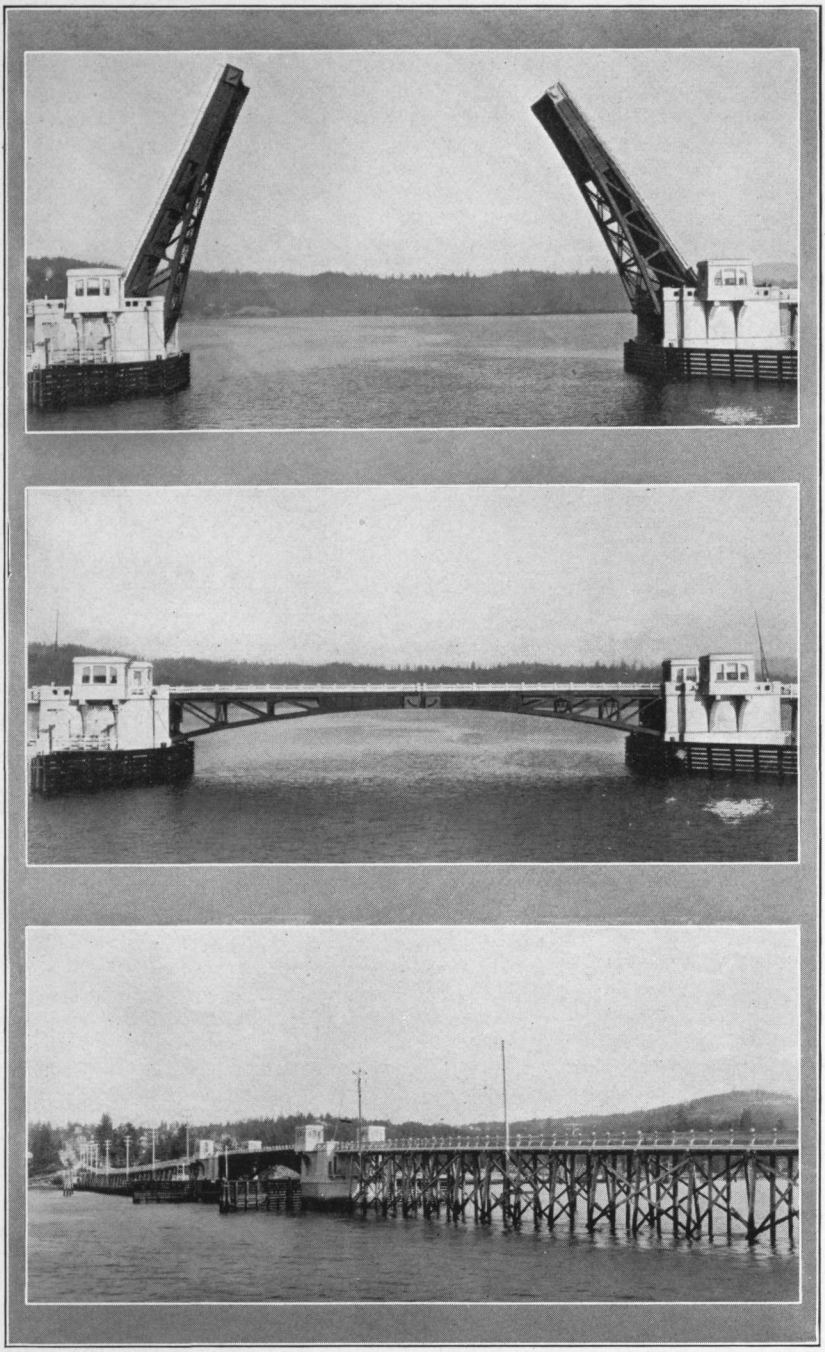
The Oregon City Bridge over the Willamette River is a concrete structure 850 feet in length, the main span being a 350-foot concrete-encased steel arch. It is probably the most artistic appearing large bridge in the State. Its completed cost will be in the neighborhood of $265,000.00.

The construction of a very excellent bridge over the Umpqua River at Winchester is underway at the close of 1922. This structure will consist of seven concrete arch spans, each 112 feet in length. It will cost completed, approximately $120,000.00.

An important feature of the bridge work handled by the State Highway Commision, is the furnishing of designs and the supervising of construction for bridges on county roads. This service is furnished to the counties without charge in compliance with a state law directing the Highway Commission to prepare designs for county bridges upon the request of County Courts. During the two years just passed thirty such designs have been prepared, the total of the cost estimates for the structures concerned amounting to $230,000.00. Thirteen county bridges designed by the State have been constructed during this period, and ten more are in process of construction as the period closes. The aggregate value of the structures completed is approximately $110,000.00, and of those in process of construction, $95,000.00. The most noteworthy of the county bridges designed by and constructed under the supervision of the Highway Commission is the Park Place Bridge over the Clackamas River. This bridge is on a heavily travelled county road between Oregon City and Portland. Its completed cost was $49,752.04.

The work of preparing the designs for the large number of bridges and other structures necesary in connection with the improvement of the Highway System, represents in itself a very considerable task. Altogether 169 designs were prepared during 1921 and 1922 for structures having spans in excess of twenty feet. In addition to this, designs were prepared for 74 structures having spans less than twenty feet. The sum of the estimated costs of all structures designed during the two-year period is $2,000,000.00.

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.



YOUNGS BAY BRIDGE ON THE ROOSEVELT COAST HIGHWAY
SOUTH OF ASTORIA

MAINTENANCE

The maintenance of the highways which have been constructed during the last few years has now become a very important part of the work handled by the Highway Commission, and the magnitude of this work will increase as the construction of new highways progresses. Last year this work involved the maintenance of 485 miles of bituminous pavement, 105 miles of concrete pavement, 700 miles of rock and gravel surfacing, and 1,600 miles of subgrade and earth road, which mileages are entirely exclusive of any mileage of new work constructed during 1922.

The maintenance of the mileages stated above, inclusive of the maintenance of bridges, cost during the one-year period a total of $609,188.91, distributed as follows:

Maintenance of bituminous pavement	$ 46,669.31
Maintenance of concrete pavement	25,186.90
Maintenance of rock and gravel surfacing	164,862.94
Maintenance of subgrade and earth road	226,169.29
Maintenance of bridges	124,339.97
Superintendence of maintenance	13,872.95
Miscellaneous maintenance expense	8,087.55
Total	$609,188.91

From the above figures, it is possible to arrive at average per mile costs for the maintenance of different classes of work, but such average costs could hardly be considered representative of the relative costs of maintaining different types of improvement over a period of years. The major portions of the costs of maintaining pavements have been incurred in the maintenance of only a few miles of pavements which are too light to carry the heavy traffic which is being put over them. The cost of maintaining concrete and bituminous pavements of the types constructed by the Highway Commission during the past three years has been negligible. The cost of maintaining subgrade and earth road has been high on account of the expense of removing slides which inevitably come in during the first year or two after new grades are constructed. The cost of maintaining rock and gravel surfacing is probably not far from what the maintenance of this type of surfacing will cost over a period of years, although it is probably below rather than above what will be the average.

The total expenditure for maintenance work of all kinds during the whole of the 1921-1922 biennium has amounted to $1,128,614.18. In addition to this, $120,729.26 has been expended for what is classed as betterment work, which work comprises the construction of guard fence, the installation of additional drainage, the widening of roadbeds, and other work performed subsequent to original construction that is an improvement to the road, as distinguished from a repair.

ELIMINATION OF GRADE CROSSINGS

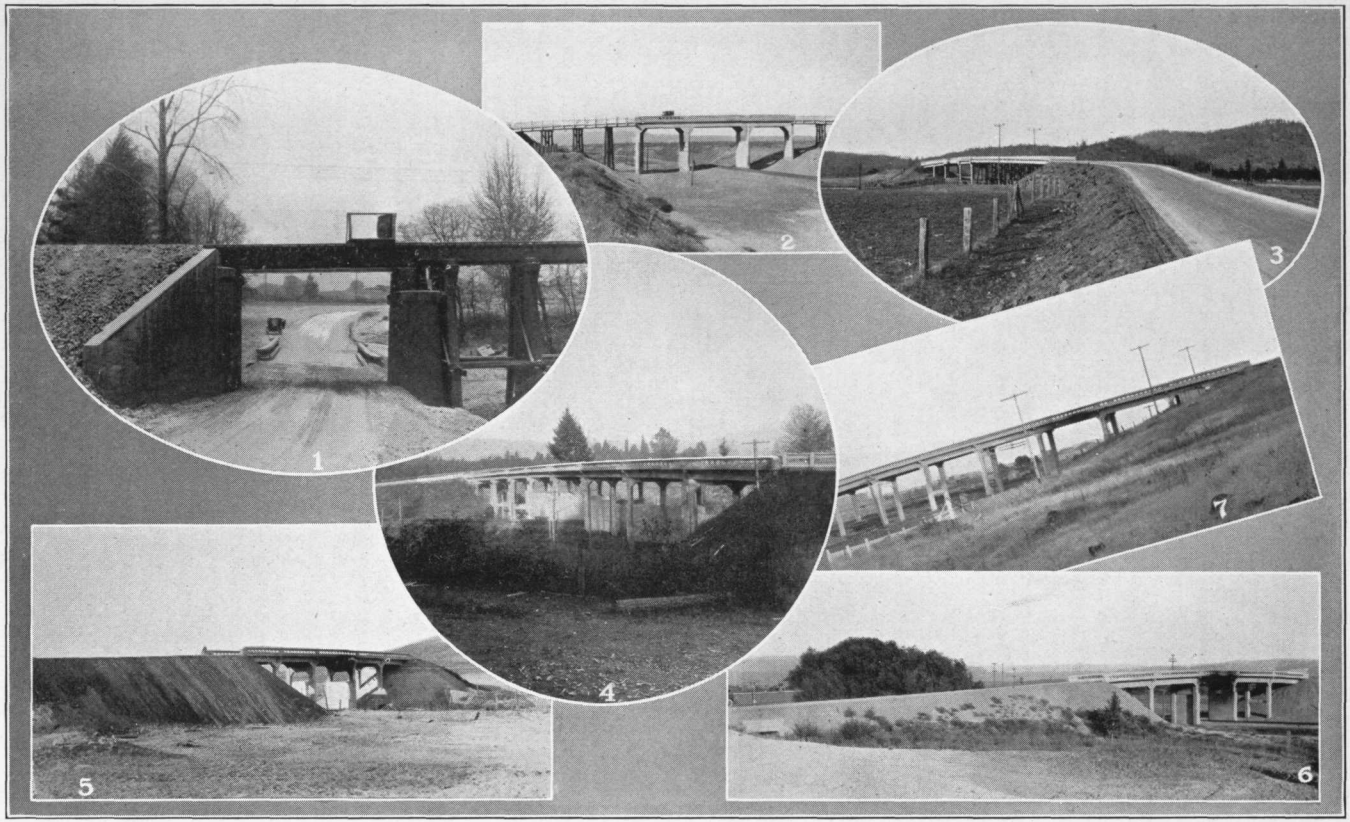
One of the features in connection with state highway location and construction which receives special attention from the Highway Commission is the matter of crossings with railroads. Modern traffic conditions demand that grade crossings be avoided wherever possible, and that where they can not be avoided they be made safe.

In the selecting of routes for state highways it has been endeavored, to avoid, as far as possible, the crossing of railway tracks, and in the construction of highways which must cross tracks it has been the policy to cross either above or below the railway grade, unless the cost of such crossing would be prohibitive or not warranted by the conditions involved. It was quite common for the old roads, which have been followed more or less generally by the state highways, to meander back and forth across railway tracks, with more or less disregard for the the danger involved. In the reconstruction of such roads it has been the policy to eliminate these unnecessary crossings by staying on one side or the other of the tracks throughout.

By the consistent following out of this policy to avoid crossings with railways, to eliminate existing grade crossings, and to construct the fewest possible number of new grade crossings, the number of grade crossings on the 4,450 miles of state highways has been reduced to 121, and the number of undercrossings on the highway system has been increased from eight to nineteen, and the number of overcrossings from nine to thirty-one. It would be impossible to estimate what the cost of avoiding and eliminating grade crossings by means of the relocation of old roads and by the selection of routes free from railway crossings has been, but the cost of constructing the eleven undercrossings and the twenty-two overcrossings which have been built since the improvement of the state highway system was commenced in 1913 has amounted to approximately $850,000.00. In the construction of these grade separations it has been possible for the Highway Commission to secure very considerable amounts of cooperation from the railway companies and from counties, the result being that of the $850,000.00 expended upon grade separations, $220,000.00 was contributed by the railway companies and $180,000.00 by the counties.

Applications have been filed with the Public Service Commission for permission to construct over and under crossings at several points on the Pacific Highway where grade crossings have been temporarily allowed to remain. It is expected that action will be obtained upon these applications in time to enable the completion of the structures before the end of the coming season.

In the cut on the opposite page are shown a few of the more recently constructed over and under crossing structures.



SOME OF THE OVERHEAD AND UNDERGRADE RAILWAY CROSSINGS CONSTRUCTED DURING THE 1921-1922 BIENNIUM

1. North of Albany
2. Near Messner
3. Near Tolo
4. South of Eugene
5. Near Telocaset
6. Near North Powder
7. At Hot Lake

HAULING WITH STATE TRUCKS AND OTHER STATE FORCE CONSTRUCTION OPERATIONS

At the opening of the 1922 construction season it was decided to utilize the large number of trucks received from the Federal Government, by performing with State forces and equipment, the hauling work in connection with rock and gravel surfacing contracts. This work being largely an equipment proposition, it was considered that it could best be handled by the Equipment Department, and it was therefore turned over to that department, and the superintendence of the work delegated to A. B. McLeod.

The hauling operations were concentrated on two projects, the Corvallis-Newport Highway between Toledo and Blodgett, 34.4 miles, and the Coos Bay-Roseburg Highway between Myrtle Point and Camas Mountain, 41.8 miles. On each of these projects the removal of slides, preparation of subgrade, crushing of surfacing materials, spreading and dragging, was done by contract, only the hauling being done by the State.

On the Newport-Corvallis project, 32,616 cubic yards of materials were handled with a total of 166,557 yard-miles of haul. On the Coos Bay-Roseburg Highway, 53,705 cubic yards of materials were handled with a total of 146,289 yard-miles of haul. Altogether 86,322 cubic yards of materials were handled, with a total of 312,846 yard-miles of haul. The total cost of the hauling, including rental of trucks at standard rates, was $74,147.30, which figures a unit cost of 23.7 cents per yard-mile. If no charge were made for the use of the state-owned trucks, then the average hauling cost, inclusive of all labor, oil, gasoline, field repairs, and other operating expense, would be 16.7 cents per yard-mile.

The experience of the past season indicates that the rental charges which have been in effect on trucks up to this time is considerably more than enough to fully take care of the upkeep cost and depreciation and, for this reason, it is planned to make a reduction in these rental rates, which reduction will be reflected in lower average hauling costs on state hauling work.

The decision to operate the state trucks proved to be a wise one, because, as the season advanced, a shortage of commercially operated trucks developed, which resulted in the delaying of work on many contracted jobs. The fact that the state hauling was concentrated upon jobs in close proximity also worked out advantageously, as it was possible to shift trucks from one unit to another to take care of varying outputs from the crushers, thus reducing idle time and increasing the output of materials.

In addition to the hauling work described above, the State has handled a limited amount of other state force work, which work has also been in charge of what might be called the construction division of the Equipment Department. This work includes the following projects:

(1) Hamlet Junction-Tillamook County Line Section of the Roosevelt Coast Highway; construction of broken stone surfacing (inclusive of crushing).

(2) Salem-Brunk's Corner Section of the Salem-Dallas Highway; building shoulders, deepening ditches and widening roadbed.

(3) Cascade Locks-Hood River Section of the Columbia River Highway; widening roadbed and cutting away points to improve the sight distance, and widening the insides of sharp curves.

(4) Astoria-Multnomah County Line Section of the Columbia River Highway; widening roadbed and cutting away points to improve sight distance.

(5) Rice Hill Section, the Pacific Highway in Douglas County; widening roadbed and ditching.

In addition to the work on these projects, state trucks were used on the surfacing of the Bee Ranch-Dolph Section and the resurfacing of the Sheridan-Grand Ronde Section of the McMinnville-Tillamook Highway in connection with contract work.

All of the jobs referred to above, as well as the roadbed widening and ditching on the Multnomah County Line-Newberg Section of the West Side Highway, and the hauling of surfacing materials on the Green Springs Mountain Section of the Ashland-Klamath Falls Highway, both of which jobs were done during 1921, are described in detail in the detailed job descriptions which appear in this report under appropriate headings in the respective counties.

Besides making use of the Government trucks and turning them into road value, state force work also serves to hold together a nucleus of state force organization for use in emergency, or for use whenever it becomes desirable to undertake a job on a state force basis. It serves also to give first hand cost data for use in the making up of cost estimates for various construction operations. The state force organization built up during the last season worked very smoothly, and results as to costs and accomplishments have been very satisfactory.

REGULATION OF TRAFFIC AND POLICING OF STATE HIGHWAYS

Prior to 1920 the enforcement of the motor vehicle laws was in the hands of the peace officers of the various municipalities and counties. As the number of motor vehicles increased, however, accidents and thefts increased in a greater ratio, and it became evident that it was necessary to check up, and to control by more stringent laws, the operation of a type of vehicle which was unquestionably a necessity yet at the same time a menace to life and property. It was admitted that the present laws were inadequate, and one of the principal results of the Special Session of 1920 was to provide a code for more strict regulation of the operation of motor vehicles, which gave the courts wider latitude in dealing with offenders, provided a means of identification of the motor vehicle operator, and provided the State with administrative officers whose duties would be confined to the enforcement of this one particular law, thus creating a state traffic force to cooperate with the constituted police powers in the several localities. Penalties were provided in the law in the form of fines or jail sentences, and each individual operator was required to be licensed, and the license record filed by the Secretary

of State. As an added precautionary measure, the courts and the Secretary of State were empowered to suspend or revoke the license of the operator for cause. Under the provisions of the 1920 law, effective July 1, 1920, the Secretary of State was authorized to appoint three traffic officers, who entered upon their duties and became the nucleus of the present state traffic force. In June, 1921, under authority of the 1921 Legislature, regular session, this force was increased to seven, one of whom was to act as Chief Inspector.

At the special session held in December, 1921, further legislation was enacted for the protection of both the traveling public and the State's extensive highway system. Supervisory and regulatory powers were given to the Public Service Commission in the matter of stage lines and truck freight lines, and a schedule of fees in addition to the regular motor vehicle license fees was adopted. The same legislature also gave the State Highway Commission the authority to limit weights and speeds on any highway, and to close certain highways whenever, in the judgment of the Commission, it is necessary to do so for the protection of the highways. This has been done in a few instances during the winter season, particularly in the case of highways only partially completed. The new law also provided that no logs or piling should be hauled over the state highways without a special permit from the Highway Commission. This was to prevent commercial logging over state highways where there were other means of transportation available, and also to give the Highway Commission closer control over this class of traffic, which had previously done considerable damage. Fifty-two log hauling permits were issued by the Highway Commission during 1922.

Authority was also given to the Commission to employ such traffic officers to enforce the motor vehicle laws as seemed necessary, and under this authority six men were commissioned and placed in the field soon after March 1, 1922. In order to avoid duplication and confusion, the traffic enforcement work of the Commission was placed in charge of the Chief Inspector of the Motor Vehicle Division of the Secretary of State's office, who had previously handled the law enforcement work, and who continued as head of the department, acting for both the Highway Commission and the Secretary of State and reporting to each. All appointments of personnel were made by the Chief Inspector subject to approval of the Commission or Secretary of State for respective employes. This made a combined force of thirteen men and the state was divided into eleven patrol districts, the districts being determined on the basis of mileage of improved highways and motor vehicle registration. An officer was appointed to each district with one man operating at large and the chief of the force to supervise the work.

The officers have been impressed with the fact that the policy of the State was: first, the safety of the public; second, the protection of the highways; and, third, to see to it that the license fees prescribed in the laws were collected. They were further instructed that the purpose for which the force was created was to secure an observance of the law and not merely a large number of arrests. Constant attention to duty with courtesy to all but partiality to none has been adopted as a working motto. The traffic officers have been properly equipped with motorcyles and automobiles and weighing devices, called loadometers, for detecting overloaded trucks. A part of the traffic officer's equipment is a

small supply of road maps, copies of the law, etc., for the information of tourists and others. He also carries a small first aid kit for use in case of accidents.

The Biennial Report of the Chief Inspector, covering the period October 1, 1920, to September 30, 1922, gives the following information:

License activities		8,518
Activities directed against improper lighting equipment and its operation, reckless driving, speeding and all violations containing an element of danger		9,370
Trucks inspected, weighed and equipment investigated		6,418
Stolen cars recovered		42
Accidents investigated		345
Assistance rendered tourists		95
Warnings issued		14,706
Arrests		2,358
Miscellaneous activities		50
Total activities		41,902
Days in the field		4,640
Patrol miles covered		288,073
Amount of delinquent license fees collected as a result of activities of state traffic officers	$ 88,922.50	
Amount of fines imposed by the courts as a result of activities of state traffic officers	32,116.65	
Total		$121,039.15

In addition, the value of stolen cars recovered amounted to approximately $17,470.00.

The total cost of all the traffic enforcement work from the beginning to September 30, 1922, a period of two years and two months, was $56,818.05, and of this expenditure there was on hand equipment at that date inventoried at $8,395.00. A comparison of these figures makes a very satisfactory showing, and in addition there is the further thought that possibly human lives have been saved, due to the fact that such a force existed and operated to curb recklessness.

One international and three interstate motor vehicle traffic conferences were attended and much valuable information obtained as to how the growing traffic problem was being met in other states. In addition to the traffic officers mentioned above, the Commission has also deputized seventeen of its regular employes, who are working in various parts of the state, to enforce traffic regulation without additional compensation. T. A. Raffety is Chief Inspector and maintains an office in the Capitol Building at Salem.

EQUIPMENT DEPARTMENT

This department is the supply depot of the Highway Department. Here is centered the assembling, disposition, maintenance and accounting of equipment and supplies necessary for the efficient operation of the whole organization.

In order to efficiently procure and furnish the equipment and supplies needed by an organization handling the amount of construction that the Highway Department does each year, and maintaining the ever-increasing mileage of completed roads, it is necessary to have proper shop facilities

and force for its mechanical care and maintenance, adequate warehousing facilities for the storage and proper segregation of equipment and supplies and also a clerical force sufficient to keep proper records.

The main plant for the carrying on of this work is located at Salem on state owned property just outside of the city limits. During the biennium a small frame office building has been added to house the clerical force, records and stationery supplies. The plant is divided into the various shops, such as the machine shop proper, blacksmith shop, carpenter shop, paint shop, curtain and top shop, etc., and the storage warehouses. All of these are handled as a unit and employes are assigned from one to another as may be required for most efficient operation. The machine shop proper is well equipped for all kinds of repairs on road machinery and automotive equipment. The shop machinery consists of lathes, milling machines, grinders, a planer, a shaper, a complete welding outfit, and all the necessary small tools and instruments required in connection with mechanical work. This equipment will handle all of the state's requirements from the largest castings on caterpillar tractors to the smallest parts on motorcycles. In a recent comparison of the shop cost of performing certain classes of repair work, with charges made by commercial shops, the result was decidedly favorable to the highway department shop. Considerable work is done for state institutions and other state departments, and for such work the same schedule of charges is made as for the department's own work. E. F. Halik is master mechanic in charge of the mechanical division, his duties being to supervise the work in the machine shop, the maintenance of buildings and grounds and the loading, unloading and other handling of heavy equipment.

It has been found advisable and economical to operate a branch shop in Eastern Oregon for the maintenance of the road machinery, automobiles, trucks and tractors in service in that district. This shop, which was formerly located in Pendleton, was moved to La Grande during the past year in order to be more centrally located and in closer touch with the La Grande Division Office of the Department. A small stock of special repair and replacement parts is carried at this branch shop, and a few trained mechanics are employed. R. A. Farnam is foreman of the La Grande shop.

The large amount of equipment received from the Federal Government under its policy of allotting to the states all surplus war materials and equipment that were suitable for road improvement purposes, has had much to do with the increase, since the close of the war, in the size and activity of the equipment department. This distribution of equipment by the Government has continued into the present biennium, and an endless variety of things has been received, the most important of which are trucks and tractors. A total of 185 trucks has been received during the years 1921 and 1922, of which 123 have been turned over to the counties at the cost of the freight from government storage plants, plus a handling charge and such costs as are necessary to recondition and remodel them for road-building purposes. Also, twenty five-ton tractors have been received during the biennium, these being pieces of equipment which have a variety of uses in road work. A large amount of truck parts, small

tools and miscellaneous equipment and machinery has also been received, chief among which are a road roller, two concrete mixers, twenty-five pumping units, three air compressors, etc.

The trucks and other equipment which have been received from the Government during the past two years were practically new, but in many cases they had been held in open storage for three years and for this reason had considerably deteriorated, and some parts were missing. This necessitated the thorough overhauling and reconditioning of practically every piece of equipment received. Also, the trucks received were equipped with cargo bodies, and these had to be removed and dump bodies and hoists installed to fit them for road-building purposes. This necessary overhauling and remodeling has been done in the department shops at very reasonable costs.

About one-half of the automotive equipment received has been the Government Class "B" truck, more commonly known as the Liberty Truck. This is not a commercially manufactured truck, but was designed especially for the Government during the recent war. It is a very excellent piece of equipment. These trucks cost the State from $300.00 to $600.00 each, laid down in Salem; the overhauling, remodeling and installation of new fixtures costs approximately $500.00, and new tire equipment costs approximately $400.00, making a total cost to the State for these trucks, ready to run, from $1,200.00 to $1,500.00 each. If these trucks could be duplicated on the market they would cost from $5,000.00 to $5,500.00 each.

In addition to the performing of remodeling and repair work, the shops also manufacture some special road maintenance equipment, chief of which is a special heavy road drag. This drag has been designed and developed by the department, and it has been pronounced by prominent road builders to be a most efficient piece of road equipment; evidence of the sincerity of these pronouncements is indicated by the fact that several states are now manufacturing similar drags for their own use. These drags are made from structural shapes, standard grader blades and special cast shoes and scarifier teeth, and they cost, complete, approximately $275.00 each.

The annual overhauling of the department's business cars, practically all of which are Fords, is done in these machine shops. In order to expedite the overhauling of Ford cars, overhauled motors, rear end assemblies, front end assemblies, radiators, etc., are kept on hand, with the result that a car is out of service for overhauling only for the time necessary to assemble and adjust the mechanism and to repair and paint the body and fittings, if painting is needed. During the winter months the construction equipment which is returned to the shops from the various jobs over the state is given a thorough inspection, and the necessary repairs and replacements are made, so that the opening of the next construction season finds all equipment ready for service.

The warehousing division is under the direction of a storekeeper upon whom devolves the duties, first, of keeping an accurate record of the disposition of equipment; second, of supervising the receiving and shipping of equipment and supplies; third, of supervising the proper storage and segregation of equipment and supplies; fourth, of checking all bills for equipment repair, repair parts, etc., contracted at commercial shops by employes in the field; and, fifth, of acting as purchasing agent.

The stock of supplies kept on hand in the care of the storekeeper embraces principally the parts necessary to repair and to maintain, in efficient operation, the various pieces of equipment owned by the State Highway Department. For standard commercial vehicles, it is not necessary to carry an extensive supply of parts, but for vehicles such as the Liberty truck, which are not commercially manufactured, it is necessary to carry a supply of parts sufficient for the needs of this equipment during the whole of its serviceable life. Practically all of the truck parts on hand have been received from the government, and as the cost to the state is only the amount of the freight from the government storage points, a large stock has been obtained. There is stored in the warehouses, in addition to parts for repair and replacements on trucks, various hand tools, engineering equipment and office supplies.

During the past two years the storekeeper has handled supplies and equipment costing this department $515,167.26, and has on hand at this date supplies that have a commercial value of approximately $256,000.00 and equipment which has a commercial value of approximately $503,-325.00, the total commercial value for the two items being $759,325.00. This is a material reduction from the value reported for supplies and equipment on hand at the end of the 1919-1920 biennium, which reduction in value is accounted for by the decrease in market values of equipment in the past two years, the turnover of considerable equipment to counties, and the natural depreciation of equipment in service. On the following page will be found a tabulated statement, compiled from the storekeeper's records, showing in detail the numbers of different kinds of equipment received during the biennium, the numbers turned over to counties, the numbers on hand, etc. Practically all of the equipment retained by the state has been in use during the whole of the working season, and on November 30, 1922, there was in use on maintenance work, 119 trucks, 35 graders, 9 tractors, 7 snow plows, and 13 heavy road drags. S. B. Gillette is storekeeper.

To take care of the details of accounting, cost-keeping, etc., a small clerical force is maintained in connection with the equipment department. Complete records are kept of all equipment and of all shop and warehouse operations. For example, each piece of equipment, on arrival, is recorded on a form which is to be its continuous record of service, and on this form is noted a description of the equipment, from whom it was received, date of receipt, cost and rental rate and, as time goes on, notations are made as to its assignments and its earned rentals. On a companion form a record is kept of the operating and maintenance costs applying to the same piece of equipment, so by combining these two records a complete history of the piece of equipment can be obtained. The rental rate at which equipment is put out to work is so devised that when the equipment is worn out there will have been charged out a sum equal to its first cost, plus the cost of its upkeep, the renter in all cases paying for broken or lost parts. Rental is charged upon all equipment sent out for use, whether it be used by a contractor or by the Highway Department itself. For equipment used on the Department's own work, the rental is charged to the job upon which the equipment is used, and a corresponding credit is made in favor of the equipment department, this transaction being made by means of a transfer voucher. The time for which rental is charged is computed from the day such equipment leaves the plant

until it is returned, except in special cases where it is advisable to temporarily store a piece of equipment on the job rather than to return it to headquarters. In cases of this kind no rental is charged while the equipment is idle.

Each piece of work that goes into the shop is given a job number and a work card is made out, upon which is entered the hours of labor and quantities of materials expended in the performance of that particular job. From this card invoices are made out and the card is indexed and filed. The billing for materials furnished to counties or contractors, or furnished for use on state work, is done at time of sale; the billing for rentals and the sending out of statements of accounts is done once each month. E. A. Hinz is chief clerk.

The following is a condensed financial statement covering the operations of the Equipment Department during the two-year period from December 1, 1920, to November 30, 1922:

Credit from Equipment Rentals, from Labor and Supplies furnished, etc.	*$790,643.62	
Credits from Sale of Supplies and Equipment received from U. S. War Department	* 67,477.79	
Credits for Office and Field Supplies handled through Store	6,254.56	
Total Credits		$864,375.97
Purchase of Equipment	$110,814.20	
Freight on Equipment and Supplies received from U. S. War Department	81,234.39	
Purchase of parts and supplies for Repairing, Remodeling and Maintaining Equipment	318,031.74	
Labor and Other Expense Operating Shops and Warehouses	209,295.74	
Construction of Warehouses and Shops	17,768.78	
Insurance on Warehouses and Equipment and Licenses for Automotive Equipment	19,189.73	
Purchase Cost of Office and Field Supplies handled through Store	5,086.93	
Total Gross Charges		761,421.51
Total Net Credit		$102,954.46

* Credit is not taken here for outstanding bills against counties to the amount of $27,531.05, nor for outstanding bills against other parties to the amount of $12,184.60.

Considering the operation of the Equipment Department over the entire period during which the State has owned and operated equipment, we find that the total net cost of equipment, stock and plant at the end of the 1919-20 biennium was $380,318.15 During the 1921-1922 biennium the Equipment Department was not only self-supporting, but it netted a profit of $102,954.46. Applying this profit to reduce the amount of the total prior net cost leaves a balance of $277,363.69, which represents the net cost of all equipment, stock and plant, as of November 30, 1922. Opposite this net cost of $277,363.69, we have equipment and materials on hand having an inventoried value of $759,325.00.

The Equipment Department was in charge of C. L. Grutze until April 1, 1922, when he was transferred to other work. Since that time the department has been in charge of Lewis P. Campbell, Assistant Engineer.

RECORD OF EQUIPMENT RECEIVED, DISPOSED OF AND ON HAND

PERIOD DECEMBER 1, 1920, TO NOVEMBER 30, 1922

This table shows the heavy equipment owned by the Highway Department December 1, 1920, the amount received since that date, the number disposed of through allotment to counties or otherwise, and the balance on hand November 30, 1922.

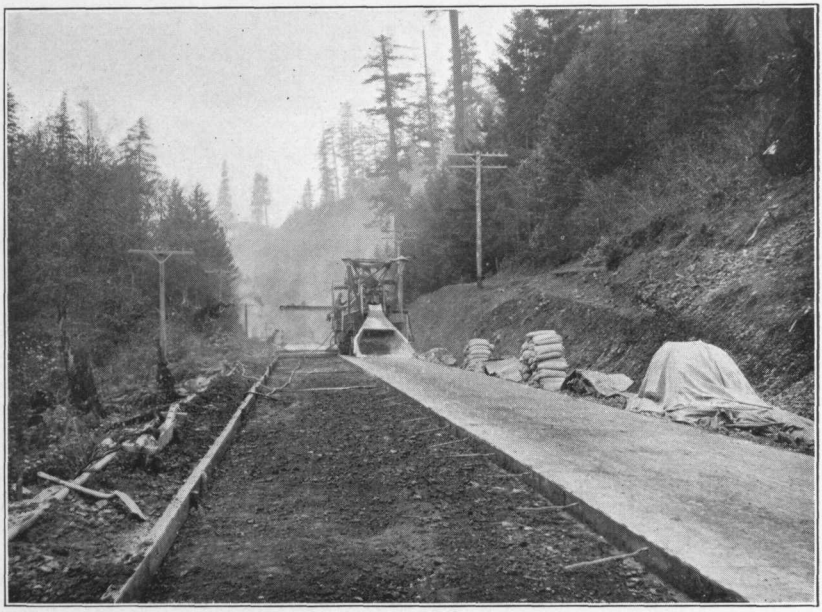
KIND OF EQUIPMENT	Number on Hand Dec. 1, 1920	Number Bought 1921-1922	Number Allotted by Government 1921-1922	Number Converted from Other Equipment 1921-1922	Total	Allotted to Cities, Counties, State Institutions 1921-1922	Disposed of as Obsolete or Unserviceable 1921-1922	Converted to Other Types of Equipment 1921-1922	Number on Hand November 30, 1922
Trucks—									
Federal	1	....	....	....	1	....	....	....	1
Ford Delivery	1	....	....	14	15	....	....	....	15
Ford Express	4	....	....	....	4	....	....	....	4
Ford Truck	4	....	....	....	4	....	....	....	4
F. W. D.	43	....	31	....	74	32	1	....	41
G. M. C. ¾-ton	....	....	22	....	22	10	....	....	12
G. M. C. 3½-ton	1	....	....	....	1	....	....	....	1
Heavy Aviation	16	....	....	....	16	....	....	....	16
Indiana	1	....	....	....	1	....	....	....	1
International	1	....	....	....	1	1	....	....	....
Kelly-Springfield 1½-ton	1	....	....	....	1	1	....	....	....
Kelly-Springfield 3-ton	8	....	....	....	8	8	....	....	....
Liberty	....	....	81	....	81	56	....	....	25
Moreland 1½-ton	6	....	....	....	6	....	2	....	4
Moreland 2-ton	1	....	....	....	1	....	....	....	1
Moreland 4-ton	21	....	....	....	21	1	2	....	18
Nash Quad	42	....	....	....	42	12	....	....	30
Packard 1½-ton	....	....	26	....	26	....	18	....	8
Packard 3-ton	1	....	....	....	1	....	....	....	1
Packard 5-ton	4	....	....	....	4	....	1	....	3
Pierce-Arrow 2-ton	16	....	....	....	16	....	1	....	15
Pierce-Arrow 5-ton	21	....	....	....	21	....	....	....	21
Standard	16	....	5	....	21	2	....	....	19
White	....	....	20	....	20	....	....	....	20
Totals for trucks	209	....	185	14	408	123	25	....	260
Automobiles—									
Buick Touring	8	....	....	....	8	....	....	....	8
Cadillac Touring	....	1	....	....	1	....	....	....	1
Chalmers Roadster	....	1	....	....	1	....	....	....	1
Chevrolet Touring	2	....	....	....	2	....	2	....	....
Dodge Touring	....	6	1	....	7	....	....	....	7
Dodge Roadster	....	1	....	....	1	....	....	....	1
Ford Ambulance	9	....	....	....	9	....	3	6	....
Ford Touring	102	1	....	....	103	....	26	5	72
Ford Roadster	3	....	....	....	3	....	1	1	1
Jeffery Roadster	2	....	....	....	2	....	2	....	....
Maxwell Touring	4	....	....	....	4	....	4	....	....
Oakland Touring	1	....	....	....	1	....	1	....	....
Oldsmobile Touring	2	....	....	....	2	....	2	....	....
Reo Touring	2	....	....	....	2	....	2	....	....
Studebaker Touring	....	1	....	....	1	....	....	....	1
Studebaker Roadster	....	1	....	....	1	....	....	....	1
Willys-Overland Touring	2	....	....	....	2	....	2	....	....
Totals for automobiles	137	12	1	....	150	....	45	12	93

RECORD OF EQUIPMENT RECEIVED, DISPOSED OF AND ON HAND—Continued

KIND OF EQUIPMENT	Number on Hand Dec. 1, 1920	Number Bought 1921-1922	Number Allotted by Government 1921-1922	Number Converted from Other Equipment 1921-1922	Total	Allotted to Cities, Counties, State Institutions 1921-1922	Disposed of as Obsolete or Unserviceable 1921-1922	Converted to Other Types of Equipment 1921-1922	Number on Hand November 30, 1922
Motorcycles—									
Cleveland	10	....	....	....	10	....	9	....	1
Harley-Davidson	....	4	45	....	49	....	32	....	17
Totals for motorcycles	10	4	45	....	59	....	41	....	18
Tractors—									
Cleveland	2	....	....	....	2	....	....	....	2
Case J. I. Steam	1	....	....	....	1	....	....	....	1
Holt 5-ton	....	....	20	....	20	....	1	....	19
Holt 10-ton	2	....	....	....	2	1	....	....	1
Holt 20-ton	23	....	....	....	23	7	2	....	14
Never Slip	1	....	....	....	1	....	1	....	....
Truck Tractor	2	....	....	....	2	....	....	....	2
Totals for tractors	31	....	20	....	51	8	4	....	39
Heavy Equipment—									
Locomotive crane	2	....	....	....	2	....	....	....	2
Steam hoist	2	....	....	....	2	1	....	....	1
Clam shells	5	....	....	....	5	....	....	....	5
Orange peel	4	....	....	....	4	....	....	....	4
Road rollers	5	....	1	....	6	....	....	....	6
Railroad paving plant	1	....	....	....	1	....	....	....	1
Portable paving plant	1	....	....	....	1	....	....	....	1
Gas locomotive	2	....	....	....	2	....	....	....	2
Crushing plants	6	....	....	....	6	....	....	....	6
Concrete mixers	8	....	2	....	10	....	2	....	8
Graders	6	30	....	....	36	....	1	....	35
Heavy road drag	....	....	....	13	13	....	....	....	13
Snow plows	....	7	....	....	7	....	....	....	7
Power units	....	....	....	6	6	....	....	....	6
Pumping units	15	....	25	1	41	....	10	....	31
Air compressors	3	1	3	....	7	....	3	....	4
Stiff Leg derrick	1	....	....	....	1	....	....	....	1
Engineering Equipment—									
Transits	95	....	3	....	98	....	....	....	98
Levels	62	....	6	....	68	....	....	....	68
Barometers	....	....	6	....	6	....	....	....	6

TESTING DEPARTMENT

The activities of the Testing Department are divided under two general heads, field inspection and supervision, and laboratory operation. The field inspection involves chiefly the supervision of the manufacture of paving mixtures and the investigation of sources of construction materials. This work in general has been handled wholly by the testing engineer himself except when an unusual quantity of work temporarily required the placing of an assistant from the laboratory in the field. With very few exceptions, the testing engineer was



ON THE PACIFIC HIGHWAY SOUTH OF CANYONVILLE

These views show the method used in constructing concrete pavement on roads which can not be closed to traffic for more than a few hours at a time.

present when the actual mixing and placing of the wearing course on a pavement job was commenced and the proper proportions of materials established. During the press of the work visits to the jobs were made every ten days or two weeks, or oftener, if the conditions called for closer attention.

On each paving job, it is the practice to place two inspectors, one to pass on materials, the quantity of the mixture and to see that the required proportions are used and the other to see that the mixtures are laid according to specifications. Although working directly under the resident engineer, the first-mentioned inspector is responsible to the testing engineer. From the jobs, samples of the bituminous mixtures or test cylinders of concrete are sent to the laboratory each day and tested, so that a constant control of the work is had. In addition to the pavement inspectors, an inspector is stationed at each of the cement mills in the state during the construction seasons to sample all the cement used in highway work. The samples of cement taken by the inspector are tested in the laboratory at Salem.

The work in the laboratory has in the main, been routine control testing on cement, asphalt, sand, rock, gravel and paving mixtures, although a great deal of other testing has been done and a small amount of investigative work carried on: During the biennium nearly 11,000 tests were made, necessitating, during the construction season, a personnel of seven men. In the slack season, this force is cut to two, the assistant testing engineer and the chemist.

The work of the laboratory in connection with bridge concrete construction has given remarkably good results, both as to the quality of the concrete and the cost of construction. By careful analysis of the local materials available for a job, it has been possible, by varying the proportions from those usually specified, to obtain the required strength of concrete, even though the available materials were of inferior quality. In other words, the mixture was fitted to the material rather than the material to the mixture.

Before a job of any kind is let, all probable sources of material are prospected, either by the resident engineer or the testing engineer, and samples therefrom are tested in the laboratory. The acceptable material is then noted in the specifications so that the contractor knows definitely what to bid on.

The total cost chargeable to the testing department for the biennium was $36,784.22. This includes the field expenses of the testing engineer and the principal assistant, some new laboratory equipment, and all laboratory operating charges. This amounts to 0.12% of the total expenditures for highway construction. That portion of the above expense directly chargeable against pavements amounts approximately to 1.2 cents per square yard of pavement, or less than 0.5% of the cost of its construction. While this work of the testing department entails only a small amount of expense, it performs a very important service and has in a great measure been responsible for the present high standard of our highway construction.

The work of the testing department is in charge of Kenneth S. Hall, Testing Engineer. The laboratory work is carried on under the immediate supervision of N. M. Finkbiner, Assistant Testing Engineer.

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 coordination 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 Division Offices, the Auditing Department, the Legal Department, the Office Engineering Department and the Bridge 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 keeps the minutes of all meetings of the Commission and handles all Commission correspondence and that of the State Highway Engineer in his absence. He also has in his custody the seal of the Commission, original copies of all construction and material contracts, bid proposals, agreements with counties, and the general correspondence files.

Permits for log hauling, permits for the construction of telegraph, telephone and power pole lines and permits for gas, water, sewer and other pipe lines on the state highways are issued by and filed in the General Office, which also issues weekly reports on road conditions which are distributed to the press for the information of the general public.

Division Offices—The Division Offices handle correspondence with the Resident Engineers in their own districts, as well as local matters, and also check over and approve for payment Resident Engineers' monthly estimates, invoices for local supplies, payrolls, expense accounts, etc., and forward them to the General Office. They also check over and approve requisition for supplies, equipment inventories, etc. Two Division Headquarters are maintained at Salem in connection with the General Offices. Other Division Offices are at La Grande, The Dalles, Medford and Marshfield.

Auditing Department—All monthly progress and final payments on contracts, invoices for materials or supplies furnished, payroll and expense accounts of direct employees, industrial accident insurance, and all claims of whatever nature against the State 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 for-

warded to the Secretary of State, who draws a warrant to cover, from the State Highway Fund. It is required that each claimant make an 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 Division Engineers. All vouchers drawn on the Counties or Cities for cooperative work on projects over which the State has supervision are also audited by this department.

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.

Employees of the Commission are paid with bank checks drawn on the $75,000 emergency revolving fund, and also bills carrying discount terms and emergency items are handled through the same fund. The revolving fund is reimbursed to the extent of advances made by warrant covering payrolls and other items drawn on the State Highway Fund. The total number of revolving fund checks issued in 1921 was 15,452, amounting to $1,331,472.63, and in 1922 there were 15,925 checks, amounting to $1,195,543.59, the total for the two year period being 31,377 checks, amounting to $2,527,016.22.

In 1921 there were 89 county vouchers, amounting to $369,383.68, and 9,470 state vouchers amounting to $18,645,334.69, or a total of 9,559 vouchers amounting to $19,014,718.37. In 1922 there were 11 city vouchers, in amount $71,164.00, 307 county vouchers, in amount $1,182,104.78, and 8,311 state vouchers, in amount $12,553,218.82, or a total of 8,629 vouchers, in amount $13,806,487.60. The total for the biennium is 18,188 vouchers amounting to $32,821,205.97 paid through this department.

In addition to the expenditures, the bookkeeping accounts record the funds received from the Federal Government or Counties on cooperative projects, sale of bonds, motor vehicle license fees and gasoline tax, rentals and sales of equipment and miscellaneous accounts. Statements showing receipts and disbursements are issued monthly which are checked in with the Secretary of State's records each three months. A complete record is also kept of all interest and principal payments due on outstanding bonds. The bookkeeper also keeps the payroll check register and makes a check of the revolving fund bank account each month. Mr. L. N. Myers has served as bookkeeper during the biennium.

In order to expedite payment of the department claims through the Secretary of State, a deputy auditor from the latter's office has a desk in the highway offices and his salary is equally divided between the two.

The cost of the Auditing Department follows:

	1921	1922	1921 and 1922
Salaries	$16,057.37	$16,573.40	$32,630.77
Printing	101.51	179.26	280.77
Equipment	336.66	231.59	568.25
Materials and supplies	99.05	168.06	267.11
Travel expense	46.48	19.90	66.38
Telephone and telegraph	22.07	.....	22.07
Total	$16,663.14	$17,172.21	$33,835.35

One of the phases of the work of the Auditing Department is that of carefully checking all freight rates on claims and freight rates on shipments to the Commission. Also such other traffic information as to rates, etc., as is required by the various departments and engineers is furnished. Mr. Walter S. Wright handles this work, although fully two-thirds of his time has been given to other auditing duties.

No attempt has been made recently to engage in any additional freight rate investigations, but complaints made two years ago by this Commission to the carriers, in the matter of excessive rates on sand, gravel and crushed rock have been persistently followed up and highly satisfactory results accomplished, as evidenced by the twenty percent reduction in rates on these materials which became effective September 10, 1921; the saving effected on the basis of the lower freight rate on sand, gravel and crushed rock would be practically impossible to compute as no records have been kept to show the quantity of material moving to the various road construction projects but it could be stated conservatively that the construction cost of highways has been lowered many thousands of dollars.

The twenty per cent reduction in the rate on cement, obtained only after a hard fight against the carriers where unavoidable but vexatious delays, postponements and inaction in the way of necessary hearings occurred, finally became effective on June 26, 1922, and during the last five months a saving in freight charges on cement for highway construction alone has amounted to approximately $10,000.00.

By the careful revision of freight bills, reimbursement for overcharge, loss and damage during the past two years has amounted to the sum of $6,720.66. Assistance has also been extended to the contractors to recover overcharges from the railroad companies; notably, one claim for freight on sand and gravel in the amount of $400.00, actual overcharge. In another instance, a contractor was reimbursed by the carrier in the amount of $2,808.95 with $238.44 interest because of excessive estimated weights used in assessing and collecting the original freight charges on gravel shipments. This Bureau was instrumental in bringing this claim to the notice of the carrier in such a way that it could not be consistently declined.

Mr. C. E. Lytle was at the head of this department as Auditor until the date of his death, October 1, 1921, and the work has since been under the charge of Carl F. Smith who was appointed Acting Auditor on October 1, 1921, acting in that capacity until his appointment as Auditor on September 1, 1922. The Auditing Department is under the general supervision of 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, Asistant 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 per-

tain to surveys, grading, rock and gravel surfacing, 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 keeping of the cost and expenditure segregation records; 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-keeping 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 the blue prints that are required in connection with the advertising for bids and for the direction of contractors and field employees. In the cost-keeping office is kept a complete and detailed segregation of all expenditures made 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, and G. S. Paxson, Chief Field Assistant.

REPORT OF LEGAL DEPARTMENT

Since the biennial report of the State Highway Commission covering the years 1919 and 1920 was published the Highway Commission has expended or obligated for highway construction approximately $31,000,000, and in connection with said highway construction work there have been awarded during said period approximately 295 contracts. A construction program of so great magnitude involving the many contractual relations which will naturally arise between the State and its contractors, likewise between the State and the surety on the bonds required by the State Highway Commission in support of the said contracts, involves and occasions many legal problems and demands keen observation not only on the part of the engineering department but the legal department, to the end that the State's interests may always be safeguarded.

In addition to the aforementioned contracts there have been prepared approximately sixty agreements, some of which grew out of the construction contracts and others which involved the purchase of material or other matters incident to highway construction.

Involved in the construction of highways during the biennial period just closing is the question of rights of way. The standard width of state highways is sixty feet, and when it is contemplated that during the past biennial period there have been constructed of all types of state highways approximately 800 miles of road it will be observed that involved in such construction work is approximately 5,700 acres of land for rights of way, and since necessarily roads are often located through valuable lands many difficulties are encountered in procuring rights of way which often result in law suits.

During the biennial period covered by this report the State has prosecuted the following actions for the procurement of land either for rights of way or for the purpose of procuring road material therefrom:

State vs. Frank Turner, et ux.
State vs. J. L. and S. A. Kendall.
State vs. Lulu B. Fulton, et al.
State vs. L. H. Starratt, et ux.
State vs. Sid Storie, et ux.
Umatilla County vs. Casteel.
Umatilla County vs. Sturtevant
Umatilla County vs. Stanton.
Umatilla County vs. Walter Smith, et ux.
Umatilla County vs. Cunningham Sheep & Land Company.
State vs. Beauregard.
State vs. Griebler.
State vs. Fleishauer.
State vs. Florence Cornell.
State vs. James Dalton
State vs. Morton, et al.

The State Highway Commission in its effort to afford the greatest possible safety to the traveling public has eliminated approximately 100 grade crossings either by relocation of highway or by grade elimination. Where the grade crossing is eliminated by grade elimination it necessitates an application to the Public Service Commission and a trial before the Commission for the purpose of determining the necessity for the grade elimination and the distribution of the cost of the same. During the said biennial period there have been filed before the Public Service Commission applications for grade eliminations in the following instances, each of which has been heard and tried in the usual manner:

Application for grade separation at Huntington.
Application for grade separation at Durkee.
Application for grade separation at Unity.
Application for grade separation at Glover.
Application for grade separation at Perry.
Application for grade separation at Hot Lake.
Application for grade separation at Telocaset.
Application for grade separation at Meacham.
Application for grade separation at Messner.
Application for grade separation at Myrtle Creek.
Application for grade separation at Arlington.
Application for grade separation at Albany.
Application for grade separation at Biggs.

Application for grade separation at Sherman.
Application for grade separation at Creswell.
Application for grade separation at Van Horn.
Application for grade separation at Moro.
Application for grade separation at Wilbur.
Application for grade separation at Sutherlin.
Application for grade separation at Oakland.
Application for grade separation at Shady Point.
Application for grade separation at Rhinehart.
Application for grade separation at Blodgett.
Application for grade separation at Oro Dell.

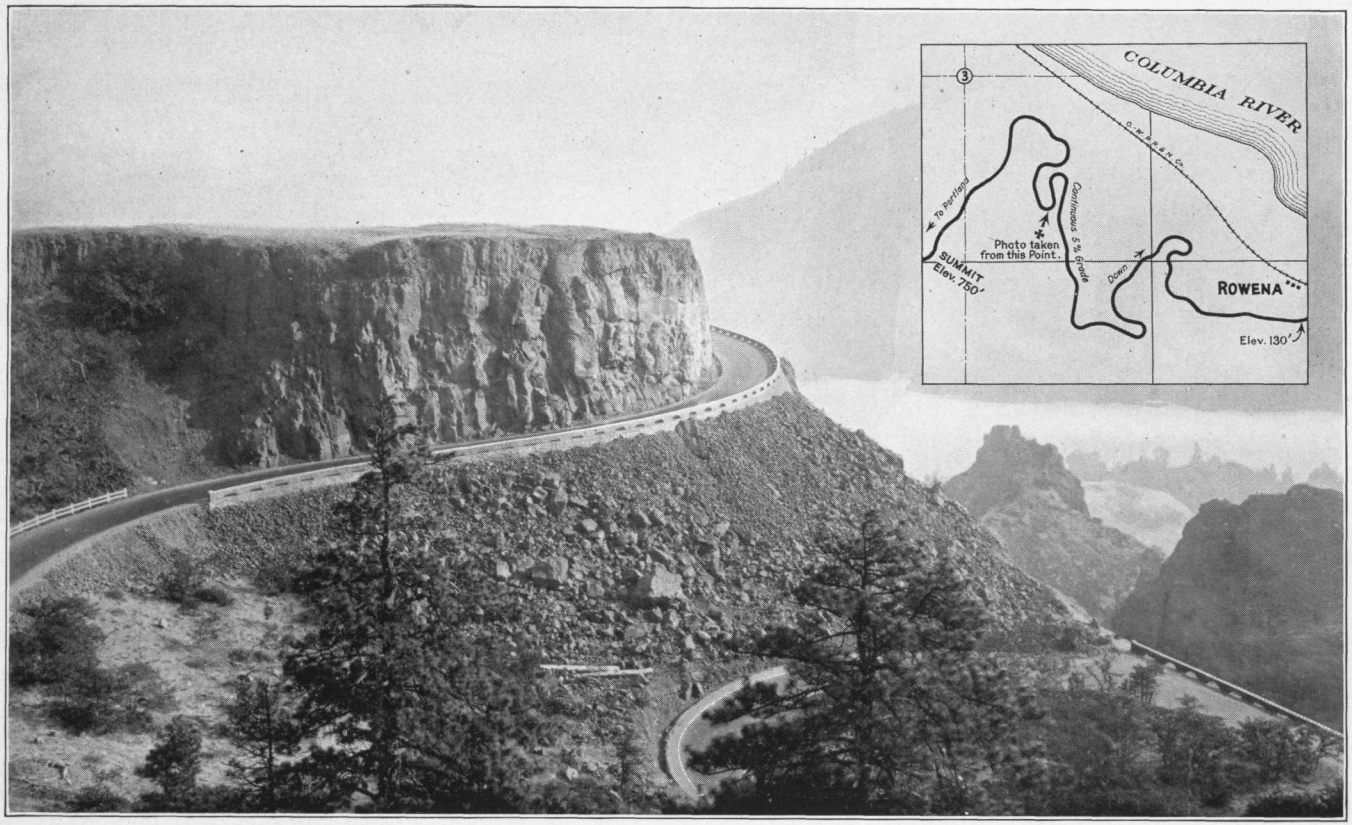
In addition to the foregoing matters and actions the state has prosecuted or defended in the following actions and suits:

M. W. Mix, et al. vs. S. Benson, et al.
Hawley vs. Anderson, et al.
Ernest Zilesch, et al. vs. County of Polk, et al.
Postal Telegraph Co. vs. State.
Peters vs. Umatilla County.
State vs. Tom Mirriman.
Fidelity & Deposit Co. of Maryland vs. R. A. Booth.
First National Bank of Southern Oregon vs. A. J. Green.
Cascade Investment Co. vs. G. J. Hardy.
Calkins vs. County of Lane.
Keller vs. Klocker, et al.
Walker vs. Polk County.
Morten vs. A. D. Kern, Highway Commission, et al.
Warren Bros. Co. vs. Huber.

A matter of vital concern to the state and which is not enumerated in any of the foregoing actions, suits or matters is an application filed by the State Highway Commission and prosecuted before the Public Service Commission wherein the state asked for a reduction in freight rates on road building material. This application was bitterly contested by the railroad companies but resulted in a favorable decision to the state as a consequence of which the state saved in freight expenditures during the past biennial period approximately $50,000.00.

In the case of Warren Brothers' Company vs. Huber the State Highway Commission defended because of the public interest in the result of the suit. The suit, however, was determined adversely to the defendant and is now being appealed to the United States circuit court of appeals with the hope that a more favorable decision may be the outcome.

A report of this kind can reflect only in a small way the volume of work necessarily handled by this branch of the attorney-general's office during the past two years. The items above mentioned do not, of course, include the thousands of letters written, the many leases, certificates, undertakings and other legal papers prepared and employed in connection with the Highway Commission's program of road construction; a specific report of such work would be almost impossible and perhaps would serve no good purpose if given other than to disclose the volume of work handled.



ROWENA HEIGHTS. ON THE COLUMBIA RIVER HIGHWAY IN WASCO COUNTY

Financial Report

Covering the Fiscal Period

December 1, 1920, to November 30, 1922

INDEX TO TABLES

Table I. Statement of Receipts and Disbursements Through State Highway Fund.

Table II. Grand Summary of Net Incomes, Net Expenditures, and Net Balances on Hand.

Table III. Detailed Summary of Net Income from All Sources.

Table IV. Detailed Summary of Net Expenditures.

Table V. Expenditures of the State Highway Commission Summarized by Counties.

Table VI. Detailed Statement of Expenditures for Construction Work (Except Post Road Projects).

Table VII. Detailed Statement of Expenditures upon 1916-1920 Series of Post Road Projects.

Table VIII. Detailed Statement of Expenditures upon 1921-1922 Series of Post Road Projects.

Table IX. Detailed Statement of Cooperation on Forest Road Work.

Table X. Expenditures for Maintenance and Betterment Work.

Table XI. Expenditures for Surveys.

Table XII. Expenditures for Construction Engineering on County Work.

Table XIII. Direct Expenditures upon Market Road Work.

Table XIV. Expenditures for General and Miscellaneous Purposes.

TABLE I

STATE HIGHWAY FUND

December 1, 1920, to November 30, 1922

The below statement of receipts and disbursements under the State Highway Fund is arranged with a view to setting out particularly the net receipts and the net disbursements of strictly state moneys as differentiated from federal government, county and railroad moneys disbursed through the State Highway Fund, and as differentiated from certain other moneys which are handled through the State Highway Fund as a matter of convenience but which do not effect the net income or net expenditure in connection with state highway work. The statement is intended chiefly as a reconciliation of the receipts and disbursements through the State Highway Fund with the receipts and disbursements in connection with state highway work as these are set out in tables which follow.

It should be noted that a part of, but not all, federal government, county, and railroad moneys expended upon state highway work is handled through the State Highway Fund. For a more representative and complete statement of receipts and expenditures for state highway work see Tables II, III and IV.

RECEIPTS—

Net Income Items (State Funds Only):			
Balance on hand Dec. 1, 1920	$ 1,822,589.86		
Bonds sold	17,222,903.35		
Motor vehicle license fees	3,983,970.04		
Gasoline and distillate tax	1,892,820.12		
Interest on bank deposits, warrants, etc.	59,409.34		
Transfer from market roads funds to cover disbursements on market road work	74,136.96		
Total net income (state funds only)		$25,055,829.67	
Miscellaneous Receipts and Receipts of Cooperative Funds Handled Through the State Highway Fund:			
Federal aid post road cooperative payments	$ 3,225,651.72		
County cooperative payments (amount includes $120,192.16 in uncashed county warrants)	3,177,411.74		
Railroad cooperative payments	79,177.88		
State market road levy (except $74,136.96 included in net income items)	1,708,267.82		
Transfer from revolving fund to cover disbursement necessary to increase that fund to $75,000	45,000.00		
Receipts of miscellaneous funds handled through the State Highway Fund in connection with equipment and miscellaneous accounts (amount includes $18,177.36 in uncashed county warrants)	377,043.63		
Total of miscellaneous receipts and receipts of cooperative funds handled through the State Highway Fund		† 8,612,552.79	
Grand total receipts in State Highway Fund			†$33,668,382.46

TABLE I—Continued

DISBURSEMENTS—

Net Disbursements (State Funds Only):			
State construction work	$15,322,640.14		
Post road construction work	2,201,482.18		
State cooperation on forest road work	724,970.53		
Maintenance work	1,052,268.31		
Betterment work	120,729.26		
Road signing	36,441.90		
Policing highways	14,791.16		
Interest and maturities on bonds	2,633,633.37		
Equipment, shops and material stocks*	102,954.46 (Credit)		
Surveys	242,767.87		
Engineering county work	35,088.49		
Work performed on market roads	74,136.96		
Administration and general supervision	405,511.35		
Miscellaneous general expense	38,143.51		
Total net disbursements (state funds only)		$22,799,650.57	
Miscellaneous Disbursements and Disbursements of Cooperative Funds Handled Through the State Highway Fund:			
Federal aid on post road work	$ 3,225,651.72		
County funds on cooperative work	3,177,411.74		
Railroad funds on cooperative work	79,177.88		
Turnover of market road funds to counties	1,494,617.97		
To increase revolving fund	45,000.00		
Miscellaneous funds disbursed through the State Highway Fund in connection with equipment and miscellaneous accounts	377,043.63		
Total of miscellaneous disbursements and disbursements of cooperative funds handled through the State Highway Fund		8,398,902.94	
Grand total of disbursements through the State Highway Fund			$31,198,553.51
Balance on hand Dec. 1, 1922			‡$ 2,469,828.95

* This credit of $102,954.46 occurring among the disbursement items is occasioned by the fact that credits which have accrued to the equipment, shop and stock accounts for rentals and repairs on equipment, for supplies furnished, etc., have been in excess of the total amounts disbursed under these accounts during the corresponding period.

† This total includes $138,369.52 in uncashed county warrants.

‡ This balance includes $138,369.52 in uncashed county warrants and $213,649.85 of market road funds.

TABLE II

GRAND SUMMARY OF NET INCOMES, NET EXPENDITURES, AND NET BALANCES ON HAND

DECEMBER 1, 1920, TO NOVEMBER 30, 1922

This table shows the grand totals of net incomes and net expenditures in connection with state highway work handled under the direct control of the State Highway Commission. It includes all county cooperation upon work directed by the Highway Commission, and all federal government cooperation upon post road projects. It does not include market road moneys, nor moneys of the federal government and counties expended upon forest road projects.

It is to be noted that the amounts shown as "State Funds" correspond, not to the total receipts and disbursements in the State Highway Fund, but to the "Net Receipts" and "Net Disbursements" as separately set out in the State Highway Fund statement immediately preceding this table.

FUNDS	Grand Total Income	Grand Total Expenditures	Balance on Hand December 1, 1922
State Funds (Net)	$25,055,829.67	$22,799,650.57	*$2,256,179.10
County Funds	4,800,233.55	4,800,233.55	.....
Federal Government Funds	3,225,651.72	3,225,651.72	.....
Railroad Cooperative Funds	79,719.65	79,719.65	.....
Grand Totals	$33,161,434.59	$30,905,255.49	*$2,256,179.10

For detailed statement of Receipts, see Table III.

For detailed statement of Expenditures, see Table IV.

* Differs from balance on hand in State Highway Fund by $213,649.85 which is amount of Market Road Funds on hand in that fund.

TABLE III

DETAILED SUMMARY OF NET INCOME FROM ALL SOURCES

DECEMBER 1, 1920, TO NOVEMBER 30, 1922

STATE FUNDS:		
Balance on hand December 1, 1920	$ 1,822,589.86	
From Motor Vehicle License Fees, 1921	1,624,983.02	
From Motor Vehicle License Fees, 1922	2,358,987.02	
From Gasoline and Distillate Tax, 1921	948,509.66	
From Gasoline and Distillate Tax, 1922	944,310.46	
From Sale of Bonds, 1921	10,957,359.33	
From Sale of Bonds, 1922	6,265,544.02	
From Interest on Bank Balance, 1921	19,284.39	
From Interest on Bank Balance, 1922	40,124.95	
From Market Road Appropriation, 1921	30,693.65	
From Market Road Appropriation, 1922	43,443.31	
Total Income of State Funds		$25,055,829.67
COUNTY FUNDS:		
Cash remitted to the State in payment of agreed cooperation	$ 3,177,411.74	
Cooperative construction paid for by counties	1,622,821.81	
Total Income of County Funds		4,800,233.55
FEDERAL GOVERNMENT FUNDS:		
Cash remitted to the State in payment of agreed cooperation	$ 3,225,651.72	
Total Income of Federal Government Funds		3,225,651.72
RAILROAD FUNDS:		
Cash remitted to the State in payment of agreed cooperation in grade crossing eliminations	$ 79,177.88	
Cooperative work paid for by Railway Companies	541.77	
Total Income of Railroad Funds		79,719.65
Grand Total Net Income from all sources		$33,161,434.59

TABLE IV

SUMMARY OF EXPENDITURES

DECEMBER 1, 1920, TO NOVEMBER 30, 1922

CLASSIFICATION	Table to be Referred to for Details	EXPENDITURES					Engineering and Administration (Included in Preceding Columns)
		Total	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 Road Projects	VI	$19,287,132.29	$15,322,640.14	$3,895,784.03	$	$ 68,708.12	$ 891,655.89
For Post Road Construction Work	VII, VIII	6,258,489.10	2,201,482.18	821,125.54	3,225,651.72	10,229.66	262,588.45
For Cooperation on Forest Road Work	IX	724,970.53	724,970.53				
For Maintenance Work	X	1,128,614.18	1,052,268.31	75,564.00		781.87	
For Betterment Work	X	120,729.26	120,729.26				
For Road Signing	XIV	36,441.90	36,441.90				
For Policing Highways	XIV	14,791.16	14,791.16				
For Acquisition of Parks, Rights of Way, Gravel Pits, etc.	XIV	15,073.87	15,073.87				396.11
For Interest and Maturities on Bonds	XIV	2,633,633.37	2,633,633.37				
For Equipment and Stocks	XIV	Cr. 102,954.46	Cr. 102,954.46				
For Surveys	XI	248,039.61	242,767.87	5,271.74			248,039.61
For Engineering County Construction	XII	37,576.73	35,088.49	2,488.24			37,576.73
For Work Performed on Market Roads	XIII	74,136.96	74,136.96				73,717.38
For Administration and General Supervision	XIV	405,511.35	405,511.35				405,511.35
For Miscellaneous General Expense	XIV	23,069.64	23,069.64				
Grand Totals		$30,905,255.49	$22,799,650.57	$4,800,233.55	$3,225,651.72	$ 79,719.65	$1,919,485.52

TABLE V

EXPENDITURES OF THE STATE HIGHWAY COMMISSION SUMMARIZED BY COUNTIES

DECEMBER 1, 1920, TO NOVEMBER 30, 1922

The amounts given in this table do not include expenditures for administration and general supervision, for interest and maturities on bonds, and for other general purposes, which expenditures do not represent direct charges against particular jobs. Only expenditures upon work under direct supervision of the State Highway Department are included.

COUNTIES	State Funds	County Funds	Railroad Funds	Government Funds	Totals
Baker	$ 572,372.46	$ 200,979.26	$ 1,791.59	$ 134,403.45	$ 909,546.76
Benton	518,681.07	6,310.70	.....	103,578.70	628,570.47
Clackamas	781,125.74	232,213.64	.....	143,441.84	1,156,781.22
Clatsop	670,590.91	153,489.11	781.87	115,090.20	939,952.09
Columbia	290,498.84	9,763.42	.....	46,643.72	346,905.98
Coos	384,184.78	346,791.91	.....	44,038.35	775,015.04
Crook	354,594.92	104,344.10	.....	85,577.31	544,516.33
Curry	372,435.15	140,205.18	.....	.....	512,640.33
Deschutes	327,415.17	20,904.14	.....	.....	348,319.31
Douglas	3,219,583.62	235,289.98	2,510.36	125,311.99	3,582,695.95
Gilliam	345,648.33	133,101.14	.....	204,760.74	683,510.21
Grant	255,236.14	65,089.69	.....	149,290.33	469,616.16
Harney	128,350.06	49,300.89	.....	109,843.59	287,494.54
Hood River	450,956.02	116,058.67	.....	59,421.65	626,436.34
Jackson	833,324.63	386,798.41	32,922.18	209,342.97	1,462,388.19
Jefferson	83,893.43	90,000.00	.....	83,621.35	207,514.78
Josephine	862,418.91	26,719.37	.....	.....	889,138.28
Klamath	330,389.99	185,395.60	.....	239.091.66	754,877.25
Lake	91,839.61	71,502.99	.....	68,879.99	232.222.59
Lane	1,208,903.76	211,296.39	15,457.83	.....	1,435,657.98
Lincoln	419,923.82	87,427.55	.....	.....	507,351:37
Linn	545,531.78	19,531.95	.....	.....	565,063.73
Malheur	416,356.54	131,947.47	.....	57,291.65	605,595.66
Marion	409,075.10	18,616.82	.....	23,240.48	450,932.40
Morrow	437,072.76	76,729.85	.....	.....	513,802.61
Multnomah	(Cr.) 2,620.85	4,061.10	.....	.....	1,440.25
Polk	522,479.68	85,409.78	.....	.....	607,889.46
Sherman	189,394.15	68,254.97	.....	108,594.30	366,243.42
Tillamook	404,783.85	104,261.28	.....	.....	509,045.13
Umatilla	818,718.05	193,010.48	.....	106,701.67	1,118,430.20
Union	912,748.74	504,430.71	16,026.16	.....	1,433,205.61
Wallowa	269,084.65	185,084.58	.....	61,784.85	515,954.08
Wasco	907,561.10	110,788.56	10,229.66	459,973.60	1,488,552.92
Washington	422,596.33	37,010.64	.....	.....	459,606.97
Wheeler	173,645.31	86,560.12	.....	158,981.07	419,186.50
Yamhill	898,772.57	301,553.10	.....	326,746.26	1,527,071.93
Miscellaneous	2,143.97	.....	.....	.....	2,143.97
Totals	$19,779,711.09	$ 4,800,233.55	$ 79,719.65	$ 3,225,651.72	$27,885,316.01
Total expenditures not pro-rated	3,019,939.48	.....	.....	.....	3,019.939.48
Grand totals	$22,799,650.57	$ 4,800,233.55	$ 79,719.65	$ 3,225,651.72	$30,905,255.49

TABLE VI

EXPENDITURES FOR CONSTRUCTION WORK—DECEMBER 1, 1920, TO NOVEMBER 30, 1922

In this table are listed the expenditures upon all construction jobs except those jobs which are classified as Post Road Projects and those which are classified as Forest Road Projects. For the Expenditures upon these two classes of projects see Tables VII, VIII and IX.

COUNTY AND SECTION	Length in Miles	Estimated Total Cost	Expended During 1921 and 1922	Total Amount Expended to Date	State Cooperation			County Cooperation			Construction Engineering	
					State Share of Estimated Cost	Expended by State During 1921 and 1922	Total Expended by State to Date	County Share of Estimated Cost	Expended by Counties During 1921 and 1922	Total Expended by Counties to Date	Cost During 1921 and 1922	Total Engineering Cost to Date
Baker County:												
Grading and Surfacing, Baker-Haines	9.38	$ 105,689.77	$ 4,133.56	$ 105,689.77	$ 69,535.31	$ 2,735.72	$ 69,535.31	$ 36,154.46	$ 1,397.84	$ 36,154.46	$ 110.28	$ 8,710.78
Grading and Surfacing, Haines-North Powder	8.06	115,302.74	106,367.84	115,302.74	59,360.37	57,986.83	59,360.37	55,942.37	48,381.01	55,942.37	6,216.89	7,590.43
Grading and Surfacing, Nelson-Malheur County Line	24.09	121,500.00	101,381.16	101,381.16	95,190.25	95,525.86	95,525.86	26,309.75	5,855.30	5,855.30	7,454.57	7,454.57
Grading, Nelson-Huntington	19.04	270,995.13	259,807.57	259,807.57	184,203.54	173,015.98	173,015.98	85,000.00	85,000.00	85,000.00	17,516.71	17,516.71
(O. W. R. & N. Co. cooperates $1,791.59. All paid during 1921-22.)												
Grading, Love Bridge-Black Bridge	13.22	128,000.00	66,642.45	66,642.45	11,000.00	7,087.12	7,087.12	117,000.00	59,555.33	59,555.33	7,087.12	7,087.12
Regrading and Resurfacing, Baker-Haines	9.40	29,600.00	15,821.52	15,821.52	29,600.00	15,821.52	15,821.52	.....	.....	.....	2,220.67	2,220.67
Two Bridges over Burnt River near Weatherby	.....	40,871.74	40,871.74	40,871.74	40,871.74	40,871.74	40,871.74	.....	.....	.....	2,345.52	2,345.52
Six Bridges on Nelson-Huntington Section	.....	15,844.19	15,844.19	15,844.19	15,844.19	15,844.19	15,844.19	.....	.....	.....	1,236.89	1,236.89
Overcrossing of O. W. R. & N. Ry. near Huntington	.....	41,985.24	41,985.24	41,985.24	16,794.10	41,985.24	41,985.24	8,397.04	.....	.....	2,675.94	2,675.94
(O. W. R. & N. Co. cooperates approxmiately $16,794.10. No payments to date.)												
Abutments for O. W. R. & N. Ry. Undercrossing near Durkee	.....	20,500.00	4,770.14	4,770.14	8,200.00	4,770.14	4,770.14	4,100.00	.....	.....	501.44	501.44
(O. W. R. & N. Co. cooperates approximately $8,200.00. No payments to date.)												
Benton County:												
Grading and Paving, Corvallis-Polk County Line	10.51	306,368.74	82,968.70	306,368.74	306,368.74	82,968.70	306,368.74	.....	.....	.....	2,685.52	16,030.83
Paving, Monroe North Section	9.15	257,514.74	132,898.67	257,514.74	243,568.01	126,903.78	245,554.06	13,946.73	5,994.89	11,960.68	3,570.00	11,917.33
Surfacing, Wren-Blodgett	4.8	31,016.28	31,016.28	31,016.28	31,016.28	31,016.28	31,016.28	.....	.....	.....	676.25	676.25
Grading, Alsea Mountain Section	6.0	222,000.00	118.35	118.35	116,500.00	118.35	118.35	105,500.00	.....	.....	118.35	118.35
Flyn Bridge over Mary's River (State Share)	.....	5,043.27	5,043.27	5,043.27	5,043.27	5,043.27	5,043.27	.....	.....	.....	633.56	633.56
Benton and Lane Counties:												
Paving, Monroe-Junction City	8.6	278,501.37	278,501.37	278,501.37	276,804.71	277,973.00	277,973.00	1,696.66	528.37	528.37	4,392.64	4,392.64
Benton and Lincoln Counties:												
Surfacing, Blodgett-Eddyville	17.2	130,000.00	67,094.80	67,094.80	87,000.00	67,094.80	67,094.80	43,000.00	.....	.....	1,777.12	1,777.12
Clackamas County:												
Grading and Paving, Bolton-Oregon City	0.3	15,000.00	3,550.98	3,550.98	15,000.00	3,550.98	3,550.98	.....	.....	.....	691.98	691.98
Paving Bridges, Tryon Crk., Sucker Crk., Molalla River	0.11	5,709.77	5,709.77	5,709.77	5,709.77	5,709.77	5,709.77	.....	.....	.....	21.77	21.77
Grading and Surfacing, Canby-Molalla River	1.2	10,407.26	10,407.26	10,407.26	10,407.26	10,407.26	10,407.26	.....	.....	.....	1,564.41	1,564.41
Surfacing, Multnomah County Line-Sandy	6.2	40,500.00	975.80	975.80	22,500.00	975.80	975.80	18,000.00	.....	.....	446.73	446.73
Surfacing, Sandy-Cherryville	6.7	68,000.00	28,175.52	28,175.52	33,000.00	28,175.52	28,175.52	35,000.00	.....	.....	2,128.16	2,128.16
Surfacing, Cherryville-Forest Boundary	10.7	51,000.00	1,752.92	1,752.92	28,000.00	1,752.92	1,752.92	23,000.00	.....	.....	177.75	177.75
Grading, Oregon City-Oswego	6.3	58,841.29	1,379.47	58,841.29	58,841.29	1,379.47	58,841.29	.....	.....	.....	299.05	5,546.75
Grading, Unit 1, Multnomah Co. Line-Forest Boundary	11.86	52,426.54	52,426.54	52,426.54	23,426.54	27,426.54	27,426.54	29,000.00	25,000.00	25,000.00	5,622.63	5,622.63
Grading, Units 2 & 3, Multnomah Co. Line-Forest Boundary	12.35	183,000.00	163,200.93	163,200.93	85,491.88	125,465.31	125,465.31	97,508.12	37,735.62	37,735.62	8,017.30	8,017.30
Bridge over Molala River	.....	60,728.00	14,712.86	60,728.00	60,728.00	14,712.86	60,728.00	.....	.....	.....	1,146.01	4,732.30
Trestle over Tryon Creek	.....	9,734.01	3,356.18	9,734.01	9,734.01	3,356.18	9,734.01	.....	.....	.....	233.94	1,085.41
Bridge over Clackamas River at Parkplace	.....	49,752.04	49,752.04	49,752.04	1,926.09	1,926.09	1,926.09	47,825.95	47,825.95	47,825.95	1,926.09	1,926.09
Bridge over Willamette River at Oregon City	.....	270,000.00	253,927.43	253,927.43	70,000.00	133,927.43	133,927.43	200,000.00	120,000.00	120,000.00	16,278.70	16,278.70
Seven Culverts, Unit 1, Mult. Co. Line-Forest Boundary	.....	15,332.58	15,332.58	15,332.58	7,832.58	15,332.58	15,332.58	7,500.00	.....	.....	581.10	581.10
Three Bridges, Units 2 & 3, Mult. Co. Line-Forest Bounardy	.....	45,028.81	45,028.81	45,028.81	22,528.81	45,028.81	45,028.81	22,500.00	.....	.....	2,155.84	2,155.84
Clatsop County:												
Paving, Svenson-Clatskanie	28.0	702,822.10	241,796.04	702,822.10	702,822.10	241,796.04	702,822.10	.....	.....	.....	6,215.55	24,606.17
Paving, Youngs Bay-Miles Crossing	0.6	23,267.61	3,839.48	23,267.61	23,267.61	3,839.48	23,267.61	.....	.....	.....	3.89	1,028.29
Paving, Skipanon-Seaside	9.94	281,132.35	281,132.35	281,132.35	278,802.57	278,802.57	278,802.57	2,329.78	2,329.78	2,329.78	8,215.96	8,215.96
Paving, Youngs Bay Bridge and North Approach	0.35	9,578.70	9,578.70	9,578.70	8,057.07	8,057.07	8,057.07	1,521.63	1,521.63	1,521.63	204.45	204.45
Paving, Youngs Bay Bridge—South one-third mile	0.33	10,885.07	10,885.07	10,885.07	10,885.07	10,885.07	10,885.07	.....	.....	.....	706.59	706.59
Paving, Skipanon-Miles Crossing	4.2	105,000.00	93,079.83	93,079.83	40,000.00	53,377.53	53,377.53	65,000.00	39,702.30	39,702.30	3,044.96	3,044.96
Grading and Surfacing, Skipanon-Miles Crossing	1.3	43,489.68	43,489.68	43,489.68	43,414.08	43,414.08	43,414.08	75.60	75.60	75.60	3,244.53	3,244.53
Surfacing, Hamlet Jct.-Tillamook Co. Line (State Share)	7.0	55,000.00	46,217.95	47,929.65	55,000.00	46,217.95	47,929.65	.....	.....	.....	280.64	280.64
Widening, Miles Crossing to Warrenton Cut-off	2.9	28,150.35	28,150.35	28,150.35	28,150.35	28,150.35	28,150.35	.....	.....	.....	1,265.85	1,265.85
Bulk-head at South end of Youngs Bay Bridge	.....	15,433.16	15,433.16	15,433.16	15,433.16	15,433.16	15,433.16	.....	.....	.....	130.19	130.19
Operation of Youngs Bay Bridge	.....	3,566.62	3,566.62	3,566.62	.....	679.60	679.60	3,566.62	2,887.02	2,887.02	.....	.....
Upkeep of Youngs Bay Bridge	.....	1,013.04	1,013.04	1,013.04	1,013.04	1,013.04	1,013.04	.....	.....	.....	.....	.....
Clatsop and Columbia Counties:												
Pavement repair and widening, Astoria-Goble	.....	113,000.00	58,763.99	58,763.99	113,000.00	58,763.99	58,763.99	.....	.....	.....	1,720.69	1,720.69
Columbia County:												
Paving, Deer Island-Rainier	22.16	469,496.55	10,876.42	469,496.55	469,496.55	10,876.42	469,496.55	.....	.....	.....	1,069.53	13,925.13
Regrading and Surfacing, Rainier City Section	0.9	26,000.00	23,136.18	23,136.18	22,800.00	19,936.18	19,936.18	3,200.00	3,200.00	3,200.00	2,012.15	2,012.15
Surfacing, Clatskanie-Delena	9.0	143,492.26	1,831.20	143,492.26	143,492.26	1,831.20	143,492.26	.....	.....	.....	.....	6,451.22
Grading, Scappoose-Deer Island	10.85	63,539.16	1,070.75	63,539.16	61,242.35	1,070.75	63,539.16	2,296.81	.....	.....	.....	4,272.43
Grading, Rainier City Section	0.9	48,659.99	.....	48,659.99	40,393.94	Cr. 6,563.42	40,393.94	8,266.05	6,563.42	8,266.05	.....	1,489.32

TABLE VI—Continued

COUNTY AND SECTION	Length in Miles	Estimated Total Cost	Expended During 1921 and 1922	Total Amount Expended to Date	State Cooperation			County Cooperation			Construction Engineering	
					State Share of Estimated Cost	Expended by State During 1921 and 1922	Total Expended by State to Date	County Share of Estimated Cost	Expended by Counties During 1921 and 1922	Total Expended by Counties to Date	Cost During 1921 and 1922	Total Engineering Cost to Date
Coos County:												
Paving, Marshfield-Cedar Point	14.49	391,355.61	15,751.27	391,355.61	391,355.61	15,751.27	391,355.61	.....	.....	.....	3,901.27	17,847.08
Paving, Cedar Point-Coquille	1.96	64,591.78	39,339.87	64,591.78	64,591.78	39,339.87	64,591.78	.....	.....	.....	1,521.36	3,197.30
Paving, Marshfield-North Bend	0.6	13,801.53	13,801.53	13,801.53	5,136.64	5,136.64	5,136.64	8,664.89	8,664.89	8,664.89	390.42	390.42
Paving, Coquille City Section	0.5	9,381.88	9,381.88	9,381.88	8,232.84	9,381.88	9,381.88	1,149.04	.....	.....	226.42	226.42
Grading and Surfacing, Coquille-Myrtle Point	7.0	98,000.00	48,845.88	48,845.88	54,000.00	26,638.33	26,638.33	44,000.00	22,207.55	22,207.55	3,439.90	3,439.90
Surfacing, Myrtle Point to Bridge	11.8	83,000.00	54,064.27	54,064.27	45,000.00	32,100.79	32,100.79	38,000.00	21,963.48	21,963.48	1,310.10	1,310.10
Surfacing, Bridge to Douglas County Line	12.2	112,000.00	65,631.33	65,631.33	61,000.00	38,135.94	38,135.94	51,000.00	27,495.39	27,495.39	2,682.58	2,682.58
Grading, Bridge to Remote	8.0	157,262.15	157,262.15	157,262.15	81,500.06	85,930.50	85,930.50	75,762.09	71,331.65	71,331.65	5,737.96	5,737.96
Grading, Myrtle Point to Bridge	10.0	166,000.00	154,140.82	154,140.82	88,000.00	81,105.29	4,857.32	85,000.00	78,838.80	78,838.80	4,843.32	4,843.32
Bridge over Coquille River at Coquille	.....	90,000.00	83,696.12	83,696.12	5,000.00	4,857.32	81,105.29	78,000.00	73,035.53	73,035.53	8,038.23	8,038.23
Crook County:												
Surfacing, Prineville-Bear Creek	18.4	11,958.46	11,958.46	11,958.46	11,958.46	11,958.46	11,958.46	.....	.....	.....	330.12	330.12
Surfacing, Prineville-Ochoco Forest Boundary	10.0	22,652.04	22,652.04	22,652.04	22,652.04	22,652.04	22,652.04	.....	.....	.....	1,042.84	1,042.84
Surfacing, Prineville-Jones Mill	17.3	49,000.00	155.20	155.20	49,000.00	155.20	155.20	.....	.....	.....	155.20	155.20
Grading, Prineville-Bear Creek-Davis Ranch	31.99	364,021.89	150,138.62	364,021.89	261,109.62	107,226.35	261,109.62	102,912.27	42,912.27	102,912.27	4,082.97	21,619.56
Grading, Prineville-Ochoco Forest Boundary	17.05	138,015.99	138,015.99	138,015.99	80,033.49	113,671.89	113,671.89	57,982.50	24,344.10	24,344.10	5,487.23	5,487.23
Three Bridges between Prineville and Jones Mill	.....	11,537.43	11,537.43	11,537.43	11,537.43	11,537.43	11,537.43	.....	.....	.....	949.38	949.38
Bridge over Dry Creek, 7 miles South of Prineville	.....	5,034.95	5,034.95	5,034.95	5,034.95	5,034.95	5,034.95	.....	.....	.....	633.64	633.64
Bridge over Bear Creek, 22 miles South of Prineville	.....	5,609.03	5,609.03	5,609.03	5,609.03	5,609.03	5,609.03	.....	.....	.....	624.26	1,300.75
Bridge over Crooked River, 25 miles South of Prineville	.....	19,880.53	11,141.70	19,880.53	19,880.53	11,141.70	19,880.53	.....	.....	.....	1,027.87	1,027.87
Bridge over Crooked River, 21 miles South of Prineville	.....	17,729.62	17,729.62	17,729.62	17,729.62	17,729.62	17,729.62	.....	.....	.....	1,049.36	1,049.36
Curry County:												
Surfacing, Hubbard Creek-Brush Creek	4.2	27,859.70	27,859.70	27,859.70	27,859.70	27,859.70	27,859.70	.....	.....	.....	1,230.08	1,230.08
Surfacing, Port Orford-Hubbard Creek	1.4	10,085.23	10,085.23	10,085.23	10,085.23	10,085.23	10,085.23	.....	.....	.....	185.77	185.77
Surfacing, Sixes River-Denmark	5.0	29,300.42	29,300.42	29,300.42	29,300.42	29,300.42	29,300.42	.....	.....	.....	1,048.00	1,048.00
Surfacing, Humbug Mountain Section	.....	5,260.51	5,260.51	5,260.51	5,260.51	5,260.51	5,260.51	.....	.....	.....	.....	.....
Grading, Hubbard Creek-Brush Creek	6.82	186,491.08	74,737.83	186,491.08	156,491.08	44,737.83	156,491.08	30,000.00	30,000.00	30,000.00	2,682.42	10,875.67
Grading, Port Orford-Hubbard Creek	1.6	31,616.47	31,616.47	31,616.47	31,616.47	31,616.47	31,616.47	.....	.....	.....	1,241.21	1,241.21
Grading, Sixes River-Denmark	5.0	71,208.35	71,208.35	71,208.35	41,208.35	41,208.35	41,208.35	30,000.00	30,000.00	30,000.00	3,115.15	3,115.15
Grading, Unit 1, Brush Creek-Mussel Creek	3.8	101,945.47	101,945.47	101,945.47	71,945.47	71,945.47	71,945.47	30,000.00	30,000.00	30,000.00	5,969.19	5,969.19
Grading, Hunters Head Section	4.28	163,000.00	61,362.24	61,362.24	113,000.00	11,362.24	11,362.24	50,000.00	50,000.00	50,000.00	3,607.93	3,607.93
Deschutes County:												
Surfacing, Bend-Allen Ranch	17.1	31,512.53	166.22	31,512.53	31,512.53	166.22	31,512.53	.....	.....	.....	.....	2,535.11
Surfacing, Bend-Jefferson County Line	24.2	133,406.67	114,171.97	133,406.67	133,406.67	114,171.97	133,406.67	.....	.....	.....	2,200.51	3,242.49
Surfacing, Cline Falls-West	5.0	21,010.60	21,010.60	21,010.60	21,010.60	21,010.60	21,010.60	.....	.....	.....	976.08	976.08
Surfacing, Bend-Horse Ridge	10.9	20,056.35	20,056.35	20,056.35	20,056.35	20,056.35	20,056.35	.....	.....	.....	1,005.13	1,005.13
Surfacing, Cline Falls-Sisters	10.81	26,500.00	13,823.74	13,823.74	21,500.00	13,823.74	13,823.74	5,000.00	.....	.....	1,134.71	1,134.71
Surfacing, Tumalo-Sisters	14.96	36,243.22	36,243.22	36,243.22	29,743.22	36,243.22	36,243.22	6,500.00	.....	.....	1,722.81	1,722.81
Grading, Bend-Jefferson County Line	24.2	126,657.90	47,390.75	126,657.90	66,657.90	32,390.75	66,657.90	60,000.00	15,000.00	60,000.00	4,046.74	13,008.72
Grading, Unit 2, Allen Ranch-Klamath County Line	9.3	15,000.00	13,075.14	13,075.14	8,500.00	7,171.00	7,171.00	6,500.00	5,904.14	5,904.14	1,266.85	1,266.85
Multiple Pipe Culverts, Bend-Horse Ridge Section	.....	5,678.70	5,678.70	5,678.70	5,678.70	5,678.70	5,678.70	.....	.....	.....	364.50	364.50
Two Bridges and two Culverts near Sisters	.....	4,500.00	4,060.07	4,060.07	4,500.00	4,060.07	4,060.07	.....	.....	.....	532.12	532.12
Douglas County:												
Grading and Paving, Oakland-Wilbur	7.0	348,545.03	157,669.37	348,545.03	338,545.03	157,669.37	348,545.03	10,000.00	.....	.....	5,275.18	15,878.14
Paving, Myrtle Creek-Dillard	12.94	467,005.80	80,363.54	467,005.80	467,005.80	80,363.54	467,005.80	.....	.....	.....	1,956.37	17,753.64
Paving, Oakland-Yoncalla	10.12	334,216.54	84,416.01	334,216.54	334,216.54	84,416.01	334,216.54	.....	.....	.....	3,156.05	13,294.62
Paving, Oakland-South Section	1.16	41,658.19	41,658.19	41,658.19	41,658.19	41,658.19	41,658.19	.....	.....	.....	1,047.69	1,047.69
Paving, Divide-Drain	14.1	617,082.45	617,082.45	617,082.45	608,017.45	617,082.45	617,082.45	9,065.00	.....	.....	11,156.40	11,156.40
Paving, Roseburg-Dillard	6.2	216,032.55	216,032.55	216,032.55	216,032.55	216,032.55	216,032.55	.....	.....	.....	4,779.65	4,779.65
Paving, Oakland City Section	0.5	15,107.32	15,107.32	15,107.32	8,874.48	11,990.90	11,990.90	6,232.84	3,116.42	3,116.42	575.28	575.28
Paving, Drain-Yoncalla	8.6	229,500.00	222,381.05	222,381.05	229,500.00	222,381.05	222,381.05	.....	.....	.....	5,177.38	5,177.38
Paving, Roseburg-Wilbur	5.32	154,500.00	134,841.32	134,841.32	154,500.00	134,841.32	134,841.32	.....	.....	.....	5,352.70	5,352.70
Paving, Myrtle Creek-Canyonville	10.5	231,500.00	220,898.13	220,898.13	228,500.00	220,898.13	220,898.13	3,000.00	.....	.....	7,063.20	7,063.20
Pavement resurface, Rice Hill Section	2.8	42,076.41	11,875.52	11,875.52	42,076.41	11,875.52	11,875.52	.....	.....	.....	311.91	311.91
Grading and Surfacing, Roseburg-Dillard	6.64	126,118.88	28,045.60	126,118.88	126,118.88	28,045.60	126,118.88	.....	.....	.....	759.48	8,167.30
Grading and Surfacing, Leona-Drain	4.0	102,988.32	28,546.20	102,988.32	102,988.32	28,546.20	102,988.32	.....	.....	.....	1,702.57	6,383.25
Grading and Surfacing, Oakland South Section	1.13	26,387.60	365.96	26,387.60	26,387.60	365.96	26,387.60	.....	.....	.....	Cr. 9.74	1,633.95
Grading and Surfacing, Yoncalla Section	8.67	168,727.85	92,898.43	168,727.85	168,727.85	92,898.43	168,727.85	.....	.....	.....	3,006.05	7,513.74
Grading and Surfacing, Lane County Line-Comstock	0.76	20,860.19	9,320.08	20,860.19	20,860.19	9,320.08	20,860.19	.....	.....	.....	705.52	1,963.16
Grading and Surfacing, Jacques Place-Johns Place	7.15	111,950.73	7,032.81	111,950.73	111,950.73	7,032.81	111,950.73	.....	.....	.....	49.15	7,829.48
Surfacing, Comstock Section (State Forces)	0.2	2,310.30	1,688.62	2,310.30	2,310.30	1,688.62	2,310.30	.....	.....	.....	72.47	72.47
Surfacing, Roseburg-Wilbur	4.1	66,885.72	59,260.52	66,885.72	66,885.72	59,260.52	66,885.72	.....	.....	.....	1,859.17	2,448.20
Surfacing, Canyonville-Myrtle Creek	9.5	55,908.25	55,908.25	55,908.25	55,908.25	55,908.25	55,908.25	.....	.....	.....	2,475.13	2,475.13
Surfacing, Coos County Line-Camas Valley	10.8	101,000.00	39,195.02	39,195.02	55,000.00	23,498.47	23,498.47	46,000.00	15,696.55	15,696.55	1,507.07	1,507.07
Surfacing, Winston-Camas Mountain	10.8	40,500.00	14,195.45	14,195.45	21,500.00	8,135.55	8,135.55	19,000.00	6,059.90	6,059.90	741.06	741.06
Surfacing, Camas Mountain Section	7.0	26,000.00	10,452.71	10,452.71	13,500.00	7,700.84	7,700.84	12,500.00	2,751.87	2,751.87	292.60	292.60
Grading, Yoncalla-Drain	5.89	75,527.72	2,344.79	75,527.72	75,527.72	2,344.79	75,527.72	.....	.....	.....	9.91	7,572.78
Grading, Roseburg-Wilbur	4.1	37,255.51	8,361.93	37,255.51	37,255.51	8,361.93	37,255.51	.....	.....	.....	640.12	4,586.19
Grading, Oakland-Yoncalla	10.4	101,114.99	13,150.79	101,114.99	19,033.97	13,150.79	19,033.97	82,081.02	.....	82,081.02	.....	5,883.18
Grading, Canyonville-Myrtle Creek	9.18	99,294.22	94,184.71	99,294.22	97,988.12	92,878.61	97,988.12	1,306.10	1,306.10	1,306.10	6,413.50	9,852.15
Grading, Winston-Camas Mountain	11.5	83,500.00	58,947.57	58,947.57	45,500.00	31,772.93	31,772.93	38,000.00	27,174.64	27,174.64	4,598.27	4,598.27
Grading, Camas Valley Section	8.47	96,000.00	57,028.89	57,028.89	51,000.00	30,161.54	30,161.54	45,000.00	26,867.35	26,867.35	3,294.17	3,294.17
Grading, Myrtle Creek City Section	0.27	8,854.73	8,854.73	8,854.73	8,673.53	8,673.53	8,673.53	181.20	181.20	181.20	792.34	792.34

TABLE VI—Continued

COUNTY AND SECTION	Length in Miles	Estimated Total Cost	Expended During 1921 and 1922	Total Amount Expended to Date	State Cooperation: State Share of Estimated Cost	State Cooperation: Expended by State During 1921 and 1922	State Cooperation: Total Expended by State to Date	County Cooperation: County Share of Estimated Cost	County Cooperation: Expended by Counties During 1921 and 1922	County Cooperation: Total Expended by Counties to Date	Construction Engineering: Cost During 1921 and 1922	Construction Engineering: Total Engineering Cost to Date
Douglas County—Continued												
Bridge over Sand Creek near Leona	.....	13,915.02	4,336.90	13,915.02	13,915.02	4,336.90	13,915.02	.....	.....	.....	379.02	2,260.69
Bridge over South Umpqua River near Canyonville	.....	48,704.37	48,704.37	48,704.37	48,704.37	48,704.37	48,704.37	.....	.....	.....	2,495.71	2,495.71
Bridge over Canyon Creek at Canyonville	.....	13,753.88	13,753.88	13,753.88	18,753.88	13,753.88	13,753.88	.....	.....	.....	851.65	851.65
Five Bridges on Winston-Camas Mountain Section	.....	31,380.96	26,894.50	26,894.50	17,380.96	13,142.16	13,142.16	14,000.00	13,752.34	13,752.34	2,880.96	2,880.96
Two Bridges on Camas Valley Section	.....	11,789.25	7,842.03	7,842.03	6,289.25	4,362.52	4,362.52	5,500.00	3,479.51	3,479.51	789.25	789.25
Bridge over Elk Creek at Drain	.....	14,500.00	13,738.08	13,738.08	8,000.00	7,623.86	7,623.86	6,500.00	6,114.22	6,114.22	1,159.28	1,159.28
Culverts between Lane County Line and Comstock	.....	5,958.09	885.01	5,958.09	5,958.09	885.01	5,958.09	.....	.....	.....	68.70	272.74
Overcrossing of S. P. Ry. near Comstock (S. P. Ry. Co. cooperates $8,478.88. Paid $5,968.52 prior to 1921 and $2,510.36 during 1921-22.)	0.2	25,196.48	2,648.52	25,196.48	12,478.16	Cr. 4,101.28	12,478.16	4,239.44	4,239.44	4,239.44	59.22	1,387.89
Bridge over Umpqua River and S. P. Ry. at Myrtle Creek (S. P. Ry. Co. cooperates $15,000.00. Nothing paid to November 30, 1922.)	.....	77,632.71	77,632.71	77,632.71	28,089.44	43,089.44	43,089.44	34,543.27	34,543 27	34,543.27	4,574.15	4,574.15
Culvert over Mill Race at Myrtle Creek (State Forces)	.....	7,000.00	122.52	122.52	7,000.00	122.52	122,52	.....	.....	.....	21.77	21.77
Slide removal and widening, Myrtle Creek-Dillard	13.0	43,754.04	6,582.02	43,754.04	43,754.04	6,582.02	43,754.04	.....	.....	.....	.....	280.58
Retaining Wall South of Roseburg	.....	11,182.80	11,182.80	11,182.80	11,182.80	11,182.80	11,182.80	.....	.....	.....	115.96	115.96
Purchase of right of way (State reimbursed by County)	.....	35,608.86	8,687.44	35,608.86	.....	Cr. 26,921.42	.....	35,608.86	35,608.86	35,608.86	.....	.....
Douglas and Josephine Counties:												
Paving, Wolf Creek-Galesville	14.1	515,179.78	515,179.78	515,179.78	515,179.78	515,179.78	515,179.78	.....	.....	.....	11,328.11	11,328.11
Gilliam County:												
Grading and Surfacing, Arlington-Morrow County Line	12.23	240,423.03	47,328.11	240,423.03	240,423.03	47,328.11	240,423.03	.....	.....	.....	1,861.23	6,119.04
Grading and Surfacing, Base Line-Shutlers	7.94	61,000.00	56,736.36	56,736.36	43,500.00	39,236.36	39,236.36	17,500.00	17,500.00	17,500.00	3,495.63	3,495.63
Grading and Surfacing, Arlington-Shutlers	7.1	62,000.00	20,152.57	20,152.57	44,500.00	2,652.57	2,652.57	17,500.00	17,500.00	17,500.00	1,903.60	1,903.60
Grading and Surfacing, Heppner Jct.-Morrow Co. Line	9.6	97,500.00	16,363.47	16,363.47	97,500.00	16,363.47	16,363.47	.....	.....	.....	2,489.95	2,489.95
Grading and Surfacing, Condon North Section	6.0	78,038.56	77,095.74	77,095.74	23,595.87	37,095.74	37,095.74	54,442.69	40,000.00	40,000.00	5,353.62	5,353.62
Grading, Blalock-Arlington	8.84	244,191.10	886.27	244,191.10	194,191.10	Cr. 4,113.73	194,191.10	50,000.00	5,000.00	50,000.00	90.62	11,697.34
Guard Fence, Arlington-Morrow County Line	1.08	5,606.55	5,606.55	5,606.55	5,606.55	5,606.55	5,606.55	.....	.....	.....	203.80	203.80
Guard Fence, Blalock-Arlington	0.71	3,370.65	3,370.65	3,370.65	3,370.65	3,370.55	3,370.55	.....	.....	.....	8.25	8.25
Bridge over Willow Creek at Heppner Junction	.....	23,976.30	3,525.85	23,976.30	23,976.30	3,525.85	23,976.30	.....	.....	.....	.....	1,638.30
Two Bridges over Willow Creek near Heppner Junction	.....	13,500.00	1,213.57	1,213.57	13,500.00	1,213.57	1,213.57	.....	.....	.....	299.82	299.82
Overcrossing of O. W. R. & N. Ry. at Heppner Junction	.....	18,634.37	1,617.98	18,634.37	12,756.48	1,617.98	18,634.37	5,877.89	.....	.....	346.76	1,725.19
Oiling blow sands, Columbia River Highway	.....	39,349.52	24,485.04	39,349.52	39,349.52	24,485.04	39,349.52	.....	.....	.....	.....	.....
Gilliam and Sherman Counties:												
Reconstruction of Bridge over John Day River	.....	15,000.00	9,348.90	9,348.90	15,000.00	9,348.90	9,348.90	.....	.....	.....	1,114.25	1,114.25
Grant County:												
Surfacing, Coles Bridge-Danby Ranch	4.55	26,668.00	22,991.79	26,668.00	26,668.00	22,991.79	26,668.00	.....	.....	.....	1,451.21	1,962.02
Surfacing, Wheeler County Line-East	11.4	31,925.12	31,925.12	31,925.12	31,925.12	31,925.12	31,925.12	.....	.....	.....	2,545.60	2,545.60
Surfacing, Cummins Creek-Valades Ranch	14.7	53,000.00	17.97	17.97	28,000.00	17.97	17.97	25,000.00	.....	.....	17.97	17.97
Grading, Cummins Creek-Valades Ranch	14.7	116,000.00	52,484.96	52,484.96	62,000.00	28,057.95	28,057.95	54,000.00	24,427.01	24,427.01	3,630.89	3,630.89
Two Bridges between Cummins Creek and Valades Ranch	.....	35,000.00	7,806.10	7,806.10	19,000.00	4,573.59	4,573.59	16,000.00	3,232.51	3,232.51	1,341.08	1,341.08
Harney County:												
Grading and Surfacing, Burns Section	4.2	22,000.00	1,103.66	1,103.66	17,000.00	1,103.66	1,103.66	5,000.00	.....	.....	652.00	652.00
Grading, Burns-Sage Hen Hill	14.5	61,306.80	61,306.80	61,306.80	46,908.20	46,908.20	46,908.20	14,398.60	14,398.60	14,398.60	3,712.40	3,712.40
Grading, Summit Springs Market Road	8.14	22,500.00	14,790.37	14,790.37	.....	.....	.....	22,500.00	14,790.37	14,790.37	.....	.....
Hood River County:												
Paving, Cascade Locks-Hood River	22.11	614,584.94	27,231.16	614,584.94	614,584.94	27,231.16	614,584.94	.....	.....	.....	468.35	17,873.03
Paving, Hood River Bridge	0.1	2,419.20	2,419.20	2,419.20	2,419.20	2,419.20	2,419.20	.....	.....	.....	.....	.....
Surfacing, Units 1 & 2, Hood River-Forest Boundary	17.04	108,000.00	1,367.05	1,367.05	58,000.00	752.30	752.30	50,000.00	614.75	614.75	111.73	111.73
Surfacing, Unit 3, Hood River-Forest Boundary	6.08	41,000.00	.....	.....	22,000.00	.....	.....	19,000.00	.....	.....	.....	.....
Grading, Unit 1, Hood River-Mosier	1.37	39,907.29	909.77	39,907.29	39,907.29	909.77	39,907.29	.....	.....	.....	.....	2,253.20
Grading, Unit 2, Hood River-Mosier	2.7	126,384.65	13,561.31	126,384.65	126,384.65	13,561.31	126,384.65	.....	.....	.....	5.75	5,767.84
Grading, Booth Hill Section	5.0	77,500.00	60,078.85	60,078.85	42,000.00	32,643.85	32,643.85	35,500.00	27,435.00	27,435.00	5,208.82	5,208.82
Grading, Hood River-Booth Hill	6.08	150,000.00	111,105.33	111,105.33	79,500.00	58,461.44	58,461.44	70,500.00	52,643.89	52,643.89	5,817.50	5,817.50
Grading, Booth Hill-Forest Boundary	12.04	90,000.00	56,421.74	56,421.74	47,000.00	29,539.25	29,539.25	43,000.00	26,882.49	26,882.49	2,656.73	2,656.73
Bridge on Hood River-Booth Hill Section	.....	22,000.00	18,516.18	18,516.18	12,000.00	10,033.64	10,033.64	10,000.00	8,482.54	8,482.54	1,537.08	1,537.08
Jackson County:												
Paving, Ashland-Green Springs Junction	5.85	266,795.08	89,097.37	248,359.36	266,795.08	89,097.37	248,359.36	.....	.....	.....	4,377.51	12,417.22
Paving, Green Springs Junction-California State Line	14.8	634,225.06	245,628.62	634,225.06	634,225.06	245,628.62	634,225.06	.....	.....	.....	4,534.60	17,692.44
Paving, Gold Hill-Josephine County Line	11.95	369,449.26	178,268.19	369,449.26	369,449.26	178,268.19	369,449.26	.....	.....	.....	6,042.62	20,813.25
Grading and Surfacing, Medford-Agate	8.5	71,500.00	70,900.40	70,900.40	17,500.00	16,900.40	16,900.40	54,000.00	54,000.00	54,000.00	6,667.27	6,667.27
Surfacing, Green Springs Mountain-Pacific Highway	5.91	32,891.85	24,904.00	32,891.85	16,737.75	8,749.90	16,737.75	16,154.10	16,154.10	16,154.10	269.91	583.64
Surfacing, Green Springs Mountain Section	7.8	63,690.87	63,690.87	63,690.87	32,514.40	32,514.40	32,514.40	31,176.47	31,176.47	31,176.47	1,226.86	1,226.86
Grading, Green Springs Mountain-Pacific Highway	10.09	220,163.01	104,479.37	220,163.01	118,047.98	36,852.57	152,536.21	102,115.03	67,626.80	67,626.80	4,784.29	15,852.94
Grading, Green Springs Mountain-Jenny Creek	8.71	118,427.15	42,735.50	118,427.15	62,706.58	Cr. 12,985.07	62,706.58	55,720.57	55,720.57	55,720.57	2,315.24	7,130.61
Grading, Ashland Overcrossing Approaches (S. P. Ry. Co. cooperates $5,801.18. Paid all during 1921-22.)	0.2	14,550.51	5,132.89	14,550.51	5,839.23	Cr. 3,578.39	5,839.23	2,910.10	2,910.10	2,910.10	260.22	495.72
Grading, Talent Reservoir Section	0.64	12,639.57	7,301.23	12,639.57	467.92	463.72	467.92	12,171.65	6,837.51	12,171.65	463.72	467.92
Widening Roadbed, Ashland-Talent	.....	7,782.06	7,782.06	7,782.06	7,782.06	7,782.06	7,782.06	.....	.....	.....	735.90	735.90
Widening Roadbed, Gold Hill-Central Point	.....	6,007.96	6,007.96	6,007.96	6,007.96	6,007.96	6,007.96	.....	.....	.....	678.23	678.23

TABLE VI—Continued

COUNTY AND SECTION	Length in Miles	Estimated Total Cost	Expended During 1921 and 1922	Total Amount Expended to Date	State Cooperation			County Cooperation			Construction Engineering	
					State Share of Estimated Cost	Expended by State During 1921 and 1922	Total Expended by State to Date	County Share of Estimated Cost	Expended by Counties During 1921 and 1922	Total Expended by Counties to Date	Cost During 1921 and 1922	Total Engineering Cost to Date
Jackson County—Continued												
Overcrossing of S. P. Railway near Ashland	.....	35,229.05	7,594.00	35,229.05	14,072.15	Cr. 13,562.90	14,072.15	7,045.56	7,045.56	7,045.56	398.52	1,918.73
(S. P. Ry. Co. cooperates $14,111.34. Paid all during 1921-22.)												
Overcrossing of S. P. Railway at Tolo	.....	32,913.37	1,981.50	32,913.37	13,398.88	Cr. 17,532.99	13,398.88	6,504.83	6,504.83	6,504.83	430.56	1,915.41
(S. P. Ry. Co. cooperates $13,009.66. Paid all during 1921-22.)												
Bridges over Birdseye Creek and Millers Gulch	.....	13,585.11	3,365.04	13,585.11	13,585.11	3,365.04	13,585.11	.....	.....	.....	412.54	1,512.93
Jackson and Klamath Counties:												
Grading, Jenny Creek-Hayden Creek	14.3	131,500.00	119,540.32	119,540.32	70,500.00	106,657.54	106,657.54	61,000.00	12,882.78	12,882.78	7,562.77	7,562.77
Jefferson County:												
Grading and Surfacing, Unit 6, Madras-Wasco Co. Line	5.54	42,500.00	31,542.54	31,542.54	17,500.00	11,542.54	11,542.54	25,000.00	20,000.00	20,000.00	2,862.64	2,862.64
Grading, Units 2 and 4, Madras-Wasco County Line	6.27	34,382.64	32,879.22	32,879.22	9,382.64	12,879.22	12,879.22	25,000.00	20,000.00	20,000.00	2,746.74	2,746.74
Bridge over Trout Creek near Madras	.....	8,645.57	8,645.57	8,645.57	8,645.57	8,645.57	8,645.57	.....	.....	.....	504.74	504.74
Josephine County:												
Paving, Sexton Mountain Section	7.5	189,500.00	140,736.25	140,736.25	189,500.00	140,736.25	140,736.25	.....	.....	.....	6,631.75	6,631.75
Paving, Grants Pass-Sexton Mountain	9.8	240,000.00	170,051.95	170,051.95	240,000.00	170,051.95	170,051.95	.....	.....	.....	6,602.89	6,602.89
Grading and Surfacing, Grants Pass-Pleasant Valley	9.84	116,297.96	110,618.56	116,297.96	116,297.96	110,618.56	116,297.96	.....	.....	.....	5,772.02	7,158.49
Surfacing, Grave Creek-Pleasant Valley	7.48	118,656.71	103,643.98	118,656.71	118,656.71	103,643.98	118,656.71	.....	.....	.....	4,243.13	5,517.34
Grading, Sexton Mountain Section	7.43	155,004.09	23,341.02	155,004.09	145,004.09	18,341.02	145,004.09	10,000.00	5,000.00	10,000.00	1,405.67	10,046.44
Widening Roadbed, Grants Pass-Jackson County Line	3.8	13,634.46	13,634.46	13,634.46	13,634.46	13,634.46	13,634.46	.....	.....	.....	1,015.69	1,015.69
Widening Roadbed, Wolf Creek-Grave Creek	.....	11,866.79	11,866.79	11,866.79	11,866.79	11,866.79	11,866.79	.....	.....	.....	664.99	664.99
Bridge over Grave Creek	.....	21,128.65	4,570.95	21,128.65	11,415.68	Cr. 5,142.02	11,415.68	9,712.97	9,712.97	9,712.97	549.51	1,722.70
Bridge over Deer Creek near Selma	.....	19,056.25	15,075.04	15,075.04	10,548.43	6,567.22	6,567.22	8,507.82	8,507.82	8,507.82	2,040.62	2,040.62
Bridge over Wolf Creek near Wolf Creek	.....	4,433.40	4,433.40	4,433.40	2,576.41	2,576.41	2,576.41	1,856.99	1,856.99	1,856.99	719.41	719.41
Klamath County:												
Grading and Surfacing, Klamath Falls-North (State Share)	3.42	46,033.53	11,604.05	46,033.53	46,033.53	11,604.05	46,033.53	.....	.....	.....	159.39	3,632.10
Grading and Surfacing, Merrill Section	2.6	39,000.00	34,010.97	34,010.97	20,500.00	19,704.21	19,704.21	18,500.00	14,306.76	14,306.76	1,635.21	1,635.21
Surfacing, Barclay Springs-Lamms Mill	5.1	30,610.07	30,610.07	30,610.07	15,889.87	15,889.87	15,889.87	14,720.20	14,720.20	14,720.20	1,154.66	1,154.66
Grading, Barclay Springs-Lamms Mill	5.1	78,326.61	78,326.61	78,326.61	62,052.36	62,052.36	62,052.36	16,274.25	16,274.25	16,274.25	3,587.79	3,587.79
Bridge over Altamont Canal near Klamath Falls	.....	4,518.14	4,518.14	4,518.14	3,415.17	3,415.17	3,415.17	1,102.97	1,102.97	1,102.97	106.27	106.27
Overcrossing of O. C. & E. Ry. near Dairy	.....	3,323.49	3,323.49	3,323.49	1,154.03	2,501.08	2,501.08	822.41	822.41	822.41	236.47	236.47
(O. C. & E. Ry. Co. cooperates $1,347.05. Nothing paid to date.)												
Lake County:												
Grading and Surfacing, Crooked Creek-Chandlers Station	6.5	71,500.00	69,585.99	69,585.99	45,000.00	43,684.84	43,684.84	26,500.00	25,901.15	25,901.15	4,833.10	4,833.10
Grading and Surfacing, Drews Valley Section	8.8	112,000.00	1,696.77	1,696.77	71,000.00	1,263.27	1,263.27	41,000.00	433.50	433.50	470.22	470.22
Grading and Surfacing, Valley Falls-Chewaucan Narrows	12.3	40,000.00	192.85	192.85	25,000.00	192.85	192.85	15,000.00	.....	.....	136.93	136.93
Surfacing, Chandlers Station-Valley Falls	4.0	10,681.82	10,681.82	10,681.82	6,580.12	6,617.62	6,617.62	4,101.70	4,064.20	4,064.20	427.57	427.57
Grading, Chandlers Station-Chewaucan Narrows	16.8	56,000.00	50,040.82	50,040.82	27,500.00	32,318.77	32,318.77	28,500.00	17,722.05	17,722.05	5,079.10	5,079.10
Bridge over Chewaucan River near Paisley	.....	16,085.53	16,085.53	16,085.53	10,260.35	10,372.18	10,372.18	5,825.18	5,713.35	5,713.35	1,522.57	1,522.57
Lane County:												
Paving, Eugene-Junction City	12.4	272,264.81	.....	272,264.81	271,021.20	Cr. 1,243.61	271,021.20	1,243.61	1,243.61	1,243.61	.....	9,275.54
Paving, Goshen-Walker	9.8	338,404.15	338,404.15	338,404.15	337,689.74	338,404.15	338,404.15	714.41	.....	.....	6,663.11	6,663.11
Paving, Walker-Divide	6.3	231,252.42	231,252.42	231,252.42	231,252.42	231,252.42	231,252.42	.....	.....	.....	6,432.03	6,432.03
Paving, Cottage Grove Section	1.6	58,667.79	53,331.75	53,331.75	33,667.79	30,037.63	30,037.63	25,000.00	23,294.12	23,294.12	2,591.53	2,591.53
Grading and Surfacing, Divide-Douglas County Line	1.38	30,772.76	4,001.73	30,772.76	30,772.76	4,001.73	30,772.76	.....	.....	.....	74.57	1,031.78
Grading and Surfacing, Thurston-Walterville	4.5	44,500.00	40,611.36	40,611.36	23,500.00	22,352.66	22,352.66	21,000.00	18,258.70	18,258.70	4,093.93	4,093.93
Grading and Surfacing, Power Plant and Shell Rock Secs.	2.1	39,000.00	18,065.83	18,065.83	21,000.00	10,157.56	10,157.56	18,000.00	7,908.27	7,908.27	1,810.36	1,810.36
Grading and Surfacing, Walterville, Deer Horn, Doyle Hill	2.98	25,500.00	17,296.10	17,296.10	14,000.00	10,374.60	10,374.60	11,500.00	6,921.50	6,921.50	1,885.15	1,885.15
Grading and Surfacing, Harrisburg-Junction City	3.46	47,000.00	34,083.78	34,083.78	19,500.00	9,906.27	9,906.27	27,500.00	24,177.51	24,177.51	2,339.96	2,839.96
Surfacing, McVeigh Overcrossing Approaches	0.4	3,305.21	3,305.21	3,305.21	3,305.21	3,305.21	3,305.21	.....	.....	.....	195.84	195.84
Surfacing, Goldson-Blachly	13.6	95,000.00	25,695.97	25,695.97	51,500.00	16,412.20	16,412.20	43,500.00	9,283.77	9,283.77	1,925.09	1,925.09
Grading, Walker-Cottage Grove	3.07	49,602.38	.....	49,602.38	28,613.26	Cr. 15,391.12	28,613.26	1,963.12	.....	1,963.12	.....	2,788.91
(S. P. Ry. Co. cooperates $19,026.00. Paid $3,634.88 prior to 1921, and $15,391.12 during 1921-22.)												
Grading, McVeigh Overcrossing Approaches	0.5	29,975.89	28,594.82	28,594.82	13,975.89	28,594.82	28,594.82	6,000.00	.....	.....	1,660.27	1,660.27
(S. P. Ry. Co. cooperates $10,000.00. Nothing paid to date.)												
Grading, Goldson Section	11.29	155,731.77	155,731.77	155,731.77	83,042.68	83,042.68	83,042.68	72,689.09	72,689.09	72,689.09	10,353.59	10,353.59
Grading, Summit Blachly	2.3	65,677.66	65,677.66	65,677.66	33,939.25	33,939.25	33,939.25	31,738.41	31,738.41	31,738.41	2,200.85	2,200.85
Overcrossing of S. P. Ry. near Divide	1.2	28,593.39	4,827.15	28,593.39	17,153.77	4,760.44	20,468.46	.....	.....	.....	94.17	1,551.85
(S. P. Ry. Co. cooperates $11,439.62. Paid $8,058.22 prior to 1921, and $66.71 during 1921-22. Balance of $3,314.69 remains unpaid this date.)												
Overcrossing of S. P. Ry. at McVeigh Point	.....	38,794.87	38,794.87	38,794.87	19,569.29	38,794.87	38,794.87	6,000.00	.....	.....	2,027.12	2,027.12
(S. P. Ry. Co. cooperates $13,225.58. Nothing paid to date.)												
Two Bridges near Goldson	.....	12,983.17	12,983.17	12,983.17	6,917.82	11,987.77	11,987.77	6,065.35	995.40	995.40	1,289.60	1,289.60
Bridge over Willamette River North of Cottage Grove	.....	14,500.00	41.86	41.86	1,000.00	41.86	41.86	13,500.00	.....	.....	41.86	41.86
Superstructure over Willamette River near Latham	.....	13,612.33	13,612.33	13,612.33	1,347.75	1,361.75	1,361.75	12,264.58	12,250.58	12,250.58	1,347.75	1,347.75

TABLE VI—Continued

COUNTY AND SECTION	Length in Miles	Estimated Total Cost	Expended During 1921 and 1922	Total Amount Expended to Date	State Cooperation			County Cooperation			Construction Engineering	
					State Share of Estimated Cost	Expended by State During 1921 and 1922	Total Expended by State to Date	County Share of Estimated Cost	Expended by Counties During 1921 and 1922	Total Expended by Counties to Date	Cost During 1921 and 1922	Total Engineering Cost to Date
Lincoln County:	17.2	155,000.00	37,965.58	37,965.58	102,000.00	37,098.48						
Grading and Surfacing, Eddyville-Toledo							37,098.48	53,000.00	867.10	867.10	1,090.16	1,090.16
Surfacing, Toledo-Newport	7.25	105,000.00	91,684.71	91,684.71	105,000.00	91,684.71	91,684.71				1,268.57	1,268.57
Surfacing, Tum Tum Section		3,122.70	3,122.70	3,122.70	3,122.70	3,122.70	3,122.70				79.75	79.75
Grading, Toledo-Newport	5.3	59,374.88	28,694.12	59,374.88	6,928.77	3,315.56	6,928.77	52,446.11	25,378.56	52,446.11	3,715.56	6,928.77
Grading, Chitwood-Toledo	10.6	103,000.00	85,475.11	85,475.11	66,000.00	55,677.87	55,677.87	37,000.00	29,797.24	29,797.24	9,821.96	9,821.96
Grading, Chitwood-Tum Tum	9.7	96,000.00	74,621.76	74,621.76	61,000.00	47,440.08	47,440.08	35,000.00	27,181.68	27,181.68	6,223.92	6,223.92
Thirteen Bridges, Benton County Line-Toledo		13,500.00	6,064.88	6,064.88	8,500.00	3,990.39	3,990.39	5,000.00	2,074.49	2,074.49	878.65	878.65
Bridge over Yaquina River at Eddyville		12,500.00	4,919.76	4,919.76	8,000.00	3,111.78	3,111.78	4,500.00	1,807.98	1,807.98	399.82	399.82
Prospecting for Quarry Sites (Benton Co. Line-Toledo)		1,441.16	1,441.16	1,441.16	1,441.16	1,441.16	1,441.16				194.34	194.34
Linn County:												
Grading and Paving, Albany-Jefferson	6.77	207,296.72	32,575.53	207,296.72	184,481.93	24,506.64	184,481.93	22,814.79	8,068.89	22,814.79	455.06	13,056.83
Paving, Shedd-Halsey	7.8	245,500.00	221,223.22	221,223.22	243,094.23	221,223.22	221,223.22	2,405.77			4,679.83	4,679.83
Paving, Albany-Tangent	7.3	152,112.89	139,263.22	139,263.22	152,112.89	139,263.22	139,263.22				2,622.64	2,622.64
Paving, Halsey-Harrisburg	7.94	205,000.00	85,654.16	85,654.16	204,614.68	85,654.16	85,654.16	385.32			3,225.49	3,225.49
Grading, Surfacing & Bridge, Murder Creek Undercrossing. (S. P. Ry. Co. cooperates approximately $9,000.00. Nothing paid to date.)	0.6	22,219.36	12,219.36	12,219.36	6,219.36	12,219.36	12,219.36	7,000.00			1,032.99	1,032.99
Surfacing, Albany-Tangent	7.41	34,415.17	19,669.24	34,415.17	34,415.17	19,669.24	34,415.17				1,512.95	2,618.90
Bridges over Lake and Oak Creeks near Tangent		14,500.00	11,049.88	11,049.88	1,000.00	11,049.88	11,049.88	13,500.00			792.13	792.13
Linn and Marion Counties:												
Bridge over Santiam River at Mehama		46,162.70	18,008.75	46,162.70	962.30	Cr. 756.45	962.30	45,200.40	18,765.20	45,200.40	751.81	2,454.56
Malheur County:												
Grading and Surfacing, Ontario-Weiser	14.36	143,051.87	143,051.87	143,051.87	68,051.87	81,682.11	81,682.11	75,000.00	61,369.76	61,369.76	8,310.20	8,310.20
Grading and Surfacing, Vale-Burrelle	6.5	48,896.72	48,896.72	48,896.72	26,238.33	26,238.33	26,238.33	22,658.39	22,658.39	22,658.39	3,579.93	3,579.93
Surfacing, Vale-Jamieson	17.8	65,195.58	65,195.58	65,195.58	65,195.58	65,195.58	65,195.58				5,384.58	5,384.58
Surfacing, Jamieson-Brogan	6.24	14,641.58	14,641.58	14,641.58	7,809.99	7,809.99	7,809.99	6,831.59	6,831.59	6,831.59	978.39	978.39
Grading, Jamieson-Brogan	6.2	24,853.33	24,853.33	24,853.33	13,369.50	13,369.50	13,369.50	11,483.83	11,483.83	11,483.83	1,885.66	1,885.66
Grading, Baker County Line-Weiser	15.27	106,950.90	101,838.82	101,838.82	104,241.52	99,129.44	99,129.44	2,709.38	2,709.38	2,709.38	8,073.29	8,073.29
Bridge over Malheur River at Vale		42,980.31	41,609.78	42,980.31	23,346.10	21,975.57	23,346.10	19,634.21	19,634.21	19,634.21	2,341.35	3,711.88
Bridge over Malheur River near Ontario		36,642.46	36,642.46	36,642.46	36,642.46	36,642.46	36,642.46				2,162.29	2,162.29
Bridge over Malheur River near Juntura		8,500.00						8,500.00				
Bridge over Bully Creek near Vale		14,644.82	14,644.82	14,644.82	7,844.27	7,844.27	7,844.27	6,800.55	6,800.55	6,800.55	1,043.72	1,043.72
Three Bridges on Ontario-Weiser Section		18,218.35	18,218.35	18,218.35	18,218.35	18,218.35	18,218.35				1,139.27	1,139.27
Marion County:												
Paving, Jefferson North Section	6.76	233,713.96	63,193.68	233,713.96	233,713.96	63,193.68	233,713.96				2,131.20	7,504.21
Paving, Salem South Section	8.5	284,269.79	284,269.79	284,269.79	284,269.79	284,269.79	284,269.79				6,700.78	6,700.78
Grading and Paving, Jefferson City Section	0.9	27,000.00	22,076.89	22,076.89	24,300.00	22,076.89	22,076.89	2,700.00			1,006.83	1,006.83
Surfacing, Salem South Section	7.2	54,532.83	33,730.10	54,532.83	54,532.83	33,730.10	54,532.83				2,233.88	3,423.67
Relief Opening and Approach to Pudding River Bridge at Aurora		14,000.00	9,382.09	9,382.09	1,000.00	1,074.89	1,074.89	13,000.00	8,307.20	8,307.20	750.23	750.23
Marion and Polk Counties:												
Repairs to Willamette River Bridge at Salem		2,056.61	2,056.61	2,056.61	1,032.88	1,032.88	1,032.88	1,023.73	1,023.73	1,023.73		
Painting Willamette River Bridge at Salem		2,381.62	2,381.62	2,381.62	2,381.62	2,381.62	2,381.62				54.95	54.95
Morrow County:												
Surfacing, Gilliam County Line-Morgan	12.65	104,184.92	104,184.92	104,184.92	104,184.92	104,184.92	104,184.92				3,729.32	3,729.32
Surfacing, Morgan-Lexington	12.65	86,711.59	86,711.59	86,711.59	85,874.40	85,874.40	85,874.40	837.19	837.19	837.19	2,670.88	2,670.88
Surfacing, Lexington-Heppner	10.27	68,000.00	41,811.80	41,811.80	68,000.00	41,811.80	41,811.80				3,318.96	3,318.96
Grading, Lexington-Gilliam County Line	25.0	227,556.26	100,810.45	227,556.26	93,754.60	70,092.98	93,754.60	133,801.66	30,717.47	133,801.66	7,660.63	27,432.14
Grading, Lexington-Heppner	9.5	55,942.02	55,942.02	55,942.02	55,708.76	55,708.76	55,708.76	233.26	233.26	233.26	3,928.74	3,928.74
Grading, Heppner-Jones Hill	9.0	59,869.99	59,869.99	59,869.99	19,641.99	19,641.99	19,641.99	40,228.00	40,228.00	40,228.00	3,126.19	3,126.19
Grading Approaches to Messner Overcrossing		1,084.05	1,084.05	1,084.05	813.04	1,084.05	1,084.05	271.01			98.20	98.20
Overcrossing of O. W. R. & N. Ry. at Messner		19,318.73	7,391.69	19,318.73	13,831.60	7,391.69	19,318.73	5,487.13			909.88	1,665.98
Three Bridges on O. W. Highway at Heppner		19,710.63	19,710.63	19,710.63	17,973.43	17,973.43	17,973.43	1,737.20	1,737.20	1,737.20	1,236.23	1,236.23
Bridge over Black Horse Creek at Lexington		5,764.60	5,764.60	5,764.60	5,231.25	5,764.60	5,764.60	533.35			431.10	431.10
Polk County:												
Grading and Paving, Rickreall-Monmouth-Independence	7.8	258,067.50	43,519.68	258,067.50	235,718.54	43,519.68	258,067.50	22,348.96			850.61	13,298.44
Grading and Paving, Brunks Corner-Dallas	7.5	252,500.00	232,654.37	232,654.37	241,800.00	225,536.98	225,536.98	10,700.00	7,117.39	7,117.39	8,202.44	8,202.44
Grading and Paving, Dallas City Section	1.0	24,500.00	24,091.26	24,091.26	500.00	485.34	485.34	24,000.00	23,605.92	23,605.92	485.34	485.34
Grading and Surfacing, Benton County Line-Suver	1.64	18,566.44	2,619.57	18,566.44	5,116.72	Cr. 10,830.15	5,116.72	13,449.72	13,449.72	13,449.72	667.59	1,960.42
Grading and Surfacing, Yamhill Co. Line-Butlers Store	7.6	133,500.00	129,938.92	130,307.48	133,500.00	129,938.92	130,307.48				13,956.40	14,324.96
Surfacing, Monmouth-Kings Valley Road (State Forces)		6,538.28	6,538.28	6,538.28	6,538.28	6,538.28	6,538.28				241.33	241.33
Resurfacing, Suver-Benton County Line (State Forces)		2,814.66	2,814.66	2,814.66	2,814.66	2,814.66	2,814.66				103.60	103.60
Resurfacing, Rickreall-Holmes Gap (State Forces)		7,783.15	7,783.15	7,783.15	7,783.15	7,783.15	7,783.15				45.55	45.55
Surfacing, Monmouth-Luckiamute River (State Forces)		2,500.00	1,932.55	1,932.55	2,500.00	1,932.55	1,932.55					
Grading, Rickreall-Holmes Gap	5.3	16,793.39	16,343.95	16,343.95	1,949.71	16,343.95	16,343.95	14,843.68			1,949.71	1,949.71
Grading, Monmouth-Luckiamute River	5.1	51,000.00	47,204.50	47,204.50	5,000.00	7,737.02	7,737.02	46,000.00	39,467.48	39,467.48	4,844.06	4,844.06
Grading, Luckiamute River-Suver	2.3	10,500.00	7,917.65	7,917.65	2,000.00	7,917.65	7,917.65	8,500.00			1,677.91	1,677.91
Bridge over Yamhill River near Willamina		13,000.00	9,436.80	9,436.80	13,000.00	9,436.80	9,436.80				664.97	664.97

TABLE VI—Continued

COUNTY AND SECTION	Length in Miles	Estimated Total Cost	Expended During 1921 and 1922	Total Amount Expended to Date	State Cooperation			County Cooperation			Construction Engineering	
					State Share of Estimated Cost	Expended by State During 1921 and 1922	Total Expended by State to Date	County Share of Estimated Cost	Expended by Counties During 1921 and 1922	Total Expended by Counties to Date	Cost During 1921 and 1922	Total Engineering Cost to Date
Polk and Yamhill Counties:												
Grading and Paving, Amity-Holmes Gap	8.3	288,961.14	75,765.81	285,165.26	248,461.14	72,712.01	276,307.74	40,500.00	3,053.80	8,857.52	5,716.96	17,372.44
Bridges on Amity-Holmes Gap Section	.....	22,795.60	Cr. 237.16	22,795.60	1,132.23	Cr. 12,443.17	10,589.59	21,663.37	12,206.01	12,206.01	.....	721.48
Sherman County:												
Grading and Surfacing, Biggs-Wasco	9.45	155,000.00	14,714.48	14,714.48	85,000.00	8,047.17	8,047.17	70,000.00	6,667.31	6,667.31	3,243.56	3,243.56
Grading and Surfacing, Wasco-Moro	7.5	69,049.92	69,049.92	69,049.92	36,477.77	36,477.77	36,477.77	32,572.15	32,572.15	32,572.15	3,905.57	3,905.57
Grading and Surfacing, Moro-Grass Valley	8.58	67,000.00	49,038.71	49,038.71	36,000.00	26,744.97	26,744.97	31,000.00	22,293.74	22,293.74	4,124.86	4,124.86
Oiling Operations along Columbia River Highway	14.78	11,461.28	2,089.14	11,461.28	11,461.28	2,089.14	11,461.28	.....	.....	.....	.....	.....
Guard Fence along Columbia River Highway	.....	7,264.66	7,264.66	7,264.66	7,264.66	7,264.66	7,264.66	.....	.....	.....	211.14	211.14
Sherman and Wasco Counties:												
Bridge over Deschutes River on Columbia River Highway	.....	81,595.30	404.04	81,595.30	31,595.30	404.04	31,595.30	50,000.00	.....	50,000.00	.....	4,751.11
Bridge over Deschutes River at Shearar's	.....	6,000.00	.....	.....	.....	.....	.....	6,000.00	.....	.....	.....	.....
Tillamook County:												
Grading and Paving, Hemlock-Beaver	5.0	195,794.90	89,883.76	195,794.90	195,794.90	89,883.76	195,794.90	.....	.....	.....	3,908.12	12,098.47
Pavement Resurface, Tillamook South	5.0	131,919.55	131,919.55	131,919.55	131,919.55	131,919.55	131,919.55	.....	.....	.....	2,717.18	2,717.18
Grading and Surfacing, Unit "A," Mohler-Clatsop Co. Line	4.7	61,500.00	33,821.56	33,821.56	33,500.00	18,330.40	18,330.40	28,000.00	15,491.16	15,491.16	2,839.23	2,839.23
Grading and Surfacing, Unit "B," Mohler-Clatsop Co. Line	2.63	42,000.00	.....	.....	23,000.00	.....	.....	19,000.00	.....	.....	.....	.....
Grading and Surfacing, Hebo-Neskowin	13.0	156,500.00	46,941.05	46,941.05	85,500.00	22,206.26	22,206.26	71,000.00	24,734.79	24,734.79	4,580.44	4,580.44
Surfacing, Riverdale-Hobsonville	4.69	37,088.87	31,181.01	37,088.87	37,088.87	31,181.01	37,088.87	.....	.....	.....	847.09	1,124.89
Surfacing, Moore Cut-off	3.0	50,000.00	37,438.14	41,259.94	50,000.00	37,438.14	41,259.94	.....	.....	.....	2,332.08	3,027.24
Surfacing, Beaver-Hebo	4.7	49,000.00	40,638.17	41,812.12	49,000.00	40,638.17	41,812.12	.....	.....	.....	3,369.67	4,008.12
Surfacing, Wilson River-Riverdale	1.5	12,714.00	12,714.00	12,714.00	12,714.00	12,714.00	12,714.00	.....	.....	.....	420.91	420.91
Surfacing, Rockaway North Section	3.3	18,500.00	9,497.16	9,497.16	18,500.00	9,497.16	9,497.16	.....	.....	.....	626.66	626.66
Bridge over Kilchis River near Tillamook	.....	11,257.74	7,772.22	11,257.74	404.22	Cr. 3,081.30	404.22	10,853.52	10,853.52	10,853.52	112.66	404.22
Bridge over Big Nestucca River near Hebo	.....	18,715.34	9,194.77	18,715.34	640.46	Cr. 8,880.11	640.46	18,074.88	18,074.88	18,074.88	336.45	640.46
Bridge over Nehalem River near Mohler	.....	27,264.87	27,264.87	27,264.87	937.53	937.53	937.53	26,327.34	26,327.34	26,327.34	937.53	937.53
Umatilla County:												
Paving, Adams-Athena	9.0	219,041.72	30,147.80	219,041.72	169,041.72	30,147.80	169,041.72	50,000.00	.....	50,000.00	543.98	15,344.00
Paving, Athena-Milton	11.54	395,365.67	258,570.11	395,365.67	395,365.67	258,570.11	395,365.67	.....	.....	.....	8,505.40	18,213.62
Grading and Surfacing, Cold Springs-Holdman	13.2	158,710.18	158,710.18	158,710.18	9,884.82	9,884.82	9,884.82	148,825.36	148,825.36	148,825.36	9,884.82	9,884.82
Grading and Surfacing, Holdman-Harps Ranch	3.0	46,000.00	19.12	19.12	4,000.00	19.12	19.12	42,000.00	.....	.....	19.12	19.12
Surfacing, Cabbage Hill-Deadman's Pass	12.82	100,929.86	100,906.83	100,929.86	100,929.86	100,906.83	100,929.86	.....	.....	.....	3,022.36	3,045.39
Surfacing, Pilot Rock-Vinson Canyon	10.7	43,500.00	33,821.55	33,821.55	43,500.00	33,821.55	33,821.55	.....	.....	.....	2,516.05	2,516.05
Surfacing, Vinson Section	4.0	24,000.00	27.00	27.00	24,000.00	27.00	27.00	.....	.....	.....	27.00	27.00
Grading, Pendleton-Echo	21.88	308,387.84	74,440.72	308,387.84	228,017.34	74,440.72	228,017.34	80,370.50	.....	80,370.50	1,432.87	25,068.01
Grading, Pilot Rock-Vinson	14.7	92,500.00	89,800.13	89,800.13	57,500.00	61,882.66	61,882.66	35,000.00	27,917.47	27,917.47	7,138.16	7,138.16
Guard Fence on State Highways in Umatilla County	7.5	26,647.09	26,647.09	26,647.09	26,647.09	26,647.09	26,647.09	.....	.....	.....	1,517.11	1,517.11
Bridge on Athena-Milton Section	.....	12,533.31	10,300.43	12,533.31	1,009.99	1,228.62	1,510.28	11,523.32	9,071.81	11,023.03	728.33	1,009.99
Bridge over Stage Gulch at Stanfield	.....	3,354.80	3,354.80	3,354.80	1,342.32	1,342.32	1,342.32	2,012.48	2,012.48	2,012.48	336.09	336.09
Two Bridges over Birch Creek near Pilot Rock	.....	9,755.27	9,755.27	9,755.27	5,342.31	9,755.27	9,755.27	4,412.96	.....	.....	929.34	929.34
Bridge over U. S. R. S. Canal near Echo	.....	6,000.00	15.63	15.63	500.00	15.63	15.63	5,500.00	.....	.....	15.63	15.63
Union County:												
Paving, Island City-La Grande-Hot Lake	6.0	223,889.50	64,124.28	223,889.50	211,815.47	52,929.02	211,815.47	12,074.03	11,195.26	12,074.03	1,873.02	11,013.16
Paving, Union City Section	1.31	79,153.51	79,153.51	79,153.51	18,676.46	33,408.33	33,408.33	60,477.05	45,745.18	45,745.18	3,368.52	3,368.52
Grading and Surfacing, Hot Lake-Union	5.03	76,612.99	76,612.99	76,612.99	34,971.01	76,612.99	76,612.99	41,641.98	.....	.....	5,533.33	5,533.33
Surfacing, Lone Pine-Hot Lake	3.91	63,123.32	27,861.07	63,123.32	58,613.45	23,351.20	58,613.45	4,509.87	4,509.87	4,509.87	813.81	3,014.61
Surfacing, Union-Telocaset	6.01	45,955.78	45,955.78	45,955.78	45,231.78	45,955.78	45,955.78	724.00	.....	.....	2,232.55	2,232.55
Surfacing, Telocaset-North Powder	9.1	65,008.54	65,008.54	65,008.54	65,008.54	65,008.54	65,008.54	.....	.....	.....	2,726.88	2,726.88
Surfacing, Elgin-Minam	9.3	96,068.78	96,068.78	96,068.78	2,902.06	2,902.06	2,902.06	93,166.72	93,166.72	93,166.72	2,902.06	2,902.06
Surfacing, Kamela-Oro Dell	18.77	101,000.00	98,268.23	98,268.23	101,000.00	98,268.23	98,268.23	.....	.....	.....	2,332.56	2,332.56
Grading, Kamela-Hilgard	12.75	181,257.49	180,757.49	180,757.49	7,500.80	7,000.80	7,000.80	173,756.69	173,756.69	173,756.69	7,295.18	7,295.18
Grading, Hilgard-La Grande	6.3	118,740.15	118,740.15	118,740.15	4,175.88	5,928.57	5,928.57	114,564.27	112,811.58	112,811.58	4,175.88	4,175.88
Grading, North Powder-Telocaset	9.06	48,794.63	42,150.18	48,794.63	5,758.16	Cr. 886.29	5,758.16	43,036.47	43,036.47	43,036.47	3,483.56	5,758.16
Grading, Island City-Elgin	18.1	78,500.00	62,090.19	62,090.19	78,500.00	62,090.19	62,090.19	.....	.....	.....	5,399.46	5,399.46
Bridge and Overhead Crossing near Hilgard (O. W. R. & N. Co. cooperates approximately $17,323.04. Nothing paid to date.)	.....	49,494.40	49,494.40	49,494.40	24,747.20	49,494.40	49,494.40	7,424.16	.....	.....	3,151.51	3,151.51
Overhead Crossing near Casey (O. W. R. & N. Co. cooperates approximately $7,386.78. Nothing paid to date.)	.....	21,105.08	21,105.08	21,105.08	10,552.54	21,105.08	21,105.08	3,165.76	.....	.....	1,641.88	1,641.88
Overhead Crossing near Hot Lake (O. W. R. & N. Co. cooperates approximately $15,980.11. Nothing paid to date.)	.....	45,657.45	45,657.45	45,657.45	22,828.72	45,657.45	45,657.45	6,848.62	.....	.....	3,014.45	3,014.45
Overhead Crossing near Telocaset (O. W. R. & N. Co. cooperates approximately $9,292.81. Nothing paid to date.)	.....	26,550.89	26,550.89	26,550.89	13,275.45	26,550.89	26,550.89	3,982.63	.....	.....	2,503.07	2,503.07
Overhead Crossing near North Powder (O. W. R. & N. Co. cooperates $16,026.16. All paid during 1921-1922.)	.....	40,171.10	40,171.10	40,171.10	16,131.86	24,144.94	24,144.94	8,013.08	.....	.....	2,789.11	2,789.11
Bridge and Overhead Crossing near Rinehart (O W. R. & N. Co. cooperates approximately $8,400.00. Nothing paid to date.)	.....	42,000.00	12,362.87	12,362.87	16,800.00	12,362.87	12,362.87	16,800.00	.....	.....	1,631.96	1,631.96
Bridges over Wolf and Jimmy Creeks near North Powder	.....	8,191.90	8,191.90	8,191.90	639.78	8,191.90	8,191.90	7,552.12	.....	.....	639.78	639.78
Two Bridges over Catherine Creek near Union	.....	17,073.29	17,073.29	17,073.29	1,319.45	17,073.29	17,073.29	15,753.84	.....	.....	1,319.45	1,319.45
Bridge over Grand Ronde River near Perry	.....	24,914.01	24,914.01	24,914.01	1,488.93	24,914.01	24,914.01	23,425.08	.....	.....	1,488.93	1,488.93
Bridges over Grand Ronde River & Dry Creek near Elgin	.....	34,500.00	28,646.35	28,646.35	34,500.00	28,646.35	28,646.35	.....	.....	.....	1,795.28	1,795.28
Four Bridges between Kamela and La Grande	.....	24,105.14	24,105.14	24,105.14	1,639.70	24,105.14	24,105.14	22,465.44	.....	.....	1,639.70	1,639.70

TABLE VI—Continued

COUNTY AND SECTION	Length in Miles	Estimated Total Cost	Expended During 1921 and 1922	Total Amount Expended to Date	State Cooperation			County Cooperation			Construction Engineering	
					State Share of Estimated Cost	Expended by State During 1921 and 1922	Total Expended by State to Date	County Share of Estimated Cost	Expended by Counties During 1921 and 1922	Total Expended by Counties to Date	Cost During 1921 and 1922	Total Engineering Cost to Date
Union and Wallowa Counties:												
Surfacing, Wallowa Hill Section	5.4	32,000.00	5,706.92	5,706.92	5,000.00	5,706.92	5,706.92	27,000.00	.....	.....	657.50	657.50
Grading, Wallowa Hill Section	5.48	135,166.88	131,711.21	131,711.21	125,394.06	131,711.21	131,711.21	9,772.82	.....	.....	8,254.01	8,254.01
Wallowa County:												
Grading and Surfacing, Wallowa Canyon-Lostine	12.0	236,688.04	236,688.04	236,688.04	123,032.45	166,777.06	166,777.06	113,655.59	69,910.98	69,910.98	10,815.00	10,815.00
Grading and Surfacing, Enterprise-Joseph	6.23	74,148.94	74,148.94	74,148.94	37,354.22	37,354.22	37,354.22	36,794.72	36,794.72	36,794.72	5,243.55	5,243.55
Surfacing, Wallowa Canyon Section	8.38	56,761.66	56,761.66	56,761.66	29,298.76	29,298.76	29,298.76	27,462.90	27,462.90	27,462.90	1,835.86	1,835.86
Trestle over Prairie Creek near Enterprise	.....	11,591.99	11,591.99	11,591.99	6,156.42	6,156.42	6,156.42	5,435.57	5,435.57	5,435.57	720.85	720.85
Wasco County:												
Paving, Mosier-The Dalles	12.6	434,874.07	434,874.07	434,874.07	434,874.07	434,874.07	434,874.07	.....	.....	.....	8,125.52	8,125.52
Grading and Surfacing, Toll Bridge Cut-off (State Share)	0.54	2,258.64	32.09	2,258.64	2,258.64	32.09	2,258.64	.....	.....	.....	18.39	127.71
Grading and Surfacing, The Dalles-Dufur	15.2	196,500.00	68,404.73	68,404.73	105,500.00	37,104.06	37,104.06	91,000.00	31,300.67	31,300.67	4,751.09	4,751.09
Grading, Unit 3, Hood River-Mosier	2.3	219,339.57	34,739.50	219,339.57	219,339.57	34,739.50	219,339.57	.....	.....	.....	.....	7,563.69
Grading, Cow Canyon Section	7.83	81,005.00	80,505.00	80,505.00	42,760.24	43,393.85	43,393.85	38,244.76	37,111.15	37,111.15	4,515.48	4,515.48
Four Bridges on The Dalles-Dufur Section	.....	25,000.00	8,139.38	8,139.38	13,500.00	4,559.18	4,559.18	11,500.00	3,580.20	3,580.20	978.98	978.98
Bridge over White River near Tygh	.....	20,000.00	401.17	401.17	10,500.00	401.17	401.17	9,500.00	.....	.....	401.17	401.17
Lining Tunnel No. 1 on Columbia River Highway	.....	20,371.87	17,536.62	20,371.87	20,371.87	17,536.62	20,371.87	.....	.....	.....	1,379.06	1,863.46
Oiling Operations along Columbia River Highway	.....	1,341.60	1,341.60	1,341.60	1,341.60	1,341.60	1,341.60	.....	.....	.....	.....	.....
Washington County:												
Paving, Canyon Road Section	3.89	135,623.99	30,953.54	135,623.99	115,494.44	22,823.99	115,494.44	20,129.55	8,129.55	20,129.55	1,959.33	8,037.28
Paving, Forest Grove-Gaston	6.73	232,955.42	232,955.42	232,955.42	229,348.23	230,998.23	230,998.23	3,607.19	1,957.19	1,957.19	6,560.01	6,560.01
Paving, Gap at Scoggin's Creek Bridge	0.1	3,921.18	3,921.18	3,921.18	3,921.18	3,921.18	3,921.18	.....	.....	.....	5.33	5.33
Surfacing, Forest Grove-Gaston	6.7	71,232.98	26,770.67	71,232.98	71,232.98	26,770.67	71,232.98	.....	.....	.....	1,047.56	3,877.58
Regrading, Newberg-Multnomah County Line	15.7	34,040.88	34,040.88	34,040.88	34,040.88	34,040.88	34,040.88	.....	.....	.....	86.33	86.33
Repairs to Bridge over Gales Creek near Forest Grove	.....	1,615.18	1,615.18	1,615.18	112.48	112.48	112.48	1,502.70	1,502.70	1,502.70	112.48	112.48
Bridge over Scoggin's Creek near Gaston	.....	6,706.43	6,706.43	6,706.43	898.09	947.23	947.23	5,808.34	5,759.20	5,759.20	898.09	898.09
Bridge over Tualatin River at Gaston	.....	9,500.00	8,882.83	8,882.83	800.00	738.98	738.98	8,700.00	8,143.85	8,143.85	724.98	724.98
Wheeler County:												
Grading and Surfacing, Cummins Hill-Fossil	2.7	34,005.65	34,005.65	34,005.65	19,769.92	19,769.92	19,769.92	14,235.73	14,235.73	14,235.73	1,809.20	1,809.20
Grading and Surfacing, Unit 1, Ochoco Forest Boundary-Mitchell	1.99	23,854.33	23,854.33	23,854.33	12,622.20	15,941.80	15,941.80	11,232.13	7,912.53	7,912.53	1,390.07	1,390.07
Grading and Surfacing, Unit 2, Ochoco Forest Boundary-Mitchell	12.0	150,000.00	29,820.95	29,820.95	101,232.13	4,820.95	4,820.95	48,767.87	25,000.00	25,000.00	2,622.78	2,622.78
Grading and Surfacing, City of Fossil Sec. (State Share)	0.59	4,000.00	52.71	52.71	4,000.00	52.71	52.71	.....	.....	.....	52.71	52.71
Rocking, Units 1 & 2, Sarvice Creek-Valades Ranch (State Forces)	.....	9,531.35	9,531.35	9,531.35	9,531.35	9,531.35	9,531.35	.....	.....	.....	468.37	468.37
Yamhill County:												
Grading and Paving, McMinnville-Sheridan	8.48	232,267.48	62,958.83	232,267.48	208,099.64	42,456.01	208,099.64	24,167.84	20,502.82	24,167.84	1,186.22	10,677.46
Grading and Paving, McMinnville-Yamhill	9.8	243,243.68	26,208.37	243,243.68	198,762.11	17,260.31	198,762.11	44,481.57	8,948.06	44,481.57	2,076.03	11,688.27
Paving, Sheridan Section (1918 Job)	2.2	40,497.64	2,281.60	40,497.64	30,497.64	2,281.60	30,497.64	10,000.00	.....	10,000.00	.....	1,131.35
Paving, Newberg-Viaduct and Chehalem Creek Trestle	0.2	4,909.38	4,909.38	4,909.38	4,909.38	4,909.38	4,909.38	.....	.....	.....	40.07	40.07
Paving, Yamhill City Section	0.52	25,578.83	25,578.83	25,578.83	16,053.37	16,053.37	16,053.37	9,525.46	9,525.46	9,525.46	753.84	753.84
Paving, West Dayton-St. Joseph	4.2	122,000.00	121,214.84	121,214.84	119,995.38	119,210.22	119,210.22	2,004.62	2,004.62	2,004.62	4,664.43	4,664.43
Paving, Whiteson Bridge	0.25	5,538.88	5,538.88	5,538.88	5,538.88	5,538.88	5,538.88	.....	.....	.....	45.75	45.75
Grading and Surfacing, Newberg-West Dayton	5.9	38,148.45	.....	38,148.45	14,874.40	Cr. —9,393.27	14,874.40	23,274.05	9,393.27	23,274.05	.....	5,275.15
Grading and Surfacing, Bee Ranch Section	3.97	83,160.78	13,360.24	83,160.78	78,160.78	10,382.52	80,183.06	5,000.00	2,977.72	2,977.72	799.06	6,458.47
Grading and Surfacing, Grand Ronde-Alder Creek	6.8	153,000.00	139,541.61	139,541.61	153,000.00	139,541.61	139,541.61	.....	.....	.....	7,168.11	7,168.11
Surfacing, Grand Ronde-Butlers Store	1.85	19,143.53	10,279.53	19,143.53	19,143.53	10,279.53	19,143.53	.....	.....	.....	612.16	1,027.16
Surfacing, Sheridan-Polk County Line	4.5	71,132.01	65,577.67	71,132.01	71,132.01	65,577.67	71,132.01	.....	.....	.....	4,230.64	5,420.45
Surfacing, McMinnville-West Dayton	4.9	30,277.06	21,701.42	30,277.06	30,277.06	21,701.42	30,277.06	.....	.....	.....	1,232.75	1,859.28
Surfacing, one-half mile Section North of Yamhill	0.5	2,074.41	1,746.12	2,074.41	2,074.41	1,746.12	2,074.41	.....	.....	.....	385.23	431.52
Surfacing, McMinnville-Amity	2.4	9,713.06	9,713.06	9,713.06	9,713.06	9,713.06	9,713.06	.....	.....	.....	911.88	911.88
Grading, McMinnville-West Dayton	5.0	93,861.15	17,763.69	93,861.15	6,725.82	Cr.—24,040.55	6,725.82	87,135.33	41,804.24	87,135.33	217.64	6,597.86
Grading, Yamhill-Gaston	7.9	54,705.44	34,001.26	54,705.44	6,455.69	2,743.50	6,455.69	48,249.75	31,257.76	48,249.75	2,743.50	6,455.69
Grading, McMinnville-Amity	5.25	23,877.09	23,877.09	23,877.09	3,429.52	3,429.52	3,429.52	20,447.57	20,447.57	20,447.57	3,385.52	3,385.52
Grading, St. Joseph-Yamhill River	.....	7,030.68	7,030.68	7,030.68	409.58	409.58	409.58	6,621.10	6,621.10	6,621.10	409.58	409.58
Eight Bridges between McMinnville and Sheridan	.....	1,684.27	.....	1,684.27	1,336.17	Cr. —348.10	1,336.17	348.10	348.10	348.10	.....	1,336.17
Bridge over North Yamhill River near St. Joseph	.....	51,500.65	51,500.65	51,500.65	2,355.99	2,355.99	2,355.99	49,144.66	49,144.66	49,144.66	2,355.99	2,355.99
Bridge over Yamhill River near Grand Ronde	.....	5,329.94	5,329.94	5,329.94	243.35	243.35	243.35	5,086.59	5,086.59	5,086.59	243.35	243.35
Bridge over Deer Creek near Bellevue	.....	10,000.00	7,674.02	7,674.02	1,000.00	815.80	815.80	9,000.00	6,858.22	6,858.22	815.80	815.80
Bridge over Ash Swale at Amity	.....	29,000.00	24,115.49	24,115.49	2,000.00	1,781.74	1,781.74	27,000.00	22,333.75	22,333.75	1,767.74	1,767.74
Bridge over Willamina River at Willamina	.....	12,500.00	1,407.19	1,407.19	1,000.00	307.80	307.80	11,500.00	1,099.39	1,099.39	307.80	307.80
Revisions to Bridge over Yamhill River at Whiteson	.....	21,513.89	21,513.89	21,513.89	1,913.75	Cr. —393.88	Cr. —393.88	19,600.14	21,907.77	21,907.77	1,913.75	1,913.75
Grand Totals		$32,834,895.41	$19,287,132.29	$29,286,280.68	$25,883,755.30	$15,322,640.14	$24,512,022.79	$6,729,506.21	$3,895,784.03	$4,687,888.15	$ 891,655.89	$1,465,463.82

SUMMARY

Cooperating Parties	Estimated Total Cost	Expended Prior to Dec. 1, 1920	Expended During 1021 and 1922	Total Expended to Date	Cost to Complete
State	$25,883,755.30	$ 9,189,382.65	$15,322,640.14	$24,512,022.79	$ 1,371,732.51
County	6,729,506.21	792,104.12	3,895,784.03	4,687,888.15	2,041,618.06
Railway Companies	221,633.90	17,661.62	68,708.12	86,369.74	135,264.16
Totals	$32,834,895.41	$ 9,999,148.39	$19,287,132.29	$29,286,280.68	$ 3,548,614.73

TABLE VII

EXPENDITURES ON POST ROAD PROJECTS AUTHORIZED UNDER COOPERATIVE POST ROAD ACTS PASSED BY CONGRESS DURING THE YEARS 1916 TO 1920, INCLUSIVE

In this table are shown both the expenditures made during the 1921-1922 biennium and the total of the expenditures to date, for those post road projects handled under the earlier of the cooperative post road acts passed by Congress. For expenditures in connection with projects being handled under the acts of 1921 and 1922, see the table following this.

COUNTY AND SECTION	Project No.	Length in Miles	Estimated Total Cost	Expended During 1921 and 1922	Total Expended to Date	State Cooperation			County Cooperation			Government Cooperation			Construction Engineering (Included in preceding columns)	
						State Share of Estimated Cost	Expended by State During 1921-1922	Total Expended by State to Date	County Share of Estimated Cost	Expended by Counties During 1921-1922	Total Expended by Counties to Date	Government Share of Estimated Cost	Expended by Government During 1921-1922	Total Expended by Government to Date	Cost During 1921-1922	Total Cost to Date
Baker County:																
Grading and Surfacing, 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
Grading, Canyon Section	11	4.42	77,483.99	469.79	77,483.99	38,786.89	Cr. 15,052.67	38,786.89	6,000.00	.....	6,000.00	32,697.10	15,522.46	32,697.10	.....	6,771.89
Surfacing, Canyon Section	11	4.42	35,420.61	707.50	35,420.61	1,465.94	Cr. 15,536.87	15,866.18	17,710.30	.....	3,310.06	16,244.37	16,244.37	16,244.37	364.20	2,588.66
Grading, Baker-Middle Bridge	10	18.75	103,513.36	.....	103,513.36	35,310.55	Cr. 19,036.05	35,310.55	15,000.00	.....	15,000.00	53,202.81	19,036.05	53,202.81	.....	7,804.74
Surfacing, Baker-Middle Bridge	10	8.7	41,550.96	.....	41,550.96	26,261.62	.....	37,484.59	11,222.97	.....	.....	4,066.37	.....	4,066.37	.....	2,236.76
Benton County:																
Paving, Corvallis-South	50	7.58	240,029.42	240,029.42	240,029.42	121,530.32	136,450.72	136,450.72	.....	.....	.....	118,499.10	103,578.70	103,578.70	8,395.27	8,395.27
Paving, 2 Gaps South of Corvallis	50	0.38	10,838.82	10,658.19	10,658.19	5,992.57	10,658.19	10,658.19	.....	.....	.....	4,846.25	.....	.....	450.41	450.41
Clackamas County:																
Paving, Oregon City-Multnomah Co. Line	49	5.70	244,300.64	243,787.12	244,300.64	130,200.64	129,687.12	130,200.64	.....	.....	.....	114,100.00	114,100.00	114,100.00	12,780.96	13,294.48
Paving, Canby-Aurora	53	3.75	119,321.09	119,321.09	119,321.09	87,768.15	88,368.15	88,368.15	2,211.10	1,611.10	1,611.10	29,341.84	29,341.84	29,341.84	4,942.33	4,942.33
Clatsop County:																
Youngs Bay Bridge at Astoria	22	.....	360,146.86	196,015.45	360,146.86	67,547.61	Cr. 17,251.42	92,228.86	122,857.92	98,176.67	98,176.67	169,741.33	115,090.20	169,741.33	7,839.17	18,611.07
Columbia County:																
Paving, Deer Island-Scappoose	27	10.85	313,711.75	61,443.85	313,711.75	161,014.10	14,800.13	161,014.10	.....	.....	.....	152,697.65	46,643.72	152,697.65	773.39	11,014.16
Coos and Douglas Counties:																
Grading, Remote-Camas Valley	29	14.17	473,500.65	235,788.96	473,500.65	199,226.64	31,207.64	199,226.64	82,414.92	82,414.92	82,414.92	191,859.09	122,166.40	191,859.09	9,505.58	24,035.14
Crook and Deschutes Counties:																
Grading and Surfacing, Prineville-Redmond	43	18.75	117,070.18	94,176.41	117,070.18	18,753.13	859.36	18,753.13	42,087.73	37,087.73	42,087.73	56,229.32	56,229.32	56,229.32	3,433.43	5,447.42
Bridge in City of Prineville	43	.....	5,235.60	1,401.92	5,235.60	2,691.39	Cr. 1,142.29	2,691.39	.....	.....	.....	2,544.21	2,544.21	2,544.21	18.94	581.38
Bridge over Old Bed of Crooked River	43	.....	4,912.41	4,912.41	4,912.41	2,807.04	2,807.04	2,807.04	.....	.....	.....	2,105.37	2,105.37	2,105.37	663.34	663.34
Surfacing, Prineville-Redmond	43	11.6	67,994.33	67,994.33	67,994.33	43,295.92	43,295.92	43,295.92	.....	.....	.....	24,698.41	24,698.41	24,698.41	1,842.74	1,842.74
Gilliam County:																
Grading, John Day River-Blalock	24	14.94	243,436.22	37,285.12	243,436.22	127,850.52	11,907.01	127,850.52	.....	.....	.....	115,585.70	25,378.11	115,585.70	1,035.04	16,773.25
Surfacing, John Day River-Blalock	24	15.0	156,821.54	156,821.54	156,821.54	82,322.53	82,322.53	82,322.53	.....	.....	.....	74,499.01	74,499.01	74,499.01	8,097.14	8,097.14
Grading, Mayville-30 Mile Creek	41	6.9	115,424.42	85,055.93	115,424.42	31,709.44	1,340.95	31,709.44	35,236.10	35,236.10	35,236.10	48,478.88	48,478.88	48,478.88	5,450.10	9,557.75
Subsurfacing, Mayville-30 Mile Creek (State Forces)	41	.....	22,188.59	22,188.59	22,188.59	14,895.45	14,895.45	14,895.45	.....	.....	.....	7,293.14	7,293.14	7,293.14	277.15	277.15
Surfacing, Mayville-30 Mile Creek	41	6.9	53,197.95	53,197.95	53,197.95	13,106.35	13,106.35	13,106.35	16,500.00	16,500.00	16,500.00	23,591.60	23,591.60	23,591.60	2,456.98	2,456.98
Surfacing, Blalock-Arlington	44	9.21	65,970.99	26,596.87	65,970.99	40,450.99	1,076.87	40,450.99	.....	.....	.....	25,520.00	25,520.00	25,520.00	713.82	4,424.72
Grant County:																
Grading and Surfacing, John Day-Fiske Crk.	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 Surf., 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, Unit 1, Sarvice Crk.-Valades Ranch	6	13.0	214,740.04	9,462.62	214,740.04	92,149.76	Cr. 8,145.13	92,149.76	28,500.00	.....	28,500.00	94,090.28	17,607.75	94,090.28	202.68	12,477.93
Bridges, Unit 1, Sarvice Crk.-Valades Ranch	6	.....	20,822.47	7,362.99	20,822.47	11,508.10	Cr. 1,951.38	11,508.10	.....	.....	.....	9,314.37	9,314.37	9,314.37	262.60	1,392.77
Grading, Unit 2, Sarvice Crk.-Valades Ranch	6	12.1	166,647.28	65,548.09	166,647.28	89,842.32	19,411.08	89,842.32	7,500.00	.....	7,500.00	69,304.96	46,137.01	69,304.96	4,843.82	17,819.67
Bridges, Unit 2, Sarvice Crk.-Valades Ranch	6	.....	5,808.90	5,744.75	5,808.90	3,159.33	3,095.18	3,159.33	.....	.....	.....	2,649.57	2,649.57	2,649.57	217.79	281.94
Grading, Unit 3, Sarvice Crk.-Valades Ranch	6	12.0	153,476.03	113,117.63	153,476.03	54,612.72	44,298.06	54,612.72	32,500.00	17,500.00	32,500.00	66,363.31	51,319.57	66,363.31	6,422.81	13,062.23
Bridges, Unit 3, Sarvice Crk.-Valades Ranch	6	.....	60,649.74	60,649.74	60,649.74	32,449.77	32,449.77	32,449.77	.....	.....	.....	28,199.97	28,199.97	28,199.97	2,172.98	2,172.98
Grading, Unit 4, Sarvice Crk.-Valades Ranch	6	10.92	185,956.74	98,917.90	185,956.74	93,881.59	31,217.80	93,881.59	17,500.00	17,500.00	17,500.00	74,575.15	50,200.10	74,575.15	6,859.17	19,944.35
Bridges, Unit 4, Sarvice Crk.-Valades Ranch	6	.....	42,329.04	42,329.04	42,329.04	22,758.35	22,758.35	22,758.35	.....	.....	.....	19,570.69	19,570.69	19,570.69	1,306.88	1,306.88
Harney County:																
Grading and Surfacing, Burns-Lawen	15	16.72	260,154.82	53,852.27	260,154.82	119,207.97	17,028.12	119,207.97	33,000.00	.....	33,000.00	107,946.85	36,824.15	107,946.85	530.44	14,036.80
Grading and Surfacing, Lawen-Crane	48	10.46	148,057.06	147,846.83	148,057.06	55,037.62	54,827.39	55,037.62	20,000.00	20,000.00	20,000.00	73,019.44	73,019.44	73,019.44	5,814.07	6,024.30
Hood River and Wasco Counties:																
Grading, Mosier-Rowena	35	8.96	313,547.82	79,070.02	313,547.82	210,729.97	Cr. 23,747.83	210,729.97	.....	.....	.....	102,817.85	102,817.85	102,817.85	2,454.07	12,684.52
Bridge, Mosier Creek Arch	35	.....	47,316.83	21,412.83	47,316.83	29,847.57	3,943.57	29,847.57	.....	.....	.....	17,469.26	17,469.26	17,469.26	508.23	2,606.69
Bridge, Dry Canyon Arch	35	.....	29,282.77	9,426.44	29,282.77	19,673.55	Cr. 182.78	19,673.55	.....	.....	.....	9,609.22	9,609.22	9,609.22	1,470.16	2,217.66
Surfacing, Mosier-Rowena	35	8.96	73,010.06	63,057.31	73,010.06	56,235.70	46,282.95	56,235.70	.....	.....	.....	16,774.36	16,774.36	16,774.36	1,559.82	2,237.64
Paving, Hood River-Mosier	35	10.55	404,068.18	404,068.18	404,068.18	246,576.38	246,576.38	246,576.38	3,462.67	3,462.67	3,462.67	154,029.13	154,029.13	154,029.13	8,338.06	8,338.06
Jackson County:																
Grading, Unit 1, Agate-Trail	47	2.44	46,788.22	46,788.22	46,788.22	10,007.34	10,007.34	10,007.34	15,000.00	15,000.00	15,000.00	21,780.88	21,780.88	21,780.88	2,105.90	2,105.90
Grading, Unit 2, Agate-Trail	47	7.22	119,185.35	119,185.35	119,185.35	23,773.55	23,773.55	23,773.55	37,000.00	37,000.00	37,000.00	58,411.80	58,411.80	58,411.80	3,946.29	3,946.29
Grading, Unit 3, Agate-Trail	47	4.69	55,185.50	55,185.50	55,185.50	11,376.32	11,376.32	11,376.32	17,000.00	17,000.00	17,000.00	26,809.18	26,809.18	26,809.18	2,611.98	2,611.98
Bridges, Agate-Trail Section (4 concrete)	47	.....	47,169.91	47,169.91	47,169.91	11,089.02	11,089.02	11,089.02	14,000.00	14,000.00	14,000.00	22,080.89	22,080.89	22,080.89	3,209.91	3,209.91
Bridge over Rogue River South of Trail	47	.....	49,575.88	49,575.88	49,575.88	11,060.72	11,060.72	11,060.72	15,000.00	15,000.00	15,000.00	23,515.16	23,515.16	23,515.16	3,064.94	3,064.94
Surfacing, Agate-Trail	47	14.35	115,581.14	115,581.14	115,581.14	22,836.08	22,836.08	22,836.08	36,000.00	36,000.00	36,000.00	56,745.06	56,745.06	56,745.06	2,582.36	2,582.36
Jefferson County:																
Grading and Surfacing, Deschutes County Line-Madras	39	16.30	173,234.38	121,534.05	173,234.38	39,613.03	Cr. 12,087.30	39,613.03	50,000.00	50,000.00	50,000.00	83,621.35	83,621.35	83,621.35	5,469.20	10,647.63

TABLE VII—Continued

COUNTY AND SECTION	Project No.	Length in Miles	Estimated Total Cost	Expended During 1921 and 1922	Total Expended to Date	State Cooperation: State Share of Estimated Cost	State Cooperation: Expended by State During 1921-1922	State Cooperation: Total Expended by State to Date	County Cooperation: County Share of Estimated Cost	County Cooperation: Expended by Counties During 1921-1922	County Cooperation: Total Expended by Counties to Date	Government Cooperation: Government Share of Estimated Cost	Government Cooperation: Expended by Government During 1921-1922	Government Cooperation: Total Expended by Government to Date	Construction Engineering (Included in preceding columns): Cost During 1921-1922	Construction Engineering: Total Cost to Date
Klamath County:																
Grading and Surfacing, Algoma Section	26	8.92	150,593.41	103,289.49	150,593.41	43,506.19	19,172.84	43,506.19	34,929.26	28,891.49	34,929.26	72,157.96	55,225.16	72,157.96	5,240.61	10,876.36
Grading and Surfacing, Klamath Falls-Dairy	30	13.91	187,542.70	160,598.74	187,542.70	63,111.16	39,299.39	63,400.19	44,127.06	40,994.87	43,838.03	80,304.48	80,304.48	80,304.48	6,861.12	11,034.46
Grading and Surf., Klamath Falls-Merrill	31	14.68	166,800.66	67,411.93	166,800.66	47,244.18	310.78	48,131.95	39,362.55	23,804.99	38,474.78	80,193.93	43,296.16	80,193.93	4,203.93	9,350.44
Grading and Surf., Merrill-Calif. State Line	34	12.80	139,037.02	122,747.26	135,228.44	42,775.01	30,935.04	40,112.59	32,692.52	31,546.36	31,546.36	63,569.49	60,265.86	63,569.49	6,500.89	8,266.95
Lake County:																
Grading and Mac., Lakeview-Crooked Creek	32	11.09	136,719.68	68,693.15	136,719.68	40,904.41	Cr. 12,241.40	40,904.41	30,962.09	16,081.37	30,962.09	64,853.18	64,853.18	64,853.18	4,367.70	12,871.33
Grading and Surfacing, Unit 1, Lakeview-New Pine Creek	23	1.78	17,940.67	6,593.18	17,940.67	9,744.98	979.00	9,744.98	4,168.88	1,587.37	4,168.88	4,026.81	4,026.81	4,026.81	243.69	1,265.16
Malheur County:																
Surfacing Cairo-Nyssa	28	8.98	68,777.43	.....	68,777.43	34,401.65	Cr. 4,275.98	34,401.65	.....	.....	.....	34,375.78	4,275.98	34,375.78	.....	1,456.83
Grading and Paving, Ontario-Snake River	46	0.89	30,857.09	6,174.50	30,857.09	16,526.35	Cr. 8,156.24	16,526.35	.....	.....	.....	14,330.74	14,330.74	14,330.74	357.28	2,298.72
Grading, Cow Valley-Brogan	17	9.57	95,644.80	.....	95,644.80	34,253.63	Cr. 15,460.10	34,253.63	10,000.00	.....	10,000.00	51,391.17	15,460.10	51,391.17	.....	6,363.71
Bridges over Pole Creek and Canyon Creek	17	.....	18,238.82	595.09	18,238.82	18,238.82	595.09	18,238.82	.....	.....	.....	.....	.....	.....	595.09	1,208.82
Marion County:																
Paving, Salem-Brooks	19	4.16	117,260.18	1,557.42	117,260.18	61,698.92	Cr. 21,683.06	61,698.92	.....	.....	.....	55,561.26	23,240.48	55,561.26	63.27	6,483.59
Paving, Brooks-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
Polk County:																
Paving, Salem-Brunks Corner	18	13.07	171,966.60	3,476.02	171,966.60	78,498.65	2,612.94	94,974.99	20,863.08	863.08	10,863.08	72,604.87	.....	66,128.53	1,406.74	13,037.68
Sherman County:																
Grading, Across Sherman County	25	14.78	242,644.39	69,637.19	242,644.39	131,928.57	28,172.18	131,928.57	2,478.48	2,478.48	2,478.48	108,237.34	38,986.53	108,237.34	3,154.02	16,333.31
Bridge, Spanish Gulch Bridge	25	.....	22,142.54	3,875.76	22,142.54	7,577.04	Cr. 10,689.74	7,577.04	4,243.29	4,243.29	4,243.29	10,322.21	10,322.21	10,322.21	49.73	926.11
Surfacing, Across Sherman County	25	14.78	127,373.33	127,266.31	127,373.33	68,087.77	67,980.75	68,087.77	.....	.....	.....	59,285.56	59,285.56	59,285.56	3,252.61	3,359.63
Umatilla County:																
Grading and Surf., Pendleton-Cabbage Hill	38	7.54	124,100.46	46,355.32	124,100.46	53,136.97	25,617.31	53,136.97	17,000.00	.....	17,000.00	53,963.49	20,738.01	53,963.49	2,898.16	11,102.80
Surfacing, Echo-Pendleton	42	22.00	136,758.99	72,405.63	136,758.99	71,858.99	7,505.63	71,858.99	.....	.....	.....	64,900.00	64,900.00	64,900.00	3,256.50	7,368.84
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	.....	5,924.36
Grading, Union-Telocaset	8	6.02	76,690.77	.....	76,690.77	4,286.33	.....	61,690.77	57,404.44	.....	.....	15,000.00	.....	15,000.00	.....	4,286.33
Wallowa County:																
Grading, Wallowa Canyon Section	40	8.38	134,824.44	80,688.21	132,660.04	12,792.51	Cr. 22,958.03	10,628.11	60,247.08	41,861.39	60,247.08	61,784.85	61,784.85	61,784.85	6,907.36	15,267.71
Wasco County:																
Talus Subsurfacing, Rowena-The Dalles	36	.....	44,092.92	42,879.38	44,092.92	44,092.92	42,879.38	44,092.92	.....	.....	.....	.....	.....	.....	469.02	469.02
Grading, Rowena-The Dalles	36	7.76	101,720.14	21,755.40	101,720.14	52,958.29	Cr. 2,900.02	52,958.29	1,454.19	1,454.19	1,454.19	47,307.66	23,201.23	47,307.66	1,080.42	5,409.02
Bridge, Chenowith Cr. Bridge (State Forces)	36	.....	3,365.56	Cr. 204.78	3,365.56	3,365.56	Cr. 204.78	3,365.56	.....	.....	.....	.....	.....	.....	Cr. 16.38	Cr. 13.15
Grading, Seufert-Deschutes	37	12.5	224,432.90	103,211.88	224,432.90	106,473.80	Cr. 14,747.22	106,473.80	.....	.....	.....	117,959.10	117,959.10	117,959.10	3,097.55	8,757.74
Overhead Crossing at Big Eddy (Cooperation in the amount of $10,229.66 has been received from the O. W. R. R. & N. Co.)	37	.....	52,866.71	45,024.29	52,866.71	23,493.42	15,651.00	23,493.42	10,327.42	10,327.42	10,327.42	8,816.21	8,816.21	8,816.21	1,846.40	2,530.27
Overhead Crossing at Dillon	37	.....	71,335.35	65,236.74	71,335.35	45,762.83	39,664.22	45,762.83	14,076.77	14,076.77	14,076.77	11,495.75	11,495.75	11,495.75	2,549.80	3,350.61
Bridge, Seufert Viaduct	37	.....	44,791.65	10,507.60	44,791.65	21,857.57	Cr. 12,426.48	21,857.57	5,000.00	5,000.00	5,000.00	17,934.08	17,934.08	17,934.08	654.93	2,585.44
Oiling Sand for Protection of Road	37	.....	890.96	184.81	890.96	549.54	Cr. 156.61	549.54	.....	.....	.....	341.42	341.42	341.42	.....	.....
Surfacing, Seufert-Deschutes River	37	12.5	93,117.86	93,117.86	93,117.86	54,170.22	54,170.22	54,170.22	.....	.....	.....	38,947.64	38,947.64	38,947.64	2,779.71	2,779.71
Paving, The Dalles-Three Mile Creek	16	2.00	47,229.78	.....	47,229.78	19,861.01	.....	19,361.01	4,000.00	.....	4,000.00	23,368.77	.....	23,368.77	.....	1,076.74
Wheeler County:																
Grading, Butte Creek Section	4	9.35	73,098.43	1,106.03	73,098.43	40,980.23	Cr. 10,449.89	40,980.23	.....	.....	.....	32,118.20	11,555.92	32,118.20	269.82	7,984.57
Surfacing, Butte Creek Section	4	9.35	74,392.69	70,374.68	74,392.69	39,953.19	35,935.18	39,953.19	.....	.....	.....	34,439.50	34,439.50	34,439.50	3,315.50	3,950.43
Yamhill County:																
Grading and Surfacing, Grand Ronde Section	12	3.47	57,200.47	8,892.95	57,200.47	27,732.89	Cr. 14,987.39	27,732.89	10,000.00	10,000.00	10,000.00	19,467.58	13,880.34	19,467.58	604.53	4,904.30
Paving, Newberg-West Dayton	52	6.20	219,186.83	219,186.83	219,186.83	126,207.38	126,207.38	126,207.38	1,580.45	1,580.45	1,580.45	91,399.00	91,399.00	91,399.00	7,528.58	7,528.58
Paving, Gaston-Yamhill	51	7.90	350,748.00	350,748.00	350,748.00	197,228.00	197,228.00	197,228.00	.....	.....	.....	153,520.00	153,520.00	153,520.00	7,110.59	7,110.59
Grand Totals			$9,958,769.84	$5,368,126.00	$9,952,616.23	$4,567,442.14	$1,664,260.78	$4,708,163.38	$1,088,621.27	$748,280.71	$967,989.41	$4,292,476.77	$2,945,354.85	$4,266,233.78	$215,643.32	$530,740.77

SUMMARY

COOPERATING PARTIES	Estimated Cooperative Shares	Expended Prior to Dec. 1, 1920	Expended Dec. 1, 1920, to Nov. 30, 1922	Total Expended to Date	Cost to Complete
State	$4,567,442.14	$3,043,902.60	$1,664,260.78	$4,708,163.38	Cr.$140,721.24
Counties	1,088,621.27	219,708.70	748,280.71	967,989.41	120,631.86
Federal Government	4,292,476.77	1,320,878.93	2,945,354.85	4,266,233.78	26,242.99
Railway Companies	10,229.66	.....	10,229.66	10,229.66	.....
Totals	$9,958,769.84	$4,584,490.23	$5,368,126.00	$9,952,616.23	$ 6,153.61

TABLE VIII

EXPENDITURES ON POST ROAD PROJECTS AUTHORIZED UNDER THE COOPERATIVE POST ROAD ACTS PASSED BY CONGRESS IN 1921 AND 1922

All expenditures shown in this table were incurred during the 1921-1922 biennium. For expenditures in connection with post road projects authorized under acts of Congress prior to 1921, see preceding table.

COUNTY AND SECTION	Project No.	Length in Miles	Estimated Total Cost of Project	Total Expended to Date	State Cooperation		County Cooperation		Government Cooperation		Construction Engineering Expenditures (Included also in Preceding Columns)
					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:											
Grading and Surfacing, Baker-Nelson	66	26.95	$ 250,000.00	$ 159,974.21	$ 99,503.67	$ 76,373.64	$	$	$ 150,496.33	$ 83,600.57	$ 7,653.12
Bridges on Baker-Nelson Section (4)	66	.....	21,500.00	13,302.89	10,080.89	13,302.89	.....	.....	11,419.11	.....	860.19
Overcrossing of O. W. R. R. & N. near Unity (Cooperation in amount of $4,277.00 is expected from the O. W. R. R. & N. Co.)	66	.....	10,692.51	10,692.51	Cr. 2,390.86	10,692.51	2,138.50	.....	6,667.87	.....	949.67
Coos County:											
Grading, Parkersburg Unit, Coquille-Bandon Section	82	4.75	75,500.00	184.38	40,500.00	184.38	15,000.00	.....	20,000.00	.....	184.38
Surfacing, Parkersburg Unit, Coquille-Bandon Section	82	4.75	31,500.00	.....	26,500.00	.....	.....	.....	5,000.00	.....	.....
Curry County:											
Grading, Elk River-Sixes River Project	70	2.76	53,000.00	31,784.83	2,499.30	31,784.83	11,500.00	.....	39,000.70	.....	1,659.34
Bridges, Elk River-Sixes River Project	70	.....	60,000.00	10,975.20	21,912.74	10,975.20	.....	.....	38,087.26	.....	1,695.58
Surfacing, Elk River-Sixes River Project	70	2.76	15,000.00	.....	5,817.33	.....	.....	.....	9,182.67	.....	.....
Douglas County:											
Paving, Canyonville-Galesville	61	11.1	333,000.00	236,951.75	115,044.81	189,767.81	.....	.....	217,955.19	47,183.94	7,828.45
Bridge over Umpqua River at Winchester	69	.....	132,000.00	29,760.62	Cr. 8,968.14	18,416.31	60,000.00	11,344.31	80,968.14	.....	4,156.95
Overcrossing of S. P. Ry. at Oakland (Cooperation in amount of $5,965.20 is expected from S. P. Ry. Co.)	74	0.23	58,839.00	.....	7,754.86	.....	23,535.60	.....	21,583.34	.....	.....
Overcrossing of S. P. Ry. at Wilbur (Cooperation in amount of $11,642.56 is expected from S. P. Ry. Co.)	76	0.44	60,282.75	.....	2,207.16	.....	24,320.09	.....	22,112.94	.....	.....
Overcrossing of S. P. Ry. at Sutherlin (Cooperation in amount of $11,642.56 is expected from S. P. Ry. Co.)	77	0.54	43,430.00	.....	.....	.....	15,856.16	.....	15,931.28	.....	.....
Overcrossing of S. P. Ry at Shady Point (Cooperation in amount of $23,711.60 is expected from S. P. Ry. Co.)	78	0.37	59,279.00	.....	3,152.44	.....	10,670.22	.....	21,744.74	.....	.....
Jackson County:											
Surfacing, Keene Creek-Klamath County Line	86	12.34	72,000.00	5.43	Cr. 7,996.55	5.43	36,000.00	.....	43,996.55	.....	5.43
Jefferson County:											
Grading and Surfacing, Madras-North	81	15.64	123,000.00	251.73	47,692.80	251.73	.....	.....	75,307.20	.....	251.73
Klamath County:											
Surfacing, Jackson County Line-Hayden Creek	85	9.83	62,800.00	26.16	Cr. 4,195.19	26.16	28,570.00	.....	38,425.19	.....	26.16
Grading, Hayden Creek-Keno	84	11.70	126,000.00	223.67	48,500.00	223.67	57,500.00	.....	20,000.00	.....	223.67
Surfacing, Hayden Creek-Keno	84	11.70	67,000.00	.....	31,500.00	.....	30,500.00	.....	5,000.00	.....	.....
Grading and Surfacing, Lamms Mill-Fort Klamath	83	19.04	144,812.25	1,023.48	Cr. 65,823.85	1,023.48	65,823.85	.....	144,812.25	.....	999.48
Lane County:											
Overcrossing of S. P. Ry. at Creswell (Cooperation in amount of $18,213.80 is expected from S. P. Ry. Co.)	75	0.32	45,534.50	.....	9,106.90	.....	1,510.82	.....	16,702.98	.....	.....
Malheur County:											
Surfacing, Baker County Line-Weiser	67	15.54	72,000.00	57,795.79	28,152.74	34,570.96	.....	.....	43,847.26	23,224.83	3,829.55
Polk County:											
Paving and Bridges, Monmouth-Benton County Line	57	9.70	274,000.00	142.21	106,435.54	142.21	.....	.....	167,564.46	.....	142.21
Paving, Holmes Gap-Rickreall	59	5.67	154,200.00	59.74	59,952.35	59.74	.....	.....	94,247.65	.....	59.74
Basket Slough Bridge north of Rickreall	59	.....	4,800.00	.....	Cr. 2,934.56	.....	4,800.00	.....	2,934.56	.....	.....
Umatilla County:											
Grading and Surfacing, Deadman's Pass-Kamela	62	13.54	138,500.00	55,415.33	Cr. 21,213.54	34,351.67	70,418.46	.....	89,295.08	21,063.66	2,594.54
Union County:											
Surfacing, Island City-Elgin	80	18.06	122,000.00	21,428.95	Cr. 57,158.28	1,265.59	111,000.00	20,163.36	68,158.28	.....	1,265.59
Wallowa County:											
Grading and Surfacing, Lostine-Enterprise	71	7.89	108,000.00	2,300.79	Cr. 4,910.58	1,303.74	49,000.00	997.05	63,910.58	.....	1,303.74
Bridges on Lostine-Enterprise Section	71	.....	20,500.00	5,994.94	593.00	3,372.97	9,500.00	2,621.97	10,407.00	.....	750.98

TABLE VIII—Continued

COUNTY AND SECTION	Project No.	Length in Miles	Estimated Total Cost of Project	Total Expended to Date	State Cooperation		County Cooperation		Government Cooperation		Construction Engineering Expenditures (Included also in Preceding Columns)
					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	
Wasco County :											
Surfacing, Cow Canyon Section	72	7.72	46,750.00	11.88	21,144.41	11.88	.....	.....	25,605.59	.....	11.88
Washington and Yamhill Counties:											
Concrete Paving, Newberg-Multnomah County Line.	73	3.64	108,000.00	5,506.95	41,505.49	5,506.95	.....	.....	66,494.51	.....	483.95
Bituminous Paving, Newberg-Multnomah Co. Line...	73	12.04	254,000.00	53,991.85	94,515.00	53,991.85	.....	.....	159,485.00	.....	2,303.53
Wheeler County:											
Surfacing, Unit 2, Sarvice Creek-Valades Ranch.....	6	12.10	41,000.00	.....	15,926.36	.....	.....	.....	25,073.64	.....	.....
Grading and Surfacing, Sarvice Creek Section.....	64	9.70	172,000.00	71,336.84	Cr. 31,269.96	Cr. 3,658.25	107,480.10	37,718.14	95,789.86	37,276.95	4,160.82
Yamhill County:											
Paving, McMinnville-Amity	58	5.00	121,220.97	121,220.97	48,820.95	53,274.05	.....	.....	72,400.02	67,946.92	3,544.45
Totals.....			$3,482,140.98	$ 890,363.10	$ 681,957.23	$ 537,221.40	$ 735,123.80	$ 72,844.83	$1,989,607.23	$ 280,296.87	$ 46,945.13

SUMMARY

COOPERATING PARTIES	Estimated Cooperative Shares	Expended to Date	Cost to Complete
State	$ 681,957.23	$ 537,221.40	$ 144,735.83
Counties	735,123.80	72,844.83	662,278.97
Federal Government	1,989,607.23	280,296.87	1,709,310.36
Railway Companies	75,452.72	.....	75,452.72
Totals.....	$3,482,140.98	$ 890,363.10	$2,591,777.88

TABLE IX

EXPENDITURES ON FOREST ROADS DETAILED BY JOBS—TO NOVEMBER 30, 1922

The expenditures of state funds as shown in the following table are the actual disbursements as shown by the books of the Highway Department. The expenditures of county funds and of federal government funds are as reported to the Highway Department by the U. S. Bureau of Public Roads, which bureau supervises all forest road work. It is to be noted that in those tables given in other parts of this report, which set out the total expenditures of the State Highway Department, only those expenditures upon forest road work which are made by the State are included.

PROJECT	Length in Miles	TOTAL		STATE FUNDS				COUNTY FUNDS		FEDERAL FUNDS	
		Estimated Cost of Project	Expended to Date	State Share of Estimated Cost	Expended Prior to 1921	Expended During 1921-2 Biennium	Expended From State Funds to Date	County Share of Estimated Cost	Expended From County Funds to Date	Gov't Share of Estimated Cost	Expended From Gov't Funds to Date
Baker and Grant Counties:											
Prairie City-Unity Survey	36.55	$ 7,000.00	$ 3,724.44	$ 2,500.00	$	$ 2,500.00	$ 2,500.00	$ 2,000.00	$	$ 2,500.00	$ 1,224.44
Clackamas and Hood River Counties:											
Mt. Hood Loop	37.58	910,000.00	506,341.05	455,000.00	87,097.65	169,650.47	256,748.12	.....	.....	455,000.00	249,592.93
Clackamas and Wasco Counties:											
Mt. Hood-Wapinitia Survey	36.00	10,000.00	4,267.27	5,000.00	.....	2,500.00	2,500.00	.....	.....	5,000.00	1,767.27
Government Camp-Clear Lake	7.50	141,000.00	.....	70,500.00	.....	.....	.....	.....	.....	70,500.00	.....
Coos County:											
Lakeside-Lake Saunders	3.10	68,321.13	68,321.13	.....	.....	.....	.....	.....	.....	68,321.13	68,321.13
Crook County:											
Ochoco Canyon	9.70	111,144.17	111,144.17	39,634.17	44,634.17	Cr. 5,000.00	39,634.17	21,875.00	21,875.00	49,635.00	49,635.00
Curry County:											
Brush Creek-Mussels Creek	6.10	150,000.00	75,761.53	45,000.00	.....	25,000.00	25,000.00	30,000.00	.....	75,000.00	50,761.53
Deschutes County:											
Sisters Section	14.30	85,000.00	39,666.67	42,500.00	.....	30,000.00	30,000.00	.....	.....	42,500.00	9,666.67
Deschutes and Lane Counties:											
Blue River-Sisters	50.10	645,000.00	477,579.37	302,500.00	91,742.37	131,589.70	223,332.07	20,000.00	7,988.87	322,500.00	246,258.43
Douglas County:											
Tiller-Trail	3.94	100,000.00	100,000.00	33,333.33	.....	33,333.33	33,333.33	33,333.33	33,333.33	33,333.34	33,333.34
Canyonville-Galesville, Unit 1	9.90	211,000.00	211,000.00	94,000.00	94,000.00	.....	94,000.00	23,000.00	23,000.00	94,000.00	94,000.00
Canyonville-Galesville, Unit 2	1.10	98,776.86	98,776.86	88,776.86	63,000.00	25,776.86	88,776.86	.....	.....	10,000.00	10,000.00
Grant County:											
Prairie City-Austin	17.10	300,000.00	21,075.97	.....	.....	.....	.....	150,000.00	.....	150,000.00	21,075.97
Jackson County:											
Trail-Prospect	13.60	300,000.00	126,517.70	150,000.00	.....	50,000.00	50,000.00	.....	.....	150,000.00	76,517.70
Prospect-Crater Lake	21.71	246,000.00	235,647.31	121,250.00	91,626.75	29,623.25	121,250.00	3,500.00	3,438.71	121,250.00	110,958.60
Josephine County:											
Hayes Hill	2.39	76,272.70	76,272.70	38,233.39	36,250.00	1,983.39	38,233.39	9,522.99	9,504.62	28,516.32	28,534.69
Oregon Caves	11.68	205,000.00	202,211.19	102,500.00	.....	102,500.00	102,500.00	.....	.....	102,500.00	99,711.19
Waldo-California Line	4.13	115,000.00	699.80	105,000.00	.....	.....	.....	.....	.....	10,000.00	699.80
Klamath County:											
Anna Creek, Unit 1	3.50	14,207.13	14,207.13	7,103.56	4,230.82	2,872.74	7,103.56	.....	.....	7,103.57	7,103.57
Anna Creek, Unit 2	6.70	81,000.00	7,880.57	27,000.00	.....	.....	.....	27,000.00	.....	27,000.00	7,880.57
Fort Klamath-Sand Creek	16.30	240,000.00	21,294.54	.....	.....	.....	.....	120,000.00	.....	120,000.00	21,294.54
Klamath and Lake Counties:											
Lapine-Lakeview Survey	18.20	1,758.74	1,758.74	879.37	750.00	129.37	879.37	.....	.....	879.37	879.37
Klamath and Lane Counties:											
Willamette Highway Survey	100.00	20,000.00	3,552.32	10,000.00	.....	.....	.....	.....	.....	10,000.00	3,552.32
Lane County:											
Eugene-Florence Survey	24.00	7,486.83	7,486.83	3,732.82	3,732.82	.....	3,732.82	.....	.....	3,754.01	3,754.01
Blachly-Rainrock	15.50	300,000.00	4,014.84	.....	.....	.....	.....	150,000.00	.....	150,000.00	4,014.84
Lincoln County:											
Alsea	28.70	367,000.00	191,881.05	187,000.00	16,780.78	62,108.61	78,889.39	93,000.00	20,173.48	187,000.00	92,318.18
Lincoln and Tillamook Counties:											
Neskowin-Devil's Lake	17.00	320,000.00	22,780.93	100,000.00	.....	25,000.00	25,000.00	120,000.00	.....	100,000.00	Cr. 2,219.07
Linn County:											
Cascadia-Shea's Hill	3.30	85,000.00	10,958.72	.....	.....	.....	.....	42,500.00	.....	42,500.00	10,958.72
Tillamook County:											
Three Rivers	8.70	209,900.37	209,900.37	149,528.51	177,664.67	Cr. 28,136.16	149,528.51	18,624.69	18,624.69	41,747.17	41,747.17
Wallowa County:											
Flora-Enterprise	12.90	134,770.66	134,770.66	55,940.52	41,708.12	14,232.40	55,940.52	27,201.10	27,201.10	51,629.04	51,629.04
Wheeler County:											
Ochoco Canyon	9.73	233,600.00	208,125.73	114,350.00	56,043.43	49,306.57	105,350.00	4,900.00	4,273.86	114,350.00	98,501.37
Grand totals		$5,794,228.59	$3,197,119.59	$2,301,262.53	$ 809,261.58	$ 724,970.53	$1,534,232.11	$ 896,457.11	$ 169,413.66	$2,596,518.95	$1,493,473.82
Expended prior to 1921		1,568,241.67	1,568,241.67	809,261.58	809,261.58	.....	809,261.58	102,271.45	102,271.45	656,708.64	656,708.64
Totals for 1921-1922		$4,225,996.92	$1,628,877.92	$1,492,000.95	$	$ 724,970.53	$ 724,970.53	$ 794,185.66	$ 67,142.21	$1,939,810.31	$ 836,765.18

TABLE X

EXPENDITURES FOR MAINTENANCE AND BETTERMENT WORK

December 1, 1920, to November 30, 1922

COUNTY	Expended for Maintenance Work			Expended for Betterment Work — All State Funds
	By State	By County	Total	
Baker	$ 32,575.98	$ 789.78	$ 33,365.76	$ 5,639.03
Benton	8,006.86	315.81	8,322.67	.....
Clackamas	54,501.04	40.97	54,542.01	271.66
Clatsop	65,706.65	* 9,577.98	75,284.63	6,978.75
Columbia	60,261.32	.....	60,261.32	12,593.81
Coos	42,306.53	3,893.70	46,200.23	1,234.23
Crook	13,248.88	.....	13,248.88	2.50
Curry	8,134.56	205.18	8,339.74	5,608.78
Deschutes	20,359.47	.....	20,359.47	556.80
Douglas	91,642.82	.....	91,642.82	21,332.31
Gilliam	21,128.71	1,365.04	22,493.75	2,414.06
Grant	14,057.39	2,430.17	16,487.56	5,931.71
Harney	3,269.45	111.92	3,381.37	.....
Hood River	61,390.07	.....	61,390.07	27,078.89
Jackson	34,102.11	4,822.47	38,924.58	1,228.78
Jefferson	6,209.88	.....	6,209.88	2,684.69
Josephine	19,565.58	1,641.59	21,207.17	322.71
Klamath	23,954.53	48.52	24,003.05	5,006.62
Lake	242.77	.....	242.77	.....
Lane	23,785.34	2,007.06	25,792.40	.....
Lincoln	4,057.38	320.50	4,377.88	.....
Linn	26,277.89	2,080.46	28,358.35	.....
Malheur	19,710.25	459.76	20,170.01	1,268.28
Marion	18,520.44	210.41	18,730.85	205.54
Morrow	19,741.50	2,976.73	22,718.23	925.22
Polk	15,160.59	599.07	15,759.66	2,049.31
Sherman	8,746.40	.....	8,746.40	.....
Tillamook	42,360.92	8,779.59	51,140.51	1,468.72
Umatilla	120,361.36	5,183.36	125,544.72	1,780.21
Union	19,536.36	45.58	19,581.94	1,380.20
Wallowa	9,877.61	.....	9,877.61	.....
Wasco	15,632.79	776.61	16,409.40	240.47
Washington	57,268.35	11,518.15	68,786.50	.....
Wheeler	20,771.26	1,693.72	22,464.98	8,088.75
Yamhill	47,684.72	14,451.74	62,136.46	4,437.23
Undistributed bridge maintenance	2,110.55	.....	2,110.55	.....
Totals	$1,052,268.31	$ 76,345.87	$1,128,614.18	$ 120,729.26

* Of the $9,577.98 shown as paid by the county, $781.87 was paid by the Larkin & Green Logging Company, this in connection with grade crossings with logging railways.

TABLE XI

EXPENDITURES FOR SURVEYS DETAILED BY JOBS

DECEMBER 1, 1920, TO NOVEMBER 30, 1922

COUNTY AND JOB	Amount Expended
Baker County:	
Union County Line-Haines	$ 9.12
Baker City-Malheur County Line	7,417.45
Baker-Stices Gulch	15,028.28
Middle Bridge-Emigrant Creek	3,460.55
Benton County:	
Corvallis-Monroe	7.83
Corvallis-Lincoln County Line (Corvallis-Newport Highway)	2,168.28
Philomath-Lincoln County Line (Alsea Highway)	9,849.00
Clackamas County:	
Oswego-Oregon City	1,004.50
Oregon City Bridge Site	118.06
Oregon City-Canemah	1,398.28
Canby-Aurora	85.60
Gresham-Sandy	519.08
Sandy-Forest Reserve Boundary	552.76
Clatsop County:	
Lewis and Clark Bridge Site	8.76
Coos County:	
Myrtle Point-Coquille	740.34
Coquille-Bandon	4,627.43
Hauser-North Section	2,647.54
Crook County:	
Prineville-Wheeler County Line	3,159.03
Bear Creek Connection between Crooked River and Central Oregon Highways	3,056.69
Shorty Davis Ranch-Paulina	2,128.25
Curry County:	
Hubbard Creek-Mussell Creek	1,115.76
Coos County Line-Port Orford	3,765.66
Euchre Creek-Gold Beach	45.48
Gold Beach-Brookings	11,899.57
Deschutes County:	
Bend-Jefferson County Line	2.85
Allen Ranch-Klamath County Line	388.24
Bend-Sisters	24.14
Redmond-Sisters	88.97
Millican-Harney County Line (Central Oregon Highway)	798.52
Millican-Lake County Line (Prineville-Lakeview Highway)	211.05
Douglas County:	
Pacific Highway through town of Myrtle Creek	253.94
Elk Creek Bridge Site	83.58
Oakland Overhead and River Crossing	12.95
Winchester Bridge Site	529.99
Roseburg-Camas Valley	4,615.63
Roosevelt Coast Highway across Douglas County	11,496.66
Gilliam County:	
Arlington-Condon	7,004.35
Mayville-Thirty Mile Creek	1,177.41
Heppner Junction-Morrow County Line	2,936.50
Grant County:	
Valades Ranch-Coles Bridge (John Day Highway)	8,296.10
Prairie City-Forest Boundary	3,168.46
Harney County:	
Burns-Suntex	867.79
Deschutes County Line-East 7 miles	229.17
Hood River County:	
Mt. Hood Loop across County	2,325.54

TABLE XI—Continued

COUNTY AND JOB	Amount Expended
Jackson County:	
Medford-Prospect	970.75
Jefferson County:	
Deschutes County Line-Madras	20.50
Madras-Wasco County Line	3,505.33
Josephine County:	
Grants Pass-Crescent City Highway	5.75
Oregon Caves Highway	462.29
Klamath County:	
Deschutes County Line-Crescent	1,964.68
Deschutes Forest Boundary-Sand Creek	1,665.20
Sand Creek-Klamath Falls	4,551.46
Merrill Section	318.67
Klamath Falls-Lake County Line	1,865.45
Klamath Falls-Keno	2,105.13
Keno-Jackson County Line	2,797.11
Lake County:	
Lakeview-Fort Rock	3,699.30
Fort Rock-Deschutes County Line	656.32
Lakeview-Fremont National Forest Boundary	643.92
Lane County:	
Harrisburg-Junction City	265.19
Junction City-Monroe	864.68
Pacific Highway-Blachley	361.69
Thurston-Walterville	740.31
Walterville-Blue River	1,567.51
Goshen-Lowell	88.35
Douglas County Line-Florence	8,761.11
Florence-Lincoln County Line	501.67
Bridge Investigations on Pacific Highway	421.73
Lincoln County:	
Newport-Toledo	5.75
Otis-Siletz River	3,233.46
Devils Lake-Lane County Line	4,985.57
Linn County:	
Albany-Harrisburg	1,895.60
Lebanon-Cascadia	127.80
Malheur County:	
Baker County Line-Ontario	3,486.11
Ontario-Vale	4.52
Vale-Brogan	81.69
Brogan-Cow Valley	70.04
Cow Valley-Ironside	866.17
Vale-Riverside (Central Oregon Highway)	321.00
Marion County:	
Salem Grade Crossing Elimination	428.81
Morrow County:	
Oregon-Washington Highway across County	1,695.82
Multnomah County:	
Plans for new Burnside Street Bridge: (State Funds) Credit	1,536.21
(County Funds)	1,572.86
Polk County:	
Amity-Rickreall	867.25
Monmouth-South	690.47
Sherman County:	
Biggs South to Wasco County Line	9,393.32
Tillamook County:	
Clatsop County Line-Mohler	1,076.61
Mohler-Manhattan, via Brighton	135.12
Hebo-Neskowin	64.24

TABLE XI—Continued

COUNTY AND JOB	Amount Expended
Umatilla County:	
Pendleton-Kamela	523.85
Umatilla Cutoff	38.47
Pendleton-Morrow County Line (via Pilot Rock)	2,985.14
Pendleton-Cold Springs	5,233.83
Ukiah-Grant County Line	4,631.42
Union County:	
Kamela-La Grande	1,607.92
Hot Lake-Union	1,882.59
Telocaset-North Powder	22.05
La Grande-Elgin	5,438.14
Wallowa Hill	3,203.14
Wallowa County:	
Union County Line-Joseph	6,682.94
Wasco County:	
The Dalles-Dufur (via Three Mile Creek)	3,006.81
The Dalles-Dufur (via Eight Mile Creek) (County Funds)	3,698.88
Dufur-Maupin	6,776.66
Maupin-Jefferson County Line	5,001.43
Sherman County Line-Cow Canyon (Sherman Highway)	524.59
Wheeler County:	
Cummins Hill-Fossil	658.75
Butte Creek Summit-South four miles	1,639.73
Sarvice Creek Section	1,677.09
Ochoco National Forest Boundary-Mitchell	4,461.39
Yamhill County:	
West Dayton-McMinnville	133.44
McMinnville-Amity	502.17
Sheridan-Willamina	80.52
Miscellaneous:	
Special investigations on Roosevelt Coast Highway across state	33.42
Total of expenditures for Surveys	$248,039.61

Paid by Multnomah County	$ 1,572.86
Paid by Wasco County	3,698.88
Paid by State	242,767.87
Total	$248,039.61

TABLE XII
EXPENDITURES FOR CONSTRUCTION ENGINEERING ON COUNTY WORK
December 1, 1920, to November 30, 1922

The expenditures included in this table are for engineering work in connection with work by county forces or under county contracts. This engineering service is, in general, 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 the construction work in connection with which these engineering expenditures are incurred.

COUNTY AND JOB	Amount Expended
Benton County:	
Corvallis-Lincoln County Line, grading	$ 4,709.64
Overhead crossing of S. P. R. R. at Blodgett	375.84
County bridges	329.67
Clackamas County:	
County bridges	451.46
Clatsop County:	
County bridges	181.46
Coos County:	
County bridges	6.84
Curry County:	
County bridges	3.55
Deschutes County:	
Bend-Horse Ridge. grading	250.08
Redmond-Sisters, grading	1,893.98
Tumalo-Sisters, grading	1,038.20
Grant County:	
Unit No. 4—Sarvice Creek-Valades Ranch, macadam	2,206.63
Canyon Creek-Danby Ranch, grading	14.92
Canyon Creek-Danby Ranch, graveling	135.93
Danby Ranch-Coles Bridge, graveling	630.78
Josephine County:	
Bear Creek section of Caves Road, grading	8.73
Merlin Hill section, grading	5.73
Lane County:	
Cottage Grove section, grading	557.04
Cottage Grove North, grading	16.45
Goshen-Walker, grading	754.58
County bridges	805.21
Lincoln County:	
Benton County Line-Thornton Creek, grading	2,683.15
Thornton Creek-Toledo, grading	.53
Steel bridge over Siletz River	558.72
Three wooden bridges over Siletz River	1,137.34
Linn County:	
Tangent-Halsey, grading	3,897.18
County bridges	62.82
Marion County:	
County bridges	237.49
Multnomah County:	
Repairs to Portland bridges—(State funds (Credit)	1,187.48
(County funds)	2,488.24
Repairs to Multnomah Falls viaduct	102.84
Polk County:	
County bridges	340.61
Tillamook County:	
Bridge over Nehalem River at Nehalem	1,835.54
Roosevelt Coast Highway, grading	2,746.00
County bridges	436.52

TABLE XII—Continued

COUNTY AND JOB	Amount Expended
Umatilla County:	
Cabbage Hill-Kamela, grading	2,677.63
Athena-Milton, grading (Credit)	51.64
Pendleton-Pilot Rock, grading and macadam	4,373.63
Union County:	
La Grande-Hot Lake, grading	608.64
County bridges	214.96
Yamhill County:	
County bridges	37.29
Total expenditures for engineering on County construction	$ 37,576.73

Paid by State	$ 35,088.49
Paid by Multnomah County	2,488.24
Total	$ 37,576.73

TABLE XIII

EXPENDITURES ON MARKET ROADS

DECEMBER 1, 1920, TO NOVEMBER 30, 1922

In this table are listed all expenditures made by the State Highway Commission in connection with work performed 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 repair charges on State equipment used in Market Road construction. The amounts of expenditures in each County as shown in this table have been deducted from the apportionments of the State Market Road Funds to the respective counties.

COUNTY AND ROAD	Amounts	Total for Each County
Baker County:		
Richland-Robinette	$ 345.68	
Lockhart up North Powder River	169.99	
Lockhart-Salisbury	738.52	
Baker-James School House	293.41	
Haines-Rock Creek	306.66	
Total for Baker County		$ 1,854.26
Clackamas County:		
Eagle Creek-Dover	$ 212.13	
Borland Market Road	0.90	
Oregon City-Silverton	2.25	
Total for Clackamas County		215.28
Clatsop County:		
Miles Crossing-Youngs River-Olney	$ 16.68	
Total for Clatsop County		16.68
Columbia County:		
Pittsburg-St. Helens	$ 2.97	
Total for Columbia County		2.97

TABLE XIII—Continued

COUNTY AND ROAD	Amounts	Total for Each County
Crook County:		
Prineville-Jap Creek	$ 93.12	
Prineville-McKay Creek	65.56	
Prineville-Josiah Williams Ranch	302.07	
Mill Creek Market Road	190.01	
Post-Paulina	764.91	
Total for Crook County		1,415.67
Curry County:		
Elk River Market Road	$ 289.71	
Sixes River Market Road	435.83	
Total for Curry County		725.54
Deschutes County:		
Shevlin Park Road (Bend-Fish Hatchery)	$ 45.08	
Redmond-Williams Corner	427.16	
Terrebonne-Lower Bridge	49.91	
Redmond-Crook County Line	485.11	
Butler Road	70.19	
Total for Deschutes County		1,077.45
Gilliam County:		
Wehrlie Canyon Road	$ 1,532.77	
Cayuse Canyon Road	1,309.60	
Ramsey Creek Road	439.16	
Total for Gilliam County		3,281.53
Grant County:		
Ritter Hill Road	$ 2.50	
Beach Creek Hill Road	1.32	
Total for Grant County		3.82
Harney County:		
Wright Point Market Road	$ 197.61	
Summit Springs Section of Well Hill Market Road	3,078.40	
Burns-Otis Valley	840.27	
Total for Harney County		4,116.28
Hood River County:		
Odell Market Road	$ 11.74	
Pine Grove Market Road	13.07	
Tucker (Rockford) Road	847.42	
Total for Hood River County		872.23
Jackson County:		
Blue Ledge Road between Jacksonville and Ruch	$ 2,233.37	
Reese Creek School-Butte Falls	5,046.31	
Dead Indian Road	899.17	
Foots Creek Road	98.52	
Lake Creek Road	1,634.52	
Sardine Creek Road	1,110.23	
Big Applegate Road	1,049.70	
Total for Jackson County		12,071.82
Jefferson County:		
Grizzly-Madras	$ 53.86	
Madras-Ashwood	77.45	
Madras-Mecca	64.14	
Culver-Grand View	15.27	
Gateway-Lyle Gap	13.72	
Gateway-Agency Plains	13.23	
Culver-Lamonta	3.60	
Total for Jefferson County		241.27

TABLE XIII—Continued

COUNTY AND ROAD	Amounts	Total for Each County
Josephine County:		
Williams Creek Road (Grants Pass to Oregon Caves)	$ 680.26	
Grants Pass down Rogue River	660.43	
Grants Pass-Williams Corner	3.12	
Grants Pass-Elsom's Ranch	3.36	
Total for Josephine County		1,347.17
Klamath County:		
Klamath Falls-Midland	$ 365.93	
Poe Valley Road	2,004.22	
Langell Valley Road	2,397.82	
Total for Klamath County		4,767.97
Lake County:		
Lakeview-Adel	$ 3,410.17	
Total for Lake County		3,410.17
Lincoln County:		
All Market Roads in Lincoln County	$ 7.50	
Total for Lincoln County		7.50
Malheur County:		
Jordan Valley Road	$ 5,169.15	
Total for Malheur County		$ 5,169.15
Morrow County:		
Rhea Creek Road	$ 352.73	
Lexington-Columbia River	95.24	
Jarmon Road, northeast 6 miles	* 4,733.63	
Total for Morrow County		* 5,181.60
Polk County:		
Oak Dale Road	$ 81.66	
Polk Station Road	91.08	
Zena-Bethel	119.17	
Crowley-Pacific Highway	13.87	
Teats Station-Dallas-Falls City	35.16	
Corvallis-Independence	28.34	
Perrydale-Byerly Corner	177.63	
River Road, Independence to Buena Vista	14.17	
Cross Road, Independence to Buena Vista	35.23	
Airlie-Dallas	56.99	
Wallace Bridge-Salt Creek	3,987.03	
Independence-Brunks Corner	249.72	
Total for Polk County		4,890.05
Sherman County:		
Grass Valley Road	†$ 288.56	
Fulton Canyon Road	2.50	
Total for Sherman County		† 291.06
Tillamook County:		
Tillamook City Limits-Netarts	$ 11.77	
Total for Tillamook County		11.77

* Of this amount, $139.58 is construction expense.
† Of this amount, $280.00 is construction expense

TABLE XIII—Continued

COUNTY AND ROAD	Amounts	Total for Each County
Union County:		
Ladd Canyon Road	$ 3.62	
Hilgard-Starkey	3.62	
North Powder down North Powder River	3.63	
Elgin-Crogan's Ranch	1,797.17	
Indian Creek Road	271.02	
North Powder, west 5 miles	226.24	
Total for Union County		2,305.30
Wallowa County:		
Wallowa-Powwatka	$ 29.80	
Lostine Road	4.74	
Enterprise-Imnaha	1.00	
Joseph-Armon	1.00	
Total for Wallowa County		36.54
Wasco County:		
Wapanitia Road	$ 5.00	
Total for Wasco County		5.00
Washington County:		
Hammelman's Place-Luck Quarry	$ 56.01	
1 Mile North of Beaverton to Buxton	1,323.90	
Bertha Beaverton Road-A. Hill's Place	404.48	
Hillsboro-Scholls-Sherwood	235.15	
Greenville-Hillside Quarry	5.32	
Forest Grove up Gales Creek	376.88	
Laurel-Gaston-Cherry Grove and Scoggins Valley	44.45	
Haines-Verboort-Christie	32.95	
Burkhalter Corner-Beaverton	47.72	
Forest Grove-Banks	223.15	
Hillsboro-North Plains	383.53	
Bechens north to District Line	52.33	
Cornell Road-Walker Road	124.66	
Mountain Dale south to District Line	46.00	
Cherry Grove-Yamhill County Line	108.35	
North Plains-Scotch Church	11.25	
Forest Grove-Naylor Cemetery	27.67	
Scholls-Sherwood Road	106.01	
Findley Road	44.81	
Orenco Road	33.51	
Total for Washington County		3,688.13
Wheeler County:		
Mitchel-Sarvice Creek	$ 1,625.09	
Cottonwood Creek Road	1,062.08	
Pine Creek Road	1.08	
Total for Wheeler County		2,688.25
Yamhill County:		
Newberg-Yamhill	$ 638.26	
Chehalem-Wapato	719.29	
Newberg-Butteville River Road	155.28	
Gopher Valley Road	491.52	
Hopewell-Amity	685.26	
Moores Valley Road	538.56	
Yamhill-Cherry Grove	1,612.13	
Total for Yamhill County		4,840.30
Undistributed Market Road Supervision Expense		9,602.20
Grand Total expended for Market Roads from December 1, 1920, to November 30, 1922		‡$74,136.96

‡ Of this amount, $419.58 is construction expense.

Sig. 5.

TABLE XIV

EXPENDITURES FOR GENERAL AND MISCELLANEOUS PURPOSES

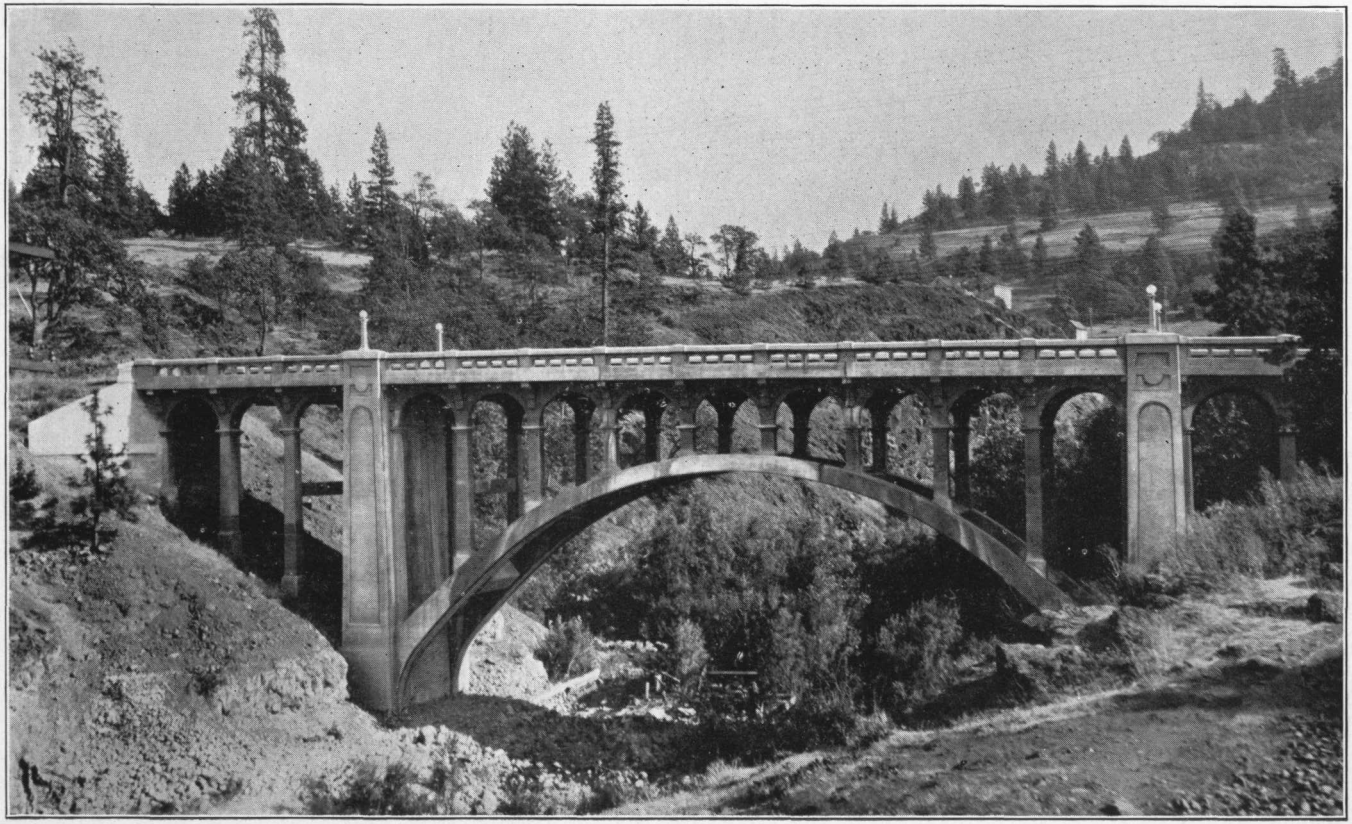
PERIOD DECEMBER 1, 1920, TO NOVEMBER 30, 1922

In this table are listed all expenditures that are not covered in the tables preceding. The expenditures included in it are those which can not be charged out to projects, but which must be carried as general expense. They consist of expenditures in the payment of interest and maturities on bonds, expenditures for the general administration and general supervision of the State Highway work, expenditures for the operation of equipment, shops and warehouses, and expenditures for road signing, policing of highways, acquisition of parks, etc.

ADMINISTRATION AND GENERAL SUPERVISION—		
General Administration	$ 62,474.80	
State Highway Commissioners	22,143.72	
Legal Department	14,615.07	
Auditing Department	33,835.35	
Purchasing Department (Discontinued 1921)	3,997.52	
Testing Laboratory	9,957.77	
Office Engineering Department	66,097.70	
Bridge Department	4,183.15	
Medford Division Office (Discontinued 1921)	5,402.36	
Klamath Falls Division Office (Discontinued 1922)	2,071.44	
Marshfield Division Office	5,721.88	
La Grande Division Office	10,221.35	
The Dalles Division Office	10,049.93	
State Highway Engineer and Assistant and Division Engineers	154,739.31	
Total	$405,511.35	
EQUIPMENT, SHOPS AND WAREHOUSES—		
Purchase of Equipment	$110,814.20	
Freight on Equipment and Supplies received from U. S. War Department	81,234.39	
Purchase of Parts and Supplies for Repairing, Remodeling, and Maintaining Equipment	318,031.74	
Labor and other expense operating Shops and Warehouses	209,295.74	
Construction of Warehouses and Shops	17,768.78	
Insurance on Warehouses and Equipment and Licenses for Automotive Equipment	19,189.73	
Purchase cost of Office and Field Supplies handled through Store	5,086.93	
Total Gross Charges		$761,421.51
Credits from Equipment Rentals, from Labor and Supplies furnished, etc.	$790,643.62	
Credits from Sale of Supplies and Equipment received from U. S. War Department	67,477.79	
Credits for Office and Field Supplies handled through Store	6,254.56	
Total Credits		$864,375.97
Total Net Credit	(Credit)	$102,954.46
BOND INTEREST AND EXPENSE—		
Interest on bonds	$2,496,135.02	
Maturies on bonds	125,000.00	
Expense engraving and issing bonds	12,498.35	
Total	$2,633,633.37	

TABLE XIV—Continued

ROAD SIGNING		
Total for this item	$	36,441.90
POLICING STATE HIGHWAYS—		
Total for this item	$	14,791.16
ACQUISITION OF PARK SITES, GRAVEL PITS, RIGHTS OF WAY, ETC.—		
Total for this item	$	15,073.87
MISCELLANEOUS GENERAL EXPENSE—		
Traffic Census	$	5,788.79
Warren Patent Suit		17,178.37
Refund to Clackamas County of over payment of Bond Interest due State		16.66
Investigation of Proposed Road Improvement Districts		155.68
Deductions from payrolls account of Industrial Accident Insurance for which turnover to Industrial Accident Commission was not completed during this Biennium (Credit)		69.86
Total	$	23,069.64



THE MOSIER ARCH ON THE COLUMBIA RIVER HIGHWAY NEAR MOSIER

Statistical Information

Pertaining to

State Highways and County Roads

in the

State of Oregon

INDEX TO TABLES

Table No. 1. Mileages of State Highway Construction, 1913 to 1922.
Table No. 2. State Funds Received and Expended, 1913 to 1922.
Table No. 3. State, County and Government Funds Expended, 1913 to 1922.
Table No. 4. Continuing Equipment Account, 1917 to 1922.
Table No. 5. Incomes from Different Sources, 1917 to 1922.
Table No. 6. Expenditures for Different Purposes, 1917 to 1922.
Table No. 7. Expenditures to Date upon Each of the State Highways.
Table No. 8. Expenditures of State Funds in Each of the Counties, 1913 1922.
Table No. 9. Road Expenditures of Counties, 1913 to 1922.
Table No. 10. County Populations, Areas, Assessed Valuations, and Bonding Limits.
Table No. 11. County Bond Issues.
Table No. 12. Statistics Pertaining to Forest Road Work.
Table No. 13. Motor Vehicle Registration, by Counties.
Table No. 14. Mileages of State Highways, by Counties.
Table No. 15. Mileages of County Roads, by Counties.
Table No. 16. Numbers and Mileages of State Highways with Map of State Highway System.
Table No. 17. New State Highway Construction, by Counties.
Table No. 18. New County Road Construction, by Counties.
Table No. 19. New Market Road Construction, by Counties.
Table No. 20. Apportionment of 1921 Market Road Funds.
Table No. 21. Apportionment of 1922 Market Road Funds.
Table No. 22. Market Road Receipts and Expenditures, 1920.
Table No. 23. Market Road Receipts and Expenditures, 1921.
Table No. 24. Market Road Receipts and Expenditures, 1922.
Table No. 25. Mileages of New State Highway Construction, by Jobs.
Table No. 26. Mileages of Surveys, by Jobs.
Table No. 27. Bridge Design and Construction, by Jobs.
Table No. 28. Bridges Designed for Counties, by Jobs.
Table No. 29. Results of Traffic Counts, 1921 and 1922.

TABLE NO. 1

RECORD OF MILEAGE OF CONSTRUCTION UNDER THE SUPERVISION OF THE STATE HIGHWAY COMMISSION

The mileages given in this table include all State and County Co-operative work, all Post Road work, and such County work on State Highways as is paid for on vouchers drawn by the State Highway Department. Forest Road work and work under county forces and under County Contracts are 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	87.0	277.3
1920	167.7	16.4	264.0	402.8
1921	125.0	51.0	433.9	449.7
1922	75.7	24.6	397.1	336.0
Totals	565.5	129.6	1,313.6	1,760.5

TABLE NO. 2

STATE FUNDS RECEIVED AND EXPENDED BY THE STATE HIGHWAY COMMISSION, 1913 TO 1922

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	7,458,614.05	6,248,304.16
1920	11,348,989.82	11,410,242.74
1921	13,580,830.05	15,031,655.14
1922	9,652,409.76	7,767,995.43
Totals	$46,219,208.61	$43,963,029.51
Balance on hand December 1, 1920		$ 2,256,179.10
Total		$46,219,208.61

TABLE NO. 3

TOTAL YEARLY EXPENDITURES UPON WORK HANDLED UNDER THE SUPERVISION OF THE STATE HIGHWAY DEPARTMENT, 1913 TO 1922

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	6,248,304.16	368,550.01	224,851.60	.....	6,841,705.77
1920	11,410,242.74	868,539.59	1,096,027.33	17,661.62	13,392,471.28
1921	15,031,655.14	985,831.42	2,181,956.65	46,378.16	18,245,821.37
1922	7,767,995.43	3,814,402.13	1,043,695.07	33,341.49	12,659,434.12
Totals	$43,963,029.71	$ 8,202,165.78	$4,546,530.65	$97,381.27	$56,809,107.41

* Expenditure of county funds during 1913 and 1914 is approximate only.

TABLE NO. 4

CONTINUING STATEMENT OF EQUIPMENT AND SUPPLIES ACCOUNT

In this table are summarized the disbursements and credits entering into the State Equipment and Supplies Account since the commencement of the operation of a State Equipment Department. The difference between the total of the disbursements and the total of the credits (what is referred to in the table as "Total Net Cost 1917 to End of Period") represents the net cost to the State of all equipment and supplies on hand, the value of which is shown in the column headed "Inventory Value of Equipment and Supplies on Hand."

PERIOD	Gross Expense	Total Credits	Net Cost for the Period	Total Net Cost 1917 to End of Period	Inventory Value of Equipment and Supplies on Hand
1917-1918	$ 111,547.03	$ 24,829.48	$ 86,717.55	$ 86,717.55	$ 100,000.00
1919-1920	602,230.22	308,629.62	293,600.60	380,318.15	1,500,000.00
1921	403,500.21	476,502.73	Cr. 73,002.52	307,315.63	825,000.00
1922	357,921.30	387,873.24	Cr. 29,951.94	277,363.69	759,325.00
Totals (1917-1922)	$1,475,198.76	$1,197,835.07	$ 277,363.69		

The large fluctuations in inventory values of equipment and supplies on hand are due to the fact that the major part of the equipment has been received from the U. S. War Department at a cost far below its inventory value and to the fact that much of the equipment on hand at the end of 1920 and of that subsequently received has been turned over to the counties of the State at much less than its inventory value.

TABLE NO. 5

SCHEDULE OF YEARLY INCOMES FROM DIFFERENT SOURCES—1917 TO 1922, INCLUSIVE

SOURCES OF INCOME	1917	1918	1919	1920	1921	1922	Total Receipts 1917 to 1922
Balance on hand Dec. 1, 1916	$ 94,418.14	$	$	$	$	$	$ 94,418.14
Bond sales (including Accrued Interest)	1,338,081.10	1,102,448.76	6,373,509.63	9,170,196.50	10,957,359.33	6,265,544.02	35,207,139.37
One-quarter Mill Tax	219,690.98	232,151.39	246,883.47	247,608.87	.....	.....	946,334.71
Automobile License Fees	150,000.00	425,000.00	532,418.83	1,481,122.75	1,624,983.02	2,358,987.02	6,572,511.62
Gasoline and Distillate Tax	.....	.....	290,795.49	404,050.16	948,509.66	944,310.46	2,587,665.77
Interest on Bank Balances	.....	.....	15,006.69	17,375.77	19,284.39	40,124.95	91,791.71
Miscellaneous	.....	.....	.....	28,635.77	30,693.65	43,443.31	102,772.73
Sub-totals (all State Funds)	$ 1,802,190.22	$ 1,759,600.15	$ 7,458,614.05	$11,348,989.82	$13,580,830.05	$ 9,652,409.76	$45,602,634.05
County Cooperation	270,162.37	439,562.42	368,550.01	868,539.59	985,831.42	3,814,402.13	6,747,047.94
Federal Government Cooperation	.....	.....	224,851.69	1,096,027.33	2,181,956.65	1,043,695.07	4,546,530.65
Railroad Cooperation	.....	.....	.....	17,661.62	46,378.16	33,341.49	97,381.27
Total Incomes	$ 2,072,352.59	$ 2,199,162.57	$ 8,052,015.63	$13,331,218.36	$16,794,996.28	$14,543,848.45	$56,993,593.91

TABLE NO. 6

SCHEDULE OF YEARLY EXPENDITURES—1917 TO 1922, INCLUSIVE

The expenditures in this table include all expenditures in connection with work handled under the direct supervision of the State Highway Department. They do not include federal government and county expenditures on Forest Road work, and they do not include Market Road Funds turned over to counties.

CLASSIFICATION OF EXPENDITURES	1917	1918	1919	1920	1921	1922	Total Expenditures 1917 to 1922
For State Construction work	$ 798,699.04	$ 2,363,152.96	$ 4,890,273.61	$ 8,026,266.93	$11,272,783.37	$ 8,014,348.92	$35,365,524.83
For Post Road Projects	.....	20,480.53	901,559.69	3,662,449.81	4,689,441.29	1,569,047.81	10,842,979.13
For Forest Road Projects	.....	5,130.50	273,869.55	528,239.42	418,097.62	306,872.91	1,532,210.00
For Maintenance work	.....	.....	15,523.31	98,813.17	534,522.20	594,091.98	1,242,950.66
For Betterment work	.....	.....	.....	.....	.....	120,729.26	120,729.26
For Road Signing	.....	.....	.....	5,226.79	9,986.62	26,455.28	41,668.69
For Policing Highways	.....	.....	.....	.....	.....	14,791.16	14,791.16
For Acquisition of Parks, Rights of Way, Gravel Pits, etc.	.....	.....	.....	.....	.....	15,073.87	15,073.87
For Interest on Bonds	.....	82,083.05	146,838.63	506,583.10	981,676.98	1,526,956.39	3,244,138.15
For Maturities on Bonds	.....	.....	.....	.....	.....	125,000.00	125,000.00
For Equipment and Stocks	48,641.06	38,076.49	213,044.84	80,555.76	Cr. 73,002.52	Cr. 29,951.94	277,363.69
For Surveys	62,941.08	77,432.46	226,408.44	188,402.90	123,432.29	124,607.32	803,224.49
For Engineering on County Construction	.....	3,713.13	27,642.58	63,525.62	28,317.48	9,259.25	132,458.06
For work performed on Market Roads	.....	.....	.....	28,635.77	30,830.49	43,306.47	102,772.73
For Administration and General Supervision	34,130.80	63,491.02	146,753.39	203,933.77	229,888.59	175,622.76	853,820.33
For Miscellaneous General Expense	.....	10.15	Cr. 208.27	Cr. 161.76	Cr. 153.04	23,222.68	22,709.76
Total Expenditures	$ 944,411.98	$ 2,653,570.29	$ 6,841,705.77	$13,392,471.28	$18,245,821.37	$12,659,434.12	$54,737,414.81

TABLE NO. 7

CLASSIFICATION OF EXPENDITURES BY HIGHWAYS

Period December 1, 1916, to November 30, 1922

This table gives the totals of expenditures made directly upon each of the several state highways during the six-year period ending November 30, 1922. It includes all expenditures made under the supervision of the State Highway Commission for bridge construction, grading, rocking and paving work, maintenance work, surveys and construction engineering. It does not include expenditures for administration and general supervision or expenditures for interest and maturities on bonds, which expenditures can not be charged out to the individual highways.

HIGHWAY	Total Amount Expended	Cooperation in Expenditures			
		By State	By Counties	By Federal Government	By Railway Companies
Pacific	$12,717,186.22	$11,548,041.34	$ 648,676.52	$ 451,916.37	$ 68,551.99
Columbia River	8,960,208.22	7,506,482.90	958,197.32	1,085,298.34	10,229.66
West Side	3,110,545.27	2,498,002.30	349,618.35	262,924.62	.....
The Dalles-California	1,496,159.46	786,278.89	386,969.07	322,911.50	.....
John Day	2,253,599.76	1,191,537.81	355,903.21	706,158.74	.....
The Old Oregon Trail	2,956,380.38	2,069,760.37	657,618.97	211,183.29	17,817.75
Central Oregon	579,365.03	301,541.20	96,857.54	180,966.29	.....
Oregon-Washington	1,736,893.83	1,409,707.33	327,186.50	.....	.....
Roosevelt Coast	2,934,249.96	2,258,419.55	506,089.08	169,741.33	.....
La Grande-Enterprise	989,303.34	590,142.64	316,800.35	82,360.35	.....
Enterprise-Flora	55,940.52	55,940.52	.....	.....	.....
Baker-Cornucopia	427,952.58	209,348.13	89,865.39	128,739.06	.....
Baker-Unity	31,095.54	31,095.54	.....	.....	.....
Shaniko-Mitchell	.....	.....	.....	.....	.....
McKenzie	372,366.51	339,278.04	33,088.47	.....	.....
Santiam	4,598.61	4,598.61	.....	.....	.....
Bend-Sisters	43,613.65	43,613.65	.....	.....	.....
Lakeview-Burns	.....	.....	.....	.....	.....
Prineville-Lakeview	626,649.37	400,736.68	157,032.70	68,879.99	.....
Klamath Falls-Lakeview	211,856.04	86,457.62	45,093.94	80 304.48	.....
Ashland-Klamath Falls	571,728.41	388,167.69	183,560.72	.....	.....
Medford-Crater Lake	690,404.20	293,061.23	188,000.00	209,342.97	.....
Klamath-Crater Lake	7,103.56	7,103.56	.....	.....	.....
The Rim	.....	.....	.....	.....	.....
Grants Pass-Crescent City	57,678.15	49,170.33	8,507.82	.....	.....
Mt. Hood Loop	836,863.55	658,069.26	178,794.29	.....	.....
Alsea	93,900.01	93,900.01	.....	.....	.....
Pendleton-John Day	6,808.67	6,808.67	.....	.....	.....
Tualatin Valley	1,349,981.52	1,068,712.25	127,749.27	153,520.00	.....
Salem-Dallas	671,341.33	324,528.89	280,683.91	66,128.53	.....
McMinnville-Tillamook	1,004,959.84	922,833.96	62,658.30	19,467.58	.....
Corvallis-Newport	504,016.09	389,841.49	114,174.60	.....	.....
Willamette Valley-Florence	276,279.75	161,573.08	114,706.67	.....	.....
Coos Bay-Roseburg	1,378,697.12	621,825.52	565,012.51	191,859.09	.....
Pendleton-Cold Springs	168,609.28	19,783.92	148,825.36	.....	.....
Deschutes	2,258.64	2,258.64	.....	.....	.....
Bertha-Beaverton	165,931.92	92,678.95	73,252.97	.....	.....
Ochoco	609,558.14	414,636.47	109,344.36	85,577.31	.....
Sherman	334,102.02	203,318.01	61,533.20	69,250.81	.....
Oregon Caves	102,976.75	102,976.75	.....	.....	.....
Totals	$48,341,163.24	$37,152,231.80	$6,545,801.39	$4,546,530.65	$ 96,599.40

TABLE NO. 8

YEARLY EXPENDITURES OF STATE FUNDS IN COUNTIES—1914 TO 1922, INCLUSIVE

This table does not include administration or other general charges which are not direct expenditures in particular counties.

COUNTIES	*1914-15-16	1917	1918	1919	1920	1921	1922	Total
Baker	$ 802.74	$ 1,214.01	$ 6,364.67	$ 129,250.32	$ 197,030.02	$ 366,787.43	$ 205,585.03	$ 907,034.22
Benton	908.64	47.56	.....	94,814.36	281,511.56	413,425.98	105,255.09	895,963.19
Clackamas	1,601.11	12,519.70	143,341.40	105,463.20	282,100.56	674,859.94	106,265.80	1,326,151.71
Clatsop	120,520.91	54,294.83	290,092.40	164,169.81	465,627.25	606,524.25	64,066.66	1,765,296.11
Columbia	116,598.07	76,424.91	411,877.24	620,371.94	595,663.81	70,619.26	219,879.58	2,111,434.81
Coos	375.81	16,703.28	264.40	166,528.82	310,711.15	298,394.81	85,789.97	878,768.24
Crook	12,109.49	.....	3,053.72	43,850.69	198,237.26	366,282.36	Cr. 11,687.44	611,846.08
Curry	.....	79.91	5,549.33	29,532.97	91,136.05	214,842.25	157,592.90	498,733.41
Deschutes	.....	7,244.37	13,472.00	11,183.38	151,348.06	203,993.11	123,422.06	510,662.98
Douglas	40,889.20	8,803.50	150,966.08	615,811.17	1,370,242.25	2,037,854.61	1,181,729.01	5,406,295.82
Gilliam	7.42	4,443.52	31,555.96	186,248.81	490,530.86	319,695.75	25,952.58	1,058,434.90
Grant	26.95	2,980.16	4,488.62	72,459.19	92,238.44	187,120.67	68,115.47	427,429.50
Harney	.....	.....	1,873.45	8,593.22	103,402.69	111,422.35	16,927.71	242,219.42
Hood River	53,322.25	61,326.69	372,601.53	426,614.51	447,952.84	79,699.57	371,256.45	1,812,773.84
Jackson	117,299.22	54,476.20	32,143.68	376,353.07	1,022,709.31	966,663.77	Cr. 133,339.14	2,436,306.11
Jefferson	.....	.....	.....	2,466.69	54,817.15	Cr. 8,094.83	41,988.26	91,177.27
Josephine	7,820.84	5,297.73	72,700.41	310,165.29	297,614.12	518,158.12	344,260.79	1,556,017.30
Klamath	.....	27.75	791.48	36,686.51	152,496.28	261,992.26	68,397.73	520,392.01
Lake	.....	15,215.57	176.10	12,926.19	72,441.74	18,627.47	73,212.14	192,599.21
Lane	4,700.18	12,247.61	2,281.91	270,006.64	334,950.47	919,854.67	289,049.09	1,833,090.57
Lincoln	24.83	2,054.05	943.42	5,378.43	33,770.40	162,606.80	257,317.02	462,094.95
Linn	246.13	287.67	503.40	45,693.52	142,706.49	79,488.06	466,043.72	734,968.99
Malheur	189.61	93.02	773.63	6,427.18	150,271.85	206,606.18	209,750.36	574,111.83
Marion	1,207.10	479.41	4,604.18	266,568.74	237,047.59	359,119.72	49,955.38	918,982.12
Morrow	105.18	4,200.72	6,662.38	163,433.54	114,801.59	290,976.24	146,096.52	726,276.17
Multnomah	1,175.11	.....	.....	61,252.97	Cr. 47,671.81	Cr. 2,528.53	Cr. 92.32	12,135.42
Polk	7,103.22	137.78	665.14	153,139.31	244,785.61	289,516.30	232,963.38	928,310.74
Sherman	45,705.33	48.87	3,003.27	36,129.66	133,946.99	152,531.93	36,862.22	408,228.27
Tillamook	1,851.60	5,213.34	63,060.95	146,123.61	194,265.90	293,110.46	111,673.39	815,299.25
Umatilla	13.49	100,608.75	73,333.75	243,343.95	518,724.77	587,386.60	231,331.45	1,754,742.76
Union	42.20	5,975.15	26,213.02	190,205.75	134,027.33	707,023.16	205,725.58	1,269,212.19
Wallowa	.....	.....	765.07	43,095.31	38,545.45	283,101.99	Cr. 14,017.34	351,490.48
Wasco	145.25	286.02	4,027.77	193,090.34	646,204.73	745,663.80	161,897.30	1,751,315.21
Washington	24,295.06	70,139.95	176,629.10	264,534.18	243,733.81	285,550.54	137,045.79	1,201,928.43
Wheeler	5.64	13,084.26	56,130.52	64,184.33	194,579.55	154,902.52	18,742.79	501,629.61
Yamhill	2,622.74	38,714.45	86,244.39	175,579.35	621,581.34	654,872.06	243,900.51	1,823,514.84
Miscellaneous	.....	.....	.....	198.62	21.62	.....	2,143.97	2,364.21
Totals	$561,715.32	$574,670.74	$2,047,154.37	$5,741,875.57	$10,614,105.08	$13,878,651.63	$ 5,901,059.46	$39,319,232.17

*** See page 92 of 1919-1920 Report for segregation by years.**

TABLE NO. 9

COUNTY DISBURSEMENTS FOR ROAD PURPOSES FOR THE YEARS 1914 TO 1922, 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, and for a segregation of the 1914-1915 expenditures, see page 93 of the report of the State Highway Commission for the 1919-1920 biennium.

County	1914–1915	1916	1917	1918	1919	1920	1921	1922 Estimated
Baker	$ 87,848.29	$ 76,388.43	$ 23,003.51	$ 53,244.98	$ 91,729.04	$ 121,268.82	$ 111,363.44	$ 247,794.47
Benton	133,050.53	58,541.54	61,824.18	111,121.38	158,719.43	153,684.02	148,585.25	57,833.08
Clackamas	653,634.40	325,126.31	365,151.90	405,298.79	449,637.68	509,862.88	796,167.62	916,340.73
Clatsop	796,656.92	323,113.00	206,070.00	342,704.00	368,652.52	420,000.00	548,140.00	314,177.00
Columbia	585,188.00	194,631.00	186,429.00	215,511.00	222,411.00	208,479.03	385,588.28	192,605.92
Coos	481,300.00	175,515.00	428,920.00	313,448.00	224,413.00	252,039.00	722,002.44	*
Crook	60,548.88	103,877.97	45,034.15	15,509.97	134,165.50	252,585.49	129,400.01	*
Curry	49,439.92	47,579.43	40,816.48	44,425.16	50,683.05	23,247.11	87,350.00	*
Deschutes	*	*	14,663.48	31,834.30	32,778.47	*	*	*
Douglas	133,227.96	*	*	103,607.75	205,437.22	270,054.96	532,160.28	980,000.00
Gilliam	78,866.26	63,460.49	66,402.51	70,500.00	74,535.94	64,206.49	80,933.28	170,000.00
Grant	46,941.80	33,748.38	32,470.45	44,025.29	48,599.32	33,434.37	26,000.00	48,200.00
Harney	*	*	*	*	*	127,282.55	90,994.12	48,423.15
Hood River	89,000.00	47,194.16	60,731.96	38,260.20	48,717.64	60,000.00	*	*
Jackson	551,477.69	97,583.84	83,319.47	103,419.36	187,692.85	219,976.85	467,115.32	402,620.00
Jefferson	*	13,500.00	25,000.00	25,000.00	25,000.00	31,764.24	*	*
Josephine	92,508.13	38,242.42	37,222.00	46,000.73	80,959.21	181,601.28	104,582.15	64,669.68
Klamath	72,020.88	50,579.12	51,252.14	96,474.99	85,301.74	80,000.00	832,661.37	832,661.37
Lake	50,000.00	30,000.00	25,000.00	27,784.00	30,000.00	31,000.00	77,317.00	71,374.00
Lane	274,998.31	110,000.00	282,556.45	280,913.55	349,591.78	279,516.41	453,753.99	745,000.00
Lincoln	128,810.00	60,471.00	12,632.00	33,788.00	125,044.00	197,210.57	131,641.39	199,200.00
Linn	302,262.53	168,379.25	184,335.26	166,807.04	289,835.09	565,324.60	589,882.39	424,765.42
Malheur	30,781.14	*	*	50,912.82	54,049.93	161,298.20	156,613.85	67,515.73
Marion	485,000.00	182,000.00	267,000.00	442,000.00	449,000.00	475,000.00	647,102.38	600,000.00
Morrow	64,627.72	29,629.40	58,897.95	57,864.95	91,605.75	186,949.51	201,641.94	98,424.91
Multnomah	1,802,534.83	690,457.60	586,338.51	479,764.92	493,995.86	563,959.92	478,993.82	290,500.00
Polk	199,436.43	137,123.09	62,201.73	118,902.18	69,663.28	92,987.04	185,460.24	40,000.00
Sherman	109,000.00	56,000.00	58,000.00	60,000.00	65,000.00	68,325.00	93,769.83	90,000.00
Tillamook	192,463.38	174,017.38	188,150.00	188,150.00	204,595.00	187,000.00	222,591.00	207,000.00
Umatilla	*	*	*	*	*	*	378,647.42	313,023.62
Union	38,664.83	*	*	*	*	193,113.82	344,620.51	637,842.10
Wallowa	68,640.25	55,557.77	53,986.96	37,732.58	71,070.17	123,853.99	166,348.74	205,135.77
Wasco	80,504.73	80,553.73	110,327.98	194,654.86	82,358.95	116,197.06	238,001.68	228,499.64
Washington	414,156.78	259,057.94	235,624.84	266,140.51	461,363.27	259,347.38	282,899.11	276,292.46
Wheeler	39,061.18	16,660.79	26,810.93	65,836.11	24,120.50	74,153.95	81,209.98	157,620.58
Yamhill	100,000.00	50,000.00	50,000.00	60,000.00	300,000.00	340,000.00	*	*
Totals	$8,292,651.77	$3,748,989.04	$3,930,173.84	$4,591,638.42	$5,650,227.19	$6,924,624.54	$9,793,538.83	$8,927,519.63

* Data not available.

TABLE NO. 10

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

COUNTY	Population by 1920 census	Area in acres	Assessed valuation December, 1922	Road bonding limit based on 6 per cent of assessed valuation	Road bond indebtedness on November 1, 1922, inclusive of authorized bonds
Baker	17,929	1,958,400	$ 22,424,632.52	$ 1,345,477.95	$ 500,000.00
Benton	13,744	440,320	14,657,108.87	879,426.53	220,000.00
Clackamas	37,698	1,192,960	39,336,303.29	2,360,178.20	1,700,000.00
Clatsop	23,030	525,440	30,870,933.26	1,852,256.30	443,000.00
Columbia	13,960	423,680	15,328,134.45	919,688.07	300,000.00
Coos	22,257	1,041,920	23,330,636.61	1,399,838.20	589,600.00
Crook	3,424	1,916,160	6,010,075.12	360,604.51	315,000.00
Curry	3,025	958,720	3,914,813.46	234,888.81	263,000.00
Deschutes	9,622	1,928,080	10,957,873.89	657,472.43	175,000.00
Douglas	21,332	3,150,080	28,753,444.08	1,725,206.65	1,600,000.00
Gilliam	3,960	768,640	10,713,518.00	642,811.08	250,000.00
Grant	5,496	2,892,800	8,113,800.35	486,828.02	532,000.00
Harney	3,992	6,357,120	11,551,878.35	693,112.70	.....
Hood River	8,315	347,520	9,866,195.47	591,971.73	407,000.00
Jackson	20,405	1,815,040	27,661,184.07	1,659,671.04	971,000.00
Jefferson	3,211	1,133,680	5,746,255.24	344,775.31	100,000.00
Josephine	7,655	1,120,640	7,739,401.99	464,364.12	.....
Klamath	11,413	3,839,360	18,593,385.87	1,115,603.15	1,147,704.00
Lake	3,991	5,068,800	11,098,949.37	665,936.96	200,000.00
Lane	36,166	2,951,680	40,487,106.21	2,429,226.37	2,000,000.00
Lincoln	6,084	645,120	7,752,390.40	465,143.42	626,240.00
Linn	24,550	1,435,520	32,849,093.16	1,970,945.59	494,500.00
Malheur	10,907	6,325,120	16,037,337.44	962,240.25	260,000.00
Marion	47,117	764,160	43,219,589.38	2,593,175.36	850,000.00
Morrow	5,617	1,296,000	11,557,353.42	693,441.21	290,000.00
Multnomah	275,898	288,640	342,854,364.26	20,571,261.86	* 875,000.00
Polk	14,181	453,760	18,751,719.00	1,125,103.14	265,000.00
Sherman	3,826	535,040	11,518,812.18	691,128.73	300,000.00
Tillamook	8,776	720,000	17,693,025.07	1,061,581.50	430,000.00
Umatilla	25,946	2,030,720	47,395,653.64	2,843,739.22	1,050,000.00
Union	16,636	1,335,680	21,095,765.57	1,265,745.93	1,498,000.00
Wallowa	9,778	2,012,800	13,883,283.85	832,997.03	300,000.00
Wasco	13,648	1,499,520	17,676,832.15	1,060,609.93	1,160,000.00
Washington	26,376	467,840	31,331,616.72	1,879,897.00	.....
Wheeler	2,791	1,090,560	5,120,688.68	307,241.32	264,000.00
Yamhill	20,529	456,960	23,605,999.99	1,416,360.00	780,000.00
Totals	783,285	61,188,480	$1,009,499,160.38	$60,569,949.62	$21,123,544.00

* In addition Multnomah county voted $1,250,000 bonds for Interstate Bridge on July 1, 1914. Of this amount $250,000 has been paid.

TABLE NO. 11

COUNTY BONDS FOR HIGHWAY PURPOSES, 1913-1922

This tabulation was compiled from reports from the various county treasurers as of November 1, 1922, and it is believed to include all bonds issued by counties for highway purposes to and including the year 1922.

COUNTY	Date voted	Amount	Amount sold	Bonds matured and paid	Sinking fund on hand	Amount sold less matured bonds and sinking fund
Baker	June 3, 1919	$ 500,000.00	$ 450,000.00			$ 450,000.00
Benton	June 3, 1919	220,000.00	220,000.00			220,000.00
Clackamas	Nov. 24, 1919	1,700,000.00	390,450.00			390,450.00
Clatsop	Nov. 4, 1913	400,000.00	400,000.00	57,000.00	45,000.00	298,000.00
Clatsop	Nov. 2, 1920	100,000.00	100,000.00			100,000.00
Columbia	Feb. 1914	360,000.00	360,000.00	60,000.00	40,600.00	259,400.00
Coos	June 1916	362,000.00	362,000.00	72,400.00		289,600.00
Coos	June 7, 1921	300,000.00	300,000.00		11,085.71	288,914.29
Crook	May 17, 1918	95,000.00	95,000.00			95,000.00
Crook	Nov. 7, 1919	220,000.00	220,000.00			220,000.00
Curry	June 3, 1919	98,000.00	98,000.00			98,000.00
Curry	June 7, 1921	165,000.00	84,000.00		375.00	83,625.00
Deschutes	June 3, 1919	125,000.00	125,000.00			125,000.00
Deschutes	June 7, 1921	50,000.00	50,000.00		3,505.89	46,494.11
Douglas	Oct. 1, 1917	555,500.00	520,000.00	55,500.00		464,500.00
Douglas	June 7, 1921	1,100,000.00	780,000.00			780,000.00
Gilliam	June 3, 1919	250,000.00	125,000.00		1,959.58	123,040.42
Grant	June 4, 1917	140,000.00	98,000.00	48,000.00	2,500.00	47,500.00
Grant	June 7, 1921	440,000.00	250,000.00			250,000.00
Harney						
Hood River	July 15, 1914	75,000.00	75,000.00	18,000.00	6,000.00	51,000.00
Hood River	June 7, 1921	350,000.00	250,000.00			250,000.00
Jackson	Sept. 9, 1913	500,000.00	500,000.00	29,000.00	66,661.99	404,338.01
Jackson	May 21, 1920	500,000.00	380,000.00			380,000.00
Jefferson	June 3, 1919	100,000.00	100,000.00			100,000.00
Josephine						
Klamath	June 3, 1919	347,704.00	347,704.00			347,704.00
Klamath	Feb. 21, 1922	800,000.00	400,000.00			400,000.00
Lake	June 3, 1919	200,000.00	200,000.00		8,588.11	191,411.89
Lane	May 21, 1920	2,000,000.00	850,000.00			850,000.00

Lincoln	June 3, 1919	180,000.00	180,000.00			180,000.00
Lincoln	June 7, 1921	343,240.00	343,240.00			343,240.00
Lincoln	May 19, 1922	103,000.00	63,000.00			63,000.00
Linn	June 3, 1919	600,000.00	600,000.00	105,500.00	23,754.53	470,745.47
Malheur	June 3, 1919	260,000.00	260,000.00		7,830.10	252,169.90
Marion	June 3, 1919	850,000.00	595,000.00			595,000.00
Morrow	June 3, 1919	290,000.00	290,000.00		14,000.00	276,000.00
Multnomah	Mar. 1915	* 1,250,000.00	1,250,000.00	375,000.00		875,000.00
Polk	June 3, 1919	265,000.00				
Sherman	April 5, 1919	300,000.00	300,000.00			300,000.00
Tillamook	June 3, 1919	430,000.00	430,000.00			430,000.00
Umatilla	Mar. 4, 1919	1,050,000.00	735,000.00			735,000.00
Union	Oct. 11, 1919	1,400,000.00	860,000.00			860,000.00
Wallowa	June 3, 1919	300,000.00	300,000.00		20,468.75	279,531.25
Wasco	Nov. 7, 1916	260,000.00	260,000.00	26,000.00		234,000.00
Wasco	Nov. 2, 1920	100,000.00				
Wasco	June 7, 1921	800,000.00	200,000.00			200,000.00
Washington						
Wheeler	Nov. 7, 1916	80,000.00	80,000.00	6,500.00		73,500.00
Wheeler	June 3, 1919	44,000.00	44,000.00			44,000.00
Wheeler	June 7, 1921	140,000.00	140,000.00			140,000.00
Yamhill	June 3, 1919	360,000.00	360,000.00			360,000.00
Yamhill	May 21, 1920	420,000.00	396,000.00			396,000.00
Totals		$21,976,444.00	$15,816,394.00	$ 852,900.00	$ 252,329.66	$14,711,164.34

* In addition, Multnomah County voted $1,250,000.00 bonds for Interstate Bridge on July 1, 1914, of which $250,000.00 has been paid.

TABLE NO. 12

STATISTICS PERTAINING TO FOREST ROAD WORK

The statistics here given apply to highway work in the State of Oregon performed under the supervision of the U. S. Bureau of Public Roads. All of the work included is upon state highways at points where these highways are in or adjacent to National Forests. The work is financed under cooperative agreements between the Federal Government, the State and the Counties of the State, certain federal funds being apportioned for expenditure in the State of Oregon as outlined under the article printed in another part of this report under the head "Forest Road Projects."

The figures in these tables were furnished by the Portland office of the U. S. Bureau of Public Roads. They will not exactly check the figures given in the table of forest road expenditures included in the financial statement of the State Highway Department as printed in this report, owing to differences in fiscal periods covered. In highway department expenditure summaries only state funds expended on forest road work are included. In highway department tables of mileages of work completed no mileages for forest road work are included.

EXPENDITURES ON FOREST ROAD WORK

YEAR	Expenditures			
	State Funds	County Funds	Government Funds	Total
To December 31, 1918	$ 427.30	$	$ 36,817.35	$ 37,244.65
1919	197,542.17	58,298.14	391,921.82	647,762.13
1920	489,290.04	43,276.15	260,512.87	793,079.06
1921	430,915.44	65,611.04	371,203.84	867,730.32
1922, to October 31	144,585.15	2,368.12	596,568.84	743,522.11
Totals	$1,262,760.10	$ 169,553.45	$1,657,024.72	$3,089,338.27

MILEAGES OF WORK COMPLETED ON FOREST ROAD PROJECTS

YEAR	Grading Miles	Surfacing Miles	Surveys Miles
1918	4.30	.....	121.92
1919	62.90	.....	90.92
1920	56.10	22.59	41.38
1921	33.23	37.61	21.93
1922, to October 31	37.85	39.56	84.11
Totals	194.38	99.76	360.26

TABLE NO. 13

REGISTRATION OF MOTOR VEHICLES

JANUARY 1, 1922, TO SEPTEMBER 15, 1922

The figures given in this table apply to the registration of motor vehicles to September 15, only, and they do not represent the total registration for the whole of the year 1922. The information given was furnished by the Secretary of State, who is in charge of the registration of motor vehicles.

COUNTY	Total Number of Licensed Motor Vehicles Except Motorcycles	Number of Persons per Licensed Motor Vehicle	Classification of Motor Vehicles						Number of Motorcycles	Total Gross Fees Collected
			Passenger Cars	Ambulances & Hearses	Busses and Stages	Delivery Cars Less than One Ton	Trucks	Trailers		
Baker	2,016	8.9	1,819	.....	18	55	113	11	53	$ 50,039.50
Benton	2,579	5.3	2,329	2	8	66	166	8	55	61,001.50
Clackamas	5,760	6.5	5,078	3	4	199	464	12	145	140,684.25
Clatsop	2,673	8.6	2,201	2	11	187	263	9	50	75,583.00
Columbia	1,619	8.6	1,395	3	9	65	135	12	45	39,427.34
Coos	2,632	8.5	2,216	3	30	115	251	17	39	66,131.50
Crook	576	5.9	525	1	.....	12	38	.....	4	12,422.75
Curry	440	6.9	376	.....	1	10	49	4	5	9,350.75
Deschutes	1,939	5.0	1,739	1	3	58	137	1	18	44,605.25
Douglas	3,392	6.3	2,956	3	22	84	311	16	115	83,263.50
Gilliam	699	5.7	584	.....	.....	11	104	.....	4	18,280.25
Grant	629	8.7	578	.....	1	10	38	2	2	13,154.50
Harney	571	7.0	521	1	2	9	38	.....	7	11,287.75
Hood River	1,779	4.7	1,485	1	4	39	246	4	27	47,511.75
Jackson	4,840	4.2	4,348	3	28	116	340	5	69	116,131.00
Jefferson	473	6.8	419	.....	.....	6	48	.....	6	10,524.50
Josephine	1,620	4.7	1,443	2	4	39	131	1	24	38,373.50
Klamath	2,099	5.4	1,828	1	25	67	170	8	22	51,225.00
Lake	690	5.8	633	1	.....	9	47	.....	7	15,229.25
Lane	6,296	5.7	5,717	1	18	161	368	31	226	147,472.25
Lincoln	387	15.7	326	.....	5	13	42	1	5	7,073.00
Linn	4,323	5.7	3,951	3	11	81	266	11	90	100,502.00
Malheur	1,304	8.4	1,180	2	.....	33	88	1	7	27,376.00
Marion	8,845	5.3	7,848	7	31	222	717	20	233	208,823.75
Morrow	889	6.3	802	.....	1	13	73	.....	7	21,722.75
Multnomah	43,367	6.3	37,717	29	262	2,137	3,647	75	1,389	1,253,697.75
Polk	2,523	5.6	2,271	2	11	43	190	6	41	55,567.25
Sherman	867	4.4	782	.....	.....	31	54	.....	10	23,310.00
Tillamook	1,602	5.5	1,384	1	3	44	160	10	26	39,315.25
Umatilla	4,926	5.3	4,391	7	28	163	331	6	45	124,850.00
Union	2,483	6.7	2,265	5	6	58	137	12	69	58,814.25
Wallowa	987	9.9	914	1	1	13	58	.....	9	21,048.50
Wasco	2,376	5.7	2,052	4	6	100	213	1	41	59,668.00
Washington	4,488	5.9	3,986	6	4	152	329	11	96	111,026.75
Wheeler	347	8.0	295	.....	1	5	45	1	2	8,092.50
Yamhill	3,641	5.6	3,286	4	4	50	291	6	54	84,767.75
Totals	127,177	6.7	111,640	99	562	4,476	10,098	302	3,047	$3,257,354.59

TABLE NO. 14

MILEAGES OF STATE HIGHWAYS BY COUNTIES

The mileages given in this table are inclusive of mileages within cities and towns.

COUNTY	Total Mileage of State Highways	Classification as to Improvement			
		Paved	Surfaced With Rock or Gravel	Graded to State Standards	Not Graded to State Standards
Baker	218.8	1.1	84.2	26.6	106.9
Benton	84.3	32.4	11.1	.....	40.8
Clackamas	67.6	18.1	12.7	30.4	6.4
Clatsop	75.6	50.5	11.2	.....	13.9
Columbia	55.6	54.6	1.0	.....	.....
Coos	102.8	24.0	35.9	7.5	35.4
Crook	83.6	.....	36.4	30.0	17.2
Curry	95.4	.....	16.8	6.7	71.9
Deschutes	235.5	0.8	97.0	15.1	122.6
Douglas	152.3	97.3	10.7	14.7	29.6
Gilliam	97.4	.....	70.1	12.4	14.9
Grant	164.8	.....	37.5	17.2	110.1
Harney	106.0	.....	27.2	14.4	64.4
Hood River	69.7	27.6	5.8	16.7	19.6
Jackson	150.3	61.0	48.4	28.2	12.7
Jefferson	50.7	.....	22.9	6.3	21.5
Josephine	97.9	32.2	4.9	11.2	49.6
Klamath	333.3	3.0	65.6	71.6	193.1
Lake	202.0	.....	26.0	13.1	162.9
Lane	303.3	47.2	36.6	18.7	200.8
Lincoln	134.9	.....	28.3	21.3	85.3
Linn	116.5	29.6	0.5	7.0	79.4
Malheur	199.6	1.4	70.3	9.3	118.6
Marion	42.8	42.6	.....	0.2	.....
Morrow	93.8	.....	68.8	11.5	13.5
Multnomah	102.3	97.4	0.8	0.7	3.4
Polk	49.8	27.4	18.0	1.8	2.6
Sherman	63.9	.....	23.6	10.0	30.3
Tillamook	87.5	15.4	35.9	2.0	34.2
Umatilla	246.9	42.9	108.9	6.1	89.0
Union	87.1	8.8	63.0	13.8	1.5
Wallowa	73.7	.....	43.1	3.1	27.5
Wasco	146.9	22.7	18.3	12.9	93.0
Washington	44.5	44.4	0.1	.....	.....
Wheeler	139.6	.....	37.1	34.9	67.6
Yamhill	73.9	55.3	18.6	.....	.....
Totals	4,450.6	837.7	1,197.3	475.4	1,940.2

TABLE NO. 15

MILEAGES OF COUNTY ROADS

Except for concrete and bituminous pavements, the mileages here given are not represented to be more than roughly approximate, as accurate information is available in only a very few of the counties. Mileages of state highways are not included in these figures.

COUNTY	Total mileage county roads	Concrete pavement	Bituminous pavement	Rock and gravel surfacing	Planked roads	Improved earth roads	Unimproved earth roads
Baker	4,050	.....	.....	100	.....	750	3,200
Benton	448	.....	.....	230	5	70	143
Clackamas	1,330	.....	30	350	90	500	360
Clatsop	212	11	11	123	16	11	40
Columbia	732	.....	1	205	13	213	300
Coos	570	.....	.....	125	45	350	50
Crook	1,020	.....	.....	20	.....	100	900
Curry	146	.....	.....	18	.....	98	30
Deschutes	1,000	1	.....	630	25	200	144
Douglas	1,000	1	.....	500	.....	200	299
Gilliam	1,500	.....	.....	50	.....	500	950
Grant	819	.....	.....	3	.....	16	800
Harney	2,271	.....	.....	21	.....	115	2,135
Hood River	250	2	.....	107	.....	50	91
Jackson	1,200	.....	.....	480	.....	360	360
Jefferson	585	.....	.....	18	.....	10	557
Josephine	360	.....	.....	78	.....	126	156
Klamath	606	.....	.....	6	.....	150	450
Lake	1,803	.....	.....	13	.....	90	1,700
Lane	1,150	.....	.....	750	25	200	175
Lincoln	450	.....	.....	60	8	20	362
Linn	1,785	.....	.....	650	.....	550	585
Malheur	4,040	.....	.....	40	.....	500	3,500
Marion	1,200	.....	62	723	.....	250	165
Morrow	1,159	.....	.....	20	.....	39	1,100
Multnomah	417	8	32	255	.....	50	72
Polk	1,050	.....	2	400	.....	400	248
Sherman	550	.....	.....	9	.....	341	200
Tillamook	291	3	.....	156	17	75	40
Umatilla	3,563	.....	.....	63	.....	500	3,000
Union	1,250	.....	.....	50	.....	250	950
Wallowa	400	.....	.....	12	.....	20	368
Wasco	1,275	.....	5	70	.....	700	500
Washington	969	.....	.....	381	46	440	102
Wheeler	500	.....	.....	5	.....	10	485
Yamhill	1,225	10	.....	400	.....	650	165
Totals	41,176	36	143	7,121	290	8,904	24,682

TABLE NO. 16

STATE HIGHWAYS

NAMES, NUMBERS, LENGTHS AND MILEAGES OF DIFFERENT TYPES OF IMPROVEMENT

The mileages given in this table are inclusive of mileages within cities and towns.

No.	HIGHWAY NAME	Total Length in Miles	Classification as to Improvement			
			Miles Paved	Miles Surfaced with Rock or Gravel	Miles Graded to State Standards	Miles Not Graded to State Standards
1	Pacific	345.6	327.2	6.9	6.4	5.1
2	Columbia River	340.1	203.0	137.1	.....	.....
3	West Side	111.9	95.4	12.1	1.8	2.6
4	The Dalles-California	326.0	3.5	119.3	31.2	172.0
5	John Day	315.5	.....	128.1	58.5	128.9
6	Old Oregon Trail	193.3	10.2	166.3	14.8	2.0
7	Central Oregon	281.0	0.3	46.8	14.4	219.5
8	Oregon-Washington	145.3	39.1	64.5	20.8	20.9
9	Coast	409.0	59.1	64.1	15.5	270.3
10	La Grande-Joseph	73.0	2.3	48.4	16.9	5.4
11	Enterprise-Flora	35.0	.....	12.9	.....	22.1
12	Baker-Cornucopia	75.0	.....	21.4	17.9	35.7
13	Baker-Unity	44.8	.....	.....	.....	44.8
14	Shaniko-Mitchell	50.0	.....	.....	.....	50.0
15	McKenzie	112.6	0.6	53.3	14.9	43.8
16	Santiam	100.0	.....	.....	1.1	98.9
17	Bend-Sisters	16.9	.....	15.0	.....	1.9
18	Willamette	100.0	.....	.....	.....	100.0
19	Prineville-Lakeview	217.0	.....	26.0	34.4	156.6
20	Klamath Falls-Lakeview	94.0	.....	13.9	.....	80.1
21	Ashland-Klamath Falls	56.9	.....	10.7	22.0	24.2
22	Medford-Crater Lake	78.5	0.6	37.7	27.5	12.7
23	Klamath-Crater Lake	18.3	.....	1.2	12.7	4.4
24	The Rim	35.0	.....	.....	35.0	.....
25	Grants Pass-Crescent City	42.8	.....	2.4	.....	40.4
26	Mount Hood Loop	104.0	14.2	19.0	47.8	23.0
27	Alsea	63.0	.....	5.8	6.3	50.9
28	Pendleton-John Day	103.0	.....	.....	.....	103.0
29	Tualatin Valley	46.4	46.3	0.1	.....	.....
30	Salem-Dallas	15.1	15.1	.....	.....	.....
31	Mount Hood-Clear Lake	7.5	.....	.....	.....	7.5
32	McMinnville-Tillamook	48.7	12.6	36.1	.....	.....
33	Corvallis-Newport	58.4	0.5	33.3	13.7	10.9
34	Willamette Valley-Florence	69.0	.....	4.0	9.5	55.5
35	Coos Bay-Roseburg	61.6	.....	34.8	16.4	10.4
36	Pendleton-Cold Springs	30.0	.....	13.2	.....	16.8
37	Umatilla Cut-off	19.8	.....	.....	.....	19.8
38	Oregon Caves	20.4	.....	.....	11.2	9.2
39	Deschutes	0.5	.....	0.5	.....	.....
40	Bertha-Beaverton	5.4	5.4	.....	.....	.....
41	Ochoco	113.0	.....	53.7	14.7	44.6
42	Sherman	65.0	.....	8.7	10.0	46.3
43	Monmouth-Independence	2.3	2.3	.....	.....	.....
	Totals	4,450.6	837.7	1,197.3	475.4	1,940.2

STATE OF OREGON
SYSTEM OF STATE HIGHWAYS
1922
Scale of Miles
0 10 20 30 40
LEGEND
Improvements shown were completed or under contract Nov. 30, 1922
Paved
Rock or Gravel Surfaced
Graded
Unimproved
PACIFIC OCEAN
CALIFORNIA
NEVADA
IDAHO
CLATSOP
COLUMBIA
WASHINGTON
TILLAMOOK
YAMHILL
POLK
MARION
CLACKAMAS
HOOD RIVER
WASCO
SHERMAN
GILLIAM
MORROW
UMATILLA
UNION
WALLOWA
BAKER
GRANT
WHEELER
JEFFERSON
LINCOLN
BENTON
LINN
LANE
DOUGLAS
COOS
CURRY
JOSEPHINE
JACKSON
KLAMATH
LAKE
DESCHUTES
CROOK
HARNEY
MALHEUR
ASTORIA
PORTLAND
SALEM
ALBANY
CORVALLIS
EUGENE
ROSEBURG
MEDFORD
Ashland
Grants Pass
Marshfield
Hood River
The Dalles
PENDLETON
La Grande
BAKER
Huntington
Ontario
Vale
Burns
Bend
Prineville
Lakeview
Klamath Falls
Crater Lake
Walla Walla
Vancouver
Oregon City
Newport
Tillamook
Seaside
Florence
Bandon
Gold Beach
Brookings
Pacific Highway
Columbia River
Snake River
Malheur L.
Harney L.
Upper Klamath Lake
Goose L.
Summer Lake
Silver Lake
E. A. SHELLEY

TABLE NO. 17

MILEAGES OF CONSTRUCTION IN EACH COUNTY

PERIOD DECEMBER 1, 1920, TO NOVEMBER 30, 1922

This table shows the mileages of different classes of road improvement constructed on State Highways by the State of Oregon and by the State of Oregon cooperating with the Counties and with the Federal Government, during the two-year period from December 1, 1920, to November 30, 1922. It includes construction on all State Projects, Post Road Projects and such County Projects as were handled under the direct supervision of the State Highway Department. It does not include construction on Forest Road Projects handled by the Federal Government.

COUNTY	Mileages			
	Bituminous Pavement	Concrete Pavement	Gravel or Broken Stone Surfacing	Grading
Baker	.....	.....	59.58	65.43
Benton	5.88	7.95	7.76	2.64
Clackamas	0.22	9.31	5.94	26.50
Clatsop	14.32	0.33	14.68	4.01
Columbia	.....	.....	0.91	.....
Coos	.....	2.88	21.71	26.16
Crook	.....	.....	30.25	28.63
Curry	.....	.....	13.07	13.56
Deschutes	.....	.....	62.66	9.59
Douglas	54.89	15.67	26.38	33.81
Gilliam	.....	.....	42.48	31.15
Grant	.....	.....	12.81	25.98
Harney	.....	.....	11.46	26.98
Hood River	4.15	.....	0.50	18.91
Jackson	7.00	.....	31.25	37.32
Jefferson	.....	.....	15.55	21.82
Josephine	19.37	.....	13.10	9.85
Klamath	.....	.....	39.93	39.76
Lake	.....	.....	11.88	27.92
Lane	13.52	11.22	16.41	27.08
Lincoln	.....	.....	21.20	21.85
Linn	20.26	.....	1.33	0.60
Malheur	.....	.....	61.24	43.48
Marion	0.04	9.49	.....	.....
Morrow	.....	.....	37.05	24.17
Polk	8.53	.....	20.12	23.90
Sherman	.....	.....	30.90	21.14
Tillamook	6.23	.....	19.75	6.91
Umatilla	5.64	.....	50.77	38.47
Union	3.71	.....	56.97	47.49
Wallowa	.....	.....	29.62	28.90
Wasco	19.14	.....	24.15	21.62
Washington	10.30	0.40	.....	.....
Wheeler	.....	.....	20.13	22.53
Yamhill	7.52	18.34	19.50	7.51
Totals	200.72	75.59	831.04	785.67

TABLE NO. 18

COUNTY ROAD CONSTRUCTION—1921 AND 1922

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.

COUNTY	1921				1922			
	Concrete pavement	Bituminous pavement	Broken stone or gravel surfacing	Grading	Concrete pavement	Bituminous pavement	Broken stone or gravel surfacing	Grading
Baker	*	*	*	*	*	*	*	*
Benton			8.5	2.8			7.8	4.5
Clackamas	*	*	*	*	*	*	*	*
Clatsop	2.0		3.0	6.0	2.3		7.0	10.0
Columbia			21.8	20.6			18.5	13.6
Coos	*	*	*	*	*	*	*	*
Crook			8.0	20.0			5.0	22.0
Curry			6.0				8.0	
Deschutes	*	*	*	*	*	*	*	*
Douglas			35.0	25.0	0.8		130.0	150.0
Gilliam	*	*	*	*	*	*	*	*
Grant				8.0			2.5	12.0
Harney				19.5			2.5	12.0
Hood River	1.2		35.0	2.0	0.8		44.0	2.5
Jackson			30.0	25.0			30.0	40.0
Jefferson			7.9				8.1	12.0
Josephine			9.0	8.0			6.0	5.0
Klamath								2.0
Lake				5.0			4.0	5.0
Lane	*	*	*	*	*	*	*	*
Lincoln			2.0	2.0			2.0	2.0
Linn	*	*	*	*	*	*	*	*
Malheur			14.0					
Marion		20.0	50.0	30.0		23.0	60.0	40.0
Morrow			7.0	9.0			9.0	11.0
Multnomah	0.9				1.3		10.0	6.0
Polk	*	*	*	*	*	*	*	*
Sherman			0.5				6.5	1.0
Tillamook	0.5			1.0	0.5		0.5	3.5
Umatilla			28.0	2.0			35.0	5.0
Union	*	*	*	*	*	*	*	*
Wallowa			4.0	7.0			6.0	20.0
Wasco			8.0	8.0			7.0	7.0
Wheeler			2.0	8.0			3.0	2.0
Washington		2.9	54.0	11.0		2.0	38.0	8.0
Yamhill	*	*	*	*	*	*	*	*
Totals	4.6	22.9	333.7	219.9	5.7	25.0	450.4	396.1

* Data not available.

TABLE NO. 19

MILEAGES OF COUNTY ROAD CONSTRUCTED UNDER MARKET ROAD ACT

Years 1920, 1921 and 1922

COUNTY	Miles of paving	Rock or gravel surfacing		Grading	
		Width 16 feet or greater	Width less than 16 feet	Width 16 feet or greater	Width less than 16 feet
Baker	.....	.....	4.3	9.6	3.4
Benton	.....	2.5	1.3	16.8	.....
Clackamas	.....	25.7	.....	25.7	.....
Clatsop	8.3	.....	.....	8.7	.....
Columbia	.....	10.9	.....	8.0	.....
Coos	.....	.....	11.0	20.0	.....
Crook	.....	.....	7.0	21.9	.....
Curry	.....	.....	.....	3.5	.....
Deschutes	.....	.....	6.5	14.5	.....
Douglas	.....	.....	45.8	25.6	2.1
Gilliam	.....	.....	2.8	4.8	.....
Grant	.....	.....	.....	.....	12.8
Harney	.....	.....	.....	14.7	8.8
Hood River	2.5	.....	.....	2.5	.....
Jackson	.....	.....	24.8	24.0	0.8
Jefferson	.....	.....	14.5	15.6	.....
Josephine	.....	.....	9.7	9.7	.....
Klamath	.....	.....	2.5	28.0	.....
Lake	.....	.....	2.0	6.9	.....
Lane	.....	5.3	19.9	26.0	.....
Lincoln	.....	.....	8.0	10.6	.....
Linn	.....	0.4	40.1	41.5	.....
Malheur	.....	.....	20.0	20.0	.....
Marion	28.7	.....	.....	25.6	.....
Morrow	.....	5.7	.....	9.7	.....
Multnomah	7.1	16.4	8.0	13.3	.....
Polk	1.3	.....	18.0	11.0	.....
Sherman	.....	2.5	7.4	9.9	.....
Tillamook	.....	.....	3.7	3.7	.....
Umatilla	.....	20.6	17.4	47.0	.....
Union	.....	.....	17.4	19.9	.....
Wallowa	.....	0.8	3.6	11.4	.....
Wasco	.....	.....	18.8	18.8	.....
Washington	0.5	5.2	28.5	14.7	.....
Wheeler	.....	.....	4.0	3.3	.....
Yamhill	.....	.....	19.3	20.8	.....
Totals	48.4	96.0	366.3	567.7	27.9

TABLE NO. 20

APPORTIONMENT OF 1921 STATE MARKET ROAD FUNDS

COUNTY	Amount of state tax collected in county	County's pro rata share of Multnomah county surplus	County's minimum share, if matched	County market road levy	Final Apportionment		
					Total	Paid to county in cash	Paid to county in engineering service
Baker	$ 24,099.23	$ 9,364.30	$ 33,463.53	$ 33,202.52	$ 33,202.52	$ 33,126.64	$ 75.87
Benton	13,063.70	5,076.18	18,139.88	16,990.50	16,990.50	16,990.50	.....
Clackamas	35,596.39	13,831.78	49,428.17	35,628.81	35,628.81	35,419.06	209.75
Clatsop	31,700.78	12,318.05	44,018.83	44,986.98	44,986.98	44,986.98	.....
Columbia	15,338.68	5,960.19	21,298.87	41,808.56	41,808.56	41,805.59	2.97
Coos	23,799.66	9,247.89	33,047.55	24,459.41	24,459.41	24,459.41	.....
Crook	6,200.15	2,409.21	8,609.36	9,993.55	9,993.55	9,699.57	293.99
Curry	3,937.48	1,530.00	5,467.48	5,418.96	5,418.96	4,861.99	556.97
Deschutes	10,885.50	4,229.81	15,115.31	10,856.50	10,856.50	9,860.73	995.77
Douglas	28,679.53	11,144.07	39,823.60	34,173.39	34,173.39	34,173.39	.....
Gilliam	11,798.80	4,584.69	16,383.49	17,784.61	17,784.61	16,200.65	1,583.96
Grant	8,616.69	3,348.21	11,964.90	13,475.84	13,475.84	13,475.84	.....
Harney	11,686.67	4,541.12	16,227.79	19,320.55	19,320.55	18,993.97	326.58
Hood River	10,283.48	3,995.88	14,279.36	15,929.40	15,929.40	15,907.09	22.31
Jackson	29,613.84	11,507.12	41,120.96	41,020.76	41,020.76	36,212.57	4,808.19
Jefferson	5,749.27	2,234.00	7,983.27	7,792.56	7,792.56	7,632.01	160.55
Josephine	8,201.18	3,186.75	11,387.93	12,276.32	12,276.32	11,614.66	661.66
Klamath	17,880.07	6,947.70	24,827.77	21,038.87	21,038.87	18,806.86	2,232.01
Lake	11,535.72	4,482.46	16,018.18	12,027.32	12,027.32	9,793.91	2,233.41
Lane	41,076.34	15,961.14	57,037.48	56,145.97	56,145.97	56,145.97	.....
Lincoln	8,206.03	3,188.64	11,394.67	11,000.22	11,000.22	11,000.22	.....
Linn	31,604.57	12,280.67	43,885.24	45,359.97	45,359.97	45,359.97	.....
Malheur	17,850.94	6,936.38	24,787.32	24,328.09	24,328.09	20,296.53	4,031.56
Marion	43,157.48	16,769.81	59,927.29	62,673.91	62,673.91	62,673.91	.....
Morrow	11,491.99	4,465.47	15,957.46	15,251.03	15,251.03	14,803.06	447.97
Multnomah	366,221.64	.....	104,083.90	104,083.90	104,083.90	104,083.90	.....
Polk	18,228.22	7,082.99	25,311.21	25,500.00	25,500.00	24,895.48	604.52
Sherman	13,579.29	5,276.54	18,855.83	19,618.91	19,618.91	19,338.91	280.00
Tillamook	17,206.10	6,685.82	23,891.92	27,372.71	27,372.71	27,360.94	11.77
Umatilla	47,484.11	18,451.01	65,935.12	66,113.94	66,113.94	66,113.94	.....
Union	22,396.21	8,702.55	31,098.76	30,822.83	30,822.83	29,093.52	1,729.31
Wallowa	14,896.88	5,788.52	20,685.40	17,528.65	17,528.65	17,528.65	.....
Wasco	17,576.32	6,829.67	24,405.99	26,205.24	26,205.24	26,205.24	.....
Washington	31,282.59	12,155.55	43,438.14	41,934.48	41,934.48	40,957.87	976.61
Wheeler	5,449.52	2,117.53	7,567.05	6,574.60	6,574.60	4,662.57	1,912.03
Yamhill	24,464.00	9,506.04	33,970.04	21,862.75	21,862.75	19,796.90	2,065.85
Totals	$1,040,839.05	$ 262,137.74	$1,040,839.05	$1,020,562.61	$1,020,562.61	$ 994,339.00	$ 26,223.61

TABLE NO. 21

APPORTIONMENT OF 1922 STATE MARKET ROAD FUNDS

COUNTY	Paid into state market road appropriation	Pro rata share of surplus funds	Proportionate share of funds	County levy for 1922	Final Apportionment			
					State funds apportioned in 1922	State funds paid to county treasurer	State expenditures for engineering	Balance to be paid to county in cash
Baker	$ 22,303.21	$ 8,620.29	$ 30,923.50	$ 33,682.53	$ 30,923.50	$ 15,461.75	$ 1,778.39	$ 13,683.36
Benton	14,809.65	5,723.99	20,533.64	18,177.77	18,177.77	9,088.88	.....	9,088.89
Clackamas	38,722.85	14,966.55	53,689.40	49,423.58	49,423.58	24,711.79	5.53	24,706.26
Clatsop	30,882.21	11,936.11	42,818.32	43,032.16	42,818.32	21,409.16	16.68	21,392.48
Columbia	15,674.77	6,058.37	21,733.14	34,981.19	21,733.14	10,866.57	.....	10,866.57
Coos	23,217.28	8,973.58	32,190.86	34,282.21	32,190.86	16,095.43	.....	16,095.43
Crook	6,003.49	2,320.37	8,323.86	14,645.92	8,323.86	4,161.93	1,121.68	3,040.25
Curry	3,888.38	1,502.87	5,391.25	5,557.26	5,391.25	2,695.63	168.57	2,527.05
Deschutes	11,116.69	4,296.64	15,413.31	15,507.28	15,413.31	7,706.65	81.68	7,624.98
Douglas	28,532.48	11,027.93	39,560.42	50,373.49	39,560.42	19,780.21	.....	19,780.21
Gilliam	11,099.51	4,290.01	15,389.52	15,269.56	15,269.56	7,634.78	1,697.57	5,937.21
Grant	8,225.08	3,179.03	11,404.11	17,098.55	11,404.11	5,702.06	3.82	5,698.23
Harney	11,664.63	4,508.43	16,173.06	17,651.70	16,173.06	8,086.53	3,789.70	4,296.83
Hood River	10,220.55	3,950.33	14,170.89	17,415.36	14,170.89	7,085.44	849.92	6,235.53
Jackson	27,841.13	10,760.72	38,601.85	44,258.90	38,601.85	19,300.93	7,263.63	12,037.29
Jefferson	5,820.73	2,249.74	8,070.47	8,096.54	8,070.47	4,035.23	80.72	3,954.52
Josephine	7,915.48	3,059.37	10,974.85	12,341.21	10,974.85	5,487.43	685.51	4,801.91
Klamath	18,422.98	7,120.56	25,543.54	30,751.26	25,543.54	12,771.77	2,535.96	10,235.81
Lake	11,249.75	4,348.08	15,597.83	15,648.22	15,597.83	7,798.91	1,176.76	6,622.16
Lane	40,637.04	15,706.39	56,343.43	57,395.06	56,343.43	28,171.72	.....	28,171.71
Lincoln	7,924.22	3,062.74	10,986.95	11,022.45	10,986.95	5,493.47	7.50	5,485.98
Linn	32,510.39	12,565.41	45,075.80	43,829.97	43,829.97	21,914.99	.....	21,914.98
Malheur	17,272.66	6,675.96	23,948.62	24,501.21	23,948.62	11,974.31	1,137.59	10,836.72
Marion	43,708.75	16,893.64	60,602.44	63,136.58	60,602.44	30,301.22	.....	30,301.22
Morrow	11,650.78	4,503.08	16,153.86	16,027.95	16,027.95	8,013.97	4,733.63	3,280.35
Multnomah	348,014.13	.....	103,647.38	103,647.38	103,647.38	51,823.69	.....	51,823.69
Polk	19,076.60	7,373.19	26,449.79	33,533.53	26,449.79	13,224.90	4,285.53	8,939.36
Sherman	12,217.60	4,722.15	16,939.75	25,771.84	16,939.75	8,469.87	11.06	8,458.82
Tillamook	17,578.05	6,793.99	24,372.04	30,000.00	24,372.04	12,186.02	.....	12,186.02
Umatilla	48,848.54	18,880.17	67,728.71	66,006.14	66,006.14	33,003.07	.....	33,003.07
Union	21,602.50	8,349.46	29,951.96	31,435.58	29,951.96	14,975.98	575.99	14,399.99
Wallowa	14,388.02	5,561.03	19,949.05	17,869.19	17,869.19	8,934.60	36.54	8,898.05
Wasco	17,798.06	6,879.03	24,677.09	29,980.21	24,677.09	12,338.54	5.00	12,333.55
Washington	30,940.51	11,958.64	42,899.15	46,348.32	42,899.15	21,449.58	2,711.52	18,738.05
Wheeler	5,219.41	2,017.32	7,236.73	9,095.09	7,236.73	3,618.36	776.22	2,842.15
Yamhill	23,806.05	9,201.14	33,007.19	43,666.56	33,007.19	16,503.60	2,774.45	13,729.14
Totals	$1,020,804.20	$ 260,036.31	$1,036,473.76	$1,131,461.75	$1,024,557.94	$ 512,278.97	$ 38,311.15	$ 473,967.82

TABLE NO. 22

SUMMARY OF EXPENDITURES BY COUNTIES IN CONNECTION WITH MARKET ROAD WORK, YEAR 1920

COUNTY	County Market Road Tax		State Aid			Total cash available for county expenditures	Amount expended by county	Balance in county treasury at end of 1920
	Amount levied	Amount collected	Total amount apportioned	Deducted by state for engineering	Total cash paid to county			
Baker	$ 26,760.38	$ 24,472.36	$ 33,042.66	$ 77.39	$ 32,965.27	$ 57,437.63	$ 33,311.51	$ 24,126.12
Benton	11,054.02	11,225.84	17,061.33	.....	17,061.33	28,287.17	10,783.75	17,503.42
Clackamas	36,623.86	36,445.56	47,601.79	3,320.35	44,281.44	80,727.00	22,456.07	58,270.93
Clatsop	41,381.11	40,000.00	40,148.59	.....	40,148.59	80,148.59	88,960.49	.....
Columbia	26,919.34	25,405.40	20,433.77	21.29	20,412.48	45,817.88	3,205.82	42,612.06
Coos	23,545.54	23,613.86	31,149.76	.....	31,149.76	54,763.62	51,132.52	3,631.10
Crook	9,968.59	6,977.80	8,477.15	184.95	8,292.20	15,270.00	3,753.00	11,517.00
Curry	4,868.68	4,852.15	5,304.40	852.52	4,451.88	9,304.03	10,038.16	.....
Deschutes	8,887.27	10,894.24	14,190.06	953.23	13,236.83	24,131.07	25,084.39	.....
Douglas	28,005.94	26,572.90	37,050.68	.....	37,050.68	63,623.58	22,801.31	40,822.27
Gilliam	22,493.89	18,175.07	14,735.79	676.54	14,059.25	32,234.32	2,643.73	29,590.59
Grant	16,674.66	23,282.58	11,189.79	12.22	11,177.57	34,460.15	18,797.25	15,662.90
Harney	12,883.07	6,747.09	15,907.50	1,000.75	14,906.75	21,653.84	13,269.30	8,384.54
Hood River	12,972.03	9,777.04	13,764.65	715.72	13,048.93	22,825.97	16,451.48	6,374.49
Jackson	55,051.78	62,126.42	41,114.37	4,240.79	36,873.58	99,000.00	99,000.00	.....
Jefferson	5,171.76	4,664.81	7,368.33	210.40	7,157.93	11,822.74	9,467.95	2,354.79
Josephine	35,270.80	46,341.32	11,327.61	3,666.47	7,661.14	54,002.46	54,002.46	.....
Klamath	17,703.16	17,703.16	23,420.53	.....	23,420.53	41,123.69	15,218.08	25,905.61
Lake	12,323.32	12,027.32	15,633.24	1,525.97	14,107.27	26,134.59	9,543.50	16,591.09
Lane	35,021.63	33,580.84	55,918.09	.....	55,918.09	89,498.93	58,423.96	31,074.97
Lincoln	9,357.68	10,316.51	10,316.51	.....	10,316.51	20,633.02	13,590.13	7,042.89
Linn	35,873.23	29,446.84	42,656.82	.....	42,656.82	72,103.66	43,892.77	28,210.89
Malheur	13,709.79	13,106.27	20,813.50	1,807.24	19,006.26	32,112.53	14,883.97	17,228.56
Marion	84,584.28	72,036.22	58,455.99	.....	58,455.99	130,492.21	130,492.21	.....
Morrow	14,046.73	12,600.00	15,672.61	784.62	14,887.99	27,487.99	5,812.80	21,675.19
Multnomah	100,000.00	100,583.30	99,043.55	.....	99,043.55	199,626.85	261,978.43	.....
Polk	23,867.00	23,867.00	24,482.14	.....	24,482.14	48,349.14	2,983.68	45,365.46
Sherman	20,882.39	18,668.16	15,414.52	134.19	15,280.33	33,948.49	29,802.88	4,145.61
Tillamook	30,079.16	13,955.97	22,696.60	.....	22,696.60	36,652.57	18,729.00	17,923.57
Umatilla	49,240.06	49,000.00	62,465.43	.....	62,465.43	111,465.43	111,465.43	.....
Union	25,938.93	24,691.95	29,655.90	488.18	29,167.72	53,859.67	52,333.00	1,526.67
Wallowa	17,472.15	10,000.00	19,975.85	29.95	19,945.90	29,945.90	28,292.08	1,653.82
Wasco	18,297.39	24,453.50	23,211.89	.....	23,211.88	47,665.38	29,298.29	18,367.09
Washington	34,987.21	33,086.02	41,253.66	1,446.87	39,806.79	72,892.81	53,263.49	19,629.32
Wheeler	6,390.25	4,768.92	7,305.95	234.98	7,070.97	11,839.89	1,879.68	9,960.21
Yamhill	31,267.70	17,444.32	32,174.46	6,251.15	25,923.31	43,367.63	39,210.01	4,157.62
Totals	$ 959,574.78	$ 902,910.74	$990,435.47	$ 28,635.77	$ 961,799.69	$1,864,710.43	$1,406,252.58	$ 531,308.78

TABLE NO. 23

SUMMARY OF RECEIPTS AND EXPENDITURES BY COUNTIES IN CONNECTION WITH MARKET ROAD WORK, YEAR 1921

COUNTY	County Market Road Tax		State Aid			Total cash market road incomes for year	Balance carried over from previous year	Amount expended by county	Balance in county treasury at end of 1921
	Amount levied	Amount collected	Total amount apportioned	Deducted by state for engineering	Total cash paid to county				
Baker	$ 33,202.52	$ 32,114.83	$ 33,202.52	$ 75.87	$ 33,126.64	$ 65,241.47	$ 24,126.12	$ 57,879.84	$ 31,487.75
Benton	16,990.50	17,056.88	16,990.50	.....	16,990.50	34,047.38	17,503.42	59,804.38	.....
Clackamas	35,628.81	34,805.21	35,628.81	209.75	35,419.06	70,224.27	58,270.93	105,195.04	23,300.16
Clatsop	44,986.98	44,986.98	44,986.98	.....	44,986.98	89,973.96	.....	95,952.18	.....
Columbia	41,808.56	41,632.97	41,808.56	2.97	41,805.59	83,438.56	42,612.06	115,543.95	10,506.59
Coos	24,459.41	24,469.47	24,459.41	.....	24,459.41	48,928.88	3,631.10	62,188.62	.....
Crook	9,993.55	8,909.34	9,993.55	293.99	9,699.56	18,608.90	11,517.00	38,511.00	.....
Curry	5,418.96	4,990.77	5,418.96	556.97	4,861.99	9,852.76	.....	7,897.05	1,955.71
Deschutes	10,856.50	8,682.55	10,856.50	995.77	9,860.73	18,543.28	.....	11,937.91	6,605.37
Douglas	34,173.39	33,498.88	34,173.39	.....	34,173.39	67,672.27	40,822.27	84,621.97	23,872.57
Gilliam	17,784.61	17,119.18	17,784.61	1,583.96	16,200.65	33,319.83	29,590.59	30,191.68	31,633.23
Grant	13,475.84	12,752.53	13,475.84	.....	13,475.84	26,228.37	15,662.90	34,076.49	16,046.56
Harney	19,320.55	14,670.58	19,320.55	326.58	18,993.97	33,664.55	8,384.54	23,389.80	18,659.29
Hood River	15,929.40	16,000.00	15,929.40	22.31	15,907.09	31,907.09	6,374.49	45,246.71	.....
Jackson	41,020.76	40,967.55	41,020.76	4,808.19	36,212.57	77,180.12	.....	87,000.00	.....
Jefferson	7,792.56	8,394.77	7,792.56	160.55	7,632.01	16,026.78	2,354.79	20,991.01	.....
Josephine	12,276.32	12,276.32	12,276.32	661.66	11,614.66	23,890.98	.....	26,257.07	.....
Klamath	21,038.87	17,407.14	21,038.87	2,232.01	18,806.86	36,214.00	25,905.61	49,285.63	12,833.98
Lake	12,027.32	27,523.65	12,027.32	2,233.41	9,793.91	37,317.56	16,591.09	49,849.29	4,059.36
Lane	56,145.97	61,283.82	56,145.97	.....	56,145.97	117,429.79	31,074.97	120,579.91	27,924.85
Lincoln	11,000.22	11,000.21	11,000.22	.....	11,000.22	22,000.43	7,042.89	25,155.18	4,888.14
Linn	45,359.97	41,569.57	45,359.97	.....	45,359.97	86,929.54	28,210.89	104,670.55	10,469.88
Malheur	24,328.09	18,265.41	24,328.09	4,031.56	20,296.53	38,561.94	17,228.56	55,790.50	.....
Marion	62,673.91	62,673.91	62,673.91	.....	62,673.91	125,347.82	.....	132,515.28	.....
Morrow	15,251.03	20,848.11	15,251.03	447.97	14,803.06	35,651.17	21,675.19	41,834.50	15,491.86
Multnomah	104,083.90	113,426.52	104,083.90	.....	104,083.90	217,510.42	.....	217,510.42	.....
Polk	25,500.00	25,905.95	25,500.00	604.52	24,895.48	50,801.43	45,365.46	105,523.52	.....
Sherman	19,618.91	18,840.41	19,618.91	280.00	19,338.91	38,179.32	4,145.61	40,190.16	2,134.77
Tillamook	27,372.71	25,538.82	27,372.71	11.77	27,360.94	52,899.76	17,923.57	72,057.45	.....
Umatilla	66,113.94	66,113.94	66,113.94	.....	66,113.94	132,227.88	.....	132,227.88	.....
Union	30,822.83	31,592.84	30,822.83	1,729.31	29,093.52	60,686.36	1,526.67	62,213.03	.....
Wallowa	17,528.65	25,997.53	17,528.65	.....	17,528.65	43,526.18	1,653.82	46,513.62	.....
Wasco	26,205.24	41,648.56	26,205.24	.....	26,205.24	67,853.80	18,367.09	61,362.87	24,858.02
Washington	41,934.48	53,179.95	41,934.48	976.61	40,957.87	94,137.82	19,629.32	113,400.39	366.75
Wheeler	6,574.60	5,080.83	6,574.60	1,912.03	4,662.57	9,743.40	9,960.21	14,044.45	5,659.16
Yamhill	21,862.75	20,638.55	21,862.75	2,065.85	19,796.90	40,435.45	4,157.62	37,117.06	7,476.01
Totals	$1,020,562.61	$1,061,864.53	$1,020,562.61	$ 26,223.61	$ 994,339.00	$2,056,203.52	$ 531,308.78	$2,388,526.39	$ 280,230.01

TABLE NO. 24

SUMMARY OF RECEIPTS AND EXPENDITURES BY COUNTIES IN CONNECTION WITH MARKET ROAD WORK, YEAR 1922

COUNTY	County Market Road Tax		State Aid			Total cash market road income for year	Balance carried over from previous year	Amount expended by county	Balance in county treasury at end of 1922	Balance to be paid county by state
	Amount levied	Amount collected	Total amount apportioned	Deducted by state for engineering	Total cash paid to county					
Baker	$ 33,682.52	$ 30,330.42	$ 30,923.50	$ 1,778.39	$ 15,461.75	$ 45,792.17	$ 31,487.75	$ 26,723.93	$ 50,555.99	$ 13,683.36
Benton	18,177.77	16,092.91	18,177.77	.....	9,088.88	25,181.79	.....	21,635.86	3,545.93	9,088.89
Clackamas	49,423.58	46,552.98	49,423.58	5.53	24,711.79	71,264.77	23,300.16	121,629.13	.....	24,706.26
Clatsop	43,032.16	43,000.00	42,818 32	16.68	21,409.16	64,409.16	.....	86,000.00	.....	21,392.48
Columbia	34,981.19	30,000.00	21,733.14	.....	10,866.57	40,866.57	10,506.59	46,000.00	5,373.16	10,866.57
Coos	34,282.21	24,278.02	32,190.86	.....	16,095.43	50,373.45	.....	74,274.60	.....	16,095.43
Crook	14,645.92	11,347.64	8,323.86	1,121.68	4,161.93	15,509.57	.....	9,959.75	5,549.82	3,040.25
Curry	5,557.26	4,828.42	5,391.25	168.57	2,695.63	7,524.05	1,955.71	7,113.55	2,266.21	2,527.05
Deschutes	15,507.28	7,706.65	15,413.31	81.68	7,706.65	15,413.30	6,605.37	12,726.24	11,446.51	7,624.98
Douglas	50,373.49	45,000.00	39,560.42	.....	19,780.21	64,780.21	23,872.57	75,000.00	13,652.78	19,780.21
Gilliam	15,269.56	14,475.35	15,269.56	1,697.57	7,634.78	22,110.13	31,633.23	8,663.28	45,080.08	5,937.21
Grant	17,098.55	25,436.88	11,404.11	3.82	5,702.06	31,138.94	16,046.56	32,845.02	6,108.70	5,698.23
Harney	17,651.70	12,123.02	16,173.06	3,789.70	8,086.53	20,209.55	18,659.29	16,271.33	22,597.51	4,296.85
Hood River	17,415.36	16,992.53	14,170.89	849.92	7,085.44	24,077.97	.....	27,498.84	.....	6,235.53
Jackson	44,258.90	40,000.00	38,601.85	7,263.63	19,300.93	59,300.93	.....	60,000.00	.....	12,037.29
Jefferson	8,096.54	5,779.88	8,070.47	80.72	4,035.23	9,815.11	.....	12,805.13	.....	3,954.52
Josephine	12,341.21	12,276.00	10,974 85	685.51	5,487.43	17,763.43	.....	13,766.93	3,996.50	4,801.91
Klamath	30,751.26	24,122.71	25,543.54	2,535.96	12,771.77	36,894.48	12,833.98	23,837.07	25,891.39	10,235.81
Lake	15,648.22	13,129.45	15,597.83	1,176.76	7,798.91	20,928.36	4,059.36	23,563.91	1,423.81	6,622.16
Lane	57,395.06	39,884.10	56,343.43	.....	28,171.72	68,055.82	27,924.85	102,141.09	.....	28,171.71
Lincoln	11,022.45	11,000.00	10,986.95	7.50	5,493.47	16,493.47	4,888.14	19,500.00	881.61	5,485.98
Linn	43,829.97	41,684.17	43,829.97	.....	21,914.99	63,599.16	10,469.88	55,784.94	18,284.10	21,914.98
Malheur	24,501.21	19,719.41	23,948.62	1,137.59	11,974.31	31,693.72	.....	34,392.16	.....	10,836.72
Marion	63,136.58	127,840.85	60,602.44	.....	30,301.22	158,142.07	.....	158,142.07	.....	30,301.22
Morrow	16,027.95	11,389.30	16,027.95	4,733.63	8,013.97	19,403.27	15,491.86	43,929.45	.....	3,280.35
Multnomah	103,647.38	63,065.40	103,647.38	.....	51,823.69	114,889.09	.....	208,052.28	.....	51,823.69
Polk	33,533.53	19,194.90	26,449.79	4,285.53	13,224.90	32,419.80	.....	34,205.30	.....	8,939.36
Sherman	25,771.84	23,500.00	16,939.75	11.06	8,469.87	31,969.87	2,134.77	33,410.54	694.10	8,458.82
Tillamook	30,000.00	25,489.84	24,372.04	.....	12,186.02	37,675.86	.....	32,319.96	5,355.90	12,186.02
Umatilla	66,006.14	33,003.07	66,006.14	.....	33,003.07	66,006.14	.....	81,516.65	.....	33,003.07
Union	31,435.58	28,851.03	29,951.96	575.99	14,975.98	43,827.01	.....	58,316.76	.....	14,399.99
Wallowa	17,869.19	12,937.08	17,869.19	36.54	8,934.60	21,871.68	.....	22,801.48	.....	8,898.05
Wasco	29,980.21	23,327.65	24,677.09	5.00	12,338.54	35,666.19	24,858.02	62,832.36	.....	12,333.55
Washington	46,348.32	42,270.03	42,899.15	2,711.52	21,449.58	63,719.61	366.75	66,797.46	.....	18,738.05
Wheeler	9,095.09	6,868.04	7,236.73	776.22	3,618.36	10,486.40	5,659.16	5,706.35	10,439.21	2,842.15
Yamhill	43,666.56	40,447.15	33,007.19	2,774.45	16,503.60	56,950.75	7,476.01	72,977.29	.....	13,729.14
Totals	$1,131,461.74	$1,003,944.88	$1,024,557.94	$38,311.15	$512,278.97	$1,516,223.85	$280,230.01	$1,793,140.71	$233,143.31	$473,967.82

TABLE NO. 25

MILEAGES OF CONSTRUCTION DETAILED BY JOBS

This table shows in detail the mileage of different classes of road improvement constructed by the State of Oregon, and by the State of Oregon cooperating with the Counties and with the Federal Government, during the two-year period from December 1, 1920, to November 30, 1922. It includes construction under all State Projects, Post Road Projects and such County Projects as were handled under the direct supervision of the State Highway Department. It does not include construction under Forest Road Projects handled by the Federal Government.

COUNTY AND SECTION	MILEAGES			
	Bituminous Pavement	Concrete Pavement	Gravel or Broken Stone Surfacing	Grading
Baker County:				
North Powder-Haines	.....	.....	8.09	7.09
Haines-Baker	.....	.....	9.40	.....
Baker-Nelson	.....	.....	18.00	25.00
Nelson-Huntington	.....	.....	.....	19.29
Nelson-Malheur County Line	.....	.....	24.09	4.85
Love Bridge-Balck Bridge	.....	.....	.....	9.20
Totals for Baker County	.....	.....	59.58	65.43
Benton County:				
Wren-Blodgett	.....	.....	4.87	.....
Blodgett-Lincoln County Line	.....	.....	2.50	.....
Monroe, North	2.78	.....	.....	2.64
Monroe-Lane County Line	3.10	.....	.....	.....
Corvallis, South	.....	7.95	.39	.....
Totals for Benton County	5.88	7.95	7.76	2.64
Clackamas County:				
Multnomah County Line-Bolton	.10	5.71	.....	.81
Bolton-Oregon City	.....	.....	.....	.24
Canby-Aurora	.12	3.60	1.04	1.25
Multnomah County Line-Sandy	.....	.....	1.40	11.86
Sandy-Cherryville	.....	.....	3.20	7.57
Cherryville-Forest Boundary	.....	.....	.30	4.77
Totals for Clackamas Co.	.22	9.31	5.94	26.50
Clatsop County:				
Youngs Bay Bridge and Approaches	.35	.33	.....	.....
Miles Crossing-Skipanon	4.02	.....	4.01	4.01
Skipanon-Seaside	9.95	.....	.....	.....
Hamlet Junction-Tillamook County Line	.....	.....	10.67	.....
Totals for Clatsop County	14.32	.33	14.68	4.01
Columbia County:				
Rainier City	.....	.....	.91	.....
Total for Columbia County	.....	.....	.91	.....
Coos County:				
North Bend-Marshfield	.....	.31	.....	.31
Marshfield-Cedar Point	.....	2.25	.....	3.18
Cedar Point-Coquille	.....	.....	.....	.....
Coquille City	.....	.32	.....	.....
Coquille-Bandon	.....	.....	.....	.14
Coquille-Myrtle Point	.....	.....	5.20	1.78
Myrtle Point-Remote	.....	.....	9.68	17.98
Remote-Douglas County Line	.....	.....	6.83	2.77
Totals for Coos County	.....	2.88	21.71	26.16

TABLE NO. 25—Continued

COUNTY AND SECTION	MILEAGES			
	Bituminous Pavement	Concrete Pavement	Gravel or Broken Stone Surfacing	Grading
Crook County:				
Prineville-Davis Ranch	.....	.....	4.23	2.93
Deschutes County Line-Prineville	.....	.....	15.15	8.65
Prineville-Ochoco Forest Boundary	.....	.....	10.87	17.05
Totals for Crook County	.....	.....	30.25	28.63
Curry County:				
Denmark-Sixes River	.....	.....	4.97	4.97
Sixes River-Elk River	.....	.....	.....	1.90
Port Orford-Hubbard Creek	.....	.....	1.43	1.60
Hubbard Creek-Brush Creek	.....	.....	6.67	1.82
Brush Creek-Mussels Creek	.....	.....	.....	.79
Hunters Head Section	.....	.....	.....	2.48
Totals for Curry County	.....	.....	13.07	13.56
Deschutes County:				
Trail Crossing-Bend	.....	.....	17.62	.26
Unit 2, Allen Ranch-Klamath County Line	.....	.....	.....	9.33
Sisters-Cline Falls	.....	.....	15.81	.....
Redmond-Crook County Line	.....	.....	3.59	.....
Sisters-Tumalo	.....	.....	14.87	.....
Bend-Horse Ridge	.....	.....	10.77	.....
Totals for Deschutes County	.....	.....	62.66	9.59
Douglas County:				
Lane County Line-Drain	12.50	.....	.13	.13
Drain-Yoncalla	9.03	.....	1.69	.52
Yoncalla-Oakland	.42	.....	.....	.....
Oakland City	.48	.....	.....	.....
Oakland South	1.13	.....	.....	.....
Oakland-Wilbur	5.58	.....	.....	.....
Wilbur-Roseburg	.....	5.26	3.65	.....
Roseburg-Dillard	6.22	.....	.....	.....
Myrtle Creek-Canyonville	.....	10.41	10.13	9.76
Canyonville-Galesville	9.90	.....	.....	.....
Galesville-Josephine County Line	9.63	.....	.....	.....
Winston-Camas Mountain	.....	.....	4.66	11.00
Camas Mountain-Camas Valley	.....	.....	1.88	6.10
Camas Valley-Coos County Line	.....	.....	4.24	6.30
Totals for Douglas County	54.89	15.67	26.38	33.81
Gilliam County:				
John Day River-Blalock	.....	.....	14.95	.....
Arlington-Shutler	.....	.....	4.00	7.12
Shutler-Base Line	.....	.....	8.05	8.05
Condon North	.....	.....	6.57	6.57
Mayville-Thirty-mile Creek	.....	.....	6.91	2.41
Heppner Junction-Morrow County Line	.....	.....	2.00	7.00
Totals for Gilliam County	.....	.....	42.48	31.15
Grant County:				
Fossil-Sarvice Creek	.....	.....	.....	.....
Unit 3, Sarvice Creek-Valades Ranch	.....	.....	11.36	8.36
Unit 4, Sarvice Creek-Valades Ranch	.....	.....	.....	4.42
Valades Ranch-Cummins Creek	.....	.....	.....	13.20
Cole Bridge-Danby Ranch	.....	.....	1.45	.....
Totals for Grant County	.....	.....	12.81	25.98

TABLE NO. 25—Continued

COUNTY AND SECTION	MILEAGES			
	Bituminous Pavement	Concrete Pavement	Gravel or Broken Stone Surfacing	Grading
Harney County:				
Sage Hen Summit-Burns	.....	.....	.....	14.52
City of Burns	.....	.....	1.00	2.00
Lawen-Crane	.....	.....	10.46	10.46
Totals for Harney County	.....	.....	11.46	26.98
Hood River County:				
Hood River Bridge	.08	.....	.....	.....
Hood River-Wasco County Line	4.07	.....	.....	.....
Hood River-Booth Hill	.....	.....	.50	4.45
Booth Hill Section	.....	.....	.....	4.96
Booth Hill-Forest Boundary	.....	.....	.....	9.50
Totals for Hood River Co.	4.15	.....	.50	18.91
Jackson County:				
Josephine County Line-Gold Hill	4.53	.....	.....	4.53
Ashland-Green Springs Mtn. Road	.35	.....	.....	.19
Green Springs Mtn. Road-California Line	2.12	.....	.....	.....
Pacific Highway-Green Springs Mtn. Summit	.....	.....	.64	1.49
Green Springs Mtn. Summit Section	.....	.....	7.76	.....
Green Springs Mtn. Summit-Jenny Creek	.....	.....	.....	2.47
Jenny Creek-Klamath County Line	.....	.....	.....	4.46
Klamath County Line-Hayden Creek	.....	.....	.....	9.83
Medford-Agate	.....	.....	8.50	.....
Agate-Trail	.....	.....	14.35	14.35
Totals for Jackson County	7.00	.....	31.25	37.32
Jefferson County:				
Wasco County Line-Madras	.....	.....	5.40	11.67
Madras-Trail Crossing	.....	.....	10.15	10.15
Totals for Jefferson Co.	.....	.....	15.55	21.82
Josephine County:				
Douglas County Line-Wolf Creek	4.47	.....	.....	.....
Grave Creek-Pleasant Valley	7.50	.....	5.43	.....
Pleasant Valley-Grants Pass	7.40	.....	7.67	9.85
Totals for Josephine Co.	19.37	.....	13.10	9.85
Klamath County:				
Fort Klamath-Lamm's Mill	.....	.....	.....	3.00
Lamm's Mill-Barclay Springs	.....	.....	5.12	5.12
Algoma Section	.....	.....	6.12	.02
Klamath Falls-Merrill	.....	.....	1.68	7.28
Merrill Section	.....	.....	2.57	2.57
Merrill-California Line	.....	.....	12.80	4.30
Hayden Creek-Jackson County Line	.....	.....	.....	9.83
Klamath Falls-Dairy	.....	.....	11.64	7.64
Totals for Klamath County	.....	.....	39.93	39.76

TABLE NO. 25—Continued

COUNTY AND SECTION	MILEAGES			
	Bituminous Pavement	Concrete Pavement	Gravel or Broken Stone Surfacing	Grading
Lake County:				
Paisley Section	.....	.....	.....	.57
Chewaucan Narrows-Chandler's Station	.....	.....	3.84	15.43
Chandler's Station-Crooked Creek	.....	.....	6.55	6.55
Crooked Creek-Lakeview	.....	.....	1.49	1.49
Lakeview South	.....	.....	.....	.88
Drews Valley Section	.....	.....	.....	3.00
Totals for Lake County	.....	.....	11.88	27.92
Lane County:				
Benton County Line-Junction City	5.75	.....	.....	.....
Junction City-Eugene	.06	.....	.....	.....
Springfield Overcrossing (McVeigh)	.....	.....	.39	.39
Cottage Grove Section	.....	1.42	.....	.....
Goshen-Walker	.....	9.80	.....	.....
Walker-Divide	6.33	.....	.....	.....
Divide-Douglas County Line	1.38	.....	.....	.....
Thurston-Walterville	.....	.....	4.56	4.56
Walterville-Deerhorn and Doyle Hill	.....	.....	2.50	2.98
Power Plant and Shell Rock Grades	.....	.....	1.50	2.06
Harrisburg-Junction City	.....	.....	3.46	3.46
Goldson-Blachly	.....	.....	4.00	13.63
Totals for Lane County	13.52	11.22	16.41	27.08
Lincoln County:				
Benton County Line-Eddyville	.....	.....	7.10	.....
Eddyville-Toledo	.....	.....	5.80	.40
Toledo-Newport	.....	.....	8.30	1.78
Tum Tum-Chitwood	.....	.....	.....	9.67
Chitwood-Toledo	.....	.....	.....	10.00
Totals for Lincoln County	.....	.....	21.20	21.85
Linn County:				
Murder Creek Section	.....	.....	.60	.60
Albany-Tangent	7.39	.....	.73	.....
Shedd-Halsey	7.82	.....	.....	.....
Halsey-Harrisburg	5.05	.....	.....	.....
Totals for Linn County	20.26	.....	1.33	.60
Malheur County:				
Brogan-Jamieson	.....	.....	6.30	6.24
Jamieson-Vale	.....	.....	17.70	.....
Burrelle-Vale	.....	.....	7.38	7.38
Baker County Line-Weiser Road	.....	.....	15.54	15.54
Weiser Road-Ontario	.....	.....	14.32	14.32
Totals for Malheur County	.....	.....	61.24	43.48
Marion County:				
City of Salem	.04	.....	.....	.....
Salem South	.....	8.57	.....	.....
City of Jefferson	.....	.92	.....	.....
Totals for Marion County	.04	9.49	.....	.....

TABLE NO. 25—Continued

COUNTY AND SECTION	MILEAGES			
	Bituminous Pavement	Concrete Pavement	Gravel or Broken Stone Surfacing	Grading
Morrow County:				
Gilliam County Line-Morgan	.....	.....	12.66	.....
Morgan-Lexington	.....	.....	12.65	5.32
Lexington-Heppner	.....	.....	11.74	9.75
Heppner-Jones Hill	.....	.....	.....	9.03
Messner Overcrossing Approaches	.....	.....	.....	.07
Totals for Morrow County	.....	.....	37.05	24.17
Polk County:				
Yamhill County Line-Holmes Gap	.....	.....	.74	.77
Holmes Gap-Rickreall	.....	.....	3.44	4.96
Monmouth-Luckiamute River	.....	.....	2.20	5.24
Luckiamute River-Suver	.....	.....	.....	2.29
Suver-Benton County Line	.....	.....	1.60	.....
Dallas City	1.03	.....	.....	.....
Dallas-Brunks Corner	7.50	.....	5.40	3.40
Yamhill County Line-Butlers Store	.....	.....	6.74	7.24
Totals for Polk County	8.53	.....	20.12	23.90
Sherman County:				
Across County	.....	.....	14.76	.....
Biggs-Wasco	.....	.....	.....	5.00
Wasco-Moro	.....	.....	7.50	7.50
Moro-Grass Valley	.....	.....	8.64	8.64
Totals for Sherman County	.....	.....	30.90	21.14
Tillamook County:				
Clatsop County Line-Mohler	.....	.....	2.31	2.31
Rockaway North	.....	.....	3.00	.....
Hobsonville-Riverdale	.....	.....	3.00	.....
Riverdale-Wilson River	.....	.....	1.44	.....
Tillamook South	5.00	.....	.....	.....
Moore Cutoff	.....	.....	2.45	.....
Hemlock-Beaver	1.23	.....	.....	.....
Beaver-Hebo	.....	.....	4.15	.....
Hebo-Neskowin	.....	.....	3.40	4.60
Totals for Tillamook Co.	6.23	.....	19.75	6.91
Umatilla County:				
Echo-Pendleton	.....	.....	4.42	.....
Pendleton-Cabbage Hill	.....	.....	2.44	.04
Cabbage Hill-Deadmans Pass	.....	.....	12.66	.....
Deadmans Pass-Kamela	.....	.....	7.34	10.54
Pilot Rock-Vinson	.....	.....	10.71	14.69
Vinson Section	.....	.....	.....	.....
Cold Springs-Holdman	.....	.....	13.20	13.20
Athena-Milton	5.64	.....	.....	.....
Totals for Umatilla County	5.64	.....	50.77	38.47
Union County:				
Kamela-Oro Dell	.....	.....	18.77	19.05
Island City-La Grande-Lone Pine	2.40	.....	.....	.....
Lone Pine-Hot Lake	.....	.....	.30	.....
Hot Lake-Union	.....	.....	5.36	5.01
Union City	1.31	.....	.....	.....
Union-Telocaset	.....	.....	6.09	.....
Telocaset-North Powder	.....	.....	8.83	1.41
Island City-Elgin	.....	.....	6.37	17.20
Elgin-Minam	.....	.....	9.35	.....
Minam-Wallowa County Line	.....	.....	1.90	4.82
Totals for Union County	3.71	.....	56.97	47.49

TABLE NO. 25—Continued

COUNTY AND SECTION	MILEAGES			
	Bituminous Pavement	Concrete Pavement	Gravel or Broken Stone Surfacing	Grading
Wallowa County:				
Union County Line-Wallowa Canyon	.....	.....	.....	.66
Wallowa Canyon Section	.....	.....	8.29	4.41
Wallowa-Lostine	.....	.....	15.10	15.10
Lostine-Enterprise	.....	.....	.....	2.50
Enterprise-Joseph	.....	.....	6.23	6.23
Totals for Wallowa County	.....	.....	29.62	28.90
Wasco County:				
Hood River County Line-Mosier	2.30	.....	.....	.....
Mosier-The Dalles	16.73	.....	6.63	.....
Seufert-Deschutes	.11	.....	12.52	3.82
The Dalles-Dufur	.....	.....	5.00	10.00
Cow Canyon Section	.....	.....	.....	7.80
Totals for Wasco County	19.14	.....	24.15	21.62
Washington County:				
Forest Grove-Gaston	6.55	.....	.....	.....
West Side Highway Across County	3.65	.40	.....	.....
Scoggins Creek Bridge	.10	.....	.....	.....
Totals for Washington Co.	10.30	.40	.....	.....
Wheeler County:				
Cummins Hill-Fossil	.....	.....	2.68	2.68
City of Fossil	.....	.....	.....	.59
Butte Creek Section	.....	.....	6.46	.....
Sarvice Creek Section	.....	.....	7.00	8.00
Unit No. 2, Sarvice Creek-Valades Ranch	.....	.....	.....	1.27
Ochoco Forest-Mitchell	.....	.....	3.99	9.99
Totals for Wheeler County	.....	.....	20.13	22.53
Yamhill County:				
Washington County Line-Newberg	2.06	.40	.....	.....
Newberg-West Dayton	.....	5.84	.....	.....
West Dayton-St. Joseph	.....	4.13	.....	.....
Newberg Viaduct and Chehalem Creek Trestle	.23	.....	.....	.....
Gaston-Yamhill	.....	7.67	.50	2.36
Yamhill City	.23	.30	.....	.....
Sheridan-Polk County Line	.....	.....	2.59	.....
Butlers Store-Grand Ronde	.....	.....	.49	.....
Grand Ronde-Alder Creek	.....	.....	13.70	.....
McMinnville-Amity	5.00	.....	2.22	5.15
Totals for Yamhill County	7.52	18.34	19.50	7.51
Grand totals for entire state	190.82	75.59	831.04	795.57

TABLE NO. 26

MILES OF STATE HIGHWAYS SURVEYED DURING PERIOD DECEMBER 1, 1920, TO NOVEMBER 30, 1922

This table includes only surveys made under the direct supervision of the State Highway Department. It does not include surveys made by the Counties or United States Bureau of Public Roads, nor State surveys on market roads.

COUNTY AND SECTION	Miles of Completed Location
Baker County:	
Baker-Stices Gulch	46.00
Total for Baker County	46.00
Benton County:	
Corvallis-Toledo	3.80
Lincoln County Line-Philomath (Alsea Highway)	25.00
Total for Benton County	28.80
Clackamas County:	
Oregon City-Oswego	0.56
Oregon City Bridge	0.50
Canemah-Oregon City	0.90
Total for Clackamas County	1.96
Coos County:	
Coquille-Bandon	14.66
Hauser-Douglas County Line	6.97
Myrtle Point-Coquille	3.30
Total for Coos County	24.93
Crook County:	
Prineville-Jones Mill (Ochoco Highway)	4.26
Bear Creek-Deschutes County Line	17.31
Davis Ranch-Paulina	19.07
Prineville-Davis Ranch	2.93
Total for Crook County	43.57
Curry County:	
Coos County Line-Port Orford	5.90
Hubbard Creek-Mussels Creek (Roosevelt Coast Highway)	7.00
Gold Beach-California Line	14.68
Total for Curry County	27.58
Deschutes County:	
Horse Ridge to Junction with Prineville-Lakeview Highway	12.70
Millican-Crook County Line (Prineville-Lakeview Highway)	6.23
Total for Deschutes County	18.93
Douglas County:	
Through Myrtle Creek	1.07
Winston-Camas Valley	19.99
Winchester Bridge	1.00
Coast Highway across County	24.45
Elk Creek Bridge	0.22
Total for Douglas County	46.73
Gilliam County:	
Heppner Junction-Morrow County Line (Oregon-Washington Highway)	9.58
Condon-Arlington	37.10
Total for Gilliam County	46.68

TABLE NO. 26—Continued

COUNTY AND SECTION	Miles of Completed Location
Grant County:	
John Day-Canyon Creek (John Day Highway)	0.79
Prairie City-Forest Boundary (John Day Highway)	11.10
Valades Ranch-Cole Bridge (John Day Highway)	28.50
Total for Grant County	40.39
Hood River County:	
Hood River-Forest Boundary (Mt. Hood Loop)	3.11
Total for Hood River County	3.11
Jackson County:	
Medford-Prospect	0.21
Total for Jackson County	0.21
Jefferson County:	
Madras-Wasco County Line	21.05
Total for Jefferson County	21.05
Josephine County:	
George Ranch-Robinson Creek (Oregon Caves Highway)	3.09
Total for Josephine County	3.09
Klamath County:	
Keno-Klamath Falls	11.21
Klamath Falls-Sand Creek (The Dalles-California Highway)	14.18
Sand Creek-Deschutes Forest Boundary (The Dalles-California Highway)	5.24
Crescent-Deschutes County Line	8.10
Merrill Section	2.58
Total for Klamath County	41.31
Lake County:	
Lakeview-Fremont National Forest Reserve	9.83
Total for Lake County	9.83
Lane County:	
Harrisburg-Junction City	4.00
Thurston-Walterville	5.35
Douglas County Line-Florence	8.12
Walterville-Blue River	10.16
Florence-Lincoln County Line	16.67
Total for Lane County	44.30
Lincoln County:	
Otis-Siletz River	12.00
Devils Lake-Lane County Line	7.10
Benton County Line-Toledo	8.00
Total for Lincoln County	27.10
Linn County:	
Lebanon-Cascadia	11.40
Total for Linn County	11.40
Malheur County:	
Vale-Riverside (Central Oregon Highway)	1.52
Total for Malheur County	1.52
Marion County:	
Grade Crossing Elimination in North Salem	0.60
Total for Marion County	0.60

TABLE NO. 26—Continued

COUNTY AND SECTION	Miles of Completed Location
Morrow County:	
Oregon-Washington Highway	8.55
Total for Morrow County	8.55
Sherman County:	
Sherman Highway	49.20
Total for Sherman County	49.20
Tillamook County:	
Clatsop County Line-Mohler	6.35
Mohler-Manhattan	7.00
Total for Tillamook County	13.35
Umatilla County:	
Deadmans Pass-Kamela	5.00
Pilot Rock-Morrow County Line	8.00
Pendleton-Cold Springs	16.20
Ukiah-Grant County Line	2.62
Total for Umatilla County	31.82
Union County:	
Wallowa Hill (La Grande-Enterprise Highway)	4.76
La Grande-Kamela	1.29
Hot Lake-Union	6.62
La Grande-Elgin	14.66
Total for Union County	27.33
Wallowa County:	
Union County Line-Joseph	29.22
Wallowa Hill (La Grande-Enterprise Highway)	0.66
Total for Wallowa County	29.88
Wasco County:	
Maupin-Jefferson County Line	28.57
Maupin-Dufur	28.88
The Dalles-Dufur (Eight Mile Creek Route)	8.30
The Dalles-Dufur (Hill Route)	7.99
Sherman Highway	3.00
Total for Wasco County	76.74
Wheeler County:	
Sarvice Creek Section (John Day Highway)	5.70
Cummins Hill-Fossil	2.87
Ochoco Forest-Mitchell (Ochoco Highway)	14.00
Butte Creek Summit-South four miles (John Day Highway)	4.04
Total for Wheeler County	26.61
Grand total for all Counties	752.57

TABLE NO. 27

SCHEDULE OF BRIDGES CONSTRUCTED, UNDER CONSTRUCTION OR DESIGNED—SPANS 20 FEET AND ABOVE

DECEMBER 1, 1920, TO NOVEMBER 30, 1922

All bridges listed in this table are located on state highways, or are designed for location on state highways. The status of each structure or design as of November 30, 1922, is indicated by means of the symbols which appear in the third column, the key to which is given at the bottom of each page.

For structures designed for counties see Table No. 28.

Bridge No.	LOCATION AND TYPE OF STRUCTURE	Status Nov. 30, 1922	Estimated Cost
	Baker County		
698	70′ Steel Span on R. C. Abutments over Burnt River, 1 mile north of Weatherby, on Old Oregon Trail	a	$ 18,510.35
699	90′ Steel Span on R. C. Abutments over Burnt River, ½ mile north of Weatherby, on Old Oregon Trail	a	19,986.87
700	120′ Steel Span and two 40′ R. C. Spans over Burnt River and O.-W. R. & N. Co. tracks, 4 miles northwest from Huntington, on Old Oregon Trail	a	39,263.62
704	114′ R. C. Viaduct over O.-W. R. & N. Co. tracks near Unity on Old Oregon Trail	a	9,742.84
705	Concrete Abutments for Railroad Span to carry O.-W. R. & N. Co. tracks over Old Oregon Trail at Durkee	b	15,000.00
741	60′ Steel Span on R. C. Abutments over Pritchard Creek on Old Oregon Trail near Durkee	b	8,330.00
788	45 lin. ft. Frame Trestle over Smith Creek at Station 1607, Nelson-Huntington Section, Old Oregon Trail	a	1,782.66
936	45′ R. C. Span over Powder River at Station 420, Baker-Stices Gulch Section, Baker-Unity Highway	d	.....
	Benton County		
688	64′ R. C. Viaduct over Fisher's Mill Race at south side of Corvallis on West Side Highway	a	6,875.00
771	60′ Covered Wood Span and 190 lin. ft. Frame Trestle over Mary's River near Philomath on the Alsea Highway	a	8,819.43
773	38 lin. ft. Frame Trestle over Norton Creek at Station 801, Corvallis-Lincoln County Line Section, Corvallis-Newport Highway	a	700.00
866	60′ Wood Deck Truss Span, 35′ "I" Beam Span and 167 lin. ft. Trestle over Mary's River and S. P R. R. tracks at Blodgett on the Corvallis-Newport Highway	d	.....
933	75′ Covered Wood Span, 38 lin. ft. Trestle over Mill Creek at Station 589, Alsea-Forest Boundary Section, Alsea Highway	d	.....
	Clackamas County		
357	350′ Steel Arch encased in concrete and 500 lin. ft. R. C. Viaduct over Willamette River at Oregon City on the Pacific Highway	b	265,225.00
665	165′ R. C. Viaduct over Alder Creek at Station 463, Sandy-Forest Boundary Section, Mount Hood Loop	a	18,588.76
666	70′ R. C. Viaduct over Cedar Creek at Station 284, Sandy-Forest Boundary Section, Mount Hood Loop	a	6,631.89
689	60′ R. C. Viaduct over Wild Cat Creek at Station 509, Sandy-Forest Boundary Section, Mount Hood Loop	a	6,863.22
	Clatsop County		
330	150′ Clear Span Double Leaf Trunion Bascule Bridge and 1615 lin. ft. Pile Trestle over Young's Bay at Astoria on the Coast Highway	a	340,162.29
914	Comfort Station in Bradley Park at Clatsop Crest on Columbia River Highway	d	.....

Key to Symbols in Third Column: a—construction completed; b—under construction; d—design completed; f—designed but eliminated by subsequent relocation; h—designed but eliminated by substitution of pipe culvert.

TABLE NO. 27—Continued

Bridge No.	LOCATION AND TYPE OF STRUCTURE	Status Nov. 30, 1922	Estimated Cost
	Coos County		
481	60′ Wood Span, 114 lin. ft. Pile Trestle over Big Creek at Bridge on Coos Bay-Roseburg Highway	a	10,606.50
482	60′ Covered Wood Span, 38 lin. ft. Trestle over Sandy Creek on the Bridge-Remote Section, Coos Bay-Roseburg Highway	a	8,188.63
609	50′ Steel Bascule, 210′ Pile Trestle over Coal Bank Slough in Marshfield on the Coast Highway	a	25,000.00
598	235′ Steel Swing Span, 135 lin. ft. Pile Trestle over Coquille River at Coquille on the Coast Highway	a	86,956.94
953	40′ "A" Frame Span, 57 lin. ft. Pile Trestle over Bear Creek on Parkersburg Section, Coast Highway	b	1,960.00
	Crook County		
528	56′ Wood Deck Truss Span over old bed of Crooked River at Station 155, Prineville-Deschutes County Line Section, Ochoco Highway	a	5,049.47
537	40′ Wood Pony, and 38 lin. ft. Frame Trestle over Dry Creek, Station 343, Prineville-Davis Ranch Section, Crooked River Highway	a	4,565.94
539	40′ Wood Pony Truss and 38 lin. ft. Frame Trestle over Bear Creek at Station 1133, Prineville-Davis Ranch Section, Crooked River Highway	a	4,984.77
540	120′ Wood Span, 114 lin. ft. Frame Trestle over Crooked River at Station 1305, Prineville-Davis Ranch Section, Crooked River Highway	a	18,174.17
541	120′ Wood Span, 152 lin. ft. Frame Trestle over Crooked River at Station 1052, Prineville-Davis Ranch Section, Crooked River Highway	a	16,680.26
719	40′ "A" Frame Span over Mill Creek at Station 521, Prineville-Jones Mill Section, Ochoco Highway	a	5,044.03
720	40′ "A" Frame Span over Marks Creek at Station 841, Prineville-Jones Mill Section, Ochoco Highway	a	5,044.02
781	23′ Frame Trestle over Ochoco Canal at Station 309, Prineville-Jones Mill Section, Ochoco Highway	a	500.00
	Curry County		
756	Four 19′ Pile Trestle Spans over Brush Creek at Station 460, Brush Creek-Mussel Creek Section, Coast Highway	a	2,560.85
757	Four 19′ Frame Trestle Spans over Bear Trap Creek at Station 502, Brush Creek-Mussel Creek Section, Coast Highway	a	4,192.95
758	Five 19′ Spans Frame Trestle over Brush Creek at Station 542, Brush Creek-Mussel Creek Section, Coast Highway	a	4,548.47
901	Three 90′ Steel Deck Spans over Sixes River at Station 439, Port Orford-Sixes River Sec., Coast Highway	b	29,880.00
902	Two 90′ Steel Deck Spans over Elk River at Station 354, Port Orford-Sixes River Sec., Coast Highway	b	24,400.00
928	95 lin. ft. Frame Trestle over Chrystal Creek at Station 452, Port Orford-Sixes River Section, Coast Highway	b	1,255.00
	Deschutes County		
522	21′ R. C. Span over Swalley Canal at Station 12, Bend-Redmond Section, The Dalles-California Highway	a	2,581.99
806	Four 19′ Frame Trestle Spans on concrete over Squaw Creek at Station 894, Tumalo-Sisters Section, Bend-Sisters Highway	b	3,473.00
945	Repairs to Broad Canyon Bridge on McKenzie Highway	b	1,500.00
	Douglas County		
434	185′ R. C. Viaduct over S. P. R. R. near Sutherlin on the Pacific Highway	d	.....
435	525′ R. C. Viaduct over S. P. R. R. near Wilbur on the Pacific Highway	d	.....
436	200′ R. C. Viaduct over S. P. R. R. at Shady Point on the Pacific Highway	d	.....
490	Three 130′ R. C. Arch Spans, 160′ R. C. Viaduct over S. P. R. R. and Umpqua River at Myrtle Creek on Pacific Highway	a	73,058.56

Key to Symbols in Third Column: a—construction completed; b—under construction; d—design completed; f—designed but eliminated by subsequent relocation; h—designed but eliminated by substitution of pipe culvert.

TABLE NO. 27—Continued

Bridge No.	LOCATION AND TYPE OF STRUCTURE	Status Nov. 30, 1922	Estimated Cost
509	220′ Steel Span, 265 lin. ft. Frame Trestle over South Umpqua River at Station 170, Canyonville-Myrtle Creek Section, Pacific Highway	a	46,208.66
548	Two 45′ R. C. Spans over Canyon Creek at Station 587, Canyonville-Galesville Section, Pacific Highway	a	12,902.23
559	90′ Covered Wood Span, 76 lin. ft. Pile Trestle over Coquille River on the Camas Valley Section, Coos Bay-Roseburg Highway	b	8,076.30
581	51 lin. ft. Frame Trestle over Bear Creek at Station 169, Remote-Camas Valley Section, Coos Bay-Roseburg Highway	a	1,075.81
587	105′ Covered Wood Span, 38 lin. ft. Trestle over Looking Glass Creek at Station 1192, Camas Mountain-Winston Section, Coos Bay-Roseburg Highway	b	8,411.50
588	105′ Covered Wood Span, 38 lin. ft. Frame Trestle over Looking Glass Creek at Station 1000, Camas Mountain-Winston Section, Coos Bay-Roseburg Highway	b	8,327.50
603	80′ Steel Span and 308′ R. C. Viaduct over S. P. R. R. and Calapooia River, near Oakland on the Pacific Highway	d	.....
805	105′ Covered Wood Span and 38 lin. ft. Frame Trestle over Looking Glass Creek at Station 1452, Camas Mountain-Winston Section, Coos Bay-Roseburg Highway	b	8,928.00
808	40′ "A" Frame Span, 26 lin. ft. Frame Trestle over South Fork Ten Mile Creek at Station 896, Camas Mountain-Winston Section, Coos Bay-Roseburg Highway	b	2,263.00
809	57 lin. ft. Frame Trestle over Porter Creek at Station 1089, Camas Mountain-Winston Section, Coos Bay-Roseburg Highway	b	1,896.00
839	Seven 112′ R. C. Arch Spans over the Umpqua River at Winchester on the Pacific Highway	b	120,986.00
855	40′ "A" Frame and 38 lin. ft. Frame Trestle over South Fork of Ten Mile Creek at Station 885, Camas Valley Section, Coos Bay-Roseburg Highway	b	2,607.50
874	150 lin. ft. R. C. Viaduct over Elk Creek in Drain on the Pacific Highway	b	15,026.61
908	Concrete Abutments for Steel Truss Span over Myrtle Creek in town of Myrtle Creek on Pacific Highway	b	6,000.00
	Gilliam County		
323	144′ R. C. Viaduct over O.-W. R. & N. tracks at Heppner Junction on Columbia River Highway	a	16,866.26
795	46 lin. ft. Frame Trestle over Juniper Canyon at Station 968, Condon-Arlington Section, John Day River Highway	d	.....
802	70 lin. ft. R. C. Viaduct over Rock Creek at Station 1082, Condon-Arlington Section, John Day River Highway	d	.....
905	40′ "A" Frame, 26 lin. ft. Pile Trestle over Willow Creek at Station 181, Heppner Junction-Morrow County Line Section, Oregon-Washington Highway	b	3,187.00
906	60′ Steel Span, 38 lin. ft. Pile Trestle over Willow Creek at Station 254, Heppner Junction-Morrow County Line Section, Oregon-Washington Highway	b	9,368.00
	Grant County		
239	40′ "A" Frame at Station 268, Unit No. 3, Sarvice Creek-Valades Ranch Section, John Day River Highway	a	5,793.37
240	40′ "A" Frame, 12 lin. ft. Frame Trestle at Station 430, Unit No. 3 Sarvice Creek-Valades Ranch Section, John Day River Highway	a	3,197.70
240a	57 lin. ft. Frame Trestle at Station 35, Unit No. 3 Sarvice Creek-Valades Ranch Section, John Day River Highway	a	1,399.94
240b	19′ Frame Trestle at Station 601, Unit No. 3, Sarvice Creek-Valades Ranch Section, John Day River Highway	a	822.35

Key to Symbols in Third Column: a—construction completed; b—under construction; d—design completed; f—designed but eliminated by subsequent relocation; h—designed but eliminated by substitution of pipe culvert.

TABLE NO. 27—Continued

Bridge No.	LOCATION AND TYPE OF STRUCTURE	Status Nov. 30, 1922	Estimated Cost
240c	13' Frame Trestle at Station 532, Unit No. 3, Sarvice Creek-Valades Ranch Section, John Day River Highway	a	541.50
241	40' "A" Frame, 12 lin. ft. Frame Trestle at Station 295, Unit No. 3, Sarvice Creek-Valades Ranch Section, John Day River Highway	a	5,389.75
241a	47 lin. ft. Frame Trestle at Station 744, Unit No. 4, Sarvice Creek-Valades Ranch Section, John Day River Highway	a	3,072.32
242	40' "A" Frame, 57 lin. ft. Frame Trestle, over Holmes Creek at Station 168, Unit No. 3, Sarvice Creek-Valades Ranch Section, John Day River Highway	a	6,794.95
242a	75' Wood Span, 42 lin. ft. Frame Trestle over Rock Creek at Station 1060, Unit No. 4, Sarvice Creek-Valades Ranch Section, John Day River Highway	a	12,636.30
243	105' Wood Span, 75 lin. ft. Frame Trestle over John Day River at Station 820, Unit No. 4, Sarvice Creek-Valades Ranch Section, John Day River Highway	a	18,866.48
244	Two 105' Wood Spans, 130' Frame Trestle over North Fork of John Day River at Station 50, Unit No. 3, Sarvice Creek-Valades Ranch Section, John Day River Highway	a	37,648.96
256	40' Wood Span, 57 lin. ft. Frame Trestle over Rattlesnake Creek at Station 24, Unit No. 4, Sarvice Creek-Valades Ranch Section, John Day River Highway	a	6,367.06
256a	Two 19' Timber Spans on concrete at Station 660, Unit No. 4, Sarvice Creek-Valades Ranch Section, John Day River Highway	a	4,595.56
886	95 lin. ft. Pile Trestle over Cummins Creek at Station 755, Cummins Creek-Valades Ranch Section, John Day River Highway	d	.....
887	38 lin. ft. Pile Trestle over Relief Channel for Cummins Creek at Station 758, Cummins Creek-Valades Ranch Section, John Day River Highway	d	.....
888	Two 70' Steel Spans, 207 lin. ft. Pile Trestle over John Day River at Station 1142, Cummins Creek-Valades Ranch Section, John Day River Highway	b	20,911.15
889	70' Steel Span, 114 lin. ft. Pile Trestle over South Fork of John Day River at Station 1309, Cummins Creek-Valades Ranch Section, John Day River Highway	b	12,066.50
890	30 lin. ft. Pile Trestle over Battle Creek at Station 1464, Cummins Creek-Valades Ranch Section, John Day River Highway	b	755.00
891	45 lin. ft. Pile Trestle over slough at Station 1487, Cummins Creek-Valades Ranch Section, John Day River Highway	b	1,545.00
892	45 lin. ft. Pile Trestle over Irrigation Canal at Station 1500, Cummins Creek-Valades Ranch Section, John Day River Highway	b	1,625.00
	Hood River County		
640	80' Steel Span, 92' R. C. Approach over East Fork of Hood River on Mount Hood Loop Highway	a	18,500.04
645	97 lin. ft. Railway Trestle to carry Mount Hood Rail road over the Mount Hood Loop near Whisky Creek	b	10,000.00
646	56 lin. ft. Railway Trestle to carry Mount Hood Railroad over the Mount Hood Loop near Van Horn	b	2,500.00
	Jackson County		
678	40' R. C. Span over Indian Creek at Station 1310, Agate Trail Section, Medford-Crater Lake Highway	a	6,778.97
679	Two 40' R. C. Spans over Antelope Creek at Station 1932, Agate Trail Section, Medford-Crater Lake Highway	a	11,623.43
681	60' Steel Deck Truss Span, 88 lin. ft. R. C. Viaduct over Little Butte Creek at Station 1865, Agate Trail Section, Medford-Crater Lake Highway	a	17,565.40

Key to Symbols in Third Column: a—construction completed; b—under construction; d—design completed; f—designed but eliminated by subsequent relocation; h—designed but eliminated by substitution of pipe culvert.

TABLE NO. 27—Continued

Bridge No.	LOCATION AND TYPE OF STRUCTURE	Status Nov. 30, 1922	Estimated Cost
682	Two 30′ R. C. Spans over Reese Creek at Station 1585, Agate Trail Section, Medford-Crater Lake Highway	a	7,977.70
684	Two 80′ Steel Deck Spans, 146′ R. C. Viaduct over Rogue River at Trail on Medford-Crater Lake Highway	a	46,496.44
	Jefferson County		
813	Two 36′ R. C. Spans over Hay Creek at Station 822, Madras-Wasco County Line Section, The Dalles-California Highway	d	.....
814	Two 25′ R. C. Spans over Wilson Creek at Station 788, Madras-Wasco County Line Section, The Dalles-California Highway	h	5,800.00
815	90 lin. ft. R. C. Viaduct over Trout Creek at Station 1064, Madras-Wasco County Line Section, The Dalles-California Highway	a	6,814.96
	Josephine County		
708	162′ R. C. Viaduct over Deer Creek, near Selma on the Grants Pass-Crescent City Highway	a	17,015.62
712	35′ R. C. Span over Wolf Creek at Station 214, Grave Creek-Wolf Creek Section, Pacific Highway	a	3,713.99
934	50′ R. C. Span over Jump-Off-Joe Creek at Station 410, Grants Pass-Sexton Mountain Section, Pacific Highway	d	.....
	Klamath County		
550	56′ Wood Span, 38 lin. ft. Frame Trestle over Altamont Canal at Station 75, Klamath Falls-Merrill Section, The Dalles-California Highway	a	4,411.87
551	57 lin ft. Frame Trestle over Oregon-California and Eastern R. R. at Dairy on the Klamath Falls-Lakeview Highway	a	3,087.02
920	68 lin. ft. Frame Trestle over U. S. R. S. Canal at Station 1591, Merrill-California Line Section, The Dalles-California Highway	d	.....
	Lake County		
571	112 lin. ft. Frame Trestle over the Chewaucan River at Station 1422, Paisley-Chandlers Station Section, Bend-Lakeview Highway	a	4,127.23
572	100′ R. C. Viaduct over the Chewaucan River at Paisley on the Bend-Lakeview Highway	a	14,562.96
573	97 lin. ft. Frame Trestle, two center Spans, removable, over Chewaucan River at Station 1800, Paisley-Chandler Station Section, Bend-Lakeview Highway	a	3,707.63
764	One 21′ Trestle Span at Station 1156, Narrows-Chandler Station Section, Bend-Lakeview Highway	a	647.32
765	One 21′ Trestle Span, Station 1241, Chandler Station-Paisley Section, Bend-Lakeview Highway	a	491.11
767	Two 17′ Standard Trestle Spans over Crooked Creek, Station 870, Chandlers Station-Crooked Creek Section, Bend-Lakeview Highway	a	792.24
768	One 19′ Standard Trestle Span over Crooked Creek, Station 892, Chandlers Station-Crooked Creek Section, Bend-Lakeview Highway	a	1,096.45
769	One 15′ Standard Trestle Span over Crooked Creek, Station 897, Chandlers Station-Crooked Creek Section, Bend-Lakeview Highway	a	1,128.09
	Lane County		
373	330′ R. C. Viaduct over S. P. R. R. at Springfield, on the Pacific Highway	a	**36,767.75**
432	Two 20′ R. C. Spans over Crow Creek at Station 236, Monroe-Junction City Section, West Side Highway	a	7,335.62
613	150′ through Steel Truss, 190′ Pile Trestle over Coast Fork of Willamette River, Walker-Cottage Grove Section, Pacific Highway	a	28,000.00
614	120′ Steel Truss and three 19′ Pile Trestle Spans over Coast Fork of Willamette River near Cottage Grove, Walker-Divide Section, Pacific Highway	d	.....

Key to Symbols in Third Column: a—construction completed; b—under construction; d—design completed: f—designed but eliminated by subsequent relocation; h—designed but eliminated by substitution of pipe culvert.

TABLE NO. 27—Continued

Bridge No.	LOCATION AND TYPE OF STRUCTURE	Status Nov. 30, 1922	Estimated Cost
716	168' R. C. Viaduct over S. P. R. R. tracks near Creswell, Pacific Highway	d	.....
727	56' Deck Span, five 19' Trestle Spans over Bear Creek, Station 535, Goldson-Summit Section, Willamette Valley-Florence Highway	a	7,236.07
728	90' Covered Howe Truss over Long Tom River, Station 714, Goldson-Summit Section, Willamette Valley-Florence Highway	a	7,504.83
729	60' Covered Howe Truss and two 19' Trestle Spans over Long Tom River, Station 747, Goldson-Summit Section, Willamette Valley-Florence Highway	a	4,597.32
730	Four 19' Spans Frame Trestle over Long Tom River, Station 887, Goldson-Summit Section, Willamette Valley-Florence Highway	a	2,217.82
798	190 lin. ft. Pile Trestle over Camas Swale near Creswell, Pacific Highway	a	4,000.00
	Lincoln County		
654	Three 19' and one 23' Spans over Hayes Creek, Station 1842, Eddyville-Chitwood Section, Corvallis-Newport Highway	b	1,395.00
683	80' Steel Span, five 19' Pile Trestle Spans over Yaquina River, in Eddyville, Tum Tum-Chitwood Section, Corvallis-Newport Highway	b	11,462.50
856	Two 15' and 21' Pile Trestle Spans over Little Elk Creek, Station 1397, Tum Tum-Chitwood Section, Corvallis-Newport Highway	b	947.00
857	One 19' and one 23' Pile Trestle Spans over Oglesby Creek, Station 1517, Tum Tum-Chitwood Section, Corvallis-Newport Highway	b	774.00
858	Five 19' Spans Pile Trestle over Thornton Creek, Station 2058, Chitwood-Toledo Section, Corvallis-Newport Highway	b	1,680.00
860	Two 23' Frame Trestle Spans over Simpson Creek, Station 2148, Chitwood-Toledo Section, Corvallis-Newport Highway	b	809.00
861	Two 15' and one 21' Frame Trestle Spans over Simpson Creek, Station 2172, Chitwood-Toledo Section, Corvallis-Newport Highway	b	907.00
862	One 19' and one 21' and two 17' Pile Trestle Spans over Cooks Fork Simpson Creek, Station 2208, Chitwood-Toledo Section, Corvallis-Newport Highway	b	790.00
864	One 21'. Pile Trestle over Olalla Slough, Station 2356, Chitwood-Toledo Section, Corvallis-Newport Highway	b	457.00
865	Three 23' Spans Pile Trestle over West Fork of Olalla Slough, Station 2527, Chitwood-Toledo Section, Corvallis-Newport Highway	b	1,033.00
875	51' Pile Trestle over Big Beaver Creek, Station 130, Toledo-Newport Section, Corvallis-Newport Highway	b	947.00
876	51' Pile Trestle at Station 149, Toledo-Newport Section, Corvallis-Newport Highway	b	907.00
	Linn County		
397	19' Timber Span on concrete at Station 334, Albany-Tangent Section, Pacific Highway	a	1,505.00
510	105' Covered Wood Span, 190 lin. ft. Trestle over Calapooia River at Station 470, Tangent-Shedd Section, Pacific Highway	b	23,200.00
553	76 lin. ft. Pile Trestle at Station 435, Albany-Harrisburg Section, Pacific Highway	a	1,122.46
561	323 lin. ft. Pile Trestle at Station 460, Albany-Harrisburg Section, Pacific Highway	a	4,803.97
563	114 lin. ft. Pile Trestle at Station 489, Albany-Harrisburg Section, Pacific Highway	a	1,742.30
564	57 lin. ft. Pile Trestle at Station 502, Albany-Harrisburg Section, Pacific Highway	a	968.85
565	38 lin. ft. Pile Trestle at Station 508, Albany-Harrisburg Section, Pacific Highway	a	685.00
566	266 lin. ft. Pile Trestle at Station 606, Albany-Harrisburg Section, Pacific Highway	a	3,490.92

Key to Symbols in Third Column: a—construction completed; b—under construction; d—design completed; f—designed but eliminated by subsequent relocation; h—designed but eliminated by substitution of pipe culvert.

TABLE NO. 27—Continued

Bridge No.	LOCATION AND TYPE OF STRUCTURE	Status Nov. 30, 1922	Estimated Cost
567	Double 4'x4' R. C. Box Culvert, at Station 1035, Albany-Harrisburg Section, Pacific Highway	a	1,080.00
568	38 lin. ft. Pile Trestle at Station 1139, Albany-Harrisburg Section, Pacific Highway	a	652.68
569	228 lin. ft. Pile Trestle at Station 1190, Albany-Harrisburg Section, Pacific Highway	a	3,244.92
570	57 lin. ft. Pile Trestle at Station 1284, Albany-Harrisburg Section, Pacific Highway	a	909.04
578	40' R. C. Deck Girder Span over Santiam River in City of Lebanon	a	12,000.00
607	Thirteen 19' Spans of Pile Trestle over Slough, Station 606, Albany-Harrisburg Section, Pacific Highway	a	1,250.00
608	Eight 19' Spans Pile Trestle over Little Muddy Creek, Station 104, Albany-Harrisburg Section, Pacific Highway	a	2,392.49
622	40' R. C. Span over Murder Creek at Station 383, Albany-Jefferson Section, Pacific Highway	a	4,844.39
737	Two 40' R. C. Spans over Oak Creek, Station 85, Albany-Tangent Section, Pacific Highway	a	6,695.80
738	Two 35' R. C. Spans over Lake Creek, Station 387, Albany-Tangent Section, Pacific Highway	a	5,571.10
	Malheur County		
599	180' Steel Span, 152 lin. ft. Trestle over Malheur River at Vale on the John Day River Highway	a	39,268.43
630	90' Steel Pony Truss Span, 38 lin. ft. Pile Trestle over Bully Creek, at Station 95, Burrelle-Vale Section, Central Oregon Highway	a	13,601.10
731	Six 50' Spans R. C. Deck Girders over Malheur River, Station 1510, Ontario-Weiser Section, Old Oregon Trail	a	34,480.17
732	One 38' R. C. Span over Jacobson's Gulch, Station 1416, Ontario-Weiser Section, Old Oregon Trail	a	12,001.15
783	30' R. C. Span over Benson Creek, Baker County Line-Weiser Section, Old Oregon Trail	a	5,414.84
784	30' R. C. Span over Birch Creek, Baker County Line-Weiser Section, Old Oregon Trail	a	5,689.54
	Marion County		
585	Three 25' R. C. Spans over Pudding River Relief Channel near Aurora, Canby-Aurora Section, Pacific Highway	a	12,624.00
	Morrow County		
356	90' R. C. Viaduct, 114 lin. ft. Frame Trestle over O.-W. R. & N. tracks at Meesner, on the Columbia River Highway	a	17,402.64
611	30' R. C. Span over Black Horse Creek in Lexington, on Oregon-Washington Highway	a	5,333.50
651	40' "A" Frame on masonry over Morgan Creek at Morgan on Oregon-Washington Highway	a	4,441.59
672	Three 19' Timber Spans on masonry over Reitman Creek at Station 1056, Heppner-Gilliam County Line Section, Oregon-Washington Highway	a	3,641.29
776	One 28' R. C. M. Beam Span over Hinton Creek, Lexington-Heppner Section, Oregon-Washington Highway	a	3,146.93
777	45' R. C. Deck Girder over Willow Creek, Lexington-Heppner Section, Oregon-Washington Highway	a	6,923.43
778	75' R. C. Viaduct over Willow Creek, Heppner-Umatilla County Line Section, Oregon-Washington Highway	a	8,404.04
	Polk County		
351	112 lin. ft. Pile Trestle over Mud Slough near Derry on the Salem-Dallas Highway	a	2,100.00
491	Three 19' Spans Frame Trestle over South Fork Ash Creek, Station 1156, Monmouth-Independence Section, West Side Highway	a	1,800.00
617	21' M. B. Span over North Fork of South Fork of Ash Creek, Station 1079, Monmouth-Suver Section West Side Highway	a	3,841.97

Key to Symbols in Third Column: a—construction completed; b—under construction; d—design completed; f—designed but eliminated by subsequent relocation; h—designed but eliminated by substitution of pipe culvert.

TABLE NO. 27—Continued

Bridge No.	LOCATION AND TYPE OF STRUCTURE	Status Nov. 30, 1922	Estimated Cost
745	120′ Steel Span and 57′ Trestle over Yamhill River, Station 287, Yamhill County Line-Butler's Store Section, McMinnville-Tillamook Highway	b	12,206.00
827	Two 20′ R. C. Spans over Basket Slough, Station 645, Holmes Gap-Rickreall Section, West Side Highway	d	.....
871	40′ R. C. Span over Soap Creek, Station 446+88, Monmouth-Suver Section, West Side Highway	d	.....
872	40′ R. C. Span over Soap Creek, Station 451+76, Monmouth-Suver Section, West Side Highway	d	.....
	Sherman County		
817	Two 15′ Timber Spans, Station 554, Moro-Grass Valley Section, Sherman Highway	b	1,750.00
897	Two 21′ Timber Spans over China Hollow Creek, Station 354, Biggs-Wasco Section, Sherman Highway.	b	4,735.00
898	Two 23′ Timber Spans over Spanish Hollow, Station 360, Biggs-Wasco Section, Sherman Highway	b	4,375.00
899	Three 21′ Timber Spans on R. C. Abutments over Spanish Hollow, Station 364, Biggs-Wasco Section, Sherman Highway	b	5,575.00
	Tillamook County		
455	90′ Steel Span over Kilchis River on the Tillamook-Bay City Section, Coast Highway	a	28,390.00
555	140′ Steel Span and 176′ R. C. Viaduct over Nestucca River at Station 884, Beaver-Hebo Section, Coast Highway	a	46,500.00
574	234′ Steel Swing Span, 460 lin. ft. Pile Trestle between Nehalem and Wheeler on Coast Highway	b	75,884.50
867	Two 19′ Spans Pile Trestles over Alder Creek, Station 144+50, Hebo-Dolph Section, McMinnville-Tillamook Highway	d	.....
868	Two 19′ Spans Pile Trestle over Buck Creek, Station 155, Hebo-Dolph Section, McMinnville-Tillamook Highway	d	.....
870	30′ M. B. Span over Clear Creek, Station 500, Neskowin-Hebo Section, Coast Highway	a	5,119.00
877	25′ M. B. Span over Simons Creek, Station 216, Tillamook-Hebo Section, Coast Highway	b	5,311.00
883	24′ R. C. Span over Big Rock Heap Creek, Station 114, Clatsop County Line-Mohler Section, Coast Highway	b	3,730.80
	Umatilla County		
447	Eight 40 R. C. Spans over O.-W. R. & N. tracks and Meacham Creek, Station 1608, Kamela-Cabbage Hill Section, Old Oregon Trail	d	.....
495	60′ Steel Span over Dry Creek at Station 323, Athena-Milton Section, Oregon-Washington Highway	a	11,523.32
694	Six 19′ Spans of Frame Trestle over Cold Springs Canyon, Station 355, Cold Springs-Holdman Section, Pendleton-Cold Springs Highway	a	4,915.45
695	Two 19′ Spans over South Fork of Cold Springs Creek, Station 473, Cold Springs-Holdman Section, Pendleton-Cold Springs Highway	a	1,906.08
754	28′ M. B. Span over Stage Gulch in City of Stanfield, Columbia River Highway	a	3,018.71
843	Two 21′ M. B. Spans over East Birch Creek, Station 765, Vinson Pilot Rock Section, Oregon-Washington Highway	a	2,988.40
844	40′ R. C. Span over Birch Creek, Station 669, Vinson-Pilot Rock Section, Oregon-Washington Highway	a	5,837.53
954	31′ R. C. Span over U. S. R. S. Feed Canal near Echo	d	.....
	Union County		
445	304′ R. C. Viaduct and 188 lin. ft. Pile Trestle over O.-W. R. & N. Co. tracks near Hot Lake, Hot Lake-Union Section, Old Oregon Trail	a	42,643.00
449	Three 43′ R. C. Spans over O.-W. R. & N. tracks near Glover, Kamela-Hilgard Section, Old Oregon Trail	a	19,463.20
450	140′ R. C. Viaduct over O.-W. R. & N. tracks near Telocaset, Old Oregon Trail	a	24,047.82
558	60′ Steel Span over Catherine Creek on the Hot Lake-Union Section, Old Oregon Trail	a	13,131.58

Key to Symbols in Third Column: a—construction completed; b—under construction; d—design completed; f—designed but eliminated by subsequent relocation; h—designed but eliminated by substitution of pipe culvert.

TABLE NO. 27—Continued

Bridge No.	LOCATION AND TYPE OF STRUCTURE	Status Nov. 30, 1922	Estimated Cost
626	135′ R. C. Arch and 174′ R. C. Viaduct over Grand Ronde River and O.-W. R. & N. tracks near Perry, Hilgard-La Grande Section, Old Oregon Trail	d	.....
635	140′ Steel Deck Truss and 182′ R. C. Viaduct over Grand Ronde River and O.-W. R. & N. tracks, Hilgard-La Grande Section, Old Oregon Trail	a	46,342.89
636	197′ R. C. Viaduct over O.-W. R. & N. tracks, North Powder-Telocaset Section, Old Oregon Trail	a	37,381.99
649	30′ R. C. Deck Girder Span over Wolf Creek, Station 102, North Powder-Telocaset Section, Old Oregon Trail	a	4,437.78
693	140′ Steel Span and two 40′ R. C. Deck Girders over Grand Ronde River, near Perry, Hilgard-La Grande Section, Old Oregon Trail	a	23,425.08
718	60′ Steel Span over Five Points Creek, Kamela-Hilgard Section, Old Oregon Trail	a	9,837.11
779	Rehabilitation of present 40′ "I" Beam Span over Catherine Creek in City of Union, Hot Lake-Union Section, Old Oregon Trail	a	2,622.26
796	Two 31′ R. C. Spans, one 240′ Steel Span, one 28′ R. C. Span over Grand Ronde River and O.-W. R. & N. Co. Tracks, Hilgard-La Grande Section, Old Oregon Trail	d	.....
799	140′ Steel Span and 176′ R. C. Approach over O.-W. R. & N. Co. tracks, Island City-Elgin Section, La Grande-Joseph Highway	b	39,988.00
800	140′ through Steel Truss Span, 475′ Pile Trestle over Grand Ronde River near Elgin, Island City-Elgin Section, La Grande-Joseph Highway	b	25,136.50
653	Lining Portals of Mosier Tunnel on Hood River-Mosier Section, Columbia River Highway	a	18,572.52
893	30′ R. C. Span over Eight-Mile Creek, first crossing Eight-Mile Creek-Dufur Section, The Dalles-California Highway	b	5,534.00
894	30′ R. C. Span over Eight-Mile Creek, second crossing Eight-Mile Creek-Dufur Section, The Dalles-California Highway	b	6,119.00
895	Two 24′ R. C. Spans over Eight-Mile Creek, third crossing Eight-Mile Creek-Dufur Section, The Dalles-California Highway	b	5,937.00
896	30′ R. C. Span over Eight-Mile Creek, fourth crossing Eight-Mile Creek-Dufur Section, The Dalles-California Highway	b	5,447.00
917	120′ Steel and 50′ R. C. Span over White River Tygh Valley-Maupin Section, The Dalles-California Highway	b	17,700.00
	Washington County		
628	51 lin. ft. Pile Trestle at Station 40, Forest Grove-Gaston Section, Tualatin Highway	a	1,281.45
736	Rehabilitation of 80′ Steel Pony Truss over Gales Creek, Forest Grove-Gaston Section, Tualatin Highway	a	1,502.70
782	95′ R. C. Viaduct over Scoggins Creek, Station 242, Forest Grove-Gaston Section, Tualatin Highway	a	5,808.34
810	100′ R. C. Viaduct over Tualatin River, Forest Grove-Gaston Section, Tualatin Highway	b	8,157.75
	Wheeler County		
290	70′ Wood Span over Haystack Creek at Station 837, Unit No. 2, Service Creek-Valades Ranch Section, John Day River Highway	a	5,526.96
846	23′ Timber Span over Pioneer Creek, Service Creek Section, John Day River Highway	b	2,340.00
847	23′ Timber Span over Little Service Creek, Service Creek Section, John Day River Highway	b	1,945.00
848	23′ Timber Span over Jerkins Creek, Station 1406, Service Creek Section, John Day River Highway	b	1,685.00
919	Four 19′ Spans over West Branch Creek, Forest Boundary-Mitchell Section, Ochoco Highway	d	.....
940	Four 23′ Timber Spans over Bridge Creek, Station 740, Ochoco Forest Boundary-Mitchell Section, Ochoco Highway	d	.....

Key to Symbols in Third Column: a—construction completed; b—under construction; d—design completed; f—designed but eliminated by subsequent relocation; h—designed but eliminated by substitution of pipe culvert.

TABLE NO. 27—Continued

Bridge No.	LOCATION AND TYPE OF STRUCTURE	Status Nov. 30, 1922	Estimated Cost
	Yamhill County		
416	Six 50′ R. C. Spans over Ash Swale near Amity, Amity-Holmes Gap Section, West Side Highway	b	26,720.00
441	One 80′ Steel Deck Span and 280′ R. C. Viaduct over North Yamhill River at Station 74, McMinnville-Lafayette Section, West Side Highway	a	49,144.66
442	101′ R. C. Viaduct over Deer Creek near Bellevue, McMinnville-Sheridan Section, McMinnville-Tillamook Highway	b	9,395.00
612	Two 56′ Wood Pony Spans, one 19′ Span Pile Trestle over North Yamhill River at Station 171, Bee Ranch Section, McMinnville-Tillamook Highway	a	5,086.59
662	Three 19′ Spans Frame Trestle over Rock Creek, Sheridan - Willamina Section, McMinnville - Tillamook Highway	a	2,000.00
715	1292 lin. ft. Pile Trestle and Repairs to 159′ Steel Span over North Yamhill River, McMinnville-Amity Section, West Side Highway	a	19,600.14
937	One 80′ Steel Pony Span and seven 19′ Frame Trestle Spans over Yamhill River, Sheridan-Willamina Section, McMinnville-Tillamook Highway	b	11,434.15
803	Eight 19′ Spans Frame Trestle over Dry Creek, Station 1235, Island City-Elgin Section, La Grande-Enterprise Highway	b	5,606.50
804	198′ Trestle over Indian Creek, Station 1144, Island City-Elgin Section, La Grande-Joseph Highway	a	8,924.64
818	20′ R. C. Span over Little Creek, Station 686+50, Hot Lake-Union Section, Old Oregon Trail	a	2,740.09
836	Twelve 19′ Spans Pile Trestle over Willow Creek, Station 784, Island City-Elgin Section, La Grande-Joseph Highway	a	5,302.72
837	Three 19′ Spans Pile Trestle at Station 256, Island City-Elgin Section, La Grande-Joseph Highway	b	1,271.36
638	Four 19′ Spans Pile Trestle at Station 219, Island City-Elgin Section, La Grande-Joseph Highway	b	1,671.77
	Wallowa County		
722	Two 19′ Pile Trestle Spans at Station 1438, Wallowa Canyon-Joseph Section, La Grande-Joseph Highway	b	2,800.00
723	80′ Steel Span over Wallowa River, Wallowa-Joseph Section, La Grande-Joseph Highway	b	11,687.50
724	Two 23′ Timber Spans over Trout Creek, Station 1607, Wallowa-Joseph Section, La Grande-Joseph Highway	b	3,536.00
725	Seven 19′ Frame Trestles over Prairie Creek, Station 1866, Wallowa-Joseph Section, La Grande-Joseph Highway	a	10,871.14
791	Two 19′ Spans Frame Trestle over Rock Creek, Station 480, Wallowa Canyon-Lostine Section, La Grande-Joseph Highway	a	2,175.22
792	Four 19′ Spans Frame Trestle over Dry Creek, Station 482, Wallowa Canyon-Lostine Section, La Grande-Joseph Highway	a	3,484.88
793	Three 19′ Spans Frame Trestle at Station 544, Wallowa Canyon-Lostine Section, La Grande-Joseph Highway	a	977.57
794	Three 19′ Spans Frame Trestle, Station 581, Wallowa Canyon-Lostine Section, La Grande-Joseph Highway	a	2,679.86
	Wasco County		
307	113′ R. C. Viaduct, 96′ Frame Trestle over O.-W. R. & N. tracks near Big Eddy on the Columbia River Highway	a	19,132.80
498	110′ R. C. Arch over Mosier Creek near Mosier on the Columbia River Highway	a	41,523.21
524	75′ R. C. Arch Span over Dry Canyon on Mosier-Rowena Section, Columbia River Highway	a	27,174.20

Key to Symbols in Third Column: a—construction completed; b—under construction; d—design completed; f—designed but eliminated by subsequent relocation; h—designed but eliminated by substitution of pipe culvert.

TABLE NO. 28

BRIDGE DESIGNS PREPARED FOR COUNTIES

DECEMBER 1, 1920, TO NOVEMBER 30, 1922

Designs for the following bridges, constructed or to be constructed on county roads, have been prepared by the Highway Department at the request of county road officials. In most cases, the Highway Department has also supervised and engineered the construction work.

For the status of each structure as of November 30, 1922, 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, 1922
	Clackamas County	
604	220′ Steel Span and 160 lin. ft. Trestle over Clackamas River at Park Place on the Oregon City-Portland Road	a
605	105′ Medium Traffic Covered Wood Span, 50 lin. ft. Trestle over Molalla River near Molalla on County Road	a
655	76 lin. ft. Medium Traffic Trestle over Union Mill Race on Swede Stump-Meadowbrook Section, Market Road No. 1	a
656	38 lin. ft. Medium Traffic Trestle over Union Mill Intake on Swede Stump-Meadowbrook Section, Market Road No. 1	a
	Crook County	
935	90′ Steel Span, 76 lin. ft. Trestle over Crooked River on Market Road No. 2	d
	Gilliam County	
926	80′ Steel Span, 72 lin. ft. Trestle over Rock Creek near Gwendolin on Cayuse Canyon Market Road	b
	Harney County	
946	38 lin. ft. Pile Trestle over Pine Creek at Station 41, Pine Creek-Otis Creek Market Road	b
947	38 lin. ft. Pile Trestle over Pine Creek at Station 350, Pine Creek-Otis Creek Market Road	b
	Jackson County	
930	40′ "A"Frame Span, 38 lin. ft. Trestle over North Fork of Little Butte Creek on North Fork of Little Butte Creek Market Road	d
	Klamath County	
797	225 lin. ft. Trestle over Lost River on the Poe Valley Market Road	a
823	60 lin.ft. Trestle over U. S. R. S. Canal on Midland Market Road	d
	Lane County	
932	Checking design for 105′ Wood Span over North Fork of Siuslaw River on a Market Road	b
	Lincoln County	
851	190′ Covered Wood Span, 171 lin. ft. Trestle over Siletz River, ¾ mile north of Siletz	b
852	190′ Covered Wood Span, 95 lin. ft. Trestle over Siletz River, 3 miles north of Siletz	b
853	190′ Steel Span, 152 lin. ft. Trestle over Siletz River at Siletz	b
854	190′ Covered Wood Span, 110 lin. ft. Trestle over Siletz River, 7 miles east of Siletz	b
	Linn County	
819	30 lin. ft. Trestle at Station 162, Church-Cooper Section, Market Road No. 11	a
820	19′ Trestle Span at Station 400, Ash Swale-Carlson Section, Market Road No. 11	a

Key to Symbols in Third Column: a—construction completed; b—under construction; d—design completed; f—designed but eliminated by subsequent relocation.

TABLE NO. 28—Continued

Bridge No.	LOCATION AND TYPE OF STRUCTURE	Status on Nov. 30, 1922
821	19′ Trestle Span at Station 421, Ash Swale-Carlson Section, Market Road No. 11	a
822	57 lin. ft. Trestle at Station 360, Ash Swale-Carlson Section, Market Road No. 11	a
938	23′ Trestle Span at Station 317, Ash Swale-Carlson Section, Market Road No. 11	a
	Malheur County	
943	80′ Steel Span, 34 lin. ft. Trestle over Malheur River near Juntura on County Road	b
	Marion County	
962	Three 34′ R. C. Spans over Little Pudding River on Salem-Silverton Road	b
	Polk County	
760	80′ Steel Span over Rickreall Creek at Hosford Station on County Road	a
761	80′ Steel Span over Little Luckiamute River, 5 miles southwest of Monmouth on County Road	a
	Sherman County	
701	40′ R. C. Bridge over Fulton Canyon near Millers Siding on Fulton Canyon Market Road	f
	Tillamook County	
633	100′ Steel Span and 152 lin. ft. Trestle over North Fork of Nehalem River near Mohler on County Road	a
	Umatilla County	
927	19′ Timber Span on Gravity Abutments over East Birch Creek on Birch Creek Market Road	d
	Wasco County	
939	60′ Steel Deck Truss Span over Deschutes River at Shearars on County Road	b
	Washington County	
918	5′x7′ R. C. Box Culvert at Station 23, Hillsboro-North Plains Market Road	d

Key to Symbols in Third Column: a—construction completed; b—under construction; d—design completed; f—designed but eliminated by subsequent relocation.

TABLE NO. 29

RECAPITULATION OF TRAFFIC COUNTS MADE BY THE STATE HIGHWAY DEPARTMENT DURING YEARS 1921 AND 1922

The numbers given in this table are the numbers of vehicles of all kinds passing the observation points listed, between the hours of 6:00 a. m. and 10:00 p. m. on the dates stated at the heads of the columns. In those columns for which the dates given cover more than one day, the number of vehicles given is the average per day for the dates given. A blank in a column opposite any particular observation point signifies that no count of the traffic at that point was made upon that particular date. Detail as to the number of each kind of vehicle passing a given observation point during each hour of each of the observation dates will be furnished upon application.

OBSERVATION POINT	July 15, 16, 17, 1921, Saturday, Sunday and Monday	May 13, 14, 15, 1922, Saturday, Sunday and Monday	June 13, 1922, Tuesday	July 19, 1922, Wednesday	Aug. 17, 1922, Thursday	Sept. 15, 1922, Friday	Oct. 21, 1922, Saturday
Pacific Highway—							
Sucker Creek Bridge	.....	994	541	602	451	514	493
Parkplace Bridge north of Oregon City	.....	3,473	3,228	3,110	2,934	2,947	2,854
New Era	1,932	.....	.....	.....	.....	.....	.....
Pudding River Bridge at Aurora	.....	1,667	1,157	1,360	1,455	1,377	1,462
One-quarter mile south of Aurora	1,347	.....	.....	.....	.....	.....	.....
Jct. with Liberty Rd. south of Salem	.....	1,322	.....	.....	.....	.....	.....
One-quarter mile south of Albany	828	313	280	.....	.....	444	537
Junction City	812	1,031	224	1,052	271	278	859
Creswell	505	785	674	930	1,007	815	.....
One mile south of Divide	437	.....	.....	.....	.....	.....	.....
Yoncalla	.....	344	.....	531	620	505	461
North limits of Roseburg	.....	979	1,006	.....	1,268	939	1,246
One mile south of Roseburg	796	775	856	1,143	.....	1,101	1,143
Jct. with Coos Bay-Roseburg H'way	.....	.....	.....	.....	857	.....	.....
One-half mile south of Canyonville	306	231	296	449	420	338	215
One mile north of Grave Creek Bridge	319	243	269	428	415	365	246
Three miles north of Grants Pass	527	419	405	583	577	517	484
One mile south of Grants Pass	741	737	641	930	924	942	856
One mile north of Medford	1,283	.....	.....	.....	.....	.....	.....
One mile south of Medford	1,688	1,408	1,297	1,598	1,714	.....	1,717
Three miles south of Ashland	699	.....	.....	.....	.....	.....	.....
Jct. with Klamath Falls Highway	.....	405	308	419	428	432	348
Three miles north of California Line	270	278	233	377	340	323	249
Columbia River Highway—							
Clatsop-Columbia County Line	.....	442	432	651	706	.....	501
West limits of Rainier	1,335	.....	.....	.....	.....	.....	.....
Columbia-Multnomah County Line	.....	1,376	993	1,243	1,461	.....	1,046
One-half mile west of Cascade Locks	1,146	817	662	878	952	729	695
2.5 miles west of Hood River	928	858	545	749	751	629	694
Near Hood River Bridge	677	1,607	822	905	739	672	590
West limits of The Dalles	.....	766	655	909	903	697	659
East limits of The Dalles	585	686	752	870	773	855	645
Rufus	.....	109	275	306	319	273	206
Quinton	155	.....	.....	.....	.....	.....	.....
Arlington	.....	283	361	422	456	400	366
One-half mile east of Heppner Jct.	.....	103	171	236	234	211	244
Boardman	158	114	192	265	261	213	157
Junction with Cold Springs Road near Umatilla	.....	213	234	368	382	312	188
One-half mile north of Hermiston	222	.....	.....	.....	.....	.....	.....
Nolin	202	184	271	308	365	312	417

TABLE NO. 29—Continued

OBSERVATION POINT	July 15, 16, 17, 1921 Saturday, Sunday and Monday	May 13, 14, 15, 1922 Saturday, Sunday and Monday	June 13, 1922, Tuesday	July 19, 1922, Wednesday	Aug. 17, 1922, Thursday	Sept. 15, 1922, Friday	Oct. 21, 1922, Saturday
West Side Highway—							
Multnomah-Washington Co. Line	.....	1,727	1,325	1,311	1,305	1,134	1,507
West Dayton	1,185	886	690	609	598	478	633
Junction with Tualatin Highway	388	82	58	174	127	461	879
Junction with McMinnville-Tillamook Highway	282	133	.....	333	1,075	432	1,028
North of junction at Rickreall	256	241	215	191	275	.....	276
South of junction at Rickreall	.....	238	342	213	231	.....	230
Marys River Bridge at Corvallis	795	985	788	933	1,110	943	971
Junction with Pacific Highway	216	971	645	831	991	809	255
The Dalles-California Highway—							
Jct. with Columbia River Highway	705	757	737	892	860	789	898
One mile south of Dufur	.....	.....	.....	.....	109	152	160
Tygh Valley Grade	.....	83	92	70	.....	.....	.....
18 miles north of Madras	69	.....	.....	100	112	84	.....
One mile north of Madras	.....	57	98	.....	.....	.....	.....
One mile north of Redmond	225	277	230	238	277	233	403
Five miles north of Bend	239	174	143	159	131	.....	240
One mile south of Bend	272	264	139	178	206	.....	228
Sand Creek, 11 miles north of Kirk	45	25	32	45	53	28	17
Barclay Springs	153	139	112	138	182	153	147
Junction with Klamath Falls-Lakeview Highway	149	254	226	199	186	230	308
California State Line	.....	.....	.....	123	223	225	114
John Day Highway—							
Jct. with Columbia River Highway	.....	180	106	96	78	99	173
North limits of Condon	69	94	106	111	58	100	111
South limits of Condon	79	116	122	113	197	168	147
West limits of Fossil	67	118	100	89	109	241	132
2.5 miles south of Sarvice Creek Summit	.....	.....	50	41	35	48	94
Sarvice Creek Postoffice	.....	33	.....	.....	.....	.....	.....
One-quarter mile east of Dayville	129	28	16	41	17	26	56
Eight miles east of John Day	99	102	110	115	109	112	153
One mile west of Canyon Creek	.....	129	120	150	166	109	146
Jamieson	62	159	89	20	125	112	145
West of Cairo	137	166	.....	168	237	195	196
South of Cairo	216	222	205	243	257	273	290
Old Oregon Trail—							
Cabbage Hill, 9 miles east of Pendleton	136	155	162	155	211	186	181
Meacham	.....	16	128	173	153	210	108
One mile east of Hilgard	.....	.....	127	.....	.....	.....	.....
Country Club, between Perry and La Grande	306	203	.....	170	398	263	298
East limits of La Grande	.....	595	617	596	568	544	.....
Lone Tree, between La Grande and Hot Lake	464	.....	.....	.....	.....	.....	.....
Two miles south of Union	170	153	180	198	223	209	168
South limits of Haines	245	.....	.....	.....	.....	.....	.....
Four miles south of Haines	.....	187	187	259	302	275	291
Weatherby	60	31	91	84	88	79	87
Olds Ferry Road, 6 miles east of Huntington	61	26	73	108	101	91	77
Five miles north of Ontario	.....	205	148	176	196	194	242
One-quarter mile east of Ontario	690	699	498	653	553	625	825
Central Oregon Highway—							
One mile east of Bend	126	192	114	196	213	.....	217
15 miles west of Burns	15	20	20	37	.....	43	39
Four miles east of Burns	37	80	67	43	.....	85	110
West limits of Vale	186	155	90	74	144	133	131

TABLE NO. 29—Continued

OBSERVATION POINT	July 15, 16, 17, 1921, Saturday, Sunday and Monday	May 13, 14, 15, 1922, Saturday, Sunday and Monday	June 13, 1922, Tuesday	July 19, 1922, Wednesday	Aug. 17, 1922, Thursday	Sept. 15, 1922, Friday	Oct. 21, 1922, Saturday
Oregon-Washington Highway—							
One-half mile east of Heppner Jct.	.....	16	8	7	11	15	5
One-half mile east of Morgan	.....	53	48	50	78	73	72
One-half mile east of Lexington	257	110	112	80	119	129	137
Six miles east of Heppner	133	29	41	45	17	28	32
Lena	22	23	27	30	25	26	33
One mile north of Pilot Rock	173	143	153	143	125	122	140
One-half mile east of Havana	533	580	519	531	702	630	651
One mile north of Freewater	1,564	1,198	1,536	1,187	1,288	1,142	1,007
Roosevelt Coast Highway—							
Warrenton Rd. at west end of cut-off	.....	600	265	.....	.....	.....	296
Warrenton Cut-off at junction	.....	974	122	.....	.....	.....	406
South of junction	.....	1,400	300	.....	.....	.....	560
O'Hanna Creek Bridge	1,034	.....	.....	1,474	1,925	.....	.....
North of Cannon Beach Road	270	172	165	429	475	.....	129
Cannon Beach Road	114	119	106	384	404	.....	86
South of Cannon Beach Road	56	53	68	151	123	.....	81
North of Garibaldi Road	286	218	80	111	256	.....	147
Garibaldi Road	.....	64	121	203	509	.....	212
South of Garibaldi Road	119	.....	110	147	459	.....	257
Beaver	299	.....	.....	.....	.....	.....	.....
North of Hebo	.....	84	176	192	438	.....	208
South of Hebo	.....	114	194	120	395	.....	275
Midway between North Bend and Marshfield	.....	1,140	957	1,163	1,217	1,107	1,477
Midway between Marshfield and Coquille	.....	396	224	282	269	314	291
One-half mile north of Coquille	431	.....	.....	.....	.....	.....	.....
Coquille River at Coquille	247	73	153	132	107	187	296
Coos-Curry County Line	195	135	127	135	164	145	136
One mile north of Port Orford	.....	94	112	149	124	147	115
One mile south of Port Orford	.....	37	50	80	88	42	31
La Grande-Enterprise Highway							
East limits of La Grande	742	592	695	653	686	613	.....
Two miles east of Elgin	174	.....	.....	.....	.....	.....	.....
Five miles east of Elgin	.....	46	53	80	81	77	98
Minam	.....	51	40	85	78	52	74
Two miles east of Wallowa	50	114	78	113	126	147	185
One mile west of Lostine	210	.....	.....	.....	.....	.....	.....
Four miles north of Joseph	251	213	201	222	300	336	370
Baker-Cornucopia Highway—							
Foot of Flagstaff Hill	150	130	116	113	140	146	118
McKenzie Highway—							
One mile east of Springfield	.....	569	.....	.....	.....	.....	.....
Two miles east of Vida	.....	.....	.....	.....	.....	.....	33
Thurston	470	.....	211	220	216	190	284
Two miles west of Redmond	113	133	129	81	85	93	197
Bend-Sisters Highway—							
Jct. with The Dalles-California Hwy.	121	181	94	100	176	.....	91
Lakeview-Burns Highway—							
Lake Albert, 27 miles north of Lakeview	.....	26	35	24	30	34	43
Prineville-Lakeview Highway—							
Five miles north of Lakeview	95	89	97	70	102	139	122
Three miles south of Lakeview	.....	93	89	79	108	133	111

TABLE NO. 29—Continued

OBSERVATION POINT	July 15, 16, 17, 1921, Saturday, Sunday and Monday	May 13, 14, 15, 1922, Saturday, Sunday and Monday	June 13, 1922, Tuesday	July 19, 1922, Wednesday	Aug. 17, 1922, Thursday	Sept. 15, 1922, Friday	Oct. 21, 1922, Saturday
Klamath Falls-Lakeview Highway—							
Jct. with The Dalles-Calif. Highway	356	170	164	164	174	203	293
Olene	205	179	153	.....	.....	.....	.....
Beatty	45	12	63	.....	.....	.....	.....
Three miles west of Lakeview	.....	95	108	92	102	153	247
Ashland-Klamath Falls Highway—							
Junction with Pacific Highway	.....	85	82	89	87	79	90
Jenny Creek	35	11	57	49	47	.....	52
Medford-Crater Lake Highway—							
Little Butte Creek near Eagle Point	.....	259	156	341	388	.....	297
McLeod Bridge, 32 miles north of Medford	186	.....	.....	.....	.....	.....	.....
Near Prospect	.....	45	86	226	.....	.....	.....
12 miles north of Prospect	138	.....	.....	.....	.....	.....	.....
Grants Pass-Crescent City Highway—							
Junction with Pacific Highway	377	462	397	604	526	622	659
Four miles south of Waldo	71	16	27	49	56	72	14
Mount Hood Loop Highway—							
Forks of road east of Sandy	210	222	187	206	145	.....	175
Salmon River near Brightwood	.....	35	37	61	67	.....	43
Four miles south of Hood River	.....	538	486	339	389	404	595
Jct. with Columbia River Highway	401	.....	.....	.....	.....	.....	.....
Alsea River Highway—							
One-half mile west of Philomath	311	.....	.....	.....	.....	.....	.....
Tualatin Valley Highway—							
East of junction with Canyon Road	.....	1,254	797	878	819	645	879
Canyon Road at junction	.....	1,361	1,029	1,113	1,041	1,073	1,231
West of junction with Canyon Road	.....	2,270	1,652	1,782	1,622	1,606	1,958
West limits of Hillsboro	1,506	.....	.....	.....	.....	.....	.....
Gales Creek Bridge south of Forest Grove	.....	764	475	605	529	622	764
Junction with West Side Highway	409	565	367	422	395	454	607
Salem-Dallas Highway—							
East of junction at Rickreall	190	490	373	498	511	.....	543
West of junction at Rickreall	138	438	152	338	415	.....	463
McMinnville-Tillamook Highway—							
Junction with West Side Highway	650	705	665	626	740	634	613
Midway	.....	178	190	262	363	240	272
Salmon River Road at Midway	.....	.....	5	13	13	10	6
Dolph	310	.....	.....	.....	326	297	271
Junction with Coast Hwy. at Hebc	.....	113	102	133	387	.....	333
Corvallis-Newport Highway—							
Forks of Road near Corvallis	100	.....	.....	.....	.....	.....	.....
Depot Slough Bridge	.....	98	73	248	188	136	159
Siletz Market Road	.....	25	62	61	88	92	95
Willamette Valley-Florence Highway—							
One mile west of Junction City	77	95	180	.....	.....	.....	.....
Two miles west of Goldson	.....	.....	.....	79	34	114	85

TABLE NO. 29—Continued

OBSERVATION POINT	July 15, 16, 17, 1921, Saturday, Sunday and Monday	May 13, 14, 15, 1922, Saturday, Sunday and Monday	June 13, 1922, Tuesday	July 19, 1922, Wednesday	Aug. 17, 1922, Thursday	Sept. 15, 1922, Friday	Oct. 21, 1922, Saturday
Coos Bay-Roseburg Highway—							
Jct. with Dillard Rd. near Brockway	162	66	148	122	145	125	122
Dillard Road	.....	56	76	43	48	105	44
West of junction with Dillard Road	.....	76	131	107	120	165	129
Bridge	.....	.....	66	91	88	140	159
Two miles south of Coquille	277	250	249	300	252	189	284
Crooked River Highway							
Mill Creek near Prineville	99	49	46	58	49	66	69
Ochoco Highway—							
One mile west of Prineville	172	159	119	109	143	167	225
One mile east of Prineville	158	164	138	162	163	227	277
Sherman Highway—							
North of Moro	440	.....	.....	.....	.....	.....	.....
One mile south of Moro	.....	191	116	134	204	184	180
Albany-Corvallis County Road—							
West Side Road, 0.25 mile west of bridge	.....	868	715	646	907	822	547
East Side Road, 0.25 mile west of Albany	.....	428	.....	.....	.....	255	576
Total vehicles counted	41,363	56,573	44,718	52,602	57,589	43,679	54,361

PERCENTAGE CLASSIFICATION OF VEHICLES COUNTED

CLASS OF VEHICLE	July 15, 16, 17, 1921, Saturday, Sunday and Monday	May 13, 14, 15, 1922, Saturday, Sunday and Monday	June 13, 1922, Tuesday	July 19, 1922, Wednesday,	Aug. 17, 1922, Thursday	Sept. 15, 1922, Friday	Oct. 21, 1922, Saturday,
Horse drawn vehicles	3.75	2.60	3.89	2.61	3.45	4.16	3.77
Motorcycles	1.19	1.79	1.17	0.94	0.92	1.18	0.89
Passenger cars, Oregon	72.82	79.93	66.78	63.66	64.20	65.19	73.81
Passenger cars, other states	14.50	7.74	14.83	21.65	20.03	17.08	10.82
Trucks, under 1.5 tons	4.55	4.81	7.46	6.11	6.55	6.68	6.22
Trucks, 1.5 tons and over	3.19	3.13	5.87	5.03	4.85	5.71	4.49
Totals	100	100	100	100	100	100	100

NORTH OF OTTER CREST IN LINCOLN COUNTY; ON A SECTION OF THE ROOSEVELT COAST HIGHWAY PROPOSED FOR EARLY CONSTRUCTION

Description of Work

of the

State Highway Department

in the

Counties of the State

1921-1922

BAKER COUNTY

There was considerable activity in highway construction in Baker County during the period covered by this report, and the close of the working season of 1922 will show the completion of the Old Oregon Trail across the County, a distance of approximately 70 miles.

On December 7, 1921, Baker County awarded the contract for grading approximately 13 miles of the Baker-Cornucopia highway through the lower Powder River Canyon to Oxman & Harrington, contractors, Baker, Oregon. It is anticipated this construction will be completed in February, 1923. The completion of this unit will eliminate the Sparta Summit and allow winter travel between Baker and the prosperous Eagle and Pine Valleys.

During the two-year period location surveys have been made and estimates prepared for grading the Baker-Unity Highway, a distance of approximately 46 miles, affording connection with the John Day Highway at the latter point. It is anticipated that the portion of this highway between Baker and the confluence of Mill Gulch and Burnt River will be graded during the season of 1923.

Approximately eight miles of market road work were constructed in 1921 and 1922, and the plans and estimates for approximately 10 miles were made during the fall of 1922 preparatory to spring construction.

R. H. Baldock was Division Engineer during this period of construction in Baker County.

[BAKER]

North Powder-Haines Grading and Surfacing

Contract No. 293 for grading and surfacing the North Powder-Haines Section of the Old Oregon Trail was awarded to Oxman & Harrington of Baker, Oregon, on August 24, 1920. A small amount of work was accomplished during the 1920 working season and the section was carried to completion by August 20, 1921. A more detailed description of this project will be found on page 138 of the Fourth Biennial Report.

Total expenditures on the project amount to $115,302.74, of which the County cooperated to the extent of $55,942.37, the State paying the balance of $59,360.37. Expenditures during 1920 amounted to $8,934.90, having been paid $1,373.54 by the State and $7,561.36 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,590.43
Work by State forces to complete job (deducted from contractor's estimate)		223.77
Contract items as follows:		
Clearing and grubbing, all	$ 300.00	
Common excavation, 53,257.7 cu. yds. at 50c	26,628.85	
Overhaul, 52,127.0 sta. yds. at 5c	2,606.35	
12-inch plain concrete pipe, 1,761.0 lin. ft. at $2.00	3,522.00	
18-inch reinforced concrete pipe, 180.0 lin. ft. at $3.00	540.00	
24-inch reinforced concrete pipe, 368.0 lin ft. at $4.00	1,472.00	
36-inch reinforced concrete pipe, 172.0 lin. ft. at $7.00	1,204.00	
Class "A" concrete, 288.91 cu. yds. at $32.00	9,245.12	
Class "C" concrete, 70.39 cu. yds. at $28.00	1,970.92	
Lumber and timber, 27.931 M-FBM at $70.00	1,955.17	
Metal reinforcement, 19,142.0 lbs. at 10c	1,914.20	
Riprap, 17.6 cu. yds. at $3.00	52.80	
Gravel surfacing, 17,047.0 cu. yds. at $2.95	50,288.65	
Adjustment due to change in plans	1,598.77	
Riprap, 17.6 cu. yds. at $3.00	52.80	
Force account items:		
Installing galvanized iron pipe syphons	2,871.07	
Extra riprapping at North Powder River Bridge	424.83	
Replacing double 12-inch pipe culvert with single 24-inch pipe culvert	18.13	
Repairing bridge at Sta. 102+00	1,099.45	
Total amount earned by contractor	$107,712.31	
Deduction:		
Completing contract with State forces	223.77	
Total amount paid to contractor		107,488.54
Grand total cost of project		$115,302.74
Paid by State	$ 59,360.37	
Paid by County	55,942.37	
Total	$115,302.74	

Baker-Haines Grading and Surfacing

A report on the construction of this section will be found on page 138 of the Fourth Biennial Report.

The work was entirely completed during 1920. During the present biennium delayed charges of $4,133.56 have been made, $2,735.72 by the State and $1,397.84 by Baker County. This brings the total completed cost of the section to $105,689.77, the State share being $69,535.31 and the County share $36,154.46.

[BAKER]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8,710.78
Force account work by State forces		105.00
Purchase of gravel pit		221.80
Rental of tractor (deducted from amount earned by contractor)		75.00
Repairs to tractor (deducted from amount earned by contractor)		123.55
Royalty on gravel (deducted from amount earned by contractor)		600.00
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 $1,000.00	4,488.00	
Overhaul, 44,620.0 sta. yds. at 5c	2,231.00	
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, 15.882.0 lbs. at 10c	1,588.20	
12-inch corrugated galvanized iron pipe, 442.0 lin. ft. at $1.95	861.90	
18-inch corrugated galvanized iron pipe, 304.0 lin. ft. at $2.60	790.40	
24-inch corrugated galvanized iron pipe, 86.0 lin. ft. at $3.50	301.00	
Crushed gravel, 20,047.6 cu. yds. at $2.70	54,128.52	
Payhaul on gravel, 17,379.65 yd. mi. at 33⅓c	5,793.22	
Force account items:		
Replacing right-of-way fence	21.24	
Changing headgates and digging irrigation ditch	61.09	
Wet excavation for footings of Menke Creek culvert	480.33	
Moving crusher plant to new site account original gravel pit condemned	575.99	
Changing width of grader road section	829.89	
Reconstructing irrigation ditch	115.01	
Total amount earned by contractor	$ 96,652.19	
Deductions for royalty on gravel, tractor rental and repairs	798.55	
Total amount paid to contractor		95,853.64
Grand total cost of project		$105,689.77
Paid by State	$ 69,535.31	
Paid by County	36,154.46	
Total	$105,689.77	

Baker-Haines Ditching and Resurfacing

During the fall of 1919 and the spring and summer of 1920, that section of the Old Oregon Trail between Baker and Haines was graded and macadamized. This road followed an entire new location, paralleling the Oregon-Washington railroad through the valley of the Powder River.

During the spring of 1920 the section carried the intensive truck travel incident to macadam construction, and no serious conditions resulted in the spring of 1921. However, the water table through this portion of the valley is very high, a condition further aggravated by the farmers diking their lands, preventing a quick runoff of the water.

The winter of 1921-22 was very cold, the frost penetrating the ground to considerable depth, and during the spring thaw the macadam broke through in a number of places. In order to alleviate this condition plans were prepared for ditching and draining the entire section, therein lowering the water table, and resurfacing with additional gravel to a depth from two to six inches, according to the condition of the surfacing.

Examination of this section during the spring of 1922 indicated that there were a number of springs under the roadbed and these were treated by filling in with heavy rock from a quarry south of Baker. It may be that another severe season will cause springs to break out at other places, in which event the same treatment will be necessary. To care for this

contingency stock piles of 1,800 cubic yards of gravel were crushed in readiness to assist in repairing any holes that might develop.

The contract for ditching and resurfacing, and crushing maintenance materials, was awarded to the Newport Construction Company, Hermiston, Oregon, July 26, 1922, and the work was completed on November 4 of the same year.

F. S. Davis is Resident Engineer in charge of the work, which has entailed expenditures of $15,821.52 out of a total estimated cost of $29,600.00 from State funds.

Baker-Middle Bridge Post Road Project

A complete report of this project will be found on page 139 of the last report. During the present biennium no expenditures have been made on the project, but the sum of $19,036.05 has been collected from the Federal Government, bringing their total final cooperative payments to $57,269.18. At the time of this report, the sum of $11,222.97 is still due from Baker County for their final cooperation.

Nelson-Malheur County Line Grading and Surfacing

This section extends through the Burnt River Canyon from Nelson to the Malheur County Line. The grading of the portion from Nelson to Huntington was completed under separate contract during 1921 and the early part of 1922.

From Huntington the located highway turns south across an easy pass and descends to the Snake River, striking the bank of this stream near the Baker-Malheur County Line. The grading of this latter section, 4.85 miles in length, together with the surfacing of the entire section from Nelson to the Malheur County line, a total length of 24.09 miles, was awarded to Porter & Conley, contractors, Portland, Oregon, under contract No. 501, on March 23, 1922. Work was begun April 12, and completed in November of the same year.

The eastern part of Oregon is especially blessed with an abundance of good surfacing materials and this is no where better exemplified than in the Burnt River Canyon, where the road metal was crushed from limestone talus slides. The limestone in this section is very hard and will stand considerable wear, while the decomposed nature of the talus slides gives a high percentage of lime dust which sets up the macadam from shoulder to shoulder with a surface free from depressions and inequalities, almost comparable with pavement.

In riding over this section it is difficult for the modern tourist to realize the hardships of the early pioneers. The automobile is able to make in a day's journey a distance which required weeks in the late forties.

The construction of the project was under the supervision of C. E. Carter, Resident Engineer, and when all final payments are made, is estimated to cost a total of $121,500.00. Of this amount the County and City of Huntington will cooperate to the extent of $26,309.75, the balance being paid by the State. Expenditures to date amount to $101,381.16, of which the County has paid $3,830.60, the City of Huntington $2,024.70, and the State the balance of $95,525.86.

[BAKER]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,454.57
State force work in connection with the construction of rock walls and a drinking fountain for convenience of traveling public		687.98
Sprinkling gravel through City of Huntington		717.11
Repair parts for truck purchased from State (deducted from contractor's estimate)		8.00
Contract items as follows:		
Clearing and grubbing, all	$ 20.00	
Common excavation, 21,135.0 cu. yds. at 24c	5,072.40	
Intermediate excavation, 2,270.0 cu. yds. at 40c	908.00	
Overhaul, 2,500.0 sta. yds. at 5c	125.00	
12-inch plain concrete pipe, 639.0 lin. ft. at $1.25	798.75	
18-inch reinforced concrete pipe, 289.0 lin. ft. at $2.05	592.45	
24-inch reinforced concrete pipe, 108.0 lin. ft. at $2.75	297.00	
36-inch reinforced concrete pipe, 296.0 lin. ft. at $5.50	1,628.00	
Class "C" concrete, 72.5 cu. yds. at $25.00	1,812.50	
Broken stone surfacing, 36,451.0 cu. yds. at $1.94	70,714.94	
Broken stone placed in piles for future maintenance, 1,813.0 cu. yds. at $1.94	3,517.22	
Crushed gravel surfacing for City of Huntington, 800.0 cu. yds. at $2.25	1,800.00	
Crushed gravel placed in piles for future maintenance for City of Huntington, 300.0 cu. yds. at $1.94	582.00	
Filler, 6,980.0 cu. yds. at 5c	349.00	
Payhaul on filler, 13,000.0 yd. mi. at 40c	5,200.00	
Force account items:		
Removing slides, building up superelevation on curves, removing boulders and debris left by cloudburst	7,309.40	
Grading through City of Huntington	291.15	
Furnishing lumber for rock checker's tents	27.90	
Total amount earned by contractor	$101,045.71	
Deductions for truck parts purchased from State	8.00	
Percentage retained until completion of contract	8,524.21	
Total amount paid to contractor		92,513.50
Grand total expended		$101,381.16
Paid by State	$ 95,525.86	
Paid by County	3,830.60	
Paid by City of Huntington	2,024.70	
Total	$101,381.16	

Love Bridge-Black Bridge Grading

On December 7, 1921, Baker County received bids and awarded a contract for grading 13.22 miles between Love Bridge and Black Bridge on the Baker-Cornucopia Highway. In accordance with request of the County, this contract was prepared by this Department, being entered on our records as contract No. 553, and the construction has been supervised by the State in the same manner as other State projects. It is anticipated that the grading will be completed in February of next year and, when done, will eliminate the Sparta Summit and allow winter travel between Baker and the prosperous Eagle and Pine Valleys.

Construction has been carried on under the supervision of F. S. Miller, Resident Engineer, and represents expenditures to date of $66,642.45, of which the County has paid construction expenditures to the amount of $59,555.33 and the State has paid engineering costs to the amount of $7,087.12. The completed work is estimated to cost a total of $128,000.00, of which the State share for engineering will be $11,000.00 and the County construction cost $117,000.00.

[BAKER]

Canyon Section Post Road Project

A description of this section will be found on pages 141-2 of the Fourth Biennial Report. During the present biennium expenditures of $1,177.29 have been made by the State and $31,766.83 has been received from the Federal Government for the balance of their cooperative share. This brings the total cost of the project to $112,904.60, which has been paid $54,653.07 by the State, $9,310.06 by the County, and $48,941.47 by the Federal Government. At the present time the sum of $14,400.04 is due from Baker County to complete their cooperative share.

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. yds. at 72c	20,470.68	
Solid rock excavation, 24,286.1 cu. yds. at $1.40	34,000.54	
Overhaul, 20,245.0 sta. yds. at 4c	809.80	
12-inch corrugated galvanized iron pipe, 1,220.0 lin. ft. at $2.25	2,745.00	
18-inch corrugated galvanized iron pipe, 534.0 lin. ft. at $3.75	2,002.50	
24-inch corrugated galvanized iron pipe, 138.0 lin. ft. at $5.00	690.00	
36-inch corrugated galvanized iron pipe, 80.0 lin. ft. at $7.50	600.00	
Class "A" concrete, 108.85 cu. yds. at $30.00	3,265.50	
Metal reinforcement, 13,145.0 lbs. at 10c	1,314.50	
Hand placed rock slopes, 425.0 sq. yds. at $1.50	637.50	
Rubble masonry, 93.0 cu. yds. at $20.00	1,860.00	
Force account items:		
Salvaging old culvert pipe	294.55	
Hauling lumber and building floors for engineer's camp	19.33	
Moving telephone lines	60.83	
Erecting irrigation flume in new location	571.75	
Changing bridge over Emigrant Creek	593.66	
Changing bridge at station 151+00	61.24	
Changing location of water pipe line across highway	180.01	
Building rock toe wall	519.71	
Total amount paid to contractor		70,712.10
Grand total cost of project		$ 77,483.99
Paid by State	$ 38,786.89	
Paid by County	6,000.00	
Paid by Government	32,697.10	
Total	$ 77,483.99	

SURFACING

Engineering		$ 2,588.56
Contract item as follows:		
Crushed gravel surfacing, 9,282.5 cu. yds. at $3.50	$ 32,488.75	
Force account items:		
Removing slides and widening grade	160.81	
Cleaning out ditches and culverts	182.49	
Total amount paid to contractor		32,832.05
Grand total cost of project		$ 35,420.61
Paid by State	$ 15,866.18	
Paid by County	3,310.06	
Paid by Government	16,244.37	
Total	$ 35,420.61	

[BAKER]

GRAND SUMMARY OF EXPENDITURES

	State	County	Government	Total
Grading	$38,786.89	$ 6,000.00	$32,697.10	$ 77,483.99
Surfacing	15,866.18	3,310.06	16,244.37	35,420.61
Totals	$54,653.07	$ 9,310.06	$48,941.47	$112,904.60

Baker-Nelson Post Road Project

This section of the Old Oregon Trail extends from the south city limits of Baker to the initial point of the Nelson-Malheur County Line Section, near Nelson, and is being constructed in cooperation with the County and Federal Government under the terms of Post Road Agreement No. 66. For the purposes of construction, the work has been divided into three contracts covering the grading and surfacing, four small bridges and the Unity Overcrossing, respectively.

Grading and Surfacing:

Contract No. 525 for grading and surfacing the entire 26.95 miles of the section was awarded to the Security Construction Company on April 14, 1922. Work was started on the twentieth of the same month and at the date of this report 25 miles have been graded and 18 miles have been surfaced. The entire grading and surfacing is estimated to cost $250,000, of which amount the State will pay $99,503.67 and the Federal Government $150,496.33. The expenditures to date amount to $159,974.21, which has been paid $76,373.64 by the State and $83,600.57 by the Federal Government.

Four Bridges:

Three small concrete bridges and one 60′ steel truss span over Pritchard Creek were awarded under Contract 522 to James J. Burke & Co., of Salt Lake City, Utah, on April 14, 1922. Work began on June 20, but has not been completed at the date of this report. The final cost of the four structures is estimated at $21,500, to be paid $10,080.89 by the State and $11,419.11 by the Federal Government. The expenditures to date amount to $13,302.89, and have all been advanced from State funds.

Unity Overcrossing:

Between Pleasant Valley and Durkee, the highway crosses the Oregon-Washington Railroad and Navigation Company's tracks by means of what is known as the Unity Overcrossing. The structure consists of a concrete viaduct having one thirty-eight foot and two thirty-six foot spans, and is one of the least expensive overcrossings constructed in that part of the State, its cost being $10,692.51. As in the case of other similar structures, a hearing was held before the Public Service Commission and their Order No. 707 apportioned the cost of the structure at twenty per cent to the County, forty per cent to the Railroad Company and forty per cent to the State. Owing to the Federal cooperation received on the structure as a portion of the Post Road Project, the cost will work out to payments of $2,138.50 by the County, $6,667.87 by the Government, $4,277.00 by the Railroad Company, with a credit of $2,390.86 to the State. The entire $10,692.51 mentioned above has been expended from State funds, and the various amounts of cooperation given are now due the State. These, when received, will accrue as a credit to the State expenditures.

Summing up the entire project, it is estimated to cost a total of $282,192.51, to be shared $107,193.70 by the State, $2,138.50 by Baker County, $168,583.31 by the Federal Government and $4,277.00 by the O.-W. R. & N. Co. Expenditures to date amount to $183,969 61, which have been paid $100,369.04 by the State and $83,600.57 by the Federal Government.

[BAKER]

Nelson-Huntington Grading

The pioneers who crossed the wilderness from the Missouri River to the fertile valleys of Oregon found that the most difficult sections on their journey were the crossings of the Snake River and the passage through the Burnt River Canyon.

When the Union Pacific Railroad was built, it followed for the main portion the trail blazed by these men and the line was located through the Burnt River Canyon from Huntington to Durkee. In view of the fact that the railroad company took the best portion of the canyon, involving the easiest construction, the location and grading of a highway through this section has been very difficult and expensive.

On the eighteenth of January, 1921, a force of men under Copenhagen Brothers, contractors of Portland, Oregon, began grading that section of the Old Oregon Trail between Nelson and Huntington, in Baker county, under the terms of contract No. 319, awarded January 4, 1921. The work was completed, with the exception of the backfilling of bridges, during February, 1922.

In view of the fact that the grading contractors were unable to backfill the bridge approaches, with particular reference to the overhead structure three miles west of Huntington, their contract was extended until these structures were completed. The grading operations were entirely completed August 21, 1922.

The total length of the section is 19.29 miles, of which 19 miles were completed in 1921 and 0.29 miles in 1922.

J. M. Clark was Resident Engineer in charge of the work in 1921. and C. E. Carter, Resident Engineer, was in charge in 1922. When all final payments have been made, the work is estimated to require a total expenditure of $270,995.13, which will be borne $184,203.54 by the State, $85,000.00 by the County and $1,791.59 by the railroad. Expenditures to date amount to $259,807.57, of which amount the State has expended $173,015.98 and the County and railroad have paid their cooperative shares given above.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 17,516.71
Labor and material furnished by State:		
Materials for syphons to be installed by contractor		863.45
Constructing curb around well at Weatherby		64.43
T. N. T. *furnished free to contractor as per terms of contract*		5,100.00
Moving dam and irrigation ditch off right-of-way		200.00
Moving Western Union telegraph lines		275.70
Watchman's services to protect railroad tracks		1,957.40
Items deducted from contractor's estimate:		
Rental of industrial track owned by State		1,930.79
Freight on industrial track		551.24
Contract items as follows:		
Clearing and grubbing, all	$ 2,000.00	
Common excavation, 81,190.7 cu. yds. at 55c	44,654.89	
Intermediate excavation, 67,313.2 cu. yds. at 75c	50,484.90	
Solid rock excavation, 79,281.2 cu. yds. at $1.30	103,065.56	
Overhaul, 92,136.0 sta. yds. at 5c	4,606.80	
12-inch corrugated galvanized iron pipe, 2,416.0 lin. ft. at $2.00	4,832.00	
18-inch corrugated galvanized iron pipe, 604.0 lin. ft. at $3.50	2,114.00	
24-inch corrugated galvanized iron pipe, 564.0 lin. ft. at $5.00	2,820.00	
30-inch corrugated galvanized iron pipe, 22.0 lin. ft. at $7.50	165.00	
36-inch corrugated galvanized iron pipe, 740.0 lin. ft. at $9.00	6,660.00	
Rubble masonry, 644.56 cu. yds. at $15.00	9,668.40	
Riprap, 1,427.8 cu. yds. at $3.00	4,283.40	

[BAKER]

EXPENDITURES—Continued

Hand placed rock slopes, 452.0 cu. yds. at $3.00	1,356.00	
Standard wood guard fence, 5,000.0 lin. ft. at $1.00	5,000.00	
Clay or other earth filler, 841.3 cu. yds. at 95c	799.24	
Force account items:		
Constructing rock toe wall	124.63	
Repairing railroad right-of-way fences	277.35	
Reconstructing irrigation ditch and installing syphons across roadway	1,815.35	
Cleaning out ditch for channel change	269.37	
Installing wheel guards on guard fence	120.68	
Deepening channel of Durbin Creek and removing slide	147.28	
Total amount earned by contractor	$245,264.85	
Deductions:		
Rental of industrial track owned by State	1,930.79	
Freight on industrial track	551.24	
Total amount paid to contractor		242,782.82
Grand total cost of project		$271,242.54
Less final payment to contractor in transit		11,434.97
Total expended to November 30, 1922		$259,807.57
Paid by State	$173,015.98	
Paid by County	85,000.00	
Paid by Government	1,791.59	
Total	$259,807.57	

Burnt River Bridges Near Weatherby

Just north of the station of Weatherby the Old Oregon Trail crosses the Burnt River twice; once on a 70′ steel span and once on a 90′ steel span, both structures having concrete abutments.

Contract No. 340 was awarded on March 8, 1921, to the Illinois Steel Bridge Company of Spokane, Washington, for the construction of both bridges. The contractors started work on May 7, 1921, and completed the construction by June 9, 1922, at a total cost of $40,871.74 from State funds.

Resident Engineer L. H. Allen supervised the work to November 30, 1921, when operations were discontinued for the winter. Upon their resumption in the spring and until the completion of the work, Resident Engineer Christ Fauerso was in charge.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,345.52
Name plates for two bridges, furnished by State		20.00
Contract items as follows:		
Class "A" concrete, 424.75 cu. yds. at $20.00	$ 8,495.00	
Metal reinforcement, 37,234.0 lbs. at 9c	3,351.06	
Structural steel, 142,881.0 lbs. at 9½c	13,573.70	
Excavation to elevation shown on plans, 1,138.41 cu. yds. at $8.00	9,107.28	
Excavation below elevation shown on plans, 205.02 cu. yds. at $10.00	2,050.20	
Force account item:		
Constructing concrete handrails	1,919.98	
Total amount paid to contractor		38,497.22
Grand total cost of structures (all State funds)		$ 40,871.74

Huntington Overcrossing

About three miles northwest from Huntington, the Old Oregon Trail crosses the tracks of the Oregon-Washington Railroad and Navigation Company and Burnt River. A unique solution of the problem was made

[BAKER]

by the construction of a 120′ steel span with two 40′ concrete approach spans, crossing the river and the railroad tracks at the same point.

A hearing was held before the Public Service Commission relative to this crossing on February 25, 1921. Following the hearing, the Public Service Commission issued its order No. 707 which provided that forty per cent of the cost of the structure should be borne by the Highway Commission, forty per cent by the Railroad Company and twenty per cent by Baker County. This order, however, did not cover the entire cost of the structure, but only that portion which can properly be construed as the railroad crossing.

Contract No. 339 was let on March 8, 1921, to Lindstrom & Fiegenson for the construction of the crossing. Work was started on April 1, 1921, and completed December 24, 1921, at a cost of $41,985.24. This entire amount has been advanced by the State, and at the present time there is due $16,794.10 from the railroad company and $8,397.04 from Baker County for their respective cooperative shares. These amounts, when received, will operate as a credit to the State expenditures.

Construction was handled under the supervision of L. H. Allen, Resident Engineer for the Department.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,675.94
Bronze name plates furnished by State		14.50
Watchman's services for protecting railroad tracks		30.73
Contract items as follows:		
Class "A" concrete, 306.8 cu. yds. at $30.00	$ 9,204.00	
Class "B" concrete, 174.9 cu. yds. at $28.00	4,897.20	
Metal reinforcement in place, 53,701.0 lbs. at 7½c	4,027.58	
Structural steel in place, 127,896.0 lbs. at 10½c	13,429.08	
Concrete hand rail, 200.0 lin. ft. at $4.50	900.00	
Excavation to plan elevation, 351.4 cu. yds. at $2.50	878.50	
Excavation below plan elevation, 363.6 cu. yds. at $5.00	1,818.00	
Grouted rock fill, 220.1 cu. yds. at $18.00	3,961.80	
Force account items:		
Drilling test holes to determine safety of abutment foundations	36.83	
Installing steel expansion floor plates	75.13	
Cutting off ends of precast handrail members account change in plans	35.95	
Total amount paid to contractor		39,264.07
Grand total expended to Nov. 30, 1922 (all State funds)		$ 41,985.24

Durkee Undercrossing

Near the station of Durkee the Old Oregon Trail is so located as to pass beneath the tracks of the Oregon-Washington Railway & Navigation Company. There being no opening at the site, it was necessary to remove the existing earth fill and construct a steel girder span on concrete abutments to provide a passage for the highway.

This crossing was the subject of a hearing before the Public Service Commission who, in their order No. 707, assessed the costs of construction as in the case of the Unity Undercrossing, namely, forty per cent to the Railroad Company, twenty per cent to the County and forty per cent to the State.

Contract No. 564 was awarded to the Union Bridge Company on June 29, 1922. This contract covered only the excavation and the abutments, the remainder of the work to be handled by the Railroad Company.

The Company proceeded at once to build a temporary support for their tracks and on August 24 work was started on the excavation. Upon

reaching the depth originally planned for the foundation, the soil was found to be unsuitable and further excavation was necessary. This caused considerable delay, for which reason the work is not complete at the date of this report. The total cost will be approximately $20,500.00, of which $4,770.14 has been spent at the present time. This amount has been paid entirely from State funds.

Christ Fauerso is Resident Engineer in charge for the State.

Nelson-Huntington Bridges

Two small trestle spans and four culverts on the Nelson-Huntington Section were awarded in one contract, No. 453, dated August 21, 1921, to Rajotte-Winters, Inc.

Work was started on September 26, 1921, and continued until November 25, 1921, when it was closed down for the winter. It was resumed again in the spring and was completed by July 5, 1922, at a total cost of $15,844.19 from State funds.

L. H. Allen was Resident Engineer during the season of 1921, being succeeded in 1922 by Christ Fauerso.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,236.89
Expense in connection with cost of railroad protection		1.35
Contract items as follows:		
Class "A" concrete, 328.05 cu. yds. at $25.00	$ 8,201.25	
Class "B" concrete, 21.0 cu. yds. at $25.00	525.00	
Metal reinforcement, 25,030.0 lbs. at 10c	2,503.00	
Wood trestle superstructure, 64.0 lin. ft. at $15.00	960.00	
Lumber, 6.568 M-FBM at $65.00	426.92	
Riprap, 50.0 cu. yds. at $2.50	125.00	
Excavation, 1,143.0 cu. yds. at $1.50	1,714.50	
Force account items:		
Constructing handrail on Smith Creek Bridge and refilling west end where settlement has occurred	150.28	
Total amount paid to contractor		14,605.95
Grand total cost of structures (all State funds)		$ 15,844.19

Baker County Maintenance

On November 30, 1922, there were 76.23 miles of State highways in Baker County under maintenance; 48.4 miles on the Old Oregon Trail and 27.83 miles on the Baker-Cornucopia Highway.

The maintenance of that section of the Old Oregon Trail between North Powder and Baker, approximately 17 miles, was under the supervision of Patrolman Roland Hopper, who handled the work with one assistant. The equipment consisted of State truck, grader and drag.

Another patrol was established between Baker and Nelson on the same highway, only 10 miles being placed under maintenance in 1921, and actual work carried on only during November. Between Nelson and the Malheur County Line, approximately 25 miles, the patrol work in 1922 was handled by Thomas Roach, patrolman, with one assistant.

Maintenance on the Baker-Cornucopia Highway was handled under two patrols, the first patrol from Baker to Middle Bridge under R. L. Nelson, patrolman; the second from Richland to Halfway under A. B. Carder, patrolman. The first section consists of 10 miles of macadam and 8.7 miles of earth road; the second section consists of 9 miles of macadam road.

The maintenance work in Baker County is under the direct supervision of the La Grande division office.

[BAKER]

Prairie City-Unity Forest Road Survey

A description of the work on this project, which is partially within Baker and partially within Grant Counties, will be noted in the portion of this report devoted to Grant County Projects.

Middle Bridge-Emigrant Creek Survey

This survey was reported and a full description of the route given on page 143 of the Fourth Biennial Report. The Baker County Court was very anxious to advertise this section for grading but did not have sufficient funds to finance the entire project. After consideration it was deemed advisable to advertise 13.22 miles between Love Bridge and Black Bridge on the basis of a 14′ roadway between ditches. This change in the width of roadbed from the standard previously located necessitated a revision of the project in order to properly balance the construction quantities.

Baker-Malheur County Line Survey

A complete description of this survey will be found on pages 143-4 of the Fourth Biennial report. During the present biennium several small revisions were made and the office work on the section completed by B. H. McNamee, Locating Engineer. The survey, including plans and estimates, is now complete and the entire section is under contract for construction.

Baker-Stice's Gulch-Unity Survey

During the fall of 1921 the Highway Commission ordered a survey of the Baker-Unity Highway. The field work began in November, 1921, and was completed in September, 1922. The office records are entirely completed except for tracing.

During the winter of 1921 and 1922 the progress of the survey was handicapped by deep snow and zero weather. Between February 16 and April 17, 1922, field work was suspended pending completion of the office work on the sixteen-mile section beween Baker and the summit of Dooley Mountain, and the office work for completion of the remaining portion was suspended from September 16 to October 15, 1922, during which time the entire party was engaged in the survey of nine and one-half miles of market roads in Baker County.

The location extends from the south city limits of Baker, along the Powder River, elevation 3,500 feet, and follows the west bank of the Powder River along the Sumpter Valley Railroad for approximately 11 miles to the mouth of Stice's Gulch, at which point the proposed highway will cross the Powder River with a reinforced concrete bridge, and the Sumpter Valley Railroad at grade.

Approximately six miles of five per cent grade are required to ascend Stice's Gulch to Dooley Mountain summit, attaining an elevation of 5,400 feet. The descent is made by Mill Gulch, there being seven and one-half miles of five per cent grade required to reach the Burnt River Valley, at a point approximately five miles above Bridgeport.

The location then follows the east bank of the Burnt River, through Hereford and the head of the Burnt River Canyon, on what is known as the mail route between Hereford and Unity. The proposed highway crosses Burnt River on the present steel bridge at this point and follows up Job Creek across the adobe flats to Unity, a total distance of 46 miles.

[BAKER]

This road affords communication between the upper Burnt River Valley and Baker and will also serve as a connection with the John Day River Highway near Unity. The section over Dooley Mountain is through very good road building material and will not require surfacing.

The location was made by Ulric R. Grey, Locating Engineer.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Baker County has co-operated as follows:

1.	Paid into the State Market Road Fund	$ 69,872.65
2.	State Funds apportioned to County	97,168.68
3.	County levy made to match State Funds	93,645.42
4.	County Market Road Funds collected	86,917.61
5.	Cash paid to County by State	81,553.66
6.	State expenditures, deducted from apportionment	1,931.65
7.	Cash due County from State in December, 1922	13,683.36
8.	County expenditures on Market Roads	117,915.28
9.	Balance in County Treasury November 1, 1922	50,555.99

From the above statement it is apparent that Baker County received from the State Market Road Fund $27,296.03 more than it paid into the fund. The excess is Baker County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $93,645.42, of this amount they have collected and credited to the Market Road Fund $86,917.61.

The County Court has designated several roads to be impoved as Market Road Projects. A considerable amount of work has been done on the following projects: Muddy Creek Road, Lockhart Road and Robinette to Timber Canyon Road. A portion of the Baker-Unity State Highway was designated for improvement in 1922, but because of decision prohibiting the expenditure of Market Road Funds on State highways, no expenditures were made on the project. Other roads were then designated, surveys made and plans prepared, but little construction work was accomplished in 1922.

The County has accomplished the following work with Market Road Funds: Graded 3.4 miles of 14-ft. roadbed; graded 9.6 miles of roadbed 16 feet or more in width and surfaced 4.3 miles, 12-ft. wide with crushed rock or gravel.

A part of the engineering work was done by T. L. Borman, County Engineer, and the rest by engineers in the employ of the State Highway Commission.

The construction work is of permanent nature, on good line and grade. Most of the work was awarded by contract, under the supervision and control of the County Court.

BENTON COUNTY

The biennium just past has witnessed excellent progress in Benton County and the expenditure of a large amount of State and Federal Government funds for State highway improvement within the limits of the County.

Gaps have been closed up and the paving of the West Side Highway is now completed, except for a stretch of 1,708 feet at the north county line, which is to be constructed under a contract awarded for paving south from Monmouth.

The Corvallis-Newport Highway has been surfaced from Wren to Blodgett and surfacing work is now under way from Blodgett to the Lincoln County Line. The base course of rock has been laid over this portion, and it is now an all-winter road, although the construction of the top course will not be completed until next year. This leaves only the section between Corvallis and Wren to be brought up to standard in order to complete the Corvallis-Newport Highway in the County.

The Alsea Mountain Section of the Alsea Highway has been placed under contract for grading, and it is expected that this work will be completed during the coming year.

All State construction in Benton County has been carried on under the supervision of J. C. McLeod, Division Engineer.

Corvallis-South Post Road Project

Following the execution of project agreement on Project No. 50, covering the paving of 7.95 miles of the West Side Highway immediately south of Corvallis, the work was undertaken by the State Highway Commission. Contract No. 311, for placing a six-inch by 16-foot concrete pavement with two-foot gravel shoulders, was awarded on November 6, 1920, to Kibler & Bartlett of Tacoma, Washington. During the winter months a sand and gravel plant was erected near the Kiger Island road in order to secure materials from the Willamette River.

Paving operations were started March 4, 1921, and the last of the pavement finished September 18 of the same year. Two short gaps totaling 2,045 lineal feet were not paved under this contract because of high fills which had not yet taken their proper settlement. These sections were surfaced and placed in good shape for winter travel and all other work under the contract was completed December 20, 1921, except certain portions of the rock shoulders which it was not possible to place on account of the fact that Benton County had not yet prepared the roadbed to sufficient width. This work was later done under a special agreement made by the State and at a lower cost than if it had been done under the original contract. Work on the paving of this section was handled by J. G. Garrow, Resident Engineer.

The grading work on the entire project was done by Benton County forces. The concrete bridge over the Mill Race 0.5 mile south of Corvallis was also built by Benton County under State supervision.

Upon settlement of the high fills above referred to, contract No. 563, for paving the gap which had been left, was awarded to B. N. Bartlett of Corvallis on July 14, 1922. The work was started immediately and carried to completion on November 20 of the same year, under the supervision of W. K. Wright, Resident Engineer.

The total cost of the project is estimated to be $250,868.24, when all final payments have been made, this cost to be borne $127,522.89 by the State and $123,345.35 by the Federal Government. Total expenditures to date of this report amount to $250,687.61, having been paid $147,108.91 by the State and $103,578.70 by the Federal Government.

[BENTON]

DETAILED STATEMENT OF EXPENDITURES, CONTRACT No. 311

Engineering		$ 8,395.27
Labor and material furnished by State:		
Erecting detour signs		17.50
Widening gravel shoulders		7,517.17
Contract items as follows:		
Common excavation, 58.0 cu. yds. at $1.90	$ 58.00	
Standard 6-inch concrete pavement, 70,295.1 sq. yds. at $2.75	193,311.53	
Standard 7-inch concrete pavement, 728.9 sq. yds. at $3.10	2,259.59	
Expansion joints, 21,520.0 lin. ft. at 12c	2,582.40	
Bar reinforcement, 10,672.9 lbs. at 9c	960.56	
Gravel macadam on fills, 1,839.5 cu. yds. at $3.00	5,518.50	
Gravel for base, 1,035.0 cu. yds. at $3.00	3,105.00	
Gravel for shoulders, 4,103.0 cu. yds. at $3.00	12,309.00	
Shoulder construction, 79,898.0 lin. ft. at 5c	3,994.90	
Total amount paid to contractor	$224,099.48	
Grand total cost of project (exclusive of gaps left unpaved across fills)		$240,029.42
Paid by State	$136,450.72	
Paid by Government	103,578.70	
Total	$240,029.42	

DETAILED STATEMENT OF EXPENDITURES, CONTRACT No. 563

Engineering		$ 450.41
Paving bridge with bituminous mixture		275.50
Cement furnished by State (deducted from contractor's estimate)		4,092.00
Contract items as follows:		
Preparation of subgrade, 4,844.0 sq. yds. at 5c	$ 242.20	
Standard 7-inch concrete pavement, 3,526.0 sq. yds. at $2.40	8,462.40	
Expansion joints, 8-inch deep, 1,152.0 lin. ft. at 12c	138.24	
Expansion joints, 7-inch deep, 72.0 lin. ft. at 10c	7.20	
Metal reinforcement, 996.0 lbs. at 8c	79.68	
Gravel for shoulders, 634.0 cu. yds. at $1.85	1,172.90	
Shoulder construction, 5,543.0 lin. ft. at 3c	166.29	
Total amount earned by contractor	$ 10,268.91	
Deduction for cement purchased from State	4,248.00	
Total amount paid to contractor		6,020.91
Grand total cost of paving gaps		$ 10,838.82
Less final payment to contractor in transit		180.63
Total amount expended to Nov. 30, 1922 (all State funds)		$ 10,658.19

Monroe-North Grading and Paving

An article covering this work will be found on pages 147 and 148 of the last report. A total of 6.4 miles of pavement had been completed when the work was closed down at the end of the 1920 construction season. In the spring of the following year, the contractor moved his paving plant to a better material site at a point near Lancaster, approximately at the center of his Monroe-Junction City paving contract. From this plant the remaining 2.78 miles of the Monroe-North Section were completed.

All grading work was done by Benton County forces under subcontract from the Pacific Bridge Company. The project as a whole was carried to completion and accepted October 27, 1921.

The expenditures during the present biennium amount to $126,903.78 from State funds and $5,994.89 from County funds, bringing the total cost of the project to $257,514.74. Benton County cooperates to the

[BENTON]

amount of $13,946.73, to cover the grading on the section, the balance of $243,568.01 being borne by the State. At the present time $1,986.05 is due from the County for their final cooperation.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 11,917.33
Lumber for permanent leaders (furnished by State)		2,690.52
Contract items as follows:		
Clearing and grubbing, all	$ 200.00	
Excavation, no classification, 17,366.0 cu. yds. at 55c	9,551.30	
12-inch plain concrete pipe, 154.0 lin. ft. at $1.30	200.20	
18-inch reinforced concrete pipe, 96.0 lin. ft. at $2.95	283.20	
24-inch reinforced concrete pipe, 316.0 lin. ft. at $4.00	1,264.00	
30-inch reinforced concrete pipe, 32.0 lin. ft. at $5.15	164.80	
36-inch reinforced concrete pipe, 100.0 lin. ft. at $6.55	655.00	
Class "C" concrete, 38.2 cu. yds. at $20.00	764.00	
Class "A" concrete, 24.5 cu. yds. at $25.00	612.50	
Metal reinforcement, 800.0 lbs. at 10c	80.00	
Standard bituminous pavement, 2-inch top, 3-inch base, 84,754.8 sq. yds. at $2.10	177,985.08	
Shoulder construction, 95,442.0 lin. ft. at 6c	5,726.52	
Gravel for shoulders and base, 18,629.5 cu. yds. at $2.25	41,916.38	
Paving Monroe bridge, 524.0 batches at $6.30	3,301.20	
Force account items:		
Redistributing culvert pipe account change in plans	202.71	
Total amount paid to contractor		242,906.89
Grand total cost of project		$257,514.74
Paid by State	$245,554.06	
Paid by County	11,960.68	
Total	$257,514.74	

Corvallis-Polk County Line Grading and Paving

A complete description of this section appears on pages 146 and 147 of the 1919-1920 Biennial Report. All paving work was completed during 1920 and the remaining shoulder work finished during the summer of the following year, final estimate being rendered and the work given final acceptance on September 10.

The expenditures during the biennium amount to $82,968.70, making the total cost of the project $306,368.74 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 16,030.83
Labor and material furnished by State:		
Lumber furnished for permanent headers		1,829.33
Advertisement for bids		8.03
Items deducted from contractor's estimates:		
Asphalt furnished by State		9,861.68
Rentals and repairs of State-owned equipment		818.15
T. N. T. furnished by State		549.14
Contract items as follows:		
Excavation, no classification, 47.25 cu. yds. at $1.00	$ 47.25	
Standard 2-inch bituminous top, 95,909.1 sq. yds at $1.43	137,150.01	
Standard 3-inch bituminous base, 40,924.6 sq. yds. at $1.15	47,063.29	
Standard 2-inch bituminous base, 7,608.9 sq. yds. at 90c	6,848.01	
Standard 2-inch pavement resurfacing, 7,800.9 sq. yds. at $1.07	8,346.96	
Screened gravel, broken stone and run-of-bank gravel for base and shoulders, 33,966.0 cu. yds. at $2.40	81,518.40	
Shoulder construction, 107,558.4 lin. ft. at 6c	6,453.50	

[BENTON]

EXPENDITURES—Continued

Installing bleeders and digging ditch at engineer station 270+00	624.48	
Redressing shoulders along resurfaced pavement	65.82	
Brooming-in screenings in subbase	101.41	
Furnishing and hauling lumber for permanent headers	351.61	
Extra excavation account widening and soft spots in subgrade	80.64	
Total amount earned by contractor	$288,651.38	
Deductions:		
War tax on freight	150.83	
Asphalt furnished by State	9,861.68	
Rental and repairs of State-owned equipment	818.15	
T. N. T. furnished by State	549.14	
Total amount paid to contractor		277,271.58
Grand total cost of project (all State funds)		$306,368.74

Wren-Blodgett Surfacing

The grading on the Wren-Blodgett Section was started by Benton County forces in 1919, during which year about 2.5 miles on the Wren end was completed. This grading work was continued during 1920 and the greater part of the rough grading in the Gellatley Canyon was completed. According to agreement, the Highway Commission was to surface this highway as far as the grading had been completed by County forces and contract No. 300 for the surfacing of 4.87 miles, from the Marys River Bridge at Wren to Norton Creek approximately 0.5 mile east of Blodgett, was awarded to Washburn & Hall of Portland, Oregon, on September 28, 1920.

The contract was awarded for a two-course surface, the base course being 1½-inch maximum rock and the top course 1-inch maximum, the surfacing to be placed 8 inches thick and 12 feet wide. The placing of surfacing was started June 29, 1921, and completed September 16 of the same year, the final grading required being kept completed by Benton County in advance of the progress of the surfacing operations.

The engineering work on the project was handled during 1920 by H. O. Ragan, Resident Engineer, and during 1921 by A. A. Amort, Resident Engineer. The total cost of the surfacing has amounted to $31,016.28, being borne entirely by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 676.25
Excavating for ditches by State forces		17.50
T. N. T. furnished by State (deducted from contractor's estimate)		1,000.00
Contract items as follows:		
Broken stone for surfacing, 8,390.5 cu. yds. at $3.25	$ 27,269.13	
Clay or other earth filler, 654.5 cu. yds. at $1.20	785.40	
Broken stone for maintenance, placed in piles, 756.0 cu. yds. at $3.00	2,268.00	
Total amount earned by contractor	$ 30,322.53	
Deduction for T. N. T. furnished by State	1,000.00	
Total amount paid to contractor		29,322.53
Grand total cost of project (all State funds)		$ 31,016.28

Alsea Mountain Grading

On completion of the location survey of the Alsea Mountain Section between Yew Creek and the Jackson White Place, a distance of 6 miles,

the unit was ordered advertised for grading by the State Highway Commission and contract No. 596 for the work was awarded to Joplin & Eldon of Portland, Oregon, on October 5, 1922.

At the present time the contractors are establishing their camps and preparing to undertake the construction of the project. It is planned to do all necessary clearing and grubbing during the coming winter in order that grading operations may be started early in 1923 and as much as possible of the 1923 construction season taken advantage of. The work will be supervised by A. A. Amort, Resident Engineer.

Expenditures to date amount to $118.35, from State funds, out of a total estimated cost of $222,000.00. Benton county will cooperate to the extent of $105,500.00 with the State paying the balance of $116,500.00.

Flynn Bridge Construction Engineering

At the junction of the Alsea Highway with the Corvallis-Newport Highway, the Alsea Highway crosses Marys River on which is known as Flynn Bridge.

This structure consists of a 60-foot covered wood span with 190 feet of approach trestle. Work was started about August 1, 1921, by County forces who completed the bridge on November 20, 1921. Subsequently, the County requested State aid in connection with this bridge, which was granted and has been paid in the amount of $5,043.27.

A. G. Skelton, Resident Engineer, represented the State on this work.

Blodgett Overcrossing Engineering

Surveys have been made and a design prepared for a combined crossing of Marys River and the Southern Pacific tracks at Blodgett. A hearing has been asked of the Public Service Commission, allocating the costs to the various parties interested.

When this is disposed of, the structure will probably be contracted at once. The estimated cost of the work is $12,000.00, of which only $375.84 has been spent at the present time and consists entirely of engineering expense.

Engineering on County Bridge Construction

During the period covered by this report, Benton County built several small structures on which the State furnished engineering service to the value of $329.67. The principal one of these was over Fisher's Mill Race on the West Side Highway, just south of Corvallis.

Corvallis-Lincoln County Line Construction Engineering

All grading work on the Corvallis-Newport Highway between Wren and the Lincoln County Line has been done by Benton County forces under the supervision of the State Highway Department. Additional reference to this grading will be found under the article devoted to the Wren-Blodgett surfacing.

At the close of the 1922 season, practically all grading will be completed to State standards between the limits mentioned and there will remain only some minor clean up work left to be done, consisting of clearing and burning brush, placing headwalls, widening of a few fills and the construction of a short timber trestle west of Blodgett.

The work during 1921 and 1922 has been supervised by A. A. Amort, Resident Engineer.

[BENTON]

Maintenance

In conformance with the general State policy, the constructed sections on the State highways in Benton County have been taken over and maintained by the State. The particular sections on which maintenance has been effected are as follows:

West Side Highway from the Polk County Line to the Lane County Line and the Corvallis-Newport Highway from Wren to Blodgett. Under a special arrangement the State is also cooperating until January 1, 1923, on a 50-50 basis with the County on the maintenance of the West Side-Albany-Corvallis road.

Because of construction between Albany and Junction City on the Pacific Highway, all through State traffic has been routed over the Albany-Corvallis route as a detour. This has subjected the section to a traffic which is a great deal heavier than it would normally be required to carry and it was felt that it would be no more than fair that the State should assist the County in maintaining a County road called upon to carry such a large volume of properly State highway traffic.

Maintenance on paved sections has consisted of the care of the roadbed and right-of-way, drainage, rock shoulders, etc., sanding of bituminous pavement during hot weather and the filling, with an asphaltic filler, of checks or cracks appearing in concrete pavement. On macadam, the maintenance is covered by the care of the right-of-way, removal of slides, addition of necessary maintenance materials and the blading and dragging of the rock surface at required intervals.

Maintenance work in the County has been under the supervision of local construction Resident Engineers or the Division Engineer and has represented expenditures of $8,322.67 for the biennium, the County paying $315.81 and the State $8,006.86.

Corvallis-Toledo Survey

A complete description of this survey will be found on page 149 of the previous department report. During 1921 and 1922, the surveys on all sections between Wren and Toledo, upon which definite locations had not been finally adopted, were completed. This work was handled by T. A. Rice, Resident Engineer at Toledo, and A. A. Amort, Resident Engineer at Eddyville.

Lincoln County Line-Philomath Survey

On December 19, 1921, a field location party in charge of Locating Engineer, G. E. Farnsworth, started a survey on the Alsea Highway at the Lincoln-Benton County Line. A tie was made to the location made by the U. S. Bureau of Public Roads at this point, and the survey continued east. In spite of extremely inclement weather the location of 25 miles of line was completed by June 1, 1922, ending at Station 1322 near the Jackson White Place, at the east side of the Alsea Mountain and approximately 7.0 miles west of Philomath. The maximum grade used in the location was five per cent. The survey follows rather closely the general location of the existing road, except on the Alsea Mountain where a departure was required on account of grade development.

A location survey was also made for an alternate line which called for a 1,650-foot tunnel on the Alsea Mountain Section. The tunnel line was found to be undesirable and the surface location was given final acceptance by the Highway Commission on July 25, 1922.

[BENTON]

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Benton County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 39,992.02
2.	State Funds apportioned to County	52,229.60
3.	County levy made to match State Funds	46,222.29
4.	County Market Road Funds collected	44,375.63
5.	Cash paid to County by State	43,140.71
6.	State expenditures, deducted from apportionment	0.00
7.	Cash due County from State in December, 1922	9,088.89
8.	County expenditures on Market Roads	92,223.99
9.	Balance in County Treasury November 1, 1922	3,545.93

From the above statement it is apparent that Benton County received from the State Market Road Fund $22,237.58 more than it paid into the fund. The excess is Benton County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $46,222.29, of this amount they have collected and credited to the Market Road Fund $44,375.63.

The County Court has designated nine roads to be improved as Market Road projects and expenditures have been made on all of the projects. The work done has been of a permanent nature, following good alignment and grades. The engineering work on two projects was done by employes of the State Highway Commission, and on the other projects by W. C. Galloway, County Surveyor.

The construction work was done by County forces under the direction of the County Court.

Approximately $64,300.00 of Market Road Funds were expended by the County Court for grading on State highways. Approximately $17,400.00 was expended for improvements on the Albany-Corvallis road. This road is a natural connecting link between the Pacific Highway and the West Side Highway and may become a part of the State highway system.

For an expenditure of $92,223.99, the County accomplished the following: Graded 16.8 miles of 24-ft. roadbed; surfaced with gravel 2.5 miles 16 ft. in width, and surfaced 1.3 miles 12 ft. in width.

CLACKAMAS COUNTY

The close of the biennium just ended finds the Pacific Highway completed through Clackamas County, with the exception of a few short gaps. These gaps consist of 1,760 feet at the Southern Pacific crossing in West Linn, 4,828 feet between Oregon City and Canemah, and 750 feet at the Pudding River Bridge.

The question of the location of the highway through Oregon City has proven a very vexing one. The route known as the Hill Route, via Seventh Street and the proposed new undergrade crossing at Fifth Street, has been formally adopted by the Highway Commission. Since a considerable portion of this, or any other route, will be within the corporate limits of Oregon City and therefore can not be constructed from State funds, the necessary finances must be provided from other sources. In order to meet this situation, and as an inducement for the designation of the above described route in preference to that along the Basin, as at present traveled, certain industrial and public service corporations interested in having the highway traffic removed from the present route because of the interference with the interests of their business, have tentatively subscribed a sufficient sum to cover the preliminary estimate of cost, exclusive of right-of-way. Some of these subscriptions are conditioned upon consideration of franchise extensions and changes, street vacations, et cetera, and these matters, together with the question of required right-of-way have greatly complicated and delayed a final definite determination of the matter. Bids on the proposed construction are being advertised for at the close of the biennium and accurate information on the project cost will shortly be available. It is hoped that the matter may be finally adjusted and the construction work involved completed during the coming year.

On the Mt. Hood Loop Highway also, there have been unexpected delays. The cooperative agreement between Clackamas and Multnomah Counties and the Highway Commission, under which the grading and surfacing of the section between the Multnomah County Line and Forest Boundary was undertaken in 1921, provided for a contribution of $170,000 by Multnomah County. This amount was to be raised in two annual levies and was to be paid in 1922 and 1923. The County budget item for their 1922 share, however, was eliminated by the Tax Supervising and Conservation Commission. This action was not taken until after the contracts for grading had been awarded and work was under way, and therefore did not affect that part of the work. It did, however, cause considerable delay in the awarding of subsequent surfacing contracts and has resulted in very little having been done toward the surfacing in 1922. The matter now has been satisfactorily adjusted, and the entire completion of the section referred to, as well as the adjoining forest road project extending from Zig Zag to Government Camp, is expected during 1923.

All State construction work in Clackamas County has been handled under the supervision of W. D. Clarke, Division Engineer during the biennium.

Oregon City-Multnomah County Line Post Road Project

A description of this work will be found on page 152 of the previous report. Construction operations extended into the present biennium, and the work was finally completed on November 23, 1921. The total cost, including an expenditure of $513.52 made by the State in 1920,

amounts to $244,300.64. Of this amount the State has paid $130,200.64, and the Federal Government $114,100.00.

Construction was supervised by F. T. Young, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 13,294.48
Labor and materials furnished by State:		
Installing corrugated galvanized iron culvert and flume		691.44
Constructing headwalls for culverts		75.60
Constructing standard wood guard fence		2,015.33
Items deducted from contractor's estimate:		
Cement furnished by State		72,907.49
Culvert pipe furnished by State		205.45
Contract items as follows:		
Common excavation, 12,213.6 cu. yds. at $1.08	$ 13,190.69	
Solid rock excavation, 2,013.5 cu. yds. at $1.65	3,322.28	
Overhaul, 3,458.0 sta. yds. at 6c	207.48	
Standard 7-inch concrete pavement, 58,226.4 sq. yds. at $3.03	176,425.99	
Expansion joints, 17,224.0 lin. ft. at 17c	2,928.08	
Bar reinforcement, 165,382.0 lbs. at 6c	9,922.92	
30-inch reinforced concrete pipe, 56.0 lin. ft. at $6.50	364.00	
6-inch porous drain tile, 3,451.0 lin. ft. at 35c	1,207.85	
New broken stone, 3,975.0 cu. yds. at $3.95	15,701.25	
Reclaimed rock, 63.0 cu. yds. at $1.20	75.60	
Excavating and backfilling shoulder drains, 44.3 cu. yds. at $4.56	202.01	
Screenings for backfill of tile drains, 200.5 cu. yds. at $5.00	1,002.50	
Shoulder construction, 57,905.0 lin. ft. at 8½c	4,921.93	
Class "A" concrete, 31.81 cu. yds. at $35.00	1,113.35	
Force account items:		
Constructing culvert headwalls and catch basins	175.28	
Building rock retaining walls, Sta. 323+00 and 325+00	162.76	
Backfilling culvert headwalls	73.65	
Placing culvert pipe and connecting up to catch basin	50.21	
Riprapping around abutments of Sucker Creek bridge	17.00	
Constructing rock toe wall to protect railroad track and riprapping at south end of Tryon Creek bridge	42.01	
Removing old concrete pavement	43.90	
Lowering water pipe across highway	9.62	
Grubbing out stumps account of widening roadway	229.54	
Extra ditching to improve drainage	452.36	
Moving equipment due to change in plans	168.89	
Total amount earned by contractor	$232,011.15	
Deductions:		
Culvert pipe furnished by State	205.45	
Cement furnished by State	76,694.85	
Total deductions	$ 76,900.30	
Total amount paid to contractor		155,110.85
Grand total cost of project		$244,300.64
Paid by State	$130,200.64	
Paid by Government	114,100.00	
Total	$244,300.64	

Oregon City-Bolton Paving

Anticipating the completion of the Oregon City bridge, Contract 547 was awarded on May 31, 1922, to the Parker-Schram Company of Portland for grading and paving in the short gap between the bridge and the south end of the pavement laid near Bolton in 1921. This contract covered the grading and paving of 1,300 feet immediately north of the bridge, and redressing the existing macadam surface on the 1,760-foot gap across the crossing of the Southern Pacific tracks. This unpaved

portion was left on account of the uncertainty as to the future of this railroad line and the omitted section is of sufficient length to permit the construction of an overhead crossing, if such should be desired when the situation is finally settled.

The pavement provided for by the contract is to be a 1:1½:3 mixture of cement concrete, eighteen feet wide, of seven-inch uniform thickness and reinforced with standard one-half-inch bar reinforcement.

Grading work was begun July 19 and has been completed, but in order to avoid interference with the contractor on the Oregon City Bridge, paving operations were specified as not to be begun before September 1. At that time, however, a shortage of cement prevented the laying of concrete and further delay to permit certain paving work of the city of West Linn being done first has resulted in the construction of pavement under the contract being postponed until the last few days of the year, with the result that final completion will go over into the 1923 season.

The work is being supervised by F. T. Young, Resident Engineer, and is estimated to cost a total of $15,000 from State funds. Of this amount, $3,550.98 has been spent to date.

Paving Tryon Creek, Sucker Creek and Molalla River Bridges

Contract 430 was awarded July 28, 1921, to the Warren Construction Company for paving the Tryon Creek, Sucker Creek and Molalla River Bridges.

The Tryon Creek Bridge is a timber trestle structure, with laminated wood deck, 229 feet in length and 19 feet wide. This is paved with a bituminous concrete wearing surface two inches thick at the edges and three and one-half inches in the center.

The Sucker Creek Bridge is a concrete structure 333 feet in length having a width of 20 feet with crown of three inches. The bituminous pavement was laid to a two-inch uniform thickness.

The Molalla River Bridge consists of 310.7 feet of 19-foot concrete deck with a one and one-half inch crown, and 267 feet of flat laminated wood deck, 19 feet in width. The surfacing of the concrete deck consists of bituminous concrete laid to a uniform thickness of two inches and on the laminated wood deck it was laid to a thickness of two inches at the edges and three and one-half inches in the center. In addition to the bridge paving 38.2 feet of earth approaches were paved.

Work began September 15, 1921, with the paving of the Tryon Creek and Sucker Creek Structures and was completed December 29, 1921; the paving of the Molalla River Bridge having been delayed on account of paving operations on the Canby-Aurora Section in which the bridge is located.

F. T. Young was Resident Engineer in charge of the operations, which required a total expenditure of $5,709.77 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 21.77
Contract items as follows:		
Paving Molalla River bridge, lump sum	$ 3,290.00	
Paving Tryon Creek trestle, lump sum	1,118.00	
Paving Sucker Creek bridge, lump sum	1,280.00	
Total amount paid to contractor		5,688.00
Grand total cost (all State funds)		$ 5,709.77

[CLACKAMAS]

Canby-Aurora Post Road Project

Contract 392 was awarded on June 13, 1921, to Cummings & LaPointe of McMinnville, Oregon, for paving the Canby-Aurora Section of the Pacific Highway. This section comprises 3.72 miles, from the south end of the Oregon City-Canby Section to the north side of the Pudding River at Aurora, and ends at a point 1,737 feet north of the north end of the Aurora-Brooks Section. This gap of 1,737 feet covers the Pudding River Bridge and approach fill, and was left open on account of the bridges not being constructed and the approaches not ready for pavement. Exclusive of the Molalla River Bridge, the section consists of 3.61 miles of 16-foot by 7-inch concrete pavement. The concrete mixture was 1:2:3 and was originally planned to be laid as a plain slab without reinforcement. However, subgrade conditions encountered during the construction made advisable the reinforcing of 5,221 feet across the flat near Barlow. This reinforcing consists of one-half-inch iron bars laid longitudinally along the edges of the slab, with 7 transverse bars in each thirty-foot section. The work was started July 18, 1921, and completed December 30 of the same year, being handled as a cooperative project with the Federal Government under the terms of Post Road Agreement No. 53.

The total construction cost has amounted to $119,321.09, which has been paid $88,368.15 by the State, $1,611.10 by the City of Canby and $29,341.84 by the Federal Government. At the present time there is an additional $600 due from Canby for work within the city limits. This amount when received will accrue as a credit to the State expenditures.

L. F. Heuperman, Resident Engineer, was in charge of the work until October 6, 1921, at which time he was transferred to other duties and the supervision taken over by F. T. Young, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,942.33
Repairing damage caused by washout (State forces)		86.92
Constructing guard fence (State forces)		495.44
Cement furnished by State (deducted from contractor's estimate)		47,454.00
Contract items as follows:		
Common excavation, 304.7 cu. yds. at 70c	$ 213.29	
Preparation of subgrade, 51,256.0 sq. yds. at 6c	3,075.36	
Standard 7-inch concrete pavement, 34,382.4 sq. yds. at $2.64	90,769.54	
Expansion joints, 10,503.4 lin. ft. at 13c	1,365.44	
Metal reinforcement, 25,640.6 lbs. at 12c	3,076.87	
Gravel for subbase, 250.5 cu. yds. at $2.80	701.40	
Crushed gravel for shoulders, 2,436.5 cu. yds. at $2.80	6,822.20	
Gravel for blind stone drains, 512.0 cu. yds. at $4.00	2,048.00	
Shoulder construction, 38,122.0 lin. ft. at 6c	2,287.32	
Force account items:		
Salvaging rock from old road for use in shoulders	261.43	
Planking detour roads to maintain travel	80.44	
Placing 8-inch drain tile and constructing catch basin	80.28	
Placing 12-inch galvanized iron culvert pipe, Sta. 28+00	120.95	
Constructing crossroad approach	75.97	
Excavating for ditches, widening roadbed and placing filler in shoulder and subbase	3,973.54	
Repairing damage to roadbed caused by flood water	661.75	
Constructing flume for embankment protection	254.61	
Total amount earned by contractor	$115,868.39	
Deductions:		
Cement furnished by State	49,064.00	
Freight reductions	461.99	
Total deductions	$ 49,525.99	
Total amount paid to contractor		66,342.40
Grand total cost of project		$119,321.09

[CLACKAMAS]

EXPENDITURES—Continued

Paid by State	$ 88,368.15
Paid by County	1,611.10
Paid by Government	29,341.84
Total	$119,321.09

Canby-Molalla River Grading and Surfacing

Preparatory to the paving of the gap between Canby and the Pudding River Bridge at Aurora, Contract 336 was awarded to the V. R. Dennis Construction Company on March 8, 1921, for grading and gravel surfacing the uncompleted portion of that section between Canby and a point one-half mile south of the Molalla River. The gross length of the project was 1.74 miles, and the work awarded comprised 1.25 miles of grading and 1.04 miles of surfacing. The surfacing materials were run-of-bank gravel taken from the roadbed excavation immediately north of the Molalla River Bridge.

Work was started April 6 and completed July 14 of the same year under the supervision of L. F. Heuperman, Resident Engineer. The cost of the work amounted to $10,407.26, and was paid entirely from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,564.41
Work performed by State forces to maintain travel		174.90
Contract items as follows:		
Common excavation, 7,764.5 cu. yds. at 50c	$ 3,882.25	
Overhaul, 12,766.0 sta. yds. at 5c	638.30	
12-inch plain concrete pipe, 123.0 lin. ft. at $1.50	184.50	
Class "C" concrete, 2.51 cu. yds. at $25.00	62.75	
Gravel surfacing, 3,346.0 cu. yds. at $1.00	3,346.00	
Stone drains, 23.3 cu. yds. at $2.00	46.60	
Force account items:		
Clearing and grubbing	64.17	
Scarifying and reshaping roadway, Sta. 5+50 to Sta. 13+50	80.32	
Rolling subgrade before surfacing	154.61	
Furnishing and installing 12-inch corrugated galvanized iron pipe culverts and 6-inch porous drain tile	208.45	
Total amount paid to contractor		8,667.95
Grand total cost of project (all State funds)		$ 10,407.26

Multnomah County Line-Sandy Surfacing

On June 29, 1922, Contract 562 was awarded to the Palmer Construction Company of New Era, Oregon, for surfacing the first unit of the Mt. Hood Loop in Clackamas County. This unit covers 6.2 miles and extends from the Multnomah County Line to Sandy. The surfacing provided for in the contract is a crushed gravel to be laid 16 feet wide and 8 inches thick, loose measure. Shortly after the award of this contract, the contractor encountered financial difficulties, which made it necessary for him to turn the job over to one of the bondsmen on the contract, who is now carrying on the work. Delay in perfecting this arrangement and further delay in plant erection held off the commencement of actual surfacing operations until October 12 and, as a result, the contract will run over into the 1923 season before being completed.

The work is being supervised by Resident Engineer F. D. Eason, and is estimated to cost a total of $40,500. This cost will be divided $22,500.00 to the State, $18,000.00 to the County. The expenditures to date amount to $975.80 from State funds.

[CLACKAMAS]

Sandy-Cherryville Surfacing

The first of the three surfacing jobs, into which the Multnomah County Line-Zig Zag section of the Mt. Hood Loop is divided, to be undertaken is the second in position and extends from Sandy to Cherryville, a distance of 7.4 miles. Contract 463 for this work was awarded to E. A. Palmer of New Era, Oregon, on August 30, 1921, and work was begun October 3 of the same year. The surfacing covered by the contract is a 16-foot broken stone macadam constructed 8 inches in thickness, loose measure.

The contractor found himself in financial difficulties almost from the start of the work, and, after repeated attempts to get affairs straightened out in such manner that the work might be prosecuted to completion, it was found necessary by the Highway Commission to take over the contract. This was done on October 5, 1922, and owing to the lateness of the season it was decided to readvertise the work during the winter for completion next year rather than attempt to complete it this winter by State forces. Approximately 48 per cent of the work was completed when the contract was taken over by the State.

The entire work is estimated to cost a total of $68,000.00, to be divided, $33,000.00 to the State and $35,000.00 to the Counties. The expenditures to date amount to $28,175.52 from State funds and have been made under the supervision of F. D. Eason, Resident Engineer.

Cherryville-Forest Boundary Surfacing

Contract 554 covering the surfacing of the third unit of the Multnomah County Line-Zig Zag Section was awarded to A. D. Kern of Portland on June 29, 1922. The work covered by this contract consists of 10.7 miles of 16-foot by 8-inch crushed gravel surfacing and extends from the east end of the second unit at Cherryville to the Forest Boundary at Zig Zag. Mr. Kern also has a forest road contract for surfacing the section between Zig Zag and Government Camp, and the construction operations on the two sections are being handled together. The easterly two or three miles of the State contract will be constructed from a material plant east of Zig Zag, from which plant material will also be secured for the west end of the Forest Road Project. Work was started from this plant on September 20, 1922, but only a very minor portion of the State contract will be completed during the present season.

Supervision of the work is being handled by F. D. Eason, Resident Engineer. Expenditures to date have amounted to $1,725.92 from State funds. The total estimated cost of the project is $51,000.00, which is to be shared $28,000.00 by the State and $23,000.00 by the County.

Unit 1, Multnomah County Line-Zig Zag Grading

In accordance with an agreement between the County Court of Clackamas County, the Board of County Commissioners of Multnomah County and the Highway Commission, under which the grading and surfacing of the Mt. Hood Loop in Clackamas County was to be done as a cooperative project, bids were received for the grading of the Multnomah County Line-Zig Zag Section on May 27, 1921. The work was advertised in three units, separate bids being received on each with offers of lump sum amounts to be deducted from the sum of the totals of the separate bids in case two or more units were awarded to the same bidder. Under this method, Unit 1, extending from the Multnomah County Line to a point

east of Sandy, was awarded to Dixon & Howitt under Contract 389. This contract included only the clearing, grading and pipe culvert construction, the bridges and concrete box culverts being advertised separately.

Work on this 11.86 mile section was started June 20, 1921, and carried to final completion on August 15, 1922, at a total cost of $52,426.54. This amount is to be paid $23,426.54 by the State and $29,000.00 by the Counties. At the time of this report, excess funds in the amount of $4,000.00 have been advanced by the State and this amount is now due from the Counties.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,622.63
Labor and materials furnished by State:		
Planking road to maintain travel through winter		274.65
Contract items as follows:		
Clearing and grubbing, all	$ 2,000.00	
Common excavation, 49,655.0 cu. yds. at 60c	29,793.00	
Common excavation west of Sandy, 1,657.0 cu. yds. at $1.00	1,657.00	
Intermediate excavation, 7,715.0 cu. yds. at 90c	6,943.50	
Solid rock excavation, 252.0 cu. yds. at $1.25	315.00	
Overhaul, 37,806.0 sta. yds. at 6c	2,268.36	
Overhaul west of Sandy, 258.0 sta. yds. at 10c	25.80	
12-inch corrugated galvanized iron pipe, 1,094.0 lin. ft. at $1.60	1,750.40	
18-inch corrugated galvanized iron pipe, 114.0 lin. ft. at $2.50	285.00	
24-inch corrugated galvanized iron pipe, 72.0 lin. ft. at $3.00	216.00	
Class "C" concrete, 40.04 cu. yds. at $30.00	1,201.20	
6-inch porous drain tile, 148.0 lin. ft. at 50c	74.00	
Total amount paid to contractor		46,529.26
Grand total cost of project		$ 52,426.54
Paid by State	$ 27,426.54	
Paid by County	25,000.00	
Total	$ 52,426.54	

Units 2 and 3, Multnomah County Line-Zig Zag Grading

Under the procedure outlined above, under Unit 1, Units 2 and 3 were awarded to the Johnson Contract Company of Portland, Oregon.

Unit 2 covers the section from the east end of Unit 1, 0.42 mile west of Cedar Creek, to a point approximately 350 feet west of the Salmon River, and has a total length of 7.57 miles. This work was awarded under Contract 390, which provides for a reduction of $10,500.00 in accordance with the contractors' proposal in consideration of the award of Units 2 and 3 together.

Work was started June 16, 1921, and completed September 25, 1922.

Unit 3, covered by Contract 391, extends from a point 250 feet east of the Salmon River to the Forest Boundary at Zig Zag, a distance of 4.77 miles. The gap of 600 feet between Units 2 and 3 was left to permit a slight relocation when reconstruction of the Salmon River Bridge becomes necessary. This contract provided for a reduction of $4,500 from the bid price in consideration of the award of Units 2 and 3 together. Work was begun June 16, 1921, and all quantities had been moved and materials furnished by November 15 of the same year. By mutual consent, the final finishing of some parts of the contract was permitted to go over until the 1922 season, and this work was finally completed September 25, 1922.

The total estimated cost of Units 2 and 3 combined is $183,000.00, which is to be paid $85,491.88 by the State and $97,508.12 by the Counties.

[CLACKAMAS]

The expenditures to date, made under the supervision of F. D. Eason, Resident Engineer, amount to $163,200.93, having been paid $125,465.31 by the State and $37,735.62 by the Counties.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8,017.30
Labor and materials furnished by State:		
Removing slides and repairing damage caused by washout at Brightwood cut		116.50
Contract items as follows:		
UNIT No. 2—		
Clearing and grubbing, all	$ 24,350.00	
Common excavation, 79,547.0 cu. yds. at 54c	42,955.38	
Intermediate excavation, 20,978.0 cu. yds. at 90c	18,880.20	
Solid rock excavation, 7,836.0 cu. yds. at $1.08	8,462.88	
Overhaul, 103,948.0 sta. yds. at 7c	7,276.36	
12-inch corrugated galvanized iron pipe, 1,432.0 lin. ft. at $1.85	2,649.20	
18-inch corrugated galvanized iron pipe, 466.0 lin. ft. at $3.00	1,398.00	
24-inch corrugated galvanized iron pipe, 102.0 lin. ft. at $4.00	408.00	
30-inch corrugated galvanized iron pipe, 52.0 lin. ft. at $5.00	260.00	
36-inch corrugated galvanized iron pipe, 206.0 lin. ft. at $6.50	1,339.00	
Rubble masonry, 131.25 cu. yds. at $14.80	1,942.50	
6-inch porous drain tile, 607.0 lin. ft. at 40c	242.80	
Broken stone backfill for tile drains, 23.30 cu. yds. at $3.00	69.90	
Force account items:		
Removing buildings off right-of-way	298.89	
Total amount earned by contractor	$110,533.11	
Deductions as per contract for award of both Units No. 2 and No. 3	10,500.00	
Percentage retained until completion of contract	3,000.00	
Total amount paid to contractor on Unit No. 2		97,032.12
UNIT No. 3—		
Contract items as follows:		
Clearing and grubbing, all	$ 12,200.00	
Common excavation, 20,319.0 cu. yds. at 63c	12,800.97	
Intermediate excavation, 27,067.0 cu. yds. at 90c	24,360.30	
Solid rock excavation, 6,722.0 cu. yds. at $1.15	7,730.30	
Overhaul, 66,478.0 sta. yds. at 7c	4,653.46	
12-inch corrugated galvanized iron pipe, 572.0 lin. ft. at $1.90	1,086.80	
18-inch corrugated galvanized iron pipe, 36.0 lin. ft. at $3.00	108.00	
36-inch corrugated galvanized iron pipe, 38.0 lin. ft. at $7.00	266.00	
Extra clearing, 1.76 acres at $325.00	572.00	
Rubble masonry, 33.48 cu. yds. at $14.80	495.50	
Force account items:		
Placing corrugated iron flume at end of culvert	56.58	
Total amount earned by contractor	$ 64,329.91	
Deductions as per contract for award of both Units No. 2 and No. 3	4,500.00	
Percentage retained until completion of contract	1,794.90	
Total amount paid to contractor on Unit No. 3		58,035.01
Grand total expended to Nov. 30, 1922, both units		$163,200.93
Paid by State	$125,465.31	
Paid by County	37,735.62	
Total	$163,200.93	

[CLACKAMAS]

Oregon City-Oswego Grading

A descriptive article covering this work will be found on page 157 of the previous department report. During the present biennium delayed expenditures of $1,379.47 have been made, bringing the total cost of the work to $58,841.29 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,573.75
Materials furnished by State for special culvert and flume		187.58
Contract items as follows:		
Clearing and grubbing, all, at $600.00	600.00	
Extra clearing and grubbing, 6.0 acres at $416.515	2,499.09	
Common excavation, 22,485.0 cu. yds. at 59c	13,266.15	
Intermediate excavation, 4,453.0 cu. yds. at 84c	3,740.52	
Solid rock excavation, 11,709.0 cu. yds. at $1.69	19,788.21	
Overhaul, 11,536.0 sta. yds. at 10c	1,153.60	
12-inch plain concrete pipe, 408.0 lin. ft. at $1.49	607.92	
18-inch reinforced concrete pipe, 144.0 lin. ft. at $2.69	387.36	
24-inch reinforced concrete pipe, 244.0 lin. ft. at $3.69	900.36	
36-inch reinforced concrete pipe, 188.0 lin ft. at $7.59	1,426.92	
Class "A" concrete, 105.01 cu. yds. at $34.00	3,570.34	
Class "C" concrete, 41.14 cu. yds. at $34.00	1,398.76	
Metal reinforcement, 11,854.0 lbs. at 10c	1,185.40	
Force account items:		
Rocking detour and other 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 culvert pipe and flume	45.80	
Adjustment on 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 paid to contractor		53,079.96
Grand total cost of project (all State funds)		$ 58,841.29

Mount Hood Loop Forest Road Project

The Mount Hood Loop-Forest Project extends from the Ranger Station at Zig Zag, in Clackamas County, east around the south side of Mount Hood to the Forest Boundary in Hood River County, and has a total length of 37.58 miles.

The section from Zig Zag to Government Camp, 14.4 miles, has been graded, the work being completed in October, 1921. A contract for the surfacing of ten miles of this portion extending east from Zig Zag was awarded to the A. D. Kern Company at an estimated cost of approximately $67,000.00. No appreciable progress has been made on this work during the present season.

The Middle Section begins at Government Camp and extends 17.3 miles over the summit into Hood River County. Clearing for this section, which was let to A. Pieren at approximately $20,000 is now completed. Contract for grading the section has been awarded to the J. F. Clarkson Construction Company at an estimated total cost of approximately $275,000.00. The work under this contract is now 25 per cent complete.

The Hood River Section, 5.88 miles in length, extends from the end of the Middle Section to the Forest Boundary south of Parkdale. The grading of this section was completed in December, 1921, under contract held by the J. F. Clarkson Construction Company. Contract for surfacing 10 miles, beginning at the Forest Boundary, was awarded during the present year to J. K. Shotwell at an estimated total cost of approximately

$55,000.00. Very good progress has been made on this contract during the season.

The project agreement for the construction of the entire project is based upon an estimated total cost of $910,000.00, to be shared equally by the State and the Federal Government. Expenditures to date amount to $506,341.05, which have been paid $256,748.12 by the State and $249,592.93 by the Government. The State expenditures include $87,079.65 expended during previous bienniums.

Mount Hood-Wapinitia Forest Road Project

Descriptions of the work on this project, which is partially within Clackamas and partially within Wasco County, will be found in the portion of this report devoted to Wasco County Projects.

Parkplace Bridge

On February 1, 1921, Clackamas County awarded Contract 329 to Parker & Banfield for the construction of a bridge over the Clackamas River at Park Place. This was to replace an old wood span that had long since served its time, and was inadequate for the demands made upon it.

The contractor started work on April 10, 1921, and, aside from a long delay in securing structural steel, pushed the work to completion, which was accomplished on December 23, 1921. As completed, the structure consists of a 220-foot steel span, with 160 feet of wood trestle approach, and cost a total of $49,752.04. This amount has been paid $1,926.09 by the State for engineering charges and $47,825.95 by the County for the construction costs.

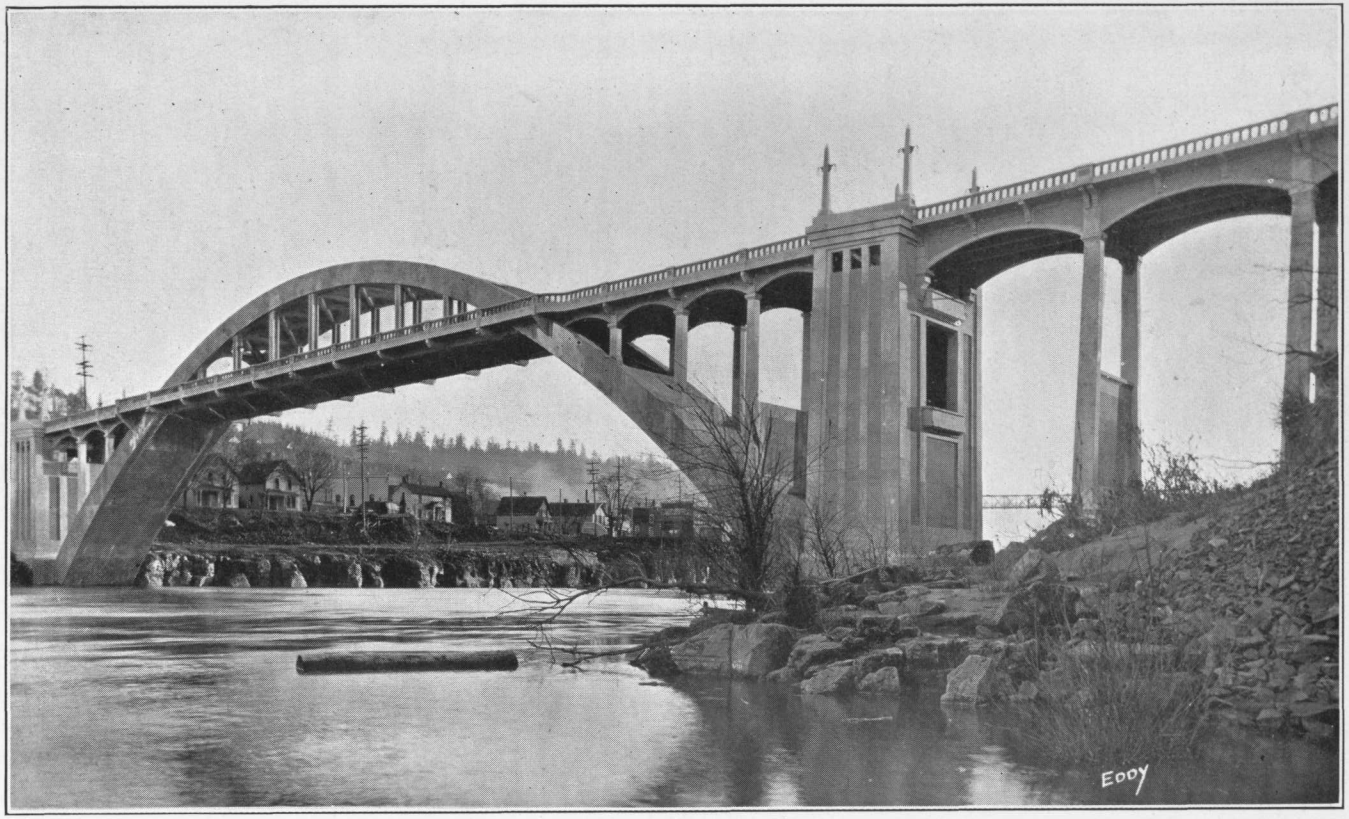
R. A. Furrow, Resident Engineer, was in charge of supervision of the construction.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,926.09
Contract items as follows:		
Removing existing structure, lump sum	$ 1,568.00	
Maintaining traffic, lump sum	1,553.00	
Class "A" concrete, 147.07 cu. yds. at $27.00	3,970.89	
Class "B" concrete, 55.77 cu. yds. at $23.00	1,282.71	
Metal reinforcement, 19,120.0 lbs. at 7½c	1,434.00	
Structural steel, 321,326.0 lbs. at 10½c	33,739.23	
Lumber in place, 13.28 M-FBM at $71.00	942.88	
Excavation for pier foundations, 107.8 cu. yds. at $3.00	323.40	
Trestle superstructure, 153.9 lin. ft. at $19.00	2,924.10	
Force account items:		
Riprapping south pier base	41.01	
Removing old retaining wall	34.51	
Setting curb angle irons	12.22	
Total amount paid to contractor		47,825.95
Grand total cost of structure		$ 49,752.04
Paid by State	$ 1,926.09	
Paid by County	47,825.95	
Total	$ 49,752.04	

Tryon Creek Bridge

This structure was undertaken and practically completed during the previous biennium, and a description will be noted on page 158 of the last report. During the present biennium final payment for the work,



BRIDGE OVER THE WILLAMETTE RIVER AT OREGON CITY; ON THE PACIFIC HIGHWAY IN CLACKAMAS COUNTY

together with some few engineering charges, amounting in all to $3,356.18, have been paid. This brings the entire cost of the structure to $9,734.01 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,085.41
Contract items as follows:		
Frame trestle, all, at $7,224.00	$ 7,224.00	
Class "B" concrete, 34.4 cu. yds. at $35.00	1,204.00	
Lumber in excess of amount called for on plans, 1.929 M-FBM at $55.00	106.10	
Force account items:		
Painting timbers with hot carbolineum	114.50	
Total amount paid to contractor		8,648.60
Grand total cost of structure (all State funds)		$ 9,734.01

Molalla River Bridge

A descriptive article covering this work will be found on page 160 of the preceding biennial report. During the present biennium additional expenditures of $14,712.86 have been made. These expenditures bring the total cost of the work to $60,728.00 on the part of the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,732.30
Lumber furnished by State, deducted from contractor's estimate		300.00
Contract items as follows:		
Class "A" concrete, 358.8 cu. yds. at $25.00	$ 8,970.00	
Class "B" concrete, 439.9 cu. yds. at $25.00	10,997.50	
Reinforcing steel, 67,069.0 lbs. at 6c	4,024.14	
Structural steel, 175,489.0 lbs. at 10½c	18,952.81	
Reinforced concrete handrail, 671.0 lin. ft. at $3.00	2,013.00	
Approach piling, 1,049.0 lin. ft. at 50c	524.50	
Timber approach, 267.0 lin. ft. at $15.60	4,165.20	
Force account items:		
Applying extra coat of paint	80.50	
Excavating for pier No. 3	4,188.95	
Excavating for pier No. 4 and pedestal "B"	984.68	
Changing shoes for trusses	317.67	
Additional work on approaches not shown on plans	537.11	
Furnishing and placing expansion joint tiller and brass dowels	239.64	
Total amount earned by contractor	$ 55,995.70	
Deduction for lumber furnished by State	300.00	
Total amount paid to contractor		55,695.70
Grand total cost of structure (all State funds)		$ 60,728.00

Oregon City Bridge

The bridge over the Willamette River at Oregon City, mentioned in the last biennial report as having been designed, is practically complete on the date of the present report.

Contract No. 414 for its construction was awarded to A. Guthrie & Company on June 29, 1921. The work was started as soon thereafter as possible, with a view to completion of all work at low elevations during the low water period.

This was successfully accomplished and work, therefore, has proceeded without interruption up to the present time. The contractor adopted a unique method of erection, using the suspension cables of the old span to support the arch rib sections until all were erected and self-supporting. By this procedure, he was able to save considerable time over what would have otherwise been required.

[CLACKAMAS]

The bridge is at present near enough completed so that a good idea can be had of its utility and beauty. From the amount of favorable comment which has been heard even at this early date, it is evident that the effort spent in the design was not wasted.

The total cost of the structure is estimated at $270,000.00, of which amount the State is to pay $70,000.00 and the County $200,000.00. The expenditures to date amount to $253,927.43, paid $133,927.43 by the State and $120,000.00 by the County.

R. A. Furrow and C. P. Richards are Resident Engineers in charge of construction for the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 16,278.70
Bronze name plates furnished by State		23.50
Drayage charges on wire mesh, furnished by State		53.20
Contract items as follows:		
Earth excavation to elevation shown on plans, 200.0 cu. yds. at $1.50	$ 300.00	
Rock excavation to elevation shown on plans, 280.0 cu. yds. at $4.00	1,120.00	
Excavation below elevation shown on plans, 900.0 cu. yds. at $12.00	10,800.00	
Embankment in place, 400.0 cu. yds. at $1.40	560.00	
Class "A" concrete, 2,550.0 cu. yds. at $22.50	57,375.00	
Class "B" concrete, 1,600.0 cu. yds. at $18.50	29,600.00	
¾-inch Gunite covering, 4,000.0 sq. ft. at 17c	680.00	
1¼-inch Gunite covering, 15,000.0 sq. ft. at 29c	4,350.00	
Structural steel, 929,000.0 lbs. at 12c	111,480.00	
Metal reinforcement, 302,000.0 lbs. at 5½c	16,610.00	
Wire mesh reinforcement, 14,000.0 lbs. at 12c	1,680.00	
Concrete handrail, 1,520.0 lin. ft. at $4.00	6,080.00	
Electrical equipment, lump sum, 50 per cent $750.00	375.00	
Force account items:		
Making test borings under ends of arch ribs	1,674.35	
Furnishing and placing dowels in foundation of West Linn pier	720.19	
Painting inside of rib sections as directed by engineer	2,577.86	
Erecting scaffolding in connection with taking of strain gauge measurements	46.55	
Furnishing and placing "sheer strakes"	1,639.31	
Extra work in connection with placing reinforcing steel	1,000.00	
Rebending reinforcing steel account of change in plans	21.10	
Furnishing and placing steel ladders	141.28	
Furnishing and placing steel channel plates in rib sections	371.96	
Furnishing and installing copper incasements around steel stringers at expansion joints	240.98	
Reinforcing hangers on steel span	114.73	
Extra Guniting of members, walls and bottom of slab between ribs	4,033.91	
Total amount earned by contractor	$253,592.22	
Percentage retained until completion of contract	16,020.19	
Total amount paid to contractor		237,572.03
Grand total expended to Nov. 30, 1922		$253,927.43
Paid by State	$133,927.43	
Paid by County	120,000.00	
Total	$253,927.43	

Unit 1, Mount Hood Loop Bridges

Contract 413 was awarded to Tobin & Pierce on June 29, 1921, for the construction of seven culverts on the Mt. Hood Loop near Sandy. Work was started July 10, 1921, and completed October 1 of the same

year under the supervision of G. S. Paxson, Resident Engineer for the State. The total cost of culverts has amounted to $15,322.58. This entire amount has been paid by the State and at the present time there is due from the County $7,500.00 in cooperation.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 581.10
Contract items as follows:		
BRIDGE No. 667—		
Excavation, no classification, 126.2 cu. yds. at $3.00	$ 378.60	
Class "A" concrete, 118.57 cu. yds. at $25.45	3,017.61	
Metal reinforcement, 10,498.0 lbs. at 7c	734.86	
BRIDGE No. 668—		
Excavation, no classification, 51.3 cu. yds. at $3.00	153.90	
Class "A" concrete, 45.96 cu. yds. at $25.45	1,169.68	
Metal reinforcement, 4,035.0 lbs. at 7c	282.45	
BRIDGE No. 691—		
Excavation, no classification, 74.0 cu. yds. at $3.00	222.00	
Class "A" concrete, 66.08 cu. yds. at $25.45	1,681.74	
Metal reinforcement, 6,010.0 lbs. at 7c	420.70	
BRIDGE No. 702—		
Excavation, no classification, 66.4 cu. yds. at $3.00	199.20	
Class "A" concrete, 55.3 cu. yds. at $25.45	1,407.39	
Metal reinforcement, 4,600.0 lbs. at 7c	322.00	
BRIDGE No. 703—		
Excavation, no classification, 71.4 cu. yds. at $3.00	214.20	
Class "A" concrete, 42.76 cu. yds. at $25.45	1,088.24	
Metal reinforcement, 3,810.0 lbs. at 7c	266.70	
BRIDGE No. 747—		
Excavation, no classification, 68.5 cu. yds. at $3.00	205.50	
Class "A" concrete, 31.23 cu. yds. at $25.45	794.80	
Metal reinforcement, 2,776.0 lbs. at 7c	194.32	
BRIDGE No. 748—		
Excavation, no classification, 55.0 cu. yds. at $3.00	165.00	
Class "A" concrete, 57.21 cu. yds. at $25.45	1,455.99	
Metal reinforcement, 5,380.0 lbs. at 7c	376.60	
Total amount paid to contractor		14,751.48
Grand total cost of structures (all State funds)		$ 15,322.58

Unit 2, Mount Hood Loop Bridges

Bids were taken on June 28, 1921, for the construction of the bridges required on this section. The low bid received was from A. Guthrie & Co., but was rejected as too high, and it was decided to do the work with State forces.

Material, equipment and crew were assembled, and the work started on July 15, 1921, under G. S. Paxson, Superintendent. Favorable progress was made until November 20, when the severe storm of that date delayed progress and increased the cost considerably.

The work was finally completed in February, 1922, at a total cost of $45,028.81. This cost is not as low as might be expected, principally on account of the severe weather mentioned above, but it is still a few hundred dollars under what the cost would have been had it been contracted to the low bidder.

The entire expenditures for the structures have been made by the State and at the present time the sum of $22,500.00 is due from the County in cooperation.

[CLACKAMAS]

Maintenance

Maintenance expenditures by the State in Clackamas County during the two-year period have covered general patrol work, slide removals, shoulder and drainage maintenance and sanding of bituminous pavements during the summer months. The section from Canemah to Canby, which was paved with a two-inch bitulithic surface in 1918, has required much more than its proportionate share of these expenditures.

Due to subgrade conditions the two-inch pavement in many cases proved too light for the traffic it was required to carry and a very considerable amount of repairs during the winter of 1920 and 1921 were necessitated. Since these repairs were completed, the pavement has held up markedly better and a comparatively small expense for pavement maintenance has been necessary during the ensuing seasons. Inasmuch as the State had no plant equipment suitable for the economical making of small patching repairs, this maintenance work was handled on a force account basis by contractors having a plant in operation in Portland, and the hot stuff materials were hauled from there.

F. T. Young, Resident Engineer, has been in direct charge of all maintenance in the County, which has entailed expenditures of $54,542.01 during the biennium. With the exception of $40.97 paid by the County, these have all been expended from State funds.

Oregon City-Oswego Survey

Survey work on the Oregon City-Oswego Section during the past two years has consisted of the revision of 0.56 mile of the location north from the Oregon City Bridge, involving several alternate propositions for dealing with the crossing of the Southern Pacific tracks. The location adopted follows the existing road, with two alternate lines at the immediate site of the crossing; one contemplating a temporary grade crossing and the other a future overhead structure. This work has been in charge of F. T. Young, Resident Engineer.

Canemah-Oregon City Survey

Several surveys of various routes over the 0.9-mile section between Canemah and the Oregon City Bridge have been made during the past two years and numerous trial revisions of particular lines have been made in the course of study of the situation. Questions of future double track development by the Southern Pacific, needs of industrial and public service corporations for their present business, possibility of future expansion, points of preference for personal business reasons on the part of others, as well as the problems of cost, safety and practicability of construction have all arisen to complicate the situation and delay its ultimate settlement and final determination. This final determination has been made, however, by the designation of the route from the east end of the Oregon City Bridge, at Seventh Street, via Seventh Street to Railroad Avenue, thence south along the west side of the Southern Pacific Tracks to Fifth Street, with a crossing under grade by a proposed new structure at Fifth Street to the east side of the track, and thence south along the track to Third Street and over the bluff to Canemah.

The various surveys have been made under the supervision of F. T. Young, Resident Engineer.

[CLACKAMAS]

Canby-Aurora Survey

The only survey work during the biennium just ended on the Canby-Aurora Section has been in the way of revision of location made necessary in connection with the acquisition of right-of-way through the gravel pit property of the Southern Pacific Company at Canby, covering a distance of approximately one mile.

F. T. Young, Resident Engineer, was in charge of this revision.

Mount Hood Loop Survey

Survey work on the Sandy-Gresham and Sandy-Forest Boundary Sections during the 1921-1922 biennium has consisted only of revisions of location made desirable by reasons of economy of construction, betterment of location, et cetera.

Engineering on County Bridges

Considerable work has been done in an advisory way for the County on bridges on various County Roads.

The principal work of this nature was a report on the condition and methods of repair of the Meadow Brook Bridge which was damaged by high water in November of 1921.

The total cost of this work was $451.46.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Clackamas County has cooperated as follows:

1.	Paid into the State Market Road Fund	$108,130.80
2.	State Funds apportioned to County	132,654.18
3.	County levy made to match State Funds	121,676.25
4.	County Market Road Funds collected	117,803.75
5.	Cash paid to County by State	104,412.29
6.	State expenditures, deducted from apportionment	3,535.63
7.	Cash due County from State in December, 1922	24,706.26
8.	County expenditures on Market Roads	249,280.24
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Clackamas County received from the State Market Road Fund $24,523.38 more than it paid into the fund. The excess is Clackamas County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $121,676.25, of this amount they have collected and credited to the Market Road Fund $117,803.75.

The County Court has designated 29 roads to be improved as Market Road projects. Many of the roads designated are roads upon which County bond issue funds are to be expended for pavement. It is proposed to use Market Road Funds for the preparation of grade on such roads. Other roads have also been designated upon which no bond funds are available.

The Market Road improvements being made are of a permanent nature and good alignment and grades are being obtained. Most of the

[CLACKAMAS]

Market Road construction work is being done by County forces, under direction of the County Court. Contracts have been awarded by the County Court for a portion of the work.

The last report received from the County officials shows that expenditures have been made on only 11 of the 29 projects.

The engineering work is being done by D. T. Meldrum, County Surveyor, and plans submitted to the State Highway Engineer for approval.

For an expenditure of $249,280.24, the County Court did the following amount of construction: Graded 25.7 miles of 24-ft. roadbed and surfaced, with crushed rock or gravel, 25.7 miles, 16 ft. in width.

CLATSOP COUNTY

In Clatsop County, the Columbia River Highway was completed during the 1919-1920 biennium, with the single exception of a few hundred feet at the east city limits of Astoria. The two-year period just ended has brought the completion of the Roosevelt Coast Highway from Astoria to Seaside, has given the summer vacationists to the seashore resorts a practically continuous paved highway from Portland to Seaside, and has given the people and business interests of Seaside and way points a completed all-year road to Portland.

For the first time, also, the road through Clatsop County to Tillamook is passable at all times and in all weather. The completion of the Hamlet Junction-Tillamook County Line Section of the Roosevelt Coast Highway has closed the last gap which was not so passable, although there still remains a section of some thirteen miles between Seaside and Hamlet Junction which has not been improved to standard.

During the period a much appreciated improvement has been made in the Columbia River Highway east of Astoria. This has been accomplished by betterment work, consisting of the widening of sharp curves and the cutting off of points where the view was restricted. This work is still in progress at the close of the year, with the paving of the curves which have been widened.

Construction work in the County during the biennium has been in charge of W. D. Clarke, Division Engineer.

Svenson-Clatskanie Paving

A complete description of the paving of the three units between Svenson and Clatskanie will be noted on page 165 of the last report. During the present biennium, the work has been carried to completion with additional expenditures of $241,796.04. These expenditures bring the total cost of the work to $702,822.10 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering, all units		$ 24,606.17
Contract items as follows:		
UNIT No. 1, SVENSON TO ROCK CREEK—		
Excavation, no classification, 7,415.9 cu. yds. at 75c	$ 5,561.93	
6-inch porous drain tile, 4,385.0 lin. ft. at 30c	1,312.50	
Standard wood guard fence, 2,120.0 lin. ft. at 85c	1,802.00	
Broken stone for base, 5,436.0 cu. yds. at $3.92½	21,336.30	
Broken stone for shoulders, 1,819.5 cu. yds. at $4.23	7,696.49	
Clay or earth filler, 394.0 cu. yds. at $1.00	394.00	
Shoulder construction, 79,284.0 lin. ft. at 6c	4,757.04	
Standard 2-inch bituminous surfacing, 71,185.9 sq yds. at $1.54	109,626.29	
3-inch bituminous base, 45,965.5 sq. yds. at 98c	44,948.29	
Pavement, batch haul, first mile, 4,567.0 batches at 20c	913.40	
Pavement, batch haul, second mile, 2,177.0 batches at 40c	870.80	
Pavement, batch haul, third mile, 4,526.0 batches at 60c	2,715.60	
Pavement, batch haul, fifth mile, 2,602.0 batches at $1.00	2,602.00	
Pavement, batch haul, sixth mile, 461.0 batches at $1.20	553.20	
Force account items:		
Constructing dry rock wall at Sta. 1423+00	47.03	
Riprapping approaches to Big Creek bridge	183.04	
Removing overhanging snags	389.18	
Constructing guard rails and repairing bridges at stations 1411+00 and 1413+00	143.99	
Removing brush at curves to improve sight distance	273.47	
Total amount paid to contractor on Unit No. 1		206,126.55

[CLATSOP]

UNIT NO. 2, ROCK CREEK TO WESTPORT—

Excavation, no classification, 9,796.1 cu. yds. at 75c	$ 7,347.08	
12-inch plain concrete pipe, 131.0 lin. ft. at $1.25	163.75	
6-inch porous drain tile, 2,964.0 lin. ft. at 30c	889.20	
Class "C" concrete, 30.28 cu. yds. at $22.00	666.16	
Standard wood guard fence, 11,182.0 lin. ft. at 85c	9,504.70	
Broken stone for base, 6,295.0 cu. yds. at $3.24	20,395.80	
Broken stone for shoulders, 2,120.5 cu. yds. at $3.50	7,421.75	
Shoulder construction, 99,387.0 lin. ft. at 6c	5,963.22	
Clay or earth filler, 295.5 cu. yds. at $1.00	295.50	
Standard 2-inch bituminous surfacing, 91,240.94 sq. yds. at $1.46	133,211.77	
3-inch bituminous base, 30,425.6 sq. yds. at 98c	29,817.09	
Pavement, batch haul, first mile, 2,705.0 batches at 20c	541.00	
Pavement, batch haul, second mile, 1,950.0 batches at 40c	780.00	
Pavement, batch haul, third mile, 2,698.0 batches at 60c	1,618.80	
Pavement, batch haul, fourth mile, 1,705.0 batches at 80c	1,364.00	
Pavement, batch haul, fifth mile, 450.0 batches at $1.00	450.00	
Force account items:		
Redecking Hunt Creek, Gnat Creek and Rock Creek bridges	1,240.16	
Removing overhanging snags	373.22	
Painting fences on Bugby Hill	118.47	
Constructing dry rock wall and riprap, Sta. 700 to Sta. 720	520.09	
Constructing spillway for culvert at Sta. 1050+00	11.30	
Constructing masonry wall at Sta. 764+00	1,041.33	
Erecting water tank for convenience of traveling public	18.13	
Constructing parking strip at Sta. 768+00	124.35	
Removing brush at curves to improve sight distance	124.91	
Removing slides and cleaning ditches and culverts	513.03	
Adjustment on excavation account change in alignment	1,904.00	
Total amount paid to contractor on Unit No. 2		226,418.81

UNIT NO. 3, WESTPORT TO CLATSKANIE—

Excavation, no classification, 12,755.3 cu. yds. at 75c	$ 9,566.48	
12-inch plain concrete pipe, 138.0 lin. ft. at $1.25	172.50	
6-inch porous drain tile, 6,248.0 lin. ft. at 30c	1,874.40	
Class "C" concrete, 35.74 cu. yds. at $22.00	786.28	
Standard wood guard fence, 8,651.0 lin. ft. at 85c	7,353.35	
Broken stone for base, 6,509.5 cu. yds. at $3.72	24,215.34	
Broken stone for shoulders, 2,797.5 cu. yds. at $4.00	11,190.00	
Shoulder construction, 110,558.0 lin. ft. at 6c	6,633.48	
Clay or earth filler, 537.5 cu. yds. at $1.00	537.50	
Standard 2-inch bituminous surfacing, 98,656.4 sq. yds. at $1.51	148,971.16	
3-inch bituminous base, 25,251.2 sq. yds. at 98c	24,746.18	
Pavement, batch haul, first mile, 3,237.0 batches at 20c	647.40	
Pavement, batch haul, second mile, 820.0 batches at 40c	328.00	
Pavement, batch haul, third mile, 365.0 batches at 60c	219.00	
Pavement, batch haul, fourth mile, 2,031.0 batches at 80c	1,624.80	
Pavement, batch haul, fifth mile, 975.0 batches at $1.00	975.00	
Pavement, batch haul, sixth mile, 463.0 batches at $1.20	555.60	
Force account items:		
Constructing dry rock wall at Sta. 82+00	957.46	
Removing overhanging snags and brush	236.60	
Riprapping embankments	310.90	
Constructing guard rail and repairing two bridges at Stations 17+00 and 480+00	130.27	
Constructing bleeders along curves	223.52	
Removing slides	1,664.85	

[CLATSOP]

EXPENDITURES—Continued

Constructing dry rock wall and repairing guard fence near Kerry	401.91	
Repairing pavement damaged by falling tree	59.59	
Adjustment on excavation account of change in alignment	1,289.00	
Total amount paid to contractor on Unit No. 3		245,670.57
Grand total cost of project (all State funds)		$702,822.10

Astoria-Goble Pavement Repairs

On July 26, 1922, Contract 571 was awarded to the Warren Construction Company of Portland, Oregon, for the making of bituminous pavement repairs on what was designated as the Astoria-Goble Section. This designation was given on account of the fact that most of the work contemplated was between these two points, although a small amount lays between Goble and the Multnomah County Line.

The work contemplated consisted of repairing of breaks in the pavement, which had been accumulated in considerable amount over certain sections where the original pavement was only two inches in thickness and had been laid on a subgrade which was inadequate, largely because of the saturated character of the country. The sections where such repairs were heaviest were from Svenson to Astoria, Marshland to Westport and Tide Creek to Rainier. In addition to these repairs a small amount of betterment work was done in the way of widening the pavement at a few of the places where the curves had been widened by the cutting off of points, et cetera. The original estimate for the work was divided about 30 per cent for betterment and 70 per cent for repairs.

During the progress of the work, the requirement for repairs was practically doubled on account of three factors: first, the development of additional breaks and the raising of the standard of condition to which the surface was to be brought by the work; second, overrun of the amount of material required due to the impossibility of exact estimating beforehand; and, third, the fact that much of the additional work was located at the farthest distance from sources of repair material, thus raising the average haul and thereby the average price on all such material. Also, the betterment work was increased to cover the paving of all bridges and widened curves. In view of these large increases and the amount of work to be done, a reduction of price was agreed to by the contractor and approximately the last third of the work is being done at these reduced prices.

Work was begun under the contract on October 14, and is yet under way, being supervised by A. J. Olsen, Resident Engineer. The estimated total cost of the work is $113,000.00, to be paid for from State funds. Of this amount $58,763.99 has been spent.

Paving Youngs Bay Bridge and North Approach

After completion of the Youngs Bay Bridge, Contract 464 was awarded for the paving of the bridge and filled approach on the north end. This approach, being within the city limits of Astoria, was paid for by Clatsop County.

J. H. Tillman Company of Seaside, Oregon, were the successful bidders and the contract was awarded to them on August 30, 1921. They began operations September 26 and completed the work October 10 of the same year.

The job consisted of the paving of 1,600 lineal feet of the bridge structure, exclusive of the draw spans which had previously been paved.

[CLATSOP]

The structure is 19 feet wide and was paved with a bituminous concrete two inches thick at the edges and three inches thick in the center. The filled approach, 177 feet in length, was paved with standard Type "D" pavement, consisting of three inches of bituminous base with a two-inch bituminous wearing surface. This pavement varied from 16 to 24 feet in width and was laid on a macadam subbase. In addition to this, 38 feet of pavement was laid on a concrete overcrossing structure, this pavement being of the same type as on the Youngs Bay Bridge.

All work was done under the supervision of A. J. Olsen, Resident Engineer, and called for a total expenditure of $9,578.70. This amount was paid $8,057.07 by the State and $1,521.63 by Clatsop County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 204.45
Contract items as follows:		
Standard 2-inch bituminous surfacing, 3,404.72 sq. yds. at $2.25	$ 7,660.62	
Bituminous surfacing, 62.4 batches at $10.00	624.00	
Standard bituminous pavement, 3-inch base, 2-inch top, 363.21 sq. yds. at $3.00	1,089.63	
Total amount paid to contractor		9,374.25
Grand total cost of project		$ 9,578.70
Paid by State	$ 8,057.07	
Paid by County	1,521.63	
Total	$ 9,578.70	

Unit 1, Youngs Bay-Skipanon Paving

Paving of the last section remaining unpaved between Astoria and Seaside was provided for by contracts awarded for Units 1 and 2 of the Youngs Bay-Skipanon Section. Unit 1 consists of 0.33 mile from the south end of the Youngs Bay Bridge south to the north end of the concrete pavement laid during 1920 under Contract 269. On March 23, 1922, Soleim & Gustafson of Astoria were awarded Contract 495, covering this section, which contract provided for the construction of an 18-foot cement concrete pavement, of seven-inch uniform thickness and of a 1:1½:3 mix.

Work was begun April 6, 1922, and completed the June 30th following. The subgrade of this section consists of a hydraulic sand fill and the pavement was laid without gravel or rock shoulders.

A. J. Olsen, Resident Engineer, had supervision of the work which required $10,885.07 of State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 706.59
Contract items as follows:		
Excavation, no classification, 227.3 cu. yds. at 25c	$ 56.83	
Preparation of subgrade, 4,338.0 sq. yds. at 2c	86.76	
Standard 7-inch concrete pavement, 3,570.24 sq. yds. at $2.51	8,961.30	
Felt expansion joints, 1,077.0 lin. ft. at 12c	129.24	
Broken stone for shoulders, 119.0 cu. yds. at $3.50	416.50	
Shoulder construction, 3,455.0 lin. ft. at 4c	138.20	
Force account items:		
Removing old pipe line trestle and laying 6-inch drain tile	113.44	
Widening shoulders, Sta. 0+00 to 17+27	276.21	
Total amount paid to contractor		10,178.48
Grand total cost of project (all State funds)		$ 10,885.07

[CLATSOP]

Unit 2, Youngs Bay-Skipanon Paving

Unit 2 of the Youngs Bay-Skipanon Section extends over the gap between Miles Crossing, at the south end of the pavement laid in 1920 under Contract 269, and the north end of the Skipanon-Seaside Section, at the south end of the Warrenton Cut-off. Contract 496 was awarded March 23 to the J. H. Tillman Company of Seaside for the paving of this gap. The contract provided for the construction of an 18-foot bituminous concrete wearing surface two inches in thickness. The wearing surface was constructed on three inches of bituminous base over the south 1.26 miles comprising the Warrenton Cut-off, and, from the Warrenton Cut-off to Miles Crossing, except where a gap of 2,100 feet was left to allow for a new bridge across the Lewis and Clark River, the existing eight-foot concrete pavement was widened to 18 feet with a bituminous base section five feet in width on each side.

Work was begun on the contract on April 10, 1922, and completed October 8, under the supervision of A. J. Olsen, Resident Engineer. Total expenditures for the work are estimated to amount to $105,000.00, to be paid $40,000.00 by the State and $65,000.00 by Clatsop County. The expenditures to the date of this report are $93,079.83, having been paid $53,377.53 by the State and $39,702.30 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,044.96
Constructing standard wood guard fence with State forces		352.23
Items to be deducted from contractor's estimate:		
Asphalt furnished by State		19,687.20
Rental of State-owned equipment		331.13
Contract items as follows:		
Excavation, single classification, 950.0 cu. yds. at 50c	$ 475.00	
Preparation of subgrade, 51,601.00 sq. yds. at 3c	1,548.03	
Standard bituminous pavement, 3-inch base, 2-inch top, 15,018.0 sq. yds. at $2.50	37,545.00	
Standard bituminous wearing surface, 29,114.0 sq. yds. at $1.20	34,936.80	
Standard bituminous base, 5,328.0 batches at $3.20	17,049.60	
Bituminous mixture for patching, 578.0 batches at $2.20	1,271.60	
Broken stone subbase, 1,183.0 cu. yds. at $2.00	2,366.00	
Broken stone for shoulders, 354.0 cu. yds. at $3.00	1,062.00	
Force account items:		
Removing bulkhead, fences and trees and reconstructing fences on new right-of-way	42.44	
Expense in connection with caring for asphalt that was damaged in shipment	434.28	
Total amount earned by contractor	$ 96,730.75	
Deductions:		
Asphalt furnished by State	19,508.31	
Percentage retained until completion of contract	7,558.13	
Total amount paid to contractor		69,664.31
Grand total expended to Nov. 30, 1922		$ 93,079.83
Paid by State	$ 53,377.53	
Paid by County	39,702.30	
Total	$ 93,079.83	

Youngs Bay-Miles Crossing Paving

The pavement of this section was undertaken during the previous biennium and a description thereof may be noted on page 167 of the last report. The pavement was originally laid without rock shoulders, but during the last biennium it has been found in this case, as in other cases where rock shoulders have not been constructed along pavements on sand

subgrade, that the sand shoulders wash out and that the protection of rock or gravel shoulders is a necessity. These required shoulders have been constructed as a maintenance item.

Additional expenditures of $3,839.48, covering delayed payments to the contractor and minor engineering charges, have brought the total cost of the contract to $23,267.61. This amount has been paid entirely from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,028.29
Contract items as follows:		
Common excavation, 1,565.0 cu. yds. at $1.00	$ 1,565.00	
Cement concrete pavement, 7,239.0 sq. yds. at $2.75	19,907.25	
Felt expansion joints, 2,190.0 lin. ft. at 18c	394.20	
Force account items:		
Removing pipe line bents and old road crossings	30.88	
Furnishing and laying timber headers (to be left in place)	341.99	
Total amount paid to contractor		22,239.32
Grand total cost of project (all State funds)		$ 23,267.61

Skipanon-Seaside Paving

Contract 310, awarded on November 6, 1920, to the J. H. Tillman Company of Seaside, Oregon, for paving the Skipanon-Seaside Section of the Roosevelt Coast Highway, was completed November 13, 1921. The section comprises 9.95 miles between the east end of the O'Hanna Creek Bridge, at the city limits of Seaside, and the south end of the County pavement on the road to Warrenton near Skipanon. The pavement constructed consists of 18-foot bituminous concrete of variable thickness, on which work was begun February 8, 1921.

Prior to the work done under this contract, the section from Skipanon to Seaside consisted of three types of surface. About 64.3 per cent of the distance consisted of a nine-foot bituminous pavement with broken stone shoulders three to five feet in width. Of this type there were six separate sections. Approximately 33.6 per cent consisted of a macadam surface, averaging 16 feet in width. Of this type there were three separate sections. Approximately 2.2 per cent consisted of a planked surface on an earth subgrade. Of this type there were three separate sections.

On the first type, the existing nine-foot pavement was widened to 18 feet by the construction of a bituminous concrete base with a minimum thickness of two inches. This base was topped with a bituminous concrete wearing surface having an average thickness of two inches and a minimum thickness of one and one-half inches. On the other types, a macadam subbase 18 feet wide and four inches in loose thickness was laid, although in some places the existing macadam was merely widened and thickened as necessary in order to make these minimum dimensions. On this base there was then constructed an 18-foot pavement consisting of three inches of bituminous base and two inches of bituminous concrete wearing surface.

The original specifications did not call for rock shoulders, but a protection was found necessary on account of the tendency of the sandy soil to wash away and leave the edge of the pavement exposed and subject to damage. For this reason a crushed gravel shoulder one foot in width was constructed on each side of the pavement throughout the entire length.

[CLATSOP]

A. J. Olsen, Resident Engineer, was in charge of the work, which has entailed final expenditures of $281,132.35. Payment of this amount has been made $278,802.57 by the State and $2,329.78 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8,215.96
Labor and material furnished by State:		
Removing slides and fallen trees, constructing rock walls		267.66
Seeding embankment slopes		87.16
Rental and repairs to equipment used on State force work		420.18
Profit accruing for furnishing asphalt to contractor		(credit) 430.40
Asphalt furnished by State (deducted from contractor's estimate)		41,403.31
Contract items as follows:		
Clearing and removing old plank road, all	$ 1,000.00	
Excavation, no classification, 6.0 cu. yds. at 75c	4.50	
Standard bituminous pavement, 2-inch top, 37,862.5 sq. yds. at $1.46	55,279.25	
Bituminous surfacing, 15,478.0 batches at $4.41	68,257.98	
Bituminous base, 22,989.6 batches at $4.18	96,096.53	
Broken stone subbase, 2,499.0 cu. yds. at $5.00	12,495.00	
Waterbound macadam subbase, 631.0 cu. yds. at $5.00	3,155 00	
Broken stone for shoulders, 1,575.5 cu. yds. at $3.65	5,750.58	
Force account items:		
Furnishing and installing concrete pipe culverts	594.42	
Widening cuts and digging ditches	28,658.37	
Erection of guard fences and redecking Taylor Creek bridge	1,202.27	
Moving water main in City of Warrenton	77.89	
Total amount earned by contractor	$272,571.79	
Deduction for asphalt furnished by State	41,403.31	
Total amount paid to contractor		231,168.48
Grand total cost of project		$281,132.35
Paid by State	$278,802.57	
Paid by County	2,329.78	
Total	$281,132.35	

Bulkhead and Fill at Youngs Bay

On September 24, 1919, the State Highway Commission entered into an agreement with the Port of Astoria for the construction of a bulkhead and fill from Miles Crossing to the Youngs Bay Bridge.

The first unit of this work was completed in 1920 as outlined in the last report, but further work was necessary in 1921, chiefly on account of the failure of the Astoria Marine Iron Works to complete their part of the fill. This latter work was done in cooperation with the Port of Astoria at a cost to the State of $15,433.16. This work was handled by R. A. Furrow, Resident Engineer, in conjunction with the Youngs Bay Bridge.

Miles Crossing-Skipanon Grading and Surfacing

Preparatory to closing the last gap in the pavement on the Roosevelt Coast Highway between Astoria and Seaside, Contract 431 was awarded July 28, 1921, for grading and surfacing the Warrenton Cut-off and the construction of seven-foot macadam shoulders on each side of the eight-foot concrete pavement which then existed on the section from the Warrenton Cut-off to Miles Crossing. Work was begun August 8, 1921, by John Slotte & Company, the successful bidders, and was completed February 20, 1922. The Warrenton Cut-off extends from a point on the Warrenton-Seaside Road, at the north end of the Skipanon-Seaside Section, north for a distance of 1.26 miles. The section from there to

[CLATSOP]

Miles Crossing covers a gross distance of 3.11 miles, the work under this special contract being 2.75 miles in length after omitting the gap at the Lewis and Clark River.

A. J. Olsen, Resident Engineer, was in charge of the work, which has required total expenditures of $43,489.68. Of this amount $75.60 has been paid by the County and the balance of $43,414.08 by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,244.53
Penalty for overrun of time limit (deducted from contractor's estimate)		335.42
Contract items as follows:		
Clearing and grubbing, all	$ 1,600.00	
Common excavation, 10,642.8 cu. yds. at 65c	6,917.82	
Overhaul, 15,215.0 sta. yds. at 5c	760.75	
12-inch plain concrete pipe, 78.0 lin. ft. at $1.50	117.00	
18-inch reinforced concrete pipe, 12.0 lin. ft. at $2.50	30.00	
6-inch porous drain tile, 1,007.0 lin. ft. at 30c	302.10	
Rock or gravel backfill for tile drains, 75.0 cu. yds. at $3.50	262.50	
Broken stone surfacing, 3,592.5 cu. yds. at $3.60	12,933.00	
Maintenance materials, 112.0 cu. yds. at $3.25	364.00	
Sand filler, 193.5 cu. yds. at $3.50	677.25	
Rock for shoulders along paved section, 3,988.0 cu. yds. at $3.60	14,356.80	
Maintenance materials for paved section, 199.5 cu. yds. at $3.25	648.38	
Force account items:		
Rolling macadam road, Sta. 37+00 to Sta. 105+00	1,199.95	
Placing broken stone on old county road approach	75.60	
Total amount earned by contractor	$ 40,245.15	
Deduction for overrun of time limit	335.42	
Total amount paid to contractor		39,909.73
Grand total cost of project		$ 43,489.68
Paid by State	$ 43,414.08	
Paid by County	75.60	
Total	$ 43,489.68	

Hamlet Junction-Tillamook County Line Surfacing

The surfacing of this section, undertaken during the preceding biennium, has been completed just at the close of the present year. The work consists of 10.67 miles of broken stone surfacing, extending from the junction of the road to Hamlet, approximately one-half mile south of Necanicum, to the Tillamook County Line, and is all on the Roosevelt Coast Highway. The section was graded in 1914 and was the only portion between Astoria and Tillamook that was entirely impassable for winter traffic. Surfacing of the section was started in 1920 as a County force job with the State agreeing to cooperate on a fifty-fifty basis up to the amount of $20,000. This original agreement was based on a single track surface which, however, was later changed and the surfacing has been laid as wide as the earth grade would permit, varying in width from 12 to 16 feet. During 1921 additional appropriations were made on the same percentage cooperation as before and the strengthening and housing of three wooden truss bridges in the section was included as part of the project.

From the beginning of operations in 1920 to August 1, 1921, the work was handled entirely by the County, using County forces and equipment under the supervision of the County Supervisor. On the latter date the work was taken over by the State and has been finished as a State force job. B. O. Shucking was Resident Engineer in charge from

August, 1921, to August, 1922. From the latter date until completion of the work in November it was under the supervision of Guy B. Nyswaner, Superintendent. The total estimated State share is $55,000.00. Of this amount $47,929.65 has been spent, including $1,711.70 expended during the 1919-1920 biennium.

Youngs Bay Bridge Post Road Project

The details of the construction of this structure are covered on page 169 of the previous biennial report. The work was completed during the present biennium at a total cost of $360,146.86, of which amount $196,015.45 has been spent during the biennium just closed. Of the total expenditures the State has paid $92,228.86, the Federal Government $196,741.33 and Clatsop County $98,176.67. The sum of $24,681.25 has been advanced by the State for the County, and the State is to be reimbursed by this amount.

The bridge was placed in service on July 3, 1921, and since that time has operated with a smoothness and speed that have entirely fulfilled the hopes of its designers.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 18,611.07
Paving bridge with bituminous mixture		1,357.50
Name plates furnished by State (deducted from contractor's estimate)		16.00
Contract items as follows:		
Fir piling, 24,171.0 lin. ft. at 47c	$ 11,360.37	
Lumber in place, 446.5 M-FBM, at $69.00	30,808.50	
Handrail, 3,547.3 lin. ft. at $1.90	6,739.87	
Fire protection system, 1,615.0 lin. ft. at $2.50	4,037.50	
Cast iron drains, 58.0 each at $5.00	290.00	
Excavation, 1,702.5 cu. yds. at $20.00	34,050.00	
Class "A" concrete, 1,181.2 cu. yds. at $26.90	31,774.28	
Class "B" concrete in counterweights, 237.3 cu. yds. at $21.00	4,983.30	
Class "D" concrete, 2,600.0 cu. yds. at $18.00	46,800.00	
Foundation piling, 23,135.0 lin. ft. at 60c	13,881.00	
Steel reinforcement, 112,106.0 lbs. at 6½c	7,286.89	
Structural steel for substructure, 98,449.0 lbs. at 11c	10,829.39	
Oak bumping blocks, 10.0 each at $20.00	200.00	
Piling in protection piers, 5,432.75 lin. ft. at 37c	2,010.12	
Lumber in protection piers, 20.45 M.-FBM. at $72.00	1,472.40	
Dolphin chains, 360.0 lin. ft. at 60c	216.00	
Test piles, 8.0 each at $100.00	800.00	
Steel ladders, 74.0 lin. ft. at $2.00	148.00	
6-inch galvanized pipe conduit, 54.0 lin. ft. at $4.00	216.00	
Gas pipe handrail, 71.0 lin. ft. at $4.00	284.00	
Curb angles, 526.4 lbs. at 10c	52.64	
Suspended ceiling, 46.2 sq. yds. at $2.00	92.40	
Operators' houses, 4.0 each at $400.00	1,600.00	
Plumbing, lump sum, at $750.00	750.00	
Structural steel for superstructure, 504,815.0 lbs. at 12½c	63,101.88	
Operating machinery, 64,319.0 lbs. at 40c	25,727.60	
Reinforcing steel in counterweight, 57,252.0 lbs. at 7c	4,007.64	
Electrical equipment for operating, lump sum, at $18,000.00	18,000.00	
Roadway gates, 2.0 each at $850.00	1,700.00	
Fog bell, 1.0 each at $500.00	500.00	
Pit pumps and motors, 2.0 each at $850.00	1,700.00	
Test blocks, 2.0 each at $10.00	20.00	
Balance blocks, 620.0 each at $2.00	1,240.00	
Roadway floor on moving leaves, 348.0 sq. yds. at $8.00	2,784.00	

[CLATSOP]

EXPENDITURES—Continued

Force account items:		
Removing and replacing decking of Astoria Marine Iron Works' dock to conform to grade of new bridge	134.26	
Cutting off and rebending reinforcing steel due to change in plans	76.19	
Furnishing and placing extra bolts in guardrail posts	422.58	
Changing floor plates to allow for crown in roadway	534.00	
Sanding second coat of paint on handrail	585.25	
Framing handrail post to conform to change in design	230.44	
Cutting counterweight steel to fit revised plans	264.83	
Constructing machinery room walls to conform to new design	1,228.22	
Furnishing and placing extra bolts and shims in live load plates due to change in plans	220.66	
Furnishing extra plates to fasten guard rail to stringer on moving leaves	19.69	
Furnishing and placing extra angle irons, spikes and other material in connection with paving of moving leaves and fixed floor slab	49.04	
Furnishing and placing end posts with ornamental lights	1,179.76	
Building covers over openings in front of operators' houses	73.55	
Furnishing water pipe and meter to connect fire protection system with city water pipe lines	314.60	
Wrecking old bridge	4,899.68	
Changing electrical system to conform to new design	401.36	
Furnishing and applying two coats of carbolineum to preserve piers	418.01	
Lowering drains due to change in thickness of pavement	11.07	
Furnishing and installing metal guards over main drive pinions	40.00	
Painting fire hydrants, transformer platform and handrail on piers	39.27	
Furnishing electrical supplies	187.55	
Total amount earned by contractor	$340,793.79	
Deductions:		
Omitting operator's telephone	31.50	
Omitting wiring to center lock resistance	20.00	
Substituting sirens for bells	60.00	
Omitting 6-inch grout facing on jutwall	500.00	
Name plates furnished by State	20.00	
Total deductions	$ 631.50	
Total amount paid to contractor		340,162.29
Grand total cost of structure		$360,146.86
Paid by State	$ 92,228.86	
Paid by County	98,176.67	
Paid by Government	169,741.33	
Total	$360,146.86	

Miles Crossing-Warrenton Grading

Work under Contract 309, covering the widening of the fill between Miles Crossing and the north end of the Warrenton Cut-off, was begun on January 15, 1921, and completed the May 21st following. This work was done by McLean & Williams of Astoria under the contract awarded to them November 6, 1920. The contract consisted of widening the then existing fill with dune sand taken from near Warrenton, and covered a total net length of 2.75 miles.

The total expenditures for the construction amount to $28,150.35, and were made under the supervision of A. J. Olsen, Resident Engineer.

[CLATSOP]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,265.85
Contract items as follows:		
Sand embankment in place, 14,405.35 cu. yds. at $1.83	$ 26,361.79	
Force account items:		
Extending 36-inch concrete culvert and placing riprap at Station 123+65	98.03	
Installing 18-inch corrugated iron culvert and wrecking old frame bridge at Station 275+20	424.68	
Total amount paid to contractor		26,884.50
Grand total cost of project (all State funds)		$ 28,150.35

Construction Engineering on County Bridges

As stated on page 172 of the previous report, a design was prepared by the department for a plate girder draw span over the Walluski River, about six miles southeast of Astoria. During the present biennium the State continued to act in an advisory capacity relative to this structure until its completion during the spring of 1921. The cost of this supervision for the biennium has amounted to $181.46.

Bradley Park at Clatsop Crest

Under agreement between the County Court of Clatsop County and the heirs of the Bradley Estate, a tract of twenty acres including the site known as Clatsop Crest is to be deeded to Clatsop County for park purposes, the consideration being the erection of a monument at the expense of the County to be approved by the donors of the property. The deed is understood to be in escrow pending fulfillment of the consideration, with the County Court having awarded a contract for the construction of the monument. It is expected that the park will be turned over to the State to be maintained and improved as a State park and, in anticipation of this action, filing has been made on the necessary water supply and a small amount of improvement work has been done in the way of construction of temporary comfort stations, et cetera.

This park will cover and protect for public use the most valuable point from a scenic aspect along the lower Columbia River Highway and its control by the State is, for that reason, especially desirable.

Maintenance

Maintenance work in Clatsop County has consisted chiefly of two items: first, the general maintenance of drainage and rock shoulders, which work has been handled partly by the small section gang system; and second, pavement repairs which have been made by contract or on a force account basis with paving contractors who have had paving plants in operation within striking distance of the work.

At the close of the year there is still under way a contract covering the repair of pavement in Clatsop and Columbia Counties and also the widening of curves as betterment work. This work and contract is described under the article entitled "Astoria-Goble Pavement Repairs."

J. J. Lynott, Superintendent, has had supervision of the maintenance and betterment work in Clatsop County east of Astoria, with the exception of the above mentioned contract, which, together with the maintenance work south of Astoria, has been in charge of A. J. Olsen, Resident Engineer.

[CLATSOP]

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Clatsop County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 91,100.54
2.	State Funds apportioned to County	127,953.89
3.	County levy made to match State Funds	129,400.25
4.	County Market Road Funds collected	127,986.98
5.	Cash paid to County by State	106,544.73
6.	State expenditures, deducted from apportionment	16.68
7.	Cash due County from State in December, 1922	21,392.48
8.	County expenditures on Market Roads	270,912.67
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Clatsop County received from the State Market Road Fund $36,853.35 more than it paid into the fund. The excess is Clatsop County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $129,400.25, of this amount they have collected and credited to the Market Road Fund $127,986.98.

The County Court has designated only one road to be improved as a Market Road project, namely, the Miles Crossing-Youngs River, Olney Road. This road is being constructed to good alignment and grade. The roadbed is being graded 22 feet in width and concrete pavement 15 feet in width is being laid. Part of the work has been done by County forces and part by contract. A total of 8.7 miles has been graded and 8.3 miles of pavement has been laid.

COLUMBIA COUNTY

All work required for the completion of the paving of the Columbia River Highway through Columbia County was either completed or placed under contract during the 1919-1920 biennium, with the exception of a gap of 0.9 mile in the City of Rainier. This gap still remains in the pavement, but the section has been macadamized and opened to traffic and is to be paved during the 1923 season.

This one surfacing contract has been the only regular construction project which was undertaken in the County during the last biennium, all other work consisting of maintenance and betterment. The betterment work has been similar to that done in Clatsop County, consisting of the widening of curves at points where vision was most obstructed and the straightening of certain sections where a series of short reverse curves readily permitted the improvement of the alignment. This work has been done mostly in the vicinity of Goble and Rainier and on the section west of Clatskanie.

Betterment work in both Counties has been handled under the direction of J. J. Lynott, Superintendent. The supervision of all of the work in the County has been handled by W. D. Clarke, Division Engineer.

Scappoose-Deer Island Post Road Project

A description of this work will be noted on page 178 of the previous report. During the present biennium additional expenditures of $14,800.13 from State funds and $46,643.72 from Federal Government funds have been made. This brings the total cost of the project to $313,711.75, which has been paid $161,014.10 by the State and $152,697.65 by the Federal Government.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 11,014.16
Moving telephone pole from privately-owned right-of-way		21.63
Rental on asphalt plant (deducted from contractor's estimate)		1,233.87
Contract items as follows:		
Excavation, no classification, 4,547.6 cu. yds. at $1.00	$ 4,547.60	
6-inch porous drain tile, 531.0 lin ft. at 40c	212.40	
Broken stone, 13,007.5 cu. yds. at $3.21	41,754.08	
Crushed gravel, 8,757.5 cu. yds. at $2.74	23,995.55	
Standard 3-inch bituminous base, 101,533.0 sq. yds. at 79c	80,211.07	
Standard 2-inch bituminous surfacing, 102,243.3 sq. yds. at $1.41	144,163.05	
Shoulder construction, 113,855.0 lin. ft. at 6c	6,831.30	
Force account items:		
Planking Honeyman hill grade to allow winter travel	898.72	
Laying 30 feet of 12-inch concrete culvert pipe	32.25	
Removing temporary planking on Honeyman hill grade	29.94	
Total amount earned by contractor	$302,675.96	
Deduction for rental of asphalt plant owned by State	1,233.87	
Total amount paid to contractor		301,442.09
Grand total cost of project		$313,711.75
Paid by State	$161,014.10	
Paid by Government	152,697.65	
Total	$313,711.75	

[COLUMBIA]

Deer Island-Rainier Paving

This work was completed during the 1919-1920 biennium and a description thereof will be found on page 174 of the previous report. During the present biennium additional expenditures of $10,876.42 have been made, bringing the total cost of the work to $469,496.55.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 13,925.13
Work by State forces removing slides, cleaning ditches, etc.		3,744.86
Maintenance work to maintain travel during construction		517.72
Contract items as follows:		
Common excavation, 32,024.1 cu. yds. at 75c	$ 24,018.08	
Solid rock excavation, 3,458.0 cu. yds. at $1.60	5,532.80	
Overhaul, 4,329.0 sta. yds. at 4c	173.16	
6-inch porous drain tile, 18,050.0 lin. ft. at 29c	5,234.50	
12-inch plain concrete pipe, 285.5 lin. ft. at $1.25	356.88	
24-inch reinforced concrete pipe, 8.0 lin. ft. at $3.32	26.56	
Standard 2-inch bituminous surfacing, 191,548.5 sq. yds. at $1.44	275,829.84	
3-inch bituminous base, 666.0 sq. yds. at $4.54	3,023.64	
Broken stone for base and shoulders, 32,375.5 cu.. yds at $3.55	114,933.04	
Gravel for base and shoulders, 1,805.5 cu. yds. at $3.07	5,542.89	
Shoulder construction, 209,550.00 lin. ft. at 6c	12,573.00	
Clay or earth filler, 481.0 cu. yds. at $1.00	481.00	
Force account items:		
Clearing borrow for Tide Creek fill	25.77	
Constructing catch basins and culverts	679.76	
Constructing dry rock walls	1,001.35	
Felling dangerous trees along highway	41.52	
Laying guardrail on Deer Island bridge	170.34	
Hauling lumber from Prescott, Oregon	45.74	
Building driveway at Sta. 139+75	34.29	
Constructing railroad crossing	39.06	
Building aprons and boxing to protect shoulders	252.15	
Removing slides and overhanging rocks	940.15	
Rocking approaches to bridges	246.31	
Maintenance work to maintain travel	174.41	
Constructing bulkhead and riprap at Merrill Creek	173.80	
Constructing riprap at Engineers' Station 38+12	27.84	
Total amount earned by contractor	$451,577.88	
Deductions for war tax exemptions and freight rate reduction on sand	269.04	
Total amount paid to contractor		451,308.84
Grand total cost of project (all State funds)		$469,496.55

Svenson-Clatskanie Paving

A description of this work, which is partially within Clatsop County and partially within Columbia County, will be noted in the portion of this report devoted to Clatsop County Projects.

Rainier City Regrading and Surfacing

Subsequent to the original grading of this section, exceptionally high waters caused eroding of the embankment. To remedy this condition, and to provide a suitable base for pavement, Contract No. 500 was awarded to Soleim & Gustafson on March 23, 1922, for restoring the embankment to the original width and for the construction of a broken stone surfacing over the 0.91 mile involved. This surfacing was constructed to a total width of 22 feet, being eight inches in thickness, loose measure.

[COLUMBIA]

Work was started on April 24 and completed October 18 under the supervision of A. J. Olsen, Resident Engineer. When all final charges are paid the work is estimated to cost a total of $26,000.00, to be paid $22,800.00 by the State and $3,200.00 by Rainier. Expenditures to date amount to $23,136.18, comprising $19,936.18 of State funds and $3,200.00 of City funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,012.15
Rental of State-owned equipment (to be deducted from contractor's estimate)		887.62
Contract items as follows:		
Excavation, single classification, 7,913.0 cu. yds. at 52c	$ 4,114.76	
Overhaul, 22,950.0 sta. yds. at 4c	918.00	
Class "A" concrete, 141.0 cu. yds. at $22.00	3,102.00	
Metal reinforcement, 7,100.0 lbs. at 6c	426.00	
Excavation for undercrossing foundations, 430.0 cu. yds. at $1.50	645.00	
Broken stone surfacing, 2,649.0 cu. yds. at $3.48	9,218.52	
Riprap, 66.0 cu. yds. at $3.00	198.00	
Force account items:		
Salvaging sand from old road for filler	1,006.27	
Salvaging sand from old road for embankment	825.33	
Removing slides and cleaning ditches	1,074.25	
Sprinkling macadam	58.73	
Total amount earned by contractor	$ 21,586.86	
Percentage retained until completion of work	1,350.45	
Total amount paid to contractor		20,236.41
Grand total expended to Nov. 30, 1922		$ 23,136.18
Paid by State	$ 19,936.18	
Paid by County	3,200.00	
Total	$ 23,136.18	

Clatskanie-Delena Macadam

An article descriptive of this work will be noted on page 177 of the last report. During the present biennium expenditures of $1,831.20 have been made, bringing the total cost of the project to $143,492.26 from State funds.

Scappoose-Deer Island Grading

A description of this work is given on page 178 of the 1919-1920 report. During the present biennium delayed expenditures of $1,070.75 have been made, bringing the total expenditures to $63,539.16 from State funds. Out of this amount there is due, as reimbursement by the County, $2,296.81 for cooperation on the construction of the Honeyman and Hegele cattle passes.

Rainier City Grading

This work was completed during 1919 and a description is given on page 179 of the previous report. No expenditures have been made during the present biennium, the only entry being occasioned by the receipt of $6,563.42 in cooperation. This brings the total distribution of cost to $40,393.94 of State funds and $8,266.05 of County and City funds.

[COLUMBIA]

Park on Ditto Property Near Rainier

A tract of 1.88 acres was acquired, at a point along the highway about two and one-half miles west of Rainier, where improvements on the property adjacent to the highway constituted a serious obstruction to the view of traffic meeting at that point and resulted in a consequent hazard which could be eliminated only by the removal of the offending building. The site is at a scenic point and has been graded off as a parking spot. In addition, it includes an excellent spring which it is planned to develop for the benefit of traveling public.

Maintenance

The principal item of maintenance work done during the past two years has consisted of pavement repair work handled under the current contract held by the Warren Construction Company for maintenance and betterment work in Columbia and Clatsop Counties. A more complete description of this work will be found in the portion of this report devoted to Clatsop County projects.

Aside from this contract and a small amount of similar work done in 1921, the maintenance has required only routine patrol in the care of drainage, shoulders, et cetera. Superintendent J. J. Lynott, with headquarters at Rainier, has been in charge of this work in both counties. His maintenance organization in Columbia County consisted of two patrolmen at the south end of the County where the country is open and maintenance is light, and a section gang of three or more men, as occasion demands, in the western part where slides are more apt to occur and the work is heavier.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Columbia County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 45,527.56
2.	State Funds apportioned to County	83,975.47
3.	County levy made to match State Funds	103,709.09
4.	County Market Road Funds collected	97,038.37
5.	Cash paid to County by State	73,084.56
6.	State expenditures, deducted from apportionment	24.26
7.	Cash due County from State in December, 1922	10,866.57
8.	County expenditures on Market Roads	164,749.77
9.	Balance in County Treasury November 1, 1922	5,373.16

From the above statement it is apparent that Columbia County received from the State Market Road Fund $38,447.91 more than it paid into the fund.

The County Court in 1921 made a County levy of 3 mills for Market Roads, which produced an amount greater than their proportionate share of funds from the State Market Road appropriation. Many Counties made a County levy which produced an amount less than their proportionate share of funds from the State Market Road appropriation. Each county was apportioned an amount equal to that produced by their County levy. Columbia, therefore, benefited by being able to match a sum greater than her proportionate share. The County Court has reported, by resolu-

tions, that County levies have been made sufficient to produce $103,709.09. Of this amount they have collected and credited to the Market Road fund only $97,038.37, or $6,670.72 less than the amount that they were expected to put into their County Market Road Fund.

The County Court has designated only one road to be improved as a Market Road project, namely, the St. Helens-Pittsburg Road. The survey of this road was made in 1914 by C. C. Kelley, under the direction of H. O. Bowlby, State Highway Engineer. This road is of great importance to Columbia County, and will make it possible for a large section of the County to reach the County seat by a direct route, which they have heretofore been unable to do.

This road is being constructed to good alignment and grade, with a roadbed width of 20 feet, and is being surfaced, 12 feet wide, with crushed rock. A portion of the road had been graded with County funds before the Market Road Act went into effect.

The construction is being done under contracts awarded by the County Court. Eight miles have been graded and 10.9 miles have been surfaced.

COOS COUNTY

Coos County has within its borders only two State roads, the Roosevelt Coast Highway and the Coos Bay-Roseburg Highway. The past two years have witnessed excellent progress on these roads and the work in the County has now reached the point where the results of construction are apparent and may be appreciated.

On the Roosevelt Coast Highway, the location surveys have been completed through the County. As a Forest Road Project, the Forestry Service has graded 3.1 miles between Lakeside and Lake Saunders and the County has graded an additional six miles immediately north of Coos Bay. A large serviceable ferry, named the Roosevelt, has been constructed by the County and placed in operation between the south end of this improvement and North Bend. South of North Bend the highway has been paved to Coquille and the Coquille River Bridge has been constructed. Between Coquille and Bandon a post road contract has been awarded for the grading of 4.75 miles and the County has already graded an additional three miles. The section between Bandon and the Curry county Line was graded and surfaced by the County and has been taken over for maintenance by the State.

The Coos Bay-Roseburg Highway has been graded and placed under contract for surfacing throughout its entire length, with the exception of approximately two miles at Myrtle Point. This two-mile section is open and usable at all times of the year and future construction, when undertaken, will be on an entirely new alignment.

All State work in Coos County has been under the supervision of W. E. Chandler, Division Engineer.

Marshfield-North Bend Paving

This section of pavement was advertised for bids, but the bids received were considered to be too high and the State Highway Commission ordered the work done by State forces. Work was started July 8, 1921, and completed September 15 of the same year under the supervision of Paul Copp, Superintendent, and W. M. Strohmeyer, Resident Engineer.

The section was 0.31 mile in length and has cost a total of $13,801.53, having been paid $5,136.64 by the State and $8,664.89 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 390.42
Construction		13,411.11
Total		$ 13,801.53
Paid by State	$ 5,136.64	
Paid by County	8,664.89	
Total	$ 13,801.53	

STATEMENT OF QUANTITIES

Preparation of subgrade	3,269.8 sq. yds.
7-inch cement concrete pavement	3,269.8 sq. yds.
Felt expansion joints	288.0 lin. ft.
12-inch plain concrete pipe	10.0 lin. ft.
6-inch plain concrete drain tile	970.0 lin. ft.
Gravel backfill for drain tile	80.5 cu. yds.
Excavation	2,450.0 cu. yds.
Removing old plank road and construction and maintenance of detour, amounting to	$1,015.65

[COOS]

Cedar Point-Coquille Paving

A description of this work is given on page 185 of the last report. Construction operations were resumed as early as conditions permitted in 1921 and were finished on April 19 of that year, being under the supervision of A. D. Griffin, Resident Engineer.

Additional expenditures of $39,339.87 have been made, bringing the total cost of the work to $64,591.78 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,197.30
Items deducted from contractor's estimates:		
Freight on gravel shipments		296.96
Cement furnished by State		221.56
Contract items as follows:		
Common excavation, 3,303.9 cu. yds. at 70c	$ 2,312.73	
Overhaul, 297.0 sta. yds. at 3c	8.91	
6-inch porous drain tile, 690.0 lin. ft. at 18c	124.20	
Run-of-bank gravel for shoulders, 823.0 cu. yds. at $5.62	4,625.26	
Standard 6-inch concrete pavement, 18,724.83 sq. yds. at $2.68	50,182.54	
Bituminous felt expansion joints, 5,497.0 lin. ft. at ½c	27.49	
Shoulder construction, 20,506.6 lin. ft. at 13c	2,665.86	
Removal of slides, special, 389.7 cu. yds. at $1.25	487.13	
Force account items:		
Constructing culverts	51.25	
Planking unpaved sections to keep road open to travel during winter	717.31	
Reflooring bridges and building plank approaches	191.80	
Total amount earned by contractor	$ 61,394.48	
Deduction for freight and cement	518.52	
Total amount paid to contractor		60,875.96
Grand total cost of project (all State funds)		$ 64,591.78

Coquille City Paving

This section, 0.32 mile in length, was constructed by the State under the same considerations as given for the Marshfield-North Bend pavement and the two units were handled in conjunction. The completed work cost a total of $9,381.88. This amount has been paid entirely by the State, although reimbursement in the amount of $1,149.04 is due from the City.

DETAILED STATEMENT OF EXPENDITURES

Engineering	$ 226.42
Construction	9,155.46
Total cost (all State funds)	$ 9,381.88

STATEMENT OF QUANTITIES

Preparation of subgrade	2,924.0 sq. yds.
7-inch cement concrete pavement	2,924.0 sq. yds.
Felt expansion joints	275.0 lin. ft.
Gravel for shoulders	111.0 cu. yds.
Shoulder construction	3,290.0 lin. ft.
Grading work amounting to	$ 282.62
Repairing bridges	121.39

Marshfield-Cedar Point Pavement

This work is properly to be considered a 1919-1920 project and a description thereof will be noted on page 184 of the last report. That report covers the operations on the project up until the work was closed on September 14, 1920, due to the unusually early rains. This early

[coos]

closing of the construction season found the Department with approximately $30,000 worth of cement on hand and facing the probability of losing a part of it. This condition, together with the heavy storage charges which would accrue for holding the cement in storage over the winter, made advisable winter continuance of the work, and plans were worked out for constructing the remaining 3.13 miles of pavement required. These plans required the purchase of one four-ton truck and sufficient lumber to plank one mile of road. The mixer and trucks were run on this plank road, using the same batch-haul method as had been used with the large trucks during summer construction. Work was started on November 29 and the remaining mileage completed on March 24, 1921. Due to cheaper hauling, lower wages for labor and the absence of necessity for curing the concrete and rolling the subgrade, the cost was very little higher per square yard of pavement than for that laid during the summer season.

The pavement laid under this method is standing up especially well. There has been little settlement, no longitudinal cracks in the pavement and very few transverse ones. At this time the pavement has been open for over twenty months and has carried an average of 300 cars and trucks each day.

Due to the low unit prices bid on the job and increased rates for day labor, coupled with the fact that the job was held over two years, the construction costs have resulted in a loss to the Surety Company on the contract. This loss has been paid by them.

Net expenditures of $15,751.27 by the State during the present biennium have brought the total cost of the work to the State to the sum of $391,355.61.

Paul Copp was general foreman on the work done by the State, and A. D. Griffin handled the engineering and general superintendence of the construction.

A detail statement of the construction quantities is given herewith:

Excavation, no classification	25,444.7	cu. yds.
4-inch porous drain tile	375	lin. ft.
5-inch porous drain tile	1,825	lin. ft.
6-inch porous drain tile	5,297	lin. ft.
Type "A" concrete pavement, 6-inch	133,997.0	sq. yds.
Expansion joints	56,797	lin. ft.
Broken stone, loose measure	7,765	cu. yds.
Broken stone shoulders	146,782.8	lin. ft.
Earth filler	1,600.7	cu. yds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 17,847.08
Cost of cement furnished by State (includes freight and handling charges)		117,768.86
Contract items as follows:		
Excavation, no classification, 25,444.7 cu. yds. at $1.00	$ 25,444.70	
4-inch porous drain tile, 375.0 lin. ft. at 9½c	35.63	
5-inch porous drain tile, 1,825.0 lin. ft. at 13c	237.25	
6-inch porous drain tile, 5,297.0 lin. ft. at 15c	794.55	
Broken stone, loose measure, 7,765.0 cu. yds. at $3.50	27,177.50	
Shoulder construction, 146,782.8 lin. ft. at 15c	22,017.42	
Earth filler, 1,600.76 cu. yds. at $1.00	1,600.76	
Standard 7-inch concrete pavement, 133,997.01 sq. yds. at $1.99	266,654.05	
Bituminous felt expansion joints, 57,797.0 lin. ft. at 5c	2,889.85	
Force account items:		
Removing old bituminous surfacing	478.50	
Furnishing and placing steel reinforcement in concrete pavement where subgrade is weak	424.28	
Repairing broken pavement at expansion joints	123.66	
Widening roadway to secure 4-foot shoulder and prevent encroaching on railroad right-of-way	1,004.08	
Installing 10-inch vitrified sewer drain across roadway	27.05	

[COOS]

EXPENDITURES—Continued

Redecking old timber bridges and planking approaches	1,075.17	
Removing slides and cleaning out ditches	645.84	
Maintenance work to maintain travel throughout winter months of 1919-1920	853.89	
Lowering forms and extra excavation due to change in grade line	821.14	
Planking subgrade to maintain travel over subgrade during rainy season	6,117.10	
Transporting cement, owned by State, from Marshfield to point of construction	1,609.09	
Adjustment items:		
Allowance for Smith Terminal Dock storage	826.30	
Allowance for four Ford trucks taken over by State	2,500.00	
Subtotal	$363,357.81	
Deductions:		
War tax exemptions and reduction in freight rates	10,987.15	
Cement furnished by State	96,212.76	
Extra auditing cost	418.23	
Total amount payable under contract		255,739.67
Grand total cost of project (all State funds)		$391,355.61

Parkersburg Section Post Road Project

This section extends from the end of the County work east of Bandon, towards Coquille, a distance of 4.75 miles, and is being constructed in cooperation with the County and Federal Government under the terms of Post Road Project Agreement No. 32.

Contract 605 for grading the section was awarded to D. P. Plymale of Bandon, Oregon, on October 6, 1922, at a total estimated cost of $75,500. The present project agreement calls for an expenditure of $40,500 by the State, $15,000 by the County and $20,000 by the Federal Government for this grading. Owing to limitation of Federal funds available, only a nominal amount of Government cooperation was requested, which, however, will be increased as soon as future appropriations become available. The grading construction is being supervised by C. H. Armstrong, Resident Engineer, with expenditures to date of $184.38. In addition to the grading of the section, surfacing was provided for in the project agreement and this work will be undertaken as soon as progress in the grading construction will permit.

Coquille-Myrtle Point Grading and Surfacing

On May 9, 1922, the Scandia Shipbuilding Company of Marshfield was awarded Contract 332 for grading 1.78 miles and surfacing 7.23 miles between Coquille and Myrtle Point. The work is being handled under the supervision of W. H. Strohmeyer, Resident Engineer, and is estimated to cost a total of $98,000.00, of which amount the State will pay $54,000.00 and the County $44,000.00. Expenditures to date amount to $48,845.88 and have been paid $26,638.33 by the State and $22,207.55 by the County.

Myrtle Point-Bridge Surfacing

The surfacing of the Coos Bay-Roseburg Highway from Myrtle Point to Camas Valley was divided into three units, and Unit 1, extending from Myrtle Point to Bridge, 11.82 miles, was awarded to the Warren Construction Company of Portland, Oregon, under Contract 548, on May 31, 1922. This contract was awarded on the basis of the contractor furnishing and crushing the surfacing materials and handling their actual

[COOS]

placing on the road, all hauling to be done by the State without cost to the contractor. Under this arrangement there has been hauled 20,846.5 cubic yards of broken stone a total of 44,452 yard miles. This hauling has been done at the rate of 26.7 cents per yard mile, the unit cost being segregated as follows:

Labor operating trucks	7.8c per yard mile
Supplies, i. e., gas, oil and grease	8.1c per yard mile
Rental charges and supervision	10.8c per yard mile
	26.7c per yard mile

The entire surfacing, including the hauling, is estimated to cost a total of $83,000.00, to be paid $45,000.00 by the State and $38,000.00 by the County. The total expenditures to date amount to $54,064.27, and have been made $32,100.79 by the State and $21,963.48 by the County These expenditures have been made under the supervision of Paul Van Scoy, Resident Engineer.

Bridge-Douglas County Line Surfacing

As stated under the previous article, the Myrtle Point-Camas Valley Section was divided into three units, and Contract 540 for surfacing Unit 2 was awarded to S. S. Schell on May 10, 1922. The State was also doing the hauling on this project and during the construction season 14,792.5 yards of broken stone have been hauled a total of 39,691 yard miles. This has been done at a cost of 24.2 cents per yard mile, the detailed segregation being as follows:

Labor operating trucks	8.0c per yard mile
Supplies, i. e., gas, oil and grease	7.6c per yard mile
Rental charges and supervision	8.6c per yard mile
	24.2c per yard mile

The completed work including the hauling is estimated to cost a total of $112,000.00, to be paid $61,000.00 by the State and $51,000.00 by the County. Expenditures to date amount to $65,631.33, and have been made $38,135.94 by the State and $27,495.39 by the County.

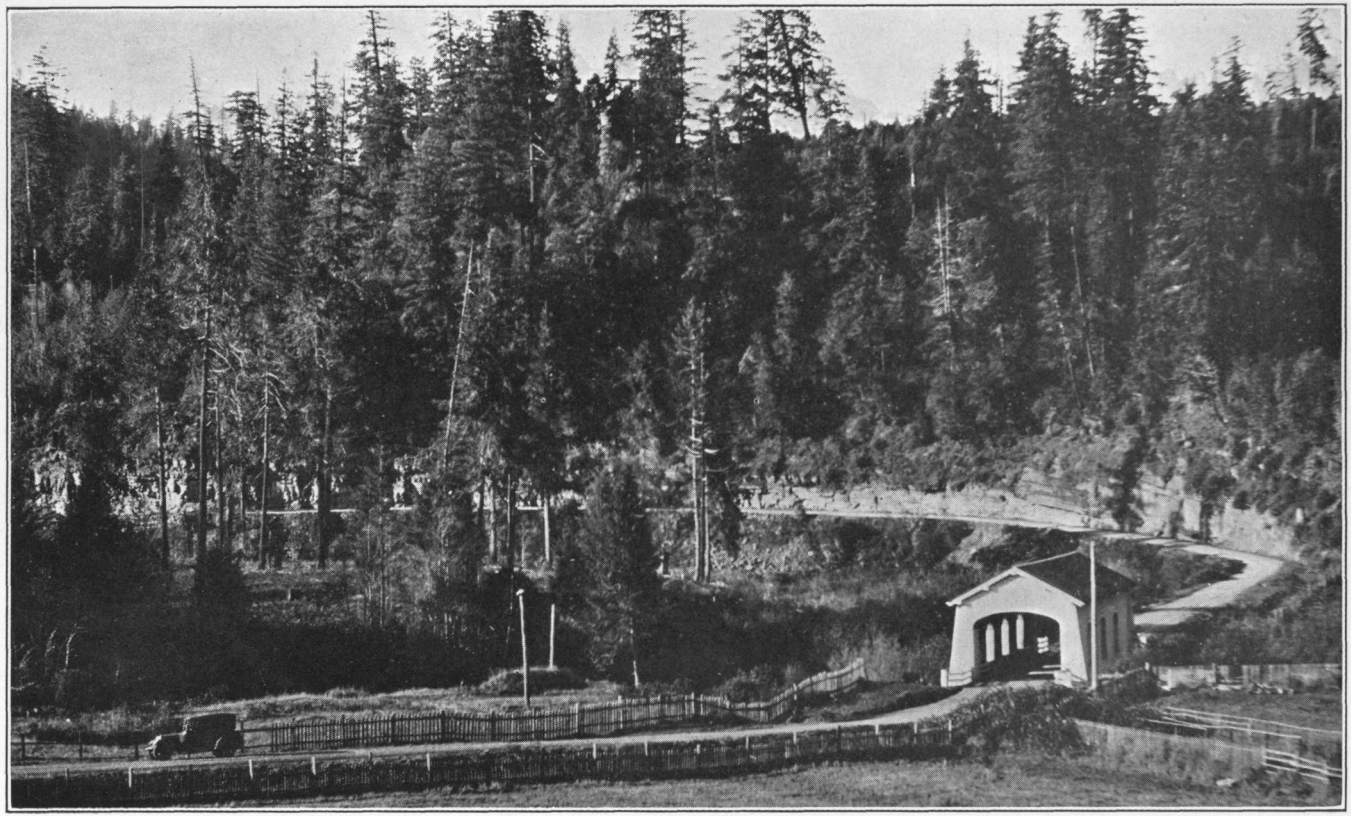
Myrtle Point-Bridge Grading

The Warren Construction Company was awarded Contract No. 486 on December 15, 1921, for the grading of 10 miles of the Coos Bay-Roseburg Highway between Myrtle Point and Bridge. The construction was started January 7, 1922, and is practically completed at the present time.

Construction has been handled under the supervision of Paul Van Scoy, Resident Engineer, and represents an expenditure to date of $81,105.29 from State funds and $73,035.53 from County funds, making a total of $154,140.82 expended. The total final cost of the project is estimated to be $166,000.00. Of this amount Coos County cooperates to an estimated amount of $78,000.00, covering 50 per cent of the construction cost with the balance of $88,000.00 being borne by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8,038.23
Moving right-of-way fence		1.50
Air hose, furnished by State (to be deducted from amount due contractor)		30.00
Contract items as follows:		
Clearing and grubbing, all	$ 2,000.00	
Common excavation, 65,233.0 cu. yds. at 45c	29,354.85	
Intermediate excavation, 43,266.0 cu. yds. at 58c	25,094.28	



BRIDGE OVER ROCK CREEK; ON THE COOS BAY-ROSEBURG HIGHWAY IN COOS COUNTY

[COOS]

EXPENDITURES—Continued

Solid rock excavation, 73,037.0 cu. yds. at 90c	65,733.30	
Overhaul, 19,340.0 sta. yds. at 5c	967.00	
10-inch vitrified pipe, 836.0 lin. ft. at $1.35	1,128.60	
12-inch plain concrete pipe, 1,800.0 lin. ft. at $1.50	2,700.00	
18-inch reinforced concrete pipe, 1,831.0 lin. ft. at $2.75	5,035.25	
24-inch reinforced concrete pipe, 881.0 lin. ft. at $3.80	3,347.80	
4-ft.x4-ft. cedar log culvert, 250.0 lin. ft. at $6.00	1,500.00	
4-ft.x6-ft. cedar log culvert, 46.0 lin. ft. at $8.00	368.00	
6-ft.x6-ft. cedar log culvert, 114.5 lin. ft. at $9.00	1,030.50	
6-inch porous drain tile, 715.0 lin. ft. at 35c	250.25	
Class "A" concrete, 8.32 cu. yds. at $33.25	276.64	
Class "B" concrete, 121.75 cu. yds. at $29.50	3,591.63	
Riprap, 267.9 cu. yds. at $3.55	951.05	
Lumber and timber, 120.63 M-FBM. at $60.00	7,237.80	
Timber piling, 524.0 lin. ft. at $1.35	707.40	
Metal reinforcement, 3,400.0 lbs. at 9c	306.00	
60-foot covered Howe truss, 1 only at $4,000.00	4,000.00	
Force account items:		
Moving fence on account of line change	51.44	
Removing overhanging trees	132.34	
Total amount earned by contractor	$155,764.13	
Percentage retained until completion of contract	9,693.04	
Total amount paid to contractor		146,071.09
Grand total expended to Nov. 30, 1922		$154,140.82
Paid by State	$ 81,105.29	
Paid by County	73,035.53	
Total	$154,140.82	

Reedsport-Coos Bay Forest Road Project

During 1918 an agreement was entered into with the Federal Government whereby the State was to expend at least $50,000.00 between Port Orford and Brush Creek in Curry County and the Federal Government was to expend the same minimum amount between Hauser and the Douglas County Line in Coos County. In accordance with this agreement the Federal Government has made a survey of 10.5 miles of line extending south from the Douglas County Line and has graded 3.1 miles between Lakeside and Lake Saunders. This work was completed in November of 1921 under contract held by Hennessy, Gilber & Burton at a total cost of $68,321.13.

Quarry Site on Britton Property

The State agreed to furnish material for surfacing on the Coos Bay-Roseburg Highway, and a quarry located on the Britton Property is being used by S. S. Schell for materials on the section from Bridge to the Douglas County Line. This quarry shows the best quality available in large quantities on the highway and, after leaving it, there is no more hard and durable material available for a distance of thirty miles. For this reason the entire outcropping was purchased, enough land to allow roads to be built two ways to the main highway being secured in addition. A total of 10.15 acres of land was purchased.

Bridge-Remote Grading

Contract No. 404 for the construction of 7.98 miles of the Coos Bay Highway between Bridge and Remote, was awarded to A. Guthrie & Company on June 29, 1921.

Work was started on July 12 and completed December 12 of the same year under the supervision of C. F. Waite, Resident Engineer.

The completed project represents a total expenditure of $157,262.15.

[COOS]

Of this amount Coos County cooperates to the extent of $75,762.09, covering 50 per cent of the cost of grading. Expenditures to date amount to $157,262.15, having been paid $85,930.50 by the State and $71,331.65 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,737.96
Contract items as follows:		
Clearing and grubbing, all	$ 8,000.00	
Common excavation, 77,340.6 cu. yds. at 70c	54,138.42	
Solid rock excavation, 44,737.3 cu. yds. at $1.17	52,342.64	
Overhaul, 9,287.0 sta. yds. at 5c	464.35	
12-in.x12-in. cedar log culverts, 2,200.3 lin. ft. at $2.50	5,500.75	
18-in.x18-in. cedar log culverts, 2,028.1 lin. ft. at $3.00	6,084.30	
24-in.x24-in. cedar log culverts, 535.1 lin. ft. at $3.25	1,739.08	
30-in.x30-in. cedar log culverts, 288.0 lin. ft. at $4.00	1,152.00	
3-ft.x3-ft. cedar log culverts, 95.2 lin. ft. at $4.50	428.40	
4-ft.x4-ft. cedar log culverts, 264.6 lin. ft. at $5.00	1,323.00	
6-ft.x6-ft. cedar log culverts, 81.8 lin. ft. at $7.00	572.60	
Class "B" concrete, 115.91 cu. yds. at $35.00	4,056.85	
Riprap, 146.2 cu. yds. at $2.50	365.50	
Lumber and timber, 105.061 M-FBM. at $65.00	6,828.97	
60-foot wood truss superstructure, 1.0 at $5,000.00	5,000.00	
Reinforcement steel, 795.0 lbs. at 14c	111.30	
Force account items:		
Extra clearing and burning	1,649.04	
Test drilling for bridge foundation at Sandy Creek	4.62	
Additional log culvert, Sta. 591+00	40.27	
Wet excavation east pier of Sandy Creek bridge	283.35	
Raising approach to McBee bridge	104.18	
Placing aprons at ends of culverts and drain boxes	229.88	
Reinforcing ends of 6-ft.x6-ft. culvert at Sta. 827+22	212.46	
Removing slides	22.57	
Extra form work on Sandy Creek bridge	75.83	
Maintenance work on completed portions of project to maintain travel	482.89	
Extra steel plates for Sandy Creek bridge	35.22	
Furnishing and installing porous drain tile	333.12	
Total amount earned by contractor	$151,581.59	
Deduction for guard fence left unpainted on account of wet weather	57.40	
Total amount paid to contractor		151,524.19
Grand total cost of project		$157,262.15
Paid by State	$ 85,930.50	
Paid by County	71,331.65	
Total	$157,262.15	

Remote-Camas Valley Post Road Project

A full description of this project will be found on page 186 of the previous report. During the present biennium the work on the two units involved has been carried to completion under the supervision of the State. No loss to the contractor has been incurred and, in fact, the completed work was turned over to the contractor with a profit after all expenses of State force construction have been deducted from the estimate due him based on the unit prices for work accomplished.

Unit 1, in Coos County, represents a total cost of $184,226.31, being borne $69,951.16 by the State, $39,360.92 by the County and $74,914.23 by the Federal Government.

Unit 2, in Douglas County, represents a total cost of $289,274.34, being borne $129,275.48 by the State, $43,054.00 by Douglas County and $116,944.86 by the Federal Government.

[COOS]

DETAILED STATEMENT OF EXPENDITURES

UNIT No. 1—

Engineering		$ 9,616.96
Moneys advanced by State to complete work		85,000.00
Contract items as follows:		
Clearing and grubbing, all	$ 10,000.00	
Common excavation, 74,674.9 cu. yds. at $1.07	79,902.14	
Solid rock excavation, 61,957.0 cu. yds. at $1.07	66,293.99	
Overhaul, 13,518.0 sta. yds. at 5c	675.90	
12-inch corrugated galvanized iron pipe, 2,060.0 lin. ft. at $2.25	4,635.00	
18-inch corrugated galvanized iron pipe, 202.0 lin. ft. at $3.50	707.00	
24-inch corrugated galvanized iron pipe, 264.0 lin. ft. at $4.50	1,188.00	
36-inch corrugated galvanized iron pipe, 66.0 lin. ft. at $7.25	478.50	
Class "B" concrete, 11.42 cu. yds. at $50.00	571.00	
Riprap, 9.6 cu. yds. at $3.00	28.80	
Extra clearing and grubbing, 3.34 acres at $300.00	1,002.00	
Lumber and timber in place, 13.55 M.-FBM. at $65.00	880.75	
60-ft. wood superstructure over Rock Creek, all at $5,000.00	5,000.00	
Force account items:		
Maintaining drainage ditches through winter	7.46	
Falling dangerous trees outside of right-of-way	484.49	
Clearing channel of river opposite Sta. 1036	90.07	
Refinishing roadbed after winter rains	1,174.18	
Constructing dry rock wall at ends of culverts	1,352.34	
Constructing wooden troughs at ends of culverts to protect embankment	162.73	
Total amount earned by contractor	$174,634.85	
Deductions:		
For using rough timber in superstructure	25.00	
Payments advanced by State to complete work	85,000.00	
Total deductions	$ 85,025.00	
Total amount paid to contractor		89,609.35
Grand total cost of grading Unit No. 1		$184,226.31
Paid by State	$ 69,951.16	
Paid by Coos County	39,360.92	
Paid by Government	74,914.23	
Total	$184,226.31	

UNIT No. 2—

Engineering		$ 14,418.18
Items deducted from contractor's estimate:		
Rental of State-owned equipment		1,669.37
T. N. T. and caps furnished by State		11,753.44
Bills paid by State to carry on work		130,646.74
Contract items as follows:		
Clearing and grubbing, all	$ 13,000.00	
Common excavation, 110,494.1 cu. yds. at $1.10	121,543.51	
Solid rock excavation, 107,509.4 cu. yds. at $1.10	118,260.34	
Overhaul, 28,748.0 sta. yds. at 5c	1,437.40	
12-inch corrugated galvanized iron pipe, 3,004.0 lin. ft. at $2.25	6,759.00	
18-inch corrugated galvanized iron pipe, 230.0 lin. ft. at $3.50	805.00	
24-inch corrugated galvanized iron pipe, 44.0 lin. ft. at $4.50	198.00	
36-inch corrugated galvanized iron pipe, 72.0 lin. ft. at $7.25	522.00	
Additional clearing, 3.99 acres at $300.00	1,197.00	
Lumber and timber in place, 35.154 M.-FBM. at $65.00	2,285.01	
18-in.x18-in. cedar log culvert, 64.6 lin. rt. at $3.00	193.80	
4-ft.x4-ft. cedar log culvert, 39.1 lin. ft. at $6.50	254.15	
4-ft.x5-ft. cedar log culvert, 218.8 lin. ft. at $7.25	1,586.30	
5-ft.x5-ft. cedar log culvert, 76.0 lin. ft. at $7.50	570.00	
Riprap, 7.5 cu. yds. at $3.00	22.50	

[COOS]

EXPENDITURES—Continued

Force account items:		
Removing log jam and boulders in river at Windy Point	415.73	
Cleaning creek channels to improve drainage	286.30	
Keeping culverts open during winter months	136.85	
Removing dangerous trees outside of right-of-way	681.15	
Removing slides	436.22	
Reshaping roadbed after winter rains	1,565.73	
Constructing wooden troughs at ends of culverts to protect embankment slopes	150.31	
Excavating for footings of Bear Creek bridge	96.41	
Constructing rock wall at Sta. 300+00	24.20	
Adjustment for excess cost of powder over that guaranteed contractor	2,429.25	
Total amount earned by contractor	$274,856.16	
Deductions:		
Rental of State-owned equipment	1,669.37	
T. N. T. and caps furnished by State	11,753.44	
Bills paid by State to carry on the work	130,646.74	
Total deductions	$144,069.55	
Total amount paid to contractor		130,786.61
Grand total cost of grading Unit No. 2		$289,274.34
Paid by State	$129,275.48	
Paid by Douglas County	43,054.00	
Paid by Government	116,944.86	
Total	$289,274.34	

GRAND SUMMARY OF EXPENDITURES

	State	*Coos County*	*Douglas County*	*Government*	*Totals*
Grading Unit No. 1	$ 69,951.16	$39,360.92	$	$ 74,914.23	$184,226.31
Grading Unit No. 2	129,275.48		43,054.00	116,944.86	289,274.34
Totals	$199,226.64	$39,360.92	$43,054.00	$191,859.09	$473,500.65

Coquille City Bridge

One of the principal projects undertaken by Coos County during this period was the construction of a bridge over the Coquille River at Coquille. The structure consists of a 235-foot steel draw span, on concrete piers, and has 135 feet of pile trestle approach.

Contract No. 344 was awarded to Mr. A. B. Gidley of Marshfield on March 15, 1921, for its construction. Work started on May 10, 1921, and continued with a small crew until October 15, 1922, when it was completed. It was opened to traffic, however, on August 18, 1922.

A number of causes contributed to the long delay in construction. The foundation material proved to be entirely different from what was anticipated, making a revision of the plans necessary. High water occurred earlier than usual and continued for a long time without abatement. The contractor only worked a small crew even at the most advantageous times. Now that the bridge is in use, however, it is being used by an increasing number of people daily, and will be a valuable asset in the development of Coos County.

The final cost of the structure is estimated at $90,000.00, to be paid $5,000.00 by the State for engineering and $85,000.00 by the County for construction. The expenditures to date amount to $83,696.12, having been paid $4,857.32 by the State and $78,838.80 by the County.

Raymond Archibald was Resident Engineer in charge of construction.

[COOS]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,843.32
Brass name plates furnished by State		14.00
Contract items as follows:		
Excavation to plan elevation, 375.0 cu. yds. at $6.00	$ 2,250.00	
Excavation below plan elevation, 178.0 cu. yds. at $6.00	1,068.00	
Class "A" concrete, 234.0 cu. yds. at $28.90	6,552.00	
Class "B" concrete, 223.0 cu. yds. at $25.00	5,575.00	
Concrete "Tremie," 254.0 cu. yds. at $25.00	6,350.00	
Reinforcement steel, 29,220.0 lbs. at 8c	2,337.60	
Lumber, 185.0 M.-FBM. at $38.00	7,030.00	
Structural steel, 304,000.0 lbs. at 10c	30,400.00	
Structural steel tubes, 22,980.0 lbs. at 9c	2,068.20	
Fir piling, 7,105.0 lin. ft. at 40c	2,842.00	
Operating machinery, 32,000.0 lbs. at 48c	15,360.00	
Castings, 4,900.0 lbs. at 35c	1,715.00	
Power plant, all at $700.00	700.00	
Materials on hand	741.00	
Total amount earned by contractor	$ 84,988.80	
Percentage retained until completion of structure	6,150.00	
Total amount paid to contractor		78,838.80
Grand total expended to Nov. 30, 1922		$ 83,696.12
Paid by State	$ 4,857.32	
Paid by County	78,838.80	
Total	$ 83,696.12	

Maintenance

The maintenance work in Coos County has been concentrated on the five following sections:

1. North Bend-Marshfield:

Maintenance on this section of 1,320 feet of pavement, lying between the city limits of the two cities, has consisted of keeping the ditches clean and the cracks in the pavement filled with bitumen. A soft rock cut on the section also required considerable work in removing eroded materials during the winter months.

2 Marshfield-Coquille:

Maintenance of this section, paved with concrete during 1920 and 1921, has consisted of cleaning ditches, repairing shoulders, removing slides and filling cracks. A rather unusual thing in this pavement is the fact that the pavement laid during the winter of 1920-1921 has not cracked, while the remainder shows ordinary paving cracks.

3. Bandon to Curry County Line:

This section was graded and surfaced by the County and was taken over for maintenance by the State in 1920. In order to cover up the large coarse crushed rock of which the surfacing had been constructed, a large amount of repair work was required during the first year. The County cooperated in this to the extent of furnishing a drag line gravel plant at Floras Creek, and this equipment has been left there to be available to the State, without cost, when desired in the future.

4. Coquille-Myrtle Point:

This section was kept in repair by the State and County, cooperating on a fifty-fifty basis, until it was put under contract for surfacing during 1922. This repair work was done with County forces.

[COOS]

5. Myrtle Point-Douglas County Line:

This section has been under construction and only such maintenance has been done as could be accomplished by patrolmen with shovels. After the construction season of 1922 the maintenance will be taken over on the sections entirely completed, but only such maintenance will be done on the uncompleted portions as is required for the removal of slides, the keeping open of drains, et cetera.

Hauser-North Survey

Survey of the Roosevelt Coast Highway from Hauser north to the Douglas County Line was made by F. W. Waller between July 1, 1921, and September 1, 1922. The line, 6.95 miles in length, passes through a generally timbered country and will connect the town of Lakeside with Coos Bay. Except in the summer months, Lakeside is isolated from the other coast towns as it has no passable highways during the wet season. The lakes in the section furnish great opportunity for sportsmen and will be available for tourists when the section is constructed. In addition to this, several ranches will be provided with an outlet to their markets and points of supply.

Coquille-Bandon Survey

After the general route had been decided on by the Highway Commission, the location of this section was made by F. N. Drinkhall, Resident Engineer, the survey being begun June 20, 1922, and finished October 10. On the greater portion of the unit no preliminary line was necessary as this had been run at previous times by the County. The survey, 14.66 miles in length, follows the foothills along the Coquille Valley bottoms for the greater part of the distance from Coquille to Bandon, except on the Bandon end where the line swings inland and takes a slightly higher elevation for the remaining distance.

Myrtle Point-Coquille Survey

Two lines have been run between Myrtle Point and the second crossing of the Southern Pacific Railroad, but neither are satisfactory due to the necessity of either using two dangerous crossings or constructing two expensive overhead crossings. Another line has been located paralleling the railroad on the east, which will eliminate the two railroad crossings but will require a mile of very heavy grading in order to get the line above high water. On the remaining distance between Coquille and Myrtle Point the old county survey was used, except between Stations 236 and 330 where a revision was made. The surveys were made by W. H. Strohmeyer and Paul Van Scoy.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

[COOS]

Since the Market Road Law went into effect, Coos County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 69,142.62
2.	State Funds apportioned to County	87,800.03
3.	County levy made to match State Funds	82,287.16
4.	County Market Road Funds collected	82,361.35
5.	Cash paid to County by State	71,704.60
6.	State expenditures, deducted from apportionment	0.00
7.	Cash due County from State in December, 1922	16,095.43
8.	County expenditures on Market Roads	187,595.74
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Coos County received from the State Market Road Fund $18,657.41 more than it paid into the fund. The excess is Coos County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $82,287.16. Of this amount they have collected and credited to the Market Road Fund $82,361.35.

The County Court has designated ten roads to be improved as Market Road projects.

The surveys have been made, and plans prepared, by C. S. McCulloch, County Roadmaster. Considerable difficulty has been encountered in persuading the Roadmaster to make the improvements in accordance with the plans approved. Most of the work has been done by County forces.

Reports from the Roadmaster are incomplete, and it is impossible to determine from records sent to this office the amount of work which has been done on Market Road projects. W. E. Chandler, Division Engineer, recommended approval of plans for the Market Roads and the funds have been turned over to the County Court.

Construction work has been done on six projects, and $74,274.60 has been expended. Our records show that 12.2 miles have been graded and 7.6 miles surfaced, 9 feet wide.

CROOK COUNTY

Crook county, located practically in the geographical center of the State, has received a full share of the construction activities of the Department, and the end of the biennium finds the more important of its State roads either graded and surfaced or under contract.

The Ochoco Highway has been graded and surfaced from the Deschutes County Line to Prineville, and has been graded and is under contract for surfacing from Prineville to the Ochoco Forest Boundary. The section from the Forest Boundary to the Wheeler County Line has been graded and surfaced as a Forest Road Project.

South of Prineville the road has been graded to Bear Creek, and has been surfaced over intermittent sections. This was originally a portion of the Crooked River Highway and was graded under a contract covering the section from Prineville to the Shorty Davis Ranch. The portion from Bear Creek to the Davis Ranch was graded, but since has been abandoned as a State Highway and the adopted road south of Prineville now continues from the junction at Bear Creek south to Lakeview, crossing the Central Oregon Highway east of Millican in Deschutes County.

Supervision of all State activities in Crook County was handled by J. H. Scott, Division Engineer, until April 1, 1922, on which date he was transferred to other work and the district taken over by C. W. Wanzer, Division Engineer.

Prineville-Redmond Post Road Project

The section described on page 189 of the Fourth Biennial Report included, in addition to bridges, the grading of the Ochoco Highway from the Deschutes-Crook County Line to Prineville, and the surfacing of that portion between Station 422+40 and Prineville. During the present biennium the Commission ordered the surfacing of the balance of the highway between Redmond and Station 422+40, Deschutes County having previously prepared the roadbed from Redmond to the Crook County Line.

On March 8, 1921, Contract No. 343 was awarded to A. D. Kern of Portland, Oregon, for surfacing 11.59 miles, 3.59 miles being in Deschutes County, and 8.00 miles being in Crook County, with the Federal Government cooperating in the cost of the portion in Crook County under the original Post Road Project. The portion in Deschutes County was surfaced from what is known as the Redmond pit and materials for the Crook County portion were secured from a gravel deposit on the old riverbed approximately two miles off the road. The materials secured from this latter pit were the most satisfactory of any that were available between Redmond and Prineville.

Work was started immediately after the award of the contract, the contractors beginning operations at the Redmond pit. Owing to the light, dry, powdery nature of the soil, it was necessary to resort to sprinkling throughout the job in order to prevent the surfacing materials from disappearing into the roadbed, this work being done by State trucks. This work was handled under the supervision of R. P. Newland, Resident Engineer, and was completed August 13, 1921.

The original grading and surfacing contract, No. 233, included the construction of a trestle across the old bed of Crooked River. No suitable foundations were found for the trestle and the location was changed to allow the use of a 56-foot deck truss. This being such a radical change in type of construction, the structure was eliminated from the contract and placed on the program for construction by State forces. Work was begun on January 5, 1920, using a part of the crew from the work on

the Crooked River Highway, and was completed and open to traffic on April 20.

Summing up, the construction of the entire project, including the bridges, has cost a total of $195,212.52, having been paid $67,547.48 by the State, $42,087.73 by the County and $85,577.31 by the Federal Government. The expenditures made during the present biennium amounted to $168,485.07, consisting of $45,820.03 from State funds, $37,087.73 from County funds and $85,577.31 from Federal Government funds.

DETAILED STATEMENT OF EXPENDITURES

CONTRACT No. 233—

Engineering		$ 5,447.42
Digging test pits for gravel investigations		226.15
Items deducted from contractor's estimate:		
T. N. T. furnished by State		500.00
Rental, repairs and upkeep on State-owned tractors		3,060.81
Contract items as follows:		
Clearing and grubbing, all	$ 2,500.00	
Common excavation, 39,239.8 cu. yds. at 54c	21,189.49	
Solid rock excavation, 21,863.8 cu. yds. at $1.80	39,354.84	
Overhaul, 4,251.0 sta. yds. at 5c	212.55	
12-inch plain concrete pipe, 1,062.0 lin. ft. at $1.35	1,433.70	
18-inch reinforced concrete pipe, 644.0 lin. ft. at $3.00	1,932.00	
24-inch reinforced concrete pipe, 40.0 lin. ft. at $4.00	160.00	
36-inch reinforced concrete pipe, 296.0 lin. ft. at $6.00	1,776.00	
Crushed gravel surfacing, 10,436.0 cu. yds. at $3.50	36,526.00	
Class "C" concrete, 137.16 cu. yds. at $25.00	3,429.00	
Force account items:		
Redrilling rock cut due to widening grade and change in grade line	2,263.93	
Riprap to protect ends of bridge, Sta. 155+00	302.76	
Riprap to protect banks of main irrigation canal	38.41	
Cleaning ditches, removing slides and repairing washouts	277.93	
Total amount earned by contractor	$111,396.61	
Deductions:		
Holt tractor parts furnished by State	1,392.67	
Rental on Holt tractors owned by State	1,668.14	
T. N. T. furnished by State	500.00	
Total deductions	$ 3,560.81	
Total amount paid to contractor		107,835.80
Grand total cost of project		$117,070.18
Paid by State	$ 18,753.13	
Paid by County	42,087.73	
Paid by Government	56,229.32	
Total	$117,070.18	

PRINEVILLE CITY BRIDGE—

Engineering		$ 581.38
Sale of small equipment used in connection with force account work		(credit) 64.90
Contract items as follows:		
Class "A" concrete, 83.69 cu. yds. at $35.00	$ 2,929.15	
Steel reinforcement, 7,943.0 lbs. at 11c	873.73	
Excavation, 85.0 cu. yds. at $1.00	85.00	
Concrete handrail, 58.5 lin. ft. at $3.50	204.75	
Force account items:		
Furnishing and driving piling for abutment foundations	626.49	
Total amount paid to contractor		4,719.12
Grand total cost of structure		$ 5,235.60
Paid by State	$ 2,691.39	
Paid by Government	2,544.21	
Total	$ 5,235.60	

[CROOK]

REDMOND-PRINEVILLE SURFACING—

Engineering		$ 1,842.74
Sprinkling macadam by State forces		2,823.14
Contract items as follows:		
Run-of-bank gravel, 6,436.0 cu. yds. at $2.30	$ 14,802.80	
Crushed gravel, 15,505.5 cu. yds. at $3.12	48,377.16	
Force account items:		
Erecting wire fence around gravel pit	148.49	
Total amount paid to contractor		63,328.45
Grand total cost of project		$ 67,994.33
Paid by State	$ 43,295.92	
Paid by Government	24,698.41	
Total	$ 67,994.33	

SUMMARY

	State	*County*	*Government*	*Total*
Grading and surfacing	$ 18,753.13	$ 42,087.73	$ 56,229.32	$117,070.18
Prineville bridge	2,691.39	.....	2,544.21	5,235.60
Surfacing	43,295.92	.....	24,698.41	67,994.33
Crooked River bridge	2,807.04	.....	2,105.37	4,912.41
Totals	$ 67,547.48	$ 42,087.73	$ 85,577.31	$195,212.52

Prineville-Ochoco Forest Boundary Surfacing

When the work under the grading contract on the Prineville-Ochoco Forest Boundary Section had proceeded far enough to allow surfacing operations, it was decided to construct a surfacing over such intermittent sections as required to make the road available for traffic. Owing to the limitation of funds available, this surfacing was not constructed to full standard and it was expected that the work done would only be sufficient to permit temporary use of the road. With this object in view, Contract 466 was awarded on September 20, 1921, to Greenwood & Dann of Portland, the expenditures under the contract being limited to $25,000. Construction operations were started immediately and the contract was completed on December 28 of the same year.

Total expenditures amounted to $22,652.04 from State funds and were made under the supervision of C. W. Woodruff, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,042.84
Contract items as follows:		
Gravel surfacing, 15,000.25 cu. yds. at $1.40	$ 21,000.35	
Force account items:		
Scarifying old macadam	468.98	
Placing sand filler	139.87	
Total amount paid to contractor		21,609.20
Grand total cost of project (all State funds)		$ 22,652.04

Prineville-Ochoco Forest Boundary Surfacing

Subsequent to the completion of the surfacing mentioned in the preceding article, it was decided to surface the entire distance between Prineville and the end of the Ochoco Forest Road Project to standard, and Contract 595 for this work was awarded to J. K. Shotwell of Hermiston, Oregon, on August 29, 1922. The surfacing materials to be laid consist of crushed gravel and of talus from natural deposits. A fair start has been made in the construction and it is expected that the work will be completed early in the summer of 1923.

The entire work is estimated to cost a total of $49,000.00 from State funds. Expenditures to the date of this report amount to $155.20 and have been made under the supervision of C. W. Woodruff, Resident Engineer.

Prineville-Ochoco Forest Grading

This section of the Ochoco Highway extends from Station 52+80, 2,360 feet east of the city limits of Prineville, to the south end of the Ochoco Forest Road Project, at Station 1,072+50, with the exception of the portion from Station 144 to Station 260, which is along the present graveled road and required no grading.

The State Highway Commission awarded Contract No. 345 to Greenwood & Dann of Portland, Oregon, on April 5, 1921, for the grading of the section. Owing to lack of funds the roadbed was narrowed to 18′ and 20′ between ditches. The old road was narrow and dangerous and usually impassable during the winter season. The new location runs along the north side of the new Ochoco dam and reservoir, and is quite scenic at this point. Considerable local interest is taken in this road as it opens up a large amount of new country, and is an outlet from the Mitchell district to a railroad shipping point.

Work was carried on under the direction of C. W. Woodruff, Resident Engineer, and completed on November 10, 1921.

The total cost of the project is $138,015.99, with Crook County cooperating to the extent of $57,982.50 and the State paying the balance. Total expenditures to date amount to $138,015.99, having been paid $113,671.89 by the State and $24,344.10 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,487.23
Contract items as follows:		
Clearing and grubbing, all	$ 1,750.00	
Common excavation, 53,923.5 cu. yds. at 57c	30,736.40	
Intermediate excavation, 48,135.5 cu. yds. at 80c	38,506.80	
Solid rock excavation, 33,353.0 cu. yds. at $1.40	46,694.20	
Overhaul, 33,598.0 sta. yds. at 5c	1,679.90	
12-inch corrugated galvanized iron pipe, 2,646.0 lin. ft. at $2.00	5,292.00	
18-inch corrugated galvanized iron pipe, 1,244.0 lin. ft. at $3.15	3,918.60	
24-inch corrugated galvanized iron pipe, 228.0 lin. ft. at $4.00	912.00	
30-inch corrugated galvanized iron pipe, 98.0 lin. ft. at $6.50	637.00	
36-inch corrugated galvanized iron pipe, 252.0 lin. ft. at $7.75	1,953.00	
Riprap, 18.52 cu. yds. at $3.25	60.19	
Lumber and timber, 2.99 M.-FBM. at $60.00	179.40	
Force account items:		
Wrecking small bridge and replacing with 36-inch culvert pipe	41.23	
Backfilling around abutments of Mill Creek bridge	106.28	
Repairing old bridge over Marks Creek	61.76	
Total amount paid to contractor		132,528.76
Grand total cost of project		$138,015.99
Paid by State	$113,671.89	
Paid by County	24,344.10	
Total	$138,015.99	

[CROOK]

Crooked River Section Grading

An article descriptive of this section will be noted on page 191 of the last report. During the present biennium the work has been carried to completion with the expenditures of $150,138.62, consisting of $107,266.35 from State funds and $42,912.27 from County funds. This brings the total cost of the work to $364,021.89, comprising $261,109.62 of State funds and $102,912.27 of County funds. These expenditures do not include the construction of the bridges built by State forces.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 21,619.56
Equipment furnished by State:		
Gas engine, rental and repair parts		190.78
Centrifugal pump, rental and repair parts		252.14
Contract items as follows:		
Clearing and grubbing, all	$ 8,500.00	
Common excavation, 134,766.7 cu. yds. at 68c	91,641.36	
Solid rock excavation, 89,805.9 cu. yds. at $1.75	157,160.33	
Overhaul, 68,490.0 sta. yds. at 5c	3,424.50	
12-inch corrugated galvanized iron pipe, 3,608.0 lin. ft. at $3.50	12,628.00	
18-inch corrugated galvanized iron pipe, 1,436.0 lin. ft. at $4.50	6,462.00	
24-inch corrugated galvanized iron pipe, 884.0 lin. ft. at $5.50	4,862.00	
36-inch corrugated galvanized iron pipe, 158.0 lin. ft. at $9.00	1,422.00	
Riprap, 478.3 cu. yds. at $15.00	7,174.50	
Lumber and timber, 104.522 M.-FBM. at $75.00	7,839.15	
Dry rock wall, 809.22 cu. yds. at $14.00	11,329.08	
Force account items:		
Removing and replacing culvert pipe, due to change in line and grade	462.20	
Repairing and cleaning out irrigation ditch	427.45	
Excavating under bridges and filling in around ends	354.67	
Digging test pits for bridge foundations	263.96	
Installation and operation of temporary pumping plant to deliver irrigation water across highway during road construction	824.09	
Furnishing and installing metal irrigation flume	2,074.58	
Hand placing rock on embankment slopes to protect irrigation ditch	1,097.55	
Constructing trap at gravel bar to obtain material for embankment	522.25	
Repairing damage caused by cloudburst	1,558.52	
Clearing borrow pits outside of right-of-way	337.63	
Adjustment with contractor due to alteration in details of construction	21,593.59	
Total amount paid to contractor		341,959.41
Grand total cost of project		$364,021.89
Paid by State	$261,109.62	
Paid by County	102,912.27	
Total	$364,021.89	

Prineville-Bear Creek Surfacing

On August 30, 1921, Contract No. 442 was awarded to the County Court of Crook County for reshaping and placing a crushed gravel surfacing on the worst sections of the Crooked River Highway between Prineville and Bear Creek. The Highway Commission, in this contract, limited the amount of authorized expenditures to $12,000, this being considered sufficient to make the section passable throughout the year, until such time as funds were available for the placing of a standard surfacing over the entire section.

With the funds available, surfacing was placed between the following stations: 42 to 242, 272 to 285+50 and 454 to 463.

The work was carried on under the direction of C. W. Woodruff, Resident Engineer, with expenditures of $11,958.46 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 330.12
Contract items as follows:		
Gravel surfacing, 3,580.0 cu. yds. at $1.35	$ 4,833.00	
Force account items:		
Grading roadbed, filling in around bridges No. 1 and No. 2	130.03	
Cleaning ditches and opening culverts	73.80	
Removing slide and filling in around Dry Creek bridge	456.45	
Cutting weeds, blading roadbed and removing small slides	804.73	
Backfilling culverts with rock	53.82	
Placing earth filler on rock cuts and fills	5,276.51	
Total amount paid to contractor		11,628.34
Grand total cost of project (all State funds)		$ 11,958.46

Ochoco Canyon Forest Road Project

This project was completed during the previous biennium and a description thereof will be noted on page 190 of the previous report. No additional expenditures have been made during the present biennium, the only entry on our books being occasioned by reimbursement to the State of $5,000 which had been advanced for Crook County.

Crooked River Section Bridges

Mention is made of these bridges under "Crooked River Project-Grading" in the last report.

Satisfactory progress having been made on the first bridge constructed with State forces, it was decided to continue on the other three in the same manner. Work was accordingly begun on the bridge over Dry Creek on January 20, 1921, and the structure was completed and open for traffic May 5, 1921. On account of unfavorable weather conditions, no work was done during the month of March.

Upon the completion of the Dry Creek Bridge, construction was started on the Bear Creek Bridge and the Lower Crooked River Bridge. As these bridges are near each other, the work was carried on simultaneously. The work was started May 6, 1921; the Bear Creek Bridge was completed September 5, 1921, and the Lower Crooked River Bridge was completed October 25, 1921.

This work was under the direction of G. S. Paxson, Superintendent, until July 15, 1921, and from that date until completion, under the direction of Mervyn Stephenson. The total cost of the bridges was $48,254.13 from State funds, of which $39,515.30 was spent during the present biennium.

Prineville-Jones Mill Bridges

Bids were taken on the construction of bridges over Mill and Marks Creeks on June 28, 1921, but were rejected as too high. They were accordingly placed on the list for State force construction and later a third one was added, a 23-foot span over the Ochoco Canal. The first two structures are 40-foot wood "A" Frame structures on concrete foundations.

[CROOK]

The same crews that built the bridges on the Crooked River Highway were used on the construction of these bridges. Work was begun on the bridge over the Irrigation Canal September 23, 1921, and the bridge was completed October 8, 1921. The bridges over Marks Creek and Mill Creek were begun October 10, 1921. The Mill Creek bridge was finished December 10, 1921, and the Marks Creek bridge January 25, 1922. The total cost of the bridges on this section was $11,537.43 from State funds.

The work was under the direction of Mervyn Stephenson, Superintendent.

Maintenance

For the purposes of maintaining the State highways in the County, Resident Engineer C. W. Woodruff established maintenance headquarters at Prineville and was supplied with several items of State equipment consisting of a quad truck, grader, small drags, et cetera. Owing to the large mileage of roads to be maintained, local men and teams have been hired where needed, preference being given to residents adjacent to the particular unit.

The maintenance work has consisted chiefly of the dragging of gravel surfacing after the rains, the cleaning of ditches, widening of fills, installation of extra culvert pipes, et cetera. Constant maintenance has been necessary on the Ochoco Highway between Prineville and the Wheeler County Line owing to the large number of stock which are driven over the road from Grant and Wheeler Counties to be shipped to market from Prineville. A water spout occurring during June, 1921, did considerable damage to the roadbed and ditches and filled up numerous culverts on the section within the Ochoco Forest. This damage has been repaired and additional culverts have been installed to take care of future happenings of this sort.

At this date a camp has been established at the summit near the Wheeler County Line for general maintenance purposes and, in addition, it is expected that it will be possible to keep the Ochoco Highway clear of snow during the winter months.

Prineville-Jones Mill Survey

At the request of the County Court, field work was started on the location of the Ochoco Highway east of Prineville on August 12, 1919, and was carried on at intermittent periods until February, 1921. The location runs over the north end of the earth dam of the Ochoco Irrigation District; thence along the north side of the reservoir and up Ochoco Creek to the west end of the Forest Road Project in the forest reserve. This survey completed the location of the Ochoco Highway across the County.

Davis Ranch-Paulina Survey

Upon abandonment of the portion of the Crooked River Highway east of Bear Creek as a State highway, the County decided on the eventual improvement of the road as far as Paulina, using bond money and market road funds as they become available. With this idea in view, the County Court requested that a survey be made covering a portion of the distance east of the Davis Ranch. In accordance with their request, a location was made, beginning at the Davis Ranch and extending up the Crooked River Canyon, through the town of Post, to a point 19.07 miles from the point of beginning. The location was made under the supervision of C. W. Woodruff, Resident Engineer, and was completed in June

of the present year. The cost of this survey is to be paid for by the County.

Immediately subsequent to the completion of the location, the County awarded a contract for grading the section and contemplate the letting of the surfacing construction as soon as grading is completed

Bear Creek-Central Oregon Highway Survey

During 1922 the Highway Commission ordered a survey for a connection between the Crooked River Highway at Bear Creek and the Central Oregon Highway east of Millican. While directly serving only a sparsely settled district, this route will provide a short cut to Prineville for a large portion of Deschutes County and it will also form a link in a possible all-winter road between Prineville and Lakeview.

The survey was made by C. R. Burns, Locating Engineer, during August and September, the location beginning at the south end and proceeding northerly. Approximately the south four miles are in Deschutes County and the balance of the distance in Crook County.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Crook County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 18,224.96
2.	State Funds apportioned to County	26,794.56
3.	County Levy Made to Match State Funds	34,608.06
4.	County Market Road Funds collected	27,234.78
5.	Cash paid to County by State	22,153.69
6.	State expenditures, deducted from apportionment	1,600.62
7.	Cash due County from State in December, 1922	3,040.25
8.	County expenditures on Market Roads	50,223.75
9.	Balance in County Treasury November 1, 1922	5,549.82

From the above statement it is apparent that Crook County received from the State Market Road Fund $8,569.60 more than it paid into the fund. The excess is Crook County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $34,608.06. Of this amount they have collected and credited to the Market Road Fund only $27,234.78.

The County Court has designated eight roads to be improved as Market Road projects. Expenditures have been made on four projects.

Surveys have been made and plans prepared by C. W. Woodruff, Resident Engineer, in the employ of the State Highway Commission.

The construction work is of a permanent nature, good alignment and grades being obtained. Some of the work is being done by County forces and some under contracts awarded by the County Court.

The County Court have expended $50,223.75, have graded 22 miles of roadbed, 20 feet in width, and have surfaced with gravel 7.0 miles, 10 feet wide.

CURRY COUNTY

The Roosevelt Coast Highway is the only State highway within the limits of Curry County and State expenditures have necessarily been confined to this one road.

The section between Denmark and the Sixes River has been graded and surfaced, and construction under a Federal Aid project is under way between the Sixes and Elk Rivers. Improvement of the portion between the Elk River and Port Orford, as a Federal Aid project, is in prospect.

South of Port Orford continuous grading and surfacing has been provided for as far as Mussells Creek, and a 4.5-mile section south of Gold Beach is being graded. This last unit is known as the Hunters Head Section, and involves some of the heaviest grading undertaken by the Department. In order to avoid the serpentine slides near the ocean, the alignment is some distance inland and reaches a maximum elevation of 700 feet.

The policy of continuous construction, while desirable, has not been followed, on account of the preference of the County Court and State Highway Commission for giving precedence to the construction of the sections which were most impassable. This policy has required that the heaviest grading be undertaken first, and, for that reason, grading expenditures have been proportionately great.

The completed Coast Highway will be of inestimable value to the County, as there are no railroads available and the only means of moving commodities is by road or by the sea. Owing to shallow bars and an unprotected coast, ocean traffic is somewhat unreliable and a large burden will always fall upon highway transportation until such time as a railroad system may be available.

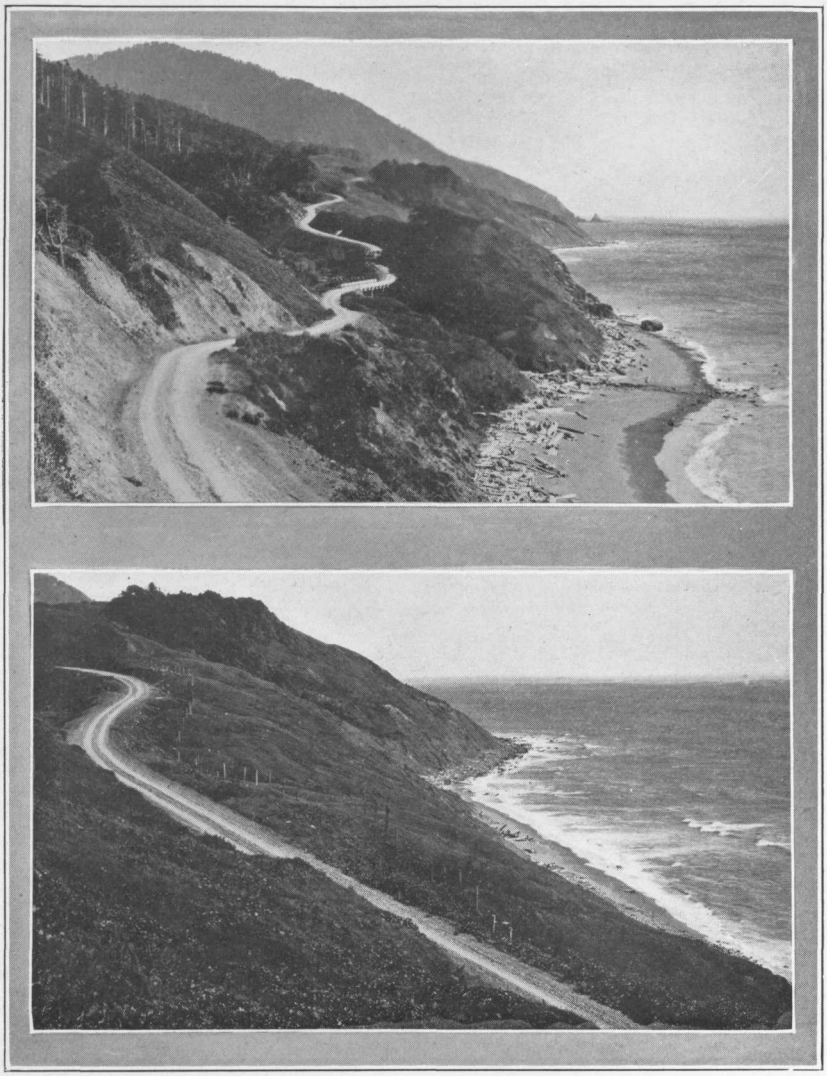
All work in the County has been handled by W. E. Chandler, Division Engineer.

Elk River-Sixes River Post Road Project

The improvement of 2.75 miles of the Roosevelt Coast Highway, between a point approximately 0.6 mile south of Elk River and a point approximately 0.5 mile north of the Sixes River, is being undertaken in cooperation with the County and Federal Government under the terms of Post Road Project Agreement No. 70.

Contract 555 was awarded to John Hakanson and he started grading operations on July 8, 1922, which will be completed during 1923. This work is estimated to cost a total of $53,000.00, to be paid $2,499.30 by the State, $11,500.00 by the County and $39.000.70 by the Federal Government. The expenditures to date amount to $31,784.83 from State funds and have been made under the supervision of C. H. Armstrong, Resident Engineer.

On July 25, 1922, Contract 574 was awarded to the Portland Bridge Company of Portland, Oregon, for the construction of structures over Elk River, Sixes River and Crystal Creek. The Elk River Bridge consists of two 90-foot steel spans with pile trestle approaches, the Sixes River Bridge has three 90-foot spans with pile trestle approaches, and the Crystal Creek Bridge consists of five spans of pile trestle. Excellent progress has been made to date and the work promises to be speedily completed. Raymond Archibald, Resident Engineer, is in charge of the work, with expenditures to date from State funds of $10,975.20 out of a total estimated cost of $60,000.00 for the three structures. This total estimated cost is to be finally divided $21,912.74 to the State and $38,087.26 to the Government.



SOUTH OF PORT ORFORD ON THE ROOSEVELT COAST HIGHWAY IN CURRY COUNTY

No contract has been awarded for the surfacing, which is provided for in the project agreement and is estimated to cost a total of approximately $15,000.00, divided $5,817.33 to the State and $9,182.67 to the Federal Government.

In summing up, the entire project is estimated to cost a total of $128,000.00 for the grading, bridges and surfacing. This total cost will be borne $30,229.37 by the State, $11,500.00 by the County and $86,270.63 by the Federal Government. The total expenditures to date amount to $42,760.03 from State funds.

Sixes River-Denmark Surfacing

On June 28, 1921, the State Highway Commission awarded Contract No. 401 to John Hakanson for surfacing 4.97 miles between Sixes River and Denmark on the Coast Highway. Construction was started on August 29 of the same year and completed June 30, 1922. Gravel for use on the work was secured from Sixes River and from Floras Creek.

Final expenditures amount to $29,300.42, having been made under the supervision of C. H. Armstrong, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,048.00
Items deducted from contractor's estimate:		
Garford truck sold to contractor by State		2,408.00
Rental of Ford truck owned by State		165.50
Contract items as follows:		
Run-of-bank gravel for surfacing 10,876.0 cu. yds. at $2.45	$ 26,646.20	
Gravel placed in piles for future maintenance, 493.5 cu. yds. at $2.35	1,159.73	
Force account items:		
Raking off large rock from top course	279.54	
Sprinkling gravel surfacing	166.95	
Total amount earned by contractor	$ 28,252.42	
Deductions:		
Garford truck sold to contractor	2,408.00	
Rental of Ford truck	165.50	
Total deductions	$ 2,573.50	
Total amount paid to contractor		25,678.92
Grand total cost of project (all State funds)		$ 29,300.42

Humbug Mountain Surfacing

Bids were received for the surfacing of this section, but were considered too high and the work was ordered done by State forces. Construction operations were started August 13 and completed October 19, 1921, and a total of 2.45 miles were surfaced at a total cost of $5,260.51 from State funds.

Talus materials were loaded by steam shovel in Brush Creek Canyon and were hauled and placed on the roadbed by State trucks. These materials were intended to be used only as a base course, but since being placed on the road they have worked out so well that a dressing course was not considered necessary. Up to the time of this report, the surfacing has been standing up excellently and, in fact, is becoming better all the time.

Operations were handled by Paul Copp, Superintendent, and B. O. Johnson, Resident Enginer.

[CURRY]

Port Orford-Hubbard Creek Surfacing

This section of the Coast Highway begins at the south city limits of Port Orford and extends south 1.43 miles to Hubbard Creek. Upon the completion of the grading, the State Highway Commission, on June 28, 1921, awarded contract No. 402 to John Hakanson for surfacing the section. Work was started July 21 and completed on September 11 of the same year, gravel for the surfacing being hauled from the Elk River north of Port Orford.

The completed surfacing represents an expenditure of $10,085.23 from State funds. Construction was supervised by B. O. Johnson, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 185.77
Contract items as follows:		
Gravel surfacing, 2,476.5 cu. yds. at $3.50	$ 8,667.75	
6-inch porous drain tile, 378.0 lin. ft. at 50c	189.00	
Rock back-fill for drain ditches, 42.0 cu. yds. at $3.50	147.00	
Gravel in piles for maintenance, 150.5 cu. yds. at $3.50	526.75	
Force account items:		
Sprinkling garvel surfacing	286.34	
Excavation for tile drains	82.62	
Total amount paid to contractor		9,899.46
Grand total cost of project (all State funds)		$ 10,085.23

Hubbard Creek-Brush Creek Surfacing

Contract No. 302 was awarded to J. W. Hillstrom on September 28, 1920, for surfacing 4.2 miles of the Coast Highway, between Hubbard Creek and Brush Creek, south of Port Orford. Work was started February 11, 1921, and completed September 11 of the same year under the supervision of B. O. Johnson, Resident Engineer.

The completed project represents a cost of $27,859.70 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,230.08
Contract items as follows:		
Broken stone surfacing, 7,431.5 cu. yds. at $3.50	$ 26,010.25	
6-inch rock for ditch drains and subbase, 20.5 cu. yds. at $3.00	61.50	
Force account items:		
Widening cuts and dressing up extra wide sections	66.05	
Sprinkling macadam	491.82	
Total amount paid to contractor		26,629.62
Grand total cost of project (all State funds)		$ 27,859.70

Brush Creek-Mussels Creek Forest Road Project

This section lies between Brush Creek and Mussels Creek on the Coast Highway in Curry County and has a total length of 6.1 miles. The first 3.5 miles were graded by the State Highway Department, and the Forest Road Project covers the surfacing of this 3.5 miles, with the grading and surfacing of an additional 2.6 miles immediately south. Contract for this work has been awarded by the Government and is approximately 75 per cent complete at the present time. Sliding materials have been encountered in the heavy cuts on the work, but no serious difficulty in maintaining the road is anticipated from this source.

The project agreement on the work calls for a total expenditure of $150,000.00, which is to be paid $45,000.00 by the State, $30,000.00 by

Curry County and $75,000.00 by the Federal Government. Total expenditures to date amount to $75,761.53, which have been paid $25,000.00 by the State and $50,761.53 by the Federal Government.

Sixes River-Denmark Grading

This unit extends from a point approximately 0.5 mile north of the Sixes River north for a distance of 4.97 miles, and has been graded under Contract 400 by Klockars, Padrick & Weber of North Bend, Oregon. Construction operations were started on July 11, 1921, but owing to the fact that the section extends through the largest body of Port Orford cedar in Curry County and to the fact that, owing to difficulty in burning, the job could not be finished in the fall, the section was not finally completed until June, 1922.

C. H. Armstrong, Resident Engineer, supervised the construction, which required a total expenditure of $71,208.35. This expenditure was divided $41,208.35 to the State and $30,000.00 to the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,115.15
Special investigation by State geologist		77.27
Contract items as follows:		
Clearing and grubbing, all	$ 7,000.00	
Excavation, no classification, 68,179.5 cu. yds. at 67c	45,680.27	
Overhaul, 42,566.0 sta. yds. at 5c	2,128.30	
Timber culverts, 205.250 M-FBM at $58.00	11,904.50	
6-inch porous drain tile, 874.0 lin. ft. at 35c	305.90	
Rock backfill for tile drains, 173.0 cu. yds. at $3.00	519.00	
Force account items:		
Digging up and replacing tile drain account change in alignment	40.15	
Extra clearing outside of 60-foot right-of-way	437.81	
Total amount paid to contractor		68,015.93
Grand total cost of project		$ 71,208.35
Paid by State	$ 41,208.35	
Paid by County	30,000.00	
Total	$ 71,208.35	

Port Orford-Hubbard Creek Grading

This project begins at the intersection of Sixth and Jefferson Streets in Port Orford and extends 1.6 miles to Station 87 at Hubbard Creek. Grading of the unit was done by J. R. Hill of Port Orford, Oregon, under Contract 316, operations being started on February 20, 1921, and completed November 1 of the same year.

B. O. Johnson, Resident Engineer, supervised the construction, which required a total expenditure of $31,616.47 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,241.21
Contract items as follows:		
Clearing and grubbing, all	$ 2,010.00	
Common excavation, 30,707.5 cu. yds at 72c	22,109.40	
Overhaul, 16,796.0 sta. yds. at 5c	839.80	
6-inch porous drain tile, 552.0 lin. ft. at 75c	414.00	
Cedar lumber and timber in trestles, 27.449 M.-FBM. at $70.00	1,921.43	
Cedar lumber and timber in trestles, 27.449 M.-FBM. at $51.50	3,080.63	
Total amount paid to contractor		30,375.26
Grand total cost of project (all State funds)		$ 31,616.47

[CURRY]

Hubbard Creek-Brush Creek Grading

The construction of this section was started in 1919 and a description thereof will be found on page 194 of the previous report. Work was continued into the present biennium and finally completed on October 22, 1921. The remoteness of the project from a point of labor supply and the difficulty of getting machinery onto the work were contributing causes to the length of time required for the completion of the project.

Expenditures during the present biennium have amounted to $74,437.83 and have been paid $44,437.83 by the State and $30,000.00 by the County. These expenditures bring the total cost of the project to $186,491.08, paid $156,491.08 by the State and $30,000.00 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 10,875.67
Contract items as follows:		
Clearing and grubbing, all	$ 7,000.00	
Common excavation, 155,690.4 cu. yds. at 50c	77,845.20	
Solid rock excavation, 68,951.2 cu. yds. at 99c	68,261.69	
Overhaul, 3,364.0 sta. yds. at 3c	100.92	
Riprap, 924.0 cu. yds. at $4.00	3,696.00	
Lumber and timber, 174.117 M.-FBM. at $40.00	6,964.68	
Port Orford cedar for culverts, 202.213 M-FBM. at $40.00	8,088.52	
Port Orford cedar for bridge floors, 22.214 M.-FBM. at $45.00	999.63	
Wooden gutters, 3.955 M-FBM. at $40.00	158.20	
Extra clearing, 0.8 acre at $225.00	180.00	
Force account items:		
Covering fill slopes with brush to prevent wash	626.10	
Constructing two concrete culverts and thirty-two concrete pedestals for Brush Creek bridge	879.16	
Applying white lead and carbolineum to bridges	815.31	
Total amount paid to contractor		175,615.41
Grand total cost of project		$186,491.08
Paid by State	$156,491.08	
Paid by County	30,000 00	
Total	$186,491.08	

Hunters Head Grading

This section begins approximately 4.4 miles south of Gold Beach and extends south 4.28 miles to a point approximately 1.3 miles east of Cape Sebastian. Contract 542 for its grading was awarded to John Hampshire of Grants Pass and involves what is perhaps a piece of as heavy construction as has been undertaken by the Department along the Coast. The contractor started work on June 1, 1922, but it is not anticipated that the section will be completed before the summer of 1923.

The grading of the 4.4 miles is estimated to cost a total of $163,000.00, to be paid $113,000.00 by the State and $50,000.00 by the County. B. O. Johnson, Resident Engineer, has been in charge of the work, with expenditures to date of $61,362.24. Of this amount the County has paid their full cooperative share on the project of $50,000.00 and the State has expended the balance, consisting of $11,362.24.

Unit 1, Brush Creek-Mussel Creek Grading

This section begins approximately 4.7 miles south of Port Orford and extends south for a distance of 3.79 miles. Contract 403 for grading the project was awarded to the Bates & Rogers Construction Company on June 20, 1921. Construction operations were started on July 20 of the same year and completed on June 28, 1922, under the supervision of B. O. Johnson, Resident Engineer.

The completed grading represents a total cost of $101,945.47, consisting of expenditures of $71,945.47 from State funds and $30,000.00 from County funds. The surfacing of this section, together with the grading and surfacing of the balance of the distance to Mussels Creek is being done as a Forest Road Project.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,969.19
Contract items as follows:		
Clearing and grubbing, all	$ 3,880.00	
Common excavation, 34,965.9 cu. yds. at 63c	22,028.52	
Solid rock excavation, 27,204.1 cu. yds. at $1.15	31,284.72	
Overhaul, 6,866.0 sta. yds. at 6c	411.96	
6-inch porous drain tile, 1,382.0 lin. ft. at 63c	870.66	
Class "B" concrete, 151.92 cu. yds. at $40.00	6,076.80	
Lumber and timber, 202.393 M-FBM. at $80.00	16,191.44	
Timber piling, 283.1 lin. ft. at $1.15	325.57	
Cedar for culverts, 133.411 M.-FBM. at $35.00	4,669.39	
Force account items:		
Laying deck and filling approaches to bridge at Sta. 448+00	63.34	
Removing old log fill and drain	74.32	
Placing riprap, Sta. 446 to Sta. 489+00	3,656.99	
Gravel surfacing not included in contract	2,700.09	
Removing partly constructed bridge account change in alignment	153.33	
Hauling shell rock from slide to road at Sta. 405+00	499.59	
Extra clearing outside of 60-foot right-of-way	559.24	
Reshaping roadbed after winter rains	1,378.52	
Backfilling tile drains with rock	779.02	
Plowing and seeding field used as detour during construction	19.98	
Enlarging scupper holes on bridges	114.90	
Extra work on bridge piers due to change in plans	325.74	
Total amount earned by contractor	$ 96,064.12	
Deductions:		
Lumber and timber salvaged by contractor from temporary bridges	87.84	
Total amount paid to contractor		95,976.28
Grand total cost of project		$101,945.47
Paid by State	$ 71,945.47	
Paid by County	30,000.00	
Total	$101,945.47	

Maintenance

All maintenance work in Curry County has been done by State forces, using what is known as the gang system. The maintenance undertaken has covered all the completed State highway in the County and has consisted of removing slides, keeping ditches and culverts clean and dragging the roadbed on five miles of graveled surfacing between Sixes River and Denmark and on 8.5 miles between Port Orford and Brush Creek. The greatest part of the expense required for maintenance has been due to the weathering of slopes and the resulting slides.

Hubbard Creek-Mussel Creek Survey

As stated on page 195 of the previous report, a location survey of a portion of the distance between Hubbard Creek and Mussel Creek was under progress at the close of the biennium. This location has been completed during the ensuing two years and the entire line covered is now constructed or under contract. The entire location was 13.2 miles in length and lies practicaly all on the ocean slope.

[CURRY]

Gold Beach-Brookings Survey

In addition to the reconnaissance made by J. H. Scott, Locating Engineer, in 1920, F. N. Drinkhall, Locating Engineer, has worked out further information on the five alternate lines investigated by Mr. Scott and more detailed studies have been made. Several routes have been examined, varying from a route along the coast to various others with different summit elevations lying back along the ocean slope. The surprising thing noted is that the route with the highest summit is the line with the least total rise and fall in the grade line, and is also the shortest and least expensive. This route follows the general location of the present road and well adjusts itself to existing stock ranches. The line is entirely free from slides and unstable ground and has a high scenic value as it overlooks the ocean from an appreciable altitude.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Curry County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 11,593.58
2.	State Funds apportioned to County	16,114.61
3.	County levy made to match State Funds	15,844.90
4.	County Market Road Funds collected	14,671.34
5.	Cash paid to County by State	12,009.50
6.	State expenditures, deducted from apportionment	1,478.06
7.	Cash due County from State in December, 1922	2,627.05
8.	County expenditures on Market Roads	25,048.76
9.	Balance in County Treasury November 1, 1922	2,266.21

From the above statement it is apparent that Curry County received from the State Market Road Fund $4,521.03 more than it paid into the fund. The excess is Curry County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $15,844.90. Of this amount they have collected and credited to the Market Road Fund only $14,671.34.

The County Court has designated three roads to be improved as Market Road projects, namely, Elk River Road, Sixes River Road and the Coast Highway from Gold Beach to Pistol River. Because of a ruling prohibiting the expenditure of Market Road funds on State highways, no funds have been expended on the section from Gold Beach to Pistol River.

The market road surveys has been made and plans prepared by B. O. Johnson, Resident Engineer, in the employ of the State Highway Commission.

Most of the construction work was done under contracts awarded by the County Court.

The County Court has expended $25,048.76, and has graded 3.5 miles of roadbed 10 feet wide.

DESCHUTES COUNTY

Prior to 1919 only one project had been undertaken in Deschutes County by the State Highway Commission, that one being on the section of The Dalles-California Highway between Bend and Allen's Ranch. Since that time, however, the State activities have been continuous and the County is well along the way to having a correlated system of improved State highways which, perhaps, is second to no other County in Oregon.

At the north end of the County a short gap has been left in The Dalles-California Highway for a possible future structure over the Crooked River Gorge. From this gap, the grading and surfacing, through Redmond and Bend, has been completed as far south as Allen's Ranch. The section betwen Allen's Ranch was divided into two construction units. Unit 1, being the north eight miles, has been held up on account of the Benham Falls Irrigation project, as the construction of this project would require an entirely new highway location. However, the possibility of construction of the irrigation project seems rather remote and construction of the highway is now under consideration as a Federal Aid Project. Unit 2, extending on to the Klamath County Line, has been graded to standard and will probably be surfaced at the same time as Unit 1.

The McKenzie Highway, beginning at the summit of the Cascades and extending through Sisters to Redmond, has been graded and is now being surfaced except for the short portion between Cline Falls and Redmond. This portion will very probably be advertised for grading and surfacing during the coming winter.

Beginning at Redmond, the Ochoco Highway has been graded and surfaced to the Crook County Line, and on to Prineville.

The Bend-Sisters Highway has been graded from Tumalo to a junction with the McKenzie Highway near Sisters, and is now under contract for surfacing. No definite plans have been worked out for the improvement of the two miles between Tumalo and The Dalles-California Highway, but it is probable that this portion will be constructed during the coming biennium.

East of Prineville, the Central Oregon Highway has been graded and surfaced as far as Horse Ridge, but no action has been undertaken on further improvement.

The Department has just completed a location and reconnoissance across the County of a portion of the Prineville-Lakeview Highway. This line crosses the Central Oregon Highway a few miles east of Millican.

With the exception of the McKenzie Highway between the Lane County Line and Sisters, and The Dalles-California Highway between the Crooked River and Bend, all grading has been done by County forces and paid for from the proceeds of the sale of County bonds. In return for this, all surfacing work has been done by, and at the expense of, the State.

State work in the County was handled by J. H. Scott, Division Engineer, until April 1, 1922, and by C. W. Wanzer, Division Engineer, since that date.

Bend-Jefferson County Line Surfacing

As stated on page 197 of the Fourth Biennial Report, this surfacing was completed at that time for a distance of approximately five miles. During the present biennium the work on the balance of the 24.72 miles has been carried to completion.

[DESCHUTES]

Some remarkable daily outputs of gravel were secured on this work, with a maximum running as high as 1,432 cubic yards of surfacing in a single day, and maintaining a run of about 1,200 cubic yards per day for several days. The pit gravel contained a slight amount of oversize particles which were raked out at various stages of the construction. However, practically all of the materials were small, deficient in fines, and very clean.

Owing to the lack of moisture during construction and for sometime afterwards, it was necessary to resort to sprinkling and rolling. The results were not entirely satisfactory, however, and did not justify the required expenditure. Under the head of betterment work, rock shoulders have been built up in several places and this, with the winter moisture, has finally set up the gravel into a satisfactory surfacing. It is anticipated that maintenance costs will be high, however, as it is impracticable to construct a broken stone or gravel surfacing which will withstand the long dry summers in this portion of the State.

The construction of the project was handled under the supervision of R. P. Newland, Resident Engineer, with expenditures of $114,171.97 during the present biennium. This brings the total cost of the project to $133,406.67, which has been entirely paid from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,242.49
Labor and equipment furnished by State:		
Rental and repairs of State-owned equipment used on force account work		1,201.81
Rental of State truck (deducted from contractor's estimate)		335.84
Contract items as follows:		
Gravel surfacing, 51,752.0 cu. yds. at $2.45	$126,792.40	
Force account items:		
Sprinkling macadam	1,250.33	
Dragging accepted portions of finished roadway	786.15	
Backfilling over culverts	133.49	
Total amount earned by contractor	$128,962.37	
Deductions for rental, repairs and parts for State truck	335.84	
Total amount paid to contractor		128,626.53
Grand total cost of project (all State funds)		$133,406.67

Cline Falls-West Surfacing

When Deschutes County undertook the grading of the McKenzie Highway across the County, the State Highway Commission agreed to spend an amount on surfacing equal to the County expenditures for grading. At the time of letting this surfacing contract it was not definitely known just how much Deschutes County had expended on the grading, and, as the pit from which the gravel was taken for surfacing was east of the Deschutes River, the contract was limited by the economical haul limit.

On May 26, 1921 the State Highway Commission awarded Contract No. 396 to J. K. Shotwell of Hermiston, Oregon, for surfacing the portion from Cline Falls to a point five miles west. The construction work was carried on during the dry season and it was necessary for the State to keep two water trucks in continual operation as surfacing was laid. An excellent surfacing material was obtained and will be adequate for ordinary traffic but will not stand the heavy lumber trucks engaged in hauling lumber from Sisters. It was therefore necessary to prohibit the use of the road by these trucks.

[DESCHUTES]

Construction was handled under the supervision of R. P. Newland, Resident Engineer, with total expenditures of $21,010.60 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 976.08
Rental, repairs and operation of State equipment used for shaping up macadam, sprinkling and rolling		1,263.27
Contract items as follows:		
Crushed gravel surfacing, 8,073.0 cu. yds. at $2.30	$ 18,567.90	
Force account items:		
Sprinkling macadam	19.90	
Completing grading work started by County forces	183.45	
Total amount paid to contractor		18,771.25
Grand total cost of project (all State funds)		$ 21,010.60

Bend-Allen Ranch Surfacing

A complete description of this project will be found on pages 197-8 of the Fourth Biennial Report. The work was entirely completed at the time of that report, but during the present biennium delayed charges of $166.22 have been paid. This brings the total cost to $31,512.53, all from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,535.11
Rental of State-owned tractor (deducted from contractor's estimate)		208.82
Contract items as follows:		
Clearing and grubbing, all	$ 200.00	
Common excavation, 3,960.0 cu. yds. at 90c	3,564.00	
Solid rock excavation, 21.0 cu. yds. at $3.00	63.00	
Gravel surfacing, 1,504.0 cu. yds. at $3.70	5,564.80	
Cinder surfacing, 7,471.0 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	
Force account items:		
Constructing and placing three wooden box culverts	166.22	
Total amount earned by contractor	$ 28,977.42	
Deduction for rental of State-owned tractor	208.82	
Total amount paid to contractor		28,768.60
Grand total cost of project (all State funds)		$ 31,512.53

Tumalo-Sisters Surfacing

In conjunction with the award of the Cline Falls-Sisters Section, Contract 509 was awarded to March & Bowers of Spokane for surfacing 14.96 miles of the Bend-Sisters Highway between Tumalo and the junction with the McKenzie Highway near Sisters. This work is being handled on the same cooperative basis as outlined for the Cline Falls-Sisters Section and the County is to cooperate to the extent of $6,500.00 out of a cost of $36,243.22. Expenditures to date of the entire cost have been made from State funds, the County cooperative share not yet having been received.

Supervision of the construction was handled by C. L. Grutze, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,722.81
Sprinkling by State forces		1,637.03
Contract items as follows:		
Crushed gravel surfacing, 18,790.5 cu. yds. at $1.75	$ 32,883.38	
Total amount paid to contractor		32,883.38
Grand total cost of project (all State funds)		$ 36,243.22

[DESCHUTES]

Cline Falls-Sisters Surfacing

Contract 508 covering the surfacing of the 10.81 miles of the McKenzie Highway, between a point five miles west of Cline Falls and Sisters, was awarded on April 14, 1922, to March & Bowers of Spokane, Washington. Work was started on July 23 but has not been completed at the time of this report. This section was previously graded by Deschutes County and, in accordance with agreement, the State is to expend for surfacing an amount equivalent to the County grading expenditures. This amount, however, will not be suficient to complete the surfacing of the section and the County is cooperating to an amount of $5,000 in order that the entire section may be surfaced.

The total estimated cost of the work amounts to $26,500, of which amount $13,823.74 has been expended from State funds. The work is being handled under the supervision of C. L. Grutze, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,134.71
Sprinkling macadam by State forces		622.78
Contract items as follows:		
Crushed gravel surfacing, 8,020.0 cu. yds. at $1.75	$ 14,035.00	
Total amount earned by contractor	$ 14,035.00	
Percentage retained until completion of contract	1,968.75	
Total amount paid to contractor		12,066.25
Grand total expended to Nov. 30, 1922 (all State funds)		$ 13,823.74

Sisters Forest Road Project Surfacing

This section extends from Sisters west a distance of 14.3 miles and was graded under the original forest road agreement on the Blue River-Sisters Forest Road Project. During the present year, however, it was decided to surface this portion and the Department entered into a cooperative forest project agreement with the Government for the handling of the work. The agreement in force calls for an expenditure of $85,000, which is to be shared equally by the State and the Federal Government. Construction is proceeding under a contract awarded by the Bureau of Public Roads to Elliott, Scoggin & Paquet, and is approximately half complete at the present time.

The expenditures to date amount to $39,666.67, the State having advanced $30,000.00 of this amount, with the Government expending the balance.

A description of the entire Blue River-Sisters Project will be found in the portion of this report devoted to Lane County Projects.

Bend-Horse Ridge Surfacing

By arrangement with the State Highway Commission, Deschutes County graded, during 1920, 10.9 miles of the Central Oregon Highway east of Prineville with the understanding that the State would spend for surfacing an amount equal to their grading expenditures.

On August 30, 1921, Contract No. 448 was awarded to J. K. Shotwell of Hermiston, Oregon. As the contract price did not quite equal the County expenditures for grading, and as the County had been unable to carry their grading to completion, some money was expended under this contract for grading, being credited to the State's cooperative share.

[DESCHUTES]

As surfacing materials in this district are very difficult to secure, and as roadbed materials are of such a light nature that they do not readily support a surfacing, it was decided to lay the materials in a 4-inch course, 12 feet wide; more being placed later if rendered necessary.

Work was carried on under the supervision of R. P. Newland, Resident Engineer, with total expenditures of $20,056.35 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,005.13
Furnishing and installing concrete pipe culvert by State forces		41.60
Contract items as follows:		
Gravel surfacing, 9,264.0 cu. yds. at $1.95	$ 18,064.80	
Force account items:		
Grading work to bring roadway to established grade line	944.82	
Total amount paid to contractor		19,009.62
Grand total cost of project (all State funds)		$ 20,056.35

Unit 2, Allen Ranch-Klamath County Line Grading

This section is the south unit of the portion of The Dalles-California Highway between Allen Ranch and the Klamath County Line. It has been undertaken first on account of Unit 1 necessarily being held in abeyance until it is definitely known whether or not the Benham Falls Reservoir project is to be constructed. Decision is expected during the coming winter, after which date plans may be made for the construction of the unit. On July 28, 1921, Contract 432 was awarded to the Deschutes County Court for the grading of the south 9.33 miles, known as Unit 2. On account of the uniform topography of the country, about seven-eights of the alignment has been grader work. Although almost complete at the beginning of the present year, burning of the cleared materials and construction of headwalls delayed the completion of the work until October.

When all charges have been paid, the work is estimated to cost a total of $15,000.00, to be paid $8,500.00 by the State and $6,500.00 by the County.

Construction has been supervised by R. P. Newland, Resident Engineer; with expenditures to date of $13,075.14. Of this amount the State has paid $7,171.00 and the County $5,904.14.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,266.85
Contract items as follows:		
Clearing and grubbing, all	$ 4,500.00	
Excavation, single classification, 14,718.1 cu. yds. at 35c	5,151.34	
Overhaul, 15.0 sta. yds. at 10c	1.50	
12-inch plain concrete pipe, 29¾.0 lin. ft. at $1.48	435.12	
18-inch reinforced concrete pipe, 144.0 lin. ft. at $3.20	460.80	
30-inch reinforced concrete pipe, 36.0 lin. ft. at $5.00	180.00	
Grader work, 8.232 miles at $240.00	1,975.68	
Total amount earned by contractor	$ 12,704.44	
Percentage retained until completion of contract	896.15	
Total amount paid to contractor		11,808.29
Grand total expended to Nov. 30, 1922		$ 13,075.14
Paid by State	$ 7,171.00	
Paid by County	5,904.14	
Total	$ 13,075.14	

[DESCHUTES]

Bend-Jefferson County Line Grading

A description of this section will be found on page 198 of the previous report. At that time the work was almost completed except for the construction of concrete bridges over irrigation canals.

During the present biennium the section has been carried to completion. Total cost of $126,657.90 has been paid, $66,657.90 by the State and $60,000.00 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 13,008.72
Labor and material furnished by State:		
Filling up old reservoir		22.50
Repairing weir and digging ditch		95.65
Backfilling bridge ends at Bend		15.00
Repairing culvert at Redmond		15.94
Building irrigation flume at Rice place		64.04
Storage on reinforcing steel		88.75
Items deducted from contractor's estimates:		
Rental of State-owned equipment		2,197.44
Contract items as follows:		
Clearing and grubbing, all	$ 6,000.00	
Common excavation, 48,123.1 cu. yds. at 54c	25,986.47	
Intermediate excavation, 21,041.7 cu. yds. at 78c	16,412.53	
Solid rock excavation, 10,812.7 cu. yds. at $2.75	29,734.92	
Overhaul, 2,841.8 sta. yds. at 5c	142.09	
Grader work, 11.055 miles at $700.00	7,738.50	
8-inch plain concrete pipe, 162.0 lin. ft. at $1.25	202.50	
12-inch plain concrete pipe, 1,416.0 lin ft. at $1.50	2,124.00	
18-inch reinforced concrete pipe, 532.0 lin. ft. at $3.00	1,596.00	
24-inch reinforced concrete pipe, 300.0 lin. ft. at $3.75	1,125.00	
30-ft. reinforced concrete pipe, 431.0 lin. ft. at $5.00	2,155.00	
36-inch reinforced concrete pipe, 587.0 lin. ft. at $6.00	3,522.00	
Class "A" concrete, 69.38 cu. yds. at $33.00	2,289.54	
Class "C" concrete, 284.14 cu. yds. at $25.00	7,103.50	
Metal reinforcement, 7,409.0 lbs. at 10c	740.90	
Rubble masonry, 22.59 cu. yds. at $15.00	338.85	
Force account items:		
Adjustment on culverts, account change in plans	5,182.06	
Reconstructing private water pipe lines	169.55	
Hauling and placing gravel backfill for pipe culverts	115.62	
Installing galvanized iron pipe culverts	174.81	
Installing concrete pipe syphon	138.60	
Constructing temporary bridges on detours	67.46	
Washing sand used in concrete for bridges	59.03	
Moving equipment to make extra fill over culverts	136.97	
Clearing and grubbing on alignment later abandoned	79.07	
Moving concrete culvert pipe to new location	12.33	
Total amount earned by contractor	$113,347.30	
Deduction for rental of State-owned equipment	2,197.44	
Total amount paid to contractor		111,149.86
Grand total cost of project		$126,657.90
Paid by State	$ 66,657.90	
Paid by County	60,000.00	
Total	$126,657.90	

Bend-Horse Ridge Culverts

As part of the State's cooperation on the Bend-Horse Ridge Section, Contract No. 325 was awarded to F. H. May of Bend, Oregon, for installing several multiple pipe culverts on this section.

Work was started on February 16, 1921, and carried to completion April 30, 1921, under the direction of R. P. Newland, Resident Engineer.

The total cost amounted to $5,678.70, which was all paid from State funds.

[DESCHUTES]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 364.50
Contract items as follows:		
Common excavation, 117.7 cu. yds. at $1.00	$ 117.70	
Solid rock excavation, 49.1 cu. yds. at $7.00	343.70	
24-inch reinforced concrete pipe, 72.0 lin. ft. at $3.75	270.00	
30-inch reinforced concrete pipe, 390.0 lin. ft. at $5.00	1,950.00	
36-inch reinforced concrete pipe, 96.0 lin. ft. at $5.30	528.00	
Class "C" concrete, 70.16 cu. yds. at $30.00	2,104.80	
Total amount paid to contractor		5,314.20
Grand total cost of project (all State funds)		$ 5,678.70

Bridges Near Sisters

The construction of two culverts and two small trestle bridges on the Bend-Sisters Highway was awarded on April 14, 1922, to F. H. May of Bend, Oregon, under Contract 523.

Work started on May 15 and was completed on September 15, 1922, being supervised by C. L. Grutze, Resident Engineer. The expenditures to date amount to $4,060.07 and final payments on the structures will bring the total cost to approximately $4,500.00 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 532.12
Contract items as follows:		
Excavation, 176.45 cu. yds. at $1.00	$ 176.45	
Class "A" concrete, 94.06 cu. yds. at $23.00	2,163.38	
Class "B" concrete, 13.65 cu. yds. at $21.00	286.65	
Metal reinforcement, 7,778.0 lbs. at 7c	545.16	
Wood trestle, 76.0 lin. ft. at $9.30	706.80	
Backfill, 125.70 cu. yds. at $1.00	125.70	
Hand placed riprap, 5.70 cu. yds. at $5.00	28.50	
Materials on hand	117.89	
Total amount earned by contractor	$ 4,150.53	
Percentage retained until completion of contract	622.58	
Total amount paid to contractor		3,527.95
Grand total expended to Nov. 30, 1922 (all State funds)		$ 4,060.07

Maintenance

Surfacing of The Dalles-California Highway from Bend to Allen's Ranch was completed in May, 1920, and from Bend north to the Jefferson County Line in April 1921. The surfacing of the Bend-Horse Ridge Section of the Central Oregon Highway was completed in December, 1921. These sections have all been under continual maintenance by the State Highway Department since their completion. This work has been under the supervision of C. W. Woodruff, Resident Engineer, with headquarters at Prineville, and a quad truck grader and other equipment have been used as needed. Local teams and labor have also been used when required. The work done has consisted of dragging the surfacing, cleaning ditches, building up and widening shoulders and hauling filler on sections where the gravel surfacing did not compact satisfactorily.

Beginning October 1, 1922, maintenance headquarters have been established at Redmond, from which point all of the maintenance work in the County will be handled. These headquarters will be more centrally located for the work when the surfacing on the Bend-Sisters and Cline Falls-Sisters Sections is completed. The total mileage of surfaced State highways in Deschutes County to be maintained is approximately 95 miles.

[DESCHUTES]

Central Oregon Highway-Silver Lake Reconnaissance

During the fall of 1922, J. H. Scott, Locating Engineer, made a reconnaissance of the portion of the Prineville-Lakeview Highway, extending from the intersection with the Central Oregon Highway, east of Millican, south to Silver Lake. The alignment secured is very direct and the grading on the section should not be expensive.

South of the Lake County Line detailed investigations were made of several alternate routes for the purpose of securing a line which would be free from snow during as large a part of the winters as possible. The selection of the best route has been rendered exceedingly difficult on account of the peculiar local snow conditions existing in this area.

Horse Ridge-Lake County Line Survey

During 1922 C. R. Burns, Locating Engineer, made a location of the Central Oregon Highway between Horse Ridge and a junction with the Prineville-Lakeview Highway east of Millican. In addition to this, J. H. Scott, Locating Engineer, carried a reconnaissance on through to Suntex in Harney County, crossing the northeast corner of Lake county. This reconnaissance generally follows parallel to, and north of, the Strahon railroad survey in order to avoid right-of-way complications. The alignment is practically straight for the entire distance, and no attempt was made to follow section lines as the country traversed is undeveloped and of little present value, except for grazing purposes. Considerable distance was saved by this means as the old road follows the section lines.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Deschutes County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 32,081.39
2.	State Funds apportioned to County	40,459.87
3.	County levy made to match State Funds	35,250.94
4.	County Market Road Funds collected	27,283.44
5.	Cash paid to County by State	30,804.21
6.	State expenditures, deducted from apportionment	2,030.68
7.	Cash due County from State in December, 1922	7,624.98
8.	County expenditures on Market Roads	49,748.54
9.	Balance in County Treasury November 1, 1922	11,446.51

From the above statement is is apparent that Deschutes County received from the State Market Road Fund $8,378.48 more than it paid into the fund. The excess is Deschutes County's proportionate share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $35,251.05. Of this amount they have collected and credited to the Market Road Fund only $27,283.44, or $7,967.61 less than the amount that they were expected to put into their County Market Road Fund.

The County Court has designated seven roads to be improved as Market Road projects. Expenditures have been made by the County amounting to approximately $23,000.00 for grading on the McKenzie Highway and Ochoco Highway, these roads both being State highways.

All surveys have been made and plans prepared by engineers in the employ of the State Highway Commission.

[DESCHUTES]

All Market Road work has been of high standard, with good alignment and grades. Construction work was done by County forces under the direction of Robert Gould, County Engineer and County Roadmaster.

The County Court has expended $49,748.54, has graded 14.5 miles of 22-foot roadway, and has surfaced with gravel 6.5 miles, 14 feet wide.

DOUGLAS COUNTY

Douglas County has within its borders three State Highways, the Pacific, Coos Bay-Roseburg, and Roosevelt Coast Highways. Although ranking ninth among the Counties in the mileage of State highways, the rugged nature of the topography has required expensive construction, and since 1914 more than twice as much State money has been expended in this County than in any other single County of the State. However, the results of this expenditure are apparent and Douglas County now has the second largest mileage of paved roads, being exceeded only by Multnomah County.

On the Pacific Highway, 97.3 miles have been paved, in a total distance of 100 miles. The unpaved portions are six in number and cover gaps which have been left for construction of bridges and railroad crossing structures. These short gaps offer no difficulties to travel and, for all practical purposes, it may be said that the Pacific Highway is paved.

The Coos Bay-Roseburg Highway has been graded from the Pacific Highway to the Coos County Line, and is now under contract for surfacing. In fact, surfacing has been provided for all the way to Coquille.

No construction has been undertaken on the Roosevelt Coast Highway, but the location surveys have been completed and plans are now being made up. This section will involve some very heavy construction and the grading costs will be high.

Supervision of the construction in the County has been divided into three districts, J. C. McLeod having charge of the Pacific Highway as far south as Roseburg, W. E. Chandler, Division Engineer, having the Coos Bay-Roseburg Highway, and K. E. Hodgman, Division Engineer, the Pacific Highway south of Roseburg.

Advances for Right-of-Way

During the past two bienniums, the State Highway Department has advanced for the County various amounts for the purchases of rights-of-way on the Pacific Highway. These amounts were advanced with the understanding that the County would make reimbursement as soon as funds were available.

Under this agreement, $26,921.42 was advanced during 1919-1920 with an additional amount of $8,687.44 during the biennium just closing. Reimbursement of this total amount of $35,608.86 has now been made by the County. The respective sections and expenditures are given in the following table:

Comstock-Pass Creek	$ 530.00
Leona-Drain	50.54
Drain-Yoncalla	5,964.76
Oakland-Wilbur	450.00
Wilbur-Roseburg	3,403.00
Roseburg-Dillard	11,407.38
Myrtle Creek-Canyonville	9,656.44
Canyonville-Johns Place	1,440.50
Stage Road Pass Section	2,706.24
Total (all County funds)	$ 35,608.86

Divide-Drain Paving

Contract No. 349, for paving the Pacific Highway between Divide and Drain, was awarded to the Warren Construction Company of Portland, Oregon, on April 6, 1921, the contract covering the construction of three inches of bituminous base with a two-inch bituminous wearing

surface. Practically all of the total length of the project, 13.9 miles, had been graded and surfaced from one to three years previous and afforded a solid well-settled base for pavement. The contract specified that any newly filled sections should not be paved until the 1922 season, and under this requirement 13.7 miles were paved in 1921 and the remaining portion in the spring of 1922.

The northern limit of the work was just north of the Divide Overcrossing, approximately 1.4 miles north of the Lane-Douglas County Line, while the southerly limit was the S. P. wye spur near the south city limits of Drain. A short section of 0.22 mile at the site of the Elk Creek bridge in Drain was left unpaved. The project as a whole follows the Pass Creek drainage from its head at Divide to the point of confluence with Elk Creek at Drain, and the paving of the section eliminated one of the worst barriers to the traveling public on the Pacific Highway. In addition to paving, all narrow roadbed throughout the section was widened to Class "A" standard width and guard fence was placed at all necessary points.

Construction was supervised by J. S. Sawyer, Resident Engineer, and represents a total expenditure of $617,082.45 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 11,156.40
Repair parts for State equipment, furnished by State		6.49
Rental of State-owned equipment (deducted from contractor's estimate)		1,260.53
Contract items as follows:		
Preparation of subgrade, 181,556.2 sq. yds. at 6c	$ 10,893.37	
6-inch porous drain tile, 27,997.0 lin. ft. at 40c	11,198.80	
Rock backfill for tile drains, 5,063.0 cu. yds. at $3.80	19,239.40	
Standard bituminous pavement, 3-inch base, 2-inch top, 132,023.0 sq. yds. at $2.89	381,546.47	
Shoulder construction, 144,380.4 lin. ft. at 6c	8,662.83	
Broken stone for base and shoulders, 34,845.25 cu. yds. at $3.60	125,442.90	
Earth filler, 294.0 cu. yds. at $1.00	294.00	
Special bituminous surfacing, 2-inch at edges, 3-inch at center, 1,424.2 sq. yds. at $2.14	3,047.79	
Standard wood guard fence, 10,008.0 lin. ft. at $1.15	11,509.20	
Force account items:		
Clearing and widening roadway from Divide to Lane-Douglas County line	2,111.74	
Clearing and widening roadway from Lane-Douglas County line to Anlauf	21,634.64	
Clearing and widening roadway from Anlauf to Drain	12,879.08	
Excavation for tile drains from the north end of the contract to the Lane-Douglas County line	2,432.30	
Excavation for drain tile from the Lane-Douglas County line to Anlauf	4,117.74	
Excavation for drain tile from Anlauf to Drain	2,536.78	
Total amount earned by contractor	$617,547.04	
Deductions:		
Rental of State-owned equipment	1,260.53	
Freight rate reduction	207.48	
Lump sum reduction in total bid price	11,420.00	
Total deductions	$ 12,888.01	
Total amount paid to contractor		604,659.03
Grand total cost of project (all State funds)		$617,082.45

Drain-Yoncalla Paving

The paving of the Drain-Yoncalla Section, under Contract No. 478, awarded to the Oregon Hassam Paving Company of Portland, Oregon on October 27, 1921, extends from the S. P. wye spur in Drain to the

[DOUGLAS]

beginning of the Yoncalla pavement four miles south of Yoncalla, a total distance of 8.59 miles.

At the time the contract was awarded it excepted a section of 0.44 mile within the city limits of Yoncalla which had been paved in 1914 with a bituminous penetration macadam and which was apparently in good condition. Under the concentrated trucking incident to paving operations, this pavement was insufficient to carry the loads and several sections failed entirely. It was consequently necessary to extend the contract to include the resurfacing of this portion, making the total length of the pavement 9.03 miles. Where the penetration pavement had failed, suitable rock was added and the whole made into a macadam base, and over these portions a five-inch bituminous concrete pavement was constructed similar to that laid on the rest of the job. Where the penetration macadam was unharmed by the hauling, a two-inch bituminous resurface was placed.

The railway paving plant which was used on the job was set up at Yoncalla and the mineral aggregate for the pavement shipped in from Eugene and Roseburg. The setting up of the plant was started January 1, 1922, and actual pavement operations started May 11, being completed September 2. All shoulder work and guard fence on the project has been finished and the final estimate is now being checked in the Salem office.

The project is estimated to cost a total of $229,500.00, expenditures of $222.381.05 having been made to the date of this report.

Supervision of the construction was handled by J. S. Sawyer, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,177.38
Asphalt furnished by State (to be deducted from amount due contractor)		26,607.53
Contract items as follows:		
Preparation of subgrade, 111,569.0 sq. yds. at 3c	$ 3,347.07	
Standard bituminous pavement, 2-inch top, 3-inch base, 81,449.5 sq. yds. at $1.95	158,826.53	
Broken stone for base and shoulders, 13,596.0 cu. yds. at $2.70	36,709.20	
Broken stone backfill for drains, 84.0 cu. yds. at $2.70	226.80	
Shoulder construction, 90,907.0 lin. ft. at 2c	1,814.14	
Standard wood guard fence, 5,224.0 lin. ft. at 80c	4,179.20	
Reimbursement to contractor for freight advanced on asphalt	2,064.20	
Force account items:		
Widening roadbed, deepening ditches and placing filler on shoulders	10,222.83	
Paving City of Yoncalla:		
Preparation of subgrade, 3,062.0 sq. yds. at 3c	108.06	
Standard bituminous pavement, 2-inch top, 3-inch base, 3,601.6 sq. yds. at $1.56	5,618.50	
Standard 2-inch bituminous surfacing, 1,902.5 sq. yds. at 50c	951.25	
Broken stone in base and shoulders, 600.0 cu. yds. at $2.70	1,620.00	
Total amount earned by contractor	$225,687.78	
Deductions:		
Asphalt furnished by State	29,196.91	
Percentage retained until completion of contract	5,894.73	
Total amount paid to contractor		190,596.14
Grand total expended (all State funds)		$222,381.05

[DOUGLAS]

Oakland-Yoncalla Paving

This project was undertaken during 1919, and will be found described on page 204 of the last report. Work was continued during the present biennium, and the section carried to final completion on June 10. 1921. Additional expenditures of $84,416.01 have been made from State funds, bringing the total cost of the project to $334,216.54.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 13,294.62
Labor and material furnished by State:		
Grass seed used for slope protection		5.60
Crushed gravel for repairing macadam		101.50
Hauling logs for bridge over borrow pit near schoolhouse		9.00
Furnishing and hauling lumber for headers, to be left in place		5,051.95
Erecting traffic signs		8.16
Widening roadbed		216.38
Contract items as follows:		
Excavation, no classification, 9,622.8 cu. yds. at 75c	$ 7,217.10	
Hand excavation for ditches, 1,886.1 cu. yds. at $2.50	4,715.25	
6-inch porous drain tile, 8,815.0 lin. ft. at 30c	2,644.50	
Shoulder construction, 106,919.0 lin. ft. at 6c	6,415.14	
Broken stone, screened, for base and shoulders, 7,838.0 cu. yds. at $3.97	31,116.86	
Broken stone, run of quarry, for base and shoulders, 21,455.0 cu. yds. at $3.65	78,310.75	
Standard 2-inch bituminous surfacing, 26,452.3 sq. yds. at $1.47	38,884.88	
Standard bituminous pavement, 3-inch base, 2-inch top, 69,073.7 sq. yds. at $2.24	154,725.09	
Force account items:		
Removing slides	428.27	
Total amount earned by contractor	$324,457.84	
Deductions for reduction of freight rate and war tax on freight	8,928.51	
Total amount paid to contractor		315,529.33
Grand total cost of project (all State funds)		$334,216.54

Rice Hill Resurfacing

Contract No. 597 for the construction of 2.8 miles of two-inch bituminous resurfacing was awarded to John Crane of Portland, Oregon, on October 5, 1922. The section covered by the contract extends over Rice Hill on the Pacific Highway in northern Douglas County and is a portion of the original Oakland-Yoncalla paving project. This project was started at a point approximately 4.1 miles south of Yoncalla and extends to Oakland. When it was paved, construction was started at the north end, and the portion of the pavement constructed before the specifications were changed consisted of a two-inch bituminous wearing surface on a six-inch compacted macadam base. This work was done during 1919 and has given very good service. During the past year the two-inch pavement began to show indications of settlement and waviness, indicating that it was too light to stand the traffic to which it was being subjected. For this reason the resurfacing contract was awarded in order to remedy the condition by thickening the pavement to a depth sufficient to carry the traffic.

All low places in the old pavement were brought up to shape by the addition of a bituminous base mixture and the entire width was then covered with a two-inch bituminous top course.

Construction has been carried on under the supervision of J. S. Sawyer, Resident Engineer, and is complete at the present time. The total estimated cost from State funds is $42,076.41 when all final payments have ben made. The expenditures to date amount to $11,875.52.

[DOUGLAS]

Oakland City Section Paving

Bids were received July 28, 1921, for a two-inch bituminous resurfacing over First Street, the route of the Pacific Highway through Oakland, and Contract No. 433 for the work was awarded to the United Construction Company of Portland, Oregon.

The total length of the job was 2,557 lineal feet, extending from a point 340 feet south of the north city limits to a point 75 feet north of the south city limits. The width of the two-inch resurfacing varied from twenty to forty feet, depending upon the width of the previous surface. On the street between Maple and Walnut Streets, an alignment betterment was made. On this change a macadam base was constructed and a five-inch thickness of pavement was laid. All the two-inch resurface constructed was laid on an old bituminous macadam which had begun to show signs of disintegration and shattered or settled areas were patched and brought to grade with a bituminous base mixture prior to the placing of the resurfacing.

In figuring the cooperation on the work the old bituminous macadam was taken as the full share of the city cooperation on a 16-foot width and this width was paid for entirely by the State. Resurfacing outside of a 16-foot width, together with drainage, grading and right-of-way costs, was borne by the city.

Paving operations were started August 18, 1921, and completed September 14 of the same year, under the supervision of G. E. Farnsworth, Resident Engineer.

The work represents a total cost of $15,107.32, to be borne $8,874.48 by the State and $6,232.84 by the City of Oakland. Expenditures to date amount to $15,107.32, having been paid $11,990.90 by the State and $3,116.42 by the City.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 575.28
Contract items as follows:		
Excavation, single classification, 781.1 cu. yds. at $1.00	$ 781.10	
12-inch plain concrete pipe, 35.0 lin. ft. at $2.50	87.50	
Crushed gravel for shoulders, 126.5 cu. yds. at $3.50	442.75	
Shoulder construction, 3,090.0 lin. ft. at 6c	185.40	
Crushed gravel for subbase, 210.0 cu. yds. at $3.50	735.00	
Standard 3-inch bituminous base, 338.0 batches at $3.50	1,183.00	
Standard 2-inch bituminous wearing surface, 7,394.4 sq. yds. at $1.35	9,982.44	
Force account items:		
Preparing surface of old bituminous macadam to receive new pavement	384.20	
Digging ditches and placing rock backfill for tile drains	750.65	
Total amount paid to contractor		14,532.04
Grand total cost of project		$ 15,107.32
Paid by State	$ 11,990.90	
Paid by City of Oakland	3,116.42	
Total	$ 15,107.32	

Oakland-South Paving

This section was graded during 1919 and macadamized in 1919 and 1920. Beginning at the south city limits of Oakland, it follows closely the alignment of the S. P. Railroad to a point opposite the old undercrossing of the railroad. Contract No. 395 for paving the 1.13-mile unit was awarded to the United Construction Company of Portland, Oregon,

on June 27, 1921. The contract covered the construction of a standard type "D" five-inch bituminous concrete pavement.

Operations were started July 9, 1921, and carried to completion September 30 of the same year, under the supervision of G. E. Farnsworth, Resident Engineer.

The completed project represents a total expenditure of $41,658.19 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,047.69
Labor and equipment furnished by State:		
30 lin. ft. of 6-inch drain tile		3.00
Stakes for headers to be left in place		35.01
Erection of danger signs		4.80
Contract items as follows:		
Preparation of subgrade, 13,351.0 sq. yds. at 6c	$ 801.06	
6-inch porous drain tile, 3,405.0 lin. ft. at 40c	1,362.00	
Gravel backfill for tile drains, 261.0 cu. yds. at $3.50	913.50	
Standard wood guard fence, 904.0 lin. ft. at $1.40	1,265.60	
Standard bituminous pavement, 3-inch base, 2-inch top, 10,679.1 sq. yds. at $2.75	29,367.53	
Shoulder construction, 12,010.0 lin. ft. at 6c	720.60	
Gravel for shoulders, 616.0 cu. yds. at $3.50	2,156.00	
Gravel for subbase, 949.0 cu. yds. at $3.50	3,321.50	
Force account items:		
Deepening ditches for tile drains and repairing embankment slopes near Sta. 1740+00	213.90	
Widening roadbed to 28 feet, day lighting curves and building rock wall to protect embankment	446.00	
Total amount paid contractor		40,567.69
Grand total cost of project (all State funds)		$ 41,658.19

Oakland-Wilbur Grading and Paving

A description of this project will be found on page 205 of the last biennial report. Paving operations were resumed in the early spring of 1921 and the entire job carried to completion on October 7 of the same year. The pavement constructed under this contract consisted of four inches of bituminous concrete on an eight-inch macadam base. On 3,300 lineal feet, extending across the adobe fill north of Wilbur, the pavement was increased to a total thickness of five inches.

The expenditures during the present biennium amount to $157,669.37, bringing the total cost of the project to $348,545.03, of which amount Douglas County cooperates to the extent of $10,000.00, the balance being paid from State funds.

At the time of writing this report, the County cooperation is still due, the funds having been advanced by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 15,878.14
Labor and material furnished by State:		
Grass seed used for slope protection		4.55
Purchase of drain tile		8.00
Brass rods and expansion joint filler for bridges		11.92
Widening roadbed		1,501.89
Maintenance work on unpaved sections to maintain travel		45.50
Purchase of lumber and carbolineum for guard fence		487.98
Advance in freight rate guaranteed by State		536.64
Items deducted from contractor's estimate:		
Rental of State-owned equipment		187.50
Asphalt furnished by State		7,652.45
Contract items as follows:		
Clearing and grubbing, all	$ 1,500.00	
Common excavation, 18,253.2 cu. yds. at 80c	14,602.56	
Intermediate excavation, 18,096.5 cu. yds. at 95c	17,191.68	

[DOUGLAS]

EXPENDITURES—Continued

Solid rock excavation, 1,559.2 cu. yds. at $1.50	2,338.80	
Overhaul, 8,697.0 sta. yds. at 4c	347.88	
12-inch plain concrete pipe, 291.0 lin. ft. at $1.50	436.50	
18-inch reinforced concrete pipe, 248.0 lin. ft. at $2.70	669.60	
24-inch reinforced concrete pipe, 28.0 lin. ft. at $3.75	105.00	
36-inch reinforced concrete pipe, 108.0 lin. ft. at $6.50	702.00	
6-inch porous drain tile, 1,712.0 lin. ft. at 30c	513.60	
Class "A" concrete, 591.49 cu. yds. at $30.00	17,744.70	
Class "C" concrete, 36.65 cu. yds. at $25.00	916.25	
Metal reinforcement, 58,612.0 lbs. at 10c	5,861.20	
Riprap, 6.1 cu. yds. at $7.00	42.70	
Concrete handrail, 429.04 lin. ft. at $4.00	1,716.16	
Wilbur conglomerate base, 25,219.5 cu. yds. at $3.00	75,658.50	
Crushed gravel, 121.0 cu. yds. at $3.97	480.37	
Clay filler, 18.5 cu. yds. at $1.25	23.13	
Standard 2-inch bituminous surface, 64,715.5 sq. yds. at $1.46	94,484.63	
Standard 2-inch bituminous base, 58,423.8 sq. yds. at $1.16	67,771.61	
Standard 3-inch bituminous base, 5,864.6 sq. yds. at $1.71	10,028.47	
Wooden headers, left in place, 73,876.0 lin. ft. at 10⅘c	7,978.61	
Shoulder construction, 72,237.0 lin. ft. at 6c	4,334.22	
Increase in guaranteed freight rate, 6,207.51 cwt. at 8½c	527.64	
Force account items:		
Moving culvert pipe account change in plans	22.10	
Renewing and lowering irrigation pipe line across highway	554.34	
Lowering culvert at Station 1989+90	30.25	
Extra grading due to change in grade line	20.35	
Changing location of pipe culvert, Station 1995+65	90.54	
Rebuilding bridge forms account raising grade line	983.19	
Removing brush and debris from culvert outlet channels	290.04	
Removing slides, enlarging ditches, etc.	2,827.17	
Hauling rock for embankment protection at bridge ends	186.97	
Eliminating soft spots in subgrade	202.32	
Widening roadbed and building rock slope walls	1,112.75	
Total amount earned by contractor	$332,295.83	
Deductions:		
War tax exemptions and freight rate reductions	2,225.42	
Rental of State-owned equipment	187.50	
Asphalt furnished by State	7,652.45	
Total deductions	$ 10,065.37	
Total amount paid to contractor		322,230.46
Grand total cost of project (all State funds)		$348,545.03

Roseburg-Wilbur Paving

S. A. Moceri of Tacoma, Washington, was the low bidder for the paving of 5.35 miles of the Pacific Highway between the S. P. grade crossing south of Wilbur and the north city limits of Roseburg. There was excepted from this section 0.8 mile at the site of the new Umpqua River Bridge at Winchester. Contract No. 467 for the placing of a seven-inch concrete pavement over the section was awarded on October 25, 1921. Paving operations were started May 13, 1922, and the entire section was thrown open to traffic on October 10.

The detour problem was rather difficult, traffic for a time being routed through adjacent fields between Winchester and Roseburg. Because of numerous unavoidable delays in the securing of materials, the contractor on the project was later in finishing than had been originally planned. The work is now being rushed to completion on the macadam and earth shoulders and by the time this report goes to press the entire job should be ready for final acceptance.

[DOUGLAS]

The work is estimated to cost a total of $154,500.00 from State funds, of which amount $134,841.32 has already been expended. Construction work was handled under the supervision of Resident Engineers J. H. Neef, M. S. Jones and J. G. Garrow, successively.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,352.70
Widening roadbed and deepening ditches with State forces		8,216.83
Cement furnished by State (deducted from contractor's estimate)		60,472.54
Contract items as follows:		
Preparation of subgrade, 67,322.2 sq. yds. at 10c	$ 6,732.22	
Excavation, no classification, 336.6 cu. yds. at 85c	286.11	
Standard 7-inch concrete pavement, 48,986.6 sq. yds. at $2.40	117,567.84	
Felt expansion joints, 14,716.0 lin. ft. at 15c	2,207.40	
Bar reinforcement for pavement, 11,472.2 lbs. at 10c	1,147.22	
Concrete headers, 53.1 lin. ft. at 40c	21.24	
Broken stone for shoulders, 343.0 cu. yds. at $2.50	857.50	
Shoulder construction, 17,320.0 lin. ft. at 5c	866.00	
Standard wood guard fence, 120.0 lin. ft. at $1.00	120.00	
Force account items:		
Moving surplus gravel left by bridge forces	60.33	
Revising headers due to change in grade line at bridge	59.57	
Trimming slopes and excavating ditches	71.10	
Cleaning out ditches at Sta. 2315 to 2320	27.61	
Building up embankment at Sta. 2349	12.46	
Furnishing laborer for engineering party when required	43.01	
Repairing broken culvert pipe at Sta. 2511+00	22.99	
Salvaging rock from bottom of stock piles for shoulder construction	198.66	
Widening grade where necessary to accommodate shoulders	4,212.85	
Maintenance work on detours	41.22	
Total amount earned by contractor	$134,555.33	
Deductions:		
Cement furnished by State	63,026.80	
Percentage retained until completion of contract	10,729.28	
Total amount paid to contractor		60,799.25
Grand total expended (all State funds)		$134,841.32

Myrtle Creek-Canyonville Paving

Upon the completion of the surfacing of the section and the allowance of the winter season for the settlement and compacting of the materials, the State Highway Commission on February 21, 1922, awarded Contract No. 488 to J. C. Compton of McMinnville, Oregon, for paving the Pacific Highway between the south city limits of Myrtle Creek and Canyonville. The contract also included the grading of the portion from the south city limits of the town of Myrtle Creek to the bridge over the Umpqua River and surfacing from the south city limits down to a point 1,000 feet north of the north city limits.

The contract called for a 16-foot bituminous pavement, consisting of a three-inch base and a two-inch wearing surface. This pavement was provided with two-foot rock shoulders on each side and was laid upon the crushed gravel surfacing previously constructed. The Umpqua River bridge at Myrtle Creek and the Canyon Creek bridge at Canyonville were paved with a bituminous wearing surface of a uniform thickness of two inches. The Umpqua River bridge, one and one-half miles north of Canyonville, was paved with a bituminous wearing surface three and one-half inches thick at the center and feathering to two inches at the edges.

[DOUGLAS]

Work was started April 17, 1922, and completed November 1 of the same year, one month in advance of the expiration of the time limit given in the contract.

The work as a whole is estimated to cost $231,500.00 when all charges have been paid. Of this amount $2,500.00 is to be paid by the County and $500.00 by Myrtle Creek, for the work through the town, the balance of $228,500.00 being borne by the State.

All construction work has been handled under the supervision of Roy Nunn, Resident Engineer, with total expenditures of $220,898.13 to date. These expenditures have all been made by the State.

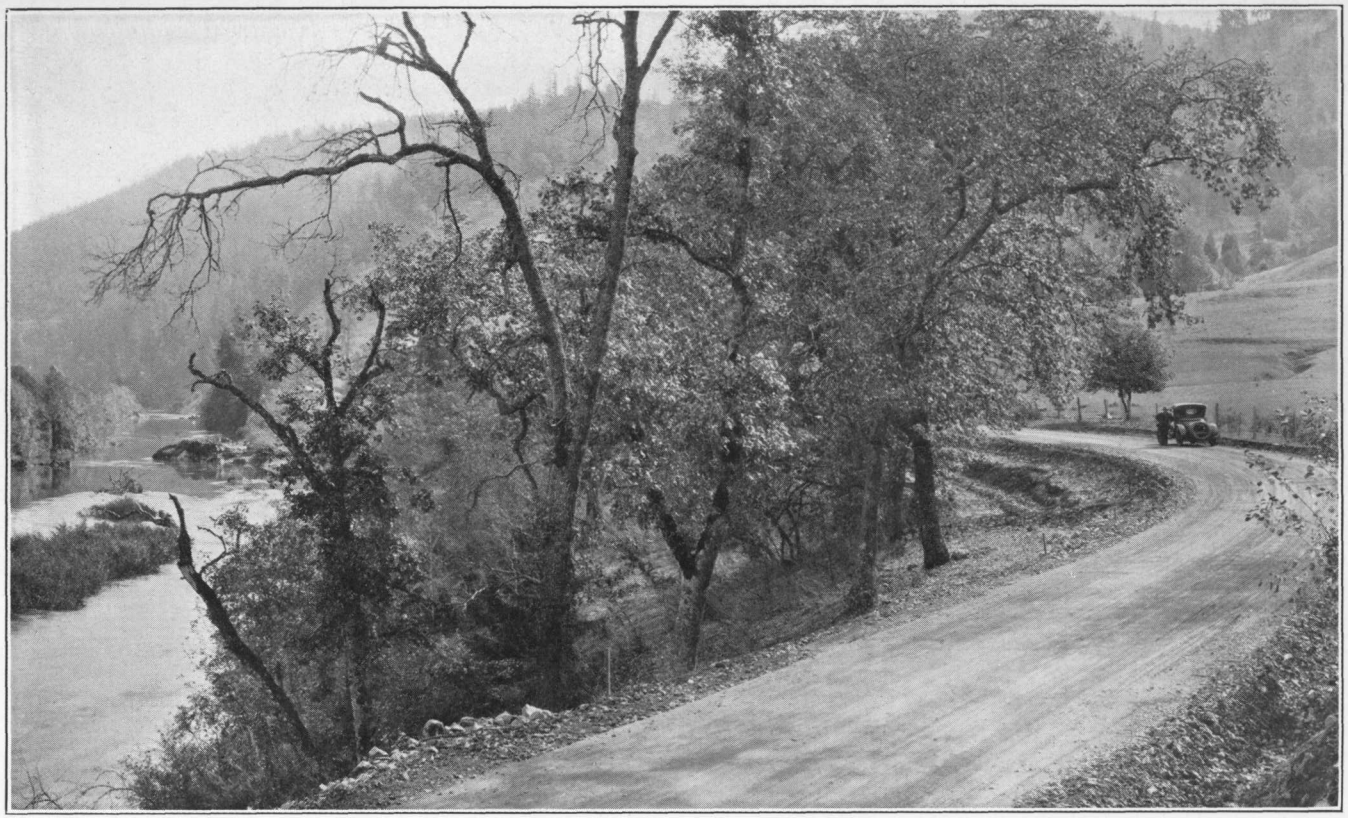
DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,063.20
Asphalt furnished by State (deducted from amounts due contractor)		34,202.37
Contract items as follows:		
Excavation, single classification, 3,859.8 cu. yds. at 75c	$ 2,894.85	
Overhaul, 960.0 sta. yds. at 5c	48.00	
12-inch plain concrete pipe, 102.0 lin. ft. at $2.00	204.00	
18-inch reinforced concrete pipe, 40.0 lin. ft. at $3.00	120.00	
6-inch porous drain tile, 3,252.0 lin. ft. at 30c	975.60	
Gravel backfill for tile drains, 226.0 cu. yds. at $3.00	678.00	
Class "C" concrete, 2.36 cu. yds. at $25.00	59.00	
Preparation of subgrade, 119,800.0 sq. yds. at 4½c	5,391.00	
Standard bituminous pavement, 2-inch top, 3-inch base, 95,858.2 sq. yds. at $1.77	169,669.01	
Standard bituminous pavement on bridge No. 1, 2-inch top, 1,197.0 sq. yds. at $1.30	1,556.10	
Standard bituminous pavement on bridge No. 2, 2-inch top, 972.0 sq. yds. at $1.50	1,458.00	
Standard bituminous pavement on bridge No. 3, 2-inch top, 197.0 sq. yds. at $1.30	256.10	
Crushed gravel for subbase, 4,827.9 cu. yds. at $2.25	10,862.77	
Crushed gravel for shoulders, 9,627.5 cu. yds. at $2.25	21,661.88	
Shoulder construction, 105,695.2 lin. ft. at 4c	4,227.80	
Freight on asphalt advanced by contractor	1,265.47	
Force account items:		
Flooding fill at approach to South Umpqua bridge to obtain settlement before rocking and paving	32.84	
Total amount earned by contractor	$221,360.42	
Deductions:		
Asphalt furnished by State	35,238.63	
Rental of State-owned equipment	933.58	
Percentage retained until completion of contract	5,555.65	
Total amount paid to contractor		179,632.56
Grand total expended (all State funds)		$220,898.13

Canyonville-Galesville Post Road Project

Contract No. 510 for paving 11.1 miles of the Pacific Highway between Canyonville and Galesville was awarded to S. A. Moceri of Tacoma, Washington, on April 14, 1922. The contract called for the construction of Type "A" pavement, being a one course seven-inch concrete surfacing 18-feet wide. As the grading, which had been done under the supervision of the Bureau of Public Roads as a forest road project, provided only a 16-foot traveled way it was necessary to widen out the roadbed to provide sufficient width for the construction of an 18-foot pavement. At the same time much of the sharp curvature was eliminated.

Grading operations were started on May 9 and actual construction of pavement was begun on July 19. Owing to the necessity of taking care of traffic, certain portions where detours were not available have been paved in two strips. From Canyonville to a point five miles south, two-strip construction was used and the next 2.25 miles were laid full width. This was followed by a 1.5-mile stretch of two-strip construction, the



ON THE PACIFIC HIGHWAY BETWEEN DILLARD AND MYRTLE CREEK IN DOUGLAS COUNTY

remaining 2.25 miles to the end of the project being laid full width. The Federal Government is cooperating on the construction of the section under the terms of Post Road Project Agreement No. 61. At the time of this report, the project is practically completed and has occasioned expenditures of $236,951.75 from State funds and $47,183.94 from Federal Government funds. The completed project is estimated to require a total expenditure of $333,000.00, which will be borne $129,414.69 by the State and $203,585.31 by the Federal Government.

Supervision of the construction of the section has been handled by G. E. MacVicar, Resident Engineer.

Roseburg-Dillard Paving

This section extends 6.60 miles, from the south city limits of Roseburg to a point 2.15 miles north of Dillard, and has a net length of 6.22 miles. On account of the proposed overhead crossing south of Shady, 0.38 mile has been left unpaved.

The macadamizing of the section was completed in 1920, and on February 1, 1922, Contract 323 was awarded to the Oregon Hassam Paving Company of Portland for paving the section with a five-inch bituminous pavement, 16 feet wide. The previously placed macadam was used as a subbase for the pavement. In order to improve drainage conditions considerable widening and deepening of ditches was done after the paving was completed.

Construction was supervised by A. S. Kennedy, Resident Engineer, and has required expenditures of $216,032.55 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,779.65
Purchase of right-of-way		35.00
Widening of roadbed and deepening ditches by State forces		10,259.90
Lumber for guard fence furnished by State (deducted from contractor's estimate)		97.34
Contract items as follows:		
Excavation, no classification, 258.0 cu. yds. at $1.50	$ 387.00	
Standard wood guard fence, 824.0 lin. ft. at $1.00	824.00	
Standard 2-inch gravel bituminous surfacing, 59,222.0 sq. yds. at $1.44	85,279.68	
Gravel bituminous base, 21,602.0 batches at $4.00	86,408.00	
Bituminous wearing surface, 46.0 batches at $8.00	368.00	
Shoulder construction, 64,228.0 lin. ft. at 6c	3,853.68	
Gravel for shoulders, 3,753.25 cu. yds. at $3.00	11,259.75	
Gravel for subbase, 4,160.5 cu. yds. at $3.00	12,481.50	
Gravel for road crossings, 55.75 cu. yds. at $3.00	167.25	
Total amount earned by contractor	$201,028.86	
Deductions:		
War tax on freight	70.86	
Lumber for guard fence	97.34	
Total amount paid to contractor		200,860.66
Grand total cost of project (all State funds)		$216,032.55

Myrtle Creek-Dillard Paving

A complete description of this project will be found on page 206 of the previous Department report. The pavement proper was completed during 1920 and the shoulders and guard fences were completed by January 20, 1921.

Expenditures during the present biennium have amounted to $80,363.54, bringing the total cost of the project to $467,005.80 from State funds.

[DOUGLAS]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 17,753.64
Replacing damaged culvert		1,560.83
Drain tile furnished by State		115.91
Grass seed furnished by State for slope protection		3.00
Credit for lumber salvaged from old bridge		(credit) 39.80
Items deducted from contractor's estimate:		
T. N. T. furnished by State		59.95
Drain tile furnished by State		9.66
Lumber purchased from State		275.00
Contract items as follows:		
Excavation, no classification, 4,863.4 cu. yds. at 70c	$ 3,404.38	
Common excavation, 8,638.0 cu. yds. at 90c	7,774.20	
Intermediate excavation, 2,366.4 cu. yds. at 90c	2,129.76	
Solid rock excavation, 7,073.8 cu. yds. at $1.40	9,903.32	
Overhaul, 200.0 sta. yds. at 3c	6.00	
6-inch porous drain tile, 6,701.0 lin. ft. at 40c	2,680.40	
Class "A" concrete, 11.18 cu. yds. at $32.00	357.76	
Broken stone for base, 47,914.25 cu. yds. at $2.93	140,388.75	
Broken stone for shoulders, 3,563.0 cu. yds. at $2.93	10,439.59	
Shoulder construction, 134,423.0 lin. ft. at 6c	8,065.38	
Standard 2-inch bituminous surfacing, 121,714.1 sq. yds. at $1.49	181,354.01	
Bituminous base, 63,005.1 sq. yds. at $1.15	72,455.87	
Pavement headers, left in place, 67,896.0 lin. ft. at 7½c	5,092.20	
Standard wood guard fence, 3,370.0 lin. ft. at 80c	2,696.00	
Force account items:		
Installing concrete pipe culverts	106.49	
Furnishing and delivering 6-inch drain tile "Tees"	20.95	
Excavating for shoulder drains	603.61	
Rock backfill for tile drains	62.31	
Excavating 650 feet of side ditches	55.52	
Removing temporary deck of Umpqua River bridge	95.42	
Salvaging old macadam base for use in shoulders	138.93	
Total amount earned by contractor	$447,830.85	
Deductions:		
War tax on freight	218.63	
Drain tile furnished by State	9.66	
T. N. T. furnished by State	59.95	
Lumber purchased from State	275.00	
Total deductions	$ 563.24	
Total amount paid to contractor		447,267.61
Grand total cost of project (all State funds)		$467,005.80

Wolf Creek-Galesville Paving

On April 5, 1921, Contract No. 348 was awarded to Giebisch, Joplin & Eldon of Glendale, Oregon, for paving 14.1 miles of the Pacific Highway between Wolf Creek and Galesville, and a standard five-inch bituminous pavement was constructed upon the surfacing which had been laid the year before. The work was sublet to the Independent Asphalt Paving Company of Seattle, Washington, who were late in starting, it being midsummer before their two plants were ready to operate, and who completed the section on November 30, 1921.

When this section was originally graded a narrow roadbed was built, that portion on the Stage Road Pass Section having a width of only 20 feet including ditches. In order to construct a 16-foot pavement with the required shoulders it was necessary to widen the roadbed practically throughout and several crews worked through the summer to complete this phase of the construction in advance of the pavement.

The work was supervised by Paul Van Scoy, Resident Engineer, and represents a total expenditure of $515,179.78 from State funds.

[DOUGLAS]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 11,328.11
Labor and material furnished by State:		
Watchmen to direct traffic during construction		215.60
Removing slides, repairing guard fence and private water pipe line		78.45
Prospecting for road materials		208.52
Contract items as follows:		
Preparation of subgrade, 201,845.0 sq. yds. at 12½c	$ 25,230.63	
Standard bituminous pavement, 2-inch top, 3-inch base, 137,499.5 sq. yds. at $2.70	371,248.65	
Shoulder construction, 147,380.0 lin. ft. at 5c	7,369.00	
Broken gravel subbase, 7,328.0 cu. yds. at $2.75	20,152.00	
Broken gravel for shoulders, 4,882.5 cu. yds. at $2.75	13,426.88	
Clay filler, 426.0 cu. yds. at $1.00	426.00	
Standard wood guard fence, 3,656.0 lin. ft. at 80c	2,924.80	
6-inch porous drain tile, 2,803.0 lin. ft. at 35c	981.05	
Rock backfill for tile drains, 389.5 cu. yds. at $2.75	1,071.13	
12-inch plain concrete pipe, 871.0 lin. ft. at $1.25	1,088.75	
Force account items:		
Widening roadway account change in original cross-section	61,136.46	
Total amount earned by contractor	$505,055.35	
Deductions:		
Freight rate reductions	1,706.25	
Total amount paid to contractor		503,349.10
Grand total cost of project (all State funds)		$515,179.78

Lane County Line-Comstock Grading and Macadam

This work was undertaken in 1920 and a descriptive article is given on page 307 of the previous report. Delayed expenditures and additional work done during 1921 have required an additional $9,320.08. This amount brings the total cost to $20,860.19 from State funds.

Comstock Macadam

This section covers the surfacing of the approach fills on the Comstock overcrossing and an article relative thereto is given on page 208 of the last report. During 1921 work was carried to completion with additional expenditures of $1,688.62, which brings the total expenditure to $2,310.30 from State funds.

Leona-Drain Grading and Surfacing

A description of this project will be found on page 209 of the previous Department report. All grading and surfacing was completed during 1920, except work totaling 0.13 mile north of the Sand Creek Bridge. This was held up by bridge construction, the excavated material north of the structure being required for the approach fills. The work was carried to final completion and accepted August 1, 1921.

Biennial expenditures amount to $28,546.20, bringing the total cost of the section to $102,988.32 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,383.25
Rental of State road roller (deducted from contractor's estimate)		246.77
Contract items as follows:		
Clearing and grubbing, all	$ 1,200.00	
Common excavation, 14,021.9 cu. yds. at 70c	9,815.33	
Intermediate excavation, 7,822.1 cu. yds. at 80c	6,257.68	
Solid rock excavation, 7,257.7 cu. yds. at $2.35	17,055.60	
Overhaul, 16,765.0 sta. yds. at 7c	1,173.55	

[DOUGLAS]

EXPENDITURES—Continued

12-inch plain concrete pipe, 700.0 lin. ft. at $1.75	1,225.00	
18-inch reinforced concrete pipe, 32.0 lin. ft. at $2.75	88.00	
24-inch reinforced concrete pipe, 84.0 lin. ft. at $3.25	273.00	
12-inch corrugated galvanized iron pipe, 72.0 lin. ft. at $1.75	126.00	
36-inch corrugated galvanized iron pipe, 39.0 lin. ft. at $6.75	263.25	
6-inch porous drain tile, 1,448.0 lin. ft. at 40c	579.20	
Class "A" concrete, 131.64 cu. yds. at $28.00	3,685.92	
Class "C" concrete, 24.45 cu. yds. at $25.00	611.25	
Metal reinforcement, 8,401.9 lbs. at 10c	840.19	
Broken stone macadam, waterbound, 11,597.25 cu. yds. at $4.50	52,187.63	
Clay or earth filler, 759.75 cu. yds. at $1.75	1,329.56	
Total amount earned by contractor	$ 96,711.16	
Deductions:		
War tax exemptions and freight reductions	106.09	
Rental of State road roller	246.77	
Total deductions	$ 352.86	
Total amount paid to contractor		96,358.30
Grand total cost of project (all State funds)		$102,988.32

Yoncalla Section Grading and Surfacing

A description of this work will be found on page 210 of the previous Department report. Because of the extremely short construction season during 1920, the project was not completed and given final acceptance until July 20, 1921.

Expenditures during the biennium, amounting to $92,898.43, brought the total cost of the work to $168,727.85. This cost has been borne entirely by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,513.74
Rental on State equipment (deducted from contractor's estimate)		1,786.78
Contract items as follows:		
Common excavation, 7,975.8 cu. yds. at 90c	$ 7,178.22	
Intermediate excavation, 5,270.9 cu. yds. at $1.10	5,797.99	
Solid rock excavation, 3,023.6 cu. yds. at $2.00	6,047.20	
Overhaul, 9,059.0 sta. yds. at 7c	634.13	
12-inch plain concrete pipe, 388.0 lin. ft. at $2.00	776.00	
18-inch reinforced concrete pipe, 252.0 lin. ft. at $3.25	819.00	
24-inch reinforced concrete pipe, 152.0 lin. ft. at $4.25	646.00	
6-inch porous drain tile, 10,474.0 lin. ft. at 40c	4,189.60	
Broken stone, 29,033.75 cu. yds. at $4.35	126,296.81	
Clay filler, 825.5 cu. yds. at $1.50	1,238.25	
Class "A" concrete, 116.99 cu. yds. at $30.00	3,509.70	
Class "C" concrete, 27.76 cu. yds. at $25.00	694.00	
Metal reinforcement, 12,325.0 lbs. at 10c	1,232.50	
Concrete handrail, 92.5 lin. ft. at $4.00	370.00	
Force account items:		
Widening cuts and constructing drainage ditches at culvert outlets	731.18	
Digging out soft places in subgrade and back-filling with rock	116.17	
Removing slides and cleaning ditches	419.02	
Hauling concrete culvert pipe to new location	38.41	
Making channel change at Yoncalla Creek	71.91	
Grading old County road approach at Devore	61.62	
Removing slide and constructing retaining wall at Sta. 728+00	346.40	
Total amount earned by contractor	$161,214.11	
Deduction for rental of State equipment	1,786.78	
Total amount paid to contractor		159,427.33
Grand total cost of project (all State funds)		$168,727.85

[DOUGLAS]

Oakland-South Grading and Surfacing

A description of this project will be found on page 211 of the previous Department report. During the biennium delayed expenditures of $365.96 have been made, bringing the total cost of the project to the State to $26,387.60.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,633.95
Extra gravel hauled by Clarke & Henry Construction Co.		27.00
Rental of State trucks (deducted from contractor's estimate)		1,232.88
Contract items as follows:		
Clearing and grubbing, all	$ 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, 942.0 sta. yds. at 5c	47.10	
Screened gravel, 2,597.0 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-inch plain concrete pipe, 317.0 lin. ft. at $1.50	475.50	
18-inch reinforced concrete pipe, 32.0 lin. ft. at $3.00	96.00	
36-inch reinforced concrete pipe, 84.0 lin. ft. at $6.50	546.00	
6-inch porous drain tile, 688.0 lin. ft. at 25c	172.00	
Force account items:		
Rocking approach from old highway	29.67	
Resloping cuts after removing slide	147.29	
Total amount earned by contractor	$ 24,726.65	
Deductions:		
Rental and repairs on trucks furnished by State	1,232.88	
Total amount paid to contractor		23,493.77
Grand total cost of project (all State funds)		$ 26,387.60

Roseburg-Wilbur Surfacing

A detailed description of this work is given on page 211 of our previous biennial report. Construction work was resumed as soon as weather conditions permitted in the spring of 1921 and was carried to completion on August 15 of the same year.

The expenditures during the biennium have amounted to $59,260.52, bringing the total cost to $66,885.72 from State funds. All work during 1921 was supervised by A. S. Kennedy, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,448.20
Royalty on gravel from Winchester quarry		941.72
Labor repairing contractor's truck (deducted from contractor's estimate)		580.76
Contract items as follows:		
Crushed gravel for surfacing 18,834.5 cu. yds. at $3.35	$ 63,095.58	
Force account items:		
Rolling gravel surfacing from Winchester to Roseburg	400.22	
Total amount earned by contractor	$ 63,495.80	
Deduction for labor repairing contractor's truck	580.76	
Total amount paid to contractor		62,915.04
Grand total cost of project (all State funds)		$ 66,885.72

Roseburg-Dillard Grading and Surfacing

A description of this project will be found on page 212 of the previous Department report. The surfacing was carried to completion on December 31, 1920, and, following this, the City of Roseburg graded and

graveled a connection from the north end of the State work to the existing pavement on Stephens Street. Later, in 1921, a 16-foot concrete pavement was constructed over this connection and the only gap left on the project is at the present grade crossing of the S. P. Railroad south of Shady, where an overhead crossing is in prospect.

Final expenditures of $28,045.60 have been made during the present biennium, bringing the total cost of the project to $126,118.88 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8,167.30
Contract items as follows:		
Clearing and grubbing, all	$ 1,000.00	
Common excavation, 23,698.0 cu. yds. at 60c	14,218.80	
Intermediate excavation, 11,975.0 cu. yds. at 80c	9,580.00	
Solid rock excavation, 17,961.0 cu. yds. at $1.20	21,553.20	
Overhaul, 74,980.0 sta. yds. at 10c	7,498.00	
12-inch plain concrete pipe, 498.0 lin. ft. at $1.50	747.00	
18-inch reinforced concrete pipe, 392.0 lin. ft. at $2.70	1,058.40	
24-inch reinforced concrete pipe, 400.0 lin. ft. at $4.51	1,804.00	
36-inch reinforced concrete pipe, 68.0 lin. ft. at $7.34	499.12	
6-inch porous drain tile, 5,171.0 lin. ft. at 45c	2,326.95	
Class "A" concrete, 297.2 cu. yds. at $22.00	6,538.40	
Class "C" concrete, 69.7 cu. yds. at $20.00	1,394.00	
Metal reinforcement, 24,781.0 lbs. at 8c	1,982.48	
Riprap, 10.0 cu. yds. at $6.00	60.00	
Lumber and timber, 40.4 M.-FBM. at $40.00	1,616.00	
Broken stone macadam, waterbound, 12,294.0 cu. yds. at $3.45	42,414.30	
Clay or other earth filler, 1,224.0 cu. yds. at $1.80	2,203.20	
Concrete handrail, 67.6 lin. ft. at $4.00	270.40	
Force account items:		
Hauling and placing gravel backfill in tile drains	806.92	
Building 432 lineal feet of standard wood guard fence	380.41	
Total amount paid to contractor		117,951.58
Grand total cost of project (all State funds)		$126,118.88

Myrtle Creek-Canyonville Surfacing

On April 4, 1921, Contract No. 361 was awarded to Hetrick & Kline of Portland, Oregon, for surfacing 9.5 miles of the Pacific Highway between the towns of Myrtle Creek and Canyonville. The work was started on June 10 and completed December 31 of the same year.

The surfacing was constructed of crushed gravel, laid to a top width of 18 feet and feather-edged to a total width of 20 feet, being of an average thickness of eight inches. This surfacing carried a heavy traffic throughout the winter without injury and formed a suitable base when paving of the section was started in the spring of 1922.

The construction work was handled under the supervision of E. A. Geen, Resident Engineer, with total expenditures of $55,908.25 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,475.13
Labor and rental of equipment for sprinkling macadam		1,641 75
Prospecting for materials		103.05
Contract items as follows:		
Crushed gravel for surfacing, 22,258.0 cu. yds. at $2.24	$ 49,857.92	
Crushed gravel placed in piles for maintenance, 832.0 cu. yds. at $2.20	1,830.40	
Total amount paid to contractor		51,688.32
Grand total cost of project (all State funds)		$ 55,908.25

[DOUGLAS]

Jacques Place-Johns Place Grading and Surfacing

An article describing this section will be found on pages 213 and 214 of the Fourth Biennial Report.

During the present year final expenditures of $7,032.81 have been made, bringing the total cost of the section to $111,950.73 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,829.48
Labor and material furnished by State:		
Royalty on gravel		381.75
Raking oversize from top course pit-run gravel		183.45
Contract items as follows:		
Clearing and grubbing, all	$ 3,000.00	
Common excavation, 24,994.0 cu. yds. at 90c	22,494.60	
Intermediate excavation, 14,950.0 cu. yds. at $1.00	14,950.00	
Solid rock excavation, 3,636.0 cu. yds. at $1.50	5,452.50	
Overhaul, 17,475.0 sta. yds. at 5c	873.75	
12-inch corrugated iron pipe, 1,290.0 lin. ft. at $1.90	2,451.00	
18-inch corrugated iron pipe, 464.0 lin. ft. at $3.10	1,438.40	
24-inch corrugated iron pipe, 276.0 lin. ft. at $4.50	1,242.00	
36-inch corrugated iron pipe, 40.0 lin. ft. at $8.35	334.00	
Class "A" concrete, 201.8 cu. yds. at $25.00	5,045.00	
Class "C" concrete, 34.45 cu. yds. at $22.00	757.90	
Metal reinforcement, 15,391.0 lbs. at 10c	1,539.10	
Lumber and timber, 4.92 M-FBM at $50.00	246.00	
Run-of-bank gravel, 16,433.5 cu. yds. at $2.60	42,727.10	
Force account items:		
Extending and relaying old corrugated galvanized iron pipe culverts	223.71	
Lowering private water supply pipe to Jacques ranch	7.65	
Extra cost of constructing concrete box culvert at Sta. 309+00 due to change in plans	424.33	
Maintaining detour between Jacques and Johns	37.53	
Raking oversize from top course gravel	316.40	
Total amount earned by contractor	$103,560.97	
Deduction for war tax on freight	4.92	
Total amount paid to contractor		103,556.05
Grand total cost of project (all State funds)		$111,950.73

Coos County Line-Camas Valley Surfacing

The surfacing of this 10.76 miles of the Coos Bay-Roseburg Highway is being done by L. B. Hickox & Company under Contract No. 541 awarded to them on May 10, 1922. As on other surfacing projects in this vicinity, the hauling of materials is being done by the State without cost to the Contractor. During the construction year, 11,391.5 cubic yards of broken stone have been hauled a total of 33,790 yard miles, at an average cost of 22.7 cents per yard mile. This cost is segregated as follows:

Labor operating trucks	7.2c per yd. mi.
Supplies, i. e., gas, oil and grease	6.2c per yd. mi.
Rental charges and supervision	9.3c per yd. mi.
Total	22.7c per yd. mi.

Expenditures to date amount to $39,195.02. These have been made under the supervision of Paul Van Scoy, Resident Engineer, and consist of $23,498.47 from State funds and $15,696.55 from County funds. The total estimated cost of the work, including the State hauling, is $101,000, of which amount the State share amounts to $55,000 and the County share $46,000.

[DOUGLAS]

Camas Mountain Surfacing

This section of the Coos Bay-Roseburg Highway extends from Camas Valley east to the end of the Winston-Camas Mouutain Section, and is being surfaced by W. C. Stone under Contract No. 556. Work was started under the contract on August 20, 1922, and will be completed during the 1923 season.

The contract was awarded with the provision that all hauling be done with State trucks, without cost to the Contractor. Under this provision, 6,475 cubic yards of material have been hauled a total of 28,356 yard miles, at an average cost of 24.3 cents per yard mile. This cost has been made up as follows:

Labor operating trucks	7.8c per yd. mi.
Supplies, i. e., gas, oil and grease	5.4c per yd. mi.
Rental charges and supervision	11.1c per yd. mi.
Total	24.3c per yd. mi.

The surfacing of the entire 6.96 miles, including the State hauling, is estimated to cost a total of $26,000.00, with Douglas County cooperating to the extent of $12,500.00. Construction has been supervised by H. W. Libby, Resident Engineer, and expenditures to date amount to $10,452.21. This amount has been made up of $7,700.84 from State funds and $2,751.87 from County funds.

Winston-Camas Mountain Surfacing

Contract No. 533 has been awarded to Metzger & Johnson for surfacing 10.6 miles of the Coos Bay-Roseburg Highway, between a junction with the Pacific Highway near Roseburg and a junction with the Lookinglass Road east of Camas Mountain. Work was started under the contract on July 20, 1922, but is uncompleted at the present time. It is estimated that the work should be finally finished during the summer of 1923. To date 4.66 miles of surfacing have been constructed.

The completed work is estimated to cost a total of $40,500, to be shared $21,500 by the State and $19,000 by the County. Expenditures to date amount to $14,195.45, consisting of $8,135.55 from State funds and $6,059.90 from County funds. These have been under the supervision of H. W. Libby, Resident Engineer.

Oakland-Yoncalla Grading

This is properly a 1917-1918 project and articles thereon will be found on pages 95 and 216 of the last two biennial reports, respectively. As stated in the last report, final payment to the contractor was not accepted. This final payment has since been accepted by the Contractor and the expenditures on the project are now complete.

Payment of $13,150.79 during the biennium just past brings the total cost of the work to $101,114.99. This has been paid $19,033.97 by the State and $82,081.02 by the County.

Yoncalla-Drain Grading

A description of this work will be noted on page 215 of the last report.

During the present biennium delayed expenditures have been made in the amount of $2,344.79, bringing the total cost of the project to $75,527.72 from State funds.

[DOUGLAS]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,572.78
Grass seed furnished by State to be used for slope protection		3.10
Repairing railroad right-of-way fence		40.15
Advertisement for bids		9.78
Contract items as follows:		
Clearing and grubbing, all	$ 1,400.00	
Extra clearing and grubbing, 1.0 acre at $100.00	100.00	
Common excavation, 42,989.5 cu. yds. at 75c	32,242.13	
Intermediate excavation, 10,774.4 cu. yds. at 75c	8,080.80	
Solid rock excavation, 8,496.2 cu. yds. at $1.00	8,496.20	
Overhaul, 35,286.0 sta. yds. at 5c	1,764.30	
12-inch plain concrete pipe, 1,105.00 lin. ft. at $1.50	1,657.50	
18-inch reinforced concrete pipe, 440.0 lin. ft. at $3.00	1,320.00	
24-inch reinforced concrete pipe, 120.0 lin. ft. at $3.50	420.00	
6-inch porous drain tile, 972.0 lin. ft. at 50c	486.00	
Class "A" concrete, 200.8 cu. yds. at $26.00	5,220.80	
Class "C" concrete, 50.01 cu. yds. at $24.00	1,200.24	
Metal reinforcement, 14,729.0 lbs. at 12c	1,767.48	
Rubble masonry, 174.2 cu. yds. at $2.00	348.40	
Force account items:		
Planking roadway over soft places	307.34	
Lowering culverts to fit new grade line	85.05	
Ditching outside of right-of-way for drainage	40.55	
Resloping deep cuts to prevent slides	585.73	
Removing slides	2,327.83	
Rebuilding right-of-way fence	51.56	
Total amount paid to contractor		67,901.91
Grand total cost of project (all State funds)		$ 75,527.72

Roseburg-Dillard Retaining Walls

The portion of the Roseburg-Dillard Section of the Pacific Highway between Roseburg and Shady, lays along the sliding hillside caused by the movement of the black adobe soil which overlies a strata of rock. In the spring of 1921, slides caused by the saturation and softening of the support on the fill side occured in three different places, allowing a section of the fill to slip out. It was apparent that immediate action was necessary in order to save the embankments and at Stations 1,476 and 1,477+75, excavation was made down to the solid rock and gravity section concrete walls were constructed, the walls being 36 feet and 54 feet long, respectively. The construction of these retaining walls was started April 20 and completed June 9.

At Station 1.517, where the largest slide occurred, the excavation uncovered soft rock which was not suitable for a foundation for a concrete wall. It was therefore decided to construct a cedar log crib at this point. Owing to difficulty in securing the required quantity of cedar logs, the crib was not completed until October 7. A. S. Kennedy, Resident Engineer, was in charge of all the above mentioned work.

No further trouble was experienced until October, 1921, when a slide occurred at Stateion 1,478+85. A concrete wall 65 feet long was constructed at this point and it is believed that the section is now safe from danger of further slides. J. R. Mitchell, Resident Engineer, supervised the construction of the wall at this last mentioned point.

The entire cost of the above construction has been borne by the State and represents total expenditures of $11,182.80.

Roseburg-Wilbur Grading

This job was completed at the close of the preceding biennium and a description is given on page 216 of the last report. During the biennium, delayed expenditures of $8.361.93 have been made, making $37,255.51, from State funds, the total cost of the project.

[DOUGLAS]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,586.19
Contract items as follows:		
Clearing and grubbing, all	$ 300.00	
Common excavation, 5,708.0 cu. yds. at 60c	3,424.80	
Intermediate excavation, 15,394.0 cu. yds. at 65c	10,006.10	
Solid rock excavation, 1,859.0 cu. yds. at $1.40	2,602.60	
Overhaul, 17,233.0 sta. yds. at 5c	861.65	
12-inch plain concrete pipe, 303.0 lin. ft. at $1.50	454.50	
18-inch reinforced concrete pipe, 288.0 lin. ft. at $3.50	1,008.00	
24-inch reinforced concrete pipe, 116.0 lin. ft. at $4.50	522.00	
36-inch reinforced concrete pipe, 44.0 lin. ft. at $6.50	286.00	
6-inch porous drain tile, 512.0 lin. ft. at 40c	204.80	
Class "A" concrete, 281.5 cu. yds. at $26.00	7,319.00	
Class "C" concrete, 30.1 cu. yds. at $22.00	662.20	
Metal reinforcement, 29,239.0 lbs. at 11c	3,216.29	
Concrete handrail, 114.6 lin. ft. at $4.00	458.40	
Force account items:		
Rocking detours around new bridges	134.50	
Excavating for bridge foundations below water level	390.39	
Excavating for change in creek channel	498.47	
Resloping cuts account of slides and widening roadbed	227.61	
Moving and extending culvert pipe account of change in alignment and widening roadbed	92.01	
Total amount paid to contractor		32,669.32
Grand total cost of project (all State funds)		$ 37,255.51

Tiller-Trail Forest Road Project

This section lies on the Tiller-Summit Highway in Douglas County and the construction of four miles has been handled as a Forest Road Project. During 1921 William von der Hellen graded three miles and Ed Jackson and others graded one mile. In addition 1.5 miles were constructed by the Forest Service during 1916 from funds other than those allotted for cooperation with the State.

The grading of the four miles referred to cost a total of $100,000, which has been divided equally between the State, County and Federal Government, with the Government paying the odd cent.

Remote-Camas Valley Post Road Project

A description of this project, which is partially within Douglas County and partially within Coos County, will be noted on page 186 of the previous Department report. It will also be found taken up in the present report under the portion devoted to Coos County projects.

Camas Valley Section Grading

This section extends from the Coquille River Bridge, approximately 2.3 miles west of the Camas Valley Postoffice, east 8.47 miles to the foot of Camas Mountain, and is being graded by W. C. Stone under Contract No. 489. Work was started on March 20, 1922, and will be completed during the 1923 season.

Construction has been supervised by H. W. Libby, Resident Engineer, and expenditures to date amount to $57,028.89. These have been paid for $30,161.54 by the State and $26,867.35 by the County. The total estimated cost of the work is $96.000.00, and will be shared $51,000.00 by the State and $45,000.00 by the County.

[DOUGLAS]

Myrtle Creek-Dillard Slide Removals

A contract for removing the slides on the Myrtle Creek-Dillard Section was completed during 1919 and final payment was made to the contractor. This contract is described on page 218 of the last report. However, during the subsequent biennium additional slides occurred and their removal, together with the widening of the roadbed, has required $6,582.02. This work was done by the Oregon Hassam Paving Company in connection with their paving contract on the section.

This expenditure brings the total cost of the widening and slide removals to $43,754.04 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 280.58
Contract items as follows:		
Excavation, no classification, 19,475.0 cu. yds. at 65c.	$ 12,658.75	
Force account items:		
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	30,396.50	
Total amount paid to contractor		43,473.46
Grand total cost of project (all State funds)		$ 43,754.04

Myrtle Creek Grading

On December 15, 1921, Contract No. 484 was awarded to H. J. Hildeburn of Roseburg, Oregon, for the grading of a short section of the Pacific Highway starting within the city limits of Myrtle Creek and extending north to the existing pavement constructed in 1920. The contract covered 0.26 mile of grading and included a large quantity of rubble masonry construction at the north approach to the bridge over the South Umpqua River.

Work was started January 3, 1922, and completed May 20, at a total cost of $8,854.73. Of this amount the City of Myrtle Creek cooperates to the extent of $90.60 and Douglas County to the same amount. At the time of making this report, the State has expended $8,673.53 and Douglas County and Myrtle Creek $90.60 each.

Construction work was supervised by Roy Nunn, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 792.34
Rocking approach to Myrtle Creek bridge		58.35
Contract items as follows:		
Common excavation, 6,218.1 cu. yds. at 40c.	$ 2,487.24	
Solid rock excavation, 652.2 cu. yds. at $1.25	815.25	
Overhaul, 832.0 sta. yds. at 5c	41.60	
12-inch plain concrete pipe, 191.0 lin. ft. at $1.80	343.80	
Class "C" concrete, 3.66 cu. yds. at $30.00	109.80	
Rubble masonry, 404.9 cu. yds. at $7.00	2,834.30	
Masonry parapet wall, 101.0 lin. ft. at $5.00	505.00	
Payhaul, 1,349.5 yd. mi. at 40c	539.80	
Force account item:		
Clearing and grubbing and lowering grade at south end of Myrtle Creek bridge	327.25	
Total amount paid to contractor		8,004.04
Grand total cost of project		$ 8,854.73
Paid by State	$ 8,673.53	
Paid by County	90.60	
Paid by City of Myrtle Creek	90.60	
Total	$ 8,854.73	

[DOUGLAS]

Canyonville-Myrtle Creek Grading

An article describing this section will be found on pages 218 and 219 of the last report. With the exception of minor work required on culvert headwalls, the grading of this section was practically completed at the end of the 1921 season. This culvert headwall work was done during 1922 and the job was given final acceptance on May 25.

The grading of the section represents a total cost of $99,294.22, which has been paid $97,988.12 by the State and $1,306.10 by Douglas County. Expenditures of $92,878.61 by the State and 1,306.10 by the County have been made during the biennium.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 9,852.15
Labor and material furnished by State:		
Removing slides and cleaning ditches		123.99
Installing 48 feet of 12-inch plain concrete pipe		47.88
Contract items as follows:		
Clearing and grubbing, all	$ 1,500.00	
Common excavation, 38,096.2 cu. yds. at 60c	22,857.72	
Intermediate excavation, 30,746.2 cu. yds. at 60c	18,447.72	
Solid rock excavation, 21,377.8 cu. yds. at $1.35	28,860.03	
Overhaul, 28,232.0 sta. yds. at 5c	1,411.60	
12-inch plain concrete pipe, 1,181.0 lin. ft. at $1.60	1,889.60	
16-inch reinforced concrete pipe, 468.0 lin. ft. at $3.50	1,638.00	
24-inch reinforced concrete pipe, 468.0 lin. ft. at $4.50	2,106.00	
36-inch reinforced concrete pipe, 148.0 lin. ft. at $7.00	1,036.00	
6-inch porous drain tile, 3,993.0 lin. ft at 30c	1,197.90	
Class "A" concrete, 132.5 cu. yds. at $25.00	3,312.50	
Class "C" concrete, 76.38 cu. yds. at $22.00	1,680.36	
Metal reinforcement, 11,737.0 lbs. at 10c	1,173.70	
Screened gravel for backfilling tile drains, 277.0 cu. yds. at $2.50	692.50	
Force account items:		
Removing old culverts from roadbed	152.80	
Clearing and grubbing outside of right-of-way	35.43	
Resloping banks where cuts were widened	356.96	
Digging extremely deep trenches for tile drains	899.97	
Constructing temporary bridge on detour around opening for cattle pass	21.41	
Total amount paid to contractor		89,270.20
Grand total cost of project		$ 99,294.22
Paid by State	$ 97,988.12	
Paid by County	1,306.10	
Total	$ 99,294.22	

Unit 2, Canyonville-Galesville Forest Road Project

A description of this work will be noted on page 220 of the previous report. On March 24, 1920, the State Highway Commission authorized additional cooperation for the construction of the Canyon Creek Bridge.

State expenditures during the present biennium on the project have amounted to $25,776.86, bringing the total State share to $88,776.86. In addition to this amount, the Federal Government has expended $10,000.00, making the total cost of the work $98,776.86.

Winston-Camas Mountain Grading

This section extends from a junction with the Pacific Highway near Winston, east 11.54 miles to the foot of Camas Mountain, and is being graded by H. J. Hildeburn of Roseburg, Oregon, under Contract No. 465.

Work under the contract was started on October 6, 1921, and is practically finished at the present time, only a very small portion

remaining to be completed at the close of the biennium, with a total estimated cost of $83,500.00, to be paid for $45,500.00 by the State and $38,000.00 by the County. H. W. Libby, Resident Engineer, has been in charge of the work with expenditures to date of $58,947.57. This amount has been paid $31,772.93 from State funds and $27,174.64 from County funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,598.27
Contract items as follows:		
Clearing and grubbing, all	$ 13,000.00	
Common excavation, 79,377.0 cu. yds. at 38c	30,163.26	
Solid rock excavation, 10,470.0 cu. yds. at 38c	3,978.60	
Overhaul, 61,254.0 sta. yds. at 8c	4,900.32	
24-inch reinforced concrete pipe, 124.0 lin. ft. at $4.75	589.00	
12-inch corrugated galvanized iron pipe, 1,866.0 lin. ft. at $1.50	2,799.00	
18-inch corrugated galvanized iron pipe, 326.0 lin. ft. at $3.25	1,059.50	
24-inch corrugated galvanized iron pipe, 272.0 lin. ft. at $4.50	1,224.00	
36-inch corrugated galvanized iron pipe, 476.0 lin. ft. at $5.50	2,618.00	
Total amount earned by contractor	$ 60,331.68	
Percentage retained until completion of contract	5,982.38	
Total amount paid to contractor		54,349.30
Grand total expended		$ 58,947.57
Paid by State	$ 31,772.93	
Paid by County	27,174.64	
Total	$ 58,947.57	

Blachly-Rainrock Forest Road Project

A forest road project covering 15.5 miles, from Blachly west to Rainrock on the Willamette Valley-Florence Highway, will be graded during the coming biennium as a cooperative project between the Government and Lane County. A survey of the project was completed by the Bureau of Public Roads during 1922, and they will also supervise the construction for the Forestry Department. It is planned to have the section cleared during the coming winter months in order that grading operations can be started as soon as good weather permits next season. The sum of $300,000.00 has been set aside for the project, $150,000.00 from Forest Road funds and $150,000.00 from Lane County bond funds. The State is not participating in the cost of the project.

Reports from the Bureau of Public Roads give the expenditures to date as $4,014.84 from Government funds, these expenditures covering the cost of the location survey.

Maintenance

As rapidly as the grading, surfacing and paving contracts have been completed in Douglas County, the maintenance of the various sections has been taken over by the State. Under the head of this class of work has come the removal of slides, cleaning of ditches and culverts, blading and dragging of surfaced sections after rains, the addition of new rock screenings to the surface of bituminous pavements to neutralize the bleeding of the bituminous surface during extreme summer heat, and the general maintenance of roadbed and right-of-way such as the cutting of grass and weeds, burning of debris, etc.

[DOUGLAS]

For the most part, patrol maintenance has been used, with preference given to the employment of local men living adjacent to the particular maintenance unit. These patrolmen have worked under the direction of the nearest construction Resident Engineer or the Division Engineer in charge of the County.

All maintenance work on the Pacific Highway in Douglas County has been paid for by the State and has amounted to $91,642.82 for the biennium.

Lane County Line-Comstock Culverts

The work under this contract is described on page 222 of the Fourth Biennial Report. The work was completed and accepted December 20, 1920, with additional expenditures of $885.01. This brings the total cost of the work to the State to $5,958.09.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 272.74
Excavating for culverts by State forces		1,193.72
Contract items as follows:		
12-inch plain concrete pipe, 82.0 lin. ft. at $1.80	$ 147.60	
Class "A" concrete, 102.6 cu. yds. at $31.00	3,180.60	
Class "C" concrete, 5.0 cu. yds. at $30.00	150.00	
Steel reinforcement, 9,213.0 lbs. at 11c	1,013.43	
Total amount paid to contractor		4,491.63
Grand total cost of project (all State funds)		$ 5,958.09

Sand Creek Bridge

The details of this work are covered on page 222 of the last report. Final payments to the contractor, and for engineering, were made during this biennium, amounting to $4,336.90, and making the total cost of the bridge $13,915.02 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,260.69
Material furnished by State:		
Weep hole covers		8.85
Steel ordered by contractor but not used		37.90
Contract items as follows:		
Class "A" concrete, 217.38 cu. yds. at $39.00	$ 8,477.82	
Metal reinforcement, 34,669.0 lbs. at 7c	2,426.83	
Concrete handrail, 222.06 lin. ft. at $3.00	666.18	
Refund for advance in guaranteed freight rate	36.75	
Total amount paid to contractor		11,607.58
Grand total cost of structure (all State funds)		$ 13,915.02

Elk Creek Bridge

Up to the present time the Pacific Highway through the town of Drain has made two right angle turns and has crossed Elk Creek on old bridge of light design, inadequate to handle the present day traffic. A design was prepared, early in 1922, for a structure consisting of two 30-foot and two 45-foot spans of concrete construction.

Contract No. 551 covering the work was awarded to Albert Anderson on May 31, 1922. Work started on June 8, and excellent progress was made until completion on November 5, 1922.

The estimated cost is $14,500.00 and is to be divided $8,000.00 to the State and $6,500.00 to the County. Construction was handled by Stewart

Mitchell, Resident Engineer, and has entailed expenditures of $13,738.08 to date. This amount has been paid $7,623.86 by the State and $6,114.22 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,159.28
Name plates for bridge (furnished by State)		14.00
Items deducted from contractor's estimate:		
Cement furnished by State		1,866.42
Rental of State-owned concrete mixer		142.25
Contract items as follows:		
Excavation for foundations, 303.0 cu. yds. at $4.00	$ 1,212.00	
Class "A" and "B" concrete, 448.0 cu. yds. at $20.80	9,318.40	
Metal reinforcement, 59,200.0 lbs. at 5½c	3,256.00	
Reinforced concrete handrail, 150.0 lin. ft. at $4.00	600.00	
Refund for freight advanced by contractor	919.15	
Refund to contractor for empty cement sacks returned	143.50	
Total amount earned by contractor	$ 15,449.05	
Deductions:		
Cement furnished by State	2,887.82	
Rental of State-owned concrete mixer	142.25	
Percentage retained until completion of contract	1,862.85	
Total amount paid to contractor		10,556.13
Grand total expended		$ 13,738.08
Paid by State	$ 7,623.86	
Paid by County	6,114.22	
Total	$ 13,738.08	

Winchester Bridge Post Road Project

The most important bridge undertaken in Douglas County during this biennium is the one now being built over the North Umpqua River at Winchester. This bridge will consist of seven arch spans of 112 feet each, and 100 feet of concrete viaduct approach. It is located just below the dam of the Douglas County Light & Power Company and will replace an old steel span that is no longer suitable for the loads that come on it.

Contract No. 573, for its construction, was awarded on July 25, 1922, to Mr. H. E. Doering. Work was started on August 15, 1922, and has progressed at a satisfactory rate since that time. At the present time, the foundations are practically all in place and some form work is done on the main arches.

The structure is being built in cooperation with the County and Federal Government under Post Road Project Agreement No. 69, and is estimated to cost a total of $132,000.00; this amount to be paid for $60,000.00 by the County and $80,968.14 by the Federal Government, with a credit accruing to the State of $8,968.14. However, it will probably be impossible to collect the full Federal cooperation called for by the project agreement, and it is very likely that, in the final balance, the entire State credit will be wiped out.

Construction of the structure is being supervised by Stewart Mitchell, Resident Engineer, and has occasioned expenditures to date of $29,760.62. This amount has been paid $18,416.31 by the State and $11,344.31 by the County.

Comstock Overcrossing

An article descriptive of this work will be noted on page 221 of the last report. During the biennium, additional expenditures of $2,648.52 have been made, bringing the total cost of the work to $25,196.48. This

[DOUGLAS]

total amount has been paid $12,478.16 by the State, $4,239.44 by the County and $8,478.88 by the Southern Pacific Railroad Company.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,387.89
Labor and materials furnished by State:		
Constructing standard wood guard fence		201.76
Watchmen to guard railway from damage		278.23
Moving telegraph lines, removing cattle guards, repairing railroad fences		214.34
Macadamizing approach embankments		1,522.91
Bituminous pavement laid by Watsonite Products Co.		2,336.90
Oil purchased for force account work, but used on another job		(credit) 87.50
Contract items as follows:		
Common excavation, 1,413.0 cu. yds. at 75c	$ 1,059.75	
Intermediate excavation, 970.0 cu. yds. at $1.00	970.00	
Solid rock excavation, 649.0 cu. yds. at $2.00	1,298.00	
Overhaul, 9,785.0 sta. yds. at 6c	592.50	
Class "A" concrete, 152.3 cu. yds. at $30.00	4,569.00	
Class "B" concrete, 50.3 cu. yds. at $20.00	1,006.00	
Metal reinforcement, 16,234.00 lbs. at 7c	1,136.38	
Timber trestle, 512.0 lin. ft. at $15.60	7,987.20	
Force account items:		
Driving pile footings for abutments of main span	154.95	
Placing sand finish on painted handrails	50.00	
Adding extra bracing to structure bents	193.02	
Cutting holes in forms for puddling and enlarging concrete haunches	90.67	
Furnishing, painting and piling guard fence material to be erected later	236.48	
Total amount paid to contractor		19,343.95
Grand total cost of project		$ 25,196.48
Paid by State	$ 12,478.16	
Paid by County	4,239.44	
Paid by railroad	8,478.88	
Total	$ 25,196.48	

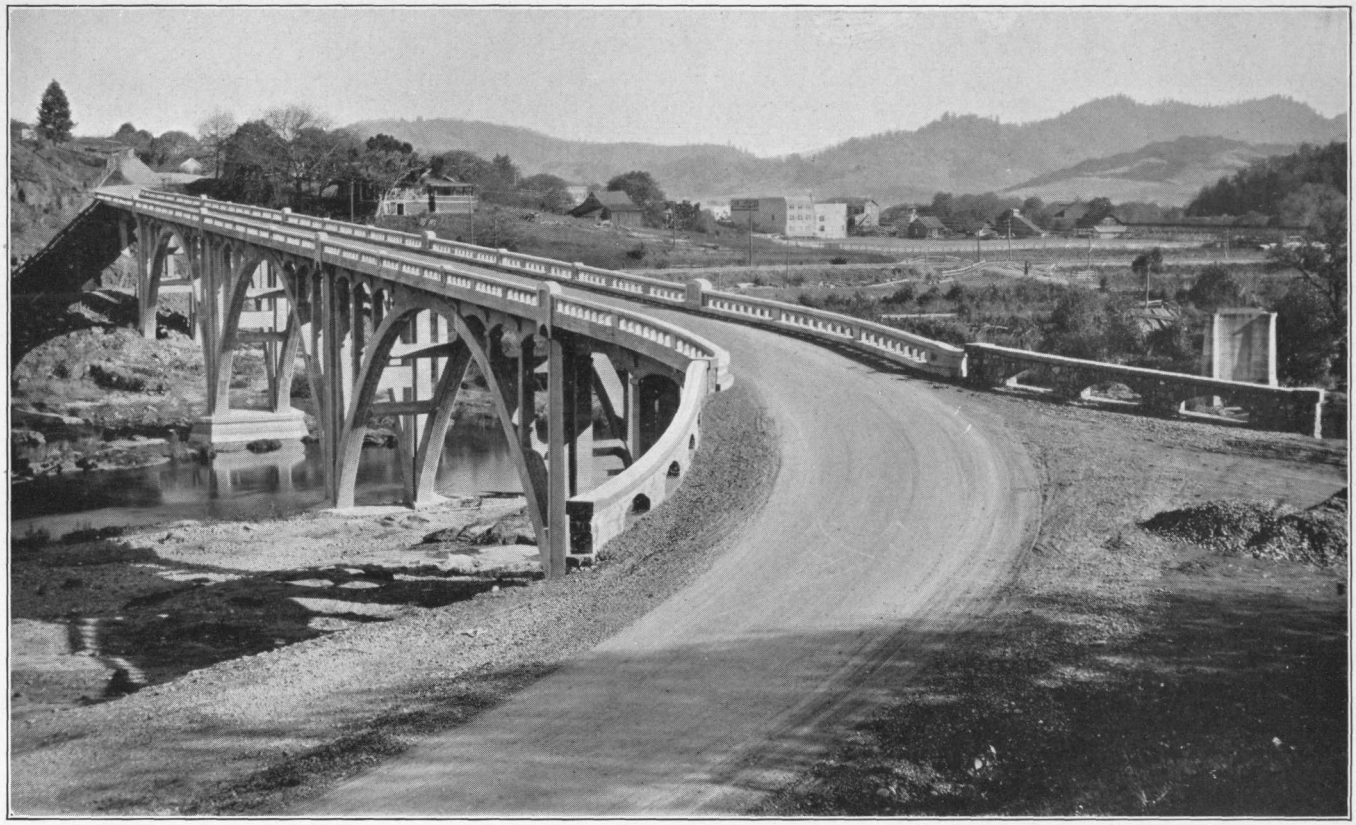
Myrtle Creek Bridge

At the completion of the Pacific Highway from Dillard to Myrtle Creek, traffic was thrown onto a light wooden bridge over the South Umpqua River near the Town of Myrtle Creek. It was, therefore, imperative that a new bridge be built to care for the heavy vehicles now using the highway. The crossing selected involved also a crossing of the Southern Pacific track. An undergrade crossing was at first considered, but was later abandoned in favor of the scheme finally adopted. As designed and built, the crossing consists of three 130-foot arch spans over the river, with some 170 feet of concrete approaches. The track passes underneath one of the approach spans which is 53 feet in length.

The matter was heard before the Public Service Commission on February 5, 1921, who in their order No. 708 allotted $15,000.00 of the cost to the railway company and the balance, 50 per cent to the County and 50 per cent to the State.

Contract No. 341 for the construction was awarded on March 8, 1921, to Lindstrom & Feigenson. Work started on May 11, 1921, and was completed on December 10, 1921. Owing to the necessity of completing a retaining wall and fill at the west end of the bridge, it was not opened to traffic until June 7, 1922.

The bridge is located at a place which gives it every opportunity to display itself as a beautiful structure and has excited much favorable comment. Much credit is due the contractor and engineer for the pleasing effect produced. Stewart Mitchell was Resident Engineer for the State.



BRIDGE OVER THE UMPQUA RIVER AND OVER THE SOUTHERN PACIFIC RAILWAY; ON THE PACIFIC HIGHWAY AT MYRTLE CREEK

The entire cost of the work is $77,632.71, the Railroad cooperation being $15,000.00, with the balance divided $28,089.44 to the State and $34,543.27 to the County. The expenditures to date have been made $43,089.44 by the State and $34,543.27 by the County, no Railroad funds having been received.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,571.15
Material furnished by State:		
Two bronze name plates		14.50
Powder used in connection with force account grading		11.00
Contract items as follows:		
Excavation to plan elevation, 178.0 cu. yds. at $4.00	$ 712.00	
Excavation below excavation shown on plans, 25.0 cu. yds. at $6.00	150.00	
Class "A" concrete, 1,537.28 cu. yds. at $30.00	46,118.40	
Class "C" concrete, 123.5 cu. yds. at $25.00	3,087.50	
Grouting rock fill in piers, 18.6 cu. yds. at $15.00	279.00	
Metal reinforcement, 237,989.0 lbs. at 6¾c	16,064.26	
Reinforced concrete handrail, 1,167.0 lin. ft. at $4.50	5,251.50	
Force account items:		
Grading work at south end of bridge to protect bridge from slides	901.36	
Material and labor for wiring conduits and doing other miscellaneous work not included in contract	270.84	
Bush hammering face of piers and retaining walls	198.20	
Total amount paid to contractor		73,033.06
Grand total cost of structure		$ 77,632.71
Paid by State	$ 43,089.44	
Paid by County	34,543.27	
Total	$ 77,632.71	

Canyon Creek Bridge at Canyonville

Contract No. 328 was awarded to Parker & Banfield on February 1, 1921, for a bridge over Canyon Creek at Canyonville. This bridge consists of two 45-foot concrete spans, and replaced an old wooden structure which had long since outlived its usefulness.

Work was started on April 12, 1921, and completed on July 31, 1921, at a cost of $13,753.88 from State funds. Stewart Mitchell was Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 851.65
Bronze name plates furnished by State		14.50
Filling in around abutments and grading approaches (state forces)		518.01
Contract items as follows:		
Excavation to plan elevation, 180.0 cu. yds. at $3.00	$ 540.00	
Excavation below elevation shown on plans, 32.0 cu. yds. at $5.00	160.00	
Class "A" concrete, 258.4 cu. yds. at $27.70	7,157.68	
Metal reinforcement, 42,348.0 lbs. at 8¾c	3,705.45	
Concrete handrail, 186.0 lin. ft. at $4.50	837.00	
Total amount earned by contractor	$ 12,400.13	
Deduction for under-run of cement used	30.41	
Total amount paid to contractor		12,369.72
Grand total cost of structure (all State funds)		$ 13,753.88

Culvert in Myrtle Creek

A 5x8 culvert on the Pacific Highway in Myrtle Creek is being built by State forces under H. H. Flanagan. Expenditures to date have been $122.52, in an estimated total cost of $7,000.00 from State funds.

[DOUGLAS]

Umpqua River Bridge North of Canyonville

On the section between Myrtle Creek and Canyonville, the Pacific Highway crosses the South Umpqua River on a bridge consisting of one 220-foot steel truss span, with 265 feet of wood trestle approach.

Contract No. 327 was awarded to the Union Bridge Company on February 1, 1921. Work was started on May 11, 1921, and was complete on October 13, 1921, Stewart Mitchell being Resident Engineer. The total cost was $48,704.37 from State funds as outlined below:

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,495.71
Freight on equipment used on force account work		2.85
Two bronze name plates, furnished by State		14.50
Rental of State-owned pumping equipment (deducted from contractor's estimate)		181.76
Contract items as follows:		
Excavation to plan elevation, 171.0 cu. yds. at $1.60	$ 273.60	
Excavation below elevation shown on plans, 11.1 cu. yds. at $4.00	44.40	
Class "A" concrete, 200.5 cu. yds. at $30.00	6,015.00	
Metal reinforcement, 4,004.0 lbs. at 10c	400.40	
Lumber and timber, 44.807 M.-FBM. at $60.00	2,688.42	
Structural steel, 277,443.0 lbs. at 11½c	31,073.62	
Wood approach trestle, 265.0 lin. ft. at $16.00	4,240.00	
Force account items:		
Extra excavation and other work not included in contract due to change of bridge location	1,655.15	
Total amount earned by contractor	$ 46,390.59	
Deductions:		
Rental of State-owned pumping equipment	181.76	
Deduction for under-run of cement used	149.28	
Clearing up refuse left by contractor (to be removed by State forces)	50.00	
Total amount paid to contractor		46,009.55
Grand total cost of structure (all State funds)		$ 48,704.37

Bridges on the Camas Valley Section

Contract No. 502 for the construction of these two bridges was awarded to E. D. Olds on March 23, 1922. The two bridges are a 90-foot wood truss span over the Coquille River and a 40-foot "A" frame over Ten Mile Creek, both with wooden approaches.

Work was started on June 12, 1922, and completed on November 30, 1922, at a total estimated cost of $11,789.25. This amount is to be paid $6,289.25 by the State and $5,500.00 by the County. Expenditures to date, amounting to $7,842.03, have been paid $4,362.52 by the State and $3,479.51 by the County. These expenditures have been made under the supervision of Stewart Mitchell, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 789.25
Name plates for bridges (furnished by State)		42.00
Hauling done by State (deducted from contractor's estimate)		345.00
Contract items as follows:		
Excavation for footings, 180.0 cu. yds. at $1.50	$ 270.00	
Class "A" concrete, 8.4 cu. yds. at $31.00	260.40	
Class "B" concrete, 87.0 cu. yds. at $29.70	2,583.90	
Metal reinforcement, 2,900.0 lbs. at 6½c	188.50	
Lumber, 4.0 M.-FBM. at $40.00	160.00	
90-foot wood truss span, 95 per cent at $3,479.00	3,305.05	
Wood approaches, 76.0 lin. ft. at $14.00	1,064.00	
Materials on hand	355.25	
Total amount earned by contractor	$ 8,187.10	

EXPENDITURES—Continued

Deductions:		
Hauling done by State	345.00	
Percentage retained until completion of contract	1,176.32	
Total amount paid to contractor		6,665.78
Grand total expended		$ 7,842.03
Paid by State	$ 4,362.52	
Paid by County	3,479.51	
Total	$ 7,842.03	

Winston-Camas Hill Bridges

The construction of five wood bridges on the Winston-Camas Hill Section was awarded on October 25, 1921, to J. W. & J. R. Hillstrom under Contract No. 475.

Work was started on December 10, 1921, and progressed steadily, though slowly, until November 30, 1922, when it was completed. The final cost is estimated at $31,380.96, to be paid $17,380.96 by the State and $14,000.00 by the County. Expenditures to date, made under the supervision of Stewart Mitchell, Resident Engineer, amount to $26,894.50 and consist of $13,142.16 from State funds and $13,752.34 from County funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,880.96
Name plates for bridges (furnished by State)		42.00
Contract items as follows:		
Excavation to plan elevation, 671.3 cu. yds. at $1.25	$ 839.13	
Excavation below elevation shown on plans, 42.2 cu. yds. at $2.00	84.40	
Class "A" concrete, 25.0 cu. yds. at $21.00	525.00	
Class "B" concrete, 246.1 cu. yds. at $20.00	4.922.00	
Metal reinforcement, 7,810.0 lbs. at 6c	468.60	
Lumber, 13.263 M.-FBM. at $50.00	663.25	
Wood truss spans, 105 feet in length, 3 each at $5,824.00	17,472.00	
"A" frame structure, 40-foot span, all	1,214.00	
Approach trestle, 197.0 lin. ft. at $11.00	2,167.00	
Total amount earned by contractor	$ 28,355.38	
Deductions:		
Percentage retained until completion of contract	850.66	
Estimates No. 4 and 6 in transit	3,533.18	
Total amount paid to contractor		23,971.54
Grand total expended		$ 26,894.50
Paid by State	$ 13,142.16	
Paid by County	13,752.34	
Total	$ 26,894.50	

Elk Creek Bridge Survey

In May, 1922, the Commission ordered a survey for, and the construction of, a bridge across Elk Creek in the City of Drain, the new structure to replace the existing light steel bridge which has outlived its usefulness. A survey was made by Resident Engineer J. S. Sawyer, and a vicinity map prepared and forwarded to the Bridge Department for design of the structure.

Oakland Overcrossing Survey

In January, 1922, a survey was made for the elimination of the existing grade crossing of the Southern Pacific Railroad at the north city limits of Oakland.

[DOUGLAS]

The present road crosses the Calapooia River by means of a light steel bridge, crosses the railroad at grade, and extends to a connection with the pavement on the main street in Oakland. The new line is 1,303 feet in length and calls for a combined bridge and overcrossing structure. These combined structures will be located about 150 feet up stream from the present county bridge. At the present time construction of the project is waiting adjudication of costs between the State, County and Railroad Company by action of the Public Service Commission. The surveys and investigations in connection with the project were in charge of G. E. Farnsworth, Resident Engineer.

Winchester Bridge Survey

At the present time there remains an unimproved gap of 0.81 mile on the Roseburg-Wilbur Section which has been left open until the completion of the Winchester bridge. A location survey of this unit was authorized, and was made in January, 1922.

The existing road drops down to the Umpqua River from an excessive grade on the north, crosses the river on a steel bridge which is too light for present-day traffic, and then extends through the town of Winchester to a connection with the Pacific Highway immediately south of the town.

The new location shortens the distance over the old road by several hundred feet and has a maximum grade of 5 per cent. The adopted line crosses the river below the dam of the Douglas County Light & Power Company. Contract has already been awarded for the construction of a concrete bridge over the Umpqua River and work on the structure is now under way. A description thereof is given in another portion of this report.

Location of the new line was made under the direction of J. S. Sawyer, Resident Engineer.

Myrtle Creek Survey

During the biennium A. S. Kennedy, Resident Engineer, made a location of 1.07 miles of the Pacific Highway at Myrtle Creek. The section begins at the south end of the Myrtle Creek-Dillard pavement, approximately 1,000 feet outside of the north city limits of Myrtle Creek, and extends to the south city limits of the town.

Camas Valley-Dillard Survey

During 1921 a complete revision and relocation of the previous survey between the Pacific Highway and Camas Valley was made by W. P. Smith, Locating Engineer, the entire distance covered being 19.99 miles. This section of the highway has the best alignment to be found on the entire distance to Coquille; topographical conditions being such as permit excellent alignment without requiring excessive costs.

Roosevelt Coast Highway Survey

The length of the Roosevelt Coast Highway across Douglas County is 24.75 miles. Location survey of this distance was made by W. F. Waller and B. O. Johnson, Locating Engineers, between September 9, 1921, and May 9, 1922.

The line is practically all through virgin country having very little development at the present time but possessing possibilities for great

development as an agricultural district. The line follows as close to the ocean as is practicable, and, where inland, is skirting the Umpqua River or following along the margin of inland lakes, among which are Eel Lake, Lake Edna, Clear Lake, Lake Tahkenitch, Lake Siltcoos and Lake Woahink. Various large bodies of spruce timber have been skirted or penetrated by the location, and the section traversed, while having great potential value, is probably the most undeveloped district on the Roosevelt Coast Highway.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Douglas County has co-operated as follows:

1.	Paid into the State Market Road Fund	$ 83,529.12
2.	State Funds apportioned to County	110,784.49
3.	County levy made to match State Funds	112,552.82
4.	County Market Road Funds collected	105,071.78
5.	Cash paid to County by State	91,004.28
6.	State expenditures, deducted from apportionment	0.00
7.	Cash due County from State in December, 1922	19,780.21
8.	County expenditures on Market Roads	182,423.28
9.	Balance in County Treasury November 1, 1922	13,652.78

From the above statement it is apparent that Douglas County received from the State Market Road Fund $27,255.37 more than it paid into the fund. The excess is Douglas County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that county levies have been made sufficient to produce $112,552.82. Of this amount they have collected and credited to the Market Road Fund $105,071.78.

The County Court has designated 57 sections of road to be improved as Market Road projects. These sections range in length from 500 feet to 4 miles, and in proposed expenditures from $1,000.00 to $17,000.00. These projects are scattered over the County, so that each road district gets a portion of the Market Road funds. Many projects are worthy of improvement with Market Road funds but it appears that some should be considered and handled as maintenance projects, instead of being improved with Market Road funds. When plans for short sections of roads are submitted for approval as Market Road projects, it is difficult to determine the standard of construction which should be required, and also difficult to determine whether or not the section is such that it will be of use at the time the road as a whole is improved to the standard of construction needed for the district.

District, General, Special Tax, Donation and other County funds have been used along with Market Road funds and it has been difficult to determine what was being accomplished with Market Road funds. Bridges have been constructed on sections designated as Market Road projects, which are not up to the standard requirements for Market Roads. These bridges have been paid for from other funds in most cases. Thus, when the project is completed, there may be two sections of Market Roads, the construction plans of which have been approved by the State Highway Commission, connected by a bridge the plans of which were not approved.

[DOUGLAS]

The surveys have been made and plans prepared by F. C. Frear, County Roadmaster. Most of the construction work has been done by County forces under the direction of the Roadmaster.

The County Court has expended $105,071.78; has graded 2.0 miles of 14-foot roadway and 25.6 miles of 20-foot roadway and has surfaced with crushed rock or gravel 45.8 miles, 9 feet wide.

GILLIAM COUNTY

Gilliam County, by reason of its frontage on the Columbia River, has not been as much cut off from the outside as some of the other Counties of Eastern Oregon. It has also had a railroad outlet in the Condon branch line, and has been served, in a measure, by the Heppner branch. However, the people have been desirous of highway development and their needs have been given full attention. Local conditions required that precedence be given to the portion south of Condon as this district is dependent on highway transportation alone. In addition to purely local value, the highway also serves as a link in a connection with the railroad for a large part of Wheeler County, and is an outlet to the Columbia River Highway for both Wheeler and Grant Counties.

The past two years has been a period of continued activity in the County and at the present time the Columbia River Highway has been completed, and the John Day Highway is completed or under contract with the exception of approximately sixteen miles. In the northeastern corner of the County, a portion of the Oregon-Washington Highway is being graded and surfaced.

All State work was under the supervision of J. H. Scott, Division Engineer, until April 1, 1922, at which time he was succeeded by C. W. Wanzer, Division Engineer.

Blalock-Arlington Post Road Project

A description of this project will be found on page 231 of the Fourth Biennial Report. The work was carried to final completion on November 10, 1920, and during the present biennium final payments have been made in the amount of $26,596.87. This brings the total cost of the project to $65,970.99, which has been paid $25,520.00 by the Federal Government and $40,450.99 by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,424.72
Contract items as follows:		
Crushed gravel surfacing, 19,888.5 cu. yds. at $2.25	$ 44,749.13	
Payhaul, 18,298.0 yd. mi. at 50c	9,149.00	
Talus subsurfacing, 158.5 cu. yds. at $1.00	158.50	
Pitrun crushed gravel for future maintenance, placed in piles, 936.0 cu. yds. at $2.00	1,872.00	
Payhaul on maintenance material, 912.0 yd. ml. at 50c	456.00	
Force account items:		
Constructing rockwall and riprapping slopes near bridge, Sta. 42+60	961.21	
Removing slides	1,742.86	
Repairing damage caused by cloud burst	102.66	
Repairing grade and removing blow sand	1,473.18	
Grading of line change to eliminate sand blow	881.73	
Total amount paid to contractor		61,546.27
Grand total cost of project		$ 65,970.99
Paid by State	$ 40,450.99	
Paid by Government	25,520.00	
Total	$ 65,970.99	

Arlington-Morrow County Line Grading and Surfacing

The contract for grading and graveling this section was awarded during 1919 and a description of the project will be found on page 231 of the previous biennial report. At the time of the completion of the

grading in the vicinity of the overcrossing near Heppner, the structure had not been completed, and it was necessary to leave the approach fills uncompleted. On October 7, 1920, Horace W. White of Arlington submitted a proosal for grading and surfacing these approaches and the construction of riprap on the fill slopes. His bid was accepted, work being started on November 1 and completed February 10, 1921.

Total expenditures during the present biennium, including the amounts required for the construction of the Heppner overcrossing approaches and for completion of the original grading and surfacing contract, have amounted to $47,328.11. This brings the total cost of the entire project to $240,423.03 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 16,119.04
Force account work by State forces:		
Grading work at Heppner overcrossing and Willow Creek bridge approaches, building roadway under west approach of bridge and repairing shoulders		1,259.31
Erecting dry masonry wall at Willow Creek bridge		331.50
Riprapping at Willow Creek bridge		669.90
Gravel surfacing at Heppner Junction		449.35
Furnishing and placing concrete pipe drains		78.00
Items deducted from contractor's estimates:		
Cement furnished by State		411.53
Rental of State-owned equipment		412.35
Contract items as follows:		
Clearing and grubbing, all	$ 600.00	
Common excavation, 45,094.7 cu. yds. at 65c	29,311.56	
Grader work, 3.3739 mi. at $600.00	2,024.34	
Solid rock excavation, 22,953.2 cu. yds. at $3.50	80,336.20	
Overhaul, 51,688.0 sta. yds. at 3c	1,550.64	
12-inch plain concrete pipe, 271.0 lin. ft. at $2.00	542.00	
Class "A" concrete, 48.75 cu. yds. at $30.00	1,462.50	
Class "C" concrete, 5.5 cu. yds. at $25.00	137.50	
Metal reinforcement, 3,402.45 lbs. at 10c	340.25	
Screened gravel, 25,418.0 cu. yds. at $3.25	82,608.50	
Screened gravel, 496.0 cu. yds. at $3.00	1,488.00	
Payhaul on screened gravel, 23,897.0 yd. mi. at 60c	14,338.20	
Pit run crushed gravel, 1,144.0 cu. yds. at $3.00	3,432.00	
Payhaul on crushed gravel, 796.0 yd. mi. at 50c	398.00	
Lumber and timber, 19.332 M.-FBM. at $90.00	1,739.88	
Force account items:		
Erection of fences to stop sand drifts	141.68	
Riprapping at bridge in Arlington	81.10	
Excavation for embankment in Arlington	192.89	
Constructing detour at Heppner Junction	326.42	
Constructing three cattle passes	464.27	
Total amount earned by contractor	$221,515.93	
Deductions for cement and rental of equipment	823.88	
Total amount paid to contractor		220,692.05
Grand total cost of project (all State funds)		$240,423.03

Heppner Junction-Morrow County Line Grading and Surfacing

This section of the Oregon-Washington Highway begins at a junction with the Columbia River Highway at a point approximately two-thirds of one mile east of Heppner Junction and extends southerly up the valley of Willow Creek to the Morrow County Line. For most of the length it lies along the east side of the right-of-way of the Heppner Branch Railroad, and in a number of places the alignment has encroached on this right-of-way and on easements held by the Western Union Telegraph Company. For this reason special agreements with the respective interests were necessary.

Contract No. 546 was awarded to the Warren Construction Company on May 31, 1922, for grading and placing a broken stone surfacing on

the 9.58 miles of the section. The end of the biennium finds the grading finished for approximately three-quarters of the project, and a good start has been made on the placing of the surfacing.

The construction is being carried on under the supervision of H. G. Smith, Resident Engineer, and is estimated to cost a total of $97,500.00, to be paid for entirely from State funds. Expenditures to the date of this report amount to $16,363.47.

Shutler-Base Line Grading and Surfacing

It was originally intended that this section extend as far south as Rock Creek, but, owing to the fact that County cooperative funds might only be applied north of the Base Line, the south 1.5 miles were eliminated and the contract was awarded to cover only the portion between Shutler and the Base Line.

The location extends over what is known as the Shutler Flat and has been graded and surfaced by the Security Contruction Company of La Grande, Oregon, under Contract 494 awarded to them on February 21, 1922. Work under the contract was started on April 28 and carried to completion on September 30, the entire length of the section being 8.05 miles.

It is expected that outstanding amounts will bring the expenditures under the contract to the sum of $61,000.00. Of this amount, the County will cooperate to the extent of $17,500.00 and the State will pay the balance of $43,500.00. Construction was supervised by F. K. Gettins, Resident Engineer, and has occasioned expenditures to date of $56,736.36. This amount has been paid, $17,500.00 by the County and $39,236.36 by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,495.63
Sprinkling macadam by State forces		3,136.59
Rental and repairs on State-owned equipment (to be deducted from contractor's estimate)		1,437.16
Contract items as follows:		
Clearing and grubbing, all	$ 100.00	
Common excavation, 44,305.3 cu. yds. at 22c	9,747.17	
Intermediate excavation, 672.9 cu. yds. at 50c	336.45	
Solid rock excavation, 1,018.5 cu. yds. at $1.00	1,018.50	
Overhaul, 11,241.0 sta. yds. at 4c	449.64	
12-inch corrugated, galvanized iron pipe, 916.0 lin. ft. at $1.10	1,007.60	
18-inch corrugated, galvanized iron pipe, 100.0 lin. ft. at $2.00	200.00	
24-inch corrugated, galvanized iron pipe, 28.0 lin. ft. at $3.00	84.00	
Class "A" concrete, 30.04 cu. yds. at $30.00	901.20	
Class "C" concrete, 33.03 cu. yds. at $27.50	908.33	
Metal reinforcement, 2,584.9 lbs. at 8c	206.79	
Riprap, 6.7 cu. yds. at $2.00	13.40	
Crushed gravel surfacing, 18,620.0 cu. yds. at $1.95	36,309.00	
Maintenance material, placed in piles, 788.0 cu. yds. at $1.95	1,536.60	
Total amount earned by contractor	$ 52,818.68	
Deductions for rental and repairs of State equipment	531.04	
Percentage retained until completion of contract	3,620.66	
Total amount paid to contractor		48,666.98
Grand total expended		$ 56,736.36
Paid by State	$ 39,236.36	
Paid by County	17,500.00	
Total	$ 56,736.36	

[GILLIAM]

John Day River-Blalock Post Road Project

A description of this project will be found on page 230 of the Fourth Biennial Report and during the present biennium final payments have been made on the grading, and the surfacing has been completed.

On portions of the section large areas of blow sand were encountered and have been controlled by oiling. As most of the surfacing was placed during the dry season and the only binding material available for use as a filler consisted of blow sand, it was necessary to sprinkle the subgrade and also wet each course of the surfacing materials as they were placed. This proved to be rather expensive but has resulted in a very good type of macadamized road, considering the nature of the subgrade upon which the surfacing materials were placed.

During the present biennium, final payments of $37,285.12 have been made on grading, bringing the cost of this work to $243,436.22 and expenditures of $156,821.54 have been made for surfacing. This brings the entire cost of the project to $400,257.76, which has been paid $190,084.71 by the Federal Government and $210,173.05 by the State.

DETAILED STATEMENT OF EXPENDITURES

GRADING—

Engineering		$ 16,773.25
Watchmen services guarding railroad and telegraph lines		436.63
Adjustment with contractor for canceling tunnel contract		5,540.17
Rental of State-owned equipment (deducted from contractor's estimate)		262.70
Patrolling railroad track after June 30, 1920 (deducted from contractor's estimate)		66.80
Contract items as follows:		
Clearing and grubbing, all	$ 500.00	
Common excavation, 75,817.1 cu. yds. at 63c	47,764.77	
Intermediate excavation, 20,653.5 cu. yds. at $1.00	20,653.50	
Solid rock excavation, 55,146.7 cu. yds. at $2.10	115,808.07	
Overhaul, 102,629.0 sta. yds. at 5c	5,131.45	
12-inch plain concrete pipe, 918.0 lin. ft. at $1.50	1,377.00	
18-inch reinforced concrete pipe, 404.0 lin. ft. at $2.50	1,010.00	
24-inch reinforced concrete pipe, 244.0 lin. ft. at $3.25	793.00	
36-inch reinforced concrete pipe, 176.0 lin. ft. at $6.00	1,056.00	
Rubble masonry, 492.99 cu. yds. at $14.00	6,901.86	
Class "A" concrete, 306.96 cu. yds. at $27.50	8,441.40	
Class "C" concrete, 119.56 cu. yds. at $22.50	2,690.10	
Standard wood guard fence, 5,384.0 lin. ft. at 70c	3,768.80	
Solid rock borrow, 335.0 cu. yds. at $1.75	586.25	
Metal reinforcement, 22,232.0 lbs. at 8c	1,778.56	
Concrete handrail, 94.0 lin. ft. at $3.25	305.50	
Riprap, 188.4 cu. yds. at $5.00	942.00	
Force account items:		
Extra clearing due to change in alignment	302.86	
Moving and rebuilding railroad right-of-way fence	875.05	
Total amount earned by contractor	$220,686.17	
Deductions:		
Rental of State-owned equipment	262.70	
Guarding railway and power lines after June 30, 1920	66.80	
Total deductions	$ 329.50	
Total amount paid to contractor		220,356.67
Grand total cost of project		$243,436.22

SURFACING—

Engineering	$ 8,097.14
Expense of sprinkling broken stone surfacing	1,846.42
Royalty on rock from Hook quarry	505.44
Guarding railway and power lines from damage	126.25
Items deducted from contractor's estimate:	
Rental, freight and upkeep of State-owned tractor	1 605.94
Powder and blasting supplies furnished by State	453.50

EXPENDITURES—Continued

Contract items as follows:		
Excavating slides and blow sand, 7,500.0 cu. yds. at 40c	$ 3,000.00	
Talus subsurfacing, 364.0 cu. yds. at $1.00	364.00	
Broken stone surfacing, 33,076.0 cu. yds. at $3.98	131,642.48	
Pay haul on surfacing materials, 994.0 yd. miles at 60c	590.40	
Rubble masonry, 139.67 cu. yds. at $11.00	1,536.37	
Force account items:		
Rolling subbase and base courses	3,898.12	
Placing filler on broken stone surfacing	4,134.71	
Constructing rock toe wall for railroad protection	445.67	
Sprinkling broken stone surfacing	634.54	
Total amount earned by contractor	$146,246.29	
Deductions:		
Rental, freight and upkeep of State-owned tractor	1,605.94	
Blasting supplies furnished by State	453.50	
Total deductions	$ 2,059.44	
Total amount paid to contractor		144,186.85
Grand total cost of project		$156,821.54

GRAND SUMMARY OF EXPENDITURES

	State	*Government*	*Total*
Grading	$127,850.52	$115,585.70	$243,436.22
Surfacing	82,322.53	74,499.01	156,821.54
Total	$210,173.05	$190,084.71	$400,257.76

Arlington-Shutler Grading and Surfacing

This section extends south from the Columbia River Highway at Arlington to a point near Shutler Station, on the Condon Branch of the Oregon-Washington Railroad & Navigation Company, and has a total length of 7.12 miles. The location leaves Arlington on the east side of the railroad, crossing the line to the west side at a point about one mile south. From this crossing, the old Condon-Arlington road is followed.

Contract 526 for grading and surfacing the section was awarded to the Security Construction Company of La Grande on April 14, 1922. The contractors began operations on April 28, and, at the close of the biennium, the grading has been completed and four miles of the project have been surfaced.

Construction is being supervised by F. K. Gettins, Resident Engineer, and is estimated to cost a total of $62,000.00, towards which the County will cooperate to the extent of $17,500.00, with the State paying the balance. Expenditures to date amount to $20,152.57, of which the State has expended $2,652.57 and the County has put up the entire amount of their cooperation.

Condon-North Grading and Surfacing

The County funds available for cooperative work on the John Day Highway have been limited, and, on request of the County Court, the Highway Commission received bids for the grading and surfacing of a six-mile unit north of Condon for the cooperative expenditures of County money available for the 1921 work. Bids were received on May 27, 1921, and Contract 279 was awarded to A. D. Kern of Portland for grading and surfacing the six miles involved. Subsequently, the County Court and the Town of Condon requested that the work be extended from the north city boundary to the center of town, and by agreement with the Contractor this extension was made, bringing the total length of the improvement to 6.57 miles. Practically three miles of the project, which includes the northerly two miles in their entirety, are adjacent to and parallel with the right-of-way of the Condon Branch Railroad.

[GILLIAM]

The completion of the improvement on June 24, 1922, marked a big step toward closing up the gap between Condon and Arlington, and at the present time only the section from the Base Line to the north end of this project is unimproved.

The work was handled under the supervision of E. G. Gettins, Resident Engineer, and is estimated to cost a total of $78,038.56 when all final accounts have been paid. Of this amount, the County will cooperate to the extent of $54,442.69, the State paying the balance of $23,595.87. Expenditures to date amount of $77,095.74, and have been paid $37,095.74 by the State and $40,000.00 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,353.62
Sand for filler, furnished by State		3,432.18
Contract items as follows:		
Clearing and grubbing, all	$ 200.00	
Excavation, no classification, 35,174.7 cu. yds. at 37c.	13,014.64	
Overhaul, 11,672.0 sta. yds. at 8c	933.76	
12-inch corrugated galvanized iron pipe, 1,060.00 lin. ft. at $1.34	1,420.40	
18-inch corrugated galvanized iron pipe, 132.0 lin. ft. at $2.60	343.20	
Class "C" concrete, 34.53 cu. yds. at $35.00	1,208.55	
Standard wood guard fence, 648.0 lin. ft. at 95c	615.60	
Broken stone surfacing, 14,921.5 cu. yds. at $3.00	44,764.50	
Broken stone placed in piles for maintenance, 696.0 cu. yds. at $3.00	2,088.00	
Timber cattle passes, 3.0 each at $800.00	2,400.00	
Crushed rock filler, 456.0 cu. yds. at $2.00	912.00	
Force account items:		
Installing 24-inch corrugated galvanized iron pipe culverts	212.25	
Construction of stand trap for loading sand filler	85.65	
Excavating for three cattle passes	1,053.87	
Constructing extra deep ditches in all thorough cuts	1,170.20	
Total amount earned by contractor	$ 70,422.62	
Percentage retained until completion of contract	2,112.68	
Total amount paid to contractor		68,309.94
Grand total expended		$ 77,095.74
Paid by State	$ 37,095.74	
Paid by County	40,000.00	
Total	$ 77,095.74	

Mayville-Thirtymile Creek Post Road Project

A description of this section will be found on pages 233-4 of the Fourth Biennial Report. During the present biennium the Federal Aid feature was extended to include the surfacing of the section, in addition to the grading.

The grading of the section was completed on March 21, 1921, at a total cost of $115,424.42, including $30,368.49 expended during the previous biennium.

Upon completion of the grading it was found necessary to place a subsurface course of talus in order to provide an impervious base for the surfacing materials. This work was done by State forces under the supervision of F. K. Gettins, Resident Engineer. A total of 12,000 cubic yards were laid at a total cost of $22,188.59. This is considered a very creditable showing in view of the adverse weather conditions which were experienced during the course of the work.

Contract No. 360 was awarded to the Hauser Construction Company of Portland, Oregon, on April 22, 1921, for placing a broken stone sur-

facing on the project. Work was started May 18. 1921, and completed November 15 of the same year, under the supervision of F. K. Gettins, Resident Engineer, at a total cost of $53,197.95.

The cost of the project as a whole was $190,810.96, which has been paid $79,363.62 by the Federal Government, $51,736.10 by Gilliam County and $59,711.24 by the State.

DETAILED STATEMENT OF EXPENDITURES

GRADING AND SUBSURFACING—

Engineering		$ 9,834.90
Talus subsurfacing performed by State forces		21,911.44
Grass seed for slope protection furnished by State		12.67
Powder furnished by State free to contractor		1,742.06
Rental on State truck (deducted from contractor's estimate)		80.78
Contract items as follows:		
Clearing and grubbing, all	$ 1,000.00	
Common excavation, 74,186.6 cu. yds. at 80c	59,349.28	
Solid rock excavation, 16,476.8 cu. yds. at $1.70	28,010.56	
Overhaul, 31,231.4 sta. yds. at 5c	1,561.57	
12-inch corrugated galvanized iron pipe, 558.0 lin. ft. at $2.00	1,116.00	
18-inch corrugated galvanized iron pipe, 64.0 lin. ft. at $3.50	224.00	
24-inch corrugated galvanized iron pipe, 184.0 lin. ft. at $5.00	920.00	
36-inch corrugated galvanized iron pipe, 68.0 lin. ft. at $10.00	680.00	
42-inch corrugated galvanized iron pipe, 22.0 lin. ft. at $12.00	264.00	
6-inch porous drain tile, 33.0 lin. ft. at 40c	13.20	
Rubble masonry, 424.66 cu. yds. at $15.00	6,369.90	
Riprap, 81.9 cu. yds. at $3.50	286.65	
Lumber and timber in place, 28.598 M.-FBM. at $100.00	2,859.80	
Hand placed rock slopes, 426.5 sq. yds. at $3.00	1,279.50	
Class "A" concrete, 4.08 cu. yds. at $35.00	142.80	
Force account items:		
Relaying private water pipe across roadway	34.68	
Total amount earned by contractor	$104,111.94	
Deduction for rental on State-owned truck	80.78	
Total amount paid to contractor		104,031.16
Grand total cost of grading and subsurfacing		$137,613.01

SURFACING—

Engineering		$ 2,456.98
Contract items as follows:		
Standard wood guard fence, 3,824.0 lin. ft. at $1.10	$ 4,206.40	
Broken stone surfacing, 10,159.5 cu. yds. at $3.30	33,526.35	
Broken stone for maintenance, placed in piles, 612.0 cu. yds. at $3.10	1,897.20	
Binder course, 6,165.0 cu. yds. at $1.75	10,788.75	
Force account items:		
Repairing damage to shoulders and ditches caused by cloudburst	322.27	
Total amount paid to contractor		50,740.97
Grand total cost of project		$ 53,197.95

GRAND SUMMARY OF EXPENDITURES

	State	*County*	*Government*	*Total*
Grading and subsurfacing	$ 46,604.89	$ 35,236.10	$ 55,772.02	$137,613.01
Surfacing	13,106.35	16,500.00	23,591.60	53,197.95
Totals	$ 59,711.24	$ 51,736.10	$ 79,363.62	$190,810.96

[GILLIAM]

Blalock-Arlington Grading

This project was undertaken during the preceding biennium and an article thereon is given on page 232 of the last report. During the present biennium, delayed expenditures of $886.27 have been made. This brings the total cost of the project to $244,191.10, which has been paid $194,191.10 by the State and $50,000.00 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 11,697.84
Watchmen services guarding railway from damage		1,961.96
Advertisment for bids		19.79
Force account work by state forces on Arlington revision:		
Superintendence and general expense	$ 543.05	
Industrial insurance	1,079.68	
Contractor's profit on cost plus work	8,437.34	
Grading work	43,467.92	
Pipe culverts and headwalls	809.50	
Rubble masonry walls	32,469.54	
Camp construction and operation	9,426.62	
Corral construction and operation	1,033.27	
Total cost of State Force Account Work		$ 97,266.92
Grading under agreement with Oskar Huber, contractor:		
Common excavation, 6,579.1 cu. yds. at 60c	$ 3,947.46	
18-inch reinforced concrete pipe, 28.0 lin. ft. at $2.50	70.00	
24-inch reinforced concrete pipe, 32.0 lin. ft. at $3.25	104.00	
Class "C" concrete, 6.0 cu. yds. at $25.00	150.00	
Riprap, 2.6 cu. yds. at $5.00	13.00	
Total amount paid to Oscar Huber		$ 4,284.46
Contract items as follows, by Johnson Contract Co., contractors:		
Clearing and grubbing, all, at $350.00	$ 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, 69,615.0 sta. yds. at 5c	3,480.75	
12-inch plain concrete pipe, 936.0 lin. ft. at $1.10	1,029.60	
18-inch reinforced concrete pipe, 168.0 lin. ft. at $2.30	386.40	
24-inch reinforced concrete pipe, 284.0 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, 180.0 lin. ft. at $4.00	720.00	
Riprap, 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 riprap at cattle passes	373.18	
Total amount paid to Johnson Contract Company		$128,960.13
Grand total cost of project		$244,191.10
Paid by State	$194,191.10	
Paid by County	50,000.00	
Total	$244,191.10	

Blalock-Arlington Guard Fence

Upon the completion of the grading and surfacing on this section, Contract No. 324 was awarded McCall & Sheerin, on March 19, 1921, for the construction of wood guard fences at various danger points along the section. Work was started on February 1, 1921, and completed on March 19 of the same year under the direction of C. C. Seeley, Resident Engineer. Total expenditures for the work amounted to $3,370.65 from State funds.

[GILLIAM]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8.25
Contract items as follows:		
Standard wood guard fence, 3,736.0 lin. ft. at 90c	$ 3,362.40	
Total amount paid to contractor		$ 3,362.40
Grand total cost of constructing guard fences (all State funds)		$ 3,370.65

Arlington-Morrow County Line Guard Fence

During the grading and surfacing of this section no guard fence was placed, but owing to the excellent condition of the new graveled road the traffic became so intense and traveled at such high rates of speed that it was considered essential to construct guard fence at several danger points. Accordingly, Contract No. 318 was awarded to Solcim & Gustafson of Astoria, Oregon, on January 4, 1921. Work was started January 29, 1921, and completed March 3, 1921, being held under the supervision of C. C. Seeley, Resident Engineer.

A total length of 5,698.1 feet of fence was built, at a cost of $5,606.55 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 203.80
Extra guard fence posts furnished by State		24.00
Contract items as follows:		
Standard wood guard fence, 5,691.8 lin. ft. at $0.945	$ 5,378.75	
Total amount paid to contractor		$5,378.75
Grand total cost of constructing guard fence (all State funds)		$ 5,606.55

Oiling Sand Fills

A description of this work will be found on page 236 of the last report under the article devoted to maintenance. This work has been continued into the present biennium and a total of approximately 188 acres have now been oiled. This area covers all of the bad sand blows in the County, but additional oiling will be necessary from time to time in order to keep them under control.

John Day River Bridge

During the period of high water in 1921, one of the bents under the approach to the John Day River Bridge, between Sherman and Gilliam Counties, was undermined and several others were injured or threatened. In view of these occurrences, it was considered advisable to replace that portion of the approaches adjacent to the main spans, with two 80-foot steel truss spans.

Contract No. 561 was accordingly awarded, on June 28, 1922, for this construction to the Portland Bridge Company. Work started on August 1, and is nearly complete at this date. The estimated total cost is $18,000.00, of which $9,348.90 has been paid out to date, all from State funds.

J. O. Madden, Resident Engineer, is in charge of the work.

[GILLIAM]

Heppner Junction Overcrossing

A description of this work is given on page 234 of the last report. During the present biennium, additional expenditures of $1,617.98 have been made, bringing the complete cost of the work to $18,634.37. This entire amount has been advanced by the State, and the sum of $5,877.89 is due from the County for their cooperative share. A portion of the cooperation covers work on the grading and approaches, the cost of which has been charged to the Arlington-Morrow County Line project.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,725.19
Guarding railway from damage		46.92
Items deducted from contractor's estimates:		
Bronze name plates, furnished by State		16.00
Cement furnished by State		2,095.20
Contract items as follows:		
Class "A" concrete, 386.91 cu. yds. at $31.00	$ 11,994.21	
Metal reinforcement, 50,029.0 lbs. at $0.075	3,752.18	
Concrete handrail, 302.0 lin. ft. at $3.00	906.00	
Force account items:		
Brass pipe for expansion joints in handrail	22.98	
Angle irons for expansion joints in slab	152.94	
Extra metal reinforcements	37.95	
Total amount earned by contractor	$ 16,866.26	
Deductions for name plates and cement furnished by State	2,115.20	
Total amount paid to contractor		14,751.06
Grand total cost of structure (all State funds)		$ 18,634.37

Willow Creek Bridge

The details of this project are given on page 234 of the previous report. The work was complete on the date of that report, but owing to financial difficulties on the part of the contractor, final payment was not made until everything was cleared up. The final payment amounted to $3,525.85, bringing the total cost of the work to $23,976.30 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,638.30
Items deducted from contractor's estimates:		
Bronze name places, furnished by State		16.00
Cement furnished by State		2,182.80
Contract items as follows:		
Class "A" concrete, 197.07 cu. yds. at $31.00	$ 6,109.17	
Class "B" concrete, 184.31 cu. yds. at $25.50	4,699.90	
Metal reinforcement, 36,043.0 lbs. at 7½c	2,703.23	
Structural steel, 61,626.0 lbs. at 12c	7,395.12	
Concrete handrail, 300.0 lin. ft. at $3.00	900.00	
Force account items:		
Brass dowels	13.39	
Excess cost of paint	51.05	
Cost of steel bearing plates	155.74	
Cost of sand rejected by Engineer	314.40	
Total amount earned by contractor	$ 22,342.00	
Deductions for name plates and cement furnished by State	2,202.80	
Total amount paid to contractor		20,139.20
Grand total cost of structure (all State funds)		$ 23,976.30

Two Bridges Over Willow Creek

Between Heppner Junction and the Morrow County Line, the Oregon-Washington Highway crosses Willow Creek twice; once on a 40-foot "A"

frame span and once on a 60-foot steel truss span, each with wood approaches. Their estimated cost is $13,500.00, to be paid entirely by the State.

Contract No. 583 providing for their construction was awarded on August 29, 1922, to Tobin & Pierce. Work was begun on October 15, and has been progressing slowly since. J. O. Madden is Resident Engineer on the work, and expenditures have been made to the amount of $1,213.57.

Maintenance

The completed mileage of the Columbia River Highway in Gilliam County is approximately 36.4 miles, and maintenance headquarters for the care of this section have been located at Arlington. From this point it is also the intention to handle the maintenance required on the John Day Highway between Arlington and the Base Line. This latter section will probably be completed about the end of the year and will be immediately taken over for such maintenance work as may be required.

The equipment now on hand at Arlington consists of one quad truck, one grader and all necessary drags, small tools, et cetera. The work done to date consists principally of dragging, blading, cleaning ditches, building up shoulders, widening cuts, cutting weeds and keeping the road open during the unusual snows in November 1921.

Previous to the completion of the Condon North Section, the maintenance between Condon and the Wheeler County Line was handled with equipment from headquarters at Fossil under the supervision of K. D. Lytle, Resident Engineer. Usual maintenance requirements were handled and, in addition, betterment of the Mayville-Wheeler County Line Section was made by adding crushed rock screenings and fine talus. Maintenance rock was also added to the section between Condon and Thirtymile Creek, and the sections south of Condon are now in excellent condition.

Maintenance headquarters for the southern part of the County are now located at Condon and from this location all maintenance between six miles north of Condon and the Wheeler County Line is handled. The equipment on hand consists of a truck, grader, several small drags and miscellaneous small tools.

Heppner Junction-Morrow County Line Survey

During the present biennium a location survey was made for that portion of the Oregon-Washington Highway between Heppner Junction and Morrow County Line and the section is now under contract for grading and surfacing.

The survey follows Willow Creek for its entire length. As the railroad crosses Willow Creek several times and, at various points, is crowded into the hill by the creek several encroachments on the railroad right-of-way were found necessary. The alignment is very nearly tangent and has only a few light curves. Several crossings of the creek were required but were all handled by comparatively short spans. This line was selected in preference to a location following the hill contours which would require greater distance, more curvature and encounter materials more expensive to move. Work on this location was started May 4, 1921, and completed in June of the same year under the supervision of H. C. Compton, Resident Engineer.

[GILLIAM]

Condon-Arlington Survey

This survey was ordered by the Commission on January 4, 1921, and extends from Condon to a junction with the Columbia River Highway in Arlington. The general direction of the line is almost due north from Condon, running through Gwendolen and Juniper Canyon and crossing Rock Creek about one mile west of Olex. The survey practically follows the old road across Shutler Flats, passing through the town of Shutler and down Alkali Canyon to Arlington. Location was started January 20, 1921, and completed in July of the same year, under the direction of H. C. Compton, Resident Engineer.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Gilliam County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 33,365.14
2.	State Funds apportioned to County	47,789.96
3.	County levy made to match State Funds	55,548.06
4.	County Market Road Funds collected	49,769.60
5.	Cash paid to County by State	37,894.68
6.	State expenditures, deducted from apportionment	3,958.07
7.	Cash due County from State in December, 1922	5,937.22
8.	County expenditures on Market Roads	41,498.69
9.	Balance in County Treasury November 1, 1922	45,080.08

From the above statement it is apparent that Gilliam County received from the State Market Road Fund $14,424.82 more than it paid into the fund. The excess is Gilliam County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $55,548.06. Of this amount they have collected and credited to the Market Road fund $49,769.60.

The County Court has designated five roads to be improved as Market Road projects. Expenditures have been made on three projects.

The surveys have been made and plans prepared by engineers in the employ of the State Highway Commission.

The construction work has been of a permanent nature, good alignment and grade having been obtained.

A part of the construction has been done under contracts awarded by the County Court, and part by County forces under the direction of the Roadmaster.

The County Court has expended $41,498.69; has graded 4.8 miles of road and has surfaced with crushed rock 2.8 miles, 12 feet wide.

GRANT COUNTY

Grant County is one of the older settled Counties of Eastern Oregon, and has long been in need of highway facilities. The discovery of placer gold along the John Day River resulted in the creation of mining camps over a half century ago, and was followed by the extension of the Sumpter Valley Railroad, over three separate high divides, to the valley at Prairie City. Agricultural and stock raising activities centered along the river, reaching west of Canyon City as far as Mount Vernon.

Communication with the outside by railroad has been dependent on the indirect route by way of Baker and has been very expensive. For this reason there has been a pressing demand for a highway outlet and this is being answered by the construction of the John Day Highway. At the present time this line has been completed or placed under contract for grading and surfacing from the Wheeler County Line to Cummins Creek. Improvement of the section from Cummins Creek to Cole Bridge is contemplated under contracts to be awarded during the coming winter. East of Cole Bridge the highway is in good condition to Prairie City, and the portion east to Unity is being improved as a Forest Road project. The completion of this highway will provide an outlet to the Columbia River Highway, through Wheeler and Gilliam Counties, and will be of inestimable value.

On the north, the Pendleton-John Day Highway will provide a connection with Pendleton. No construction has yet been undertaken on this highway in Grant County.

On June 7, 1921, by special election, the voters of the County authorized a bond issue of $440,000.00. Of this amount $350,000.00 was designated to be expended on the John Day Highway, $200,000.00 being applied west of John Day and $150,000.00 east of John Day.

All State work in the County was supervised by J. H. Scott, Division Engineer, until April 1 1922, and has been under the supervision of C. W. Wanzer, Division Engineer, since that date.

Unit 4, Sarvice Creek-Valades Ranch Surfacing

Subsequent to the completion of the grading of this section, Grant County requested the Highway Commission to surface Unit 3, agreeing to surface Unit 4 at their own expense in cooperation. As the two units are approximately the same length, the proposal met favor with the Highway Commission and the work has been carried on on that basis.

The surfacing on Unit 4 has been carried on by the County with their own forces and has been handled under the engineering supervision of A. A. Kirkwood, Resident Engineer. The State has expended $2,206.63 for engineering supervision, and the value of the cooperative work done by the County has amounted to $26,260.15. This value is based upon the quantities of work performed, using the same unit prices as in the State contract on Unit 3.

Wheeler County Line-East Surfacing

This section covers Unit 3 of the Sarvice Creek-Valades Ranch Post Road Project, was graded during 1920 and 1921, and extends from the Wheeler County Line south along the John Day River for a distance of 11.36 miles.

On August 30, 1921, Contract 447 was awarded to S. C. Comerford of Boise, Idaho, for the construction of a crushed gravel surfacing over the section and operations were started on September 27. Owing to the

covering of available gravel bars by high water in the John Day River, completion of the work was delayed until September 2, 1922. Suitable gravel was very scattered and the contractor found it necessary to waste a large amount of oversize particles.

Construction was supervised by A. A. Kirkwood, Resident Engineer and has required a total expenditure of $31,925.12 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,545.60
Hardware supplies for construction of drinking fountain (furnished by State)		4.88
Breaking ice jam at Junction Bridge		14.00
Contract items as follows:		
Screened gravel surfacing, 15,435.0 cu. yds. at $1.60	$ 24,696.00	
Force account items:		
Cleaning ditches and removing slides	2,287.17	
Grading approaches to North Fork Bridges	1,775.44	
Bringing roadbed to new grade at Bridge Sta. 425 to 433+50	450.10	
Constructing drinking fountain at spring for convenience of public	117.31	
Extra cost of hauling maintenance materials, Sta. 58 and 278	34.62	
Total amount paid to contractor		$ 29,360.64
Grand total cost of project (all State funds)		$ 31,925.12

Cummins Creek-Valades Ranch Surfacing

As soon as the contract for grading the Cummins Creek-Valades Ranch Section had progressed far enough to justify the action, Contract No. 568 was awarded to Gus Carlson & Company for surfacing the project. This contract was awarded on July 26, 1922. By an accident happening at the rock rusher Mr. Carlson was killed, and the contract was afterwards assigned to Paulus & Retrum. On account of the delays incidental to the administration of Mr. Carlson's estate, and the assignment of the contract, construction of the surfacing was not started until October 26, and very little progress has been made at the end of the biennium.

The work is estimated to cost a total of $53,000.00, and will be shared $28,000.00 by the State and $25,000.00 by the County. A. A. Kirkwood, Resident Engineer has been in charge of this work as well as the grading. Expenditures to date under the surfacing contract amount to $17.97 from State funds.

Danby Ranch-Cole Bridge Surfacing

A description of this project will be found on page 239 of the Fourth Biennial Report. During the present biennium the work was carried to final completion on March 28, 1921.

By the terms of the contract the gravel was screened only, not being segregated below the 1½-inch maximum size. Excellent results have been obtained with this type of surfacing and the section elicited very favorable comment in the community. Equipment was very hard to secure and adverse weather conditions set in before the work was really well under way. Nevertheless the contractor attempted to carry on construction operations during the winter in spite of the weather and the engineering costs have been correspondingly high. The gravel was placed on a new grade that the County was constructing and surfacing operations were often carried on only a few hundred feet behind the grading.

This project was handled under the supervision of C. D. Jones, Resident Engineer, and was paid for entirely from State funds. Expendi-

PICTURE GORGE. ON THE JOHN DAY HIGHWAY IN GRANT COUNTY

tures during the previous biennium amounted to $3,676.21, and to $22,991.79 during the present biennium, making the total cost of the project $26,668.00.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,962.02
Penalty for overrun of time limit (deducted from contractor's estimate)		119.49
Contract items as follows:		
Gravel surfacing, 9,455.5 cu. yds, at $2.45	$ 23,165.98	
Gravel surfacing, 880.0 cu. yds. at $1.75	1,540.00	
Total amount earned by contractor	$ 24,705.98	
Deduction:		
Penalty for overrun of time limit	119.49	
Total amount paid to contractor		$ 24,586.49
Grand total cost of project (all State funds)		$ 26,668.00

Sarvice Creek-Valades Ranch Post Road Project

A complete description of this project will be found on pages 240-1-2 of the Fourth Biennial Report. During the present biennium the project has been carried to completion and the final Government payments have been received.

The total expenditures on the project during the previous biennium amounted to $447,297.48, made up of $15,000.00 received from Grant County, $36,000.00 from Wheeler County, $139,069.27 from the Federal Government and $257,228.21 expended by the State.

Expenditures of $403,132.76 have been made during the present biennium, being made up of $35,000.00 received from Grant County, $224,999.03 from the Federal Government with $143,133.73 expended from State funds.

This brings the total cost of the project to $850,430.24, Grant County cooperating to the extent of $50,000.00, Wheeler County $36,000.00, the Federal Government $364,068.30 and the State paying the balance of $400,361.94.

Unit No. 1 Grading, Wheeler County:

The grading of this section was completed on November 30, 1920. Expenditures of $9,462.62 in addition to the sum of $205,277.42 expended during the previous biennium bring the total cost of the section to $214,740.04, not including the amount expended under maintenance order for the placing of a temporary surfacing over certain portions.

Unit 1 Bridges, Wheeler County:

The structures on this section were completed during the biennium with additional expenditures of $7,362.99. This brings the total cost to $20,822.47.

Unit No. 2 Grading, Wheeler County:

This section was completed on April 28, 1921, and was thrown open to local traffic at that time; however, it was not available for through traffic until September when progress on Units 3 and 4 had advanced far enough to permit traffic over the entire project.

Expenditures during the present biennium amount to $65,548.09, in addition to $101,099.19 expended during the previous biennium, bringing the total cost of the section to $166,647.28.

Unit 2 Bridges, Wheeler County:

Construction of the structure across Haystack Creek was completed on January 5, 1922, additional expenditures of $5,744.75 being made during the biennium. This amount, in addition to $64.15 previously ex-

[GRANT]

pended, brings the total cost of the structure to $5,808.90. Construction was handled by A. G. Skelton, Resident Engineer.

Unit No 3 Grading, Grant County:

Very little progress was made on this section before the winter of 1920, owing to the extreme difficulty in securing supplies, equipment and labor. As Units 2 and 4 neared completion, however, equipment was transferred from them and progress became much better. The grading was practically completed by June 1, 1921, except for a cut in the vicinity of the North Fork Bridge across the John Day River, several small bridges let with the grading contract and culvert headwalls. All of this work, however, was completed during the summer except the cut at the North Fork Bridge. At this point a temporary road was provided and excavated materials were moved and hauled across on a force account basis.

As there were no old roads on this section the bridges had to be built as the grading progressed and it became possible to haul in bridge materials. Later in the summer temporary detours were provided around all the bridges not in place, and traffic was permitted to go through.

Expenditures during the previous biennium amounted to $30,258.40. Expenditures of $113,117.63 during the present biennium bring the total cost of the section to $153,476.03.

Unit 3 Bridges, Grant County:

Work on the construction of the structures on this section was started on November 5, 1920, and was completed on October 6, 1921, at a total cost of $60,649.74. No expenditures were made at the time of closing the previous report and the entire cost has been paid out during the present biennium. This work was handled by A. G. Skelton, Resident Engineer.

Unit 4 Grading, Grant County:

This section was completed May 28, 1921, except for the bridges. In August temporary detours were built around these bridge sites and the section was opened for traffic.

Expenditures during the previous biennium amounted to $87,038.84. The sum of $98,917.80 has been expended during the present biennium, bringing the total cost of the section to $185,956.74.

Unit 4 Bridges, Grant County:

Contract 326 was awarded on February 1, 1921, to James F. Clarkson of Portland, Oregon, for the construction of four bridges on this unit. These structures consist of three wood bridges of 40-foot, 75-foot and 105-foot spans, respectively, each with wood approaches. The other structure is a small wood trestle.

Work was started on May 20, 1921, and completed October 24 of the same year, with a cost of $42,329.04, being handled under the supervision of A. G. Skelton, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

GRADING, UNIT No. 1—

Engineering		$ 12,477.93
Contract items as follows:		
Common excavation, 58,875.1 cu. yds. at 90c	$ 52,987.59	
Solid rock excavation, 59,394.0 cu. yds. at $2.15	127,697.10	
Overhaul, 6,935.0 sta. yds, at 5c	346.75	
12-inch corrugated galvanized iron pipe, 3,158.0 lin. ft. at $2.10	6,631.80	
18-inch corrugated galvanized iron pipe, 856.0 lin. ft. at $3.00	2,568.00	
24-inch corrugated galvanized iron pipe, 220.0 lin. ft. at $3.50	770.00	
36-inch corrugated galvanized iron pipe, 70.0 lin. ft. at $6.00	420.00	

[GRANT]

EXPENDITURES—Continued

Rubble masonry, 343.03 cu. yds. at $10.00	3,430.30	
Lumber and timber 75.39 M-FBM at $68.30	5,149.14	
Adjustment to cover excess cost of bridge timbers	2,213.45	
Force account items:		
Moving fence off right-of-way	19.80	
Painting bridge timbers with carbolineum	28.18	
Total amount paid to Jas. F. Clarkson, contractor		202,262.11
Grand total cost of grading Unit No. 1		$214,740.04
Paid by State	$ 92,149.76	
Paid by County	28,500.00	
Paid by Government	94,090.28	
Total	$214,740.04	

BRIDGES, UNIT No. 1—

Engineering		$ 1,392.77
Contract items as follows:		
Bridge Over Mule Shoe Creek		
Class "B" concrete, 36.463 cu. yds. at $35.00	$ 1,276.21	
Wood trestle approach, 38.0 lin. ft. at $12.00	456.00	
90-foot wood truss span, all at $4,000.00	4,000.00	
Bridge Over Alder Creek		
Class "B" concrete, 41.439 cu. yds. at $35.00	1,450.36	
Wood trestle approach, 38.0 lin. ft. at $12.00	456.00	
70-foot wood truss span, all at $3,000.00	3,000.00	
Bridge Over Kohler Creek		
Class "B" concrete, 40.7 cu. yds. at $35.00	1,424.00	
Wood trestle approach, 17.0 lin. ft. at $12.00	204.00	
108-foot wood truss span, all at $5,500.00	5,500.00	
Force account items:		
Adding additional bracing and painting timber ends with carbolineum	1,662.63	
Total amount paid to Jas. F. Clarkson, contractor		19,429.70
Grand total cost of structures on Unit No. 1		$ 20,822.47
Paid by State	$ 11,508.10	
Paid by Government	9,314.37	
Total	$ 20,822.47	

GRADING, UNIT No. 2—

Engineering		$ 17,819.67
6-inch drain tile furnished by State (deducted from contractor's estimate)		37.00
Contract items as follows:		
Common excavation, 68,818.2 cu. yds. at 90c	$ 61,963.38	
Solid rock excavation, 30,218.2 cu. yds. at $2.15	64,969.13	
Overhaul, 21,516.0 sta. yds. at 5c	1,075.80	
12-inch corrugated galvanized iron pipe, 16 gauge, 3,254.0 lin. ft. at $2.10	6,833.40	
18-inch corrugated galvanized iron pipe, 16 gauge, 626.0 lin. ft. at $3.00	1,878.00	
24-inch corrugated galvanized iron pipe, 16 gauge, 458.0 lin. ft. at $4.00	1,832.00	
24-inch corrugated galvanized iron pipe, 14 gauge, 138.0 lin. ft. at $4.89	674.82	
36-inch corrugated galvanized iron pipe, 14 gauge, 32.0 lin. ft. at $6.00	192.00	
36-inch corrugated galvanized iron pipe, 12 gauge, 96.0 lin. ft. at $8.82	846.72	
Rubble masonry, 177.65 cu. yds. at $12.00	2,131.80	
Riprap, 34.1 cu. yds. at $5.00	170.50	
Lumber and timber, 58.385 M.-FBM. at $100.00	5,838.50	
Force account items:		
Painting bridge timbers with carbolineum	22.91	
Placing earth cushion on rock fills	398.65	
Total amount earned by contractor	$148,827.61	
Deductions:		
6-inch porous drain tile furnish by State	37.00	
Total amount paid to Jas. F. Clarkson, contractor		148,790.61
Grand total cost of grading Unit No. 2		$166,647.28

[GRANT]

EXPENDITURES—Continued

Paid by State	$ 89,842.32	
Paid by County	7,500.00	
Paid by Government	69,304.96	
Total	$166,647.28	

BRIDGES, UNIT No. 2—

Engineering		$ 281.94
Contract items as follows:		
40-foot wood truss span, one	$ 2,500 00	
Excavation to plan elevation, 62.71 cu. yds. at $6.00	376.26	
Excavation below elevation shown on plans, 7.13 cu. yds. at $10.00	71.30	
Class "B" concrete, 30.06 cu. yds. at $40.00	1,202.40	
Approach trestle, 38.0 lin. ft. at $28.00	1,064.00	
Lumber and timber, 2.504 M-FBM at $125.00	313.00	
Total amount paid to Curtis Gardner, contractor		5,526.96
Grand total cost of structure		$ 5,808.90
Paid by State	$ 3,159.33	
Paid by Government	2,649.57	
Total	$ 5,808.90	

GRADING, UNIT No. 3—

Engineering		$ 13,062.23
Constructing approaches to Hay Stack Creek Bridge with State forces		412.95
Contract items as follows:		
Clearing and grubbing, all	$ 500.00	
Common excavation, 43,301.0 cu. yds. at 85c	36,805.85	
Intermediate excavation, 40,943.3 cu. yds. at 95c	38,896.14	
Solid rock excavation, 17,491.2 cu. yds. at $2.50	43,728.00	
Overhaul, 42,596.0 sta. yds. at 5c	2,129.80	
12-inch corrugated galvanized iron pipe, 16 gauge, 1,728.0 lin. ft. at $2.25	3,888.00	
15-inch corrugated galvanized iron pipe, 16 gauge, 1,014.0 lin. ft. at $3.00	3,042.00	
18-inch corrugated galvanized iron pipe, 14 gauge, 418.0 lin. ft. at $3.50	1,463.00	
24-inch corrugated galvanized iron pipe, 14 gauge, 126.0 lin. ft. at $7.00	882.00	
18-inch corrugated galvanized iron pipe, 16 gauge, 228.0 lin. ft. at $3.50	798.00	
24-inch corrugated galvanized iron pipe, 16 gauge, 110.0 lin. ft. at $7.00	770.00	
6-inch porous drain tile, 494.0 lin. ft. at 50c	247.00	
Class "B" concrete, 15.386 cu. yds. at $50.00	769.30	
Lumber and timber, 41.042 M-FBM at $100.00	4,104.20	
Rubble masonry, 157.51 cu. yds. at $12.00	1,890.12	
Force account items:		
Constructing temporary detours around bridges and treating exposed timbers with carbolineum	87.44	
Total amount paid to Jas. F. Clarkson, contractor		140,000.85
Grand total cost of grading Unit No. 3		$153,476.03
Paid by State	$ 54,612.72	
Paid by County	32,500.00	
Paid by Government	66,363.31	
Total	$153,476.03	

BRIDGES, UNIT No. 3—

Engineering		$ 2,172.98
Bronze name plates for North Fork Bridge, furnished by State		14.50
Additional steel to reinforce structures, furnished by State		74.63
Contract items as follows:		
Bridge Over North Fork of John Day River		
Excavation to plan elevation, 286.48 cu. yds. at $7.50	$ 2,148.60	
Excavation below elevation shown on plans, 84.31 cu. yds. at $10.00	843.10	
Class "A" concrete, 13.17 cu. yds. at $40.00	526.80	
Class "B" concrete, 205.94 cu. yds. at $40.00	8,237.60	
Metal reinforcement, 3,901.0 lbs. at 12c	468.12	
Lumber and timber, 8.342 M-FBM at $125.00	1,042.75	
Wooden approach trestle, 152.0 lin. ft. at $28.00	4,256.00	
105-foot wood truss span, two, each at $10,000.00	20,000.00	

[GRANT]

EXPENDITURES—Continued

Bridge Over Holmes Creek

Excavation to plan elevation, 109.55 cu. yds. at $7.50	821.63	
Excavation below elevation shown on plans, 1.47 cu. yds. at $10.00	14.70	
Class "B" concrete, 33.71 cu. yds. at $40.00	1,348.40	
Metal reinforcement, 532.0 lbs. at 12c	63.84	
Lumber and timber, 3.603 M-FBM at $125.00	450.38	
Wooden approach trestle, 57.0 lin. ft. at $28.00	1,596.00	
40-foot wood truss span, one at $2,500.00	2,500.00	

Bridge No. 239 Over Water Spout Gulch

Excavation to plan elevation, 103.86 cu. yds. at $7.50	778.95	
Excavation below elevation shown on plans, 13.79 cu. yds. at $10.00	137.90	
Class "B" concrete, 41.97 cu. yds. at $40.00	1,678.80	
Reinforcing steel, 531.0 lbs. at 12c	63.72	
Lumber and timber, 1.04 M-FBM at $125.00	130.00	
Wooden approach trestle, 18.0 lin. ft. at $28.00	504.00	
40-ft. wood truss span, one at $2,500.00	2,500.00	

Bridge No. 241 Over Water Spout Gulch

Excavation to plan elevation, 107.33 cu. yds. at $7.50	804.98	
Excavation below elevation shown on plans, 1.06 cu. yds. at $10.00	10.60	
Class "B" concrete, 38.62 cu. yds. at $40.00	1,544.80	
Metal reinforcement, 531.0 lbs. at 12c	63.72	
Lumber and timber, 0.98 M-FBM at $125.00	122.50	
Wooden approach trestle, 12.0 lin. ft. at $28.00	336.00	
40-ft. wood truss span, one at $2,500.00	2,500.00	

Bridge No. 240 Over Water Spout Gulch

Excavation to plan elevation, 43.73 cu. yds. at $7.50	327.98	
Excavation below elevation shown on plans, 2.86 cu. yds. at $10.00	28.60	
Class "B" concrete, 19.24 cu. yds. at $40.00	769.60	
Metal reinforcement, 531.0 lbs. at 12c	63.72	
Lumber and timber, 1.435 M-FBM at $125.00	179.38	
Wooden approach trestle, 65.0 lin. ft. at $28.00	1,820.00	
Force account items:		
Constructing bridge approach fills	141.56	
Total amount earned by contractor	$ 58,824.73	
Deductions:		
Penalty for overrun of time limit	337.10	
Final payment retained until settlement of Bessonette labor claim	100.00	
Total amount paid to Curtis Gardner, contractor		58,387.63
Grand total expended, structures on Unit No. 3		$ 60,649.74
Paid by State	$ 32,449.77	
Paid by Government	28,199.97	
Total	$ 60,649.74	

GRADING, UNIT NO. 4—

Engineering		$ 19,944.35
Constructing detours around bridge sites (State forces)		88.37
Rental of industrial track and trucks owned by State (deducted from contractor's estimate)		1,558.41
Contract items as follows:		
Clearing and grubbing, all	$ 500.00	
Common excavation, 38,651.8 cu. yds. at $1.00	38,651.80	
Intermediate excavation, 44,595.9 cu. yds. at $1.00	44,595.90	
Solid rock excavation, 29,456.8 cu. yds. at $1.90	55,967.92	
Overhaul, 28,056.0 cu. yds. at 5c	1,402.80	
12-inch corrugated galvanized iron pipe, 1,490.0 lin. ft. at $2.50	3,725.00	
15-inch corrugated galvanized iron pipe, 716.0 lin. ft. at $2.82	2,019.12	
18-inch corrugated galvanized iron pipe, 766.0 lin. ft. at $3.25	2,489.50	
24-inch corrugated galvanized iron pipe, 412.0 lin. ft. at $4.91	2,022.92	
36-inch corrugated galvanized iron pipe, 36.0 lin. ft. at $9.14	329.04	
6-inch porous drain tile, 1,196.0 lin. ft. at 40c	478.40	
Rubble masonry, 375.4 cu. yds. at $12.00	4,504.80	
Class "B" concrete, 135.37 cu. yds. at $50.00	6,768.50	
Lumber and timber, 43.94 M-FBM at $80.00	3,515.20	

[GRANT]

EXPENDITURES—Continued

Force account items:		
Treating exposed bridge timbers with carbolineum and strengthening bridges with extra bolts	208.62	
Riprapping fill slopes to protect against high water	2,527.07	
Backfilling drain tile ditches with coarse gravel	100.92	
Furnishing and placing 36-inch metal flume	1,199.98	
Total amount earned by contractor	$171,007.49	
Deductions:		
Rental of State-owned industrial track and trucks	1,558.41	
Percentage retained until completion of contract	5,083.47	
Total amount paid to A. D. Kern, contractor		164,365.61
Grand total expended for grading Unit No. 4		$185,956.74
Paid by State	$ 93,881.59	
Paid by County	17,500.00	
Paid by Government	74,575.15	
Total	$185,956.74	

BRIDGES, UNIT NO. 4—

Engineering		$ 1,306.88
Contract items as follows:		
Bridge Over Rattlesnake Creek		
Excavation to plan elevation, 50.28 cu. yds. at $6.00	$ 301.68	
Excavation below elevation shown on plans, 2.87 cu. yds. at $12.00	34.44	
Class "B" concrete, 33.84 cu. yds. at $40.00	1,273.60	
Metal reinforcement, 612.0 lbs. at 12c	73.44	
Trestle approach substructure, 1.226 M-FBM at $150.00	183.90	
Trestle approach superstructure, 40.0 lin. ft. at $37.50	1,500.00	
40-foot wood truss span, one at $3,000.00	3,000.00	
Bridge Over Rock Creek		
Excavation to plan elevation, 129.80 cu. yds. at $6.00	778.80	
Excavation below elevation shown on plans, 27.64 cu. yds. at $12.00	331.68	
Class "A" concrete, 8.38 cu. yds at $45.00	377.10	
Class "B" concrete, 82.88 cu. yds. at $40.00	3,315.20	
Metal reinforcement, 1,446.0 lbs. at 12c	173.52	
Trestle approach substructure, 1.1 M-FBM at $150.00	165.00	
Trestle approach superstructure, 42.0 lin. ft. at $37.50	1,575.00	
75-foot wood truss span, one at $6,000.00	6,000.00	
Bridge Over John Day River		
Excavation to plan elevation, 245.67 cu. yds at $6.00	1,474.02	
Excavation below elevation shown on plans, 10.72 cu. yds. at $12.00	128.64	
Class "A" concrete, 8.66 cu. yds. at $45.00	389.70	
Class "B" concrete, 116.64 cu. yds. at $40.00	4,665.60	
Metal reinforcement, 2,146.0 lbs. at 12c	257.52	
Trestle approach substructure, 3.22 M-FBM at $150.00	483.00	
Trestle approach superstructure, 76.0 lin. ft. at $37.50	2,850.00	
105-foot wood truss span, one at $8,500.00	8,500.00	
Bridge Over Water Spout Gulch		
Excavation to plan elevation, 40.27 cu. yds at $6.00	241.62	
Excavation below elevation shown on plans, 9.47 cu. yds. at $12.00	113.64	
Class "B" concrete, 17.33 cu. yds. at $40.00	693.20	
Metal reinforcement, 723.0 lbs. at 12c	86.76	
Trestle approach substructure, 1.164 M-FBM at $150.00	174.60	
Trestle approach superstructure, 47.0 lin. ft. at $37.50	1,762.50	
Force account items:		
Furnishing and placing extra material to reinforce structure	98.88	
Riprapping and backfilling bridge ends	19.12	
Total amount paid to Jas. F. Clarkson, contractor		41,022.16
Grand total cost of structures on Unit No. 4		$ 42,329.04
Paid by State	$ 22,758.35	
Paid by Government	19,570.69	
Total	$ 42,329.04	

[GRANT]

GRAND SUMMARY OF EXPENDITURES

	State	County	Government	Total
Grading, Unit No. 1	$ 92,149.76	$ 28,500.00	$ 94,090.28	$214,740.04
Bridges on Unit No. 1	11,508.10	.....	9,314.37	20,822.47
Grading, Unit No. 2	89,842.32	7,500.00	69,304.96	166,647.28
Bridges on Unit No. 2	3,159.33	.....	2,649.57	5,808.90
Grading, Unit No. 3	54,612.72	32,500.00	66,363.31	153,476.03
Bridges on Unit No. 3	32,449.77	.....	28,199.97	60,649.74
Grading, Unit No. 4	93,881.59	17,500.00	74,575.15	185,956.74
Bridges on Unit No. 4	22,758.35	.....	19,570.69	42,329.04
Totals	$400,361.94	$ 86,000.00	$364,068.30	$850,430.24

Cummins Creek-Valades Ranch Grading

On April 15, 1922, Contract No. 511 was awarded to Gus Carlson & Company of Boise, Idaho, for grading 14.74 miles of the John Day Highway between Cummins Creek and the south end of the improved section at Valades Ranch.

Work was started early in May and at the end of the biennium all but 1.5 miles have been completed. Some rock work and one of the heaviest earth cuts on the section are yet to be finished. The contractor make good progress from the start, and would have finished on time except for an accident which cost him his life. The work was then delayed, due to administration of the estate, but is expected to be completed in February of 1923.

A. A. Kirkwood, Resident Engineer, has had supervision of the project which is estimated to cost a total of $116,000.00. Of this amount, the County will cooperate to the extent of $54,000.00, leaving a balance of $62,000.00 to be paid by the State. Expenditures to date amount to $52,484.96, and have been paid $28,057.95 by the State and $24,427.01 by Grant County.

John Day River Bridges

The John Day River Highway crosses the John Day River twice in the vicinity of Dayville, once on a 70-foot steel span with wood approaches and once on a bridge consisting of two such spans, also with wood approaches.

Contract No. 552, covering the construction of these bridges, was awarded to Lindstrom & Feigenson on May 31, 1922. Work was started on July 13, 1922, and is about half completed at the present time. The estimated cost is $35,000.00, to be paid $19,000.00 by the State and $16,000.00 by the County. Under the supervision of Mervyn Stephenson Resident Engineer, expenditures of $7,806.10 have been made. These expenditures have been made up of $4,573.59 of State funds and $3,232.51 of County funds.

Prairie City-Austin Forest Road Project

The portion of the Prairie City-Unity Project between Prairie City and a point approximately 2.5 miles south of Austin is being graded and surfaced by the Federal Government under contract awarded to Siems & Carlson in the spring of 1922. This section is 17 miles in length and is estimated to cost a total of $277,000.00.

The project agreement in force on the project calls for a total estimated amount of $300,000.00, to be paid equally by the County and the Federal Government. Expenditures to date amount to $21,075.97 and have been paid entirely by the Government.

[GRANT]

Canyon Creek-Danby Ranch Construction Engineering

The grading, and a portion of the surfacing, of this section was accomplished by County forces during the previous biennium, and a description thereof is given on page 242 of the last report.

In the spring of 1921, the County was able to resume operations and decided to surface the balance of the section and to resurface such portions as had been previously graveled, in order to bring the entire distance to first-class condition.

In carrying on the work, the County desired to use as superintendent the engineer assigned by the State for inspection of the work. Under this arrangement 95 per cent of his salary was paid by the county and 5 per cent by the State. Results were very satisfactory and excellent surfacing has been secured at a very low cost per cubic yard for all materials placed.

Construction was handled by K. C. Roberts, Resident Engineer.

Maintenance

Maintenance work in Grant County has been confined principally to that section of the John Day Highway between Coles Bridge and Prairie City, being accomplished from headquarters at John Day. The routine work has consisted of dragging, cleaning ditches and culverts, cutting weeds, etc.

On the section between John Day and Prairie City additional gravel has been added where the surfacing had cut through during wet weather, and more culverts were built in order to keep the road more satisfactorily drained. This work was handled by means of a Ford truck and small drags, with local labor and teams being employed as necessary.

Upon the completion of the surfacing of Unit 3 of the Sarvice-Valades Ranch Section in April, 1922, a maintenance force was organized with headquarters at Dayville under the supervision of A. A. Kirkwood, Resident Engineer. Equipment consisting of one quad truck, grader and small drag has been provided in addition to miscellaneous small tools. Unit 4 was completed during September, and the entire section between the Wheeler County Line and Dayville is now in excellent condition. On the total distance, ditches have been cleaned, slides removed and the surfacing dragged as necessary.

Valades Ranch-Coles Bridge Survey

Preparatory to awarding contracts for improvement of the John Day Highway, the State Highway Commission ordered surveys of all unlocated portions between Valades Ranch and Coles Bridge. In accordance therewith field location was started in November of 1921 and completed in March, 1922, under the supervision of C. R. Burns, Locating Engineer. Subsequent to this time, revision has been made of approximately three miles, east of Cummins Creek, placing the line on the south side of the river instead of on the north side as orginally located.

Prairie City-Forest Boundary Survey

When Grant County passed their bond issue at the general 1921 election, request was made by the County Court for surveys of all uncompleted sections of the John Day Highway in the County. On account of snow conditions which prevail during the winter east of Prairie City, the section between Prairie City and the Forest Boundary

was put first on the list of the surveys to be made. The located line follows a route favorably reported on from a previous reconnaissance, and is the route which was designated for cooperation from the County bond issue. It starts at the Forest Boundary on the top of Dixie Mountain at a point approximately one-half mile north of Dixie Station. The line crosses the railroad by means of a proposed overhead structure at the highest point on the mountain, and the grade is carried down by means of loops used to develop distance in order to miss switch-backs in the railroad location. The line then follows down Jeff Davis Creek to within one-half a mile of the John Day Valley. From this point, it swings west, crosses Dods Creek and the Sumpter Valley Railroad, and extends on to Prairie City.

The present road is blocked with snow during the winter and becomes so muddy that it can only be used a short time during the year. The new line will provide for the old road being left open in order to be used as a stock driveway.

Surveys on the section were handled by C. R. Burns, Locating Engineer.

Prairie City-Unity Forest Road Project Survey

This project extends from Prairie City in Grant County to Unity in Baker County, a total estimated distance of 48 miles. The survey of the section has been undertaken by the Federal Government under an agreement whereby the State and Government are to pay $2,500.00 each, Baker County $584.00 and Grant County $1,416.00, in an estimated total cost of $7,000.00. Subsequent to this arrangement the State made a survey between Prairie City and the Forest Boundary, and the Government now has under way the balance of the location between the Forest Boundary and Unity.

Expenditures to date amount to $3,724.44, and have been paid $2,500.00 by the State and $1,224.44 by the Federal Government.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Grant County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 24,789.88
2.	State Funds apportioned to County	36,069.74
3.	County levy made to match State Funds	47,249.05
4.	County Market Road Funds collected	61,471.99
5.	Cash paid to County by State	30,355.47
6.	State expenditures, deducted from apportionment	16.04
7.	Cash due County from State in December, 1922	5,698.23
8.	County expenditures on Market Roads	85,718.76
9.	Balance in County Treasury November 1, 1922	6,108.70

From the above statement it is apparent that Grant County received from the State Market Road Fund $11,279.86 more than it paid into the fund. The excess is Grant County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $47,249.05. Of this amount they have collected and credited to the Market Road Fund $49,471.99, or $2,222.94 more than the amount that they were expected to put into their County Market Road Fund.

[GRANT]

The County Court has designated five roads to be improved as Market Road projects, namely, Ritter-Mt. Vernon, Monument-Kimberly Junction, Ritter-Umatilla County Line, John Day, via Canyon City, Bear Valley, and Silvies, to the Harney County Line and Canyon Creek Extension-Vance Creek-Brierly. Five sections of the Ritter-Mt. Vernon Road, three sections of the Monument-Kimberly Junction and one section of the Canyon Creek-Vance Creek-Bierly Road have been improved.

The engineering work has been done by L. E. Lucas, County Engineer, and plans have been submitted to this office for approval. Most of the construction work has been done by County forces under the direction of the County Court.

The County Court has expended $85,718.76. They have graded 12.8 miles of roadbed, 12 feet or 14 feet in width.

HARNEY COUNTY

During the period covered by the Fourth Biennial Report a number of surveys on State highways were made in Harney County, and the section of the Central Oregon Highway between Burns and Lawen, over a distance of 16.73 miles, was graded and macadamized. In addition to this work, approximately 14.0 miles of market roads were graded.

During the biennium just passed the section between Lawen and Crane, a distance of 10.46 miles, was graded and macadamized, connecting Burns with the rail head at Crane. This is the most important section of highway in Harney County because it permits transportation of passengers and freight from Crane to Burns at all times of the year.

In addition to the completion of the section of the Central Oregon Highway between Burns and Crane, 14.52 miles between Burns and Sage Hen Hill were graded. From the summit of Sage Hen Hill the present county road is in fair condition for summer traffic the entire distance to Bend.

On the first of September, 1922, construction was started on grading and surfacing the four-mile connection between what is known as the Burns-Crane and the Burns-Sage Hen Hill sections. This section, when graded and macadamized, will give a continuous stretch of 45 miles of improved road on the Central Oregon Highway, of which approximately 31 miles will be macadamized. It is expected that the four-mile section above referred to will be completed shortly after the first of the coming year.

During the years 1921 and 1922, approximately 54 miles of market roads were surveyed and 17 miles constructed.

The work in Harney County was under the supervision of E. B. Bishop, Division Engineer, during 1921, and in 1922 was in charge of R. H. Baldock Division Engineer.

Burns Section Surfacing

On August 29, 1922, Contract 590, for grading 3.82 miles and surfacing 4.2 miles between the east end of the Burns-Sage Hen Hill Section and the west end of the Burns-Lawen Section, was awarded to E. E. Larson. Work was started on September 1, and is expected to be completed during the coming winter, the total estimated cost being $22,000.00. Of this amount, the County will cooperate to the extent of $5,000.00, with the State paying the balance of $17,000.00.

Construction is proceeding under the supervision of M. V. Dodge, Resident Engineer, and has occasioned expenditures to date of $1,103.66. This amount has been paid entirely from State funds.

Sage Hen Summit-Burns Grading

On May 26, 1921, Contract No. 373, for grading 14.52 miles of the Central Oregon Highway between the summit of Sage Hen Hill and the south city limits of Burns, was awarded to Gus Carlson & Company of Boise, Idaho. The improvement eliminated the worst remaining stretch on the Central Oregon Highway in Harney County and provides a good transportation medium to a large percentage of the population living south and west of Burns.

The section begins at Burns and extends by easy curves and light grades through the Silves River Valley to the summit of Sage Hen Gulch and when surfaced will provide an all-round road.

The grading of this section was completed October 18 1921, under the direction of P. O. Harding, with expenditures of $46,908.20 from

[HARNEY]

State funds and $14,398.60 from County funds; the completed project representing a total cost of $61,306.80.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,712.40
Hauling material for fill through swamp at Station 1589		81.08
Prospecting for quarry sites		69.50
Contract items as follows:		
Clearing and grubbing, all	$ 600.00	
Common excavation, 43,422.8 cu. yds. at 35c	15,197.98	
Intermediate excavation, 6,492.2 cu. yds. at 90c	5,842.98	
Solid rock excavation, 9,127.3 cu. yds. at $2.75	25,100.08	
Overhaul, 26,833.0 sta. yds. at 10c	2,683.30	
12-inch corrugated galvanized iron pipe, 1,384.0 lin. ft. at $2.20	3,044.80	
18-inch corrugated galvanized iron pipe, 304.0 lin. ft. at $3.60	1,094.40	
24-inch corrugated galvanized iron pipe, 302.0 lin. ft. at $4.60	1,389.20	
36-inch corrugated galvanized iron pipe, 122.0 lin. ft. at $9.00	1,098.00	
Rubble masonry, 115.3 cu. yds. at $12.00	1,383.60	
Force account items:		
Repairing right-of-way fence	9.48	
Total amount paid to contractor		57,443.82
Grand total cost of project		$ 61,306.80
Paid by State	$ 46,908.20	
Paid by County	14,398.60	
Total	$ 61,306.80	

Lawen-Crane Post Road Project

A description of this project will be found on page 246 of the Fourth Biennial Report. A correction, however, is made changing the mileage of the project from 10.46 to 10.48 miles.

The work was carried to final completion on November 19, 1921, at a total cost of $148,057.06, including expenditures of $210.23 from State funds during the previous biennium. The Federal Government cooperated to the extent of $73,019.44 and Harney County to the extent of $20,000.00, leaving $55,037.62 expended from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,024.30
Powder furnished by State free to contractor		2,447.76
Sprinkling macadam with State forces		3,278.83
Rental of State-owned tractor (deducted from contractor's estimate)		1,255.03
Contract items as follows:		
Clearing and grubbing, all	$ 4,266.67	
Common excavation, 50,300.00 cu. yds. at 50c	25,150.00	
Overhaul, 743.0 sta. yds. at 15c	111.45	
12-inch plain concrete pipe, 837.0 lin. ft. at $1.50	1,255.50	
18-inch reinforced concrete pipe, 148.0 lin. ft. at $3.20	473.60	
24-inch reinforced concrete pipe, 120.0 lin. ft. at $4.25	510.00	
Class "B" concrete, 9.24 cu. yds. at $40.00	369.60	
Class "C" concrete, 66.44 cu. yds. at $40.00	2,657.60	
Lumber and timber, 12.13 M-FBM at $100.00	1,213.00	
Crushed rock surfacing, 23,069.0 cu. yds. at $4.25	98,043.25	
Earth filler, 4,511.0 cu. yds. at 50c	2,255.50	
Total amount earned by contractor	$136,306.17	
Deduction for rental of State-owned tractor	1,255.03	
Total amount paid to contractor		135,051.14
Grand total cost of project		$148,057.06

EXPENDITURES—Continued

Paid by State	$ 55,037.62
Paid by County	20,000.00
Paid by Government	73,019.44
Total	$148,057.06

Burns-Lawen Post Road Project

A description of this project will be found on pages 245-6 of the Fourth Biennial Report. The project has been finished, being carried to final completion on December 4, 1920. During the present biennium final expenditures of $53,852.27 have been made. This brings the total cost of the project to $260,154.82, which has been paid $119,207.97 by the State, $33,000.00 by Harney County and $107,946.85 by the Federal Government.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 14,036.80
Sprinkling macadam with State forces		4,452.70
Rental of State owned equipment (deducted from contractor's estimate)		6,009.15
Contract items as follows:		
Clearing and grubbing, all	$ 2,315.40	
Common excavation, 76,138.0 cu. yds. at 50c	38,069.00	
Common excavation stripping gravel pit, 31,538.0 cu. yds. at 30c	9,461.40	
12-inch corrugated galvanized iron pipe, 1,330.0 lin. ft. at $1.80	2,394.00	
18-inch corrugated galvanized iron pipe, 200.0 lin. ft. at $3.50	700.00	
24-inch corrugated galvanized iron pipe, 246.0 lin. ft. at $6.00	1,476.00	
Class "B" concrete, 6.72 cu. yds. at $40.00	268.80	
Class "C" concrete, 61.29 cu. yds. at $38.00	2,329.02	
Lumber and timber, 4.87 M-FBM at $60.00	292.20	
Run-of-bank gravel surfacing, 35,004.0 cu. yds. at $1.40	49,005.60	
Payhaul on gravel, 217,785.0 yd. miles at 55c	119,781.75	
Adjustments to cover development of gravel pit which was later abandoned	2,299.95	
Adjustment to cover extra dragging and reshaping	11,201.28	
Force account items:		
Repairing bridges and constructing handrails	1,209.05	
Redistributing culvert pipe account change in plans	70.34	
Sprinkling macadam to secure good bond	744.37	
Wrecking old abandoned bridge	8.50	
Painting handrails on bridges	38.66	
Total amount earned by contractor	$241,665.32	
Deduction:		
Rental of State-owned equipment	6,009.15	
Total amount paid to contractor		235,656.17
Grand total cost of project		$260,154.82
Paid by State	$119,207.97	
Paid by County	33,000.00	
Paid by Government	107,946.85	
Total	$260,154.82	

Summit Springs Market Road Grading

This section is on a County road approximately 26 miles southeast of Crane, and was awarded by the Highway Commission at the request of Harney County, being paid for from the County Market Road Fund.

The work being done covers 8.14 miles of grading, awarded under Contract No. 479 to Jetley Bros. on October 26, 1921.

Construction is being supervised by M. V. Dodge, Resident Engineer, and has occasioned expenditures of $14,790.37 from County funds, out of a total estimated cost of $22,500.00.

[HARNEY]

DETAILED STATEMENT OF EXPENDITURES

Contract items as follows:		
Clearing and grubbing, 70 per cent at $250.00	$ 192.50	
Common excavation, 7,870.0 cu. yds. at 40c	3,148.00	
Intermediate excavation, 6,471.0 cu. yds. at 55c	3,559.05	
Solid rock excavation, 4,251.0 cu. yds. at $1.15	4,888.65	
Overhaul, 1,648.0 sta. yds. at 9c	148.32	
Installing 12-inch corrugated galvanized iron pipe, 368.0 lin. ft. at 10c	36.80	
Installing 18-inch corrugated galvanized iron pipe, 64.0 lin. ft. at 20c	12.80	
Installing 36-inch corrugated galvanized iron pipe, 36.0 lin. ft. at 30c	10.80	
Installing 48-inch corrugated galvanized iron pipe, 22.0 lin. ft. at 40c	8.80	
Dry rubble masonry, 1,079.0 cu. yds. at $3.25	3,506.75	
Excavation for culvert pipe, 280.0 cu. yds. at $1.50	420.00	
Riprap, 55.0 cu. yds. at $1.75	96.25	
Force account items:		
Cutting back cut slopes to prevent slides	144.73	
Total amount earned by contractor	$ 16,173.45	
Percentage retained until completion of contract	1,383.08	
Total amount paid to contractor		14,790.37
Grand total expended from County funds		$ 14,790.37

State engineering expenditures, amounting to $3,078.40, are included in the tabulation of Expenditures on Market Roads, on page 95.

Maintenance

During 1921 there were approximately 17 miles of the Central Oregon Highway under maintenance in the County. At the close of 1922 there are 41.7 miles under maintenance, of which 27.2 are surfaced and 14.5 are graded earth roadbed.

Patrol work in the County has been handled under the supervision of Roy McGee, County Roadmaster. Traffic has not been heavy and the only work required has consisted of blading and dragging, as required. A State truck was used for this work.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Harney County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 34,650.40
2.	State Funds apportioned to County	51,399.11
3.	County levy made to match State Funds	49,855.32
4.	County Market Road Funds collected	33,540.69
5.	Cash paid to County by State	41,987.25
6.	State expenditures, deducted from apportionment	5,117.03
7.	Cash due County from State in December, 1922	4,296.83
8.	County expenditures on Market Roads	52,930.43
9.	Balance in County Treasury November 1, 1922	22,597.51

From the above statement it is apparent that Harney County received from the State Market Road Fund $16,748.71 more than it paid into the fund. The excess is Harney County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $48,855.32. Of this amount they have collected and credited to the Market Road Fund only $33,540.69.

In 1920 the County Court reported that they had made a County levy which would produce $12,883.07. The State Highway Commission apportioned to the County $15,905.50, but they collected only $6,747.09 of County funds. In 1921 they reported a County levy of $19,320.55. The State Highway Commission apportioned to them $19,320.55, but they collected only $14,670.58. In 1922 they reported a levy of $17,651.70. The State Highway Commission apportioned to them $16,173.06, but they had collected, to November 1, only $12,223.02. During the three-year period they have put into their County Market Road Fund less than 70 per cent of the amount of County funds pledged and have received their full share of State funds. The State Highway Commission has no control over the collection of County taxes and can only assume that the County Courts will put into the fund the full amount pledged. Many other Counties have not collected as much as was pledged but in no other County is the percentage of shortage as great as in Harney County.

Harney County is constructing with Market Road fnds the Summit Springs section of road, a part of which is in Malheur County. The contract for this work was awarded by the State Highway Commission and the construction work is under the supervision of R. H. Baldock, Division Engineer. Estimates for payment to the contractor are submitted to the State Highway Engineer to be checked and made up in voucher form. The vouchers are then sent to the County Court and payments are made by the County Court to the contractor. All other Market Road construction work is handled by the County Court.

The surveys have been made by employes of the State Highway Commission or by M. V. Dodge, County Surveyor, and the plans have been submitted to the State Highway Engineer for approval.

The County Court has expended $52,930.43. They have graded 8.8 miles of 12-foot roadbed and 14.7 miles of 18-foot roadbed.

HOOD RIVER COUNTY

Hood River County has within its borders only two State Highways, the Columbia River Highway and the Mount Hood Loop Highway.

The Columbia River Highway extends across the northern boundary of the County, closely paralleling the Columbia River, and has now been paved throughout the limits of the County.

The Mount Hood Loop has been placed under contract for grading and surfacing for the entire distance from Hood River to the forest reserve boundary, and will undoubtedly be completed during 1923. The section within the forest reserve is being improved as a forest road project by the United States Bureau of Public Roads and will probably be finished during the coming biennium. This highway constitutes the main north and south traffic artery in the County and provides transportation facilities for a large and intensively developed fruit growing and farming area.

While the County has been better provided with railroads than some of the other portions of the State, the construction of improved highways has given an added impetus to the development of rural pursuits and has rendered conveniently available the many local scenic attractions. This will be true, in a greater measure, when the Mount Hood Loop is carried to completion.

State Highway activities in the County were handled by J. H. Scott, Division Engineer, until April 1, 1922, and by C. W. Wanzer, Division Engineer, since that time.

Cascade Locks-Hood River Paving

A description of this project will be found on pages 249-50 of the Fourth Biennial Report.

During the present biennium final payments of $27,231.16 have been made, bringing the total cost of the project to $614,584.94 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 17,873.03
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)		9,900.90
2,370 lineal feet 6-inch porous drain tile, installed under force account		173.95
Contract items as follows:		
12-inch plain concrete pipe, 1,029.0 lin. ft. at $1.25	$ 1,286.25	
6-inch porous drain tile, 18,981.0 lin. ft. at 12c	2,277.72	
Class "C" concrete, 32.0 cu. yds. at $20.90	640.00	
Rubble masonry, 1,310.0 cu. yds. at $15.90	19,650.00	
Parapet walls, 2,517.0 lin. ft. at $2.50	6,292.50	
Standard wood guard fence, 27,160.0 lin. ft. at 70c	19,012.00	
Broken stone, loose measure, 50,992.0 cu. yds. at $2.87½	146,602.00	
Standard bituminous pavement, 2-inch top, 222,430.0 sq. yds. at $1.36	302,504.80	
Shoulder construction, 233,544.0 lin. ft. at 5c	11,677.20	
Gravel for shoulders, 2,466.5 cu. yds. at $1.85	4,563.03	
Force account items:		
Clearing channel and constructing 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	60,542.09	
Moving hoist to Cascade Locks for shipment	343.76	

[HOOD RIVER]

EXPENDITURES—Continued		
Building parapet walls and extending Ruckel Creek bridge and wing walls	4,144.08	
Building parapet walls and concrete shoulder two feet wide between wall and pavement	2,827.63	
Removing debris and preparing Hood River bridge for paving	291.46	
Repairs to foundation of bridges over Warren Creek and Viento Creek	434.91	
Constructing private road connection as per terms of right-of-way agreement	153.19	
Constructing box drains on Ruthton Hill	180.64	
Total amount earned by contractor	$587,184.62	
Deductions:		
Rental of hoisting crane	390.00	
Cement sacks returned	169.05	
Total amount paid to contractor		586,625.57
Grand total cost of project (all State funds)		$614,584.94

Hood River Bridge Paving

Upon completion of the paving between Cascade Locks and Hood River the contractor on that section, Mr. G. E. Kibbe, was authorized to place bituminous pavement on the Hood River bridge. This pavement was placed in two courses; the base course tapering from a 2-inch thickness in the center of the structure to nothing at the edges, the top course being a uniform thickness of 2 inches.

A total of 951 square yards of pavement were laid at a cost of $2,419.20 from State funds, the work being handled under the supervision of W. P. Smith, Resident Engineer.

Hood River-Mosier Paving

A description of this work, which is partially within Hood River County and partially within Wasco County, will be found in the portion of this report devoted to Wasco County projects.

Units 1 and 2, Forest Boundary-Hood River Surfacing

The approaching completion of the grading work on the Mount Hood Loop within the County made it desirable to award surfacing contracts in time to allow the successful bidders to assemble their equipment and plants before the beginning of the winter season, and to do such work as might be possible on the portions which had been completely graded. It was further desired to enable them to begin operations early in the spring of 1923, and insure completion of the work before the apple harvest season.

For the purpose of receiving bids, the distance between the Forest Boundary and Hood River was divided into three units and bids were received on August 29, 1922. At this time Contract No. 585 was awarded to Albert Anderson & Company for the surfacing of both Units 1 and 2, the combined length being 17.01 miles. These units extend from the forest boundary to the north end of the Booth Hill Section, at a point approximately 1.25 miles east of the railroad station of Odell. Broken stone was specified for use in the surfacing as gravel is not available.

Construction is being supervised by C. C. Seeley, Resident Engineer, and is estimated to cost a total of $108,000.00. Hood River County will cooperate to the extent of $50,000.00, and the State will pay the balance of $58,000.00. Expenditures to date amount to $1,367.05 and consist of $752.30 from State funds and $614.75 from County funds.

[HOOD RIVER]

Unit 3, Forest Boundary-Hood River Surfacing

This unit extends from the north end of Unit 2 to a junction with the Columbia River Highway east of the Hood River bridge, and has a length of 6.08 miles. Contract No. 586 for the surfacing of the section was awarded on August 29, 1922, to Root & Joslin of Spokane.

As the contractor will complete another contract for surfacing before moving his equipment to this location, it is not expected that construction operations will begin before the early spring of 1923. The contract, however, calls for full completion during the summer season.

The work is estimated to cost a total of $41,000.00, to be paid $22,000.00 by the State and $19,000.00 by the County. No expenditures have been made to the date of this report.

Hood River Loops Park Site

After leaving Hood River, the Columbia River Highway ascends a 5 per cent grade, through a series of loops, to the top of the hill overlooking the Columbia River and the City of Hood River. Upon completion of the highway, it soon became apparent that the State should acquire the property within the loops as the land is underlaid with a sand and gravel deposit and the owners had opened up several pits which were encroaching upon the supporting slopes of the highway roadbed. In addition to this, the use of the property for residential or commercial purposes would be a source of continual annoyance to the traveling public.

The property involved is owned by F. H. Button, Don E. Dean and V. T. Beauregard. The portions owned by Messrs. Button and Dean were easily acquired, but it was necessary to start condemnation proceedings against V. T. Beauregard for his property. After many delays, a reasonable price was agreed upon at the time that the case went to trial. The total acreage acquired from all owners amounted to 4.7 acres.

The property within the loops is ideally situated for a park site, and, since acquiring it, the intention is to grade and level down some portions, and it is hoped that some means will be found to plant native shrubbery and flowers.

Hood River-Booth Hill Grading

The Hood River-Booth Hill Section of the Mount Hood Loop extends from a junction with the Columbia River Highway, just east of the Hood River bridge, to a point approximately 1.25 miles east of Odell Station, the total length of the project being 6.08 miles. On account of three separate sections aggregating 1.63 miles being on the old road and passably surfaced, these sections were omitted from the improvement to avoid interruption to traffic during the winter. The County, however, has assumed the obligation of completing these portions during the spring of 1923. This leaves a net length for the project of 4.45 miles.

Contract No. 491 for the grading of the section was awarded to E. A. Webster & Company of Spokane on February 21, 1922. Work was started on March 13 and is practically completed at the present time, except for the three short stretches mentioned above.

Work has been carried on under the supervision of C. C. Seeley and is estimated to cost a total of $150,000.00, this amount to be divided $79,500.00 to the State and $70,500.00 to the County. Expenditures to date amount to $111,105.33 and have been paid $58,461.44 by the State and $52,643.89 by the County.

[HOOD RIVER]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,817.50
Graveling between Stations 1126+18 and 1143+50		361.00
Contract items as follows:		
Clearing and grubbing, 95 per cent at $6,000.00	$ 5,700.00	
Common excavation, 30,707.5 cu. yds. at 27c	8,291.03	
Intermediate excavation, 14,899.9 cu. yds. at 40c	5,959.96	
Solid rock excavation, 89,798.5 cu. yds. at 72c	64,654.92	
Overhaul, 69,391.0 sta. yds. at 4c	2,775.64	
12-inch corrugated galvanized iron pipe, 1,221.0 lin. ft. at $1.60	1,953.60	
18-inch corrugated galvanized iron pipe, 32.0 lin. ft. at $2.75	88.00	
24-inch corrugated galvanized iron pipe, 84.0 lin. ft. at $4.00	336.00	
36-inch corrugated galvanized iron pipe, 120.0 lin. ft. at $8.00	960.00	
12-inch corrugated galvanized iron siphon, 120.0 lin. ft. at $2.50	300.00	
Class "C" concrete, 19.89 cu. yds. at $30.00	596.70	
Class "A" concrete, 426.95 cu. yds. at $32.00	13,662.40	
Metal reinforcement, 38,002.0 lbs. at 7c	2,660.14	
Rubble masonry, 48.34 cu. yds. at $15.00	725.10	
Force account items:		
Extra clearing and grubbing outside 60-ft. right-of-way	1,695.03	
Construction of undercrossing at Sta. 1924+00	2,760.26	
Construction of irrigation flumes	107.05	
Construction of undercrossing at Sta. 892+00	280.44	
Total amount earned by contractor	$113,506.27	
Percentage retained until completion of contract	8,579.44	
Total amount paid to contractor		104,926.83
Grand total expended		$111,105.33
Paid by State	$ 58,461.44	
Paid by County	52,643.89	
Total	$111,105.33	

Booth Hill Section Grading

The first construction work on the Mount Hood Loop in Hood River County was started on what is known as the Booth Hill Section. This section is 4.96 miles in length. It extends from a point 1.25 miles east of Odell south 4.96 miles and covers what is known as Booth Hill, which separates the upper valley from the lower valley. The improvement of the section was of prime importance to the County.

Grading of the section was awarded to Joplin & Eldon on August 30, 1921, under Contract No. 440. Work was started on October 3, 1921, and is completed at the time of this report, although final payment has not yet been made. The construction was a very slow and difficult job for the contractors, owing to the nature of the materials encountered. When uncovered, what had appeared to be an earth hillside was found to be a conglomerate mass of large boulders, many of which had to be broken up before they could be handled. The contractor installed a steam shovel, considering this method to be the most economical. The work was further delayed by labor shortages and complications arising from irrigation flumes crossing the right-of-way. The owners of the flumes refused to allow water diverted during the irrigation season, and it was frequently necessary for the contractor to delay operations on this account. Considerable time was also lost due to the continued snowfall during the winter of 1921-22.

Superintendence of the construction was handled by C. C. Seeley, Resident Engineer, with expenditures to date of $60,078.85. The State has expended $32,643.85 of this amount and the County has paid

[HOOD RIVER]

$27,435.00. The completed project is estimated to cost a total of $77,500.00, of which the State will pay $42,000.00 and the County will cooperate to the extent of $35,500.00.

DETAILED STATEMENT OF EXPENDITURES

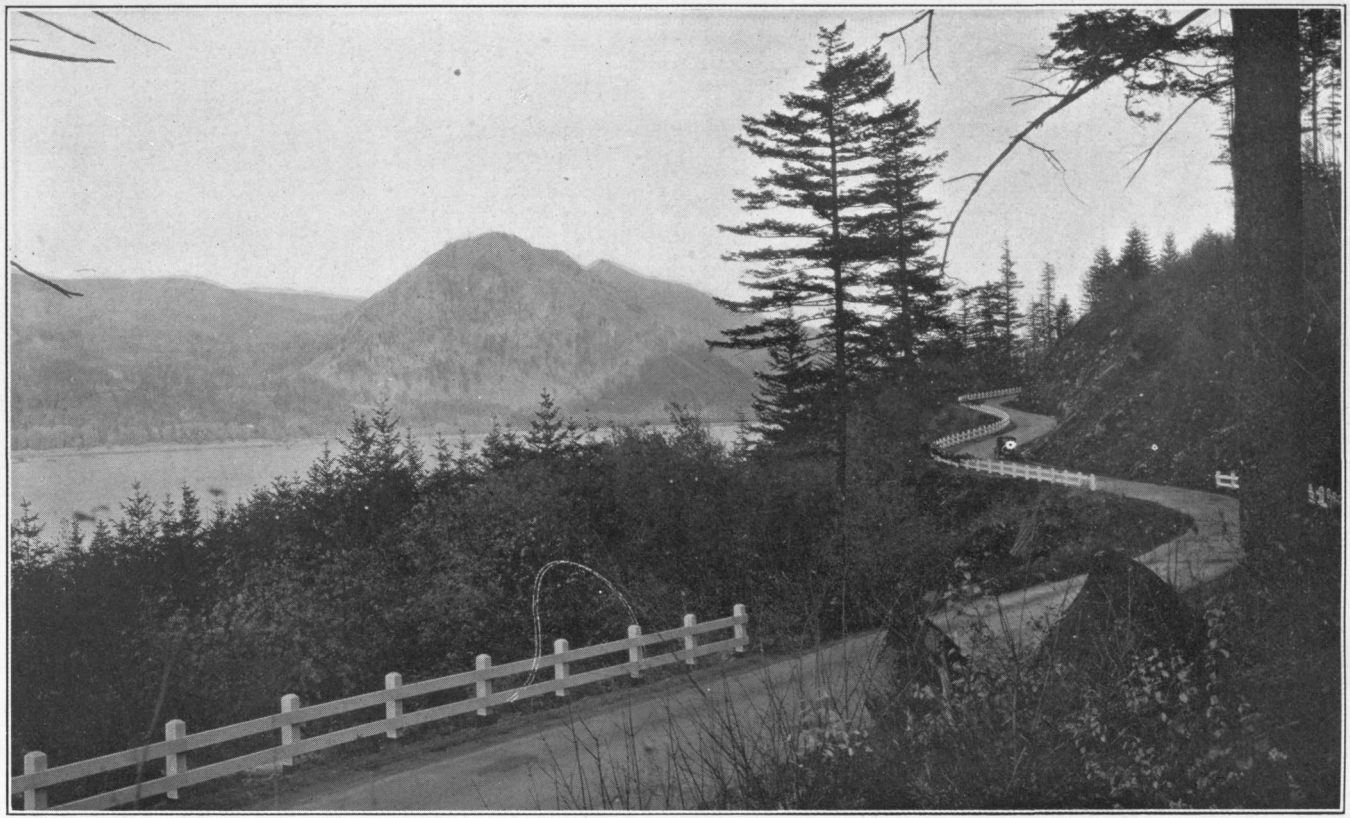
Engineering		$ 5,208.82
Items deducted from contractor's estimates:		
T. N. T. furnished by State		118.00
Rental of State-owned jack hammer		50.12
Contract items as follows:		
Clearing and grubbing, all	$ 3,750.00	
Common excavation, 23,840.3 cu. yds. at 35c	8,344.11	
Intermediate excavation, 13,430.4 cu. yds. at 50c	6,715.20	
Solid rock excavation, 23,660.7 cu. yds. at 90c	21,294.63	
Overhaul, 58,296.0 sta. yds. at 5c	2,914.80	
12-inch corrugated galvanized iron pipe, 2,252.0 lin. ft. at $1.30	2,927.60	
18-inch corrugated galvanized iron pipe, 232.0 lin. ft. at $2.25	522.00	
24-inch corrugated galvanized iron pipe, 36.0 lin. ft. at $3.90	140.40	
30-inch corrugated galvanized iron pipe, 154.0 lin. ft. at $4.80	739.20	
36-inch corrugated galvanized iron pipe, 30.0 lin. ft. at $5.50	165.00	
24-inch reinforced concrete pipe, 120.0 lin. ft. at $4.00	480.00	
Class "A" concrete, 132.0 cu. yds. at $27.50	3,630.00	
Class "C" concrete, 38.98 cu. yds. at $27.00	1,052.46	
Metal reinforcement, 10,200.0 lbs. at 9c	918.00	
Lumber and timber, 21.0 M.-FBM. at $50.00	1,050.00	
12-inch corrugated iron siphon, 40.0 lin. ft. at $2.50	100.00	
Force account items:		
Lowering wooden irrigating pipe line to safe depth below highway grade	3,101.78	
Extra clearing and grubbing outside of right-of-way	688.96	
Repairing and removing temporary irrigation flumes	426.88	
Total amount earned by contractor	$ 58,961.02	
Deductions for rental of jackhammer and T. N. T. furnished by State	168.12	
Percentage retained until completion of contract	4,090.99	
Total amount paid to contractor		54,701.91
Grand total expended		$ 60,078.85
Paid by State	$ 32,643.85	
Paid by County	27,435.00	
Total	$ 60,078.85	

Booth Hill-Forest Boundary Grading

This section extends from the south end of the Booth Hill project to the north boundary of the Oregon National Forest. Of the total length of 12.04 miles of the project, approximately eight miles are in open country and have permitted the use of a very direct alignment. The remainder at the south end is in what might be called the foothill area of Mt. Hood, and the topography requires a very winding and circuitous alignment, consisting principally of sidehill work.

Contract No. 492 for the grading of the section was awarded to the Johnson Contract Company of Portland, Oregon, on February 1, 1922. At this time there was still about two feet of snow on the ground left over from the winter storms. Winter conditions are unusually severe on the portion within the foothills and there is a large winter snowfall.

Work was started on April 20, and, although the contractor has made good progress, it is not probable that it will be completed before the early summer of 1923. At the end of the biennium about three-quarters



A PORTION OF THE COLUMBIA RIVER HIGHWAY; EAST OF CASCADE LOCKS IN HOOD RIVER COUNTY

of the distance has been fully graded, approximately 2.5 miles have been partly finished and 0.6 mile at the north end of the section has not yet been opened up.

The completed work is estimated to cost a total of $90,000.00, towards which the County will cooperate to the extent of $43,000.00 and the State will pay the balance of $47,000.00. Under the supervision of C. C. Seeley, Resident Engineer, expenditures of $56,421.74 have been made. This amount has been paid, $26,882.49 by Hood River County and $29,539.25 by the State.

Booth Hill-Hood River Bridges

On this section the Mount Hood Loop crosses the east fork of Hood River, at a point about three miles from Troutdale, on a structure consisting of an 80-foot steel span with approximately 80 feet of concrete approach. Contract No. 503, covering the construction of this bridge, and a culvert over Evans Creek, was awarded to the Union Bridge Company on March 23, 1922. Work was started on May 8, and carried to completion on October 7, the total estimated cost being $22,000.00 after all final charges have been paid. Of this amount, the County will cooperate to the extent of $10,000.00 with the State paying the balance of $12,000.00.

Construction has been carried on under the supervision of N. W. Reese, Resident Engineer, with expenditures to date of $18,516.18. The County has paid $8,482.54 of this amount, and the State has paid $10,033.64. The structure over the east fork of Hood River represents one of the best examples of concrete construction which has yet been secured by the Department.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,537.08
Name plates for structures (furnished by State)		14.00
Contract items as follows:		
Excavation to plan elevation, 490 cu. yds. at $4.00	$ 1,960.00	
Excavation below elevation shown on plans, 27.0 cu. yds. at $7.00	189.00	
Class "A" concrete, 267.0 cu. yds. at $21.00	5,607.00	
Class "B" concrete, 70.0 cu. yds. at $21.00	1,470.00	
Metal reinforcement, 47,784.0 lbs. at 7c	3,344.88	
Structural steel, 64,729.0 lbs. at 8c	5,178.32	
Concrete handrail, 353.0 lin. ft. at $6.00	2,118.00	
Force account items:		
Resloping stream bank	91.74	
Total amount earned by contractor	$ 19,958.94	
Percentage retained until completion of structures	2,993.84	
Total amount paid to contractor		16,965.10
Grand total expended		$ 18,516.18
Paid by State	$ 10,033.64	
Paid by County	8,482.54	
Total expended	$ 18,516.18	

Mount Hood Loop Forest Road Project

A description of this project, which is partially within Clackamas County and partially within Hood River County, will be noted in the portion of this report devoted to Clackamas County projects.

[HOOD RIVER]

Unit No. 1, Hood River-Mosier Grading

A description of this section will be found on page 254 of the Fourth Biennial Report. During the present biennium delayed charges of $909.77 have been made, bringing the total cost of the unit to $39,907.29 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,253.20
Advertisement for bids		9.09
Guarding railroad and telegraph lines from damage		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, 45,096.0 sta. yds. at 3c	1,352.88	
12-inch plain concrete pipe, 528.0 lin. ft. at $1.34	707.52	
Class "C" concrete, 15.32 cu. yds. at $20.00	306.40	
Force account items:		
Placing and backfilling drain tile	236.50	
Constructing concrete curb and handrail on retaining wall	258.07	
Spreading temporary wearing surface of gravel	117.70	
Adjustment charges:		
Excess excavation moved after date of completion of contract	909.77	
Total amount paid contractor		37,495.21
Grand total cost of project (all State funds)		$ 39,907 29

Unit No. 2, Hood River-Mosier Grading

A description of this section will be found on page 254 of the Fourth Biennial Report. During the present biennium delayed expenditures of $13,561.31 have been made, bringing the cost of the unit to $126,384.65 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,767.84
Advertisement for bids		19.85
Guarding O.-W. R. & N. railway tracks during construction		441.83
Contract items as follows:		
Clearing and grubbing, all	$ 2,000.00	
Extra clearing and grubbing, 3.179 acres at $100.00	317.90	
Common excavation, 105,564.6 cu. yds. at 48c	50,671.01	
Solid rock excavation, 49,650.1 cu. yds. at $1.00	49,650.10	
Overhaul, 10,547.0 sta. yds. at 3c	316.41	
12-inch plain concrete pipe, 444.0 lin. ft. at $1.34	594.96	
24-inch reinforced concrete pipe, 52.0 lin. ft. at $4.00	208.00	
Class "C" concrete, 8.38 cu. yds. at $20.00	167.60	
Rubble masonry walls, 377.32 cu. yds. at $12.00	4,527.84	
Force account items:		
Moving building off right-of-way	15.40	
Laying drain tile and placing rock wearing surface on new grade	2,283.54	
Building catch basins and flume for culvert run-off	452.16	
Labor and material for construction of half-viaduct	1,517.93	
Building dry rock wall	626.08	
Adjustment charges:		
Excess excavation moved after date of completion of contract	6,806.20	
Total amount paid to contractor		120,155.13
Grand total cost of project (all State funds)		$126,384.65

Maintenance

Upon the completion of the paving of the Columbia River Highway, maintenance headquarters were established at Hood River and J. R.

Nickelson was placed in charge of all maintenance work on the highway within the County. Slides from the high cut slopes have required constant attention and, at different times, slides containing from 50 to 200 cubic yards of rock have fallen onto the highway at various points. These have been removed promptly, and at no time has the highway been closed to traffic for more than two or three hours. From Hood River to the Multnomah County Line, the rainfall is very heavy, amounting to about eighty inches per year in the vicinity of Cascade Locks. This means that the ditches must be kept clear, and the culverts must be kept open at all times in order to properly take care of the drainage. Other routine work constantly carried on has consisted of building up shoulders, cutting weeds, building drains, sanding pavement, repairing fences and retaining walls, patching pavement where fills have settled, etc.

One November 8, 1921, a heavy snow started and continued three days, falling to a level depth of approximately four feet. Much of the precipitation was in the form of sleet and hail, and slid off the hillsides as it fell, completely covering the highway to the full depth of the cuts. In many cases the depth of snow on the highway center line was in the neighborhood of twenty feet. This condition had not occurred before since the Columbia River Highway was constructed, and the section west of Hood River was blocked for over two months. All of the heavy drifts had to be loosened up by blasting, and the snow was then loaded into trucks and hauled away. This snow removal was very slow and very expensive and, after the snow had melted, it was found that a large amount of guard fence had been broken down and parapet walls had been broken or shoved out of line. This damage has all been repaired by State forces.

Betterment work is now underway between Hood River and the Multnomah County Line and consists of widening cuts and embankments to better the alignment, and increase sight distance, widening shoulders, and building concrete gutters and curbs in cuts where there is considerable drainage to take care of. One cut-off is being made at a point approximately one mile west of Cascade Locks, which eliminates a dangerous 56-degree curve, greatly improves the alignment and shortens the distance by 300 feet. When completed this betterment work will decidedly improve the highway, and render it comparatively safe for the constantly increasing traffic. This betterment work is being handled by the Equipment Department under Mr. L. P. Campbell, and is entirely separate from the ordinary maintenance operations.

Mount Hood Loop Survey

The original location survey for the Mt. Hood Loop had its southerly terminus at a connection with the location through the Forest Reserve made by the Bureau of Public Roads. During 1921, the Bureau revised its location, placing it several hundred feet higher in elevation and involving a shift of the line about three-quarters of a mile to the west. This necessitated a revision of the State location on the southerly three miles of the line. The boundary of the forest reserve is such that this change resulted in the forest road survey ending at a point one mile farther south than their original location, and required an additional 1.4 miles on the State portion. Relocation survey was started at the new end of the Forest Reserve Section and extended north, a trifle over three miles, to a connection with the original location. The revision was made by C. M. Hurlburt between June 24 and August 13, 1921.

[HOOD RIVER]

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Hood River County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 30,281.07
2.	State Funds apportioned to County	43,864.94
3.	County levy made to match State Funds	46,316.79
4.	County Market Road Funds collected	42,769.57
5.	Cash paid to County by State	36,041.46
6.	State expenditures, deducted from apportionment	1,587.95
7.	Cash due County from State in December, 1922	6,235.53
8.	County expenditures on Market Roads	89,197.03
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Hood River County received from the State Market Road Fund $13,583.87 more than it paid into the fund. The excess is Hood River County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $46,316.79. Of this amount they have collected and credited to the Market Road Fund $42,769.57.

The County Court has designated three sections of road to be improved as Market Road projects, namely, Odell near warehouse, River Grove and Tucker Road. These roads have been paved with concrete pavement in accordance with surveys made and specifications prepared by the State Highway Commission.

The construction work in 1920 was done by County forces. In 1921 and 1922 contracts for the work to be done were awarded to contractors by the County Court and competent engineers were employed to insure proper construction.

The County Court has expended $89,197.03. They have constructed 2.5 miles of 16-foot concrete pavement.

JACKSON COUNTY

The extensive program started in Jackson County during 1919-20 has been carried on steadily, and has now reached the stage of requiring only the finishing up of a few uncompleted portions. The coming biennium will undoubtedly witness the final completion of all the State highways in the County.

The Pacific Highway has been paved from the Josephine County Line to the California Line, a total distance of 60.4 miles, and all structures have been completed. The highway is a year-round road, the portion in the Siskiyou Mountains being kept free from snow during the winters by the use of snow plows.

The Ashland-Klamath Falls Highway has been graded through to the Klamath County Line, and provisions have been made for surfacing the unsurfaced portion east of Keene Creek. This latter work should be finished during 1923.

On the Medford-Crate Lake Highway, the portion between Medford and Trail has been graded and surfaced to full State standard. With the exception of a gap of approximately eight miles in the center of the section, the portion between Trail and Prospect is being graded and surfaced by the United States Bureau of Public Roads under a cooperative forest road project agreement between the State and Federal Government. At the time of this report, no definite plans have been made for the construction of the unimproved gap. The highway has been graded from Prospect to the Park Boundary and the south six miles have been surfaced. Owing to the nature of the soil on the balance a surfacing has not been considered immediately necessary.

State work in the County was handled by K. E. Hodgman, Division Engineer, until his resignation on September 30, 1922, at which time the district was taken over by C. C. Kelley, Assistant State Highway Engineer.

Gold Hill-Josephine County Line Paving

A description of this section will be found on page 258 of the Fourth Biennial Report. Construction operations were resumed early in 1921, and the 4.53 miles of pavement required to finish the section were completed July 30.

Expenditures of $178,268.19 have been made during the present biennium, bringing the total cost of the project to $369,449.26 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 20,813.25
Labor and material furnished by State:		
Royalty on dirt for fill at Rock Point		170.10
Painting and placing traffic regulation signs		7.20
Lumber for header material		1,192.01
Services of patrolman during construction		62.50
Cost of furnishing asphalt above cost guaranteed to contractor		2,676.79
Items deducted from contractor's estimate:		
Asphalt furnished by State		46,245.08
Royalty on rock from Champlin's Quarry		1,319.43
Salary of rock checker kept at Champlin's Quarry		1,443.24
Contract items as follows:		
Clearing and grubbing, all	$ 300.00	
Excavation, no classification, 31,468.54 cu. yds. at 70c	22,027.98	
Overhaul, 17,060.0 sta. yds. at 5c	353.00	
6-inch concrete sewer pipe, 464.0 lin. ft. at 85c	394.40	
12-inch plain concrete pipe, 1,392.0 lin. ft. at $1.50	2,088.00	
24-inch reinforced concrete pipe, 10.0 lin. ft. at $3.55	35.50	
12-inch corrugated galvanized iron pipe, 36.0 lin. ft. at $1.60	57.60	

[JACKSON]

EXPENDITURES—Continued

18-inch corrugated galvanized iron pipe, 48.0 lin. ft. at $2.60	124.80	
24-inch corrugated galvanized iron pipe, 6.0 lin. ft. at $3.75	22.50	
36-inch corrugated galvanized iron pipe, 6.0 lin. ft. at $7.50	45.00	
48-inch corrugated galvanized iron pipe, 36.0 lin. ft. at $8.00	288.00	
6-inch porous drain tile, 12.0 lin. ft. at 25c	3.00	
Class "C" concrete, 41.88 cu. yds. at $20.00	837.60	
Lumber and timber, 20.331 M-FBM at $45.00	914.90	
Broken stone for base, 15,142.55 cu. yds. at $3.10	46,941.91	
Broken stone for shoulders, 2,371.5 cu. yds. at $2.70	6,403.05	
Crushed gravel for base, 155.85 cu. yds. at $2.25	350.66	
Sand for binder, 569.0 cu. yds. at $2.70	1,536.30	
Shoulder construction, 123,391.2 lin. ft. at 6c	7,403.47	
Standard bituminous pavement, 2-inch top, 111,229.7 sq. yards. at $1.35	150,160.10	
Standard bituminous pavement, 3-inch base, 37,009.5 sq. yds. at $1.10	40,710.45	
Standard bituminous base, 1½-inch to 2-inch thickness, 15,453.0 batches at $3.70	57,176.10	
Standard wood guard fence, 2,848.0 lin. ft. at $1.00	2,848.00	
Force account items:		
Repairing Sardine Creek and Foots Creek bridges	308.08	
Widening fills, constructing rock walls and backfilling around curtain wall of Rock Point bridge	353.10	
Widening roadbed and constructing extra wide ditches	2,343.91	
Total amount earned by contractor		$344,527.41
Deductions:		
Expense of rock checker at Champlin Quarry	1,443.24	
Asphalt furnished by State	46,245.08	
Royalty on rock from Champlin Quarry	1,319.43	
Total deductions		$ 49,007.75
Total amount paid to contractor		295,519.66
Grand total cost of project (all State funds)		$369,449.26

Ashland-Green Spring Mountain Road Paving

A description of this project will be found on page 259 of the Fourth Biennial Report. Upon completion of the grading and settlement of fills on the two-thirds of a mile in the vicinity of the proposed Talent Reservoir, the paving was carried to completion. The hot stuff for this short stretch was hauled from the paving plant at the summit of the Siskiyous, all work being completed August 31, 1921.

Work during 1921 was handled under the supervision of G. E. MacVicar, Resident Engineer. Expenditures of $89,097.37 have been made during the period covered by this report, bringing the total cost of the project to $248,359.36 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 12,417.22
Labor and materials furnished by State:		
Sanding pavement		328.00
Placing decomposed granite base on Talent Reservoir Section		1,544.00
36 feet of 1-inch galvanized iron pipe used to drain spring under fill according to terms of right-of-way agreement		6.48
Building standard wood guard fence at Ashland overcrossing		(credit) 1,328.00
Items deducted from contractor's estimates:		
Asphalt furnished by State		23,307.00
Contract items as follows:		
Clearing and grubbing, all	$ 500.00	
Common excavation, 17,610.5 cu. yds. at 60c	10,566.30	
Solid rock excavation, 7,755.8 cu. yds. at $1.50	11,633.70	
Overhaul, 29,885.0 sta. yds. at 3c	896.55	
Class "A" concrete, 86.88 cu. yds. at $25.00	2,172.00	

[JACKSON]

EXPENDITURES—Continued

Class "C" concrete, 42.08 cu. yds. at $20.00	841.60	
Metal reinforcement, 3,583.0 lbs. at 10c	358.30	
12-inch plain concrete pipe, 686.0 lin. ft. at $1.25	857.50	
15-inch corrugated galvanized iron pipe, 30.0 lin. ft. at $1.75	52.50	
18-inch corrugated galvanized iron pipe, 18.0 lin. ft. at $2.50	45.00	
24-inch corrugated galvanized iron pipe, 32.0 lin. ft. at $3.25	104.00	
36-inch corugated galvanized iron pipe, 2.0 lin. ft. at $6.00	12.00	
6-inch porous drain tile, 51.0 lin. ft. at 30c	15.30	
Standard wood guard fence, 1,624.0 lin. ft. at $1.00	1,624.00	
Riprap, 74.0 cu. yds. at $6.00	444.00	
Standard 2-inch bituminous wearing surface, 53,856.0 sq. yds. at $1.79	96,402.24	
Bituminous wearing surface mixture, 657.0 batches at $3.85	2,529.45	
Bituminous wearing surface mixture, 792.0 batches at $5.00	3,960.00	
Standard 3-inch bituminous base, 41,731.2 sq. yds. at $1.15	47,990.89	
Gravel for base and shoulders, 11,658.0 cu. yds. at $4.00	46,632.00	
Gravel filler material, 559.0 cu. yds. at $3.50	1,956.50	
Wood headers left in place, 46,700.0 lin. ft. at 7½c	3,502.50	
Shoulder construction, 58,816.0 lin. ft. at 6c	3,528.96	
Force account items:		
Riprapping slopes, lowering fills, replacing rock base, and constructing drains at Ashland overhead crossing	749.55	
Applying flush coat and sanding batch basis wearing surface	675.20	
Placing rock drains in narrow cuts and lowering old culverts	573.13	
Payhaul on crushed rock and pavement materials hauled to Talent Reservoir Section and Ashland overcrossing	4,181.14	
Spreading decomposed granite on Talent Reservoir Section	71.20	
Repairing pavement at bridge ends and at Ashland overcrossing	516.15	
Total amount earned by contractor	$243,391.66	
Deductions:		
Asphalt furnished by State	23,307.00	
Lump sum reduction by contractor as per terms of contract	8,000.00	
Total amount paid to contractor		212,084.66
Grand total cost of project (all State funds)		$248,359.36

Green Spring Mountain Road-California Line Paving

A description of this project will be found on page 260 of the Fourth Biennial Report. The 2.12 miles of road unpaved at the close of the last biennium were carried to completion on August 31, 1921. Completion of the project provided a continuous pavement from Grants Pass to the California line, a distance of approximately 65 miles. Work during 1921 was handled under the supervision of G. E. MacVicar, Resident Engineer, with an expenditure of $245,628.62. This brings the total cost of the project to $634,225.06, which has all been paid from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering	$ 17,692.44
Labor and materials furnished by State:	
Rental and operation of crusher	3,091.84
Rental and operation of trucks	672.98
Camp operation on State force work	1,281.92
Asphalt furnished on State force work	982.87
Sharpening tools, freight on forms for concrete and purchase of 6-inch concrete pipe	38.60

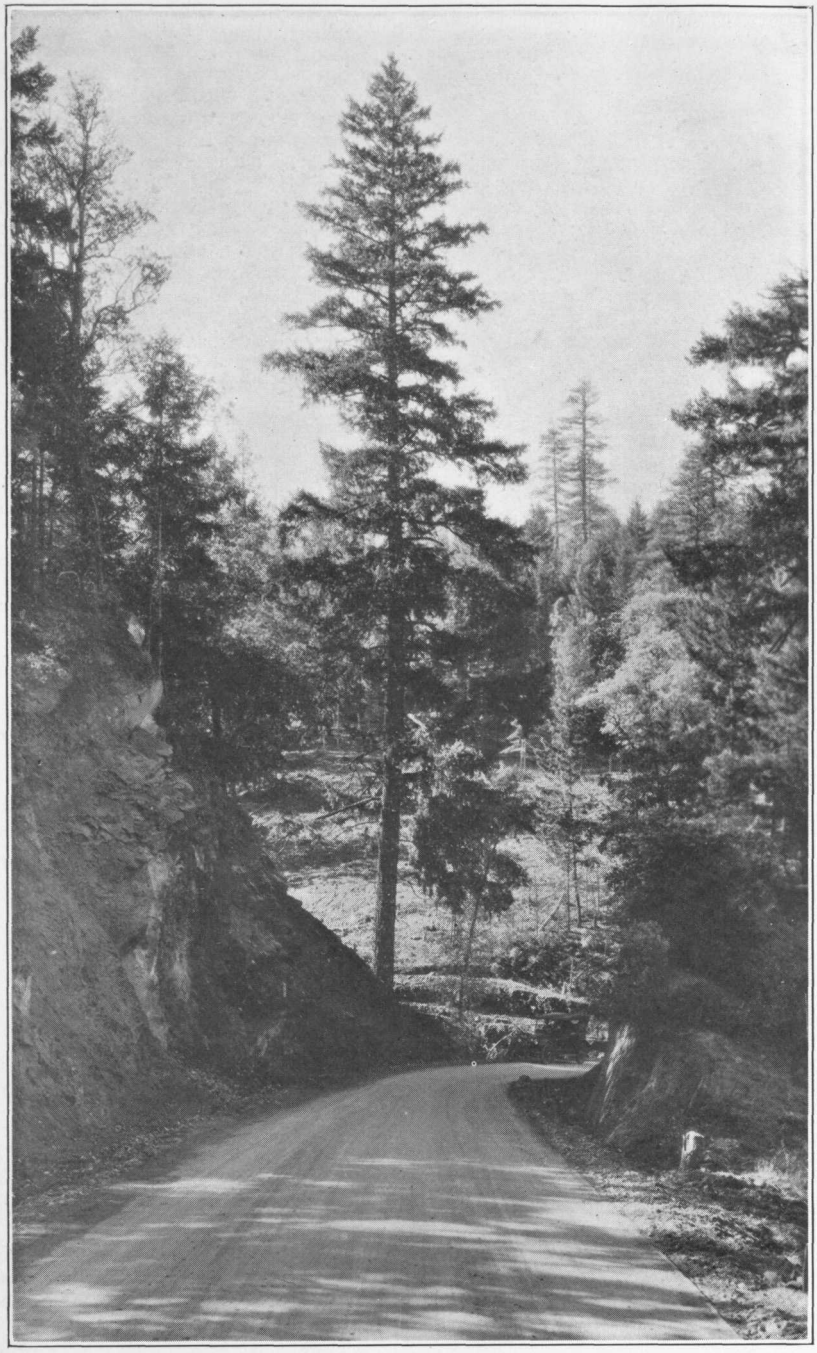
[JACKSON]

EXPENDITURES—Continued

Reimbursement received from Southern Pacific R. R. Co., for damage to pavement at Ashland overcrossing (credit)		97.33
Salvaging of 2-inch pipe used on State force work (credit)		268.35
Items deducted from contractor's estimate:		
Asphalt furnished by State		58,429.40
Rental and operation of State-owned equipment		2,891.63
Granite for top dressing furnished by State		60.00
Contract items as follows:		
Common excavation, 19,712.7 cu. yds. at 75c	$ 14,784.53	
Solid rock excavation, 9,855.0 cu. yds. at $2.00	19,710.00	
Overhaul, 12,804.0 sta. yds. at 3c	384.12	
12-inch plain concrete pipe, 272.0 lin. ft. at $1.25	340.00	
6-inch porous drain tile, 4,452.0 lin. ft. at 30c	1,335.60	
Class "C" concrete, 20.0 cu. yds. at $5.56	111.20	
Shoulder construction, 157,253.0 lin. ft. at 7c	11,007.71	
Clay filler, 27.0 cu. yds. at $1.00	27.00	
Broken stone for base and shoulders, 27,616.5 cu. yds. at $4.00	110,466.00	
Standard 3-inch bituminous base, 21,500.8 sq. yds. at $1.15	24,725.92	
Standard 2-inch bituminous top, 142,075.2 sq. yds. at $1.79	254,314.61	
Standard 3-inch bituminous base, 7,964.0 batches at $3.85	30,661.40	
Standard 2-inch to 3-inch bituminous base, 16,009.0 batches, at $5.15	82,446.35	
Additional bituminous top, 4,748.0 batches at $5.15	24,452.20	
Grizzly binder, 20.0 cu. yds. at $3.50	70.00	
5-inch pavement headers, left in place, 75,928.0 lin. ft. at 7½c	5,694.60	
4-inch pavement headers, left in place, 27,172.0 lin. ft. at 6c	1,630.32	
Standard wood guard fence, 6,972.0 lin. ft. at $1.00	6,972.00	
Force account items:		
Removing surplus rock from shoulders on account of change in plans	365.40	
Furnishing and laying forms, flush coat and sand for covering additional pavement top	2,011.66	
Cleaning out old culverts and placing corrugated iron pipe extensions to existing culverts	264.16	
Constructing driveway over highway ditch	19.70	
Construction of rock-filled cross drains	438.42	
Regrading, ditching and other work necessary to prepare roadbed for summer traffic	804.23	
Repairing pavement damaged by settlement of embankments	747.00	
Dissembling and loading State rock crushers for shipment to Salem	433.44	
Removing slides, excavating to improve drainage and placing riprap along water course	22,612.52	
Total amount earned by contractor	$616,830.09	
Deductions:		
Asphalt furnished by State	58,429.40	
Rental and operations of State-owned equipment	2,891.63	
Granite top dressing furnished by State	60.00	
Reduction on account of increase in width of paving to 16 feet	6,000.00	
Total deductions	$ 67,381.03	
Total amount paid to contractor		549,449.06
Grand total cost of project (all State funds)		$634,225.06

Medford-Agate Grading and Surfacing

Jackson County voted a bond issue of $200,000.00 to be spent on the Medford-Crater Lake Highway. Of this amount $134,000.00 was expended for grading, surfacing and bridges of the Trail-Agate Section, leaving a balance of $66,000.00. The County offered to cooperate to this amount on the Medford Agate Section and their offer was accepted by the State Highway Commission, being later revised to $54,000.00.



PAVEMENT IN THE SISKIYOU MOUNTAINS; ON THE PACIFIC HIGHWAY IN JACKSON COUNTY

Accordingly, Contract No. 487 was awarded December 15, 1921, to W. C. Stone of Portland, Oregon, for grading and surfacing 8.5 miles between Medford and Agate.

Construction operations were started February 11, 1922. The grading was very light, and in many places rock was struck in the bottom of the ditches, making the unit cost to the contractor very high. The surfacing consisted of crushed gravel laid to a width of 16 feet and varying in depth from six inches on rock fill to nine inches on adobe soil. The base course materials were crushed to a 1½-inch maximum size and the top course materials to a 1-inch maximum size.

The work was supervised by J. R. Mitchell, Resident Engineer, and completed September 30, 1922. The total estimated cost of the work when all final bills have been paid is $71,500.00, with Jackson County cooperating to the extent of $54,000.00 as stated above. The total expenditures to date amount to $70,900.40, having been paid $16,900.40 by the State and $54,000.00 by Jackson County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,667.27
Sprinkling macadam by State forces		1,761.10
Contract items as follows:		
Clearing and grubbing, all	$ 100.00	
Common excavation, 23,286.7 cu. yds. at 25c	5,821.68	
Solid rock excavation, 6,783.3 cu. yds. at 50c	3,391.65	
Overhaul, 15,400.0 sta. yds. at 5c	770.00	
12-inch plain concrete pipe, 991.0 lin. ft. at $1.75	1,734.25	
18-inch reinforced concrete pipe, 120.0 lin. ft. at $2.75	330.00	
24-inch reinforced concrete pipe, 192.0 lin. ft. at $3.75	720.00	
36-inch reinforced concrete pipe, 36.0 lin. ft. at $7.00	252.00	
Class "A" concrete, 214.96 lin. ft. at $23.00	4,944.08	
Class "C" concrete, 49.76 lin. ft. at $20.00	995.20	
Metal reinforcement, 20,173.0 lbs. at 6c	1,210.38	
Crushed gravel surfacing, 21,001.0 cu. yds. at $2.09	43,892.09	
Force account items:		
Changing location of 600 feet of irrigation ditch	242.82	
Total amount earned by contractor	$ 64,404.15	
Percentage retained until completion of contract	1,932.12	
Total amount paid to contractor		62,472.03
Grand total expended		$ 70,900.40
Paid by State	$ 16,900.40	
Paid by County	54,000.00	
Total	$ 70,900.40	

Agate-Trail Post Road Project

Description of this project will be found on page 263 of the Fourth Biennial Report. During the present biennium the grading and bridges have been completed and the entire project has been surfaced.

Upon completion of the surfacing, a final inspection was made by the Bureau of Public Roads and it was reported by them to be the best piece of highway construction and surfacing which they had encountered in the Portland District.

The total cost of the entire project amounted to $433,486.00, which has been paid $90,143.03 by the State, $134,000.00 by Jackson County and $209,342.97 by the Federal Government. Paul B. Rynning, Resident Engineer, was in charge of the grading and surfacing work throughout.

Unit No. 1 Grading:

The construction of this section was completed on October 28, 1921. Practically all the work was completed in the spring, but the fill at the north end of the Rogue River Bridge was included in this contract, and it was necessary to await the completion of the bridge before the fill could

[JACKSON]

be completed. The cost of the section was $46,788.22, which has been paid $10,007.34 by the State, $15,000.00 by Jackson County and $21,780.88 by the Federal Government.

Unit No. 2 Grading:

The material on this section consisted mostly of adobe, and little progress was made during the winter of 1920. On this account and on account of being delayed on bridge fills the unit was not completed until November 12, 1921. The total expenditures amounted to $119,185.35, which has been paid $23,773.55 by the State, $37,000.00 by Jackson County and $58,411.80 by the Federal Government.

Unit No. 3 Grading:

Contrary to the statement made in the last report, this section covers the 4.69 miles adjacent to Eagle Point instead of Trail. Conditions on this unit were similar to those on Unit No. 2, and the work was completed September 24, 1921. The total expenditures on the unit amount to $55,185.50, which has been paid $11,376.32 by the State, $17,000.00 by Jackson County and $26,809.18 by the Federal Government.

Four Small Bridges:

Albert Anderson of Grants Pass was originally awarded Contract No. 307 for the construction of these bridges, but was unable to qualify and the contract was given Lindstrom & Feigenson, who had submitted the next lowest bid. They agreed, however, to do the work for the unit prices submitted by Mr. Anderson, so nothing was lost to the State by the change.

Work was started on November 6, 1920, and completed October 20, 1921, under the supervision of A. A. Clausen, Resident Engineer. Final expenditures for the structures have amounted to $47,169.91, shared $11,089.02 by the State, $14,000.00 by Jackson County and $22,080.89 by the Federal Government.

Rogue River Bridge:

For this structure two alternate designs were prepared, one calling for two 80-foot arches with 140 feet of concrete approach, and the other calling for two 80-foot steel spans with the same type of concrete approaches. Bids were taken November 6, 1920, on both types and the Portland Bridge Company submitted a bid on the steel design which was approximately 10 per cent lower than the lowest bid received for the concrete arches. This Company was, therefore, awarded the work under Contract No. 308.

Material and equipment was assembled and actual operations started on January 20, 1921, under the supervision of A. A. Clausen, Resident Engineer. Work continued steadily until August 27, 1921, when the structure was completed, the total cost being $49,575.88. Cooperation of $15,000.00 has been received from the County and $23,515.16 from the Federal Government, leaving the State expenditures $11,060.72.

Surfacing:

The agreement between the State Highway Commission, the Bureau of Public Roads and Jackson County called for the surfacing of the entire project as soon as the grading was far enough advanced to allow the placing of surfacing materials, and on May 27, 1921, Contract 380 was awarded to William von der Hellen of Eagle Point for surfacing the entire 14.35 miles. At this time Jackson County offered to cooperate to the extent of an additional $500.00 per mile if the surfacing were widened from 12 to 16 feet, their original cooperation being figured on the basis of a 12-foot surfacing.

The thickness of the surfacing constructed varied from a few inches on rock fill to 11 inches on black sticky adobe, the gravel being placed in from one to three courses. Where three courses were placed, run of crusher materials with a three-inch maximum size were used in the lower course, one and one-half inch materials in the middle course and one-inch materials in the top course. Where but two courses were placed, one and one-half-inch materials were used in the base course and one-inch materials in the top course. The surfacing was placed without use of filler. As the materials were placed on a new grade before it had a chance to settle, and as most of the subgrade materials when dry broke up into small cubes, leaving excessive voids, great care was taken to roll the subgrade thoroughly before the surfacing materials were put on. Each course of surface, as laid, was sprinkled and thoroughly rolled.

Work was started June 7, 1921, and progressed very rapidly, being completed November 30 of the same year. The base course was kept several miles ahead of the succeeding courses and when the fall rains started the base course was completed and no difficulty was experienced in finishing the rest of the surfacing.

The total expenditures amounted to $115,581.14, which have been paid $22,836.08 by the State, $36,000.00 by Jackson County and $56,745.06 by the Federal Government.

DETAILED STATEMENT OF EXPENDITURES

GRADING UNIT NO. 1—

Engineering		$ 2,105.90
T.N.T. furnished free to contractor		1,165.60
Contract items as follows:		
Clearing and grubbing, all	$ 2,700.00	
Common excavation, 5,737.6 cu. yds. at 80c	4,590.08	
Intermediate excavation, 7,468.8 cu. yds. at $1.10	8,215.68	
Solid rock excavation, 9,967.5 cu. yds. at $2.00	19,935.00	
Overhaul, 4,830.0 sta. yds. at 8c	386.40	
12-inch corrugated galvanized iron pipe, 198.0 lin. ft. at $3.40	673.20	
24-inch corrugated galvanized iron pipe, 174.0 lin. ft. at $6.00	1,044.00	
36-inch corrugated galvanized iron pipe, 30.0 lin. ft. at $12.00	360.00	
6-inch porous drain tile, 300.0 lin. ft. at 50c	150.00	
Class "A" concrete, 47.92 cu. yds. at $33.00	1,581.36	
Class "C" concrete, 22.5 cu. yds. at $30.00	675.00	
Metal reinforcement, 4,530.0 lbs. at 12c	543.60	
Standard wood guard fence, 2,184.0 lin. ft. at $1.10	2,402.40	
Stone and gravel backfill for drains, 20.0 cu. yds. at $3.00	60.00	
Force account items:		
Clearing and grubbing for borrow pit outside of right-of-way	200.00	
Total amount paid to William von der Hellen, contractor		43,516.72
Grand total cost of grading Unit No. 1		$ 46,788.22
Paid by State	$ 10,007.34	
Paid by County	15,000.00	
Paid by Government	21,780.88	
Total	$ 46,788.22	

GRADING UNIT NO. 2—

Engineering		$ 3,946.29
T.N.T. furnished free to contractor		2,230.00
Contract items as follows:		
Clearing and grubbing, all	$ 8,000.00	
Common excavation, 5,511.6 cu. yds. at 65c	3,582.54	
Intermediate excavation, 43,239.1 cu. yds. at $1.10	47,563.01	
Solid rock excavation, 17,247.6 cu. yds. at $2.00	34,495.20	
Overhaul, 20,105.0 sta. yds. at 7c	1,407.35	
12-inch plain concrete pipe, 1,548.0 lin. ft. at $2.00	3,096.00	
18-inch reinforced concrete pipe, 68.0 lin. ft. at $4.00	272.00	

[JACKSON]

EXPENDITURES—Continued

24-inch reinforced concrete pipe, 148.0 lin. ft. at $5.00	740.00	
36-inch reinforced concrete pipe, 104.0 lin. ft. at $8.00	832.00	
6-inch porous drain tile, 321.0 lin. ft. at $1.00	321.00	
Class "A" concrete, 112.46 cu. yds. at $40.00	4,498.40	
Class "C" concrete, 59.81 cu. yds. at $36.00	2,153.16	
Metal reinforcement, 10,769.0 lbs. at 10c	1,076.90	
Standard wood guard fence, 2,464.0 lin. ft. at $2.00	4,928.00	
Stone and gravel back fill for drains, 14.5 cu. yds. at $3.00	43.50	
Total amount paid to Rhodes & Price, contractors		113,009.06
Grand total cost of grading Unit No. 2		$119,185.35
Paid by State	$ 23,773.55	
Paid by County	37,000.00	
Paid by Government	58,411.80	
Total	$119,185.35	

GRADING UNIT No. 3—

Engineering		$ 2,611.98
T.N.T. furnished free to contractor by State		400.00
45 feet of siphon pipe furnished by State		123.75
Contract items as follows:		
Clearing and grubbing, all	$ 3,900.00	
Common excavation, 7,307.5 cu. yds. at 70c	5,115.25	
Intermediate excavation, 22,961.1 cu. yds. at $1.00	22,961.10	
Solid rock excavation, 4,543.9 cu. yds. at $1.85	8,406.22	
Overhaul, 11,210.0 sta. yds. at 8c	896.80	
8-inch corrugated galvanized iron pipe, 116.0 lin. ft. at $1.60	185.60	
12-inch corrugated galvanized iron pipe, 640.0 lin. ft. at $2.10	1,344.00	
18-inch corrugated galvanized iron pipe, 66.0 lin. ft. at $3.70	244.20	
24-inch corrugated galvanized iron pipe, 178.0 lin. ft. at $5.00	890.00	
36-inch corrugated galvanized iron pipe, 220.0 lin. ft. at $10.00	2,200.00	
Class "A" concrete, 61.94 cu. yds. at $40.00	2,477.60	
Class "C" concrete, 56.09 cu. yds. at $40.00	2,243.60	
Metal reinforcement, 6,076.0 lbs. at 10c	607.60	
Standard wood guard fence, 296.0 lin. ft. at $1.25	370.00	
Force account items:		
Installing old culvert pipe at crossroad approach	7.80	
Clearing and grubbing outside of right-of-way for borrow pits	200.00	
Total amount paid to W. B. Tull, contractor		52,049.77
Grand total cost of grading Unit No. 3		$ 55,185.50
Paid by State	$ 11,376.32	
Paid by County	17,000.00	
Paid by Government	26,809.18	
Total	$ 55,185.50	

FOUR CONCRETE BRIDGES—

Engineering		$ 3,209.91
Bronze name plates furnished by State		14.50
Contract items as follows:		
Excavation to plan elevation, 651.6 cu. yds. at $2.00	$ 1,303.20	
Excavation below elevation shown on plans, 15.9 cu. yds. at $5.00	79.50	
Class "A" concrete, 710.52 cu. yds. at $32.00	22,736.64	
Class "B" concrete, 35.59 cu. yds. at $28.00	996.52	
Metal reinforcement, 109,361.9 lbs. at 9c	9,842.57	
Structural steel, 46,970.0 lbs. at 11c	5,166.70	
Reinforced concrete handrail, 699.0 lin. ft. at $3.75	2,621.25	
Force account items:		
Rehauling materials account change in location of bridge	58.44	
Excavation for foundation of Little Butte Creek bridge	1,052.00	
Construction of temporary bridge around construction	49.36	

[JACKSON]

EXPENDITURES—Continued

Cutting metal reinforcement, due to change in plans of footings	9.32	
Rental of tillable ground for storage of materials	30.00	
Total amount paid to Lindstrom & Fiegenson, contractors		43.945.50
Grand total cost of structures		$ 47,169.91
Paid by State	$ 11,089.02	
Paid by County	14,000.00	
Paid by Government	22,080.89	
Total	$ 47,169.91	

STEEL BRIDGE OVER ROGUE RIVER—

Engineering		$ 3,064.94
Bronze name plates furnished by State		14.50
Contract items as follows:		
Excavation to plan elevation, 110.8 cu. yds. at $4.00	$ 443.20	
Excavation below elevation shown on plans, 12.7 cu. yds. at $40.00	508.00	
Class "A" concrete, 387.76 cu. yds. at $33.00	12,796.08	
Class "B" concrete, 138.74 cu. yds. at $30.00	4,162.20	
Metal reinforcement, 72,072.4 lbs. at 8c	5,765.79	
Structural steel, 126,383.0 lbs. at 15½c	19,589.37	
Reinforced concrete handrail, 627.0 lin. ft. at $4.25	2,664.75	
Force account items:		
Extra material in handrails and revision in Pier No. 3 due to change in design	567.05	
Total amount paid to Portland Bridge Company, contractors		46,496.44
Grand total cost of structure		$ 49,575.88
Paid by State	$ 11,060.72	
Paid by County	15,000.00	
Paid by Government	23,515.16	
Total	$ 49,575.88	

SURFACING UNITS NOS. 1, 2, AND 3—

Engineering		$ 2,582.36
Rental and repairs to sprinkling equipment owned by State		3,035.17
Contract items as follows:		
Sand for subbase, 820.0 cu. yds. at $2.00	$ 1,640.00	
Crushed gravel for surfacing, 39,579.5 cu. yds. at $2.50	98,948.75	
Force account items:		
Sprinkling and rolling macadam, not included in contract	9,344.28	
Constructing plank crossing over railroad tracks	30.58	
Total amount paid to William von der Hellen, contractor		109,963.61
Grand total cost of surfacing		$115,581.14
Paid by State	$ 22,836.08	
Paid by County	36,000.00	
Paid by Government	56,745.06	
Total	$115,581.14	

GRAND SUMMARY OF EXPENDITURES

	State	*County*	*Government*	*Total*
Grading Unit No. 1	$ 10,007.34	$ 15,000.00	$ 21,780.88	$ 46,788.22
Grading Unit No. 2	23,773.55	37,000.00	58,411.80	119,185.35
Grading Unit No. 3	11,376.32	17,000.00	26,809.18	55,185.50
Surfacing Units 1, 2 and 3	22,836.08	36,000.00	56,745.06	115,581.14
Four concrete bridges	11,089.02	14,000.00	22,080.89	47,169.91
Steel bridge over Rogue River	11,060.72	15,000.00	23,515.16	49,575.88
Totals	$ 90,143.03	$134,000.00	$209,342.97	$433,486.00

Trail-Prospect Forest Road Project

On the basis of surveys previously made by the State, the Bureau of Public Roads, in the spring of 1922, awarded contracts for grading and surfacing 13.6 miles between Trail and Prospect.

[JACKSON]

The contract for grading and surfacing the 6.4 miles from Trail to MeLeod was awarded to George Brown & Sons and is now about 70 per cent complete.

The contract for grading and surfacing the 7.2 miles between Trail and Cascade Gorge was awarded to the Hill Construction Company and is now about 80 per cent complete.

Contract for the construction of the five major bridges on the project was awarded to Lindstrom & Feigenson and work under this contract is now in progress.

The project agreement on the entire work calls for an expenditure of $300,000.00, to be divided equally between the State and Government. Expenditures to date amount to $126,517.70, which have been paid $50,000.00 by the State and the balance by the Government.

Volume of Travel to Crater Lake

Crater Lake is one of the wonders of the world and needs no introduction in this report. Up until the past few years, however, the means of access were difficult and the Lake was visited only by those who were willing to undertake a long, hard trip to view what is perhaps the most beautiful spot in Oregon.

As the roads leading to the Lake have been improved, the traffic has shown a steady increase. At the present time there are only a few sections yet to be constructed in order to provide standard improved highways from both Medford and Klamath Falls, and, today, the tourist who visits Oregon without seeing Crater Lake has missed one of the chief scenic attractions which the State has to offer.

Crater Lake National Park is under the jurisdiction of the National Park Service of the Department of the Interior and records of traffic to the Lake have been kept since 1904. A tabulation of their traffic records is given herewith, and a study of the figures will show the popularity which this recreation point is attaining as the result of advertising and improved highway construction.

Year	*Cars Registered*	*Visitors Registered*
1904	not listed	1,400
1905	not listed	1,400
1906	not listed	1,800
1907	not listed	2,600
1908	not listed	5,275
1909	not listed	5,000
1910	not listed	5,000
1911	not listed	4,500
1912	not listed	5,235
1913	not listed	6,235
1914	not listed	7,096
1915	not listed	11,371
1916	2,649	12,265
1917	2,756	11,645
1918	3,105	13,231
1919	4,637	16,645
1920	5,158	20,135
1921	7,892	28,617
1922	9,429	33,011

Prospect-Crater Lake Forest Road Project

A complete description of this work will be noted on page 264 of the last report. As stated therein, excess funds were being used for the construction of surfacing on six miles of the section. This six miles covers the portion adjacent to Prospect and the work was completed late in 1920.

The project represents a total expenditure to date of $235,647.31, which has been paid $121,250.00 by the State, $3,438.71 by the County and $110,958.60 by the Government. The state expenditures given include $91,626.75 paid during the previous biennium.

Green Springs Mountain Summit-Pacific Highway Surfacing

A description of this project will be found on page 262 of the Fourth Biennial Report. Instead of the construction of six miles of surfacing, however, but 2.84 miles, extending east from the Pacific Highway, were surfaced under this contract and the balance later included in the contract for the adjoining section on the east. Approximately 2.2 miles were surfaced during 1920, the remaining 0.64 mile being completed during the spring of 1921. During the present biennium the sum of $24,904.00 has been expended, bringing the total cost of the project to $32,891.85. Of this amount the County paid $16,154.10 and the State $16,737.75.

Hauling was done by State-operated trucks, under exceptionally adverse conditions. For this reason, the hauling costs ran higher than ordinary. A total of 6,773 cubic yards were hauled a total of 29,937 yard miles.

Green Springs Mountain Summit Surfacing

On June 29, 1921, Contract No. 407 was awarded to A. D. Kern of Portland, Oregon, for surfacing 7.76 miles of the Ashland-Klamath Falls Highway extending from the summit of the Green Springs Mountain west to a connection with the surfacing previously constructed. The material for the surfacing was taken from an ideal quarry site located about the center of the job, where it was crushed to a 1½-inch maximum size and placed to a width of 10 feet on top, being feathered to a total width of 14 feet. The thickness of surfacing varied from four inches in rock fills to 10 inches in adobe soil. The contract called for the crushing and spreading of the rock and the preparation of the subgrade, the hauling being done by the State. No rolling or sprinkling of the surfacing materials was done.

The work was started September 8, 1921, and completed January 20, 1922, under the supervision of G. E. MacVicar, Resident Engineer, with total expenditures of $63,690.87. Of this amount Jackson County cooperated to the extent of $31,176.47, the balance of $32,514.40 being paid by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,226.86
Hauling surfacing material by State		30,264.53
Rental of trucks owned by State (deducted from contractor's estimate)		900.40
Contract items as follows:		
Broken stone surfacing, 13,819.5 cu. yds. at $2.15	$ 29,711.93	
Maintenance materials, placed in piles, 1,157.0 cu. yds. at $2.15	2,487.55	
Total amount earned by contractor	$ 32,199.48	
Deduction for rental of State trucks	900.40	
Total amount paid to contractor		31,299.08
Grand total cost of project		$ 63,690.87
Paid by State	$ 32,514.40	
Paid by County	31,176.47	
Total	$ 63,690.87	

[JACKSON]

Keene Creek-Klamath County Line Post Road Project

Upon completion of the grading of the Ashland-Klamath Falls Highway between Jenny Crek and the Klamath County Line, the Commission ordered the advertising of the surfacing between Keene Creek, in Jackson County, and Hayden Creek in Klamath County. For the purpose of receiving bids, this section was divided into two units, the point of division being at the County line. Bids were received on this basis on October 6, 1922, and Contract No. 602 was awarded to S. S. Shell of Oakland for surfacing the Jackson County portion.

The work is being done in cooperation with the County and Federal Government under the terms of Post Road Project Agreement No. 86. The surfacing was originally advertised to be constructed to a width of 16 feet, but the Bureau of Public Roads objected to the width to which the original roadbed had been constructed and agreed that any expenditures occasioned by widening of the roadbed might be deducted from the expenditures to be made on the surfacing. Under this agreement, arrangements were made with Mr. Hampshire, who held the grading contract on the unit, for widening the roadbed and a clause was inserted in the surfacing contract whereby the required reduction in cost might be accomplished either by narrowing the width or decreasing the thickness of the surfacing to be constructed.

Exclusive of the cost of widening the roadbed, the surfacing is estimated to cost a total of $72,000.00, to be paid $36,000.00 by the County and $43,996.55 by the Federal Government, with a credit of $7,996.55 to the State. No expenditures have been made on the project to the date of this report.

Gold Hill-Central Point Widening

In order to provide suitable drainage where the ditches were too narrow or too shallow, Contract No. 446 was awarded to C. L. Calvert of Grants Pass, Oregon, on August 30, 1921, for widening and ditching certain portions of the Gold Hill-Central Point Section.

Of the total length of 8.9 miles, 3.44 miles were widened, the remainder having either been originally constructed to a wide roadbed or the materials encountered such that a deep ditch was not required. The quantities involved in the work being small, the contract was completed by November 29 of the same year it was awarded.

The work was supervised by Paul B. Rynning, Resident Engineer, with total expenditures of $6,007.96 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 678.23
Contract items as follows:		
Common excavation, 6,889.0 cu. yds. at 63c	$ 4,340.07	
Solid rock excavation, 343.0 cu. yds. at $1.50	514.50	
Overhaul, 412.0 sta. yds. at 8c	32.96	
12-inch plain concrete pipe, 208.0 lin. ft. at $1.25	260.00	
Force account items:		
Trimming up ditches and shoulders	144.47	
Relaying crossroad culverts to conform to new grade line	37.73	
Total amount paid to contractor		5,329.73
Grand total cost of project (all State funds)		$ 6,007.96

Ashland-Talent Widening

When the Pacific Highway was graded between Ashland and Talent during 1914, insufficient importance was placed on the matter of pro-

viding adequate drainage. In order to improve this condition, Contract No. 441 was awarded to Albert Anderson of Grants Pass, Oregon, on August 31, 1921. This contract covered the necessary widening and ditching on the section. Work was started October 1 of the same year and was completed January 14, 1922. The work was of a very light character and was scattered over the entire length of the section.

Construction was supervised by G. E. MacVicar, Resident Engineer, and represents a total expenditure of $7,782.06 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 735.90
Repairing water main in town of Talent by State forces		118.68
Contract items as follows:		
Common excavation, 4,446.0 cu. yds. at 79c	$ 3,512.34	
Solid rock excavation, 650.2 cu. yds. at $2.00	1,300.40	
Overhaul, 2,440.0 sta. yds. at 6c	146.40	
8-inch plain concrete pipe, 92.0 lin. ft. at $1.25	115.00	
12-inch plain concrete pipe, 446.0 lin. ft. at $1.50	669.00	
Standard wood guard fence, 944.0 lin. ft. at $1.00	944.00	
Force account item:		
Constructing rock walls at ends of culverts across private road approaches	240.34	
Total amount paid to contractor		6,927.48
Grand total cost of project (all State funds)		$ 7,782.06

Talent Reservoir Grading

A description of this project will be found on page 262 of the Fourth Biennial Report. Work was completed on March 24, 1921, with biennium expenditures of $463.72 from State funds and $6,837.51 from County funds. This brings the total cost of the project to $12,639.57, having been paid $467.92 by the State and $12,171.65 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 467.92
Contract items as follows:		
Clearing and grubbing, all	$ 990.00	
Common excavation, 2,003.8 cu. yds. at 74c	1,482.81	
Solid rock excavation, 3,993.6 cu. yds. at $2.20	8,785.92	
Overhaul, 460.0 sta. yds. at 4c	18.40	
12-inch plain concrete pipe, 194.0 lin. ft. at $2.50	485.00	
24-inch corrugated galvanized iron pipe, 10.0 lin. ft. at $5.50	55.00	
Class "C" concrete, 4.66 cu. yds. at $40.00	186.40	
Force account items:		
Salvaging crushed rock from old roadway	124.84	
Filling ruts and cleaning ditches	43.28	
Total amount paid to contractor		12,171.65
Grand total cost of project		$ 12,639.57
Paid by State	$ 467.92	
Paid by County	12,171.65	
Total	$ 12,639.57	

Green Springs Mountain Summit-Jenny Creek Grading

A description of this section will be found on page 263 of the Fourth Biennial Report. During the present biennium the work was carried to completion on November 15, 1921, with a credit of $12,985.07 to the State funds, and expenditures of $55,720.57 from County funds. This brings the total cost of the project to $118,427.15, which has been paid $62,706.58 by the State and $55,720.57 by Jackson County.

[JACKSON]

Green Springs Mountain Summit-Pacific Highway Grading

A description of this project will be found on page 262 of the Fourth Biennial Report. Construction was carried to completion on October 31, 1921. During the present biennium $104,497.37 have been expended from State funds and $67,626.80 from County funds, bringing the total cost of the project to $220,163.01. At the time of writing this report the sum of $34,488.23 is due from Jackson County in cooperation.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 15,852.94
Labor and materials furnished by State:		
Rental of State-owned truck		21.00
Items deducted from contractor's estimate:		
T. N. T. furnished by State		3,000.00
Rental of trucks owned by State		271.88
Contract items as follows:		
Clearing and grubbing, all	$ 6,000.00	
Common excavation, 4,407.6 cu. yds. at 75c	3,305.70	
Intermediate excavation, 32,170.2 cu. yds. at 90c	28,953.18	
Solid rock excavation, 112,880.3 cu. yds. at $1.30	146,744.39	
Overhaul, 18,995.0 sta. yds. at 5c	949.75	
12-inch plain concrete pipe, 1,626.0 lin. ft. at $1.50	2,439.00	
18-inch reinforced concrete pipe, 284.0 lin. ft. at $3.75	1,065.00	
24-inch reinforced concrete pipe, 92.0 lin. ft. at $5.25	483.00	
30-inch reinforced concrete pipe, 48.0 lin. ft. at $8.00	384.00	
6-inch porous drain tile, 210.0 lin. ft. at 25c	52.50	
Lumber and timber, 53.776 M.-FBM. at $50.00	2,688.80	
Force account items:		
Changing location of culverts	26.28	
Removing old bridge over Cattle Gulch Creek	21.97	
Removing slides, opening ditches and cleaning out old culverts	8,025.19	
Constructing retaining walls between Sta. 130 and Sta. 131	1,198.63	
Extra clearing due to widening of roadbed after construction was started	720.00	
Damage claims for breaking of fences and depositing rocks on property adjacent to right-of-way	1,236.75	
Total amount earned by contractor	$204,294.14	
Deductions:		
Rental of State-owned trucks	271.88	
T. N. T. furnished by State	3,000.00	
War tax on freight	5.07	
Total deductions	$ 3,276.95	
Total amount paid to contractor		201,017.19
Grand total cost of project		$220,163.01
Paid by State	$152,536.21	
Paid by County	67,626.80	
Total	$220,163.01	

Jenny Creek-Klamath County Line Grading

Contract No. 459 for the grading of the Ashland-Klamath Falls Highway between Jenny Creek and Klamath County Line was awarded to John Hampshire of Grants Pass, Oregon, on August 30, 1921, the contract covering a total length of 4.46 miles. Work was started on September 12 and continued until operations were shut down by winter snow. Owing to an unusually late season, it was May, 1922, before the contractor could resume work.

Subsequent to the completion of the work on the original contract, the surfacing of the unit from Keene Creek to the Klamath County Line has been submitted to the Bureau of Public Roads for their cooperation as a post road project. The Bureau objected to the width of the graded

roadbed and stipulated that this be increased to a minimum width of 18 feet between ditches before they would accept it as a project upon which they could cooperate. It was agreed that the expenditures for surfacing might be reduced in amount equal to the cost of widening and work is proceeding on this basis. To cover this, a special agreement has been entered into with Mr. Hampshire whereby he has agreed to widen the entire section from Keene Creek to the County Line at the same unit prices applying to his original grading contract for the section from Jenny Creek to the County Line.

Work has been handled under the supervision of R. L. Kuney, Resident Engineer, and is estimated to cost a total of $43,000.00. Of this amount Jackson County will cooperate to the extent of $17,600.00, the balance being borne by the State. Expenditures to date amount to $37,208.58 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,081.49
Expense of taking traffic count		2.90
Prospecting for quarry sites		16.80
Contract items as follows:		
Clearing and grubbing, all	$ 6,966.00	
Common excavation, 6,018.0 cu. yds. at $1.00	6,018.00	
Intermediate excavation, 6,177.0 cu. yds. at $1.25	7,721.25	
Solid rock excavation, 7,498.0 cu. yds. at $1.65	12,371.70	
Overhaul, 5,190.0 sta. yds. at 5c	259.50	
12-inch corrugated galvanized iron pipe, 708.0 lin. ft. at $1.75	1,239.00	
18-inch corrugated galvanized iron pipe, 82.0 lin. ft. at $3.00	246.00	
24-inch corrugated galvanized iron pipe, 60.0 lin. ft. at $4.00	240.00	
Force account items:		
Moving culvert pipe to new location account change in plans	3.48	
Riprapping at ends of culverts to protect embankments	86.88	
Cutting down overhanging trees	55.58	
Total amount earned by contractor	$ 35,207.39	
Percentage retained until completion of contract	100.00	
Total amount paid to contractor		35,107.39
Grand total expended (all State funds)		$ 37,208.58

Ashland Overcrossing and Approaches

A detailed description of this work may be found on page 267 of the last report. During the present biennium, both the structure and approaches have been carried to completion and final payments have been made.

The net expenditures on the structure during the period amount to $7,594.00. The sum of $7,045.56 was received from the County, and $14,111.34 from the Railroad Company, leaving the State funds a net credit of $13,562.90. These entries bring the total cost to $35,229.05, paid $14,072.15 by the State, $7,045.56 by the County and $14,111.34 by the Southern Pacific Railroad Company.

The net expenditure for the biennium on the grading of the approaches amounts to $5,132.89, made up of $2,910.10 received from the County, $5,801.18 received from the Railroad Company and a credit of $3,578.39 to the State. These amounts bring the total cost to $14,550.51, consisting of $5,839.23 from State funds, $2,910.10 from County funds and $5,801.18 from Railroad funds.

The combined cost of the structure and approaches has amounted to $49,779.56, towards which the State has paid $19,911.38, Jackson County $9,955.66 and the Southern Pacific Railroad Company $19,912.52.

[JACKSON]

DETAILED STATEMENT OF EXPENDITURES

STRUCTURE—

Engineering		$ 1,918.73
Labor and materials furnished by State:		
Removing cattle guards and road crossing		115.89
Items deducted from contractor's estimate:		
Bronze name plates furnished by State		16.00
Contract items:		
Excavation, 364.54 cu. yds. at $2.00	$ 729.08	
Class "A" concrete, 192.37 cu. yds. at $40.00	7,694.80	
Class "B" concrete, 311.33 cu. yds. at $27.50	8,561.58	
Metal reinforcement, 44,022.0 lbs. at 9c	3,961.98	
Concrete handrail, 216.0 lin. ft. at $4.50	972.00	
Wood trestle approaches, 338.18 lin. ft. at $30.00	10,145.40	
Force account items:		
Installing extra expansion joints	431.55	
Applying carbolineum to trestle, painting outside stringers and sanding handrail	702.04	
Total amount earned by contractor	$ 33,198.43	
Deductions for bronze name plates furnished by state	20.00	
Total amount paid to contractor for structure		33,178.43
Total cost of structure		$ 35,229.05

APPROACHES—

Engineering		$ 495.72
Labor and materials furnished by State:		
Standard wood guard fence		1,328.00
Purchase of right-of-way		1,137.00
Contract items:		
Clearing and grubbing, all	$ 750.00	
Common excavation, 16,679.2 cu. yds. at 64c	10,674.69	
Force account items:		
Installing 12-inch plain concrete pipe with head-walls	165.10	
Total amount paid to contractor		11,589.79
Total cost of approaches		$ 14,550.51
Grand total cost of structure and approaches		$49,779.56

	Structure	*Approaches*	*Total*
Paid by State	$ 14,072.15	$ 5,839.23	$ 19,911.38
Paid by County	7,045.56	2,910.10	9,955.66
Paid by Southern Pacific Railroad Company	14,111.34	5,801.18	19,912.52
Total	$ 35,229.05	$ 14,550.51	$ 49,779.56

Tolo Overcrossing

An article descriptive of the work on this project was given on page 266 of the last report. During the present biennium, the guard fence referred to has been built at a total cost of $1,076.80, and miscellaneous work was done to the value of $474.14. These amounts, in addition to delayed engineering expenditures amounting to $430.56, bring the total expenditures for the two-year period to $1,981.50.

During the biennium $6,504.83 was received from the County and $13,009.66 from the Railroad Company, leaving a net credit to the State of $17,532.99. This brings the total cost of the structure to $32,913.37, which has been paid $13,398.88 by the State, $6,504.83 by Jackson County, and $13,009.66 by the Southern Pacific Railroad Company.

[JACKSON]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,915.41
Labor and materials furnished by State:		
Royalty on material for embankment		250.00
Services of watchman, removing cattle guard and road crossing, closing right-of-way fence and repairing signal line		474.14
Standard wood guard fence		1,076.80
STRUCTURE—		
Contract items as follows:		
Class "A" concrete, 244.55 cu. yds. at $30.00	$ 7,336.50	
Metal reinforcement, 39,908.0 lbs. at 8½c	3,392.18	
Structural steel, 24,050.0 lbs. at 9c	2,164.50	
Timber approach trestle, 177.3 lin. ft. at $17.90	3,173.67	
Concrete handrail, 250.0 lin. ft. at $3.25	812.50	
Force account items:		
Painting timbers, digging test holes and removing fill around bracing	359.13	
Total amount paid to contractor for building structure		17,238.48
APPROACHES—		
Contract items as follows:		
Common excavation, 14,041.21 cu. yds. at 65c	$ 9,126.79	
Overhaul, 42,096.0 sta. yds at 4c	1,683.84	
24-inch reinforced concrete pipe, 40.0 lin. ft. at $3.74	149.60	
36-inch reinforced concrete pipe, 80.0 lin. ft. at $6.33	506.40	
Class "C" concrete, 9.02 cu. yds. at $20.00	180.40	
Force account items:		
Moving fences off right-of-way	40.15	
Building dry rubble walls at end of approach fills	94.80	
Leveling up borrow pit	176.56	
Total amount paid to contractor for building approaches		11,958.54
Grand total cost of structure and approaches		$ 32,913.37
Paid by State	$ 13,398.88	
Paid by County	6,504.83	
Paid by Southern Pacific Railroad Company	13,009.66	
Total	$ 32,913.37	

Maintenance

The program of State highway construction in Jackson County has reached the stage where practically all the highways have been constructed and the item of maintenance of these highways is becoming an item of increasing importance each year. Slides on newly graded sections have required large expenditures, notably on the Medford-Crater Lake Highway, the Ashland-Klamath Falls Highway and the Pacific Highway at the summit of the Siskiyous.

Ditches and culverts have been kept open during the winter seasons and the finished macadam in the County, consisting of 22 miles on the Medford-Crater Lake Highway and 10 miles on the Ashland-Klamath Falls Highway, have been dragged on the average of twice a week. The pavement shoulders on the Pacific Highway have also commanded consideration.

The concrete pavement between Medford and Ashland has held up remarkably well and has required only a small amount of maintenance, consisting of filling the pavement cracks with hot bitumen. Both of the approaches to the Tolo and Ashland overhead crossings settled and required some patching of the bituminous pavement.

While the paving plant of Contractor J. C. Compton was set up, north of Grants Pass, it was considered advisable to secure bituminous mixture from him for use in general skin patching of pavement. This patching was done over such portions of the Pacific Highway in Jackson County as required in order to correct minor defects in the pavement.

[JACKSON]

Birdseye Creek and Miller's Gulch Bridges

The reader is referred to page 265 of the previous report for the details of this work. Payments amounting to $3,365.04 have been made during the present biennium, bringing the final cost to $13,585.11 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,512.93
Contract items as follows:		
BIRDSEYE CREEK BRIDGE No. 412—		
Excavation, 90.87 cu. yds. at $1.25	$ 113.59	
Class "A" concrete, 107.54 cu. yds. at $30.00	3,226.20	
Metal reinforcement, 17,965.38 lbs. at 10c	1,796.54	
Maintaining traffic, all	300.00	
Reinforced concrete handrail, 129.0 lin. ft. at $3.00	387.00	
Force account items:		
Construction of masonry wall to protect west bank of Birdseye Creek	408.50	
MILLER'S GULCH BRIDGE No. 413—		
Excavation, 109.16 cu. yds. at $1.25	$ 136.45	
Class "A" concrete, 94.48 cu. yds. at $30.00	2,834.40	
Metal reinforcement, 17,944.98 lbs. at 10c	1,794.50	
Maintaining traffic, all	300.00	
Reinforced concrete handrail, 115.0 lin. ft. at $3.00	345.00	
Force account items:		
Furnishing extra form lumber and falsework on account of change in plans	440.00	
Removing old bridge abutments	30.00	
Total amount earned by contractor	$ 12,112.18	
Deductions for name plates furnished by State	40.00	
Total amount paid to contractor		12,072.18
Grand total cost of structures (all State funds)		$ 13,585.11

Medford-Prospect Survey

Prior to the construction of the section of the Medford-Crater Lake Highway between Agate and Trail, several minor changes in location were made. The line was originally located via Eagle Point and was later revised to pass about one-quarter mile west of town, providing a more direct route and one with much better alignment and grades.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Jackson County has co-operated as follows:

1.	Paid into the State Market Road Fund	$ 86,658.52
2.	State Funds apportioned to County	120,736.98
3.	County levy made to match State Funds	140,331.44
4.	County Market Road Funds collected	143,093.97
5.	Cash paid to County by State	92,387.08
6.	State expenditures, deducted from apportionment	16,312.61
7.	Cash due County from State in December, 1922	12,037.29
8.	County expenditures on Market Roads	246,000.00
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Jackson County received from the State Market Road Fund $34,078.46 more than it paid into the

fund. The excess is Jackson County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $140,331.44.

In 1920 and 1921 they collected $103,093.97. The County Treasurer has not reported the amount collected and expended in 1922, although this information was requested November 4, 1922. The figures in the above table are, therefore, unofficial.

The County Court has designated nine roads to be improved as Market Road projects.

The engineering work has been done by engineers in the employ of the State Highway Commission. Plans have been submitted to this Department for approval.

The construction work has been done under the direction of the County Court. They have employed engineers recommended by Division Engineer K. E. Hodgeman and have consulted him concerning construction work.

Reports received from County officials seem to indicate that Market Road funds are used along with other County funds on certain projects and that no attempt is made to segregate the expenditures. The County Treasurer has reported the receipts of Market Road funds and the balance on hand, but has not shown on what roads expenditures were made. The County Judge has reported expenditures on the different roads showing the expenditures in even thousand-dollar amounts.

Reports showing the amount of work done and the construction costs do not check with the figures submitted by the County Judge.

The County Court has graded and surfaced, with crushed rock or gravel, 24.8 miles of road.

JEFFERSON COUNTY

From the standpoint of State highways, Jefferson County is served by only The Dalles-California Highway. This road, however, runs north and south through the center of the County and passes through Madras, Metolius and Culver.

During the past two years three units have been graded and one unit has been surfaced between Madras and the Wasco County Line. Improvement of the gaps was presented to the Federal Government for their cooperation as post road work, and a contract has been awarded for the balance of the grading and surfacing required.

South of Madras, the grading and surfacing has been completed to the gap which has been left at the Crooked River in contemplation of a future high crossing of the gorge. At the present time, traffic is using the "Trail Crossing" road, which requires descent and ascent of the Crooked River Canyon.

State work in the County was handled by J. H. Scott, Division Engineer, until April 1, 1922, on which date the supervision was taken over by C. W. Wanzer, Division Engineer.

Madras-North Post Road Project

Subsequent to the completion of the grading of Units 2 and 4, and the grading and surfacing of Unit 6 on The Dalles-California Highway north of Madras, the State Highway Commission ordered the contracting of the balance of the unimproved sections. The matter was taken up with the Bureau of Public Roads for their cooperation and was approved under the terms of Post Road Project Agreement No. 81. This agreement calls for the grading of units 1, 3 and 5 and the surfacing of all units except Unit 6, there being involved 9.37 miles of grading and 15.64 miles of surfacing.

Contract No. 601 was awarded to More & Anderson on October 26, 1922, with the hauling of the surfacing materials to be done by State-operated trucks without cost to the contractor. The contract calls for the delivering of surfacing materials in the bunkers and all spreading, dragging and shaping of the materials done by the contractor.

The total estimated cost of the work is $123,000.00, towards which the Federal Government will cooperate to the extent of $75,307.20, and the State will pay the balance of $47,692.80. Expenditures to date were made under the supervision of R. P. Newland, Resident Engineer, and amount to $251.73 from State funds.

Madras-Deschutes County Line Post Road Project

Description of this project will be found on page 272 of the Fourth Biennial Report, and work was completed June 30, 1921. The south end of the project was surfaced from materials secured near Culver, but when the haul on materials became too long to be economical, the crushing plant was moved to a quarry near Madras. The materials secured from this latter source were not as satisfactory as from the Culver quarry, and considerable difficulty was experienced in making the surfacing set up, this difficulty being aggravated by the fact that the materials were placed during dry weather. However, they have had a winter's rain since that time and have worked out very satisfactorily.

The expenditures during the present biennium amount to a credit of $12,087.30 to State funds, $50,000.00 by Deschutes County and $83,621.35 by the Federal Government, bringing the total cost of the project to $173,234.38, which has been paid $39,613.03 by the State, $50,000.00 by the County and $83,621.35 by the Federal Government.

[JEFFERSON]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 10,647.63
Freight on county road roller used on force account work		38.35
Placing filler on base course		104.08
Rental of State-owned tractor (deducted from contractor's estimate)		4,602.20
T. N. T. furnished by State (deducted from contractor's estimate)		2,246.47
Contract items as follows:		
Clearing and grubbing, all	$ 800.00	
Common excavation, 30,298.5 cu. yds. at 65c	19,694.03	
Solid rock excavation, 5,482.4 cu. yds. at $2.60	14,254.24	
Overhaul, 2,000.2 sta. yds. at 8c	160.02	
Grader work, 11.262 miles at $700.00	7,883.40	
12-inch plain concrete pipe, 288.0 lin. ft. at $2.00	576.00	
18-inch reinforced concrete pipe, 24.0 lin. ft. at $3.25	78.00	
24-inch reinforced concrete pipe, 188.0 lin. ft. at $4.50	846.00	
36-inch reinforced concrete pipe, 28.0 lin. ft. at $6.00	168.00	
Class "C" concrete, 48.33 cu. yds. at $25.00	1,208.25	
Crushed rock base material, 15,581.0 cu. yds. at $4.75	74,009.75	
Crushed rock top material, 8,405.0 cu. yds. at $4.75	39,923.75	
Crushed rock placed in piles for maintenance, 200.0 cu. yds. at $4.50	900.00	
Crushing rock only, for future maintenance, 636.0 cu. yds. at $2.25	1,431.00	
Force account items:		
Unloading county road roller	82.66	
Rolling macadam	295.98	
Constructing wood box culvert at Adams Street, Madras	29.61	
Placing earth filler on crushed rock surfacing	93.00	
Loading county road roller for reshipment	10.63	
Total amount earned by contractor	$162,444.32	
Deductions:		
Rental of State-owned tractor	4,602.20	
T. N. T. furnished by State	2,246.47	
Total amount paid to contractor		155,595.65
Grand total cost of project		$173,234.38
Paid by State	$ 39,613.03	
Paid by County	50,000.00	
Paid by Government	83,621.35	
Total	$173,234.38	

Trout Creek Bridge

Bids were taken on March 23, 1922, for the construction of bridges over Hay Creek, Wilson Creek and Trout Creek on the Madras-Wasco County Line Section, at which time Lindstrom & Feigenson were the low bidders.

Before the contract was awarded, however, a line change was adopted which eliminated the proposed crossings of Hay Creek and Wilson Creek. Lindstrom & Feigenson agreed to allow their unit prices to stand for the remaining structure, and were accordingly awarded Contract No. 504 for the construction of the Trout Creek bridge.

Work was started on May 1, 1922, and was completed on September 1, 1922, except for a small amount of finishing which is to be done later.

A considerable amount of riprap was necessary for the protection of the fills at the ends of the bridge. This was placed by State forces under the supervision of Mervyn Stephenson, Resident Engineer, at a cost of $1,530.32. Including this sum, a total of $8,645.57 has been paid from State funds.

[JEFFERSON]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 504.74
Bronze name plates furnished by State		14.00
Constructing rock wall and improving waterway beneath bridge by State forces		1,417.16
Maintenance on County Bridges		99.16
Contract items as follows:		
Excavation, no clasification, 193.2 cu. yds. at $2.00	$ 386.40	
Excavation below elevation shown on plans, 5.5 cu. yds. at $3.00	16.50	
Class "A" concrete, 181.74 cu. yds. at $22.85	4,152.76	
Metal reinforcement, 22,200.0 lbs. at $0.059	1,309.80	
Concrete handrail, 189.9 lin. ft. at $5.00	949.50	
Total amount earned by contractor	$ 6,814.96	
Percentage retained until completion of contract	204.45	
Total amount paid to contractor		6,610.51
Grand total expended (all State funds)		$ 8,645.57

Units 2 and 4, Madras-Wasco County Line Grading

Of the total of six units in which The Dalles-California Highway in Jefferson County north of Madras was divided, it was decided to improve first Units 2, 4 and 6 with the limited funds available. This action was taken to eliminate the worst grades and provide a passable road.

Contract No. 482 for grading Units 2 and 4 was awarded to McAuliffe & Healy of Portland on October 26, 1921. Unit 2 begins approximately one mile north of Madras and extends north for a distance of 1.8 miles. Unit 4 begins approximately six miles north of Madras and extends north 4.47 miles. Operations on the grading were started soon after the award of the contract, and were completed on July 1, 1922, under the supervision of R. P. Newland, Resident Engineer. When all final payments have been made, the work is estimated to cost a total of $34,382.64, and is to be paid $9,382.64 by the State and $25,000.00 by the County. Expenditures to date amount to $32,879.22, and have been paid $12,879.22 by the State and $20,000.00 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,746.74
Hauling and placing rock in soft spots		189.23
Prospecting for surfacing materials		12.25
Contract items as follows:		
Clearing and grubbing, all	$ 375.00	
Common excavation, 21,879.0 cu. yds. at 29c	6,344.91	
Intermediate excavation, 5,499.0 cu. yds. at 49c	2,694.51	
Solid rock excavation, 16,901.0 cu. yds. at 99c	16,731.99	
Overhaul, 14.845.0 sta. yds. at 5c	742.25	
12-inch corrugated galvanized iron pipe, 376.0 lin. ft. at $1.30	488.80	
18-inch corrugated galvanized iron pipe, 206.0 lin. ft. at $2.20	453.20	
24-inch corrugated galvanized iron pipe, 174.0 lin. ft. at $3.00	522.00	
36-inch corrugated galvanized iron pipe, 156.0 lin. ft. at $5.75	897.00	
Class "C" concrete, 46.55 cu. yds. at $30.00	1,396.50	
Force account items:		
Resloping cut slopes to prevent slides	36.01	
Placing riprap at spillway, station 520+00	119.63	
Digging test pits for gravel	8.29	
Constructing dry rock wall at ends of culverts	46.61	
Total amount earned by contractor	$ 30,856.70	
Percentage retained until completion of contract	925.70	
Total amount paid to contractor		29,931.00
Grand total expended		$ 32,879.22

[JEFFERSON]

EXPENDITURES—Continued

Paid by State	$ 12,879.22
Paid by County	20,000.00
Total	$ 32,879.22

Unit 6, Madras-Wasco County Line Grading and Surfacing

This is the north unit of The Dalles-California Highway in Jefferson County, and connects with the Cow Canyon Section in Wasco County. The section is 5.4 miles in length, and has been graded and surfaced under Contract No. 483, awarded to D. F. Murphy & Company of Boise, Idaho, on October 26, 1921. No unusual difficulties were encountered during construction, but completion of the project was delayed on account of difficulty in securing experienced help.

Construction was carried on under the supervision of R. P. Newland, Resident Engineer, and is estimated to cost a total of $42,500.00, when all final payments have been made. Of this amount, the County will cooperate to the extent of $25,000.00, and the State will pay the balance of $17,500.00. Expenditures to date amount to $31,542.54, consisting of $20,000.00 from County funds and $11,542.54 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,862.64
Constructing crossroad approach with State forces		22.50
Constructing dike and siphons with State forces		21.80
Contract items as follows:		
Clearing and grubbing, all	$ 200.00	
Common excavation, 29,245.0 cu. yds. at 24c	7,018.80	
Intermediate excavation, 5,319.0 cu. yds. at 45c	2,393.55	
Solid rock excavation, 3,788.0 cu. yds. at $1.00	3,788.00	
Overhaul, 3,190.0 sta. yds. at 5c	159.50	
12-inch corrugated galvanized iron pipe, 811.0 lin. ft. at $1.50	1,216.50	
18-inch corrugated galvanized iron pipe, 417.0 lin. ft. at $2.50	1,042.50	
24-inch corrugated galvanized iron pipe, 258.0 lin. ft. at $3.20	825.60	
36-inch corrugated galvanized iron pipe, 32.0 lin. ft. at $6.50	208.00	
Class "C" concrete, 59.34 cu. yds. at $25.00	1,483.50	
Crushed gravel surfacing, 8,204.0 cu. yds. at $1.55	12,716.20	
Filler, 198.0 cu. yds. at 50c	99.00	
Payhaul on filler, 24.0 yd. mi. at 40c	9.60	
Force account items:		
Lowering water pipe lines in cuts and borrow pits	196.61	
Repairing irrigation ditch damaged by cloudburst	52.67	
Salvaging culvert pipe from old county road	42.92	
Constructing hand placed rock wall to protect slopes	49.00	
Total amount earned by contractor	$ 31,501.95	
Percentage retained until completion of contract	2,866.35	
Total amount paid to contractor		28,635.60
Grand total expended		$ 31,542.54
Paid by State	$ 11,542.54	
Paid by County	20,000.00	
Total	$ 31,542.54	

Maintenance

Maintenance headquarters for the State highways in Jefferson County are located at Madras for the present and are under the supervision of R. P. Newland, Resident Engineer, who also has charge of the construction work north of Madras.

[JEFFERSON]

The Madras-Deschutes County Line Section was completed June 30, 1921, and the State immediately took over the maintenance of the unit. This maintenance has consisted of dragging, cleaning ditches, adding extra surfacing materials where needed, reshaping roadbed, and rolling such sections of the surfacing as had not properly set up. This work has been carried on as needed, and the section is now in excellent condition.

Considerable betterment work has been done on what is known as the Trail Crossing of the Crooked River Gorge, and has consisted of widening the roadbed, building guard fence, removing slides and placing surfacing on some of the worst places. The road in and out of the gorge is now in passable condition, although no attempt has been made to bring it to standard, as future plans at this place contemplate a possible high crossing of the Crooked River.

Upon completion of the section in Jefferson County north of Madras and the Cow Canyon Section in Wasco County, they will also be maintained by equipment from the Madras headquarters. The equipment now in use consists of one quad truck, one grader, small drags and other miscellaneous tools and equipment.

Madras-Wasco County Line Survey

During 1920 a location survey was started north from Madras, but was discontinued pending the selection of a definite route which might accord with the restrictions imposed by the previously authorized County bond issue. Early in 1921 the Highway Commission definitely adopted the route of The Dalles-California Highway between Madras and the Columbia River Highway, and in accordance with the request of the County Court, a location survey was made of the portion within Jefferson County. This was done on account of the fact that the County had $50,000.00 available for cooperation, and was desirous of having construction started as soon as possible.

Location was made by C. R. Burns, Locating Engineer, and upon its completion contracts were awarded for the improvement of Units 2, 4 and 6.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Jefferson County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 16,803.73
2.	State Funds apportioned to County	23,231.36
3.	County levy made to match State Funds	21,060.86
4.	County Market Road Funds collected	18,839.46
5.	Cash paid to County by State	18,825.17
6.	State expenditures, deducted from apportionment	451.67
7.	Cash due County from State in December, 1922	3,954.52
8.	County expenditures on Market Roads	43,264.09
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Jefferson County received from the State Market Road Fund $6,427.63 more than it paid into the fund. The excess is Jefferson County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $21,060.86. Of this amount they have collected and credited to the Market Road Fund $18,839.46.

[JEFFERSON]

The County Court has designated seven roads to be improved as Market Road projects. These have been divided into numerous sections, and plans submitted and approved for 15 small projects. Most of the surveys have been made by the County Surveyor. R. P. Newland, Resident Engineer for the State Highway Commission, has helped in the preparation of the plans.

Construction work has been done by County forces, under the direction of the County Court. Work on some projects was done before plans were approved. On some projects the improvement has not been made in accordance with the plans approved.

The County Court has expended $43,264.09. They have graded 15.6 miles of road and surfaced, with gravel, 14.5 miles.

JOSEPHINE COUNTY

During the past two years the grading and surfacing north of Grants Pass has been completed and the sections have been placed under contract for paving as soon as permitted by the intervals required for the proper settlement of embankments. At present, these paving contracts have all been completed, except for approximately 2.5 miles between Pleasant Valley and Grants Pass. With the exception of this one gap, the highway is paved throughout from the Douglas County Line to the Jackson County Line, a total distance of 34.7 miles.

No further construction has been taken on the Grants Pass-Crescent City Highway beyond the Hayes Hill section mentioned in the previous report

On the Oregon Caves Highway the Bureau of Public Roads has graded a section, 11.6 miles in length, adjacent to the Caves, as a cooperative forest road project. Bids were received by the State for grading three miles immediately west of this, but were rejected. This section will very probably be readvertised during the coming winter.

Supervision of the State work in the County was handled by K. E. Hodgman, resigned, until September 30, 1922, at which time his division was taken over by C. C. Kelley, Assistant State Highway Engineer.

Wolf Creek-Galesville Paving

A description of this project, which is partially within Douglas County and partially within Josephine County, will be found in a portion of this report devoted to Douglas County projects.

Grave Creek-Pleasant Valley Paving

This section begins at Grave Creek and extends south over what is known as Sexton Mountain to Pleasant Valley, the grade of the mountain averaging 5 per cent. In the original plans for the paving of this section, it was understood that Federal Aid would be received and in accordance with requirements of the Bureau of Public Roads a pavement of a total width of 18 feet was advertised. Upon receipt of bids on the project, the Commission decided to make the award for what is known as type "C" pavement and the contract was awarded for this type of construction. Type "C" consists of a 5-inch bituminous pavement 13 feet in width, with 7-inch concrete shoulders 2½ feet in width on each side. The Bureau of Public Roads objected to the award of this type on account of the 5 per cent grade on the mountain and they refused to accept the award for post road cooperation. The Commission accordingly assumed the entire cost of construction.

Contract No. 515 for the work was awarded April 15, 1922, to A. D. Kern of Portland, Oregon. On May 10, two concrete construction crews began work on the shoulders, one crew beginning at the north end and working south and the other crew beginning at approximately the center of the project and working south. In order to allow material trucks to turn around, one pannel was ommitted approximately every 500 feet. These gaps were closed up when the bituminous pavement was completed. All bituminous mixture was hauled from the plant set up by the contractor at Jump Off Joe Creek for work under his contract on the Pleasant Valley-Grants Pass Section. The laying of pavement was started at Grave Creek and extended south towards the hot stuff plant.

Construction has been carried on under the supervision of G. J. Bromley, Resident Engineer, and is practically completed at the present

time. Expenditures of $140,736.25 have been made out of a total final estimated cost of $189,500.00 from State funds.

Pleasant Valley-Grants Pass Paving

The State Highway Commission awarded Contract No. 409 to A. D. Kern of Portland, Oregon, on June 29, 1921, for paving 9.85 miles from the south foot of Sexton Mountain to Grants Pass. The pavement covered by the contract was 16 feet in width and consisted of a 3-inch bituminous base covered by a 2-inch bituminous wearing surface. Rock shoulders two feet wide were constructed on each side of the pavement.

The laying of pavement was started at the Grants Pass end on September 2, 1921, and 3.94 miles were constructed. Work was then suspended until the following spring in order to allow the newly graded portions to settle during the winter. Operations were resumed early in the spring and pavement laid an additional 3.46 miles to the plant set up at Jump Off Joe Creek. At this time the contractor, who also had the contract for the Grave Creek-Pleasant Valley Section, transferred his crews to the north end of that project and started paving operations, working south. This was done in order to eliminate the necessity for hauling plant mixtures over any of the newly constructed pavement. At the present time, the Sexton Mountain pavement is practically completed but it is extremely doubtful that the gap of 2.45 miles left at the north end of the Pleasant Valley-Grants Pass Section will be completed before the 1923 working season.

Construction has been under the supervision of J. G. Bromley, Resident Engineer, with expenditures to date of $170,051.95 out of a total estimated cost of $240,000.00 from State funds.

Wolf Creek-Grave Creek Widening

The pavement between Wolf Creek and Grave Creek was placed upon a roadbed having a width of 20 feet including ditches. Although the pavement was constructed to only a width of 14 feet there was insufficient room left for adequate ditches. In order to improve this condition and provide proper drainage, it was decided to widen the roadbed on 2.61 miles of the 4.91 miles of the section and Contract No. 445 was awarded to Washburn & Hall of Portland, Oregon, on August 20, 1921. Work was started immediately and completed November 23, of the same year. The work was supervised by Paul Van Scoy, Resident Engineer. and represents a total expenditure of $11,866.79 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 664.99
Contract items as follows:		
Common excavation, 15,034.9 cu. yds. at 60c	$ 9,020.94	
Solid rock excavation, 1,511.0 cu. yds. at $1.00	1,511.00	
Overhaul, 163.0 sta. yds. at 5c	8.15	
12-inch plain concrete pipe, 84.0 lin. ft. at $2.50	210.00	
18-inch reinforced concrete pipe, 16.0 lin. ft. at $4.00	64.00	
24-inch reinforced concrete pipe, 8.0 lin. ft. at $5.50	44.00	
6-inch porous drain tile, 150.0 lin. ft. at 25c	37.50	
Class "C" concrete, 8.4 cu. yds. at $30.00	252.00	
Force account items:		
Leveling up piles of waste material	54.21	
Total amount paid to contractor		11,201.80
Grand total cost of project (all State funds)		$ 11,866.79

[JOSEPHINE]

Grants Pass-Pleasant Valley Grading and Surfacing

A description of this section will be found on page 277 of the Fourth Biennial Report. The grading required was completed during the early spring of 1921, and the surfacing completed August 20 of the same year. The total expenditures during the present biennium amount to $110,618.56, bringing the total cost of the project to $116,297.96 from State funds.

DETAILED STATEMENT OF EXPENDITURES

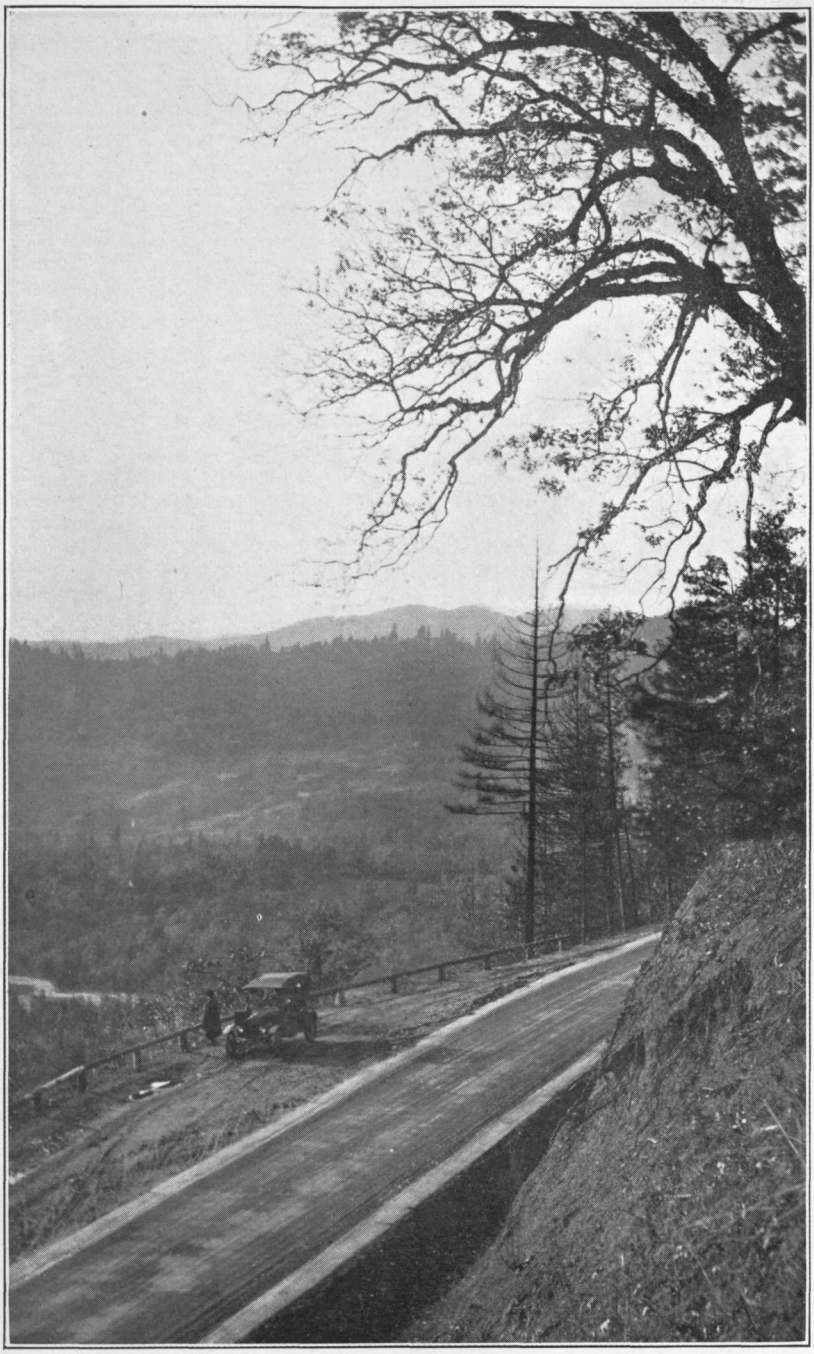
Engineering		$ 7,158.49
Moving telephone poles off right-of-way		96.14
Contract items as follows:		
Clearing and grubbing, all	$ 1,500.00	
Common excavation, 15,564.9 cu. yds. at 70c	10,895.43	
Intermediate excavation, 5,927.9 cu. yds. at 90c	5,335.11	
Solid rock excavation, 629.6 cu. yds. at $1.50	944.40	
Overhaul, 12,920.0 sta. yds. at 5c	646.00	
12-inch corrugated galvanized iron pipe, placing only, 452.0 lin. ft. at 20c	90.40	
18-inch corrugated galvanized iron pipe, placing only, 144.0 lin. ft. at 30c	43.20	
24-inch corrugated galvanized iron pipe, placing only, 198.0 lin. ft. at 40c	79.20	
36-inch corrugated galvanized iron pipe, placing only, 36.0 lin. ft. at 70c	25.20	
6-inch porous drain tile, 10,911.0 lin. ft. at 35c	3,818.85	
Class "C" concrete, 55.62 cu. yds. at $25.00	1,390.50	
Riprap, 51.55 cu. yds. at $5.00	257.75	
Broken stone surfacing, 11,427.0 cu. yds. at $3.65	41,708.55	
Decomposed granite surfacing, 8,554.0 cu. yds. at $2.40	20,529.60	
Broken stone backfill for tile drains, 924.0 cu. yds. at $4.00	3,696.00	
Force account items:		
Completing grading work started by County forces	15,006.67	
Replacing old 48-inch culvert with new	156.73	
Constructing two reinforced concrete box culverts	2,919.74	
Total amount paid to contractor		109,043.33
Grand total cost of project (all State funds)		$116,297.96

Sexton Mountain Surfacing

A description of this section will be found on page 277 of the Fourth Biennial Report. Owing to continuous rains, the work was suspended for the winter after a narrow strip of gravel had been laid from Grave Creek to the summit of Sexton Mountain. Traffic used the surfacing on the north side of the mountain without difficulty, but on the south side, it was necessary to use the old grade. As this rutted very deeply, the State found it necessary to maintain teams to assist traffic through, when required.

A great deal of settlement and many slides occurred on the new grade on the south side of the mountain. These slides were removed and settlements corrected during the spring, and the surfacing of the entire section was completed August 21, 1921. Surface was laid to a width of sixteen feet, with an average depth of eight inches of crushed gravel. A two-inch layer of decomposed granite was placed on the gravel in order to fill the voids and provide a wearing surface.

Expenditures of $103,643.98 have been made during the present biennium, bringing the total cost of the project to $118,656.71 from State funds.



ON THE SEXTON MOUNTAIN SECTION OF THE PACIFIC HIGHWAY IN JOSEPHINE COUNTY

[JOSEPHINE]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,517.34
Labor and material furnished by State:		
Royalty on gravel from Williams Pit		775.42
Royalty on granite surfacing materials from Sexton Quarry		209.00
Maintaining travel during construction		47.70
Rental of equipment owned by Josephine County		29.00
Contract items as follows:		
Crushed gravel surfacing, 19,385.5 cu. yds. at $3.90	$ 75,603.45	
Decomposed granite surfacing, 5,225.0 cu. yds. at $3.90	20,377.50	
Force account items:		
Maintaining travel over incomplete sections through winter	1,702.06	
Removing slides, constructing ditches and building up settled embankments	14,395.24	
Total amount paid to contractor		112,078.25
Grand total cost of project (all State funds)		$118,656.71

Grants Pass-Jackson County Line Widening

The roadbed over this 6.09-mile section was constructed by the County during 1917. The original narrow grade was used when the section was paved in 1919 and outside the gravel shoulders there remained room for no more than a narrow, shallow ditch.

Later the Grants Pass Irrigation Company built a canal along the hillside above the road and the drainage from the canal threatened the foundation of the pavement. To improve these conditions Contract No. 359 was awarded on April 22, 1921, for widening the roadbed and deepening the ditches along the section. The contract was awarded to Grieve & Seymour of Medford, Oregon, and paid for entirely from State funds.

In order to avoid interference with the operations of the canal, part of the work was postponed until after the close of the irrigation season, the work being carried to final completion on October 6, 1921, under the supervision of J. G. Bromley, Resident Engineer, with total expenditures of $13,634.46 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,015.69
Contract items as follows:		
Clearing and grubbing, all	$ 200.00	
Common excavation, 7,181.7 cu. yds. at 60c	4,309.02	
Intermediate excavation, 6,017.3 cu. yds. at 75c	4,512.98	
Solid rock excavation, 1,097.1 cu. yds. at $2.00	2,194.20	
Overhaul, 4,326.0 sta. yds. at 10c	432.60	
Class "A" concrete, 5.58 cu. yds. at $50.00	279.00	
Metal reinforcement, 219.76 lbs. at 20c	43.95	
Force account items:		
Extending existing concrete pipe culverts	567.71	
Removing old drain tile	79.31	
Total amount paid to contractor		12,618.77
Grand total cost of project (all State funds)		$ 13,634.46

Sexton Mountain Grading

A description of this project will be fond on page 279 of the Fourth Biennial Report. The work was practically completed at that time, with the exception of a few headwalls and other minor work. On account of the heavy winter rains, the contractor was not able to finish until March 29, 1921, the final work being handled under the direction of Paul Van Scoy, Resident Engineer.

[JOSEPHINE]

Expenditures during the present biennium amount to $23,341.02, having been paid $18,341.02 by the State and $5,000.00 by Josephine County. This brings the total cost of the project to $155,004.09, with Josephine County cooperating to the extent of $10,000.00.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 10,046.44
Labor and material furnished by State:		
Royalty on gravel for maintenance of old road		13.76
Removing slides, ditching and cleaning culverts		400.00
Items deducted from contractor's estimates:		
T. N. T. furnished by State		200.00
Rental of State-owned equipment		1,448.20
Contract items:		
Clearing and grubbing, all	$ 10,000.00	
Common excavation, 47,608.0 cu. yds. at 65c	30,945.20	
Intermediate excavation, 66,660.0 cu. yds. at 65c	43,329.00	
Solid rock excavation, 46,760.0 cu. yds. at $1.05	49,098.00	
Overhaul, 13,980.0 sta. yds. at 5c	699.00	
12-inch plain concrete pipe, 2,442.0 lin. ft. at $1.50	3,663.00	
18-inch reinforced concrete pipe, 872.0 lin. ft. at $3.00	2,616.00	
24-inch reinforced concrete pipe, 540.0 lin. ft. at $4.00	2,160.00	
36-inch reinforced concrete pipe, 140.0 lin. ft. at $6.50	910.00	
6-inch porous drain tile, 1,938.0 lin. ft. at 50c	969.00	
Class "A" concrete, 134.9 cu. yds. at $30.00	4,047.00	
Class "C" concrete, 58.03 cu. yds. at $28.00	1,624.84	
Metal reinforcement, 11,813.0 lbs. at 11c	1,299.43	
Force account items:		
Constructing timber culvert across borrow pit	58.01	
Constructing timber bridge across irrigation ditch for farm crossing, Sta. 886+50	69.37	
Maintaining old road during construction	97.48	
Total amount earned by contractor	$151,585.33	
Deductions:		
War tax on freight	41.44	
Rental of State-owned equipment	1,448.20	
T. N. T. furnished by State	200.00	
Deduction as per contract for securing award of three units	7,000.00	
Total deductions	$ 8,689.64	
Total amount paid to contractor		142,895.69
Grand total cost of project		$155,004.09
Paid by State	$145,004.09	
Paid by County	10,000.00	
Total	$155,004.09	

Hayes Hill Forest Road Project

A description of this project will be noted on pages 279 and 280 of the previous report. During the present biennium the surfacing work has been carried to completion, being finished in July, 1920.

During the present biennium the State has received a refund of $1,016.61 for overpayment on the grading, leaving a net amount of $35,233.39. In addition to this amount, the State has expended $3,000.00 for cooperation on the surfacing. The total cost of the work has amounted to $76,272.70, which has been paid $38,233.39 by the State and $28,534.69 by the Federal Government.

Oregon Caves Forest Road Project

The portion of the Oregon Caves Highway between Robinson's Corner and the Caves, a distance of 11.68 miles, has been constructed by the Bureau of Public Roads under a cooperative Forest Road Agreement. The project, which consisted of grading and drainage, has been completed

during 1922. For the purposes of construction, the section was divided into two units and separate contracts awarded to C. Frank Rhodes and White, Brown & Leahy Company. The completion of this grading makes the caves available to tourists to a greater extent than heretofore and considerable traffic has used the section during the first year that it has been open to public use.

The project agreement in force on the work calls for a total expenditure of $205,000.00, to be paid equally by the State and the Federal Government. Expenditures to date amount to $202,211.19, of which amount the State paid out $102,500.00 and the Federal Government $99,711.19.

Deer Creek Bridge

The Grants Pass-Crescent Highway crosses Deer Creek near Selma on a concrete viaduct consisting of two 31-foot and two 50-foot spans.

Contract No. 354 covering its construction was awarded on April 5, 1921, to Lees Dock Company of Rainier, Oregon. Work started on April 20, 1921, being subcontracted to Mr. O. J. Green of Grants Pass. Progress was slow owing to difficulties between the contractor and the subcontractor, but the work was finally completed on November 20, 1921.

Litigation is still in progress relative to the disposal of the final payment for this work, amounting to $3,981.21. When this is paid, the total cost will amount to $19,056.25, of which the State share will amount to $10,548.43 and the County share to $8,507.82. The expense to date amounts to $6,567.22 from State funds and $8,507.82 from County funds, making a total of $15,075.04.

Construction was carried on under the supervision of Burt Wilkes, Resident Engineer, until September 10, on which date he was succeded by A. A. Clausen, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,040.62
Brass name plates furnished by State		14.50
Contract items as follows:		
Excavation to plan elevation, 136.5 cu. yds. at $3.50	$ 477.75	
Excavation below elevation shown on plans, 64.0 cu. yds. at $10.00	640.00	
Class "A" concrete, 300.0 cu. yds. at $29.80	8,940.00	
Metal reinforcement, 57,000.00 lbs. at 8c	4,560.00	
Reinforced concrete handrail, 100.0 lin. ft. at $5.00	500.00	
Materials on hand	199.80	
Total amount earned by contractor	$ 15,317.55	
Percentage retained until completion of contract	2,297.63	
Total amount paid to contractor		13,019.92
Grand total expended		$ 15,075.04
Paid by State	$ 6,567.22	
Paid by County	8,507.82	
Total	$ 15,075.04	

Grave Creek Bridge

The details of the construction of this structure are covered in an article given on page 280 of the previous report. Final payments to the contractor and for engineering supervision of the construction have been made during the present biennium in the amount of $4,570.95. The entries on the books for the biennium show a total of $9,712.97 received from the County as cooperation, with a net credit to State funds of

[JOSEPHINE]

$5,142.02. These entries bring the total cost of the structure to $21,128.65, of which amount the County has paid $9,712.97 and the State has paid $11,415.68.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,722.70
Bronze name places furnished by State (deducted from contractor's estimate)		16.00
Contract items:		
Metal reinforcement, 2,096.0 lbs. at 10c	$ 209.60	
Class "B" concrete, 176.31 cu. yds. at $25.00	4,407.75	
Excavation, 427.9 cu. yds at $4.00	1,711.60	
Wood trestle approach, 114.0 lin. ft. at $21.50	2,451.00	
Wood truss span, one	10,630.00	
Total amount earned by contractor	$ 19,409.95	
Deduction for bronze name plates furnished by State	20.00	
Total amount paid to contractor		19,389.95
Grand total cost of structure		$ 21,128.65
Paid by State	$ 11,415.68	
Paid by County	9,712.97	
Total	$ 21,128.65	

Wolf Creek Bridge

Contract 355, for the construction of a 35-foot concrete span on the Pacific Highway near Wolf Creek, was awarded to J. Elmer Nelson on April 5, 1921. Work was started on May 19 and completed August 20 of the same year at a total cost of $4,433.40. Of this amount, the State has paid $2,576.41 and the County has cooperated to the extent of $1,856.99.

Supervision of the construction was handled by Burt Wilkes, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 719.41
Brass name plates furnished by State		14.50
Contract items as follows:		
Excavation, no classification, 52.2 cu. yds. at $2.50	$ 130.50	
Class "A" concrete, 88.02 cu. yds. at $25.00	2,200.50	
Metal reinforcement, 12,407.0 lbs. at 7c	868.49	
Concrete handrail, 80.0 lin. ft. at $5.00	400.00	
Maintaining traffic during construction, lump sum	100.00	
Total amount paid to contractor		3,699.49
Grand total cost of structure		$ 4,433.40
Paid by State	$ 2,576.41	
Paid by County	1,856.99	
Total	$ 4,433.40	

Oregon Caves Highway Survey

In order that a continuous road might be constructed from the Crescent City Highway, at a point near the junction of the Holland Road, to a connection with the Oregon Caves Highway at Robinson's Corner, a location survey was made over a three-mile section on the north side of Sucker Creek. This survey began November 5, 1921, and was completed January 5, 1922. The work was advertised and bids received on October 5, 1922, but no award was made.

ON THE OREGON CAVES HIGHWAY IN JOSEPHINE COUNTY

Volume of Travel to Oregon Caves

With the improvement of the roads in the district, the traffic to the Oregon Caves is increasing by leaps and bounds. As further improvement is accomplished, and as the Caves become more widely advertised and better known, it is expected that this wonder spot will be a mecca for a vastly increased number of tourists.

The 1922 season at the Caves was officially opened by the Forestry Service on June 26. This was somewhat later than usual as the season is ordinarily opened on June 1. The season was officially closed on October 15, and a total of 9,431 visitors registered during the period. It is estimated that at least 500 failed to register, which brings the number of visitors to approximately 10,000. A comparison of these figures with the highest previous registration during any one season of 1,200, will show the increasing interest which is being taken in this attraction and will indicate the volume of purely tourist traffic that may be expected when the Oregon Caves and Grants Pass-Crescent City Highways are completed.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Josephine County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 24,162.67
2.	State Funds apportioned to County	34,578.78
3.	County levy made to match State Funds	59,888.33
4.	County Market Road Funds collected	70,893.64
5.	Cash paid to County by State	24,763.23
6.	State expenditures, deducted from apportionment	5,013.64
7.	Cash due County from State in December, 1922	4,801.91
8.	County expenditures on Market Roads	94,026.46
9.	Balance in County Treasury November 1, 1922	3,996.50

From the above statement it is apparent that Josephine County received from the State Market Road Fund $10,416.11 more than it paid into the fund. The excess is Josephine County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $59,888.33. They have collected and credited to the Market Road Fund $70,893.64.

The County Court has designated two roads to be improved as Market Road projects. Work has been done on five sections of these roads.

Engineering work has been done by J. G. Bromley, Resident Engineer in the employ of the State Highway Commission.

Part of the construction work has been done by contract and part by County forces, all under the direction of the County Court. A total of 9.7 miles has been graded and surfaced.

KLAMATH COUNTY

There are within the limits of Klamath County approximately 272 miles of approved State highways. The Dalles-California Highway extends through the County from its northern boundary to the California State Line, a total distance of approximately 160 miles. The Klamath Falls-Ashland Highway has approximately 37 miles of its length in Klamath County. Of the Klamath Falls-Crater Lake highway approximately 10 miles are between old Fort Klamath and the Crater Lake Park Boundary. Of the Klamath Falls-Lakeview Highway there are approximately 65 miles in Klamath County, between Klamath Falls and the Lake County Line.

On this entire system practically all surveys have been completed and the plans approved, excepting that portion of the Klamath Falls- Lakeview Highway between Dairy and the Klamath-Lake County Line. There are several possible routes for the location of this section of the highway and during the winter of 1921 exhaustive reconnaissance was made over all possible routes, both under heavy snow conditions and in the early spring, the purpose of this work being to determine the best all-year route.

On June 13, 1919, the County voted their first bond issue, amounting to $347,704.00, for cooperation with the State and Federal Government towards the construction of a portion of this system of roads. At the close of the season of 1921 there had been approximately 60 miles of roads graded and macadamized.

In the beginning of 1922 the Klamath County Court proposed a second bond issue of $800,000.00, which was carried by a big majority at a special election held March 21. Since passing this last issue additional contracts have been let covering approximately 58 miles of grading and macadamizing and approximately 12 miles of grading.

Work in this district was carried on during 1921 under the supervision of E. B. Bishop, Division Engineer. At the beginning of the year 1922 the Klamath Falls Division Office was discontinued and the territory added to the Medford division under K. E. Hodgman, Division Engineer. In September, 1922, upon the resignation of K. E. Hodgman, the work was taken over by C. C. Kelley, Assistant Highway Engineer.

Jackson County Line-Hayden Creek Post Road Project

This section adjoins the Keene Creek-Klamath County Line Section at the Jackson-Klamath County Line, and is being surfaced in cooperation with the County and Federal Government under the terms of Post Road Project Agreement No. 85. The same conditions relative to width of surfacing prevail as on the other project, and the widening of the roadbed is being carried out in the same manner.

Contract No. 603, for surfacing the 9.83 miles involved, was awarded to W. C. Stone and F. P. Obee of Portland, Oregon, on October 6, 1922. However, the contractors have not yet executed the contract and, in the event that they fail to do so, it will be necessary to declare the contract abandoned and readvertise the work.

The surfacing is estimated to cost a total of approximately $62,800.00, of which the County will cooperate to the extent of $28,570.00 and the Government $38,425.19, with a credit of $4,195.19 accruing to State funds. It is very probable, however, that this credit will be wiped out during the course of construction. Preliminary expenditures made to date amount to $26.16 from State funds.

Hayden Creek-Keno Post Road Project

This section extends from Hayden Creek to the west end of the Klamath River bridge at Keno, and has a total length of 11.7 miles. Grading and surfacing of the section is to be done in cooperation with the County and the Federal Government under Post Road Project Agreement No. 84. In executing the agreement with the Federal Government, there was excepted the construction of a bridge across the first crossing of the Klamath River a few miles west of Keno. However, this structure will probably be placed under contract for 1923 construction and at that time the agreement will be amended to include the bridge as a portion of the post road project.

The grading of the section is being done by John Hampshire of Grants Pass under Contract No. 604, awarded to him on October 6, 1922, the estimated cost of the work under this contract being $193,000.00. The project agreement calls for the expenditure of $80,000.00 by the State, $88,000.00 by the County and $25,000.00 by the Federal Government. The Federal Government share is limited by the amount of Federal funds which are now available and will be increased to the permissible maximum as soon as additional appropriations are made by Congress. The expenditures to date on the project amount to $223.67 from State funds.

Anna Creek Forest Road Project

A description of a portion of this project will be noted on page 283 of the last biennial report. During the present biennium the grading of the section has been carried to completion at a total cost of $14,207.13, divided $7,103.56 to the State and $7,103.57 to the Government. The total State cooperation given includes $4,230.82 expended during the previous bienniums.

Subsequent to the completion of the grading, it was decided to improve the entire section from the south boundary of the Crater National Park to a junction with The Dalles-California Highway near Fort Klamath. In accordance with the decision an agreement has been entered into between the State, County and Federal Government whereby each party is to put up $27,000.00 in a total estimated cost of $81,000.00 for the surfacing of the three miles already graded and the grading and surfacing of an additional 6.7 miles.

The contract for this work has been awarded to the Hill Construction Company by the Federal Government and construction operations are now under way. Expenditures of $7,880.57 have been made by the Federal Government under this contract.

Fort Klamath-Sand Creek Forest Road Project

A contract was awarded in the spring of 1922 to the Hill Construction Company for the grading and surfacing of 17 miles of The Dalles-California Highway between Fort Klamath and Sand Creek. This work is being handled as a cooperative Forest Road Project between the County and Federal Government and is estimated to cost a total of $240,000.00, each party contributing equally. The total expenditures to date amount to $21,294.54, and have been paid by the Government.

The contract in question was awarded upon the basis of a location survey made by the State. In addition to this, the Bureau of Public Roads has made an additional survey north of the project, covering 29.8 miles to the Deschutes County Line.

[KLAMATH]

Lamms Mill-Fort Klamath Post Road Project

This portion of The Dalles-California Highway extends from the north end of the Barclay Springs-Lamms Mill Section, near Modoc Point, north to the initial point of the Klamath-Crater Lake Highway near Fort Klamath. The section lies wholly within the Klamath Indian Reservation and is being constructed as a post road project under the terms of Project Agreement No. 83. In accordance with the ruling of the Secretary of Agriculture, that the Bureau of Public Roads could permissibly cooperate to the extent of 100 per cent on post road projects within Indian Reservations, the Bureau has been requested to pay the entire agreement estimate cost and the project is proceeding upon this basis.

For the purpose of construction, the section was divided into two units and contractors were requested to submit proposals on either or both of the individual units. Bids were received on October 5, 1922, and separate awards were made for each unit.

Contract No. 598, covering the grading and surfacing of the south unit, 9.57 miles, was awarded to K. K. and K. E. Hodgman of Medford, Oregon.

Contract No. 599, for grading and surfacing the north unit, 9.47 miles, was awarded to Dunn & Baker of Oretown, Oregon.

The completion of these two contracts will eliminate the worst section of the road between Klamath Falls and Crater Lake and will provide a continuous stretch of macadam from Klamath Falls to Fort Klamath. North of the end of this contract, on the Fort Klamath-Crater Lake Highway, the section from the junction to the south boundary of the Crater Lake National Park is being graded and surfaced by the Bureau of Public Roads as a forest road project. The Dalles-California Highway from the junction to a point 15 miles north is also under contract as a forest road project.

The Lamms Mill-Fort Klamath Section is estimated to cost a total of $144,812.25, to be paid entirely by the Federal Government. However, in accordance with agreements previously entered into with the County for construction of The Dalles-California Highway, the County will cooperate to an estimated amount of $65,823.25. This will accrue as a credit to State funds on the construction of the project. Construction expenditures are being carried by the State, for which reimbursement will be made by the Government and County, and to the date of this report have amounted to $1,023.48. Work is being handled under the supervision of G. I. Stebbins, Resident Engineer.

Barclay Springs-Lamms Mill Surfacing

Upon completion of the grading of this section in August, 1921, the road was thrown open to traffic, but presented a very difficult stretch to travel on account of the talus slide materials through which the roadbed had been constructed. On August 30 of the same year, Contract No. 458 was awarded to the Warren Construction Company of Portland, Oregon, for surfacing the 5.12 miles involved. Work was immediately started and has been carried to completion at a total cost of $30,610.07, Klamath County cooperating to the extent of $14,720.20 with the balance being paid by the State. All work has been handled under the supervision of G. I. Stebbins, Resident Engineer.

Following completion, maintenance of this section was immediately taken over by the State. During the winter and early spring of 1921, the action of frost and rains caused numerous slides of the talus materials and a crew of workmen was immediately employed to remove these slides.

It is expected that these will occur to a less extent each winter and, at the close of the present season, the Department has a patrolman stationed midway on this section whose duty it is to cover the section daily and to remove all boulders which roll down from the slopes above and lodge on the roadway. This precaution has proven sufficient and takes care of what otherwise might be a dangerous menace to traffic.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,154.66
Sprinkling macadam by State forces		450.72
Contract items as follows:		
Broken stone surfacing, 9,360.0 cu. yds. at $2.89	$ 27,050.40	
Broken stone placed in piles for maintenace, 640.0 cu. yds. at $2.89	1,849.60	
Force account items:		
Cleaning ditches and removing slides	104.69	
Total amount paid to contractor		29,004.69
Grand total cost of project		$ 30,610.07
Paid by State	$ 15,889.87	
Paid by County	14,720.20	
Total	$ 30,610.07	

Klamath Falls-North Grading and Surfacing

A description of this project will be found on page 284 of the Fourth Biennial Report. During the present biennium the State has made additional expenditures of $11,604.05, bringing the total share to $46,033.53.

Algoma Post Road Project

A description of this project is given on page 283 of the previous Department report. Work has been continued during the present biennium and was carried to final completion on September 27, 1921, under the supervision of R. C. Stretchberry, Resident Engineer. The completed project represents a total cost of $150,593.41. Of this amount the Federal Government cooperated to the extent of $72,157.96, Klamath County to the extent of $34,929.26, with the balance of $43,506.19 being paid by the State.

The section skirts the east shore of Upper Klamath Lake, which is reputed to be the largest body of fresh water west of the Rocky Mountains. The shore line in places is very abrupt, rising from the water edge to an elevation of over 2,000 feet, and presented some very difficult locating engineering problems. At a point about midway of the section, the highway, in rounding an abrupt point along the shore line known as Rattlesnake Point, climbs from the lake to an elevation of approximately 200 feet. The rock has been cut back a considerable distance at this place and a substantial masonry wall constructed along the outside of the roadbed, providing adequate outside parking space. Below this point, the entire lake surface is in view and is second in scenic attraction only to some of the noted points of the Columbia River Highway.

In addition to its scenic beauty the highway is of great commercial importance to the County and the State as a whole, and provides an easy outlet to an immense tract of rich grazing and agricultural land bordering the shores of Upper Klamath and Agency Lakes.

[KLAMATH]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 10,876.36
Powder and caps furnished by State (deducted from contractor's estimate)		2,350.97
Contract items as follows:		
Clearing and grubbing, all	$ 400.00	
Common excavation, 16,618.8 cu. yds. at 85c	14,125.98	
Solid rock excavation, 14,809.6 cu. yds. at $2.00	29,619.20	
Overhaul, 8,700.0 sta. yds. at 8c	696.00	
12-inch plain concrete pipe, 444.0 lin. ft. at $1.35	599.40	
Standard wood guard fence, 6,104.0 lin. ft. at 90c	5,493.60	
Broken stone macadam, 25,262.0 cu. yds. at $3.30	83,364.60	
Earth filler, 1,500.0 cu. yds. at 75c	1,125.00	
Rubble masonry, 33.01 cu. yds. at $18.00	594.18	
Lumber and timber, 2.56 M-FBM at $85.00	217.60	
Force account items:		
Hand placing rock slopes	436.46	
Removing slides and changing finished grade	439.01	
Removing solid rock point to improve sight distance	42.82	
Cleaning out ditches to improve drainage	368.64	
Widening roadway around point at Algoma	2,194.56	
Total amount earned by contractor	$139,717.05	
Deduction for powder and caps furnished by State	2,350.97	
Total amount paid to contractor		137,366.08
Grand total cost of project		$150,593.41
Paid by State	$ 43,506.19	
Paid by County	34,929.26	
Paid by Government	72,157.96	
Total	$150,593.41	

Klamath Falls-Merrill Post Road Project

This section of The Dalles-California Highway begins at a point one mile southeast of the city limits of Klamath Falls and extends, 14.68 miles, to a point approximately 2.5 miles northwest of the town of Merril. Contract No. 229 for the grading and surfacing of the section was awarded to Oskar Huber on November 4, 1919, with the County and Federal Government cooperating in its cost under the terms of Project Agreement No. 31.

Gravel from the local deposit known as Hatch Pit was used on the surfacing of the section. This material is a finely graded gravel with slow binding qualities, but under maintenance and the action of traffic has developed into a very satisfactory road surfacing.

Work was completed July 23, 1921 under the supervision of R. C. Stretchberry, Resident Engineer, and the total cost of the project is $166,800.66, to be borne $47,244.18 by the State, $39,362.55 by the County and $80,193.93 by the Federal Government. Total expenditures to the date of this report amount to $166,800.66, having been paid $48,131.95 by the State, $38,474.78 by the County and $80,193.93 by the Federal Government.

DETAILED STATEMENT OF EXPENDITURES

Engineering	$ 9,350.44
Labor and materials furnished by State:	
Graveling to maintain travel	397.92
Powder, caps and fuse	2.10
100 lin. ft. of 5-inch drain tile	15.50
100 lin. ft. of 6-inch vitrified sewer pipe	40.00
Rental of State-owned equipment (deducted from contractor's estimate)	1,476.50

[KLAMATH]

EXPENDITURES—Continued

Contract items as follows:		
Common excavation, 66,199.1 cu. yds. at 50c	$ 33,099.55	
Overhaul, 21,040.0 sta. yds. at 5c	1,052.00	
12-inch plain concrete pipe, 1,263.0 lin. ft. at $1.35	1,705.05	
18-inch reinforced concrete pipe, 1,220.0 lin. ft. at $3.00	3,660.00	
24-inch reinforced concrete pipe, 808.0 lin. ft. at $4.00	3,232.00	
30-inch reinforced concrete pipe, 284.0 lin. ft. at $5.00	1,420.00	
36-inch reinforced concrete pipe, 212.0 lin. ft. at $7.00	1,484.00	
6-inch porous drain tile, 90.0 lin. ft. at 30c	27.00	
Class "B" concrete, 38.95 cu. yds. at $33.00	1,285.35	
Class "C" concrete, 109.11 cu. yds. at $25.00	2,727.75	
Standard wood guard fence, 144.0 lin. ft. at 90c	129.60	
Lumber and timber, 33.309 M-FBM at $85.00	2,831.27	
Gravel macadam, 30,892.0 cu. yds. at $3.20	98,854.40	
Force account items:		
Constructing check levies to protect irrigation ditches	1,223.82	
Erecting headgates to eliminate necessity of four culverts	392.74	
Installing syphon to carry irrigation water across roadway at Station 545+00	184.40	
Lowering culverts and revising irrigation canal boxes to conform to grade line of new highway	487.68	
Cutting down old concrete abutments on bridge at Station 389 to meet new grade and painting substructure of bridge at Station 397 with carbolineum	102.50	
Wasting unsuitable materials at Hatch Gravel Pit to obtain suitable material for surfacing	3,095.59	
Total amount earned by contractor	$156,994.70	
Deduction for rental of State-owned equipment	1,476.50	
Total amount paid to contractor		155,518.20
Grand total cost of project		$166,800.66
Paid by State	$ 48,131.95	
Paid by County	38,474.78	
Paid by Government	80,193.93	
Total	$166,800.66	

Klamath Falls-Dairy Post Road Project

A description of this project will be noted on page 285 of the 1919-20 report. In the present report the Dairy Overcrossing will be considered under a separate article as the actual construction was not handled as a portion of the post road project.

Work on the project was continued during the present biennium and is complete and open to traffic at the present time, although final expenditures have not yet been made.

Construction has been handled under the supervision of R. C. Stretchberry, Resident Engineer, and represents an estimated total cost of $187,542.70. Of this amount the Federal Government cooperates to the extent of $80,304.48, with the County paying $44,127.06 and the remainder of $63,111.16 being borne by the State. Total expenditures to date amount to $187.542.70, having been paid $80,304.48 by the Federal Government, $43,838.03 by the County and $63,400.19 by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering	$ 11,034.46
Labor and material furnished by State:	
Purchase of carbolineum for painting bridge timbers	14.28
Constructing standard wood guard fence	612.53
Items deducted from contractors estimates:	
Rental of State-owned truck	2,167.36
Powder furnished by State	1,660.00

[KLAMATH]

EXPENDITURES—Continued

Contract items as follows:		
Clearing and grubbing, all	$ 1,800.00	
Common excavation, 22,684.9 cu. yds. at 62c	14,064.64	
Intermediate excavation, 7,115.3 cu. yds. at $1.00	7,115.30	
Solid rock excavation, 5,946.1 cu. yds. at $2.50	14,865.25	
Overhaul, 9,947.0 sta. yds. at 5c	497.35	
12-inch plain concrete pipe, 656.0 lin. ft. at $1.35	885.60	
18-inch reinforced concrete pipe, 156.0 lin. ft. at $3.00	468.00	
24-inch reinforced concrete pipe, 44.0 lin. ft. at $4.00	176.00	
6-inch porous drain tile, 1,186.0 lin. ft. at 30c	355.80	
Class "B" concrete, 35.84 cu. yds. at $33.00	1,182.72	
Standard wood guard fence, 992.0 lin. ft. at 90c	892.80	
Lumber and timber, 42.275 M-FBM at $85.00	3,593.38	
Rubble masonry, 95.72 cu. yds. at $18.00	1,722.96	
Metal reinforcement, 1,720.0 lbs. at 12c	206.40	
Broken stone macadam, 30,261.75 cu. yds. at $3.70	111,968.48	
Gravel macadam, 4,130.0 cu. yds. at $3.60	14,868.00	
Earth filler, 700.0 cu. yds. at 75c	525.00	
Force account items:		
Improving sight distance on curves	164.44	
Digging drain ditch across old lake bed	171.81	
Rebuilding irrigation ditch destroyed during construction	44.58	
Constructing retaining wall at Lost River to protect embankment	312.92	
Total amount earned by contractor	$175,881.43	
Deductions:		
Rental of State-owned truck and supplies	2,167.36	
Powder and caps furnished by State	1,660.00	
Total amount paid contractor		172,054.07
Grand total cost of project		$187,542.70
Paid by State	$ 63,400.19	
Paid by County	43,838.03	
Paid by Government	80,304.48	
Total	$187,542.70	

Barclay Springs-Lamms Mill Grading

Contract No. 337, for the construction of the portion of The Dalles-California Highway between Barclay Springs and Lamms Mill, was awarded to the Warren Construction Company of Portland, Oregon, on March 8, 1921.

The project joins the Algoma Section on the south and extends 5.12 miles along the east shore of Upper Klamath Lake to Modoc Point. The immediate shore line along the lake is occupied by the Southern Pacific Railroad tracks and the highway is crowded back on the steep hillside. Like the Algoma Section it affords a wonderful view of the lake and the mountains to the west. From a construction standpoint, this section of highway presented a very difficult problem in engineering construction. In a number of instances where the road rounds an abrupt point, the railroad tracks are immediately below and great care had to be taken in blasting out the roadway to avoid damage to the railroad.

The work was carried on during the period of heavy tourist travel, and, detours being impossible, the County Court established ferry service between Barclay Springs and Modoc Point, the cost being shared equally by the State and County. This ferry handled the traffic in a very satisfactory manner and provided a pleasant diversion for tourist travel.

The work was handled under the supervision of R. L. Kuney, Resident Engineer, and represents a total cost of $78,326.61, of which amount Klamath County cooperated to the extent of $16,274.25, the balance of $62,052.36 having been paid by the State.

[KLAMATH]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,587.79
Rolling subgrade by State forces		31.50
Contract items as follows:		
Clearing and grubbing, all	$ 1,400.00	
Common excavation, 994.0 cu. yds. at 58c	576.52	
Intermediate excavation, 31,489.0 cu. yds. at 78c	24,561.42	
Solid rock excavation, 23,261.0 cu. yds. at $1.43	33,263.23	
Overhaul, 18,001.0 sta. yds. at 5c	900.05	
Hand placed riprap, 248 cu. yds. at $3.00	744.00	
12-inch corrugated galvanized iron pipe, 444.0 lin. ft. at $2.65	1,176.60	
18-inch corrugated galvanized iron pipe, 22.0 lin. ft. at $5.00	110.00	
24-inch corrugated galvanized iron pipe, 46.0 lin. ft. at $7.00	322.00	
Standard wood guard fence, 7,769.0 lin. ft. at $1.50	11,653.50	
Total amount paid to contractor		74,707.32
Grand total cost of project		$ 78,326.61
Paid by State	$ 62,052.36	
Paid by County	16,274.25	
Total	$ 78,326.61	

Altamont Canal Bridge

About four miles east of Klamath Falls, The Dalles-California Highway crosses the main canal of the United State Reclamation Service. After considerable correspondence with the Project Engineer for the Reclamation Service, a design was agreed upon consisting of a 56-foot wood truss on concrete piers, and having 15 feet of wood approach on each end.

The piers were built as a part of Contract No. 229 by Mr. Oscar Huber. Contract No. 357, covering the superstructure, was awarded April 5, 1921, to Marshall & Barhan. Work started on May 1, 1921, and was finished on July 23, 1921, at a total cost of $3,341.78 for the superstructure and $1,176.36 for the piers, or $4,518.14 for the entire structure. Of this amount the State has paid $3,415.17 and the County has paid $1,102.97 as their cooperative share.

Construction was supervised by W. T. Daily, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 106.27
Constructing bridge piers with State forces		1,176.36
Contract items as follows:		
56 feet wood truss span, complete	$ 2,475.00	
Trestle approaches, 30.1 lin. ft. at $18.75	564.37	
Lumber, 1.104 M-FBM at $60.00	66.24	
Force account items:		
Tearing out old bridge structure	83.47	
Cutting down old pedestals to new elevation	18.02	
Constructing dry rubble masonry walls and widening fills at bridge ends	28.41	
Total amount paid to contractor		3,235.51
Grand total cost of structure		$ 4,518.14
Paid by State	$ 3,415.17	
Paid by County	1,102.97	
Total	$ 4,518.14	

[KLAMATH]

Merrill-California Line Post Road Project

A descriptive article regarding this project will be noted on page 285 of the last biennial report. Work has been continued during the present biennium and construction has been under the supervision of W. T. Daily, Resident Engineer, during 1921, and G. I. Stebbins, Resident Engineer, during 1922.

When all final charges are paid, the project is estimated to cost a total of $139,037.02. Of this amount the Federal Government cooperates to the extent of $63,569.49 and the County $32,692.52, with the State paying the balance of $42,775.01. Expenditures to date amount to $135,228.44, having been paid $63,569.49 by the Federal Government, $31,546.36 by the County and $40,112.59 by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8,266.95
Labor and materials furnished by State:		
Sprinkling macadam		4,357.28
Constructing 1,200 ft. of irrigation ditch		200.00
Contract items as follows:		
Common excavation, 44,195.0 cu. yds. at 50c	$ 22,097.50	
Solid rock excavation, 189.0 cu. yds. at $1.90	359.10	
Overhaul, 7,383.0 sta. yds. at 5c	369.15	
12-inch plain concrete pipe, 310.0 lin. ft. at $1.50	465.00	
18-inch reinforced concrete pipe, 332.0 lin. ft. at $3.30	1,095.60	
24-inch reinforced concrete pipe, 192.0 lin. ft. at $4.50	864.00	
30-inch reinforced concrete pipe, 284.0 lin. ft. at $5.75	1,633.00	
36-inch reinforced concrete pipe, 172.0 lin. ft. at $6.75	1,161.00	
Class "B" concrete, 72.88 cu. yds. at $33.00	2,405.04	
Class "C" concrete, 87.66 cu. yds. at $26.00	2,279.16	
Standard wood guard fence, 412.0 lin. ft. at 90c	370.80	
Broken stone macadam, 25,538.5 cu. yds. at $3.45	88,107.83	
Sand filler, 2,611.0 cu. yds. at 75c	1,958.25	
Bridge lumber, 28.782 M-FBM at $90.00	2,590.38	
Force account items:		
Moving barn off right-of-way	21.32	
Repairing damage caused by leak in irrigation canal	280.61	
Riprapping slopes to prevent wash	38.81	
Repairing old existing culverts	36.88	
Excavating drain ditch and hauling material to widen fill	52.01	
Reimbursement to contractor for paying State garage bill by mistake	4.50	
Total amount earned by contractor	$126,189.94	
Percentage retained until completion of contract	3,785.73	
Total amount paid to contractor		122,404.21
Grand total expended		$135,228.44
Paid by State	$ 40,112.59	
Paid by County	31,546.36	
Paid by Government	63,569.49	
Total	$135,228.44	

Merrill Section Grading and Surfacing

When the Klamath Falls-Merrill and Merill-California Line contracts were awarded, a gap of 2.58 miles in the vicinity of Merrill was left between the two sections and on May 31, 1922, Contract No. 549 was awarded to the Klamath County Court for the grading and surfacing of this connecting link. Work was carried forward by subcontracts let by the contractor and at the present time is in the final stages of completion. This provides an unbroken stretch of surfaced roadbed from Klamath Falls to the California State Line.

[KLAMATH]

Work has been handled under the supervision of G. I. Stebbins, Resident Engineer, and represents expenditures to date of $34,010.97, made $19,704.21 by the State and $14,306.76 by the County. The completed project is estimated to cost a total of $39,000.00, divided $20,500.00 to the State and $18,500.00 to Klamath County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,635.21
Sprinkling and rolling macadam by State forces		2,418.49
Remodeling flume trestle by State forces to provide for highway undercrossing		1,343.75
Contract items as follows:		
Clearing and grubbing, all	$ 25.00	
Common excavation, 14,628.0 cu. yds. at 30c	4,388.40	
Intermediate excavation, 3,086.0 cu. yds. at 45c	1,388.70	
Overhaul, 5,500.0 sta. yds. at 5c	275.00	
12-inch plain concrete pipe, 214.0 lin. ft. at $2.00	428.00	
18-inch reinforced concrete pipe, 124.0 lin. ft. at $3.50	434.00	
24-inch reinforced concrete pipe, 158.0 lin. ft. at $4.50	711.00	
36-inch reinforced concrete pipe, 52.0 lin. ft. at $7.00	364.00	
Broken stone surfacing, 5,898.0 cu. yds. at $3.50	20,643.00	
Maintenance materials placed in piles, 755.5 cu. yds. at $2.00	1,511.00	
Sand filler, 552.0 cu. yds. at $1.00	552.00	
Class "C" concrete, 8.09 cu. yds. at $35.00	283.15	
Total amount earned by contractor	$ 31,003.25	
Percentage retained until completion of contract	2,389.73	
Total amount paid to contractor		28,613.52
Grand total expended		$ 34,010.97
Paid by State	$ 19,704.21	
Paid by County	14,306.76	
Total	$ 34,010.97	

Dairy Overcrossing

This work is partially covered under an article headed "Klamath Falls-Dairy Post Road Project," on page 285 of the previous biennial report.

The structure consists of three spans of standard trestle, and was contracted on April 5, 1921, to Marshall & Barhan under Contract No. 358. Work was started May 8, 1921, under the supervision of R. E. Stretchberry, Resident Engineer, and was finished June 10, 1921, at a total cost of $3,323.49. This amount is to be borne $1,154.03 by the State, $822.41 by the County and $1,347.05 by the Railroad Company. The expenditures to date amount to $2,501.08 from State funds and $822.41 from County funds, the railroad cooperation still being due to the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 236.47
Contract items as follows:		
Excavation to plan elevation, 88.3 cu. yds at $4.75	$ 419.43	
Excavation below elevation shown on plans, 19.9 cu. yds. at $5.50	109.45	
Lumber and timber, 5.18 M-FBM at $60.00	310.80	
Standard timber trestle, 59.0 lin. ft. at $23.75	1,401.25	
Class "A" concrete, 26.86 cu. yds. at $31.50	846.09	
Total amount paid to contractor		3,087.02
Grand total cost of structure		$ 3,323.49
Paid by State	$ 2,501.08	
Paid by County	822.41	
Total	$ 3,323.49	

[KLAMATH]

Jackson County Line-Hayden Creek Grading

Contract No. 460 for grading 9.83 miles of the Ashland-Klamath Falls Highway between the Jackson County Line and Hayden Creek was awarded to John Hampshire of Grants Pass, Oregon, on August 30, 1921. The surfacing of this section was submitted to the Bureau of Public Roads for their cooperation and the same objection regarding the width of roadbed was raised as on the portion between Keene Creek and the Klamath County Line. A discussion of this will be found under an article on the "Jenny Creek-Klamath County Line Grading," in Jackson County. As in the arrangement made on that section, Mr. Hampshire has agreed to do all necessary widening on the Klamath County Section at the unit prices controlling in his original grading contract.

The completed grading cost is estimated to amount to a total of $105,000.00, which will be paid $61,600.00 by the State and $43,400.00 by Klamath County. Work is being handled under the supervision of R. L. Kuney, Resident Engineer, and represents expenditures to date of $82,331.74. These have been paid $69,448.96 by the State and $12,882.78 by Klamath County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,481.28
Prospecting for quarry site		67.20
Rental on State-owned equipment (to be deducted from contractor's estimate)		99.99
Contract items as follows:		
Clearing and grubbing, all	$ 15,316.00	
Common excavation, 9,409.0 cu. yds. at $1.00	9,409.00	
Intermediate excavation, 14,254.0 cu. yds. at $1.25	17,817.50	
Solid rock excavation, 21,208.0 cu. yds. at $1.65	34,993.20	
Overhaul, 12,230.0 sta. yds. at 5c	611.50	
12-inch corrugated galvanized iron pipe, 862.0 lin. ft. at $1.75	1,508.50	
18-inch corrugated galvanized iron pipe, 290.0 lin. ft. at $3.00	870.00	
24-inch corrugated galvanized iron pipe, 66.0 lin. ft. at $4.00	264.00	
36-inch corrugated galvanized iron pipe, 156.0 lin. ft. at $7.50	1,170.00	
Force account items:		
Removing fallen tree	12.83	
Total amount earned by contractor	$ 81,972.53	
Percentage retained until completion of contract	5,289.26	
Total amount paid to contractor		76,683.27
Grand total expended		$ 82,331.74
Paid by State	$ 69,448.96	
Paid by County	12,882.78	
Total	$ 82,331.74	

Maintenance

Maintenance work has been carried forward in Klamath County from the time the first State highway contract was completed and accepted, and as fast as additional sections were completed the required maintenance orders have been issued.

In January of 1922 there were approximately 62 miles of macadamized roads completed and an organized system of maintenance was started. Two State trucks, with a specially constructed drag, and one heavy grader were assigned to this work. During the winter months maintenance work was mostly confined to clearing snow and removing slides.

Within the limits of the County, and included in the 62 miles of highway now under maintentance, there are five different types of macadam surface and each type presents its own individual problem of maintenance with reference to type of equipment and frequency of dragging. No standard fixed schedule can be applied that is consistent with economy and efficiency. In general, during the early spring and late fall the heavier drags are used, exclusively, to shape the macadam section and remove the deeper ruts and depressions. This work is carried forward during the moist season only. As soon as the macadam begins to compact and dry out light team drags are put on and the surface on some sections is patrolled daily to prevent corrugations from forming. During the dry season, when team drags are employed, one truck is kept in operation for patching and cleaning ditches, and repairing and placing culverts and guard fence.

On the Merrill-California State Line Section approximately 1,000 yards of ¾-inch crusher run rock was stocked for maintenance. It is estimated that this stock will insure all future maintenance requirements between Merrill and the California State Line for the next four years.

During the construction of the macadam surface between Barclay Springs and Lamms Mill, a separate agreement was made with the Warren Construction Company to furnish and distribute approximately 600 cubic yards of ¾-inch rock for maintenance repairs. During the spring and summer of 1922 about 450 yards of this stock was used on the Algoma Section and it is estimated that 4,000 yards of additional rock will be required to cover a three-year period.

On the Dairy Section and the Klamath Falls-Merrill Section no maintenance material was provided for under the original construction programme on account of the high prices prevailing. For maintenance materials on these two sections the Department has purchased a gravel deposit, known as the Hatch Pit, which will be opened up and put in operation for a short period each year as material is required.

Pacific Highway-Keno Survey

This work was started during the previous biennium, and a description thereof is given on page 287 of the last report. During the present biennium, the final location has been carried to completion and the entire distance is now either completed or has been placed under contract.

Klamath Falls-Keno Survey

A location survey for this section of 11.21 miles was made during the winter of 1921, by F. N. Drinkhall, Locating Engineer. The survey follows for nearly its entire length the present County road, which is of fairly good alignment and has a well compacted base. Several short line changes were made, however, which shortened the distance and improved the alignment. The road serves a rich farming and dairy country as well as being a connection with The Dalles-California Highway for travel to California either by way of Weed or the Topsy Grade and Ager. It is also a portion of the Ashland-Klamath Falls Highway.

Deschutes County Line-Sand Creek Survey

A description of this project will be noted on pages 285 and 286 of the last biennial report. The second section referred to therein started at the south boundary of the Deschutes National Forest Reserve. This

boundary was afterwards changed to a point 8.1 miles north, leaving a gap outside of the Forest Reserve unsurveyed.

A location survey for this portion has been made and the location is now continuous from the Deschutes County Line to the Crater National Forest Reserve with the exception of a portion through the Deschutes National Forest Reserve, which is to be located and constructed by the Bureau of Public Roads as a Forest Road project.

Crater National Forest Survey

The Bureau of Public Roads is constructing the portion of The Dalles-California Highway through the Crater National Forest as a Forest Road project and requested that Locating Engineer F. N. Drinkhall, being familiar with the country on account of surveys previously made, be allowed to make their location through the forest reserve. This was agreeable to the Highway Commission and the location proceeded upon this basis.

The section is through a thickly wooded country, the first mile being on the grade up the south side of Sand Creek Hill. At present the old county road along the north slope of the hill is the first portion of The Dalles-California Highway to become impassable during the winter and due to snow some years is not open until the first of July. The new location practically eliminates this trouble as the line descends the north side of the hill on a long hogback which often is covered with only a few inches of snow, while the present road, paralleling it about 100 feet east, has as much as seven inches of snow annually with very little chance for thawing.

The total length of the survey as completed is 5.24 miles.

Klamath Falls-Sand Creek Survey

Original survey on this section was made in 1919 and a discussion thereof will be found on page 286 of the previous biennial report. As noted therein, a revison has been made from the junction of the old Fort Klamath road and the present County road to the foot of Sand Creek Hill. This revision eliminates the town of Fort Klamath from the highway, but places the location on a better drained soil, eliminates two crossings over the Wood River and shortens the line 3.56 miles.

A revision was also made from a point 1,000 feet north of Williamson River to the Klamath Indian Agency. This change was occasioned on account of the building of the Link River dam, whereby the water elevation of Agency Lake was raised and caused the flooding of a portion of the original located line. Both of the above revisions were made by F. N. Drinkhall, Locating Engineer, during the winter of 1920-1921.

In September of 1922, just prior to the awarding of contracts for the grading and surfacing of the section between Lamms Mill and the junction with the Crater Lake Highway, the revision of approximately one and one-half miles was made at the Lamms Mill or southerly end of the project. This revision changed the location of the railroad overhead crossing at this point.

Merrill Survey

Location of this section was previously made as a part of the Klamath Falls-Merrill Section but on account of the original location following an existing section line road involving three right angle turns

it was not accepted for construction. The location as finally revised, provides a direct line into the City of Merrill, eliminating the three mentioned right angle turns and also three 14-foot span concrete bridges in addition to shortening the distance by 0.64 miles. By the adoption of this survey an existing 50-foot steel bridge over Lost River is utilized and one expensive canal crossing eliminated by an undercrossing of the irrigation flume.

The revised location was made by G. I. Stebbins, Resident Engineer.

Lapine-Lakeview Forest Road Project Survey

This survey covers 16.3 miles in and adjacent to the Fremont Forest Reserve in Klamath and Lake Counties and an article thereon will be noted on page 287 of the last report. During the present biennium the State has expended an additional $129.37, bringing the total State share to $879.37. The Federal Government has expended an equal amount, making the total cost of the survey $1,758.74.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Klamath County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 52,938.66
2.	State Funds apportioned to County	70,002.94
3.	County levy made to match State Funds	69,493.29
4.	County Market Road Funds collected	59,233.01
5.	Cash paid to County by State	54,999.16
6.	State expenditures, deducted from apportionment	4,767.97
7.	Cash due County from State in December, 1922	10,235.81
8.	County Expenditures on Market Roads	88,340.78
9.	Balance in County Treasury November 1, 1922	25,891.39

From the above statement it is apparent that Klamath County received from the State Market Road Fund $17,064.28 more than it paid into the fund. The excess is Klamath County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $69,493.29. Of this amount they have collected and credited to the Market Road Fund $59,233.01.

The County Court has designated three roads to be improved as Market Road projects.

The engineering work has been done by engineers in the employ of the State Highway Commission.

Part of the construction work has been done by contract and part by County forces, all under the direction of the County Court.

Much difficulty was experienced during 1920 and the early part of 1922, in obtaining plans for Market Road work and in getting work done in accordance with plans approved. It was necessary to have the engineering work done by employes of the State in order to have proper plans submitted.

It has been reported that Market Road funds are used in Klamath County for making payment of bills for work performed on work other than Market Road projects.

The County Court has expended $88,340.78. They have graded 28 miles of road and have surfaced 2.5 miles, 16 feet in width.

LAKE COUNTY

Lake County is more or less isolated from the balance of the State and the construction of all the State highways in the County probably will be a matter of several years in the future. Work has been steadily carried on, however, and good progress has been made in spite of the inadequate railroad transportation facilities available and the consequent long hauls required on construction materials and equipment.

The Prineville-Lakeview Highway, extending north and south through the County, has been brought to standard from Chewaucan Narrows to approximately two miles south of Lakeview. The greater portion of this distance has been surfaced and is an all-year road.

On the Klamath Falls-Lakeview Highway, a contract has been awarded for the grading and surfacing of 8.8 miles. This project is known as the Drews Valley Section.

Work in the County was handled by E. B. Bishop during 1921. Upon the discontinuance of the Klamath Falls Division Office, supervision was taken over by K. E. Hodgman, Division Engineer, and was handled by him until his resignation on September 30, 1922. At this time C. C. Kelley, Assistant Highway Engineer, assumed charge of the work.

Chandlers Station-Valley Falls Surfacing

Upon completion of a portion of the grading work being done north of Chandlers Station, special Contract No. 477 was awarded to the Warren Construction Company on November 5, 1921, for surfacing four miles beginning at Chandlers Station. Operations were started on November 20, 1921, and completed on the twenty-second of the following month, the work being supervised by B. J. Crowley, Resident Engineer.

The total cost of the project has amounted to $10,681.82, and has been paid $6,617.62 by the State and $4,064.20 by the County. At the present time payment in the amount of $37.50 is due from the County for the final amount of their cooperation on the work.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 427.57
Royalty on gravel, paid by State		93.75
Contract items as follows:		
Gravel surfacing, 5,806.0 cu. yds. at $1.75	$ 10,160.50	
Total amount paid to contractor		10,160.50
Grand total cost of project		$ 10,681.82
Paid by State	$ 6,617.62	
Paid by County	4,064.20	
Total	$ 10,681.82	

Crooked Creek-Chandlers Station Grading and Surfacing

This section is 6.55 miles in length and extends from a point one mile north of the Lakeview-Crooked Creek Post Road Project north to a ranch known as Chandlers Station.

Contract No. 374 for the grading and surfacing was awarded to Lake County on May 26, 1921. Work was started June 8, 1921, and completed August 12, 1922, under the supervision of B. H. Crowley, Resident Engineer.

[LAKE]

The project is estimated to cost a total of $71,500.00 when all final payments have been made. This cost will be shared $45,000.00 by the State and $26,500.00 by the County. The expenditures to date amount to $69,585.99, consisting of $43,684.84 from State funds and $25,901.15 from County funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,833.10
Contract items as follows:		
Clearing and grubbing, all	$ 350.00	
Common excavation, 27,062.3 cu. yds. at 48c	12,989.90	
Intermediate excavation, 5,406.5 cu. yds. at 75c	4,054.88	
Solid rock excavation, 2,571.4 cu. yds. at $1.80	4,628.52	
Overhaul, 3,012.0 sta. yds. at 3c	90.36	
12-inch corrugated galvanized iron pipe, 302.0 lin. ft. at $1.80	543.60	
18-inch corrugated galvanized iron pipe, 370.0 lin. ft. at $2.70	999.00	
24-inch corrugated galvanized iron pipe, 128.0 lin. ft. at $3.55	454.40	
36-inch corrugated galvanized iron pipe, 24.0 lin. ft. at $7.00	168.00	
60-inch corrugated galvanized iron pipe, 60.0 lin. ft. at $16.00	960.00	
6-inch porous drain tile, 140.0 lin. ft. at 70c	98.00	
Class "B" concrete, 54.77 cu. yds. at $28.00	1,533.56	
Lumber and timber, 19.896 M.-FBM. at $72.00	1,432.51	
Rubble masonry, 140.53 cu. yds. at $15.00	2,107.95	
Broken stone for backfilling drain tile, 17.2 cu. yds. at $3.50	60.20	
Broken stone surfacing, 10,661.5 cu. yds. at $3.20	34,116.80	
Standard wood guard fence, 1,864.0 lin. ft. at $1.00	1,864.00	
Riprap, 93.5 cu. yds. at $3.25	303.88	
Total amount earned by contractor	$ 66,755.56	
Percentage retained until completion of contract	2,002.67	
Total amount paid to contractor		64,752.89
Grand total expended		$ 69,585.99
Paid by State	$ 43,684.84	
Paid by County	25,901.15	
Total	$ 69,585.99	

Valley Falls-Chewaucan Narrows Surfacing

On August 29, 1922, Contract No. 593 was awarded to H. J. Hildeburn for surfacing the balance of the Chandlers Station-Chewaucan Narrows grading not covered by the surfacing contract awarded to the Warren Construction Company.

The work is estimated to cost a total of $40,000.00, and the cost is to be shared $25,000.00 by the State and $15,000.00 by the County. Expenditures to date amount to $192.85 from State funds.

Lakeview-Crooked Creek Post Road Project

This section was undertaken during the previous biennium, and will be found described on page 289 of the last report. The work held over into the two years covered by this report and finally was completed on December 21, 1921.

The expenditures during the present biennium amount to $68,693.15. This amount is made up of $16,081.37 received from the County and $64,853.18 received from the Federal Government, there being a credit of

$12,241.40 to State funds for the period. These entries bring the total cost of the work to $136,719.68, having been paid $40,904.41 by the State, $30,962.09 by the County and $64,853.18 by the Federal Government.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 12,871.33
Contract items as follows:		
Clearing and grubbing, all	$ 150.00	
Common excavation, 48,745.1 cu. yds. at 72c	35,096.47	
Solid rock excavation, 3,538.8 cu. yds. at $1.50	5,308.20	
12-inch corrugated galvanized iron pipe, 1,204.0 lin. ft. at $2.50	3,010.00	
18-inch corrugated galvanized iron pipe, 636.0 lin. ft. at $2.50	1,590.00	
24-inch corrugated galvanized iron pipe, 253.0 lin. ft. at $2.50	632.50	
36-inch corrugated galvanized iron pipe, 58.0 lin. ft. at $2.50	145.00	
48-inch corrugated galvanized iron pipe, 22.0 lin. ft. at $2.50	55.00	
60-inch corrugated galvanized iron pipe, 34.0 lin. ft. at $10.00	340.00	
Rubble masonry, 223.69 cu. yds. at $22.00	4,921.18	
Run-of-bank gravel macadam, 18,050.00 cu. yds. at $4.00	72,200.00	
Standard wood guard fence, 400.0 lin. ft. at $1.00	400.00	
Total amount paid to contractor		123,848.35
Grand total cost of project		$136,719.68
Paid by State	$ 40,904.41	
Paid by County	30,962.09	
Paid by Government	64,853.18	
Total	$136,719.68	

Lakeview-California Line Post Road Project

This section is one which continued over from the preceding biennium, and a description thereof may be noted on page 289 of the last report. Work was practically complete at the time of the last report, being finally accepted on December 19, 1920.

Expenditures for the present biennium amount to $6,593.18. This amount is made up of $979.00 from State funds, $1,587.37 from County funds and $4,026.81 from Government funds. This brings the total cost to $17,940.67, and the final cooperation to $9,744.98 from State funds, $4,168.88 from County funds and $4,026.81 from Government funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,265.16
Contract items as follows:		
Clearing and grubbing, all	$ 30.00	
Common excavation, 10,517.0 cu. yds. at 65c	6,836.05	
18-inch corrugated galvanized iron pipe, 124.0 lin. ft. at $2.50	310.00	
20-inch corrugated galvanized iron pipe, 72.0 lin. ft. at $2.50	180.00	
Class "C" concrete, 8.28 cu. yds. at $32.00	264.96	
Run-of-bank gravel macadam, 2,786.0 cu. yds. at $3.25	9,054.50	
Total amount paid to contractor		16,675.51
Grand total cost of project		$ 17,940.67
Paid by State	$ 9,744.98	
Paid by County	4,168.88	
Paid by Government	4,026.81	
Total	$ 17,940.67	

[LAKE]

Chandlers Station-Chewaucan Narrows Grading

This project covers the grading of 16.3 miles between Chandlers Station and a point approximately 4,000 feet north of the Chewaucan Narrows, and the grading of approximately 0.5 mile of approaches to the bridge at Paisley.

Contract No. 428 for the work was awarded to Lake County on July 28, 1921. Work was started on August 17, and is practically completed at the present time.

The total estimated cost of the work is $56,000.00 towards which the County will cooperate to the extent of $28,500.00 and the State will pay the remaining $27,500.00. Construction has been supervised by B. J. Crowley, Resident Engineer, and has occasioned expenditures to date of $50,040.82. The State has paid $32,318.77 of this amount and the County has paid $17,722.05.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,079.10
Gravel surfacing by State forces to maintain travel		656.60
Contract items as follows:		
Clearing and grubbing, all	$ 800.00	
Common excavation, 77,057.0 cu. yds. at 33c	25,428.81	
Intermediate excavation, 506.2 cu. yds. at 60c	303.72	
Overhaul, 37,755.0 sta. yds. at 5c	1,787.75	
12-inch corrugated galvanized iron pipe, 352.0 lin. ft. at $2.20	774.40	
18-inch corrugated galvanized iron pipe, 808.0 lin. ft. at $2.50	2,020.00	
24-inch corrugated galvanized iron pipe, 300.0 lin. ft. at $3.30	990.00	
36-inch corrugated galvanized iron pipe, 36.0 lin. ft. at $5.95	214.20	
42-inch corrugated galvanized iron pipe, 60.0 lin. ft. at $7.00	420.00	
Rubble masonry, 71.61 cu. yds. at $15.00	1,074.15	
Class "C" concrete, 29.66 cu. yds. at $26.00	771.16	
Class "B" concrete, 66.37 cu. yds. at $28.00	1,858.36	
Riprap, 8.47 cu. yds. at $6.50	55.06	
Lumber and timber, 85.553 M.-FBM. at $90.00	7,699.77	
Standard wood guard fence, 1,478.0 lin. ft. at $1.00	1,478.00	
Total amount earned by contractor	$ 45,675.38	
Percentage retained until completion of contract	1,370.26	
Total amount paid to contractor		44,305.12
Grand total expended		$ 50,040.82
Paid by State	$ 32,318.77	
Paid by County	17,722.05	
Total	$ 50,040.82	

Drews Valley Grading and Surfacing

The first contract awarded by the State on the Klamath Falls-Lakeview Highway in Lake County was advertised for bids to be received on August 29, 1922. On this date Contract No. 592 was awarded to H. J. Hildeburn for grading and surfacing 8.82 miles, beginning at a point approximately sixteen miles west of Lakeview and extending west to what is known as the Smalley ranch. This section extends through what is known as Drews Valley.

Operations were started October 2, under the supervision of B. J. Crowley, Resident Engineer, and are under way at the time of this

report. The completed work is estimated to cost a total of $112,000.00, of which amount the State will pay $71,000.00 and Lake County will cooperate to the extent of $41,000.00. The expenditures to date amount to $1,696.77, consisting of $1,263.27 from State funds and $433.50 from County funds.

Chewaucan River Bridge

The Prineville-Lakeview Highway formerly crossed the Chewaucan River at Paisley on a series of short wood trusses with crib piers. This old structure was in bad shape in 1920 and, accordingly, plans were prepared for a new bridge.

Bids were called for on two alternate plans. The first consisted of two 48-foot wood spans and the other was one 40-foot and two 30-foot concrete spans. All bids received were on the latter design.

Contract No. 385, calling for the construction of the concrete design, was awarded to G. J. Hardy of Gladstone, Oregon, on May 28, 1921. Work did not start until July, 1921, and proceeded slowly until December 1, 1921, when it was completed, the final cost being $16,085.53. This cost is to be shared $10,260.35 by the State and $5,825.18 by the County. Expenditure of the total cost has been made to date, and consists of $10,372.18 from State funds and $5,713.35 from County funds. This leaves a small amount due from the County on their cooperative share.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,522.57
Bronze name plates, furnished by State		14.50
Contract items as follows:		
Excavation to plan elevation, 183.5 cu. yds. at $3.50	$ 642.25	
Excavation below elevation shown on plans, 97.3 cu. yds. at $8.50	827.05	
Class "A" concrete, 252.01 cu. yds. at $36.00	9,072.36	
Metal reinforcement, 34,524.6 lbs. at 9c	3,107.21	
Reinforced concrete handrail, 205.0 lin. ft. at $5.25	1,076.25	
Total amount earned by contractor	$ 14,725.12	
Deduction for overrun of time limit	176.66	
Total amount paid to contractor		14,548.46
Grand total cost of structure		$ 16,085.53
Paid by State	$ 10,372.18	
Paid by County	5,713.35	
Total	$ 16,085.53	

Central Oregon Highway-Silver Lake Reconnaissance

Reconnaissance has been made of several alternate lines on the Prineville-Lakeview Highway north of Silver Lake. An article relating to this will be found in the portion of this report devoted to Deschutes County projects.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

[LAKE]

Since the Market Road Law went into effect, Lake County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 33,889.76
2.	State Funds apportioned to County	43,258.39
3.	County levy made to match State Funds	39,998.86
4.	County Market Road Funds collected	52,680.42
5.	Cash paid to County by State	31,700.09
6.	State expenditures, deducted from apportionment	4,936.14
7.	Cash due County from State in December, 1922	6,222.16
8.	County expenditures on Market Roads	82,956.70
9.	Balance in County Treasury November 1, 1922	1,423.81

From the above statement it is apparent that Lake County received from the State Market Road Fund $9,368.63 more than it paid into the fund. The excess is Lake County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $39,998.86. They have collected and credited to the Market Road Fund $52,680.42.

A report from the County Treasurer shows that $17,113.63 was transfered from County bond funds into the Market Road Fund in 1921.

The County Court has designated one road to be improved as a Market Road project. Work has been done on two sections of the road.

The engineer work has been done by B. J. Crowley, engineer in the employ of the State Highway Commission.

Construction work has been done by contract and by County forces under the direction of the County Court. They have graded 6.9 miles of road and surfaced 2 miles, 12 feet wide.

LANE COUNTY

The past biennium has marked the completion of a large volume of State highway work in Lane County. This work has been in various sections, and has covered all the State highways in the County, excepting the Roosevelt Coast and Willamette Highways.

Paving of the West Side Highway from the Benton County Line to Junction City has been completed. The Pacific Highway is paved the entire distance through the County with the exception of gaps totalling 7.1 miles. The former dangerous grade crossing of the Southern Pacific Railroad at McVeigh Point has been eliminated by the construction of a concrete overhead crossing.

On the McKenzie Highway, several projects have been graded and surfaced. These projects aggregate a total length of 10.54 miles, and were done on a cooperative basis between the State and County. East of Blue River, the highway lies within the Forest Reserve, and all construction work has been handled by the Forest Service under the engineering supervision of the Bureau of Public Roads. During the past month, a graded and surfaced section 14.9 miles in length, extending from Blue River to the Belknap Springs road, has been completed and accepted by the State for maintenance. The section from the Belknap Springs road to the Deschutes County Line is now under contract for grading.

The grading of the mountain section of the Wilamette Valley-Florence Highway between Goldson and Blachly has been completed, and a part of the distance has been surfaced with broken stone. The surfacing of this entire section is anticipated for the 1923 season. The grading and surfacing of a 4.1-mile section east of Goldson terminating at the railroad station at Cheshire is contemplated for early advertisement and award of contract. Between Blachly and Rainrock, a 15.5-mile section is to be constructed as a Forest Road project, and plans for 1923 construction have been laid for this work.

On the Willamette Highway, a location survey between Goshen and Lowell has been made by the State and a survey is now being made by the Bureau of Public Roads between Lowell and Oakridge. The early award of a contract for grading and surfacing 8.7 miles between Goshen and Lowell is now planned.

On the Roosevelt Coast Highway a careful reconnaissance totalling 8.54 miles has been made from the Lincoln County Line south to China Creek. From this point, a location survey has been made to the south line of the County at the Siuslaw River. The length of this location is 25.2 miles.

Surveys on the Roosevelt Coast Highway have been supervised by W. E. Chandler, Division Engineer. All other State work in the County has been under the supervision of J. C. McLeod, Division Engineer.

Monroe-Junction City Paving

The Pacific Bridge Company was the successful bidder for the construction of 8.85 miles of five-inch bituminous paving between the south end of the Long Tom River Bridge and the west end of the paving at Junction City, the north 3.1 miles being in Benton County and the balance in Lane County. Contract No. 321 was awarded to them February 1, 1921, and paving operations were started on May 23. The contractor's plant was set up near the center of the job, being located midway between the highway and Lancaster. Crushed gravel from a field pit was used for the mineral aggregate in the pavement mixture and for base and shoulder rock.

[LANE]

The bituminous pavement was constructed on the macadam surfacing laid by the State during 1919, which afforded a well settled and compacted base and required very little reshaping to bring the material to the required paving crown.

The contract was completed October 27, 1921, under the engineering supervision of H. O. Ragan, Resident Engineer. The completed project represents a total cost of $278,501.37, which has been paid $277,973.00 from State funds and $528.37 by Junction City.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,392.64
Labor and materials furnished by State:		
Constructing standard wood guard fence		214.60
Maintenance work to maintain travel		29.39
Items deducted from contractor's estimate:		
Tractor parts, furnished by State		3.68
Transportation of contractor's employes by State		3.49
Contract items as follows:		
Standard gravel bituminous wearing surface, 2-in. top, 83,705.0 sq. yds. at $1.79	$149,831.95	
Bituminous base, 25,476.5 batches at $3.30	84,072.45	
Shoulder construction, 93,384.0 lin. ft. at 6c	5,603.04	
Gravel for base and shoulders, 10,161.0 cu. yds. at $2.90	29,466.90	
Force account *items*:		
Widening shoulders, excavating for ditches, relaying 12-inch plain concrete pipe culvert, improving culvert headwalls	3,369.15	
Redecking steel bridge at Sta. 85+00	64.16	
Repairing pavement in Junction City	193.86	
Constructing rock walls for protection of embankments	1,263.23	
Total amount earned by contractor	$273,864.74	
Deduction for tractor parts and transportation of employes, furnished by State	7.17	
Total amount paid to contractor		273,857.57
Grand total cost of project		$278,501.37
Paid by State	$277,973.00	
Paid by Junction City	528.37	
Total	$278,501.37	

Walker-Divide Paving

Contract No. 322 for the construction of a five-inch bituminous pavement between Walker and Divide, was awarded to the Blake-Compton Company of McMinnville, Oregon, on February 1, 1921. The gross length of the section was 8.57 miles, from which there was eliminated a unit through Cottage Grove lying between the proposed north and south bridges over the Coast Fork of the Willamette River, leaving a net length of 6.33 miles of pavement to be constructed. Pavement north of Cottage Grove was constructed over the macadam placed by the State during 1919 and 1920, and the portion south of Cottage Grove was constructed over the macadam built by the State and Lane County prior to 1918. The contractor's paving plant was set up at Saginaw and gravel from the Willamette River was secured for pavement aggregate and for base and shoulder material.

Paving operations were started April 9, 1921, and carried to final completion on October 12 of the same year, being handled under the supervision of H. W. Libby, Resident Engineer. The completed project represents a total expenditure of $231,252.42 from State funds on the books of the Department at this time. This amount is $3,961.15 too

much, however, on account of cement charges erroneously made. The proper transfer of this charge will leave the net cost at $227,291.27.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,432.03
Widening roadbed and deepening ditches (State forces)		1,351.70
Rental of State-owned equipment (deducted from contractor's estimate)		4,377.87
Cement furnished by State used on Halsey-Harrisburg job		3,961.15
Contract items as follows:		
6-inch porous drain tile, 1,794.0 lin. ft. at 50c	$ 897.00	
Gravel backfill for drain tile, 251.0 cu. yds. at $3.50	878.50	
Gravel for shoulders, 12,518.0 cu. yds. at $3.00	37,554.00	
Standard bituminous pavement, 2-inch top, 59,511.0 sq. yds. at $1.65	98,193.15	
Standard bituminous pavement, 3-inch base, 19,212.7 batches at $3.40	65,323.18	
Shoulder construction, 66,655.0 lin. ft. at 6c	3,999.30	
Standard wood guard fence, 1,224.0 lin. ft. at $1.25	1,530.00	
Force account items:		
Removing, cleaning and replacing existing tile drains	570.64	
Removing old bridge on abandoned county road and deepening ditch to improve drainage	67.63	
Excavating for ditches from Coast Fork bridge south to Divide	4,163.33	
Lowering 12-inch culvert near Latham	9.89	
Placing earth filler on gravel shoulders	247.37	
Cleaning ditches, resloping banks and widening fills, from Walker to Cottage Grove	4,564.06	
Widening roadway on inside of sharp curve at Station 697+00	1,509.49	
Total amount earned by contractor	$219,507.54	
Deduction for rental of State-owned equipment	4,377.87	
Total amount paid to contractor		215,129.67
Total amount expended		$231,252.42
Less cost of cement improperly charged, for which transfer is being made		3,961.15
Grand total cost of project (all State funds)		$227,291.27

Cottage Grove-North Grading and Paving

During April and May of 1922, plans for grading and paving the section of the Pacific Highway immediately north of Cottage Grove were prepared and the project advertised. The County had agreed to bear the grading costs on this section and expected to finance these from their Market Road funds. Following decision of the courts that expenditures of Market Road funds on State highways were illegal, the project advertisement was cancelled and plans for the improving of the section abandoned for the present. The survey and preliminary investigations were handled by W. S. Hodge, Resident Engineer.

Goshen-Walker Paving

On April 6, 1921, the State Highway Commission awarded Contract No. 350 to the Independent Asphalt Paving Company of Seattle, Washington, for the construction of 9.8 miles of 7-inch by 16-foot concrete pavement between Goshen and Walker. The contract was drawn to cover two seasons' operations, it being specified that approximately 1.4 miles be graded and rock surfaced and allowed to settle over one winter prior to the placing of pavement. In accordance with this requirement, 8.4 miles were paved during 1921, and the balance of 1.4 miles the following year. Final acceptance of the work was given on July 20, 1922.

PAVEMENT ACROSS CAMAS SWALE BETWEEN GOSHEN AND WALKER; ON THE PACIFIC HIGHWAY IN LANE COUNTY

[LANE]

Construction was supervised by Resident Engineer M. S. Jones during 1921 and by Resident Engineer J. G. Garrow during 1922.

At the present time there remains an uncompleted gap of 0.63 mile just north of Creswell, where it is proposed to construct an overhead crossing of the Southern Pacific tracks.

The completed project has cost a total of $338,404.15, and has been paid for entirely from State funds. At the present time, the sum of $714.41 is due from the City of Creswell for the amount of their cooperation.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,663.11
Gravel surfacing Camas Swale to maintain winter traffic (State forces)		776.75
Paving Camas Swale bridge (not included in contract)		709.33
Paving bridge near Creswell (not included in contract)		395.03
Contract items as follows:		
Excavation, single classification, 921.7 cu. yds. at $1.00	$ 921.70	
Preparation of subgrade, 125,921.8 sq. yds. at 6c	7,555.31	
Standard 7-inch concrete pavement, 91,579.5 sq. yds. at $2.96	271,075.32	
Shoulder construction, 103,026.0 lin. ft. at 6c	6,181.56	
Crushed gravel for base, 6,069.0 cu. yds. at $2.75	16,689.75	
Crushed gravel for shoulders, 5,479.25 cu. yds. at $2.75	15,067.94	
Clay and earth filler, 214.0 cu. yds. at $1.00	214.00	
Felt expansion joints, 27,540.0 lin. ft. at 12c	3,304.80	
Bar reinforcement, 67,513.5 lbs. at 12c	8,101.62	
Force account items:		
Raising culverts to conform to new grade line	92.53	
Scarifying old rock road between sta. 45 and 100	145.31	
Removing and replacing cement and headers across fills which can not be paved until maximum settlement occurs	26.73	
Making special connection between concrete and asphaltic pavements at Goshen and Walker	13.88	
Opening up ditches, dressing slopes and widening earth shoulders beyond limits of contract	515.87	
Total amount earned by contractor	$329,906.32	
Deduction for reduction in freight rates	46.39	
Total amount paid to contractor		329,859.93
Grand total cost of project (all State funds)		$338,404.15

Eugene-Junction City Paving

A description of this project will be found on pages 292 and 293 of the previous report. It will be noted that the article referred to states that the County's share amounted to $24,168.94, including the sum of $12,500.00 for which credit had been allowed for work done by the County between Eugene and Blue River, and on which the State was to cooperate to the amount of $12,500.00 out of a total estimated cost of the work of $25,000.00.

In May, 1922, an adjustment was made with Lane County covering all their obligations to the Department and the above amount, together with obligations on other projects, was cancelled contingent upon the expenditure of $120,000.00 by the County on the Eugene-Florence and McKenzie State highways and the Goshen-Lowell section of County highway. This cancellation on the Eugene-Junction City Section, however, was exclusive of the sum of $588.27, which the County had spent in advance as the State's share of certain maintenance work done by County forces. Instead of paying the obligation direct to the County, they were given credit for this amount as cooperation on the Eugene-Junction City Section.

[LANE]

It will also be noted that the previous report gives the Junction City share for work done within the City limits as $3,129.62. This amount was revised by a special agreement with the City executed in September, 1921. This agreement sets out that the State expenditures within the City amounted to a total of $8,276.72, the City assuming 20 per cent of the cost, or $1,655.34. Of this amount they were allowed $1,000.00 for grading and surfacing work previously done by their own forces within the city limits, leaving a net balance of $655.34 as the total City share.

The total cost of the work has been $272,264.81, which has been paid $271,021.20 by the State, $588.27 by the County and $655.34 by Junction City. Department entries during the biennium amount to a credit to State funds of $1,243.61 received from the other cooperating parties.

Cottage Grove Section Paving

Contract No. 468 for paving 1.42 miles, from the north city limits of Cottage Grove to a point 2,882 feet south of the south city limits, was awarded October 25, 1921, to Guy F. Pyle of Eugene, Oregon. This project was a cooperative one with the City of Cottage Grove. The State and City shared equally on the cost of a width of 16 feet between the city boundaries, with the city paying the cost of all extra width construction. All pavement outside of the city limits was paid for entirely by the State.

The type of pavement constructed under the contract was a 7-inch concrete, varying in width from 16 feet to 34 feet, with the exception of 864 lineal feet of 2-in. by 30-ft. bituminous resurface on Ninth Street, 276 lineal feet of 2-in. by 34-ft. bituminous resurface on Ninth Street, and an average 2¾-in. bituminous surface, 18 ft. wide, extending 348 feet across the bridge and approaches over the Coast Fork of the Willamette River. No work was done on the Main Street in Cottage Grove between Ninth and Fifth Streets, as this portion had a satisfactory bituminous surface. Paving operations were started March 1, 1922, and a final estimate rendered September 20, 1922.

Preliminary work and supervision of the construction of the bituminous pavement and curbs was handled by Resident Engineer W. S. Hodge. Upon the completion of this work, he was transferred to the Goldson-Blachly Section and the construction of the concrete pavement and completion of the contract was supervised by J. G. Garrow, Resident Engineer.

The completed project when all charges are paid is estimated to cost a total of $58,667.79, shared $33,667.79 by the State and $25,000.00 by Cottage Grove. Expenditures to the date of this report amount to $53,331.75, having been paid $30,037.63 by the State and $23,294.12 by Cottage Grove.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,591.53
Cement furnished by State (to be deducted from contractor's estimate)		16,562.14
Contract items as follows:		
Excavation, single classification, 1,549.2 cu. yds. at $1.00	$ 1,549.20	
12-inch plain concrete pipe, 30.0 lin. ft. at $2.00	60.00	
6-inch concrete sewer pipe, 662.5 lin. ft. at $1.00	662.50	
Class "A" concrete in inlets, 7.95 cu. yds. at $30.00	238.50	
Cast iron gratings, 2,212.0 lbs. at 15c	331.80	
Concrete curb, 2,805.5 lin. ft. at 60c	1,683.30	
Salvaged surfacing material, 65.5 cu. yds. at $1.00	65.50	
Preparation of subgrade, 9,825.8 sq. yds. at 5c	491.29	
Standard 7-inch concrete pavement, 12,880.1 sq. yds. at $2.90	37,352.29	

[LANE]

EXPENDITURES—Continued

Bituminous resurface, 4,082.9 sq. yds. at $1.50	6,124.35	
2-inch bituminous concrete wearing surface, 649.8 sq. yds. at $1.75	1,137.15	
3-inch bituminous base, 43.0 batches at $4.00	172.00	
Expansion joints, 5,655.5 lin. ft. at 13c	735.22	
Bar reinforcement, 8,607.0 lbs. at 10c	860.70	
Shoulder construction, 6,968.4 lin. ft. at 5c	348.42	
Crushed gravel for shoulders, 646.8 cu. yds. at $2.75	1,778.71	
Total amount earned by contractor	$ 53,590.93	
Deductions:		
Cement furnished by State	15,106.65	
Percentage retained until completion of contract	4,306.20	
Total amount paid to contractor		34,178.08
Grand total expended		$ 53,331.75
Paid by State	$ 30,037.63	
Paid by City of Cottage Grove	23,294.12	
Total	$ 53,331.75	

McVeigh Overcrossing Approaches Surfacing

Contract No. 512, for surfacing the approaches to the McVeigh Point Overcrossing, was awarded to A. C. Matthews of Eugene on April 14, 1922. The embankments were not dry enough to permit trucking of surfacing materials until late in May and until that time a plank detour was provided for the handling of traffic. This detour extended from the north end of the project, under the structure and over the old Southern Pacific grade crossing and old road, to the south end of the project. The surfacing was completed and traffic allowed over the new crossing during the latter part of July, the contract being given final acceptance on August 4, 1922.

Supervision of the construction was handled by J. G. Garrow, Resident Engineer, the cost amounting to $3,305.21. This was paid entirely from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 195.84
Rental of State-owned equipment (deducted from contractor's estimate)		552.62
Contract items as follows:		
Crushed gravel surfacing, 1,448.0 cu. yds. at $2.00	$ 2,896.00	
Earth filler, 261.0 cu. yds. at 50c	130.50	
Force account items:		
Reconstructing private road approach and removing soft spots in roadbed	83.16	
Total amount earned by contractor	$ 3,109.66	
Deduction for rental of State-owned equipment	552.62	
Total amount paid to contractor		2,557.04
Grand total cost of project		$ 3,305.50
Less final payment in transit		.29
Total amount expended (all State funds)		$ 3,305.21

Divide-Douglas County Line Surfacing

A description of this project will be found on pages 295 and 296 of the previous Department report. During the present biennium, additional costs of $4,001.73 have been entered on the books, bringing the total expenditures on the work to $30,772.76 from State funds.

[LANE]

Harrisburg-Junction City Grading and Surfacing

One of the last remaining gaps on the Pacific Highway in Lane County was that between Harrisburg and Junction City, and Contract No. 543 for grading and surfacing the major portion of the gap was awarded to Schell & McKy on May 10, 1922. Approximately one-half mile on the Harrisburg end was not included in the improvement due to river overflow conditions and uncertainty regarding the river channel. This short section was left to be constructed at such time as a bridge over the Willamette River at Harrisburg, may be deemed desirable or practicable. When such a bridge is built, revetments to control and properly direct the river at flood stage will be necessary.

Several marked changes from the alignment of the existing road were made on the project. The new route parallels the Oregon Electric Railway into Junction City, entering on Ivy Street and extending to a junction with the West Side Highway. By the adoption of this route the use of the bad crossings of the Oregon Electric and Southern Pacific Railways north of Junction City have been eliminated, and grade crossings of the tracks on the main street of Junction City substituted.

The roadbed was constructed to the Department standard Class "A" section and 18-foot crushed gravel water-bound surfacing was provided. Standard frame trestles were constructed as relief openings at all high water channels. Work on the project was started June 12, 1922, and the job is practically complete and ready for final acceptance at this time.

The contract represents a total estimated cost of $47,000.00 to be paid $19,500.00 by the State and $27,500.00 by the County. The expenditures to date amount to $34,083.78, consisting of $9,906.27 from State funds and $24,177.51 from County funds. M. S. Jones, Resident Engineer, was in charge during the early months of the construction, and, on being transferred during the summer, was relieved by Resident Engineer G. E. Farnsworth. Mr. Farnsworth resigned on October 5, and M. S. Jones was again assigned to supervision of the project, remaining until its completion.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,839.96
Contract items as follows:		
Clearing and grubbing, 95 per cent, all	$ 475.00	
Excavation, single classification, 23,514.3 cu. yds. at 35c	8,230.01	
Overhaul, 17,690.0 sta. yds. at 5c	884.50	
12-inch plain concrete pipe, 138.0 lin. ft. at $1.00	138.00	
24-inch reinforced concrete pipe, 99.0 lin. ft. at $3.00	297.00	
36-inch reinforced concrete pipe, 212.0 lin. ft. at $5.00	1,060.00	
Class "C" concrete, 19.79 cu. yds. at $22.00	435.38	
Lumber and timber, 242.771 M.-FBM. at $47.50	11,531.62	
Timber piling, 4,602.0 lin. ft. at 60c	2,761.20	
Crushed gravel surfacing, 5,413.75 cu. yds. at $1.45	7,849.94	
Maintenance materials placed in piles, 83.0 cu. yds. at $1.35	112.05	
Earth filler, 203.25 cu. yds. at 50c	101.63	
Materials on hand	291.55	
Total amount earned by contractor	$ 34,167.88	
Percentage retained until completion of contract	2,924.06	
Total amount paid to contractor		31,243.82
Grand total expended		$ 34,083.78
Paid by State	$ 9,906.27	
Paid by County	24,177.51	
Total	$ 34,083.78	

PAVEMENT BETWEEN COTTAGE GROVE AND SAGINAW; ON THE PACIFIC HIGHWAY IN LANE COUNTY

[LANE]

Thurston-Walterville Grading and Surfacing

Contract No. 381, for the improvement of 4.56 miles of the McKenzie Highway between Thurston and Walterville, was awarded to the County Court of Lane County on May 27, 1921. The contract called for the grading of the section and the construction of a water-bound crushed gravel surfacing. Construction operations were started June 16, 1921, and practicaly all work under the contract was completed December 15. At this time there remained only the construction of minor items yet to be done, consisting of concrete headwalls to culverts and a short section of guard fence, and all work was carried to final completion during 1922.

The new alignment eliminated the rough, choppy section, locally known as Cogswell Hill, and brought the road to standard as to grade, alignment and drainage.

Work was supervised by R. A. Walsh, Resident Engineer, and when all charges have been paid, is estimated to cost a total of $44,500.00. Of this amount, Lane County cooperates to the extent of $21,000.00. Expenditures now made amount to $40,611.36, having been paid $22,352.66 by the State and $18,258.70 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,093.93
Contract items as follows:		
Clearing and grubbing, all	$ 700.00	
Common excavation, 22,846.0 cu. yds. at 50c	11,423.00	
Solid rock excavation, 590.0 cu. yds. at $1.50	885.00	
Special excavation, 120.0 cu. yds. at $1.50	180.00	
6-inch porous drain tile, 2,518.0 lin. ft. at 15c	377.70	
12-inch plain concrete pipe, 423.0 lin. ft. at $1.50	634.50	
18-inch reinforced concrete pipe, 148.0 lin. ft. at $2.65	392.20	
24-inch reinforced concrete pipe, 68.0 lin. ft. at $3.68	250.24	
12-inch corrugated galvanized iron pipe, 160.0 lin. ft. at $1.60	256.00	
24-inch corrugated galvanized iron pipe, 22.0 lin. ft. at $3.80	83.60	
Class "A" concrete, 80.0 cu. yds. at $25.00	2,000.00	
Steel reinforcement, 5,548.0 lbs. at 8c	443.84	
Crushed gravel surfacing, 10,588.0 cu. yds. at $1.70	17,999.60	
Gravel backfill for drain tile, 159.0 cu. yds. at $1.75	278.25	
Maintenance materials placed in piles, 485.0 cu. yds. at $1.60	776.00	
Earth filler, 1,059.0 cu. yds. at 75c	794.25	
Force account items:		
Riprapping fills to protect against wash and removing debris from inlets of culverts	86.13	
Digging ditch and laying tile to drain spring in center of roadway	86.53	
Total amount earned by contractor	$ 37,646.84	
Percentage retained until completion of contract	1,129.41	
Total amount paid to contractor		36,517.43
Grand total expended		$ 40,611.36
Paid by State	$ 22,352.66	
Paid by County	18,258.70	
Total	$ 40,611.36	

Power Plant and Shell Rock Grades Grading and Surfacing

There are two short sections, totalling 2.06 miles, on the McKenzie Highway, which have been known as the Power Plant and Shell Rock grade sections and have been exceedingly dangerous on account of the excessive curvature and rough, narrow roadbed. The first section was so named because, when built several years ago, it was placed above the

flood area of a proposed power project on the McKenzie River. The second section was so named on account of the numerous shell rock slides which exist along the section.

Contract No. 528 for the improvement of these units was awarded to A. F. Saar on June 5, 1922, the improvement to consist of the construction of a standard 24-foot roadbed and a 16-foot water-bound surfacing.

As this volume is being prepared, all of the grading and most of the surfacing has been completed, and the sections now offer no obstacle to all-weather traffic. The work is estimated to cost a total of $39,000.00, and is to be paid for $21,000.00 by the State and $18,000.00 by the County. The expenditures to date amount to $18,065.83, comprising $10,157.56 from State funds and $7,908.27 from County funds. Construction is being supervised by Raymond Walsh, Resident Engineer.

Walterville-Deerhorn & Doyle Hill Grading and Surfacing

In cooperation with Lane County, two small projects between Walterville and Leaburg on the McKenzie Highway have been placed under contract for grading and surfacing. The first unit is 2.49 miles in length and lies just east of Walterville. The second unit, 0.49 mile in length, is west of Leaburg, and eliminates a steep, narrow grade locally known as Doyle Hill.

Contract No. 534 for grading and surfacing the two sections was awarded to Albert Anderson on May 9, 1922, and is completed at the present time. The surfacing constructed consists of a water-bound crushed gravel, built from materials from local sources.

The final payments under the contract are estimated to amount to $25,500.00, and will be shared $14,000.00 by the State and $11,500 by the County. Expenditures to date amount to $17,296.10, comprising $10,374.60 from State funds and $6,921.50 from County funds. These expenditures have been made under the supervision of Raymond Walsh, Resident Engineer.

Blue River-Sisters Forest Road Project

A description of this work will be found on page 298 of the last report. Subsequent to that time the project agreement has been amended to cover a total estimated cost of $645,000, which is to be shared $302,500 by the State, $5,000 by Lane County, $5,000 by Deschutes County and $322,500 by the Federal Government.

Immediately upon the completion of the grading of the Blue River Section a surfacing contract was awarded and this work is now complete.

Completion of the grading of the Dead Horse Grading Section has also been accomplished.

The Summit Section, the correct mileage therefor being 19.2 instead of 22.9 as previously stated, is being graded under a contract awarded to Charles E. Lind late in 1921.

The surfacing of the Sisters Section, which was previously graded, is being done under a separate agreement. A description of this work will be found in the portion of this report devoted to Deschutes County projects.

Total expenditures on the project, except the surfacing of the Sisters Section, have amounted to $477,579.37. Of this amount the State has expended $223,332.07, the Counties $7,988.87 and the Federal Government $246,258.43.

[LANE]

Goldson-Blachly Surfacing

Upon completion of the two grading contracts between Goldson and Blachly, Contract No. 529 for surfacing the 13.63 miles of the two sections was awarded to A. D. Kern of Portland, Oregon, on April 15, 1922.

The specifications for the surfacing called for 1½-inch maximum size crusher-run materials for the base and 1-inch maximum size crusher-run materials for the top course. A quarry was opened on the Kubli property about 10 miles west of Goldson and operations were started June 6. During the 1922 season, four miles of surfacing have been completed on the west end of the contract. Shortly after the beginning of crushing operations, a quarry blast wrecked the bunkers and elevators. This, combined with the extreme toughness of the quarry stone, requiring the drilling and shooting of all rock larger than crusher size, made progress on the work extremely slow. At the present time, the contractor is considering moving his plant to another location before operations are started in 1923. Development work now under way on this prospective quarry site shows an excellent quality of rock available in sufficient quantities for the work.

W. S. Hodge is Resident Engineer in charge of the construction. and expenditures of $16,412.20 by the State and $9,283.77 by the County have been made. The completed project is estimated to cost a total of $95,000.00. Of this amount Lane County cooperates to an estimated amount of $43,500.00 to cover 50 per cent of the construction cost, the State paying the other 50 per cent of the construction cost and all engineering expenditures.

Walker-Cottage Grove Grading

This work was completed during 1920 and a description thereof is given on page 296 of the last report. No additional expenditures have been made during the present biennium, the only entry on the books being occasioned by the receipt of $15,391.12 from the Southern Pacific Railroad Company in payment of their final cooperative share. This entry brings the final cooperation on the total cost of $49,602.38, to $28,613.26 from State funds, $1,963.12 from County funds and $19,026.00 from Railroad funds.

Eugene-Florence Forest Road Project

A description of this project will be noted on page 302 of the last report. During the present biennium an additional survey has been made by the Bureau of Public Roads from Blachly to Deadwood, a distance of 15.5 miles. No additional State expenditures have been made during the present biennium and reports from the Federal Government give a total cost for the work of $7,486.83, of which the State has paid $3,732.82 and the Federal Government $3,754.01. The total surveys made amount to 39.5 miles.

Goldson Section Grading

The first contract awarded after the survey and adoption of the Willamette Valley-Florence Highway by way of the low pass route covered what is known as the Goldson section, extending from a point one mile east of the Goldson Postoffice to the summit of the Coast Range. The section covers a distance of 11.29 miles and Contract No. 305 for the grading was awarded to Washburn & Hall of Portland on November 6, 1920.

[LANE]

Clearing operations were started December 20, and the grading work was begun early in the spring of 1921. All of the work, except a small amount of finishing and culvert headwalls, was finished during that year, final acceptance of the job being made June 26, 1922.

W. S. Hodge, Resident Engineer, was in charge of the work, which required a total expenditure of $155,731.77. Of this amount the State paid $83,042.68 and the County cooperated to the extent of $72,689.09.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 10,353.59
Labor and material furnished by State:		
T. N. T. furnished free to contractor		2,000.00
Removing trees that have fallen across roadway during winter months		246.98
T. N. T. powder furnished by State (deducted from contractor's estimate)		1,000.00
Contract items as follows:		
Clearing and grubbing, all	$ 15,000.00	
Common excavation, 65,477.6 cu. yds. at 57c	37,322.23	
Intermediate excavation, 48,582.7 cu. yds. at 90c	43,724.43	
Solid rock excavation, 11,011.2 cu. yds. at $1.30	14,314.56	
Overhaul, 34,179.0 sta. yds. at 4c	1,367.16	
Class "A" concrete, 23.73 cu. yds. at $40.00	949.20	
Class "B" concrete, 82.81 cu. yds. at $37.50	3,105.38	
Class "C" concrete, 114.92 cu. yds. at $35.00	4,022.20	
Metal reinforcement, 2,924.0 lbs. at 10c	292.40	
Lumber and timber, 89.478 M.-FBM. at $65.00	5,816.07	
12-inch corrugated galvanized iron pipe, 692.0 lin. ft. at $2.25	1,557.00	
12-inch plain concrete pipe, 1,748.0 lin. ft. at $2.50	4,370.00	
18-inch reinforced concrete pipe, 524.0 lin. ft. at $4.50	2,358.00	
24-inch reinforced concrete pipe, 444.0 lin. ft. at $5.50	2,442.00	
36-inch reinforced concrete pipe, 104.0 lin. ft. at $9.00	936.00	
30-in.x30-in. cedar log culvert, 667.5 lin. ft. at $3.50	2,336.25	
4-ft.x4-ft. cedar log culvert, 43.5 lin. ft. at $7.00	304.50	
6-ft.x6-ft. cedar log culvert, 73.0 lin. ft. at $17.00	1,241.00	
Catch basins, 2 each at $50.00	100.00	
Force account items:		
Constructing rock wall to prevent fill from covering old county road at Sta. 1021+00	103.92	
Extra clearing and grubbing for three small channel changes	77.66	
Clearing extra right-of-way due to revision in alignment	158.39	
Removing slides	468.67	
Placing large log at toe of rock fill to prevent slides	18.07	
Treating the decks of Bear Creek bridge and trestle at Sta. 887+00 with a coating of tar	331.68	
Installing box culverts at private crossing to improve drainage	351.53	
Repairing embankment where culvert headwall has been destroyed	62.90	
Total amount earned by contractor	$143,131.20	
Deduction for T. N. T. furnished by State	1,000.00	
Total amount paid to contractor		142,131.20
Grand total cost of project		$155,731.77
Paid by State	$ 83,042.68	
Paid by County	72,689.09	
Total	$155,731.77	

Summit-Blachly Grading

Following the award of the contract for grading the Goldson section, the adjoining project, which extends from the summit of the Coast Range west to a junction with the High Pass road 0.9 mile east of Blachly, was

advertised. The bids received being satisfactory, Contract No. 418 for the grading of the 2.34-mile section was awarded to the Iver J. Rosten Company of Portland on June 28, 1921. Operations were started July 20, and completed December 30 of the same year. Most of the grading was sublet to stationmen in small units. The grading of this section provided a standard road, having easy curves and a maximum 6 per cent grade, over the Coast Range to the Lake Creek Valley.

Construction was supervised by W. S. Hodge, Resident Engineer, and has required expenditures of $65,677.66. Lane County has cooperated in this amount to the extent of $31,738.41, the balance of $33,939.25 having been paid from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,200.85
Contract items as follows:		
Clearing and grubbing, all	$ 4,250.00	
Common excavation, 15,929.7 cu. yds. at 43c	6,849.77	
Intermediate excavation, 34,777.0 cu. yds. at 68c	23,648.36	
Solid rock excavation, 28,061.6 cu. yds. at 88c	24,694.21	
Overhaul, 22,722.0 sta. yds. at 5c	1,136.10	
12-inch corrugated galvanized iron pipe, 1,098.0 lin. ft. at $1.35	1,482.30	
Class "C" concrete, 7.6 cu. yds. at $30.00	228.00	
30 in. x 30 in. cedar log culvert, 299.0 lin. ft. at $2.00	598.00	
2 ft. x 4 ft. cedar log culvert, 83.0 lin. ft. at $2.00	166.00	
6 ft. x 6 ft. cedar log culvert, 58.0 lin. ft. at $4.50	261.00	
Force account items:		
Constructing wood box culverts at private crossings to improve drainage	87.04	
Prospecting for quarry sites	76.03	
Total amount paid to contractor		63,476.81
Grand total cost of project		$ 65,677.66
Paid by State	$ 33,939.25	
Paid by County	31,738.41	
Total	$ 65,677.66	

McVeigh Point Overcrossing

One of the most important grade crossing eliminations in the State was the one completed near Springfield, about three miles south of Eugene. At that point the Pacific Highway formerly crossed the Southern Pacific track on a grade crossing at a very sharp angle and with steep grades. The track was also on a curve, making the view very much obstructed and the crossing a dangerous one. The matter was heard on February 16, 1921, before the Public Service Commission who, in their order No. 710, assessed $12,000.00 of the cost to Lane County, 40 per cent to the Southern Pacific Company and the remainder to the State.

Contract No. 342 for the construction was awarded on March 8, 1921, to Lindstrom & Feigenson. After the contract was awarded, it was found desirable to lengthen the structure and cut off some of the approach fill. To this the railroad company strenuously objected and refused to allow the contractor to enter the railroad right-of-way for the prosecution of the work. A rehearing was requested by the Highway Commission, which was held on June 21, 1921, and an amended order issued on June 27, 1921. This order provided that the railroad company should pay a lump sum of $13,225.58, Lane County $12,000.00, of which $6,000.00 will be applied to the approaches, and the State the remainder.

In the meantime, actual construction was started on April 11, 1921, but it was not possible to make much progress until about July 1. After

that date, however, progress was better and the entire work was complete by September 30, 1921, at a total cost of $38,794.87. This amount will be shared $19,569.29 by the State, $6,000.00 by the County and $13,225.58 by the Southern Pacific Railroad Company. The entire cost has been advanced by the State, no payments having been received from either of the other two cooperative parties.

As completed, the structure consists of a concrete viaduct of one 30-foot and eight 37-foot spans. In addition to the structure, there is a long approach fill on the north end which was built under separate contract and will be found described in another article in this report. Engineering supervision of the construction of the structure was handled by E. G. Ricketts, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,027.12
Bronze name plates furnished by State		14.50
Contract items as follows:		
Excavation to plan elevation, 519.3 cu. yds. at $2.50	$ 1,298.25	
Excavation below elevation shown on plans, 291.6 cu. yds. at $4.00	1,166.40	
Class "A" concrete, 809.92 cu. yds. at $26.00	21,057.92	
Steel Reinforcement, 137,610.0 lbs. at 6¾c	9,288.68	
Reinforced concrete handrail, 660.0 lin. ft. at $4.50	2,970.00	
Special adjustment, due to change in design involving curvature and increased length	972.00	
Total amount paid to contractor		36,753.25
Grand total cost of structure (all State funds)		$ 38,794.87

McVeigh Point Overcrossing Approaches Grading

Contract No. 408, for grading and constructing embankments at the McVeigh Point overcrossing of the Southern Pacific Railroad, was awarded to A. Guthrie & Company of Portland on June 29, 1921. On completion of the concrete overhead structure, grading operations were started on September 1, 1921. A steam shovel was installed on the work and a dinkey engine and cars were used for hauling the excavated materials to the approach fills of the overcrossing. The bulk of the grading was completed when the work was shut down on account of inclement winter weather. Work was resumed early in the spring and completed during the 1922 season. Owing to minor matters in dispute, the contractors have not yet accepted the final estimate, but payment of this will bring the total cost of the work to $29,975.89. This total will be paid $13,975.89 by the State, $6,000.00 by the County and $10,000.00 by the Railroad Company. The expenditures to date amount to $28,594.82 and have all been paid from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,660.27
Labor and material for planking detour by State forces		105.55
Purchase of borrow pit to secure embankment material		750.00
Completing guard fence construction and removing waste rock from railroad right-of-way (deducted from contractor's estimate)		126.57
Contract items as follows:		
Excavation, no classification, 31,544.6 cu. yds. at 70c	$ 22,081.22	
Riprapping slopes, 437.7 cu. yds. at $1.75	765.98	
Standard wood guard fence, 1,751.4 lin. ft. at 90c	1,576.26	
Force account items:		
Clearing right-of-way	480.65	
Constructing temporary plank detour	1,806.58	
Backfilling apron walls at each end of McVeigh overcrossing structure	954.91	
Total amount earned by contractor	$ 27,665.60	

EXPENDITURES—Continued

Deductions:		
Labor and material finishing and painting guard fence and removing rock from Southern Pacific right-of-way	126.57	
Total amount paid to contractor		27,539.03
Grand total cost of project		$ 30,181.42
Less final payment to contractor in transit		1,586.60
Total amount expended (all State funds)		$ 28,594.82

Willamette River Bridge Near Latham

In entering the town of Cottage Grove from the south, the Pacific Highway crosses the Willamette River on a bridge consisting of a 150-foot steel span with 190 feet of pile trestle approach.

Contract No. 449, for the construction of the steel span only, was awarded to the Union Bridge Company on August 31, 1921. The piers and the approaches were to be built by County forces. The County started work on the piers on about August 15, 1921, and had them done by November 5, 1921. They immediately started on the approaches and finished them on December 24, with the exception of a small amount left undone at the request of the Union Bridge Company.

The contractor started on the steel work on December 12, and brought it to completion on April 22, 1922. By this time, the County had already cleaned up their unfinished work, making the structure complete. The cost of the contract work amounted to $13,612.33, and is to be finally paid $1,347.75 by the State and $12,264.58 by the County. At this time payment of $14.00 is due from the County for their final cooperative share; this amount having been advanced by the State. Supervision of the work was handled by E. G. Ricketts, Resident Engineer, until October 1, 1921, A. G. Skelton succeeding him on that date.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,347.75
Two bronze name plates furnished by State		14.00
Contract items as follows:		
Structural steel, 140,531.0 lbs. at $0.087	$ 12,226.20	
Force account items:		
Enlarging anchor bolt holes, drilling holes for guide angle bolts and seating bed plates	24.38	
Total amount paid to contractor		12,250.58
Grand total cost of structure		$ 13,612.33
Paid by State	$ 1,361.75	
Paid by County	12,250.58	
Total	$ 13,612.33	

Divide Overcrossing

The repair work mentioned on page 299 of the previous report has been completed at a total cost of $5,729.93, of which amount $4,827.15 has been paid out during the present biennium. These repairs have consisted mainly of adding a 20-foot wood span at each end and removing an equal length of the approach fill. This operation has relieved the pressure on the earth below, and, it is believed, has solved the problem. This work was handled by States forces under John K. Holt, Superintendent.

Expenditures during the present biennium bring the total cost of the structure, approach fills and repair work to $28,593.39, the cooperation

being $17,153.77 by the State and $11,439.62 by the Railroad Company. Expenditures during the present biennium of $4,760.44 by the State and $66.71 by the Railroad Company bring the expenditures of the cooperating parties to $20,468.46 from State funds and $8,124.93 from Railroad funds. This leaves a balance due from the Railroad Company of $3,314.69. The Railroad Company has objected to the payment of this amount, claiming that they should not participate in the cost of any of the work required after the first completion of the structure. The Department does not consider this contention valid and a hearing and final adjudication of the matter has been requested from the Public Service Commission.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,551.85
Labor and materials furnished by State:		
Advertising for bids		42.63
Removing railroad cattle guards and road crossing, guarding S. P. Ry. and changing signal poles		691.11
Constructing standard wood guard fence		272.55
Regrading approaches account of settlement		630.41
Reconstructing structure		4,502.61
Contract items as follows:		
Clearing and grubbing, all	$ 75.00	
Common excavation, 6,169.0 cu. yds. at 70c	4,318.30	
Intermediate excavation, 5,790.0 cu. yds. at 70c	4,053.00	
Solid rock excavation, 470 cu. yds. at 70c	329.00	
Overhaul, 8,295.0 sta. yds. at 2½c	207.38	
18-inch reinforced concrete pipe, 96.0 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 9½c	2,827.01	
Concrete handrail, 122.0 lin. ft. at $2.00	244.00	
Force account items:		
Constructing wood guard fence	351.57	
Drainage of spring in roadbed	19.71	
Moving 18-inch culvert account change in plans	12.10	
Gravel backfill in excavation under footings	20.33	
Extra excavation account changes in footings	15.52	
Changing forms to give additional camber	17.28	
Installing girder brackets to strengthen structure, made necessary through settlement of footings	952.03	
Total amount paid to contractor		20,902.23
Grand total cost of structure and approaches		$ 28,593.39
Paid by State	$ 20,468.46	
Paid by Southern Pacific Railroad Company	8,124.93	
Total	$ 28,593.39	

Willamette River Bridge North of Cottage Grove

The Pacific Highway also crosses the Willamette River just north of Cottage Grove, this time on a 120-foot steel span with 57 feet of pile trestle approach.

Contract No. 539 for its construction was awarded to Monson-Trierweiler Company, Inc., on May 9, 1922. Owing to an adverse court decision, the County found itself without funds to pay for this bridge and notified the contractor to stop work just as it was being started. The contractor complied with this order and consequently nothing is done. On about November 25, however, the County notified the contractor that there were funds available and that he could proceed. At the date of this report, preparations are being made to start and it is hoped that the work will be done by early summer. The completed structure is esti-

mated to cost a total of $14,500.00, of which amount the State will pay the engineering charges estimated at $1,000.00 and the County will pay the construction cost estimated at $13,500.00. The only expenditures to date amount to $41.86 and cover the cost of minor preliminary engineering.

Long Tom River Bridges Near Goldson

The Willamette Valley-Florence Highway crosses the Long Tom River three times near Goldson. The first crossing consists of a 90-foot wood truss span, the second is a 60-foot span with 38 feet of trestle approach and the last crossing is entirely trestle.

Contract No. 384 covering the construction of the first two was awarded on May 28, 1921, to George W. Breeding of Eugene. Mr. Breeding started the work on June 20, 1921, and conducted it in a desultory fashion until August 19, 1921, when he abandoned the contract to his bondsmen, The National Surety Company. This Company after a delay of thirty days, sublet the work to E. D. Olds who started work at once and brought it to completion on May 6, 1922, at a total cost of $12,983.17. This amount is to be shared $6,917.82 by the State and $6,065.35 by the County. The State has expended $11,987.77 and the County has paid $995.40. The balance of the cooperation will accrue as a credit to State funds when received.

E. G. Ricketts, Resident Engineer, was in charge of the work until October 1, 1921, at which time he was succeeded by Resident Engineer A. G. Skelton.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,289.60
Two sets of bronze name plates furnished by State		29.00
Contract items as follows:		
BRIDGE No. 728—		
Excavation to plan elevation, 93.61 cu. yds. at $1.00	$ 93.61	
Excavation below elevation shown on plans, 35.45 cu. yds. at $5.00	177.25	
Class "B" concrete, 105.64 cu. yds. at $30.00	3,169.20	
Metal reinforcement, 534.0 lbs. at 6c	32.04	
90-foot wood trust span, 1.0 at $3,923.00	3,923.00	
BRIDGE No. 729—		
Excavation to plan elevation, 89.41 cu. yds. at $1.00	$ 89.41	
Excavation below elevation shown on plans, 7.8 cu. yds. at $5.00	39.00	
Class "B" concrete, 51.87 cu. yds. at $30.00	1,556.10	
Metal reinforcement, 473.0 lbs. at 6c	28.38	
Lumber and timber, 2.22 M-FBM at $36.00	79.92	
Trestle superstructure, 38.0 lin. ft. at $10.00	380.00	
60-foot wood truss span, 1.0 at $2,369.00	2,369.00	
Force account items:		
Facing winodw casings with 1-inch material	54.23	
Raising rafter plates 6 inches and placing additional bracing at ends of bridges	95.99	
Changing corbels for truss	14.57	
Total amount earned by contractor	$ 12,101.70	
Deduction for overrun of time limit	437.13	
Total amount paid to contractor		11,664.57
Grand total cost of structures		$ 12,983.17
Paid by State	$ 11,987.77	
Paid by County	995.40	
Total	$ 12,983.17	

Maintenance

During the biennium State maintenance has been effective on all sections of completed State highways in the County. This work has been carried on partly by the State patrol system, and partly by County forces. Labor and equipment has been paid for by the State and the work has been done under the direction of the State Highway Department. This work has covered the Pacific, West Side, Willamette Valley-Florence and McKenzie Highways.

Construction Engineering Goshen-Walker Grading

During August and September of 1919, 4.5 miles between Goshen and Walker were graded by Lane County forces. A description of this work is given on page 300 of the last report. During 1921 an additional 5.3 miles were graded by Lane County forces in advance of paving operations. This County work also included the necessary drainage structures and the construction of a pile trestle at Camas Swale.

There remains a gap of 0.63 mile yet to be constructed at the site of the proposed overcrossing of the Southern Pacific Railroad at Creswell.

Engineering supervision of the County work during 1921 was in charge of M. S. Jones, Resident Engineer.

Construction Engineering Cottage Grove Grading

During the summer of 1921, a section, 2,882 lineal feet in length, extending from the south city limits of Cottage Grove to a point south of the crossing of the Coast Fork of the Willamette River was graded by Lane County forces under State supervision. This section was allowed to settle over the winter in preparation for 1922 paving. Engineering supervision of the construction was handled by H. W. Libby, Resident Engineer.

Pacific Highway-Blachly Survey

A description of this location is given on pages 301-302 of the last report. At various times during the summer of 1922, W. S. Hodge, Resident Engineer on the Goldson Section surfacing, retraced the line from the east end of the Goldson Section to Harpole Corners and prepared profiles and estimates for advertising for bids. During this retracing work, a marked revision in alignment was made between Goldson and Cheshire, effecting a saving of approximately eleven hundred feet in distance. The grading and surfacing of this section is proposed for the 1923 season, and is to be paid for from Lane County bond funds.

Thurston-Walterville Survey

In preparation for cooperative work on the McKenzie Highway, a location survey was ordered for the section between Thurston and Walterville. This location was made by H. O. Ragan, Resident Engineer, being started in April, 1921, and completed during the following month. The survey for the most part followed the general route of the existing road, although several revisions of the existing alignment were made. A change in alignment at the Cogswell Hill reduced the grade to 5 per cent and eliminated some of the adverse grades. Another beneficial change in the alignment was made between Hendricks Bridge and the Millican place, at the Camp Creek Road connection, eliminating several unnecessary curves.

[LANE]

County Bridges Construction Engineering

During this biennium, the State has furnished considerable engineering service to the County at a cost of $805.21.

One of the principal County projects that has had attention is the construction of a wood truss span over the Siuslaw River near Minerva.

Harrisburg-Junction City Survey

Prior to advertising for bids on the Harrisburg-Junction City section, two revisions in the alignment of the original location survey were made. One of these revisions was in the vicinity of Lancaster. The other was in Junction City, and consists of changing the location from Juniper Street to Ivy Street.

Walterville-Blue River Survey

It was agreed between the State Highway Department and Lane County that sufficient cooperative projects would be undertaken on the McKenzie Highway during 1922 to eliminate the worst sections and provide a good road to the beginning of the Forest Road project at Blue River. These projects were to be paid for on a fifty-fifty cooperative basis. In accordance with this arrangement surveys were ordered for various sections, and a small locating party in charge of H. W. Libbey, Resident Engineer, started work on February 14, 1922.

The total distance between the Walterville and Blue River Postoffices is 27.7 miles. Of this distance location surveys totalling 10.16 miles were completed by April 30. The located sections and individual lengths are as follows:

Walterville-Leaburg Section	3.07 miles
Doyle Hill Section	0.50 miles
Power Plant Section	0.93 miles
Shell Rock Section	1.12 miles
Nimrod-Elk Creek Section	4.54 miles

The major part of the first four units listed have been graded and sufaced during the season, and will be found described elsewhere in this report.

China Creek-Lincoln County Line Reconnaissance

This reconnaissance begins at the end of the location surveys carried north from Marshfield during 1921 and 1922, and extends north along the coast to the Lane-Lincoln County Line. The line follows approximately the present road, except where changes have been made to obtain better alignment and grades and to avoid slides extending upwards from the ocean shore. The section traversed is very rugged and consists of headlands extending out to the ocean, with the intervening distance between these points cut up by numerous creeks. The elevation throughout varies from 30 feet to 300 feet above sea level, and the line, being as close to the ocean as safety will permit. is very scenic. There is considerable rise and fall in the line, as it is necessary to remain above some of the slides and headlands and then to drop nearly to sea level in order to cross some of the creeks. The alignment is generally good, but the use of maximum permissible curvature will be necessary in a few places.

The reconnaissance was made by J. H. Scott, Locating Engineer, between June 13 and July 1, 1922, its purpose being to close the gap between location surveys ending at China Creek and Siletz Bay. The total length investigated and reported on by Mr. Scott is 8.54 miles.

[LANE]

Florence-China Creek Survey

This survey begins at the north bank of the Siuslaw River, in the town of Florence, and extends north, along the coast and over Heceta Head, to China Creek. The country traversed is of a sandy nature and is covered with timber and a heavy growth of brush. Sand has blocked the outlets of several streams, and many lakes have been formed by this action. The present road is practically impassable on account of the loose sand, being very little used. The new location remains at a low elevation all the way, except at Heceta Head. At this point it rises to an elevation of 450 feet above the sea, and then drops down to an elevation of 60 feet. The alignment is good throughout, except for some maximum curvature near Heceta. There will be no particular difficulty to be encountered in the grading of the section, but the surfacing will be very expensive on account of the long hauls on rock.

The section has a total length of 16.9 miles, and was located by B. O. Johnson and F. N. Drinkhall, Locating Engineers. The survey was started on April 14, 1922, and was finished on July 10, 1922.

Douglas County Line-China Creek Survey

This survey on the Roosevelt Coast Highway traverses a section of the State having no road or road connections. The country is rough and broken and is covered with heavy brush and a small amount of timber. Construction will not be difficult, although the cost will be greater than ordinary on account of the isolated nature of the section. As there is no rock locally available, surfacing will be an expensive item on account of the fact that materials will have to be barged several miles down the Siuslaw River. The immediate country served by the location can not be developed to any great extent as an agricultural section, and the chief value of the road will consist in its service to traffic between the towns or originating beyond the limits of the section.

The location is 8.12 miles in length and was made between December 15, 1921, and April 13, 1922, by B. O. Johnson, Resident Engineer.

Willamette Highway Forest Road Project Survey

Under a Forest Road Project agreement with the State, the Bureau of Public Roads has in progress a survey covering approximately 100 miles between Oak Ridge in Lane County and Crescent in Klamath County. This survey is estimated to cost a total of $20,000.00, to be paid equally by the State and Federal Government. No State expenditures have been made to date but the Bureau of Public Roads report an expenditure of $3,552.32, with the location of 28.8 miles completed.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

[LANE]

Since the Market Road Law went into effect, Lane County has co-operated as follows:

1.	Paid into the State Market Road Fund	$121,432.02
2.	State Funds apportioned to County	168,407.49
3.	County levy made to match State Funds	148,562.66
4.	County Market Road Funds collected	134,748.76
5.	Cash paid to County by State	140,235.78
6.	State expenditures, deducted from apportionment	0.00
7.	Cash due County from State in December, 1922	28,171.71
8.	County expenditures on Market Roads	281,144.96
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Lane County received from the State Market Road Fund $46,975.47 more than it paid into the fund. The excess is Lane County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $148,562.66. Of this amount they have collected and credited to the Market Road Fund $134,748.76.

The County Court has designated 24 roads to be improved as Market Road projects.

The engineering work has been done by P. M. Mosse, County Surveyor, and plans submitted and approved by this Department.

Most of the construction work has been done by County forces under the direction of Jack McKy, County Roadmaster.

The County has expended $281,144.96. They have graded 26 miles of road, surfaced 24 miles and constructed several bridges.

LINCOLN COUNTY

Lincoln County has portions of three State highways within its boundaries; these being the Corvallis-Newport, the Alsea and the Roosevelt Coast Highways. Construction work during 1921-22 has been concentrated on the Corvallis-Newport Highway, and the grading is now practically completed. Between the Benton County Line and Newport, a distance of 36.9 miles, as a conservative estimate the surfacing of this section is 50 per cent complete. Between the County line and Toledo, a distance of 28.6 miles, the surfacing of 8.3 miles between Toledo and Newport is finished. As Lincoln is one of the Counties where the construction season between rains is very short, excellent progress has been required to achieve the present status of completion and the coming season will undoubtedly find completed an all-winter road from the West Side Highway to the sea. All of the work on this highway has been cooperative between the State and Lincoln County, and is covered in more detail in articles devoted to particular projects.

On the Alsea Highway, all construction undertaken to date has been supervised by the Bureau of Public Roads under Forest Road Project agreements. The work undertaken to date has been between Waldport and the east boundary of the Siuslaw Forest Reserve. The costs of the work have been borne by the State, County and Government with the commitments under existing agreements amounting to $367,000.00.

Various surveys and investigations on the Roosevelt Coast Highway have been made; the status of the various sections beginning at the south County line being as follows:

The County line to Cape Creek—reconnaissance completed.
Cape Creek to Waldport—reconnaissance completed.
Waldport to Newport—reconnaissance completed.
Newport to Schooner Creek—reconnaissance completed.
Schooner Creek to Otter Rock—location completed.
Otter Rock to Siletz River—reconnaissance completed.
Siletz River to Devils Lake—location completed.
Devils Lake to Tillamook County line—under construction.

The last unit named is a portion of the Neskowin-Devils Lake section, which is being graded and surfaced as a Forest Road project.

The section of the Roosevelt Coast Highway north of the Siletz River has been under the supervision of W. D. Clarke, Division Engineer. All other State work in the County has been supervised by J. C. McLeod, Division Engineer.

Tum Tum Section

Contract No. 371 was awarded to E. A. Palmer on May 26, 1921, for surfacing the Tum Tum section in Benton and Lincoln Counties. The Wischnofske quarry site at the east end of the project was designated as a source from which satisfactory materials could be secured. A coyote hole driven in the exposed rock indicated a horizontal face of approximately 25 feet of excellent material, but back of this there was discovered to be only black sand and clay. Thorough prospecting of this and other possible sources adjacent to the work showed no satisfactory rock available in sufficient quantities for the project. An adjustment was accordingly made with the contractor for his preliminary expense, and the contract was cancelled.

The total expenditures on the project amounted to $3,122.70 from State funds.

[LINCOLN]

Blodgett-Eddyville Surfacing

Contract No. 524, for the construction of 17.2 miles of broken stone surfacing between Blodgett and Eddyville, was awarded to Washburn & Hall of Portland on April 14, 1922. The specifications on the project called for 1½-inch crusher-run materials for the base course, and 1-inch crusher-run materials for the top course; the two courses to be laid to a combined thickness of eight inches, loose measure, and to have a width of 16 feet. The use of rock from a quarry two and one-half miles east of Blodgett and from the Aldrich quarry two miles east of Eddyville was stipulated. After several thousand yards of rock had been taken from the Aldrich quarry, sandstone was encountered back of the rock face. As this source of material had been guaranteed, an adjustment was made with the contractor, and the quarry was operated on a force account basis until all of the satisfactory materials had been removed. Completion of the job will be accomplished from the Blodgett quarry. During the 1922 season, a base course was laid over the entire job, and the project is conservatively estimated as being 50 per cent complete.

In accordance with the terms of the contract, all hauling has been done by State trucks without cost to the contractor. A total of 21,120 yards of material have been hauled 123,500 yard miles at an average cost of 22.2 cents per yard mile, the unit hauling costs being as follows:

Labor operating trucks	6.6c per yard mile
Supplies, i. e., gas, oil and grease	8.8c per yard mile
Rental and supervision	6.8c per yard mile
Total	22.2c per yard mile

The work has been handled under the supervision of A. A. Amort, Resident Engineer; the final estimated cost being $130,000.00. Of this amount the State will pay $87,000.00 and Lincoln County will cooperate to an estimated amount of $43,000.00. Expenditures to date amount to $67,094.80 from State funds.

Eddyville-Toledo Surfacing

Contract No. 513, for placing a broken stone surfacing on the Eddyville-Toledo Section, was awarded to A. Giebisch of Portland, Oregon, on April 14, 1922. There was included in this contract 0.8 mile of heavy grading between Eddyville and Chitwood on the portion locally known as the Hayes Creek grade. The revised location at this point parallels the railroad tracks at approximately the same elevation, and, upon its completion, the old grade over Hayes Hill will be abandoned.

A quarry site on the Steinmetz property located on mile west of Chitwood was purchased by the State, and material from this source was specified for use on the project.

The actual laying of broken stone began on July 10, 1922, but delays in the prosecution of the work prevented the finishing of the base course throughout the section before the closing down of the work for the winter. There remains uncompleted at the close of the season a two-mile gap on the east end and a three-mile gap on the Toledo end. Approximately one-third of the estimated quantity of rock required has been placed on the road to date. The section should be finished during the 1923 season without difficulty.

All hauling on this section, as on the section to the east, has been done with State trucks without cost to the contractor. Approximately

[LINCOLN]

11,496.5 yards have been hauled a total of 43,057 yard miles at an average cost of 24.5 cents per yard mile. The segregation of costs is as follows:

Labor, operating trucks	5.5c	per yard mile
Supplies, i. e., gas, oil and grease	8.2c	per yard mile
Rental charges and supervision	10.8c	per yard mile
Total	24.5c	per yard mile

The work is estimated to cost a total of $155,000.00, of which the State will pay $102,000.00 and the County will cooperate to the extent of $53,000.00. Construction has been carried on under the supervision of T. A. Rice, Resident Engineer, with expenditures of $37,965.58 to date. Of this amount the State has paid $37,098.48 and the County has paid $867.10.

Toledo-Newport Surfacing

Bids for the construction of a broken stone surfacing on 8.3 miles on the Toledo-Newport Section were received May 26, 1921, and Contract No. 394 for the work was awarded to A. D. Kern. A quarry was developed at Agate Beach, north of Newport, and materials were shipped over the Government Spruce Road to the highway crossing east of Newport. At this point, the rock was dumped into bunkers and transferred to trucks for delivery on the road. Actual surfacing operations were started on August 30, 1921, and the equivalent of 6.3 miles of completed road was finished prior to the winter shut-down. About two miles on the Toeldo end were not constructed at this time to full width, but were made passable for the winter season. Operations were resumed early during the present year, the contractors changing their source of supply and shipping rock to Toledo from the Saddle Butte quarry at Shedd. At the present time, the section is practically completed.

Construction was supervised by T. A. Rice, Resident Engineer, and is estimated to cost a total of $105,000.00 when all final payments have been made. This amount will be paid entirely from State funds. Expenditures to date amount to $91,684.71.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,268.57
Rental of equipment owned by State (to be deducted from contractor's estimate)		1,639.39
Contract items as follows:		
Crushed rock macadam, 15,419.9 cu. yds. at $5.45	$ 84,038.46	
Blind stone drains, 2,064.0 cu. yds. at $6.45	13,312.80	
Maintenance rock, 59.5 cu. yds. at $5.45	324.28	
Force account items:		
Placing filler in base rock	56.50	
Removing slides caused by winter rains	270.72	
Total amount earned by contractor	$ 98,002.76	
Deductions:		
Rental of State-owned equipment	1,261.14	
Reduction in freight rates	1,015.18	
Percentage retained until completion of contract	6,949.69	
Total amount paid to contractor		88,776.75
Grand total expended (all State funds)		$ 91,684.71

Chitwood-Toledo Grading

The last remaining ungraded section on the Corvallis-Newport Highway in Lincoln County was placed under contract to A. Giebisch on July 28, 1921. This section was awarded under Contract No. 426, which covered the grading of 10.62 miles between Thornton Creek, east of Chitwood, and Seventh and Hill Streets in Toledo.

[LINCOLN]

Grading operations were started July 31, 1921, and continued straight through the winter, the winter operations consisting of clearing and rock work. Most of the project has been completed during the 1922 season, there remaining unfinished at the present time a small amount of finishing work and placing of drain tile, and some grading in Toledo. It is expected that the project wil be finished early in the spring of 1923, well in advance of the surfacing operations now under contract.

Construction has been supervised by T. A. Rice, Resident Engineer, and is estimated to cost a total of $103,000.00. This cost will be shared $66,000.00 by the State and $37,000.00 by the County. Expenditures to date total $85,475.11, and consist of $55,677.87 from State funds and $29,797.24 from County funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 9,821.96
Construction of timber cribbing by State forces in Toledo for slope protection		722.47
Equipment purchased from State (deducted from contractor's estimate)		55.00
Amount to be deducted from contractor's estimate for overpayment on other work		484.37
Contract items as follows:		
Clearing and grubbing, 95 per cent all at $5,000.00	$ 4,750.00	
Common excavation, 95,763.9 cu. yds. at 40c	38,305.56	
Intermediate excavation, 23,754.3 cu. yds. at 50c	11,877.15	
Solid rock excavation, 20,622.8 cu. yds. at 90c	18,560.52	
Overhaul, 20,607.5 sta. yds. at 5c	1,030.38	
6-inch porous drain tile, 917.0 lin. ft. at 12c	110.04	
12-inch plain concrete pipe, 2,607.0 lin. ft. at $1.40	3,649.80	
18-inch reinforced concrete pipe, 387.0 lin. ft. at $2.65	1,025.55	
24-inch reinforced concrete pipe, 246.0 lin. ft. at $3.50	861.00	
36-inch reinforced concrete pipe, 108.0 lin. ft. at $5.20	561.60	
Rock backfill for tile drains, 7.0 cu. yds. at $2.50	17.50	
Total amount earned by contractor	$ 80,749.10	
Deductions:		
Equipment purchased from State	55.00	
Tractor parts furnished by State	46.78	
Percentage retained until completion of contract	6,256.01	
Total amount paid to contractor		74,391.31
Grand total expended		$ 85,475.11
Paid by State	$ 55,677.87	
Paid by County	29,797.24	
Total	$ 85,475.11	

Tum Tum-Chitwood Grading

As a cooperative project between the State and Lincoln County, Contract No. 406 for the grading of 9.67 miles between Kline's Mill and Chitwood was awarded to Horning, Malone & McKy on June 29, 1921. The contractors started operations on July 15 and made excellent progress during the working season. All but approximately 0.67 miles had been rough graded or finished by winter.

During the severe storms and extremely high waters of the winter months, slides aggregating several thousand yards came onto the road, completely blocking it in many places. Several washouts of culverts and bridges occurred, due to the torrents of water coming down the hillsides and carrying large loads of drift. On resuming grading operations in the spring of the present year, these slides were removed, the drainage structures were restored and the balance of the grading finished. Delays in the completion of the construction of headwalls and the placing of rock backfill for drain tile have delayed the final acceptance of the work, but all construction is practically complete at the present time.

[LINCOLN]

The final cost of the work is estimated at $96,000.00, of which the State will pay $61,000.00 and the County will pay $35,000.00. Expenditures to date amount to $74,621.76, consisting of $47,440.08 from State funds and $27,181.68 from County funds.

Construction was supervised by C. E. Carter, Resident Engineer, during 1921, and by A. A. Amort, Resident Engineer, during 1922.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,223.92
Maintenance work to maintain travel through winter		406.75
Hauling rock with State trucks (to be deducted from contractor's estimate)		36.88
Contract items as follows:		
Clearing and grubbing, all	$ 3,000.00	
Common excavation, 54,121.0 cu. yds. at 45c	24,354.45	
Intermediate excavation, 9,235.0 cu. yds. at 75c	6,926.25	
Solid rock excavation, 15,475.0 cu. yds. at $1.25	19,343.75	
Overhaul, 6,115.0 sta. yds. at 5c	305.75	
12-inch plain concrete pipe, 1,144.0 lin. ft. at $1.25	1,430.00	
18-inch reinforced concrete pipe, 80.0 lin. ft. at $2.90	232.00	
24-inch reinforced concrete pipe, 278.0 lin. ft. at $4.50	1,251.00	
30-inch reinforced concrete pipe, 52.0 lin. ft. at $7.00	364.00	
36-inch reinforced concrete pipe, 168.0 lin. ft. at $7.50	1,260.00	
48-inch reinforced concrete pipe, 88.0 lin. ft. at $10.00	880.00	
Class "C" concrete, 122.82 cu. yds. at $25.00	3,070.50	
Rock backfill for drains, 182.0 cu. yds. at $3.50	637.00	
Hand placed rock slopes, 1,016.0 cu. yds. at $3.00	3,048.00	
Placing 12-inch corrugated galvanized iron pipe, 978.0 lin. ft. at 55c	537.90	
Placing 15-inch corrugated galvanized iron pipe, 224.0 lin. ft. at 60c	134.40	
Placing 18-inch corrugated galvanized iron pipe, 92.0 lin. ft. at 70c	64.40	
Placing 24-inch corrugated galvanized iron pipe, 54.0 lin. ft. at 85c	45.90	
Placing 36-inch corrugated galvanized iron pipe, 166.0 lin. ft. at $1.00	166.00	
6-inch porous drain tile, 2,482.0 lin. ft. at 25c	620.50	
Force account items:		
Rebuilding platform in front of Eddyville School House	8.36	
Removing and rebuilding R. R. right-of-way fence	84.02	
Constructing drain under McBride farm crossing	8.53	
Reconstructing private road crossing over railroad to Peterson ranch	15.55	
Placing plank footings under 48-inch culvert pipe at Sta. 1627+80 and Sta. 1455+85	17.41	
Constructing channel change and improving drainage at culvert outlets	88.86	
Removing slides and repairing other damage caused by winter rains	3,936.54	
Removing small culvert and replacing with one of greater capacity	300.52	
Total amount earned by contractor	$ 72,131.59	
Percentage retained until completion of contract	4,177.38	
Total amount paid to contractor		67,954.21
Grand total expended		$ 74,621.76
Paid by State	$ 47,440.08	
Paid by County	27,181.68	
Total	$ 74,621.76	

Toledo-Newport Grading

This work was undertaken during the previous biennium, and a description thereof is given on page 304 of the last report. Following the winter shut-down, work was resumed early in the spring, and the

final estimate was rendered October 15, 1921. Expenditures during the present biennium amount to $28,694.12, and have been made up of $3,315.56 from State funds and $25,378.56 from County funds. These expenditures bring the total cost of the work to $59,374.88, comprising a total of $6,928.77 from State funds and $52,446.11 from County funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,928.77
Contract items as follows:		
Clearing and grubbing, all	$ 500.00	
Common excavation, 43,669.4 cu. yds. at 55c	24,018.17	
Intermediate excavation, 15,534.2 cu. yds. at $1.00	15,534.20	
Solid rock excavation, 4,196.4 cu. yds. at $1.00	4,196.40	
Overhaul, 36,392.0 sta. yds. at 5c	1,819.60	
12-inch galvanized iron pipe, 1,446 lin. ft. at 85c	1,229.10	
18-inch galvanized iron pipe, 184.0 lin. ft. at $1.75	322.00	
Class "C" concrete, 54.73 cu. yds. at $30.00	1,641.90	
6-inch porous tile drain, 2,001.0 lin. ft. at 35c	700.35	
Broken stone backfill for tile drains, 99.5 cu. yds. at $5.00	497.50	
Force account items:		
Installing 15-inch, 24-inch and 30-inch galvanized iron pipe culverts	560.05	
Installing log cribbing at Sta. 253	827.90	
Removing planking from old road and reconstructing right-of-way fence	77.69	
Planking swamp before placing fill	136.51	
Extra clearing account change in plans	384.74	
Total amount paid to contractor		52,446.11
Grand total cost of project		$ 59,374.88
Paid by State	$ 6,928.77	
Paid by County	52,446.11	
Total	$ 59,374.88	

Prospecting for Quarry Sites

A careful examination of the territory adjacent to the Corvallis-Newport highway was made during the summer of 1921, under the immediate direction of C. E. Carter, Resident Engineer, for the purpose of securing materials which would be suitable for use in the surfacing of the highway. The most promising sources discovered were fully prospected by drilling test holes and digging coyote holes where there was believed to be sufficient satisfactory stone to justify a crusher set-up. Maps and descriptions of the sites were prepared, and agreements were entered into with the owners covering the purchase of the rock in the event that any of it might be desired for State construction.

The County is to cooperate in these investigations to the extent of 40 per cent, this being their agreed cooperation on the construction in the County. The expenditures made amount to $1,441.16 from State funds.

Alsea River Forest Road Project

A description of this work will be noted on page 304 of the last report. Subsequent to that time a further agreement has been entered into with the Federal Government whereby the State is to put up an additional amount of $65,000.00, the County $29,375.00 and the Government $55,625.00. This makes the estimate cost of the entire work $367,000.00, to be borne $137,000.00 by the State, $93,000.00 by the County and $137,000.0 by the Federal Government. At this time the project was extended to Waldport and now covers the entire section from Waldport to the Benton County Line, a distance of 28.7 miles.

[LINCOLN]

During the past two years the construction of the Tide Water Hill Section has been completed and contract for the grading of 6.5 miles has been awarded to the Grant Smith Company. This company was also awarded contract for the construction of the Alsea and Scotch Creek Bridges. The estimated cost of these bridges and the grading and surfacing contract awarded is $164,00.00. Total expenditures to date on the entire project amount to $191,381.05. This amount has been paid $78,889.39 by the State, $20,173.48 by the County and $92,318.18 by the Federal Government.

Neskowin-Devils Lake Forest Road Project

The grading and surfacing of 17 miles of the Coast Highway between Neskowin and Devils Lake in Tillamook and Lincoln Counties is being undertaken by the Bureau of Public Roads in a cooperation with the State and Lincoln County under a Forest Road Project Agreement.

The section is being constructed on the basis of the location survey previously made by the State and a contract for the grading of the entire section and the surfacing from the Tilamook County Line to Devils Lake has been awarded to the Warren Construction Company by the Bureau of Public Roads. The project agreement calls for an expenditure of $320,000.00, if which amount Lincoln County puts up $120,000.00 and the State and Federal Government $100,000.00 each. Report from the Bureau of Public Roads gives total expenditures to date of $22,780.93. This has been paid entirely by the Bureau. The State, however, has advanced $25,000.00 for construction purposes, which is on deposit with the Government.

Maintenance

Maintenance work in Lincoln County for the biennium has been comparatively light, owing to the few sections which have been completed and taken over for maintenance. Construction operations have been under way for practically the entire distance from the Benton County Line to Newport, and most of the maintenance work done has been on the roadbed, right-of-way and on drainage. The surfacing has been in the hands of the contractors on their respective units and no maintenance work has been required by the State.

Trestle Bridges on Corvallis-Newport Highway

The construction of 13 small trestles on the Corvallis-Newport Highway through Lincoln County was awarded in one contract, No. 505, to A. Giebisch on March 23, 1922. The total cost of this work will be about $13,500.00, of which $8,500.00 will be paid from State funds and $5,000.00 from County funds.

Work started on June 1, 1922, and has proceeded with a small crew up to the present date, the present total expenditure being $6,064.88, of which $2,074.49 has been paid by the County and $3,990.39 by the State.

A. A. Amort is Resident Engineer on the work east of Chitwood and T. A. Rice is Resident Engineer on the work west of that point.

Eddyville Bridge

Contract No. 582 was awarded to the Union Bridge Company on August 29, 1922, for the construction of a bridge over Yaquina River at Eddyville. This bridge consists of an 80-foot steel span with 76 feet of pile trestle approach.

Work was started on September 12, 1922, and, at the date of this report, the piers are complete. Owing to the nondelivery of steel, no further work is being done, but it is expected that the entire structure will be complete by early spring. A. A. Amort is Resident Engineer.

Expenditures to date amount to $4,919.76, of which the State has paid $3,111.78 and the County $1,807.98. The final cost will be about $12,500.00, of which $8,000.00 will be paid from State funds and the remainder by the County.

Construction Engineering on County Bridges

At the request of the Lincoln County Court, the State Highway Department prepared designs for four crossings of the Siletz River, to replace bridges washed out during the storm of November, 1921. Each of these designs consist of a 190-foot wood truss on concrete piers and having wood trestle approaches.

On May 8, 1922, bids were opened at Toledo for the construction of the bridge at the Siletz Postoffice. Bids were received both on the Highway Department design and on a steel design submitted by one of the contractors. The lowest bid received was from Monson-Trierweiler Company, Inc., on the steel design, and the contract, No. 545, was awarded to them for that type of structure.

On June 28, 1922, bids were received by the Commission, in behalf of the County, for the construction of the other three bridges. As before, the low bid was from Monson-Trierweiler Company, Inc., who were awarded the contract. This contract bears No. 567.

Otis-Siletz River Survey

In preparation for the expenditure of funds available from the bond issue of Lincoln County for construction on the Roosevelt Coast Highway in the northern part of the County, a survey of the section from the Salmon River, at Otis, to the Siletz River was undertaken in January, 1922.

Beginning at the south end of a previous survey which had been run from Neskowin to a point one-quarter mile south of Otis, a complete location was made to the Siletz River. The location crosses the Salmon River just below the present bridge at Otis, and follows westerly along the left bank of the Salmon River for one and one-half miles; thence southerly, passing to the west of Devils Lake, to the crossing of its outlet at the present bridge; thence generally along the route of the present road to Taft. Schooner and Drift Creeks are crossed at their mouths, and the west shore of Siletz Bay is followed to a crossing of the Siletz River about three-quarters of one mile below the present Kernville ferry crossing. In connection with this survey, there was also made a preliminary reconnaissance of the section from Siletz River along the coast to Newport, and of the section from Neskowin to Otis.

These surveys and investigations were made by W. P. Smith, Locating Engineer.

Siletz River-Lane County Line Reconnaissance

A reconnaissance of this section was made in order to secure data on the gap between the locations ending at the Siletz River, near Taft, and at China Creek. The line investigated follows the coast line as closely as the topography will permit, running through Yachats, Waldport, Newport and Otter Rock. Some of the most rugged scenery on the

Oregon coast is found on this section, and full advantage is taken of the scenic values, the ocean being in sight of the line for practically the entire distance. Cape Perpetual, south of Yachats, and Otter Crest, north of Newport, are headlands which extend out into the ocean, and will become noted as scenic points. The completed road will open up a great agricultural and dairy section and will be of inestimable value to the district.

During the recent war, railroads were constructed by the Government for the purpose of getting out spruce timber. These railroads extend from Yachats to Otter and occupy the natural control points, increasing the cost of highway construction considerable and detracting somewhat from the scenic effect of the route. The Alsea, Yaquina and Siletz Bays are all navigable waters and, owing to the great cost of constructing bridges, it is planned to cross these with temporary ferries.

Considerable rise and fall will be necessary in the constructed line on account of crossing the drainage. Maximum curvature will be necessary in several places on account of crossing creeks, but the alignment in general will be very good.

In addition to a complete reconnaissance of the line, a location survey was made from Otter Crest to Agate Beach, a distance of 7.1 miles. The present road on this section is along the beach and is very dangerous at any time of the year, being especially so during winter.

The reconnaissance and location surveys were made by J. H. Scott, Locating Engineer.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Lincoln County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 23,458.07
2.	State Funds apportioned to County	32,303.68
3.	County levy made to match State Funds	31,380.35
4.	County Market Road Funds collected	32,316.72
5.	Cash paid to County by State	26,810.20
6.	State expenditures, deducted from apportionment	7.50
7.	Cash due County from State in December, 1922	5,485.98
8.	County expenditures on Market Roads	59,245.31
9.	Balance in County Treasury November 1, 1922	881.61

From the above statement it is apparent that Lincoln County received from the State Market Road Fund $8,845.61 more than it paid into the fund. The excess is Lincoln's County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $31,380.35. They have collected and credited to the Market Road Fund $32,316.72.

The County Court has designated five roads to be improved as Market Road projects. Work has been done on three projects.

The engineering work has been done by A. L. Porter, County Engineer. Construction work has been done by contract and County forces, under the direction of the County Court. They have graded 10.6 miles of road, surfaced 8.0 miles and constructed a bridge across the Siletz River.

A report of Market Road Fund collections was requested from the County Treasurer November 4, but was not received. Therefore the figures in the above table are not official.

LINN COUNTY

State and County activities for the biennium have been concentrated on the completion of the Pacific Highway through the County, and, as fast as the roadbed has been completed and properly settled, contracts have been awarded for paving. At this date, the Pacific Highway is either paved or under contract for pavement between the County Line, at Jefferson, and Harrisburg, with the exception of two gaps totalling 2.58 miles. The first gap consists of 0.62 mile at the Murder Creek undercrossing, and the award of a contract for paving this section is contemplated in the near future. The second gap is located between Tangent and Shedd and is 1.96 miles in length. The early award of a contract for paving this section is also contemplated. In addition to these sections not contracted, there are three miles between Alford and Harrisburg which are under contract, but are not yet paved. There also remains to be completed the construction of a bridge over the Calapooia River, this being the only one required to complete the construction of the bridges on the Pacific Highway through the County. All of the grading south of Albany has been paid for by Linn County, and the paving and surfacing work has been paid for by the State.

The construction of the Murder Creek undercrossing with the required grading and surfacing of the connections has eliminated a very dangerous railroad grade crossing. This work has been done on a cooperative basis between the State, County and Southern Pacific Railroad Company.

All State construction and maintenance has been handled under the supervision of J. C. McLeod, Division Engineer.

Halsey-Harrisburg Paving

Contract No. 535 was awarded to the Scandia Shipbuilding Company for paving the Halsey-Harrisburg Section on May 9, 1922. The contract covered the construction of 7.94 miles of 7-inch concrete pavement, 16 feet wide, and 0.34 mile of gravel surfacing, and extended from the south end of the Shedd-Halsey project to a point inside the city limits of Harrisburg. The pavement proper ends at the city limits, and the gravel surfacing to be constructed is within the town of Harrisburg. The contract covered the section which was graded by Linn County during previous years and which parallels the Southern Pacific Railroad throughout the entire distance. On this route, the grade crossing of the railroad at Alford is eliminated for Pacific Highway traffic, and a grade crossing of the Oregon Electric tracks, just inside the city limits of Harrisburg, is substituted.

The contractors established a set-up at Harrisburg to secure gravel for the pavement aggregate. This source did not furnish sand in sufficient quantities, however, and it was necessary to ship sand in from Eugene and Portland. Shipments were retarded greatly on account of car shortages, which tended to delay the work. When paving operations shut down for the present winter, 5.5 miles of pavement had been completed to Alford crossing, and a connection was made with the graveled County road to Harrisburg. Work on the gravel shoulders for the pavement will continue to completion on this paved section during the winter months, and the balance of the contract should be completed early in 1923.

The project is estimated to cost a total of $205,000.00, of which amount the State will pay $204,614.68, and the City of Harrisburg will cooperate to the extent of $385.32. Expenditures to date amount to $85,654.16 from State funds.

[LINN]

G. E. Farnsworth, Resident Engineer, was in charge of the work until his resignation on October 15, being succeeded on that date by Resident Engineer M. S. Jones.

Albany-Jefferson Grading and Paving

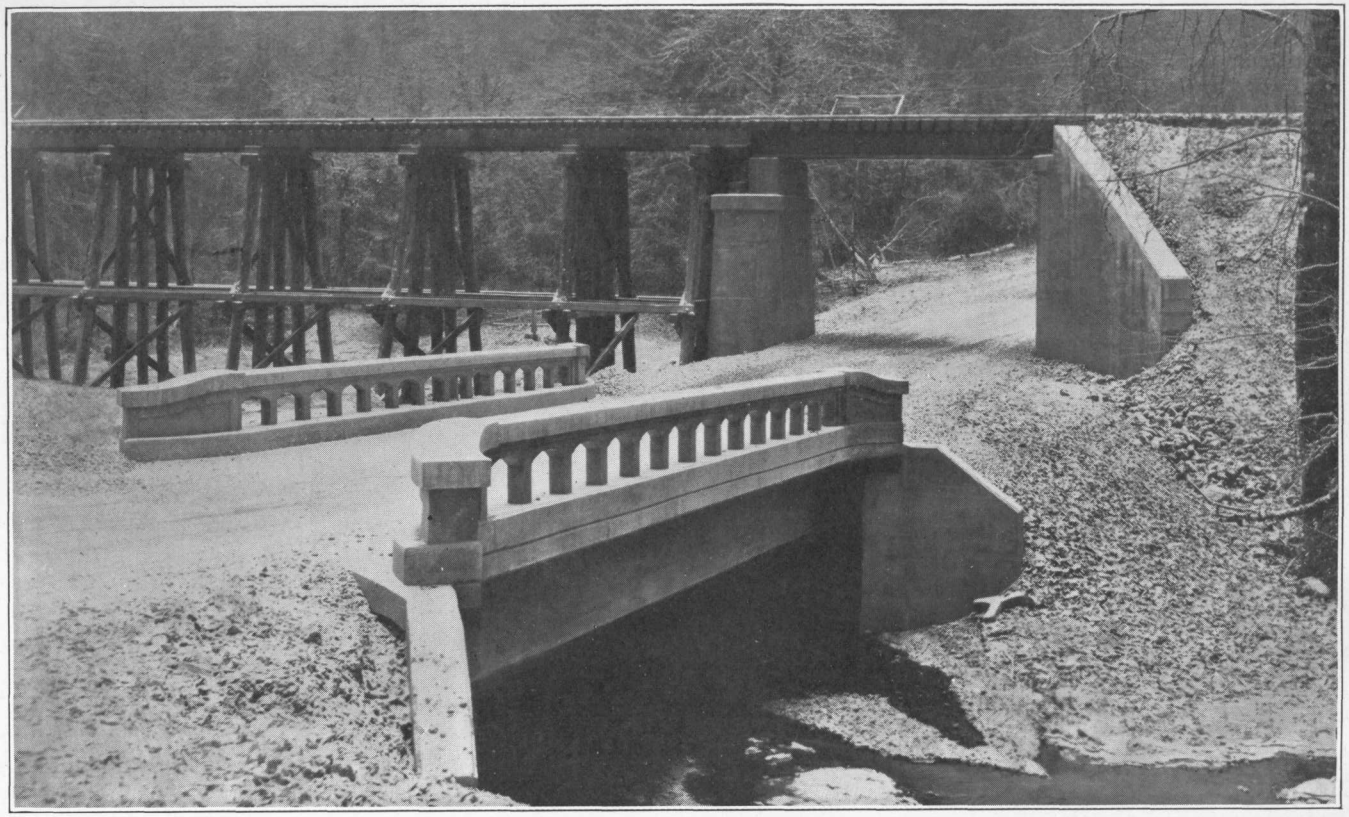
This project was undertaken during the last biennium, and a full description thereof is given on page 308 of the last report. Work was completed during the present biennium with additional expenditures of $32,575.53. These expenditures were made $24,506.64 by the State and $8,068.89 by the County. The total cost of the work has amounted to $207,296.72 and, of this amount, the State has paid $184,481.93 and the County has cooperated to the extent of $22,814.79.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 13,056.33
Macadamizing by State forces to maintain winter travel		4,470.42
Advertisement for bids		17.35
Rental of industrial track, owned by State (deducted from contractor's estimate)		323.91
Contract items as follows:		
Clearing and grubbing, all	$ 75.00	
Excavation, no classification, 33,067.9 cu. yds. at 60c	19,840.74	
Overhaul, 24,740.0 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, 9,782.0 lbs. at 10c	978.20	
12-inch plain concrete pipe, 471.0 lin. ft. at $1.25	588.75	
18-inch reinforced concrete pipe, 64.0 lin. ft. at $2.50	160.00	
Run-of-bank gravel for base, 9,024.5 cu. yds. at $2.00	18,049.00	
Broken stone, 254.0 cu. yds. at $3.50	889.00	
Shoulder construction, 68.882.0 lin. ft. at 4c	2,755.28	
Standard bituminous pavement, 2-inch top, 3-inch base, 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 Sta. 300+00	61.88	
Macadamizing to maintain travel through winter	9,722.58	
Placing earth filler in gravel subbase	188.96	
Furnishing and placing drain tile and crushed gravel backfill	3,521.43	
Total amount earned by contractor	$189,752.62	
Deduction for rental of industrial track, owned by State	323.91	
Total amount paid to contractor		189,428.71
Grand total cost of project		$207,296.72
Paid by State	$184,481.93	
Paid by County	22,814.79	
Total	$207,296.72	

Albany-Tangent Paving

This section extends from the south city limits of Albany to a point 1.25 miles south of Tangent, opposite the grade crossing of the Southern Pacific railroad, known as Drivers Crossing. The project has a total length of 7.4 miles and has been paved under Contract No. 530, awarded to the V. R. Dennis Construction Company of McMinnville on April 15, 1922. The work done under the contract consisted of the construction of a 5-inch bituminous pavement laid on the existing surfacing, additional base stone being added where required. The pavement was laid to a width of 16 feet with 2-foot crushed gravel shoulders on each side.



MURDER CREEK BRIDGE AND RAILROAD UNDERCROSSING; LOCATED ON THE PACIFIC HIGHWAY NORTH OF ALBANY

Crushed rock was used as a mineral aggregate in the 2-inch bituminous wearing surface. There was included in the contract the construction of 459 lineal feet of pavement at the grade crossings of the Oregon Electric and Southern Pacific railroads north of the Albany city limits. The pavement was laid to a point one foot outside of the rails, and the Railroad Companies, at their own expense, constructed standard plank crossings conforming with the pavement grades.

Work was started June 20, 1922, and completed October 11, under the supervision of W. K. Wright, Resident Engineer. The final estimated cost amounts to $152,112.89, and is to be paid entirely from State funds. The expenditures to date amount to $139,263.22.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,622.64
Rental of State-owned equipment (to be deducted from contractor's estimate)		3,481.60
Contract items as follows:		
Preparation of subgrade, 95,174.0 sq. yds. at 3½c	$ 3,331.09	
Standard bituminous pavement, 2-inch top, 3-inch base, 69,516.0 sq. yds. at $1.89	131,385.24	
Crushed gravel for subbase, 378.0 cu. yds. at $2.10	793.80	
Crushed gravel for shoulders, 2,839.0 cu. yds. at $2.10	5,961.90	
Shoulder construction, 31,680.0 lin. ft. at 2c	633.60	
Force account items:		
Cleaning ditches, placing filler in shoulder gravel and cleaning up right-of-way	3,845.48	
Installing permanent headers at railroad crossings	240.07	
Total amount earned by contractor	$146,191.18	
Deductions:		
Rental of State-owned equipment	1,536.09	
Percentage retained until completion of contract	11,496.11	
Total amount paid to contractor		133,158.98
Grand total expended (all State funds)		$139,263.22

Shedd-Halsey Paving

Paving Contract No. 427 for paving the Shedd-Halsey Section, 7.82 miles in length, was awarded to A. D. Kern of Portland, Oregon, on July 28, 1921. This section covered the grading which had just been completed by the County.

The contract awarded called for the construction of a 5-inch bituminous pavement on a 6-inch compacted macadam subbase, the base to be constructed 18 feet in width. It was further stipulated that only the subbase should be constructed during 1921, and that the construction of the pavement should hold over until the 1922 season. Under this stipulation, work was started on August 27, 1921, and the subbase was completed before the beginning of the winter rainy season. Paving was started during May of 1922, and the entire job is completed and ready for final acceptance at the present time. The pavement laid consisted of a 2-inch bituminous wearing surface on a 3-inch bituminous base, being laid to a width of 16 feet with 2-foot macadam shoulders on each side. Rock for the pavement aggregate and for the macadam base and shoulders was secured from the Saddle Butte quarry at Shedd.

W. K. Wright, Resident Engineer, was in charge of the rocking operations during 1921 and H. E. Abry, Resident Engineer, has been in charge of the paving during the present year.

When all final bills are paid, the work is estimated to cost a total of $245,500.00. Of this amount, the State share is estimated at $243,094.23, and the City of Halsey will cooperate to the extent of $2,405.77 for work within the city limits. Expenditures to date amount to $221,228.22 from State funds.

[LINN]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,679.83
Rental of State-owned equipment (to be deducted from contractor's estimate)		1,229.34
Contract items as follows:		
Preparation of subgrade, 100,300.0 sq. yds. at 5c	$ 5,015.00	
Standard bituminous pavement, 2-inch top, 3-inch base, 73,515.3 sq. yds. at $2.25	165,409.43	
Broken stone for subbase, 20,999.5 cu. yds. at $2.50	52,498.75	
Broken stone for shoulders, 2,829.0 cu. yds. at $2.50	7,072.50	
Shoulder construction, 8,200.0 lin. ft. at 3c	246.00	
Force account items:		
Cleaning ditches and shaping up roadway outside of shoulders	3,549.66	
Total amount earned by contractor	$233,791.34	
Deductions:		
Rental of State-owned equipment	692.46	
Percentage retained until completion of contract	17,784.83	
Total amount paid to contractor		215,314.05
Grand total expended (all State funds)		$221,223.22

Murder Creek Grade Separation

Following a hearing held by the Public Service Commission in the County Courthouse at Albany, an order was handed down by that body apportioning the cost of a grade separation at Murder Creek between the State, County and Southern Pacific Railroad. The limits of participation were fixed at stations 273+70 and 275+90, which limits included the structure required for the undercrossing, a 40-foot span highway bridge over Murder Creek and the necessary grading and channel change work.

On October 25, 1921, Contract No. 469 was awarded to L. O. Herrold of Salem for grading and surfacing 0.6 mile between connections with the existing paved highway, the above described section being included within these limits. There was also included in the contract the bridge referred to above, the Railroad Company taking care of their own structure. Due to extremely inclement weather, no work was done during 1921. Operations were started April 5, 1922, and final acceptance was given to the contract on October 4, 1922. Construction was handled under the supervision of W. K. Wright, Resident Engineer.

The opening of this unit eliminated a very dangerous grade crossing and rendered unnecessary the use of the old County bridge over Murder Creek, which has served its day and was not entirely safe for the volume and weight of present-day traffic.

The final cost is estimated at $22,219.36, towards which the State will pay $6,219.36, the County $7,000.00 and the Railroad Company $9,000.00. Expenditures to date amount to $12,219.36 from State funds.

Cascadia-Sheas Hill Forest Road Project

Using the State location survey as a basis, the Bureau of Public Roads has awarded a contract to the Hill Construction Company for the grading and surfacing of 3.8 miles of the Santiam Highway between Foster and Cascadia, the unit being what is locally known as Sheas Hill. This work is being handled as a Forest Road Project in cooperation with Linn County, each party putting up $42,500.00 of a total estimated cost of $85,000.00.

Report from the Federal Government gives a total of 1.14 miles graded, with expenditures of $10,958.72 from Government funds.

[LINN]

Albany-Tangent Surfacing

A description of this work may be noted on page 308 of the last report. During the present biennium, the work has been completed with additional expenditures of $19,669.24. This brings the total cost to $34,415.17 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,618.90
Completion of project by State forces between stations 205 and 301		4,809.07
Contract items as follows:		
Crushed gravel surfacing, 8,080.0 cu. yds. at $3.34	$ 26,987.20	
Total amount paid to contractor		26,987.20
Grand total cost of project (all State funds)		$ 34,415.17

Lake and Oak Creek Bridges

The Pacific Highway crosses Lake Creek and Oak Creek near Tangent, and structures have been built over these streams. The bridge over Lake Creek is a concrete structure having two 35-foot spans, and that over Oak Creek has two 40-foot spans, also of concrete.

Contract for the construction of these bridges was awarded to Toblin & Pierce on April 14, 1922. Work was started on May 15, and was brought to completion on October 15.

Construction was supervised by A. G. Skelton, Resident Engineer, and has required expenditures to date of $11,049.88 from State funds. The total final cost is estimated at $14,500.00, of which the State will pay $1,000.00 for engineering supervision, and the County will pay $13,500.00 for the construction.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 792.13
Name plates for bridges furnished by State		28.00
Contract items as follows:		
Excavation to plan elevation, 300.0 cu. yds. at $1.50	$ 450.00	
Excavation below elevation shown on plans, 55.0 cu. yds. at $1.00	55.00	
Class "A" concrete, 300.0 cu. yds. at $18.00	5,400.00	
Metal reinforcement, 50,000.0 lbs. at 7c	3,500:00	
Concrete handrail, 320.0 lin. ft. at $5.00	1,600.00	
Backfill at bridge ends, 75.0 cu. yds. at 40c	30.00	
Removal of old bridges, all	1,000.00	
Total amount earned by contractor	$ 12,035.00	
Percentage retained until completion of contract	1,805.25	
Total amount paid to contractor		10,229.75
Grand total expended (all State funds)		$ 11,049.88

Maintenance

Projects on State highways in Linn County have been taken over for maintenance by the State as soon as the contracts were completed and accepted. At this time, State maintenance is in effect on the Pacific Highway from Jefferson to Albany, from Albany to Drivers Crossing and from two miles north of Shedd to Halsey. The Halsey-Harrisburg section is under contract for paving and is being taken care of by the contractor on the work. W. K. Wright, Resident Engineer, with headquarters at Albany, has had local supervision of the maintenance work.

[LINN]

Albany-Lebanon-Foster Improvement District

In February, 1922, a petition was received by the State Highway Commission from resident taxpayers of Linn County, petitioning for the establishment of a road district to be known as the Albany-Lebanon-Foster Highway Improvement District. This procedure was taken in conformance with the provisions of Chapter 399, General Laws of 1921. The petitioning parties desired to form a large district adjacent to the highway between Albany and Cascadia, via Lebanon, Sweet Home and Foster, and including all the City of Albany. As prescribed by law, a hearing was held by the Commission at Albany, at 2:00 P. M. February 24, 1922, in order to hear from all interested parties. At this meeting, the limits of the district were agreed upon and approved, but, as yet, no vote of the people or further action has been taken on the matter.

Tangent-Harrisburg Construction Engineering

All grading, including bridges, from Drivers Crossing, south of Tangent, to the north city limits of Harrisburg has been done by Linn County forces. The total length of this section is 17.91 miles, of which approximately 17 miles were graded during 1921, and the balance in 1922. The work was done under the supervision of the State Highway Department, and to Department standards. Construction was supervised by W. K. Wright, Resident Engineer. There now remains required only the completion of a bridge over the Calapooia River, and this is being built by the County.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Linn County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 94,414.11
2.	State Funds apportioned to County	131,846.76
3.	County levy made to match State Funds	125,063.17
4.	County Market Road Funds collected	112,700.58
5.	Cash paid to County by State	109,931.78
6.	State expenditures, deducted from apportionment	0.00
7.	Cash due County from State in December, 1922	21,914.98
8.	County expenditures on Market Roads	204,348.26
9.	Balance in County Treasury November 1, 1922	18,284.10

From the above statement it is apparent that Linn County received from the State Market Road Fund $37,432.65 more than it paid into the fund. The excess is Linn County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $125,063.17. They have collected and credited to the Market Road Fund only $112,700.58.

The County Court has designated 18 roads to be improved as Market Road projects.

The engineering work has been done by J. R. Penland, County Roadmaster. Plans have been submitted and approved.

The construction work has been done by County forces under the direction of the County Court and Roadmaster. They have graded 41.5 miles of road and surfaced 40.5 miles.

MALHEUR COUNTY

Malheur County marks the eastern gateway to the great State of Oregon. Three main highways, the Old Oregon Trail, the John Day River Highway and the Central Oregon Highway converge near the northeast corner of the County.

The Old Oregon Trail is now completed and consequently the major portion of the traffic will be directed over this artery. However, the completion of the John Day River Highway between Cow Valley and Austin and between Vale and Cairo, will afford a continuous stretch of improved road through the central portion of the State. The Central Oregon Highway is a short cut from northwest states to California. Very little of this road has been improved as yet in Malheur County.

The major portion of highway construction in Malheur County was accomplished in the 1921-1922 biennium. The Old Oregon Trail from Ontario to the Baker County Line, 29.86 miles in length, was graded and surfaced. The Vale-Burrelle Section of the Central Oregon Highway, 6.47 miles in length, was graded and macadamized. On the John Day River Highway 6.3 miles were graded and 24.0 miles were surfaced.

The Market Road activity in this county was confined exclusively to construction of the Jordan Valley Market Road, including one section near Adrain, and the remainder on the Sucker Creek Hill in the Southern portion of the County.

Highway construction in Malheur County during the period of this report was under the supervision of R. H. Baldock, Division Engineer.

Ontario-Snake River Post Road Project

Description of this project will be noted on page 315 of the last report. During the present year, the section has been carried to completion and represents a total cost of $30,857.09. This amount has been paid $16,526.35 by the State and $14,330.74 by the Federal Government.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,298.72
8-inch concrete pipe furnished by State, installed under force account		358.37
Contract items as follows:		
Common excavation, 2,203.7 cu. yds. at 68c	$ 1,498.52	
12-inch plain concrete pipe, 495.0 lin. ft. at $1.10	544.50	
18-inch reinforced concrete pipe, 36.0 lin. ft. at $2.60	93.60	
Standard 7-inch concrete pavement, 8,393.0 sq. yds. at $2.65	22,241.45	
Class "C" concrete, 2.3 cu. yds. at $30.00	69.00	
Crushed gravel, 410.5 cu. yds. at $2.70	1,108.35	
Bituminous felt expansion joints, 2,530.0 lin. ft at 7c	177.10	
Shoulder construction, 9,414.0 lin. ft. at 15c	1,412.10	
Force account items:		
Extra cost of laying pavement in two 8-foot strips necessitated by traffic conditions	396.06	
Refinishing subgrade to give superelevation to curves	80.39	
Reconstructing old 12-inch pipe culvert	60.49	
Laying and backfilling 8-inch concrete drain pipe	189.23	
Constructing standard guard fence at Snake River bridge	210.28	
Clearing and grubbing betwen stations 18+00 and 23+00	46.46	
Constructing approach to detour at station 39+00	36.40	
Constructing shoulder drains	36.07	
Total amount paid to contractor		28,200.00
Grand total cost of project		$ 30,857.09
Paid by State	$ 16,526.35	
Paid by Government	14,330.74	
Total	$ 30,857.09	

[MALHEUR]

Baker County Line-Weiser Post Road Project

Upon completion of the grading of the section of the Old Oregon Trail between the Baker County Line and a point south of Weiser, March & Bowers of Spokane, Washington, began surfacing the 15.54 miles involved under the terms of Contract No. 499. Construction was handled under the supervision of P. S. Greenwood, Resident Engineer, and is practically completed at the present time.

The first ten miles, starting at the Baker County Line, were constructed from limestone talus slides, which made a very excellent macadam. For the last five miles, through the Snake River Slides, crushed gravel was used. It was difficult to find road metal in this section and the only source of supply available was a gravel pit on top of a hill approximately five hundred feet above the level of the Snake River. There has been considerable difficulty in getting the gravel section to set up properly but it is anticipated that the winter rains will materially assist this operation.

Payment for the work will be handled upon a cooperative basis by the State and the Federal Government under the terms of Post Road Project Agreement No. 67. The work is estimated to cost a total of $72,000.00, to be divided $28,152.74 to the State and $43,847.26 to the Federal Government. Expenditures to date amount to $34,570.96 by the State and $23,224.83 by the Federal Government.

Brogan-Jamieson Surfacing

The surfacing of the John Day River Highway between Jamieson and Brogan, 6.3 miles, was awarded to J. K. Shotwell of Hermiston, Oregon, on February 2, 1922, under the terms of Contract No. 490. Construction was started on May 10 and completed on July 4 of the same year.

The completed surfacing represents a total expenditure of $14,641.58, paid $7,809.99 from State funds and $6,831.59 from County funds. The work was supervised by F. S. Davis, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 978.39
Contract items as follows:		
Crushed gravel surfacing, 6,852.0 cu. yds. at $1.70	$ 11,648.40	
Run-of-bank gravel, 285.0 cu. yds. at $1.05	299.25	
Maintenance materials (placed in piles), 559.0 cu. yds. at $1.70	950.30	
Filler, 1,882.0 cu. yds. at 20c	376.40	
Payhaul on filler, 156.0 yd. mi. at 40c	62.40	
Force account items:		
Raising grade through swamp and surfacing with run-of-bank gravel	326.44	
Total amount paid to contractor		13,663.19
Grand total cost of project		$ 14,641.58
Paid by State	$ 7,809.99	
Paid by County	6,831.59	
Total	$ 14,641.58	

Ontario-Weiser Grading and Surfacing

The section of the Old Oregon Trail between Ontario and the Snake River Slides is located through what is known as Dead Ox Flat, which is a bench approximately 40 feet above the water level of the Snake River. This flat is divided into small tracts of land irrigated by pumping water from the Snake River and is very fertile. Prior to the construction

of the Old Oregon Trail there were practically no roads through this section.

Contract No. 353, for grading and surfacing the unit, a distance of 14.32 miles, was awarded to W. C. Stone of Portland, Oregon, on April 6, 1921. Work was started immediately and completed on December 10 of the same year, at a total cost of $143,051.87, of which amount the County cooperates to the extent of $75,000.00, with the State paying the balance. At the time of this report, the County has paid $61,369.76 of their share, a balance of $13,630.24 still being due. This amount has been paid by the State in addition to the proper State's share.

Construction was supervised by J. F. Joyce, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8,310.20
Sprinkling macadam by State forces		591.22
Penalty imposed for overrun of time limit (deducted from contractor's estimate)		201.66
Contract items as follows:		
Clearing and grubbing, all	$ 400.00	
Common excavation, 105,191.3 cu. yds. at 33c	34,713.13	
Intermediate excavation, 1,390.3 cu. yds. at $1.00	1,390.30	
Solid rock excavation, 71.9 cu. yds. at $1.50	107.85	
Ovehaul, 8,216.0 sta. yds. at 6c	492.96	
12-inch plain concrete pipe, 2,045.0 lin. ft. at $2.00	4,090.00	
18-inch reinforced concrete pipe, 379.0 lin. ft. at $3.50	1,326.50	
24-inch reinforced concrete pipe, 288.0 lin. ft. at $4.50	1,296.00	
30-inch reinforced concrete pipe, 128.0 lin. ft. at $5.97	764.16	
36-inch reinforced concrete pipe, 72.0 lin. ft. at $6.98	502.56	
Class "A" concrete, 116.93 cu. yds. at $25.00	2,923.25	
Class "C" concrete, 278.43 cu. yds. at $22.00	6,125.46	
Metal reinforcement, 8,704.0 lbs. at 10c	870.40	
Lumber and timber, 6.424 M-FBM at $55.00	353.32	
Crushed gravel surfacing, 31,489.5 cu. yds. at $2.15	67,702.43	
Crushed gravel placed in piles for maintenance, 1,521.5 cu. yds. at $2.15	3,271.23	
12-inch plain concrete pipe for siphons, 745.0 lin. ft. at $2.50	1,862.50	
18-inch reinforced concrete pipe for siphons, 1,109.0 lin. ft. at $3.50	3,881.50	
24-inch reinforced concrete pipe for siphons, 189.0 lin. ft. at $4.50	850.50	
36-inch reinforced concrete pipe for siphons, 44.0 lin. ft. at $7.00	308.00	
Force account items:		
Removal of old wooden stave-pipe culvert	74.78	
Sprinkling subgrade and macadam	283.80	
Cutting back slopes to prevent slides	451.79	
Backfilling north approach to Jacobson Gulch bridge	108.03	
Total amount earned by contractor	$134,150.45	
Deduction for overrun of time limit	201.66	
Total amount paid to contractor		133,948.79
Grand total cost of project		$143,051.87
Paid by State	$ 81,682.11	
Paid by County	61,369.76	
Total	$143,051.87	

Vale-Burrelle Grading and Surfacing

The Central Oregon Highway traversing the high, barren desert between Bend and Burns and extending through the rocky canyon of the Malheur River between Crane and Vale, is in a very preliminary state of development, there being approximately fifty miles built and the highway approximately 50 per cent surveyed in a total length of approximately 280 miles. The present western terminus of construction in Malheur County is at the Burrelle Ranch about seven miles west of Vale.

[MALHEUR]

The grading and surfacing between Vale and the Burrelle Ranch, 7.38 miles, was awarded to Morrison-Knudsen Company of Boise, Idaho, on Augst 30, 1921, under Contract No. 457. Actual construction was begun on September 13, 1921, and the work was completed May 10, 1922.

The location on this section, involving an entirely new route, parallels the right-of-way of the Oregon Short Line Railroad through Malheur River Valley, eliminating two grade crossings and the heavy construction along the sidehill occupied by the old road.

F. S. Davis, Resident Engineer, has supervised the construction of the section, which has entailed total expenditures of $48,896.72. Of this amount, the State has expended $26,238.33 and the County $22,658.39, for their respective cooperative shares.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,579.93
Contract items as follows:		
Clearing and grubbing, all	$ 100.00	
Excavation, single classification, 40,740.0 cu. yds. at 20c	8,148.00	
Overhaul, 5,371.0 sta. yds. at 6c	322.26	
12-inch corrugated galvanized iron pipe, 618.0 lin. ft. at $1.65	1,019.70	
18-inch corrugated galvanized iron pipe, 28.0 lin. ft. at $2.50	70.00	
24-inch corrugated galvanized iron pipe, 84.0 lin. ft. at $3.25	273.00	
30-inch corrugated galvanized iron pipe, 118.0 lin. ft. at $5.00	590.00	
36-inch corrugated galvanized iron pipe, 72.0 lin. ft. at $6.50	468.00	
Class "A" and "B" concrete, 169.81 cu. yds. at $24.00	4,075.44	
Class "C" concrete, 15.95 cu. yds. at $24.00	382.80	
Metal reinforcement, 9,892.0 lbs. at 8c	791.36	
24-inch corrugated galvanized iron syphon, 124.0 lin ft. at $4.00	496.00	
30-inch corrugated galvanized iron syphon, 200.0 lin. ft. at $5.30	1,100.00	
Riprap, 222.0 cu. yds. at $3.00	666.00	
Lumber and timber, 10.306 M-FBM at $80.00	824.48	
Standard wood guard fence, 400.0 lin. ft. at $1.00	400.00	
Crushed gravel surfacing, 12,496.0 cu. yds. at $1.90	23,742.40	
Special top course material, 269.0 cu. yds. at 50c	134.50	
Maintenance materials (placed in piles), 704.0 cu. yds. at $1.90	1,337.60	
Earth filler, 657.0 cu. yds. at 50c	328.50	
Force account items:		
Lowering culvert to conform to grade of irrigation ditch	46.75	
Total amount paid to contractor		45,316.79
Grand total cost of project		$ 48,896.72
Paid by State	$ 26,238.33	
Paid by County	22,658.39	
Total	$ 48,896.72	

Cairo-Nyssa Post Road Project

A complete description of this project will be noted on pages 315 and 316 of the Fourth Biennial Report. No additional expenditures have been made during the present biennium, but the sum of $4,275.98 has been received from the Federal Government as their final cooperative payment. This brings the distribution of costs to $34,401.65 of State funds and $34,375.78 of Federal Government funds, out of the total cost of $68,777.43.

[MALHEUR]

DETAILED STATEMENT OF EXPENDITURES

No change in expenditures since last report other than payment received from Government in amount $4,275.98.

Cooperation now stands:

Paid by State	$ 34,401.65
Paid by Government	34,375.78
Total	$ 68,777.43

Vale-Jamieson Surfacing

A description of this project will be found on page 316 of the Fourth Biennial Report. Construction operations were started on December 13, 1920, and completed July 28, 1921, under the supervision of F. S. Davis, Resident Engineer.

Surfacing was placed to a width of eight feet and the completed work represents a total cost of $65,195.58 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,384.58
Contract items as follows:		
Crushed gravel surfacing, 19,937.0 cu. yds. at $3.00	$ 59,811.00	
Total amount paid to contractor		59,811.00
Grand total cost of project (all State funds)		$ 65,195.58

Baker County Line-Weiser Grading

Along the south bank of the Snake River for a distance of about four miles, which section is approximately opposite Weiser, Idaho, there is a peculiar geological phenomenon, locally known as the Snake River Slides. The constant erosion of the Snake River, especially in times of high water, at the base of the clay bluffs through this section, have at various times caused slides ranging from minor local disturbances of a few hundred yards to major slides involving several million yards. Mute evidence of former disturbances exist throughout this section for a distance of about two miles back from the river bank. However, the section is now more or less stabilized, and there exists danger of movement at only a few local points. The last slide of any consequence took place in the fall of 1921, and the only disturbance prior to this, in the history of the white inhabitants, occurred approximately twenty-five years previous to this date.

The Old Oregon Trail was located through these slides in 1920. The major slide of 1921 simplified the engineering difficulties encountered through this section to a great extent. It is planned to stop further movement by planting willows along the river bank at those points which are attacked by the stream.

Contract No. 470, for grading the 15.54 miles from the Baker County Line to a point south of Weiser, was awarded to the Hauser Construction Company of Portland, Oregon, on October 25, 1921. Work was started immediately and completed on July 13, 1922, under the supervision of Max J. Kuney, Resident Engineer.

When all final bills are paid, the work is estimated to cost a total of $106,950.90, with the County cooperating to the extent of $2.709.38. Expenditures to date amount to $101,838.82, of which the State has paid $99,129.44 and the County $2,709.38.

[MALHEUR]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8,073.29
Name plates for bridges furnished by State (deducted from contractor's estimate)		28.00
Contract items as follows:		
GRADING—		
Clearing and grubbing, all	$ 1,500.00	
Common excavation, 177,856.7 cu. yds. at 15c	26,678.51	
Solid rock excavation, 31,175.6 cu. yds. at 80c	24,940.48	
Overhaul, 59,630.0 sta. yds. at 6c	3,577.80	
12-inch corrugated galvanized iron pipe, 890.0 lin. ft. at $1.32	1,174.80	
18-inch corrugated galvanized iron pipe, 292.0 lin. ft. at $2.00	584.00	
26-inch corrugated galvanized iron pipe, 604.0 lin. ft. at $2.60	1,570.40	
36-inch corrugated galvanized iron pipe, 590.0 lin. ft. at $4.80	2,832.00	
Class "A" concrete for box culverts, 254.37 cu. yds. at $27.50	6,995.18	
Class "C" concrete for headwalls, 104.08 cu. yds. at $25.00	2,602.00	
Metal reinforcement for box culverts, 21,104.0 lbs. at 8c	1,688.32	
Riprap, 3,031.6 cu. yds. at $1.35	4,092.66	
BRIDGES OVER BIRCH CREEK AND BENSON CREEK—		
Class "A" concrete, 253.03 cu. yds. at $30.00	7,590.90	
Metal reinforcement, 26,001.0 lbs. at 8c	2,080.08	
Concrete handrail, 145.6 lin. ft. at $5.00	728.00	
Excavation to plan elevation, 573.4 cu. yds. at $1.00	573.40	
Excavation below elevation shown on plans, 8.3 cu. yds. at $12.00	99.60	
12-inch corrugated galvanized iron siphon, 44.0 lin. ft. at $2.00	88.00	
18-inch corrugated galvanized iron siphon, 64.0 lin. ft. at $3.00	192.00	
Class "A" concrete for siphons, 17.93 cu. yds. at 27.50	493.08	
Force account items:		
Constructing 7 ft. x 6 ft. cattle pass at Sta. 43+62	869.46	
Constructing 10 corrugated galvanized iron siphons	3,568.07	
Extra work on pipe culverts on account of change in plans	113.10	
Materials ordered but not used account of change in plans	456.99	
Preparation of foundations for culverts installed on quaking soil	280.48	
Covering sand fills and cuts with manure to prevent wind erosion	474.49	
Removal of slides and reshaping roadbed	718.64	
Installing special reinforced concrete box pipe at Sta. 802+84	254.94	
Total amount earned by contractor	$ 96,817.38	
Deduction for name plates for bridges furnished by State	28.00	
Total amount paid to contractor		96,789.38
Grand total cost of project		$104,890.67
Less final payment in transit		3,051.85
Total expenditures to November 30, 1922		$101,838.82
Paid by State	$ 99,129.44	
Paid by County	2,709.38	
Total	$101,838.82	

Jamieson-Brogan Grading

Between September 7, 1921, and April 10, 1922, the Morrison-Knudsen Company of Boise, Idaho, graded 6.24 miles of the John Day River Highway between Jamieson and Brogan, under Contract No. 456, which had

been awarded to them August 30, 1921. This section connected up the grading of the highway between the head of Cow Valley and Vale, providing a continuous length of improved road of 35 miles. Immediately upon the completion of the grading, the section was placed under a surfacing contract which has since been completed.

Supervision of the grading work was handled by F. S. Davis, Resident Engineer, and has required total expenditures of $24,853.33. This amount has been paid $13,369.50 by the State and $11,483.83 by Malheur County, covering the respective cooperative shares.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,885.66
Penalty imposed for overrun of time limit (deducted from contractor's estimate)		70.27
Contract items as follows:		
Clearing and grubbing, all	$ 50.00	
Common excavation, 26,696.0 cu. yds. at 24c	6,407.04	
Intermediate excavation, 4,155.0 cu. yds. at 55c	2,285.25	
Solid rock excavation, 2,782.0 cu. yds. at $1.50	4,173.00	
Overhaul, 5,715.0 sta. yds. at 6c	342.90	
12-inch corrugated galvanized iron pipe, 522.0 lin. ft. at $1.65	861.30	
18-inch corrugated galvanized iron pipe, 228.0 lin. ft. at $2.50	570.00	
24-inch corrugated galvanized iron pipe, 300.0 lin. ft. at $3.25	975.00	
30-inch corrugated galvanized iron pipe, 58.0 lin. ft. at $5.00	290.00	
36-inch corrugated galvanized iron pipe, 30.0 lin. ft. at $6.50	195.00	
Class "A" concrete, 30.67 cu. yds. at $24.00	736.08	
Class "B" concrete, 59.68 cu. yds. at $24.00	1,432.32	
Class "C" concrete, 58.73 cu. yds. at $24.00	1,409.52	
12-inch corrugated galvanized iron syphon, 112.0 lin. ft. at $2.00	224.00	
24-inch corrugated galvanized iron syphon, 140.0 lin. ft. at $4.00	560.00	
36-inch corrugated galvanized iron syphon, 24.0 lin. ft. at $7.00	168.00	
Riprap, 54.0 cu. yds. at $3.00	162.00	
Lumber and timber, 18.686 M-FBM at $70.00	1,308.02	
Run-of-bank gravel, 500.0 cu. yds. at $1.50	750.00	
Force account items:		
Reconstructing private water supply line across highway	68.24	
Total amount earned by contractor	$ 22,967.67	
Deduction for overrun of time limit	70.27	
Total amount paid to contractor		22,897.40
Grand total cost of project		$ 24,853.33
Paid by State	$ 13,369.50	
Paid by County	11,483.83	
Total	$ 24,853.33	

Cow Valley-Brogan Post Road Project

A complete description of this work will be noted on page 314 of the last report. During the present biennium, additional expenditures of $595.09 have been made on the Pole and Canyon Creek bridges, bringing the total cost of the project to $113,883.62. In this connection, it should be noted that Table VII of this report shows that this entire expenditure was for construction engineering. This is in error, as $537.15 was paid for construction charges, and only $57.94 was for engineering supervision. This correction brings the total engineering expense on the bridges to $671.67 instead of the $1,208.82 given in the table referred to.

Final cooperative payments in the amount of $15,460.10 have been received from the Federal Government, bringing the total distribution of

[MALHEUR]

cooperative payments on the entire project to $51,391.17 by the Federal Government, $10,000.00 by Malheur County and $52,492.45 by the State.

A detailed statement of the expenditures on the grading is given on page 315 of the last report, and no changes in this have been made during the present biennium. A detailed statement of the expenditures on the bridges is given herewith.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 671.67
Contract items as follows:		
Excavation for foundation, 258.0 cu. yds. at $5.00	$ 1,290.00	
Class "B" concrete, 121.63 cu. yds. at $40.00	4,865.20	
Timber trestle, 129.0 lin. ft. at $25.00	3,225.00	
Special timber trestle, 13.75 lin. ft. at $35.00	481.25	
Howe truss, 75-foot span, 1.0 at $6,800.00	6,800.00	
Grading approaches, 231.0 cu. yds. at 60c	138.60	
Channel excavation, 124.0 cu. yds. at 75c	93.00	
Riprap, 83.0 cu. yds. at $6.00	498.00	
Metal reinforcement, 1,411.0 lbs. at 10c	141.10	
Extra painting with carbolineum	35.00	
Total amount paid to contractor		17,567.15
Grand total cost of structures (all State funds)		$ 18,238.82

Small Bridges on the Ontario-Weiser Section

In addition to the bridge over the Malheur River, three other smaller structures were required on the Ontario-Weiser Section. These were a 38-foot span, a 14-foot span and a 4-foot x 6-foot culvert, all of concrete.

Contract No. 412 covering this work was awarded to the Hauser Construction Company on June 29, 1921. Work was carried on simultaneously with the work on the Malheur River Bridge and was completed on May 5, 1922, at a total cost of $18,218.35, all from State funds.

L. H. Allen was Resident Engineer in charge of the construction.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,139.27
Contract items as follows:		
Class "A" concrete, 451.22 cu. yds. at $27.50	$ 12,408.55	
Metal reinforcement, 34,630.0 lbs. at 5¾c	1,991.23	
Concrete handrail, 86.0 lin. ft. at $4.50	387.00	
Excavation to plan elevation, 737.6 cu. yds. at $1.50	1,106.40	
Excavation below plan elevation, 257.0 cu. yds. at $4.00	1,028.00	
Force account items:		
Bush hammering panels of handrail posts	7.87	
Backfilling approaches at Bridges No. 733 and No. 734	150.03	
Total amount paid to contractor		17,079.08
Grand total cost of structures (all State funds)		$ 18,218.35

Bridge Over Malheur River at Ontario

Contract No. 411 was awarded on June 29, 1921, to the Hauser Construction Company for the construction of a bridge over the Malheur River near Ontario, consisting of six 50-foot concrete girder spans.

The work was started on July 11, 1921, and was completed on May 5, 1922, L. H. Allen being Resident Engineer.

The total cost of the work was $36,642.46, as detailed on the following page, the entire amount being from State funds.

[MALHEUR]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,162.29
Bronze name plates furnished by State		14.50
Contract items as follows:		
Class "A" concrete, 737.8 cu. yds. at $27.50	$ 20,289.50	
Metal reinforcement, 118,092.0 lbs. at 5½c	6,495.06	
Concrete handrail, 609.0 lin. ft. at $4.50	2,740.50	
Excavation to plan elevation, 775.5 cu. yds. at $4.50	3,489.75	
Excavation below plan elevation, 126.2 cu. yds. at $9.00	1,135.80	
Force account items:		
Bush hammering of handrail posts	26.07	
Backfilling bridge approaches	288.99	
Total amount paid to contractor		34,465.67
Grand total cost of structure (all State funds)		$ 36,642.46

Vale Bridge

This work is covered in the last report and need not be detailed here. Work continued during this biennium, with L. H. Allen as Resident Engineer, until completion on July 9, 1921.

The total cost of the work was $42,980.31, of which $41,609.78 was expended during this biennium. Of this sum, the State paid $23,346.10 and the County $19,634.21.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,711.88
Brass name plates furnished by State		14.50
Contract items as follows:		
Excavation, 390.0 cu. yds. at $10.00	$ 3,900.00	
Class "A" concrete, 32.1 cu. yds. at $25.00	802.50	
Class "B" concrete, 191.0 cu. yds. at $24.00	4,584.00	
Metal reinforcement, 4,412.0 lbs. at 11c	485.32	
Wood piling in place, 846.0 lin. ft. at $1.66⅔	1,410.00	
Lumber and timber, 30.0 M-FBM at $66.00	1,980.00	
Approach trestle, 171.0 lin. ft. at $15.50	2,650.50	
Structural steel, 211,155.0 lbs. at 11c	23,227.05	
Force account items:		
Lowering forms for foundations	27.94	
Removing mineral water from around setting concrete	186.62	
Total amount paid to contractor		39,253.93
Grand total cost of structure		$ 42,980.31
Paid by State	$ 23,346.10	
Paid by County	19,634.21	
Total	$ 42,980.31	

Bully Creek Bridge

The bridge mentioned in the last report as having been designed for Bully Creek was put under Contract No. 450 for construction by the United States Bridge Company of Boise.

Work was started on October 20, 1921, and was finished by March 2, 1922, at a total cost of $14,644.82, being paid $7,844.27 from State funds and $6,800.55 from County funds.

L. H. Allen was Resident Engineer in charge of the work.

[MALHEUR]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,043.72
Brass name plates furnished by State		14.50
Contract items as follows:		
Class "A" concrete, 55.0 cu. yds. at $35.00	$ 1,925.00	
Class "B" concrete, 59.8 cu. yds. at $31.00	1,853.80	
Metal reinforcement, 5,085.0 lbs. at 6c	305.10	
Structural steel, 75,150.0 lbs. at 9c	6,763.50	
Wood piling, driven, 176.0 lin. ft. at 75c	132.00	
Lumber, 14.486 M-FBM at $60.00	869.16	
Trestle superstructure, lump sum	950.00	
Excavation to plan elevation, 422.4 cu. yds. at $1.00	422.40	
Excavation below plan elevation, 24.8 cu. yds. at $5.00	124.00	
Force account items:		
Constructing timber wing walls and installing vertical grained blocking in timber approach spans	241.64	
Total amount paid to contractor		13,586.60
Grand total cost of structure		$ 14,644.82
Paid by State	$ 7,844.27	
Paid by County	6,800.55	
Total	$ 14,644.82	

Maintenance

At the close of 1922 there were 79.79 miles of State highways in Malheur County. Of this mileage 30.8 miles were on the Old Oregon Trail, 32.94 on the John Day Highway, and 6.47 on the Central Oregon Highway.

That section between the Baker County Line and a point opposite Weiser, on the Old Oregon Trail, a distance of 15.5 miles of macadam road, was placed under patrol maintenance the latter part of October, 1922, N. D. Johnson being the patrolman in charge.

The section from this point to Ontario, 14.0 miles of macadam, one mile of concrete pavement between Ontario and the Snake River bridge, on the Old Oregon Trail, and nine miles of macadam between Cairo and Nyssa, on the John Day Highway, were under Patrolman Aubrey Dean. The section of macadam between Cairo and Nyssa, and the one mile of concrete pavement between Ontario and the Snake River bridge were under patrol maintenance in 1921, and the section between Ontario and Weiser was placed under patrol maintenance in 1922.

Maintenance on the John Day Highway between Jamieson and Cow Valley, a distance of approximately 34.0 miles, approximately 9.6 miles of which is earth road, the remainder macadam, was handled by Paul Grondona, patrolman. Mr. Grondona also handled the maintenance on the section between Vale and the Burrelle Ranch, 6.47 miles of macadam. Traffic on these sections is very light and one patrolman can easily handle a long distance.

The maintenance in Malheur County was under the supervision of the La Grande Division Office.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

[MALHEUR]

Since the Market Road Law went into effect, Malheur County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 49,907.44
2.	State Funds apportioned to County	69,090.21
3.	County levy made to match State Funds	62,539.09
4.	County Market Road Funds collected	51,091.09
5.	Cash paid to County by State	51,277.10
6.	State expenditures, deducted from apportionment	6,976.39
7.	Cash due County from State in December, 1922	10,836.72
8.	County expenditures on Market Roads	105,066.63
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Malheur County received from the State Market Road Fund $10,182.77 more than it paid into the fund. The excess is Malheur County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $62,539.09. Of this amount they have collected and credited to the Market Road Fund only $51,091.09.

The County Court has designated the Nyssa-Jordan Valley Road for improvement as a Market Road project. Work has been done on three sections of this road.

Surveys have been made by employes of the State Highway Commission and plans submitted and approved.

The construction work has been done by contract and County forces, under the direction of the County Court and Roadmaster. They have graded and surfaced approximately 20 miles of road.

MARION COUNTY

During the past two years, all gaps in the pavement of the Pacific Highway through Marion County have been closed up, with the exception of a few hundred feet at Pudding River at the north boundary of the County. At this point, a relief opening is being constructed and it is hoped that arrangements may soon be made for the construction of a new bridge across Pudding River in order that this section may be completed.

The completion during 1919-1920 of the Federal Aid Post Road projects between Salem and Aurora gave a continuous paved road from the south end of the gap at Pudding River to a point just north of the north city limits of Salem. During the biennium, the gap north of Salem has been closed up and a connection made with the paved city streets.

During the 1921 season, a betterment project was accomplished in cooperation with Marion County, each party contributing 50 per cent of the cost. This project consisted of the widening and resurfacing of 0.9 mile of bituminous pavement, extending north from a point about 200 feet north of the north city limits. The old pavement on this section was a 14-foot bituminous concrete pavement, two and one-half inches in thickness, and was constructed by Marion County during 1915 on the previously existing gravel surfacing. This old pavement was widened to 16 feet by the addition of a bituminous base, and a two-inch bituminous concrete wearing surface was then laid over the entire width.

South of Salem, the surfaced section between the south city limits of Salem and the north end of the bituminous pavement constructed north from Jefferson during 1919 and 1920 has been paved and thrown open to traffic. This section was paved 16 feet wide, by means of an average seven-inch cement concrete pavement.

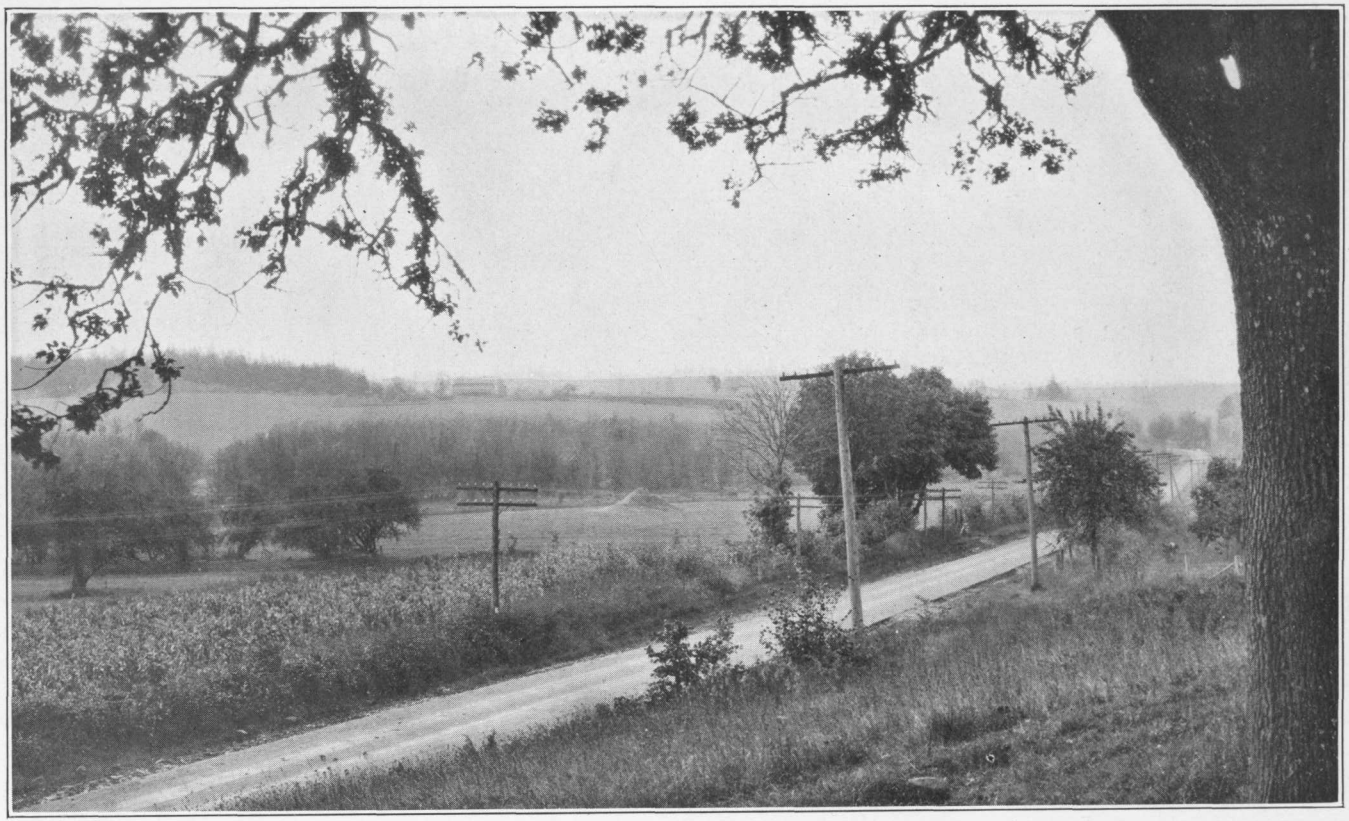
All State work in the County north of Salem was supervised by W. D. Clarke, Division Engineer. The section south of Salem was under the supervision of J. C. McLeod, Division Engineer.

Salem North Paving

In connection with the paving being done by the City of Salem, on the section from the north city limits south to the Silverton road, approximately 0.3 mile, the gap between the city limits and the south end of the existing State highway pavement was graded and paved by the State. The actual construction was done by Marion County, whose organization also did the city work on a force account basis. The grading was started August 22, 1922. and the paving completed on September 23, the total length comprising 0.04 mile. This work was handled under the supervision of L. F. Hueperman, Resident Engineer, for the State, and the cost thereof has been charged under a betterment order.

Salem South Paving

J. E. Bonnell of Tacoma, Washington, was the successful bidder on the Salem South Section, and Contract No. 333 for the construction of 8.57 miles of 7-inch cement concrete pavement was awarded to him on March 8, 1921. Work was started on May 9, 1921, and the job was completed on October 29 of the same year. Some inconvenience by the traveling public was experienced on account of detours required around the pavement construction, but the entire project was thrown open before the first fall rains had rendered the detours very bad. The pavement was



BETWEEN SALEM AND JEFFERSON; ON THE PACIFIC HIGHWAY IN MARION COUNTY

constructed 16 feet in width, with extra width on curves, and 2-foot gravel shoulders on each side were constructed throughout.

This section traverses a prosperous orchard and agricultural section, and will carry a very heavy local traffic in addition to the normal through traffic on the Pacifc Highway.

Construction was supervised by J. H. Neef, Resident Engineer, and required total expenditures of $284,269.79 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,700.78
Reimbursement gravel company for advancing royalty on sand and gravel		2,466.75
Furnishing water pipe and repairing pump by State (deducted from contractor's estimate)		394.08
Contract items as follows:		
Preparation of subgrade, 120,703.8 sq. yds. at 6c	$ 7,242.23	
Excavation, single classification, 335.3 cu. yds. at $1.50	502.95	
Standard 7-inch concrete pavement, 80,848.8 sq. yds. at $3.00	242,546.40	
Felt expansion joints, 24,390.2 lin. ft. at 12c	2,926.82	
Bar reinforcement in place, 7,189.3 lbs. at 10c	718.93	
Shoulder construction, 90,165.4 lin. ft. at 5c	4,508.27	
Gravel for shoulders, 2,645.0 cu. yds. at $3.25	8,596.25	
Screenings for shoulders, 1,088.5 cu. yds. at $3.25	3,537.63	
Gravel for subbase, 619.5 cu. yds. at $3.25	2,013.38	
Screened gravel for drains, 395.5 cu. yds. at $4.00	1,582.00	
Force account items:		
Placing coat of hot asphalt on decks of bridges over Taylor Creek and Neil Creek and making connection to drain holes in slabs	28.26	
Trimming up of roadway outside of subgrade limits	868.14	
Placing salvaged rock in drain tile ditches	31.00	
Total amount earned by contractor	$275,102.26	
Deduction for furnishing water pipe and making repairs to pump by State forces	394.08	
Total amount paid to contractor		274,708.18
Grand total cost of project (all State funds)		$284,269.79

City of Jefferson Paving

There has been approximately one mile of rough gravel road at the southern end of Marion County, which has been the subject of a great deal of discussion and complaint since the paving program was started in the County. Contract No. 579, for paving 0.92 mile through the town of Jefferson, was awarded to B. N. Bartlett of Corvallis on July 25, 1922. The paving covered by the contract consists of a 7-inch concrete pavement 16 feet in width, and having 2-foot gravel shoulders on each side. The location through the town had been the subject of a great deal of controversy, and the alignment finally adopted called for the extention of Second Street and the condemnation of some property. This extention of Second Street is joined by one curve to a connection with a tangent extending north from the Santiam River bridge, and undoubtedly possesses much better alignment than the alternate route proposed via the main street of the town.

All paving, except a one-half width strip of 140 feet at the Santiam River bridge, was completed October 18, and thrown open to traffic on November 23. The remaining 140 feet of half width pavement is now being paved, and will be thrown open to traffic as soon as the concrete is properly cured. It is estimated that the entire job will be completed about December 31 of the present year.

[MARION]

Construction has been supervised by W. K. Wright, Resident Engineer, and is estimated to cost a total of $27,000.00 when all final payments have been made. Of this amount, the State will pay $24,300.00, and the County and City of Jefferson will cooperate to the extent of $2,700.00. Expenditures to date amount to $22,076.89 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,006.83
Rental and repair of State-owned equipment (to be deducted from contractor's estimate)		394.94
Cement furnished by State (to be deducted from contractor's estimate)		9,912.00
Contract items as follows:		
Clearing and grubbing, all	$ 50.00	
Excavation, single classification, 1,698.0 cu. yds. at 75c	1,273.50	
Overhaul, 145.0 sta. yds. at 5c	7.25	
12-inch plain concrete pipe, 36.0 lin. ft. at $1.50	54.00	
Preparation of subgrade, 11,965.0 sq. yds. at 5c	598.25	
Standard 7-inch concrete pavement, 8,628.0 sq. yds. at $2.23	19,240.44	
Felt expansion joints, 8-inch deep, 2,648.0 lin. ft. at 12c	317.76	
Metal bar reinforcement, 1,180.0 lbs. at 7c	82.60	
Gravel subbase, 473.0 cu. yds. at $2.00	946.00	
Laying pavement in two strips, 138.0 sq. yds. at 20c	27.60	
Materials on hand	2,452.00	
Total amount earned by contractor	$ 22,597.40	
Deductions:		
Rental and repair of State-owned equipment	258.85	
Cement furnished by State	9,744.00	
Percentage retained until completion of contract	1,831.43	
Total amount paid to contractor		10,763.12
Grand total expended (all State funds)		$ 22,076.89

Jefferson North Paving

This section was completed in 1920, and a description thereof is given on page 324 of the last report. During the present biennium, final expenditures in the amount of $63,193.68 have been made, and the total cost of the project now stands at $233,713.96 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,504.21
Maintenance work by State forces		9,612.87
Items deducted from contractor's estimate:		
Hauling gravel with State trucks		1,507.98
Rental, freight and hauling industrial track owned by State		289.35
Contract items as follows:		
Excavation, no classification, 375.5 cu. yds. at 74c	$ 277.87	
Broken stone for base and shoulders, 9,250.5 cu. yds. at $3.72	34,411.86	
Run-of-bank gravel for base and shoulders, 4,239.0 cu. yds. at $3.00	12,717.00	
Shoulder construction, 63,663.4 lin. ft. at 6c	3,819.80	
Sand filler for base, 402.5 cu. yds. at $3.00	1,207.50	
Sand filler from pit at north end of pavement, 316.5 cu. yds. at $3.72	1,177.38	
Porous drain tile, 3,483.0 lin. ft. at 28c	975.24	
Standard 2-inch bituminous surfacing, 57,107.8 sq. yds. at $1.45	82,806.31	
Standard 3-inch bituminous base, 57,107.8 sq. yds. at $1.15	65,673.97	
Broken stone backfill for drain tile, 204.25 cu. yds. at $3.72	759.81	
Wood headers left in place, 63,753.4 lin. ft. at 7½c	4,781.51	
Force account items:		
Building additional ¾-mile of macadam road at north end of contract	7,988.63	
Total amount earned by contractor	$216,596.88	

[MARION]

EXPENDITURES—Continued

Deductions:		
Hauling gravel with State trucks by State forces	1,507.98	
Rental, freight and hauling industrial track owned by State	289.35	
Total deductions	$ 1,797.33	
Total amount paid contractor		214,799.55
Grand total cost of project (all State funds)		$233,713.96

Salem-Brooks Post Road Project

This project was undertaken during the previous biennium, and a full description thereof was given on page 323 of the last report. During the two years just passed, delayed expenditures of $1,557.42 have been made, and the sum of $23,240.48 has been received from the Federal Government in payment of their final cooperation. This brings the total cost of the project to $117,260.18, with the State paying a total of $61,698.92, and the Government cooperating to a total of $55,561.26.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,483.59
Excess cost of asphalt over cost guaranteed to contractor		144.42
Refund to contractor for advance in guaranteed freight rates		161.62
Asphalt furnished by State (deducted from amount due contractor)		16,390.73
Rental of State-owned equipment (deducted from amount due contractor)		2,398.00
Contract items as follows:		
Common excavation, 777.09 cu. yds. at 75c	$ 582.82	
Broken stone for base, 266.75 cu. yds. at $4.30	1,147.03	
Gravel for base, 4,121.25 cu. yds. at $3.00	12,363.75	
Crushed gravel for base, 108.0 cu. yds. at $3.15	340.20	
Screened gravel for subbase, 123.5 cu. yds. at $2.80	345.80	
Gravel for shoulders, 1,987.0 cu. yds. at $3.00	5,961.00	
Screened gravel for drains, 121.0 cu. yds. at $2.80	338.80	
Crushed gravel for shoulders, 95.5 cu. yds. at $3.15	300.83	
Crushed gravel screenings for shoulders, 208.0 cu. yds. at $2.80	582.40	
Sand filler in base, 197.0 cu. yds. at $2.00	394.00	
Concrete sand between bases, 6.0 cu. yds. at $3.60	21.60	
Concrete sand for squeegee, 35.5 cu. yds. at $3.60	127.80	
Concrete sand for shoulders, 152.0 cu. yds. at $3.60	547.20	
Standard bituminous pavement, 2-inch top, 3-inch base, 39,131.7 sq. yds. at $2.10	82,176.57	
Standard 3-inch bituminous base, 1,772.4 sq. yds. at 90c	1,595.16	
Shoulder construction, 43,966.4 lin. ft. at 6c	2,637.98	
Shoulder drains, 471.0 each at 60c	282.60	
Force account items:		
Patching holes in macadam and deepening drains	169.42	
Trimming edges of roadbed with grader to improve drainage	209.32	
Spreading rock to eliminate inequalities in old macadam base	40.71	
Deepening shoulder drains and extra work on headers	305.56	
Total amount earned by contractor	$110,470.55	
Deductions:		
Rental of State-owned equipment	2,398.00	
Asphalt furnished by State	16,390.73	
Total deductions	$ 18,788.73	
Total amount paid to contractor		91,681.82
Grand total cost of project		$117,260.18
Paid by State	$ 61,698.92	
Paid by Government	55,561.26	
Total	$117,260.18	

Salem South Surfacing

This work is described on page 325 of the last biennial report, and was carried to completion on December 19, 1920. Additional expenditures of $33,730.10 bring the total cost of the work to $54,532.83 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,423.67
Maintenance work by State forces to maintain travel through winter		2,637.67
Items deducted from contractor's estimate:		
Rental of equipment owned by State		685.28
Hauling gravel with State trucks		13,362.14
Contract items as follows:		
Broken stone surfacing, 15,097.25 cu. yds. at $3.20	$ 48,311.20	
Force account item:		
Placing rock, salvaged from old road, on subgrade	160.29	
Total amount earned by contractor	$ 48,471.49	
Deduction for rental of State equipment and hauling done by State forces	14,047.42	
Total amount paid to contractor		34,424.07
Grand total cost of project (all State funds)		$ 54,532.83

Maintenance

Maintenance north of Salem has consisted of the patrol maintenance of drainage and shoulders, redressing of gravel shoulders and repairs to the pavement. Three patrolmen were employed on the section from Salem to Aurora, each having an average of about eight miles of highway, until August 25, 1922, since which time the work has been handled by a small section gang in connection with Clackamas County maintenance between Aurora and Canemah. Pavement repairs, of which a small amount have been necessary each season, have been done on a force account basis by Marion County, using materials from the plants at Salem and Woodburn. Supervision of this maintenance and repair work has been handled by Resident Engineers F. T. Young and L. F. Hueperman.

South of Salem, two patrolmen have been employed, their duties consisting of the general routine patrol maintenance of pavement, shoulders, subgrade and bridge structures.

Pudding River Overflow Bridge

The Pudding River Bridge and the road immediately ajacent to it has remained to be the last unimproved portion of the Pacific Highway for many miles. The first step in the relief of this condition was the award of Contract No. 575, on July 25, 1922, to Carl O. Engstrom of Salem, for the construction of a bridge over the overflow channel and the raising of the grade between that structure and the main channel span.

Work started on August 15, 1922, and was complete on November 25, 1922, at an estimated cost of $14,000.00. In connection with this construction, the fill has been gravelled and planked for winter travel. This work has been done partly by State forces and partly as force account work by the contractor. Total expenditures to date amount to $9,382.09, consisting of $8,307.20 from County funds and $1,074.89 from State funds. All expenditures for the bridge and fills will be met by the County, leaving the surfacing and engineering, only, to the paid for by the State.

Of the total estimated cost of $14,000.00, the State share is estimated at $1,000.00, and the share of the Counties at $13,000.00.

Construction has been supervised by R. A. Furrow, Resident Engineer.

Salem Bridge Repairs and Painting

In order to make the design entirely consistent, it was deemed advisable to make certain minor repairs to the steel work of the Salem Bridge. This was done early in 1921 by State forces at a cost of $2,056.61.

The entire steel work was then given a coat of paint by A. J. Anderson of Salem. This latter work was done under Contract No. 356, awarded on April 5, 1921. The cost of the painting was $2,381.62, making the total cost of the repair work and painting $4,438.23. Of this sum, $1,023.73 was contributed by Polk and Marion Counties, and the remainder was paid by the State.

Santiam River Bridge Near Mehama

The reader is referred to page 326 of the last biennial report for an article covering the details of this work. During the present biennium, additional expenditures have been made in the amount of $18,008.75. The sum of $18,765.20 has been received from Linn and Marion Counties, leaving a net credit to State funds during the biennium of $756.45. Of the total cost of $46,162.70 for the structure, the State has paid $962.30, and the Counties have paid $22,600.20 each.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,454.56
Contract items as follows:		
Excavation for pier footings, 194.6 cu. yds. at $11.60	$ 2,257.36	
Metal reinforcement, 6,053.0 lbs. at 8c	484.24	
Class "B" concrete (Pier No. 1), 60.3 cu. yds. at $36.60	2,206.98	
Class "B" concrete (Pier No. 2), 60.7 cu. yds. at $44.00	2,670.80	
Class "A" concrete (both piers), 13.4 cu. yds. at $45.00	603.00	
Structural steel in place, 332,899.0 lbs. at 10.7c	35,620.18	
Force account items:		
Digging test pits for pier foundations	112.04	
Removing old bridge pier No. 2	341.23	
Erecting temporary tower bents to carry existing truss spans during construction of new bridge	202.31	
Excess cost of shop paint over specified cost	220.00	
Total amount earned by contractor	$ 44,718.14	
Deductions:		
Painting omitted by contractor, to be done by county forces	850.00	
Lumber furnished by counties and used by contractor for temporary construction	100.00	
Omitting drill holes in Pier No. 2, required by original drawings	60.00	
Total deductions	$ 1,010.00	
Total amount paid to contractor		43,708.14
Grand total cost of structure		$ 46,162.70
Paid by State	$ 962.30	
Paid by Linn County	22,600.20	
Paid by Marion County	22,600.20	
Total	$ 46,162.70	

[MARION]

Right-of-Way Through Jefferson

Prior to the award of the contract for paving the Pacific Highway through Jefferson, some difficulty was experienced in securing certain portions of new right-of-way from a point on Second Street, east of Second and Union Streets, to the south end of the project at the Santiam River bridge. An agreement as to price was reached with all of the owners, but one. Condemnation proceedings were instituted against the owner of this one parcel of land, and immediate possession was taken of the premises in accordance with the State statutes. This action was necessary in order to avoid suspension of work by the contractor and consequent delay in the completion of the project. The condemnation case has not yet come to trial, but a decision favorable to the State is confidently expected.

Owing to there being some doubt in the minds of the Marion County officials as to whether they were legally authorized to expend money for rights-of-way for a State highway through an incorporated town, parcels of right-of-way already secured have been paid for from funds advanced by the State. The Department Attorney is confident that there are no legal restrictions to prevent the County securing right-of-way for State highways, even though the particular section be within the limits of an incorporated town, and reimbursement for the amounts advanced will be requested from Marion County if the Attorney's opinion is sustained by the Court.

Construction Engineering County Bridges

During this biennium, Marion County has requested engineering service in connection with County bridges, which has been furnished at a cost of $237.49.

The principal work has been in connection with a bridge now under construction on Market Road No. 2 between Salem and Silverton. This bridge will consist of three 34-foot concrete spans, of standard State Highway design in every particular. When completed, it will stand for generations as testimony to the progessive spirit of those now in charge of the County's affairs.

Fairgrounds Grade Separation Survey

In connection with the location of the Pacific Highway at the north city limits of Salem, the most important consideration has been the existing Southern Pacific Railroad grade crossing and problems connected with its possible elimination.

For the study of these problems, a survey from a point about 500 feet north of the city limits to the Fairgrounds Road at Hall Street was made, in order, if practicable, to combine the Silverton Road and Pacific Highway and to overcross or undercross the railroad tracks by means of a single structure. Several studies of other crossings at various points and of various types were made, but the one which appeared to be the most feasible and the most desirable from the standpoint of the traveling public, while being at the same time the least objectionable from the standpoint of abutting and neighboring property owners, was an overhead crossing at the site of the present Silverton Road grade crossing. This scheme proposed a concrete viaduct approximately 750 feet in length, the estimated cost of the entire project being in the neighborhood of $150,000.00. As this crossing and most of the balance of the project is

within the corporate limits of Salem, and as State Highway funds can not be expended on work so situated and neither Marion County nor the City of Salem have been in a position to finance their part of the project, the matter has been dropped for the time being. The paving of the existing Pacific Highway over the grade crossing, and within the city, to a connection with the paved street system, together with installation by the Railroad Company of additional protective crossing signals, make it appear improbable that further action will be taken toward the separation project in the immediate future.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Marion County has co-operated as follows:

1.	Paid into the State Market Road Fund	$128,387.56
2.	State Funds apportioned to County	181,732.34
3.	County levy made to match State Funds	210,394.77
4.	County Market Road Funds collected	262,550.98
5.	Cash paid to County by State	151,431.12
6.	State expenditures, deducted from apportionment	0.00
7.	Cash due County from State in December, 1922	30,301.22
8.	County expenditures on Market Roads	421,149.56
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Marion County received from the State Market Road Fund $53,344.78 more than it paid into the fund. The excess is Marion County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $210,394.77. They have collected and credited to the Market Road Fund $262,550.98.

The County Court has designated nine roads to be improved as Market Road projects. The surveys have been made and plans prepared by W. J. Culver, County Roadmaster. The plans have been submitted and approved.

The County has used Market Road funds along with other available County funds in preparing grade and laying bituminous pavement on the more important County roads. The construction has been with County forces. They have paved 28.7 miles of road.

MORROW COUNTY

The period of 1921 and 1922 was one of marked activity for highway construction in Morrow County. The grading of the entire section of the Oregon-Washington Highway from the Gilliam-Morrow County Line to the foot of Jones Hill, approximately ten miles east of Heppner, a total distance of 35 miles, was completed. The section from the Gilliam-Morrow County Line to Heppner was placed under contract for surfacing, of which approximately 95 per cent is completed. With the completion of this section of the Oregon-Washington Highway in Gilliam County, residents of Heppner, Ione, Lexington and the southern portion of the county will have a macadamized highway connecting with the Columbia River Highway near Heppner Junction. This will give a surfaced road connecting the northern part of the county with the county seat and allow travel at all times of the year.

Highway construction in Morrow County during the period covered by this biennial report was under the supervision of R. H. Baldock, Division Engineer.

Gilliam County Line-Morgan Surfacing

On January 4, 1921, Contract No. 317 for surfacing 12.66 miles of the Oregon-Washington Highway, between the Morrow County Line and a point approximately two miles south of Morgan, was awarded to the Oregon Hassam Paving Company of Portland, Oregon. Work was started on February 25, 1921, and completed October 10 of the same year under the supervision of H. G. Smith, Resident Engineer. The rock used was of excellent quality, and a very good grade of surfacing obtained.

The total cost of the project amounts to $104,184.92, which has all been paid from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,729.32
Sprinkling and rolling by State forces		1,117.71
Digging of gravel test pits by State forces		168.55
Contract items as follows:		
Broken stone surfacing, 27,810.0 cu. yds .at $3.25	$ 90,382.50	
Earth filler, 297.0 cu. yds. at $1.00	297.00	
Standard wood guard fence, 5,112.0 lin. ft. at $1.00	5,112.00	
Force account items:		
Placing of earth filler on macadam	2,781.43	
Excavating beneath Morgan Bridge to give more clearance to county road	134.76	
Widening fills, stations 481 to 485 and 521 to 524	377.81	
Drayage and rental of contractor's pump, used by State forces	20.98	
Changing superelevation on curves to conform to new standard	618.75	
Placing earth cushion on rock cuts	228.86	
Trimming up slopes and roadbed where necessary	465.25	
Total amount earned by contractor	$100,419.34	
Reduction of contract price by contractor as consideration for widening surfacing from 8 feet to 16 feet	1,250.00	
Total amount paid to contractor		99,169.34
Grand total cost of project (all State funds)		$104,184.92

Morgan-Lexington Surfacing

On April 22, 1921, the State Highway Commission awarded Contract No. 364 to the Warren Construction Company of Portland, Oregon, for surfacing 12.65 miles of the Oregon-Washington Highway between

Morgan and Lexngton. Work was begun on the fifteenth of June and was completed by May 1, 1922. The surfacing materials used consisted of crushed basalt rock and provided a road metal of excellent quality.

Construction was supervised by H. G. Smith, Resident Engineer, and the work has cost a total of $86,711.59. Of this amount the County cooperates to the extent of $837.19 with the State paying the blance of $85,874.40.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,670.88
Sprinkling macadam by State forces		832.80
Penalty imposed on contractor for overrun of time limit (deducted from contractor's estimate)		1,031.13
Contract items as follows:		
Broken stone surfacing, 26,592.0 cu. yds. at $2.81	$ 74,723.52	
Broken stone for maintenance, placed in piles, 1,280.0 cu. yds. at $2.61	3,340.80	
Force account items:		
Widening road crossing at Jordan elevator	73.42	
Placing earth filler on macadam	2,917.55	
Superelevating curves to new standard and placing earth cushion on rock cuts	1,522.44	
Adjustment for crushed rock remaining unused at completion of contract	630.18	
Total amount earned by contractor	$ 83,207.91	
Deduction for overrun of time limit	1,031.13	
Total amount paid to contractor		82,176.78
Grand total cost of project		$ 86,711.59
Paid by State	$ 85,874.40	
Paid by County	837.19	
Total	$ 86,711.59	

Lexington-Heppner Surfacing

On October 25, 1921, the State Highway Commission awarded Contract No. 471 to More & Anderson for surfacing the Lexington-Heppner Section of the Oregon-Washington Highway. Work was started December 10 and is practically completed at the present time, although final payment on the work has not yet been made.

Construction has been supervised by H. G. Smith, Resident Engineer, and represents a total estimated cost of $68,000.00, to be paid entirely by the State. Expenditures to date amount to $41,811.80 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,318.96
Sprinkling macadam by State forces		716.64
Prospecting for surfacing materials		28.42
Contract items as follows:		
Broken stone surfacing, 19,076.0 cu. yds. at $1.87	$ 35,672.12	
Maintenance materials, placed in piles, 1,008.0 cu. yds. at $1.87	1,884.96	
Clay or earth filler, 4,866.0 cu. yds. at 50c	2,433.00	
Payhaul on filler, 1,704.0 yd. mi. at 40c	681.60	
Common excavation, 1,000.0 cu. yds. at 60c	600.00	
Solid rock excavation, 50.0 cu. yds. at $2.50	125.00	
Force account items:		
Cleaning ditches and trimming cut slopes	24.87	
Reshaping roadbed where necessary	551.73	
Total amount earned by contractor	$ 41,973.28	
Percentage retained until completion of contract	4,225.50	
Total amount paid to contractor		37,747.78
Grand total expended (all State funds)		$ 41,811.80

[MORROW]

Lexington-Heppner Grading

Contract No. 372 for grading the Lexington-Heppner Section of the Oregon-Washington Highway was awarded to Oxman & Harrington of Baker, Oregon, on May 26, 1921. The total length of the section was 9.75 miles and the construction was completed on December 16 of the same year as the award.

The work was supervised by U. R. Grey, Resident Engineer, and represents a total cost of $55,942.02. County cooperation in the amount of $233.26 has been received, the balance of $55,708.76 being paid by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,928.74
Items deducted from contractor's estimate:		
Lumber and cement furnished by State		194.05
T. N. T. furnished by State		620.00
Penalty for overrun of time limit on contract		158.49
Contract items as follows:		
Clearing and grubbing, all	$ 1.00	
Common excavation, 44,303.4 cu. yds. at 40c	17,721.36	
Intermediate excavation, 8,055.0 cu. yds. at 60c	4,833.00	
Solid rock excavation, 13,328.7 cu. yds. at $1.50	19,993.05	
Overhaul, 12,242.0 sta. yds. at 6c	734.52	
12-inch plain concrete pipe, 966.0 lin. ft. at $1.65	1,593.90	
18-inch reinforced concrete pipe, 244.0 lin. ft. at $2.80	683.20	
24-inch reinforced concrete pipe, 192.0 lin. ft. at $3.50	672.00	
36-inch reinforced concrete pipe, 56.0 lin. ft. at $8.00	448.00	
Rubble masonry, 141.81 cu. yds. at $16.00	2,268.96	
Lumber and timber, 30.482 M.-FBM. at $70.00	2,133.74	
Riprap, 5.85 cu. yds. at $3.00	17.55	
Class "B" concrete, 14.37 cu. yds. at $30.00	431.10	
Earth cushion on rock cuts, 2,130.0 lin. ft. at 10c	213.00	
Force account items:		
Erecting grouted riprap on O.-W. R. & N. fill to protect it against flood waters	268.90	
Total amount earned by contractor	$ 52,013.28	
Deductions:		
Cement, lumber and T. N. T. furnished by State	814.05	
Penalty for overrun of time limit	158.49	
Total deductions	$ $972.54	
Total amount paid to contractor		51,040.74
Grand total cost of project		$ 55,942.02
Paid by State	$ 55,708.76	
Paid by County	233.26	
Total	$ 55,942.02	

Gilliam County Line-Lexington Grading

A description of this project will be found on page 332 of the Fourth Biennial Report. Approximately ten miles were cut off from the original contract on account of lack of funds, and the contract reduced to cover only 25.32 miles between the Gilliam County Line and a point approximately 3.2 miles north of Lexington. During the present biennium, the State expended $70,092.98 and Morrow County $30,717.47, making a total of $100,810.45. This brings the total cost of the project to $227,556.26, having been paid $93,754.60 by the State and $133,801.66 by the County.

[MORROW]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 27,432.14
Labor and materials furnished by State:		
Guarding O.-W. R. & N. Ry. tracks		621.51
Freight and storage on bridge materials		9.62
Equipment rental and repairs		1,906.31
Credit for lumber salvaged and sold (credit)		101.80
Items deducted from contractor's estimates:		
1,600 lbs. of T. N. T. furnished by State		1,738.29
Cement furnished by State		1,133.01
Rental and freight on tractors owned by State		859.64
Contract items as follows:		
Clearing and grubbing, all	$ 500.00	
Common excavation, 159,294.4 cu. yds. at 46c	73,275.42	
Intermediate excavation, 26,246.5 cu. yds. at 77c	20,209.81	
Solid rock excavation, 28,547.3 cu. yds. at $1.90	54,239.87	
Overhaul, 58,165.0 sta. yds. at 5c	2,908.25	
12-inch plain concrete pipe, 3,636.0 lin. ft. at $1.50	5,454.00	
18-inch reinforced concrete pipe, 940.0 lin. ft. at $3.00	2,820.00	
24-inch reinforced concrete pipe, 336.0 lin. ft. at $3.90	1,310.40	
36-inch reinforced concrete pipe, 596.0 lin. ft. at $6.00	3,576.00	
Rubble masonry headwalls, 335.83 cu. yds. at $15.00	5,037.45	
Class "A" concrete, 330.3 cu. yds. at $30.00	9,909.00	
Metal reinforcement, 3,687.0 lbs. at 10c	368.70	
Lumber and timber in place, 51.923 M.-FBM. at $85.00	4,413.45	
Force account items:		
Moving power and telephone wires and shed over pumping plant at Ione; rebuilding railroad right-of-way fence	125.95	
Reconstructing culverts and headwalls to conform with new grade line	541.77	
Constructing retaining walls	674.44	
Placing riprap at Brady Creek, Morgan Creek and Reitman Creek bridges	127.49	
Extra work at road crossings: Rockwalls and approach fills, hauling culvert pipe, lowering forms and recutting steel for schoolhouse bridge	81.68	
Reconstructing irrigation ditch and lowering water pipe	915.08	
Moving industrial track, retrimming cut, raising and refinishing grade, due to line and grade changes	595.23	
Filling up gravel pit test holes	46.15	
Furnishing and placing special castings and iron for Morgan Creek bridge not covered by bid items	209.08	
Special adjustment items:		
Protection of railway and telegraph lines	1,822.87	
Extra cost of excavation, due to line change at Ione	2,116.22	
Extra cost of timber approaches to Morgan Creek bridge	44.25	
Extra cost of disposal of waste material from cut at Station 540	5,194.89	
Excess cost of explosives over cost stipulated in contract	728.00	
Lumber and pipe left on hand, account change in plans	443.03	
Total amount earned by contractor	$197,688.48	
Deductions:		
T. N. T. furnished by State	1,738.29	
Cement furnished by State	1,133.01	
Rental and freight on tractors owned by State	859.64	
Total deductions	$ 3,730.94	
Total amount paid to contractor		193,957.54
Grand total cost of project		$227,556.26
Paid by State	$ 93,754.60	
Paid by county	133,801.66	
Total	$227,556.26	

[MORROW]

Heppner-Jones Hill Grading

On the sixteenth day of June, 1921, Contract No. 382 was awarded to Oxman & Harrington of Baker, Oregon, for grading the Heppner-Jones Hill Section of the Oregon-Washington Highway. Work was started immediately and completed December 16 of the same year under the supervision of U. R. Grey, Resident Engineer.

This unit connects Heppner with what is known as the Jones Hill grade, which had been constructed by County forces in 1917, and provides a continuous stretch of 13.1 miles of standard roadbed from the west fork of Little Butter Creek to Heppner.

The completed work represents a total cost of $59,869.99, which has been paid $19,641.99 by the State and $40,228.00 by Morrow County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,126.19
Penalty for overrun of time limit (deducted from contractor's estimate)		171.83
Contract items as follows:		
Clearing and grubbing, all	$ 1.00	
Common excavation, 36,405.6 cu. yds. at 40c	14,562.24	
Intermediate excavation, 13,074.8 cu. yds. at 60c	7,844.88	
Solid rock excavation, 11,593.2 cu. yds. at $1.75	20,288.10	
Overhaul, 28,568.0 sta. yds. at 6c	1,714.08	
12-inch plain concrete pipe, 354.0 lin. ft. at $1.65	584.10	
18-inch reinforced concrete pipe, 748.0 lin. ft. at $2.80	2,094.40	
24-inch reinforced concrete pipe, 184.0 lin. ft. at $3.50	644.00	
36-inch reinforced concrete pipe, 124.0 lin. ft. at $8.00	992.00	
Class "A" concrete, 67.54 cu. yds. at $32.00	2,161.28	
Class "B" concrete, 36.54 cu. yds. at $30.00	1,096.20	
Metal reinforcement, 5,909.6 lbs. at 10c	590.96	
Lumber, 30.648 M.-FBM. at $70.00	2,145.36	
Riprap, 74.92 cu. yds. at $3.00	224.76	
Rubble masonry, 111.04 cu. yds. at $16.00	1,776.64	
Force account item:		
Installing drain tile to drain spring in roadway	23.80	
Total amount earned by contractor	$ 56,743.80	
Deduction for overrun of time limit	171.83	
Total amount paid to contractor		56,571.97
Grand total cost of project		$ 59,869.99
Paid by State	$ 19,641.99	
Paid by County	40,228.00	
Total	$ 59,869.99	

Messner Overcrossing and Approaches

This work is detailed on page 331 of the preceding report. Work continued slowly in 1921, being hindered to a large extent by the contractor's financial difficulties, and was finally completed on February 5.

The final cost of the work was $19,318.73 from State funds, of which amount $7,391.69 was paid out during the present biennium. The County is to make reimbursement of $5,487.13 of this amount.

The high winds during the fall of 1920 stripped away the shoulders of the high fill on the east approach of the structure. A special contract was awarded to J. S. Mattoon for the replacement of the embankment and, between January 14 and February 21, 1921, sufficient additional material was placed to restore the embankment to its original cross-section. After this replacement was completed, the slopes of the fill were covered with a thin blanket of gravel to prevent a recurrence of the loss of materials.

Work was handled under the supervision of W. H. Stewart, Patrolman and represents a total expenditure of $1,084.05 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,764.18
Labor and material furnished by State:		
Brass tubes for expansion joints not included in contract		22.48
Constructing temporary detour over railroad tracks		238.88
Grading approaches to overcrossing		985.85
Items deducted from contractor's estimate:		
Cement furnished by State		2,410.70
Name plates furnished by State		16.00
200 lbs. No. 12 black wire furnished by State		16.00
Contract items as follows:		
Class "B" concrete, 21.93 cu. yds. at $25.50	$ 559.22	
Class "A" concrete, 291.90 cu. yds. at $31.00	9,048.90	
Metal reinforcement, 42,816.0 lbs. at 7½c	3,211.20	
Wooden trestle approach, 114.0 lin. ft. at $30.00	3,420.00	
Reinforced concrete handrail, 185.0 lin. ft. at $3.00	549.00	
Force account items:		
Excavation below elevation shown on plans	254.66	
Placing and painting drip boards and stringers	158.09	
Painting bents with carbolineum	168.07	
Placing gravel around footings	33.50	
Total amount earned by contractor	$ 17,402.64	
Deductions for material furnished by State	2,453.95	
Total amount paid to contractor		14,948.69
Grand total cost of project (all State funds)		$ 20,402.78

Lexington Bridge

A 30-foot concrete span over Black Horse Creek, in the Town of Lexington, was built under Contract No. 452, awarded on August 31, 1921, to Tobin & Pierce.

The work was carried on simultaneously with the work in Heppner and was completed at the same time. The final cost was $5,764.60, all paid from State funds. The County will reimburse the State for $533.35 of this amount.

E. G. Ricketts was Resident Engineer on this bridge in connection with the Heppner bridges.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 431.10
Bronze name plates furnished by State		14.50
Contract items as follows:		
Excavation to plan elevation,, 30.40 cu. yds. at $1.30	$ 456.00	
Excavation below elevation shown on plans, 7.0 cu. yds. at $1.00	7.00	
Metal reinforcement, 13,695.0 lbs. at 6c	821.70	
Class "A" concrete, 119.2 cu. yds. at $29.00	3,456.80	
Concrete handrail, 70.0 lin. ft. at $4.50	315.00	
Grading approach fills, 356.0 cu. yds. at 75c	262.50	
Total amount paid to contractor		5,319.00
Grand total cost of structure (all State funds)		$ 5,764.60

Heppner Bridges

The Oregon-Washington Highway crosses Willow Creek twice and Hinton Creek once, all within the Town of Heppner. One of the Willow Creek bridges consists of three spans, 40, 23 and 10 feet in length, while the other is a single span of 45 feet. The bridge over Hinton Creek is a 28-foot span. All three are of concrete construction.

[MORROW]

Contract No. 451, covering the construction of the three bridges, was awarded to Tobin & Pierce on August 30, 1921. Work started on September 24, 1921, and was complete by April 1, 1922, at a total cost of $19,710.63. Of this cost, $1,737.20 was paid by the County and the balance by the State.

E. G. Ricketts was Resident Engineer in charge of the construction.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,236.23
Bronze name plates furnished by State		43.50
Contract items as follows:		
Excavation to plan elevation, 555.0 cu. yds. at $1.50	$ 832.50	
Excavation below elevation shown on plans, 15.0 cu. yds. at $1.00	15.00	
Class "A" concrete, 304.7 cu. yds. at $29.00	8,836.30	
Metal reinforcement, 65,560.0 lbs. at 6c	3,933.60	
Concrete handrail, 336.0 lin. ft. at $4.50	1,512.00	
Grouted riprap, 300.0 cu. yds. at $6.00	1,800.00	
Grading approach fills, 2,002.0 cu. yds. at 75c	1,501.50	
Total amount paid to contractor		18,430.90
Grand total cost of structures		$ 19,710.63
Paid by State	$ 17,973.43	
Paid by County	1,737.20	
Total	$ 19,710.63	

Maintenance

During the biennium just passed a total of 79.6 miles of State highways were placed under patrol maintenance in Morrow County. Of this mileage 30.2 miles were macadam on the Columbia River Highway, with 38.9 miles of macadam and 11.54 miles of earth grade on the Oregon-Washington Highway.

The section on the Columbia River Highway was maintained throughout the two-year period, while the maintenance on the Oregon-Washington Highway was taken over as fast as the construction was completed. Very little maintenance was done on the Oregon-Washington Highway in 1921.

On the Columbia River Highway, between Mile Post 160.2 and Mile Post 185.0, the work was handled by Patrolman W. H. Stewart and assistant. The equipment consisted of State truck and drag and County grader. In times of emergency extra teams and labor were hired.

Between Mile Post 185.0 and Mile Post 190.4, at the Morrow-Umatilla boundary line, the work was in charge of E. M. Mortimore, Patrolman, who handled this work in connection with approximately 20 miles of Umatilla County maintenance on this highway.

The work on the Oregon-Washington Highway was handled by Patrolman A. J. Strader and assistant, using State truck, grader and drag. During the spring of the year, extra men and teams were hired to get the entire section in shape, such as dragging, cleaning ditches, etc.

The work for maintenance in Morrow County was under the supervision of the La Grande Division Office.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

[MORROW]

Since the Market Road Law went into effect, Morrow County has co-operated as follows:

1.	Paid into the State Market Road Fund	$ 34,275.03
2.	State Funds apportioned to County	46,951.59
3.	County levy made to match State Funds	45,325.71
4.	County Market Road Funds collected	44,837.41
5.	Cash paid to County by State	37,705.02
6.	State expenditures, deducted from apportionment	5,966.22
7.	Cash due County from State in December, 1922	3,280.35
8.	County expenditures on Market Roads	91,576.75
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Morrow County received from the State Market Road Fund $12,676.56 more than it paid into the fund. The excess is Morrow County's share of funds collected from Multnomah County. The County Court has reported by resolutions that County levies have been made sufficient to produce $45,325.71. Of this amount they have collected and credited to the Market Road Fund $44,837.41.

The County Court has designated two roads to be improved as Market Road projects.

The surveys were made and plans prepared by engineers in the employ of the State Highway Commission.

The construction work has been done by contract and County forces under the direction of the County court. They graded 9.7 miles of road to good alignment and grades and have surfaced, with crushed rock, 5.7 miles.

MULTNOMAH COUNTY

As in the past, no State work is being done in Multnomah County and the only activities of this Department have consisted of engineering investigations and supervision carried on at the request of the County.

The investigation of the Burnside and Morrison Street bridges, in Portland, continued into the present biennium and engineering service on the bridge repair work has been furnished. In addition to this, repair work on several viaducts on the upper Columbia River Highway, required on account of the severe storm of November, 1921, was outlined by the Department.

Repairs to Multnomah Falls Viaducts

The severe sleet storm of November, 1921, caused serious damage to the viaducts on the Columbia River Highway at Multnomah Falls. This damage was caused by an overload of sleet, and consisted of the wrecking of several of the beams and columns supporting the structures.

At the request of the County, an examination was made and a report prepared covering the damage and the method of repair. With slight modification, the method of repair outlined in the report was followed and the viaducts made serviceable again. The State cost on this work was $102.84.

Bridges in the City of Portland

The investigation of the Burnside and Morrison Street bridges is covered in the previous report. Additional engineering service was furnished, in connection with the recommended repairs, at a total cost of $1,300.76. For this, and expenditures made during the previous biennium, the County repaid $2,488.24, leaving a net credit of $1,187.48 to State funds for the two-year period.

The State also spent an additional amount of $36.65 on plans for the Burnside bridge, and the County returned $1,572.86 for this and previous expenditures.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Multnomah County has cooperated as follows:

1.	Paid into the State Market Road Fund	$1,071,515.34
2.	State Funds apportioned to County	306,774.83
3.	County levey made to match State Funds	307,732.28
4.	County Market Road Funds collected	277,075.22
5.	Cash paid to County by State	254,951.14
6.	State expenditures, deducted from apportionment	0.00
7.	Cash due County from State in December, 1922	51,823.69
8.	County expenditures on Market Roads	687,541.13
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Multnomah County received from the State Market Road Fund $764,740.51 less than it paid into the fund. The County Court has reported by resolutions, that County levies have been made sufficient to produce $307,731.28. Of this amount they have collected and credited to the Market Road Fund only $277,075.22.

[MULTNOMAH]

The Board of County Commissioners has designated 35 jobs to be done as Market Road projects. These included paving, redressing macadam roads, grading and surfacing new roads, repairing bridges and building viaducts.

Plans prepared by the County Roadmaster have been submitted and approved.

The construction work has been done by contract or by County forces, under the direction of the County Roadmaster. The County has graded 13.3 miles, surfaced 25 miles, paved 7 miles and built bridges and viaducts amounting to approximately $100,000.

POLK COUNTY

As in the case of the previous biennium, the two-year period ending November 30, 1922, closes with the highway situation in Polk County one of the most vexatious problems which the Commission has encountered.

The beginning of 1921 found the construction program at a standstill and the situation at what approached a deadlock. In view of the decision of the Court upholding the Highway Commission's decision and action in locating the West Side Highway via Holmes Gap, Rickreall, Monmouth and Suver, with spur lines from Rickreall to Dallas and from Monmouth to Independence, the Commission retained their decision to complete construction on that location, nothwithstanding the lack of cooperation by the County Court of Polk County and the continued opposition of certain citizens of that County who still contended for a location south from Independence to Suver rather than the direct route from Monmouth to Suver.

In 1920, a suit, by which it was sought to enjoin the Highway Commission from constructing the West Side Highway along the route south from Monmouth, was tried and decided against the plaintiffs. The general circumstances of that litigation are set forth at some length in the Commission's biennial report for 1919-1920 at pages 67-8 and 338-9. At the close of 1920, a similar suit involving many of the same questions was pending but has never been brought to trial.

This status of inaction, which resulted from the lack of cooperation by Polk County, brought much criticism on the County Court, both from citizens of that County who were not in sympathy with any policy of obstruction, and from neighboring Counties. This led to a conference at Dallas, May 13, 1921, attended by members of the Highway Commission, the County Court and representative citizens of the County. The County Court at that time indicated their willingness to proceed with the construction of the West Side Highway in conformity to the program outlined by the Highway Commission and agreed upon at the Rckreall conference in 1919.

In view of the desire to expedite the completion of the highways in Polk County, and the lack of funds on hand to pay for grading and bridges required, the Highway Commission offered to advance, as a loan, sufficient funds to make up the deficiency. This offer was accepted and two agreements were entered into and executed in written form on May 14, 1921.

The first provided that the Monmouth-Luckiamute Section should be designated by the County Court as a Market Road and be graded as such with Market Road funds. The Highway Commission was authorized by the County Court to advertise and contract for this grading in connection with the Luckiamute River-Suver Section. The estimated cost of the proposed work, $43,000.00, being on hand in the Market Road funds of the County, was turned over to the State for this purpose.

Under the second agreement, the Luckimute-Suver Section, the Holmes Gap-Rickreall Section and the Salem-Dallas Section were to be graded under State contracts and to be paid for by the County, for which there was available unsold County bonds in the sum of $53,000.00, par value, and the balance the County agreed to pay in installments of $25,000.00 each year until the debt was fully paid. These annual payments were to be made up of $10,000.00 to be taken each year from the County share of automobile license fees and $15,000.00 to be raised each year by special levy.

Under these agreements contracts were let for the following: Brunks Corner-Dallas, grading and paving, being the uncompleted portion of the Salem-Dallas Highway; Holmes Gap-Rickreall, grading; Monmouth-Luckiamute River, grading and bridges; Luckiamute River-Suver, grading and bridges; and work was started upon all. This work had only been fairly started, however, when still another legal action was undertaken by citizens of Independence to hinder the construction. This suit was directed at the County officials and attacked the legality of the two contracts between the County Court and the Highway Commission. Three principal questions were involved: first, as to the legality of the expenditure of Market Road funds upon State highways; second, as to the legality of the contract involving obligation of funds for a term of years in excess of the statutory limitation of County indebtedness; and third, the old question of previous litigation as to the authority of the Commission to construct upon the location designated.

Upon the first two questions the decision was in favor of the plaintiffs. Appeal by plaintiffs has been taken upon the decision on the third question, which was the main point for which they were really contending. This appeal is still pending, but the question of the use of Market Road funds on State highways, which is of the first importance from the standpoint of the Highway Commission, has been determined by the Supreme Court upon appeal in another case and the decision in the Polk County case on that question has been affirmed.

The decision on the second question of the case meant that the cost of the grading and bridges on the Holmes Gap-Rickreall and Luckiamute-Suver sections would fall upon the State, and, in view of this outcome, the grading of these sections was suspended by the Highway Commission following the shut-down for the winter of 1921, and was not resumed until June 14, 1922. Contracts, also, for the paving of these sections, proposals for which were received on May 10, were not awarded until November, 24.

The net result, therefore, to Polk County, aside from relief from legal obligation under the contracts of May 14, has been to delay the completion of the highways of the County for another year. The section from the Luckiamute to Suver is impassable for another winter, the Monmouth-Luckiamute Section is limited to light traffic and the Holmes Gap-Rickreall Section is unpaved, while the main object for which the litigation was instituted has for a second time been rejected by the Courts.

All State construction work that has been accomplished north of Monmouth has been handled under the supervision of W. D. Clarke, Division Engineer. The section from Monmouth to the Benton County Line is within the district of J. C. McLeod, Division Engineer.

Amity-Holmes Gap Grading and Paving

This work was undertaken during the previous biennium, and a descriptive article will be found on page 339 of the last report.

Following dissolution of the injunction by which the work had been suspended, operations were resumed and the contract was completed on June 15, 1921. A three-quarter mile stretch, extending towards Holmes Gap from a point 0.9 mile south of McCoy, was regraded during the winter of 1920-1921 and gravel surfaced. This section was left unpaved and later included in the contract for paving the section between Holmes Gap and Rickreall.

Expenditures during the present biennium amount to $75,765.81 and consist of $72,712.01 from State funds and $3,053.80 from Yamhill County funds. These expenditures bring the total disbursements on the

[POLK]

work under the contract to $285,165.26, expended $276,307.74 by the State and $8,857.52 by Yamhill County. The total Counties' share of the work amounts to $40,500.00, and the difference between this and expenditures of $8,857.52 is due as reimbursement to the State by Polk County. Polk County's share amounts to $31,642.48, with no payments made to date. It is estimated that an additional expenditure of $3,795.88 will be required from State funds to close the project.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 17,372.44
Labor and materials furnished by State:		
Raising grade with State forces between Sta. 341+00 and 379+50		9,328.84
Maintenance work to maintain winter travel		1,374.40
Clearing right-of-way		311.52
Headers for pavement, to be left in place		2,969.16
Items deducted from contractor's estimate:		
Truck rental and operation furnished by State		267.75
Contract items as follows:		
Excavation, no classification, 23,477.10 cu. yds. at 75c	$ 17,607.83	
Overhaul, 41,756.0 sta. yds. at 3c	1,252.68	
12-inch plain concrete pipe, 304.0 lin. ft. at $1.25	380.00	
18-inch reinforced concrete pipe, 160.0 lin. ft. at $2.58	412.80	
24-inch reinforced concrete pipe, 68.0 lin. ft. at $3.35	227.80	
6-inch porous drain tile, 2,448.0 lin. ft. at 29c	709.92	
Class "C" concrete, 18.86 cu. yds. at $20.00	377.20	
Crushed gravel, loose measure, 14,498.4 cu. yds. at $4.31	62,488.11	
Standard bituminous pavement, 2-inch top, 3-inch base, 70,567.0 cu. yds. at $2.30	162,304.10	
Bituminous pavement, top only, 99.0 batches at $6.36	629.64	
Earth filler, 4,956.1 cu. yds. at $1.00	4,956.10	
Shoulder construction, 77,454.0 lin. ft. at 6c	4,647.24	
Force account items:		
Clearing and grubbing at McKee bridge and at borrow pit	323.72	
Regrading Stations 341 to 380 to raise fill	2,165.62	
Constructing and cleaning outlets for culverts and placing tile drain under crossroads	156.02	
Repairing pavement at McKee and McCoy bridges; repairing planking on county bridge; repairing railroad crossing at Holmes Gap	158.06	
Total amount earned by contractor	$258,796.84	
Deductions:		
War tax on freight	1,477.55	
Truck rental and operation, furnished by State	267.75	
Total deductions	$ 1,745.30	
Total amount paid to contractor		257,051.54
Grand total cost of project		$288,675.65
Less final payment to contractor in transit		3,510.39
Total amount expended		$285,165.26
Paid by State	$276,307.74	
Paid by Yamhill County	8,857.52	
Total	$285,165.26	

Holmes Gap-Rickreall Post Road Project

Bids for paving the Holmes Gap-Rickreall Section were received on May 9, 1922, and the Oregon Contract Company of Portland, Oregon, were the low bidders. Owing to the status of the highway situation which existed at that time, the award of the contract was postponed until November 24. For this reason no work has been done during the present season. The contract, No. 536, as awarded, covers two units. Unit No. 1 comprises the 4.94 miles from Station 464, at the south end of the

section omitted for a future overhead crossing at Holmes Gap, to a junction with the Salem-Dallas Highway at Rickreall. Unit No. 2 covers the gap of 3,870 feet left unpaved in the Amity-Holmes Gap Section when that section was paved during 1920. This unit begins at Station 340+80, about 0.9 mile south of the McCoy Road, and extends to Station 379+50.

The pavement provided for by the contract is to be of cement concrete 16 feet wide, 7 inches thick, of 1:2:3 mix, and is to be constructed without reinforcement. The shoulders are to be either of broken stone or crushed gravel, and are to be constructed one foot wide on top and feather-edged to three feet at the bottom.

Separate bids were also received for the construction of a structure over what is known as Basket Slough. Owing to the uncertainty regarding the construction of the project, the contract for this structure was never awarded, and it is proposed to call for bids again during the coming winter.

The project is being undertaken in cooperation with the Federal Government under the terms of Project Agreement No. 59, and is estimated to cost a total of $159.000.00. Of this amount, the State share will amount to $57,017.79, the Federal Government share to $97,182.21 and the County share to $4,800.00, this last being for the construction of the Basket Slough Bridge. Expenditures to date amount to $59.74 from State funds, and consist of preliminary engineering charges.

Brunks Corner-Dallas Paving

In accordance with the arrangements with the Polk County Court, whereby construction in the County was to be resumed after the shutdown which accompanied the litigation in 1920, narrated at some length in the last biennial report, the State Highway Commission awarded Contract No. 393 to the V. R. Dennis Construction Company for grading and paving the Salem-Dallas Highway between Brunks Corner and Dallas. This section comprises the 7.5 miles which was uncompleted when the contract of Oscar Huber was suspended on August 12, 1920, and later cancelled without resumption of work. Although the former contract covering this section was a Federal Aid project, the new contract was undertaken without Federal Aid.

The job was planned as a two-year project, it being specified that the part from Derry to Dallas, somewhat over half of the contract, be completed during 1921, with the exception of a few short stretches, and that the section from Brunks Corner to Derry and the excepted sections mentioned above should be graded and graveled during 1921 and paved during 1922. Substantially this program was carried out, although less pavement was completed during 1921 than was expected.

Work was begun on July 8, 1921, and completed November 15, 1922, with H. E. Abry, Resident Engineer, in charge of the work until January 15, 1922, and E. A. Collier, Resident Engineer, in charge since that time. The pavement laid was a Type "D" bituminous concrete pavement, 16 feet wide and 5 inches thick, and consisted of a 3-inch bituminous base course with a 2-inch bituminous wearing surface. The pavement was constructed upon a subbase of crushed gravel, averaging about 40 cubic yards per station, and is provided with 2-foot crushed gravel shoulders on each side.

When all final payments have been made, the contract is estimated to require a total expenditure of $252,500.00. The County share is estimated at $10,700.00 and the State will pay the balance of $241,800.00. The expenditures to date amount to $232,654.37 and consist of $7,117.39 from County funds and $225,536.98 from State funds.

[POLK]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8,202.44
Rental of ground for storage of paving material		218.61
Asphalt furnished by State (deducted from contractor's estimate)		21,420.00
Rental of State-owned equipment (to be deducted from contractor's estimate)		3,578.45
Contract items as follows:		
Preparation of subgrade, 96,484.0 sq. yds. at 5c	$ 4,824.20	
Common excavation, 10,081.1 cu. yds. at 60c	6,048.66	
Earth filler, 1,487.0 cu. yds. at $1.50	2,230.50	
Standard bituminous pavement, 2-inch top, 3-inch base, 70,511.0 sq. yds. at $2.40	169,226.40	
Overhaul, 530.0 sta. yds. at 5c	26.50	
Shoulder construction, 69,000.0 lin. ft. at 6c	4,140.00	
Crushed gravel for subbase, 17,866.0 cu. yds. at $2.40	42,878.40	
Crushed gravel for shoulders, 2,512.5 cu. yds. at $2.40	6,030.00	
12-inch plain concrete pipe, 633.0 lin. ft. at $1.50	949.50	
18-inch reinforced concrete pipe, 72.0 lin. ft. at $3.00	216.00	
24-inch reinforced concrete pipe, 35.0 lin. ft. at $4.00	140.00	
36-inch reinforced concrete pipe, 16.0 lin. ft. at $7.50	120.00	
6-inch porous drain tile, 1,613.0 lin. ft. at 20c	322.60	
Gravel backfill for tile drains, 125.0 cu. yds. at $3.00	375.00	
Class "C" concrete, 7.0 cu. yds. at $20.00	140.00	
Force account items:		
Clearing right-of-way	633.56	
Ditching and shaping shoulders	1,125.73	
Total amount earned by contractor	$239,427.05	
Deductions:		
Rental of State-owned equipment	465.99	
Asphalt furnished by State	21,420.00	
Percentage retained until completion of contract	18,306.19	
Total amount paid to contractor		199,234.87
Grand total expended		$232,654.37
Paid by State	$225,536.98	
Paid by County	7,117.39	
Total	$232,654.37	

Salem-Brunks Corner Post Road Project

This is a 1919 contract, and is described on page 340 of the previous report. As stated therein, work was suspended on August 12, 1920, on account of litigation respecting the location of the West Side Highway in Polk County. Work was not resumed, and, in accordance with the terms of an agreement entered into between the Highway Commission and Mr. Huber on February 14, 1921, providing for a cancellation of the contract at the Commission's option and stating the terms of adjustment in the event of such a cancellation, the contract was terminated on March 5, 1921. At this time the pavement was completed on the west 5.51 miles of the project, from Station 0+00, at the west end of the Willamette River bridge at Salem, to Station 494, near Brunks Corner. At the time of the termination of the contract the run-of-bank gravel shoulders and the ditching and final trimming up of the roadbed were only partially completed and this work is now being finished up as a betterment job by State forces.

The additional expenditures made under the contract during the biennium amount to $3,476.02, consisting of $2,612.94 from State funds and $863.08 from County funds. These expenditures bring the total cost of the work to $171,966.60, which has been paid $94,974.99 by the State, $10,863.08 by the County and $66,128.53 by the Government. At this time, payments of $10,000.00 and $6,476.34 are due from the County and Federal Government, respectively, for their final cooperative shares on the work.

[POLK]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 13,037.68
Labor and material furnished by State:		
Borrow material for embankment		125.00
Rental of storage site for asphalt		193.14
Loss to State on asphalt transactions with contractor		7,552.08
Items deducted from contractor's estimate:		
Asphalt furnished by State		24,108.91
Truck rental and supplies		1,651.00
Contract items as follows:		
Clearing and grubbing, 60 per cent at $1,000.00	$ 600.00	
Common excavation, 23,902.9 cu. yds. at 65c	15,536.89	
Solid rock excavation, 200.0 cu. yds. at $2.00	400.00	
Overhaul, 11,188.0 sta. yds. at 3c	335.64	
8-inch plain concrete pipe, 48.0 lin. ft. at $1.15	55.20	
10-inch plain concrete pipe, 32.0 lin. ft. at $1.20	38.40	
12-inch plain concrete pipe, 348.0 lin. ft. at $1.25	435.00	
16-inch reinforced concrete pipe, 154.0 lin. ft. at $2.25	346.50	
24-inch reinforced concrete pipe, 104.0 lin. ft. at $3.25	328.00	
36-inch reinforced concrete pipe, 12.0 lin. ft. at $5.25	63.00	
6-inch porous drain tile, 4,709.0 lin. ft. at 25c	1,177.25	
Run-of-bank gravel for base, 5,552.0 cu. yds. at $2.00	11,104.00	
Run-of-bank gravel for shoulders, 2,338.0 cu. yds. at $2.00	4,676.00	
Rock backfill for drains, 6.0 cu. yds. at $4.50	27.00	
Class "C" concrete, 29.39 cu. yds. at $20.00	587.80	
Gravel bituminous pavement, 2-inch top, 3-inch base, 52,158.81 sq. yds. at $2.00	104,317.62	
Shoulder construction, 53,000.00 lin. ft. at 6c	3,180.00	
Force account items:		
Placing riprap at Rickreall Creek	693.01	
Construction of culvert under railroad	104.39	
Adjustment account change in plans	7,043.00	
Total amount earned by contractor	$151,058.70	
Deductions:		
Rental of State-owned equipment and supplies	1,651.00	
Asphalt furnished by State	24,108.91	
Total amount paid to contractor		125,298.79
Grand total cost of project		$171,966.60
Paid by State	$ 94,974.99	
Paid by County	10,863.08	
Paid by Government	66,128.53	
Total	$171,966.60	

Dallas City Paving

This section is entirely within the city limits of Dallas and covers a distance of 1.03 miles from the east city limits to the north end of the previously paved section of Main Street.

The work was advertised in conjunction with the Brunks Corner-Dallas Section, at the request of the County Court of Polk County by whom the construction cost was paid. Contract No. 399 was awarded on June 20, 1921, to the V. R. Dennis Construction Company of McMinnville, and called for the construction of a standard type "D" bituminous concrete pavement 16 feet in width. Work was begun July 30, 1921, and completed August 30, 1922, a distance of 0.9 mile being finished during the 1921 season.

Engineering supervision was handled in conjunction with the Brunks Corner-Dallas Section by Resident Engineers H. E. Abry and E. A. Collier during 1921 and 1922, respectively.

The final cost is estimated to amount to $24,500.00, of which amount the State will pay $500.00 for engineering, and the County will pay $24,000.00 for construction. Expenditures to date amount to $24,091.26, of which the State has expended $485.34 and the County has expended $23,605.92.

[POLK]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 485.34
Contract items as follows:		
Common excavation, 14.0 cu. yds. at 60c	$ 8.40	
Standard bituminous pavement, 2-inch top, 3-inch base, 9,834.7 sq. yds. at $2.40	23,603.28	
Preparation of subgrade, 13,910.4 sq. yds. at 5c	695.52	
Crushed gravel subbase, 12.0 cu. yds. at $2.40	28.80	
Total amount earned by contractor	$ 24,336.00	
Percentage retained until completion of contract	730.08	
Total amount paid to contractor		23,605.92
Grand total expended		$ 24,091.26
Paid by State	$ 485.34	
Paid by County	23,605.92	
Total	$ 24,091.26	

Rickreall-Monmouth-Independence Paving

A complete description of this work will be found on page 341 of the last report. During the present biennium, final expenditures of $43,519.68 have been made from State funds. These expenditures bring the total cost of the project to $258,067.50, with the State having paid the entire amount. There is due, however, from the County the sum of $22,348.96 for the amount of their cooperation.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 13,298.44
Labor and materials furnished by State:		
Royalty on material for embankment		124.80
Lumber and nails for pavement headers left in place		353.81
Contract items as follows:		
Excavation, no classification, 24,882.0 cu. yds. at 75c	$ 18,661.50	
Standard bituminous pavement, 3-inch base, 17,908.0 sq. yds. at 96c	17,191.68	
Standard bituminous pavement, 3-inch base, 5,675.0 sq. yds. at 85c	4,823.75	
Standard bituminous pavement, 2-inch base, 19,271.0 sq. yds. at 64c	12,333.44	
Standard bituminous pavement, base course, 63.0 batches at $3.07	193.41	
Standard bituminous pavement, 2-inch top, 73,375.0 sq. yds. at $1.34	98,322.50	
Broken stone for base and shoulders, 14,433.3 cu. yds. at $4.70	67,836.51	
Clay or earth filler, 430.0 cu. yds. at $1.00	430.00	
Gravel screenings for filler, 2,170.0 cu. yds. at $3.74	8,115.80	
Gravel for shoulders and filling in soft spots, 3,214.0 cu. yds. at $3.74	12,020.36	
Shoulder construction, 81,973.0 lin. ft. at 6c	4,918.38	
12-inch plain concrete pipe, 405.0 lin. ft. at $1.25	506.25	
18-inch reinforced concrete pipe, 64.0 lin. ft. at $2.58	165.12	
24-inch reinforced concrete pipe, 236.0 lin. ft. at $3.35	790.60	
30-inch reinforced concrete pipe, 144.0 lin. ft. at $4.25	612.00	
Class "A" concrete, 60.55 cu. yds. at $25.00	1,513.75	
Class "C" concrete, 33.0 cu. yds. at $20.00	660.00	
Reinforcing steel, 3,177.0 lbs. at 10c	317.70	
6-inch porous drain tile, 66.0 lin. ft. at 29c	19.14	
Force account items:		
Removing concrete crosswalks in Monmouth	149.63	
Improving detour around construction	22.93	
Clearing and grubbing	347.87	
Placing wooden headers for pavement (to be left in place)	2,406.76	
Constructing bleeders	772.91	
Constructing standard wood guard fence	80.99	
Redecking bridge and painting handrail, Sta. 996+00	57.05	
Total amount earned by contractor	$253,270.03	

[POLK]

EXPENDITURES—Continued

Deductions:		
Reduction in freight rates	8,021.37	
War tax on freight	958.21	
Total deductions	$ 8,979.58	
Total amount paid to contractor		244,290.45
Grand total cost of project (all State funds)		$258,067.50

Monmouth-Benton County Line Post Road Project

Bids for the paving of the section from Monmouth to a point 1,708 feet south of the Polk-Benton County Line were received on May 10, 1922. Cummins & La Point of McMinnville were the low bidders for the construction of a 7-inch by 16-foot cement concrete pavement, with 2-foot crushed gravel shoulders on each side. The original bid included the construction of 2,042 lineal feet of concrete pavement to complete certain gaps on the section south of Corvallis, but this work was eliminated prior to the award of the contract.

Awaiting the results of legal actions and the close of the negotiations for a financial adjustment with Polk County, the award of the contract was held in abeyance until November 24, at which time the award was made to the low bidders.

There was included in this contract the construction of two bridges across Soap Creek, in addition to the paving and surfacing.

The work is being undertaken in cooperation between the State and Federal Government under the terms of Project Agreement No. 57, and is estimated to cost a total of $274,000.00. This estimated cost will be shared $106,435.54 by the State and $167,564.46 by the Federal Government. The expenditures to date, which cover only preliminary engineering charges, amount to $142.21.

Monmouth-Kings Valley Surfacing

Owing to legal questions in dispute in the County, as previously narrated, the grading operations on the Monmouth-Suver Section were delayed to such an extent that the new grade for a distance of about 3.7 miles south of Monmouth was only partly finished when the early fall rains of 1921 began. As an emergency measure, a fleet of State trucks began placing gravel on this section in order to provide a passable road for the winter. Gravel was hauled from a commercial plant at Independence, and a gravel surface approximately 8 feet wide and 2.2 miles in length was placed on all graded sections, where the old road rock had been disturbed, between Monmouth and the steam shovel cut at the Luckiamute River. This cut and points south to the Suver road were impassable on account of construction operations, and no attempt was made to do anything on this section. The work was handled by H. B. Fletcher, Resident Engineer, and required expenditures of $6,538.28 from State funds.

Monmouth-Luckiamute River Surfacing

The grading completed during 1922 on this section has been covered with an 8-foot gravel surface by State forces. Operations were similar to those carried on during the previous year, gravel being hauled by trucks from Independence. Gaps totalling 1.4 miles in length were connected up, giving a narrow graveled winter road from Monmouth to the Valley & Siletz Railroad crossing at the Luckiamute River.

The work was handled under the supervision of H. B. Fletcher, Resident Engineer, and is estimated to cost a total of $2,500.00 when all final entries have been made. The expenditures entered to date amount to $1,932.55 from State funds.

[POLK]

Suver-Benton County Line Surfacing

On account of construction work on the Pacific Highway south of Salem during 1921, the West Side Highway, from Corvallis to Suver and thence over the County Road, via Independence, to Salem, was used to a large extent as a north and south route. The highway from the end of the pavement north of Corvallis to the Suver road, a distance of 1.98 miles, soon showed distress, particularly after rains. As an emergency measure, a light lift of pit-run gravel from 8 to 10 feet in width was placed over the section.

This work was performed in September, October and November of 1921 under the supervision of J. G. Garrow, Resident Engineer, and required expenditures of $2,814.66 from State funds.

Rickreall-Holmes Gap Surfacing

This section extends from a point 1,802 feet south of the end of the pavement on the Amity-Holmes Gap Section to a junction with the Salem-Dallas Highway at Rickreall, a total distance of 4.96 miles. In order to keep the road open for traffic during the winter season, the graveling of this section was authorized by the State Highway Commission as an emergency measure, the work to be done on a State force basis. Under this authorization a total of 3.44 miles were provided with a gravel surfacing, the sections where the newly constructed highway does not follow the old road being omitted.

The grading of the project was finished, except for the south 1.38 miles, during October, 1921, which was too late in the season to undertake paving during that year. The remaining 1.38 miles were graded during 1922. It has been expected to pave the entire section during the present year, but owing to reopening of the controversy respecting Polk County highway construction and the institution of further litigation by citizens of the County, the low bid received on May 9 was held up, and the contract was not awarded until on November 24. This prevented all possibility of getting the project paved during the present winter, and the gravel has been extended to cover the 1.38 miles graded during 1922. This work was done by Polk County and the V. R. Dennis Construction Company upon agreed prices.

The State force work during 1921 was handled by the Equipment Department, and the work during the present year has been under the supervision of E. A. Collier, Resident Engineer.

The total expenditures on the surfacing amount to $7,783.15 from State funds.

Yamhill County Line-Butlers Store Grading and Surfacing

The contract for this section was awarded during 1920, and a descriptive article may be found on page 343 of the last report. The grading and surfacing of the section was approximately 95 per cent complete at the close of the 1921 working season. The close of that season was marked by the severe storm and freshets which began about November 20. Approximately three-quarters of the length of the section was under water, varying in depth from a few inches to four feet, and the newly finished surfacing was damaged considerably by having all the fine materials washed out. This resulted in the work extending over into the 1922 season and its completion being delayed until September 15 of the year. It also accounts for most of the excess of the final cost over preliminary estimate.

[POLK]

Contrary to the statement made in the descriptive article in the last report, the section is 7.25 miles in length.

In addition to grading and surfacing, the road was stocked for future maintenance with approximately 175 cubic yards of top-course materials per mile. A considerable part of this was lost during the 1921 freshets and replaced during 1922.

It is expected that final payments will bring the total cost of the work to $133,500.00, to be paid entirely from State funds. The expenditures to date amount to $130,307.48, of which $129,938.92 was paid out during the present biennium.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 14,324.96
Labor and material furnished by State:		
Royalty on rock from Rowell quarry		6.00
Royalty on rock from Tharp quarry		670.46
Crushed rock placed by W. N. Trent		390.00
Constructing approach to Yamhill River bridge		211.20
Constructing standard wood guard fence		100.10
Repairing damage caused by flood of 1921		1,174.29
Rental and repair of State-owned equipment (to be deducted from contractor's estimate)		1,819.07
Contract items as follows:		
Clearing and grubbing, all	$ 350.00	
Common excavation, 18,522.4 cu. yds. at 60c	11,113.44	
Intermediate excavation, 508.4 cu. yds. at $1.00	508.40	
Solid rock excavation, 792.4 cu. yds. at $1.50	1,188.60	
Overhaul, 3,825.0 sta. yds. at 5c	191.25	
10-inch plain concrete pipe, 32.5 lin. ft. at $1.25	40.63	
12-inch plain concrete pipe, 456.0 lin. ft. at $2.25	1,026.00	
18-inch reinforced concrete pipe, 72.0 lin. ft. at $4.00	288.00	
24-inch reinforced concrete pipe, 84.0 lin. ft. at $5.00	420.00	
36-inch reinforced concrete pipe, 100.0 lin. ft. at $6.50	650.00	
30-inch corrugated galvanized iron pipe, 32.0 lin. ft. at $6.50	208.00	
6-inch porous drain tile, 4,054.0 lin. ft. at 25c	1,013.50	
Class "C" concrete, 79.45 cu. yds. at $25.00	1,986.25	
Rubble masonry, 125.7 cu. yds. at $10.00	1,257.00	
Lumber and timber, 14.077 M.-FBM. at $60.00	844.62	
Side ditch excavation, 724.0 cu. yds. at $1.00	724.00	
Broken stone surfacing, 22,034.5 cu. yds. at $3.90	85,934.55	
Maintenance materials, placed in piles, 1,806.0 cu. yds. at $3.40	6,140.40	
Broken stone backfill for tile drains, 273.5 cu. yds. at $3.40	929.90	
Sprinkling surfacing materials, 20,736.0 cu. yds. at 7c	1,451.52	
Force account items:		
Removing old planking from highway and piling adjacent to railway track as per agreement	158.62	
Extra clearing and grubbing due to change in alignment	214.43	
Total amount earned by contractor	$116,639.11	
Deductions:		
Rental and repair of State-owned equipment	1,575.81	
Percentage retained until completion of contract	3,451.90	
Total amount paid to contractor		111,611.40
Grand total expended (all State funds)		$130,307.48

Benton County Line-North Section

A description of this project will be found on page 342 of the last report. As stated therein, no pavement had been laid at the close of the last biennium. On account of the controversial conditions existing in the County, the paving of this section was cancelled at the same time as the contract on the Salem-Brunks Corner section was terminated, and final acceptance was given to the grading and surfacing which had been done.

[POLK]

This section was later included in the contract which was awarded for paving from Monmouth to the Benton County Line.

Expenditures of $2,619.57 have been made during the present biennium from State funds. In addition to this, the sum of $13,449.72 has been received from the County for their total cooperative share. These entries bring the total cost of the work to $18,566.44, of which the State has paid $5,116.72 and the County has cooperated to the extent of the amount mentioned above.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,960.42
Contract items as follows:		
Clearing and grubbing, all	$ 250.00	
Excavation, no classification, 14,796.9 cu. yds. at 75c	11,097.68	
Overhaul, 38,250.0 sta. yds. at 3c	1,147.50	
12-inch plain concrete pipe, 108.0 lin. ft. at $1.50	162.00	
24-inch reinforced concrete pipe, 88.0 lin. ft. at $4.00	352.00	
30-inch reinforced concrete pipe, 32.0 lin. ft. at $5.50	176.00	
6-inch porous drain tile, 300.0 lin. ft. at 30c	90.00	
Run-of-bank gravel, 994.0 cu. yds. at $3.15	3,131.10	
Broken stone, 8.0 cu. yds. at $3.15	25.20	
Force account item:		
Extra clearing and grubbing and retrimming side slopes	174.54	
Total amount paid to contractor		16,606.02
Grand total cost of project		$ 18,566.44
Paid by State	$ 5,116.72	
Paid by County	13,449.72	
Total	$ 18,566.44	

Luckiamute River-Suver Grading

The Luckiamute River-Suver Section, south of the Monmouth-Luckiamute River Section, was awarded to H. J. Hildeburn on May 27, 1921. This section extends from a point approximately 3,000 feet south of the Luckiamute River to the crossroad to Suver, and has a total length of 2.29 miles. Progress on the grading was far from satisfactory. Only about one-half mile was graded during 1921 and the balance has been graded during the present year. There still remains to be done, however, the installation of some drain tile and a certain amount of finishing work before the section can be accepted.

The total cost of the project is estimated at $10,500.00, the State share being $2,000.00 and the County share $8,500.00. Expenditures to date amount to $7,917.65 from State funds, and have been made under the supervision of H. B. Fletcher, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,677.91
Contract items as follows:		
Clearing and grubbing, 90 per cent all at $500.00	$ 450.00	
Excavation, single classification, 12,700.0 cu. yds. at 40c	5,080.00	
12-inch plain concrete pipe, 498.0 lin. ft. at $1.50	747.00	
30-inch reinforced concrete pipe, 104.0 lin. ft. at $5.50	572.00	
Total amount earned by contractor	$ 6,849.00	
Percentage retained until completion of contract	609.26	
Total amount paid to contractor		6,239.74
Grand total expended (all State funds)		$ 7,917.65

[POLK]

Holmes Gap-Rickreall Grading

Pursuant to the understanding between the Highway Commission and the Polk County Court regarding the prosecution and financing of work within the County, the grading of the Holmes Gap Section was undertaken under Contract No. 386, awarded to H. J. Hildeburn of Roseburg on May 27, 1921.

The section is 4.96 miles in length, beginning at a point 1,802 feet south of the end of the Amity-Holmes Gap pavement and extending to a juncton with the Salem-Dallas Highway at Rickreall. Construction operations were started on August 16, 1921, and the grading of approximately 70 per cent of the distance was completed during that year. The entire section was completed and given final acceptance on October 20, 1922.

Engineering suprevision was handled by H. E. Abry, Resident Engineer, to January 15, 1922, and by E. A. Collier, Resident Engineer, after that date.

The construction has required expenditures of $16,343.95 from State funds, out of a total estimated cost of $16,793.39. At this time, the sum of $14,843.68 is due from the County for their cooperation on the work.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,949.71
Labor and material furnished by State:		
60 feet of 8-inch corrugated galvanized iron culvert pipe		56.51
Road drag purchased for use on maintenance work		33.40
Rental of State-owned equipment (deducted from contractor's estimate)		284.74
Contract items as follows:		
Clearing and grubbing, all	$ 300.00	
Common excavation, 25,161.7 cu. yds. at 40c	10,064.68	
Overhaul, 10,421.0 sta. yds. at 5c	521.05	
12-inch plain concrete pipe, 282.0 lin. ft. at $1.50	423.00	
18-inch reinforced concrete pipe, 144.0 lin. ft. at $3.10	446.40	
30-inch reinforced concrete pipe, 64.0 lin. ft. at $6.00	384.00	
Class "A" concrete, 57.60 cu. yds. at $25.00	1,440.00	
Class "C" concrete, 19.08 cu. yds. at $25.00	477.00	
Metal reinforcement, 4,823.0 lbs. at 10c	482.30	
6-inch porous drain tile, 390.0 lin. ft. at 35c	136.50	
Gravel backfill for tile drains, 28.2 cu. yds. at $2.25	63.00	
Total amount earned by contractor	$ 14,737.93	
Deduction for rental of State-owned equipment	284.74	
Percentage retained until completion of contract	433.60	
Total amount paid to contractor		14,019.59
Grand total expended (all State funds)		$ 16,343.95

Monmouth-Luckiamute River Grading

As outlined in detail under the general article on Polk County, it was desired to proceed with the grading of the section between Monmouth and Suver on the West Side Highway.

Contract No. 387, for grading the 5.24 miles between Monmouth and the south end of the fill across the overflow land below the Luckiamute River, was awarded to W. N. Trent of McMinnville on May 27, 1921. Most of the heavier grading was finished during that year, including about 80 per cent of the big cut north of the Luckiamute River. There were included in the contract two small concrete bridges, just south of Monmouth, and a frame trestle high-water relief opening south of the Luckiamute River. Subsequent to the award of the contract, it was deemed advisable to construct a pile trestle instead of the frame trestle

originally specified, and the contractor was authorized to drive piles on a force account basis. The superstructure was constructed at the unit price bid for lumber and timber.

The grading was closed down during the winter of 1921, and operations were resumed early in the spring of the present year, the contract being finally completed on August 15.

Operations were carried on under the supervision of H. B. Fletcher, Resident Engineer, and are estimated to cost a total of $51,000.00 when all final expenditures have been made. The Polk County share of the work is $46,000.00 and the State will pay the balance of $5,000.00. Expenditures to date amount to $47,204.50 and include $39,467.48 from County funds and $7,737.02 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,844.06
Materials furnished by State for replanking old bridge at Sta. 1283+00		163.50
Rental of State-owned truck (to be deducted from contractor's estimate)		250.00
Contract items as follows:		
Clearing and grubbing, all	$ 200.00	
Excavation, single classification, 20,895.0 cu. yds. at 40c	8,358.00	
Excavation, single classification (Sta. 1271 to Sta. 1279), 25,500.0 cu. yds. at 90c	22,950.00	
Metal reinforcement, 14,278.0 lbs. at 11c	1,570.58	
Rock backfill for tile drains, 100.00 cu. yds. at $4.25	425.00	
Lumber and timber, 89.320 M.-FBM. at $45.00	4,019.40	
12-inch plain concrete pipe, 345.0 lin. ft. at $1.50	517.50	
18-inch reinforced concrete pipe, 99.0 lin. ft. at $2.25	222.75	
6-inch porous drain tile, 1,535.0 lin. ft. at 20c	327.00	
Class "A" concrete, 96.23 cu. yds. at $30.00	2,886.90	
Class "B" concrete, 41.33 cu. yds. at $27.00	1,115.91	
Class "C" concrete, 11.70 cu. yds. at $25.00	292.50	
Force account items:		
Removing old culvert pipe at Sta. 1264+00	10.45	
Replanking old bridge at Sta. 1283+00	23.41	
Moving right-of-way fence to gain access to borrow pit	16.58	
Driving piles for bridge foundation at Sta. 1307+00	1,626.87	
Raising grade of south approach to Luckiamute River bridge	389.49	
Total amount earned by contractor	$ 44,952.34	
Percentage retained until completion of contract	3,005.40	
Total amount paid to contractor		41,946.94
Grand total expended		$ 47,204.50
Paid by State	$ 7,737.02	
Paid by County	39,467.48	
Total	$ 47,204.50	

Yamhill River Bridge Near Willamina

On that section of the McMinnville-Tillamook Highway which lies within Polk County, there are two crossings of the Yamhill River. The final location of the highway cuts off a loop of the present road and crosses the river some distance from the old bridge. The old bridge is in very bad shape and almost unfit for traffic at the present time.

Contract No. 521 was awarded on April 14th, 1922, to Marshall & Barhan for the construction of a new bridge on the revised alignment. Bids were taken on both wood and steel truss construction, but the cost of the wood design was not enough below that of the steel to warrant its selection. The design as contracted consists of a 120-foot steel span, with 57 feet of wood trestle approach.

Work started on June 24, and, at the present time, the structure is complete except for placing the deck on the main span and some other minor work. Progress during the summer was hindered considerably on account of nondelivery of structural steel.

The total estimated cost is $13,000.00 from State funds, of which $9,436.80 has been expended to date. O. A. Chase, Resident Engineer, is in charge of the work.

Amity-Holmes Gap Bridges

This work was completed during the last biennium, and a descriptive article is given on page 343 of the last report. During the present biennium a credit of $237.16 has been taken for materials on hand at the close of the work, and a payment of $12,206.01 has been received from Yamhill County. These entries bring the total cost of the structures to $22,795.60, of which amount the State has expended $10,589.59 and Yamhill County has cooperated to the extent of $12,206.01 as their final share. The Polk County share is $9,457.36, and reimbursement is due the State by the County for advancing this amount.

Maintenance

Maintenance work in Polk County has included no special items nor any great volume of work. The sections from Brunks Corner to Dallas, on the Salem-Dallas Highway, and from Holmes Gap to Rickreall and Monmouth to the Benton County Line, on the West Side Highway, have been under construction for most of the time during the past two years and have required little expenditure for maintenance by the State.

General maintenance of drainage, shoulders and surfacing on the other sections in the County, and a small amount of pavement repair on the Salem-Brunks Corner Section have constituted the major requirements. This pavement repair work was handled under a force account arrangement with the V. R. Dennis Construction Company, during 1921, and by Marion County during 1922. The materials required were furnished from paving plants at Rickreall and Salem, respectively.

Salem-Brunks Corner Shoulders and Ditching

The work on the Salem-Dallas Section was suspended in August, 1920, with the pavement completed, 5.51 miles, from the west end of the Willamette River Bridge at Salem to a point near Brunks Corner. The shoulder construction and ditching were only partially done, and the completion of this work has been undertaken during 1922.

Bids were advertised to be received on August 29, 1922, but no proposals were submitted, and the work was ordered done by State forces. Operations are being handled by the Equipment Department, with B. O. Shucking, Superintendent, in charge, and are being done under a betterment order.

Engineering County Bridges

During the present biennium, the State has spent $340.61 for engineering on bridges constructed in the County on other than State highways.

The principal structures of this kind were a steel span over Rickreall Creek, near Hosford, and one over the Luckiamute River, about five miles west of Monmouth.

[POLK]

Holman Park Site

One of the most attractive spots along the Salem-Dallas Highway, made particularly valuable by a fine spring of water, is a tract at Eola, located north of the highway and about one-quarter mile east of Eola Station. For the protection of this spring and the adjacent timber, the Highway Commission acquired from Thomas Holman of Eola a strip approximately 1,500 feet long along the highway and extending back for a distance of 300 feet from the center line of the road. The tract contains 9.8 acres, exclusive of the highway right-of-way.

Holmes Gap-Rickreall Survey

During March and April of 1921, the location of the West Side Highway between Holmes Gap and Rickreall was revised and finally determined. The principal changes involved were in the location for the proposed overcrossing at Holmes Gap and in the line through the Riggs property and around Clark Hill, about two miles north of Rickreall. These revisions were made by H. B. Fletcher, Resident Engineer.

Monmouth-South Survey

A complete description of this survey is given on page 345 of the last report. During the spring of 1921, however, the original location survey was retraced in preparation for the award of contracts for grading. A revision was made in the vicinity of Cemetery Hill, a revised location being adopted around the east side of the hill in place of the original line on the west side. A slightly lower line with less curvature, was obtained by this revision and the securing of right-of-way by the County was simplified.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Polk County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 54,694.49
2.	State Funds apportioned to County	76,431.93
3.	County levy made to match State Funds	82,900.53
4.	County Market Road Funds collected	68,967.85
5.	Cash paid to County by State	62,602.52
6.	State expenditures, deducted from apportionment	4,890.05
7.	Cash due County from State in December, 1922	8,939.36
8.	County expenditures on Market Roads	142,712.50
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Polk County received from the State Market Road Fund $21,737.44 more than it paid into the fund. The excess is Polk County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $82,900.53. Of this amount they have collected and credited to the Market Road Fund only $68,967.85.

The County Court has designated 15 roads to be improved as Market Road projects. Construction work has been done on 14 projects.

Surveys were made and plans prepared by engineers in the employ of the State Highway Commission. A survey was made and plans and

estimates prepared on the Salt Creek-Wallace Bridge Road, on which no construction work has been done.

The construction work has been done by contract and by County forces under the direction of the County Court. They have graded 11 miles, surfaced with gravel 18 miles and paved with asphaltic concrete 1.3 miles.

SHERMAN COUNTY

Sherman County, consisting mainly of plateau land lying between the Deschutes River and the John Day River, is one of the major wheat-raising sections of the State and, although well served by a railroad running north and south through the center of the County and one east and west along the northern boundary, the people of the County have been insistent upon a complete system of both State and County roads. In answer to this demand the Sherman Highway was designated as a part of the State highway system upon the completion of the Columbia River Highway. When completed, it will provide a north and south highway artery, extending from a junction with the Columbia River Highway near Biggs, through Wasco, Moro, Grass Valley, Kent and Shaniko, to a junction with The Dalles-California Highway at the top of the Cow Canyon grade in southern Wasco County.

At the present time the Columbia River Highway has been graded and surfaced the entire distance across the County, and work is well along on the Sherman Highway. The section from Biggs to Wasco is under construction for grading and surfacing, and will be completed during 1923. The highway has been completed from Wasco to Grass Valley and the section south to the Wasco County line is planned for 1923 construction as a Post Road project. In all probability, contracts for this work will be awarded during the coming winter.

State work in the County was supervised by J. H. Scott, Division Engineer, until April 1, 1923, at which time the district was taken over by C. W. Wanzer, Division Engineer.

Sherman County Post Road Project

This section is described in an article given on page 347 of the last report, and has been carried to completion during the present biennium.

The grading of the section, together with the bridges included under this particular contract, has required additional expenditures of $69,-637.19. Of these expenditures, the State has paid $28,172.18, the County $2,478.48 and the Federal Government $38,986.53, bringing the total cost of the work to $242,644.39; towards which the County has contributed $2,478.48, the Federal Government $108,237.34 and the State has paid the balance of $131,928.57.

The Spanish Gulch bridge has also required further expenditures of $3,875.76. During the two-year period the County has contributed $4,243.29, and cooperation in the amount of $10,322.21 has been received from the Federal Government, leaving a credit of $10,689.74 to State funds for the two-year period. These entries bring the total cost of the structure on the books to $22,142.54, of which amount the State has paid $7,577.04, the County $4,243.29 and the Federal Government $10,322.21.

Owing to the sandy nature of the roadbed, the heavy rains of the winter of 1920 did not interrupt the surfacing work, and in fact the rains were all that made the hauling of surfacing materials possible. Crushed gravel was used for the surfacing, and has provided a very satisfactory surface and one that is holding up excellently. Work was completed late in the spring of 1921 so there was a large part of the materials that did not get sufficient moisture to properly set-up for the summer traffic. The rains and maintenance work of the following winter corrected this condition, however, and the section has been in very good condition since that time. At the close of the last biennium the expenditures under the surfacing contract amounted to $107.02. During the present biennium

additional expenditures of $127,266.31, consisting of $67,980.75 from State funds and $59,285.56 from Federal Government funds, have been made. These expenditures bring the total cost to $127,373.33, towards which the Federal Government has cooperated in the amount stated above and the State has paid the balance.

In summary, the grading, bridges and surfacing on the project have cost a total of $392,160.26, with the State paying $207,593.38, the County $6,721.77 and the Federal Government $177,845.11.

DETAILED STATEMENT OF EXPENDITURES

GRADING—		
Engineering		$ 16,333.31
Constructing drainage pipe line near Ray		968.48
Guarding O.-W. R. & N. Railway tracks against damage		906.08
Items deducted from contractor's estimate:		
Rental of State-owned equipment		922.57
Cement furnished by State		370.46
Contract items as follows:		
Clearing and grubbing, all	$ 100.00	
Common excavation, 163,488.0 cu. yds. at 38c	62,125.44	
Intermediate excavation, 38,927.0 cu. yds. at 60c	23,356.20	
Solid rock excavation, 52,876.0 cu. yds. at $1.45	76,670.20	
Overhaul, 260,387.0 cu. yds. at 3c	7,811.61	
12-inch plain concrete pipe, 768.0 lin. ft. at $2.00	1,536.00	
12-inch corrugated galvanized iron pipe, 1,018.0 lin. ft. at $1.75	1,781.50	
18-inch corrugated galvanized iron pipe, 292.0 lin. ft. at $2.50	730.00	
24-inch corrugated galvanized iron pipe, 704.0 lin. ft. at $3.00	2,112.00	
36-inch corrugated galvanized iron pipe, 148.0 lin. ft. at $6.00	888.00	
Class "A" concrete, 433.1 cu. yds. at $35.00	15,158.50	
Class "C" concrete, 128.71 cu. yds. at $30.00	3,861.30	
Concrete handrail, 212.0 lin. ft. at $3.50	742.00	
Metal reinforcement, 39,539.0 lbs. at 9c	3,558.51	
Structural steel, 17,325.0 lbs. at 10c	1,732.50	
Rubble masonry, 627.6 cu. yds. at $8.00	5,020.80	
Riprap, 255.0 cu. yds. at $2.00	510.00	
Force account items:		
Extending private water pipe through embankment	117.30	
Moving and rebuilding railroad right-of-way fence	404.13	
Removing, relaying and extending existing culvert pipe	775.16	
Covering slopes with manure and straw to prevent wind erosion	1,505.89	
Lowering water pipe line of City of Rufus	10.14	
Removing stubs of telephone poles from right-of-way	16.90	
Installing 48-inch concrete culvert pipe	230.55	
Constructing 9-inch siphon	157.49	
Cleaning borrow pit near Deschutes River bridge	4.65	
Graveling and rocking slopes of fill to prevent wind erosion	445.32	
Cleaning out debris from inlet and outlet of Fulton Canyon bridge	29.02	
Rock protection for culvert headwall on railroad encroachment at Miller	11.41	
Resloping cuts to prevent slides	388.32	
Removing loose rock and boulders from railroad right-of-way	194.94	
Excavating ditches between Sta. 204 and Sta. 206	15.77	
Reimbursing contractor for loss of time of bridge crew at Fulton Bridge, pending settlement of railroad encroachment proceedings	280.47	
Patrolling, repairing and removing telegraph poles by Western Union crew	2,212.82	
Adjustment with contractor covering loss sustained pending settlement of encroachment proceedings	9,941.68	
Total amount earned by contractor	$224,436.52	

[SHERMAN]

EXPENDITURES—Continued

Deductions:		
Rental of State-owned equipment	922.57	
Cement furnished by State	370.46	
Total deductions	$ 1,293.03	
Total amount paid to contractor		223,143.49
Grand total cost of project		$242,644.39
Paid by State	$131,928.57	
Paid by County	2,478.48	
Paid by Government	108,237.34	
Total	$242,644.39	

SPANISH GULCH BRIDGE—

Engineering		$ 926.11
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 approaches, 322.0 cu. yds. at $32.15	10,352.30	
Wooden truss span, lump sum	4,905.00	
Riprap, 63.2 cu. yds. at $4.00	252.80	
Force account items:		
Extra work due to change in design	123.78	
Total amount paid to contractor		21,216.43
Grand total cost of structure		$ 22,142.54
Paid by State	$ 7,577.04	
Paid by County	4,243.29	
Paid by Government	10,322.21	
Total	$ 22,142.54	

SURFACING—

Engineering		$ 3,359.63
Labor and material furnished by State:		
Removing slides at Rufus		167.53
Seeding slopes to grass to prevent wind erosion		101.95
Royalty on gravel taken from Dayo and Fulton pits near Rufus		2,144.51
Guarding railway property from damage during construction		176.40
Rental of State-owned equipment (deducted from contractor's estimate)		1,304.52
Contract items as follows:		
Crushed gravel, 35,293.0 cu. yds. at $3.20	$112,937.60	
Force account items:		
Constructing rubble masonry spillways connecting with railroad culverts	73.07	
Removal of slides and sowing grass seed on slopes	8,270.88	
Hauling culvert pipe from Sta. 460+87 to Sta. 95+20	13.41	
Repairing damage to embankment caused by wind erosion	24.61	
Riprapping approaches to Spanish Gulch bridge	22.47	
Erecting fence around Fulton gravel pit	81.27	
Total amount earned by contractor	$121,423.31	
Deduction for rental of State-owned equipment	1,304.52	
Total amount paid to contractor		120,118.79
Grand total cost of project		$127,373.33
Paid by State	$ 68,087.77	
Paid by Government	59,285.56	
Total	$127,373.33	

GRAND SUMMARY OF EXPENDITURES

	State	*County*	*Government*	*Total*
Grading	$131,928.57	$ 2,478.48	$108,237.34	$242,644.39
Surfacing	68,087.77	.....	59,285.56	127,373.33
Spanish Gulch Bridge	7,577.04	4,243.29	10,322.21	22,142.54
Totals	$207,593.38	$ 6,721.77	$177,845.11	$392,160.26

Wasco-Moro Grading and Surfacing

The first contracts to be awarded on the Sherman Highway were between Wasco and Grass Valley, the work being divided in two sections, and a separate contract let for each.

The grading and surfacing of the north unit, extending from Wasco to a point approximately 1.2 miles northeast of Moro, was awarded to Bauers & Bauers of Dayton, Washington, on October 25, 1921. This section has a total length of 7.5 miles and was awarded under Contract No. 472. No unusual difficulties were encountered during construction, and the work progressed satisfactorily, being given final acceptance on August 1, 1922.

Construction was supervised by Chas. L. Hill, and required total expenditures of $69,049.92. Of this amount the State paid $36,477.77 and the County cooperated to the extent of $32,572.15.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,905.57
Contract items as follows:		
Clearing and grubbing, all	$ 10.00	
Common excavation, 42,982.2 cu. yds. at 44c	18,912.17	
Intermediate excavation, 3,670.9 cu. yds. at 70c	2,569.63	
Solid rock excavation, 3,670.6 cu. yds. at $1.50	5,505.90	
Overhaul, 66,708.0 sta. yds. at 4c	2,668.32	
12-inch corrugated galvanized iron pipe, 858.0 lin. ft. at $1.30	1,115.40	
18-inch corrugated galvanized iron pipe, 112.0 lin. ft. at $2.10	235.20	
24-inch corrugated galvanized iron pipe, 46.0 lin. ft. at $4.60	211.60	
Riprap, 75.6 cu. yds. at $2.50	189.00	
Class "A" concrete, 119.8 cu. yds. at $24.00	2,875.20	
Class "C" concrete, 48.8 cu. yds. at $24.00	1,171.20	
Metal reinforcement, 9,816.0 lbs. at 7c	687.12	
Broken stone surfacing, 14,479.5 cu. yds. at $1.75	25,339.13	
Maintenance rock, placed in piles, 751.0 cu. yds. at $2.25	1,689.75	
Earth filler, 3,257.0 cu. yds. at 25c	814.25	
Payhaul on filler, 931.0 yd. mi. at 40c	372.40	
Standard wood guard fence, 1,200.0 lin. ft. at 60c	720.00	
Force account items:		
Moving culverts account change in plans	58.08	
Total amount paid to contractor		65,144.35
Grand total cost of project		$ 69,049.92
Paid by State	$ 36,477.77	
Paid by County	32,572.15	
Total	$ 69,049.92	

Moro-Grass Valley

During 1921, Sherman County constructed, as a Market Road, a portion of the Sherman Highway, extending from the south end of the contract mentioned above to a point approximately one mile south of Moro. Consequently this portion was omitted when the State contracts for the improvement between Wasco and Grass Valley were awarded.

Contract No. 473, for the grading and surfacing of the remaining 8.64 miles between Moro and Grass Valley, was awarded to Bauers & Bauers of Dayton, Washington, on October 25, 1921. Construction was started on March 27, 1922, and was completed on November 9, although final payment has not yet been made.

The work was handled by Chas. L. Hill, Resident Engineer, and is estimated to cost a total of $67,000.00. The State share of this amount

is estimated at $36,000.00, with the County cooperating to an estimated share of $31,000.00. Expenditures to date amount to $49,038.71, of which the State has paid $26,744.97 and the County has contributed $22,293.74.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,124.86
Sprinkling macadam by State forces		326.33
Contract items as follows:		
Common excavation, 36,983.0 cu. yds. at 41c	$ 15,163.03	
Intermediate excavation, 875.0 cu. yds. at 65c	568.75	
Solid rock excavation, 1,553.0 cu. yds. at $1.60	2,484.80	
Overhaul, 10,425.0 sta. yds. at 4c	417.00	
12-inch corrugated galvanized iron pipe, 904.0 lin. ft. at $1.30	1,175.20	
18-inch corrugated galvanized iron pipe, 284.0 lin. ft. at $2.10	596.40	
24-inch corrugated galvanized iron pipe, 150.0 lin. ft. at $4.60	690.00	
Class "A" concrete, 68.47 cu. yds. at $24.00	1,643.28	
Class "C" concrete, 55.71 cu. yds. at $24.00	1,337.04	
Metal reinforcement, 3,743.0 lbs. at 7c	262.01	
Broken stone surfacing, 13,480.0 cu. yds. at $1.70	22,916.00	
Maintenance rock, placed in piles, 556.0 cu. yds. at $2.25	1,251.00	
Earth filler, 2,400.0 cu. yds. at 21c	504.00	
Payhaul on filler, 426.0 yd. mi. at 40c	170.40	
Total amount earned by contractor	$ 49,178.91	
Percentage retained until completion of contract	4,591.39	
Total amount paid to contractor		44,587.52
Grand total expended		$ 49,038.71
Paid by State	$ 26,744.97	
Paid by County	22,293.74	
Total	$ 49,038.71	

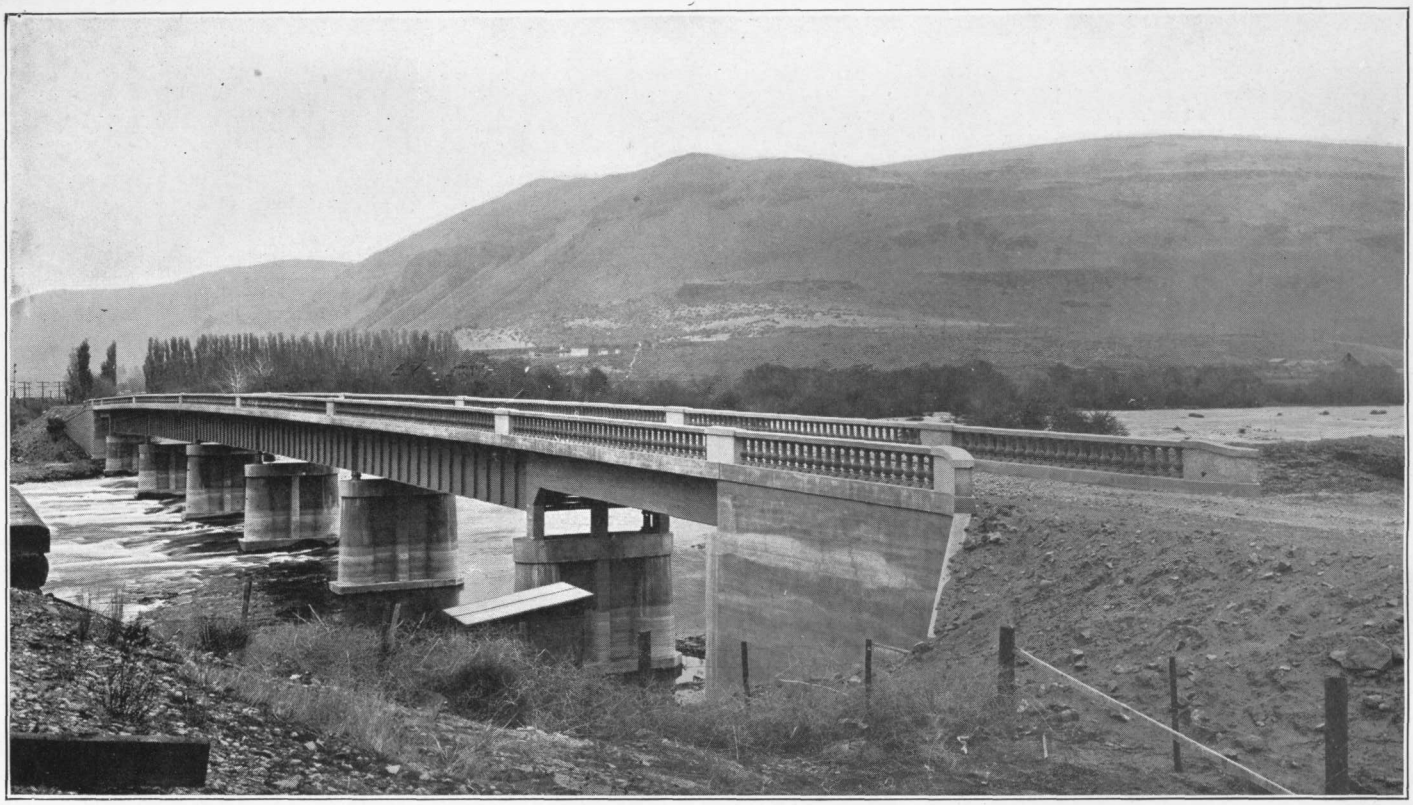
Sherman County Guard Fence

Upon completion of the grading and surfacing of the Columbia River Highway in Sherman County, and after an interval had been allowed for the proper settlement of embankments, Contract 376 was awarded to A. Guthrie & Company of Portland, Oregon, on May 26, 1921, for the construction of all required guard fences on the project. These fences were placed in intermittent sections on sharp curves, high fills and other dangerous points.

Work was started June 13, 1921, and completed on July 30 of the same year, under the supervision of C. C. Seeley, Resident Engineer, with a total expenditure of $7,264.66 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 211.14
Credit for salvage of lumber not used	(credit)	136.34
Contract items as follows:		
Standard wood guard fence, 7,896.0 lin. ft. at 87c	$ 6,869.52	
Force account item:		
Labor and material for guard fence, not included in contract	320.34	
Total amount paid to contractor		7,189.86
Grand total cost of project (all State funds)		$ 7,264.66



BRIDGE OVER THE DESCHUTES RIVER BETWEEN SHERMAN AND WASCO COUNTIES

Biggs-Wasco Grading and Surfacing

The section between Biggs and Wasco is the latest one which has been placed under contract for improvement on the Sherman Highway. The line follows closely the Shaniko Branch Railroad throughout the entire distance and encroaches on the right-of-way occupied by the railroad, telegraph and telephone lines between Stations 310 and 370. On this account, special agreements had to be entered into with the respective companies in order to permit work to proceed.

Contract No. 537 for the grading and surfacing was awarded to Pat Lonergan of Pendleton on May 9, 1922. The section is 9.45 miles in length, and begins at the Columbia River Highway at Biggs, extending to the intersection of Clark and Main Streets in the Town of Wasco. Operations were started on June 1, 1922, and the work should be completed early during the 1923 season.

The estimated cost of the project is $155,000.00, to be shared $85,000.00 by the State and $70,000.00 by the County. Expenditures to date amount to $14,714.48, consisting of $8,047.17 from State funds and $6,667.31 from County funds.

Construction is being carried on under the supervision of Chas. L. Hill, Resident Engineer.

Deschutes River Bridge

The construction of this structure is fully covered in an article given on page 350 of the last report. During the present biennium additional expenditures of $404.04 have been made by the State, bringing the total cost of the work to $81,595.30. Of this amount Sherman and Wasco Counties have contributed $25,000.00 each and the State has paid the balance of $31,595.30.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,751.11
Cement furnished by State		5,251.07
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, 87,907.0 lbs. at 8c	7,032.56	
Structural steel, all	26,943.84	
Reinforced concrete handrail, 1,128.0 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 amount earned by contractor	$ 71,818.36	
Deductions:		
Freight rate reduction and war tax exemptions	225.24	
Total amount paid to contractor		71,593.12
Grand total cost of structure		$ 81,595.30
Paid by State	$ 31,595.30	
Paid by Sherman County	25,000.00	
Paid by Wasco County	25,000.00	
Total	$ 81,595.30	

Shearars' Bridge

At Shearars' Bridge, the Deschutes River flows through a deep, narrow gorge providing an excellent opportunity to bridge the stream at a moderate cost. A bridge was built at this place in the early days,

which well served the needs of the people until the recent advent of heavy motor traffic. This brought about a demand for a new and heavier structure.

Accordingly, at the request of the Wasco County Court, a design was prepared calling for a 60-foot deck steel span, on concrete abutments. Bids were received for its construction on October 5, 1922, but all were rejected as being too high. Bids were again received on November 21, 1922, at which time the construction was awarded to the Union Bridge Company under Contract No. 611. The total cost will be about $6,000.00, all to be paid from County funds.

Maintenance

Upon completion of the surfacing of the Columbia River Highway through the County, maintenance headquarters were established at Rufus, with equipment consisting of a quad truck, an 8-foot grader, road drags and necessary small tools. The work done from these headquarters has consisted of blading and dragging the gravel surfacing as needed, cleaning ditches, removing snow, removing slides, cutting weeds and building up the roadbed shoulders.

After the designation of the Sherman Highway as a part of the State system, the sections previously constructed by the County as Market Roads were taken over and maintained by the State, under the supervision of the Resident Engineer located at Wasco. At the present time, the grading and surfacing from Wasco to Grass Valley has been practically completed and maintenance headquarters will be established at Moro, being provided with the same class of maintenance equipment as has been placed at Rufus.

Traffic in Sherman County was tied up only for a few days after the severe storms of November, 1921. The few snow drifts which formed along the Columbia River Highway were soon broken through by the use of a quad truck and grader.

Columbia River Highway Oiling

The work of this class which was done during the previous biennium is described on page 349 of the last report. Further oiling has been done during the present biennium and an additional 16 acres have been oiled. Additional oiling will be necessary every year, as a large amount of sand is shifted by the annual high waters, and in addition to this the action of the wind will continue to cause erosion of the long slopes.

Expenditures during the present biennium amount to $2,089.14 and bring the total cost of the work to $11,461.28 from State funds.

Biggs-Wasco County Line Survey

When the Sherman Highway was adopted as a portion of the State highway system, the Highway Commission ordered location surveys made over the entire line.

Location of the section from Biggs to Grass Valley was made during June and July of 1921. Of the total length of this portion of 28.6 miles, three miles in the vicinities of Moro and Grass Valley have been improved as a Market Road, and the balance has been done by State projects.

The section between Grass Valley and Kent was located during July and August of the same year. This section has a length of 12.4 miles from the south end of the Town of Grass Valley to Kent.

The section from Kent to the Wasco County Line was located in October of 1922. This section has a length of 8.2 miles and extends from Kent to the Wasco County Line.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Sherman County has co-operated as follows:

1.	Paid into the State Market Road Fund	$ 36,745.83
2.	State Funds apportioned to County	51,973.18
3.	County levy made to match State Funds	66,273.14
4.	County Market Road Funds collected	61,008.57
5.	Cash paid to County by State	43,089.11
6.	State expenditures, deducted from apportionment	425.25
7.	Cash due County from State in December, 1922	8,458.82
8.	County expenditures on Market Roads	103,403.58
9.	Balance in County Treasury November 1, 1922	694.10

From the above statement it is apparent that Sherman County received from the State Market Road Fund $15,227.35 more than it paid into the fund. The excess is Sherman County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $66,273.14. Of this amount they have collected and credited to the Market Road Fund only $61,008.57.

The County Court has designated eight sections of road to be improved as Market Road projects.

The engineering work has been done by Homer S. Wall, County Roadmaster. Plans have been submitted and approved.

The construction work has been done by contract and by County forces, under the direction of the Roadmaster. They have graded and surfaced 9.9 miles of road.

TILLAMOOK COUNTY

The season of 1922 has witnessed the completion of the last link in Tillamook County's principal passageway to Portland and the rest of the State. Completion of the section from Willamina to Grand Ronde and the resurfacing of the section from Grand Ronde to Dolph have made the McMinnville-Tillamook Highway one of the best and longest stretches of continuous macadam highway in Western Oregon.

For some time past the bettering road condition has made itself evident to the people by the introduction of services never known before. Faster mail service, daily bread delivery from Portland, frequent and rapid passenger and freight transportation and even the Portland morning paper delivered by breakfast time, are among the benefits enjoyed as a result of the improvement of this highway.

On the Coast Highway considerable progress has also been made during the past two years and two short sections—7.4 miles from Mohler to Jetty Creek at the mouth of the Nehalem River and 8.1 miles from Hobsonville to Rockaway—are now all of that highway in Tillamook County which is not improved or under contract.

In July, 1920, contracts were let for the surfacing of three different sections of the Coast Highway which illustrate well the improvement that is being made in the type of construction of rock and gravel roads in the endeavor to obtain a surfacing that will be substantial, economical to maintain and give the most valuable service. These three sections, the Riverdale-Hobsonville, Beaver-Hebo and Moore Cut-off, were originally let on a specification calling for pit-run gravel surfacing 16 feet wide and eight inches thick, but permitting material as large as 3½ inches if the surfacing was to be laid in one course, or up to 5 inches in the base course if laid in two courses, which was at the contractor's option. The work done during the 1920 season was under these specifications. At the opening of the 1921 work, however, a change was made even at a considerable increase in cost, to a type of construction which has been found to give much better results, to wit, the use of material of a maximum size of 1½ inches in the base and 1 inch in the top course.

On the Beaver-Hebo Section a change was also provided from gravel to crushed rock, and on the Riverdale-Hobsonville Section a variation was made where a specially good grade of run-of-pit gravel was available for the north half of the job, and a maximum size of 2 inches was permitted. These changes have more than justifed the additional cost by the distinctly better results obtained.

In connection with the work in Tillamook County, it should be said that all of the State and cooperative contracts in the County, except paving contracts, have been taken in competitive bidding by the County and that the class of work now being done by the County organization is eminently satisfactory. The spirit of cooperation shown by members of the County Court and their assistants has been very gratifying.

All State work in the County has been supervised by W. D. Clarke, Division Engineer.

Tillamook-South Redress

The Tillamook-South Section comprises five miles from the south end of the County concrete pavement, at point 2.97 miles south of the south city limits of Tillamook City, to a point 0.39 mile north of the Pleasant Valley corner. The section was originally paved during 1917-18 with a two-inch bituminous wearing surface on a broken stone base, and was laid under the pressure of war necessities. Immediately upon completion,

and even during construction, the pavement was subjected to a very heavy traffic consisting of the hauling of spruce timber for war purposes. A large proportion of the breaks which developed early in 1919, and increased in number and area through 1920, are attributed to the punishment of this traffic and to subgrade conditions on parts of the section which were passed over in the urgency of the construction.

In 1921 it was decided to resurface the section, and Contract No. 417 was awarded to the Warren Construction Company on August 25. The resurfacing job consisted of digging out broken spots and refilling with a bituminous base mixture, restoring the crown and general surface with a bituminous binder course and topping the entire section with a two-inch bituminous wearing surface. Gravel for the work was obtained from a bar in the Tillamook River opposite a point approximately two miles south of the north end of the section. Sand was shipped in from the Columbia River and filler was shipped from Morrow County.

The original specifications provided for an average thickness of the binder course of 1½ inches over the south 2.25 miles of the project. A large majority of the breaks were on this portion, and only a very small amount on the remainder of the project. During construction, however, it was found that the full 1½ inches were unnecessary on the south 2.25 miles and that more than had been expected was necessary in order to secure a good job on the balance. An average of ten 1,000-pound batches per station was used for restrengthening the crown and surface, except where plugging or extra strengthening was required. On these sections an average of about 30 batches per station was used.

Reconstruction of the rock shoulders and ditching the roadbed were also included in the contract, and the entire work was completed on December 15, 1921. The work by the contractors was especially painstaking and satisfactory, and they are entitled to special credit for the workmanlike and smooth surface obtained.

Roy Nunn, Resident Engineer, was in charge of the construction. The completed project represents a total expenditure of $131,919.55 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,717.18
Adjustment with Oskar Huber for purchase of Hatch gravel pit in Klamath County		(credit) 2,784.00
Removing small slides		52.50
Thermometer furnished to contractor (deducted from contractor's estimate)		26.00
Contract items as follows:		
Standard wood guard fence, 304.0 lin. ft. at $1.25	$ 380.00	
Crushed gravel for shoulders, 2,837.0 cu. yds. at $3.50	9,929.50	
Binder course material, 4,942.0 batches at $4.39	21,695.38	
Shoulder construction, 51,536.0 lin. ft. at 6c	3,092.16	
Standard bituminous pavement, 2-inch top, 48,436.0 sq. yds. at $1.74	84,278.64	
Force account items:		
Clearing right-of-way to permit new shoulder construction and digging of ditches	802.50	
Repairing existing bituminous pavement where necessary	1,820.19	
Burning surface of existing pavement to insure satisfactory bond with new redress	167.84	
Constructing standard shoulders and excavating ditches to insure drainage	9,767.66	
Total amount earned by contractor	$131,933.87	
Deduction for thermometer furnished by State	26.00	
Total amount paid to contractor		131,907.87
Grand total cost of project (all State funds)		$131,919.55

[TILLAMOOK]

Hemlock-Beaver Paving

This work was done under Contract No. 101, awarded April 15, 1919, and is fully described on page 353 of the last report. At the close of the 1920 season there remained 1.23 miles yet to be completed. This was accomplished during 1921, and, in addition, the 1.5 miles of two-inch pavement laid during 1919 was retopped and thickened with a two-inch bituminous wearing surface. This extra thickness makes this particular 1.5 miles a four-inch pavement, the balance of the section being five inches in thickness. The entire 4.93 miles of the contract has crushed gravel shoulders on each side, two feet in width.

Additional expenditures during the present biennium amount to $89,883.76, and bring the total cost of the work to $195,794.90. These expenditures have been made from State funds in their entirety.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 12,098.47
Labor and materials furnished by State:		
Ditching, widening earth shoulders and excavating for bleeders		2,666.86
Porous drain tile		34.29
Items deducted from contractor's estimate:		
Rental of State-owned steam roller		312.91
Contract items as follows:		
Excavation, no classification, 1,184.0 cu. yds. at 75c	$ 888.00	
6-inch porous drain tile, 3,489.0 lin. ft. at 30c	1,046.70	
8-inch porous drain tile, 460.0 lin. ft. at 36c	165.60	
Broken stone for base, 10,251.0 cu. yds. at $3.52	36,083.52	
Broken stone for shoulders, 3,339.0 cu. yds. at $3.52	11,753.28	
Run-of-bank gravel, 811.0 cu. yds. at $3.13	2,538.43	
Clay filler, 226.0 cu. yds. at $1.00	226.00	
Standard bituminous pavement, 3-inch base, 32,609.0 sq. yds. at $1.10	35,869.90	
Standard bituminous pavement, 2-inch top, 47,773.0 sq. yds. at $1.51	72,137.23	
Standard bituminous pavement top, 167.0 batches at $6.34	1,058.78	
Standard bituminous pavement resurfacing, 13,665.0 sq. yds. at $1.10	15,031.50	
Shoulder construction, 67,412.0 lin. ft. at 6c	4,044.72	
Force account items:		
Ditching and constructing bleeders	202.59	
Total amount earned by contractor	$181,046.25	
Deductions:		
Steam roller rental	312.91	
War tax on freight	50.97	
Total deductions	$ 363.88	
Total amount paid to contractor		180,682.37
Grand total cost of project (all State funds)		$195,794.90

Units "A" and "C," Clatsop County Line-Mohler Grading and Surfacing

In a bond issue voted by Tillamook County on June 3, 1919, there was included an item of $38,000.00 for expenditure on the section of the Roosevelt Coast Highway between Mohler and the Clatsop County Line. A part of this fund was expended by the County during 1920 on grading the section between the south fork of the Nehalem River and Camp No. 4. This was done with the understanding that any sections so graded would be surfaced by the State.

In January, 1921, however, the Highway Commission entered into a cooperative agreement with the Tillamook County Court to grade and surface a portion of the Clatsop County Line-Mohler section on a 50-50

basis. At that time, the combined appropriations available for the work amounted to $60,000.00 and Contract No. 538 was awarded to Tillamook County for grading and surfacing what is known as Units "A" and "C." The distance from the Clatsop County Line to the east end of the Mohler Bridge, over the south fork of the Nehalem River, is 6.31 miles. Unit "A" covers the north 2.16 miles of this section and Unit "B" covers the south 1.55 miles. The two units have a combined length of 3.72 miles. Work was started on May 9, 1922, and, at the close of the biennium, 2.31 miles have been graded and surfaced. Engineering supervision of the construction has been successively handled by Resident Engineers W. S. Coates and H. W. Peters.

The work is estimated to cost a total of $61,500.00, with the State paying $33,500.00 and the County cooperating to the extent of $28,000.00. Expenditures to date amount to $33,821.56, and consist of $18,330.40 from State funds and $15,491.16 from County funds.

Unit "B," Clatsop County Line-Mohler Grading and Surfacing

Unit "B" consists of the gap of 2.63 miles between Units "A" and "C" described in the preceding article. Contract No. 600 for the grading and surfacing of this section was awarded to the Tillamook County Court on October 5, 1922. The work is estimated to cost a total of $42,000.00, with the County cooperating to the extent of $19,000.00 and the State paying the balance of $23,000.00. No expenditures have been made to the date of this report.

Rockaway North Surfacing

During 1921, Tillamook County undertook the grading of a section of what was then a County road from Rockaway north to Jetty Creek, a short distance south of Brighton. This work was continued and completed in 1922.

On May 11, 1922, the State Highway Commission adopted the so-called Beach route from Mohler, by way of Brighton and the Tillamook beaches and through Rockaway, Bar View and Garibaldi, to Miami as the route of the Roosevelt Coast Highway.

On June 29, 1922, Contract No. 557 was awarded to Tillamook County for surfacing the section which they had graded, the length being 3.2 miles. Broken stone from Haddon quarry was used for the surfacing. The surfacing is of two-course construction, the base course consisting of 1½ inches to 1-inch materials, provided with a filler of dune sand where the subgrade itself is not of such material, and the top course consisting of materials ranging from one inch to dust. The surfacing was laid to a depth of eight inches, loose measure, and has a top width of 14 feet, being feathered to a width of 18 feet at the base. Work was begun on June 29, 1922, and the section is practically complete at the present time. There remains required only the final touches in order to finish the job.

H. W. Peters, Resident Engineer, has been in charge of the construction, with expenditures to date of $9,497.16. The contract is estimated to require a total expenditure of $18,500.00 from State funds.

Riverdale-Hobsonville Surfacing

The surfacing of this section was begun during the previous biennium, and a description is given on page 353 of the last report.

This was one of the three contracts whose specifications were changed at the opening of the 1921 season, as mentioned in the introductory

article on Tillamook County in this report. In this case the revised specifications called for bank-gravel from the Miami River, with all material over two inches in size screened out, on the section north of Bay City. On the portion from Riverdale to Bay City, the materials were specified to be of crushed gravel with a maximum dimension of 1½ inches. It was further specified that all over-sized gravel should be recrushed and included in the surfacing, and the entire materials separated in two sizes, in approximately equal quantities, and laid on the road in two courses.

The surfacing was specified to be sixteen feet wide and eight inches in thickness, loose measure, but was actually constructed considerably thicker over the portion that had been surfaced in 1920. This was done on account of the fact that it was found necessary to add a considerable quantity of the finer materials provided by the revised specifications in order to obtain a satisfactory surface.

The work was completed November 30, 1921, with additional expenditures of $31,181.01. These expenditures bring the total cost of the work to $37,088.87 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,124.89
Contract items as follows:		
Run-of-bank gravel surfacing, 6,330.5 cu. yds. at $2.90	$ 18,358.45	
Crushed gravel surfacing, 3,941.3 cu. yds. at $3.90	15,371.07	
Crushed gravel for maintenance, placed in piles, 420.0 cu. yds. at $3.65	1,533.00	
Run-of-bank gravel for maintenance, placed in piles, 264.7 cu. yds. at $2.65	701.46	
Total amount paid to contractor		35,963.98
Grand total cost of project (all State funds)		$ 37,088.87

Wilson River-Riverdale Surfacing

In accordance with the understanding with Tillamook County that the State would surface such portions of the Roosevelt Coast Highway as the County might grade to State standards, five surfacing projects have been undertaken to date by the Highway Commission. The first three contracts were awarded in 1920, the fourth in 1921, and the fifth in 1922. The Wilson River-Riverdale Section is the fourth of these contracts, and as in the case of all the others, Tillamook County has been the low bidder. For the surfacing of this particular section they were awarded Contract No. 429, on July 28, 1921.

This section is an extension of the Riverdale-Hobsonville Section, and extends from its southern terminus at Riverdale Corner south to the concrete viaduct north of the Wilson River, the section having a total length of 1.93 miles. From this, however, there has been omitted a unit of 0.49 mile at the Juno overcrossing site.

The surfacing covered by the contract consists of a two-course crushed gravel, to be constructed 16 feet wide and eight inches, loose measure, in thickness. The base course is to consist of material ranging from one inch to 1½ inches in size and the top course is to be of materials ranging from one inch maximum size to dust, the quantities of materials for each course being approximately of equal volume.

Work was started on July 8, 1921, and completed November 30 of same year, under the supervision of W. S. Coates, Resident Engineer. Total expenditures of $12,714.00 from State funds were required for the completion of the work.

[TILLAMOOK]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 420.91
Contract items as follows:		
Crushed gravel surfacing, 3,052.55 cu. yds. at $3.79	$ 11,569.16	
Maintenance rock, placed in piles, 204.5 cu. yds. at $3.54	723.93	
Total amount paid to contractor		12,293.09
Grand total cost of project (all State funds)		$ 12,714.00

Moore Cutoff Surfacing

This section was also a hold-over project from the last biennium, and is described on page 354 of the last report.

The original specifications for the section provided for a surfacing of coarse run-of-bank gravel, and this is one of the three sections on which the specifications were changed at the beginning of work in 1921.

The revised specifications provided for a crushed gravel surface of 1½ inches maximum size, screened into two sizes and laid in two coures.

The grading of the section was done by the County and was still under way when the surfacing contract was awarded. For a part of the distance, the cutoff traverses a densely shaded and very wet country. Laying surfacing on a newly graded roadbed under such conditions naturally required the placing of considerable larger quantities of surfacing material than would be required on a dry, settled roadbed.

Before the work was completed the supply of gravel in Simmons Creek, from which the surfacing material was being obtained, was exhausted for practicable operations and the work was finally finished, on November 10, 1922, with broken stone procured from a quarry at Cloverdale.

The work is estimated to cost a total of $50,000.00 from State funds when all final payments have been made. Expenditures to date amount to $41,259.94, of which $37,438.14 has been expended during the present biennium.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,027.24
Contract items as follows:		
Run-of-bank gravel surfacing, 836.0 cu. yds. at $4.40	$ 3,678.40	
Crushed gravel surfacing, 7,942.0 cu. yds. at $5.00	39,710.00	
Maintenance rock, placed in piles, 335.0 cu. yds. at $4.75	1,591.25	
Total amount earned by contractor	$ 44,979.65	
Percentage retained until completion of contract	6,746.95	
Total amount paid to contractor		38,232.70
Grand total expended (all State funds)		$ 41,259.94

Beaver-Hebo Surfacing

This section was also undertaken during the previous biennium, and will be found described on page 354 of the last report. Contract No. 278 for surfacing the section was awarded during the progress of the grading, in order that the surfacing might be done on various small stretches as soon as the grading was completed and thus keep the road in passable condition at all times. The grading of some portions of the section was very heavy, involving sidehill cuts of considerable yardage, and the work has gone over into the third season for final completion.

[TILLAMOOK]

As described in the introductory article on Tillamook County in this report, the surfacing specified in the original contract consisted of a coarse run-of-bank gravel. Early in 1921, however, a change in these specifications was made, and an adjustment effected, whereby the surfacing was constructed of broken stone from the quarry at Cloverdale. This change has made a decided improvement in the resulting surfacing, and, together with the elimination of the old Condor grade by means of the Condor cut-off, the construction of the new bridge across the Nestucca River and the improvement of the Sailing and Farmer grades, has converted a former rough, narrow and rather dangerous section into a high standard surfaced highway.

At the Sailing grade, located about 1.5 miles south of Beaver, a bend in the river throws the stream against the slope of the embankment at nearly a right angle, and to find adequate means for holding the fill during times of freshets in the river has been a serious problem. The old, narrow County road over the grade had been washed out, or partially so, until it was either benched out of solid ground or else protected by timber bulkheads. When the new and wider highway was constructed, it was thought that the fill would hold if protected by a riprap surface over the embankment slopes, even though the slopes consisted of soft rock material. Before this riprap could be completed, however, the freshet of November, 1921, came down, at which time the highest water ever known at that point occurred. The stream overflowed the highway to a depth of two feet and, although the riprap slopes of the embankment held, a washout started in the part unprotected and undermined the rock. This, assisted in displacing the riprap by floating logs which rammed the slopes at the point of impact of the current, caused a serious washout. To prevent a recurrence of these circumstances a pile bulkhead has been constructed. It is believed that this bulkhead will divert floating logs and debris from impact on the embankment and, to a considerable extent, will lessen the severity of impact by the stream itself.

This construction and the heavy rock work at Farmer grade were not finished until well along in 1922, so that the final completion of the surfacing work was not accomplished until November. The surfacing is estimated to cost a total of $49,000.00, and will be paid for entirely from State funds. Expenditures of $40,638.17 during the present biennium bring the total amount expended to date to $41,812.12.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,008.12
Contract items as follows:		
Run-of-bank gravel surfacing, 337.0 cu. yds. at $2.80	$ 943.60	
Broken stone surfacing, 9,794.0 cu. yds. at $4.30	42,114.20	
Maintenance rock, placed in piles, 350.0 cu. yds. at $4.05	1,417.50	
Total amount earned by contractor	$ 44,475.30	
Percentage retained until completion of contract	6,671.30	
Total amount paid to contractor		37,804.00
Grand total expended (all State funds)		$ 41,812.12

Hebo-Neskowin Grading and Surfacing

This section consists of 12.6 miles of the Roosevelt Coast Highway, extending from a junction with the McMinnville-Tillamook Highway at Hebo to the north end of the Neskowin-Devils Lake Forest Road project, at a point about one-half mile north of Neskowin.

THE CONDOR BRIDGE OVER THE BIG NESTUCCA RIVER; ON THE ROOSEVELT COAST HIGHWAY NEAR HEBO

[TILLAMOOK]

Under an agreement with Tillamook County whereby the grading, surfacing and bridge work on the section was to be done on a 50-50 cooperative basis, Contract No. 550 was awarded to Tillamook County on May 31, 1922. The roadbed is being graded to a standard class "A" section, the surfacing consisting of broken stone constructed 16 feet wide and eight inches, loose measure, in thickness.

Work under the contract was begun on June 14, 1922, and at the close of the season 4.6 miles have been graded and 3.4 miles have been surfaced.

Resident Engineer G. S. Grey is in charge of the supervision of the construction, which is estimated to cost a total of $156,500.00. The State share of this amounts to $85,500.00 and the County will cooperate to the extent of $71,000.00. Expenditures to date amount to $46,941.05, comprising $22,206.26 from State funds and $24,734.79 from County funds.

Neskowin-Devils Lake Forest Road Project

A description of this project, which is partially within Tillamook County and partially within Lincoln County, will be noted in the portion of this report devoted to Lincoln County projects.

Three Rivers Forest Road Project

A complete description of this work will be noted on page 354 of the last report. No additional work has been done during the present biennium, but final adjustment of accounts brings the total cost of the work to $209,900.37, which has been paid $149,528.51 by the State, $18,624.69 by the County and $41,747.17 by the Federal Government.

Nehalem River Drawbridge

One of the most important bridge projects undertaken by Tillamook County in recent years is the construction of a drawbridge over the Nehalem River between Wheeler and Nehalem River. The structure, as designed, consists of a 235-foot steel drawspan on concrete piers, together with 460 feet of pile trestle approach.

Contract No. 591, covering the construction of this bridge, was awarded to the Portland Bridge Company on September 1, 1922. Very little work has been done to date, but it is expected that the work will be complete by early summer. The only expendtures to date are for the preparation of the plans and for some little field engineering. These amount to $1,835.54, and are carried in this report under the table given on page 93.

Nestucca River Bridge

The reader is referred to the last report for the details of this structure. About the time the structural steel was delivered at Tillamook, the Pacific Foundation Company became insolvent and failed to complete their contract for the erection of the steel.

After considerable time was consumed in negotiating with the Surety Company, the steel erection was awarded to Monson-Trierweiler Company, Inc., on June 29, 1921, under Contract No. 415.

Work was started on July 10, 1921, and was complete and ready for the concrete deck on September 30, 1921. The deck and approaches were then completed and the bridge opened to traffic on about the first of the year.

[TILLAMOOK]

Expenditures under Contracts Nos. 260 and 415 amount to $18,715.34, of which $9,194.77 was paid out during the present biennium. O. A. Chase was Resident Engineer during 1921.

In addition to the amounts paid out under these two contracts, the County has constructed all the necessary concrete work at their own expense. The only State expenditures on the entire work were $640.46 for engineering.

DETAILED STATEMENT OF EXPENDITURES

Engineering for both contracts		$ 640.46
Name plates, furnished by Tillamook County		25.00
Contract items as follows:		
(Pacific Bridge Co. Contract)—		
Structural steel, 154,548.0 lbs. at 11.64c	$ 17,989.38	
Paint, 22.0 gals. at $2.75	60.50	
Total amount earned by Pacific Bridge Co.	$ 18,049.88	
Deduction for cost of completing structure by Monson-Trierweiler Co.	4,237.60	
Total amount paid to Pacific Bridge Co.		13,812.28
(Monson-Trierweiler Co. Contract)—		
Erecting structural steel, 154,480.0 lbs. at 2.58c	$ 3,985.58	
Force account items:		
Straightening bent steel	70.15	
Furnishing extra rivets, drilling extra rivet holes, repainting shoes and supports	181.87	
Total amount paid to Monson-Trierweiler Co.		4,237.60
Grand total cost of structure		$ 18,715.34
Paid by State	$ 640.46	
Paid by County	18,074.88	
Total	$ 18,715.34	

Kilchis River Bridge

This work is completely outlined in the previous report. Work continued during 1921 until completion on June 17.

The total cost of the contract work was $11,257.74, of which $7,772.22 was paid out during the present biennium. Of this total cost, $404.22 was paid from State funds, the balance being paid by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 404.22
Name plates for bridge, furnished by Tillamook County		25.00
Contract items as follows:		
Structural steel, 91,006.0 lbs. at 11.48c	$ 10,447.49	
Painting structure	213.15	
Force account items:		
Chipping off one inch of south pier to center floor beam	120.75	
Cutting handrail to allow for expansion joints	47.13	
Total amount paid to contractor		10,828.52
Grand total cost of structure		$ 11,257.74
Paid by State	$ 404.22	
Paid by County	10,853.52	
Total	$ 11,257.74	

Scovell Bridge

The Coast Highway crosses the North Fork of the Nehalem River near the Clatsop County Line over what is known as the Scovill Bridge. This

structure consists of a 100-foot steel span on concrete piers and with 150 feet of trestle approach.

Contract No. 370, covering the construction of this bridge, was awarded to the Portland Bridge Company on March 11, 1921. Work started in April and was complete on August 20, 1921, W. S. Coates being Resident Engineer. The total cost of the structure was $27,264.87. Of this, only $937.53, for engineering, was from State funds, the balance being paid by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 937.53
Cement and crushed rock, furnished by County (deducted from contractor's estimate)		806.00
Contract items as follows:		
Structural steel, 84,119.0 lbs. at 12.3c	$ 10,346.64	
Class "B" concrete, 167.26 cu. yds. at $55.00	9,199.30	
Class "A" concrete, 64.06 cu. yds. at $30.00	1,921.80	
Extra concrete around piers, 6.35 cu. yds. at $15.00	95.25	
Timber piling, 1,918.6 lin. ft. at $1.50	2,877.90	
Reinforcing steel, 10,700.0 lbs. at 8c	856.00	
Lumber in place, 7.46 M.-FBM. at $50.00	373.00	
Approach trestle, 153.0 lin. ft. at $15.00	2,295.00	
Materials on hand	62.45	
Total amount earned by contractor	$ 28,027.34	
Deductions:		
Cement furnished by Tillamook County	57.00	
Crushed rock furnished by Tillamook County	749.00	
Lump sum reduction as per terms of contract	1,700.00	
Total amount paid to contractor		25,521.34
Grand total cost of structure		$ 27,264.87
Paid by State	$ 937.53	
Paid by County	26,327.34	
Total	$ 27,264.87	

Maintenance

In addition to the ordinary maintenance of drainage and shoulders along paved sections and the dragging of macadam sections, the severe freshet of November, 1921, caused a considerable expense in removing slides, repairing bridges and replacing washed-out sections. Two washouts occurred and two bridges were completely or partially lost between Grand Ronde and Hebo, and one slide occurred and a bridge was destroyed between Hebo and Tillamook, each of which completely interrupted traffic for varying intervals from a few hours to a week or more. These all coming at the same time give our field maintenance organization a real test and they are to be complimented that inconvenience to traffic was no more serious than it was.

The patrol system has been continued on the macadam section from Hebo to Dolph and, supplemented with frequent dragging by truck and drag operating over several patrol sections, has kept the Three Rivers road in almost continuously first-class condition. Much appreciated improvements have been made at various points along Three Rivers by the construction of guard fence and by widening the roadbed at narrow fills and sharp points.

The betterment and maintenance work from the Yamhill County Line to Hebo has been under the supervision of J. C. Russell, Resident Engineer. Other maintenance work in the County has been supervised by Resident Engineer W. S. Coates.

[TILLAMOOK]

Construction Engineering

During the two-year period just ending, the State has performed the engineering work in connection with the grading by County forces of the several projects mentioned herein as having been graded by the County.

This supervision was handled by W. S. Coates and L. Wendleboe, Resident Engineers.

Engineering County Bridges

Engineering service was performed for Tillamook County on various bridge jobs, at a total cost of $436.52.

Clatsop County Line-Mohler Survey

A location survey of the Clatsop County Line-Mohler Section of the Roosevelt Coast Highway was made in connection with the County and State cooperative construction of the section. A partial survey covering a small part of the section was made in 1920 as a part of the engineering work done by the State on County construction projects, and during the fall of 1921 and spring of 1922 the location was completed. The section is 6.35 miles in length and has been placed under contract for grading and surfacing.

The location was made by W. S. Coates, Resident Engineer, being carried on at odd times in connection with other work.

Manhattan-Mohler Reconnoissance

For information to assist in considering the route of the Roosevelt Coast Highway between the South Fork of the Nehalem River at Mohler and the crossing of the Miami River at Miami, a reconnoissance was made in April, 1922. This reconnoissance covered the territory between Mohler and Manhattan, by way of Brighton and Wheeler, and was made for the special purpose of comparing the respective feasibility of two lines between Brighton and Manhattan. The first line extends along and adjacent to the Southern Pacific Railroad tracks, and involves the excavation of several heavy cuts and shifting of the railroad. The other line passes over a high point just south of Brighton and follows a grade contour along the hillside. It would appear from the survey and other data available that the first mentioned line is to be preferred, nothwithstanding the difficulties involved on account of the railroad.

The reconnoissance covered a distance of eight miles and was made by W. P. Smith, Locating Engineer.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

BRIDGE OVER THE KILCHIS RIVER; ON THE ROOSEVELT COAST HIGHWAY NEAR TILLAMOOK

[TILLAMOOK]

Since the Market Road Law went into effect, Tillamook County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 50,905.55
2.	State Funds apportioned to County	74,441.35
3.	County levy made to match State Funds	87,451.87
4.	County Market Road Funds collected	64,984.63
5.	Cash paid to County by State	62,243.56
6.	State expenditures, deducted from apportionment	11.77
7.	Cash due County from State in December, 1922	12,186.02
8.	County expenditures on Market Roads	123,106.41
9.	Balance in County Treasury November 1, 1922	5,355.90

From the above statement it is apparent that Tillamook County received from the State Market Road Fund $23,535.80 more than it paid into the fund. The excess is Tillamook County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $87,451.87. Of this amount they have collected and credited to the Market Road Fund only $64,984.63, or $22,567.24 less than the amount that they were expected to put into their County Market Road Fund.

The County Court has designated three roads to be improved as Market Road projects.

The engineering work has been done by Stanley Coates, County Surveyor. Plans have been submitted and approved.

The construction work has been done by contract and by County forces, under the direction of the County Roadmaster. They have graded and surfaced with crushed rock 3.7 miles, paved with concrete 1.1 miles, cleared right-of-way through heavy timber 3 miles.

UMATILLA COUNTY

The greater portion of the location and construction of State highways in Umatilla County was done in 1919 and 1920.

During the biennium covered by this report the major portion of the remaining sections were completed. This includes the paving between Pendleton and the Washington State Line, the grading and macadamizing of that section between McKay Creek and Pilot Rock on the Oregon-Washington Highway, and the macadamizing of the Pendleton-Deadman's Pass Section of the Old Oregon Trail.

With regard to new projects, that section between Pilot Rock and Vinson, on the Oregon-Washington Highway, a distance of 14 miles, was graded, 10 miles macadamized, and a contract let for completion of macadamizing of the remaining four miles in 1923.

The Pendleton-Cold Springs Highway, 13.2 miles on the section between Holdman and Cold Springs, were graded and macadamized, and a contract let for the section from Holdman east, three miles in length, for grading and macadamizing to be completed in 1923.

That section of the Old Oregon Trail between Deadman's Pass and Kamela, was awarded by contract for grading and macadamizing for completion during 1923. About 60 per cent of this work will be completed by the close of the 1922 season. Construction of this section will complete Oregon's length of the great east and west transcontinental highway, by means of which thousands of tourists will annually visit Oregon, and, in addition, will afford easy communication between the east and west portions of the State.

The work, covered by this biennial report, in the County was under the supervision of R. H. Baldock, Division Engineer.

Athena-Milton Paving

Description of this project will be found on page 361 of the Fourth Biennial Report. On November 20, 1920, severe weather conditions necessitated the suspension of paving operations, approximately 6.2 miles having been completed at that date. The quarry being used, located approximately three miles north of Weston, developed a high percentage of clay and materials from this source were condemned. The contractor moved to a new site near Blue Mountain Station and began work on erection of a plant at this point during January, 1921. The material secured from this source proved excellent. Construction of the macadam base was resumed on March 28 and the laying of pavement on April 19. Prior to this time it had been decided to change from a two-inch wearing surface on macadam base to Department standard Type "D" pavement. This was constructed in four and five-inch thicknesses, as required by conditions. Construction operations were carried forward very rapidly, and, except for a gap between Stations 319 and 324, the entire length was paved by June 18. The 500-foot section mentioned included a 60-foot span over Dry Creek, which had not been completed at that time. The entire job was completed August 27, 1921, and closed the final gap in a continuous pavement between Pendleton and the Washington State Line.

Expenditures during the present biennium amount to $258,570.11, bringing the total cost of the project to $395,365.67. Owing to an adjustment of funds with the State Highway Commission, Umatilla County did not cooperate in the cost of this pavement.

[UMATILLA]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 18,213.62
Contract items as follows:		
Excavation, no classification, 13,979.65 cu. yds. at 75c.	$ 10,484.74	
Standard 2-inch bituminous surface, 109,376.2 sq. yds. at $1.49	162,970.54	
Standard 3-inch bituminous base, 9,240.8 sq. yds. at $1.08	9,980.07	
Bituminous base, 2-inch to 3-inch in thickness, 14,285.0 batches at $3.45	49,283.25	
Payhaul on base material, 39,574 batch mi. at 20c	7,914.80	
Crushed gravel for subbase, 1,998.5 cu. yds. at $3.32	6,635.02	
Broken stone for subbase, 27,995.5 cu. yds. at $3.52	98,544.16	
Broken stone for shoulders, 3,118.0 cu. yds. at $3.47	10,819.46	
Shoulder construction, 116,607.4 lin. ft. at 6c	6,996.45	
Earth filler, 2,617.0 cu. yds. at $1.00	2,617.00	
12-inch plain concrete pipe, 813.0 lin. ft. at $1.70	1,382.10	
24-inch reinforced concrete pipe, 480.0 lin. ft. at $3.70	1,776.00	
Force account items:		
Salvaging macadam from old road and placing on new road	1,990.96	
Excavating shoulder drains and disposing of excess material	375.58	
Hauling excess ditch excavation to widen shoulders	581.84	
Cleaning debris from ends of culverts and outlet ditches	356.00	
Repairing culvert damaged by cloudburst	22.56	
Widening shoulders, constructing farm crossings and reshaping subgrade cut up by winter travel	2,593.77	
Changing location of culverts at farm crossings	355.07	
Repairing damage to embankment caused by heavy rains	321.53	
Furnishing and placing header boards at railroad crossing	6.04	
Constructing farm road crossings and side road approaches	685.37	
Reconstructing shoulders to new standard	339.37	
Riprap to protect embankment at Sta. 229+00	120.37	
Total amount paid to contractor		377,152.05
Grand total cost of project (all State funds)		$395,365.67

Adams-Athena Paving

A description of this paving project is given on pages 360 and 361 of the Fourth Biennial Report. The work was practically completed during 1920 and the charges appearing on the present biennium books are deferred bills which have been passed for payment during the last two years.

The total cost of the work amounted to $219,041.72, toward which the County cooperated to the extent of $50,000.00, with the blance of $169,041.72 paid by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 15,344.00
Advertisement for bids		6.00
Contract items as follows:		
Common excavation, 8,081.5 cu. yds. at 50c	$ 4,040.75	
Intermediate excavation, 710.5 cu. yds. at 90c	639.45	
Solid rock excavation, 2,432.8 cu. yds. at $1.60	3,892.48	
Overhaul, 3,863.0 sta. yds. at 4c	154.52	
12-inch plain concrete pipe, 2,180.0 lin. ft. at $1.25	2,725.00	
Ditching, 14,173.5 cu. yds. at 60c	8,504.10	
Standard bituminous pavement, 2-inch top, 85,067.7 sq. yds. at $1.53	130,153.58	
Crushed rock for base, 14,155.5 cu. yds. at $3.00	42,460.50	
Crushed rock for shoulders, 2,898.5 cu. yds. at $3.00	8,695.50	
Crushed rock for drains, 25.80 cu. yds. at $3.00	774.00	
Shoulder construction, 58,180.0 lin. ft at 6c	5,290.80	
Pavement headers, left in place, 3,502.0 lin. ft. at 40c	1,400.80	
Clay or other earth filler, 45.0 cu. yds. at $1.00	45.00	

[UMATILLA]

EXPENDITURES—Continued

Force account items:		
Constructing retaining walls	292.95	
Moving fences and grubbing out trees	52.36	
Regrading and widening shoulders	2,822.37	
Salvaging rock from abandoned roadway	260.41	
Repairing damage caused by washout	1,673.55	
Excavating for shoulder drains	912.62	
Extra haul on crushed rock for drains	135.45	
Lumber for headers at railroad crossing	10.00	
Total amount earned by contractor	$214,936.19	
Deductions:		
Reduction in freight rates	957.26	
War tax on freight	287.21	
Royalty on pavement	10,000.00	
Total deductions	$ 11,244.47	
Total amount paid to contractor		203,691.72
Grand total cost of project		$219,041.72
Paid by State	$169,041.72	
Paid by County	50,000.00	
Total	$219,041.72	

Echo-Pendleton Post Road Project

A description of this project will be found on page 364 of the Fourth Biennial Report. Work was started June 26, 1920, and concluded January 3, 1921.

The total expenditures during the present biennium amount to $7,505.63 from State funds and $64,900.00 from Federal Government funds. This brings the total cost of the project to $136,758.99, which has been paid $71,858.99 by the State and $64,900.00 by the Federal Government.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,368.84
Graveling detour to maintain travel during construction		360.00
Rental of State-owned equipment (deducted from contractor's estimate)		2,557.42
Reshaping roadbed by State forces (deducted from contractor's estimate)		331.55
Contract items as follows:		
Crushed gravel surfacing, 44,279.75 cu. yds. at $2.25	$ 99,629.44	
Talus subsurfacing, 545.50 cu. yds. at $1.00	545.50	
Payhaul on surfacing material, 37,828.8 cu. yds. at 50c	18,914.40	
Crushed gravel for maintenance, placed in piles, 517.5 cu. yds. at $2.00	1,035.00	
Reshaping old grade, 90 per cent, all at $500.00	450.00	
Force account items:		
Sprinkling and spreading manure on subgrade to settle dust	163.82	
Redressing subgrade before surfacing	45.14	
Placing filler in macadam	7,942.88	
Removing slides from ditches	275.94	
Riprapping slopes at Furnish Reservoir	28.03	
Total amount earned by contractor	$129,030.15	
Deductions:		
Rental of State-owned equipment	2,557.42	
Reshaping roadbed by State forces	331.55	
Total deductions	$ 2,888.97	
Total amount paid to contractor		126,141.18
Grand total cost of project		$136,758.99
Paid by State	$ 71,858.99	
Paid by Government	64,900.00	
Total	$136,758.99	

AT THE SUMMIT OF CABBAGE HILL; ON THE OLD OREGON TRAIL EAST OF PENDLETON

[UMATILLA]

Pendleton-Cabbage Hill Post Road Project

A description of this project will be found on pages 364 and 365 of the previous Department report.

Work was practically completed at the close of the 1920 season and during the present biennium delayed expenditures of $46,355.32 have been made, bringing the total cost of the work to $124,100.46. This total has been paid $53,136.97 by the State, $17,000.00 by Umatilla County and $53,963.49 by the Federal Government.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 11,102.80
Rental of State-owned truck (deducted from contractor's estimate)		39.94
Contract items as follows:		
Clearing and grubbing, all	$ 350.00	
Common excavation, 36,004.6 cu. yds. at 65c	23,402.99	
Intermediate excavation, 8,314.1 cu. yds. at $1.10	9,145.51	
Solid rock excavation, 15,190.5 cu. yds. at $2.00	30,381.00	
Overhaul, 24,487.0 sta. yds. at 5c	1,224.35	
12-inch plain concrete pipe, 1,023.0 lin. ft. at $1.50	1,534.50	
18-inch reinforced concrete pipe, 388.0 lin. ft. at $2.75	1,067.00	
24-inch reinforced concrete pipe, 72.0 lin. ft. at $4.00	288.00	
36-inch reinforced concrete pipe, 48.0 lin. ft. at $6.75	324.00	
Class "A" concrete, 48.3 cu. yds. at $28.00	1,352.40	
Class "C" concrete, 51.21 cu. yds. at $30.00	1,536.30	
Metal reinforcement, 2,549.0 lbs. at 10c	254.90	
Rubble masonry, 24.69 cu. yds. at $21.00	518.49	
Standard wood guard fence, 552.0 lin. ft. at $1.00	552.00	
Riprap, 1.67 cu. yds. at $8.00	13.36	
Crushed gravel surfacing, 15,939.25 cu. yds. at $1.98	31,559.72	
Payhaul on surfacing material, 9,086.2 yd. mi. at 50c	4,543.10	
Force account items:		
Changing cross-section of finished roadbed	59.75	
Relaying culvert pipe	11.45	
Placing earth filler to bind macadam	532.89	
Removing old culvert at Sta. 197+40	38.81	
Constructing loose rubble headwalls at farm crossings	146.78	
Installing tile to drain spring in roadbed	27.47	
Maintenance work to maintain travel during construction	43.02	
Repairing damage to grade caused by washout	30.12	
Reimbursement to contractor for loss sustained in holding up construction by Federal Road Bureau	4,059.75	
Total amount earned by contractor	$112,997.66	
Deduction for rental of State-owned truck	39.94	
Total amount paid to contractor		112,957.72
Grand total cost of project		$124,100.46
Paid by State	$ 53,136.97	
Paid by County	17,000.00	
Paid by Government	53,963.49	
Total	$124,100.46	

Cabbage Hill-Deadman's Pass Surfacing

A description of this section will be found on page 365 of the Fourth Biennial Report. Approximately seven miles of 5 per cent grade were used in ascending the mountain and the surfacing of the section affords the traveling public an easy ascent of what was formerly termed the worst grade in Oregon.

Surfacing operations were started November 1, 1920, and completed July 21, 1921, under the successive supervision of Paul Jones and G. B. Robinson, Resident Engineers.

[UMATILLA]

Expenditures of $100,906.83 during the present biennium, in addition to prior expenditures of $23.03, bring the total cost of the project to $100,929.86 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,045.39
Rental of State-owned equipment (deducted from contractor's estimate)		2,121.03
Contract items as follows:		
Broken stone surfacing, 23,916.1 cu. yds. at $3.95	$ 94,468.60	
Rock subsurfacing, 556.0 cu. yds. at $2.50	1,390.00	
Payhaul on rock subsurface material, 22.6 yd. mi. at 60c	13.56	
Earth filler, 1,609.85 cu. yds. at $1.25	2,012.31	
Total amount earned by contractor	$ 97,884.47	
Deduction for rental of State-owned equipment	2,121.03	
Total amount paid to contractor		95,763.44
Grand total cost of project (all State funds)		$100,929.86

Deadman's Pass-Kamela Post Road Project

Contract No. 560 was awarded to Carlson & Nyberg on June 29, 1922, for grading and surfacing the Old Oregon Trail between Deadman's Pass and Kamela. There was excepted from this work the grading and surfacing of a portion of the final alignment in the vicinity of the Meacham Overcrossing. At this point the old County road will be used as a detour and adequate surfacing has been placed on this section to render it usable at all seasons.

The work is being handled as a cooperative project between the State, County and Federal Government under the terms of Post Road Project Agreement No. 62, and is estimated to cost a total of $138,500.00, towards which the Federal Government will cooperate to the amount of $89,295.08, with the County paying the total cost of the grading, and the balance, if any, being borne by the State. The construction is proceeding under the supervision of Max J. Kuney, Resident Engineer, with expenditures to date of $34,351.67 by the State and $21,063.66 by the Federal Government.

Cold Springs-Holdman Grading and Surfacing

Contract No. 375 was awarded to A. D. Kern of Portland Oregon, for grading and macadamizing that section of the Pendleton-Cold Springs Highway between Cold Springs and Holdman, a distance of 13.2 miles, on May 26, 1921. Actual construction was begun July 5 of the same year, and the work was completed on September 22, 1922.

This road affords an outlet for the transportation of approximately 240,000 bushels of wheat a year, from the vast wheat belt tributary to the Cold Springs Canyon, to the rail point at Cold Springs Station on the Spokane Branch of the Oregon-Washington Railroad & Navigation Company. By means of the construction the farmers in this community save approximately 20 cents per sack in hauling their wheat to market, amounting to approximately $22,000.00 a year.

Construction has been handled under the supervision of C. J. Dillinger, Resident Engineer. Total expenditures amount to $158,710.18, expended $9,884.82 by the State and $148,825.36 by the County.

ONE MILE WEST OF REITH; ON THE ECHO-PENDLETON SECTION OF THE OLD OREGON TRAIL

[UMATILLA]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 9,884.82
Contract items as follows:		
Clearing and grubbing, all	$ 100.00	
Common excavation, 99,612.6 cu. yds. at 28c	27,891.53	
Intermediate excavation, 5,165.0 cu. yds. at 60c	3,099.00	
Solid rock excavation, 8,333.9 cu. yds. at $1.40	11,667.46	
Overhaul, 32,635 sta. yds. at 6c	1,958.10	
12-inch corrugated galvanized iron pipe, 866.0 lin. ft. at $1.25	1,082.50	
18-inch corrugated galvanized iron pipe, 120.0 lin. ft. at $2.50	300.00	
24-inch corrugated galvanized iron pipe, 138.0 lin. ft. at $3.25	448.50	
36-inch corrugated galvanized iron pipe, 20.0 lin. ft. at $7.00	140.00	
Class "B" concrete, 72.69 cu. yds. at $30.00	2,180.70	
Rubble masonry, 60.31 cu. yds. at $12.00	723.72	
Riprap, 4,735.6 cu. yds. at $3.00	14,206.80	
Lumber and timber, 51.233 M.-FBM. at $60.00	3,073.98	
Broken stone surfacing, 26,095.0 cu. yds. at $2.88	75,153.60	
Broken stone for maintenance, placed in piles, 1,348.0 cu. yds. at $2.88	3,882.24	
Force account items:		
Placing filler on base and top course rock	1,676.73	
Repairing damage caused by winter rains	596.06	
Covering slopes with sage brush to prevent wind erosion	277.11	
Placing earth cushion on rock fills	339.15	
Prospecting for quarry sites	28.18	
Total amount paid to contractor		148,825.36
Grand total cost of project		$158,710.18
Paid by State	$ 9,884.82	
Paid by County	148,825.36	
Total	$158,710.18	

Holdman-Harps Ranch Grading and Surfacing

Contract No. 588 for grading and surfacing the Holdman-Harps Ranch Section of the Pendleton-Cold Springs Highway was awarded to Carlson & Nyberg on August 29, 1922.

This section begins at the southeast end of the Cold Springs-Holdman Section and extends southeast along Midde Fork Creek to Harps Ranch, having a total length of three miles.

The project is estimated to cost a total of $46,000.00, of which the State share is estimated at $4,000.00 and the County share at $42,000.00. The only expenditures to date amount to $19.12 from State funds and cover preliminary construction engineering charges.

Pilot Rock-Vinson Surfacing

The Pilot Rock-Vinson Section of the Oregon-Washington Highway was graded during the fall of 1921 and the spring of 1922, and on April 15, 1922, Contract No. 514 was awarded to the General Construction Company of Spokane, Washington, for surfacing 10.71 miles of this section; the surfacing of the four miles from Vinson to the head of Vinson Canyon not being included. Work was started immediately after award of the contract and completed November 13.

Construction has been handled under the supervision of Charles D. Jones, Resident Engineer, with expenditures made of $33,821.55 out of a total estimated cost of $43,500.00 from State funds.

[UMATILLA]

Echo-Pendleton Grading

A full description of this section will be noted on pages 365 and 366 of the last report. As explained in the article given there, the work was practically completed at the end of the 1920 season. However, the contractors presented a claim for reclassification of materials, remeasurement of certain rock and several other minor details which has delayed final payment on the project. The work was remeasured and reclassified under the direction of C. H. Whitmore and C. W. Wanzer.

The completed work represents a total expenditure of $308,387.84, which has been paid $80,370.50 by Umatilla County and the balance of $228,017.34 by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 25,068.01
Labor and materials furnished by State:		
Culvert pipe		440.68
Protecting railway and telegraph lines from damage		955.54
Moving telegraph lines		83.96
Covering water main in City of Echo		4.00
Contract items as follows:		
Clearing and grubbing, all	$ 600.00	
Common excavation, 177,966.0 cu. yds. at 44c	47,505.04	
Intermediate excavation, 52,390.5 cu. yds. at 83c	43,484.11	
Solid rock excavation, 91,524.1 cu. yds at $1.56	142,777.59	
Overhaul, 177,006.0 sta. yds. at 3c	5,310.18	
12-inch corrugated galvanized iron pipe, 1,258.0 lin. ft. at $1.80	2,264.40	
18-inch corrugated galvanized iron pipe, 16-gauge, 958.0 lin. ft. at $2.70	2,586.60	
18-inch corrugated galvanized iron pipe, 14-gauge, 72.0 lin. ft. at $3.15	226.80	
24-inch corrugated galvanized iron pipe, 1,416.0 lin. ft. at $3.55	5,026.80	
36-inch corrugated galvanized iron pipe, 14-gauge, 770.0 lin. ft. at $6.25	4,812.50	
36-inch corrugated galvanized iron pipe, 12-gauge, 50.0 lin. ft. at $8.33	416.50	
6-inch porous drain tile, 126.0 lin. ft. at 50c	63.00	
Class "A" concrete, 86.12 cu. yds. at $26.00	2,239.12	
Class "C" concrete, 128.01 cu. yds. at $25.00	3,200.25	
Rubble masonry, 45.02 cu. yds. at $15.00	675.30	
Riprap, 454.85 cu. yds. at $3.50	1,591.98	
Metal reinforcement, 4,239.0 lbs. at 10c	423.90	
Grader work, 1.556 miles at $1,000.00	1,556.00	
12-inch corrugated galvanized iron pipe, placing only, 146.0 lin. ft. at 71c	103.66	
24-inch corrugated galvanized iron pipe, placing only, 32.0 lin. ft. at $1.46	46.72	
Lumber and timber, 9.549 M.-FBM. at $60.00	572.94	
Force account items:		
Moving equipment as ordered by engineer	304.18	
Moving fence and lowering water pipe	233.74	
Riveting extensions to galvanized iron pipe culverts	48.45	
Hauling culvert pipe due to change in plans, and extra expense account change in grade line	170.95	
Hand placing rock on steep embankment slope at reservoir site	184.65	
Removing culverts from O.-W. R. & N. right-of-way	134.66	
Moving and painting irrigation flume	613.47	
Special adjustment items:		
Extra cost due to change in alignment	8,276.37	
Extra cost due to delays in obtaining right-of-way	5,999.04	
Protecting telegraph line from damage	386.75	
Total amount paid to contractor		281,835.65
Grand total cost of project		$308,387.84
Paid by State	$228,017.34	
Paid by County	80,370.50	
Total	$308,387.84	

Vinson Canyon Surfacing

Contract No. 587 for surfacing the four miles of the Pilot Rock-Vinson Section not included in the surfacing contract previously awarded was awarded to the General Construction Company of Spokane, Washington, on August 29, 1922.

Construction is being supervised by Charles D. Jones, Resident Engineer, and expenditures of $27.00 have been made out of the total estimated cost of $24,000.00 to be paid by the State.

Umatilla County Guard Fence

On August 30, 1921, the State Highway Commission awarded Contract No. 444 to Frazier & Samuel of Salem, Oregon, for the construction of approximately 40,000 lineal feet of wood guard fence on the various State highways in Umatilla County. Of this amount 7,000 feet were placed on the Pendleton-Adams Section, 2,140 feet on the Adams-Athena Section, 5780 feet on the Athena-Milton Section, 5,550 feet on the Pendleton-Pilot Rock Section and 5,270 feet on the Pendleton-Deadman's Pass Section.

The work was started on October 6, 1921, and completed on July 6, 1922, the work during 1921 being under the supervision of Oscar Cutler, Resident Engineer and under Charles D. Jones, Resident Engineer, during 1922.

The completed guard fence has required an expenditure of $26,647.09 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,517.11
Rental of State-owned truck (deducted from contractor's estimate)		127.46
Contract items as follows:		
Standard wood guard fence, 39,748.0 lin. ft. at 64c	$ 25,438.72	
Force account items:		
Changing location of guard fence due to change in plans	221.40	
Painting existing guard fence	12.36	
Total amount earned by contractor	$ 25,672.48	
Deductions:		
Rental of State-owned truck	127.46	
Lump sum reduction as per terms of contract	542.50	
Total amount paid to contractor		25,002.52
Grand total cost of project (all State funds)		$ 26,647.09

Vinson-Pilot Rock Grading

Contract No. 405 for grading the Vinson-Pilot Rock Section of the Oregon-Washington Highway was awarded to Oxman & Harrington of Baker, Oregon, on July 21, 1921, and the work was carried to final completion on May 1, 1922.

The section, 14.69 miles, extends from the confluence of Vinson Canyon and Butter Creek, at the site of the old Vinson Postoffice, up Vinson Canyon to the divide between the latter stream and Jack Canyon; thence down Jack Canyon to its junction with Birch Creek and on to Pilot Rock. The construction of the section provides a highway affording a very easy grade to the rail head at Pilot Rock, and is particularly valuable for hauling the products of the fruit belt adjacent to the highway.

[UMATILLA]

Subsequent to the completion of the grading, the surfacing of the section had been placed under way under two separate contracts.

Oscar Cutler was Resident Engineer in charge of the grading, which is estimated to cost a total of $92,500.00, to be borne $57,500.00 by the State and $35,000.00 by Umatilla County. Expenditures to date amount to $89,800.13, which have been paid $61,882.66 by the State and $27,917.47 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,138.16
Contract items as follows:		
Clearing and grubbing, all	$ 100.00	
Common excavation, 63,493.4 cu. yds. at 40c	25,397.36	
Intermediate excavation, 12,923.4 cu. yds. at 40c	5,169.36	
Solid rock excavation, 18,680.5 cu. yds. at $1.40	26,152.70	
Overhaul, 27,544.4 sta. yds. at 7c	1,928.11	
12-inch corrugated galvanized iron pipe, 2,088.0 lin. ft. at $1.65	3,445.20	
18-inch corrugated galvanized iron pipe, 378.0 lin. ft. at $2.75	1,039.50	
24-inch corrugated galvanized iron pipe, 350.0 lin. ft. at $4.00	1,400.00	
36-inch corrugated galvanized iron pipe, 180.0 lin. ft. at $7.25	1,305.00	
Class "A" concrete, 51.60 cu. yds. at $35.00	1,806.00	
Class "B" concrete, 75.68 cu. yds. at $33.00	2,497.44	
Metal reinforcement, 5,160.0 lbs. at 10c	516.00	
Rubble masonry, 221.34 cu. yds. at $16.00	3,541.44	
Riprap, 2,334.1 cu. yds. at $3.00	7,002.30	
Lumber and timber in place, 40.890 M.-FBM. at $70.00	2,862.30	
Earth backfill for rock cuts, 1,091.7 cu. yds. at 75c	818.78	
Force account items:		
Cleaning ditches and culverts, repairing damage to roadbed caused by heavy rains	237.04	
Total amount earned by contractor	$ 85,218.53	
Percentage retained until completion of contract	2,556.56	
Total amount paid to contractor		82,661.97
Grand total expended		$ 89,800.13
Paid by State	$ 61,882.66	
Paid by County	27,917.47	
Total	$ 89,800.13	

Maintenance

At the close of the biennium covered by this report there were under maintenance 147.83 miles of State highways in Umatilla County, of which 110.3 miles were macadam and 37.53 were bituminous concrete pavement.

This mileage was divided between four highways: On the Columbia River Highway 44.6 miles of macadam and one mile of bituminous concrete pavement; on the Oregon-Washington Highway 22.2 miles of macadam and 36.53 miles of bituminous concrete pavement; on the Pendleton-Cold Springs Highway 13.2 miles of macadam, and on the Old Oregon Trail 20.3 miles of macadam.

Maintenance on the Columbia River Highway was handled by two patrols, the first patrol, from the Morrow County Line to Echo, was under the supervision of E. M. Mortimore and one assistant, using State truck, grader and drag. In addition to the patrol work approximately two miles between Hermiston were treated with clay binder.

The section between Echo and Pendleton was handled by Patrolman F. B. Loveland and asistants. This section carries a heavy traffic and a portion of the year it is necessary to have four men. This patrol was

furnished with a truck, grader and drag, all State equipment, and a sprinkling truck with necessary equipment during a portion of August.

Maintenance on the Oregon-Washington Highway between Pendleton and the Washington State Line, covering 36.53 miles of bituminous concrete pavement, was divided into two patrols, each patrolman being furnished with light truck, light shoulder drag and small tools. R. M. Cutler and C. W. Loveland were patrolmen on this section, each having one assistant.

The section between Pendleton and Vinson, consisting of 22.2 miles of macadam, was under Patrolman J. E. Hellums and one assistant, using State equipment.

On the Pendleton-Cold Springs Highway, between Holdman and Cold Springs, 13.2 miles were maintained intermittently, dragging and blading being done as required, under the supervision of L. J. Shannon, Umatilla County Roadmaster.

From Pendleton to Deadman's Pass, on the Old Oregon Trail, a distance of 20.3 miles of macadam, patrol work was handled by J. L. Hall and one assistant, using a State truck, grader and drag. This section for the first seven miles out from Pendleton carries a heavy traffic and requires a good deal of attention.

The work was supervised from the La Grande Division Office.

Stanfield Bridge

A 28-foot concrete span on the Columbia River Highway at Stanfield was constructed by Parker & Banfield under Contract No. 454.

The contract was awarded on August 30, 1921. Work started on October 1, 1921, and was complete by January 1, 1922, except for a small amount of riprap. This was put off until the spring of 1922, being completed on August 1, 1922. The total cost of the work was $3,354.80, of which $1,342.32 was paid by the State and $2,012.48 by the County.

E. G. Ricketts was Resident Engineer in charge of the construction.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 336.09
Bronze name plates furnished by State		14.50
Contract items as follows:		
Excavation to plan elevation, 106.7 cu. yds. at $3.00	$ 320.10	
Excavation below elevation shown on plans, 11.9 cu. yds. at $5.00	59.50	
Class "A" concrete, 56.6 cu. yds. at $25.10	1,420.66	
Metal reinforcement, 9,230.0 lbs. at 7c	646.10	
Concrete handrail, 77.0 lin. ft. at $5.25	404.25	
Grouted riprap, 25.6 cu. yds. at $6.00	153.60	
Total amount paid to contractor		3,004.21
Grand total cost of structure		$ 3,354.80
Paid by State	$ 1,342.32	
Paid by County	2,012.48	
Total	$ 3,354.80	

Bridge at Echo

One of the last items of construction required to complete the Columbia River Highway was a bridge over the United States Reclamation Service Canal at Echo.

Contract No. 606 was awarded on October 5, 1922, to the Union Bridge Company covering this construction. Work started on October 26 and is under way at the present time.

[UMATILLA]

Christ Fauerso, Resident Engineer, is in charge of the construction, which is estimated to cost a total of $6,000.00. Of this amount, the State share is estimated at $500.00 and the County share at $5,500.00. The expenditures to date amount to $15.63 from State funds.

Athena-Milton Bridges

This work is detailed in the previous report. Owing to financial difficulties on the part of the Pacific Foundation Company, it was necessary for the work to be completed by the Surety Company, which was accomplished on August 1, 1921.

The final cost was $12,533.31, of which $10,300.43 has been paid during this biennium. Of the final cost, $1,510.28 was by the State and $11,023.03 by the County. At this time there is due the sum of $500.29 from the County for funds advanced by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,009.99
Contract items as follows:		
Class "C" concrete, 121.23 cu. yds. at $25.00	$ 3,030.75	
Metal reinforcement, 10,097.0 lbs. at 8c	807.76	
Excavation, no classification, 743.45 cu. yds. at $2.00	1,486.90	
Structural steel, 52,177.0 lbs. at 10.84c	5,655.99	
Extra painting	94.13	
Force account items:		
Removing old abutment and plastering old wall with cement	273.17	
Filling in north approach	227.12	
Total amount earned by contractor	$ 11,575.82	
Deduction for paint furnished by State	52.50	
Total amount paid to contractor		11,523.32
Grand total cost of structure		$ 12,533.31
Paid by State	$ 1,510.28	
Paid by County	11,023.03	
Total	$ 12,533.31	

Cabbage Hill-Deadman's Pass Construction Engineering

A description of this work can be found on page 367 of the previous report, under the head of "Cabbage Hill-Kamela Grading." As noted therein, the County was able to construct only the section as far east as Deadman's Pass when their funds became exhausted. The balance of the section to Kamela is now being constructed by the State as a Post Road project.

During the present biennium engineering charges in the amount of $2,677.63 have been paid by the State, covering expenditures for supervision of the County work which continued until June, 1921.

Pendleton-Pilot Rock Construction Engineering

A description of this project will be noted on pages 367 and 368 of the fourth biennial report. The County paid the entire cost of the construction of the project direct from their own funds and the State furnished the engineering supervision. The County subcontracted the major portion of the grading and subcontracted the surfacing to Root-Joslin, contractors of Spokane, Washington.

[UMATILLA]

Pilot Rock Bridges

Contract No. 518 was awarded to Tobin & Pierce on April 14, 1922, for the construction of two bridges over Birch Creek, one in the town of Pilot Rock and one about two miles west of town. The one in town consists of two 21-foot spans, and the other of one 40-foot span, both being of concrete construction.

Work was started on May 3, 1922, and was completed on September 12, 1922, under the supervision of E. G. Ricketts, Resident Engineer.

A considerable amount of bank protection is necessary adjacent to the bridge in Pilot Rock. This is being done by State forces and will be included in the cost of the project. The estimated cost of the entire work is $11,500.00, of which $9,755.27 has been paid out to date from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 929.34
Two sets bronze name plates (furnished by State)		28.00
Contract items as follows:		
Excavation, no classification, 363.4 cu. yds. at $1.00	$ 363.40	
Excavation below elevation shown on plans, 26.3 cu. yds. at 50c	13.15	
Backfill for abutments, 165.3 cu. yds. at 40c	66.12	
Removal of old structure, all	500.00	
Class "A" concrete, 244.36 cu. yds. at $20.00	4,887.20	
Metal reinforcement, 28,396.0 lbs. at 7c	1,987.86	
Concrete handrail, 180.0 lin. ft. at $5.00	900.00	
Force account items:		
Improving channel adjacent to bridge	80.20	
Total amount paid to contractor		8,797.93
Grand total cost of structure (all State funds)		$ 9,755.27

Deadman's Pass-Kamela Survey

The plans of this portion of the Pendleton-Kamela Survey, a distance of 14.31 miles, were completed in the La Grande Division Office during 1921, being worked on intermittently at various times during the year. This section forms a final link on the Old Oregon Trail between Pendleton and Ontario, all the remaining sections being completed or under contract. The present County road over the mountain is extremely rough and unless steps are taken for the removal of snow, will be impassable during the winter months.

Subsequent to the completion of these plans the section has been placed under contract for grading and surfacing, and construction operations are now under way.

Pendleton-Cold Springs Survey

During January and February, 1921, J. F. Waller relocated and revised that section of the Pendleton-Cold Springs Highway from Cold Springs to Holdman, a distance of 13.2 miles. This survey extends from Cold Springs Canyon on the Columbia River, just opposite the Cold Springs Station on the Spokane Branch of the Oregon-Washington Railroad, to the Holdman Postoffice, in the Middle Cold Springs Canyon.

The main purpose of the location was to provide a downhill haul from Holdman to the Cold Springs Station for the immense volume of wheat raised over the section tributary to the Cold Springs Canyon outlet. Reconnaissance data indicated that this would amount to 15,000 tons per year, and the preferred rate on shipments given by the railroad company

at Cold Springs Station, in addition to the fact that the uphill haul to the station on the Northern Pacific will be eliminated, is of great benefit to the farmers in the community.

Between April 3 and May 31, 1922, C. J. Dillinger, Resident Engineer on the Holdman-Cold Springs Section, located and staked a survey from Holdman east to Harps Ranch, a distance of approximately three miles. This location traverses the south bank of the Cold Springs Canyon, involving heavy grading construction, and eliminating four crossings of the Cold Springs Canyon on the present road. It is an extension of the Holdman-Cold Springs Section of the Pendleton-Cold Springs Highgway, built in 1921 and 1922.

Pendleton-Pilot Rock-Morrow County Line Survey

The preliminary line between Vinson and Pilot Rock was revised and restaked by Locating Engineer C. R. Burns between April 27 and June 15, 1921.

The plans for this section, 14.69 miles in length, were completed at the same time and the project was ordered advertised by the State Highway Commission.

Ukiah-Grant County Line Survey

The survey of the portion of the Pendleton-John Day Highway from the Grant-Umatilla County Line to Ukiah, was made between September 20, 1920, and June 25, 1921, by C. R. Burns, Locating Engineer.

The route extends from the County boundary line on the John Day River, continuing up the John Day River to the mouth of Camas Creek. The survey follows Camas Crek to Owens Creek, and up the latter stream a distance of approximately one-half mile to a junction with the Ukiah-Pilot Rock County road.

The location was based on a 16-foot roadway, including ditches. It affords a water grade from the Ukiah country to the John Day River, and eliminates the present excessive grades over the hill. Construction will be very expensive through the rough canyon of Camas Creek.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Umatilla County has cooperated as follows:

1.	Paid into the State Market Road Fund	$140,701.86
2.	State Funds apportioned to County	194,585.51
3.	County levy made to match State Funds	181,360.14
4.	County Market Road Funds collected	148,117.01
5.	Cash paid to County by State	161,582.44
6.	State expenditures, deducted from apportionment	0.00
7.	Cash due County from State in December, 1922	33,003.07
8.	County expenditures on Market Roads	325,209.96
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Umatilla County received from the State Market Road Fund $53,883.65 more than it paid into the fund. The excess is Umatilla County's share of funds collected

from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $181,360.14. Of this amount they have collected and credited to the Market Road Fund $148,117.01.

The County has designated 27 roads to be improved as Market Road projects.

The engineering work has been done by L. J. Shannon, County Roadmaster. Plans have been submitted and approved.

The construction work has been done by contract and by County forces, under the direction of the Roadmaster. They have graded 47 miles of road and surfaced with crushed rock or gravel 38 miles.

UNION COUNTY

By the first of July, 1923, it is anticipated that the entire system of State highways in Union County will be completed. At the close of the working season of 1922 all State highways in the County will be graded, and there will remain approximately 13 miles of macadam to be placed in the season of 1923.

At the close of the period covered by the Fourth Biennial Report there were 32.6 miles graded, 6 miles paved and 3.6 miles macadamized. During the biennium covered by this report there was additional work completed to the extent of 57.5 miles graded, 58.3 miles macadamized and 1.3 miles paved. There remains but 13 miles to be macadamized to complete the system.

In addition to the 1.3 miles of 16-foot pavement, the State supervised the paving for the width of the main street in the City of Union, together with the supervision of installing curbs, gutters and storm sewers.

The construction of State highways in Union County has made a marvelous change in transportation facilities for the people in the section. Three years ago owners of automobiles and trucks were only able to use this equipment for about nine months of the year. During approximately two months of the winter period the roads were blocked with snow, and after the spring thaw there was a period of about one month when the roads were hub deep in mud. Automobile owners in La Grande were blocked from going in any direction. It was not even possible to drive to Baker. At the present time the highways are so constructed that they can be easily and economically kept free from snow in the winter, and are in excellent condition during the spring of the year. The construction of the secondary roads, known as County Bond roads and Market Roads, which are proposed, will tie to these main State highways all of the communities of the County.

The fertile Grande Ronde Valley, one of the finest agricultural sections in Oregon, is susceptible to intensive development but hitherto it has been retarded by lack of highway transportation.

In addition to the commercial advantages of the highway program in Union County, the highways serve to connect the civic centers, promoting a more neighborly spirit between the cities and the country, and permit the residents of the towns to enjoy the scenic beauties of the Blue Mountains and the lakes and streams in Wallowa County during their periods of recreation.

Highway construction in Union County during this biennium has been under the supervision of R. H. Baldock, Division Engineer.

City of Union Paving

On April 1, 1922, the United Contracting Company began work on their Contract No. 493, awarded to them on February 21, for the construction of pavement through the City of Union.

The project, 1.31 miles in length, was financed by the State, County and City of Union, each participating one-third in the cost of a 16-foot pavement. The City bears the cost of all paving on Main Street outside the 16-foot strip and also for the curbs, gutters, storm sewers and other sundry features of strictly city interest. The pavement laid consists of a five-inch bituminous concrete pavement on a five-inch rock base. The contractors completed the work on August 15, 1922, and accomplished an excellent piece of work.

[UNION]

Oscar Cutler was Resident Engineer in charge of the construction, which has cost a total of $79,153.51. This amount is to be divided $18,676.46 to the State, $14,652.06 to the County and $45,824.99 to the City of Union. Expenditures for the total cost of the project have been made. These have been paid $33,408.33 by the State and $45,745.18 by the City of Union.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,368.52
Items deducted from contractor's estimate:		
Cement furnished by State		1,530.00
Rental of State-owned equipment		1,039.59
Contract items as follows:		
Excavation, single classification, 5,186.1 cu. yds. at 55c	$ 2,852.36	
Excavation for drain ditch, 979.2 cu. yds. at 90c	881.28	
Overhaul, 5,535.0 sta. yds. at 2½c	138.38	
12-inch plain concrete pipe, 270.0 lin. ft. at $1.30	351.00	
12-inch concrete sewer pipe, 1,641.0 lin. ft. at $1.30	2,133.30	
18-inch reinforced concrete pipe, 90.0 lin. ft. at $2.60	234.00	
6-inch porous drain tile, 2,590.0 lin. ft. at 25c	647.50	
Class "A" concrete, 15.96 cu. yds. at $20.00	319.20	
Class "C" concrete, 0.46 cu. yds. at $18.00	8.28	
Wrought iron gratings, 18.5 each at $12.00	222.00	
Concrete curb and gutter, 3,696.2 lin. ft. at 95c	3,511.39	
Run-of-bank gravel, 1,228.0 cu. yds. at $1.35	1,657.80	
Crushed gravel subbase, 4,620.0 cu. yds. at $2.25	10,395.00	
Crushed gravel for shoulders, 658.0 cu. yds. at $2.25	1,480.50	
Gravel backfill for drains, 52.0 cu. yds. at $2.30	119.60	
Shoulder construction, 9,620.4 lin. ft. at 4c	384.82	
Preparation of subgrade, 25,761.2 sq. yds. at 5c	1,288.07	
Standard bituminous pavement, 3-inch base, 2-inch top, 20,326.4 sq. yds. at $2.23	45,327.88	
Standard 2-inch bituminous surfacing, 170.0 sq. yds. at $1.25	212.50	
Bituminous mixture, 16.8 batches at $4.00	67.20	
4-inch x 5-inch wood headers, left in place, 1,520.0 lin. ft. at 20c	304.00	
Force account items:		
Excavating soft places in subgrade and backfilling with large rock	283.33	
Constructing irrigation flume to improve drainage of highway	375.35	
Constructing temporary ditches and flumes to take care of irrigation water during construction	64.47	
Excavating, hauling, and placing filler in subbase	1,201.36	
Constructing wooden box gutters to improve drainage	332.13	
Placing 10-inch water pipe to eliminate dangerous open irrigation ditches	241.79	
Recementing joints of irrigation pipe	94.62	
Total amount earned by contractor	$ 75,129.11	
Deductions:		
Cement furnished by State	1,530.00	
Rental of State-owned equipment	1,039.59	
Total amount paid to contractor		73,215.40
Grand total cost of project		$ 79,153.51
Paid by State	$ 33,408.33	
Paid by City of Union	45,745.18	
Total	$ 79,153.51	

Island City-La Grande-Hot Lake Paving

A description of this project will be found on page 374 of the Fourth Biennial Report. The reconstruction work mentioned in this article has given admirable results and the pavement shows no signs of appreciable deterioration.

[UNION]

The total expenditures during the present biennium amount to $52,929.02 from State funds and $11,195.26 from County funds. These bring the total cost of the project to $223,889.50, which has been paid $211,815.47 by the State and $12,074.03 by the County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 11,013.16
Contract items as follows:		
Excavation, no classification, 3,565.5 cu. yds. at 50c	$ 1,782.75	
Broken stone, 14,007.5 cu. yds. at $3.92	54,909.40	
Gravel, 2,751.5 cu. yds. at $3.65	10,042.98	
Earth filler, 490.0 cu. yds. at $1.00	490.00	
Standard bituminous pavement, 2-inch top, 57,993.0 sq. yds. at $1.47	85,249.71	
Standard bituminous pavement, 3-inch base, 36,284.0 sq. yds. at $1.10	39,912.40	
Shoulder construction, 73,074.0 lin. ft. at 6c	4,384.44	
Force account items:		
Widening shoulders, trimming slopes, etc.	10,291.28	
Excavating for shoulder drains	2,049.67	
Pavement headers, left in place	4,054.54	
Total amount earned by contractor	$213,167.17	
Deduction for war tax exemptions on freight	290.83	
Total amount paid to contractor		212,876.34
Grand total cost of project		$223,889.50
Paid by State	$211,815.47	
Paid by County	12,074.03	
Total	$223,889.50	

Kamela-Oro Dell Surfacing

Prior to the era of highway development in Oregon, that section of the Old Oregon Trail between Hilgard and Kamela Pass in the Blue Mountains was unchanged and very little improved since the first trail was blazed through the wilderness by the Oregon pioneers. This trail, which had served for the passage of ox teams in bygone days, was a terror to automobile traffic, and undoubtedly caused tourists, who had heard of the discomforts attendant upon a trip over this section, to plan other routes for their itinerary on visiting the Pacific Coast.

An entire new location was chosen by the Highway Commission between Kamela and Hilgard, which resulted in a saving of approximately three miles, and materially decreased the grade. This section was graded in 1921, and on June 1, 1922, Porter & Conley, contractors of Portland, Oregon, began surfacing with crushed basaltic rock, under Contract No. 498, completing the project on the thirtieth day of October, 1922.

The project was 18.77 miles in length, extending from the Umatilla-Union County Line, approximately 4,000 feet north of the town of Kamela and about a quarter of a mile north of the summit of the Blue Mountains, to Oro Dell, near the west city limits of La Grande.

It is now a pleasure to motor from La Grande to the summit of the Blue Mountains, through forests of yellow pine timber and over a smooth surface and easy grade.

Max J. Kuney, Resident Engineer, was in engineering charge of the work, which is estimated to require a total expenditure of $101,000.00 from State funds. Expenditures to date amount to $98,268.23.

[UNION]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,332.56
Sprinkling macadam by State forces		184.02
Reimbursement by Union County for construction of detour (credit)		79.84
Rental and repair of State-owned tractor (to be deducted from contractor's estimate)		430.90
Contract items as follows:		
Broken stone base, 13,617.0 cu. yds. at $2.10	$ 28,595.70	
Broken stone surfacing, 11,541.0 cu. yds. at $2.10	24,236.10	
Broken stone for maintenance, placed in piles, 1,017.5 cu. yds. at $2.10	2,136.75	
Special crushed stone base, 5,192.0 cu. yds. at $2.25	11,682.00	
Special crushed stone surfacing, 7,661.5 cu. yds. at $2.25	17,238.38	
Special crushed stone for future maintenance, placed in piles, 557.0 cu. yds. at $2.25	1,253.25	
Filler, 11,905.5 cu. yds. at 20c	2,381.10	
Payhaul on filler, 11,084.5 yd. mi. at 40c	4,433.80	
Force account items:		
Removing slides, repairing damage caused by washouts and building up fills where settlement has occurred	6,022.92	
Constructing detour at east approach of Perry overcrossing	308.66	
Excavating to improve drainage between Kamela and Hilgard	343.36	
Total amount earned by contractor	$ 98,632.02	
Deductions:		
Rental and repair of State-owned tractor	280.90	
Percentage retained until completion of contract	2,950.53	
Total amount paid to contractor		95,400.59
Grand total expended (all State funds)		$ 98,268.23

Hot Lake-Union Grading and Surfacing

The first two miles of the section of the Old Oregon Trail between Hot Lake and Union, starting from the Hot Lake Sanitorium, traverses low, boggy ground, poorly drained. Geological examinations indicated quite clearly that this section was at one time the bottom of an old lake bed. Test borings down for many feet indicated the soil has very little bearing power, and these features made the construction of macadam highway capable of supporting a concentrated load of 20 tons a serious problem.

The grade line was raised approximately two feet above the surrounding country, because in certain seasons the entire country is overflowed and it was of paramount importance that the grade line be kept above the water table at all times. To further strengthen this section material was borrowed from a knoll composed of rock talus, earth and decomposed rock, and certain sections were reinforced with an additional thickness of gravel.

Contract No. 368 was awarded to the Security Construction Company, contractors of La Grande, Oregon, for grading and surfacing the entire section between Hot Lake and Union, on April 22, 1921. Construction was started on the third day of May, 1921, and was completed on the fifteenth of November the same year.

Under the supervision of R. A. Pratt, Resident Engineer, the project has required a total expenditure of $76,612.99. This amount has been expended entirely by the State and there is $41,641.98 now due from the County for their cooperative share.

[UNION]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,533.33
Sprinkling and rolling with State forces		1,327.69
Contract items as follows:		
Common excavation, 52,157.3 cu. yds. at 30c	$ 15,647.19	
Intermediate excavation, 10,992.4 cu. yds. at 60c	6,595.44	
Solid rock excavation, 4,183.4 cu. yds. at $1.30	5,438.42	
Overhaul, 15,279.0 sta. yds. at 5c	763.95	
12-inch corrugated galvanized iron pipe, 684.0 lin. ft. at $1.20	820.80	
18-inch corrugated galvanized iron pipe, 572.0 lin. ft. at $2.10	1,201.20	
24-inch corrugated galvanized iron pipe, 180.0 lin. ft. at $2.80	504.00	
36-inch corrugated galvanized iron pipe, 368.0 lin. ft. at $5.50	2,024.00	
Class "A" concrete, 56.34 cu. yds. at $27.50	1,549.35	
Class "C" concrete, 106.8 cu. yds. at $24.50	2,616.60	
Metal reinforcement, 4,769.0 lbs. at 8c	381.52	
Riprap, 1,265.6 cu. yds. at $2.50	3,164.00	
12-inch drainage gates, 2 each at $10.00	20.00	
18-inch drainage gates, 2 each at $25.00	50.00	
36-inch drainage gates, 2 each at $85.00	170.00	
Payhaul on gravel, 11,298.9 cu. yds. at 45c	5,084.51	
Clay filler, 840.5 cu. yds. at 25c	210.13	
Run-of-bank gravel subsurfacing, 539.0 cu. yds. at $1.55	835.45	
Crushed gravel surfacing, 10,530.0 cu. yds. at $1.85	19,480.50	
Crushed gravel for maintenance, placed in piles, 466.0 cu. yds. at $1.85	862.10	
Crushed gravel within city limits of Union, 809.0 cu. yds. at $2.10	1,698.90	
Crushed gravel for maintenance in City of Union, 15.0 cu. yds. at $2.10	31.50	
Force account items:		
Furnishing and laying 72 feet of 8-inch corrugated iron pipe	88.46	
Hauling and placing additional filler, unmeasurable	513.95	
Total amount paid to contractor		69,751.97
Grand total cost of project (all State funds)		$ 76,612.99

Island City-Elgin Post Road Project

The surfacing of the section of the La Grande-Joseph Highway between Island City and Elgin, which had been graded by the County, has been undertaken as a cooperative project between the State, County and Federal Government under the terms of Project Agreement No. 80.

For the purposes of receiving bids, the project was divided into two units, Unit No. 1 being the 6.57 miles north of Island City, and Unit No. 2 being the balance of 11.49 miles to Elgin. Bids were received on July 5, 1922, and Contract No. 569, for Unit No. 1, was awarded to Roscoe Neal. Contract No. 580, for Unit No. 2, was awarded to the Sloane Construction Company.

Construction is being supervised by J. N. Bishop, Resident Engineer, and is estimated to cost a total of $122,000.00. Of this amount the Federal Government will cooperate to an estimated total of $68,158.28. In addition to this, Union County will pay the entire cost of the construction, exclusive of engineering, in accordance with previous agreements relating to cooperation on the La Grande-Joseph Highway. The sum of the cooperation by the Federal Government and County will be in excess of the total construction cost, and the balance will accrue to the credit of the State. Expenditures to date amount to $21,428.95, and have been expended $1,265.59 from State funds and $20,163.36 from County funds.

ON THE LA GRANDE-ENTERPRISE HIGHWAY EAST OF ISLAND CITY

[UNION]

Lone Pine-Hot Lake Surfacing

A description of this project will be found on page 375 of the Fourth Biennial Report. The work was carried to completion on January 23, 1921, with expenditures of $23,351.20 from State funds and $4,509.87 from County funds during the present biennium. This brings the total cost of the project to $63,123.32, which has been paid $58,613.45 by the State and $4,509.87 by Union County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,014.61
Labor and materials furnished by State:		
Grading sections not completed by County		1,362.56
Spreading subsurface gravel from piles		470.60
Rental of State-owned tractor		123.19
Removing old structures		96.50
Contract items as follows:		
Broken stone surfacing, 6,960.0 cu. yds. at $3.65	$ 25,404.00	
Gravel surfacing, 1,788.0 cu. yds. at $2.75	4,917.00	
Payhaul on surfacing material, 27,556.5 yd. mi. at 50c	13,778.25	
Clay filler, 297.0 cu. yds. at $1.00	297.00	
Gravel for subsurfacing, placed in piles, 570.5 cu. yds. at $3.75	2,139.38	
Screened gravel for subsurfacing, placed in piles, 382.5 cu. yds. at $2.50	956.25	
Broken stone for subsurfacing, placed in piles, 194.0 cu. yds. at $3.40	659.60	
Force account items:		
Completing grading and installing culverts to drain borrow pits	3,550.81	
Rolling base course macadam	1,725.41	
Hauling and spreading sand filler	4,209.65	
Laying Telford macadam base	292.12	
Sprinkling subgrade and macadam	122.99	
Moving fences off right-of-way	3.40	
Total amount paid to contractor		58,055.86
Grand total cost of project		$ 63,123.32
Paid by State	$ 58,613.45	
Paid by County	4,509.87	
Total	$ 63,123.32	

Elgin-Minam Surfacing

This project known as the Elgin-Minam Section, 9.35 miles in length, extends from Elgin to the summit of Wallowa Hill, approximately 5.33 miles west of the town of Minam. The project was graded by State forces during 1917, as cooperative Federal Aid Project No. 5. For the most part the unit is through heavy clay soil and was almost impassable during the winter months. To alleviate this condition the County Court requested the Highway Commission to award a surfacing contract during the fall of 1920. This was done and the contract awarded to the Security Construction Company of La Grande, Oregon, during October, but through the inability of Union County to sell their bonds and finance the construction, the contract was not signed until April 6, 1921. Late spring prevented the starting of work until June 20, subsequent to which it was pushed forward to completion on October 25, 1921.

Construction was supervised by D. C. Marriott, Resident Engineer, and has required a total expenditure of $96,068.78. The State's share on the project amounts to $2.902.06 for engineering supervision of the work, with the County paying $93,166.72 for the construction cost.

[UNION]

Telocaset-North Powder Surfacing

Contract No. 367, for surfacing 8.84 miles of the Old Oregon Trail between North Powder and Telocaset, was awarded to W. C. Stone of Portland, Oregon, on April 4, 1921. Work was started June 23 and completed October 24 of the same year, under the successive supervision of J. N. Bishop and R. A. Pratt, Resident Engineers.

The completed work represents a total cost of $65,008.54 expended from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,726.88
Contract items as follows:		
Broken stone surfacing, 19,524.5 cu. yds. at $3.05	$ 59,549.73	
Broken stone for maintenance, placed in piles, 880.0 cu. yds. at $3.05	2,684.00	
Force account items:		
Cleaning inlet and outlet ditches of culverts	47.93	
Total amount paid to contractor		62,281.66
Grand total cost of project (all State funds)		$ 65,008.54

Union-Telocaset Surfacing

This section was graded during 1918 and 1919 and a description of that work will be found on page 377 of the Fourth Biennial Report.

On April 4, 1921, Contract 366 was awarded the Security Construction Company of La Grande, Oregon, for surfacing the 6.09 miles involved. Work was begun on July 29 and completed November 17 of the same year, under the supervision of R. A. Pratt, Resident Engineer.

The completed work reaches a total cost of $45,955.78 paid from State funds. There is due the sum of $724.00 from Union County for their cooperative share.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,232.55
Cost of hauling and spreading filler by State forces		934.35
Items deducted from contractor's estimate:		
Rental of State-owned truck with driver		93.06
Penalty for overrun of time limit		250.74
Contract items as follows:		
Broken stone surfacing, 12,496.5 cu. yds. at $2.90	$ 36,239.85	
Broken stone surfacing beyond limits of contract, 650.0 cu. yds. at $3.15	2,047.50	
Broken stone for maintenance, placed in piles, 575.2 cu. yds. at $2.75	1,581.80	
Broken stone for maintenance beyond limits of contract, 24.0 cu. yds. at $3.00	72.00	
Clay or other earth filler, 3,261.0 cu. yds. at 50c	1,630.50	
Force account items:		
Widening grade and building up superelevation on curves	822.01	
Furnishing and installing pipe culverts at cross-road intersections	90.30	
Hauling filler when State trucks are undergoing repairs	304.92	
Total amount earned by contractor	$ 42,788.88	
Deductions:		
Rental of State truck with driver	93.06	
Penalty for overrun of time limit	250.74	
Total amount paid to contractor		42,445.08
Grand total cost of project (all State funds)		$ 45,955.78

[UNION]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,902.06
Repair parts for tractor (deducted from contractor's estimate)		18.18
Contract items as follows:		
Common excavation, 148.5 cu. yds. at 68c	$ 100.98	
Solid rock excavation, 22.2 cu. yds. at $2.25	49.95	
6-inch porous drain tile, 2,400.0 lin. ft. at 30c	720.00	
Broken stone surfacing, 20,924.0 cu. yds. at $3.85	80,557.40	
Payhaul, 10,000.0 yd. mi. at 50c	5,000.00	
Broken stone for backfilling drain tile, 180.0 cu. yds. at $3.85	693.00	
Cleaning ditches, all	1,500.00	
Earth filler, 2,616.0 cu. yds. at $1.00	2,616.00	
Force account items:		
Building up superelevation on curves and widening grade at narrow places	1,929.39	
Total amount earned by contractor	$ 93,166.72	
Deduction for repair parts for tractor furnished by State	18.18	
Total amount paid to contractor		93,148.54
Grand total cost of project		$ 96,068.78
Paid by State	$ 2,902.06	
Paid by County	93,166.72	
Total	$ 96,068.78	

Wallowa Hill Surfacing

This section is 5.38 miles in length, of which 4.72 miles are in Union County and 0.66 mile is in Wallowa County.

Contract No. 558 for the surfacing of the section was awarded to the Sloane Construction Company on June 28, 1922, but operations were not started until the ninth of the following September.

Construction is being supervised by J. N. Bishop, Resident Engineer, and is estimated to cost a total of $32,000.00. The project is a cooperative one between the State and Union and Wallowa Counties. Union County is to pay the cost of the surfacing within Union County and Wallowa County is to pay 50 per cent of the cost of surfacing within Wallowa County. The State will pay for engineering supervision and for 50 per cent of the surfacing within Wallowa County. On this basis, the State share is estimated at $5,000.00 and the combined County shares at $27,000.00. The expenditures to date amount to $5,706.92 from State funds.

Wallowa Hill Grading

For years Wallowa County was bottled up during the winter and late spring on account of the Wallowa Hill grade. This grade, approximately two miles in length, was of an average gradient of 9 per cent, was very narrow, and had a number of sharp turns, some of which were veritable death traps. There were but few turnouts on this grade, and when vehicles met it was necessary for one to back to a passing point. The Highway Commission chose an entirely new location, entirely eliminating the hairpin turns and giving an exposure to the southeast, which materially assists in snow removal.

[UNION]

The grading on the section was very heavy, averaging 20,000 yards to the mile over the entire project, and in some sections was as high as 35,000 yards to the mile.

Construction has been accomplished by A. D. Kern of Portland, Oregon, under the terms of Contract No. 378, R. L. Shreve, Resident Engineer, supervising the work during 1921 and J. N. Bishop, Resident Engineer, during 1922. The total length of the project awarded was 5.48 miles, 4.82 miles being in Union County and 0.66 mile in Wallowa County.

Construction of the section has been handled on a cooperative basis between the State, Union and Wallowa Counties, the basis in Union County being that the State shall bear the expense of grading and the County will later pay for the surfacing. In Wallowa County, the expense of both the grading and surfacing is to be divided equally between the State and the County. The project is estimated to cost a total of $135,166.88, and, on the basis outlined above, Wallowa County's share will be $4,886.41, with the entire balance of the grading construction borne by the State. Expenditures to date amount to $131,711.21 and have been paid entirely by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8,254.01
Rental of State-owned equipment (to be deducted from contractor's estimate)		1,376.10
Contract items as follows:		
Clearing and grubbing, all	$ 2,000.00	
Common excavation, 20,308.2 cu. yds. at 45c	9,138.69	
Intermediate excavation, 20,927.6 cu. yds. at 60c	12,556.56	
Solid rock excavation, 77,014.2 cu. yds. at $1.03	79,324.63	
Overhaul, 10,632.0 sta. yds. at 5c	531.60	
12-inch corrugated galvanized iron pipe, 118.0 lin. ft. at $1.95	230.10	
18-inch corrugated galvanized iron pipe, 862.0 lin. ft. at $2.50	2,155.00	
24-inch corrugated galvanized iron pipe, 288.0 lin. ft. at $3.25	936.00	
36-inch corrugated galvanized iron pipe, 280.0 lin. ft. at $7.00	1,960.00	
Rubble masonry, 527.91 cu. yds. at $10.00	5,279.10	
Riprap, 33.18 cu. yds. at $3.00	99.54	
Force account items:		
Extra work due to line change	212.22	
Removing slides, cleaning ditches and repairing damage caused by heavy rains	9,351.28	
Placing earth filler on rock fills and cuts	3,326.36	
Total amount earned by contractor	$127,101.08	
Deductions:		
Rental of State-owned equipment	1,244.28	
Percentage retained until completion of contract	3,775.70	
Total amount paid to contractor		122,081.10
Grand total expended (all State funds)		$131,711.21

Kamela-Hilgard Grading

This section extends from the Umatilla-Union County Line, at the summit of the Blue Mountains near Kamela, to the Grand Ronde River at Hilgard, a distance of 12.75 miles. Contract No. 351 covering the grading was awarded to Elliott & Scoggin of Portland on April 6, 1921. Work was started on the eighteenth of April and was completed on the fourteenth of November of the same year.

[UNION]

The construction of this section affords a direct and well drained route between Hilgard and the summit of the Blue Mountains, the maximum grade being 5 per cent. At the present time the section is under contract for surfacing, and, upon the completion of this work, the full value of the construction will be realized.

The total expenditures amount to $180,757.49, with Union County paying $173,756.69 and the State paying $7,000.80.

Construction of this section was handled under the supervision of Max J. Kuney, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,295.18
Labor furnished by State:		
Moving Western Union telegraph lines		28.77
Watchmen services guarding Western Union lines and O.-W. R. & N. Ry. tracks		374.04
Items deducted from contractor's estimate:		
Rental on State-owned equipment		79.86
T. N. T. furnished by State		3,510.00
Contract items as follows:		
Clearing and grubbing, all	$ 11,000.00	
Common excavation, 80,207.1 cu. yds. at 55c	44,113.91	
Solid rock excavation, 74,753.9 cu. yds. at $1.40	104,655.46	
Overhaul, 56,082.0 sta. yds. at 5c	2,804.10	
12-inch corrugated galvanized iron pipe, 1,258.0 lin. ft. at $2.00	2,516.00	
18-inch corrugated galvanized iron pipe, 326.0 lin. ft. at $3.50	1,141.00	
24-inch corrugated galvanized iron pipe, 496.0 lin. ft. at $4.50	2,232.00	
36-inch corrugated galvanized iron pipe, 190.0 lin. ft. at $8.50	1,615.00	
Riprap, 329.7 cu. yds. at $3.00	989.10	
Extra clearing and grubbing, 8.14 acres at $100.00	814.00	
Hand placed rock slopes, 504.1 cu. yds. at $2.00	1,008.20	
Finishing materials, 273.3 cu. yds. at 50c	136.65	
Force account items:		
Removing, repairing and replacing railroad right-of-way fences along encroachments	146.30	
Improving alignment of logging railroad grade as per right-of-way agreement	231.00	
Culvert pipe on hand	156.78	
Total amount earned by contractor	$173,559.50	
Deductions:		
Rental on State-owned equipment	79.86	
T. N. T. purchased from State	3,510.00	
Percentage retained until completion of contract	500.00	
Total amount paid to contractor		169,469.64
Grand total expended		$180,757.49
Paid by State	$ 7,000.80	
Paid by County	173,756.69	
Total	$181,428.95	

Hilgard-La Grande Grading

The grading of the Hilgard-La Grande Section, under Contract No. 352 awarded to Rajotte-Winters, Inc., was started on April 14, 1921, and completed January 1, 1922, at a total cost of $118,740.15. The project is 6.04 miles in length and was constructed under the supervision of Max J. Kuney, Resident Engineer.

The total cost of the work is to be divided $4,175.88 to the State for engineering supervision and $114,564.27 to the County for the actual construction cost. At the present time, the State has expended $1,752.69 more than the State's share and this amount is due from Union County.

[UNION]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,175.88
Labor furnished by State:		
Moving Western Union guy wires		19.22
Constructing drain ditches		15.00
Watchmen services guarding Western Union Telegraph lines and O.-W. R. & N. Ry. tracks		616.85
Contract items as follows:		
Clearing and grubbing, all	$ 1,600.00	
Common excavation, 28,617.1 cu. yds. at 60c	17,170.26	
Intermediate excavation, 46,824.3 cu. yds. at 60c	28,094.58	
Solid rock excavation, 31,373.7 cu. yds. at $1.30	40,785.81	
Overhaul, 158,110.0 sta. yds. at 5c	7,905.50	
12-inch corrugated galvanized iron pipe, 326.0 lin. ft. at $1.45	472.70	
18-inch corrugated galvanized iron pipe, 260.0 lin. ft. at $2.30	598.00	
24-inch corrugated galvanized iron pipe, 184.0 lin. ft. at $3.00	552.00	
36-inch corrugated galvanized iron pipe, 210.0 lin. ft. at $6.00	1,260.00	
Class "C" concrete, 58.72 cu. yds. at $30.00	1,761.60	
Riprap, 2,054.1 cu. yds. at $3.50	7,189.35	
Finishing materials, 984.5 cu. yds. at $1.30	1,279.85	
Payhaul on finishing materials, 8,719.9 yd. mi. at 44c	3,836.76	
Extra clearing outside of right-of-way, 1.87 acre at $100.00	187.00	
Dry rubble masonry, 35.6 cu. yds. at $6.00	213.60	
Hand placed rock slopes, 66.7 cu. yds. at $2.00	133.40	
Force account items:		
Excavating and backfilling in construction of headwalls	240.33	
Constructing concrete barrel to drain spring under grade, removing culvert pipe from old county road and installing in approach road	155.25	
Repairing damage to grade caused by cloudburst	281.23	
Constructing temporary railroad crossings and moving railroad fences	191.78	
Culvert pipe on hand at completion of contract	4.20	
Total amount paid to contractor		113,913.20
Grand total cost of project		$118,740.15

Paid by State	$ 5,928.57
Paid by County	112,811.58
Total	$118,740.15

North Powder-Telocaset Grading

A description of this project will be found on page 377 of the Fourth Biennial Report. Little work was done during 1920 on account of adverse weather conditions during the fall of that year. Work was resumed early in the spring, however, and completed August 5, 1921, being supervised by J. N. Bishop, Resident Engineer.

Expenditures during the present biennium amount to $42,150.18, the County making payments of $43,036.47, with the State receiving a net credit of $886.29. This brings the total cost of the project to $48,794.63, which has been paid $5,758.16 by the State and $43,036.47 by Union County.

DETAILED STATEMENT OF EXPENDITURES

Engineering	$ 5,758.16
Repairs to county equipment used by contractor as per supplementary agreement	418.56
Grading North Powder overcrossing approaches, transferred to structure (credit)	12,724.40

[UNION]

EXPENDITURES—Continued

Contract items as follows:		
Clearing and grubbing (all)	$ 200.00	
Common excavation, 71,886.6 cu. yds. at 53c	38,099.90	
Solid rock excavation, 2,499.5 cu. yds. at $3.00	7,498.50	
Overhaul, 66,798.0 sta. yds. at 5c	3,339.90	
12-inch plain concrete pipe, 804.0 lin. ft. at $1.95	1,567.80	
18-inch reinforced concrete pipe, 232.0 lin. ft. at $2.60	603.20	
24-inch reinforced concrete pipe, 208.0 lin. ft. at $4.00	832.00	
30-inch reinforced concrete pipe, 140.0 lin. ft. at $5.50	770.00	
Class "A" concrete, 7.23 cu. yds. at $30.00	216.90	
Class "C" concrete, 47.34 cu. yds. at $25.00	1,183.50	
Force account items:		
Removing and replacing culvert due to line revision	42.49	
Constructing channel change and diversion dam	365.20	
Constructing cattle pass and making channel change	556.17	
Lowering culverts to drain borrow pits	66.75	
Total amount paid to contractor		55,342.31
Grand total cost of project		$ 48,794.63
Paid by State	$ 5,758.16	
Paid by County	43,036.47	
Total	$ 48,794.63	

Island City-Elgin Grading

This section of the La Grande-Joseph Highway extends from the end of the pavement at Island City to the beginning of the Elgin-Minam Section in the town of Elgin.

The grading work has been done by the Union County Court under Contract No. 485 awarded to them on December 15, 1921. Work was started on December 29, immediately after the award, and is practically completed at the present time, having been carried on under the engineering supervision of J. N. Bishop, Resident Engineer.

The completed work is estimated to cost a total of $78,500.00, to be paid entirely by the State. Expenditures to date amount to $62,090.19.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,399.46
Constructing drinking fountain by State forces for convenience of public		502.10
Contract items as follows:		
Clearing and grubbing, all	$ 1,800.00	
Common excavation, 143,743.3 cu. yds. at 19c	27,311.23	
Intermediate excavation, 8,561.2 cu. yds. at 40c	3,424.48	
Solid rock excavation, 2,676.2 cu. yds. at $1.05	2,810.01	
Overhaul, 292,809.0 sta. yds. at 3c	8,784.27	
12-inch plain concrete pipe, 486.0 lin. ft. at $1.20	583.20	
18-inch reinforced concrete pipe, 348.0 lin. ft. at $2.50	870.00	
24-inch reinforced concrete pipe, 492.0 lin. ft. at $4.00	1,968.00	
36-inch reinforced concrete pipe, 32.0 lin. ft. at $6.00	192.00	
Class "C" concrete, 33.88 cu. yds. at $22.50	762.30	
Lumber and timber, 169,748 M.-FBM. at $56.00	9,505.88	
Timber piling, 2,084.0 lin. ft. at $1.00	2,084.00	
Timber piling, 972.0 lin. ft. at $1.15	1,117.80	
Crushed gravel, 46.2 cu. yds. at $1.00	46.20	
Total amount earned by contractor	$ 61,259.37	
Percentage retained until completion of contract	5,070.74	
Total amount paid to contractor		56,188.63
Grand total expended (all State funds)		$ 62,090.19

[UNION]

Wolf Creek and Jimmy Creek Bridges

A culvert over Jimmy Creek and a 30-foot concrete span over Wolf Creek were awarded to Kenneth Oxman of Baker on July 29, 1922, under Contract No. 435.

Work was started on August 29, 1921, and finished January 3, 1922, the final cost of the two structures being $8,191.90, all from State funds. The County is to cooperate in this cost to the amount of $7,552.12.

Christ Fauerso was Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 369.78
Contract items as follows:		
Excavation, 309.06 cu. yds. at $1.00	$ 309.06	
Class "A" concrete, 168.66 cu. yds. at $30.00	5,059.80	
Metal reinforcement, 14,128.0 lbs. at 7c	988.96	
Concrete handrail, 67.0 lin. ft. at $4.00	268.00	
Force account items:		
Constructing class "B" concrete footings for abutments	555.01	
Backfilling around bridge ends	371.29	
Total amount paid to contractor		7,552.12
Grand total cost of structures (all State funds)		$ 8,191.90

Rinehart Overcrossing

Near the station of Rhinehart, the La Grande-Joseph Highway makes a combined crossing of the tracks of the Oregon-Washington Railroad & Navigation Company and the Grande Ronde River by means of a 140-foot steel span, with 175 feet of concrete approach.

This matter was presented to the Public Service Commission at a hearing held at La Grande on March 3, 1922. The Public Service Commission in its order No. 829 allotted 20 per cent of the cost of the crossing proper to the Railroad Company and the remainder in equal portions to the State and County.

The construction was awarded to the Colonial Building Company of Spokane under Contract No. 566, dated June 29, 1922. Actual construction was started on July 15, 1922, and at the date of this report is about half done.

Expenditures to date amount to $12,362.87 from State funds, out of an estimated cost of $41,500.00. E. G. Ricketts is Resident Engineer.

Overcrossings on Old Oregon Trail

From the summit of the Blue Mountains near Kamela to the Baker County Line, the Old Oregon Trail crosses the tracks of the Oregon-Washington Railroad & Navigation Company at eight different points. These are located as follows in the order which they occur:

(1) Glover
(2) Hilgard
(3) Perry
(4) Near Oro Dell
(5) Oro Dell
(6) Hot Lake
(7) Telocaset
(8) North Powder

[UNION]

With the exception of the two Oro Dell crossings, these were all made the subject of a single application for hearing before the Public Service Commission. The hearing was held on February 24, 1921, and the costs were apportioned in the Public Service Commissions' Order No. 704 dated May 9, 1921. The order varies considerably for the different crossings, for which reason, each will be treated separately.

Glover Overcrossing:

The Glover Overcrossing is the simplest one of the overcrossings, consisting of three 43-foot concrete spans with some little earth approach.

Contract No. 422 for its construction was awarded to the Heiselt Construction Company of Salt Lake on July 21, 1921. By agreement with the Railroad Company, the first work undertaken was the widening of the railroad cut to double-track width for some distance on either side of the overcrossing. This was necessarily a slow process and consumed the entire working season of 1921.

Work being impractical at this altitude during the winter, the work was closed down until spring. It was resumed again on May 10, 1922, and was complete by August 19, 1922. In the spring of 1922, a temporary overcrossing was built alongside the permanent one so that travelers might have the use of the new grade at each side of the crossing.

The total cost of the work including the approach fills and widening of the railroad cut was $21,105.08. Of this sum, the railroad will pay 35 per cent, the County 15 per cent and the State the remaining 50 per cent. The entire cost has been advanced by the State.

N. W. Reese was Resident Engineer in 1921 and E. G. Ricketts acted as such in 1922.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,641.88
Labor and material furnished by State:		
Expense to Western Union Telegraph Co. maintaining lines		86.28
Removing old structure		160.00
Freight on test samples of concrete		3.84
Bronze name plates		14.00
Guarding Western Union Telegraph Lines and O.-W. R. & N. tracks		134.70
Backfilling approaches after structure completed		553.61
Contract items as follows:		
Excavation to plan elevation, 75.7 cu. yds. at $2.50	$ 189.25	
Excavation below elevation shown on plans, 13.7 cu. yds. at $5.00	68.50	
Class "A" concrete, 277.74 cu. yds. at $35.00	9,165.42	
Metal reinforcement, 47,810.0 lbs. at 8c	3,824.80	
Concrete handrail, 263.0 lin. ft. at $5.00	1,315.00	
Force account items:		
Excavation for anticipated O.-W. R. & N. double track	4,243.70	
Backfilling Spring Creek bridge ends	333.62	
Constructing temporary overcrossing to maintain travel	717.98	
Total amount earned by contractor	$ 19,858.27	
Deduction:		
Lump sum deduction as per terms of contract	1,347.50	
Total amount paid to contractor		18,510.77
Grand total cost of structure (all State funds)		$ 21,105.08

Hilgard Overcrossing:

The construction of this crossing was awarded to Jas. F. Clarkson under Contract No. 377, dated May 28, 1921. The structure consists of a 140-foot steel truss span, with 182 feet of concrete approaches, and combines a crossing of the railroad track with one of the Grande Ronde River.

[UNION]

The Public Service Commission's order provides that 35 per cent of the cost be borne by the Railroad Company, 15 per cent by Baker County and 50 per cent by the State. Owing to the fact that a river crossing is combined with the railroad crossing, the order also provides that the engineers for the railroad and the State shall come to an agreement concerning the value of that portion of the structure to be classed as an overcrossing. In accordance with this, it was agreed that this amount should be the average cost of the crossings to be built at Glover, Hot Lake, Telocaset and North Powder, in Union County, and Unity, in Baker County.

Work started on June 17, 1921, and was complete by August 10, 1922, at a cost of $49,494.40, advanced by the State. The progress of the work was delayed to a great extent by the severe winter weather of 1921-1922.

N. W. Reese was Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,151.51
Labor and material furnished by State:		
Constructing grouted rock walls to protect slopes		3,174.66
Repairing damage to Western Union Telegraph lines		215.39
Bronze name plates		14.50
Watchman's services guarding Western Union lines and O.-W. R. & N. Ry. tracks		157.88
Contract items as follows:		
Excavation to plan elevation, 355.8 cu. yds. at $4.00	$ 1,423.20	
Excavation below elevation shown on plans, 43.0 cu. yds. at $8.00	344.00	
Class "A" concrete, 452.2 cu. yds. at $30.00	13,566.00	
Class "B" concrete, 98.0 cu. yds. at $28.00	2,744.00	
Metal reinforcement, 81,568.0 lbs. at 5¾c	4,690.16	
Structural steel, 160,131.0 lbs. at 8½c	13,611.14	
Concrete handrail, 665.5 lin. ft. at $4.50	2,994.75	
Constructing approach embankments, 3,509.0 cu. yds. at 60c	2,105.40	
Adjustment to cover cost of changing forms to allow for superelevation on curve	1,240.73	
Force account items:		
Constructing new type expansion joint in handrail and burning holes in shoes for cotter keys	30.75	
Bush-hammering handrail post panels	30.33	
Total amount paid to contractor		42,780.46
Grand total cost of structure (all State funds)		$ 49,494.40

Hot Lake Overcrossing:

The crossings at Perry and Oro Dell have not yet been constructed and therefore will not be discussed at this time. The next one in order is at Hot Lake.

This structure consists of eight concrete spans of 38 feet each, 188 feet of pile trestle approach and a considerable amount of earth approach. The southeast approach is over an area of soft, swampy soil whose bearing power is questionable. For this reason, it was not thought advisable to build the approaches entirely of earth, on account of its great weight. In place of the fill, a pile trestle was subsituted, of light design. It is contemplated that the trestle will gradually be replaced by fill as the ground appears able to support it.

Contract No. 424, for this construction, was awarded to Hauser Construction Company on July 25, 1921. Work started on August 22, 1921, but was not complete until August 2, 1922. The greater portion of the delay was caused by the slowness of the subcontractor on the approach fill.

[UNION]

The total cost was $45,657.45, advanced entirely by the State, of which the Railroad Company will pay 35 per cent, the County 15 per cent and the State 50 per cent.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,014.45
Labor and material furnished by State:		
Bronze name plates		14.00
Watchmen's services guarding Western Union Lines and O.-W. R. & N. Ry. tracks		39.08
Contract items as follows:		
Excavation to plan elevation, 489.34 cu. yds. at $2.00	$ 978.68	
Excavation below elevation shown on plans, 37.06 cu. yds. at $5.00	185.30	
Class "A" concrete, 706.96 cu. yds. at $27.75	19,618.14	
Metal reinforcement, 113,332.0 lbs. at 6½c	7,366.58	
Lumber in place, 4.24 M.-FBM. at $47.00	199.28	
Fir piling for foundations, 2,943.5 lin. ft. at 60c	1,766.10	
Fir piling for approaches, 2,031.75 lin. ft. at 60c	1,219.05	
Concrete handrail, 613.0 lin. ft. at $4.00	2,452.00	
Trestle superstructure, 188.0 lin. ft. at $8.70	1,635.60	
Approach embankment, 7,989.0 cu. yds. at 85c	6,790.65	
Force account items:		
Furnishing and installing 69 feet of 18-inch concrete pipe and construction of two headwalls	299.93	
Installing extra sway bracing due to change in plans and bush-hammering panels in handrail posts	78.61	
Total amount paid to contractor		42,589.92
Grand total cost of structure (all State funds)		$ 45,657.45

Telocaset Overcrossing:

Contract No. 423 covering the construction of the Telocaset Overcrossing was awarded on July 21, 1921, to the Heiselt Construction Company of Salt Lake.

The crossing consists of four spans of 27 feet and one of 35 feet, all of concrete construction. Earth fills lead up to the structure on either side. The total cost was $26,550.89, of which the County will pay 15 per cent, the Railroad Company 35 per cent, and the State 50 per cent. The entire amount has been advanced by the State.

Work started on August 15, 1921, and was finished August 12, 1922. As with many of the other bridges in the vicinity, the work was considerably delayed by the severe winter weather.

Christ Fauerso was Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,503.07
Bronze name plates furnished by State		14.00
Moving telephone lines (State forces)		53.45
Protecting railroad and telegraph lines from damage		54.60
Regrading approaches due to settlement		294.30
Contract items as follows:		
Excavation to plan elevation, 690.72 cu. yds. at $2.00	$ 1,381.44	
Excavation below elevation shown on plans, 42.53 cu. yds. at $5.00	212.65	
Class "A" concrete, 319.78 cu. yds. at $30.00	9,593.40	
Metal reinforcement, 52,855.0 lbs. at 6½c	3,435.58	
Reinforced concrete handrail, 290.0 lin. ft. at $5.00	1,450.00	
Foundation piles, 60.0 each at $80.00	4,800.00	
Approach embankments, 6,896.0 cu. yds. at 40c	2,758.40	
Total amount paid to contractor		23,631.47
Grand total cost of structure (all State funds)		$ 26,550.89

[UNION]

North Powder Overcrossing:

The North Powder Overcrossing consists of one 37-foot and three 40-foot concrete spans, with earth-filled approaches. It was built by James F. Clarkson under Contract No. 416, dated June 29, 1921.

Actual construction began on July 8, 1921, and continued until May 1, 1922, when it was complete. As in the case of the Hot Lake Overcrossing, the subcontractor on the approaches delayed the completion of the work to a great extent. N. W. Reese was Resident Engineer.

The final cost was $40,171.10, of which 20 per cent will be paid by the County, 40 per cent by the Railroad Company and the remainder by the State. The Railroad Company has paid their full share, amounting to $16,026.16, and the balance has been advanced by the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,789.11
Two bronze name plates furnished by State		14.50
Construction of approach embankments, handled under grading contract No. 290		12,724.40
Expense of O.-W. R. & N. Co. for keeping tracks clear during construction		118.87
Protecting railroad and telegraph lines from damage		79.07
Contract items as follows:		
Excavation to plan elevation, 467.73 cu. yds. at $1.00	$ 467.73	
Excavation below elevation shown on plans, 73.29 cu. yds. at $5.00	366.45	
Class "A" concrete, 483.20 cu. yds. at $30.00	14,496.00	
Metal reinforcement, 72,637.0 lbs. at 5¼c	3,873.97	
Concrete handrail, 399.5 lin. ft. at $4.50	1,797.75	
Approach embankments, 4,591.0 cu. yds. at 75c	3,443.25	
Total amount paid to contractor		24,445.15
Grand total cost of structure and approaches		$ 40,171.10
Paid by State	$ 24,144.94	
Paid by O.-W. R. & N. Co.	16,026.16	
Total	$ 40,171.10	

Small Bridges, Kamela to La Grande

A 60-foot steel span and three small concrete bridges were awarded together, under Contract No. 383, to Kelly & Lilly of La Grande, on May 28, 1921.

The construction was started on June 20, 1921, and finished on June 1, 1922, at a cost of $24,105.14, all from State funds. The sum of $22,465.44 is due from the County for their cooperation.

N. W. Reese was Resident Engineer in charge of the work.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,639.70
Bronze name plates furnished by State		14.50
Contract items as follows:		
Excavation to plan elevation, 757.5 cu. yds. at $2.00	$ 1,514.60	
Excavation below elevation shown on plans, 26.5 cu. yds. at $3.00	79.50	
Class "A" concrete, 463.9 cu. yds. at $30.00	13,917.00	
Metal reinforcement, 35,076.0 lbs. at 6c	2,104.56	
Structural steel, 52,278.0 lbs. at 9c	4,705.02	
Force account items:		
Grading approach fills to bridges No. 692 and No. 718	130.26	
Total amount paid to contractor		22,450.94
Grand total cost of structures (all State funds)		$ 24,105.14

[UNION]

Elgin Bridge

About a mile from Elgin, the La Grande-Joseph Highway crosses the Grande Ronde River on a bridge consisting of a 140-foot steel truss span, with 475 feet of pile trestle approach.

Contract No. 506, for its construction, was awarded to the Union Bridge Company, on March 23, 1922. This contract also includes the construction of eight spans of pile trestle over Dry Creek, in the same vicinity.

Work started on May 1, 1922, but was conducted in a rather dilatory manner until about the middle of July, when progress became much better. At the date of this report the work is about complete and probably will be entirely done by December 10.

The estimated final cost of $34,000.00 from State funds, of which $28,646.35 has been expended to date.

E. G. Ricketts is Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,795.28
Contract items as follows:		
Excavation for foundations, 790.0 cu. yds. at $2.35	$ 1,856.50	
Excavation for approach fills, 1,200.0 cu. yds. at 50c	600.00	
Class "A" concrete, 146.0 cu. yds. at $23.00	3,358.00	
Class "B" concrete, 136.0 cu. yds. at $23.00	3,128.00	
Metal reinforcement, 17,000.0 lbs. at 6c	1,020.00	
Lumber in place, 16.0 M.-FBM. at $50.00	800.00	
Fir piling, 1,758.0 lin. ft. at 70c	1,230.60	
Structural steel, 128,000.0 lbs. at 7.55c	9,664.00	
Wooden approach trestle, 600.0 lin. ft. at $12.50	7,500.00	
Total amount earned by contractor	$ 29,157.10	
Percentage retained until completion of contract	2,306.03	
Total amount paid to contractor		26,851.07
Grand total expended (all State funds)		$ 28,646.35

Engineering County Bridges

There has been $214.96 spent for engineering for County bridge construction during this biennium, principally in connection with a bridge recently built over Little Creek in the town of Union.

Catherine Creek Bridges

Near Hot Lake, the Old Oregon Trail crosses Catherine Creek on a 60-foot steel span. At the town of Union, the same stream is again crossed, this time on a 40-foot "I" beam span.

In 1920, Union County bought the structural steel for the crossing near Hot Lake, but never built the necessary abutments or erected the steel. In Union the bridge was already in place, but had only a wood deck and was badly in need of paint and repairs.

A contract was accordingly awarded to C. A. Burnette of Spokane to erect the 60-foot span and to rearrange the beams in the 40-foot span, paint them and put on a concrete deck. This contract was awarded on July 29, 1921, and was numbered 434.

Work started on September 5, 1921, and was brought to completion on May 23, 1922, at a total cost of $17,073.29, all being paid out of State funds. Cooperation in the amount of $15,753.84 is due from the County.

Christ Fauerso was Resident Engineer.

[UNION]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,319.45
Contract items as follows:		
BRIDGE No. 558—		
Excavation, 674.47 cu. yds. at $6.00	$ 4,046.82	
Class "A" concrete, 158.73 cu. yds. at $25.00	3,968.25	
Metal reinforcement, 17,895.0 lbs. at 2c	357.90	
Structural steel, 54,560.0 lbs. at 2c	1,091.20	
Foundation piles, 64.0 each at $50.00	3,200.00	
Force account items:		
Reaming out rivet holes, furnishing and installing 2 expansion plates and backfilling approaches	467.41	
BRIDGE No. 779—		
Class "A" concrete, 70.98 cu. yds. at $25.00	1,774.50	
Metal reinforcement, 6,888.0 lbs. at 2c	137.76	
Reinforced concrete handrail, 92.0 lin. ft. at $5.00	460.00	
Rearranging deck (lump sum)	250.00	
Total amount paid to contractor		15,753.84
Grand total cost of structures (all State funds)		$ 17,073.29

Grande Ronde River Bridge Near Perry

The Old Oregon Trail crosses the Grande Ronde River near Perry on a bridge consisting of a 140-foot steel span, with two 40-foot concrete approach spans.

This bridge was built by the Union Bridge Company under Contract No. 439, awarded to them on July 29, 1921. The actual construction work was started on August 22, 1921, and continued until July 10, 1922, when it was complete, at a total cost of $24,914.01, all from State funds. At this time the sum of $23,425.08 is due from the County in cooperation. This work, like the others in the same locality, was delayed considerably by cold winter weather.

N. W. Reese was Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,488.93
Bronze name plates, furnished by State		14.50
Contract items as follows:		
Excavation to plan elevation, 157.5 cu. yds. at $3.00	$ 472.50	
Excavation below elevation shown on plans, 56.4 cu. yds. at $4.00	227.20	
Class "A" concrete, 272.3 cu. yds. at $26.40	7,188.72	
Class "B" concrete, 51.2 cu. yds. at $26.30	1,346.56	
Metal reinforcement, 38,229.0 lbs. at 6c	2,293.74	
Structural steel, 126,355.0 lbs. at 9c	11,371.95	
Concrete handrail, 166.0 lin. ft. at $4.50	747.00	
Approach embankments, 284.2 cu. yds. at 45c	127.89	
Total amount earned by contractor	$ 23,775.56	
Deduction for overrun of time limit	364.98	
Total amount paid to contractor		23,410.58
Grand total cost of structure (all State funds)		$ 24,914.01

Maintenance

At the close of the period covered by this report 70.7 miles of State highways in Union County were placed under patrol maintenance. This work was carried on under the supervision of the La Grande Division Office.

On the Old Oregon Trail there were under maintenance 43.5 miles of macadam and 4.0 miles of bituminous concrete pavement, and on the La

Grande-Joseph Highway 15.85 miles of macadam and 2.0 miles of bituminous concrete pavement.

The section between Kamela and La Grande, approximately 18.8 miles of macadam, was under the supervision of Helmer Olsen. However, the work on this section did not start until October, 1922.

The section between La Grande and North Powder, 4.0 miles of pavement and 26.7 miles of macadam, was under the supervision of Patrolman A. B. Ferree. Practically all the maintenance work on this section was carried on in 1922, there being very little of the work completed in 1921. This patrol was furnished with a State truck, grader and drag. On strictly patrol maintenance the work consists of blading, dragging, and cleaning ditches and culverts, the patrolman using one assistant. However, there was considerable betterment work carried on on this section in 1922, such as filling approaches to overhead crossings, spreading gravel on these approaches and spreading sand on macadam between Hot Lake and Union, which required a larger crew for a part of the year.

Maintenance of macadam on the La Grande-Joseph Highway was done under Wm. Miller, patrolman, who used teams and grader as required. The work was carried on intermittently during 1922.

La Grande-Hot Lake Construction Engineering

A description of this work will be found on page 376 of the previous report. During the winter of 1920, the encroachment questions in the vicinity of Lone Tree were adjusted and the grading was carried to final completion in January, 1921. The 1921 work brings the total grading accomplished by the County to 7.9 miles.

Subsequent to the completion of this work, 4.01 miles have been paved and the balance surfaced with broken stone.

Oro Dell-La Grande Survey

Between the thirty-first of May and the twenty-sixth of June, 1921, Max J. Kuney, Resident Engineer in charge of the grading between La Grande and Kamela, at such times as could be spared from the grading work, located the short connecting link between what is known as Oro Dell, approximately half a mile west of the city limits of La Grande, and the site of the proposed combination railroad viaduct and highway bridge over the Grande Ronde River, to a connection with Adams Avenue in the City of La Grande.

The proposed location was made to eliminate the present entrance into La Grand from the west, involving the old steel bridge crossing the Grande Ronde River and the overhead viaduct on Second Street, which has a 7 per cent grade approach.

La Grande-Elgin Survey

In 1917 David G. Glass, Locating Engineer, staked the location between La Grand and Elgin, which mainly followed the old road. Between February 20 and April 1, 1920, R. A. Pratt revised this location between Island City and the Conley Warehouse, and between April and June, 1921, B. H. McNamee completed the location between Conley Warehouse and Elgin.

The present location follows the north and west side of the railroad track between Conley Warehouse and Rhinehart, at which point an overhead crossing over railroad and river is proposed, and the location enters

the gorge of the Grande Ronde River. This gorge is only about eight thousand feet in length, the location emerging on the river flats near the mouth of Indian Creek. From this point to Elgin the construction will be very light, with the exception of the bridge across the Grande Ronde River just west of Elgin.

This location eliminates three railroad crossings at grade, and saves approximately five miles on the distance of the old road. It further avoids the dark hillside between Rhinehart and Elgin, which drifts badly with snow every year and is the main factor in retarding traffic on the present road.

Hot Lake-Union Survey

The survey of the Hot Lake-Union Section, made by W. P. Hughes in January, 1917, was located on an almost direct line between Hot Lake and Union. However, the first three miles traversed very low, boggy ground, and it was deemed advisable to change the location to secure more stable foundation. With this in view, test borings were taken of a section of the country two miles in width, between Hot Lake and Union. The results of the test borings were plotted, and it was found a very direct line could be secured, eliminating approximately one and one-half miles of this boggy ground and securing a gravel foundation for the remainder.

On February 1, 1921, a survey was started by R. A. Pratt, Locating Engineer, and completed early in March of the same year. The total distance of the line to a point near the east city limits of Union was 6.62 miles. The survey was approximately one-quarter of a mile longer between common points than that made by Mr. Hughes.

Wallowa Hill Survey

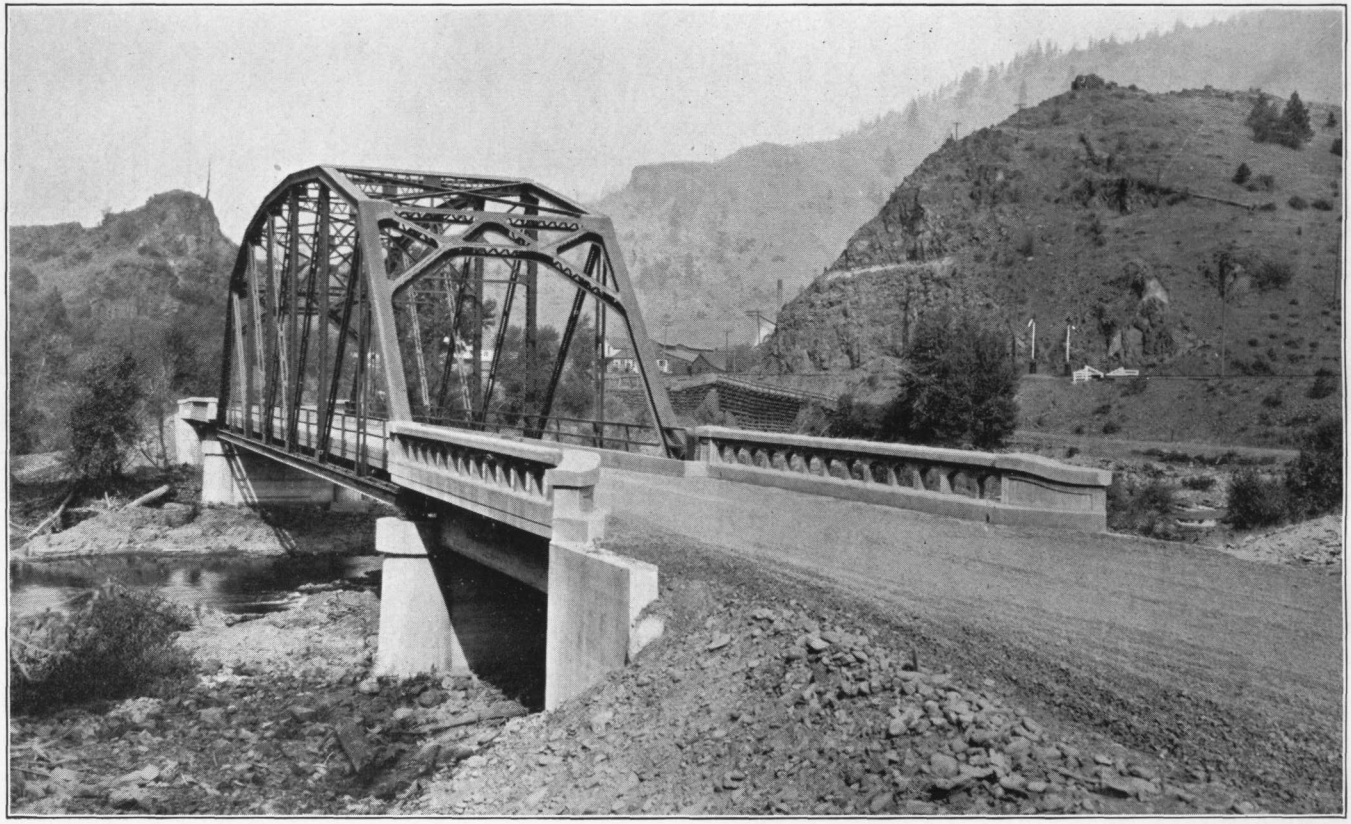
In 1917 David Glass, Locating Engineer, ran a preliminary line down Wallowa Hill. Based on this preliminary line, a location line was projected and staked by R. A. Turrell, Locating Engineer, between March 8 and April 21, 1921.

This location, 5.42 miles in length, eliminated the Wallowa Hill grade, which was very narrow, steep and had many sharp turns. The old road was extremely hazardous due to the rapidly increasing tourist traffic to summer resorts in Wallowa County. Near the top of the hill there was a long stretch of gumbo which practically isolated the people in Wallowa County during the winter and spring, in so far as highway transport was concerned.

This survey was a difficult location, traversing the steep slopes of the Minam River on a 5 per cent grade. It extends from the top of what is known as the Wallowa Grade at the end of the Elgin-Wallowa Hill Section, to a point just west of the crossing of the Wallowa River near Minam, the initial point of the Wallowa Canyon Section.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.



BRIDGE OVER THE GRAND RONDE RIVER ON THE OLD OREGON TRAIL NEAR PERRY

[UNION]

Since the Market Road Law went into effect, Union County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 65,063.30
2.	State Funds apportioned to County	90,430.69
3.	County levy made to match State Funds	88,197.34
4.	County Market Road Funds collected	85,135.82
5.	Cash paid to County by State	73,237.22
6.	State expenditures, deducted from apportionment	2,793.48
7.	Cash due County from State in December, 1922	14,399.99
8.	County expenditures on Market Roads	172,862.79
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Union County received from the State Market Road Fund $25,367.39 more than it paid into the fund. The excess is Union County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $88,197.34. Of this amount they have collected and credited to the Market Road Fund $85,135.82.

The County Court has designated nine roads to be improved as Market Road projects.

The surveys and plans have been made for some of the projects by Mr. Birney, County Roadmaster, and for some by engineers in the employ of the State Highway Commission. Plans have been submitted and approved.

The construction work has been done by contract or by County forces, all under the direction of the Roadmaster.

It has been reported that some of the construction work was not done in accordance with the plans approved.

The County has graded 19.9 miles of road and surfaced 17.4 miles.

WALLOWA COUNTY

During the period covered by the Fourth Biennial Report, very little highway construction had been done in Wallowa County, there being but four miles of grading completed on the 40 miles of the La Grande-Joseph Highway. During 1921 and 1922 the entire balance was placed under contract, and approximately 27 miles were graded and 31 miles macadamized. The contractors are now working on the section between Lostine and Enterprise, a distance of 7.89 miles. This project will be completed in the summer of 1923.

The present plans call for the completion of the entire length of the La Grande-Joseph Highway between La Grande and Joseph, a distance of approximately 80 miles, by July 1, 1923. This construction includes grading, surfacing and bridging.

Before the era of highway construction in Wallowa County, automobile traffic through the late winter and early spring was almost impossible. The main artery of traffic through the County is now well underway, and the construction of secondary and market roads as feeders to this highway, several of which are now being built, will result in Wallowa County having a very comprehensive system of highway transportation. The reflex of this construction will soon become evident, and in fact has already made itself manifest, in the prosperity to farmers who live in this fertile valley in that they are able to get their produce to the rail points with greater ease, and the communication between their homes and the civic centers has been materially facilitated.

In addition to these very important commercial advantages to the farmers residing in Wallowa County, the highway is of great interest to the State as a whole on account of the fact that it makes easily accessible to the people in Oregon, and outside tourists, the splendid scenic attractions to be found in the lakes, mountains and fishing streams of this section. Wallowa County, especially that portion between Wallowa Lake and the headwaters of Eagle Creek, has been aptly termed the Switzerland of America.

Highway construction in the County during the period of this report was under the supervision of R. H. Baldock, Division Engineer.

Wallowa Hill Grading and Surfacing

Articles covering the grading and surfacing contracts on this section, and the Wallowa County funds involved, will be found in the portion of this report devoted to Union County projects.

Wallowa Canyon-Lostine Grading and Surfacing

The section of the La Grande-Joseph Highway from the head of Wallowa Canyon to Wades Ranch, located on the Wallowa River approximately two miles west of Lostine, was graded and surfaced between April 24 and December 13, 1921. This project is known as the Wallowa Canyon-Lostine Project and was constructed by Porter & Conley of Portland, Oregon, under Contract No. 346, awarded to them on April 5, 1921.

Construction was supervised by R. A. Turrell and J. N. Bishop, Resident Engineers, successively, and represents a total cost of $236,688.04, to be paid $123,032.45 by the State and $113,655.59 by the County. At the time of this report, the State expenditures have amounted to $166,777.06 and the County expenditures to $69,910.98, leaving a balance due the State from the County of $43,744.61.

ALONG THE WALLOWA RIVER; ON THE LA GRANDE-ENTERPRISE HIGHWAY IN WALLOWA COUNTY

[WALLOWA]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 10,815.00
Labor and materials furnished by State:		
Constructing standard wood guard fence		766.51
Moving church in Lostine to improve sight distance on curve		75.00
Items deducted from contractor's estimate:		
Rental of State-owned truck		2,569.61
Completion of bridge pedestals by State forces		25.00
Penalty imposed for overrun of time limit		257.91
Contract items as follows:		
Clearing and grubbing, all	$ 2,000.00	
Common excavation, 75,434.8 cu. yds. at 50c	37,717.40	
Intermediate excavation, 35,854.4 cu. yds. at 75c	26,890.80	
Solid rock excavation, 7,051.1 cu. yds. at $1.50	10,576.65	
Overhaul, 99,456.0 sta. yds. at 10c	9,945.60	
12-inch corrugated galvanized iron pipe, 1,022.0 lin. ft. at $1.25	1,277.50	
18-inch corrugated galvanized iron pipe, 2,068.0 lin. ft. at $2.25	4,653.00	
24-inch corrugated galvanized iron pipe, 845.0 lin. ft. at $2.95	2,492.75	
36-inch corrugated galvanized iron pipe, 296.0 lin. ft. at $5.50	1,628.00	
12-inch corrugated galvanized iron siphon, 68.0 lin. ft. at $2.00	136.00	
18-inch corrugated galvanized iron siphon, 292.0 lin. ft. at $3.25	949.00	
24-inch corrugated galvanized iron siphon, 130.0 lin. ft. at $4.75	617.50	
Class "A" concrete, 276.16 cu. yds. at $40.00	10,686.40	
Class "B" concrete, 92.85 cu. yds. at $35.00	3,249.75	
Class "B" concrete for pedestal construction, 132.66 cu. yds. at $30.00	3,979.80	
Metal reinforcement, 23,480.00 lbs. at 10c	2,348.00	
Lumber and timber in place, 31.096 M.-FBM. at $100.00	3,109.60	
Lumber and timber, 73.624 M.-FBM. at $72.50	5,337.74	
Riprap, 691.4 cu. yds. at $3.50	2,419.90	
Crushed gravel surfacing, 34,789.0 cu. yds. at $2.50	86,972.50	
Crushed gravel for maintenance, placed in piles, 1,273.0 cu. yds. at $2.50	3,182.50	
Earth filler, 200.0 cu. yds. at 50c	100.00	
Force account items:		
Placing binder on base course of surfacing	200.54	
Moving sidewalk in front of church in Lostine	14.49	
Constructing levee and repairing Bear Creek bridge	227.46	
Maintenance work on gravel detour near Lostine	88.92	
Wrecking old timber culvert at Wallowa	63.95	
Excavating for pedestals at Rock Creek and Dry Creek bridges	1,720.33	
Wet excavation for bridge at Sta. 581	686.81	
Removing culvert at Sta. 579+00 and relaying in new location	22.46	
Covering water mains in Wallowa, exposed during construction	173.48	
Lowering grade of streets in Wallowa	351.12	
Excavation for bridge piers at Sta. 544	226.70	
Riprapping at culvert pipe ends	233.13	
Hauling gravel for structures (structures not included in contractor's original bid)	133.48	
Extra clearing and grubbing outside of right-of-way	618.27	
Total amount earned by contractor	$225,031.53	
Deductions:		
Rental of State-owned truck	2,569.61	
Completion of bridge pedestals by State forces	25.00	
Penalty for overrun of time limit	257.91	
Total amount paid to contractor		222,179.01
Grand total cost of project		$236,688.04
Paid by State	$166,777.06	
Paid by County	69,910.98	
Total	$236,688.04	

[WALLOWA]

Wallowa Canyon Surfacing

Upon the completion of the post road grading on this section, Contract No. 347, for surfacing the 8.29 miles involved, was awarded to March & Bowers of Spokane. Washington, on April 5, 1921. Work was started May 1 and completed October 10 of the same year. The surfacing materials were obtained from slides in the section and have made an excellent macadam.

R. L. Shreve, Resident Engineer, was in charge of the engineering supervision of the work, which represents a total cost of $56,751.66. Of this amount, Wallowa County cooperates to the extent of $27,462.90. At the time of this report, final expenditures of the entire estimated cost have been made, consisting of $29,298.76 of State funds and $27,462.90 of County funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,835.86
Contract items as follows:		
Crushed rock for surfacing, 17,417.0 cu. yds. at $2.85	$ 49,638.45	
Crushed rock for maintenance, placed in piles, 451.0 cu. yds. at $2.85	1,285.35	
Earth filler, 2,305.0 cu. yds. at $1.00	2,305.00	
Binder material, 1,697.0 cu. yds. at $1.00	1,697.00	
Total amount paid to contractor		54,925.80
Grand total cost of project		$ 56,761.66
Paid by State	$ 29,298.76	
Paid by County	27,462.90	
Total	$ 56,761.66	

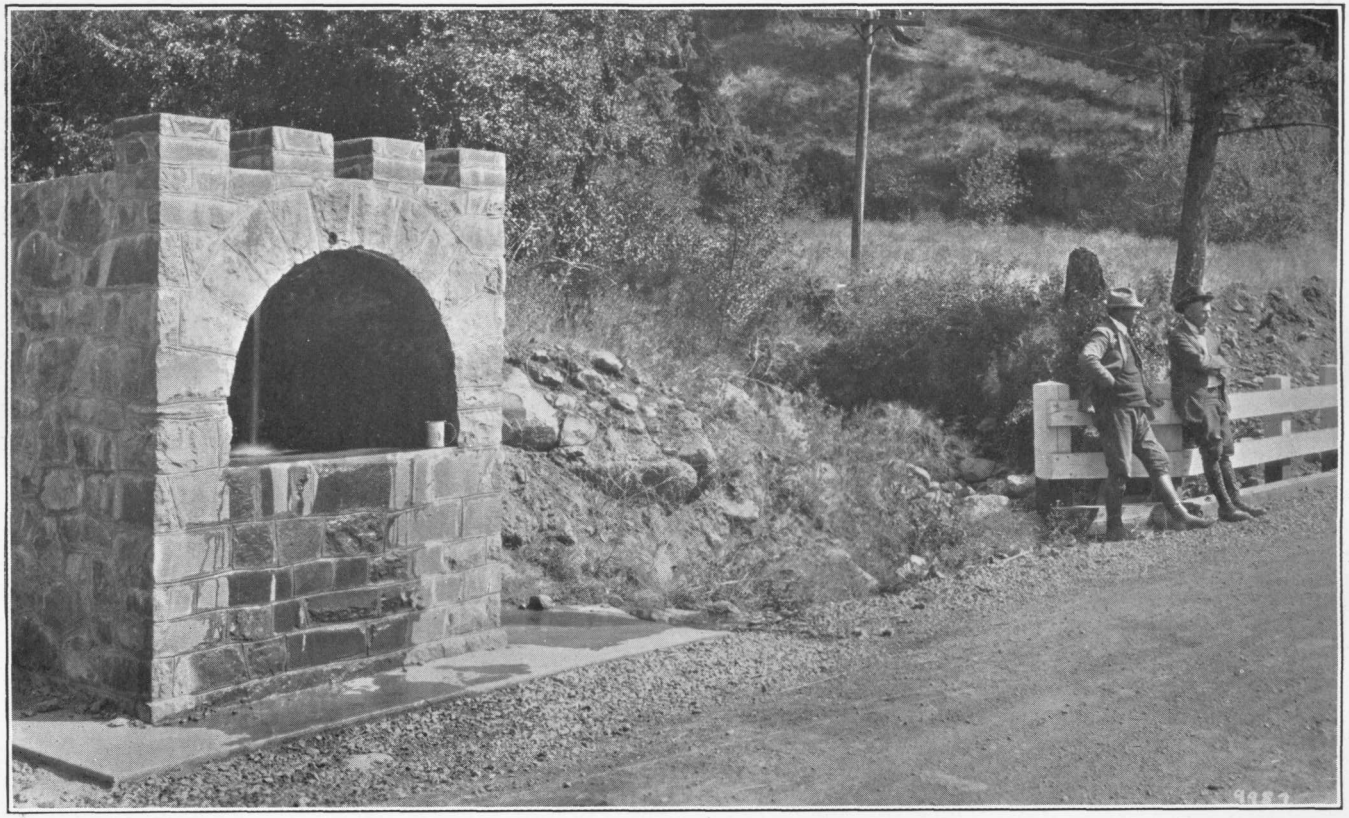
Lostine-Enterprise Post Road Project

This section begins at the end of the Wallowa Canyon-Lostine Section, near Wades Ranch approximately two miles east of Lostine, and extends to Enterprise. The grading, surfacing and bridges on the section are being constructed as a cooperative project between the State, County and Federal Government under the terms of Post Road Project Agreement No. 71.

Contract No. 570 for the construction of the grading and surfacing was awarded to the Wallowa County Court on June 26, 1922. Operations were started on September 18 and are under way at the present time, being handled under the supervision of Oscar Cutler, Resident Engineer. The section is 7.89 miles in length, and is estimated to cost a total of $108,000.00. This cost will be shared $49,000.00 by the County and $63,910.58 by the Federal Government, with an estimated net credit of $4,910.58 to State funds. However, as it is ordinarily impossible to secure the full estimated Federal cooperation on a project, it is very probable that the State credit will be entirely wiped out in the final payment. The expenditures to date amount to $2,300.79, of which the State has paid $1,303.74 and the County has paid $997.05.

There are three small bridges on this section which are being constructed under a single separate contract. One of these, over the Wallowa River, consists of an 80-foot steel span and another, over an overflow channel nearby, is two spans of standard trestle. The third is over Prairie Creek and consists of seven spans of standard trestle.

Bids were received for the construction of these bridges on July 25, the low bid being submitted by the Wallowa County Court. All the bids were considered too high, however, and were to have been rejected, but the County Court agreed to reduce their bid to the engineer's estimate.



A PUBLIC CONVENIENCE GREATLY APPRECIATED WHERE GOOD WATER IS AVAILABLE ONLY AT LONG INTERVALS; THIS FOUNTAIN IS ON THE LA GRANDE-ENTERPRISE HIGHWAY IN WALLOWA COUNTY

They were accordingly awarded the contract, No. 576, and commenced work on August 17. Since that time, the work has progressed steadily and is about half done at the present time.

The estimated cost is $20,500.00, of which $5,994.94 has been paid out to date. Of this sum, $3,372.97 was from State funds and $2,621.97 from County funds. Upon final completion, it is expected that the State share will be reduced to $593.00, while the County and the Federal Government will contribute $9,500.00 and $10,407.00 respectively.

Oscar Cutler, Resident Engineer, is in charge of the construction of these bridges, in addition to the grading and surfacing.

In summing up, the grading, surfacing and bridges are estimated to cost a total of $128,500.00, towards which the County will cooperate to the extent of $58,500.00 and the Federal Government $74,317.58, leaving a net estimated credit of $4,317.58 to State funds.

Enterprise-Joseph Grading and Surfacing

On April 22, 1921, the State Highway Commission awarded Contract No. 362, for grading and surfacing the section between Enterprise and Joseph, to the Morrison-Knudson Company of Boise, Idaho. Work was commenced on the fifth of May and completed on the nineteenth of September of the same year, under the supervision of Charles D. Jones, Resident Engineer.

The completed work represents a total expenditure of $74,148.94, which has been paid $37,354.22 by the State and $36,794.72 by Wallowa County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,243.55
74 feet of 36-inch soldered culvert pipe furnished by State		375.18
Contract items as folows:		
Clearing and grubbing, all	$ 50.00	
Common excavation, 20,129.6 cu. yds. at 45c	9,058.32	
Intermediate excavation, 9,279.5 cu. yds. at 75c	6,959.63	
Solid rock excavation, 1,733.6 cu. yds. at $1.50	2,600.40	
Overhaul, 15,580.0 sta. yds. at 15c	2,337.00	
12-inch corrugated galvanized iron pipe, 244.0 lin. ft. at $1.65	402.60	
18-inch corrugated galvanized iron pipe, 860.0 lin. ft. at $2.60	2,236.00	
24-inch corrugated galvanized iron pipe, 216.0 lin. ft. at $3.00	648.00	
18-inch siphon pipe, 222.0 lin. ft. at $2.70	599.40	
36-inch siphon pipe, 26.0 lin. ft. at $6.50	169.00	
Class "A" concrete, 114.09 cu. yds. at $30.00	3,422.70	
Class "C" concrete, 83.82 cu. yds. at $30.00	2,514.60	
Metal reinforcement, 11,512.0 lbs. at 8c	920.06	
Lumber, 31.54 M.-FBM. at $90.00	2,838.60	
Crushed gravel surfacing, 13,474.3 cu. yds. at $2.40	32,338.32	
Riprap, 381.7 cu. yds. at $3.00	1,145.10	
Force account items:		
Excavating drainage ditches Sta. 1900 to Sta. 1910	289.58	
Total amount paid to contractor		68,530.21
Grand total cost of project		$ 74,148.94
Paid by State	$ 37,354.22	
Paid by County	36,794.72	
Total	$ 74,148.94	

[WALLOWA]

Wallowa Canyon Post Road Project

An article on this project will be noted on page 382 of the last report. Construction has proceeded during the present biennium and was carried to completion on November 10, 1921.

The old grade through Wallowa Canyon, from Minam to Rock Creek, was very narrow and dangerous and was impassable for automobile traffic during the spring of the year. Construction through the canyon was very heavy and the materials for the main part were moved by steam shovel.

The total expenditures on the work have not yet been made, but are estimated to amount to $134,824.44, to be paid $12,792.51 by the State, $60,247.08 by the County and $61,784.85 by the Federal Government. Expenditures to date amount to $10,628.11 by the State, $60,247.08 by the County and $61,784.85 by the Government, making a total of $132,660.04.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 15,267.71
Labor and material furnished by State:		
Remodeling O.-W. R. & N. bridge approach to provide highway undercrossing		1,175.61
Constructing drinking fountain for convenience of public		363.46
Patrolman's services guarding railroad tracks		11.97
Items deducted from contractor's estimate:		
Rental of State-owned trucks		215.47
Powder furnished by State		945.00
Contract items as follows:		
Clearing and grubbing, all	$ 2,900.00	
Common excavation, 87,421.2 cu. yds. at $1.10	96,163.32	
Solid rock excavation, 7,120.8 cu. yds. at $1.10	7,832.88	
Overhaul, 30,766.0 sta. yds. at 5c	1,538.30	
12-inch corrugated galvanized iron pipe, 1,009.0 lin. ft. at $1.70	1,715.30	
18-inch corrugated galvanized iron pipe, 50.0 lin. ft. at $3.50	175.00	
24-inch corrugated galvanized iron pipe, 232.0 lin. ft. at $4.47	1,037.04	
36-inch corrugated galvanized iron pipe, 280.0 lin. ft. at $9.00	2,520.00	
Class "A" concrete, 22.17 cu. yds. at $29.00	642.93	
Metal reinforcement, 854.0 lbs. at 9c	76.86	
Rubble masonry, 203.07 cu. yds. at $12.00	2,436.84	
Lumber and timber, 20.024 M.-FBM. at $80.00	1,601.92	
Broken stone backfill for tile drains, 90.4 cu. yds. at $2.00	180.80	
6-inch porous drain tile, 1,131.0 lin. ft. at 20c	226.20	
Standard wood guard fence, 1,848.0 lin. ft. at $1.00	1,848.00	
Riprap, 1.8 cu. yd. at $4.00	7.20	
Force account items:		
Removing house and barn from right-of-way	62.01	
Adjustment due to alteration in details of construction	11,417.59	
Total amount earned by contractor	$132,382.19	
Deductions:		
Rental of State-owned trucks	215.47	
Powder furnished by State	945.00	
Total deductions	$ 1,160.47	
Total amount paid to contractor		131,221.72
Grand total cost of project		$149,206.94
Less final payment to contractor in transit		16,540.90
Total expended		$132,660.04
Paid by State	$ 10,628.11	
Paid by County	60,247.08	
Paid by Government	61,784.85	
Total	$132,660.04	

[WALLOWA]

Flora-Enterprise Forest Road Project

A description of this work will be noted on pages 382 and 383 of the last report. During the present biennium the surfacing of the project has been completed over the entire 12.9 miles of the section, it having been increased from the six miles previously contemplated. A project agreement for the additional funds required was entered into between the State, County and Federal Government and the entire grading and surfacing represents a total cost of $134,770.66, which has been paid $55,940.52 by the State, $27,201.10 by the County and the balance of $51,629.04 by the Federal Government.

Prairie Creek Bridge

On the section from Enterprise to Joseph, the La Grande-Joseph Highway crosses Prairie Creek on a structure consisting of seven trestle spans, on concrete foundations. These foundations are so designed that when the present wood deck is worn out, a concrete deck may be constructed in its place, making a truly permanent structure.

Contract No. 437, covering the construction of this bridge, was awarded to Oscar Oberg of Enterprise on July 29, 1921. Work started on August 10, 1921, and progressed steadily to completion on October 22, 1921, the total cost being $11,591.99. Of this amount, the State paid $6,156.42 and the County $5,435.57.

Chas. D. Jones was Resident Engineer in charge of the construction.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 720.85
Contract items as follows:		
Approach embankments, 983.9 cu. yds. at $2.00	$ 1,987.80	
Excavation for footings to plan elevation, 400.7 cu. yds. at $1.50	601.05	
Excavation for footings below elevation shown on plans, 137.2 cu. yds. at $4.00	548.80	
Class "A" concrete, 75.61 cu. yds. at $28.00	2,117.08	
Class "B" concrete, 128.12 cu. yds. at $23.00	2,946.76	
Metal reinforcement, 3,026.2 lbs. at 8½c	257.23	
Lumber, 7.044 M.-FBM. at $55.00	387.42	
Wood trestle superstructure, 135.0 lin. ft. at $15.00	2,025.00	
Total amount paid to contractor		10,871.14
Grand total cost of structure		$ 11,591.99
Paid by State	$ 6,156.42	
Paid by County	5,435.57	
Total	$ 11,591.99	

Maintenance

From November, 1921, to December, 1922, there were placed under maintenance 29.62 miles of macadam roads on the La Grande-Joseph Highway in Wallowa County. The work was handled by Patrolman Lester McCann and one assistant, using State equipment. During the fall of 1921 and the spring of 1922, there were numerous slides on this highway, which required additional men.

During the two-year period there were also 12.4 miles of the Flora-Enterprise Forest Road placed under maintenance. The traffic on this section was very light and such maintenance as was required was handled by R. N. Kellogg, Wallowa County Engineer.

Maintenance in Wallowa County was under the supervision of the La Grande Division Office.

[WALLOWA]

Union County Line-Joseph Survey

The survey between the Union County Line and Joseph was made by J. M. Clark, Locating Engineer, in 1919, and approximately ten miles was constructed on this survey.

During the spring of 1921 that portion of the line between the head of Wallowa Canyon and Lostine, and the section between Enterprise and Joseph was relocated by R. A. Turrell, Locating Engineer, in order to eliminate several bridge crossings and to avoid bank protection along the river. In the spring of 1922, 7.89 miles between Lostine and Enterprise were relocated by J. N. Bishop, Locating Engineer. The spring floods of 1922 in the Wallowa River were the highest in fifty years and the line was relocated in order to avoid bank protection along the Wallowa River.

The construction on the entire section covered by this survey is either completed or under contract.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Wallowa County has co-operated as follows:

1.	Paid into the State Market Road Fund	$ 43,473.75
2.	State Funds apportioned to County	55,373.69
3.	County levy made to match State Funds	52,869.99
4.	County Market Road Funds collected	48,934.61
5.	Cash paid to County by State	46,409.15
6.	State expenditures, deducted from apportionment	66.94
7.	Cash due County from State in December, 1922	8,898.05
8.	County expenditures on Market Roads	97,607.18
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Wallowa County received from the State Market Road Fund $11,899.94 more than it paid into the fund. The excess is Wallowa County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $52,869.99. Of this amount they have collected and credited to the Market Road Fund $48,934.61.

The County Court has designated four roads to be improved as Market Road projects.

The surveys have been made and plans prepared by R. N. Kellogg, County Engineer. Plans have been submitted and approved.

The construction work has been done by contract and by County forces, under the direction of the Roadmaster. They have graded 11.4 miles of road and surfaced 4.4 miles.

ORCHARDS ALONG THE COLUMBIA RIVER HIGHWAY IN WASCO COUNTY

WASCO COUNTY

Wasco County occupies an important position in highway development in the State, because of both its size and the fact that the natural location of two of the trunk highways must traverse it. The Columbia River Highway extends the full length of the County's frontage on the Columbia River, and The Dalles-California Highway bisects the County in a north and south line.

During the past two years the Columbia River Highway has been completed, and all that remains to be done is the annual maintenance of the existing highway, with possibly some betterment work from year to year. The pavement has been completed to a point two miles east of The Dalles and is surfaced on east of this point. As the pavement connects with the Multnomah County pavement on the west, it is now possible to travel on a continuous paved highway from The Dalles to Portland, and on to Astoria.

On the north end of The Dalles-California Highway, the section between The Dalles and Dufur, traversing one of the main settled districts, is under grading and surfacing construction operations. Location surveys have been made on the remainder of the line to the north end of Cow Canyon, in the southern part of the County, and it is very probable that contracts for the construction of various portions of this section will be awarded during the coming winter. The Cow Canyon section has been graded and will be ready for surfacing during 1923.

In the southeastern part of the County a survey is being made for the portion of the Sherman Highway from the Sherman County Line, via Shaniko, to a connection with The Dalles-California Highway at the head of Cow Canyon.

During the past six years Wasco County has voted bonds for highway construction to a total amount of $1,160,000.00. Based upon the latest assessed valuation of the County, this covers slightly more than the permissible bonding limit. At a special election, held June 7, 1921, an issue of $800,000.00 was authorized. Not less than $625,000.00 of this is to be expended upon The Dalles-California Highway, and not less than $100,000.00 on the Sherman Highway.

State work in the County was supervised by J. H. Scott, Division Engineer, until April 1, 1922, at which time the district was taken over by C. W. Wanzer, Division Engineer.

Mosier-The Dalles Paving

This section extends from a point near Marsh Pit, approximately 3.8 miles east of Mosier, to the city limits of The Dalles. The section has a length of 12.6 miles and has been paved without Federal aid.

Contract No. 365 for the paving of the project was awarded to the Hauser Construction Company on April 22, 1921. The contract covered the construction of a standard type "D" pavement, consisting of a three-inch bituminous base covered by a two-inch bituminous wearing surface.

The contractor started work on May 14, and paved the portion between The Dalles and foot of the Rowena grade, and had about three-quarters of one mile laid between Marsh Pit and the summit of Rowena loops, when the heavy snowfall during November caused a shut-down for the winter. Operations were resumed early in the spring of the present year, and the project was completed and given final acceptance on July 20. The completion of this section provided a continuous pavement from The Dalles to Astoria, with the exception of a very short distance in the City of Rainier.

[WASCO]

Construction was carried on under the supervision of J. E. Peck, Resident Engineer, and has required total expenditures of $434,874.07 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8,125.52
48 feet of 12-inch culvert pipe furnished by State, installed under force account		45.38
Black powder furnished by State free to contractor for breaking up ice		118.00
Patrolling railroad tracks to guard against damage		97.60
Powder furnished to contractor (deducted from contractor's estimate)		28.00
Lumber furnished to contractor (deducted from contractor's estimate)		150.00
Contract items as follows:		
6-inch porous drain tile, 120.0 lin. ft. at 30c	$ 36.00	
Standard wood guard fence, 11,024.0 lin. ft. at $1.00	11,024.00	
Common excavation, 2,694.1 cu. yds. at 75c	2,020.58	
Solid rock excavation, 686.2 cu. yds. at $2.00	1,372.40	
Rubble masonry, 200.5 cu. yds. at $12.00	2,406.00	
Rock slope walls, 91.5 cu. yds. at $8.00	732.00	
Masonry parapet walls, 1,545.0 lin. ft. at $3.50	5,407.50	
Preparation of subgrade, 166,414.0 sq. yds. at 5c	8,320.70	
Standard bituminous pavement, 2-inch top, 3-inch base, 122,480.6 sq. yds. at $2.50	306,201.50	
Broken stone used in preparation of subgrade, 18,960.5 cu. yds. at $2.60	49,297.30	
Broken stone for shoulders, 5,988.5 cu. yds. at $2.45	14,671.83	
Shoulder construction, 132,676.0 lin. ft. at 6c	7,960.56	
Earth filler, short haul, 1,000.0 cu. yds. at 75c	750.00	
Earth filler, long haul, 6,289.5 cu. yds. at $1.15	7,232.93	
Increase in guaranteed freight rate on asphalt, 15,001.66 cwt. at 11c	1,650.18	
Force account items:		
Placing extra culverts between Sta. 340 to 365	72.63	
Furnishing and placing 12-inch concrete pipe at Sta. 250+50 and Sta. 350+75	105.85	
Repairing damage to grade caused by washout	22.25	
Removing snow from highway to permit travel	954.35	
Widening roadbed and excavating ditches	6,156.90	
Removing overhanging rocks from cliff Sta. 387 to Sta. 391	203.50	
Total amount earned by contractor	$426,598.96	
Deductions:		
Powder furnished by State	28.00	
Lumber furnished by State	150.00	
Freight rate reductions	111.39	
Total amount paid to contractor		$426,309.57
Grand total cost of project (all State funds)		$434,874.07

Hood River-Rowena Post Road Project

This section includes within its limits the Mosier-Rowena project which was undertaken during the previous biennium and is described on page 389 of the last report. Early in 1921, it was decided to pave the Columbia River Highway between Hood River and The Dalles, and the Bureau of Public Roads was requested to extend the limits of the Mosier-Rowena project east to the Hood River bridge and to cooperate on the paving of the section between the bridge and a point known as Marsh Pit, located approxicately 3.8 miles east of Mosier. This application met with the approval of the Bureau and Project No. 35 was extended to cover this paving work in addition to the grading, surfacing and bridges between Mosier and Rowena.

The project as a whole has cost a total of $867,225.66, of which the State has paid $563,063.17, the Federal Government $300,699.82 and

Wasco County $3,462.67 for paving within the town of Mosier. Failure to secure a greater Government share was caused by the maximum allowable cooperation per mile, which operated to restrict their share. The expenditures during the present biennium amount to $577,034.78, consisting of $272,872.29 from State funds and the cooperative amounts given above from County and Government funds.

The various contracts awarded on the project are taken up in detail in the following articles.

Grading:

The grading of the project was completed and given final acceptance in November, 1920. Additional expenditures during the biennium amount to $79,070.02. Government cooperation received in the amount of $102,817.85 leaves a credit to State funds of $23,747.83 for the two-year period. Including the expenditures during the previous biennium, the work has cost a total of $313,547.82, of which the State has paid $210,729.97 and the Government has cooperated to the amount just given.

Surfacing:

At the time of the last report it was planned to reduce the depth of the surfacing to four inches in view of the fact that the project was proposed for paving during 1921. On account of the unusually heavy rainfall during the ensuing winter, it was found that a depth of four inches would prove insufficient, especially on the embankments of the new grade, and it was constructed to a depth of eight inches as far east as the foot of the Rowena Loops grade. All portions on the balance of the section were surfaced to a depth of eight inches if there were indications of weakness in the subgrade. The total length surfaced, including the extension on the Rowena-The Dalles Section, was 13.79 miles.

Work was completed on May 29, 1921, at an additional expenditure of $63,057.31. These expenditures were made up of $46,282.95 from State funds and $16,774.36 from Government funds. The total cost of the surfacing including the expenditures during the previous binnium has amounted to $73,010.06. The State has paid $56,235.70 of this amount and the Government has cooperated to the extent of $16,774.36.

Mosier Arch:

The construction of this structure was carried to completion with additional expenditures of $21,412.83. The State paid $3,943.57 of this amount and the Government cooperated to the extent of $17,469.26. The completed structure now represents a total cost of $47,316.83, of which the State has paid $29,847.57 and the Government has paid $17,469.26.

Dry Canyon Arch:

Final charges amounting to $9,426.44 have been paid during this biennium. The Government paid their cooperation of $9,609.22, leaving a credit to State funds of $182.78. These entries bring the total cost of the structure to $29,282.77, the State paying $19,673.55 and the Government cooperating to the amount mentioned.

Paving:

On March 8, 1921, Contract No. 332 was awarded to A. D. Kern of Portland, Oregon, for paving the section between the Hood River bridge and a point opposite Marsh Pit, approximately 3.8 miles east of Mosier. The section has a total length of 10.5 miles, of which 4.07 miles are in Hood River County and 6.43 miles are in Wasco County.

The contract covered the construction of five-inch pavement, consisting of three inches of bituminous base and two inches of bituminous

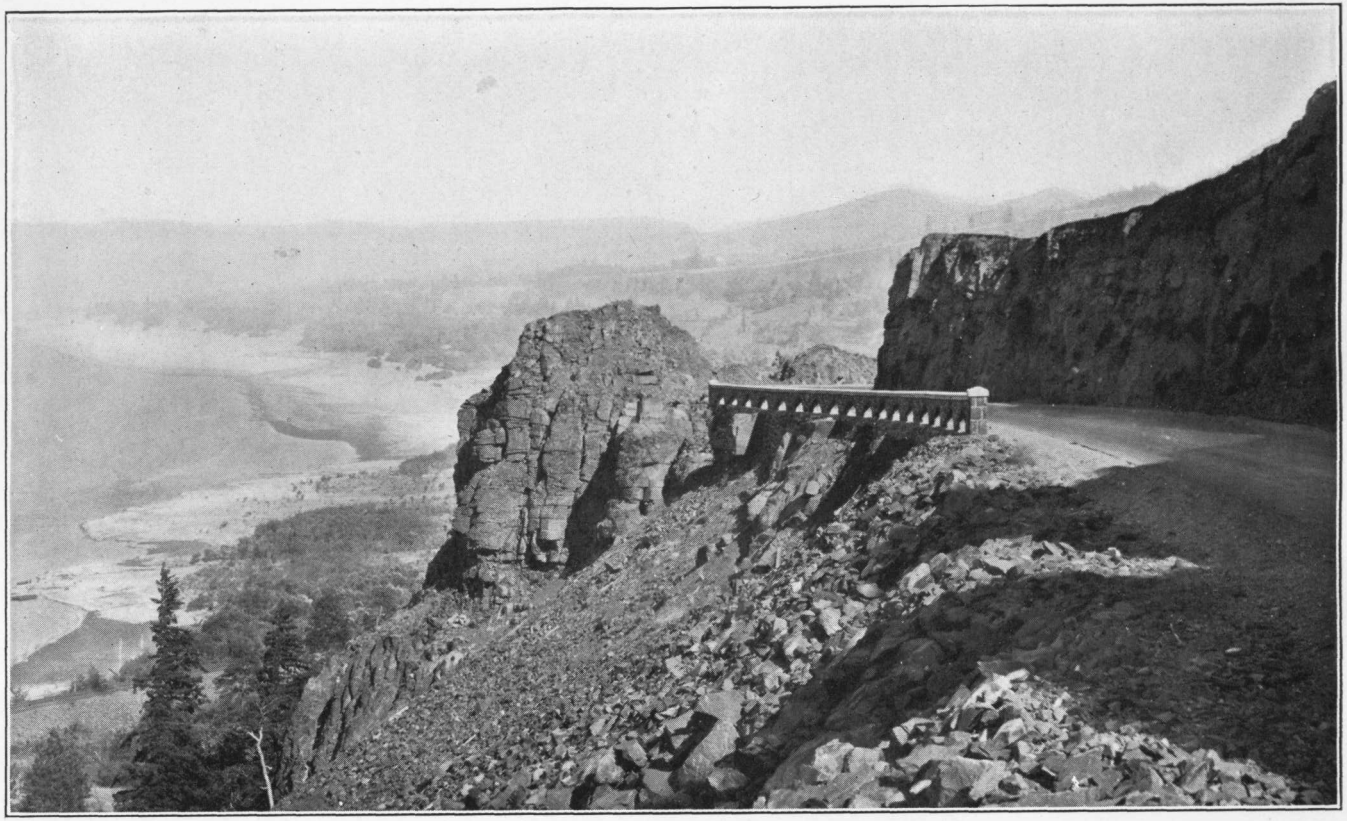
[WASCO]

wearing surface, in addition to two-foot rock shoulders on each side. Work was started April 1, and carried on very rapidly, full advantage being taken of good weather. Owing to the severe snow storm occurring during the latter part of November, 1921, work was shut down for the winter and the contract was not finished until the following season.

Construction was supervised by E. A. Collier, Resident Engineer, and represents a total cost of $404,068.18. Of this total the State has paid $246,576.38, Wasco County $3,462.67, for paving within the town of Mosier, and the Federal Government $154,029.13.

DETAILED STATEMENT OF EXPENDITURES

GRADING—		
Engineering		$ 12,684.52
Payment to Western Union Telegraph Co. for moving poles		31.04
Cost of powder in excess of cost guaranteed contractor		3,951.60
50 per cent of cost of moving Pacific Power & Light Co.'s pole line		425.18
Graveling by State forces to maintain traffic at Dry Canyon Arch		57.00
Filling approaches to Mosier Creek bridge by State forces		739.80
Constructing shelter over spring for convenience of public		23.94
Guarding railroad and power lines during construction		36.66
Powder furnished by State (deducted from contractor's estimate)		4,727.40
50 per cent of cost, moving pole lines (deducted from contractor's estimate)		425.18
Contract items as follows:		
Clearing and grubbing, all	$ 6,300.00	
Common excavation, 77,607.0 cu. yds. at 60c	46,564.20	
Solid rock excavation, 142,053.0 cu. yds. at $1.40	198,874.20	
Overhaul, 60,561.0 sta. yds. at 5c	3,028.05	
Concrete handrail, 50.0 lin. ft. at $4.00	200.00	
12-inch plain concrete pipe, 1,753.5 lin. ft. at $1.50	2,630.25	
18-inch reinforced concrete pipe, 120.0 lin. ft. at $3.75	450.00	
24-inch reinforced concrete pipe, 144.0 lin. ft. at $5.00	720.00	
36-inch reinforced concrete pipe, 128.0 lin. ft. at $8.25	1,056.00	
6-inch porous drain tile, 246.0 lin. ft. at 50c	123.00	
Class "A" concrete, 117.39 cu. yds. at $42.50	4,989.08	
Class "C" concrete, 92.78 cu. yds. at $30.00	2,783.40	
Metal reinforcement, 10,345.0 lbs. at 10c	1,034.50	
Rubble masonry, 129.5 cu. yds. at $15.00	1,942.50	
Dry rock wall, 156.8 cu. yds. at $8.00	1,254.40	
Hauling talus subsurfacing, first mile, 2,406.5 cu. yds. at 60c	1,443.90	
Hauling talus subsurfacing, second mile, 532.5 cu. yds. at $1.05	559.13	
Hauling talus subsurfacing, third mile, 982.5 cu. yds. at $1.45	1,424.62	
Hauling talus subsurfacing, fourth mile, 3,343.0 cu. yds. at $1.85	6,184.55	
Adjustment due to increased quantities and uncontrollable delays	12,400.00	
Force account items:		
Reconstructing private water system under highway grade	301.50	
Hand placing rock on slopes, building two concrete catch basins and reconnecting water pipes	1,311.78	
Changing forms on Hog Canyon bridge to fit superelevation	23.02	
Total amount earned by contractor	$295,598.08	
Deductions:		
Powder furnished by State	4,727.40	
50 per cent of cost, moving Pacific Power & Light Co.'s lines	425.18	
Total amount paid to Johnson Contract Co., contractors		290,445.50
Grand total cost of grading		$313,547.82
Paid by State	$210,729.97	
Paid by Government	102,817.85	
Total	$313,547.82	



ON THE COLUMBIA RIVER HIGHWAY; IN WASCO COUNTY WEST OF MOSIER

[WASCO]

EXPENDITURES—Continued

SURFACING—

Engineering		$ 2,237.64
Timekeeper's services on force account work		48.22
Concrete pipe furnished by State, installed under force account		149.14
Auto supplies furnished for trucks on force account work		14.34
Royalty on gravel		2,019.33
Guarding railroad and power line during construction		17.00
Rental on State tractor (deducted from contractor's estimate)		614.04
Lumber sold to contractor (deducted from contractor's estimate)		17.93
Contract items as follows:		
Gravel surfacing, 20,181.5 cu. yds. at $2.08	$ 41,977.52	
Gravel surfacing beyond limits of contract, 6,743.0 cu. yds. at $3.40	22,926.20	
Force account items:		
Constructing detour for gravel trucks around Dry Canyon bridge	70.94	
Removing slides and boulders, building up settled embankments, removing soft spots in grade and backfilling with gravel	2,826.81	
Placing culvert pipe and removing slide at Station 390+00	722.92	
Total amount earned by contractor	$ 68,524.39	
Deductions:		
Rental of tractor owned by State	614.04	
Lumber purchased from State	17.93	
Total amount paid to A. D. Kern, contractor		67,892.42
Grand total cost of surfacing		$ 73,010.06
Paid by State	$ 56,235.70	
Paid by Government	16,774.36	
Total	$ 73,010.06	

MOSIER ARCH—

Engineering		$ 2,621.69
Contract items as follows:		
Excavation, 305.0 cu. yds. at $4.25	$ 1,636.25	
Class "A" concrete, 771.8 cu. yds. at $35.75	27,591.85	
Class "B" concrete, 182.47 cu. yds. at $30.00	5,474.10	
Grouted rock fill, 62.0 cu. yds. at $12.00	744.00	
Concrete handrail, 380.0 lin. ft. at $3.25	1,235.00	
Metal reinforcement, 93,804.0 lbs. at 7½c	7,035.30	
Increase in freight rates over that guaranteed contractor	178.71	
Force account items:		
Excavation below elevation shown on plans, pier No. 3	589.21	
Installing brass pipe in handrail expansion joints, painting, changing panels and height of handrail	210.72	
Total amount paid to Lindstrom and Feigenson, contractors		44,695.14
Grand total cost of structure		$ 47,316.83
Paid by State	$ 29,847.57	
Paid by Government	17,469.26	
Total	$ 47,316.83	

DRY CANYON ARCH—

Engineering		$ 2,217.66
Construction work by State forces		27,065.11
Grand total cost of structure		$ 29,282.77
Paid by State	$ 19,673.55	
Paid by Government	9,609.22	
Total	$ 29,282.77	

[WASCO]

EXPENDITURES—Continued

PAVING—

Engineering		$ 8,338.06
Culvert pipe and drain tile furnished by State		53.30
Watchmen's services guarding railroad from damage		37.90
Rental of tractor and truck, owned by State (deducted from contractor's estimate)		2,434.69
Wood salvaged from tunnel construction, sold to contractor (deducted from contractor's estimate)		45.50
Contract items as follows:		
Common excavation, 13,497.0 cu. yds. at $1.25	$ 16,871.25	
Solid rock excavation, 305.6 cu. yds. at $2.00	611.20	
Overhaul, 10,416.0 sta. yds. at 5c	520.80	
Rubble masonry, 21.0 cu. yds. at $15.00	315.00	
Standard wood guard fence, 12,379.0 lin. ft. at $1.10	13,616.90	
Rock slope walls, 69.3 cu. yds. at $9.00	623.70	
Masonry parapet wall, 1,488.4 lin. ft. at $3.50	5,209.40	
Preparation of subgrade, 140,094.0 sq. yds. at 5c	7,004.70	
Standard bituminous pavement, 3-inch base, 2-inch top, 103,146.0 sq. yds. at $2.75	283,651.50	
Broken stone for subbase, 10,444.0 cu. yds. at $2.80	29,243.20	
Gravel for shoulders, 12,465.0 cu. yds. at $2.20	27,423.00	
Shoulder construction, 108,540.0 lin. ft. at 6c	6,512.40	
Earth filler, 528.0 cu. yds. at $1.00	528.00	
Force account items:		
Cleaning ditches, removing slides and dressing slopes after pavement is laid	2,172.07	
Placing concrete gutter through tunnel and to connection with culvert under cliff	917.30	
Constructing 5-inch concrete shoulder between concrete gutter and pavement at west end of Mosier Tunnel	439.06	
Total amount earned by contractor	$395,659.48	
Deductions:		
Rental of tractor and truck, owned by State	2,434.69	
Wood purchased from State	45.50	
Freight rate reductions	20.56	
Total amount paid to A. D. Kern, contractor		393,158.73
Grand total cost of paving		$404,068.18
Paid by State	$246,576.38	
Paid by County	3,462.67	
Paid by Government	154,029.13	
Total	$404,068.18	

GRAND SUMMARY OF EXPENDITURES—

	State	*County*	*Government*	*Total*
Paving, Mosier to Rowena	$246,576.38	$3,462.67	$154,029.13	$404,068.18
Surfacing, Mosier to Rowena	56,235.70	.....	16,774.36	73,010.06
Grading, Mosier to Rowena	210,729.97	.....	102,817.85	313,547.82
Bridge over Mosier Creek	29,847.57	.....	17,469.26	47,316.83
Bridge over Dry Canyon	19,673.55	.....	9,609.22	29,282.77
Totals	$563,063.17	$3,462.67	$300,699.82	$867,225.66

Twin Tunnels Lining

The work done on Tunnel No. 1 during the previous biennium is discussed on page 388 of the last report. It was later decided to line a portion of Tunnel No. 2, also, and this was included in the present biennium work. Operations were finished on April 4, 1921, with additional expenditures of $17,536.62. These expenditures bring the total cost of the work on both tunnels to $20,371.87.

In addition to the lining of the tunnels proper, all four portals have been protected by a finish of stone masonry. The masonry work on these portals give the openings a pleasing appearance as well as providing necessary protection from the movement of the loose rock above.

[WASCO]

Rowena-The Dalles Post Road Project

This project was undertaken during the preceding biennium and a general descriptive article is given on page 391 of the last report. During the past two years the project has been finished up and the entire section is now paved. This paving, however, was done under separate contract. being paid for from State funds, and is not a part of the Federal Aid work.

Additional expenditures on the Federal Aid project have amounted to $64,430.00 for the biennium. These have been made up of $39,774.58 from State funds, $1,454.19 from County funds and $23,201.23 from Governments funds. The total cost of the project now amounts to $149,178.62. of which the State has paid $100,416.77, the County $1,454.19 and the Government $47,307.66.

A brief description is given herewith of each of the divisions of the work.

Grading:

This work was given final acceptance on December 11, 1920. Additional expenditures during the biennium amount to $21,755.40, and consist of $1,454.19 from County funds, $23,201.23 from Government funds and a credit of $2,900.02 to State funds. These entries bring the total cost of the work to $101,720.14, with the State paying $52,958.29, the County $1,454.19 and the Government $47,307.66.

Chenowith Creek Bridge Work:

As stated in the last report, considerable extra work was done by State forces for protection of the footings on the Chenowith Creek bridge. This work was completed at the time of the last report, and the only subsequent entry on the books has been a credit of $204.78. This credit reduces the cost of the work to $3,365.56 from State funds.

Surfacing:

Five miles of the project, from Rowena to Chenowith Creek, were surfaced by A. D. Kern, contractor, as an extension to his contract for surfacing from Mosier to Rowena. As the original contract was a portion of the Mosier-Rowena project, the costs were charged thereto and do not appear as a part of the project now under discussion. This work was in addition to the talus rock which was placed by State forces on all portions consisting of sand or earth roadbed.

As Chenowith Creek was the limit of economical haul for the materials which were hauled from the Marsh Pit by A. D. Kern, it was decided to surface the remaining 2.76 miles with broken stone. Rock was purchased from the crusher operated by the City of The Dalles, and was hauled by trucks belonging to A. D. Kern until bad weather forced a shut-down. A total of 1.84 miles, adjacent to The Dalles, was surfaced under this arrangement. The soft condition of the roadbed made the hauling and placing of talus on this portion almost impossible and a greater depth of broken stone was placed than originally had been intended.

During the following spring it was found that the rock purchased from the City did not contain sufficient fines to provide a first-class surfacing, and, when the contract was awarded for paving from Marsh Pit to The Dalles, the securing of materials from The Dalles crusher was discontinued. An arrangement was then made with the Hauser Construction Company, the contractors on the paving, to place rock on the remaining 0.92 mile at a price which was more favorable to the State than the cost of materials from The Dalles.

[WASCO]

The total expenditures for the surfacing placed from The Dalles quarry and for the talus subsurfacing placed by State forces have amounted to $44,092.92 from State funds. Of this amount $42,879.38 was expended during the present biennium.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,409.02
Labor and materials furnished by State:		
Guarding railroad tracks during construction		12.50
Extra excavation		53.25
Wet masonry wall		605.00
Grading work to raise embankment across swampy ground		953.12
Repair work on Chenowith Creek bridge (deducted from contractor's estimate)		204.14
Contract items as follows:		
Clearing and grubbing, all	$ 500.00	
Common excavation, 37,378.0 cu. yds. at 74c	27,659.72	
Solid rock excavation, 26,906.0 cu. yds. at $1.80	48,430.80	
Overhaul, 15,671.0 sta. yds. at 5c	783.55	
12-inch plain concrete pipe, 1,224.0 lin. ft. at $1.70	2,080.80	
Class "A" concrete, 230.92 cu. yds. at $35.00	8,082.20	
Class "C" concrete, 33.84 cu. yds. at $30.00	1,015.20	
Metal reinforcement, 27,776.0 lbs. at 10c	2,777.60	
Concrete handrail, 133.0 lin. ft. at $3.50	465.50	
Rubble masonry, 66.3 cu. yds. at $12.00	795.60	
Force account items:		
Driving 70 lineal feet of tunnel	1,073.29	
Slope protection at Chenowith Creek bridge	58.68	
Hauling and spreading talus material on sandy section of grade	772.58	
Resloping cut at Sta. 728 to prevent slides	105.91	
Changing forms to reduce camber in Chenowith Creek bridge, riprapping slopes and widening creek channel	85.82	
Total amount earned by contractor	$ 94,687.25	
Deduction for repair of Chenowith Creek bridge by State forces	204.14	
Total amount paid to contractor		94,483.11
Grand total cost of grading		$101,720.14
Paid by State	$ 52,958.29	
Paid by County	1,454.19	
Paid by Government	47,307.66	
Total	$101,720.14	

TOTALS FOR PROJECT

	State	*County*	*Government*	*Total*
Grading	$ 52,958.29	$1,454.19	$ 47,307.66	$101,720.14
Protection of Chenowith Creek bridge	3,365.56	.....	.....	3,365.56
Talus subsurfacing	44,092.92	.....	.....	44,092.92
Totals	$100,416.77	$1,454.19	$ 47,307.66	$149,178.62

Seufert-Deschutes Post Road Project

This project, described in detail in an article beginning on page 392 of the last report, has been completed and given final approval by the Federal Government under Project Agreement No. 37. During the past two years the surfacing of the section was included as part of the project and Federal aid was secured on this work also.

The entire project now represents a total cost of $487,435.43, of which the State has paid $252,307.38, the County $29,404.19, the O.-W. R. & N.

Co. $10,229.66, and the Federal Government $195,494.20. The expenditures during the biennium amount to $317,283.18, consisting of $82,155.13 from State funds, $29,404.19 from County funds. $10,229.66 from Railroad funds and $195,494.20 from Government funds.

Grading:

Unusual obstacles were encountered in the construction of this section and occasioned extensive delays in the completion of the project. The O.-W. R. & N. Company required that gauntlet tracks be used at the Deschutes River tunnel and also at Cape Horn and refused to operate on more than one gauntlet track at a time. In 1920 an attempt was made to tunnel Cape Horn, but this plan had to be abandoned on account of the badly shattered rock which was encountered. During the summer of 1921, another attempt was made to drive a tunnel farthur south, but this had to be abandoned for the same reason as on the first tunnel. It then became necessary to encroach upon the railroad right-of-way and to take out an open cut for the highway. After considerable delay an agreement was reached with the Railroad Company, and work was started. As it was essential that there should be no delay to railroad traffic, it was necessary to remove each rock pinnacle by itself, and this was a slow and costly process. Some of the pinnacles were as high as 170 feet above the track, and in their removal it was necessary for the work to proceed from the top down. Men and air-drills were hoisted up the face of the cliff by ropes and were supported in this manner while working. To the public, progress on the construction seemed slow, but the condition was unavoidable, and the successful removal of the rock bluffs without serious accident or delays to railroad traffic has elicited a certain amount of favorable comment in the engineering publications of the country.

The road was open to travel on September 3, 1921, and the contract was finished on November 7 of the same year.

Expenditures during the present biennium amount to $103,211.88. Federal cooperation has been received in the amount of $117,959.10, leaving a credit of $14,747.22 to State funds for the two-year period. These entries bring the total cost of the work to $224,432.90, with the State paying a total of $106,473.80 and the Government cooperating to the extent of the amount just mentioned.

Seufert Viaduct:

Since the time of the last report, this structure has been completed and has been paved with a bituminous wearing surface, placed by the Hauser Construction Company in connection with their contract for paving the Rowena-The Dalles Section. The cost of this paving has amounted to $992.59, and 170 batches of bituminous mixture were placed upon the structure. The expenditures during the present biennium covering both the paving and the final payments on the bridge structure amount to $10,507.60. Of this amount, the County has paid $5,000.00. Government cooperation has been received in the amount of $17,934.08, leaving a credit of $12,426.48 to State funds for the period. The completed work now represents a total of $44,791.65, with the State paying $21,857.57 and the County and Federal Government the respective amounts mentioned.

Big Eddy Overcrossing:

This structure was also paved under the same arrangement as just outlined for the Seufert viaduct. 180 batches of bituminous material were placed at a cost of $1,092.82. Final payments on the structure and the cost of the surfacing bring the biennial expenditures to $45,024.29.

[WASCO]

Of these expenditures the State paid $15,651.00, the County $10,327.42, the O.-W. R. & N. Company $10,229.66 and the Federal Government $8,816.21. These expenditures bring the total cost to $52,866.71, with the State paying $23,493.42 and the County, Railroad Company and Government the respective amounts just given.

Dillon Overcrossing:

This structure was also paved and a total of 130 batches of bituminous mixture were used, the cost being $916.78. The biennial expenditures amount to $65,236.74, with the State paying $39,664.22, the County $14,076.77 and the Government $11,495.75. The total expenditures now aggregate $71,335.35, with the State bearing $45,762.83 of this amount and the County and Federal Government the amounts just given.

Oiling Sand:

The last report states that expenditures of $492.38 had been made on this work. This was in error as the amount should have been given as $706.15. Work was continued during 1921, and a total of ten acres have now been oiled, the total cost being $890.96 with additional expenditures of $184.81 made during the present biennium. The Government has cooperated to the extent of $341.42 and the State has paid $549.54. The receipt of the Government cooperation has left a credit of $156.61 to State funds for the two-year period.

The costs of this oiling have been high, but are considered as having been justified under the circumstances. The winds were blowing away a high fill at the Dillon overhead structure, and it was necessary to rush emergency equipment and supplies from The Dalles in order to protect this particular point.

It is expected that additional oiling will be needed from year to year, until such time as the danger points on the section may all be thoroughly protected by the construction of sand fences.

Surfacing:

As soon as the grading progressed far enough to allow the undertaking of surfacing operations, Contract No. 320 was awarded for the surfacing of the section to A. D. Kern of Portland, Oregon. The award was made on January 4, 1921, and operations were started on February 1, being completed on September 10 of the same year. Crushed river gravel was used for the work and owing to there being no suitable filler materials immediately available, considerable difficulty was experienced in getting the gravel to pack into a satisfactory surface. However, it since has worked into very satisfactory condition.

When the contractor completed his surfacing operations there yet remained to be done some grading at Cape Horn, and sufficient materials were stockpiled to surface this uncompleted portion.

The section was opened for travel on September 3, 1921, and was the last remaining section to be completed on the Columbia River Highway between Pendleton and Rainier. The completion of the 12.5 miles of this section shortened the running time between The Dalles and the Deschutes River by just one hour as it eliminated the necessity for using the old road over the hill.

The work was carried on under the supervision of J. E. Peck, Resident Engineer, and has cost a total of $93,117.86. Of this amount the State has paid $54,170.22 and the Government has cooperated to the extent of $38,947.64.

[WASCO]

DETAILED STATEMENT OF EXPENDITURES

Grading—

Engineering		$ 8,757.74
Grading approaches to Big Eddy and Dillon overcrossings, transferred to structures		(Credit) 62,570.29
Labor and material furnished by State:		
Construction of rubble masonry wall at Cape Horn		4,418.55
Black powder furnished free to contractor		510.00
Oiling of sand slopes to prevent wind erosion		68.35
Purchase of lumber used in construction of sand fences		39.60
Lumber salvaged and sold to contractor (deducted from final estimate)		136.34
Reimbursement to Railway Company for watchmen's services and for construction of gauntlet track at tunnel		6,336.29
Contract items as follows:		
Clearing and grubbing, all	$ 1,500.00	
Common excavation, 76,515.3 cu. yds. at 60c	45,909.18	
Intermediate excavation, 32,988.5 cu. yds. at 90c	29,689.65	
Solid rock excavation, 56,030.3 cu. yds. at $2.50	140,075.75	
Overhaul, 139,950.0 sta. yds. at 5c	6,997.50	
12-inch corrugated galvanized iron pipe, 1,106.0 lin. ft. at $2.00	2,212.00	
18-inch corrugated galvanized iron pipe, 227.0 lin. ft. at $3.50	794.50	
24-inch corrugated galvanized iron pipe, 236.0 lin. ft. at $4.50	1,062.00	
36-inch corrugated galvanized iron pipe, 40.0 lin. ft. at $8.50	340.00	
Standard wood guard fence, 4,265.00 lin. ft. at $1.00	4,265.00	
Class "A" concrete, 33.65 cu. yds. at $50.00	1,682.50	
Class "C" concrete, 91.93 cu. yds. at $45.00	4,136.85	
Metal reinforcement, 2,269.0 lbs. at 10c	226.90	
Rubble masonry, 412.4 cu. yds. at $15.00	6,186.00	
Hand placed rock slopes, 682.0 sq. yds. at $2.50	1,705.00	
Solid rock undercut, 18.0 cu. yds. at $3.00	54.00	
Tunnel excavation, 90.0 lin. ft. at $70.00	6,300.00	
Overbreak tunnel excavation, 63.7 cu. yds. at $2.00	127.40	
Force account items:		
Hauling and spreading manure to protect sand slopes	1,227.60	
Hauling and spreading rock to protect sand slopes	957.22	
Reconstructing private road approach at Tumwater	68.35	
Sprinkling and oiling sand slopes to prevent wind erosion	1,630.23	
Erecting sand fence to prevent sand drifting on railroad tracks	38.21	
Digging test pits to determine depth of gravel	150.95	
Moving Government windmill from right-of-way at Big Eddy	110.10	
Erecting temporary overcrossing at Big Eddy for transporting embankment materials	845.59	
Excavating Indian relics to prevent ruin of road by relic hunters	193.25	
Moving telephone line from highway near Seufert	76.62	
Excavating and repairing old 24-inch culvert at Sta. 1190+25	285.43	
Moving Government water and sewer pipes from right-of-way at Big Eddy	20.55	
Replacing 420 feet of irrigation pipe near Seufert, destroyed during construction	1,410.41	
Repairing O.-W. R. & N. right-of-way fence, destroyed during construction	34.33	
Lowering private water pipe lines across right-of-way	107.33	
Removing slides from railroad tracks, caused by highway construction	116.19	
Seeding sand slopes to prevent wind erosion	76.99	
Moving house from right-of-way	138.62	
Constructing parapet walls	2,611.85	
Spreading gravel, stocked pending completion of tunnel	694.03	
Maintaining watchmen at Cape Horn for protection of railroad	750.23	

[WASCO]

EXPENDITURES—Continued

Adjustment with contractor for loss sustained on account change in plans at Cape Horn	2,064.35	
Total amount earned by contractor	$266,872.66	
Deduction for lumber purchased from State	136.34	
Total amount paid to contractor		266,736.32
Grand total cost of project		$224,432.90
Paid by State	$106,473.80	
Paid by Government	117,959.10	
Total	$224,432.90	

Seufert Viaduct—

Engineering		$ 2,585.44
Paving structure with bituminous mixture		992.59
Name plates furnished by State (deducted from contractor's estimate)		16.00
Contract items as follows:		
Excavation, 869.2 cu. yds. at $3.00	$ 2,607.60	
Class "A" concrete, 693.19 cu. yds. at $36.00	24,954.84	
Metal reinforcement, 119,237.0 lbs. at 8c	9,538.96	
Reinforced concrete handrail, 462.0 lin. ft. at $3.00	1,386.00	
Reimbursement for increase in guaranteed freight rate	358.84	
Force account items:		
Excavation over four feet below elevation shown on plans	1,846.16	
Revising expansion joints and installing conduits for electric wiring	525.22	
Total amount earned by contractor	$ 41,217.62	
Deduction for name plates furnished by State	20.00	
Total amount paid to Colonial Building Co., contractors		41,197.62
Grand total cost of structure		$ 44,791.65
Paid by State	$ 21,857.57	
Paid by County	5,000.00	
Paid by Government	17,934.08	
Total	$ 44,791.65	

Big Eddy Overcrossing—

Engineering		$ 2,530.27
STRUCTURE—		
Moving Western Union Telegraph lines		652.67
Paving structure with bituminous mixture		1,090.82
Watchmen's services guarding railroad against damage		763.29
Name plates, furnished by State (deducted from contractor's estimate)		16.00
Contract items as follows:		
Excavation, 337.4 cu. yds. at $2.50	$ 843.50	
Class "A" concrete, 281.62 cu. yds. at $33.50	9,434.27	
Class "B" concrete, 32.8 cu. yds. at $33.00	1,082.40	
Metal reinforcement, 47,773.0 lbs. at 8c	3,821.84	
Reinforced concrete handrail, 234.0 lin. ft. at $3.00	702.00	
Wooden trestle approach, 132.0 lin. ft. at $23.00	3,036.00	
Force account items:		
Revising expansion joints on account of change in design	216.79	
Total amount earned by conrtactor	$ 19,136.80	
Deduction for name plates furnished by State	20.00	
Total amount paid to Colonial Building Co., contractors, for structure		19,116.80
Grand total cost of structure		$ 24,169.85
APPROACHES—		
Common excavation, 7,701.0 cu. yds. at 60c	$ 4,620.60	
Intermediate excavation, 3,076.8 cu. yds. at 90c	2,769.12	
Solid rock excavation, 5,337.0 cu. yds. at $2.50	13,342.50	
Overhaul, 55,755.0 sta. yds. at 5c	2,787.75	

[WASCO]

EXPENDITURES—Continued

Hand placed rock slopes, 95.0 sq. yds. at $2.50	237.50	
Rubble masonry, 193.4 cu. yds. at $15.00	2,901.00	
18-inch corrugated galvanized iron pipe, 50.0 lin. ft. at $3.50	175.00	
Standard wood guard fence, 809.0 lin. ft. at $1.00	809.00	
Class "C" concrete, 4.64 cu. yds. at $45.00	208.80	
Force account items:		
Constructing temporary structure over which to transport material for embankments	845.59	
Total amount paid to Jas. F. Clarkson, contractor, for grading approaches		28,696.86
Grand total cost of structure and approaches		$ 52,866.71
Paid by State	$ 23,493.42	
Paid by County	10,327.42	
Paid by Government	8,816.21	
Paid by Railroad	10,229.66	
Total	$ 52,866.71	

Dillon Overcrossing—

Engineering		$ 3,350.61
STRUCTURE—		
Paving structure with bituminous mixture		916.78
Watchman's services guarding railroad against damage		750.47
Name plates furnished by State (deducted from contractor's estimate)		16.00
Light globes for Seufert Viaduct furnished by State (deducted from contractor's estimate)		78.85
Contract items as follows:		
Excavation to plan elevation, 346.2 cu. yds. at $2.50	$ 865.50	
Excavation below elevations shown on plans, 316.9 cu. yds. at $5.00	1,584.50	
Class "A" concrete, 424.8 cu. yds. at $33.00	14,018.40	
Class "B" concrete, 157.5 cu. yds. at $33.00	5,197.50	
Metal reinforcement, 99,416.0 lbs. at 8c	7,953.28	
Reinforced concrete handrail, 347.0 lin. ft. at $3.00	1,041.00	
Reimbursement for increase in guaranteed freight rate	737.96	
Extra steel required account lowering footings	397.32	
Force account items:		
Furnishing labor for making foundation investigations	38.88	
Cost of piling furnished but not used	47.80	
Revising expansion joints and changing type of handrail due to change in design	565.92	
Total amount earned by contractor	$ 32,448.06	
Deductions:		
Name plates furnished by State	20.00	
Light globes for Seufert Viaduct, furnished by State	78.85	
Total amount paid to Colonial Building Co., contractors, for structure		32,349.21
Grand total cost of structure		$ 37,461.92
APPROACHES—		
Common excavation, 22,746.3 cu. yds. at 60c	$ 13,647.78	
Intermediate excavation, 6,926.3 cu. yds. at 90c	6,233.67	
Solid rock excavation, 4,033.6 cu. yds. at $2.50	10,084.00	
Overhaul, 34,275.0 sta. yds. at 5c	1,713.75	
Standard wood guard fence, 624.0 lin. ft. at $1.00	624.00	
Force account items:		
Oiling sand fills to prevent wind erosion	1,570.23	
Total amount paid to Jas. F. Clarkson, contractor, for grading approaches		33,873.43
Grand total cost of structure and approaches		$ 71,335.35
Paid by State	$ 45,762.83	
Paid by County	14,076.77	
Paid by Government	11,495.75	
Total	$ 71,335.35	

[WASCO]

EXPENDITURES—Continued

Surfacing—		
Engineering		$ 2,779.71
Sprinkling macadam by State forces		1,290.87
Contract items as follows:		
Common excavation, 2,212.3 cu. yds. at 40c	$ 884.92	
Intermediate excavation, 302.0 cu. yds. at 80c	241.60	
Crushed gravel surfacing, 31,175.25 cu. yds. at $2.64	82,302.66	
Crushed gravel, royalty consideration, 300.0 cu. yds. at $2.24	672.00	
Force account items:		
Watering macadam by pumping from Government canal and Columbia River	951.21	
Placing filler in gravel base	3,783.67	
Spreading manure over sand slopes to prevent wind erosion	21.18	
Removing rock slides	64.67	
Rebuilding right-of-way fence, Sta. 1450 to Sta. 1480	125.37	
Total amount paid to contractor		$9,047.28
Grand total cost of project		$ 93,117.86
Paid by State	$ 54,170.22	
Paid by Government	38,947.64	
Total	$ 93,117.86	

GRAND SUMMARY OF EXPENDITURES FOR PROJECT

	State	*County*	*Government*	*Railroad*	*Total*
Grading, Seufert to Deschutes River	$106,473.80	$	$117,959.10	$	$224,432.90
Macadam, Seufert to Deschutes River	54,170.22		38,947.64		93,117.86
Overcrossing at Big Eddy	23,493.42	10,327.42	8,816.21	10,229.66	52,866.71
Overcrossing at Dillon	45,762.83	14,076.77	11,495.75		71,335.35
Oiling sand slopes	549.54		341.42		890.96
Seufert Viaduct	21,857.57	5,000.00	17,934.08		44,791.65
Totals	$252,307.38	$29,404.19	$195,494.20	$10,229.66	$487,435.43

Toll Bridge Cutoff Grading and Surfacing

This work is described on page 387 of the last report. Additional expenditures of $32.09, made during the present biennium, bring the cost to $2,258.64 from State funds.

The Dalles-Dufur Grading and Surfacing

The final adoption of the "Eightmile Creek" route for the northerly section of The Dalles-California Highway was followed immediately by the award of the contract.

The contract as originally awarded did not connect directly with the Columbia River Highway, a gap of 2.25 miles being left out. This gap consisted of a County road which was in fair condition, but the contract has been extended to cover the improvement of this portion. The located highway extends up the valley of Eightmile Creek to a junction with the County road between The Dalles and Dufur. It then follows along or close to this County road for most of the remaining distance to Dufur and includes about 3,000 feet within the city limits.

Contract No. 527, for grading and surfacing the 14.98 miles of the section, was awarded to Clifton, Applegate & Toole of Spokane, Washington, on April 15, 1922. Work was started on May 10, and at the close of the biennium about ten miles of grading and five miles of surfacing have been completed. It is expected that the project will be finished early in the spring of the coming year.

[WASCO]

Construction has been carried on under the supervision of J. E. Peck, Resident Engineer, and is estimated to cost a total of $196,500.00. The State will pay $105,500.00 of this amount and the County will cooperate to the extent of $91,000.00. Expenditures to date amount to $68,404.73, consisting of $37,104.06 from State funds and $31,300.67 from County funds.

Cow Canyon Post Road Project

This section covers 7.72 miles of the Cow Canyon Section, graded as described in another article of this report. Owing to the study being made of the Federal aid 7 per cent system and to the doubt existing at the time the project was submitted as to whether The Dalles-California or the Sherman Highway would be adopted north of their junction points as a part of the system, the Bureau refused to approve as a part of the project a short distance on the north end of the section. The balance was approved for a cooperative surfacing project, being given No. 72. The project statement estimate amounts to $41,882.50, with the Government obligated to the extent of $25,605.59 and the State to the extent of $16,276.91. No steps have been taken towards the award of a contract for the work.

Unit 3, Hood River-Mosier Grading

A description of this section will be found on page 388 of the Fourth Biennial Report. The construction work was carried to completion on July 12, 1920, with delayed expenditures of $34,739.50 during the present biennium. This brings the total cost of the project to $219,339.57, which has been paid entirely from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,563.69
Labor and materials furnished by State:		
Advertising for bids		15.29
Protection of railway and telegraph lines		1,180.31
Freight on lumber for barricades along O.-W. R. & N. tracks		563.14
Contract items:		
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, 155,766.0 sta. yds. at 3c	4,673.28	
12-inch plain concrete pipe, 402.0 lin. ft. at $1.34	538.68	
Class "A" concrete, 80.14 cu. yds. at $30.00	2,404.20	
Class "C" concrete, 5.2 cu. yds. at $20.00	104.00	
Reinforcing steel, 7,622.0 lbs. at 9c	685.98	
Dry rock walls, 120.42 cu. yds. at $4.00	481.68	
Tunnel construction, 349.8 lin. ft. at $57.00	19,938.60	
Tunnel overbreak, 263.5 cu. yds. at $3.00	790.50	
Concrete bridge handrail, 95.5 lin. ft. at $3.00	286.50	
Rubble masonry, 90.01 cu. yds. at $12.00	1,080.12	
Force account items:		
Moving oil house off right-of-way	47.30	
Constructing rubble wall and timber barricade along O.-W. R. & N. tracks	3,788.00	
Hauling screenings for new fill	13.20	
Constructing rubble wall and railing at tunnels	3,395.04	
Constructing retaining wall and hand placing rock on slopes	2,672.75	
Special adjustment items:		
Protecting railway and telegraph lines from damage	8,238.88	
Removing slides and loose rock on slopes	12,938.41	
Total amount paid to contractor		210,017.14
Grand total cost of project (all State funds)		$219,339.57

[WASCO]

Cow Canyon Grading

This section of The Dalles-California Highway begins at the Jefferson-Wasco County Line and extends north for a distance of 7.8 miles. About one-half of the section is in what was known as "Cow Canyon." Excellent grade and alignment has been secured through this canyon.

Contract No. 474, for grading, was awarded to McAuliffe & Healy of Portland on October 25, 1921. Work was started on November 6 and completed on July 10 of the present year.

About one-half of the section consisted of heavy rock work, and construction operations on this portion were carried on during the winter. The entire project was completed in a very workmanlike manner.

Since the completion of the grading, a filler of earth has been put on the rock cuts and fills by State forces, and the section is now in good passable condition. Federal aid has been requested on the surfacing of the section, but no active steps have yet been taken towards the award of a contract.

Construction was handled under the supervision of R. P. Newland, Resident Engineer, and is estimated to cost a total of $81,005.00 when all final payments have been made. The State share of this will amount to $42.760.24 and the County share to $38,244.76. Expenditures to date amount to $80,505.00, of which the State has paid $43,393.85 and the County has paid $37,111.15.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,515.48
Placing earth filler on rock cuts and fills		1,767.17
Contract items as follows:		
Clearing and grubbing, all	$ 825.00	
Common excavation, 8,335.5 cu. yds. at 27c	2,250.59	
Intermediate excavation, 24,451.1 cu. yds. at 50c	12,225.55	
Solid rock excavation, 60,058.7 cu. yds. at 89c	53,452.24	
Overhaul. 27,184.0 sta. yds. at 5c	1,359.20	
12-inch corrugated galvanized iron pipe, 892.0 lin. ft. at $1.40	1,248.80	
18-inch corrugated galvanized iron pipe, 408.0 lin. ft. at $2.35	958.80	
24-inch corrugated galvanized iron pipe, 428.0 lin. ft. at $3.20	1,369.60	
36-inch corrugated galvanized iron pipe, 112.0 lin. ft. at $6.30	705.60	
Class "C" concrete, 38.535 cu. yds. at $30.00	1,156.05	
Force account items:		
Lowering water pipe lines that cross highway at Sta. 186 and Sta. 216	124.10	
Hand placing rock on slopes and at culvert ends	88.76	
Resloping cuts between Sta. "B" 200 and "B" 210 to prevent slides	131.47	
Cleaning ditches and refinishing completed grade that was cut up by winter travel	622.13	
Total amount earned by contractor	$ 76,517.89	
Percentage retained until completion of contract	2,295.54	
Total amount paid to contractor		74,222.35
Grand total expended to Nov. 30, 1922		$ 80,505.00
Paid by State	$ 43,393.85	
Paid by County	37,111.15	
Total	$ 80,505.00	

Mount Hood-Wapinitia Forest Road Project Survey

This project extends from a connection with the Mount Hood Loop Project, just east of Government Camp, to Wapinitia, a total distance of

36 miles. A survey of the section is being made by the Bureau of Public Roads under a cooperative agreement whereby the State and the Government are to pay $5,000.00 each, in a total estimated cost of $10,000.00.

To date the Bureau has completed the location of 18.29 miles on the west end of the project. Expenditures amount to $2,500.00 from State funds and $1,767.27 from Government funds.

Mount Hood Loop-Clear Lake Forest Road Project

Agreement has been entered into between the State Highway Commission and the Federal Government for the construction of 7.5 miles of the Mount Hood-Wapinitia Project between Mount Hood and Clear Lake. The work is estimated to cost a total of $141,000.00, this being divided equally between the State and the Government. Bids for the clearing of this portion were recently obtained, and it was recommended that Heller Brothers be awarded the contract. No expenditures have been made to date.

Maintenance

Maintenance operations in Wasco County have been confined entirely to the Columbia River Highway and to the pavement between The Dalles and Threemile Creek.

Following the completion of the roadbed on the Columbia River Highway between The Dalles and the Hood River County Line, considerable maintenance was necessary on account of slides which came down from the long slopes. Most of this section was soon placed under contract for surfacing and paving, and the necessary maintenance work such as cleaning ditches, removing slides, etc., was taken over by the contractor on the section. Subsequent to completion of the paving, State forces have handled the necessary building up of the shoulders, cleaning ditches, removing slides, sanding pavements, etc. This work was supervised by J. E. Peck, Resident Engineer, with headquarters at The Dalles, until November 1, 1922. On this date he was succeeded by J. R. Nickelson, working from headquarters at Hood River.

The section between The Dalles and the Deschutes River has been handled by Victor Starling, from headquarters at Rufus, under the supervision of Resident Engineer J. E. Peck. This portion has been one of the hardest sections of the Columbia River Highway to maintain on account of the shifting blow sands. The wind has blown practically all of the fines from the top course of the surfacing during the dry season just past, and at many other places blow sand has been deposited on the surfacing and has worked into the gravel and prevented packing of the materials.

State forces under the direction of L. P. Campbell began hauling a clay filler on this section on November 1. These forces are placing about five cubic yards of filler per station, which is entirely bladed in and mixed with the gravel. Upon receiving this treatment the surfacing seems to be packing under traffic and good results are expected.

On The Dalles-Threemile Creek Section, the ditches have been cleaned, the shoulders built up, the weeds cut and the pavement sanded as needed.

Upon the completion of The Dalles-Dufur Section next spring, maintenance headquarters will be established at The Dalles, to handle this section in conjunction with The Dalles-Deschutes River Section.

[WASCO]

Deschutes River Bridge

An article regarding the final expenditures on this structure, which is over the stream dividing Sherman and Wasco Counties, will be found in the portion of this report devoted to Sherman County projects.

Bridges on The Dalles-Dufur Section

The Dalles-California Highway makes four crossings of Eightmile Creek between The Dalles and Dufur. All four bridges are of concrete, one being of two 24-foot spans and the other three are single spans of 30 feet.

Contract No. 565, providing for their construction, was awarded to Tobin & Pierce on June 29, 1922. Work started on August 19, 1922, and is well along at this time. Total expenditures to date are $8,139.38, out of a total estimated cost of $25,000.00, to be shared $13,500.00 by the State and $11,500.00 by the County. The expenditures to date have been borne $4,559.18 by the State and $3,580.00 by the County.

N. W. Reese is Resident Engineer in charge of the work.

White River Bridge

Near the town of Tygh Valley, The Dalles-California Highway crosses White River on a bridge which is to consist of a 120-foot steel span with 25 feet of concrete approach on each end.

The construction was contracted on October 5, 1922, under Contract No. 607, to the Union Bridge Company. Work started on November 1, 1922, and good progress has been made to date. It is estimated that the final cost will be $21,000.00, of which the State will pay $10,500.00 and the County share will be $9,500.00. Construction is being supervised by N. W. Reese, Resident Engineer, with expenditures to date of $401.17 from State funds.

Rowena Loops

Only two other points on the Columbia River have a view equal to that from the top of Rowena Heights, situated about midway between The Dalles and Mosier, and directly across the river from Lyle, Washington. Very soon after the completion of the grading on this section, Mr. Mark A. Mayer very generously offered to acquire the property adjacent to the Rowena Loops, and including that at the summit, and to present it to the State as a park. The 80 acres near the foot of the loops owned by Edgar V. Dodge were offered reasonably, as were also 20 acres owned by Andrew Pearson adjoining that of Mr. Dodge on the north. However, these tracts had no special attraction unless some of the property owned by R. D. Crowe was also acquired. Mr. Crowe has refused all reasonable offers by Mr. Mayer for part or all of this property, and, at the request of the Highway Department, Wasco County has started condemnation proceedings for the acquirement of 160 acres owned by R. D. Crowe. The summit of Rowena Heights is located near the center of this 160 acres. After many delays a change of venue was granted by Circuit Judge Wilson of Wasco County, and the case has been set for trial for the term of court beginning November 20, 1922, in Sherman County, at Moro.

[WASCO]

Threemile Creek-Dufur Survey

The original location of this section was described on page 397 of the last report. During September of 1921, H. C. Compton, Locating Engineer, ran a revised line on a 6 per cent maximum grade which covered practically the same route. Later, a comparative line was run up Eightmile Creek at the request of the Wasco County Court. This latter line was adopted as the location of the State highway.

Eightmile Creek-Dufur Survey

This survey was made at the request of the Wasco County Court, and was paid for by the County. Former surveys between The Dalles and Dufur, via Threemile Creek, showed that adherence to a 5 per cent grade involved heavy work and right-of-way costs, and that a 6 per cent location would be considerably cheaper, but that neither could make use of any appreciable amount of the County construction which had been done previously on an 8 per cent maximum gradient.

It was desired, if possible, to confine all grades to a 5 per cent maximum, and, for this reason, the location survey between Eightmile Creek and Dufur was made. The new survey follows a route that avoids the high summits on the present traveled road. It begins at a crossing of Eightmile Creek, located 4.4 miles from The Dalles and 2.4 miles southeast of a junction with the Columbia River Highway, and follows up Eightmile Creek for approximately 8.3 miles to a junction with the existing road and the survey mentioned in the last report. The adoption of this line for The Dalles-California Highway involves an increase in length of 4.5 miles over the existing roads between The Dalles and Dufur, but it provides a water grade for the greater part of the distance.

The location was made between October 25 and December 17, 1921, by H. C. Compton, Locating Engineer.

Maupin-Dufur Survey

The town of Maupin was almost entirely destroyed by fire on September 10, 1921, and, before rebuilding, the property owners desired to know where the location of The Dalles-California Highway through the town would be placed. In acordance with this desire, the State Highway Commission ordered a survey beginning at the Deschutes River bridge at Maupin and extending to Dufur.

The line begins at the south end of the bridge, and, after crossing the river, cuts through the townsite of Maupin and then makes a sidehill ascent to the plateau above. Over two miles of sidehill work are required in the total of three miles between the river and the top of the grade.

The route passes across the Juniper Flat, through the town of Tygh Valley, up Butler Canyon to Tygh Ridge, and thence to Dufur. With the exception of one tangent over three miles in length across Juniper Flat, the alignment is very crooked until the top of Tygh grade is reached. For construction and estimating purposes the location has been divided into four units.

Unit No. 1 is seven miles in length and extends from Maupin to the beginning of the descent to Tygh Valley.

Unit No. 2 is six miles in length and covers the long descent to the White River and the town of Tygh Valley and extends on to the foot of the Tygh Valley grade.

[WASCO]

Unit No. 3 is six miles in length and includes the ascent to the summit of Tygh Ridge. The contract for this section, when awarded, will cover one of the heaviest rock jobs placed under contract by the Department.

Unit No. 4 is 9.88 miles in length and covers the balance of the distance from the top of the Tygh Valley grade to Dufur.

The location of the first 7.2 miles was made by H. C. Compton, Locating Engineer, betwen October 1 and October 24, 1921. The balance of the distance was located by C. R. Burns, Locating Engineer, between May 2 and August 13, 1922.

Maupin-Jefferson County Line Survey

This survey begins at the bridge across the Deschutes River in the town of Maupin, extends south to a connection with the north end of the Cow Canyon project, and has a total length of 20.77 miles.

Maupin is located in the deep canyon of the Deschutes River, and in order to reach the plateau above several miles of sidehill location, involving a large amount of doubling back, are required. This portion is followed by a more gradual ascent of several miles. The existing County road is followed in a general way for a large part of the distance. At the southerly end the topography is so uniform that one tangent, several miles in length, was used. Possible quarry sites for the securing of surfacing materials are found along the route.

The location was made by C. R. Burns, Locating Engineer, between March 13 and April 30, 1922.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Wasco County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 51,861.79
2.	State Funds apportioned to County	74,094.22
3.	County levy made to match State Funds	74,482.84
4.	County Market Road Funds Collected	89,429.71
5.	Cash paid to County by State	61,755.66
6.	State expenditures, deducted from apportionment	5.00
7.	Cash due County from State in December, 1922	12,333.55
8.	County Expenditures on Market Roads	153,493.52
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Wasco County received from the State Market Road Fund $22,232.43 more than it paid into the fund. The excess is Wasco County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $74,482.84. They have collected and credited to the Market Road Fund $89,429.71.

The County Court has designated three roads to be improved as Market Road projects.

The engineering work has been done by P. W. Marx, County Roadmaster. Plans have been submitted and approved.

Most of the construction work has been done by contract under supervision of the Roadmaster. The roads are being graded to good alignment, with a maximum grade of 5 per cent, and a good permanent road is being obtained. They have graded and surfaced 18.8 miles of road.

WASHINGTON COUNTY

So far as original construction is concerned, the State highways in Washington County are complete, except two short gaps where new bridges have been, or are to be, constructed over the Tualatin River, at Gaston, and over Dairy Creek, at Hillsboro, and, with the single exception of the gap at the Tualatin River, the Tualatin Valley, Bertha-Beaverton and West Side Highways are paved throughout the County.

The Tualatin River bridge is complete and paving of that gap is planned for 1923. The County Court of Washington County are preparing for filling part of the present approach trestle at Dairy Creek in the coming season and for the construction of a new bridge in 1923 or 1924.

A resurfacing project upon the West Side Highway, described in another section of this report, is under way and scheduled for completion during the summer of 1923. Thus the last remaining portions of the State highways in this County are under way or definitely provided for.

Work in the County has been handled under the supervision of W. D. Clarke, Division Engineer.

Multnomah County Line-Newberg Post Road Project

The betterment work on this section is described in another article given in this report. As a sequel to that work, and in accordance with the policy followed of leaving the resurfacing of the section until it could be done as a whole, the State Highway Commission undertook this resurfacing in 1922.

The project, designated as the Multnomah County Line-Newberg resurfacing, was submitted and approved as a Federal Aid project, and is recorded as Oregon Post Road Project No. 73.

The specifications for the work, as under way, provide for widening the pavement from 16 to 18 feet and for resurfacing all sections having a grade of over 5 per cent with cement concrete, with the balance of the section being surfaced with bituminous concrete.

Bids were first taken on the entire project on July 25, 1922, at which time a cement concrete resurface was specified for only the west slope of Rex Hill. The steepest grades on the section occur at this point and vary from 5 per cent to 7.8 per cent. Prior to the award of the contract, however, the Bureau of Public Roads advised that their approval of the project was contingent, among other things, on all grades over 5 per cent being resurfaced with cement concrete. For this reason all such sections, with some intervening stretches of less grade, the total aggregating 3.64 miles, were withdrawn as a part of the original proposals and were ordered readvertised as a separate contract.

This action divided the section into ten subsections of alternate cement concrete and bituminous concrete surface. These sections are as follows:

First concrete section, Station 0+00 to Station 33.
First bituminous section, Station 33 to Station 166.
Second concrete section, Station 166 to Station 181.
Second bituminous section, Station 181 to Station 501.
Third concrete section, Station 501 to Station 523.
Third bituminous section, Station 523 to Station 544.
Fourth concrete section, Station 544 to Station 593.
Fourth bituminous section, Station 593 to Station 652.
Fifth concrete section, Station 652 to Station 732.
Fifth bituminous section, Station 732 to Station 834+77.

[WASHINGTON]

These divisions have been, and will continue to be, subject to slight variations as the work progresses.

Based upon the first bids received, Contract No. 581, for an aggregate total of 12.06 miles of bituminous resurfacing, was awarded to A. D. Kern of Portland, Oregon. The work to be done under this contract consisted of a 2-inch by 18-foot bituminous concrete wearing surface, with a binder course between the old bituminous pavement and the new wearing surface of an average thickness of one and one-half inches. This binder course is being placed in order to restore the general crown and grade of the pavement and to afford additional strength. Under the extra width of the new surfacing, the old pavement being only 16 feet wide, there is being constructed a bituminous base four inches in thickness. A bond is being secured betwen this new base and the edge of the old pavement by chipping the old pavement to a clean beveled edge and painting this edge with hot asphalt.

Work under this contract was begun on September 1, 1922, and the first bituminous section, containing 2.52 miles, has been completed so far as the paving work is concerned. The bituminous mixture for this section was hauled from a plant in Portland. Engineering work on the particular unit has been under the supervision of C. G. Reiter, Resident Engineer.

On the south end, consisting of the fourth and fifth bituminous sections, a total distance of 8.19 miles has been resurfaced. Materials for this work were secured from a paving plant at Newberg. This work is in charge of E. A. Collier, Resident Engineer, who has also supervised the concrete work on the project.

For construction of the second and third bituminous sections, a plant has been erected at Cipole from which point work will be begun in the spring of next year. Operations have been suspended for the winter upon sections constructed from the Portland and Newberg plants.

Proposals were received for the concrete resurfacing work on August 29, 1922. Contract 589 was then awarded to Cummins & La Pointe of McMinnville. Work was started by them on October 1, and the equivalent of approximately 0.4 mile of pavement has been completed at this time. It is planned to continue this concrete pavement work during suitable weather throughout the winter until the work under the contract is completed.

The specifications provide for a concrete resurface, to be laid directly on the old bituminous pavement except where it extends outside of the old pavement width of 16 feet. The old pavement originally had a crown of three inches, but in many places this crown has largely disappeared. In other places the crown still exists but the pavement has become wavy, the waves extending across the entire width. Because of these conditions, the thickness of the concrete resurfacing was specified to be of not less than six inches in the center, nor less than seven inches at the edges, the crown being varied from the Department standard of one and one-half inches whenever a saving in concrete quantities can be effected by this means. It has been found, however, that in order to get proper superelevation on curves, an average center thickness of about seven inches has been necessary. Because of the variations of thickness and crown, the concrete resurface is being paid for on the cubic yard basis instead of on the customary square yard basis.

On account of the volume of traffic over the highway and the impracticability of using detours through the winter, the concrete resurface in general is being laid in two strips. The mixture for the pavement is of the standard 1:2:3 proportions and reinforcement of one-half inch

square bars has been specified. Longitudinal bars are placed six inches from each edge of the slab. If the pavement is laid in two strips there are also two bars adjacent and parallel to the center longitudinal joint. Transverse bars 17 feet 6 inches long are placed at the end of each 30-foot panel. Where the pavement is laid in a single strip five intermediate transverse bars of the same length are used, being spaced evenly throughout the slab. If the pavement is laid in two strips these intermediate bars are reduced simply to tie bars and are three feet in length.

In connection with this project reconstruction of the overcrossing near Votaw, which will permit improvement of the alignment and sight distance at that place, has been agreed upon with the Southern Pacific Railroad Company. Also a change in the line at the foot of Rex Hill has been arranged, for the purpose of securing improvement of the grade and alignment.

The bituminous resurfacing is estimated to cost a total of $254,000.00 with the State paying $94,515.00 and the Federal Government cooperating to the amount of $159,485.00. The expenditures on this work amount to $53,991.85 from State funds to date.

The concrete resurfacing is estimated to cost a total of $108,000.00 with the State paying $41,505.49 and the Federal Government $66,494.51. Expenditures on this work amount to $5,506.95 from State funds.

The estimated cost of the entire project is $362,000.00, the State share being $136,020.49 and the Federal Government share $225,979.51, with total expenditures to date amounting to $59,498.80 from State funds.

Scoggin Creek Bridge Paving

After completion of the bridge over Scoggin Creek, on the Tualatin Valley Highway about 2.25 miles north of Gaston, the paving of the gap which had been left at that point when the Forest Grove-Gaston section was paved was undertaken.

On July 25, 1922, Contract No. 577 was awarded to the Warren Construction Company of Portland, Oregon, for paving the 0.1 mile involved. The surfacing constructed consisted of a five-inch type "D" bituminous pavement, 16 feet in width, on the approaches, and a bituminous pavement, two inches in thickness at the edges and three and one-half inches in thickness at the center, on the bridge proper. On the approaches to the structure, broken stone shoulders were constructed corresponding to the shoulders on the balance of the Forest Grove-Gaston section.

Work was started August 4, 1922, and completed August 10, being under the engineering supervision of C. G. Reiter, Resident Engineer.

The completed work represents a total expenditure of $3,921.18 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5.33
Maintenance work by State forces to maintain winter travel		664.53
Contract items as follows:		
Preparation of subgrade, 1,132.1 sq. yds. at 6c	$ 67.93	
2-inch standard bituminous concrete wearing surface, 1,086.8 sq. yds. at $1.50	1,630.20	
3-inch standard bituminous base, 288.0 batches at $4.45	1,281.60	
Broken stone subbase, 25.0 cu. yds. at $5.00	125.00	
Broken stone for shoulders, 14.5 cu. yds. at $5.00	72.50	
Shoulder construction, 850.0 lin. ft. at 6c	51.00	
Force account items:		
Digging out soft spots in embankment and refilling with rock	23.09	
Total amount paid to contractor		3,251.32
Grand total cost of project (all State funds)		$ 3,921.18

[WASHINGTON]

Beaverton-Multnomah County Line Paving

The paving of this section, extending from Beaverton to the Multnomah County Line near Sylan, is described in some detail on page 400 of the last report. The contract was reported to be practically complete at that time, but owing to the occurrence of a few breaks, at points where the originally specified two-inch pavement had been laid on a subgrade which proved during the winter to be insufficiently drained, the repair of which breaks could not be done practicably until good weather, the final estimate on the work was not given until 1921.

This delay permitted the paving of a short gap near the Multnomah County Line, which had been left undone at the time of the 1920 work on account of the new embankment, and it also permitted the strengthening of a short section near the junction of the Bob Walker road by means of resurfacing with a two-inch top course. This additional work and the repairs of the breaks were completed on September 10, 1921.

Contrary to the statement made in the last report, the section is 3.8 miles in length.

Additional expenditures during the present biennium amount to $30,953.54, of which the State paid $22,823.99 and the County $8,129.55. These expenditures bring the total cost of the work to $135,623.99, with the State paying $115,494.44 and the County cooperating to the extent of $20,129.55.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 8,037.28
Contract items as follows:		
Clearing, all	$ 300.00	
Common excavation, 14,956.6 cu. yds. at 75c	11,217.45	
Intermediate excavation, 2,404.1 cu. yds. at $1.25	3,005.13	
Solid rock excavation, 53.0 cu. yds. at $1.75	92.75	
Overhaul, 5,489.0 sta. yds. at 4c	219.56	
48-inch reinforced concrete pipe, 52.0 lin. ft. at $8.80	457.60	
18-inch reinforced concrete pipe, 176.0 lin. ft. at $2.20	387.20	
12-inch plain concrete pipe, 105.0 lin. ft. at $1.25	131.25	
12-inch corrugated galvanized iron pipe, 72.0 lin. ft. at $1.51	108.72	
12-inch corrugated galvanized iron pipe joints, 1.0 at $3.89	3.89	
24-inch corrugated galvanized iron pipe, 30.0 lin. ft. at $2.99	89.70	
6-inch porous drain tile, 40.0 lin. ft. at 30c	12.00	
Class "A" concrete, 109.05 cu. yds. at $28.00	3,053.40	
Metal reinforcement, 8,419.0 lbs. at 10c	841.90	
Standard bituminous pavement, 2-inch top, 39,406.2 sq. yds. at $1.50	59,109.30	
Standard bituminous pavement, 3-inch base, 5-mile haul, 954.0 sq. yards. at $3.85	3,672.90	
Standard bituminous pavement, 3-inch base, 6-mile haul, 833.8 sq. yds. at $4.05	3,376.89	
Standard bituminous pavement, 3-inch base, 7-mile haul, 395.0 sq. yds. at $4.25	1,678.75	
Standard bituminous pavement, 3-inch base, 8-mile haul, 480.0 sq. yds. at $4.45	2,136.00	
Standard bituminous pavement, 3-inch base, 9-mile haul, 178.2 sq. yds. at $4.65	828.63	
Broken stone for base and shoulders, 9,157.5 cu. yds. at $3.74	34,249.05	
Shoulder construction, 40,094.0 lin. ft. at 6c	2,405.64	
Force account items:		
Constructing wooden flumes for drainage purposes	134.59	
Moving buildings off right-of-way	74.41	
Total amount paid to contractor		127,586.71
Grand total cost of project		$135,623.99
Paid by State	$115,494.44	
Paid by County	20,129.55	
Total	$135,623.99	

[WASHINGTON]

Forest Grove-Gaston Paving

Contract No. 334, for paving the Forest Grove-Gaston Section of the Tualatin Valley Highway, was awarded to the Warren Construction Company of Portland, Oregon, on March 8, 1921. The section has a length of 6.8 miles, and extends from the intersection of "A" Street and Fourth Avenue in Forest Grove to the Yamhill County Line, which point is also the south city limits of Gaston. From this distance there were omitted two short gaps, one at Scoggin Creek and one at the Tualatin River, where new bridges were to be constructed.

The contract called for the construction of a 16-foot type "D" bituminous pavement, consisting of a two-inch wearing surface and a base course of not less than two inches in thickness. This base course was paid for on the basis of the number of 1,000-pound batches of bituminous base mixture used and was laid to the thickness required by subbase conditions. In general it was constructed to a thickness of three inches.

Broken stone shoulders of the feather-edge type were constructed, and the way they have held their form and surface has clearly demonstrated the superiority of broken stone over gravel for this type of shoulder construction. It has also demonstrated the possibility of constructing satisfactory feather-edged shoulders, if broken stone is used and the construction is done with care.

Work was begun May 11, 1921, and completed November 10 of the same year, under the field engineering supervision of C. G. Reiter, Resident Engineer. The work cost a total of $232,955.42, of which the State has paid $230,998.23 and the City of Forest Grove has paid $1,957.19. The County and City of Gaston shares amount to $1,650.00, and payment of their cooperative amounts is now due to the State.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,560.01
State share of cost of drainage system in City of Gaston		527.54
Repairing damage caused by washout of 1921		108.10
Rental of State-owned equipment (deducted from contractor's estimate)		2,005.18
Contract items as follows:		
Common excavation, 711.7 cu. yds. at $1.25	$ 889.63	
6-inch porous drain tile, 3,545.0 lin. ft. at 40c	1,418.00	
Standard wood guard fence, 1,280.0 lin. ft. at $1.25	1,600.00	
Preparation of subgrade, 84,606.0 sq. yds. at 6c	5,076.36	
2-inch standard gravel bituminous wearing surface, 62,441.8 sq. yds. at $1.66	103,653.39	
3-inch standard gravel bituminous base, 19,127.0 batches at $4.16	79,568.32	
Broken stone for shoulders, 3,547.0 cu. yds. at $3.75	13,301.25	
Rock backfill for tile drains, 476.0 cu. yds. at $3.75	1,785.00	
Broken stone for subbase, 3,823.5 cu. yds. at $3.75	14,338.13	
Shoulder construction, 68,384.4 lin. ft. at 6c	4,103.06	
Force account items:		
Grading detour and improving drainage	26.63	
Total amount earned by contractor	$225,759.77	
Deduction for rental of State-owned equipment	2,005.18	
Total amount paid to contractor		223,754.59
Grand total cost of project		$232,955.42
Paid by State	$230,998.23	
Paid by City of Forest Grove	1,957.19	
Total	$232,955.42	

Forest Grove-Gaston Surfacing

This work was undertaken during the previous biennium, and is described on page 402 of the last report. The work was practically

finished at that time, although it was not entirely completed and given final acceptance until March 11, 1921.

Additional expenditures of $26,770.67, made during the present biennium, bring the total cost of the work to $71,232.98 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,877.58
Labor and material furnished by State:		
Rental of State trucks (loaned to Washington County, free of charge)		23,299.71
Rental of State hoisting engine (deducted from contractor's estimate)		225.00
Contract items as follows:		
Broken stone, 16,020.25 cu. yds. at $2.75	$ 44,055.69	
Total amount earned by contractor	$ 44,055.69	
Deduction for rental of hoisting engine, owned by State	225.00	
Total amount paid to contractor		43,830.69
Grand total cost of project (all State funds)		$ 71,232.98

Multnomah County Line-Newberg Section

This section is not properly a contract project, having been done under a Department betterment order, but, owing to the nature of the work involved, it appears worthy of an article in this report.

On June 29, 1921, bids were taken for work to be done on the Multnomah County Line-Newberg Section of the West Side Highway in Washington and Yamhill Counties. The section is 15.7 miles in length and extends from the Multnomah County Line to the north end of the concrete viaduct at Newberg.

The project, as advertised, contemplated regrading the earth shoulders, deepening ditches, installing drain tile or blind stone drains where necessary, redressing the rock shoulders with screenings, resurfacing four separate sections aggregating 3.4 miles, and patching all breaks and points of serious settlement on the remaining 12.3 miles.

This section was one of the first projects to be undertaken under the six million dollar bond act, and most of the work was done during 1918. This was just at the time when there was a demand for use of all highways for war purposes and this demand in this case, as in several similar projects, viz., the Canemah-Canby Section of the Pacific Highway in Clackamas County and the Tillamook South Section of the Roosevelt Coast Highway in Tillamook County, required construction of the paving on the project during the same season in which the grading was done. This procedure meant that practically all the pavement on the projects mentioned was laid upon an insufficiently settled subgrade. This condition combined with the light standard of the pavement built—two inches of bituminous concrete on a light open rock subbase—accounts for the failure to secure satisfactory service under the greatly increased weight and volume of traffic that has since developed on these highways.

Appreciating these conditions, and realizing that the proper remedy lay in the strengthening of the pavement at its weak points, rather than a continuation of repair work, the Highway Commission in advertising the project had in mind improving the subgrade condition along the entire section, so far as possible by regrading and ditching work, and considered it advisable to strengthen the parts where the most serious weaknesses of the pavement developed. These portions were selected as

follows: 0.6 mile from the Multnomah County Line south; 0.4 mile from the grade at Tigard north; 1.7 miles from the Union Flat bridge to the bridge south of Six Corners, and 0.7 mile on the south slope of Rex Hill.

Upon receiving bids, however, it was found that the cost of such piecemeal treatment would be excessive and it was decided that the resurfacing work should be left until such time as it could be undertaken upon the entire section at once. Therefore, all bids were rejected and the regrading, ditching and rock shoulder improvement was undertaken by State forces. The repair of the pavement, covering only the patching of actual breaks, was done on a force account basis.

The State force work was handled by the Equipment Department with Tom Lacey, Superintendent, in immediate charge in the field.

Maintenance

The principal item of maintenance work in Washington County in the past two years has been the repair of the concrete pavement on the Bertha-Beaverton Highway and Tualatin Valley Highway from the Multnomah County Line near Bertha to Hillsboro. Aside from this, the maintenance work has consisted simply in general maintenance of drainage and shoulders by the patrol system, and a small amount of bituminous pavement repair on the Forest Grove-Hillsboro and Rex-Tigard Sections.

The repair of the Hillsboro-Multnomah County Line Section is the first trial in this State, to any considerable extent, of the repair of a concrete pavement with concrete patches. The same type of patching was used in 1921 to a very limited extent on the concrete section between Bellevue and Sheridan in Yamhill County, and its success there was largely the basis for its use for the extensive repairs required on the pavement between Hillsboro and Bertha.

The concrete pavement on the section, laid in 1919, is of 1:2:3 mix, 16 feet wide, five and one-half inches in thickness at the edges and six inches in the center, with four-inch submerged expansion joints. Within a year after its completion, the pavement began to show distress and to give evidence of insufficiency which, it is believed, can be attributed to four causes. None of these causes probably would have been sufficient alone to have brought about the degree of failure that the pavement has shown, but, together, they have done so. These causes are: First, subgrade conditions—A considerable proportion of the pavement was laid upon a subgrade too recently graded and insufficiently settled. Second, design—The idea that a pavement should be thicker in the center than on the edges to better carry the greater concentration of loading at that point, or to facilitate construction of a crowned section, is one that has been since demonstrated incorrect. Third, material—This pavement was laid at a period when the state of the highway fund was such as to make necessary every possible economy in first cost, even in some cases like this, at the sacrifice of quality, which explains acceptance of a low bid based on use of sand known to be inferior to other more expensive material. And fourth, traffic—The traffic which developed upon this highway in the first year after its completion far outran both in weight and volume anything that had been anticipated when the pavement was designed and laid.

Up until 1922 repairs of breaks in the pavement were made with bituminous material and it was nearly a continuous performance to keep all breaks repaired. Not only did new breaks occur with disconcerting rapidity, but old breaks continued to enlarge beyond the limits of the

bituminous patches which had been put in . One reason for this latter trouble lay in the difficulty in getting and keeping the bituminous patches flush and smooth at their joint with the concrete. These patches were necessarily laid with hand tamping and those laid flush with the concrete soon became pounded down by traffic and slightly lower than the pavement around. Those laid a little high seemed always to be the ones which did not pound down, but remained high. In either case, a pounding effect was produced on the edge of the concrete by traffic passing over the patch.

The concrete patches laid in 1922 were constructed as follows, all old bituminous patches and broken concrete were dug out and the concrete pavement broken back to a fairly uniform edge and chipped off with a cold chisel to form as nearly as possible a square clean corner on the top. In many instances it was necessary to enlarge the break quite appreciably in order to get an edge of firm dense concrete. The subgrade was then excavated to a depth of three to six inches, depending upon the size of the patch, below the bottom of the pavement and this excavation was carried under the edge of the old pavement a distance of six to eight inches all around the break. In the smaller breaks this excavation of the subgrade was made to a uniform depth, both in the open break and under the edge of the pavement, on the average being about five inches below the bottom of the pavement. In the larger breaks the excavation was carried only about three inches below the pavement out in the open break and to a depth of five or six inches under the edge of the old pavement and over a strip of about equal width out in the break. Where the breaks came at the corners of panels, and of course a very large majority of them did so occur, expansion joints were replaced, but were full depth rather than submerged joints such as were originally constructed when the pavement was laid. The concrete patch was then placed of 1:1½:3 mix, great care being used to see that the concrete was thoroughly tamped into the space excavated under the edge of the old pavement. Finishing was done by hand trowels, and the patches were barricaded and traffic kept off for 14 days. At the end of 24 hours the patches were covered with earth and kept wet for seven days.

This procedure meant a very considerable inconvenience to traffic during the time barricades were necessary, though every effort was made to reduce such annoyance to a minimum. Patching was carried on along one side, from one end of the 11.28 miles to the other, before beginning on the other side.

The cost of the work per square yard has been high, but results, so far as can be ascertained at this writing, have fully justified both the cost and the inconvenience necessitated. With the exception of two small patches which were damaged in the first 24 or 48 hours by a heavy truck overrunning the barricades, there have been no breaks or cracks in the patches themselves and not a single instance of an enlargement of the break by the old concrete breaking back from the patch. In this is believed to lie the test as to the success or failure of this method of patching. New breaks are continuing to appear but at less frequent intervals of time and space and they will probably continue to diminish as the strength of the weakest corners gradually rises with elimination by failure and repair of those still weaker.

One problem of this type of repair work which has not been yet satisfactorily solved is the joint between the new concrete of the patch and the old of the pavement. The impracticability of getting a perfectly smooth square corner on the upper surface of the edge around the break means more or less spalling off with the contraction and expansion of

the pavement and necessitates treatment of this joint with asphalt as regular expansion joints are treated when they begin to spall. This in turn outlines the patches in black and makes them stand out in plain sight.

This work was done by State forces under the supervision of Don C. Marriott, Superintendent. On the section of 11.28 miles, a total of 2,548 square yards, surface area, of patches was laid, using 708 cubic yards, sack count, of concrete. Incomplete expenditures on the work, amounting to $21,826.07, include the concrete patching, bituminous treatment of joints, including all expansion joints as well as joints at new patches, and also a certain amount of ditching, tile drains and trimming of shoulders.

Gales Creek Bridge

Just south of Forest Grove the Tualatin Valley Highway crosses Gales Creek on a bridge consisting of an 80-foot steel span. It was built some years ago and required considerable work in order to bring it up to the State standard.

Contract No. 438, covering this rehabilitation work, was awarded to the Beam Construction Company of Mt. Vernon, Washington, on July 29, 1921. Work started on August 22, 1921, and was complete by October 1, 1921, at a total cost of $1,615.18. Of this sum, $112.48 for engineering, was paid by the State, leaving $1,502.70 for construction, which was paid by the County.

O. A. Chase was Resident Engineer in supervisory charge of the work.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 112.48
Contract items as follows:		
Class "A" concrete, 4.3 cu. yds. at $45.00	$ 193.50	
Lumber, 15.744 M-FBM at $35.00	551.04	
Structural steel, 2,216.0 lbs. at 16c	354.56	
Redriving rivets, 680.0, each at 52c	353.60	
Painting structure, all at $50.00	50.00	
Total amount paid to contractor		1,502.70
Grand total cost of repairs		$ 1,615.18
Paid by State	$ 112.48	
Paid by County	1,502.70	
Total	$ 1,615.18	

Gaston Bridge

At Gaston, the Tualatin Valley Highway crosses the Tualatin River on a concrete bridge consisting of a 50- and two 25-foot spans.

The construction of this bridge was awarded to William D. Hoffman of Amity on March 23, 1922, under Contract No. 507. Work was not started until July 10, 1922, but has progressed satisfactorily since that time and is nearly complete at the date of this report. O. A. Chase is Resident Engineer in charge of the work.

The estimated total cost is $9,500.00, to be paid $800.00 by the State and $8,700.00 by the County, of which $8,882.83 has been paid to date. Of this sum the County has paid $8,143.85, leaving $738.98 which has been paid by the State.

[WASHINGTON]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 724.98
Bronze name plates furnished by State		14.00
Contract items as follows:		
Excavation, single classification, 294.0 cu. yds. at $2.00	$ 588.00	
Timber piling, 1,360.0 lin. ft. at 75c	1,020.00	
Class "A" concrete, 243.3 cu. yds. at $21.00	5,109.30	
Metal reinforcement, 41,655.0 lbs. at 5½c	2,291.03	
Concrete handrail, 240.0 lin. ft .at $3.70	888.00	
Allowance for extra cement used	22.50	
Total amount earned by contractor		9,918.83
Grand total cost of structure		$ 10,657.81
Less final payment to contractor in transit		1,774.98
Total expended		$ 8,882.83
Paid by State	$ 738.98	
Paid by County	8,143.85	
Total	$ 8,882.83	

Scoggins Creek Bridge

Contract No. 455 was awarded to Ward Mayer of Portland on August 30, 1921. This contract covered the construction of a concrete bridge over Scoggins Creek near Patton, consisting of one 45-foot and two 15-foot spans.

Work started on September 15, 1921, and continued in a desultory way until completion on August 1, 1922, the final cost being $6,706.43. Of this sum, $947.23 was paid by the State and $5,759.20 by the County. The sum of $49.14 is due from the County for excess funds advanced by the State.

O. A. Chase was Resident Engineer in charge of the construction.

In addition to the contract work, there was some riprap work done by State forces at the County's expense, the total cost of which was $554.20.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 898.09
Rental of State-owned pumping equipment to be assumed by Washington County		49.14
Contract items as follows.		
Excavation to plan elevation, 183.0 cu. yds. at $1.05	$ 192.15	
Excavation below elevation shown on plans, 43.0 cu. yds. at $1.86	79.98	
Class "A" concrete, 161.6 cu. yds. at $20.37	3,291.79	
Metal reinforcement, 27,616.0 lbs. at 4c	1,104.64	
Timber piling, 567.5 lin, ft. at 63c	357.53	
Concrete handrail, 158.0 lin. ft. at $3.87	611.46	
Adjustment for superelevating outside of curve	109.28	
Force account items:		
Backfilling north pier of bridge	12.37	
Total amount paid to contractor		$ 5,759.20
Grand total cost of structure		$ 6,706.43
Paid by State	$ 947.23	
Paid by County	5,759.20	
Total	$ 6,706.43	

[WASHINGTON]

Highway Improvement Districts

Under the provisions of Chapter 399, Laws of 1921, which provides for the incorporation of municipal corporations to be known as highway improvement districts, attempts have been made toward the organization of two such districts in Washington County in the past two years.

The first one, known as the Scoggins Valley Highway Improvement District, was designated to include approximately 70 square miles comprising, roughly, the drainage of Scoggins Creek. Under this district it was intended to improve the road known as the Scoggins Valley road from its junction with the Tualatin Valley Highway about two and a half miles north of Gaston northwesterly for a distance of approximately ten miles.

The organization of this district proceeded through the required approval by the State Highway Commission of the district boundaries and to a vote on the formation of the district. The result of such election was a negative majority, whereupon all proceedings ended.

The Cornell Highway Improvement District was proposed by residents in the vicinity of Cedar Mill along the Cornell Road. It never reached the stage of consideration of boundaries by the Highway Commission as the amount of opposition which developed resulted in withdrawal of the matter by the original petitioners without carrying it to a hearing.

Such engineering investigation as was required in connection with these improvement district projects was done by C. G. Reiter, Resident Engineer in Washington County.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads, and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Washington County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 91,525.58
2.	State Funds apportioned to County	126,087.29
3.	County levy made to match State Funds	123,270.01
4.	County Market Road Funds collected	128,536.00
5.	Cash paid to County by State	102,214.24
6.	State expenditures, deducted from apportionment	5,135.00
7.	Cash due County from State in December, 1922	18,738.05
8.	County expenditures on Market Roads	233,461.34
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Washington County received from the State Market Road Fund $34,561.71 more than it paid into the fund. The excess is Washington County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $123,270.01. They have collected and credited to the Market Road Fund $128,536.00.

The County Court has designated 23 roads to be improved as Market Road projects. Many of these roads are many miles in length and are not a direct route between the terminal points. Short sections have been designated for improvement and plans have been submitted for approximately 40 sections of road. From data submitted by the County officials, it is almost impossible to determine the sections of road which have been

[WASHINGTON]

improved or the cost of the improvement. In their cost records they do not segregate the costs of certain sections. Reports received indicate that but little attempt is made to construct the sections in accordance with the plans approved.

Surveys have been made and plans prepared by C. G. Reiter, County Engineer; these have been submitted and approved.

The construction work has been done by contract and by County forces under the direction of the County Court. Some of the construction work has been good standard work of a permanent nature, other work has been in the nature of maintenance and not permanent.

The County Court has graded approximately 14.7 miles of road, surfaced with gravel or crushed rock 33.7 miles and paved with bituminous pavement 0.5 mile.

WHEELER COUNTY

Wheeler County is one of the interior Counties of the State that, until very recently, has been comparatively isolated. Its own topography and location with respect to the surrounding regions are such that it is not readily accessible by rail. Under these conditions the prospects for growth, except such as were occasioned by stock raising and a necessarily limited amount of farming, were meagre until the inauguration of a comprehensive plan of highway development. The County has shared fully in the program of construction undertaken by the Department, and, although there still remains much to be done, a large amount of construction has already been completed.

There are three designated State highways within the limits of the County, the John Day, the Ochoco and the Shaniko-Mitchell Highways. No work has been undertaken on the last named, but the other two have progressed far towards completion.

The John Day Highway extends from the Gilliam County Line on the north, through Fossil, Sarvice Creek and Spray, to the Grant County Line on the east, the total length being approximately 52.3 miles. At the present time, the grading of the entire distance has been provided for and there remains only about two miles to be completed. Surfacing has been provided for the entire distance, except on the section between Sarvice Creek and Spray. This one section has been provided with a surfacing by State forces. Although the surfacing was placed as an emergency measure and was not done to full State standards, the unit is in very good shape and is open to all-year traffic.

Activities on the Ochoco Highway have been confined to the portion between the Crook County Line and Mitchell. The Ochoco Forest Section has been graded and surfaced as a Forest Road project, and the balance of the distance into Mitchell is now under contract for grading and surfacing. Completion of the projects now under way will provide a continuous surfaced highway from Redmond, in Deschutes County, through Prineville, to Mitchell and will provide the residents of southwestern Wheeler County with a first-class transportation route to a connection with the narrow gauge railroad at Prineville or the standard gauge at Redmond. No work has been undertaken on the Ochoco Highway between Mitchell and the connection with the John Day Highway near Dayville.

Supervision of the State work in the County was handled by J. H. Scott, Division Engineer, until April 1, 1922. On this date the division was taken over by Division Engineer C. W. Wanzer.

City of Fossil Grading and Surfacing

This section covers the unimproved portion of the John Day Highway through the town of Fossil, and extends from the south end of the Cummings Hill-Fossil Section to the north end of the Butte Creek Section, a total distance of 0.59 mile.

As this section had not been included in previous contracts, the city officials of Fossil and the County Court of Wheeler County requested that the unit be improved, and agreed to finance 50 per cent of the cost. The project was advertised for October 5, 1922, but no bids were received. The County Court then agreed to do the grading and surfacing at the unit prices given in the engineer's estimate for the project, and Contract No. 608 was awarded to them. The work included in the contract covers

the grading of the section, and surfacing with a base course of talus and a wearing surface of rhyolite, both materials being convenient to the work.

In addition to this work, two timber bridges with concrete piers, required for crossings of Butte Creek, are being built by State bridge maintenance forces, who have been working near this point. The County Court did not consider it advisable to take over the bridge construction as it is very difficult to secure skilled bridge labor in this part of the State.

The State share of the cost of the total work, including the bridges, is $4,000.00. Expenditures of $52.71 of this amount have been made to date.

Unit 2, Sarvice Creek-Valades Ranch Post Road Project

This work is properly a part of the Sarvice Creek-Valades Ranch Section, Federal Aid Project No. 6, which is fully described in an article given in the Grant County portion of this report. However, the work there described was done under what has been designated as our first post road program, and the particular work now under discussion is being undertaken under the second post road program. For this reason, it has been considered advisable to consider this work as a separate project.

On November 21, 1922, Contract No. 609 was awarded to Metzger & Johnson of Roseburg, Oregon, for surfacing what is known as Unit 2. This unit is 12.1 miles in length and extends from Spray to the Grant County Line.

The depth of surfacing required on the section is quite variable, running from four inches to twelve inches, dependent on the condition of the roadway and susceptibility to saturation.

Owing to the lateness in time of the award of the contract, it is not expected that the contractor can do much work before spring, as the section is badly cut up and the subgrade is too soft to haul over.

K. D. Lytle, Resident Engineer, is in charge of the work, which is estimated to cost a total of $41,000.00. This cost will be shared $15,926.36 by the State and $25,073.64 by the Federal Government. No expenditures have been made to the date of this report.

Butte Creek Post Road Project

This project will be found described in full on page 408 of the last report. During the biennium additional expenditures have been made on the grading in the amount of $1,106.03. Cooperation of $11,555.92 has been received from the Federal Government, leaving a credit of $10,449.89 to State funds for the two-year period. These transactions bring the total cost of the grading to $73,098.43, of which the State share has been $40,980.23 and the Government has cooperated to a total of $32,118.20.

Work on the surfacing was shut down during the winter of 1920, but was resumed early in the following spring and was carried to final completion on September 15, 1921. The additional expenditures on the surfacing during the present biennium amount to $70,374.68, consisting of $35,935.18 from State funds and $34,439.50 from Government funds. These additional expenditures bring the total cost of the surfacing to $74,392.69, of which the State has paid $39,953.19, and the Federal Government has cooperated to the amount just stated.

The project as a whole has cost $147,491.12, with the State paying $80,933.42 and the Federal Government $66,557.70.

[WHEELER]

DETAILED STATEMENT OF EXPENDITURES

GRADING—

Engineering		$ 7,984.57
Contract items as follows:		
Clearing and grubbing, all	$ 3,000.00	
Common excavation, 41,325.6 cu. yds. at 74c	30,580.94	
Solid rock excavation, 13,574.8 cu. yds. at $1.80	24,434.64	
Overhaul, 6,458.0 sta. yds. at 5c	322.90	
12-inch corrugated galvanized iron pipe, 1,842.0 lin. ft. at $2.00	3,684.00	
18-inch corrugated galvanized iron pipe, 104.0 lin. ft. at $2.50	260.00	
24-inch corrugated galvanized iron pipe, 24.0 lin. ft. at $3.50	84.00	
36-inch corrugated galvanized iron pipe, 36.0 lin. ft. at $5.50	198.00	
Rubble masonry, 182.71 cu. yds. at $9.00	1,644.39	
Lumber and timber, 14.252 M-FBM at $50.00	712.60	
Force account items:		
Extra clearing on new located line	76.47	
Hand placing rock slopes	39.65	
Removing culvert that was eliminated by digging ditch	37.32	
Changing catch basins to improve drainage	38.95	
Total amount paid to Jas. F. Clarkson (contractor)		65,113.86
Grand total cost of grading		$ 73,098.43
Paid by State	$ 40,980.23	
Paid by Government	32,118.20	
Total	$ 73,098.43	

SURFACING—

Engineering		$ 3,950.43
Placing binder on new surfacing; sprinkling and rolling as required (State forces)		1,773.79
Rental on State-owned truck (deducted from contractor's estimate)		38.71
T. N. T. furnished by State (deducted from contractor's estimate)		200.00
Contract items as follows:		
Broken stone surfacing, 14,369.0 cu. yds. at $4.20	$ 60,349.80	
Broken stone for shoulder drains, 2.66 cu. yds. at $5.50	14.63	
Pit-run Rhylolite, 1,011.5 cu. yds. at $3.80	3,843.70	
Talus subsurfacing, 1,767.5 cu. yds. at $3.50	6,186.25	
Payhaul on talus, 583.0 yd. miles at 50c	291.50	
Force account items:		
Installing culvert under irrigation ditch	8.48	
Excavating soft spots in roadbed and backfilling with rock	90.49	
Total amount earned by contractor	$ 70,784.85	
Deductions:		
Rental of State-owned truck	38.71	
T. N. T. furnished by State	200.00	
Percentage retained pending adjustment of quantities	2,116.38	
Total amount paid to Blake & Compton (contractors)		68,429.76
Grand total expended on surfacing		$ 74,392.69
Paid by State	$ 39,953.19	
Paid by Government	34,439.50	
Total	$ 74,392.69	

GRAND SUMMARY OF EXPENDITURES

	State	*Government*	*Total*
Grading	$ 40,980.23	$ 32,118.20	$ 73,098.43
Surfacing	39,953.19	34,439.50	74,392.69
Totals	$ 80,933.42	$ 66,557.70	$147,491.12

[WHEELER]

Cummins Hill-Fossil Grading and Surfacing

Contract No. 425, for grading and surfacing that portion of the John Day Highway between the foot of Cummings Hill and Fossil, was awarded to D. F. Murphy & Company of Boise, Idaho, on July 28, 1921. Work was started August 15 and completed December 12 of the same year. Completion of this section provides a surfaced road from Fossil to the end of the railroad at Condon and means a new era in transportation in this portion of the County. A trip can now be made from Fossil to Condon in an hour, whereas it formerly took several hours.

Work was handled under the supervision of K. D. Lytle, Resident Engineer, and represents a total expenditure of $34,005.65, having been paid $19,769.92 by the State and $14,235.73 by Wheeler County.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,899.20
Contract items as follows:		
Common excavation, 17,872.3 cu. yds. at 36c	$ 6,434.03	
Intermediate excavation, 2,438.2 cu. yds. at 64c	1,560.45	
Solid rock excavation, 1,627.3 cu. yds. at $1.45	2,359.59	
Overhaul, 8,100.0 sta. yds. at 4c	324.00	
18-inch corrugated galvanized iron pipe, 610.0 lin. ft. at $3.00	1,830.00	
36-inch corrugated galvanized iron pipe, 160.0 lin. ft. at $6.50	1,040.00	
Broken stone surfacing, 6,132.0 cu. yds. at $2.60	15,943.20	
Rhyolite filler, 1,142.0 cu. yds. at $1.25	1,427.50	
Rubble masonry, 60.94 cu. yds. at $19.00	1,157.86	
Riprap, 19.86 cu. yds. at $3.00	59.58	
Force account items:		
Relaying culvert pipe to cross road at right angles	42.64	
Constructing crossing over drainage ditch at Dukek's farm	17.60	
Total amount paid to contractor		32,196.45
Grand total cost of project		$ 34,005.65
Paid by State	$ 19,769.92	
Paid by County	14,235.73	
Total	$ 34,005.65	

Units 1 and 2, Sarvice Creek-Valades Ranch Surfacing

In August, 1921, the Bureau of Public Roads requested the State Highway Department to backfill the rock cuts on Units 1 and 2 of the Sarvice Creek-Valades Ranch Post Road project, in order to provide a suitable surface to traffic. At about the same time, Unit 1 was struck by a water spout which filled up the ditches and culverts and deposited material and debris in many places, leaving the unit in a very poor shape for travel.

The work was authorized as an emergency measure and State forces were organized and started work on September 29. A total of 3,606 cubic yards of gravel were placed on portions of Unit 1, totalling 2.66 miles, by December 1, at which time all work was shut down on account of the weather. Considerable work was also done in the way of cleaning ditches and removing slides. During the year 1922, State forces have completed the placing of a temporary surfacing on the entire unit, and this section is now in very good shape. K. D. Lytle, Resident Engineer, was in charge of the work, which cost a total of $9,531.35 from State funds.

Sarvice Creek Section Post Road Project

Improvement of the final gap of the John Day Highway between the Sarvice Creek summit and the town of Sarvicecreek was undertaken during 1922. The first 1.6 miles, connecting with the south end of the Butte Creek project, had already been graded and surfaced, but some additional grading work and the resurfacing of this portion was considered necessary. The remaining 9.7 miles, extending on to the Sarvicecreek postoffice, are being graded and surfaced.

The improvement of the section is being undertaken in cooperation with the County and Federal Government, under the terms of Post Road Project Agreement No. 64.

Contract No. 497 for the improvement was awarded to the Montague-O'Reilly Company of Portland, Oregon, on March 23, 1922. The contract called for completion by October 31, but it is doubtful whether the work will be completed before spring. The delay in the completion has been due principally to inability of the contractor to secure labor sufficient to carry on the work. The contractor was also unfortunate in selecting the site of the first set-up of his crusher plant. The rock in the ledge selected apeared hard on the exposed face, but, after being thoroughly opened up, was found to be too soft for use. After using the limited amount of satisfactory materials available at this place it was necessary to move the entire crusher plant to another location.

For the purpose of handling the heavy grading work on the section, a steam shovel was installed by the contractor.

Supervision of the construction has been handled by K. D. Lytle, Resident Engineer, with expenditures to date of $71,336.84. To cover this amount $37,718.14 has been received from the County and $37,276.95 from the Federal Government, leaving a credit of $3,658.25 to State funds. The total estimated cost of the project is $172,000.00. The County share is estimated at $107,480.10 and the Government share is $95,789.86, leaving an estimated credit of $31,269.96 to State funds.

Ochoco Canyon Forest Road Project

This section is covered in a descriptive article on page 410 of the last report. During the present biennium the surfacing has been extended over the entire section, and the project has been completed and turned over to the State for maintenance.

Additional State expenditures of $49,306.57 have been made by the State. According to reports from the Bureau of Public Roads, the total expenditures now amount to $208,125.73, of which the State has paid $105,350.00, the County $4,273.86 and the Federal Government $98,501.87.

Unit 1, Ochoco Forest Boundary-Mitchell Grading and Surfacing

This unit of the McKenzie Highway extends from the north end of the Ochoco Forest Road project towards Mitchell for a distance of 1.99 miles. Contract No. 480, for grading and surfacing the section, was awarded to Curtis Gardner of Portland, Oregon, on October 26, 1921. The contractor began work on November 10 of the same year, and finished on September 1, 1922.

Delay in completion of the contract was caused by the severe weather which, at this altitude, made winter work impossible and required the closing down of the work. About the middle of June, the subgrade had dried out sufficiently, and grading operations were resumed, but progress was slow.

[WHEELER]

The work was handled under the supervision of C. W. Woodruff, Resident Engineer, and has cost a total of $23,854.33. Of this amount, the State share amounts to $12,622.20 and the County is to cooperate to the extent of $11,232.13. Expenditures of the total cost have been made at the present time, of which the State has expended a total of $15,941.80 and County cooperation has been received in the amount of $7,912.53.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,390.07
Penalty for overrun of time limit (deducted from contractor's estimate)		298.16
Contract items as follows:		
Clearing and grubbing, all	$ 400.00	
Common excavation, 10,620.7 cu. yds. at 40c	4,248.28	
Intermediate excavation, 7,798.0 cu. yds. at 50c	3,899.00	
Solid rock excavation, 1,334.9 cu. yds. at $1.25	1,668.63	
Overhaul, 2,971.0 sta. yds. at 5c	148.55	
Talus surfacing, 3,821.75 cu. yds. at $1.75	6,688.06	
Clay or earth filler, 166.7 cu. yds. at $1.00	166.70	
12-inch corrugated galvanized iron pipe, 412.0 lin. ft. at $1.87	770.44	
18-inch corrugated galvanized iron pipe, 64.0 lin. ft. at $3.00	192.00	
24-inch corrugated galvanized iron pipe, 70.0 lin. ft. at $4.00	280.00	
Lumber and timber, 13.96 M-FBM at $70.00	977.20	
Class "B" concrete, 20.12 cu. yds. at $40.00	804.80	
Class "C" concrete, 23.79 cu. yds. at $40.00	951.60	
4 ft. x 6 ft. timber culvert, 54.0 lin. ft. at $12.50	675.00	
6 ft. x 6 ft. timber culvert, 42.0 lin. ft. at $15.00	630.00	
Total amount earned by contractor	$ 22,500.26	
Deductions:		
Penalty for overrun of time limit	298.16	
Timber for culvert construction, furnished by State	36.00	
Total amount paid to contractor		22,166.10
Grand total cost of project		$ 23,854.33
Paid by State	$ 15,941.80	
Paid by County	7,912.53	
Total	$ 23,854.33	

Unit 2, Ochoco Forest Boundary-Mitchell Grading and Surfacing

This unit is 12 miles in length, and extends from the north end of Unit 1 to Mitchell. The section includes within its limits, 0.9 mile graded under a State contract in 1918, and also a 90-foot bridge across Bridge Creek.

Contract No. 559, for the grading and surfacing of the section, was awarded to Greenwood & Dann of Portland, Oregon, on June 28, 1922. The contract covers a large amount of heavy rock work, and also the construction of two wooden bridges. Grading was started on July 10, and, although a good force has been employed, it will probably take until midwinter to finish this part of the work. It is expected that the surfacing will be completed before the middle of next season.

The construction is being supervised by C. W. Woodruff, Resident Engineer, and is estimated to cost a total of $150,000.00. The estimated State share of this cost amounts to $101,232.13 and the County share to $48,767.87. Expenditures to date amount to $29,820.95, of which the State has paid $4,820.95 and the County has paid $25,000.00.

Maintenance

Maintenance of the John Day Highway in Wheeler County has been handled by Resident Engineer K. D. Lytle, with headquarters at Fossil. The State equipment on hand consists of one quad truck, one Moreland truck, two graders, necessary small drags, etc.

The work accomplished has covered the usual maintenance requirements, such as dragging, cleaning ditches, moving slides, and repairing damage done by cloudbursts. Betterment work has been accomplished, on the section from the Gilliam County Line to the foot of Cummings Hill, by means of adding additional screenings to the surfacing already in place. These screenings were hauled from the Hauser Construction Company crusher, operating between Mayville and Thirtymile Creek, and a total of approximately eighten hundred cubic yards were placed.

Considerable maintenance work has also been done on the Butte Creek Section, south of Fossil, and on Units 1 and 2 of the Sarvice Creek-Valades Ranch project. Unit 1 is now in excellent shape and probably will not need additional surfacing for some time to come.

Upon completion, on October 21, 1922, of the Ochoco Forest Road project, the maintenance of the section was taken over and the ditches have been cleaned and the road dragged and put in good condition for winter travel. Considerable betterment work is necessary on this section, such as widening fills, superelevating curves, building guard fences and daylighting cuts on sharp curves to give better sight distances. It is proposed to put State forces in camps and buildings left by the Forestry Service at the summit, and to do this work early next year. Maintenance work on the Ochoco Highway is under the supervision of C. W. Woodruff, Resident Engineer.

Cummins Hill-Fossil Survey

The two miles of the John Day Highway, immediately north of Fossil, were surfaced by the County some time ago. The surfacing materials used consisted of a soft gravel and disintregated material. After several years of service under the carrying of a heavy traffic, the surfacing on the two miles broke up and a survey was made contemplating the further improvement of the section. This survey was 3.7 miles in length and was made by Resident Engineer K. D. Lytle as other work permitted.

Sarvice Creek Section Survey

A survey of 4.04 miles of the John Day Highway south of the Sarvice Creek summit was made by B. H. McNamee, Locating Engineer, during 1917. Between July 15 and December 25, 1921, as other duties permitted, Resident Engineer K. D. Lytle made a relocation of this unit, and an original survey of 5.7 miles on south to Sarvice Creek. The total distance of 9.74 miles has been combined and placed under contract for grading and surfacing. This work closes the gap betwen the south end of the Butte Creek project and the north end of the Sarvice Creek-Valades Ranch project.

Ochoco Forest Boundary-Mitchell Survey

Survey of the entire distance from the north end of the Ochoco Forest Road project to Mitchell was made during 1917. Since that time the Department standards on grade and alignment have become much higher, and it was not considered advisable to construct on the lower standard of the original survey. The Forest Road project in the meantime had been relocated and constructed to standards closely agreeing with

the present State practice. At the time of the original survey, a connection was made with the then existing Forest Road survey. After the relocation a new connection was made higher up on the hill.

The location of the first 3.5 miles north of the Forest Boundary was made by A. A. Kirkwood, Resident Engineer, between August 5 and September 10, 1921. The remaining 10.5 miles were located by Resident Engineer C. W. Woodruff, being completed on July 2, 1922. The survey was carried on as other duties permitted.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Wheeler County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 15,858.35
2.	State funds apportioned to County	21,117.28
3.	County levy made to match State funds	22,059.94
4.	County Market Road Funds collected	16,717.79
5.	Cash paid to County by State	15,351.90
6.	State expenditure, deducted from apportionment	2,923.23
7.	Cash due County from State in December, 1922	2,842.15
8.	County expenditures on Market Roads	21,630.48
9.	Balance in County treasury, Nov. 1, 1922	10,439.21

From the above statement it is apparent that Wheeler County received from the State Market Road Fund $5,258.93 more than it paid into the fund. The excess is Wheeler County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $22,059.94. Of this amount they have collected and credited to the Market Road Fund only $16,717.79.

The County Court has designated four roads to be improved as Market Road projects.

The engineering work has been done by engineers in the employ of the State Highway Commission. Plans have been submitted and approved.

The construction work has been done by County forces, or by contract under the direction of the County Court. They have graded 3.3 miles of road and surfaced 4.0 miles.

YAMHILL COUNTY

The biennium just closing has marked the practical completion of the State highways in Yamhill County. There remains only one gap left of any importance, and this is less than one and one-half miles in length. It extends from St. Joseph to the Yamhill River, and is on the West Side Highway. There are, also, two other sections a few hundred feet in length where the pavement is not completed. These are at the new bridges at Deer Creek and Ash Swale at Amity.

The gap at St. Joseph involves a crossing of the Southern Pacific Railroad at that point. There are three possible solutions for a crossing at this point, these being an overcrossing, an undercrossing and a grade crossing, respectively. No final decision has been made as yet on the type of construction which finally will be adopted.

The Yamhill County portion of the resurfacing project on the Newberg-Multnomah County Line section is not quite complete and a small line revision, requiring some new grading, probably will postpone its completion until late next year.

The completion of the State highways, in addition to the paved County road from McMinnville to Dayton and West Dayton, gives in effect five paved highways leading, like the spokes of a wheel, into the hub at McMinnville. McMinnville is the metropolis and county seat of the County, and the completion of these roads gives Yamhill County nearly, if not quite, the best paved road system of any County in the State outside of Multnomah County.

The construction carried on during the biennium has been handled under the supervision of W. D. Clarke, Division Engineer.

Yamhill City Pavement

Anticipating completion of the paving of the Yamhill-Gaston Section, the matter of paving through the City of Yamhill was taken up, and, after negotiation with the city authorities, the following arrangement was agreed upon.

The State was to pay 90 per cent of the cost of the paving a strip 16 feet in width, and, the City was to pay 10 per cent of the cost of this strip and all of the cost of work outside of the 16-foot width. The pavement was to consist of seven inches of cement concrete, except for four blocks through the business section of the town. These four blocks were to be a two-inch bituminous concrete. Three blocks and four intersections were to be paved the full width of the street, 42 feet curb to curb, and the remaining block was to be paved 16 feet wide. The use of the two-inch bituminous concrete was allowed by the State in view of the fact that the street was already surfaced with an old penetration macadam, and, by using a light binder course, this macadam could be used without disturbing its existing surface. This method permitted the construction of a uniform pavement in the business district, at considerable less cost to the City than the concrete type. Under the circumstances an entirely satisfactory pavement has been obtained.

The section is 2,771.6 feet in length, and extends from Sation 0+00, at the north end of the McMinnville-Yamhill concrete pavement, along Maple Street to Station 27+71.6, at the north city limits. The project was divided into six sections which were paved as follows:

Section "A," Station 0+00 to 0+12, bituminous pavement 16 feet wide.

Section "B," Station 0+12 to Station 0+64, bituminous pavement 19 feet wide. (Bridge.)

Section "C," Station 0+64 to Station 5+00, concrete pavement 16 feet wide.

[YAMHILL]

Section "D," Station 5+00 to Station 7+10, bituminous pavement 16 feet wide.

Section "E," Station 7+10 to Station 16+31, bituminous pavement 42 feet wide.

Section "F," Station 16+31 to Station 27+71.5, concrete pavement 16 feet wide.

For the purposes of construction, separate contracts were awarded for the bituminous and concrete pavements. Contract No. 461 was awarded, on August 30, 1921, to the Warren Construction Company of Portland, Oregon, for the construction of the bituminous pavement. Contract No. 462, for the concrete pavement, was awarded to Cochran Bros. of Portland, on the same date.

Work was begun on the concrete pavement on September 1, 1921, and was completed November 20 of the same year. Work was started on the bituminous sections on September 15, 1921, and was completed on November 1 of the same year. The work on both contracts was handled under the supervision of P. P. Whitmore, Resident Engineer.

The work under both contracts cost a total of $25,578.83, of which the State share amounted to $16,053.37 and the City has paid their share of $9,525.46.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 753.84
BITUMINOUS PAVEMENT—		
Contract items as follows:		
Excavation, no classification, 247.85 cu. yds. at $1.00	$ 247.85	
8-inch vitrified clay pipe, 678.0 lin. ft. at 70c	474.60	
Class "A" concrete, 7.26 cu. yds. at $26.00	188.76	
Cast iron gratings, 1,096.00 lbs. at 15c	164.40	
Preparation of subgrade, 5,247.52 sq. yds. at 8c	419.80	
Broken stone for base, 114.5 cu. yds. at $4.30	492.35	
Standard 3-inch bituminous base, 249.0 batches at $4.16	1,035.84	
Standard 2-inch bituminous concrete wearing surface, 5,158.51 cu. yds. at $1.72	8,872.64	
Total amount paid to Warren Construction Co., contractors		11,896.24
CONCRETE PAVEMENT—		
Excavation, no classification, 618.3 cu. yds. at $1.00	$ 618.30	
Overhaul, 6,467.0 sta. yds. at 5c	323.35	
12-inch vitrified clay pipe, 800.0 lin. ft. at $1.25	1,000.00	
Preparation of subgrade, 4,236.67 sq. yds. at 10c	423.67	
Gravel for base, 43.0 cu. yds. at $4.00	172.00	
Gravel for shoulders, 221.0 cu. yds. at $4.00	884.00	
Standard 7-inch concrete pavement, 2,835.25 sq. yds. at $3.25	9,214.56	
Expansion joints, 864.0 lin. ft. at 12c	103.68	
Shoulder construction, 3,153.2 lin. ft. at 6c	189.19	
Total amount paid to Cochran Bros., contractors		12,928.75
Grand total cost of both projects		$ 25,578.83
Paid by State	$ 16,053.37	
Paid by City of Yamhill	9,525.46	
Total	$ 25,578.83	

Yamhill-McMinnville Paving

This work was practically complete at the close of the last biennium and is described on page 412 of the last report.

Final expenditures during the present biennium amount to $26,208.37, consisting of $17,260.31 from State funds and $8,948.06 from County funds. The project has now cost a total of $243,243.68, of which the State has paid $198,762.11 and the County has paid $44,481.57.

[YAMHILL]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 11,688.27
Maintenance work to maintain travel through winter		139.75
Payment by contractor, reimbursing State for advancing freight charges		(credit) 54.43
Credit accruing to State for furnishing cement to contractor		(credit) 115.02
Cement furnished by State (deducted from contractor's estimate)		71,491.73
Contract items as follows:		
Excavation, no classification, 45,498.2 cu. yds. at 70c	$ 31,848.74	
Overhaul, 30,780.0 sta. yds. at 4c	1,231.20	
12-inch plain concrete pipe, 623.0 lin. ft. at 60c	373.80	
18-inch reinforced concrete pipe, 52.0 lin. ft. at $1.60	83.20	
24-inch reinforced concrete pipe, 176.0 lin. ft. at $2.20	387.20	
6-inch porous drain tile, 7,283.0 lin. ft. at 35c	2,549.05	
Class "C" concrete, 48.68 cu. yds. at $12.00	584.16	
6-inch concrete pavement, 82,144.0 sq. yds. at $2.05	168,395.20	
Felt expansion joints, 24,752.0 lin. ft. at 5c	1,237.60	
Gravel for shoulders, 3,995.5 cu. yds. at $2.50	9,988.75	
Shoulder construction, 91,310.1 lin. ft. at 4c	3,652.40	
Special items:		
Credit for cement sacks returned	8,925.64	
Difference in cost of Portland sand over Newberg sand, guaranteed by State, 124,440.58 cwt. at 1½c	1,866.61	
Credit for switching charges on Portland sand	594.69	
Force account items:		
Clearing, grubbing and moving fence account of change in alignment	4,834.12	
Furnishing and laying 36-inch corrugated galvanized iron pipe	1,260.86	
Fencing new right-of-way as per right-of-way agreement	623.38	
Removing obstructions from new right-of-way	705.86	
Total amount earned by contractor	$239,142.96	
Deductions:		
Reduction in freight rates	6,648.83	
War tax exemptions	908.52	
Cement furnished by State	71,491.73	
Total deductions	$ 79,049.08	
Total amount paid to contractor		160,093.38
Grand total cost of project		$243,243.68
Paid by State	$198,762.11	
Paid by County	44,481.57	
Total	$243,243.68	

Newberg Viaduct and Chehalem Creek Trestle Paving

On June 28, 1921, Contract No. 410 was awarded to the Warren Construction Company of Portland, for paving the Chehalem Creek trestle and the Newberg viaduct. The former is a timber trestle 343 feet in length, located just outside of the south city limits of Newberg. The latter is a concrete viaduct 604 feet in length, and is located at the north city limits of Newberg. Both structures are on the West Side Highway.

The Chehalem Creek trestle was paved with a bituminous concrete pavement, consisting of a two-inch wearing surface placed on a binder course two inches thick at the center and one-half inch thick at the edges. The roadway on this structure is 19 feet 2¾ inches in width. At each end of the trestle a section of five-inch type "D" bituminous pavement was constructed. These sections are each 30 feet in length, and were laid on a six-inch rock subbase on the fill approaches to the structure.

The pavement of the Newberg viaduct consisted of a bituminous concrete wearing surface with a uniform thickness of two inches, the roadway of the viaduct having been constructed with a crowned surface. At the north end of the structure approximately twenty-three feet of type

[YAMHILL]

"D" five-inch bituminous concrete was laid, to connect with the pavement on the Newberg-Multnomah County Line Section.

Work was begun under the contract on August 23, 1921, and was completed on the thirty-first of the same month, being handled under the supervision of George McGee, Resident Engineer. The work cost a total of $4,909.38 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 40.07
Contract items as follows:		
NEWBERG VIADUCT—		
Standard 2-inch bituminous concrete wearing surface, 1,525.0 sq. yds. at $1.61	$ 2,455.25	
Standard 3-inch bituminous base, 48.0 batches at $3.75	180.00	
Gravel for subbase, 18.0 cu. yds. at $4.65	83.70	
Gravel for shoulders, 7.5 cu. yds. at $4.65	34.88	
Shoulder construction, 270.0 lin. ft. at 6c	16.20	
CHEHALEM CREEK TRESTLE—		
Standard 2-inch bituminous concrete wearing surface, 873.0 sq. yds. at $1.61	$ 1,405.53	
Standard 3-inch bituminous base, 138.0 sq. yds. at $1.10	151.80	
Bituminous base on trestles, 735.0 sq. yds. at 62c	455.70	
Gravel for subbase, 14.0 cu. yds. at $4.65	65.10	
Gravel for shoulders, 3.0 cu. yds. at $4.65	13.95	
Shoulder construction, 120.0 lin. ft. at 6c	7.20	
Total amount paid to contractor		4,869.31
Grand total cost of project (all State funds)		$ 4,909.38

Yamhill-Gaston Post Road Project

Paving the Yamhill-Gaston Section of the Tualatin Valley Highway was part of the accomplishment of 1921. Contract No. 385, for paving this section, was awarded to Cochran Brothers of Portland, Oregon, on March 8, 1921. Work was started by the contractors on April 11, 1921, and completed the sixteenth of the following November. The project covers 7.68 miles, extending from the north city limits of Yamhill to the Yamhill County Line at Gaston.

The project was submitted to the Bureau of Public Roads and was approved for Federal aid, being designated as Post Road Project No. 51.

The specifications provided for a 16-foot concrete pavement, of seven-inch uniform thickness and a 1:2:3 mix, not reinforced. For a short part of the distance, particularly between Cove Orchard and Wapato, the highway traverses a country where the soil is of an adobe nature. For such places a subbase of sand or gravel four inches in thickness, loose measure, was specified. The contract also provided for the placing of six-inch porous drain tile where seepage conditions seemed to render this necessary, and about four miles of tile was used. The excavations for this tile were all backfilled with loose gravel.

At the north end of the project, a fill over an arm of Wapato Lake was not constructed until the middle of July. This fill is about 800 feet long and varies in depth from two feet, at the ends, to ten feet, over a 200-foot section in the middle. Rather than omit the paving of this fill, it was decided to try water settling and to pave it the same year. In line with this plan, the embankment was made of clay loam and was hauled in by wagons from a steam shovel borrow pit. The uniformity of the fill seemed to favor such handling on account of the level transverse topography and gradual change of depth on the longitudinal axis of the embankment. The fill was diked along the edges, and at intervals across the roadbed, and was kept flooded for a period of about two weeks. Augur holes, about two inches in diameter, were bored through the

embankment at frequent intervals, in order to permit thorough saturation. After the flooding period, the embankment was drained and was allowed to stand for about a month before paving. This stretch of pavement was reinforced with bar reinforcing, and was laid in 20-foot panels instead of the standard 30-foot panels.

Since the pavement has been completed, there has been a further settlement of the fill. It is believed, however, that this is largely a subsidence of the embankment, as a whole, into the soft soil of the lake bottom, rather than a settlement or shrinkage of the embankment materials proper. This belief is based upon the fact that the settlement, while being greatest in the high part of the fill, was not uniform at that point. Near the center of the deepest fill there is a culvert, the foundation of which was excavated through the soft rock of the lake bottom to the hard subsoil, and no appreciable settlement has occurred over this culvert. The maximum subsidence, being about four inches, has taken place in the fill at each side of the culvert, running out to nothing over the culvert, and at each end where the embankment was built on firm ground.

The same treatment was applied to another small fill about a mile south, but no noticeable settlement has occurred there. No cracks in the pavement have developed in either place.

The construction of the project was supervised by P. P. Whitmore, Resident Engineer, and cost a total of $350,748.00. The State paid $197,228.00 of this amount and the Federal Government cooperated to the extent of $153,520.00.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,110.59
Labor, materials, etc., furnished by State:		
Paving bridge approaches one mile south of Gaston		71.66
Constructing log boom to protect fill from washing out		43.76
Rolling shoulders with State truck		443.21
Paving gap at bridge site north of Yamhill City		615.62
Guarding pavement at bridge gap during period of curing		141.91
Contract items as follows:		
Excavation, no classification, 2,522.77 cu. yds. at $1.50	$ 3,784.16	
Preparation of subgrade, 99,046.48 sq. yds. at 10c	9,904.65	
6-inch porous drain tile, 20,842.0 lin. ft. at 50c	10,421.00	
Standard 7-inch concrete pavement, 72,049.68 sq. yds. at $3.50	252,173.88	
Expansion joints, 22,080.0 lin. ft. at 12c	2,649.60	
Bar reinforcement, 10,112.45 lbs. at 15c	1,516.87	
Gravel for base, 6,164.5 cu. yds. at $4.00	24,658.00	
Gravel for shoulders, 6,447.0 cu. yds. at $4.00	25,788.00	
Gravel backfill for tile drains, 2,125.0 cu. yds. at $4.00	8,500.00	
Shoulder construction, 80,990.4 lin. ft. at 6c	4,859.42	
Clay filler, 58.0 cu. yds. at $2.00	116.00	
Force account items:		
Repairing damage caused by heavy winter rains	83.24	
Widening cuts, deepening ditches and dressing up shoulders	6,008.15	
Total amount earned by contractor	$350,462.97	
Deductions:		
Reduction of bid, account of award of all units	7,000.00	
Freight rate reduction	1,141.72	
Total deductions	$ 8,141.72	
Total amount paid to contractor		342,321.25
Grand total cost of project		$350,748.00
Paid by State	$197,228.00	
Paid by Government	153,520.00	
Total	$350,748.00	

[YAMHILL]

McMinnville-Amity Post Road Project

The Cochran Construction Company of Portland were successful bidders for paving the McMinnville-Amity Section, and were awarded Contract No. 515 for the work on April 14, 1922.

The section is identical with that covered by the grading and surfacing projects, and comprises a net length of five miles of paving.

The pavement constructed is a seven-inch concrete, and was built 16 feet wide, except where it was widened in connection with the construction of curbs. The curbs used on this job were for the same purpose as on the West Dayton-St. Joseph Section, and were of the same type of construction, except that the height is 12 inches instead of six inches. This increase in height was made with the idea of omitting the guard fence along the curb sections.

The construction was started on May 1, 1922, and was completed the thirtieth of the following September, being under the engineering direction of P. P. Whitmore, Resident Engineer.

The construction of the project was undertaken in cooperation with the Bureau of Public Roads, under the terms of Project Agreement No. 58, and has cost a total of $121,220.97. Of this amount, the State has expended $53,274.05 and the Federal Government has cooperated to the extent of $67,946.92. At this time, payment of the final Government share, amounting to $4,453.10, is in transit. This will operate as a credit to State expenditures when received.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,544.45
Erecting guard fence at curb ends to protect traveling public		280.46
Items deducted from contractor's estimate:		
Cement furnished by State		51,729.70
Rental of State-owned equipment		312.66
Salary of truck driver rolling shoulders		112.50
Contract items as follows:		
Preparation of subgrade, 65,181.6 sq. yds. at 3½c	$ 2,281.36	
Standard 7-inch concrete pavement, 47,490.0 sq. yds. at $2.05	97,354.50	
Standard 9-inch concrete pavement, 81.6 sq. yds. at $2.60	212.16	
Felt expansion joints, 14,448.0 lin. ft. at 13c	1,878.24	
Metal reinforcement, 2,690.0 lbs. at 8c	215.20	
Concrete curb, 994.0 lin. ft. at $1.00	994.00	
Crushed gravel, 4,250.5 cu. yds. at $2.50	10,626.25	
Shoulder construction, 51,836.0 lin. ft. at 4c	2,073.44	
Excavation, single classification, 71.6 cu. yds. at 60c	45.66	
Force account items:		
Installing 50 feet of 12-inch corrugated iron culvert pipe	54.18	
Finishing side slopes and ditches subsequent to placing pavement and rock shoulders	2,020.50	
Labor and material used in construction of 3 catch basins	143.05	
Total amount earned by contractor	$117,898.54	
Deductions:		
Cement furnished by State	52,235.00	
Rental, repairs and supplies of State-owned equipment	312.66	
Salary of truck driver rolling shoulders	109.68	
Total deductions	$ 52,657.34	
Total amount paid to contractor		65,241.20
Grand total cost of project		$121,220.97
Paid by State	$ 53,274.05	
Paid by Government	67,946.92	
Total	$121,220.97	

Multnomah County Line-Newberg Resurfacing

A description of this work, which is partially within Washington and partially within Yamhill Counties, will be found in the portion of this report devoted to Washington County projects.

Newberg-West Dayton Post Road Project

Contract No. 315, for paving the Newberg-West Dayton section of the West Side Highway, was awarded on November 6, 1920, to the Oregon Contract Company of Portland, Oregon. The original specifications called for the construction of a 16-foot concrete pavement, six and one-half inches in thickness in the center and five and one-half inches in thickness at the edges. Prior to the actual laying of any pavement, however, these dimensions were changed by mutual agreement with the contractor and without change in price, to a uniform slab thickness of six inches throughout. Later, during the progress of the work, arrangements were made for the laying of a seven-inch uniform slab. This pavement was constructed at a proportional increase in price, and was laid on such portions as had less than a four-inch compacted gravel subbase, or where deemed desirable for other reasons. A total of approximately 1.18 miles of this type of pavement was laid.

Bar reinforcement of standard type and amount was used in a number of short stretches scattered throughout the project, where subgrade conditions seemed to be such as to require this extra precaution.

The concrete pavement proportions were of the standard 1:2:3 mix. Gravel, from the Willamette River near Dayton, and sand, from the Sandy River, were used in the pavement aggregate. Alternate bids received for the use of Sandy River and Dayton sand, showed the Dayton sand to be 14 cents per square yard cheaper, but the use of the Sandy River material was considered perferable, notwithstanding the increased cost.

Work was begun on March 30, 1921, and the contract was finally completed on December 10 of the same year. The final acceptance of the work was delayed in being given, on account of the regrading of shoulders and ditching done as extra work after the pavement was completed. The section is 5.92 miles in length and extends from the end of the bituminous street pavement in Newberg to a junction with the paved County road to Dayton, at West Dayton. The roadbed was graded, during 1919, to a width of 24 feet, including ditches on the old section, but, particularly over the first 1.5 miles south of Newberg, the grade line had been laid low in order to reduce the grading costs. This resulted in inadequate drainage, and the roadbed was too narrow for the pavement and rock shoulders. The regrading of the shoulders and ditches added a considerable amount to the cost of the paving project, but resulted in one of the best drained and easiest maintained sections in this part of the State.

The work was undertaken in cooperation with the Federal Government under the terms of Post Road Project Agreement No. 52, and cost a total of $219,186.83. Of this amount, the State paid $126,207.38, the County $1,580.45 for paving through the Town of Dundee, and the Federal Government $91,399.00.

The engineering supervision of the project was handled by George McGee, Resident Engineer.

[YAMHILL]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,528.58
Labor and material furnished by State:		
Grubbing and burning brush		256.97
Painting detour signs		5.50
Hauling rock for backfilling tile drains		76.72
Constructing standard wood guard fence		1,368.68
Cement furnished by State (deducted from contractor's estimate)		29,823.45
Contract items as follows:		
Common excavation, 330.2 cu. yds. at $1.25	$ 412.75	
6-inch porous drain tile, 4,705.0 lin. ft. at 30c	1,411.50	
Standard 6-inch concrete pavement, 44,217.3 sq. yds. at $2.83	125,134.96	
Standard 7-inch concrete pavement, 11,175.1 sq. yds. at $3.30	36,877.83	
Expansion joints in place, 16,700.0 lin. ft. at 13c	2,171.00	
Bar reinforcement, 17,051.0 lbs. at 10c	1,705.10	
Shoulder construction, 61,719.4 lin. ft. at 6c	3,703.16	
Gravel for shoulders, 4,105.5 cu. yds. at $3.00	12,316.50	
Gravel backfill for tile drains, 657.0 cu. yds. at $3.00	1,971.00	
Gravel for subgrade, 1,515.75 cu. yds. at $3.00	4,547.25	
Force account items:		
Draining soft spots in roadbed	63.62	
Widening roadbed and digging ditches	20,215.57	
Extra moving of equipment to pave gap omitted on account of soft subgrade	100.00	
Removing rejected sand from roadway	183.42	
Total amount earned by contractor	$210,813.66	
Deductions for cement furnished by State	30,686.73	
Total amount paid to contractor		180,126.93
Grand total cost of project		$219,186.83
Paid by State	$126,207.38	
Paid by County	1,580.45	
Paid by Government	91,399.00	
Total	$219,186.83	

West Dayton-St. Joseph Paving

Contract No. 481, for paving the West Dayton-St. Joseph Section of the West Side Highway in Yamhill County, was awarded to the Oregon Contract Company of Portland, on October 26, 1921. Nothing was done towards actual construction during that year, but work was begun April 24, 1922, and the job was finally completed on November 7.

The section covered by the contract comprises 4.13 miles, extending from the south end of the Newberg-West Dayton Section, at a junction with the paved County road to Dayton, to a point about one mile from a junction with the Tualatin Valley Highway.

Within the section there are several large fills, in the vicinity of Lafayette, where considerable difficulty had been experienced during previous winters on account of the washing of embankment slopes. The fills are mostly at sags in the grade line, and the water falling on the roadbed, accumulating as it flowed to the bottom of the sag, often made it a serious problem to prevent erosion of the embankment. In order to meet this situation, and to prevent damage to the pavement, the contract called for the construction of curbs, monolithic with the pavement, along fills where this danger existed.

At such places as these curbs were built, the pavement was widened so as to provide two feet extra width on the inside of the face of each curb. That is, if curbs were constructed on both sides, the pavement is 20 feet in the clear betwen curbs. If the curb has been constructed on only one side, the pavement is ten feet wide on that side of the center line and eight feet wide on the side without the curb, the nominal width of the pavement being 16 feet.

[YAMHILL]

The pavement has been constructed of cement concrete, seven inches thick, of standard 1:2:3 mix, and, in general, unreinforced. Bar reinforcement was used, however, on the section where curbs were constructed and these curbs were tied into the pavement by short bars.

Crushed gravel shoulders, two feet in width, were constructed as a part of the paving project. The regrading of shoulders and ditching work, ordinarily specified as force account work in connection with paving projects, on this job were undertaken during the fall of 1921 by State forces. Insufficient drainage conditions, which extended over a considable part of the section, made the performance of this work necessary at that time in order to insure subgrade conditions suitable for paving in the spring. It was also believed that the work could be done more economically by State forces than as extra work. The winter rains prevented the full completion of this work in 1921, although the most essential parts of it were completed. The remaining parts were handled in connection with the paving contract in the regular manner.

The entire project was handled under the engineering direction of Resident Engineer George McGee, with Don C. Marriott acting as Superintendent in charge of the State force work.

The project is estimated to cost a total of $122,000.00, of which the State will pay $119,995.38 and the County will cooperate to the extent of $2,004.62. Expenditures to date amount to $121,214.84. These have been made up of $119,210.22 from State funds and the County has paid the amount just mentioned.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,664.43
Widening roadbed and constructing drainage ditches with State forces		11,215.11
Purchase of material for guard fence to be erected by State forces		248.52
Cement furnished by State (deducted from contractor's estimate)		46,409.48
Rental of State equipment (to be deducted from contractor's estimate)		296.45
Contract items as follows:		
Excavation, single classification, 1,482.0 cu. yds. at 80c	$ 1,185.60	
Standard wood guard fence, 1,864.0 lin. ft. at 80c	1,491.20	
Preparation of subgrade, 54,813.1 sq. yds. at 5c	2,740.66	
Standard 7-inch concrete pavement, 40,789.6 sq. yds. at $2.23	90,960.81	
Bar reinforcement, 14,165.2 lbs. at 8c	1,140.42	
Expansion joints, 12,717.0 lin. ft. at 14c	1,780.38	
Concrete curbing, 2,965.0 lin. ft. at 25c	741.25	
Shoulder construction, 17,658.0 lin. ft. at 4c	706.32	
Crushed gravel for shoulders, 1,823.0 cu. yds. at $2.75	5,013.25	
Gravel for subgrade, 384.0 cu. yds. at $2.50	960.00	
Force account items:		
Trimming up ditches, widening cuts and fills, furnishing and installing culvert pipe	6,305.15	
Constructing special drainage outlets to carry water away from roadway at embankments	650.51	
Resloping cut between Sta. 127+00 and Sta. 130+00 to prevent slides	196.28	
Total amount earned by contractor	$113,871.83	
Deductions:		
Cement furnished by the State	47,399.00	
Percentage retained until completion of contract	8,091.98	
Total amount paid to contractor		58,380.85
Grand total amount expended to Nov. 30, 1922		$121,214.84
Paid by State	$119,210.22	
Paid by County	2,004.62	
Total	$121,214.84	

[YAMHILL]

McMinnville-Sheridan Grading and Paving

This work properly belongs in the previous biennium, and a description thereof is given on page 413 of the last report.

During the present biennium, additional expenditures have been made in the amount of $62,958.83. The State has paid $42,456.01 of this amount and the County has cooperated to the extent of $20,502.82. These expenditures bring the cost of the work to a total of $232,267.48. The State has paid $208,099.64 of this cost and the County cooperation has amounted to $24,167.84.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 10,677.46
Cost of asphalt over cost guaranteed to contractor		436.28
Asphalt furnished by State (deducted from contractor's estimate)		17,140.97
Contract items as follows:		
Excavation, no classification, 282.0 cu. yds. at 65c	$ 183.30	
12-inch plain concrete pipe, 132.0 lin. ft. at $1.00	132.00	
18-inch reinforced concrete pipe, 36.0 lin. ft. at $2.50	90.00	
24-inch reinforced concrete pipe, 180.0 lin. ft. at $3.50	630.00	
6-inch porous drain tile, 2,027.0 lin. ft. at 25c	506.75	
Broken stone for shoulders and base, 21,956.5 cu. yds. at $3.25	71,358.63	
Shoulder construction, 89,322.0 lin. ft. at 6c	5,359.32	
Standard 2-inch bituminous surface, 81,011.2 sq. yds. at $1.45	117,466.24	
Standard 3-inch bituminous base, 1,691.6 sq. yds. at $1.45	2,452.82	
Standard 2-inch bituminous base, 13,248.5 sq. yds. at $1.05	13,910.93	
Bituminous mixture for patching, 535.0 batches at $6.50	3,477.50	
Refund for paying war tax on freight	131.04	
Force account items:		
Construction of concrete curbs and catch basins at end of "B" street, McMinnville	192.17	
Completing grading work started by Yamhill County forces	5,473.62	
Total amount earned by contractor	$221,364.32	
Deductions:		
Asphalt furnished by State	17,140.97	
War tax and reduction in freight rate	210.58	
Total deduction	$ 17,351.55	
Total amount paid to contractor		204,012.77
Grand total cost of project		$232,267.48
Paid by State	$208,099.64	
Paid by County	24,167.84	
Total	$232,267.48	

Whiteson Bridge Paving

Contract No. 578, for paving the bridge over the Yamhill River, near Whiteson, was awarded to the V. R. Dennis Construction Company on July 5, 1922. This work was originally advertised in conjunction with the paving of the Scoggins Creek Section and repairs to the McMinnville-Bellevue pavement, but only this one portion was awarded to the V. R. Dennis Construction Company.

The work under the contract covered the construction of 1,358 lineal feet of bituminous pavement, which was laid to a width varying from 15 to 19 feet. Where the bridge deck was superelevated for curvature, the bituminous wearing surface was laid to a uniform thickness of two and one-half inches. Where the deck of the bridge was level, the wearing surface was laid to a thickness of three and one-half inches at the center and two inches at the edges.

The work was supervised by P. P. Whitmore, Resident Engineer, and represents a total cost of $5,538.88 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 45.75
Contract items as follows:		
Standard bituminous surfacing, 2¾-inch thick, 673.07 sq. yds. at $2.10	$ 1,413.45	
Standard bituminous surfacing, 2½-inch thick, 2,147.20 sq. yds. at $1.90	4,079.68	
Total amount paid to contractor		5,493.13
Grand total cost of project (all State funds)		$ 5,538.88

Amity-Holmes Gap Section

Descriptive articles covering the grading, paving and bridges on this section, which is partially within Yamhill County and partially within Polk County, will be found in the portion of this report devoted to Polk County projects.

Yamhill-North Surfacing

This work is briefly described on page 419 of the last report. Additional expenditures of $1,746.12 during the present biennium bring the total cost to $2,074.41 from State funds.

Sheridan-Polk County Line Surfacing

This project was undertaken during the previous biennium, and is described on page 415 of the last report. As stated in that article, the specifications were changed from the ones which were provided in the original contract. These changed specifications were used during the latter part of 1920, during which season about one-third of the work was done. The unusually rainy winter of 1920-21 demonstrated that even under the revised specifications the rock from the Rowell Quarry did not make a satisfactory surface, and, at the opening of the 1921 season, the procedure was again changed. The Rowell rock was used only for the base course, the dimensions of which course were changed to 20 feet in width and to from four to six inches in depth. For the wearing surface, arrangements were made with Elliott & Scoggin, who were operating a quarry about three miles west of Willamina, for the purchase of rock, the material from this quarry being of very good quality. These materials were hauled by State trucks, operated by State forces, and the spreading and rolling was done by Elliott & Scoggin on a yardage basis. The completion of the base course, as indicated above, having required approximately the whole quantity of rock estimated for the original contract, that contract was considered as fulfilled and was closed.

The method of construction adopted last has given a satisfactory and substantial surfacing, and, in return for the added cost, has provided a surfacing which is wider and easier and cheaper to maintain in a satisfactory condition than would have been secured if the original specifications had been followed.

The contract was completed on October 7, 1921, and the construction of the wearing surface was finished on June 28, 1922, all work having been handled under the supervision of W. W. Harcombe, Resident Engineer.

[YAMHILL]

The expenditures during the biennium amount to $65,577.67 and bring the total cost of the project to $71,132.01 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 5,420.45
Items paid for direct by State:		
Royalty on rock taken from Rowell and Thorp quarries		811.11
Paving of bridge 1½ miles west of Sheridan by Warren Construction Company		470.41
Quarrying rock at Thorp quarry by Elliott & Scoggin		18,009.01
Spreading, sprinkling and rolling rock by Elliott & Scoggin		3,348.09
Freight on roller, Willamina to Salem		113.60
Hauling rock quarried by Elliott & Scoggin		11,984.90
Items deducted from contractor's estimates:		
Elliott and Scoggin, rental of State truck and sprinkler		183.40
W. N. Trent, rental of State roller and scarifier		306.02
Contract items as follows:		
Broken stone surfacing, 8,848.0 cu. yds. at $3.48	$ 30,791.04	
Deduction for rental of State-owned equipment	306.02	
Total amount paid to W. N. Trent, contractor		30,485.02
Grand total cost of project (all State funds)		$ 71,132.01

McMinnville-West Dayton Surfacing

This work is described briefly on page 419 of the last report. It is stated therein that the work was practically complete, but it is also noted that a considerable difficulty was being experienced on account of the sloughing of fills. This difficulty continued during the winter of 1920, to such an extent as to require considerable rebuilding of the embankments during 1921, and a consequent regravelling of the new fills. This latter work could not be done for a considerable time after the contractor had completed the other parts of the work. He was, therefore, released under his contract and the additional work was done by State forces.

The work during 1921 was handled under George McGee, Resident Engineer, with additional expenditures of $21,701.42. These expenditures bring the total cost of the work to $30,277.06 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,859.28
Graveling by State forces to repair damage caused by washouts subsequent to completion of contract		454.70
Contract items as follows:		
Run-of-bank gravel surfacing, 9,709.0 cu. yds. at $2.87	$ 27,864.83	
Force account items:		
Digging trenches for blind drains at ends of fills and backfilling with coarse gravel	98.25	
Total amount paid to contractor		27,963.08
Grand total cost of project (all State funds)		$ 30,277.06

McMinnville-Amity Surfacing

Following completion of the grading of this section, it was decided that no paving should be done until the following year, in order to permit the grading to settle properly. In order to provide a passable road during the winter, all sections were regravelled where the new grade followed directly along the old road and the old gravelled surface had been destroyed. Where the alignments were separate and traffic followed the old road, the new grade was closed to traffic and was left ungravelled.

This procedure required the surfacing of 2.22 miles, and Contract No. 443 for the work was awarded to Fred Ruble of Amity, Oregon, on

August 30, 1921. Work was begun September 12, and completed December 15 of the same year. This section covers identically the same section as the McMinnville-Amity grading and paving projects, and has a total length of 5.26 miles. The net length of the surfacing of 2.22 miles covers the following units.

Stations 0+00 to 69; 86 to 90; 94+20 to 96+50; 116 to 117; 145 to 150; 163 to 170; 248 to 277+03.7. Station 0+00 is at the junction with the McMinnville-Tillamook Highway and Station 277+03.7 is at the north city limits of Amity.

George McGee, Resident Engineer, was in charge of the work, which has cost a total of $9,713.06 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 911.88
Labor and material furnished by State:		
Culvert pipe, installed under force account		61.95
Lumber for temporary fence		35.75
Repairing damage caused by washout		74.67
Contract items as follows:		
Gravel surfacing, 2,340.0 cu. yds. at $3.01	$ 7,043.40	
Gravel for maintenance, placed in piles, 451.25 cu. yds. at $3.01	1,358.26	
Force account items:		
Sprinkling subgrade and installing culvert across private road approach	227.15	
Total amount paid to contractor		8,628.81
Grand total cost of project (all State funds)		$ 9,713.06

Newberg-West Dayton Grading and Surfacing

This project is described on page 417 of the last report. No additional expenditures have been made during the present biennium, the only entry in the books being occasioned by receipt of $9,393.27 from the County. The project now represents a total cost of $38,148.45, of which the State has paid $18,874.40 and the County has paid $23,274.05.

Grand Ronde-Butler Store Surfacing

This work is described on page 415 of the last report. As stated therein, the work was incomplete and it was not finally completed until June 30, 1921. W. W. Harcombe, Resident Engineer, was in charge of the project during that season.

Additional expenditures of $10,279.53, made during the present biennium, bring the total cost of the work to $19,143.53 from State funds.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,027.16
Cost of completing contract with State forces (deducted from contractor's estimate)		1,012.82
Royalty on rock at quarry		19.18
Contract items as follows:		
Water-bound macadam, 5,097.8 cu. yds. at $3.55	$ 18,097.19	
Total amount earned by contractor	$ 18,097.19	
Deductions:		
Completing contract with State forces	1,012.82	
Total amount paid to contractor		17,084.37
Grand total cost of project (all State funds)		$ 19,143.53

[YAMHILL]

Grand Ronde Post Road Project

This project is fully described on page 416 of the last report. During the present biennium, final expenditures have been made in the amount of $8,892.95. The sum of $10,000.00 has been received from Yamhill County and $13,880.84 has been received from the Federal Government, leaving a credit of $14,987.39 to State funds for the two-year period. These expenditures bring the total cost of the work to $57,200.47, of which the State has paid $27,732.89, Yamhill County $10,000.00 and the Federal Government $19,467.58.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 4,904.30
Advertisement for bids		23.36
Repairing bridges by State bridge crew		181.85
Cement furnished by State (deducted from contractor's estimate)		147.49
Contract items as follows:		
Clearing and grubbing, all	$ 3,000.00	
Common excavation, 16,642.0 cu. yds. at 52c	8,653.84	
Solid rock excavation, 3,759.0 cu. yds. at $1.25	4,698.75	
Overhaul, 13,079.0 sta. yds. at 5c	653.95	
12-inch corrugated galvanized iron pipe, 18.0 lin. ft. at $1.65	29.70	
12-inch plain concrete pipe, 181.0 lin. ft. at $1.65	298.65	
18-inch reinforced concrete pipe, 88.0 lin. ft. at $2.65	233.20	
30-inch reinforced concrete pipe, 203.0 lin. ft. at $5.00	1,015.00	
Class "A" concrete, 22.13 cu. yds. at $25.00	553.25	
Class "C" concrete, 35.56 cu. yds. at $20.00	711.20	
Lumber and timber, 23.576 M.-FBM. at $40.00	943.04	
Extra clearing and grubbing, 2.62 acres at $200.00	524.00	
Earth filler, 629.0 cu. yds. at 80c	503.20	
Metal reinforcement, 707.2 lbs. at 9c	63.65	
Broken stone macadam (W. N. Trent), 5,508.0 cu. yds. at $3.85	21,205.80	
Broken stone macadam (Elliott & Scoggin), 833.0 cu. yds. at $4.35	3,623.55	
Broken stone for maintenance, placed in piles, 1,154.5 cu. yds. at $4.35	5,022.08	
Force account items:		
Hauling and placing river gravel on finished grade	310.75	
Maintenance work at bridge ends to maintain travel	49.50	
Total amount earned by contractor	$ 52,093.11	
Deduction for cement furnished by State	149.64	
Total amount paid to contractor		51,943.47
Grand total cost of project		$ 57,200.47
Paid by State	$ 27,732.89	
Paid by County	10,000.00	
Paid by Government	19,467.58	
Total	$ 57,200.47	

Bee Ranch Grading and Surfacing

This section is described on page 417 of the last report. It is stated therein that the work was complete at that time but faulty workmanship in some of the culverts was discovered, which necessitated their being reconstructed. This work was finally completed June 30, 1921, the reconstruction being under the supervision of W. W. Harcombe, Resident Engineer.

Additional expenditures during the biennium amount to $13,360.24, consisting of $10,382.52 from State funds and $2,977.72 from County funds. These expenditures bring the total cost of the work to $83,160.78, of which the State has paid $80,183.06 and the County has paid the amount just mentioned. The original County cooperation agreed upon amounted to $5,000.00, and a balance of $2,022.28 of this amount is still due.

[YAMHILL]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,458.47
Extra work performed by W. N. Trent		384.79
Maintaining detour during construction of highway		40.75
Repairs to Mercier Creek bridge		(Credit) 40.00
Advertisement for bids		8.02
Items deducted from contractor's estimates:		
Cement furnished by State		90.48
Rental of State-owned equipment		346.83
Contract items as follows:		
Clearing and grubbing, all	$ 1,500.00	
Common excavation, 14,805.0 cu. yds. at 50c	7,402.50	
Intermediate excavation, 18,822.0 cu. yds. at 80c	15,057.60	
Solid rock excavation, 3,533.0 cu. yds. at $1.50	5,299.50	
Overhaul, 10,010.0 sta. yds. at 3c	300.30	
12-inch corrugated galvanized iron pipe, 196.0 lin. ft. at $1.65	284.20	
18-inch corrugated galvanized iron pipe, 595.0 lin. ft. at $2.80	1,666.00	
24-inch corrugated galvanized iron pipe, 40.0 lin. ft. at $3.95	158.00	
30-inch corrugated galvanized iron pipe, 44.0 lin. ft. at $5.40	237.60	
36-inch corrugated galvanized iron pipe, 246.0 lin. ft. at $6.00	1,476.00	
Class "B" concrete, 23.54 cu. yds. at $30.00	706.20	
Class "C" concrete, 53.76 cu. yds. at $25.00	1,344.00	
Clay filler, 804.0 cu. yds. at 80c	643.20	
Lumber and timber, 30.48 M.-FBM. at $40.00	1,219.20	
Broken stone macadam, 8,103.5 cu. yds. at $3.75	26,336.38	
Broken stone placed in piles for future maintenance, 2,715.0 cu. yds. at $4.00	10,860.00	
Wooden span bridge, one	550.00	
Force account items:		
Laying corduroy and rock to maintain travel	836.84	
Maintenance work on detour	37.77	
Ditching to protect fill at Station 190+00	33.99	
Repairing bridge at Station 171+00	100.58	
Removing slide at Station 102+00	47.55	
Ditching and laying 260 feet of drain tile, Station 75+60	83.57	
Filling in bridge ends with large rock to prevent wash	34.79	
Extending culvert and constructing headwalls	18.49	
Extra clearing on account of channel change	74.49	
Total amount earned by contractor	$ 76,308.75	
Deductions:		
Cement furnished by State	90.48	
Rental on State-owned equipment	346.83	
Total deductions	$ 437.31	
Total amount paid to contractor		75,871.44
Grand total cost of project		$ 83,160.78
Paid by State	$ 80,183.06	
Paid by County	2,977.72	
Total	$ 83,160.78	

Grand Ronde-Alder Creek Grading and Resurfacing

On pages 356 and 422 of the last report, there will be found articles descriptive of work then underway on the Three Rivers Section and on the Sourgrass Section of the McMinnville-Tillamook Highway.

In the summer of 1920, at which time the maintenance of State highways was being done in general on a cooperative basis by the State and the several Counties, maintenance orders were approved for rather extensive repairs on the McMinnville-Tillamook Highway between Bee Ranch, in Yamhill County, and Hebo, in Tillamook County, a distance of 15.4

[YAMHILL]

miles. This work was to be done by State forces and was to consist principally of a partial and light redress of the existing surfacing with crushed rock. It was planned to use rock from the quarry at Dolph on the work.

Owing to a late start and an unusually early rainy season, only a small part of the job was done during 1920. During the following winter, the second one during which the Tillamook road was open to all-winter traffic, it became evident that the surfacing on the Sourgrass Section and on the easterly part of the Three Rivers Section would not hold up, even after the contemplated redress course had been placed. It was also found that the Dolph rock would be unsuitable on account of being too soft. It was, therefore, decided to abandon the original plans and to do a much more extensive resurfacing job, using a rock from better, though less favorably located, quarries and to advertise for bids on the work.

Two separate projects were advertised. The first covered the resurfacing of 6.81 miles from Bee Ranch to Alder Creek and stocking the 11.4 miles from Grand Ronde to Dolph with maintenance materials, and the second covered stocking the 10.9 miles from Dolph to Hebo with maintenance materials. The bids, as originally received, were not satisfactory and those on the Dolph-Hebo work were rejected. Negotiations with the low bidder on the Grand Ronde-Dolph Section brought about a reduction in some of the prices, and an agreement to take over a part of the other work at the same unit prices. Contract No. 419, therefore, was awarded to the Warren Construction Company of Portland, Oregon, covering the work as advertised from Grand Ronde to Alder Creek and extending the stocking of maintenance materials from Dolph to Alder Creek. It was further understood that the State might purchase, at the contract price for such material, all maintenance stock as was required for the section from Alder Creek to Hebo. In accordance with the original specifications, the contract provided that all hauling be done by State-owned trucks, operated by State forces, without cost to the contractor.

Work was begun July 16, 1921, and approximately half of the mileage of the resurfacing was finished during that year. During this work it became evident that a considerably larger quantity of material was required to make a substantial surface than had been anticipated originally. An aditional appropriation was made for this purpose with the resumption of operations in 1922. The resurfacing work was also extended to Grande Ronde, before the final completion of the project.

The last details of the work are being closed up at the present time. The contract work, in addition to the surfacing, has included regrading of shoulders and ditches, additional clearing, and additional culverts on the Bee Ranch-Alder Creek Section. Only a small part of the stocking with maintenance materials was done, but, instead, these materials were put directly into the resurfacing. At the beginning of the 1922 season, on account of the large overrun of rock quantities, the contractor agreed to a reduction in the cost of the work to the State to the extent of taking over and paying the operating cost of the truck haul, including drivers' wages, gas, oil, repairs, etc. Trucks were rented to the contractor by the State at a nominal price. This action by the contractors was done without haggling, in a frankly cheerful manner and the Warren Construction Company are to be complimented on the spirit of cooperation shown by them.

The work has been in charge of J. C. Russell, Resident Engineer, and is estimated to cost a total of $153,000.00 from State funds, when all final payments have been made. The expenditures to date amount to $139,541.61.

[YAMHILL]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 7,168.11
Hauling gravel with State trucks (as per terms of contract)		28,062.65
Items to be deducted from contractor's estimates:		
Porous drain tile, furnished by State		*260.00*
T. N. T. furnished by State		172.50
Rental of State-owned quarry equipment		2,181.68
Contract items as follows:		
Excavation, single classification, 11,109.3 cu. yds. at $1.25	$ 13,886.63	
Overhaul, 13,803.0 sta. yds. at 5c	690.15	
12-inch corrugated galvanized iron pipe, 730.0 lin. ft. at $1.80	1,314.00	
18-inch corrugated galvanized iron pipe, 8.0 lin. ft. at $2.80	22.40	
24-inch corrugated galvanized iron pipe, 56.0 lin. ft. at $4.00	224.00	
6-inch porous drain tile, 8,877.0 lin. ft. at 40c	3,550.80	
Class "C" concrete, 26.76 cu. yds. at $50.00	1,338.00	
Broken stone surfacing, 17,785.5 cu. yds. at $3.40	60,470.70	
Broken stone surfacing placed by Elliott & Scoggin, 889.0 cu. yds. at $3.40	3,022.60	
Maintenance materials, placed in piles, 2,779.0 cu. yds. at $2.80	7,781.20	
Rock backfill for blind stone drains, 1,277.0 cu. yds. at $3.40	4,341.80	
Rock backfill for drain tile, 1,489.0 cu. yds. at $3.40	5,062.60	
Standard wood guard fence, 640.0 lin. ft. at $1.50	960.00	
Force account items:		
Clearing and grubbing	4,116.46	
Redecking small bridges and lowering culvert pipe	95.74	
Placing earth filler on base course	161.87	
Removing blind stone drains and drain tile account change in plans	218.61	
Total amount earned by contractor	$107,257.56	
Deductions:		
Material and equipment furnished by State	730.66	
Percentage retained until completion of contract	4,830.23	
Total amount paid to contractor		101,696.67
Grand total expended to Nov. 30, 1922 (all State funds)		$139,541.61

McMinnville-Amity Grading

The grading of the McMinnville-Amity Section, on the West Side Highway, was undertaken during 1921. Contract No. 363, for the work, was awarded to Thomas Hansen of Portland, on April 22, 1921. The contract covered 4.98 miles of grading, between a junction with the McMinnville-Tillamook Highway, about seven-eighths of a mile south of the city limits of McMinnville, and the north city limits of Amity. The total distance between the termini is 5.26 miles, but a short section at the Yamhill River bridge was not included.

Work was started on May 20, 1921, and completed August 31 of the same year. The project included the elimination of two grade crossings just north of Amity by means of a relocation of the highway. A third crossing was eliminated north of Whiteson, by means of a relocation whereby the highway was changed to pass under the railroad at the south end of the trestle approach to the railroad Yamhill River bridge.

Engineering supervision of the project was handled by J. R. Mitchell, Resident Engineer. The work cost a total of $23,877.09, of which the State paid $3,429.52 and Yamhill County paid $20,447.57.

[YAMHILL]

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 3,385.52
Metal reinforcement purchased for use in construction of cattle pass by county forces		207.26
Grading railroad undercrossing at Whiteson by State forces		299.43
Contract items as follows:		
Clearing and grubbing, all	$ 400.00	
Common excavation, 32,277.5 cu. yds. at 48c	15,493.20	
Overhaul, 18,085.0 sta. yds. at 5c	904.25	
8-inch plain concrete pipe, 84.0 lin. ft. at 82½c	69.30	
12-inch plain concrete pipe, 777.0 lin. ft. at $1.14	885.78	
15-inch reinforced concrete pipe, 9.0 lin. ft. at $1.70½	15.35	
18-inch reinforced concrete pipe, 196.0 lin. ft. at $2.46	482.16	
24-inch reinforced concrete pipe, 32.0 lin. ft. at $3.18	101.76	
36-inch reinforced concrete pipe, 28.0 lin. ft. at $5.10	142.80	
48-inch reinforced concrete pipe, 96.0 lin. ft. at $8.10	777.60	
20-inch vitrified sewer pipe, 16.0 lin. ft. at $2.70	43.20	
Class "C" concrete, 37.07 cu. yds. at $18.06	669.48	
Total amount paid to contractor		19,984.88
Grand total cost of project		$ 23,877.09
Paid by State	$ 3,429.52	
Paid by County	20,447.57	
Total	$ 23,877.09	

Yamhill-Gaston Grading

An article descriptive of this work is given on page 419 of the last report. During the present biennium the work has been carried to completion, with additional expenditures of $34,001.26. These expenditures have been made $2,743.50 by the State and $31,257.76 by the County. The completed project now represents a total cost of $54,705.44, of which the State has paid $6,455.69 and the County has paid $48,249.75.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,455.69
Contract items as follows:		
Clearing and grubbing, all	$ 1,500.00	
Common excavation, 43,237.5 cu. yds. at 65c	28,104.38	
Intermediate excavation, 3,609.2 cu. yds. at 95c	3,428.74	
Overhaul, 67,885.0 sta. yds. at 5c	3,394.25	
12-inch plain concrete pipe, 1,014.0 lin. ft. at $1.90	1,926.60	
18-inch reinforced concrete pipe, 96.0 lin. ft. at $3.00	288.00	
24-inch reinforced concrete pipe, 308.0 lin. ft. at $4.00	1,232.00	
30-inch reinforced concrete pipe, 104.0 lin. ft. at $6.00	624.00	
36-inch reinforced concrete pipe, 200.0 lin. ft. at $7.00	1,400.00	
6-inch porous drain tile, 337.0 lin. ft. at 20c	67.40	
Class "A" concrete, 161.0 cu. yds. at $25.00	4,025.00	
Metal reinforcement, 7,800.0 lbs. at 6c	468.00	
Class "C" concrete, 70.92 cu. yds. at $24.00	1,702.08	
Force account items:		
Moving building off right-of-way	46.74	
Moving and replacing existing fences along right-of-way	42.56	
Total amount paid to contractor		48,249.75
Grand total cost of project		$ 54,705.44
Paid by State	$ 6,455.69	
Paid by County	48,249.75	
Total	$ 54,705.44	

[YAMHILL]

McMinnville-West Dayton Grading

A complete description of this work will be found on page 420 of the last report. Expenditures for the present biennium amount to $17,763.69. The sum of $41,804.24 has been received from the County, leaving a net credit of $24.040.55 to State funds during the two-year period. These transactions bring the total cost of the work to $93,861.15, of which the State has paid $6,725.82 and the County has paid $87,135.33.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 6,597.86
Removing falsework from culvert by State forces (deducted from contractor's estimate)		127.96
Contract items as follows:		
Clearing and grubbing, all	$ 1,800.00	
Excavation, no classification, 64,684.5 cu. yds. at 72c	46,572.84	
Overhaul, 54,403.0 sta. yds. at 6c	3,264.18	
12-inch plain concrete pipe, 15.0 lin. ft. at $1.60	24.00	
18-inch reinforced concrete pipe, 156.0 lin. ft. at $2.70	421.20	
30-inch reinforced concrete pipe, 32.0 lin. ft. at $6.50	208.00	
48-inch reinforced concrete pipe, 144.0 lin. ft. at $12.00	1,728.00	
12-inch corrugated galvanized iron pipe, 240.0 lin. ft. at $1.55	372.00	
18-inch corrugated galvanized iron pipe, 50.0 lin. ft. at $2.60	130.00	
24-inch corrugated galvanized iron pipe, 84.0 lin. ft. at $4.00	336.00	
6-inch porous drain tile, 549.0 lin. ft. at 50c	274.50	
Class "A" concrete, 734.1 cu. yds. at $30.00	22,023.00	
Class "C" concrete, 28.0 cu. yds. at $30.00	840.00	
Metal reinforcement, 64,097.0 lbs. at 10c	6,409.70	
Force account items:		
Connecting highway culvert to railroad culvert	243.60	
Clearing and deepening Hahn Creek channel	1,821.77	
Moving equipment to repair damage caused by washout	791.04	
Total amount earned by contractor	$ 87,259.83	
Deduction for removing falsework in culvert	124.50	
Total amount paid to contractor		$ 87,135.33
Grand total cost of project		$ 93,861.15
Paid by State	$ 6,725.82	
Paid by County	87,135.33	
Total	$ 93,861.15	

Yamhill River Fill Construction Engineering

Following completion of the new bridge over the North Yamhill River, near St. Joseph, the County Court of Yamhill County undertook to complete the embankment approaches to the structure. These approaches had been partially constructed as a part of the grading of the McMinnville-West Dayton Section, but required extension in order to connect with the structure.

A contract for the work was awarded by the County Court to the V. R. Dennis Construction Company of McMinnville. The contractor started work on March 3, 1922, and completed the same on June 15 of the same year. The section covered by the contract lies between the ends of the concrete pavement on each side of the bridge, and has a gross length of 0.23 mile. After eliminating the bridge structure, the net length is 0.17 mile.

Material for the fills was obtained principally from a sideroad and from adjoining private property. The work was handled by means of a steam shovel, with narrow gauge construction cars and a dinkey engine.

[YAMHILL]

The construction costs were paid direct by Yamhill County, the cost of the engineering supervision being borne by the State. George McGee, Resident Engineer, was in charge of the engineering supervision of the construction operations.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 408.58
Contract items as follows:		
Common excavation, 14,830.0 cu. yds. at 44c	$ 6,525.20	
Force account items:		
Widening fill as ordered by Yamhill County Court	95.90	
Total amount paid to contractor		6,621.10
Grand total cost of project		$ 7,030.68
Paid by State	$ 408.58	
Paid by County	6,621.10	
Total	$ 7,030.68	

Maintenance

In maintenance of the State highways in Yamhill County during the past two years there have been no features to require or warrant special notice. The principal single item has been the repairing of the McMinnville-Bellevue bituminous pavement during 1922. This work was originally advertised for contract, but the bids received were considered unsatisfactory, and were rejected. The work was then done on a force account basis by the V. R. Dennis Construction Company, who had just completed paving the Whiteson bridge from their plant at Rickreall.

Most of the completed sections in Yamhill County have been maintained as to drainage, shoulders, etc., by the patrol system, being under the immediate supervision of the Resident Engineer located adjacent to the work.

Whiteson Bridge

About a mile north of Whiteson, the West Side Highway formerly crossed the Southern Pacific track at grade and then turned sharply to the left and crossed the Yamhill River by means of a long wood trestle and a 160-foot steel span.

Before being graded to the State Highway standard, the line was relocated so as to pass under the end of the Southern Pacific trestle over the river and then curve to the right and join the old road about the middle of the old trestle.

An examination of the old bridge revealed the facts that, with some little repair work, the main span could be made to serve for several years more, but that the trestle had about outlived its usefulness and was not in condition to carry traffic any longer. Plans were therefore prepared, calling for a new trestle approach, on the new alignment, and for the rehabilitation of the old steel truss span.

Contract No. 476. for this construction, was awarded to Monson-Trierweiler Co., Inc., on October 25, 1921. Actual construction started November 15, 1921, and proceeded slowly until completion on May 15, 1922. The delay was caused mainly by inability to secure timber for the trestle work.

The final cost was $21,513.89, which is a very reasonable figure for the size and quality of the resulting structure. County funds have been received in the amount of $21,907.77, which leaves a net credit of $393.88

to State funds. In the final adjustment of accounts, this excess payment by the County will be credited as cooperation on some other project.

O. A. Chase, Resident Engineer, has been in charge of the engineering suppervision of the work.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,913.75
Contract items as follows:		
Removing old trestle, 1,120.0 lin. ft. at 41c	$ 459.20	
Lumber in place, 352.1 M-FBM at $41.00	14,436.10	
Timber piling, 9,058.0 lin. ft. at 25c	2,264.50	
Structural steel, 18,960.0 lbs. at $0.0915	1,734.84	
Driving rivets, 908.0, each 20c	181.60	
Repainting bridge, lump sum	350.00	
Waste piling over 5 feet long, 304.0 lin. ft. at 9c	27.36	
Force account items:		
Furnishing material and erecting extra diagonal members	52.48	
Furnishing material and installing wheel guard bolts account change in plans	94.06	
Total amount paid to contractor		19,600.14
Grand total cost of revisions		$ 21,513.89
Paid by State (Credit)	$ 393.88	
Paid by County	21,907.77	
Total	$ 21,513.89	

Does not include work done by Railroad Company for which bill has not yet been received.

Deer Creek Bridge

During 1919 and 1920 the State and County improved the section from McMinnville to Sheridan by the construction of a standard grade, permanent bridges and pavement, except for a short stretch just west of Bellevue where the highway crosses Deer Creek.

It was not until April 14, 1922, that a contract was awarded for the construction of the necessary permanent bridge. On that date, Contract No. 520 was awarded to LeDoux & LeDoux of Portland, for the construction of a concrete viaduct at this point, consisting of one 45- and two 28-foot spans.

The work began on May 15, 1922, and was practically complete on October 1, 1922. The contract called for certain grading work in connection with the bridge, which could not be done until the bridge was complete. This was completed far enough so that the fills could be planked and used before wet weather set in, but is not entirely completed at this date.

The total estimated cost is $10,000.00, of which $7,674.02 has been paid out to date, $6,858.22 by the County and $815.80 by the State. The final cooperation on the structure is estimated at $9,000.00 by the County and $1,000.00 by the State.

Amity Bridge

In the completion of Yamhill County's part of the Amity-Holmes Gap Section of the West Side Highway, it was necessary to build a bridge over Ash Swale, at the south city limits of Amity. This structure consists of six 50-foot concrete spans and is one of the most attractive bridges in the County.

Contract No. 517, for its construction, was awarded on April 14, 1922, to Tobin & Pierce. They started work on May 15, 1922, and at this date have the structure complete. The fills at the ends are also part

[YAMHILL]

of the same contract, but are not complete. A temporary trestle has been erected at the joint expense of the County and the contractor and is serving as an approach to the bridge during the winter.

The estimated cost of this work is $29,000.00, of which $24,115.49 has been expended to date. All but $1,781.74 of this amount has been paid by the County, leaving that amount paid from State funds. The cooperation on the final cost is estimated at $2,000.00 from State funds and $27,000.00 from County funds.

Construction has been carried on under the field supervision of O. A. Chase, Resident Engineer.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 1,767.74
Bronze name plates furnished by State		14.00
Contract items as follows:		
Excavation, single classification, 745.0 cu. yds. at $1.00	$ 745.00	
Timber piling, 1,900.0 lin. ft. at 40c	760.00	
Class "A" concrete, 710.0 cu. yds. at $18.00	12,780.00	
Metal reinforcement, 127,000.0 lbs. at 7c	8,890.00	
Concrete handrail, 620.0 lin. ft. at $5.00	3,100.00	
Total amount earned by contractor	$ 26,275.00	
Percentage retained until completion of contract	3,941.25	
Total amount paid to contractor		22,333.75
Grand total expended to Nov. 30, 1922		$ 24,115.49
Paid by State	$ 1,781.74	
Paid by County	22,333.75	
Total	$ 24,115.49	

Mercier Bridge

At a point about three miles west of Grande Ronde the McMinnville-Tillamook Highway crosses the Yamhill River on what is known as the Mercier bridge. This consists of two 50-foot wood truss spans, with one 19-foot wood approach span.

Contract 398, covering its construction, was awarded on June 16, 1921, to the V. R. Dennis Construction Company. The work was started on July 1, 1921, and completed on September 1, 1921, at a total cost of $5,329.94. Of this, $5,086.59 was borne by the County and $243.35 by the State.

O. A. Chase was Resident Engineer in charge of the work.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 243.35
Contract items as follows:		
Removal of old bridge, all	$ 150.00	
Excavation, no classification, 119.3 cu. yds. at $3.50	417.55	
Backfilling abutments, 88.9 cu. yds. at 60c	53.34	
Class "A" concrete, 5.2 cu. yds. at $25.00	130.00	
Class "B" concrete, 72.0 cu. yds. at $25.00	1,800.00	
Metal reinforcement, 957.0 lbs. at 10c	95.70	
Wooden truss spans, 2.0 each at $1,220.00	2,440.00	
Total amount paid to contractor		5,086.59
Grand total cost of structure		$ 5,329.94
Paid by State	$ 243.35	
Paid by County	5,086.59	
Total	$ 5,329.94	

Yamhill River Bridge Near St. Joseph

On June 16, 1921, the Gilpin Construction Company was awarded Contract No. 397 for the construction of a bridge over the North Yamhill River, on the West Side Highway, near St. Joseph. Bids had previously been taken and the work awarded to Stebinger Brothers, but they refused to sign the contract and the work had to be readvertised.

The bridge as constructed consists of an 80-foot steel span, with 280 feet of concrete approach. It replaced an old steel span with wood approaches, all of which had long since outlived its useful life.

Work was started on July 15, 1921, and brought to completion on March 1, 1922, at a total cost of $51,500.65. This amount represents not only the cost of the bridge, but also a considerable amount for the construction of a retaining wall at the end of the easterly approach fill. This by supplementary agreement with the State.

The entire cost of this construction was borne by the County except the item of engineering, amounting to $2,355.99, which the State paid.

O. A. Chase was Resident Engineer in charge of the work.

DETAILED STATEMENT OF EXPENDITURES

Engineering		$ 2,355.99
Name plates furnished by State		14.50
Contract items as follows:		
BRIDGE STRUCTURE—		
Excavation, no classification, 671.0 cu. yds. at 70c	$ 469.70	
Class "A" concrete, 680.0 cu. yds. $27.25	18,530.00	
Class "B" concrete, 292.0 cu. yds. at $19.25	5,621.00	
Metal reinforcement, 135,100.0 lbs. at 5c	6,755.00	
Structural steel, 66,068.0 lbs. at 9½c	6,276.46	
Timber piling, 3,918.0 lin. ft. at 65c	2,546.70	
Concrete handrail, 725.0 lin. ft. at $4.95	3,588.75	
RETAINING WALL—		
Excavation, no classification, 147.0 cu. yds. at 75c	110.25	
Class "A" concrete, 157.5 cu. yds. at $25.00	3,937.50	
Metal reinforcement, 15,273.0 lbs. at 6c	916.38	
Force account items:		
Bush hammering panels of handrail posts	27.60	
Riprapping earth slopes at bridge ends	337.32	
Waste timber piling over five feet in length	13.50	
Total amount paid to contractor		49,130.16
Grand total cost of structure		$ 51,500.65
Paid by State	$ 2,355.99	
Paid by County	49,144.66	
Total	$ 51,500.65	

Willamina Bridge

On August 29, 1922, Contract No. 584 was awarded to Marshall & Barhan of Portland for the construction of a bridge over Willamina River at the edge of the town of Willamina, replacing the old wood span now in use.

This structure consists of an 80-foot steel span, with 135 feet of wood trestle approach. Actual construction started on September 18, and at the present time the foundations are about complete.

It is expected that this work will be completed by early spring, at a total cost of $12,500.00, of which $1,407.19 has been paid to date. The County will bear all of the cost except for engineering. Of the expenditures to date $1,099.39 has been paid by the County and $307.80 by the State.

O. A. Chase is Resident Engineer in charge of the field supervision of construction.

[YAMHILL]

McMinnville-West Dayton Survey

Surveys and estimates have been made for alternate methods of handling the crossing of the West Side Highway over the main line and wye track of the Southern Pacific Railroad at St. Joseph.

One line contemplates the use of a grade crossing at the site of the present grade crossing. A second survey provides for an overhead structure across the main line of the Forest Grove Branch, about one hundred feet north of the present crossing. This location, however, requires a grade crossing over the back leg of the wye. A third alternate contemplates an undergrade crossing of both the main tracks and the wye track at a point close to the switch joining the two. This last proposition would require a new location from the undercrossing west to the Tualatin Valley Highway and would intersect the Highway about five hundred feet north of the intersection of the present road.

Final determination of one of the three plans to be adopted has not been made at this time.

McMinnville-Amity Survey

During the spring of 1921, a revision of location was made on the McMinnville-Amity section, between McMinnville and Whiteson. This revision was made by Resident Engineer P. P. Whitmore, and was for the purpose of straightening and shortening the line by means of cutting across corners at points where the original location had followed the old road.

Market Roads

The Market Road Law went into effect in 1920. Resolutions passed by the County Court, accepting the benefits of the act, showing the County levy made each year for Market Roads and designating the roads to be improved as Market Road projects, are on file in the office of the State Highway Engineer.

Since the Market Road Law went into effect, Yamhill County has cooperated as follows:

1.	Paid into the State Market Road Fund	$ 71,123.58
2.	State funds apportioned to County	87,044.40
3.	County levy made to match State funds	96,797.01
4.	County Market Road Funds collected	78,530.02
5.	Cash paid to County by State	62,223.81
6.	State expenditures, deducted from apportionment	11,091.45
7.	Cash due County from State in December, 1922	13,729.14
8.	County expenditures on Market Roads	149,304.36
9.	Balance in County Treasury November 1, 1922	0.00

From the above statement it is apparent that Yamhill County received from the State Market Road Fund $15,920.82 more than it paid into the fund. The excess is Yamhill County's share of funds collected from Multnomah County. The County Court has reported by resolutions, that County levies have been made sufficient to produce $96,797.01. Of this amount they have collected and credited to the Market Road Fund only $78,530.02.

The County Court has designated eight roads to be improved as Market Road projects.

The surveys and plans have been made by employes of the State Highway Commission. Plans have been submitted and approved.

The construction work has been done by County forces under the direction of the County Court. They have graded 20.8 miles of road and surfaced 19.3 miles.

CERTIFICATE OF AUDIT

G. ED ROSS
CONSULTING COST ACCOUNTANT
1453 Court Street, Salem, Oregon.

To the Oregon State Highway Commission,
Salem, Oregon.

Gentlemen: In accordance with arrangements made with your Commission, a careful audit of the State Highway Fund, and State Highway Engineer's Payroll Account, has been made for the period from December 1, 1921, to November 10, 1922, covering your voucher payments, Nos. 1 to 8311, inclusive.

All receipts from all sources have also been listed and schedules attached.

All funds have been properly accounted for and all disbursements found to be made in accordance with authority given for the operation of the State Highway Department.

Cash records are in the hands of experienced and competent employes, and are well handled.

I wish to certify on honor, that to the best of my knowledge and belief, and after careful examination, schedules attached hereto, pages 1 to 22, inclusive, reveal the true status of the accounts of the State Highway Department, as of November 10, 1922.

Dated at Salem, Oregon, this seventeenth day of January, 1923.

Respectfully submitted,

(Signed) G. ED ROSS,
Public Accountant and Auditor.

ODOT LIBRARY
00002948

OR/
ODOT
BIENNL
1921-22
C.1

Biennial report of the Oregon State Highway Commission,

OREGON DEPARTMENT OF
TRANSPORTATION LIBRARY