COLORADO HIGHWAYS

9th ANNUAL ROAD REVIEW

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Colorado Highways
"BETTER ROADS"
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Our Colorado

By WM. H. ADAMS
Governor of Colorado

NOWHERE in the United States is there such a wealth of raw material, such a wide range of natural resources, as in Colorado. Nowhere is there such a happy combination of geographical location, climatic advantages and undeveloped resources.

Since the first coming of the white man, Colorado has gone forward with practically uniform development. It passed first through the era of mining development following the discovery of vast mineral values in its mountain areas, its production of the commercial metals now aggregating a total of almost one and three-quarters billions of dollars since that pioneer day. The coming of the miners created a market for livestock and agricultural products, and during the next decade these industries expanded to meet the changed market conditions.

That period marked the beginning of the present-day development in agricultural and livestock industries, necessitating an enormous expansion program for better highways which will take years of effort and millions of dollars to complete. There can be no backward movement or cessation of effort in this direction, and with the proper supervision of effort this system of good roads will be one of the greatest assets, and will materially aid in the future development of Colorado's great natural resources.

View of two modern highway underpasses on Denver-Colorado Springs highway, constructed by State Highway Department.

History of Highway Progress in Colorado

By JAMES E. MALONEY
Assistant Highway Engineer, Colorado Highway Department

THE first wheeled vehicles came over the Santa Fe Trail in 1828 enroute for Santa Fe, New Mexico, just touching what is now the extreme southeast corner of Colorado, following the Cimarron River.

"About 1852, this trail was changed, and went by way of Ft. Bent, and down Timpas Creek, with a branch running up the Arkansas River to Canon City. For twenty years great wagon trains, often numbering as high as four hundred teams, passed over this natural highway, each caravan doing its own road work as the case demanded, which was just sufficient to get them through. Five thousand pounds of freight was about the limit for eight mules or three yokes of oxen. There were no bridges, and it often required forty to fifty head of mules to pull one wagon across the river beds; while at flood times the caravans had to camp and wait. For a long time the lowest going rate from Independence, Missouri, to Santa Fe, New Mexico, was ten cents per pound.

"The first overland stage and mail line was started from Independence, Missouri, in 1849. These stage coaches were built water tight in order to use them for ferries when the streams were too high for fording. The trip was made in two weeks when the Indians were not too thick and the weather fairly good. There are many places to be seen even at this late day on the old trail showing the deep ruts made by old coaches, covering sometimes a space 200 feet in width. Between 1850 and 1858, two other trails were laid out, one from Leavenworth, Kansas, called "Smoky Hill" trail, and the other from Atchison, Kansas, along the Patte River towards Colorado and Utah, called the "Overland Trail."

"The first real stage line to Colorado was the Leavenworth and Pikes Peak Express Line, which made its first trip starting March 27th, 1859, reaching Denver June 7th, a trip of seventy-one days. The route followed was along the divide between the Solomon and Republican rivers, thence northwest to the south side of the Republican to its source, thence southwest to the headwaters of the Beaver, Bijou and Kiowa creeks, thence along the pine ridge to Cherry Creek, thence along the high ridge on the north side of Cherry Creek to Denver, a total distance of 687 miles; afterwards the distance was reduced to 600 miles, and the average time each way reduced to ten or twelve days.

"In 1861, Ben Holiday bought up many of the old stage lines and controlled about 3,300 miles of stage routes; and between 1861 and 1865, the Government was paying Mr. Holiday $1,000,000 yearly for carrying daily mail from Missouri River to Placerville, California, a distance of 2,000 miles, over the Overland Route. Holiday made the trip himself, for a test, from Atchison, Kansas, to Placerville, California, 2,000 miles, in twelve days. Albert Richardson made the trip from Atchison to Denver in four and one-half days, and Butterfield was advertising regular trips from the Missouri River to Denver in eight days, and often made them in six days.

"Very little change has been made in the old Santa Fe Trail. The route being from Holly to La Junta, and from La Junta to Trinidad, then over the Raton Pass

into New Mexico—the Smoky Hill River road, follows what is known as the Golden Belt road, coming into Colorado through Cheyenne Wells, thence via Hugo, Limon and Deertrail to Denver, parallel to the line of the U. P. R. R. route.

"The Overland Trail line has been somewhat changed. It starts from Omaha, and is partly on the north side of the Platte; while in the stage coach days it ran from Atchison and kept on the south side of the river through Julesburg to a point near Greeley, thence to La Porte near Fort Collins, thence to Virginia Dale, thence to Rock Springs, Wyoming." Mr. Bartlett observes this point:

"I have become much interested in statements of the old-timers, that in the stage coach days the roads did not become muddy, even around Denver, where we now have after a slight rain very muddy roads. It is stated that in old times such was not the case. The reason given for this is that the top soil, undisturbed, had become covered with a layer of sand, which packed hard under the wide tires of the freight wagons and stage coaches, and became impervious to water.

"The first stage line was built between Denver and Pueblo in 1862; afterwards followed the famous Barlow and Sanderson lines, which were built throughout Colorado wherever there seemed to be a demand.

"In 1867, the Union Pacific Railroad reached Julesburg, and in June, 1870, the Denver Pacific Railroad was completed from Denver to Cheyenne, thus practically ending the Overland staging. It is interesting to note that before the stage coach period was ended, the famous old "Pony Express" was introduced. It was started April 9, 1860, from St. Joseph, Missouri, running to Sacramento, California. It was the outcome of a fight amongst the Overland stage lines for mail contracts. This express was backed by W. H. Russell, who advertised in advance to make the trip in nine days and four hours. A little later, a branch of this "Pony Express" ran through Denver to Salt Lake City.

"These facts are interesting because today, 54 years later, one could hardly make the trip of 1,913 miles from the Missouri River to the Pacific Coast in the best automobile in the time made by the "Pony Express." In fact, could not greatly better the time of the stage coaches, which were making the trip in twenty-one to twenty-three days.

"During the period from 1861 to 1876 there is no evidence that there was any systematic effort made to build roads. Some special appropriations were made, but the roads were mainly built by the miners and stage companies.

Stretch of state road east of Holyoke, showing splendid maintenance condition.

"Between 1876 and 1887 many roads had been built to reach mining camps, which were developing with great rapidity. The railroad building period was also in its advancing stage and counties were unable to raise road funds fast enough to keep up with the demand; consequently many toll roads were built, all of which have now become free roads. In fact, it may be said that the great road building of the state was during the time between 1876 and 1888. This was a period in which our great pathfinder, Otto Mears, was at his best; it is due to his energy and perseverance that we have many of our present-day roads.

"The period between 1880 and 1902 was known as the bridge building period, due to the fact that the state was able to supply the counties with a certain yearly road and bridge fund from the Internal Improvement Fund, derived from the sale of public lands donated by Congress, and the State of Colorado appropriated sufficient funds for the construction of bridges throughout the state.

"About 1900 the automobile appeared on the scene, and in 1902 forty-two gentlemen who owned automobiles in Denver got together and formed the Colorado Automobile Club, with D. W. Brunton, President, and F. L. Bartlett, Vice-President; the purpose being to start a campaign for better roads.

"Later, clubs were formed at Colorado Springs and other cities, and worked together jointly with the Colorado Club and good roads meetings began to be held.

"In 1905 Governor McDonald issued a call for a State Good Roads convention to be held in Denver July 27-28. Each city and county was asked to send delegates; sixty-five were present, and it was at this meeting that the Colorado Good Roads Association was formed. J. S. Haynes of Colorado Springs was President, and F. L. Bartlett of Denver, Vice-President, and Henry Wray of Colorado Springs, Secretary. Arrangements were made at this convention to call another one shortly and formulate much-needed road legislation.

"The next convention was held in 1906, at the Chamber of Commerce in Denver. Thomas F. Walsh took active part in this, and contributed $500 toward expenses, while the Chamber of Commerce shouldered the balance of the expense, amounting to $1,500.

"The first bill for a State Highway Commission was drawn up and adopted by this convention, and committees were appointed to have it adopted by the legislature—the bill, however, failed of consideration. The Good Roads Association immediately lined up for a campaign in the spring of 1908. The Good Roads Association and the Rocky Mountain Highway Association worked together. The first highway bill was finally passed by the legislature and became a law in 1909, but without adequate appropriation for effective work. C. B. Allen, Wm. M. Wiley and Thos. Tully were appointed State Highway Commissioners in January, 1910, J. F. Maloney being appointed Secretary and Engineer. During 1910, state roads were mapped and laid out and preliminary work was accomplished, but with funds available only for just a beginning of the work. Fifty thousand dollars was all that was at hand for the Commission to encourage the counties to do work along certain improved lines. It was this first

work, together with the hearty co-operation of the road pioneers of the state, that laid the foundation upon which all state highway work since that period has been based.

"In 1911, under the auspices of the Good Roads Association, another convention was held in Denver for the purpose of obtaining further appropriations for the State Highway Commission. This convention recommended turning over the Internal Improvement Fund to the Highway Commission, also the passage of a ten million dollar bond issue.

"The bill appropriating the income fund for the Highway Commission was amended and passed after the legislature had made ninety-three special appropriations. Governor Shafroth vetoed the ninety-three special road bills, turning over the entire Internal Improvement fund to the Highway Commission. The validity of the bill was assailed and the bill was fought through the courts and finally pronounced invalid by the Supreme Court, and the State Highway Commission was thus left without funds, and monies amounting to $800,000 were left deposited in the bank. The Good Roads Association of Colorado continued its efforts, and finally, in 1913, adequate road legislation was secured, making the funds mentioned available for road purposes. This ended the struggle which had been carried on for eight years by a few enthusiastic road boosters."

The new Highway Act was passed by the legislature and approved by the Governor on April 7, 1913—this act provided for the appointment of a State Highway Commissioner and an advisory board of five members. The members appointed were as follows:

T. J. Ehrhart, State Highway Commissioner.
J. M. Kuykendall, Chairman.
Leonard E. Curtiss, Member.
Charles R. McLain, Member.
Charles E. Herr, Member.
L. Boyd Walbridge, Member.

J. E. Maloney was appointed Secretary and Engineer.

This Commission continued working under this law until 1917, when the legislature passed an act amending the 1913 law and provided for the appointment of a State Highway Commissioner and an advisory board of five members. The Commission was appointed as follows:

T. J. Ehrhart, State Highway Commissioner.
L. Boyd Walbridge, Chairman.
Leonard E. Curtiss, Vice-Chairman.
Fred J. Radford, Member.
Frederick Goble, Member.
Lafayette M. Hughes, Member.
J. E. Maloney was appointed Chief Engineer.
Nate Ballou, Secretary.

The Commission operated under this law until May 21, when the act now in force was passed. This law provides for a State Highway Engineer, who shall be the executive head of the department, and an Assistant State Highway Engineer, to be in charge of the engineer's work. Also an advisory board consisting of seven members, all of whom are subject to the direct control of the Governor. These members are:

H. A. Edmonds, Chairman.
Geo. L. Gann, Vice-Chairman.
E. E. Sommers, Member.
Wm. Weiser, Member.
J. A. Clay, Member.
Chas. Lansing, Member.
F. D. Blue, Member.

L. D. Blauvelt was appointed State Highway Engineer, and J. E. Maloney, Assistant Engineer.

The State of Colorado is divided into seven (7) districts, each one of which is represented by one of the advisory board.

For the purpose of administration, maintenance and construction, the state highway was divided into seven districts, each of which is in charge of an Assistant Superintendent of Maintenance for the maintenance of roads, and a Division Engineer, for surveys and construction and supervision.

The Auditing and Accounting end is taken care of by the Accounting Division. In addition to the Accounting Division, Engineering and Maintenance Division, a Purchasing and Traffic Division has been established for the purpose of taking care of the purchases

Section of newly constructed road between Granby and Grand Lake, forming a link in the Fall River circle trip from Denver.

Concrete arch bridge over the Fountain River, near Pueblo, which forms a connection with State Road No. 96.

for the entire department, and repairs and housing of equipment received from the Government. This organization is well under way, and is now in good working condition. This outline of the history of the establishment and changes in the Highway Department brings us up to the present time.

The appropriations for the Highway Department from its organization to the present time will give an index of the gradual increase in its activities.

In 1910, 1911 and 1912 the Commission had a total of $50,000 per year to aid the counties in construction and maintenance, and pay for all salaries and other expenses.

In 1913 the accumulated Internal Improvement Fund was turned over to the Commission and amounted to $766,331, to be expended during 1913-1914.

The motor licenses for the year 1913 amounted to $27,974; and that of 1914 was $38,302. The amount expended in those two years for all salaries and expense, including office fixtures and supplies, was $29,177. In 1914 the state road mileage was 5,842 miles, with a total mileage of all roads in the state of 30,733. The funds of the State Highway Commission were increased in 1916 by a vote of the people, establishing a one-half mill levy for state highway purposes.

During 1915 and 1916 there was a total of $918,200 expended for maintenance and construction upon state highways. At this time the state highways had been increased to 7,083 miles, while the total mileage of all highways in the state had increased to 40,067 miles. The total amount expended for salaries and expenses of the Commission for this period was $29,422. The motor license fund, which was first received in 1913, amounted to $52,853 in 1915; in 1916 this fund amounted to $90,560.

For 1917-18 the State Road Fund had increased to $1,807,000 and the Motor License Fund in 1917 was $135,000. The Motor License Fund in 1918 was $186,000.

In 1919 and 1920 the receipts of the State Road Fund from all sources was $3,343,000. Of this, the Automobile License Fund was $205,000 in 1919, and $450,000 in 1920.

In 1921 the receipts for the fiscal year were $2,462,000 for the State Road Fund. Of this $400,000 was from the automobile receipts.

It will be noted that from 1913 to 1921 the state's half of the motor vehicle license fees had increased from $27,974 to over $400,000. One-half of the Motor Vehicle License Fund was turned over to the counties for use upon county roads. It will also be noted that from $50,000 a year at the establishment of the Commission in 1910, the fund for state road work has been increased to $2,462,000 in 1921. This is exclusive of any bond issue or Federal Aid funds.

In the election of November, 1920, the people voted a five-million-dollar bond issue for road purposes; two million to be issued in July, 1921, and three million in July, 1922. One-half of the proceeds of these bonds was to be apportioned among the counties according to their mileage of state roads within the county—the other half to be used to meet Federal Aid upon state highways. This fund was used to meet Federal Aid during 1921 and 1922.

Federal Aid for State Highways

In 1916 Congress passed a Federal Aid Road Act, making an appropriation for Federal Aid to the states for road work; this appropriation was continued for the succeeding five years. The following amounts were awarded to Colorado:

1916	$ 83,000.00
1917	166,000.00
1918	250,000.00
1919	1,190,000.00
1920	1,711,000.00
1921	1,301,000.00

In 1921 the Federal Road Act was again amended, making further appropriation to the states of Federal Aid, and of this Colorado was awarded $1,341,000.

This outline of the formation and gradual increase of the financial resources of the Commission will in a measure indicate the tremendous change that has taken place in the past twenty years in the affairs of the State Highway Department.

In this state, as in all other states, the increase of road expenditures has been multiplied many times within the last ten years. This, of course, follows the demand created by the large increase in the number of motor vehicles which have come into operation during this period, and which have continued to increase.

A fund of $3,000,000 has been set aside by the California highway department for the construction of grade crossing structures. To date there have been 96 grade separation structures built in California, of which 35 have been overhead crossings and 61 subways. In 1931 there will have been added 34 grade crossing eliminations. There are at present 559 railroad crossings in the coast state.

View of Federal Aid road near Parshall, in Grand County, forming a link in the Victory highway, completed in 1929 by the State Highway Department.

Progress in Forest Road Work

By ALLEN S. PECK, District Forester

THE beginning of a new calendar year is the usual time for taking inventory of a business. For many it means the annual determination of profits and losses. To road builders and those interested in road improvement, it has become a stock-taking time at which it is appropriate to sum up the progress made during the past year and to check against the goal which has been set. Prior to the enactment of the Federal Highway Act in 1921, road work throughout the country was progressing in a more or less haphazard manner, various agencies working independently. Since the passage of that act the work has been well coordinated and is proceeding according to system. It is now possible to plan the work several years in advance and, in fact, to estimate the date of probable completion of the nation's entire highway system.

It is under Section 23 of that act that our forest roads are built. They are of two classes: Firest highways, which are of chief public interest and form important parts of the Federal and state highway systems; and development roads, which are laid out and built primarily for the protection, improvement and use of the national forests and their resources. The total mileage on the carefully selected system of forest roads for Colorado amounts to 1,860 miles of forest highways and 1,685 miles of development roads. Of this mileage, 676 miles of forest highways and 644 miles of development roads are now considered as being constructed up to satisfactory standard for the time being; 1,076 miles of projected forest highways are in unsatisfactory condition and 108 miles are non-existing at the present time. Of the development roads, 672 miles are in an unsatisfactory state and 369 miles remain to have anything done on them at all. These figures, by comparison with those of several years ago, indicate slow but steady progress. At the same time there remains to be done road work on the forest highway system which it is estimated will cost $15,067,826, and on the development system $3,070,861. By far the greater part of the job is, therefore, ahead of us and, in fact, at the present rate of appropriation, which gives a net sum of approximately $300,000 per year in Colorado for the construction of forest highways, it will take fifty years to complete these important links in the road system of this state. In addition to the roads, the Forest Service, out of its road funds, has had to build and is maintaining 11,848 miles of trail. While most of this mileage has been completed, there still remains an estimated cost of $62,300 to finish the job.

Accomplishments during the past construction season have been the building of two and one-half miles of the Dolores-Rico road at an expenditure of about $70,000, of which something over $5,000 was co-operative funds; the completion of the Chicago Creek road between Echo Lake and Idaho Springs at an expenditure of $15,753; the construction of 2.6 miles of the South St. Vrain road between Allens Park and Estes Park at a cost of $11,276; the building of an additional 4.4 miles of the Tennessee Pass road with an expenditure of $79,080 of Government funds and $10,000 allotted by the state; and the building of 5 miles on Willow Creek Pass at an expense of $48,336. In addition to this, over $35,000 of Federal funds was spent in the maintenance of sections of forest highways recently built. It is customary for the Bureau of Public Roads to maintain forest highways for two years after the completion of construction before turning them over to the state or county for maintenance. All of the foregoing construction work has been done by or under the direction of the Bureau of Public Roads of the U. S. Department of Agriculture.

The more important work on the forest development

road system during the past season has been the construction of about 7 miles on the Divide road in Montrose County, at a cost of $21,000. This road is about 75 miles long and we have been working on it since 1920, 25 miles having been built at a cost of about $58,000. We are going to keep at it, but it will take a long time to finish it with our limited funds. Another important project which was finished this past year is the Eagle-Thomasville, with an expenditure of $39,000. The Ripple Creek road in Rio Blanco County was started and the Rio Grande Reservoir road in Hinsdale County was finished. A contract was let for the building of 1½ miles to Blue Lake, in Las Animas County in the San Isabel Forest, to finish a project started several years ago, and work was started on the Clark-Slavonia road in Routt County, this being a 9-mile project to be built in co-operation with Routt County. Five thousand dollars was provided for widening and surfacing 4 miles of very unsatisfactory road on the Grand Mesa, the work being carried out in co-operation with Mesa County. A substantial bridge was built across the Big Cimarron in Gunnison County at a cost of $2,000. The finishing touches were put on the first section of the Newcastle-Buford road in Garfield County, and it was turned over to the county for maintenance. A number of relatively small allotments were made to such projects as the Crystal River road in Gunnison County, Buzzard road in Garfield County, Laramie River road in Larimer County, and the repairing of flood damage in Custer and Montezuma counties and also in various other parts of the state. Eight hundred twenty-five miles of development roads within the national forests of the state were given such maintenance as the available funds would provide up to a total cost of about $30,000, about $8,000 of which was contributed by counties and other co-operators. About 400 miles of trail were built at a cost of $17,000 and $12,000 was spent in maintaining trails already constructed.

The standards to which our roads are built vary considerably. Development roads are classified into light duty, ordinary duty, and heavy duty. The light duty roads are constructed as cheaply as possible and to the narrowest practicable width in order to conserve funds for the more important ones. Very few of these development roads cost over $5,000 and they are much more likely to run $1,500 to $4,000 a mile. Similar distinctions are made in the construction of trails based on the character and intensity of use to which they are to be put. More money is spent on primary trails than on secondary trails, and we also have on our system a considerable mileage of what are designated as "ways" on which very little money is spent. The chief use of these is as emergency trails to get to fires. Forest highways may be grouped into two general classes: those which form connecting links on Federal Aid roads crossing the forests, and those which are not on the Federal Aid system but are of primary importance to the counties or communities. These do, of course, often form important parts of the state highway system.

The program of forest highway projects to be undertaken each year is agreed upon in conference between the State Highway Department, the Bureau of Public Roads, and the Forest Service. This program is then presented to the Secretary of Agriculture for his approval. In making up this program, careful attention is given to priorities as they appear at the time. An attempt is made to forecast projects which are likely to be undertaken in the next or following years and provision is made for the survey of these projects. Consideration of the construction of a project is rarely given except where a survey has been made and an estimate prepared the year before. Priorities change, of course, from year to year, and the survey of a project is by no means assurance that it will be constructed the following year. However, a real effort is made to maintain orderly progress in carrying out the plan for a comprehensive road system.

Recently the amendment of Section 23 of the Road Act has been urged by some to give preference in forest highway expenditures to forest roads which are sections of the Federal Aid system. This would place legal restriction upon the allotment of the funds, which would handicap the State Highway Department, the Bureau of Public Roads, and the Forest Service, and undoubtedly prevent the taking up in the order of importance a number of road projects in Colorado which are very essential links in the state highway system but do not happen to be Federal Aid or 7% roads. Under the present method of programming expenditures through joint conferences, preference has in the past been given to roads which are sections of the Federal Aid system, so that this system has not suffered inside the forests of Colorado—in fact, quite the reverse. It would seem logical, therefore, to keep the Federal Aid and forest highway funds separate and distinct as they have been in the past and not to confuse them, since the forest highway funds have been appropriated upon a basis peculiar to the conditions existing in the na-

(Continued on Page 24)

Molas Lake and Turks Head on Silverton-Durango road, showing newly constructed highway in foreground.

PROGRESS REPORTS FROM DIVISION ENGINEERS

DIVISION 1

By E. E. MONTGOMERY, Division Engineer

F. A. P. No. 279-F: This work was started in 1928 but not completed until the middle of 1929, and eliminates the long, steep grade on Crow Hill near Baileys, which the old-timers remember and which no tourist could ever forget.

Kansas Air Line: State highway on the boundary line between Adams and Arapahoe counties, connecting with the Denver-Limon road at Byers, and traverses a portion of the country formerly known as the Great American Desert, but later corrected, when the mistake was discovered.

Adams and Arapahoe County forces have elevated and surfaced this road from Byers to the Washington County line. and it is now in a satisfactory condition for year-around travel.

F. A. P. No. 149-B: The Denver-Limon Road—Surveys for this much-needed improvement were started in July, in anticipation of the next year's appropriation.

The unusual storms in the late fall and early winter of this year have shown the faulty drainage of the worn out road, and the torn down fences and tracks of automobiles in adjoining fields reveal portions of the road not navigable for machines in wet weather.

One good-natured tourist stopped and asked the boys on the survey party alongside the road if that river he was following flowed through Denver; and another yelled to the boys to build the road 20 feet high, which no doubt seemed about right to him that day.

The proposed work will be the oil-processed gravel type, with the grade elevated, so that the wind will sweep the roadway clean of snow in the winter.

The Advisory Board's Budget for 1930 has funds for approximately 16 miles of this construction easterly from the end of the pavement at the Fitzsimons Hospital.

Loveland Pass: This is a continuation of the highway up Clear Creek Canon from the Berthoud Pass highway at Empire, thence via Georgetown, Silver Plume and Camp Lemen.

The road was completed on the eastern slope to the top of the pass during the past season; and on October 10th the first automobile made the trip from Silver Plume to Dillon.

Next year's work contemplates the completion of two miles of work on the Western Slope from the top of the pass to a connection with the old road from Dillon, which, with a little fixing up, may be used for auto travel, pending the completion of a new road, but the grades on the old road will exceed the maximum of 6% allowable on new work.

Mt. Evans: Many eminent writers have been exhausted in trying to describe the colossal, spectacular, thrilling, awe-inspiring grandeur of the scenery, and on recovery have advised the traveler to go and see for himelf the things that cannot be expressed in words.

The State Highway Department has been for years extending this scenic highway from Echo Lake toward the top of a mountain that is higher than the peak General Zebulon Pike said would probably never be climbed by man.

There remains 1.9 miles of work to complete this highway, which work was let by contract August 8, 1929, and too late to finish during the short working season at that altitude, but will be completed this next summer.

SUMMARY OF WORK ACCOMPLISHED IN CONSTRUCTION DIVISION No. 2 DURING 1929

By J. J. VANDEMOER, Division Engineer

This division includes Delta, Gunnison, Hinsdale, Mesa, Montrose, Ouray, San Miguel and portions of Garfield and Rio Blanco counties. Ten Federal Aid projects and twelve state projects have been under construction during the past 1929 season.

Seven of the ten Federal Aid projects have been completed within the contract time, and it looks very much at this time as if the other three will be completed on time during the 1930 season.

The only Federal Aid project to be completed in Delta County was the elimination of Fools Hill, between Grand Junction and Delta. This grading and graveling project was

A 1,000 foot bridge across the Platte River near Moreno, on the Fort Morgan-Sterling paved highway, constructed by the State Highway Department.

about 3½ miles long. Gardner Brothers & Glenn were the contractors.

Two Federal Aid projects were completed in Gunnison County. One six mile grading and surfacing project was completed by Hinman Brothers between Sapinero and Gunnison, which completes Federal Aid between the two towns.

The other project also consisted of grading and graveling between Doyleville and Sargents and is 3.35 miles long. Ed Honnen was the contractor.

Cole Brothers of Pueblo are also constructing five miles of grading and surfacing across the Blue Mesa in Gunnison County at this time. This project will be completed some time in 1930.

No projects were constructed in Hinsdale County this year.

Three Federal Aid projects were completed in Mesa County this year. One six mile grading and graveling project was completed by Hinman Brothers between Loma and Mack and one 9¼ mile oil surfacing project was completed between Grand Junction and Palisade by Hinman Brothers.

The Clifton viaduct was also completed by Harry A. Rousch.

Hinman Brothers are also constructing at this time ten miles of grading and graveling through the Colorado River Canon between DeBeque and Palisade.

This project will be completed in the summer of 1930.

One Federal Aid project was completed in Montrose County by the Mountain States Construction Company, which consisted of the grading and graveling of three miles of new road over Cerro Summit between Montrose and Cimarron.

One Federal Aid project will be completed early in January by C. V. Hallenbeck in Ouray County. This grading project begins at Ouray and extends three miles north. The construction of this project was greatly hampered by cloudbursts during 1929.

This completes the list of Federal Aid projects under construction during 1929.

The total mileage of Federal Aid projects either under contract at this time or completed during 1929 amounts to almost fifty miles.

There were no state projects of any great importance. Out of the twelve that were under construction, eight are completed at this time. The other four will be continued during 1930.

About twenty miles of state projects were improved during 1929. Nearly all of these were off the Federal Aid system.

About 34 miles of advance surveys on the Federal Aid system have also been made.

This completes the summary of activities for 1929.

DIVISION 3

By J. R. CHENEY, Division Engineer

The year 1929 saw rather more than usual activity in this division. Total active Federal Aid projects for the year include fifteen projects.

147-A, a holdover 1927 job, was completed early in the year. It was a 16 mile surfacing project south of Cortez. Two 1928 projects were completed, namely, 147-B, a gravel surfacing project of 4.8 miles, also south of Cortez, and 262-I, a four mile surfacing job on the west side of La Veta Pass.

Five 1928 projects are in various stages of construction and will average about eighty per cent complete. These are 68-R, a gravel base surfacing job of 1.9 miles on the Gunbarrel road north of Monte Vista. This is in preparation for anticipated paving the coming year.

266-D, a surfacing project, including a 245 foot bridge, 4.1 miles long, on the road south from Durango to New Mexico and connecting at the state line with a recently completed project in that state.

295-D, a gravel surace and bridge job extending north two and one-half miles from Antonito and eliminating two railroad crossings. This project will be oil treated the coming spring.

298-B, a gravel surfacing project of two and four-tenths miles, east of Pagosa Springs. This job, when, as and if completed, will eliminate the finest skating rink for automobiles between Denver and Durango.

300-B, being two and eight-tenths miles of grading above Silverton on the road to Red Mountain. This job is standing proof of the acumen of contractors Hamilton & Gleason in prognosticating the weather. The job was let to them so late in the fall that no one, locally, expected work to be undertaken this season. They moved in on October 26 with what was apparently more courage than good judgment, and succeeded in working practically without weather interruption

View of picturesque Big Thompson highway leading to Estes Park. Constructed and improved with state funds.

until a few days before Christmas, getting the rough grading well along toward completion.

One 1928 project, 243-C, being a gravel surfacing job of three and four-tenths miles, is ready to let.

One 1929 project, 295-BR was completed, this being a gravel surfacing job of 6.6 miles south of La Jara. This was oil treated by state forces after the contract work was completed.

1929 projects under construction include three which will average eighty per cent complete. These are: 147-C, a surfacing job of three and four-tenths miles, south of Cortez.

263-A, a surfacing job of three and four-tenths miles, east of Garland.

270-C, a surfacing job of five miles, west from Alamosa. This project was oiled by state forces.

One other 1929 project, 265-C, which is a surfacing job between Durango and Bayfield, is ready to let.

The last 1929 project, 298-C, is being surveyed, with plans under way on part of it. This is a grading job on the east side of Wolf Creek Pass and will cover the section from Twin bridges toward South Fork.

The above summarized gives four jobs completed for a total of 31.4 miles.

Eight projects under construction for a total of 25.1 miles, all of which should be completed early the coming season.

Two projects for a total of 5.9 miles are ready to be let in January, and one to be let in early spring.

And thus, piece by piece, is progress being made toward a surfaced system of main highways for the great southwestern section of the state.

DIVISION 4

By JAMES D. BELL, Division Engineer

Colorado State Highway Department, Engineering Division No. 4, located in the southeast section of the state, consists of the counties of Baca, Bent, Custer, Crowley, Fremont, Huerfano, Kiowa, Las Animas, Otero, Prowers and Pueblo.

Construction in Division No. 4 for 1929 was slower than usual in starting, and for this reason we will have a large amount of work to carry over into 1930.

During 1929 we completed three concrete paving projects,

ne Utah Rock Asphalt paving project, two bridge projects, wo gravel surfacing projects, and two grading projects. Included in the paving projects were two grade separations.)ne of these was an overhead crossing of the C. & S. Ry. outh of Aguilar, and one an underpass under the A. T. & S. '. R. R. east of Manzanola.

Of the paving projects completed, two were on Road No. and continued the paving north from Trinidad 3.85 miles.)ne project was 1.22 miles, including the overhead, consisting)f a concrete structure of three spans—one span of 60 feet nd two of 45 feet. The other paving project on Road No. 1 vas 1.63 miles in length, and continued the paving through \guilar. Included in this project is a concrete bridge of 120 oot span. A paving project at Manzanola on Road No. 6 is .95 miles in length, and includes in addition to the underpass)ne concrete pile bridge of 50 foot, and one concrete bridge)f 60 foot span.

South Santa Fe Avenue in Pueblo was paved with Utah Rock Asphalt wearing surface on a slag and crushed rock)ase. The length of this project was 0.58 mile.

A gravel surfacing project 6.6 miles in length near Greenhorn on Road No. 1 in Pueblo County was completed. This project involved approximately four miles of new location, and eliminated several steep grades, including the "Greenhorn Hill." This project included two bridges, one a steel truss and one a concrete bridge.

A surfacing project on Road No. 6 west of Portland, 2.43 miles in length, including a bridge of concrete and steel over Hardscrabble Creek, was completed. About one mile of this work is on new location, necessary to eliminate excessive grades.

A 300 foot concrete pile bridge was built over Clay Creek east of Lamar.

A grading project, 9.85 miles in length, leading to Mosca Pass, was completed early in the year.

A grading project on Whiskey Creek, near Stonewall in Las Animas County, was constructed. This project is 2.29 miles in length, involving 100 per cent new location, and considerable rock excavation.

A project 15.6 miles in length, on Road No. 1 north of Pueblo, is now under construction. This project consists of grading, building bridges and culverts, an underpass of the A. T. & S. F. R. R. at Bragdon, etc., in preparation for paving to be placed at a later date. This project includes 75 concrete culverts, which are completed, 11 bridges, 6 of which are completed, and the steel complete in place on the other five. The grading is practically completed. This involved approximately 125,000 cu. yds. of common excavation, 30,000 cu. yds. of rock excavation, and 55,000 cu. yds. of borrow excavation.

Work is started on the Arkansas River bridge at Lamar and the irrigation structures for the paving project west of Rocky Ford are being constructed.

Surveys were made and plans prepared for several projects, including a 5 mile surfacing project on Road No. 12, east of Model; a 7.2 mile surfacing project on Road No. 1, south of Greenhorn; a 1-13 mile paving project on Road No. 1 at Starkville, and a 3 mile paving project on Road No. 6, east of Canon City.

In addition, several stretches of road on the secondary system have been graded and surfaced.

DIVISION 6

By H. L. JENNESS, Division Engineer

Following is a summary of the work in Division 6 during 1929:

Eagle County

Federal Aid Project No. 292-B, a grading and gravel surfacing project 2.640 miles in length extending from the foot of Battle Mountain to Minturn, was started May 13, 1929, by O. J. Dorsey, the contractor, and finished October 25, 1929.

Federal Aid Project No. 292-C, a grading and gravel surface project 1.646 miles in length extending from Avon toward Wolcott, was started May 23, 1929, by E. H. Honnen, the contractor, and finished October 25, 1929.

Federal Aid Project No. 78-R, an overhead railroad crossing and bridge over the Eagle River, with graded and gravel surfaced approaches, was started October 5, 1929, by The J. Fred Roberts & Sons Construction Co., who have continued work during the year 1929. One concrete pier is complete and the concrete poured for the footings for the abutments of the railroad crossings; also, excavations are in progress for the piers and abutments over the Eagle River.

State Project No. 656, a wire cable guard rail on Battle Mountain extending from Gilman toward Red Cliff a distance of one-half mile, was started July 10, 1929, by C. A. Switzer, the contractor, and finished November 16, 1929.

A section of the Glenwood Canon highway along the Colorado River.

Survey for Holy Cross Highway from the foot of Battle Mountain to Camp Tigiwon, a distance of 6.272 miles, started May 13, 1929, and finished June 29, 1929, using two survey parties, and plans were completed in the Rifle office. The survey line travels through a very rough, steep section of mountainside.

Garfield County

Federal Aid Project No. 282-H, a grading and gravel surfacing project, six miles north of Rifle on the Rifle-Meeker Highway, 7.029 miles in length. This project connects Federal Aid Project No. 282-C and Federal Aid Project No. 4 and was started April 22, 1929, by Winterburn & Lumsden, the contractors, who worked during the year and have it 85% completed.

State Project No. 728 was a dry rubble retaining wall with backfill at the east entrance to Glenwood Springs, which eliminated a very dangerous, narrow section of highway at a blind curve. Started March 5, 1929, by C. A. Switzer, the contractor, and finished April 17, 1929. The length of retaining wall is 320 feet.

State Project No. 729, an earth grading project 2,844 ft. in length, east of Carbondale at Catherine, connecting a 1928 state project with the old Midland grade, was started April 2, 1929, by C. A. Switzer, the contractor, and finished May 25, 1929.

Grand County

Federal Aid Project No. 138-A was finished October 15, 1929. The contractor, F. L. Hoffman, worked during the year on this grading and crushed gravel surfacing project, 10.957 miles in length, extending from a point 9.6 miles north of Kremmling toward Muddy Pass.

Federal Aid Project No. 138-B, a grading and crushed gravel surfacing project 3.133 miles in length, was started July 11, 1929, by F. L. Hoffman, the contractor, who worked during the year until forced to quit by weather conditions. This project extends from a point 20.5 miles north of Kremmling toward Muddy Pass.

State Project No. 627-C was a project to reconstruct the Potato Hill bridge across the Colorado River, located one and one-half miles east of Hot Sulphur Springs, the bridge being 132 feet in length. The work was started April 15, 1929, by C. A. Switzer, the contractor, and finished May 17, 1929.

State Project No. 628 was the grading and gravel surfacing of sections of the highway from Granby to Grand Lake. Grand County, the contractor, started work June 12, 1929, and finished August 7, 1929, having worked over sections aggregating approximately 4 miles in length.

Survey from Fraser to Tabernash started October 29, 1929, and was finished December 7, 1929. The length of the lines run is 9.467 miles.

Survey on the Grand Lake-Granby highway from its junction with the Victory Highway near Granby to Camp Ouray was started November 11, 1929, and finished November 30, 1929. The length of line run was 3.7 miles. This survey was made for a 1930 state project.

Jackson County

State Project No. 629-C, a grading project extending from the top of Muddy Pass a distance of 3 miles to Grizzly Canon,

was started by Jackson County, the contractor, June 15, 1929, and finished October 30, 1929.

State Project No. 740 was a grading project in King's Canon approximately 15 miles north of Walden on the Walden-Laramie Highway, one-half mile in length, and was started June 10, 1929, by Jackson County, the contractor, and finished August 27, 1929.

Moffat County

Federal Aid Project No. 150-A is a grading and crushed gravel surfacing project starting 9 miles west of Craig and extending toward Lay for a distance of 8.227 miles. This project was started October 2, 1929, by Gardner Bros. & Glenn, who worked until forced to close down by weather conditions, having done 11% of the required work.

Federal Aid Project No, 282-A, Reopened, was a project for constructing a rock fill bulkhead 750 ft. long on the north side of the Yampa River at the bridge on F. A. P. 282-A. This project was started in 1928 and the contractor finished it May 9, 1929.

Federal Aid Project No. 282-G is a grading and crushed gravel surfacing project 5.147 miles in length, starting on the Craig-Meeker road 3 miles south of Craig and ending at Wise Hill. The contract was let October 15, 1929, and the contractor has not started active construction, but is working during the winter crushing and stock piling gravel for surfacing.

Pitkin County

State Project No. 509-C is the constructing of one mile of wire cable guard fence on Independence Pass, one-half on the east side and one-half on the west side. This work was started August 26, 1929, by C. A. Switzer, the contractor, and finished October 26, 1929.

Rio Blanco County

Federal Aid Project No. 282-E is a grading and gravel surfacing project starting in the town of Meeker and extending north for a distance of 6.421 miles toward Craig and connecting with Federal Aid Project No. 282-D. This project was finished August 14, 1929, by Luke E. Smith, the contractor, having been started in 1928.

Survey from Nine Mile Hill at the end of Federal Aid Project 211 (a point 11 miles north of Meeker) to Axial, the survey covering a distance of 14 miles, consisting of alignment, profile, cross sections and topography. Started August 12, 1929, and finished November 27, 1929.

Routt County

Federal Aid Project No. 253-D is the grading and crushed gravel surfacing of a section of highway 2.547 miles in length extending from a point three-quarters of a mile east of Bear River, through the town of Bear River and the town of Mt. Harris to a point one-quarter mile west of Mt. Harris. This project was started September 14, 1929, by Hamilton & Gleason, the contractors, who will work all winter, having done 22% of the required work.

State Project No. 634-B is a grading project being done by state forces with a department-owned shovel. This project starts at Oak Creek and extends north, being the grading of a very heavy rock hillside; the grading of 3 miles will be completed this year.

Survey of preliminary type consisting of angle line and profile 15.5 miles in length was made between Junction City (near Haybro) and Milner, starting June 26, 1929, and finishing July 26, 1929.

Summit County

State Project No. 513 is a grading project on the north side of Hoosier Pass near the top of the pass. This project was started June 21, 1929, by Summit County, the contractor, and finished September 28, 1929, and was 3,000 ft. in length.

DIVISION 7

By A. B. COLLINS, Division Engineer

Federal Aid work in Division 7 during 1929 was again confined to a small number of projects on principal highways, heretofore committed to improvement.

A total of $458,651 was allocated to four projects, the most important of which, Federal Aid Project No. 175-A, carried an appropriation of $250,000 and provides for the construction on new location of forty-two miles of earth graded and drained road between Sterling and Ovid, in Logan and Sedgwick counties. This road will be extended to the Colorado-Nebraska state line a distance of ten miles, and gravel surfaced and oiled under future appropriations.

Due to difficulties encountered in securing the necessary right of way, the project was not gotten under way until September 20th, at which time Cole Brothers Construction Company, successful bidders for the work, started operations with three power shovels, two elevating graders and a team outfit. The work involves 690,000 cu. yds. of borrow fill, the construction of 623 feet of standard creosoted pile bridge, and the installation of 133 minor drainage structures. January 1, 1930, about 200,000 cu. yds. of embankment had been placed.

The second most important work in Division 7 for the year of 1929 was the extension of the paving on State Road No. 2 west from Wiggins, in Morgan County, a distance of

Showing one of the switch-backs on the Flagstaff Mountain highway near Boulder.

State highway maintenance forces clearing snow from highway leading south and east of Craig, in Moffat County.

5.59 miles, and designated as Federal Aid Project No. 287-A-5. The project carried an appropriation of $183,651, contract for which was let to Edward Selander in April, 1929, who completed the project in his usual expeditious manner. The first pavement was laid June 11th, and completed August 10, 1929, the entire project being ready for final acceptance September 30, 1929. This road had been graded and drained under previous appropriations, and this improvement was the second phase of improvement, complying with agreements for the eventual improvement of this road entered into between the State of Colorado and the United States Bureau of Public Roads.

Paving on this road is now continuous from Fort Morgan west a distance of nineteen miles. On the completion of contemplated work in 1930 there will remain only nineteen and one-half miles to complete the paving on State Road No. 2 between Greeley and Sterling.

Federal Aid Projects 286-BR-2 and 286-A-1, carrying an appropriation of $25,000, provided for the oil processing of State Road No. 3, between Nunn and the Colorado-Wyoming state line, a distance of 21.8 miles. This section of road had been graded and surfaced with crushed rock under preceding appropriations.

Oiling operations were conducted with state-owned equipment, operated with state forces, supplemented with rental equipment from Weld County.

Wyoming and California Asphaltic Road Oils with 60-70 penetration were used, with an indicated application of 1.55 gallons per sq. yd. for a three-inch mat. The resultant road has so far proven eminently satisfactory and justifies the belief that with further work along these lines a satisfactory intermediate type of surfacing may be developed for properly stabilized and adequately drained roadbeds.

On State Road No. 123, between Fort Collins and Laramie, Federal Aid Projects 144-A, B, and C, graded and surfaced for a base course under previous appropriations, were given an additional three inches of surfacing and oil processed. The total length of the projects involved was 10.8 miles.

The work was conducted with state owned and operated equipment. An indicated usage of 1.55 gallons of oil per sq. yd. for three inches in depth was obtained.

It is felt that this project demonstrates clearly the advisability, where possible, of establishing a satisfactory base, the material to be oiled windrowed along the sides, to be spread in position just in advance of oiling. When handled in this manner the amount of material receiving oil is under closer control than where it has to be developed by scarifying the roadway.

Taken as a whole, the season just closed has offered more favorable working conditions than have been encountered in a number of years. All Federal Aid projects with the exception of F. A. P. 175-A, discussed elsewhere in this resumé, were started reasonably early in the season and pushed to early completion.

The same conditions prevailed with reference to state projects in the division. With the advent of favorable working conditions in the spring, state projects were gotten under way with state and county forces and equipment and crowded to early completion.

All state projects in the division with the exception of state project 580-C, in Weld County, between Roggen and Wiggins, were on a fifty-fifty participating basis between state and county. It is desired to acknowledge this participation and express appreciation to the various counties of the division for their co-operation.

The largest state project in the division, designated as state project No. 580-C, provided for clay and gravel surfacing State Road No. 54, between Roggen and Wiggins, the road having been graded under previous appropriations.

This road is difficult sand hill construction, requiring the application of approximately sixty cu. yds. of clay and twenty cu. yds. of gravel per 100 ft. station in order to produce a stable condition adequate to carry the traffic. Due to unfavorable weather conditions work on the project was suspended in November. To date fourteen miles have been clay surfaced, six miles of which have been given a wearing surface of gravel. Work on the project, which carried a $30,000 appropriation, was conducted with local trucks operating on a yard mile basis, an average of twenty-four trucks being employed on the project.

In Weld County a joint state and county appropriation of $20,000 was used to grade and surface State Road No. 54 from Fort Lupton west to the county line, a distance of twelve miles. County equipment, operating under the supervision of the State Highway Department, carried on the work, which was completed in August.

On State Road No. 14 in Weld County, between Ault and the Weld-Larimer County line, a joint appropriation of $10,000 was used to gravel surface the road, graded under a previous appropriation. This work was completed with county hauling equipment, operating on a yard mile basis in the early part of April.

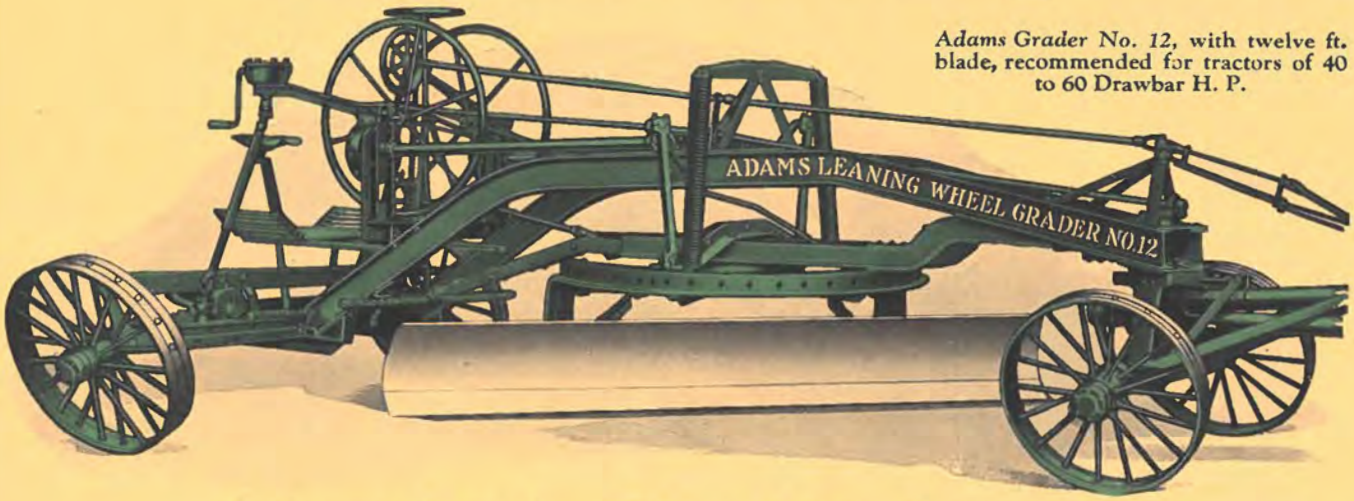
Joint appropriations totaling $20,000 in Logan and Phillips counties were used to grade and drain twenty-one miles of State Road No. 14, beginning at the Phillips-Logan County line and extending east nine miles toward Holyoke, and west twelve miles toward Sterling. This work is on the direct line between Sterling and Holyoke and is the 1929 contribution to a tentative three-year program for the completion of this road.

Other small appropriations in Yuma and Washington counties were met with equal amounts by the counties, and were used for minor improvements on isolated sections of the principal state roads within these counties—a matter of "glorified maintenance" rather than new construction.

Taken on the whole, the year's program for road improvements in Division 7 has been satisfactorily consummated, rather negligible balances on four minor projects being carried over into 1930.

An interesting event on October 27, last, was the opening of a highway known as Hutchinson Road, which runs parallel with the Boston Post road from Pelham Manor to Westchester Avenue, midway between White Plains and Port Chester, N. Y. No less than twelve bridges, in addition to one cut through an embankment, carry the highway to Westchester Avenue without a grade crossing. It is eleven miles long and costs more than $10,000,000 to complete.

Do More, Last Long in the Long Run!



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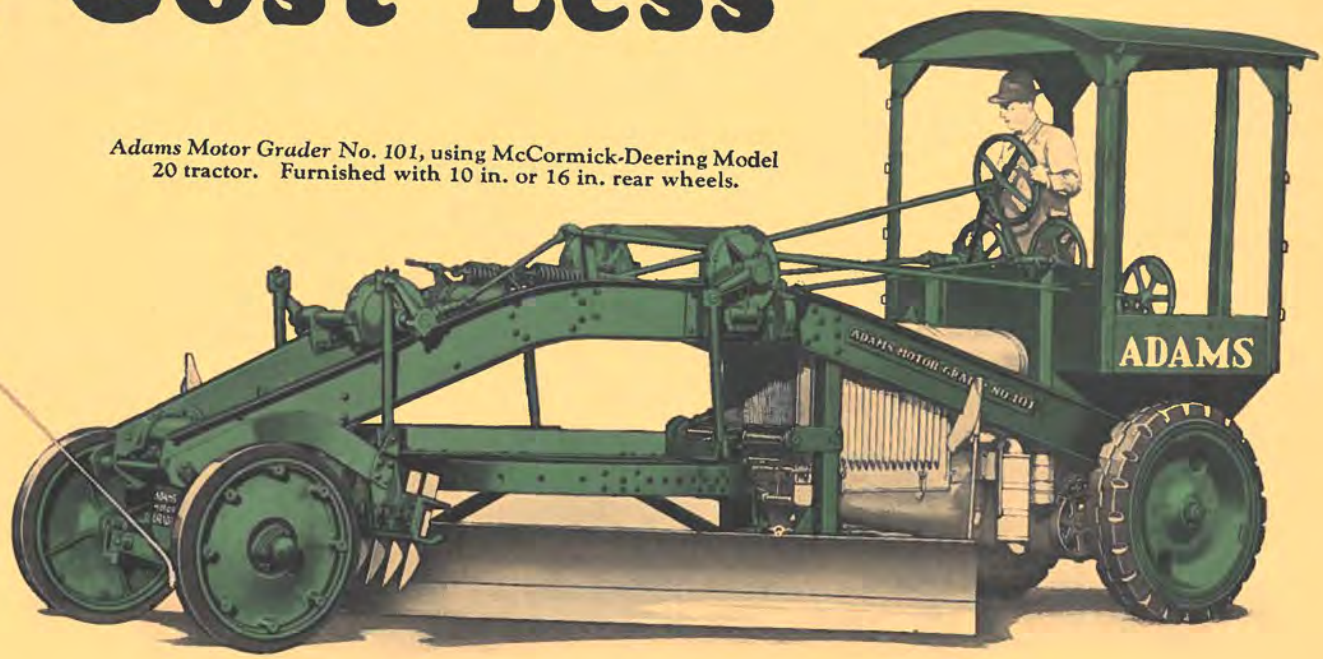

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GRADERS

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County Commissioners to Meet in Denver

THE annual convention of the Colorado State Association of County Commissioners will be held in Denver on January 21, 22 and 23. All sessions of the conference will take place in the state capitol building. This is the twenty-second conference of the association.

Mayor Benj. F. Stapleton of Denver will welcome the commissioners to Denver. There will be addresses by Gov. Wm. H. Adams and W. H. Bartell, vice-president of the association.

On the program are some of the most prominent citizens of the state. Included among the speakers are J. W. Johnson, of the U. S. Bureau of Public Roads; William Weiser, member of the State Highway Advisory Board, and Allen S. Peck, U. S. Forester.

Entertainment features of the convention include luncheons and banquets, among them being luncheons by the H. W. Moore Equipment Co. and H. P. Wilson Machinery Co. Also, there will be the traditional Hardesty banquet.

Officers of the association are: R. A. Miller, president, Arapahoe County; Wm. H. Bartell, vice-president, El Paso County; Lynn Kennedy, vice-president, Garfield County, and Fred O. Pearce, secretary-treasurer, Adams County.

The full program of the conference follows:

TUESDAY MORNING, JAN. 21, 1930

9:30—Call to Order.
Registration of Counties.
Introduction of New Members.
9:50—Invocation.....Rev. J. C. Hoover
Pastor First Baptist Church, Englewood
10:00—Address of Welcome.....Hon. Benj. F. Stapleton
Mayor of Denver
10:10—Response.....Wm. H. Bartell
Chairman Board, El Paso County
10:20—Address....Hon. Wm. H. Adams, Governor of Colorado
10:30—Reports.
10:45—"Aims and Purposes of Colorado Association"....
.....Dr. B. M. Rastall, Executive Vice-President
11:30—"A Better Highway Program for Colorado".....
....Clarence Werthan, Secy. Rocky Mt. Motorists, Inc.
Appointment of Committees.
Adjournment for lunch. The Convention to be guests of H. P. Wilson Co. at their office and warehouse, 1936 Market St. Cars will be in readiness at 12 M. sharp.

Afternoon

2:00—"Federal Aid and Maintenance".....J. W. Johnson
Federal Aid Dept., U. S. A.
2:15—"State Highways and Maintenance"...Wm. A. Carlson
Chairman Board, Weld County
2:45—"Highways and Business'.....Chas. C. Gates
Denver Chamber of Commerce
3:15—U. S. Forestry Department, "Roads and Grazing"..
.....Allen S. Peck, U. S. Forester
3:45—"State Highways and Colorado".....Wm. Weiser
Member State Highway Advisory Board
4:15—"Experience with Oiled Roads".....Clyde Walters
State Highway Department

WEDNESDAY MORNING, JAN. 22, 1930

9:30—Call to Order.
"Correction of Civil Service Abuses"..Philip Hornbein
Attorney at Law, City and County of Denver
10:00—"Taxes and Valuations".....Geo. L. Loomis
Loomis-Larsen Investment Co., Denver
10:30—"Poor—How Handled in Logan County"..B. F. Ragatz
Deputy Commissioner of Poor, Logan County
11:00—"The Colorado Tax Commission".....E. B. Morgan
Chairman Tax Commission
11:20—"Our New Laws".....Senator John J. Tobin
from Colorado
11:40—"The Commissioners and the General Assembly"..
.....Rep. E. C. Johnson, Minority Floor Leader
Adjournment for lunch. The Convention to be guests of H. W. Moore & Co. at their office and warehouse, 6th and Acoma. Cars will be in readiness at 12 M sharp.

Afternoon

2:00—"Colorado Economics".....Edw. T. Leach
Editor Rocky Mountain News
2:45—"Does Colorado Need a New Constitution?".....
.....Representative W. L. Knous of Montrose
3:45—"Corporation Assessments".....John R. Wolff
County Attorney, Boulder County
4:15—Questions. Discussions by members from the floor.
6:30—Traditional Hardesty Banquet.
8:00—Open House, John A. Crook and Wife.

THURSDAY MORNING, JAN. 23, 1930
EXECUTIVE SESSION

9:30—Report of Legislative Committee..Judge V. H. Johnson
Cheyenne Wells, Colo.
10:15—"Gas Tax Exemptions." Discussion led by Wm. D. Rees of Pueblo County.
10:45—"The County Nurse." Discussion led by R. P. Lewis of Otero County.
11:15—"Tuberculosis".....Senator Chas. F. Horn, Pueblo

Afternoon

2:00 P. M.—Reports of Committees.
Necrology.
Eulogy by some member from the county where deceased served.
Auditing.
Resolutions.
Appointment Standing Committees.
Meeting Place Next Year.
Election of Officers.
Adjournment.

Weld county gives its shovels and other heavy equipment fast, time and money saving rides on a new six-wheel 15-ton heavy duty trailer. Speed in transportation of heavy machinery from one job to another keeps their machinery on production schedules. Weld county has over 5,000 miles or roads to maintain throughout the year, a goodly number of them school bus routes.

A state highway maintenance patrol near Texas Creek in Fremont County.

Newly constructed scenic highway bridge over the Royal Gorge near Canon City.

Flying Span Bridges Royal Gorge

BUILDERS of Colorado have forced a road to the top of Pikes Peak and a tunnel beneath James Peak. More spectacular than either of these feats is the bridging of the Royal Gorge or the Grand Canon of the Arkansas near Canon City, Colorado.

The gorge proper is a chasm seven and one-half miles long, 2,600 feet deep at the deepest point and averaging about 1,000 feet in width. The canon walls are of varicolored granite and are almost sheer.

Only six miles from the Canon City-Salida highway on U. S. 50, the north rim of the gorge has been a tourist attraction for years. Visitors with a vivid imagination have often pictured a bridge across the narrow canon.

Some twenty years ago George E. Cole, a Houston, Texas, engineer, visited the gorge and the idea of a bridge began to haunt him. Last year Lon P. Piper and the Royal Gorge Bridge and Amusement Company drafted Cole to make plans for his dream bridge.

Construction was started on June 6, 1929, and six months and three days later the span was finished. Dedication ceremonies were held December 8, 1929.

The bridge is more than twice the height of any other similar structure in the world and has the longest span of any bridge west of the Mississippi River. The span across the Grand Canon of the Colorado at Lee's Ferry, Arizona, is but 467 feet high and the bridge at Twin Falls, Idaho, across the Snake River is 500 feet high.

The Royal Gorge bridge is 1,053 feet above the bed of the stream.

The new bridge is in all respects a native of Colorado, since all the products used were made in the state. All steel used was made to rigid specifications at the Minnequa plant of The Colorado Fuel and Iron Company in Pueblo.

The main span of the bridge is 880 feet in length and the total length, exclusive of approaches, is 1,260 feet. The roadway is 18 feet wide and is protected by a guard rail 4½ feet high.

Two pairs of towers 150 feet high carry the two supporting cables across the canon. The tops of the towers are 75 feet above the floor of the bridge. The cables in the center have a sag of 1/15 of the span.

The main cables are passed over steel castings weighing 3,590 pounds each, which are placed on top the towers. Clamps weighing 200 pounds each are used to fasten the cables in place. The main cables are 9 feet closer together in the center of the span than at the towers.

Each supporting cable is made up of 2,100 strands of special Colorado Fuel and Iron Company No. 9 stranded copper-bearing wire. More than 1,300 MILES of this wire was needed to make up the two cables.

In placing the first strand of wire across the chasm a man was lowered from each wall carrying the end of a wire. At the bottom of the canon the wires were clamped together and drawn up. Then a special carriage, invented by Cole, was used to carry the strands of wire back and forth across the canon to form the cables.

In the center of the span, 1,100 feet above the river, two cages were fastened and in these trained engineers guarded the tension of each strand of wire as it was drawn between the towers.

As the cables were finished they were banded at intervals of 10 feet to hold the wires in a compact bundle. On other bridges of this type throughout the country wire has been wound laterally around the cables to protect the supporting strands from the weather. The copper-bearing steel wire used in this bridge will not deteriorate in Colorado weather and does not need this protection.

Each wire placed in the supporting cables of the

bridge was tested and has a tensile strength of 120,000 pounds to the square inch. The cost of testing the wire equalled the cost of manufacture.

Anchoring the cables of the bridge to the solid granite at either end presented a problem. Finally, trenches four feet square and 100 feet long were dug in the stone. At the bottom of each trench 100 two-inch pipes were set three feet into bed rock and fastened by the sulphur process.

In each pipe were placed twenty-one wires of the cable and then a rod was forced into each pipe holding the wires. Concrete was then poured into the trenches, filling them level with the surrounding stone.

The floor of the bridge is made of Oregon fir, grown in Colorado. The bridge flooring is carried on fifteen-inch steel "I" beams and on nine lines of eight-inch "I" beams used for joists. The floor timbers are twelve by three by eighteen feet.

At ten-foot intervals 1⅛-inch steel rods are fastened through the flooring and clamped to the supporting cables. These can be adjusted by means of a nut underneath the steel "I" beams.

The bridge floor is cambered and is six feet higher at the center than at the ends. Under a twenty-ton concentrated load there is a deflection of only 3½ inches.

Sidesway in the long span is prevented by cables leading from the ten-foot panel rods to the canon walls. On the opening day, in spite of very high winds and a large crowd on the bridge, there was no evidence of swaying.

Rapidly nearing completion at the bridge site is a cable railway which will be little less spectacular than the bridge itself.

Starting from the bottom of the gorge at a point near the famous Hanging Bridge of the Denver & Rio Grande Western Railroad, cars holding twenty-one persons will be hauled up the side of the canon to the end of the bridge.

The cable way is 1,700 feet long and has a grade of 100 per cent, or 45 degrees.

Attracting the attention of the world, the new Royal Gorge bridge will cause many tourists to come to Colorado to see this spectacular engineering feat. All-weather highways lead to the bridge and soon a series of drives opening a new scenic district will be completed.

Colorado products used in Colorado wonders will always attract attention of the world.

Progress in Forest Road Work

(Continued from Page 11)

tional forests. These funds are in recognition of the obligation of the Federal Government as a non-tax-paying landholder to do its share in public road construction through its property, and it would seem that there is just as much obligation to construct roads of county and community interest as to concentrate entirely on those which are parts of the through interstate trunk lines. It is to be remembered also that the regular Federal Aid appropriations are available to be spent inside of the national forests as well as outside.

A few figures will, I believe, make clear the situation with regard to the two groups of forest highways.

Royal Gorge Bridge, showing railroad tracks 1,053 feet below.

Of the total forest highway mileage of 1,860, 423 miles lie on the Federal Aid or 7% system. The total cost of constructing this entire mileage is estimated at $3,805,327. Of this class of road, 271 miles have been built at a cost of $2,111,507. There thus remains to be built the relatively small amount of 152 miles, at an estimated cost of $1,693,820. As contrasted with the foregoing, there are 1,437 miles of forest highways which are not on the Federal Aid system, but constitute important links in the state highway system and roads of chief interest to counties and communities. The total estimated expense of building this block of roads is $15,429,683. There have thus far been built only 405 miles, at a cost of $2,055,677, and there remains to be built the large amount of 1,032 miles, at an estimated cost of $13,374,006. To attempt to paint this picture in percentages: the Federal Aid forest roads call for only 20% of the total estimated cost of the entire system, while the other roads not on the Feedral Aid system call for 80% of the cost. Up to date, however, 51% of all expenditures have been applied to the first group—Federal Aid roads—the balance, or 49%, having been put on the other class, which constitutes nearly 80% of the total mileage.

The Uintah Basin Industrial convention held recently at Fort Duchesne, Utah, sponsored a movement for beautifying the Victory Highway from the Colorado state line through to the Duchesne-Wasatch line. This is a movement to attract tourists from Colorado through the Uintah Basin.

McCORMICK-DEERING INDUSTRIAL TRACTORS

FLEXIBILITY to combine with a great variety of road equipment has made the McCormick-Deering Industrial Tractor the standard power plant for the construction and maintenance of roads. It provides abundant power as a separate or built-in unit. Service through an unequaled branch and distributor organization in the United States and Canada. Catalog on request.

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One of the many applications of the McCormick-Deering Industrial Power Plant is shown above where it is operating a derrick shovel on a big road project.

International Trucks

have reduced hauling costs in the road building industry by their economical operation. The Heavy-Duty Trucks are big, sturdy units for the heaviest work you have. International Speed Trucks are fast and do a lot of hauling in short order.

The McCormick-Deering's simplest service is hauling trailers, as above, where it is handling many yards of materials between the mixer and the job.

Below: The Texas Highway Commission owns several hundred McCormick-Deering units. This fleet shows eight graders powered by the McCormick-Deering that keep the roads of the Lone Star state in excellent shape.

H. W. MOORE EQUIPMENT CO. *Sales Agents* 120 West 6th Avenue DENVER, COLORADO

Congress Speeds Road Finance

By JAMES W. BROOKS

HEARINGS on the measure introduced by Representative Dowell of Iowa, chairman of the House committee on roads, to increase Federal Aid for highway construction from $75,000,000 to $125,000,000 a year beginning with 1930, have been concluded in the regular course of legislative procedure.

Out of the details involved came the significant fact that never before since modern highway improvement was inaugurated twelve or thirteen years ago has there been given such wide and effective support to this phase of national progress.

Foremost in placing the facts before Congress as to highway needs in the various states was the American Association of State Highway Officials, to whose membership is entrusted the responsibility of getting the work done. These officials were supported by such national organizations as the United States Chamber of Commerce, the National Manufacturers Association, the American Federation of Labor, the National Grange, the National Automobile Chamber of Commerce, the American Farm Bureau Federation, and the American Automobile Association. In connection with the support given by the American Farm Bureau Federation, an interesting bit of highway history was brought out in the fact that this farm organization began passing resolutions for road improvement forty years ago, and that at each successive Congress similar resolutions have been presented.

Two points in particular were made at the hearings, however, that fall short of the mark. One statement was to the effect that "the quicker the United States can complete its system of transportation, the quicker we will reach the apex of our prosperity." So far as the actual completion of highway building in the United States is concerned, this can never be, for however well the work may be done, there will still be more to do. With approximately twenty-five million motor vehicles already on the road, the extension, widening and rebuilding of highways must continue with unabated energy. It is as if some great giant were feverishly engaged around manufacturing centers forging new vehicles for modern transportation and throwing them out on the roads red-hot. So long as makers of automobiles keep this up, there will be a continuing need for roads.

The second point made at the hearings was in regard to the employment of labor, a very necessary and a very desirable goal, to be sure, but beyond that is the matter of holding down motor vehicle operating costs. As to labor as a necessary factor in continued prosperity, however, it has been found upon careful investigation by state highway departments that in building roads of whatever type forty per cent of the cost goes to labor. The percentage is even more than that, when the manufacture of materials and other contributory items are taken into account.

Highway pavement, when laid in logically connected systems, as state and Federal highway engineers are now doing, will clip a penny a mile, at least, off of every motorist's gasoline bill. With 25,000,000 motor vehicles using highways at the average rate of 3,000 miles a year each, a penny a mile saved with pavement is something to think about.

Seventeen states, according to published figures, have constructed more than 100 miles of pavement in 1929. They are: Iowa, 765; Illinois, 632; New York, 537; Pennsylvania, 500; Michigan, 474; Wisconsin, 326; Indiana, 308; Ohio, 279; Tennessee, 226; New Jersey, 222; Louisiana, 214; South Carolina, 184; Oklahoma, 178; Arkansas, 157; North Carolina, 153; Minnesota, 112; Alabama, 106.

This year's total will bring Iowa's total paved mileage to about 2,400. At the present rate Iowa's program of paving 5,000 miles will be completed in a little more than three years. Although Wisconsin paved less than half as many miles as Iowa this year, its total is still larger than Iowa's, or about 2,800 miles.

Colorado paved about 70 miles in 1929, of which fifty miles was the new low-type oil process pavement, and twenty miles being concrete pavement.

Showing snow removal on Tennessee Pass highway by state forces. This work continues throughout the winter months.

Drive Over SANTA FE DRIVE

WHEN YOU ARE IN DENVER

DRIVE OVER THREE TYPES OF SURFACING!

On Santa Fe Drive you can test the driving ease and smoothness of "Mixed-in-Place" Road Oil type of construction from Alameda Ave. south to Iowa Ave.; Midwest Asphalt Pavement from Iowa Ave. south to Petersburg, and concrete pavement south from Petersburg.

~ not "Pavement" but a "MIXED-IN-PLACE" ROAD made with ASPHALTIC ROAD OIL!

A delight to motorists—the "Mixed-in-Place" Road between Nunn and the Colorado-Wyoming state line, made with Midwest Asphaltic Road Oil.

View of the improved highway between Alamosa and Monte Vista—another Midwest Asphaltic Road Oil "Mixed-in-Place" job.

SEEING IS BELIEVING—so when in Denver see, examine and drive over Santa Fe Drive south from Alameda Ave. to Iowa Ave. This is a good sample of "Mixed-in-Place" road construction with Asphaltic Road Oil—*and was constructed at a cost of less than $3,000.00 per mile, including cost of gravel!*

This street was opened to traffic on October 4, 1929, and since then an average of *thirty-five hundred vehicles,* including dozens of heavily loaded trucks—also many horse-drawn vehicles—have used this road every day and *it is standing up under this heavy punishment!*

DUSTLESS AND MUDLESS

Midwest Asphaltic Oil "Mixed-in-Place" Roads have no cracks, are little affected by frosts and freezing, and no expansion joints are necessary. There is no dust—no mud—even snow fails to stick and slush soon disappears. A graveled road loses annually, through wind action and erosion, one inch of material. This represents a loss in money amounting to over one-half the cost of a lasting, dustless, mudless Midwest Asphaltic Oil "Mixed-in-Place" Road! The use of this type of construction binds the gravel together so there will be absolutely no loss of road material. This method of construction gives "more miles per dollar" of smooth, durable and entirely satisfactory road than offered by any other method of improved road construction. ASK THE MOTORISTS — THEY PREFER OILED ROADS!

MIDWEST ASPHALTIC ROAD OIL always meets specifications—is always of uniform high quality. You can buy no better road oil at ANY price!

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"MOUNTAIN MADE FOR MOUNTAIN TRADE"

THE CAR, THE ROAD AND THE DRIVER

*By FREDERIC A. REIMER

THE eternal triangle of vehicle traffic is the car, the road and the driver. Safety is a major factor of construction of the car and the highway, but is not viewed as paramount in the most important angle of all, the mind of the driver. The safety triangle is not yet complete.

The motorist sets forth in a motor car equipped with four-wheel brakes so that it may stop quickly and with balloon tires which tend to hold it steady on the pavement. The steering wheel could be operated by a mere child, it works so gently. The springs and shock absorbers eliminate fatigue, which is the arch enemy of safety. Improved transmission and reserve engine power for uniform acceleration at all speeds enable him to travel swiftly, yet safely.

He knows that automobile manufacturers are spending huge sums continuously for research looking toward greater safety and better performance in their products. He knows that amazing progress has been made along these lines since the first cars were built.

As he drives along, he finds most of the dangerous curves that once marred the road have been straightened or super-elevated so that he scarcely needs slacken his speed. Some have been removed entirely by relocation of the road.

A white streak in the center of the paved road divides the two lanes of traffic, particularly at curves or the approach to the peak of a hill. If he drives in his lane and the fellow motorist going the opposite way observes the center stripe also, there can be no collisions. The state of Ohio alone spent almost $50,000 for this form of motorist's protection in 1928.

Where the road follows along a cliff or steep bank he finds guard rails on the outer edge which will prevent a car from going over under any ordinary conditions.

Everywhere are to be seen warning signs, such as "Sharp Curve," "Steep Hill" and similar designations, erected to help along with highway safety.

Many of the dangerous railroad crossings that once claimed human lives with startling regularity have given way to beautiful structures that separate the railroad from the highway and forever remove the danger of collisions there. Where crossings are still on the same level, he often finds them protected by flashing and moving signs and ringing bells.

On dirt roads he finds that treatment by oils has removed the old-time dust hazard. On both dirt and paved roads he finds the trend is toward smoother, safer surfaces. Once dangerous one-way bridges and traffic bottle-necks are rapidly disappearing and thousands of dollars have been expended to build safety into new bridges and approaches.

He finds the highway maintenance forces and the state highway patrolmen enthusiastic in the cause of highway safety and doing all they can to encourage careful driving. He notices other drivers paying careful attention to traffic signals, using caution in entering on a through roadway, giving signals when turning out of and into traffic, slowing down or stopping at intersections or school zones, giving consideration to fellow travelers.

There's only one conclusion that a thinking motorist can reach under these conditions. That is, to put as much safety into his driving as he finds built into his automobile and the nation's roads.

*President of the American Road Builders Association.

The side of a mountain was cut away to make room for this paved road near Sedalia.

BETTER ROADS LOWER CAR OPERATING COST

Motorists, in states which have not modernized their highways, pay an extra premium for every mile of travel, as well as an increased maintenance cost, according to Rocky Mountain Motorists, Inc., the local A. A. A. automobile club, which has just received 1929 reports covering these expenses.

The relative cost of operating a car, in cents per mile, on the three main classifications of roads are: high type 5.44, intermediate type 6.43 and low type 7.50. These figures include fixed costs for oil, license, garage, interest and insurance, which are identical for all kinds of highways. The main differences are in gasoline, tires and tubes, maintenance and depreciation.

It has been found, says the Automobile Club, that the following increases cover operation of the average vehicle over the three types of roads: gasoline 1.09, 1.31 and 1.61; tires and tubes .29, .64 and .84; maintenance 1.43, 1.72 and 2.11 and depreciation 1.26, 1.39 and 1.57.

Motorists using intermediate roads pay 1.18 a mile more than when driving on high type roads and if they use low types of roads their cost is 1.38 cents a mile higher than high type road expenses.

Since the average driver operates his vehicle approximately 10,000 miles annually, the saving is important, the Automobile Club points out. If he drives entirely on high type roads, his costs would approximate $544, whereas on secondary roads the expense would be $643, an increase of nearly a hundred dollars, and on low type roads it would be $750, or an increased expense of $206.

Highway development plans for Cleveland are reported by the U. S. Bureau of Public Roads to be among the most elaborate of any American city. The plans include the tributary area of Cleveland with belt highways around the city, widening of many present routes, construction of viaducts, bridges over streams and other developments that call for an estimated expenditure of $63,000,000. It is a 10-year construction program.

TREMENDOUS SUM SPENT DURING 1929 FOR GAS AND OIL

The average car owner in Colorado spent $124 for gas and oil during last year, while Wyoming motorists averaged $141 for each of their cars, according to Rocky Mountain Motorists, Inc., the local A. A. A. automobile club.

The total expenditures for fuel and lubricants in Wyoming amounted to $8,881,000 and in Colorado $37,349,000.

Other western states reported the following average cost for gasoline and oil: California $185, Montana $148, New Mexico $146, Arizona $143, Nevada $142, Oregon $137, Washington $126, Idaho $123, Utah $116.

National revenue from the sale of gasoline and oil, including taxes, amounted to $3,229,693,000. The average cost per car for gasoline this year was $90.53, and the average cost of oil was $20.61. Taxes averaged $14.68 per vehicle.

Due to the steady gain in the number of motor vehicles registered, and increased use as travel horizons are broadened, gasoline consumption shows a heavy boost each year. Today eighty per cent of all gasoline refined is used by motorists.

Motorists use about 38,000,000 gallons of gasoline per day, with a revenue to stations of approximately $8,000,000 a day, or around $6,000 per minute.

MT. EVANS HIGHWAY WILL BE COMPLETED THIS YEAR

The association's survey discloses the fact that gas and oil sales averaged highest in the Southern states, due to the more extensive driving time allowed. Florida had the highest average, being $203.

The highest automobile road in the United States will be completed in Colorado in 1930.

It will wind above the clouds to the summit of Mount Evans—14,260 feet above sea level, and more than 2,000 feet above timberline

The Mount Evans Highway—known as State Highway Project No. 103—will give access to one of the most beautiful spots in Colorado and in the entire West.

Approximately 13 miles of the highway has been completed.

Contract was let by the state highway department last fall for the completion of the remaining 1.9 miles of the highway to the peak.

FRED O. PEARCE
Newly-elected Secretary-Treasurer of the Colorado Association of County Commissioners.

The contract called for completion of the road within 100 working days. Snow forced the construction crews from the bleak shoulder of the peak after they had worked only 12 days, however, and the remainder of the distance will be blasted, graded and surfaced into roadbed this spring.

It is planned to start construction just as soon as the snow which covers the peak in the winter melts enough to make road building practicable.

When the highway is completed it will form a beautiful motor boulevard to the top of the Continental Divide—past one snow glacier in a fissure of the peak which summer suns scarcely ever diminish.

Starting abruptly upward from Echo Lake—a beauty spot of the Rockies—the Mount Evans road will twist upward for approximately 15 miles before reaching the summit.

The view from the top comprises a magnificent panorama of hundreds of miles of beautifully wild and rugged mountain country, much of it untouched by any apparent steps of civilization.

On clear days one can gaze far out on the plains where Denver lies some 45 miles distant. North and south extends the inspiring "backbone" of the Rocky Mountains with its hundreds of crags and peaks.

COLORADO NATIONAL FOREST HIGHWAY BUDGET APPROVED

At a conference in Denver between officials of the United States Forest Service, the Federal Bureau of Roads and the state highway department, a budget calling for the expenditure of $307,000 by the Forest Service for construction and maintenance of highways in Colorado during 1930, was prepared and forwarded to the Secretary of Agriculture at Washington for approval.

The budget provided for the construction projects at a total cost of $272,000, three surveys at $9,000, and $26,000 for maintenance and stabilization of roads constructed by the Forest Service and now under control of the Bureau of Roads.

The conference was for the purpose of fitting these Forest Service projects into the system planned and being executed by the state highway department adjoining the National Forests.

$124,700 IN FOREST FUNDS GIVEN COLORADO COUNTIES

More than $124,700 will be distributed to Colorado counties by the national forest service for school and road purposes in 1930.

This fund, 25 per cent of national forest receipts during the last fiscal year, is divided among counties on the basis of the area of each county contained in the individual forest.

The Montezuma forest turned the largest amount, $19,823, over to the counties this year, J. I. Buckner, district fiscal agent for the forest service, said yesterday. The Colorado forest was next with $11,955.

Counties that will receive forest service funds and amounts are:

Gunnison, $9,244.23; Dolores, $8,948.27; Larimer, $8,656.17; Montezuma, $6,345.99; Mesa, $6,253.59; Garfield, $5,820.09; Saguache, $5,364.49; Mineral, $4,649.45; San Miguel, $4,504.90; Park, $4,355.92; Hinsdale, $4,308.30; Eagle, $4,160.76; Rio Blanco, $4,113.94; Routt, $4,083.29; Archuleta, $3,640.84; La Plata, $3,514.11; Pitkin, $3,333.06; Jackson, $3,129.81; Montrose, $2,966.38; Chaffee, $2,580.93; Conejos, $2,425.56; Grand, $2,371.91; Delta, $2,124.88; Rio Grande, $2,109.38; San Juan, $1,821.93; Boulder, $1,796.83.

Smaller amounts will go to Summit, Ouray, Clear Creek, Douglas, Lake, Custer, Alamosa, El Paso, Fremont, Gilpin, Huerfano, Jefferson, Las Animas, Moffat, Pueblo and Teller counties.

EIGHT MILES OF DE BEQUE ROAD IS NOW ROUGHED OUT

Excellent progress is being made on the construction of the ten miles of road down the Colorado river, to connect DeBeque with the present road at the west end of the Plateau canon, by Hinman Brothers, who have the contract. Out of the ten miles in the present project, practically eight miles of road has already been roughed out, and a stretch of three and a half miles has been graveled and completed. It will, however, be impossible to use any of the new road until it is all completed, as there is no outlet down the river except this road.

R. E. Cowden, locating engineer for the state highway department, is in charge of the work. He reports the contractors ahead of their schedule. Work will be continued throughout the winter. There is considerable heavy rock to be removed. This is one of the largest projects undertaken by the Colorado highway department.

It is expected that the project will be completed late next summer, giving a direct road along the Colorado River from Palisade to DeBeque, at a saving of several miles over the present Plateau canon road.

FLORENCE-EL PASO COUNTY LINE ROAD BEING GRAVELED

Work of graveling the road between Florence and the El Paso county line on road No. 115 is going forward nicely, according to Commissioner Bald, and a gang of 20 men is at work.

With this work the road will be an all-weather road, and winter snows, unless of unusual depth, will not hinder traffic between Florence and Colorado Springs.

There are 3,300 miles of Federal Aid highways in New Mexico and one half have been built. The New Mexico Highway Journal says that "it is estimated that at the present rate of construction at least 15 years and 27 million dollars will be required to close the gaps and bring the completed portion to a satisfactory standard." The five-cent gasoline tax in 1928 produced $1,800,000, the magazine states.

The U. S. Bureau of Public Roads reports there are 2,750,000 miles of rural roads in the United States, with 1,000,000 administered by town or township authorities and 1,750,000 by county authorities of 2,999 counties.

Reports received from various states indicate that many of them will take advantage of the act that permits the government to pay one-half of the cost of planting along Federal Aid highways. Massachusetts now leads the states in this beautification of highways.

Texas has plans for an extensive road program. A state highway bond issue of $175,000,000 is proposed to be submitted to the people in the 1930 election. To carry on the highway work meantime Governor Moody has recommended $20,000,000 be appropriated for construction and $10,000,000 for maintenance of the highways during the present year. Belief is expressed the 1930 bonds will be carried.

JAPAN TO BUILD ROADS

A comprehensive plan for road improvement and construction for the whole of Japan which contemplates the expenditure of about $5,689,000 over the next ten years has been formulated by the Civil Engineering Bureau of the Home Department.

The program will extend over a length of 3,600 miles of road. Municipalities, the national government and others are said to be aroused to the necessity for providing for increasing automobile traffic.

PROGRESS IN PENNSYLVANIA

The primary and secondary highway systems of Pennsylvania comprise 11,456 miles of which 4,546 miles are hard surfaced, 3,245 miles are of gravel or similar types and 3,665 miles are earth roads.

PLANS FINISHED BUT PROJECT NOT YET ADVERTISED FOR BIDS

Proj. No.	Length	Type	Location
151-A	6.472 mi.	Gravel Surfacing	West of Tabernash
243-C	3.837 mi.	Gravel Surfacing	West of Dyke
267-C	4.491 mi.	Gravel Surfacing	Northeast of Model
272-E	2.562 mi.	Concrete Pavement	West of Rocky Ford
296-E	5.467 mi.	Gravel Surfacing	South of Greenhorn
287-BR	7.565 mi.	Concrete Pavement	East of Greeley
147-D	2.903 mi.	Gravel Surfacing	South of Cortez
270-D	3.978 mi.	Oil Processed Surfacing	West of Alamosa

PLANS BEING DRAFTED

Proj. No.	Length	Type	Location
165-R	9 mi.	Oil Processed Surfacing	East of Canon City
279-H	3 mi.	Grading	North of Kenosha Pass
298-C	4 mi.	Grading	East of Wolf Creek Pass
138-C	4 mi.	Gravel Surfacing	Muddy Pass
122-R	12 mi.	Grading	East of Sedgwick
297-D	5 mi.	Gravel Surfacing	South of DeBeque
149-B	8 mi.	Oil Processed Surfacing	East of Denver
270-AR&BR	6 mi.	Oil Processed Surfacing	East of Monte Vista
251-D	¼ mi.	R. R. Underpass	East of Boulder

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per Cent Complete	Proj. No.
57-R2	North of Lamar	0.502 mi.	Bridge	J. Fred Roberts & Sons	$140,102.96	48	57-R2
68-R1	North of Monte Vista	1.900 mi.	Gravel Surfaced	J. Finger & Son	24,124.00	59	68-R1
78-R	Near Minturn	0.709 mi.	Gravel Surfaced	J. Fred Roberts & Sons	96,342.90	24	78-R
138-A	North of Kremmling	10.916 mi.	Grading	F. L. Hoffman	201,262.80	100	138-A
138-B	North of Kremmling	3.133 mi.	Gravel Surfaced	F. L. Hoffman	76,363.35	66	138-B
144-D	Northwest of Ft. Collins	2.834 mi.	Gravel Surfaced	J. Fred Roberts & Sons	66,430.10	28	144-D
147-C	South of Cortez	3.428 mi.	Gravel Surfaced	E. J. Maloney	86,182.75	82	147-C
150-A	West of Craig	8.227 mi.	Gravel Surfaced	Gardner Bros. & Glenn	93,477.35	11	150-A
175-A	Between Sterling and Ovid	41.979 mi.	Graded	Cole Bros.	193,055.75	34	175-A
208AR2-CR1	East of Grand Junction	9.254 mi.	Oil Processed Gravel Surface	Hinman Bros. Const. Co.	44,652.05	100	208AR2-CR1
253-D	West of Milner	2.547 mi.	Gravel Surfaced	Hamilton & Gleason Co.	147,192.00	31	253-D
258-G	West Side of Cerro Summit	2.885 mi.	Gravel Surfaced	Mountain States Const. Co.	68,640.60	100	258-G
258-H	West of Sapinero	4.921 mi.	Gravel Surfaced	Cole Brothers	123,700.60	69	258-H
263-A	Betw. Mortimer & Ft. Garland	3.404 mi.	Gravel Surfaced	Mtn. States Constr. Co.	47,509.20	52	263-A
266-D	South of Bondad	4.111 mi.	Gravel Surfaced	Engler, Teyssier & Co.	96,075.30	89	266-D
270-C	Betw. Alamosa & Monte Vista	5.000 mi.	Oil Pro. Gravel Surf.	Mountain States Constr. Co.	38,485.50	100	270-C
277-D1	Betw. Colo. Springs & Pueblo	15.566 mi.	Grading	M. E. Carlson	218,277.80	99	277-D1
277-E1	South of Colorado Springs	10.2 mi.	Grading	J. L. Busselle	221,389.65	71	277-E1
282-G	South of Craig	5.147 mi.	Gravel Surfaced	Chas. B. Owen	1,645.22	7	282-G
282-H	Between Rifle and Meeker	7.029 mi.	Gravel Surfaced	Winterburn & Lumsden	82,589.74	95	282-H
292-B	Between Gilman and Minturn	2.640 mi.	Gravel Surfaced	O. J. Dorsey	29,146.80	100	292-B
292-C	West of Avon	1.646 mi.	Gravel Surfaced	Ed. H. Honnen	39,663.10	100	292-C
293-C	North of Ouray	3.661 mi.	Grading	C. V. Hollenbeck	62,997.80	99	293-C
295-D	North of Antonito	2.460 mi.	Oil Pro. Gravel Surf.	Levy Const. Co.	72,676.75	82	295-D
297-C	Southwest of De Beque	9.953 mi.	Gravel Surfaced	Hinman Bros. Const. Co.	312,453.50	46	297-C
298-B	North of Pagosa Springs	2.414 mi.	Surfacing	Engler & Teyssier	38,426.00	49	298-B
300-B	North of Silverton	2.828 mi.	Graded	Hamilton & Gleason Co.	35,647.80	43	300-B

AUTOS TO CREATE NEW TYPE OF CITY, DECLARES BABSON

Roger W. Babson, writing in the Boston *Transcript*, describes the city of the future as follows:

The city of the future will look entirely different from the city of today. One of the first measures, I believe, will be street widening through elimination of sidewalks. Pedestrian traffic in the cities will be underneath arcades. This can be done by tearing away a portion of the lower floor of buildings and by supporting the street walls up to the second story on pillars, and utilize as sidewalks the space underneath which was formerly a part of the first floor. The former sidewalks will be part of the streets. Overhead passes across streets for pedestrians will be almost universal. Great arterial highways will go through the center of our cities. These will be supplemented by smaller, high-speed highways around the outskirts of the central business district. The city of the future will also be more decentralized than at present. It will spread out into what are now suburbs. Already many big department stores are establishing branches in a wide suburban area. The purpose is to reach those customers who, because of traffic congestion, are unable or unwilling to patronize the central store. This decentralization and expansion process is expensive. In time it will hurt the value of the centrally located city property; but it will increase the value of suburban business property. The reason why downtown property is more valuable than any other is because the most people pass there on foot. If foot travel becomes so dangerous or so slow in these areas that it diminishes in volume, then the value of such property will diminish.

One important reason why the automobile has caused so much congestion is that many of our cities were allowed to grow as they started, namely, along the lines of old cart paths. It is a vast and expensive undertaking to straighten and widen crooked and narrow streets. However, that is being done and will be done on a much larger scale in the future. City governments should take care, however, that future expansion is along sensible lines, and in accordance with a comprehensive and thoroughly unified traffic plan. Before starting new projects the advice of expert engineers and traffic authorities should be obtained. Otherwise much money can be wasted without accomplishing any real improvement.

Minnesota will pay an average of $96 less per mile for 20-foot concrete pavements in 1930 than in 1929, according to figures given out by the state highway department. Bids were opened October 29 on 138 miles of pavement to be built next year. Of this, 134.1 miles are to be 20 feet wide and the total of the low bids was $2,215,703, or an average of $16,522 per mile. One stretch of 27-foot pavement, 3.9 miles in length, will cost $93,807.

The contractors' figures include all labor and material except cement, which is furnished by the state. The bids for next year's supply of cement show that this item will cost an average of $7,715 per mile for 20-foot pavement, making a total of $24,237 per mile for the completed slab.

Paving work will start in Minnesota as soon as weather permits in the spring, while some of the other work will be started this winter. By letting paving contracts in the fall, it is possible for the contractors to have their equipment on the job and their crews ready to start work shortly after the frost is out of the ground in the spring. This will make it possible to complete some of the jobs so that they may be opened to travel before the end of the heavy traffic season.

Colorado Highways

Official Publication of the
COLORADO STATE HIGHWAY DEPARTMENT
Denver, Colorado

GOVERNOR WILLIAM H. ADAMS, Chief Executive

L. D. BLAUVELT,
State Highway Engineer.

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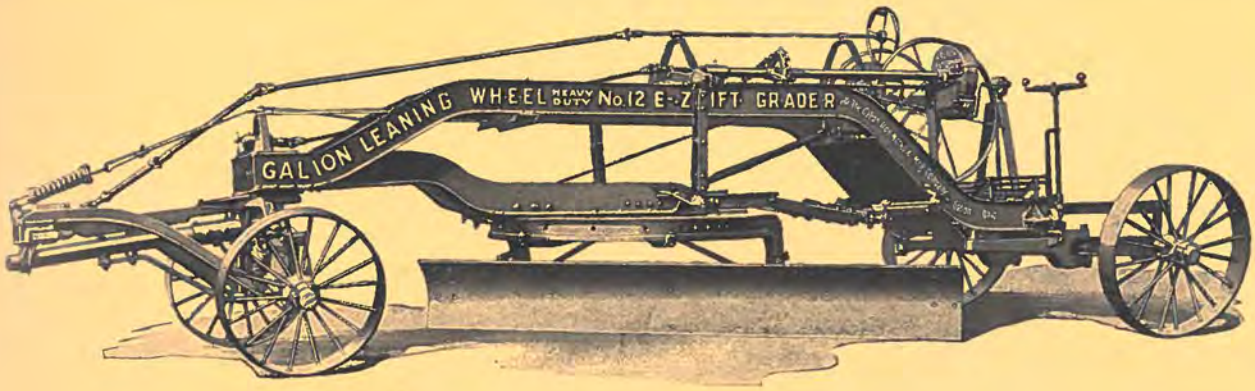
Our Cover Picture

The view on this month's cover of Colorado Highways shows a stretch of modern concrete pavement near Monument, forming a link in the Denver-Colorado Springs highway. Paved roads such as this are saving Colorado motorists thousands of dollars annually in reduced operating costs. Statistics gathered by the Iowa Agricultural college show that car owners save 2 cents per mile on pavement, over the cost of driving on dirt roads. Average all-year traffic on the Denver-Springs highway is 2,000 cars per day. Photo courtesy of P. F. Meade.



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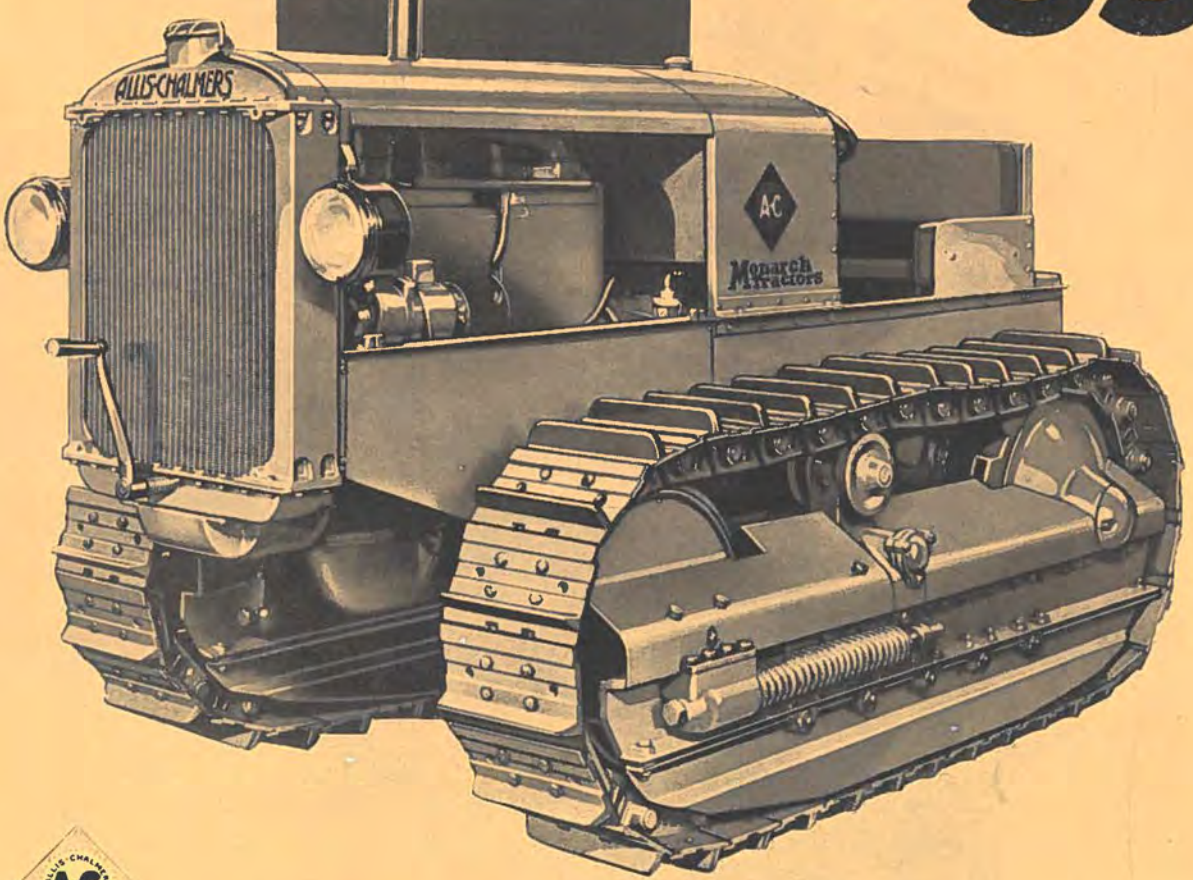

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Vol. 9 Feb. 1930 No. 2

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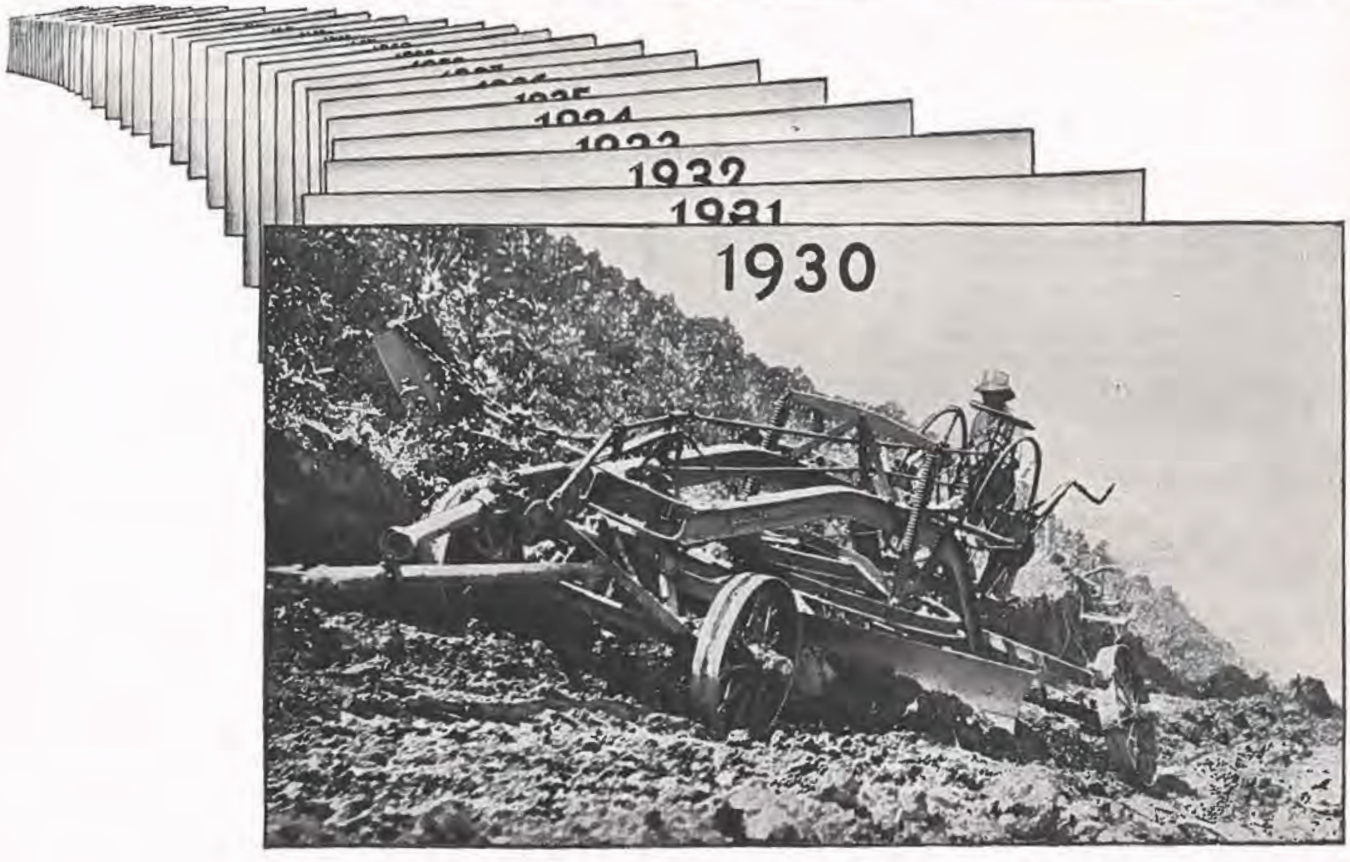
Our Cover Picture

BY courtesy of the Price Art Studio of Denver, this month's cover shows a section of the new Loveland Pass highway, which the Colorado Highway Department has under construction. The sum of $19,000 has been made available in the 1930 budget for continuing the work on this road. Work on the Loveland Pass road is being done by state forces, a steam shovel and other equipment being employed in constructing this important road. The new road now extends from Silver Plume to the summit of the pass. Two miles additional construction will bring the new road in connection with an old road leading into Keystone and Dillon. Highway engineers estimate this work will be completed during the coming summer.



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Colorado Highways
"BETTER ROADS"
VOLUME IX. FEBRUARY, 1930 NUMBER 2

State to Spend Six Million Dollars in 1930 for Improved Highways

THE 1930 state highway budget was signed by Governor William H. Adams on February 10th, and set $6,200,000 as the tentative amount to be expended under the supervision of the State Highway Department this year.

In signing the budget the governor increased the amount of the tentative budget by $284,000, the sum of $100,000 to be contributed by the Federal government.

The governor made no changes in the budget submitted to him several weeks ago by the Highway Advisory Board. He added $100,000 to be spent on oil surfacing U. S. Highway South 40, from the Kansas state line toward Cheyenne Wells. In taking this action the governor makes available $440,000 for the improvement of the north and south branches of U. S. Highway 40 into Denver. In the tentative budget submitted to the chief executive there was made available $140,000 for the improvement of North 40 from Burlington west.

On the Denver-Limon highway the budget provides $200,000. It is estimated that this sum will construct fifteen miles of oil-surfaced highway. The project will start at Fitzsimons Hospital and extend eastward approximately to Watkins. Construction of this project will eliminate the worst stretch of roadway between Denver and Strasburg. Plans for the project are nearing completion and construction will start early in the spring. Field engineers are now making surveys for the Burlington and Cheyenne Wells projects.

In making available more money for different projects he considers important to the state, Governor Adams did not whittle down amounts designated for other work suggested by the advisory board and the state highway engineer.

To straighten out a road at Jefferson, Park County, Governor Adams allotted $2,500.

The governor made no changes in the suggested budget for Districts 4, 6 and 7.

For District No. 2 he suggests these changes:

Garfield County, guard rail in Glenwood Canon, Highway 4, $20,000.

Improvement of Highway 114, Gunnison County, between Parlin and Cochetopa Pass, $30,000.

Marble and Gunnison Counties, addition to road fund, $3,500.

Pitkin County, improvement of old Midland bridge, Highway 82, fund increased by $10,000.

In District 3 these changes were made:

Increase to fund for graveling Highway 10, Pagosa Springs west, $9,000.

Alamosa north, graveling highway, $10,000 added.

Dolores County, improving Highway 145, $8,000 added.

La Veta Pass, for improvements west to Fort Garland, $30,000 added.

Federal Aid project between Trinidad and La Junta, $100,000 added.

For paving the 26 miles of road between Colorado Springs and Pueblo, the commission assigned $584,000. It was the largest amount designated for any one project. The governor approved the figure.

The budget for 1930 follows:

ANNUAL BUDGET FOR THE YEAR 1930

ESTIMATED RECEIPTS

70% 4-cent Gasoline Tax	$4,086,000	
Federal Aid	1,796 202	
P. U. Bus Tax	60,000	
Internal Improvement Fund	60,000	
County Participation	25.000	
1929 Balance	175,000	
Total		$6,202,202

ESTIMATED DISBURSEMENTS

Federal Aid Projects	$3,592,404	
Federal Aid Graveling	200,000	
State Projects	559,798	
Maintenance	1,475,000	
Surveys	25,000	
Signs and Traffic Census	20,000	
Property and Equipment	30,000	
Compensation Insurance	20,000	
Contingent	100,000	
Administration	180,000	
Total		$6,202,202

DETAIL OF EXPENDITURES

DISTRICT No. 2

FEDERAL AID PROJECTS

Road			
4	DeBeque west along Colorado River	$200,000	
4	Graveling, F. A. P. 292-A	38,000	
4	Grading and surfacing, F. A. P. 292-C, west	200,000	
6	Grading and surfacing Gunnison-Montrose County line, west	62,000	
			$500,000

STATE PROJECTS

Road			
	Delta County		
65	Gravel, Eckert to Cedaredge	$ 2,000	
92	Gravel, Austin-Hotchkiss	4,000	
	Garfield County		
4	Removing rock points, improvements	2,500	
4	Guard rail in canon	20,000	
82	Gravel and oil, Glenwood Springs, south	6,000	
139	Betterments	2,000	
	Gunnison County		
6	Gravel Halfway House to F. A. P. 125	4,000	
92	Black Mesa Road (shovel)	6,500	
114	Parlin to Cochetopa Pass	30,000	
135	Bridge over East River	3,500	
"	Crested Butte-Marble	3,500	
	Mesa County		
6	Improvement, Deer Flat	2,500	
65	Improvement, Molina Hill	3,000	
141	Whitewater, south	7,500	
	Montrose County		
90 } 145 }	Redvale-Naturita (gravel)	4,000	
	Pitkin County		
82	Improvement, Old Midland Bridge	10,000	
"	Betterments Carlton Highway	3,500	
	Rio Blanco County		
64	Oldham Dugway, west	4,000	
139	Improvements	2,000	
	San Miguel County		
62	Dallas Divide, improvements	7,000	
	Summit County		
9	Hoosier Pass, improvements	4,000	
91	Loveland Pass, improvements	19,856	
			$151,356
	Total		$651,356

DISTRICT No. 3

FEDERAL AID PROJECTS

Road			
1	Colorado-New Mexico line, north (oiled surfacing)	$100,000	
1	Greenhorn, south	20,000	
10	Wolf Creek Pass, east	90,000	
10	Alamosa, west, oiling	35,000	
10	La Veta Pass, east side	60,000	
10	Wilson Gulch, bridge and approaches	40,000	
10	From F. A. P. 262-I to Ft. Garland	30,000	
12	Trinidad-La Junta	100,000	
15	Paving, Monte Vista, north	60,000	
15	Saguache, south, grading and surfacing	40,000	
17	La Jara, north, oiling	30,000	
19	Extend and complete F. A. P. 300-B	20,000	
106	From F. A. P. 147-C to Cortez	25,000	
			$650,000

STATE PROJECTS

Road			
	Alamosa County		
	Alamosa-Las Sauses	$ 12,000	
17	Alamosa, north	10,000	
	Archuleta County		
10	Pagosa Springs, west, graveling	9,000	
	Costilla County		
152	San Luis-Stonewall	20,000	
	Dolores County		
145	Improvements	9,000	
	Hinsdale County		
149	Improvements	3,000	
	Huerfano County		
69	Improvements	4,000	
	Mineral County		
149	Improvements	4,000	
	Saguache County		
114	Improvements (Flying M Ranch)	15,000	
	San Juan County		
19	South of Silverton (cut out two points)	3,428	
			$ 89,428
	Total		$739,428

DISTRICT No. 4

FEDERAL AID PROJECTS

Road			
1	Paving north of Pueblo	$224,000	
6	Overhead east of Florence	50,000	
6	Oiled surface of crushed gravel, as per following locations:	195,404	
	Kansas State line, west	$18,000	
	Lamar, east	50,000	
	Ft. Lyon, east	32,000	
	Las Animas, west	6,202	
	Avondale, east	57,000	
	Pueblo-Fremont County line, west	32,202	
		$195,404	
15	Additional to 154-A, Salida, north	15,000	
			$484,404

STATE PROJECTS

Road			
	Baca County		
51 } 100 }	Improvements	$ 7,000	
	Crowley County		
96	Improvements	7,000	
	Custer County		
96	Repairs and improvements (with Forestry Dept.)	10,428	

A Federal Aid highway west of DeBeque. An extension of this section is now under construction between DeBeque and Palisades.—Photo by H. L. Jenness.

Road			
	Fremont County		
115, 120	Improvements (County $8,000)	$ 5,000	
	Kiowa County		
96	Improvements	7,000	
	Pueblo County		
96	Bridge, Chico Creek (County $10,000)	10,000	
	Prowers County		
6	Repairs, Granada Bridge (Maintenance balance)	13,000	
6	Graveling, Holly-Granada (to repay county for 1929 work)	4,798	
			$ 64,226
	Total		$548,630

DISTRICT No. 5

FEDERAL AID PROJECTS

Road			
1	Paving, Colorado Springs-Pueblo	$360,000	
4	Graveling and oiling, Burlington, west	140,000	
8	Colorado-Kansas State line, west	100,000	
			$600,000

STATE PROJECTS

	Cheyenne County		
59	Bridge on ————Creek near U. P. underpass	$ 1,500	
	Douglas County		
67	Sedalia-Deckers	1,500	
83	Cherry Creek	2,000	
86	Castle Rock-Franktown	1,000	
177	Wildcat Point	1,500	
	Elbert County		
4	Simla Bridge	15,000	
86	Bridge at Bijou Creek	1,000	
157	Improvements	1,000	
	El Paso County		
1	Widen paving So. Nevada Ave., curb and gutter	10,000	
115	Canon City road	12,500	
122	Improvements	1,000	
	Kit Carson County		
4	Refund to county (Stratton project)	500	
	Lake County		
104	Carlton Tunnel	2,000	
	Lincoln County		
8	Resurface in Lincoln County	$ 7,930	
63	South	250	
63	North	500	
71	North and south	1,250	
71	Bridges	500	
94	Improvements	250	
109	Genoa-Hugo	250	
	Park County		
9	Drainage, Hoosier Pass	2,000	
8	Town of Jefferson	2,500	
	Teller County		
67	Improvements	3,000	
143	Bridge, White Pine School	3,000	
			$ 71,930
	Total		$671,930

DISTRICT No. 6

FEDERAL AID PROJECTS

Road			
1	Fort Collins, north, paving	$ 80,000	
2	Muddy Pass road	80,000	
2	Craig, west	100,000	
2	Hayden, west to county line	100,000	
7	Underpass, Boulder road	25,000	
13	Craig, south	75,000	
123	From junction north Fort Collins, west, surfaced	150,000	
	Paving, Idaho Springs	50,000	
	Extension F. A. P. 144-D	10,000	
			$670,000

A fine piece of Federal Aid gravel roadway north of Meeker on Road No. 13.—Photo by H. L. Jenness.

STATE PROJECTS

Road			
	Boulder County		
119	Improvements	$ 5,000	
	Clear Creek County		
2	Improvements in and adjacent to Idaho Springs	15,000	
	Gilpin County		
119	Improvements	2,500	
	Grand County		
16	Camp Ouray to junction Rd. 2, near Granby	15,000	
	Jackson County		
14	Surfacing, Murphy Ranch to Muddy Pass	18,000	
	Jefferson County		
126	Pine Grove to Buffalo	15,000	
	Larimer County		
14	Poudre River Bridge Widen Tunnel Ault-Ft. Collins improvements	12,750	
	Routt County		
131	Oak Creek-Sidney, grading and surfacing	22,180	
			$105,430
	Total		$775,430

DISTRICT No. 7

FEDERAL AID PROJECTS

Road			
2	Addition to 175-A	$ 20,000	
2	Greeley, east, paving	175,000	
2	Sterling, east to state line, grading and surfacing	108,000	
3	Eaton-Nunn, oiling	70,000	
8	Denver-Limon, grading, surfacing and oil	200,000	
14	Sterling, east, grading and surfacing	115,000	
			$688,000

Note: ($108,000 item is made up as follows:)

State Project funds	$ 29,000
Logan County pledged	13,000
Sedgwick County "	12,000
F. A. funds	54,000
	$108,000

STATE PROJECTS

Road			
	Arapahoe County		
87	Englewood-Littleton	$ 12,100	
	Morgan County		
54	Brush, east	7,000	
	Phillips County		
14	Improvements, south	3,828	
	Sedgwick County		
51	Improvements	1,000	
59	Improvements	1,000	
	Washington County		
54	Akron, west	21,000	
	Weld County		
52	Wiggins-Roggen	18,000	
52	Hudson-Lupton	3,500	
	Yuma County		
54	Grading, surfacing and oiling	10,000	
			$ 77,428
	Total		$765,428

MAINTENANCE

Non-Federal Aid Road Counties on 50-50 Basis, State and County

County	Miles	State's Share	
Denver Mountain Parks	74	$ 19,000	
Baca	234	8,500	
Crowley	64	5,000	
Custer	96	5,000	
Delta	91	5,000	
Gilpin	36	5,000	
Hinsdale	49	5,000	
Jackson	133	5,000	
Kiowa	146	6,500	
Mineral	39	6,000	
Pitkin	88	9,000	
San Miguel	143	13,000	
Summit	82	4,000	
Teller	82	4,000	
Washington	256	12,000	
Yuma	247	18,000	
	1,860		$ 130,000
Berthoud Pass	30	$ 20,000	
Cameron Pass	20	5,000	
Cumbres Pass	...	15,000	
Independence Pass	...	10,000	
Wolf Creek Pass	40	20,000	
Sugar Creek-West Creek-Deckers	...	$ 8,000	
Dillon-Climax	...	6,000	
Ouray-Durango	64	9,000	
			$ 93,000
3,167 miles Federal Aid roads		$960,000	
Maintenance equipment		250,000	
193 miles Forest Service projects		42,000	
			$1,252,000
Total			$1,475,000

NOTE—The following items are for U. S. Government maintained roads on which the State is to pay for maintaining certain sections (agreements to be made with U. S. Bureau for our proportion of cost). These amounts are estimates only, and are covered in amount for Forest Service Projects. This amount will also include any additional sections that may be turned over to the State currently during the year 1930:

Tennessee Pass	$ 10,000	
South St. Vrain	8,000	
Ward-Raymond	8,000	
	$ 26,000	
Federal Aid graveling	$ 200,000	
Advance surveys	25,000	
Compensation insurance	20,000	
Traffic signs and census	20,000	
Property and equipment	30,000	
Contingent	100,000	
Administration	180,000	
		$ 575,000
		$6,202,202

TO COMPLETE THE 1929 BUDGET

Receipts—Estimated

Balance—Highway Fund, 1-1-30	$1,593,465.30	
U. S. Government-Federal Aid to be earned and collected upon completion of the 1929 Federal Aid Projects	1,999,951.53	
		$3,593,416.83

Disbursements—Estimated

Federal Aid Projects	$3,260,480.56	
State Projects	195,575.83	
Compensation insurance	9,381.70	
Maintenance and renewals	127,978.74	
		$3,593,416.83

Federal Aid road between Glenwood Springs and New Castle.—Photo by H. L. Jenness.

1929 Gas Tax Distributed to Counties

Twenty-seven per cent of the 4-cent gasoline tax collected in Colorado during 1929 totaled $1,395,000, according to a highway bulletin. This sum was distributed to sixty-two counties. It was divided upon a mileage basis, with Weld County receiving the largest sum, $52,008.

Denver County, with its 84,000 registered cars, did not participate in the distribution, because the capital city has no state highway mileage. Weld County had the second largest number of registered cars. Lincoln County, with its 2,558 cars registered, shared the second largest amount from the gas tax distribution, being apportioned $49,086. Las Animas County, which ranks seventh in car registration, received $41,438, while Washington County, which ranks twenty-fifth in car registration, received $40,260.

The following table gives the amounts each county received from the gas tax distribution:

Gas Tax	No. of Cars	County	No. Cars	Gas Tax
1	2	Weld	20,999	$ 52,008.00
2	26	Lincoln	2,558	49,086.00
3	7	Las Animas	7,692	41,438.00
4	25	Washington	2,753	40,260.00
5	5	Larimer	11,773	39,343.00
6	18	Yuma	4,292	37,859.00
7	4	El Paso	15,818	37,859.00
8	24	Baca	2,958	36,298.00
9	21	Montrose	3,065	36,034.00
10	41	Gunnison	1,286	35,366.00
11	8	Jefferson	7,477	34,378.00
12	49	Park	711	32,918.00
13	11	Mesa	7,291	32,674.00
14	50	Rio Blanco	711	31,556.00
15	3	Pueblo	16,377	29,660.00
16	48	Grand	733	29,583.00
17	16	Prowers	4,354	29,568.00
18	39	Moffat	1,386	28,330.00
19	15	Fremont	5,613	26,799.00
20	20	Kit Carson	3,135	26,738.00
21	37	Saguache	1,705	26,066.00
22	13	Logan	6,712	26,050.00
23	29	Routt	2,358	25,912.00
24	40	Douglas	1,292	24,963.00
25	27	Garfield	2,548	23,878.00
26	42	Kiowa	1,159	22,348.00
27	53	San Miguel	584	21,889.00
28	19	Huerfano	3,758	21,553.00
29	35	Montezuma	1,938	21,078.00
30	55	Jackson	537	21,819.00
31	47	Costilla	891	19,932.00
32	46	Eagle	942	19,672.00
33	44	Cheyenne	1,049	19,488.00
34	33	Elbert	2,041	19,411.00
35	38	Conejos	1,704	18,386.00
36	17	Delta	4,311	18,081.00
37	6	Boulder	11,450	18,065.00
38	14	Morgan	6,475	17,867.00
39	52	Clear Creek	664	16,598.00
40	28	Phillips	2,428	16,001.00
41	31	Alamosa	2,304	15,909.00
42	54	Archuleta	539	15,801.00
43	43	Teller	1,105	15,786.00
44	9	Arapahoe	7,416	15,770.00
45	23	La Plata	2,970	15,496.00
46	10	Adams	7,360	14,854.00
47	51	Custer	680	14,608.00
48	12	Otero	6,903	14,395.00
49	34	Chaffee	1,943	14,318.00
50	58	Summit	320	14,165.00
51	57	Pitkin	331	13,478.00
52	22	Rio Grande	3,062	$ 13,186.00
53	45	Lake	1,008	11,428.00
54	30	Bent	2,348	11,213.00
55	60	Dolores	292	10,937.00
56	62	Mineral	182	10,264.00
57	32	Sedgwick	233	10,080.00
58	36	Crowley	1,805	9,759.00
59	56	Ouray	454	7,574.00
60	63	Hinsdale	90	7,435.00
61	61	San Juan	285	6,794.00
62	59	Gilpin	306	5,524.00
63	1	Denver	84,025	.....
		Total		$1,395,000.00

BIDS ASKED ON FOUR FEDERAL AID PROJECTS

Bids for four Federal Aid highway projects and one state project will be received by the Highway Department at the office of the State Highway Engineer until 10 a. m., March 5.

The four Federal Aid projects are:

Gravel surfacing on about 7.2 miles of State Highway No. 1, south of Greenhorn in Pueblo and Huerfano Counties.

Gravel surfacing on about 3.9 miles of State Highway No. 10, west of Dyke in Archuleta County.

Two and one-half miles of gravel surfacing on State Highway No. 10, between Durango and Bayfield in La Plata County.

Gravel surfacing on three miles of State Highway No. 106, south of Cortez in Montezuma County.

The state project is No. M-6, consisting of furnishing on the roadway maintenance crushed rock or gravel surface course on about 30.5 miles of State Highway No. 1, between Greenhorn and Aguilar in Las Animas and Huerfano Counties.

Virginia has a large mileage of bituminous macadam which is patrolled systematically between periodic retreatment. To facilitate patching, 50-pound barrels of road oil and piles of crushed stone are placed at intervals of half a mile or less. Patrolmen mix the patching material cold and move it by wheelbarrow. Materials are therefore usually located on summits to permit wheeling downgrade.

View of world-famous Ute Pass highway, a few miles above Manitou in El Paso County.

A Forest Service project on Willow Creek Pass, constructed by the U. S. Bureau of Public Roads. An extension of this project is now under construction on the south side of the pass to connect with U. S. Highway No. 40 near Granby.—Photo by H. L. Jenness.

Motor Vehicle Fees Total $1,835,000

MOTOR vehicle license receipts during 1929 totaled $1,835,385.53, according to a report issued by Charles Armstrong, secretary of state. Of this sum, passenger car, truck and bus owners of the City and County of Denver contributed the sum of $532,676.16.

During the last year there were 78,744 passenger cars licensed in Denver; 4,925 trucks and 326 buses. Weld County was the second largest in point of passenger car registration, having 17,751 owners, 3,154 trucks and 94 busses. Pueblo County was second with 15,125 owners, 1,221 trucks and 31 busses.

License fees collected in Weld County totaled $126,811.16, and in Pueblo County $97,017.58. One-half of all fees collected from motor vehicle registrations are paid into a special fund for the retirement of the last state highway bond issue, totaling $6,000,000. This bond issue will be retired in 1932. The other half of the fees is distributed to the various counties of the state on a pro rata basis, to be expended on maintenance and construction of state roads in the various counties.

The cost of collecting the fees is deducted from the total amount.

To some the tax may seem high. But road officials point out that in Colorado the motor vehicle fees are among the lowest in the United States. Besides this, car owners in many cities pay a wheelage tax. In Chicago, for instance, the wheelage tax is approximately equal to the state license tax.

Furthermore, the license fee, or "good roads tax" is not nearly as large as the "bad roads tax." Before Colorado's present state highway plan was inaugurated with its "good roads tax," the annual "bad roads tax" was much larger than at present. Usually every dollar paid for a "good roads tax" cuts off about three dollars of the "bad roads tax."

But the "bad roads tax" has not yet been done away with. Some motor car owners pay this tax in big chunks when they get stuck in a boggy road during the spring break-up. Very often the cost of being pulled out of a bad stretch of road, or the damage done to a car trying to negotiate such a road, is several times as great as the good roads tax.

Those who escape the heavy toll levied by impassable roads, however, do not escape the "bad roads tax." They pay it in small driblets every time they go over an earth or gravel road which, due to heavy traffic, is rough, rutty, washboardy, or covered with loose material and dust. They pay it in the form of gasoline bills, tire bills, repair bills, lost time, laundry bills and in various other ways.

So by paying your auto tax you are helping to take a big slice off the annual "bad roads tax."

The following table shows the total number of cars, trucks, and busses registered in each county and the amounts collected:

Counties	Owners	Trucks	Busses	Fees Collected
Adams	6,192	1,125	43	$ 43,469.02
Alamosa	2,028	273	3	13,651.70
Arapahoe	6,828	571	17	42,206.07
Archuleta	481	58	0	2,941.35
Baca	2,447	511	0	17,449.93
Bent	2,152	195	1	13,546.56
Boulder	10,351	1,036	63	68,772.77
Chaffee	1,801	142	0	11,378.94
Cheyenne	906	132	11	6,174.17
Clear Creek	609	51	4	4,154.42
Conejos	1,488	216	0	9,509.13

Counties	Owners	Trucks	Busses	Fees Collected
Costilla	785	99	7	$ 5,213.61
Crowley	1,624	181	0	10,233.72
Custer	568	112	0	4,180.91
Delta	3,726	582	3	24,848.26
Denver	78,774	4,925	326	532,676.16
Dolores	255	37	0	1,525.06
Douglas	1,170	119	3	7,538.80
Eagle	830	111	1	5,133.95
Elbert	1,847	189	5	12,016.41
El Paso	14,829	897	92	99,704.18
Fremont	5,076	519	18	33,513.87
Garfield	2,305	239	4	14,914.44
Gilpin	278	28	0	1,743.69
Grand	640	93	0	3,774.20
Gunnison	1,211	73	2	6,546.33
Hinsdale	74	16	0	557.03
Huerfano	3,542	215	1	21,170.69
Jackson	472	65	0	2,912.96
Jefferson	6,756	714	7	43,677.44
Kiowa	1,002	147	10	6,867.09
Kit Carson	2,667	468	0	19,005.50
Lake	983	20	5	5,485.06
La Plata	2,708	252	10	17,556.40
Larimer	10,492	1,201	80	70,978.05
Las Animas	7,006	657	29	46,260.59
Lincoln	2,187	371	0	15,220.06
Logan	5,760	949	3	40,554.31
Mesa	6,607	664	20	42,668.18
Mineral	163	19	0	991.86
Moffat	1,244	142	0	7,741.94
Montezuma	1,709	227	2	11,706.20
Montrose	2,741	322	2	17,219.40
Morgan	5,546	897	32	38,777.39
Otero	6,199	679	25	40,400.97
Ouray	407	45	2	2,521.16
Park	632	79	0	4,341.73
Phillips	2,007	418	3	15,017.65
Pitkin	315	15	1	1,713.30
Prowers	3,975	347	32	25,208.51
Pueblo	15,125	1,221	31	97,017.58
Rio Blanco	643	68	0	4,039.96

Year	Passenger Cars	Trucks	Motor-cycles	Drivers	Total Receipts
Rio Grande	2,541	521	0	$	19,305.52
Routt	2,165	192	1		11,580.69
Saguache	1,434	256	15		9,872.47
San Juan	271	12	2		1,610.77
San Miguel	538	44	2		3,275.37
Sedgwick	1,840	385	8		14,073.76
Summit	313	7	0		1,541.46
Teller	1,011	89	5		6,182.28
Washington	2,265	485	3		16,867.58
Weld	17,751	3,154	94		126,811.16
Yuma	3,668	624	0		25,835.81
Total	273,960	28,501	1,028		$1,835,385.53

REGISTRATION AND RECEIPTS BY YEARS SINCE STATE ASSUMED CONTROL OF LICENSING

Year	Passenger Cars	Trucks	Motor-cycles	Drivers	Total Receipts
1913	13,135	*	2,753	1,980	$ 60,833.00
1914	17,756	*	3,683	2,058	80,047.00
1915	27,568	*	4,268	3,536	120,800.84
1916	43,296	*	4,731	6,754	197,794.75
1917	66,850	*	4,505	9,291	297,292.21
1918	83,244	*	3,872	9,686	372,490.25
1919	104,865	*	3,636	10,291	491,713.36
1920	119,964	7,585	3,364	9,814	815,100.10
1921	136,336	9,403	2,868	7,340	906,059.27
1922	151,499	10,829	2,770	7,058	991,677.22
1923	175,669	13,287	2,473	7,736	1,126,218.55
1924	197,361	15,886	2,226	7,559	1,258,204.80
1925	221,513	18,584	1,862	7,776	1,430,299.47
1926	232,308	20,905	1,480	7,162	1,507,379.19
1927	245,107	23,385	1,362	7,664	1,600,221.73
1928	259,948	23,961	1,234	7,977	1,790,182.73
1929	273,960	28,501	1,142	7,916	1,835,385.53
Total					$14,881,900.00

*Trucks included with passenger cars for these years.

Showing stretch of splendid Federal Aid highway east of Mancos in La Plata County—the main route to the Mesa Verde National Park.

County Officials Discuss Road Plan

THE annual convention of the State Association of County Commissioners, held in Denver, passed into history without its members going on record for or against any proposed change in the manner of financing state highway construction activities. As a matter of fact, the 1930 convention was the first one in years in which the members did not adopt some resolution dealing with highway matters. Not that highway matters did not occupy the attention of the commissioners, but the resolutions committee deemed it unwise to have the association, at this time, express itself for or against any financial program, and for that reason did not report out any resolution, adoption of which would have bound the association.

Highway matters formed the topic of a majority of the addresses delivered on the opening day of the convention. An address by Clarence Werthan, secretary of Rocky Mountain Motorists, Inc., was of more than ordinary interest. Werthan submitted to the county commissioners three possible plans for increasing the revenue of the State Highway Department during the next five years, and by this increased revenue bring about the completion of the state's principal highways.

Werthan's three plans follow:

1. Modified pay-as-you-go plan, providing for an exchange of the counties' share of the state gasoline tax for the state's one-half of the automobile license fees, together with the abolition of all gasoline tax refunds.

2. Twenty-five million dollar bond issue, with interest and amortization charges to be paid out of the state gasoline tax, $5,000,000 in bonds to be issued a year for a period of five years.

3. Fifty million dollar bond issue, with interest and amortization charges to be paid out of the state gasoline tax, $10,000,000 in bonds to be issued each year for a period of five years.

Werthan did not express himself in favor of any one of the three plans, but contented himself with putting the three plans before the commissioners without recommendation. It is of interest that a day or two after Werthan had delivered his address, the Colorado Association, upon recommendation of its highway committee, expressed itself as favoring the twenty-five million dollar bond issue plan as best meeting the needs of the state.

According to Werthan, about $8,000,000 in interest will have to be paid before the bonds are retired. Interest requirements of a $50,000,000 bond issue would amount to approximately $26,000,000.

All three plans submitted were of utmost interest to the county commissioners because each plan materially affects the sixty-three counties, in that it takes from the counties the share of the state gasoline tax that they receive under the present state gasoline tax law. Each plan is predicated on the repeal of that section of the law giving the counties 27 per cent of the tax and the cities 3 per cent.

Of interest also was the suggestion that in place of the 27 per cent of the gasoline tax the counties be given the State Highway Department's share of the motor vehicle fees, when the bond issue, secured by the department's share, has been redeemed by the end of 1932. Quick figuring by some of the county commissioners disclosed that, in round figures, the counties would lose about a half million dollars by the proposed exchange.

Werthan's speech was preceded by an address by Dr. B. M. Rastall, executive vice-president of the Colorado Association. Dr. Rastall made a plea for a constructive highway construction program, painting a glowing picture of the benefits that the state will derive from a system of modern improved highways, in increased tourist business. Dr. Rastall also told of the methods employed by the Colorado Association in creating interest in Colorado as a vacation center, and as an ideal place for the man seeking a home or a site for a factory.

Another interesting address dealing with highway matters was delivered by Frank H. Blair, member of the State Highway Advisory Board from Sterling.

New officers of the county commissioners' association are: President, R. A. Miller, Arapahoe County; first vice-president, W. H. Bartell, El Paso County; second vice-president, Lynn Kennedy, Garfield County, and secretary-treasurer, Fred O. Pearce, Brighton, Colo.

The convention was one of the most successful held in recent years. The attendance broke all records, virtually every county in the state being represented by one or more commissioners.

World's First Overseas Auto Ferry Links United States and Cuba

The world's first overseas auto ferry, designed to transport cars of the ever-increasing horde of American tourists bound for Cuba and the new American Monte Carlo in Havana across the 90 miles of ocean between that city and Key West, has been completed and is now in operation, it has been announced by the Peninsula and Occidental Steamship Company. The new ferry service, transporting both cars and passengers at a nominal cost, links up, by a five-hour trip, the 700-mile Cuban Central Highway with the new motor-way over the Florida Keys from Key West to Miami, joining there the Atlantic Coastal motor route to Bangor, Maine, to complete the longest model automobile highway in the world.

Completion of the Florida overseas route and the opening of the new American Monte Carlo project of John McEntee Bowman and associates in Havana have stimulated the largest volume of Cuba-bound tourist traffic in the history of Key West. Removal of entrance restrictions on cars brought into the island by American tourists has greatly increased demand for automobile transportation beyond capacity of existing facilities and the new ferry is the first unit in a service which will be materially increased in the near future.

At present the Peninsula and Occidental Steamship Company, which is operating the new line jointly with the Florida East Coast Railway, is also operating a passenger, mail and express service to Havana from Tampa and Key West and the Florida East Coast line has a daily car-ferry service to Cuba.—Michigan Roads and Pavements.

View of present paved highway east of Aurora, which will be extended ten miles toward Limon during 1930.

Public Service

By FRANK H. BLAIR
Member State Highway Advisory Board*

THE subject of roads and highways is an ever-present problem, insistently demanding solution. Far from reaching an end of our troubles, apparently they are only beginning, and never has there been a time in the history of our commonwealth when so *many* people have demanded improved roads in so *many* places; and this in spite of the millions of dollars spent annually for this purpose, and the truly wonderful improvement made during the past ten years.

Never in our history have motor vehicles increased so rapidly in numbers, nor their drivers been more critical of road conditions. A bad stretch of road which a few years ago would have excited no comment whatever now stirs up a storm of indignant protest, and a series of sizzling newspaper editorials. Within the last few years we have observed with misgivings the advent of the huge passenger bus, and the high-speed, heavy truck. Add to this the fact that the speed of the automobile has practically doubled and its destructive force quadrupled, and that probably 90 per cent of this traffic is still using a type of road utterly unsuited to it, is it any wonder that the present-day road builder is worried?

It seems but a short time ago that the majority of people considered the ordinary graveled highway good enough for any use, and the higher types of road surfacing pretty much a waste of public money. Recent traffic experience has demonstrated plainly that for many of our thoroughfares today this type of road, while capable of cheap and rapid construction, is under present conditions uneconomical and highly unsatisfactory. The storms of last November demonstrated plainly that this type of road is impossible of maintenance at times, and the cause of enormous losses and great inconvenience to the public. The result has been a growing demand for more rapid construction of the higher type of surfaced highways.

As previous speakers have explained, this brings up the subject of bond issues for highway improvement, with many good arguments pro and con. This proposition will undoubtedly appear again upon the ballot this coming fall.

It is one of the most hopeful signs of the times that men of your standing and business experience can spare the time to get together to study these important public questions with an open mind, and with the disposition to hear both sides fairly and honestly discussed, and no doubt your influence will have much to do with the final decision made by the voters in the coming election.

However, regardless of what that decision may be, whether it is "yes" or "no," we, as their servants, must go ahead with the resources furnished us, and each with the honest co-operation of the other do our best to give the taxpayer the utmost value for the money entrusted to our care.

I know that this is the attitude of our department, and as one representing the Highway Advisory Board, allow me to assure you of our interest in your proceedings and of our desire to continue the very pleasant associations we have had with your members.

I am sure that you, together with the members of the Advisory Board, have felt very keenly the absence of the head of our department, our esteemed Chief Engineer, Major Blauvelt, and have missed his wise counsel and advice. It is indeed a pleasure to be able to report his recent improvement in health and that his return to his office is predicted to take place in a few more weeks. We note also with sorrow the absence of the familiar face of one of your most distinguished members, the late Mr. Rigg. Such men of sterling worth and character are not easily forgotten, and we feel that we have lost a most useful citizen and a personal friend.

In conclusion allow me, on the part of the Highway Board, to thank you Commissioners for the many helpful things you have done for us in our various districts during the past year, and to express the hope that your present convention will be one of the most satisfactory and helpful in your history.

*Address delivered before Colorado Association of County Commissioners, Denver, January 22, 1930.

Virginia Dale and Jack Slade

Famous trading post established by Jack Slade at Virginia Dale on the old Overland stage line.

NORTHWARD and to the west out of Fort Collins goes a road, heavily traveled in these days by motor tourists, as it is Colorado's link to the main California highway on the north.

This is an historic highway. For 82 years—a long time in this lately settled West—it has been a highway of major importance, and in those years it has always been heavily burdened with a concourse of travelers.

The road takes its historic course diagonally through LaPorte, gathering place of French trappers in the fur trading days, and thence along the Cache la Poudre River, to the point where that stream emerges from the mountains. Branching to the northward, the road runs through the rolling, rocky Black Hills, rugged eminences, but lacking the majestic heights and awe-inspiring grandeur of the tall peaks to the south.

Up through these the road goes, following a natural course through the mountains and then out of the state onto the Laramie Plains of Wyoming, where it takes its way to the celebrated South Pass of Jim Bridger.

Easy course that it is, this was a trail of the old trappers, but it has been a road since the times when there was not a single settlement in Colorado worthy of the name of town.

The way across these rocky hill slopes was first ground into a road by the rumbling wagon wheels of the toiling Mormon emigrants.

In 1847, through these hills the heavy wagons of the bearded saints, laden with household goods and all the portable wealth of thousands of people, were drawn along this way by slow, plodding oxen.

The wheels of those long emigrant trains bit deep and to this day, if one knows where to look, there are numerous places along the line of the motor highway where one may see those wagon ruts as yet unfilled by the hand of time.

In fact, the motor road follows closely the original Mormon road, although it deviates from it in places a matter of a mile or two. And since the wagon trains of the Mormon saints passed on their way to the founding of an inland religious empire this road has been in use. Some of the California gold rush trains took this path, although more went along the northern route which led directly through southern Wyoming.

But it was some 15 years later when this road achieved its most colorful period in western history.

This was in 1862. Ben Holladay, who was the transportation wizard of the day, the pioneer Harriman or Hill, was having difficulty with his recently acquired Overland Stage line, which originally only touched Colorado at Julesburg, in the northeastern corner, as the Union Pacific Railroad does now.

The Indians were no respecters of persons and they were continually making attacks on the Holladay coaches, carrying both passengers and mail. So frequent and disquieting were these attacks that they virtually paralyzed the service on the line, of which Holladay was justly proud.

That determined individual, not to be balked, decided to move the whole line down to the Black Hills route, closer to the settlements and more easily protected. So the old Mormon road became a link in the Overland Stage line, that slender but vastly important thread of communication between the east and the Pacific Coast.

Now Holladay had in his employ one of the most curious and contradictory figures in the life of pioneer times. This man was Joseph A. Slade, known commonly as Jack Slade. He served Holladay as division superintendent, and when the line was moved he was assigned to take charge of the new stretch, then known as the Rocky Ridge division, being transferred from his previous headquarters at Julesburg.

While Slade is an extremely controversial figure, there being endless varying accounts of the important episodes of his life, it must be generally agreed that he was an extremely efficient division superintendent.

Slade's mail and coaches went through, and in

those days that was the important thing. Nor was this any easy condition to bring about. There were Indians to contend with, storms to battle, and on top of this, it may be easily understood that robbing the stage, in a country without much government, was regarded as an interesting as well as lucrative pastime. In addition the stage drivers, being men of the utmost determination and hardihood, were no easy crew to handle. A strong hand was needed. Slade had that, and his drivers responded by bringing home the coaches for him.

He also had a reputation, which made him in those times Colorado's most notorious citizen, for he was known wherever the stage line was known as Slade of the Overland—a desperate killer.

It must be conceded at the outset that Slade's reputation in this respect was greatly overrated. Mark Twain, who met him as a gullible youth, credits him with having killed twenty-six men. You may find estimates on his personal graveyard which run as high as 45. Emerson Hough, on the other hand, discredits completely Slade's accomplishments as a taker of life and puts him down for only two. A close examination of his record would indicate that this figure should at least be four, although it must be admitted that two of these killings have not been completely substantiated.

However that may be, there is no doubt that on occasions Slade was a man who held human life cheaply and he could be as ugly, quarrelsome and vicious as a downright devil. That was when he was drunk, which was not infrequent. Sober, he was the most suave, urbane and pleasant-mannered gentleman you would be likely to meet in the whole West. It was in this latter role Mark Twain met him as he rode the stage through Virginia Dale on his way to the Nevada mining camps. Twain, filled with horrified respect for Slade's fabulous misdeeds, which he found on every tongue along the stage line, was completely dumbfounded when he discovered that the mild and courteous station keeper, who insisted that he take the last cup of coffee in the pot, was Slade.

This episode took place in the old stage station at Virginia Dale, which Slade built when he first took charge of the division. This station is still standing in the pleasant little mountain nook almost at Colorado's northern boundary. It is perhaps in keeping with the gentler side of Slade's nature that he chose this beautiful spot for his headquarters and his home, and it is evident that he regarded it with some affection, for he named it for that remarkable woman who shared his fortunes to the bitter end, and whose first name was Virginia.

It is a disgraceful thing to record that this stage station, the only one on the old Overland line which is still standing, is not set apart and maintained for its historical interest. The State of Colorado has paid no attention to it. The old log structure is in private hands. Fortunately, it is still in a good state of preservation, but it is now covered on the outside with ship lap and across the front of it an addition has been built which obscures the older part almost completely. This addition is now used as a dance hall. It is to be hoped the state will awake sufficiently to take over this relic and preserve it as an emblem of the greatest enterprise of the early West.

However quiet and beautiful the Dale may appear now to the passing motorist, there was a time when Slade ruled there that it witnessed scenes of turbulence and bloody violence.

Slade killed at least one man there, a hated enemy, Jules Reni. Jules was succeeded as superintendent at Julesburg, named for the former, and there was bad blood between them. While there are a hundred accounts of the events which finally led up to Jules' death, the one given here appears to be the most probable after a comprehensive study of all of them.

Shortly after Slade began work at Julesburg he missed some mules and suspected Jules, who, it seems, was dismissed for suspected complicity with robbers. Slade immediately went to Jules' ranch and there the bad blood was heightened by a bitter altercation. Later as Slade one day entered a store Jules shot him with a shotgun, increasing the stage superintendent's weight by thirteen leaden shot.

Slade fell, apparently mortally wounded, and Jules sneeringly instructed his friends to take him out and bury him.

Slade hurled back a challenge from the floor:

"You ————! I'll live to wear your ears on my watch chain."

And he did.

After considerable time Slade recuperated from the charge of buckshot and Jules left the country, but after Slade was transferred to Virginia Dale, Jules came back to the country, rumbling threats and making boasts as to what he intended to do with Slade. Slade put the case before military authorities and re-

Showing original building and chimney constructed by Slade.

ceived a sort of an unofficial permission to protect himself.

He sent out some of his men and they captured Jules, bringing him bound, hand and foot, to Virginia Dale. The Frenchman was tied up to a post in the horse corral and there left over night.

The next morning Slade went out and mercilessly shot him twice, killing him without giving him a chance.

There is a dramatic yarn that Slade cruelly prolonged Jules' death, merely nipping him in the arms, legs and hands with many shots and taking a drink between each shot, but this tale is discarded by the most reputable authorities.

However, Slade made good his threat. He cut off Jules' ears and carried them in his pockets. It seemed to please his satanic sense of humor to horrify timid people with these gruesome relics. It is reported he frequently went into the rude bars of the day, usually kept by men who had a healthy respect for Slade, and ordered a drink, then offered to pay with one of the ears, which, needless to say, was never accepted.

Thomas B. Bishop, who "whacked bulls" on the northern trail in the days when Slade held forth at the Dale, and later settled down on a ranch close by, used to tell, before his death, of seeing Slade, in one of his lighter moments, gravely entertaining a small girl, who had stopped with her emigrant family in the Dale, with one of the ears, in which he had placed a couple of pebbles, and dried as it was served as an excellent rattle.

Slade became the scourge of the northern country-

Robber's Roost in the distance, where members of Slade's gang made their headquarters.

One of the many stations of the Holladay Overland stage line.

side. Drunk, he was incorrigible, and his periodical drunks increased in frequency.

At one time he rode with one of his men into La-Porte, and there terrified a storekeeper, shot up the place and then poured all the sugar and flour, molasses and vinegar onto the floor, amusing himself by running through the door and skating across the room in this mess. He later paid G. W. Sanderson $800 for the damage, however.

It is also related that on one occasion he mounted to the top of one of his coaches at the Dale and bidding the driver to drive at utmost speed, pulled his revolver and began to fire playfully through the roof of the stage. While the horses ran at a lather-gallop and the creaking coach careened madly down the rough road, the unfortunate passengers took the only course left to them and rolled out onto the rocky hillside.

Playful pranks of this nature finally got the countryside so aroused that Holladay was forced to listen to angry protests and fire his crack division superintendent.

Slade made his way to Montana, where in 1864 he fell afoul of the Vigilantes there and was hanged. Even his death is controversial. His hanging has been called the only mistake the Vigilantes made in their endeavors to stamp out lawlessness. Slade was not a member of the Plummer gang of road agents and neither was he accused of any robbery nor murder in Montana. What he did do was to go on one of his typical destructive rampages, and when haled before the people's court, he tore the warrant in two and defied the judge. The Vigilantes were so determined to establish order and justice that they would brook no such behavior. If Slade had left town for a brief time the popular anger might have been assuaged, but instead, in drunken bravado, he chose to remain, and was taken and hanged.

He died piteously, begging to see his wife and could hardly stand as the noose was placed about his neck. He pleaded and wept and died an arrant coward, an unsuspected depth of his character in the light of his bold and lawless life.

The woman who was called his wife probably could

(Continued on page 20)

Picture taken during construction of the Nunn-Wyoming Line road—a "mixed-in-place" job, made with Midwest Asphaltic Road Oil. Photo by Roy Randall, Office Engineer, Colorado State Highway Department.

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Highway Engineering Conference

THE fourth annual highway engineering conference was held at the University of Colorado on January 16 and 17. The conference was held under the auspices of the Department of Civil Engineering and the University Extension Division. One hundred highway engineers, officials, and others interested in highway construction and maintenance, as well as the civil engineering students attended the meetings.

The purpose of the highway conference is to permit those interested in highway construction, maintenance, and finance to discuss their common problems and methods of solving them. This year special attention was given to consideration of highway finance and oil-processed roads.

The conference opened Thursday morning with Prof. F. R. Dungan presiding. The address of welcome was given by President Norlin of the University, and the response was made by Mr. J. E. Field of Denver. The program for the two days follows: "The Application of Traffic Surveys to the Design of Primary Roads," by H. E. Cunningham, Field Manager, Western States Traffic Census Survey; "Time Studies on Highway Contract Operations," by C. F. Rogers, Assistant Highway Engineer, U. S. Bureau of Public Roads; "Colorado's Proposed Bond Issue," which showed the advantage of a fifty million or a twenty-five million dollar bond issue over the pay-as-you-go plan, by W. F. Bleeker; "Highway Financing," by W. C. Davidson, State Highway Engineer, New Mexico State Highway Department, O. T. Reedy, Senior Assistant Highway Engineer, Colorado State Highway Department, and A. E. Palen, Acting District Engineer, U. S. Bureau of Public Roads; "The Relation of Snow Removal to Primary Road Maintenance," by P. M. Bowen, District Engineer, New Mexico State Highway Department; "Traffic Provision During Construction," by J. J. Vandemoer, Division Engineer, Colorado State Highway Department, and by A. V. Williamson, Senior Highway Engineer, U. S. Bureau of Public Roads; "Recent Developments in Highway Research," by R. L. Downing, Assistant Professor of Civil Engineering, University of Colorado; "Selection of Oils for Oiled Gravel Roads," by H. G. Nevitt, Petroleum Engineer, White Eagle Oil and Refining Company, and by M. D. Glenn, Engineer, Gilmore Oil Company; "Field Control of Aggregates for Oiled Gravel Roads," by L. C. Campbell, Materials Engineer, New Mexico State Highway Department; "Construction of Oiled Gravel Roads," by J. E. Maloney, Assistant Highway Engineer, Colorado State Highway Department, with discussion by C. Walters, Resident Engineer, Colorado State Highway Department, W. J. Walsh, Resident Engineer, Colorado State Highway Department; A. B. Collins and J. J. Vandermoer, District Engineers, Colorado State Highway Department; "Maintenance and Traffic Capacity of Oiled Gravel Roads," by E. B. Bail, Construction and Maintenance Engineer, New Mexico State Highway Department.

The success of the conference was due to the hearty co-operation of the New Mexico and Colorado State Highway Departments, and the U. S. Bureau of Public Roads.

A view of the modern highway over the famous Battle Mountain near Redcliff.—Photo by H. L. Jenness.

Senate Passes Highway Bill

By JAMES W. BROOKS

The Senate has passed the Dowell-Phipps Bill, which increases Federal Aid for highways from $75,000,000 to $125,000,000 a year for the next three years. An amendment was added to the measure providing for an increase in the limitation of Federal Aid from $15,000, exclusive of bridges, to $25,000 per mile. The measure has therefore gone back to the House for conference.

When this measure, which has been sponsored by the American Association of State Highway Officials, reaches President Hoover for his signature, the machinery for greatly expanded road building programs will be actually set in motion by state highway departments. The opening of the 1930 construction season is near at hand and highway officials under public pressure for greater speed in road building are anxious to avoid all unnecessary delay in letting contracts.

In this connection, it will be of interest to motorists and other taxpayers to know that along with increased Federal Aid, the standards of efficiency in road construction have increased and that notwithstanding the demand for more roads, engineers are taking due caution to avoid being rushed into the building of weak roads where traffic demands safety and strength under passing tonnage. More and more as road building progresses the policy of building for today in the vain hope that tomorrow will take care of itself is falling into disuse.

One other hopeful sign in highway progress is the tendency in highway administrative circles to place a check upon legislative road building. That is to say, the tendency of state assemblies at the behest of some of their members to increase road mileage for political reasons, or in plain terms, to get votes. A road legislated to a place on a map is not a road, in the modern sense, until the engineer can build it, and it is not a mere coincidence that construction funds must be provided. Too often, however, this cold fact is overlooked.

Not until the past year or two have earnest efforts been made to reduce rather than extend highway mileage, particularly in the matter of purely local roads. As a long step toward economy in this direction, the U. S. Bureau of Public Roads, through its chief, Thomas H. MacDonald, is suggesting that "We can release a large amount of land that is now legally laid out as public highways and perhaps fenced off, but which is not in fact used except to reach the farm fields. I do not mean," Mr. MacDonald continued, "the roads which serve the agricultural population. I believe we can exclude a very considerable mileage of the total of 3,000,000 miles from our public roads if we have adequately planned systems."

Mr. MacDonald went on to say, "The whole keynote of the economical expenditure of highway funds is planning systems that, with the least possible mileage, will reach the largest number of people. It means not only planning properly, as I feel we have planned in the system of Federal Aid roads, but auxiliary systems of roads within the metropolitan districts to serve the local traffic need there; and then consolidating into systems the roads of the rural districts, and discarding as public responsibility those which are only lanes used to reach the fields. I think we can throw back for agricultural production a considerable acreage of land, and at the same time can get from under the responsibility of a considerable mileage of so-called roads."

1929 Is Great Road Building Year

The year 1929 was in many ways the greatest year of road building in the history of the nation, according to Ralph Fishel, chairman of the Good Roads Bureau of Rocky Mountain Motorists, Inc.

"Approximately 55,000 miles of highways were surfaced on the Federal Aid, state and local systems," says Fishel, "bringing the total surfaced mileage up to 675,000 miles at the close of the year. This means that around one-fifth of the nation's total of 3,013,584 miles of roads have been temporarily or permanently surfaced.

"In carrying out this vast road building and maintenance program in 1929, Federal, state and local agencies spent approximately $1,800,000,000, and have already launched programs for the ensuing year that will exceed $2,000,000,000 in cost. To this must be added around $500,000,000 a year spent by municipalities in building and maintaining streets. But large as these programs appear, it must not be assumed that they in any way measure up to the highway needs of the nation.

"Bond issues authorized near the close of 1928 were reflected in 1929 construction programs. These included the $75,000,000 authorized in Missouri; $30,000,000 authorized in Louisiana, and $35,000,000 in West Virginia. In addition, legislatures assured Maine $15,000,000 for highway construction, New Hampshire $8,000,000 and South Carolina $65,000,000.

"On the heels of these important bond issues, other states made moves to meet road-building needs. Texas heads the list with a proposed issue of $225,000,000. Oklahoma plans to assure from $100,000,000 to $150,000,000 for road construction, Georgia $75,000,000, and Iowa $100,000,000.

"The farm problem was being considered in 1929 and it served to focus attention on highway needs as a means of aiding the disposal of agricultural products. With 23 per cent of the nation's motor vehicles owned by farmers, no greater assistance can be rendered than by speeding up road building to enable him to serve new markets and remove the isolation of rural life. By far the largest number of farms are today located on unimproved roads.

"Aside from important interstate and state highways, there was also considerable progress made during 1929 in the building of forest and national park roads. There were 315.4 miles of forest highways of all classes built in the fiscal year ended June 30, 1929. Of this total 298.1 miles were in the western states and Alaska, and the remaining 17.3 miles were in the forests of two eastern states. In the national parks the year's work brought to completion the improvement of 100.7 miles of park roadway, increasing the total thus far improved to 213.4 miles. At the close of the fiscal year construction was in progress on 113 miles and surveys were under way on 209 miles more."

Virginia Dale and Jack Slade

(Continued from page 14)

lay claim to that title only by virtue of the common law. I have been unable to find any record of their marriage, and Thomas Bishop was authority for the statement that those who knew them called Virginia Slade a "fancy woman."

Even though their union may have been without benefit of clergy, it was none the less a binding one. These two turbulent spirits loved each other. Virginia was a strong, generously proportioned, handsome woman and she feared no one, not even Slade when he was drunk. She was the only person in the world who could handle him in that condition.

When he was hanged Virginia was sent for and arrived too late to save him, but she cursed his executioners and reviled his friends for permitting the deed. Then she took his body back to their ranch in a metal casket, preserved in brandy—there is ironic fitness in that—and kept him there all the winter of 1864. The next spring she took it to Salt Lake, where Slade was buried.

There is a story, fairly well authenticated, that while Slade was superintendent at the Dale he entered into an unholy alliance with a group of road agents, who made their retreat on a mountain a couple of miles distant, known as "Robber's Roost." Slade is reputed to have tipped this band off to the treasure-laden stages, which they then robbed, sharing with Slade the proceeds and then returning to their almost impregnable retreat on the mountain. This story has never been completely substantiated, but none the less it is certain that Slade was more than well supplied with money during his time in the Dale and afterward.

Authenticated or not, it is a definite part of the story of Virginia Dale and the road which runs through the valley and over the hills to the west.

Standing in the Dale, alongside the historic old log building and looking up the slope to Robber's Roost, imagination may again people that peaceful spot with the turbulent figures of 70 years ago, and if you wait until moonlight you may catch a glimpse of two phantoms, Jack Slade and his "fancy woman," Virginia, as they look out the window up toward the top of the mountain, where their robber-confederates are making merry over the success of their latest foray.

Counties in the United States this year will spend in road construction and maintenance three-quarters of a billion dollars, according to an eastern magazine. Most of this money will go for the low-cost types of roads to meet the demand for travelable roads without excessive expenditures.

PLANS FINISHED BUT PROJECT NOT YET ADVERTISED FOR BIDS

Proj. No.	Length	Type	Location
147-D	2.903 mi.	Gravel Surfacing	South of Cortez
151-A	6.472 mi.	Gravel Surfacing	West of Tabernash
243-C	3.837 mi.	Gravel Surfacing	West of Dyke
265-C	2.500 mi.	Gravel Surfacing	West of Bayfield
270-AR	3.429 mi.	Oil Processed Gravel Surfacing	East of Buena Vista
270-BR	2.833 mi.	Oil Processed Gravel Surfacing	East of Buena Vista
270-D	3.978 mi.	Oil Processed Gravel Surfacing	East of Buena Vista
277-D2	15.566 mi.	Concrete Pavement	North of Pueblo
277-E2	10.200 mi.	Concrete Pavement	South of Colorado Springs
296-E		Gravel Surfacing	South of Greenhorn

PLANS BEING DRAFTED

Proj. No.	Length	Type	Location
122-R	12.5 mi.	Graded	East of Ovid
138-C		Gravel Surfacing	South of Muddy Pass
149-B	8 mi.	Oil Processed Surfacing	East of Denver
165-R	9 mi.	Oil Processed Surfacing	East of Canon City
286-D	20 mi.	Oil Processed Surfacing	North of Eaton
298-C	4 mi.	Gravel Surfacing	Wolf Creek Pass
300-B	2 mi.	Graded	North of Silverton
144-E	2 mi.	Concrete Pavement	North of Fort Collins

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per Cent Complete	Proj. No.
2-R9	Starkville	1.35 mi.	Concrete Pavement	H. C. Lallier Const. & Eng. Co.	$ 59,180.60	0	2-R9
57-R2	North of Lamar	0.502 mi.	Bridge	J. Fred Roberts & Sons	140,102.96	53	57-R2
68-R1	North of Monte Vista	1.900 mi.	Gravel Surfaced	J. Finger & Son	24,124.00	72	68-R1
78-R	Near Minturn	0.709 mi.	Gravel Surfaced	J. Fred Roberts & Sons	96,342.90	24	78-R
138-A	North of Kremmling	10.916 mi.	Grading	F. L. Hoffman	201,262.80	100	138-A
138-B	North of Kremmling	3.133 mi.	Gravel Surfaced	F. L. Hoffman	76,363.35	66	138-B
144-D	Northwest of Ft. Collins	2.834 mi.	Gravel Surfaced	J. Fred Roberts & Sons	66,430.10	40	144-D
147-C	South of Cortez	3.428 mi.	Gravel Surfaced	E. J. Maloney	86,182.75	89	147-C
150-A	West of Craig	8.227 mi.	Gravel Surfaced	Gardner Bros. & Glenn	93,477.35	11	150-A
175-A	Between Sterling and Ovid	41.979 mi.	Graded	Cole Bros.	193,055.75	34	175-A
208AR2-CR1	East of Grand Junction	9.254 mi.	Oil Processed Gravel Surface	Hinman Bros. Const. Co.	44,652.05	100	208AR2-CR1
253-D	West of Milner	2.547 mi.	Gravel Surfaced	Hamilton & Gleason Co.	147,192.00	40	253-D
258-G	West Side of Cerro Summit	2.885 mi.	Gravel Surfaced	Mountain States Const. Co.	68,640.60	100	258-G
258-H	West of Sapinero	4.921 mi.	Gravel Surfaced	Cole Brothers	123,700.60	73	258-H
263-A	Betw. Mortimer & Ft. Garland	3.404 mi.	Gravel Surfaced	Mtn. States Constr. Co.	47,509.20	53	263-A
266-D	South of Bondad	4.111 mi.	Gravel Surfaced	Engler, Teyssier & Co.	96,075.30	89	266-D
270-C	Betw. Alamosa & Monte Vista	5.000 mi.	Oil Pro. Gravel Surf.	Mountain States Constr. Co.	38,485.50	100	270-C
277-D1	Betw. Colo. Springs & Pueblo	15.566 mi.	Grading	M. E. Carlson	218,277.80	99	277-D1
277-E1	South of Colorado Springs	10.2 mi.	Grading	J. L. Busselle	221,389.65	72	277 E1
282-G	South of Craig	5.147 mi.	Gravel Surfaced	Chas. B. Owen	61,645.22	7	282-G
282-H	Between Rifle and Meeker	7.029 mi.	Gravel Surfaced	Winterburn & Lumsden	82,589.74	96	282-H
292-B	Between Gilman and Minturn	2.640 mi.	Gravel Surfaced	O. J. Dorsey	29,146.80	100	292-B
292-C	West of Avon	1.646 mi.	Gravel Surfaced	Ed. H. Honnen	39,663.10	100	292-C
293-C	North of Ouray	3.661 mi.	Grading	C. V. Hollenbeck	62,997.80	99	293-C
295-D	North of Antonito	2.460 mi.	Oil Pro. Gravel Surf.	Levy Const. Co.	72,676.75	84	295-D
297-C	Southwest of De Beque	9.953 mi.	Gravel Surfaced	Hinman Bros. Const. Co.	312,453.50	47	297-C
298-B	North of Pagosa Springs	2.414 mi.	Surfacing	Engler & Teyssier	38,426.00	49	298-B
300-B	North of Silverton	2.828 mi.	Graded	Hamilton & Gleason Co.	35,647.80	43	300-B

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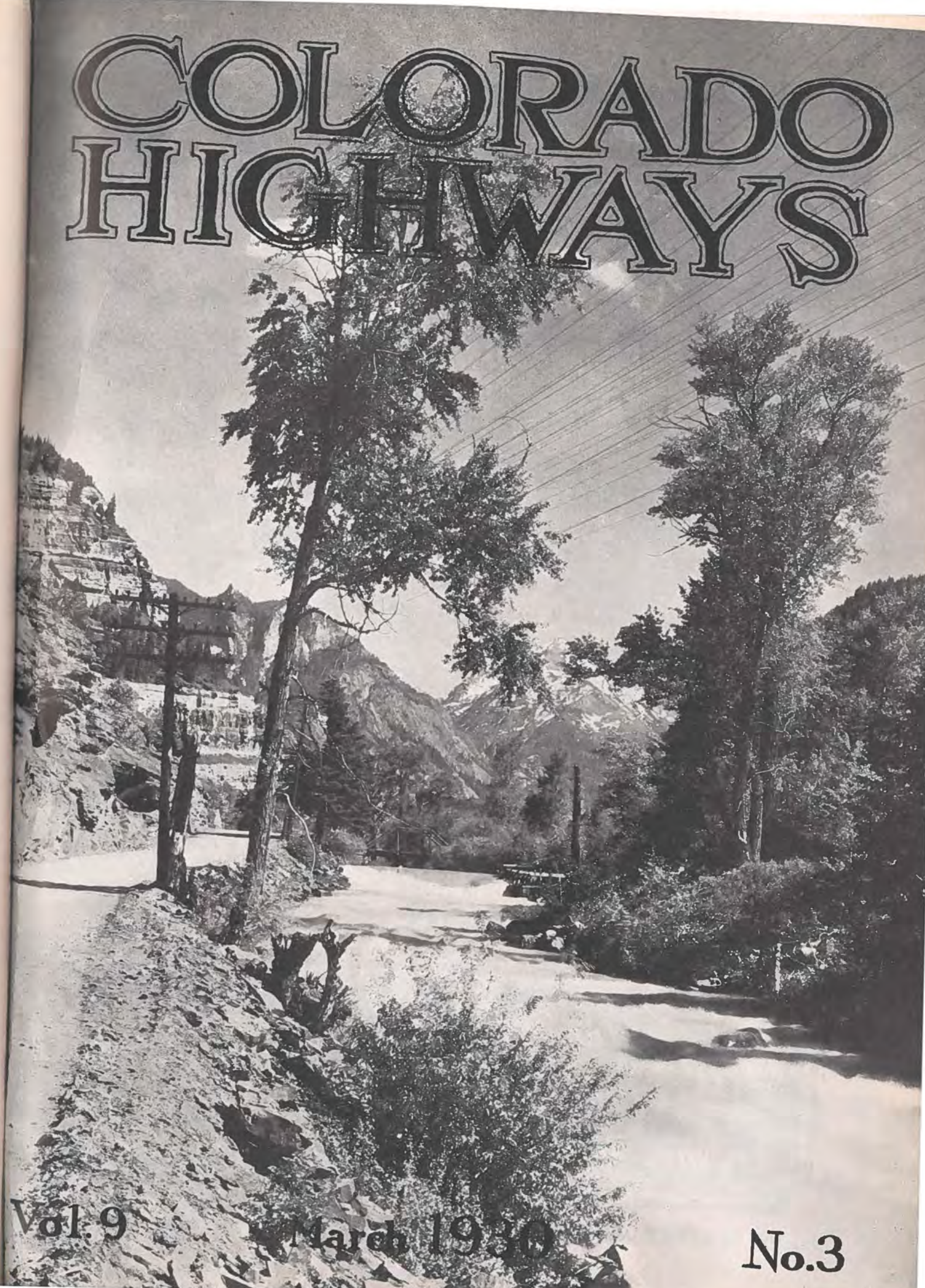

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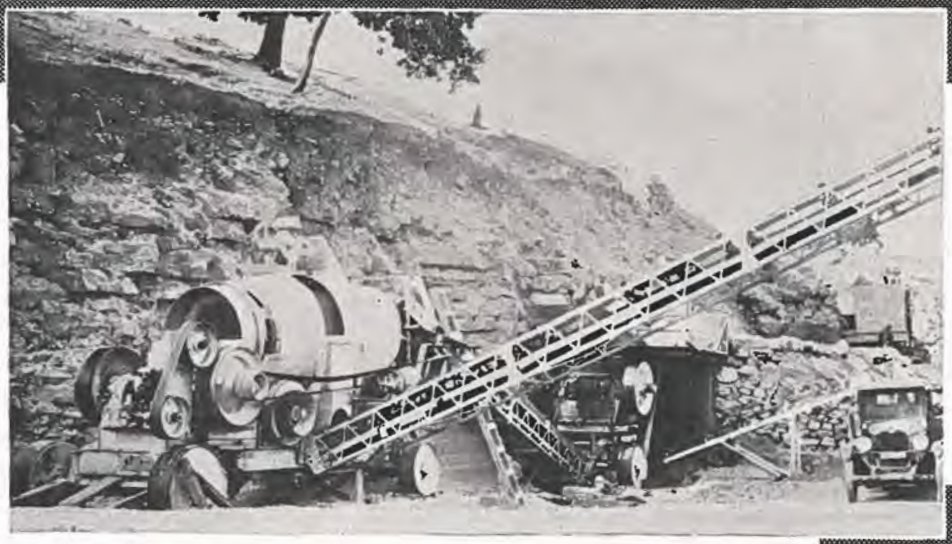
CRUSHING



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M. W. BENNETT, Editor

Articles on the subject of road building and highway development in Colorado are solicited. Manuscripts should be addressed to the Editor, with return postage. Photographs should accompany articles whenever possible.

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Our Cover Picture

ON THE COVER of this issue of COLORADO HIGHWAYS we print a picture of the highway between Montrose and Ouray. This road was recently improved with gravel surfacing. It is an important link on the main "north-south" highway of the Western Slope, and is heavily traveled throughout the year. Photo by the Walker Studio, Montrose.

Colorado Highways
"BETTER ROADS"
VOLUME IX. MARCH, 1930 NUMBER 3

Roadbuilder Shows What Can Be Done

(An Editorial)

WHEN good roadbuilders get together things happen. One paving outfit last year in Illinois built 21 miles of 18-foot wide hard pavement in 20 weeks. Not so long as 15 years ago a month was scarcely sufficient to construct a single mile of concrete.

The modern highway paving job bespeaks efficiency as much as the making of tin cans, buttons, or automobiles. Equipped with machinery that quickly whirls sand, stone, water and cement into the conglomerate mass known as concrete, the modern roadbuilder is now able to cope with the problem of how to keep pace with the automobile.

There was a time when motorists of the community shuddered when they learned that a pavement was to be laid, for they knew that perhaps the roadway would be closed for as much as a year. Nowadays the fear of the detour exists only in mild form, for pavements are quickly thrown open to traffic and highway builders generally provide by-passes that hamper the motorist little.

Pavement building has progressed to that stage where it can be said with certainty that highway builders can meet any community's motoring demands—if given the opportunity.

Picture this paving project mentioned above. The contractor, one of thousands who know their business thoroughly, studied the task well before work was started. He installed an industrial railway, large material-handling plant, and other devices necessary to the mass production of pavements. He determined that a small night-shift that would take care of the details for the following day's run would be a stroke of good business.

With everything in readiness, and despite an extremely heavy rainfall, this one paving mixer marched down the roadbed, leaving behind in a single day's run as much as 2,133 feet of finished concrete.

GOOD ROADS ECONOMY

It has been frequently asserted that good roads really cost nothing in the long run, but really yield a profit on the investment necessary to provide them. Recent statistics seem to bear out this idea.

According to Thomas P. Henry, president of the American Automobile Association, good roads have reduced the cost of automobile operation from an average of 10 cents a mile to 6.43 cents a mile in the last five years.

This means that for a trip of 100 miles the expense is now $3.57 less than it would have been under average conditions in 1925, taking into account the cost of gasoline, the less wear on cars and tires, and some allowance for time saved.

If these savings are only sufficient to offset the additional gasoline and the taxes necessary to build the highways the motorist is still ahead of the game, because of the greater satisfaction and comfort enjoyed while on the road.

GOOD ROADS HELP TO KEEP YOUNGSTERS ON THE FARM

The declining birth rate in Patrick County, Virginia, is blamed on the bad roads of that section by a registrar of the state bureau of vital statistics.

"The cost of wear and tear on our transportation machinery over our ungraded trails of mud," he writes, in a report to headquarters, "takes the profit out of marketing our products. Under such a burden, the younger and more progressive people who are about to establish their own homes are attracted elsewhere. With few exceptions those departing say they are aware that North Carolina and adjoining counties have better roads."

It is generally recognized that good roads and automobiles have interested young people in many communities in staying on the farm, so that the converse can readily be believed. A state has many sound reasons these days for improving its highway system.

THE HIGHWAY AGE

Historians of the future, looking back on the first quarter of the twentieth century, may well consider it the "Highway Age."

In 1900 paved roads were almost unknown. Uneven dirt or gravel surfaces were the best even urban localities had to offer. And in rural districts the suffering farmer struggled through mud holes and over roads indistinguishable from cow paths.

The change made in little more than a quarter century has been epochal. From coast to coast broad, smooth highways stretch, an invitation to the business man and tourist. In progressive agricultural localities old gravel and macadam roads are being given a waterproof surface with oil or asphaltic materials at moderate cost, thus modernizing old roads and providing a feeder system for main highways.

Of all the tremendous progress of this century none has been more pronounced than that made in road building. The person with an automobile can range hundreds of miles in a day. The result has been a lessening of the provincial spirit and a breaking of barriers between farms, cities, states, and even nations. —Walsenburg Independent.

Plea for Better Engineering On Secondary Roads

As Expressed by THOMAS H. MACDONALD
Chief, U. S. Public Roads Bureau

IN SUMMING up the road situation as it stands today, particularly with reference to the need for improvement on secondary roads, Thomas H. MacDonald, chief of the U. S. Public Roads Bureau, took the view in a radio talk recently that the need for money is not so pressing as the need for greater efficiency in county and township road construction, otherwise termed as farm-to-market roads.

Said he: "When people speak of farm-to-market roads, I often wonder just what kind of roads they mean, and what other kinds of roads there may be that are not properly to be described as farm-to-market roads. It puzzles me a little, because I have always thought of all our rural roads as farm-to-market roads; and the more I study the character of highway traffic, the more am I convinced that that is right.

"To be sure, there are some roads that serve not much traffic except that which originates on the farms; and some that carry, in addition to the farm traffic, a heavy inter-city movement of vehicles. There are some whose total traffic, without regard to character, is light; and others that carry a tremendous traffic; and, by and large, it has been my observation that the city roads are likely to serve also the heaviest farm traffic, and are, therefore, the most important farm-to-market roads.

"Certainly, it is true that the farmers' markets—for buying as well as selling—are in the cities; and the bigger the city the better the market. So I think the principal distinction to be drawn between roads is one rather of importance than of kind. And when my friends tell me that 'really, we shall have to do something about the farm-to-market roads,' I conclude that what they actually mean is that it is time now to be doing something more effective for the improvement of the less important roads, the local or secondary roads as they are called. And so it is.

"It is time to extend to the secondary or local roads some more effective improvement, and I am sure the time has arrived when that more effective improvement will be extended. It not only will be done; it is being done, and the process is already well advanced. There are very definite reasons why progress in the improvement of the secondary roads under the supervision of the local authorities has been slow in the past.

"First, there has been a lack of order and plan in the efforts of the local authorities, and their organization and equipment for the work have been seriously deficient. I wonder how many people realize that nearly half of the 3,000 odd counties in the United States are trying to build roads without any engineering direction whatever, and with none but the most primitive road building equipment? That is a fact; and it is also a fact that, of these counties that do have at least the most essential equipment and the basis of an engineering organization, not more than half again are really adequately equipped and organized to handle the difficult task of building roads for modern traffic.

"Thus poorly equipped, these counties have been trying, year after year, to improve all of their local roads, spreading their slender revenues over a mileage so great that the slight benefits of each year's work have been lost by the time the next year rolled 'round. That is one of the reasons why progress in the improvement of the local roads has not kept pace with the more orderly improvement of the main roads by the state and Federal governments.

"But, a movement is under way, and already well advanced, the effects of which will soon be evident in a very material improvement of the condition of the local roads. That movement is the steady enlargement of the systems of state and Federal-aid roads, which in recent years has been taking place more rapidly than most people realize.

"In the selection of the roads that make up these systems, the Federal and state governments have wisely avoided the mistake of the county and township authorities. They have limited the extent of the systems to the mileage that could be improved as a whole in a reasonable length of time. The roads chosen have been the most important roads; and together they form a connected network that covers the entire country.

"The Federal law limits the size of the Federal-aid system to seven per cent of the total mileage of roads with the definite purpose of preventing the wasteful scattering of the national appropriations; but it provided that when this limited mileage had been im-

Pile driving for new Lamar bridge, being constructed by Colorado Highway Department with Federal Aid funds. This bridge will be a half mile in length when completed, and replaces an old steel bridge constructed several years ago. Photo by Paul Bailey.

Newly completed Clay Creek concrete bridge, consisting of ten 30-foot spans, located about three miles east of Lamar in Prowers County. Photo by Paul Bailey, State Highway Bridge Engineer.

proved, other roads could be added. In three states, the mileage selected under the original seven per cent limitation has already been improved and the size of the system has been increased by adding other roads; and a similar extension will soon be possible in a number of other states.

"In a similar manner and for the same reason, the states have limited the initial mileage of their state systems. But they, also, have found it possible from time to time to add to the extent of these systems. Between 1921 and 1928, they took over from the counties more than a hundred thousand miles, and there is no doubt that they will continue to take over additional mileage as rapidly as that already taken is improved.

"This process of gradually increasing the size of the Federal-aid and state highway system is having two effects. First, it brings under the control of the well equipped Federal and state highway departments mile after mile of the more important county roads and insures that they will be improved as their importance demands.

"Second, the roads taken over, being the more heavily traveled of county highways, are those which have required the largest expenditure. Relieved of them, the counties are able, without increase of local taxes, to expend a larger sum per mile on the remaining mileage and so effect a more lasting improvement.

"This, then, is one way in which Federal and state improvement of the principal highways—all of them farm-to-market roads—is brightening the prospect for more rapid local road improvement. There is another result of this orderly development that works in the same direction. The improvement of the main roads alone has made possible the great increase in number of motor vehicles in use. The high class of service afforded to these motor vehicles by the improved main roads has made the owners of the vehicles willing and able to pay ever-increasing sums for road construction and maintenance.

"Between 1921 and 1928, the amount of this payment by the owners of motor vehicles increased from $164,000,000 to $627,000,000. The portion of these increasing funds that has gone into the state treasuries has provided the means for taking over from the counties an increasing mileage of the more heavily traveled local roads, that have been the counties' greatest burdens. But while the local governments have thus profited indirectly, they have also shared directly in these increased earnings of the main roads, for the share of the motor vehicle taxes paid directly to the counties has increased from $22,000,000 in 1921 to $104,000,000 in 1928.

"The fact that the motor vehicle owners, as a class, are the most willing of taxpayers means that they feel that they are more than repaid by the road service they receive in return, and this return and consequent willing tax payment are primarily the result of the improvement of the main roads.

"This is the result of the wise policy of selecting for first improvement the most important roads. The improvement of these roads has earned a surplus above their cost of maintenance, which surplus it has been possible to use for the improvement of other roads in the order of their importance. Only by the orderly process that has been followed could this result have been achieved, and it is only by the extension of this same process that the roads of lesser importance can be progressively and adequately improved without laying an increasing tax burden upon real property and particularly upon farm property."

Type of mixed-in-place oil road being constructed in Colorado.

*Oiled Roads in the Intermountain Region**

By DR. S. H. DIGGS, Director of Research (Standard Oil Co., Indiana, Casper)

THE problem of building suitable highways in the intermountain region is perhaps even more difficult of solution than in other parts of the country. At any rate we have some problems not common to the east or Pacific coast. The two outstanding reasons for this difference are (1) lack of population and scarcity of taxable property, (2) climatic conditions, particularly lack of moisture, and high winds. We have as much need for good highways as have the thickly populated sections of the country, perhaps even more, for our distances are long and fairly high speed on the road is more essential than in the East. On the other hand we have not the means to build very expensive types of road. What type of road can be built at moderate cost that will meet these conditions? After years of thought and observation, I am thoroughly convinced that the solution of the problem lies in properly constructed oiled roads. Fortunately we have all of the raw materials available within our own territory.

The method used in this region for building oiled roads may be outlined briefly as follows: After a road has been properly graded it is allowed to go through one winter under traffic without any surfacing whatever. That is, no gravel or road metal is placed on it. Experience has shown that this is necessary to secure a firm foundation. The next summer 3½ to 4 inches of gravel is put on the road. This gravel is leveled off with a blade but not rolled. The road is then opened for traffic. One year is allowed to elapse before any work is done on the road other than blading if necessary or possibly filling a few holes. After one year of use this graveled road is again given about 2″ of finer gravel. By this time, experience shows that the base should be well compacted, at least for the width of 18 feet, though the edges are still apt to be soft. As soon as possible after applying the top coat of fine gravel the road is scarified to the depth of 3 to 4 inches. ¾ to 1 gallon of oil is applied per square yard. This is worked in with disc harrows, then bladed to the middle of the road and again spread out. Another application of oil about the same as the first is applied, making a total of approximately two gallons per square yard (the exact amount is varied somewhat according to the nature of the gravel and other conditions). This is now repeatedly harrowed, and bladed back and forth, until the mixture appears completely homogeneous to the eye. It is then smoothed with the blade leaving a small amount of crown for drainage. No shoulders are left on the road, as experience shows that shoulders impound water and injure the road. The road is not rolled but is opened immediately to traffic.

This method of road building is an evolution from the method used for the last six years or so in California. Experience shows that it makes a very satisfactory road at low cost. Too much emphasis can not be placed on the question of cost. At least this is true for Wyoming. We have so many miles of road in this state in proportion to the taxable property that any method of road building which is very expensive is automatically eliminated.

Starting with the graded gumbo road which would be necessary, no matter what the surface, the cost of building the above type of road is about as follows:

*Dr. Diggs delivered this paper at the annual convention of Rocky Mountain Oil and Gas Association in Casper. In view of the growing importance of road oils in highway construction and Dr. Diggs' fine outline on the subject we deem it worthy of reproduction here.—Editor.

Gravel first year	$2,500 per mile
Gravel second year	2,500 per mile
Oil, labor and overhead for converting gravel to oiled road	1,500 per mile
Total cost, exclusive of earth base and grading	$6,500 per mile

Of course this is an average figure. Variations as great as $1,500 or $2,000 per mile may occur according to the distance the gravel has to be hauled and other conditions.

It will be noted here that we have a first class road for the comparatively small figure of $6,500 per mile. Further, that the road is fully 20 feet wide and an 18-foot (minimum width) concrete road will cost $20,000 or more per mile and an asphalt road of equal width will cost from $25,000 to $30,000 per mile. It is a safe assumption that the average concrete or asphalt road will cost $26,500 per mile. The difference in construction between such a road and an oiled road would be $20,000 per mile. Assuming money borrowed by the state to cost 5%, this would mean a saving of $1,000 per year for each mile of road, in interest and therefore available if necessary for repairs. Even if we used the lower figure of $24,500 per mile average cost for permanent road the interest saving would still be $900 per mile each year. It has been shown quite conclusively that $400 per mile each year is ample to maintain an oiled road in good condition permanently.

It should be fully understood that an oiled road requires more maintenance than either concrete or asphalt, at least more than the latter types do for the first few years. In the above calculations no allowance has been made for maintenance on concrete or asphalt roads. The crux of the whole question of road building in Wyoming is to secure a good road as quickly as possible at a cost that can be borne by the taxpayers.

For oiled roads such as we have just discussed no other base than the traffic compacted earth is used. We have already mentioned the fact that the edges of the road continue to be soft even after two or more years of use.

A road of the oiled type, if properly constructed, needs only minor repairs at the end of one year. Most of these repairs are needed on the edges of the roads. Now and then a chuck hole may appear in the middle of the road due to faulty mixing. These small repairs are made by hand, using a prepared mixture of coarse sand and oil. It is necessary to dig out the hole so as to leave square (vertical) edges to prevent the patch from being pushed out.

In some instances, particularly where too coarse gravel was used or where the mixture was too lean, the road at the end of one year may be slightly pockmarked. Such a road is about as comfortable for driving as a perfect one, nevertheless if the road is pockmarked it will go to pieces unless it receives prompt attention. Water will collect in the small holes and freeze, also some coarse gravel will be pulled loose on the edge of these pockmarks by car wheels. This condition can be remedied very cheaply. A surface coat of the same quality road oil as that used in the original construction is applied to one-half of the road at a time. This is allowed 16 to 24 hours to penetrate as far as it will and is then covered with a very light coat of sand. Nothing further is required. This is known as flush coating.

If the original construction was not right, or if the road did not receive the necessary small repairs mentioned above the first year, it may be necessary to scarify the entire surface of the road after two years' use. Usually, however, the repairs the second year need only be of the same nature as those already described. In general at the end of about three years it seems quite certain that it will be necessary to rescarify the surface of the road. If sufficient gravel was used in the original construction no more is now necessary. Usually a very small amount of road oil will be added after the road is scarified. Sometimes no road oil is necessary, only scarification. In any case after scarifying, the road material is thoroughly mixed much as in the first instance though considerable less labor is required. As before the surface is bladed, leaving a small crown and then opened to traffic.

We have no roads of this type in Wyoming more than about three years old, so we can only conjecture any repairs necessary in future years; but it is the opinion of those most familiar with the work that the repairs in future years will not be greater than for the first three, say an average year in and year out of $400 per mile.

It is to be noted here that ease of rescarification and ability to mix thoroughly the old material after two or three years is essential to this method of maintenance. If the surface becomes very hard like an asphalt road it would pull up in cakes when scarified and could not be mixed and bladed properly. In other words the road would have to be rebuilt. Experience shows that when the type of road oil which is now specified by the Wyoming Highway Department is used that no trouble is encountered in this work. The surface is readily scarified and mixes as easily as it did originally and can just as readily be bladed to a smooth surface.

There is a popular idea that great binding power is necessary to hold together a road metal in the road surface. This we believe to be wrong. It is well known that given a proper moisture content no better road can be desired than may be built of sand and clay. Of course such a sand and clay road goes to pieces in very wet weather and does not hold up as well as it should in long dry spells but it gives a practically perfect surface when containing the right amount of moisture. Now certainly this type of road (sand and clay) is not strongly bound. However, it withstands traffic well. This, I think, is sufficient evidence that a very strong cement or binder is not necessary but rather a cement or binder of moderate strength which retains its plasticity as long as possible.

In fact it seems quite obvious for this type of road that we do not wish an oil which hardens or drys, but rather one which acts as a plastic binder and which may be rescarified whenever necessary.

An analogy may help this picture somewhat. A piece of furniture, a table for example, finished with a hard varnish, is of course more resistant to water and hard mechanical usage than a similar table wax finished, but if the varnished table is scarred, it is necessary to scrape the entire surface and refinish, whereas if the wax table is scarred, or stained, it is only necessary to rub with a cheese cloth moistened with wax. I think this analogy is fair.

Traffic Survey Shows Heavy Increase

THAT Colorado has a vital highway problem is clearly indicated by a comparative analysis of traffic at important points in various sections of the state, showing a tremendous increase in use of the roads.

While this increase is most marked around Denver and the other larger cities of the state it is universal, according to an analysis prepared by engineers of the State Highway Department from the detailed data gathered by the annual traffic census taken by a corps of enumerators since 1925.

Such an analysis shows the percentage and trend of traffic increase on the various highways and enables the engineers to plan construction that will prove adequate for future demands on the state's system of primary roads.

Denver-Morrison Highway Busy.

Probably the largest percentage of increase was shown on highway No. 8, the Denver-Morrison road. The traffic station on the southwest city limits of Denver showed an average daily count of 3,433 vehicles during July, 1925. The average passing that point every twenty-four hours during July, 1929, had increased to 6,129 vehicles. On one day, July 4, 1929, that highway carried 13,880 vehicles.

Other July counts at the Denver city limits showed an average daily number of vehicles on the Colorado Springs road of 5,892 for 1929 and 4,256 for 1925. The average on the Golden road was 8,034 per day in 1929 and 6,831 in 1925. On the Fort Collins road the daily load averaged 7,265 in 1929 and 4,227 in 1925. The Brighton road showed 6,233 daily last year and 4,816 in July four years previously. The Limon road count in 1929 averaged 1,868 vehicles daily and 1,234 in 1925.

At the north city limits of Colorado Springs, on the Denver road, the daily average for the same month increase was from 3,076 in 1925 to 4,337 in 1929. South of Pueblo the increased average was from 1,485 to 2,085 vehicles. On the Santa Fe Trail east of Pueblo, to Lamar, the average daily count rose during the four years from 1,666 to 2,940 vehicles.

Similar Increases on Western Slope

Similar increases were shown on the western slope. At the western limits of Montrose the increase was from 521 to 789 vehicles daily. East of Durango traffic jumped from 276 to 664 each day. At the eastern limits of Grand Junction the increase was from 1,003 to 1,960 vehicles. East of Craig the 357 daily average in 1925 increased to 470 during July, 1929. The increase was from 339 to 975 east of Alamosa.

This analysis summary, according to engineers of the department, shows that many Colorado highways, while not so heavily constructed and costing much less, have to carry a traffic load as great as many of the main eastern traffic arteries. This annual traffic census will be continued this summer. It is under the supervision of John E. Furlong.

State Opens Bids on Five Projects

Bids on five federal aid and two state highway projects were opened recently by the State Highway Department.

The low bids on the seven projects total $274,016.78.

Largest of the projects calls for 7.21 miles of gravel surfacing on State Highway No. 1, south of Greenhorn in Pueblo and Huerfano Counties. The Mountain States Construction Co., with a bid of $93,594.88, was low bidder.

Low bidder on a temporary road of 12.5 miles between Aurora and Watkins was W. F. Pigg & Son. Their figure was $16,432.

Following are the low bidders on three other federal aid projects:

Gravel surfacing on three miles of State Highway No. 106 south of Cortez in Montezuma County, Wood-Morgan & Burnette Co., Durango, $43,432.60.

Gravel surfacing on 3.837 miles of State Highway No. 10, west of Dyke in Archuleta County, Grant Shields, Denver, $47,404.40.

Gravel surfacing of 2.5 miles of State Highway No. 10 between Durango and Bayfield in La Plata County, Grant Shields, $36,022.90.

Results of bids on the two state projects are:

Furnishing 27,850 tons of maintenance crushed rock or gravel surfacing on 30.5 miles of State Highway No. 1, between Greenhorn and Aguilar, in Huerfano and Las Animas Counties, Driscoll Construction Co., $27,850.

Furnishing 5,800 tons of maintenance crushed rock or gravel surfacing for 3.2 miles of State Highway No. 10, between Pagosa Springs and Sunetha in Archuleta County, Grant Shields, $9,280.

A CORRECTION

In the February issue of Colorado Highways appeared a table showing the distribution of the gasoline tax receipts to the various counties of the state. In this table was printed the number of motor vehicles in each county. Through a typographical error it was shown that Sedgwick county had only 233 motor vehicles. This figure should have been 2,233 motor vehicles. This figure is divided as follows: 1,840 passenger cars; 385 trucks and eight motorcycles. Sedgwick county received $14,073.76 as its share of the motor vehicles fees and $10,080 from the gasoline tax.

The D. L. D. Highway in Weld County will be improved this summer for at least the first 12 miles east of Hudson to Prospect, according to Weld county commissioners. This announcement followed a conference between the commissioners and A. B. Collins, division engineer of the State Highway Department. Collins agreed for the department to match county funds for money necessary to raise the grade on a 50-50 basis between Hudson and Prospect. The department already has appropriated $3,500 for use this year toward improving the D. L. D. from Fort Lupton to Hudson.

3% Gas Tax Distribution

In making up the budget for 1930 the State Highway Advisory Board, following a ruling of Attorney General Winbourn, set aside $250,000 to be expended on streets in various cities and towns connecting with state roads.

This money was made available under a law passed by the last general assembly, setting aside 3 per cent of the gasoline tax for this purpose. Of this sum the city of Denver receives the largest amount, totalling $70,127. The advisory board designated that the money should be expended in paving Alameda avenue, to connect with the Morrison paved highway. The second largest amount goes to Greeley, totalling $16,324, to improve the connection with State Road No. 3.

Details of the proposed expenditures in the seven districts follow:

DETAIL OF EXPENDITURES
3% Gas Tax Fund
DISTRICT NO. 1

County	Amount
Denver—Alameda Avenue	$70,127.73

DETAIL OF EXPENDITURES
3% Gas Tax Fund
DISTRICT NO. 2

County	Amount
Delta—Delta, North Main St.	$ 3,592.58
Eagle—Redcliff (maintenance)	781.83
Garfield—Glenwood Springs South, Gravel and Oil	2,180.15
Gunnison—Black Mesa Shovel	1,067.65
Mesa—Grand Junction, Improvement on N. 5th St.	6,062.95
Montrose—Montrose, Improvement on San Juan Ave.	2,535.45
Ouray—Maintenance	377.27
Pitkin—Midland R. R. Bridge Improvement	281.50
Rio Blanco—Maintenance	598.02
San Miguel—Dallas Divide	618.25
Summit—Hoosier Pass	282.30
Total	$18,377.95

DETAIL OF EXPENDITURES
3% Gas Tax Fund
DISTRICT NO. 3

County	Amount
Alamosa—Alamosa, Connecting No. 10	$ 1,882.03
Archuleta—Pagosa Springs, Connecting No. 10	446.78
Conejos—Antonito, Connecting No. 17	1,513.55
Costilla—San Luis, Connecting No. 159	688.60
Dolores—Rico, Connecting No. 145	250.65
Hinsdale—Lake City, Connecting No. 149	83.53
Huerfano—Walsenburg, Connecting No. 1 and No. 10	3,230.22
La Plata—Durango, Connecting No. 10	2,378.03
Las Animas—Trinidad, Connecting No. 1	6,055.05
Mineral—Creede, Connecting No. 149	155.15
Montezuma—Cortez, Connecting No. 10	1,518.82
Rio Grande—Monte Vista, Connecting No. 10	2,655.95
Saguache—Saguache, Connecting No. 15	1,249.55
San Juan—Silverton, Connecting No. 19	207.55
Total	$22,315.46

DETAIL OF EXPENDITURES
3% Gas Tax Fund
DISTRICT NO. 4

County	Amount
Baca—Springfield, Connecting No. 59	$ 1,910.25
Bent—Las Animas, Railroad Station west, south of tracks (Road No. 6)	1,836.30
Chaffee—Salida, Connecting No. 6 and No. 15	1,627.00
Crowley—Ordway, Connecting No. 96	1,433.52
Custer—Westcliffe, Connecting No. 69	576.90
Fremont—Florence, Connecting No. 6	4,875.70
Kiowa—Eads, Connecting No. 96	911.98
Otero—La Junta, Third Street, Road No. 6	5,601.25
Prowers—Lamar, Connecting No. 6	3,173.08
Pueblo—Pueblo, West 4th Street, Road No. 96	13,884.82
Total	$35,830.80

DETAIL OF EXPENDITURES
3% Gas Tax Fund
DISTRICT NO. 5

County	Amount
Cheyenne—Cheyenne Wells, south side of R. R.	$ 792.62
Douglas—No. 83, East end of County	1,122.50
Elbert—Simla, straight through town	1,772.97
El Paso—Colorado Springs, connecting No. 4, as surveyed	13,198.85
Kit Carson—Burlington, South of R. R.	2,563.60
Lake—Leadville	811.70
Lincoln—Hugo, Oil Main Street	2,159.05
Park—Jefferson	595.38
Teller—Victor	966.50
Total	$23,983.17

DETAIL OF EXPENDITURES
3% Gas Tax Fund
DISTRICT NO. 6

County	Amount
Boulder—Boulder	$ 9,517.50
Clear Creek—Idaho Springs	550.55
Gilpin—Central City	218.10
Grand—Hot Sulphur Springs	666.75
Jackson—Walden	445.00
Jefferson—Golden, on street to and on Coal Creek Road	6,110.47
Larimer—Loveland, on Fourth Street and Colorado Avenue	9,926.50
Moffat—Craig	1,162.63
Routt—Steamboat Springs	1,904.87
Total	$30,502.39

DETAIL OF EXPENDITURES
3% Gas Tax Fund
DISTRICT NO. 7

County	Amount
Arapahoe—Englewood-Littleton, Rd. No. 87	$ 6,255.55
Adams	5,965.32
Logan—Sterling, Road No. 2	5,595.07
Morgan—Fort Morgan, Road No. 2	4,858.98
Phillips—Holyoke, Road No. 14	2,151.15
Sedgwick—Julesburg, Road No. 2	1,894.35
Washington—Akron, Road No. 54	2,365.73
Weld—Greeley, Road No. 3	16,324.45
Yuma—Wray, Road No. 54	3,451.90
Total	$48,862.50

On the 6th of February, 1930, while engaged in routine duties a Highway Patrol crew, working out of Fairplay, found a small child, who had wandered away from home and brought him into Fairplay, after the entire town had been searching for him some seven hours.

On the same date a Highway Patrol crew working in the vicinity of Hasty quit their work on the highway and with a huge tractor and blade cut a wide furrow across the prairies and through hay meadows thus materially assisting the local inhabitants, who were out fighting with the best means at their command to prevent the spread of a prairie fire that was burning fiercely and spreading rapidly because it was fanned by a high wind. I neglected to say that at Fairplay they were bucking snow drifts from the road.

History and Romance of Colorado Highways

THE Arkansas river has been the route of civilized men since long before it became an established one in history. Spaniards traversed its banks and adjacent country in early periods, and following their advance up into the western slope of Colorado, and southwestern Colorado, then Spanish territory. Trappers knew the route from the earliest times, and the Trappers trail that led from Fort Laramie, Wyo., to Taos, N. M., crossed the site of Pueblo. Many of these men trapped along the river.

History as we know it today dates from Pike, who in 1806, entered the present state of Colorado following the south bank of the river and the present state highway. From it he got his first view of the great peak that bears his name. History relates that Indians dogged his footsteps up the valley, and once the party stopped and prepared for defense against the redmen.

Pike stopped on the site of Pueblo and with a few companions marched up to the base of the great peak which he reported never could be climbed. His view of it was from Cheyenne mountain, Colorado Springs. From Pueblo Pike followed the present highway to Canon City and thence continued his explorations.

From Pike history comes to Long in 1820. Long had followed the South Platte river to near Greeley and thence south over the site of Denver and along the Colorado Springs highway and on to the site of Pueblo. Here he marched down the north side of the stream to north and west of Fowler when he turned directly south for New Mexico, Captain Bell leading the second division of the expedition down the valley to the Kansas line.

Civilization was following even more rapidly in the footsteps of these men than they could possibly have imagined. In 1822 the Santa Fe Trail was opened, following the achievement of independence in 1821 of the Mexicans. The mountain division of this trail followed the north bank of the river to what later became the site of Bent's first fort opposite the town of Hadley of today. Here the trail turned south through La Junta and followed the present state highway through Thatcher to Trinidad and on over Raton pass to Santa Fe. It was along this trail that the first wheeled vehicles moved in Colorado.

Bent's first fort was established in 1829. It became the center of civilization for all this western country. It was, as stated, on the north bank of the Arkansas river and the Santa Fe Trail made it of vital importance. It was the last outpost of civilization and headquarters for trappers and traders throughout the Rocky Mountain region. Bent's new fort was built in 1854 across the river from Prowers. No history of the Arkansas valley and the state highway can be written without reference to Bent's and the importance it played in that historic era.

The Arkansas river route was followed by Fremont in 1844 from Pueblo. He was returning from California and his route across Colorado rambled through the northwest counties, southwest from the Wyoming line via Fairplay, the Cripple Creek district and into Pueblo. He, too, followed the north bank of the stream and north of Las Animas turned north and east between Galatea and Eads, near where Chivington in 1864 fought the battle of Sand Creek and then along the state highway and out of the state via Cheyenne Wells.

When Fremont came back in 1845, however, he followed the Arkansas river selecting the north side of the stream. In 1853 Gunnison in his ill-fated journey also followed this route. In explanation of this selection of the north bank of the river it may be stated that it was then the traveled route, made so by Bent's forts. Gunnison covered a large part of the southern and western districts of Colorado, discovered the Gunnison valley and Gunnison river and the Black Canon. Leaving Colorado he and several of his party were massacred by Indians in Utah.

Bent's new fort on the Arkansas river was purchased by the government in 1859 and in 1860 was named Fort Wise in honor of the governor of Virginia. The activities of Wise in 1861 in the southern confederacy prompted the change of the name to Fort Lyon in honor of General Nathaniel Lyon killed in the battle of Wilson creek, Missouri, in August, 1861. Colorado troops garrisoned the post for a considerable period of the Civil War.

Interest of those studying or reading of Colorado history always will be devoted to a large extent to the Arkansas valley, and especially to the two routes along the river.

State Highway No. 96 follows this route north of the stream from Crowley into Pueblo, and the motor-

Towing 80-foot steel girder across ice at Fountain Creek, forming link in new highway between Colorado Springs and Pueblo. Photo by Paul Bailey.

ist following the main highway on the south side is ever in view of the territory traversed by the pioneers. The pages of history are replete with Indian attacks and the privations of the pioneers along this route.

While the United States had only a vague idea of what the Rocky Mountains were, the route had been known, passed by adventurous men to civilization. One gains an idea of how little known was the territory now embraced in Colorado from the belief of Pike that he had found the source of the Red river near Leadville. As possibly a bit of information the Red river rises in New Mexico and forms the boundary between Texas and Oklahoma.

The Santa Fe Trail also must always figure in the history of the Arkansas valley. It was one of the principal routes to Santa Fe although only a division of the main trial. Its popularity lay in the prevalence of water along the route, compared with the scarcity of water along the main line. Maps of Colorado do not give what history relates of a branch of this trail in Colorado. This branch, it is disclosed, followed the Arkansas river into the present site of Canon City to reach an important trading post, and it followed the present state highway between Pueblo and Canon City.

The Arkansas river trail also figures in the history of gold in Colorado. Along the stream tramped the Cherokee Indians on their way from the headquarters of the tribe in Kansas in 1850 to the California gold diggings. They returned the same route, establishing what today is termed the Cherokee trail. At the site of Denver they found gold in the Platte river which they sent back to Lumpkin County, Ga., the pioneer gold district of the United States, for mining started in the county in 1803. This gold attracted the attention of William Green Russell, who organized his party and reached the mouth of Cherry Creek in June, 1858, and established Auraria, now a part of Denver. His settlement and the reports of the Cherokees attracted the first pioneers and gold hunters, among the latter being Jackson, who discovered gold in Clear Creek, and Gregory, who opened the Gregory diggings in Gilpin county. Both discoveries were in the spring of 1859 and caused the big "Pikes Peak" rush.

The report of Russell started what is known as the Georgia rush, the Georgians following the Arkansas river on their way to Denver.

Raising first 80-foot girder in place on new Fountain Creek bridge. Note steam shovel on ice. Photo by Paul Bailey.

Looking north at substructure for Fountain Creek bridge. When completed this bridge will be 540 feet in length. Photo by Paul Bailey.

Road Building Keeps Money in Circulation

By E. E. DUFFY

IS MONEY spent like water over the dam? Fortunately not, for the work of a dollar is never done. All too frequently money expended by governmental bodies is regarded by the taxpayer as money that is gone forever, when, as a matter of fact, the spending of money by the government gives the dollar at least a double value.

First of all, a convenience or improvement is purchased which enables the government to better serve its citizens. Secondly, money spent for improvements goes into the pockets of individuals, and not unstrangely, labor gets more than any other factor.

In the matter of paved highway construction, for instance, labor receives more than half of the total expenditure, as is shown by an analysis of costs made by the Iowa State Highway Commission. In Iowa the construction cost of a mile of concrete pavement has averaged $26,184, of which 52 per cent, or $13,706, goes to labor through various channels.

Costs for a mile of highway are distributed as follows: stone aggregate, $3,441; cement, $5,856; reinforcing steel, $850; freight, $5,520; grading, $2,000; miscellaneous contractor's costs, including profits, $8,517.

From these items labor receives the following amounts: stone aggregate, $1,032; cement, $3,116; reinforcing steel, $255; freight, $2,448; grading, $1,500; and the labor portion of miscellaneous contractor's costs, $5,355.

Money's greatest value can only be achieved by keeping it in circulation and to do this the stimulating hand of governmental activity is needed. There is not a single community in this country that is not in need of important improvements—some communities need dozens. Planning, although essential, can be dangerous if projects are left in the paper stage too long.

Since government is the one thing which all support, it must naturally be the bulwark in times when clouds gather over the economic sky. Well planned construction programs, which embrace only those projects that will be of actual value to the community, are now needed.

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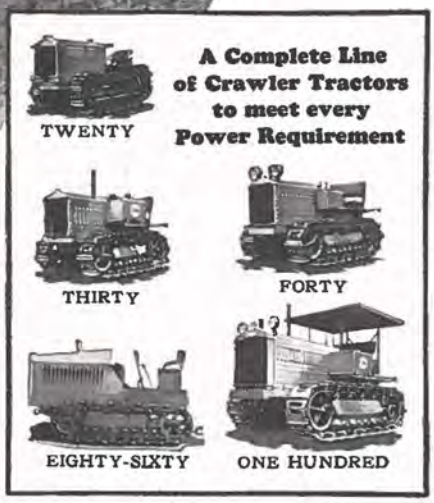

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NEWS OF THE MONTH

For the sum of $45,801, Ed. Honnen, Colorado Springs contractor, has agreed to construct four and one-half miles of new gravel-surfaced highway, located 25 miles northeast of Trinidad on State Road No. 12. The project is located near Yetta, in Las Animas County.

The New Mexico Const. Co. of Denver was low bidder on a concrete paving project located east of Greeley, 7.6 miles in length. Their bid was $145,878 for the completed job. They figured the concrete at $1.73 per square yard. When completed this project with the mile already laid will give a ribbon of concrete eight and one-half miles in length east of the county seat of Weld County, extending to the town of Kersey.

Two and one-half miles of concrete pavement will be constructed west of Rocky Ford by H. C. Lallier Const. Co. On February 20 they were low bidders on the proposed project with a bid of $76,199. This project is on State Road No. 6 and is in Otero County.

Plans are rapidly being completed by the State Highway Department for the construction of 26 miles of pavement located between Colorado Springs and Pueblo. The sum of $536,000 has been set aside for this work. Grading for the lengthy project was recently completed. This is the final link of a continuous stretch of pavement between Denver and Pueblo, a distance of 116 miles.

A good roads meeting was held in Pueblo on February 18 to discuss a proposed highway financing plan, which would involve the passage of a $25,000,000 road program in Colorado. Fred A. Sabin, chairman of the Colorado Association's committee on good roads presided at the meeting. Business men and road officials from nearly every city in the southern part of the state attended the meeting.

The following day a similar meeting was held in the Chamber of Commerce at Colorado Springs. The good roads committee of the latter organization approved the general outline of the program.

Fremont County road forces are constructing a new road which, when completed early in the summer, will give a circle trip from Canon City to the new Royal Gorge suspension bridge and return, from the southern rim of the Grand Canon of the Arkansas River, via Grape Creek, Temple Canon and the Ute Indian burial ground. The new road will be ready for summer tourist traffic.

The coming summer will see the construction of 125 miles of oil-surfaced roads in Colorado, according to plans of the State Highway Department. This mileage is divided into about ten projects located in various parts of the state. Several of them are a continuation of projects which were completed in 1929.

Work will be started this spring on one of the most difficult pieces of construction ever undertaken by the Colorado Highway Department. This work involves the construction of eight miles of new road on the east side of Wolf Creek Pass. An appropriation of $200,000 has been made for the work, which the engineers plan to start at Twin Bridges and continue east, in the direction of South Fork. An additional $6,000 has been set aside for improvement work on the pass near the summit.

The end of the 1930 construction season will see the completion of a new road between Palisades and De Beque on U. S. 40-S. The new work will reduce the distance between these points about ten miles.

The F. C. Dreher Const. Co. of Fort Collins was low bidder for the construction of a 200-ft. bridge in Poudre Canon, located 14 miles northwest of Fort Collins. The contract was awarded at a price of $16,047 by the Larimer county commissioners and A. B. Collins, representing the State Highway Department. Traffic will not be inconvenienced by the construction work.

Arrangements are being made by the commissioners of Hinsdale County for the use of thirty or forty convicts on the construction of a piece of new roadway located between Lake City and the San Juan county line. The county officials plan to start the work about May 1. The convicts will be employed about 90 days. This will be the first time in several years that convicts have been employed on highway jobs in Colorado, though formerly it was a common practice.

On March 5 the State Highway Department opened bids on seven projects located in various parts of the state. The Mountain States Const. Co. of Pueblo submitted the low bid of $93,594 for the construction of 7.5 miles of gravel-surfaced highway in Pueblo and Huerfano counties, on State Highway No. 1. The Driscoll Const. Co., also of Pueblo, submitted a low bid of $27,850 for furnishing 27,850 tons of maintenance crushed rock on 30.5 miles of State Highway No. 1 in Huerfano and Las Animas counties.

Following are low bidders on other Federal projects:

Gravel surfacing three miles of State Highway No. 106, south of Cortez in Montezuma County, Wood, Morgan & Burnette Co., Durango, $43,432.60.

Gravel surfacing 3.83 miles of State Highway No. 10, west of Dyke in Archuleta County, Grant Shields, Denver, $47,404.40.

Gravel surfacing 2.5 miles of State Highway No. 10, between Durango and Bayfield in La Plata County, Grant Shields, $36,022.90.

Furnishing 5,800 tons of maintenance crushed rock or gravel surfacing for 3.2 miles of State Highway No. 10, between Pagosa Springs and Sunetha in Archuleta County, Grant Shields, $9,280.

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Public Domain a Road Problem

ANOTHER highway problem has come up to Congress for financial solution. More than one-half of all the land in the eleven western states is public domain, and to cut through these lands and connect with main highways on either side is obviously a government responsibility and not one for the states in which public lands are located.

In these eleven western states, the people of the United States own fifty-one per cent of the land, and west of Denver public domain is thirty-eight per cent of the entire area.

Recognizing the fact that some provision must be made to extend Federal highways across these lands, a bill has been introduced in Congress by Representative Colton of Utah which authorizes the Secretary of Agriculture to co-operate with the state highway departments and with the Department of the Interior in the survey, construction, reconstruction and maintenance of main roads through unappropriated or unreserved public lands, non-taxable Indian lands, or other Federal reservations other than the forest reservations. The measure states that such sums as the Congress may hereafter authorize to be expended under the provisions of the bill shall be apportioned among those states having more than 5 per cent of their area in public lands and shall be prorated and apportioned to such states in the proportion that said lands in the states are eligible under the provisions of the act, and that no contribution from the states shall be required in the expenditure thereof.

The roads so built are to be constructed and maintained under the provisions of the act, and shall be of the same standard as to width and character of construction as the Federal government requires of the states under like conditions, provided that in the allocation of any such funds authorized to be appropriated under the bill or any subsequent act, preference shall be given to those projects which are located on the Federal Aid highway system as the same are now or may hereafter be designated.

Mr. Colton's measure has been unanimously approved by the House Committee on Roads, and its early passage is hoped for by highway departments in the states concerned. It must be remembered that there is no way to get an interstate system of roads across these states except by traversing these lands held by the Federal government.

The Rocky Mountain states fared well in the distribution of funds allotted by the Federal government for forest roads during 1930. The seven mountain states will share their portions of the $4,500,000 appropriation as follows: Idaho, $490,895; Montana, $396,642; Colorado, $327,943; Arizona, $283,882; Wyoming, $209,361; Utah, $165,839; and New Mexico, $201,512.

Work is progressing rapidly on the Boulder Canon road, which is being widened and straightened with a $5,000 fund appropriated by the state for the purpose, County Commissioner Edgar B. Hill, chairman of the board, said this morning, after a visit to the scene of operations.

At the present rate the work for this year will be completed within the next month in plenty of time to be cleared out of the way for the summer tourist travel up and down the highway, according to Hill, who was chiefly responsible for getting the money from the highway department.

Approximately a mile and a half of the road has been worked over, and it is expected that nearly a half mile more of the highway can be improved on the money remaining in the fund.

STATE HIGHWAY DEPARTMENT

Financial Statement March 1, 1930

BALANCES 12-31-29		
State Treasurer	$1,310,302.64	
County Time Warrants	10,333.42	
Revolving Fund	9,500.00	
Total Balances		$1,330,136.06
RECEIPTS		
Internal Improvement	$ 20,100.00	
Gas Tax	526,682.64	
U. S. Government	110,773.58	
Highway Receipts	12,099.99	
Bus Licenses	23,754.48	
Cancelled Warrant	2.75	
Total Receipts		$ 693,413.44
Total Balances and Receipts		$2,023,549.50

DISBURSEMENTS		
Federal Aid Projects	$ 182,593.59	
State Projects	24,357.58	
Maintenance	153,324.14	
Maintenance, Equip. and Repairs.	1,756.29	
Property and Equipment	2,897.31	
Surveys	2,142.33	
Traffic Signs and Census	2,543.59	
Administration	24,313.66	
Total Disbursements		$ 393,928.49
BALANCES 2-28-30		
State Treasurer	$1,609,787.59	
County Time Warrants	10,333.42	
Revolving Fund	9,500.00	
Total Balances		$1,629,621.01
Total Disbursements and Balances.		$2,023,549.50

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County highway patrolmen and road superintendents who look after the roads of Larimer County, numbering fifty or more, attended the annual conference of highway workers and county commissioners held at Fort Collins March 5.

Chairman Johnson of the county commissioners stated at the meeting that the commissioners desire to cancel $75,000 in outstanding warrants during 1930 and that to do that will necessitate the strictest economy in road work and in other county departments.

The county highway budget, Mr. Johnson stated, provides for the expenditure of a total of $213,000. Of this $53,000 will be used in Mr. McMullen's district; $29,500 will be used in Mr. Johnson's road district and $53,000 in Mr. McClelland's district. Work on state highways in co-operation with the State Highway Department will take $53,000, and for the general road fund, from which new equipment and supplies are purchased, $35,000 is provided.

Plans have been drawn for the completion of the oil surfacing located between Alamosa and Monte Vista. The oil surfacing now running from the Wyoming state line will be extended to Eaton, thus giving a hard-surfaced roadway between Greeley and the state line. The stretch from the state line to Cheyenne has been completed by the Wyoming highway department.

PLANS FINISHED BUT PROJECT NOT YET ADVERTISED FOR BIDS

Proj. No.	Length	Type	Location
165-R	9.325 mi.	Oil Processed Surfacing	East of Canon City
138-C	4.184 mi.	Gravel Surfacing	East of Muddy Pass
149-B	7.911 mi.	Oil Processed Surfacing	East of Denver
270-AR	3.429 mi.	Oil Processed Surfacing	East of Monte Vista
270-BR	2.833 mi.	Oil Processed Surfacing	East of Monte Vista
151-A	6.472 mi.	Gravel Surfacing	West of Tabernash

BIDS OPENED IN MARCH, 1930

Proj. No.	Length	Type	Location	Date Bids Opened
270-D	3.978 mi.	Gravel Surfacing (Oiled)	East of Monte Vista	March 26, 1930
277-D2	15.566 mi.	Pavement	North of Pueblo	March 26, 1930
277-E2	10.200 mi.	Pavement	North of Pueblo	March 26, 1930
728-B (1930)		27,400 ft. of Guard Fence	East of Glenwood Springs	March 26, 1930

PLANS BEING DRAFTED

Proj. No.	Est. Length	Type	Location
122-R	12.5 mi.	Graded	East of Ovid
144-E	1.5 mi.	Pavement	North of Ft. Collins
263-B	3 mi.	Gravel Surfacing	East of Ft. Garland
229-R			
271-AR, 271-BR			
271-CR, 271-ER	7.5 mi.	Oil Processed Surfacing	East of Florence
271-F	0.5 mi.	Overhead R. R. Crossing & Oil Processed Approaches	East of Florence
286-D	20 mi.	Oil Processed Surfacing	North of Eaton
297-D	4 mi.	Gravel Surfacing	East of Palisades
298-C	4 mi.	Gravel Surfacing	Wolf Creek Pass
300-C	2 mi.	Graded	North of Silverton
216-AR	5 mi.	Oil Processed Surfacing	East of Holly
272-BR, 92-R, 246-DR	18.5 mi.	Oil Processed Surfacing	East of Avondale

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per Cent Complete	Proj. No.
2-R9	Starkville	1.35 mi.	Concrete Pavement	H. C. Lallier Const. & Eng. Co.	$ 59,180.60	14	2-R9
57-R2	North of Lamar	0.502 mi.	Bridge	J. Fred Roberts & Sons	140,102.96	56	57-R2
68-R1	North of Monte Vista	1.900 mi.	Gravel Surfaced	J. Finger & Son	24,124.00	78	68-R1
78-R	Near Minturn	0.709 mi.	Gravel Surfaced	J. Fred Roberts & Sons	96,342.90	26	78-R
138-B	North of Kremmling	3.133 mi.	Gravel Surfaced	F. L. Hoffman	76,363.35	66	138-B
144-D	Northwest of Ft. Collins	2.834 mi.	Gravel Surfaced	J. Fred Roberts & Sons	66,430.10	51	144-D
147-C	South of Cortez	3.428 mi.	Gravel Surfaced	E. J. Maloney	86,182.75	100	147-C
147-D	Betw. Cortez & Utah Line	2.903 mi.	Gravel Surfaced	Wood-Morgan-Burnett Co.	43,432.60	0	147-D
149-B Detour	Betw. Aurora and Watkins	12.5 mi.	Gravel Surfaced	W. F. Pigg & Son, Inc.	16,432.00	0	149-B Detour
150-A	West of Craig	8.227 mi.	Gravel Surfaced	Gardner Bros. & Glenn	93,477.35	11	150-A
175-A	Between Sterling and Ovid	41.979 mi.	Graded	Cole Bros.	193,055.75	40	175-A
243-C	West of Dyke	3.837 mi.	Gravel Surfaced	Grant Shields	47,404.40	0	243-C
253-D	West of Milner	2.547 mi.	Gravel Surfaced	Hamilton & Gleason Co.	147,192.00	47	253-D
258-H	West of Sapinero	4.921 mi.	Gravel Surfaced	Cole Brothers	123,700.60	73	258-H
263-A	Betw. Mortimer & Ft. Garland	3.404 mi.	Gravel Surfaced	Mtn. States Constr. Co.	47,509.20	71	263-A
265-C	Betw. Durango & Bayfield	2.500 mi.	Gravel Surfaced	Grant Shields	36,022.90	0	265-C
266-D	South of Bondad	4.111 mi.	Gravel Surfaced	Engler, Teyssier & Co.	96,075.30	89	266-D
267-C	Near Model	4.491 mi.	Gravel Surfaced	E. H. Honnen	45,801.00	0	267-C
272-E	West of Rocky Ford	2.562 mi.	Concrete Paved	H. C. Lallier Const. & Eng. Co.	76,199.00	0	272-E
277-D1	Betw. Colo. Springs & Pueblo	15.566 mi.	Grading	M. E. Carlson	218,277.80	99	277-D1
277-E1	South of Colorado Springs	10.2 mi.	Grading	J. L. Busselle	221,389.65	77	277-E1
282-G	South of Craig	5.147 mi.	Gravel Surfaced	Chas. B. Owen	61,645.22	7	282-G
282-H	Between Rifle and Meeker	7.029 mi.	Gravel Surfaced	Winterburn & Lumsden	82,589.74	96	282-H
287-BR1	East of Greeley	7.413 mi.	Concrete Paved	New Mexico Constr. Co.	145,875.00	0	287-BR1
293-C	North of Ouray	3.661 mi.	Grading	C. V. Hollenbeck	62,997.80	99	293-C
295-D	North of Antonito	2.460 mi.	Oil Pro. Gravel Surf.	Levy Const. Co.	72,676.75	85	295-D
296-E	South of Greenhorn	7.210 mi.	Gravel Surfaced	Mountain States Constr. Co.	93,594.88	0	296-E
297-C	Southwest of De Beque	9.953 mi.	Gravel Surfaced	Hinman Bros. Const. Co.	312,453.50	47	297-C
298-B	North of Pagosa Springs	2.414 mi.	Surfacing	Engler & Teyssier	38,426.00	49	298-B
300-B	North of Silverton	2.828 mi.	Graded	Hamilton & Gleason Co.	35,647.80	43	300-B

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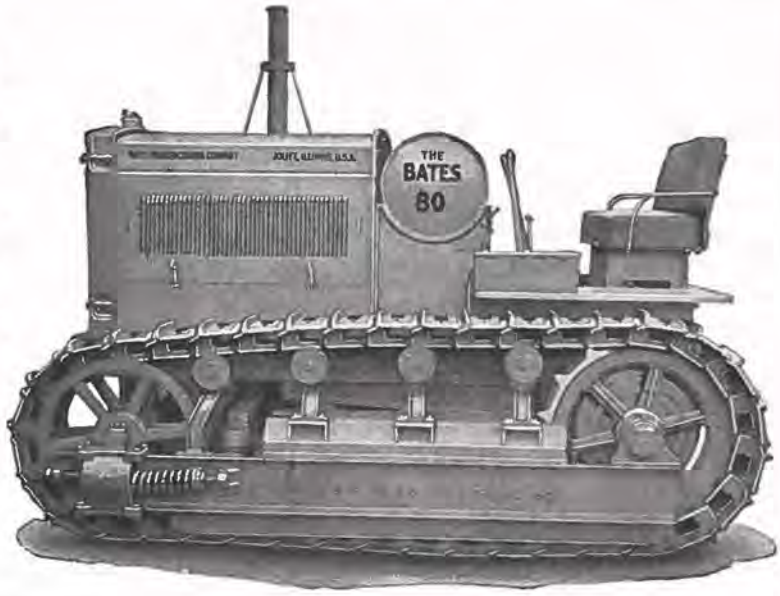

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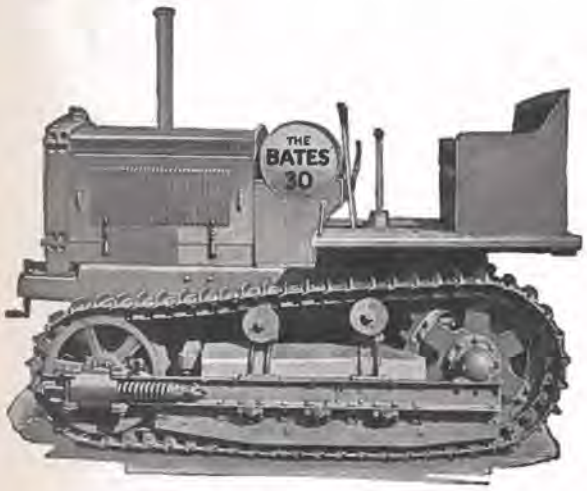

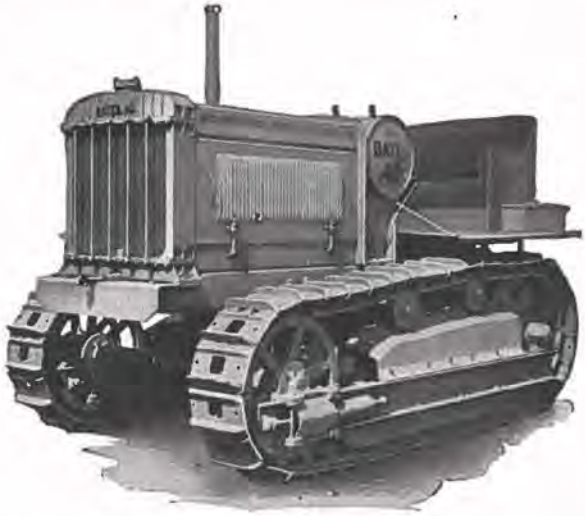

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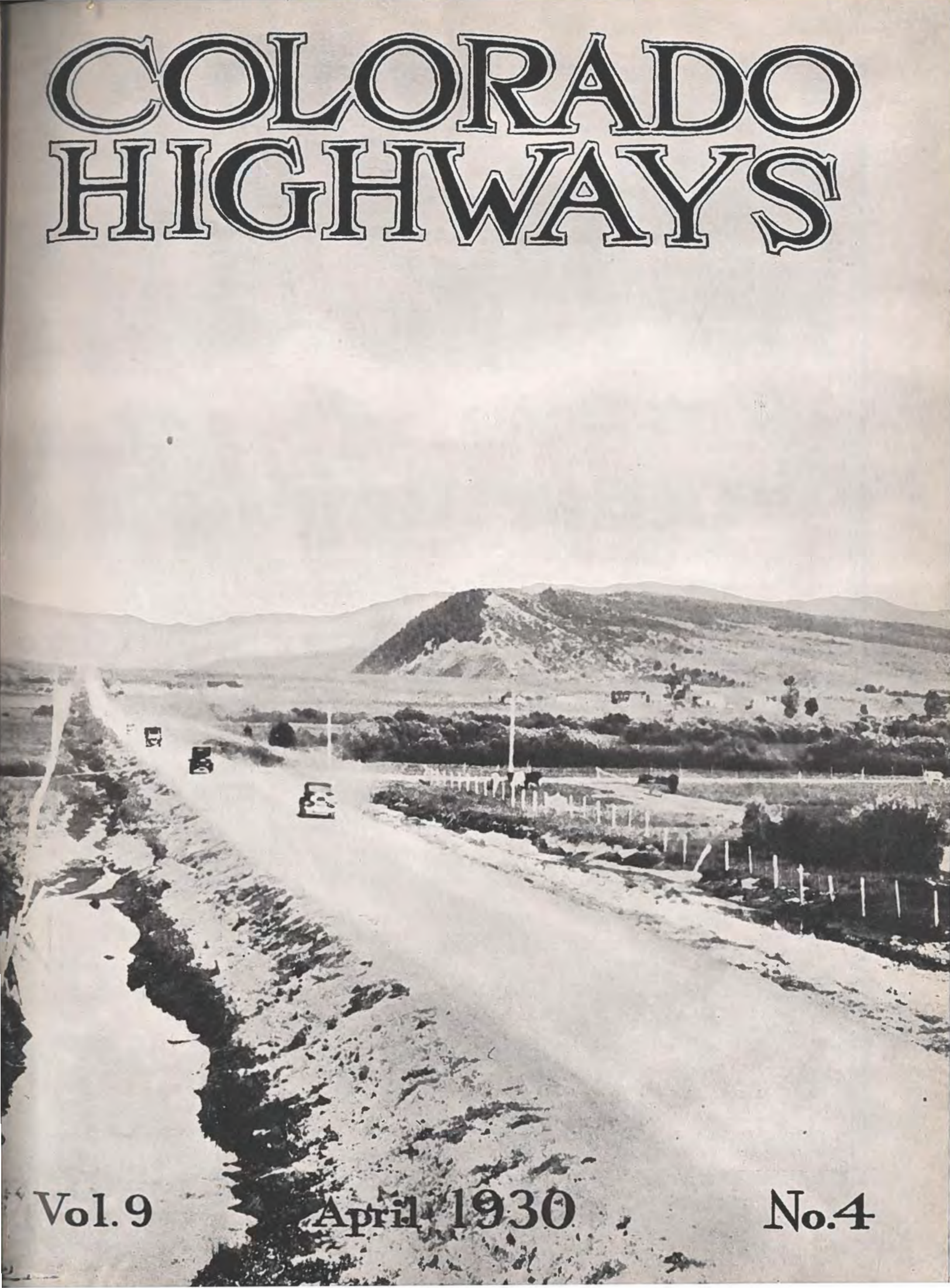

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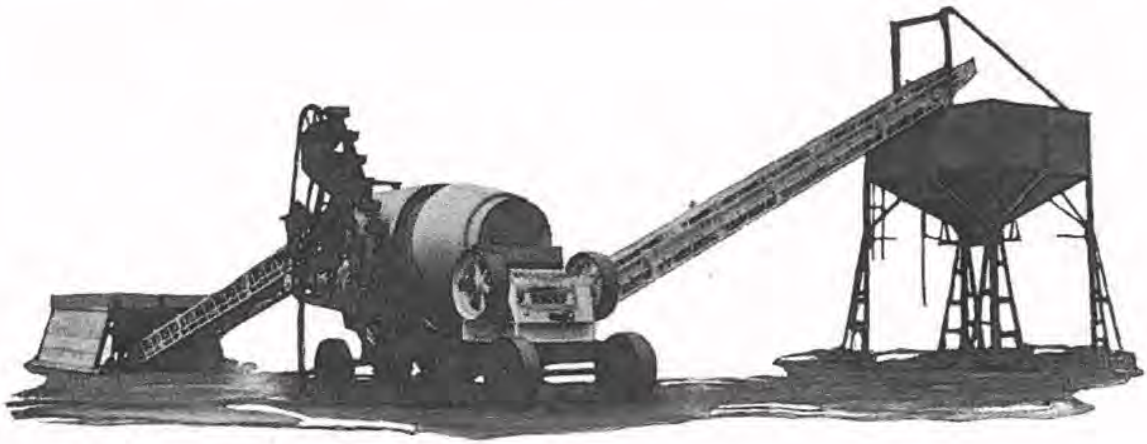

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Colorado Highways

Official Publication of the
COLORADO STATE HIGHWAY DEPARTMENT
Denver, Colorado

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Our Cover Picture

OVER the cover of this issue of COLORADO HIGHWAYS we print a photo of the newly-constructed gravel road west of Milner in Routt County, built by the Colorado Highway Department with Federal co-operation. This piece of construction forms a link in the Victory Highway. Two other links of this road are now under construction between Milner and Craig and when finished will give a modern gravel road from Steamboat Springs to Lay, twenty miles west of Craig, a total distance of about sixty miles.

Colorado Highways
"BETTER ROADS"
VOLUME IX. APRIL, 1930 NUMBER 4

Snow Removal in Colorado

NO section of the country presents more difficult obstacles in the winter upkeep of highways than Colorado, with its high mountain passes and hundreds of miles of roads in altitudes far higher than those of any other state.

But every person connected with highway maintenance in this state knows that the motorist demands a good road in winter as well as in summer. And why not? He is entitled to it, if ways and means can be provided.

Thousands of dollars are expended yearly in keeping the roads clear of snow, while other vast sums are used for the erection of snow-fences to protect motorists from the danger of deep drifts in certain parts of the state. In eastern Colorado, where snow piles up in huge drifts, mile on mile of this fence has been erected by maintenance forces.

During the past winter the maintenance division of the Colorado Highway Department has had in operation more than a hundred snow-removal units on the Federal Aid system in this state. These units consist of plows mounted on tractors and trucks, as well as tractors and blading machines. In this issue of COLORADO HIGHWAYS we print pictures of a number of these units in operation in various sections of the state and the results obtained. These units have been in operation from the plains sections of eastern Colorado to the highest altitude of Tennessee Pass.

One of the most notable achievements of the snow-removal forces has been the clearance of snow from Tennessee Pass throughout the winter months, the crews sometimes working in sub-zero temperatures. As a result, this pass has been closed only a half-dozen times during the winter, and then only for a few hours at a time. Four high-power plow units were employed in the work, including the department's large rotary plow.

On March 5th the rotary plow was transferred to Berthoud Pass, where it has been employed in the removal of snow from this important artery of travel. It is expected that this pass highway will be open to traffic the first of May, the earliest it has been negotiable since the department took over this work. The road is now passable with the exception of three miles on the west side of the pass, where two big snow-slides were encountered. A crew of workmen with the aid of the big rotary, and two bulldozer plows, are now engaged in clearing these slides.

On Tennessee Pass, Colorado's northernmost automobile route to the western slope, the maintenance division's crews have been kept busy all winter. Following every snowstorm, one crew sets out from Leadville on the east side of the pass and another crew proceeds from Redcliff on the west. The crews meet at the summit of the pass about noon and return to their starting points in the evening.

A snow-removal problem at Lime Creek Slide, between Durango and Silverton. Note roadway marked by arrow. Just fourteen feet of snow, that's all. Picture at the right shows snow plow in tough going. These pictures show one of the problems that state maintenance forces face throughout the winter months. Photos by D. Kirk Shaw.

Clearing snow from Berthoud Pass with a giant rotary plow. Twelve miles of snow and ice from 10 to 17 feet in depth is cleared annually from this important link of the Victory Highway, or otherwise known as U. S. Highway Forty, north. Pictures were taken on both sides of the "divide." Picture in left lower corner was snapped at the summit, over 10,000 feet in altitude. The state maintenance forces hope to have this pass open for motor travel by June 1. Photos by George Sharpe.

Travel over the Tennessee Pass route has been uninterrupted for the first time this winter, and even in the most stormy periods more than a hundred cars crossed the divide daily at this point, recent traffic census records show.

Snow on the divide this past winter has been unusually light. Most of the snow-removal equipment of the department has been used on the roads of the plains and not on the mountain passes. However, there has been a snowfall of four feet on Berthoud Pass since the first of March. This has handicapped the crews in their operations on this pass.

The state has been operating fourteen large snow-removal units on the plains roads east of the main range. On the plains east of the range there have been seventeen to twenty heavy snows. As a consequence, the cost of keeping the plains roads open to travel has exceeded the cost of previous years.

The most serious trouble has been caused by high winds which blow the snow back on the road almost as fast as the highway crews can plow a path through it. Due to this hazard, it has been necessary for many of the road crews to patrol both day and night. During the night hours many motorists, caught in snowdrifts, have been given aid and hauled through to safety. In no instance has it been reported where a car has been stalled all night on a main highway. Crews working in temperatures 36 degrees below zero have been reported.

But "traffic must be served," say the patrol crews. And so when they get into a situation like that, they just keep going. They have been instructed that snow removal begins during a storm and not to wait until the roads become impassable. They also open the road for the full width, because a road only partially cleared is bound to suffer when the thaw comes.

Officials of the maintenance division go on the theory that our highways are a business investment, and, lying idle, they are like a factory shut down, except that the expenses of the highway department continue and may even increase. Colorado receives the bulk of its revenue from gasoline tax, and a road blocked with snow entails a considerable loss to the highway fund. In addition, where snow is permitted to remain on the road and allowed to freeze and thaw, ruts and holes are sure to form, resulting in excessive maintenance costs.

Failure to remove snow causes cars and trucks to use chains and concentrate in narrow lanes, resulting in rapid disintegration of low types of surfaced roads.

There are now six high passes in Colorado that are classed as year-round highways. These are kept free of snow except immediately after the heaviest snows of winter, and then they are cleared as soon as it is practicable. Passes classed as year-round roads are Raton, Poncha, La Veta, Tennessee, Cumbres and Cochetopa. The latter three are the most frequently closed during the winter, but only for short periods.

Raton Pass, between Trinidad and Raton, N. M., presents the least difficulty of maintenance throughout the year. It is the lowest of the mountain passes, being 7,888 feet high at the top. Poncha Pass, leading into the northern end of the San Luis Valley from Salida, is next, with 8,945 feet, followed by La Veta, at the southern end of the same valley, 9,378 feet. Cumbres Pass is 10,003 feet, Cochetopa 10,032 feet, and Tennessee 10,240 feet.

A number of the very high passes are closed soon after the first snows. Among these are Monarch, Wolf Creek, Independence, Cameron, Berthoud, and others. Independence Pass, over the Sawatch Range, between Twin Lakes and Aspen, is the highest in the country, being 12,095 feet high at the summit.

Increased Federal Aid Presents Colorado Road Finance Problem

THE Twenty-eighth Colorado General Assembly, scheduled to convene on the first Monday of January, 1931, will face the task of reorganizing the finances of the State Highway Department as the result of the adoption by Congress of a bill increasing the annual appropriation for improvement of interstate highways —the so-called Federal Aid roads—from $75,000,000 to $125,000,000.

Unless the members of the general assembly provide additional income for the State Highway Department, Colorado will be unable to obtain the increased appropriation provided for this state by Congress. This increase, according to highway department officials who have studied the provisions of the bill, amounts to $924,000 a year, or $2,772,000 for the three-year period.

Federal Aid appropriations must, generally speaking, be met by the states who desire to take advantage of them, dollar for dollar with state funds. In the western public land states, including Colorado, the area of government-owned lands enters into the apportionment of the amount that the states must put up to obtain the government money. In Colorado the state puts up at the rate of 44 cents to the government's 56. In order to obtain the increase of $2,772,000, provided for by the terms of the new bill, the State Highway Department will be required to put up, in round figures, $2,200,000, and that is just $2,200,000 more than the State Highway Department has available under the present system of financing.

Unless the general assembly enacts legislation which will increase the department's revenue by at least $750,000 a year, the state will lose the increased Federal Aid appropriation and the money will be divided among those states which have the money to cover it.

It is unfortunate for Colorado that Congress voted to increase the Federal Aid appropriation at this time, and did not wait until 1932 or 1933 before doing so, for in 1933 the state would have ample funds to meet the increased appropriation without any legislative action whatever. In 1933 the highway department will again have available for all highway purposes one-half of the net proceeds of the sale of state motor vehicle licenses which, roughly speaking, amount to about $900,000 a year. At present the department's half of the license fees are pledged under the terms of a bond issue—sold to obtain funds with which to meet Federal Aid in the past—to pay interest on these bonds and retire them. The last of these bonds will be retired in 1933 and the money could then be used to cover the increased congressional appropriations; but the Federal government cannot and will not wait until 1933 for Colorado to draw down the money set aside for it.

Present revenues of the highway department are scarcely sufficient to meet the old Federal Aid appropriations, properly maintain the Federal Aid roads and leave a modest amount of money available for the improvement for the more than 6,000 miles of state highways not embraced in the Federal Aid system. It is a matter of record that at this time the state is something like $600,000 behind in meeting Federal Aid appropriations, but this condition is not alarming, due to the policy of the Secretary of Agriculture—administrator of the Federal Aid funds—to hold Federal Aid funds for a reasonable length of time, provided duly executed agreements for road projects are submitted within the fiscal year in which the money must be drawn down.

If the $600,000 is added to the $2,200,000 required

Showing a stretch of the highway over Tennessee Pass, over which traffic moves throughout the winter months. Except for a few hours after an unusually heavy snowstorm motorists have been able to travel this pass day and night. Snow-removal work is handled by state forces. Photo by George Toupain.

under the new appropriation, then Colorado, it will be seen, is face to face with the necessity of raising about $2,800,000 within the next three years, over and above the amount it is providing for its highway department at this time. And even this amount may have to be increased materially. All indications are that, despite the increased consumption of gasoline, the revenue from the state gasoline tax will not come up to estimates.

Highway department officials who are watching the gasoline tax collections carefully are admittedly worried about the revenue from this tax, practically the department's only source of revenue aside from Federal Aid. Enormously increased refunds of this tax and the refusal of the counties to pay the tax on gasoline used by them in road construction and maintenance work, are materially reducing the net revenue from this tax, until it is not beyond the realm of possibility that the revenue will not be sufficient to finance even the present building program.

A number of measures have been suggested to increase the highway department's revenue to meet the increased Federal Aid appropriation. No doubt, some or all of them will be presented to the members of the general assembly, in the hope that the lawmakers will enact some of them and enable the highway department to take full advantage of the additional funds available for further improvement of the state's main highway system, at the same time leaving available sufficient funds for the improvement of those highways not embraced in the Federal Aid system.

Following are some of the suggested measures:

Elimination from the state gasoline tax law of the refund provision.

Increase of the motor vehicle license fees.

Increase of the gasoline tax from 4 to 5 cents per gallon.

Increase of the fees exacted from automobile bus and truck lines.

Elimination of the refund provision from the gasoline tax law will net the highway department, provided the present arrangements by which the department is given 70 per cent of the tax proceeds is continued, something like $400,000 annually over and above the present income. Indications are that these refunds will amount to nearly $600,000 this year. They passed the $400,000 mark in 1929, with the number of consumers demanding refunds increasing constantly.

Under the present gasoline tax law the tax can be collected only on gasoline used for the propulsion of motor vehicles. Gasoline used for tractors, gasoline motors, airplanes, cleaning, etc., is tax-free. Many other states, realizing that the refund provision is an invitation to gross abuses, have done away with refunds and are collecting the tax on all gasoline sold within their borders. New Mexico is one of these states.

A raise in the fees charged automobile bus and truck lines for the use of the state highways would add something to the highway fund, though not nearly so much as the elimination of the tax refunds. In 1929 the department realized something like $35,000 from this class of fees. Among road experts the opinion prevails that these fees should be at least doubled, if not trebled. Heavy trucks and busses, it is pointed out, receive more benefits from the road improvements that are being made and they do more damage and cause greater expenditures for maintenance than all other motor vehicles combined.

"Uncle Sam must go through, rain or shine." Here we have the mail truck "surrounded" by snow east of Fairplay on Red Hill, during the month of January. Yes, it got through by the help of state crews.

An increase in the motor vehicle fees would not immediately bring about an increase in the highway department's revenues, but would result in a retirement of the outstanding bonds before 1933. As pointed out above, the department's half of the revenues from the sale of license plates is pledged for the payment of interest and retirement of a bond issue. Increase of the fees would make the amount available for retirement greater and make the revenue from this source again available for construction purposes, including acceptance of Federal Aid, long before the date now set for the retirement of the last bond.

In this connection it is pointed out that automobile license fees in Colorado are among the very lowest in the entire country. Only three or four states have fees as low or lower than Colorado.

An increase in the gasoline tax, in the opinion of many men in close touch with the state government, is out of the question. Though there were quite a few members of the general assembly at the last session who favored a five-cent tax, the sentiment of the majority was against the impost of such a heavy tax, and there is no reason to believe that sentiment since the last session has changed. It is safe to predict that the big oil companies which did not oppose the four-cent tax would oppose a five-cent tax to the limit, on the theory that a five-cent tax would have the effect of decreasing the sale of gasoline. As a matter of fact, the feeling appears to be general that an increase in any tax would be doomed to defeat, and that even the suggested increase in the automobile license fees may not be granted by the assembly.

COLORADO HIGHWAYS is calling its readers' attention to the facts because it feels that not in years has the cause of good roads in this state faced a situation as serious as the one created by the increased appropriation made by Congress. It feels that the nearly $3,000,000 set aside for Colorado can be used to great advantage, and that something should be done to enable the highway department to obtain it. It would be a calamity to reject the increased appropriation and permit the Secretary of Agriculture to divide it among the other states.

The Application of Traffic Surveys

By H. E. CUNNINGHAM
Field Manager, Western States Traffic Census Survey

EVEN though those who are engaged in the traffic-census survey are called followers of the profession of sitting on a corner and counting passing automobiles, they consider their work to be fundamentally engineering.

All of you follow a specialized profession and are engaged in momentous problems of building new highways, improving the standards of existing highways, stretching steel and concrete across seemingly impassable chasms or hewing shelf roads which are veritable goat trails along the precipitous cliffs of rocky canyons.

Enormous sums of money are spent in building a network of roads which extend in every conceivable direction, in constructing structures such as the Carquinez and Hudson River bridges, in building high type pavements across the top of shifting sands, and in building mountain highways which may cost as much as $100,000 per mile. This is done so that the working man may take his family for a ride on Sunday afternoon, the vacationist may look for secluded spots in the mountains for leisure and rest, the tourist may seek the attractions of this great land, the farmer may move his crops, and the business man and manufacturer may make their shipments. All of these elements grouped together are called traffic. Traffic counts have been made in the past, but little has been done to study and classify this traffic.

The early engineers industriously pushed trails through the wilderness in order to develop a new country. These early roads were stagecoach trails on postal mail routes. Generally speaking, the past twenty years of highway building have been devoted largely to bringing these trails to higher standards. In reality present-day locating engineers are relocating engineers. The bringing to high standards of these trails which connect local centers of population has had considerable bearing on our national development.

A revolution to which we must give serious consideration is occurring. Automotive engineers have developed vehicles capable of going as fast as one cares to drive them and a man's traveling speed is limited only by his good judgment. Many people save money with the definite idea of spending their vacation many miles away from their homes. This means that each year there is a tremendous influx of tourists who come to enjoy the advantages of the West. Records show that approximately 40 per cent of the traffic on the primary roads of Colorado originates outside the state. The tourists come and purchase gasoline and other necessities from our merchants and leave in a happy frame of mind after having spent a few weeks in the wonderland of the West. The design of primary and secondary roads must give some consideration to this foreign traffic.

Paper presented at Highway Conference held at Boulder, Colo., on January 16-17, under auspices of Department of Civil Engineering of the University of Colorado.

Bucking snow on Red Mountain Pass, at 10,000 feet altitude, between Ouray and Silverton. Some job, eh? The old ghost mining camp of Red Mountain is shown in the background. Photo by Smith, Ouray.

Factors Involved

In planning the improvement of our highway system it is necessary to consider the vehicle count, the volume flow of traffic, where it originates, and its final destination. In the future many of our highways will have to give preference to through travel. Is it fair to a tourist to force him to travel on local roads and literally through the front yards of local settlements when he is bound for a distant destination? This lack of consideration for him will probably cause him to go elsewhere on his next trip and he will shun the locality which has wasted his limited vacation time.

During past years several state highway departments have made simple counts of vehicles on one or two days of each year. These counts have been of limited usefulness and if they have been made at the wrong season of the year, the information which has been obtained may be misleading. The survey which is now being conducted by the U. S. Bureau of Public Roads in co-operation with the state highway departments of the eleven western states (excepting Montana and including Nebraska) will extend through an entire year. This survey is more than a mere count of vehicles which happen to be using the highway. It will give highway officials who are desirous of conducting their operations in a businesslike manner the one sure means of dealing fairly and wisely with the many demands which are made on them for highway improvements.

Method of Making Survey

In general, a series of key stations are distributed throughout the state at highway intersections or at points of definite traffic variation on the main traveled routes. Each station is worked once every thirteen days and a year's operation will give for each station four counts for every day in the week or a total of twenty-eight counts during the year. Blanket stations are located on less important roads and are operated on a Sunday and Monday every three months. All counts will be correlated on a twenty-four-hour basis and the tallies will show for each section of the system the number of passenger cars, busses, trucks, and trailers, together with the number of foreign vehicles.

A questionnaire card is given to each motorist, who is asked to answer certain questions and to mail the card to one of the several collection stations. This card secures useful information which could not otherwise be obtained except by the use of recorders or by having observers ask for specific information from each motorist. Obviously, the latter method would inconvenience the motorist and would also prove exceedingly costly.

Information Obtained

When complete information has been obtained, it is hoped, by a thorough analysis, to obtain detailed information concerning the following problems:

1. Volume flow of traffic, its origin and destination.

2. Density of traffic on any section of the Federal Aid system for any season of the year. This information serves as a yardstick for estimating the life of existing surfaces and also gives a comparison between states.

Some more snow-removal—in this instance on La Veta Pass, showing before and after the tractor-plow went through. State forces keep this pass highway open throughout the winter months. Photos by Douglas Stewart.

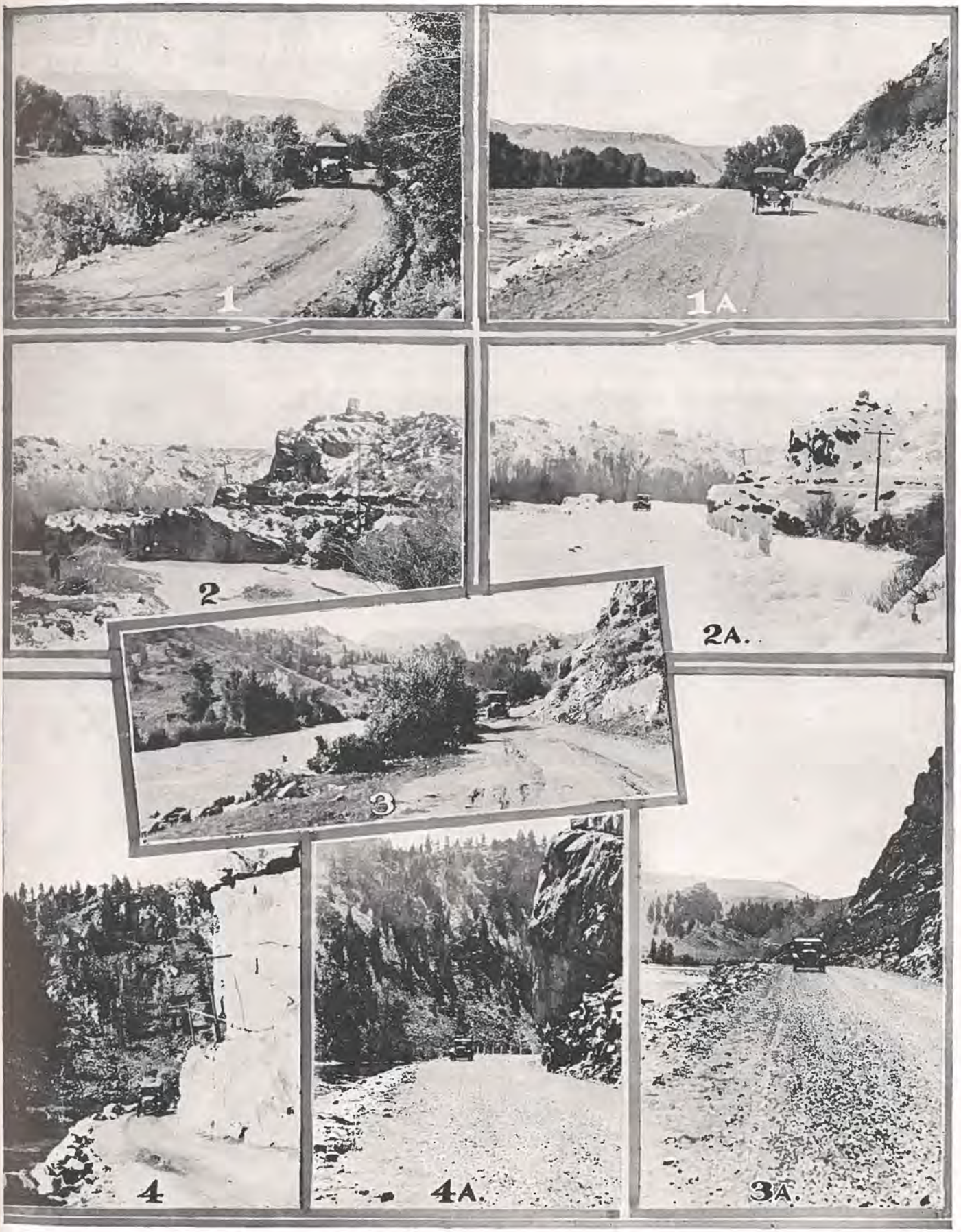
3. An analysis of traffic. If a station count indicates that thirty trucks have used a particular section of road, correlating information will show their average tonnage capacity and whether the trucks are hauling produce or supplies from a farm or whether they are transport trucks operating to and from a large city. Local passenger cars will be classified as from a farm, a rural village, or a city.

4. Approximate mileage per day covered by each vehicle. Various analyses may be made from this information. It is useful in determining estimated gasoline receipts, or surface wear in terms of miles traveled per vehicle-day. It will also indicate whether through traffic is able to cover a normal distance in a day's travel, thereby reflecting on the sectional road condition.

5. Average number of passengers per vehicle. This information is used for general statistical purposes.

6. Evaluation of the economical aspects of snow removal. Snow removal is of increasing importance. Motorists are demanding all-year highways. The survey will show the amount of traffic on the highway during the coldest day in January or the windiest day in March.

It is only by a systematic analysis of traffic that highways can be designed to give maximum service to the public with minimum expenditures based on an economic maintenance and improvement program.



A ROAD STORY WITHOUT WORDS—*One of the most striking examples of modern road construction, "before" and "after," is illustrated in the above pictures taken of a six-mile project constructed west of Gunnison by the Colorado State Highway Department with Federal co-operation. The pictures "speak" for themselves. This six miles of road was built by Ed. Honnen, contractor, at a cost of $60,100. Photos furnished by H. T. Reno, resident engineer.*

NEWS OF THE MONTH

Gasoline used in county road maintenance and construction equipment is, for the most part, exempt from taxation by the state, District Judge Robert G. Smith ruled in the Greeley district court March 26. The case involved the right of the state to collect the 4-cent gasoline tax from Weld County.

The state brought suit against the county for the collection of $25,000 in back taxes on gasoline used in maintenance units. Judge Smith held that the state could collect on gasoline used in only four types of vehicles used by the county: trucks hauling gasoline, service cars, cars of road overseers and cars used in hauling crews and materials to bridges.

The case will be appealed to the state supreme court.

Highway improvements which will cut the auto route between Colorado Springs and Gunnison 25 to 30 miles are contemplated by the Chaffee county commissioners. The major feature of this planned program is reconstruction of the road in Chalk Creek and over Tincup Pass, in the direction of Taylor Park and Gunnison. Improvement of the Ute Trail also is regarded as certain within the year.

Over 100,000 yards of dirt were moved by Cole Bros., contractors, on their project located between Sterling and Julesburg during the month of March. Operating with four draglines day and night these contractors are certainly making the "dirt fly." Forty-two miles of grading is involved in the project, which is being built by the Colorado Highway Department with Federal co-operation. Following the completion of the grading, this stretch of new road will be gravel surfaced. Funds for the latter work already are available through state, federal and county co-operation. As funds become available, it is planned to hard-surface this stretch of road to the state line, which forms a link in the Lincoln Highway from Nebraska.

A modern crushing and screening plant has been set up by the Driscoll Construction Co., Pueblo contractors, to carry out the terms of their contract for the furnishing of thirty miles of crushed rock surfacing on U. S. Route No. 85 between Aguilar and Greenhorn. The Driscoll plant has been set up at Walsenburg. A fleet of International trucks, a Cedar Rapids crushing outfit and two Bates tractors will be used on the work.

On March 5th, W. F. Pigg and Son were awarded a contract for the construction of a 12-mile detour from Fitzsimons Hospital to Watkins, on the Denver-Limon road. Exactly three weeks from the day the work was started the contract was completed. This detour will be used by traffic during the construction of eight miles of oil-processed surfacing east of Fitzsimons Hospital. Bids for the latter work were opened on April 9th. D. L. Owen, of Denver, was the low bidder for the work.

On April 4th, the Colorado State Highway Department opened bids on five projects totaling $630,888. Included in this work is 26 miles of concrete pavement between Pueblo and Colorado Springs, work on which has been started by the successful bidders.

The projects and contractors, with the amounts of their bids, follow:

F. A. P. No. 277-D, 15.566 miles of concrete paving north of Pueblo in El Paso and Pueblo counties. Edward Selander of Fort Morgan, $333,257.80.

F. A. P. No. 277-E, 10.2 miles of concrete paving south of Colorado Springs in El Paso County. J. Fred Roberts & Sons of Denver, $238,-207.30.

F. A. P. No. 270-D, 3.978 miles of gravel surfacing between Alamosa and Monte Vista in Alamosa County. The Mountain States Construction Co. of Pueblo, $32,679.40.

State Project No. 728-B, nine sections of wire cable guard fence in Glenwood Canon on Highway No. 4 east of Glenwood Springs in Garfield County. J. Fred Roberts & Sons of Denver, $16,001.60.

State Project No. 735-A, new timber deck on 1,200 feet of bridge two miles north of Granada on Highway No. 6 in Prowers County. A. R. Mackey of Fort Morgan, $10,742.40.

Showing how snow-removal is handled in Eastern Colorado—picture on the left shows a tractor and pull-grader working east of Sterling, and the one on the right is a truck with plow removing snow from the oil pavement north of Nunn. Photos by John Stamm.

Jefferson County has completed a new road between Coal Creek and Golden on the Boulder-Golden highway. The new road gives the residents of Coal Creek a direct route to the county seat.

C. V. Hallenbeck has been awarded a contract for the oil processing of nine miles of the highway east of Canon City on Highway No. 6, between Canon City and Pueblo. Hallenbeck's bid for the completed work was $50,548. The project will be built with Federal co-operation. The new road should be completed by the middle of the summer.

For the first time in twelve years concrete pavement will be laid for $1.73 per square yard on two Colorado paving projects. The New Mexico Const. Co. bid $1.73 on eight miles of pavement east of Greeley, and Edw. Selander, Fort Morgan contractor, bid $1.73½ on sixteen miles of pavement north of Pueblo. Work has been started by the contractors on both projects and should be finished by September 1 under favorable weather conditions.

The State Highway Department will receive and open bids on four Federal Aid projects April 22. The projects follow:

F. A. P. 138-C, 4.2 miles of gravel surfacing south from Muddy Pass in Grand County on Highway No. 2.

F. A. P. 262-C, five miles of gravel surfacing west of La Veta Pass on Highway No. 10 in Costilla County.

F. A. P. 263-B, 3.1 miles of gravel surfacing between Mortimer and Ft. Garland in Costilla County.

F. A. P. 300-C, two miles of grading and drainage north of Silverton on Highway No. 19 in San Juan County.

On May 1 work will be started on the construction of a new road between Brush and Akron, which it is expected eventually will become a part of the Federal Aid system in Colorado. An appropriation of $45,000 has been made for the construction of the new road, which will follow a new alignment. The new route will save 6½ miles over the present road between the two cities. Plans for the new road were drafted under the supervision of A. B. Collins, district engineer of the State Highway Department. Funds for the work were contributed by the state and Washington and Morgan counties. The road will be graded and gravel surfaced. County equipment, including elevating graders, trucks, and rotary fresnoes, will be used. F. D. Edwards, resident engineer for the State Highway Department, will be in direct charge of the work.

Work in progress on the new bridge across the Arkansas River, near Lamar. Photo shows old bridge moved down stream and now in use as a detour. Photo by L. A. Rose.

DREXEL LACEY

The highway department was saddened by the passing of Drexel Lacey on March 19. Mr. Lacey had been an employe of the department since 1919 as resident engineer working in various parts of the state. He had been ill for nearly a year prior to his death. The last project he worked on was plans for the pavement north of Pueblo.

Mr. Lacey, who was 37 years old, was born in Philadelphia. He was graduated from Washington University at St. Louis and later was employed as a draftsman by the Mt. States Telephone & Telegraph Co. At the outbreak of the World War he enlisted in the 115th Engineers, a regiment composed largely of students from the Colorado School of Mines and the State University, and served overseas. On his return from France in 1919 he joined the highway department as draftsman and was rapidly promoted until he occupied the position of resident engineer in 1926.

The sympathy of the entire department is extended the bereaved widow, his mother and father and sister.

DEDICATED

To my Wonderful Friend, DREXEL LACEY, *who passed on March 19, 1930, whom it was my great pleasure to assist in his survey of the road from the top of Mount Evans down Deer Creek, to connect with State Highway No. 8, during the fall and winter of 1923-24.*

'Tis hard to realize, dear pal,
That you have left me here;
That I can't hear your gentle voice,
Nor feel your clasp, so dear!

I sit alone and think, with joy,
Of hours so full and free,
Of work and play and those nice talks,
Which meant so much to me.

And once again I climb with you
Those rugged rocks so steep,
Along the ledge, then up again,
O'er ice and snow so deep.

Regardless of how deep the snow,
Your work was there to do;
You led the way, I followed on,
So glad to be with you.

You've been to me a loyal friend,
So good, so staunch, so true,
You've always met me with a smile,
Heedless how 'twas with you.

I can't quite seem to understand
Why you were called to die,
And leave me here along with those
Who loved you same as I.

But some sweet day, I know not when,
But when life's work is o'er,
And I am called the same as you,
We'll meet on that far shore.

Sweet memories, so dear to me,
I'll treasure until then;
So goodbye, friend—a fond goodbye,
Until we meet again.

CHARLES C. ROYAL.

Along U. S. Highways

The New Mexico highway department has built a special truck to be used on the job of erecting road signs on the highways of the state. At present the crew is erecting warning signs; later on directional signs will also be put up. The directional signs will give the mileage to the next city or town or point of interest for the guidance of the tourist. This work is being done by maintenance forces in Colorado. Directional signs are to follow on the main roads of Colorado in a few months.

At the present time the state of New Mexico has in course of construction over 100 miles of mixed-in-place oil surfacing. Weather conditions in the Sunshine State permit the laying of this type of surfacing a month earlier than in Colorado. Contracts are now being let for over 100 miles of this type of surfacing in this state. Plans call for the completion of this work before the end of the summer. Work has been started on 34 miles of concrete pavement here. Twenty-six miles of this pavement will be laid between Pueblo and Colorado Springs, and eight miles east of Greeley.

A mile of grading on the Oregon Coast highway, to cost $100,000, has been contracted by the Oregon highway department. The work is located north of Gardiner. Colorado has had several jobs costing an equal amount, notably the two miles through Byers Canon, where the highway was blasted from almost solid rock. Oregon will spend $8,000,000 for new state road construction in 1930.

Busses traveling over American highways carry eight million passengers a day, or three billion a year—24 times the total population of the United States.

Bus passengers pay three hundred million dollars a year for transportation. Common carrier bus lines now operate regularly over 290,000 miles of bus routes, as compared with 250,000 miles of steam railroads and 45,000 miles of electric railways.

Maintenance of highways by contract, which started a few years ago in Ohio, has spread over several middle-western states. Mower County, Minn., recently let a contract for the maintenance of the road system of the entire county—all gravel roads—which comprises 200 miles of maintained highway. Ten bids were submitted. The low bid was $55,000 for year-round maintenance. Using day labor, the county paid out $55,711 for eight months of maintenance in 1929. Under the day-labor system patrolmen were scattered over the county, but under the contract system it will be possible for gangs to be built up and operation to be more efficient and economical. Road machines operated in pairs will replace the work of single men.

The strong point of the day-labor system of operation is that it makes possible the payment of political debts with jobs—the spoils system which is the curse of American politics. Waste is inevitable under this system and costs are concealed in a tax rate.—*Highway Engineer & Contractor*, Chicago.

Twenty per cent of the mileage of pavements on Federal Aid projects last year were 20 feet in width. Illinois, Michigan, Wisconsin and California are among the states now specifying 20-foot pavements on well-traveled roads. New York and California, particularly, have gone in for even wider rural pavements, with many built 27, 36 and 40 feet wide.

Government tests have demonstrated that a rapidly moving car should have a 10-foot lane for safety. In the early days hundreds of miles of 16-foot pavement were laid, scarcely enough room for a car and a load of hay. Later the 18-foot pavement was adopted as standard by most states. All pavements laid in Colorado are 18 feet wide.

The Third Highway Congress of the National Highway Commission of Mexico will be held in Mexico City April 20 to 27. The American Road Builders' Association has pledged its co-operation to the extent of sending the executive committee as delegates to the congress, and it is informing the membership of the desire on the part of the Mexican highway commission to have as large a delegation representing the association as possible.

Special railroad rates for those attending the congress are offered by the railroad companies.

Last year a large delegation attended the Mexico City convention and felt fully repaid with the excellent hospitality extended by the Mexican commission. Side trips were taken to the Floating Gardens of Xochimilco, Aztec Pyramids, Pueblo, the City of Churches, and many other interesting places. Several people plan to go on this trip as their vacation.

This year the congress is held at a time when the country is most beautiful and it is felt that many of the members would like to take advantage of this trip and visit Mexico along with the official delegation.

President Hoover has appointed an honorary commission to attend the sixth congress of the Permanent International Association of Road Congresses, to be held in Washington, D. C., October 6-13, consisting of the members of the Cabinet and the chairmen of the Senate and House committees on foreign relations, and on post offices and post roads. President Hoover is honorary chairman of the congress, and Roy D. Chapin is the president of the American organizing commission.

New highway shops recently purchased and fitted up by Pueblo County, for maintenance and repair of all road equipment owned by the county.

Big Sum Apportioned for Victory Highway

"Greater progress will probably be accomplished on the Victory Highway throughout Colorado this year than during any year since work was begun upon this highly important transcontinental route," according to Dowell Livesay, writing in the Craig "Empire." An appropriation of nearly $400,000 will be expended in northwestern Colorado. The projects include:

For completion of the Muddy Pass section, $80,000. In addition to this amount there are some funds left over from appropriations of 1929 which will be expended. This means that the state will complete the improvement of the Muddy Pass section from the end of the present improved portion to the junction of the Forest Service road on Rabbit Ears Pass. This stretch of up-and-down slickness, with its companion in the Skull Creek sector to Vernal, has brought down maledictions unending from tourists caught upon it in rainy weather. Soon it will be a memory! Truly, this is progress.

For improvements between Hayden and Craig, $100,000. This will mark the beginning of another important betterment. The slick stretch near the Cary ranch will be replaced with a standard surfaced road along the railroad track.

For improvement west of Craig, $100,000. The beginning of another important piece of betterment is marked by this appropriation.

Altogether, these three appropriations alone represent a total of $380,000 to be expended upon the Victory Highway itself in northwestern Colorado. With funds left over from last year, the total will approximate $400,000.

However, the Victory Highway must be an excellent, easily traveled, comfortable highway for its entire length across Colorado, if it is finally to fill the purpose of the great transcontinental route for which it was established. In this light the work to be done during 1930 in the eastern portions of the state is significant.

From the eastern boundary of the state at Burlington, on North 40, an appropriation of $140,000 will be expended. Similarly, from the eastern boundary west on South 40 improvements costing $100,000 will be made. In Lincoln County a bridge will be built at an expenditure of $7,930. From Limon, junction of both the North and South 40 sections, $200,000 will be spent. Improvements in Clear Creek County will amount to $15,000 and important paving in Idaho Springs will cost $50,000.

Oiling will be begun this year on the eastern portions of the highway that are so important in affording an inviting entrance to Colorado for motorists from the East and in assuring pleasant passage onward across the Great Plains for travelers from the West.

All in all, with funds left over from last year, $1,000,000 will be expended directly upon the Victory Highway this year in Colorado for improvements, not counting the work on connecting roads. Certainly, this will be progress of the most encouraging character.

And that is not all. The work done so far and the improvements to be accomplished in 1930 all lead up to the final task that must be achieved, if the Victory Highway is to take its rightful place as the great central transcontinental route for motor travel.

STATE HIGHWAY DEPARTMENT

Financial Statement April 1, 1930

BALANCES 12-31-29		
State Treasurer	$1,310,302.64	
County Time Warrants	10,333.42	
Revolving Fund	9,500.00	
Total Balances		$1,330,136.06
RECEIPTS		
Internal Improvement	$ 33,100.00	
Gas Tax	802,182.64	
U. S. Government	168,119.25	
Highway Receipts	18,876.47	
Bus Licenses	23,754.48	
Cancelled Warrant	2.75	
Total Receipts		$1,046,035.59
Total Balances and Receipts		$2,376,171.65

DISBURSEMENTS		
Federal Aid Projects	$ 288,839.70	
State Projects	61,739.49	
Maintenance	253,460.57	
Maintenance, Equip. and Repairs	9,765.59	
Property and Equipment	8,214.88	
Surveys	4,347.73	
Traffic Signs and Census	3,814.70	
Administration	37,200.44	
Total Disbursements		$ 667,383.10
BALANCES 3-31-30		
State Treasurer	$1,688,955.13	
County Time Warrants	10,333.42	
Revolving Fund	9,500.00	
Total Balances		$1,708,788.55
Total Disbursements and Balances		$2,376,171.65
3% GAS TAX FUND		
RECEIPTS	$ 138,718.26	
DISBURSEMENTS		
Jefferson County	73.55	
Balance	138,644.71	
	$ 138,718.26	

Highway Improvements--State of Colorado

TABULATION OF BIDS

MARCH 26, 1930

FEDERAL AID PROJECT NO. 277-E, CONST. DIV. 2

HIGHWAY—U. S. NO. 85
COUNTY—EL PASO
ROAD—COLORADO SPRINGS-PUEBLO

ITEM	Unit	Quantity	J. Fred Roberts & Sons Const. Co. 206 Tramway Bldg. Denver, Colo. Unit Price	Amount	J. L. Busselle Fountain, Colo. Unit Price	Amount	H. C. Lallier C. & E. Co. 208 Flat Iron Bldg. Denver, Colo. Unit Price	Amount
Unclassified Excavation	Cu. Yd.	3,700	$ 0.25	$ 925.00	$ 0.25	$ 925.00	$ 0.25	$ 925.00
Dry Common Excavation Structure	Cu. Yd.	5	1.50	7.50	1.00	5.00	1.00	5.00
Unclassified Borrow	Cu. Yd.	36,600	.25	9,150.00	.25	9,150.00	.25	9,150.00
Overhaul Excavation and Borrow	Sta. Yd.	16,500	.02	330.00	.02	330.00	.02	330.00
Overhaul Special	Yd. Mi.	18,800	.30	5,640.00	.20	3,760.00	.40	7,520.00
Concrete Pavement	Sq. Yd.	103,355	1.80	186,039.00	1.84	190,173.20	1.84	190,173.20
Sand Cushion	Cu. Yd.	8,780	.75	6,585.00	.85	7,463.00	1.00	8,780.00
Miscellaneous Untreated Timber	M. B. Ft.	6.3	60.00	378.00	70.00	441.00	80.00	504.00
Class A Concrete	Cu. Yd.	224	16.00	3,584.00	12.00	2,688.00	20.00	4,480.00
Reinforced Steel, Type A	Lb.	84,600	.1425	12,055.50	.15	12,690.00	.14	11,844.00
Reinforced Steel, Type B	Lb.	73,900	.08	5,912.00	.085	6,281.50	.08	5,912.00
Reinforced Steel, Type C	Lb.	33,700	.054	1,819.80	.07	2,359.00	.05	1,685.00
Reinforced Steel, Type D	Lb.	31,700	.07	2,219.00	.0825	2,615.25	.0675	2,139.75
Reinforced Steel Bridge Appr. Slabs	Lb.	26,400	.05	1,320.00	.05	1,320.00	.05	1,320.00
Wire Cable Guard Fence	Lin. Ft.	3,210	.65	2,086.50	.70	2,247.00	.80	2,568.00
Smooth Metal Pipe	Lin. Ft.	46	2.00	92.00	1.00	46.00	1.50	69.00
Pavement Drain Grills	Each	16	4.00	64.00	5.00	80.00	10.00	160.00
TOTAL BID				$238,207.30		$242,573.95		$247,564.95

FEDERAL AID PROJECT NO. 277-D, CONST. DIV. 2

HIGHWAY—U. S. NO. 85
COUNTY—PUEBLO
ROAD—PUEBLO-COLORADO SPRINGS

ITEM	Unit	Quantity	Edw. Selander Ft. Morgan, Colo. Unit Price	Amount	H. C. Lallier C. & E. Co. 208 Flat Iron Bldg. Denver, Colo. Unit Price	Amount	J. H. Miller & Co. 410 C. of C. Bldg. Denver, Colo. Unit Price	Amount
Remove 16 Structures	Lump Sum		.....	$ 400.00	.....	$ 300.00	.....	$ 320.00
Unclassified Excavation	Cu. Yd.	10,000	.22	2,200.00	.20	2,000.00	.25	2,500.00
Dry Common Excavation Structure	Cu. Yd.	50	1.00	50.00	1.00	50.00	3.00	150.00
Unclassified Borrow	Cu. Yd.	53,300	.25	13,325.00	.20	10,660.00	.25	13,325.00
Overhaul Excavation and Borrow	Sta. Yd.	20,500	.02	410.00	.02	410.00	.02	410.00
Overhaul Special	Yd. Mi.	29,400	.20	5,880.00	.20	5,880.00	.12	3,528.00
Concrete Paving	Sq. Yd.	163,880	1.735	284,331.80	1.79	293,345.20	1.89	309,733.20
Sand Cushion	Cu. Yd.	24,480	.70	17,136.00	.70	17,136.00	.60	14,688.00
Miscellaneous Untreated Timber	M. B. Ft.	7.2	75.00	540.00	80.00	576.00	70.00	504.00
Class A Concrete	Cu. Yd.	250	13.50	3,375.00	18.00	4,500.00	9.00	2,250.00
Reinforcing Steel	Lb.	27,800	.06	1,668.00	.05	1,390.00	.05	1,390.00
Wire Cable Guard Fence	Lin. Ft.	1,540	.70	1,078.00	.80	1,232.00	.70	1,078.00
Remove Bridge 1073+	Lump Sum		.....	200.00	.....	100.00	.....	10.00
Remove Bridge 1129+	Lump Sum		.....	150.00	.....	100.00	.....	20.00
Remove Bridge 1186+ and 1188+	Lump Sum		.....	450.00	.....	200.00	.....	30.00
Remove Bridge 1365+	Lump Sum		.....	450.00	.....	100.00	.....	100.00
Remove Bridge 1444+	Lump Sum		.....	100.00	.....	100.00	.....	20.00
Remove Bridge 1658+	Lump Sum		.....	450.00	.....	100.00	.....	300.00
Remove Bridge 1789+	Lump Sum		.....	450.00	.....	100.00	.....	300.00
Smooth Metal Pipe	Lin. Ft.	152	1.00	152.00	1.50	228.00	1.00	152.00
Pavement Drain Grills	Each	66	7.00	462.00	6.00	396.00	5.00	330.00
TOTAL BID				$333,257.80		$338,903.20		$351,138.20

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Concrete paved under-crossing near Manzanola, U. S. Route No. 50. Paving project built by Colorado State Highway Department with Federal co-operation.

ROAD BUILDER'S AND MACHINERY NOTES

Gravel has been used as a road surfacing material for a great many years, and when properly selected, screened and crushed, makes an ideal surfacing material for roads.

Washington County, Minnesota, was fortunate, some eight years ago, in securing a gravel pit of excellent quality located on the Oak Park extension on Main Street, just south of Highway 45 junction. Gravel was obtained at that time for the graveling of 13 miles of road, or approximately 15,000 cubic yards. Removal of this material made a deep depression in the small area purchased. No material had been hauled out of this pit for the past seven years.

When the contract was let for the graveling of the Stillwater-Minneapolis cutoff highway, the county engineer, J. G. Merten, wishing to select a good quality of material, specified that the gravel was to be taken from this pit and recommended crushing and screening.

To load this material was a big problem, but the Roth Construction Company of St. Paul, subcontractors on the project, were equal to the occasion.

The work was carried out with utmost speed consistent with good workmanship. The high degree of efficiency of the Roth Company and operation of high production is a record worthy of special mention.

The gravel material was removed from the pit by means of a drag-line. The drag-line was operated by a hoist mounted on a truck. The other end of the drag-line was attached to a truck ordinarily known as a dead man (but in this case not so dead), which could be moved from place to place as conditions made it necessary to move.

The drag-line excavated the material and hauled same to a trap, where the larger stones, over nine inches in diameter, were removed.

The gravel material falling on a belt conveyor was carried to the combination screening, crushing and loading plant. The Pioneer Gravel Plant No. 12 was used on this project.

A Caterpillar "60" tractor furnished the necessary power to operate the crushing and screening plant. The tractor was also used for pulling stumps and for removing the crushing and screening plant from place to place.

The hauling of the gravel was done by a fleet of fourteen 2½ cubic yard International bottom dump trucks and one end dump truck for stock piling, owned and operated by the Roth Construction Company. Production ran about 450 cubic yards per ten-hour day. Elton T. Fair Company, Denver, are agents for the Pioneer crushing and screening units in Colorado.

The road machinery division of the Caterpillar Tractor Company announces a new "60" elevating grader. It is said to have greater capacity than any other model previously put on the market by "Caterpillar." This machine is built for power take-off only. The elevator belt is 42 inches wide. It is claimed this machine has greater capacity and mobility than the usual elevating grader. It has just had a gruelling tryout on Mississippi levee work in the notorious buckshot soils encountered there, and came off with flying colors. The Clinton & Held Company of Denver will be glad to furnish full specifications of this new machine. Clinton & Held also are agents for the "Caterpillar" tractor and road machinery line.

The new 3-ton speed truck, Model A-5, recently announced by International Harvester and now on display at all International branches, is designed and built to meet a wide range of hauling requirements. The 3-ton Model A-5 is built in four wheelbases—155-inch for dump and semi-trailer service, 170, 190 and 210-inch for general hauling of all kinds. Outstanding among the features of this new International are the new 6-cylinder engine with its 7-bearing crankshaft, 7-bearing camshaft and removable cylinders; the single-plate clutch with built-in vibration damper; a new and exclusive transmission with five speeds forward and one reverse; latest type mechanical four-wheel brakes, and heavy pressed steel channel tapered frames. A fleet of fifteen International trucks are being used by the Driscoll Trucking Company, Pueblo contractors, on their state highway contract at Walsenburg. The International Harvester Co. also are builders of the McCormick-Deering tractor, which is being used so successfully on a wide variety of road construction and maintenance equipment in the high altitudes of Colorado.

Adams adjustable leaning wheel graders, motor graders, road maintainers, etc., are illustrated and described in a new catalog just published by J. D. Adams Company, Indianapolis, Indiana.

The catalog pages thoroughly illustrate and describe their line of adjustable leaning wheel graders which come in 6½, 7, 8, 10, 12 and 14-foot blade lengths, as well as other units in the Adams complete line of road equipment.

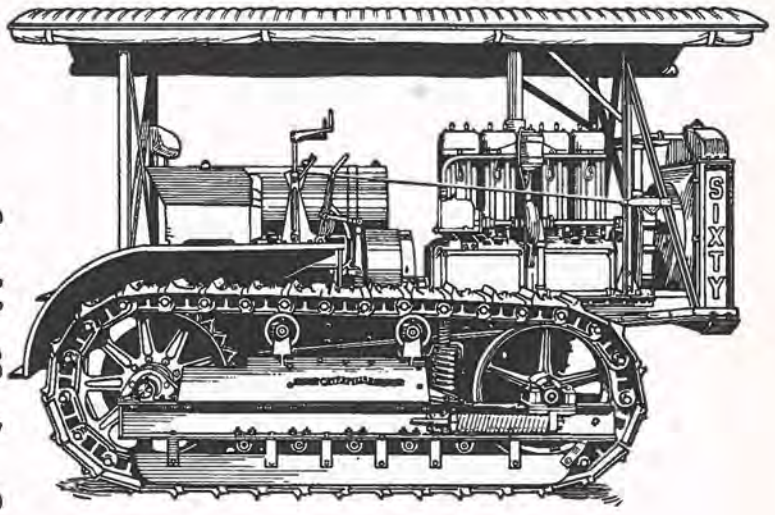
Two new machines are incorporated in

(Continued on page 22)

1. Here's an Adams Leaning Wheel Grader on "shoulder" work west of Denver. Picture by Elton T. Fair Company. 2. This picture submitted by the Wilson Machinery Company shows a Monarch "50," in close quarters near Creede. 3. A Coleman "four-wheel-drive" truck on turntable hauling cement for one of Edw. Selander's contracts. 4. Up in Larimer County they go in for modern maintenance equipment. Here's a Baker maintainer with a McCormick-Deering tractor. Photo, H. W. Moore Equipment Co.

CATERPILLAR

REG. U.S. PAT. OFF.



NOT a hope nor a promise—but backed by 25 years doing just one job—better each year . .

ONCE you really understand the difference, you realize why it takes many, many years to build a tractor with the *Stamina* and *Dependability* of "Caterpillar"—and to build an organization that can and does render satisfying service throughout the nation. The "Caterpillar" Sixty once sold for $6,250 factory. Now it sells for $4,175.00 factory—a *third* less—yet today's Sixty is better in every way. Recognition of *Dependability* has brought demand—and demand has brought increased production and greatly lowered costs *to the public.*

"Caterpillar" representation in Colorado is backed by an organization with 17 years' *tractor* experience. We maintain 12 "Caterpillar" trained men in the field. Our parts department is very complete. Every "Caterpillar" owner knows that he can get what he wants when he wants it.

"CATERPILLAR" TRACTORS

Model 60	$4,175.00
Model 30	2,495.00
Model 20	1,995.00
Model 15	1,525.00
Model 10	1,155.00

"CATERPILLAR" GRADERS

Model 42 Giant Elevating Grader, weight 12,780 lbs., F. O. B. Denver, $2,270.

Model 60 Elevating Grader, weight 13,595 lbs., equipped for power take-off, F. O. B. Denver, $2,560.

"CATERPILLAR" GRADERS

	Weight	Cut	
Super Mogul	10,235 lbs.	12-ft.	$1,585.00
Super Reliance	9,145 lbs.	12-ft.	1,470.00
Super Special	6,000 lbs.	9-ft.	930.00
Twenty	4,620 lbs.	8-ft.	765.00
Fifteen	3,740 lbs.	7-ft.	585.00
Ten	2,970 lbs.	7-ft.	460.00

All blade Graders equipped with enclosed gears and Timken roller bearings.

All Prices F. O. B. Denver.

Clinton & Held Co., Denver, Colo.

Road Builder's Notes

(Continued from page 20)

the catalog: Adams Motor Grader No. 101, which the company claims embodies several decided improvements in motor-grader construction; and Adams one-man road maintainer No. 61, a new single control machine which can be hitched to any tractor and is operated by a tractor operator.

A copy of this new catalog will gladly be mailed on request to Elton T. Fair Company, Denver.

Word has been received by the Wilson Machinery Company of a new model one yard shovel-pull, shovel-crane-dragline placed on the market by the Koehring Division of the National Equipment Corporation, Milwaukee. All gears except the turntable gear and swing pinion are enclosed and run in oil on the new shovel. All the machinery shafts which enter into the operations of hoisting, drag, dipper crowd, boom hoist and swing are mounted on roller or ball type anti-friction bearings. Full particulars will be sent on request.

The National Equipment Corporation, a consolidation of the Koehring and T. L. Smith companies, of Milwaukee, the Insley Mfg. Co. of Indianapolis, the Parsons Co. of Newton, Iowa, and the Kwik-Mix Concrete Mixer Co. of Port Washington, Wis., became an operating company January 1. Philip A. Koehring is president and general manager, with headquarters in Milwaukee. Sales, service, advertising and accounting departments have been centralized to render a more efficient service to customers and to effect economies in operation and overhead. The Wilson Machinery Company represents all of the above lines in Denver trade territory.

A combination tractor and dump wagon, known as the Dumptor, has been added to the line of machines handled by the Koehring division of the National Equipment Corporation. It is powered by twin 4-cylinder engines which enable it to travel without steering clutches in any kind of ground. It has an operating capacity of 6½ yards.

The Allis-Chalmers Company, also represented in the Denver territory by the Wilson Company, announces a new Model "35" Monarch tractor. The Monarch is now manufactured in three models, the "75," "50" and the "35." Four of the Model "50's" were recently purchased by the Colorado Highway Department. This makes twenty of these machines now at work on Colorado roads.

The Harnischfeger Corp., Milwaukee, represented in Denver by Paul Fitzgerald, announces the addition of seven new models to its present line of excavators. With these new machines this concern now has a size to meet every requirement from ½ to 3½ cubic yards capacity.

Announcement has been made that the Wood Hydraulic Hoist & Body Company of Detroit recently purchased the property and assets of the Hydraulic Hoist Mfg. Co., St. Paul. These lines are represented in Denver by the Liberty Trucks & Parts Co. A dozen of the Wood hoists and bodies were recently sold to the Colorado Highway Department. They will be installed on a fleet of Ford and Chevrolet trucks.

1. Crushing and screening rock for a state road near Lamar with a Cedar Rapids one-piece outfit. Photo by Hamilton & Gleason, contractors. 2. Bucking snow with a Cletrac north of Durango. Photo by Liberty Trucks & Parts Co. 3. A FWD truck clearing snow in Washington County. 4. One of Baca County's maintenance units—a McCormick-Deering industrial tractor and gravel trailer. 5. Ord concrete finisher working on pavement west of Ft. Morgan. Edw. Selander, contractor. 6. A General excavator in heavy rock on one of Winterburn & Lumsden's jobs near Grand Junction.

One of the most beautiful calendars of the year has been distributed by the Liberty concern for Cleveland tractors. If you want a beautiful road picture to hang on your wall, write to Liberty for one of these calendars. Incidentally, it might be mentioned that Cletracs are enjoying a large sale to counties and farmers this spring, according to Richard Carlson, sales manager.

Tony Monell made his first sales trip for the Liberty concern to the Pueblo meeting of the Arkansas Valley County Commissioners Association on March 22. Tony was secretary of the state association for twenty years. He was one of the most popular county officials in the state. For eighteen years he served as clerk of Montrose County.

The growing importance of airplane transportation has focused popular and technical attention on the need for more and better landing facilities. A common deficiency in fields used for landing purposes is inadequate drainage—a deficiency which has in many cases robbed otherwise good ports of valuable traffic.

Engineers who have made a study of the subject recognize that in designing drainage systems for landing fields the conditions peculiar to this service must be provided for and that designs and types of construction applicable to the drainage of land for other purposes will rarely apply to the drainage of a landing field.

The various angles of the subject of airport drainage are discussed in Bulletin C-2, "Building Safety into Airports—with Efficient Drainage Construction," which has just been published by the Armco Culvert Mfrs. Association, Middletown, Ohio.

A concrete test pavement, about one-half mile long, made up of slabs 9 feet square and 7 inches thick, is being constructed at the Arlington Experiment Station of the Bureau of Public Roads. When tests are made, engineers of the bureau hope they will show that the prevailing mixtures used in making concrete for roads may be modified by the use of a larger proportion of coarse aggregate, such as gravel, slag or crushed stone, so as to effect a substantial saving in cost, and, at the same time. increase the strength and durability of the concrete.

The prevailing mixture for concrete pavements is 1 part cement to 2 parts of sand and 3½ parts of crushed stone or gravel. Engineers believe that, if it is possible to secure as good or better concrete when the proportion of broken stone or gravel is increased to 4½ parts, a saving of about $1,000 per mile in the cost of concrete roads will be effected.

The test road is being built just as an ordinary concrete road would be constructed, except that the mixture for each slab will contain a different kind, or amount, of coarse aggregate and a different quantity of water. Mixing, placing and finishing of the concrete will be done in accordance with modern paving practice. using standard equipment.

The Albert Russell Erskine Bureau of Traffic Research of Harvard University predicts that 50,000,000 automobiles will be on American roads within a few years. On January 1 of this year there were 24,493,124 cars in use in this country. Now, to express the proposition mathematically, if there is traffic congestion resulting from the operation of 24,493,124 cars on our present system of 3,000,000 miles of improved road, of which only 626,000 miles are surfaced (and by "surfaced" we mean any kind of surfacing material, such as gravel, sand-clay or crushed stone), how many more miles of roads will have to be built in the next few years to accommodate 50,000,000 cars?

PLANS FINISHED BUT PROJECT NOT YET ADVERTISED FOR BIDS

Proj. No.	Length	Type	Location
151-A	6.472 mi.	Gravel Surfacing	West of Tabernash
270-AR&BR	6.262 mi.	Oil Processed Surfacing	East of Monte Vista
229-R, 271-A, B, C&ER	7.435 mi.	Oil Processed Surfacing	East of Florence
287-AR5	1.383 mi.	Concrete Pavement	West of Ft. Morgan
122-R	10.122 mi.	Graded	East of Sedgwick
297-D	4.189 mi.	Gravel Surfacing	DeBeque Canon
298-C	3.780 mi.	Gravel Surfacing	East of Wolf Creek Pass
286-D	13.867 mi.	Oil Processed Surfacing	North of Eaton

PLANS BEING DRAFTED

Proj. No.	Est. Length	Type	Location
68-R2	1.9 mi.	Concrete Pavement	North of MonteVista
144-E	1.3 mi.	Concrete Pavement	North of Fort Collins
144-F	10.0 mi	Oil Processed Surfacing	Northwest of Fort Collins
92-R, 246-DR, 272-BR	18.4 mi.	Oil Processed Surfacing	East of Pueblo
58-R, 97-R, 168-AR, 216-AR, 273-R	24.5 mi.	Oil Processed Surfacing	East of Lamar
248-B	2.0 mi.	Gravel Surfacing	South of Buena Vista
251-D	0.3 mi.	Railroad Underpass	East of Boulder
262-J	4.0 mi.	Gravel Surfacing	East of La Veta Pass
271-F	0.5 mi.	R. R. Overhead Crossing	West of Portland
279-H	2.0 mi.	Graded	East of Kenosha Pass
282-I	5.0 mi.	Gravel Surfacing	South of Craig

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per Cent Complete	Proj. No.
2-R9	Starkville	1.35 mi.	Concrete Pavement	H. C. Lallier Const. & Eng. Co.	$ 59,180.60	32	2-R9
57-R2	North of Lamar	0.502 mi.	Bridge	J. Fred Roberts & Sons	140,102.96	63	57-R2
68-R1	North of Monte Vista	1.900 mi.	Gravel Surfaced	J. Finger & Son	24,124.00	83	68-R1
78-R	Near Minturn	0.709 mi.	Gravel Surfaced	J. Fred Roberts & Sons	96,342.90	26	78-R
138-B	North of Kremmling	3.133 mi.	Gravel Surfaced	F. L. Hoffman	76,363.35	66	138-B
144-D	Northwest of Ft. Collins	2.834 mi.	Gravel Surfaced	J. Fred Roberts & Sons	66,430.10	51	144-D
147-D	Betw. Cortez & Utah Line	2.903 mi.	Gravel Surfaced	Wood-Morgan-Burnett Co.	43,432.60	0	147-D
149-B Detour	Betw. Aurora and Watkins	12.5 mi.	Gravel Surfaced	W. F. Pigg & Son, Inc.	16,432.00	53	149-B Detour
150-A	West of Craig	8.227 mi.	Gravel Surfaced	Gardner Bros. & Glenn	93,477.35	19	150-A
175-A	Between Sterling and Ovid	41.979 mi.	Graded	Cole Bros.	193,055.75	50	175-A
243-C	West of Dyke	3.837 mi.	Gravel Surfaced	Grant Shields	47,404.40	0	243-C
253-D	West of Milner	2.547 mi.	Gravel Surfaced	Hamilton & Gleason Co.	147,192.00	53	253-D
258-H	West of Sapinero	4.921 mi.	Gravel Surfaced	Cole Brothers	123,700.60	72	258-H
263-A	Betw. Mortimer & Ft. Garland	3.404 mi.	Gravel Surfaced	Mtn. States Constr. Co.	47,509.20	87	263-A
265-C	Betw. Durango & Bayfield	2.500 mi.	Gravel Surfaced	Grant Shields	36,022.90	0	265-C
266-D	South of Bondad	4.111 mi.	Gravel Surfaced	Engler, Teyssier & Co.	96,075.30	89	266-D
267-C	Near Model	4.491 mi.	Gravel Surfaced	E. H. Honnen	45,801.00	16	267-C
270-D	Betw. Alamosa & &Monte Vista	3.978 mi.	Gravel Surfaced	Mountain States Constr. Co.	32,679.40	0	270-D
272-E	West of Rocky Ford	2.562 mi.	Concrete Paved	H. C. Lallier Const. & Eng. Co.	76,199.00	16	272-E
277-D1	Betw. Colo. Springs & Pueblo	15.566 mi.	Grading	M. E. Carlson	218,277.80	99	277-D1
277-D2	North of Pueblo	15.566 mi.	Concrete Pavement	Edw. Selander	333,257.80	0	277-D2
277-E1	South of Colorado Springs	10.2 mi.	Grading	J. L. Busselle	221,389.65	83	277-E1
277-E2	South of Colorado Springs	10.2 mi.	Concrete Pavement	J. Fred Roberts & Sons	238,207.30	0	277-E2
282-G	South of Craig	5.147 mi.	Gravel Surfaced	Chas. B. Owen	61,645.22	10	282-G
282-H	Between Rifle and Meeker	7.029 mi.	Gravel Surfaced	Winterburn & Lumsden	82,589.74	96	282-H
287-BR1	East of Greeley	7.413 mi.	Concrete Paved	New Mexico Constr. Co.	145,875.00	0	287-BR1
293-C	North of Ouray	3.661 mi.	Grading	C. V. Hollenbeck	62,997.80	100	293-C
295-D	North of Antonito	2.460 mi.	Oil Pro. Gravel Surf.	Levy Const. Co.	72,676.75	85	295-D
296-E	South of Greenhorn	7.210 mi.	Gravel Surfaced	Mountain States Constr. Co.	93,594.88	8	296-E
297-C	Southwest of De Beque	9.953 mi.	Gravel Surfaced	Hinman Bros. Const. Co.	312,453.50	52	297-C
298-B	North of Pagosa Springs	2.414 mi.	Surfacing	Engler & Teyssier	38,426.00	49	298-B
300-B	North of Silverton	2.828 mi.	Graded	Hamilton & Gleason Co.	35,647.80	43	300-B

"Built to Serve, Satisfy and Survive"

Few people realize, as they roll along our splendid Western Highways, what an important part Keystone Culverts play in keeping the highways dry and open. Buried underneath the roadbed, with perhaps only a short end protruding, Keystone Culverts are doing their duty quietly, but effectively. You can always tell a Keystone Culvert by the patented reenforcement at each end.

KEYSTONE
COPPER STEEL

COLORADO CULVERT & FLUME CO.

PUEBLO, COLORADO

It Takes Real Power to do Work Like This

When you hook on to a 42-inch giant elevating grader and pull it through lumpy clay such as pictured, you want a tractor that has plenty of power. In Monarchs you will find a reserve power that meets all emergencies — the kind of power that means profit on a road job where the going is tough.

Extra long tracks give Allis-Chalmers Monarchs extra traction. The steering clutches and truck-type steering wheel enable the operator to steer accurately and naturally even when looking behind to watch his load.

Designed by Allis-Chalmers, made of the finest materials, and built by expert workmen, Monarch Tractors are the finest that money can buy. Yet they offer the lowest cost drawbar horsepower in their class. That is an advantage not to be overlooked. Let us send you prices and complete information.

ALLIS-CHALMERS MANUFACTURING CO.

Specialists in Power Machinery Since 1846

Monarch Tractors Division

SPRINGFIELD, ILL.

"75"—"50"—"35"

WILSON MACHINERY COMPANY, 1936 Market St., Denver, Colo.

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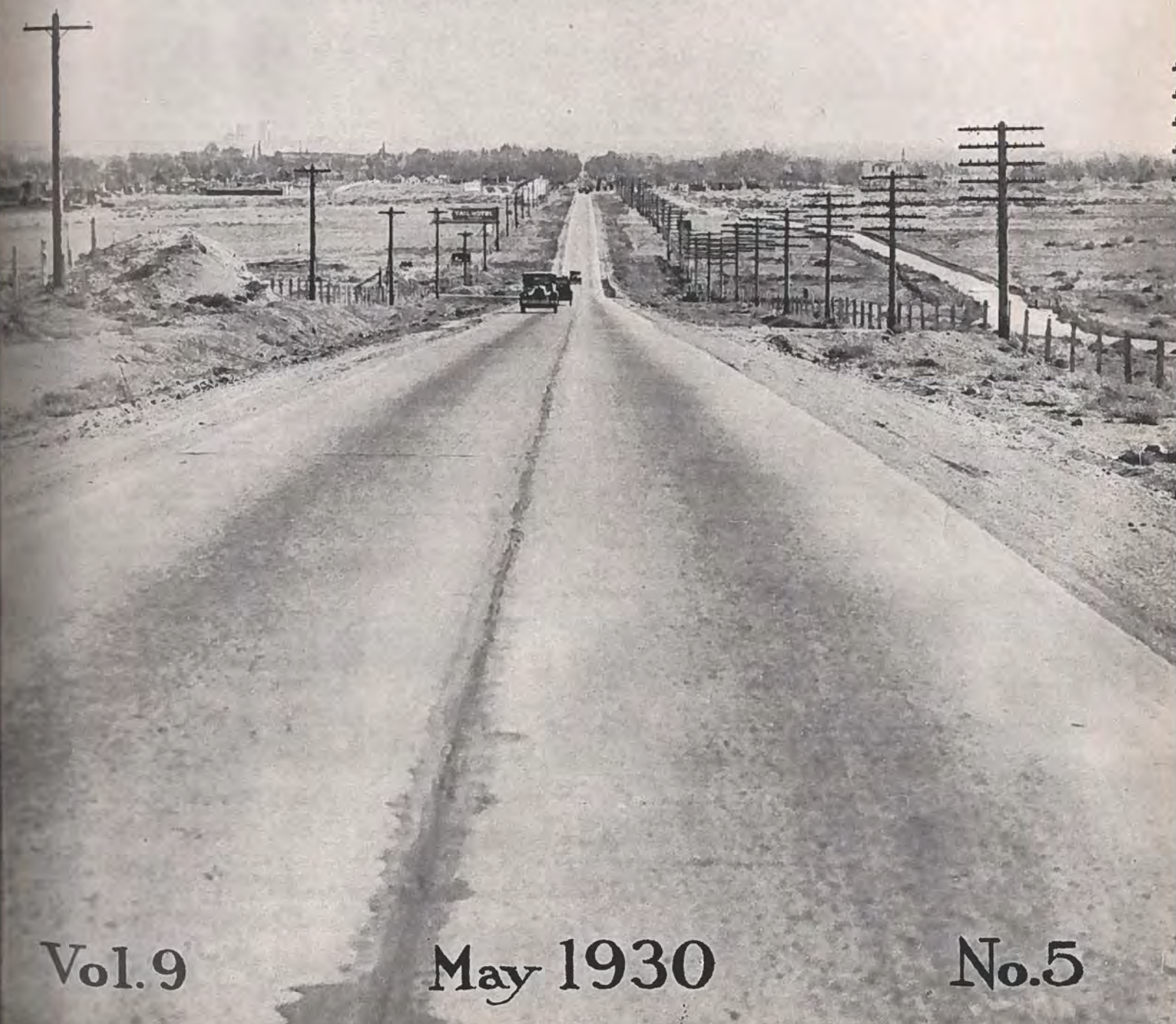
COLORADO HIGHWAYS



Vol. 9 May 1930 No. 5

420 tons a day

passing 1" ring specifications with 80% through crusher

THIS Cedar Rapids 936 One Piece Outfit is operated by Ernest McPherson, of Cloverdale, California. It crushes, screens, and loads in one operation, and is powered by a "60" Caterpillar Tractor. Operation is simple and requires no attention. One man brings the material up from the river bed with a Cedar Rapids alloy steel drag scraper bucket hauled by a Cedar Rapids Double Drum Hoist. Another man operates the One Piece Outfit. This plant has proved so profitable that the owners are converting it into a 936-336 Tandem Outfit to secure still larger capacities and in sizes as small as ¾" and under. No other equipment can do the work of Cedar Rapids road material handling equipment. No matter what your local specifications or conditions may be, write us for suggestions.

IOWA MANUFACTURING COMPANY

CEDAR RAPIDS, IOWA

Manufacturers of Crushers and Crushing Equipment exclusively

Cedar Rapids'

ROAD MATERIAL HANDLING EQUIPMENT

H. W. MOORE EQUIPMENT COMPANY

120 WEST 6TH AVENUE TABOR 1361 DENVER

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Articles on the subject of road building and highway development in Colorado are solicited. Manuscripts should be addressed to the Editor, with return postage. Photographs should accompany articles whenever possible.

10 CENTS A COPY. $1.00 A YEAR.

Our Cover Picture

THIS month we jump to the concrete pavement located north of the city of Pueblo for our cover picture. It shows a stretch of the pavement which was completed last fall, and which will connect with the new pavement now in course of construction. When completed the present project will give a ribbon of concrete between Pueblo and Colorado Springs, a distance of forty-three miles, on State Road No. 1.

Colorado Highways
"BETTER ROADS"
VOLUME IX. MAY, 1930 NUMBER 5

Start Those Public Works Now!

(An Editorial)

By Howard B. Rose, in *Western Highways Builder*

Our worthy contemporaries, the daily press, carried recently items of news from all over the country regarding unemployment riots. It is alleged in these reports that the riots were caused by certain agitators who don't work and never will work. However this may be, it is certain that the efforts of such instigators are made fruitful because of the discontent contingent upon a glutted labor supply.

There is also under discussion at the present time, by press, pulpit and police a matter which is caressingly referred to as the crime problem. Now, it occurs to us that there may be a close hook-up between the unemployment problem and the crime problem. Starve a man, cut off his source of supply for food and fuel, housing and clothes for his family, and he's pretty liable to do one of two things: he may rebel openly against the order of things which he deems responsible for his unemployment and lack of funds, or he may covertly go about securing those necessities which he believes to be his inherent right.

In the former case he becomes easy prey for the agitator, and in the latter case he simply wraps a nice soft gaspipe in a pair of old overalls and wraps it around the neck of some individual whom he considers may have the money he needs. In either case the man is a menace to the welfare of the community and the commonwealth. It naturally follows that public protection must be reinforced. Larger police reserves must be employed, possibly the militia may be called out; there follows broken heads, glutted courts, expensive proceedings, larger jails and prisons. And in the end higher taxes.

Most men are peaceable, and most men are honest. Give a man a fair break in the matter of wages so that he may keep himself and his family according to his established standards of living, and he will be a good and trustworthy citizen. Also, he will contribute to the general prosperity of the country by spending his money for such necessities and luxuries as his taste may indicate.

We are propounding no theory in this matter. Sociologists have determined this as truth. In view of the present situation, which bears some resemblance to a national crisis, why wouldn't it be a good plan to get this long-talked-of program of public improvements started? The speeding up of financing measures, the expediting of plans, the letting of contracts and the immediate prosecution of work will release funds into general circulation through wages which may be the means of averting a serious climax.

Millions of public improvements now may mean the saving of more millions later for crime prevention and public protection.

Editor's Note: Since the first of January, 1930, the Colorado Highway Department has let road contracts totalling over $2,000,000 and now has work under construction totalling over $4,500,000. With the early signing of the 1930 highway budget by Gov. W. H. Adams, and speeding up of plans by Maj. L. D. Blauvelt, state highway engineer, road construction in Colorado is farther advanced this year than ever before at this time. As a result, hundreds of men have been given work on our state roads, and reports indicate that unemployment has been considerably relieved.

State Lets Contracts for 120 Miles of New Roads Since January First

IN PURSUANCE of a suggestion made by the president of the United States that states, municipalities and other political subdivisions speed-up construction programs and by so doing reduce to the lowest possible level unemployment thruout the nation, the Colorado state highway department is working at top speed to put the 1930 budget under contract at the very earliest moment.

With less than half of the year 1930 gone and the construction season hardly opened, the department's records show that something like 60 per cent of the budget will be under contract by June 1, according to Maj. L. D. Blauvelt, state highway engineer.

Never in the history of the department have so many projects been under contract in Colorado at this time of the year as there are this year. Gov. William H. Adams materially assisted in speeding up the work this year by his early signing of the budget. Almost immediately following his signing of the budget several large projects were put under way, most notably the large paving program located between Pueblo and Colorado Springs, which it is expected will be completed by the first of September. Over one-half million dollars is being expended on this stretch of roadway.

By getting an early start, Major Blauvelt hopes that the entire highway construction program can be completed this year. In former years there always has been a substantial part held over. The holdover last year amounted to approximately three and one-half million dollars.

Records of the state highway department show that since January 1, contracts for federal aid and state projects amounting to $1,860,561, have been let. During the month of May the department is advertising for bids for additional projects involving an additional $681,900. These will be opened and the contracts awarded the latter part of the month, so that by June 1, contracts amounting to the unprecedented total of $2,542,261 will have been let under the 1930 budget.

In view of the fact that the greater part of the money expended in highway construction is spent for labor, it will be seen that the highway department's activities will go a long way in giving employment to many men. As a matter of fact already hundreds of men, who otherwise would have been idle are now at work on the many projects that are now under construction. And, in order that the work may continue, the department's engineers and draftsmen are working hard to complete plans and specifications for additional projects.

Many of these plans are reaching completion and it is expected that during June and July additional projects calling for an expenditure of approximately another million dollars will get under way.

Present activities of the department indicate that when the end of the 1930 construction season comes and weather puts a stop to outdoor work, the department will have a greater percentage of the year's budget completed or under construction than has ever been completed in any one year since the present department was organized under the 1921 highway law.

Not only is the department contributing toward maintaining normal employment conditions in the state by letting contracts for new work, but engineers are pushing work on those projects which were started in 1929. On January 1, there were still awaiting completion projects which involved the expenditure of some two and one-half million dollars. If this sum is added to the projects let under the 1930 budget, it will be seen that the department's activities so far this year reach a total of about $5,000,000 for construction.

Besides the sums now being expended for new construction, the maintenance division of the department is spending large sums in putting main roads of the state in smooth condition following the spring thaw. The maintenance forces also have started several gravel surfacing projects which involve the expenditure of several thousand dollars in various parts of the state.

In addition to the sums now being expended by the state highway department, several large projects are now being constructed by the U. S. Forest Service and the National Park Service, through the U. S. Bureau of Public Roads in various parts of the state.

A project involving the expenditure of $400,000 is now in course of construction in the Rocky Mountain National Park. This sum is being spent in the construction of a new road to the summit of Fall River Pass. Plans are now being drafted for an extension of this work to Grand Lake, involving the expenditure of $600,000 additional. Engineers plan to get this new work under way early in the summer.

Appropriations for Forest Highways in the state for the year 1930 total approximately another half million dollars. Most of these projects are located in the higher altitudes and work necessarily will not start on these for another thirty or forty days.

Work also is starting in various cities of the state on the improvement of connecting streets with state highways, to be paid for from the 3 per cent gas fund which was allotted to cities over 2,500 population. The fund set aside in the 1930 budget for this work totals $250,000.

Since January 1 contracts have been let for the construction of 119 miles of various types of roadway, and bids are being asked for in June involving the construction of 62 miles more. A majority of these projects are located on some of the most important roads in the state.

Following is a list of the projects for which contracts have been awarded:

State project No. 728-B, construction of guard fence east of Glenwood Springs, contract price, $16,001.60.

State project No. 735, placing new deck on bridge north of Granada, contract price, $10,742.40.

F. A. P. 270-d, 3.978 miles of gravel surfacing be-

A section of the famous Santa Fe Trail, located east of Avondale, is shown in the above picture... Plans call for the further improvement of this stretch of graveled roadway in the near future.

tween Alamosa and Monte Vista, contract price, $32,679.40.

F. A. P. 277-D, 15.566 miles of standard concrete pavement north of Pueblo, contract price, $333,257.80.

F. A. P. 277-E, 10.200 miles of standard concrete pavement south of Colorado Springs, contract price, $238,207.30.

F. A. P. 147-D, 2.903 miles of gravel surfacing south of Cortez, contract price, $43,432.60.

F. A. P. 149-B, 12.5 miles of detour, east of Aurora, contract price, $16,432.60, completed.

F. A. P. 243-C, 3.837 miles grading and gravel surfacing, west of Dyke, contract price, $47,404.40.

F. A. P. 265-C, 2.500 miles of grading and gravel surfacing, between Durango and Bayfield, contract price, $36,022.90.

F. A. P. 296-E, 7.210 miles of gravel surfacing south of Greenhorn, contract price, $93,594.88.

F. A. P. 267-C, 4.491 miles of gravel surfacing northeast of Trinidad, contract price, $45,801.

F. A. P. 287, 7.565 miles of standard concrete pavement located east of Greeley, contract price, $145,875.

F. A. P. 272-E, 2.562 miles of standard concrete pavement, west of Rocky Ford, contract price, $76,199.

F. A. P. 122-R, 10.122 miles of grading, between Ovid and Julesburg, contract price, $49,976.65.

F. A. P. 298-C, 3.780 miles of grading and gravel surfacing, Wolf Creek pass, contract price, $116,864.50.

F. A. P. 138-C, 4.184 miles of grading and gravel surfacing, south from Muddy Pass, contract price, $103,270.20.

State project 729, asphaltic oil processing on state road 82, in Garfield county, $2,825.

State project 711-B, asphaltic oil processing between Englewood and Littleton, $5,532.80.

F. A. P. 262-G, 5.014 miles gravel surfacing on La Veta pass, contract price, $11,932.50.

F. A. P. 263-B, 3.133 miles of gravel surfacing between Mortimer and Fort Garland, contract price, $29,532.40.

F. A. P. 300-C, 1.937 miles grading north of Silverton, contract price, $15,287.80.

State project 509-D, bridge floor on Maroon creek north of Aspen, contract price, $10,403.

State project 537, timber bridge over Big Sandy creek, east of Simla, contract price, $8,732.10.

State project 763, 0.758 miles concrete, south from Colorado Springs, contract price, $16,252.70.

F. A. P. 149-B, 7.911 miles of oil process surfacing east of Aurora, contract price $134,611.10.

F. A. P. 165-R, 9.325 miles oil process surfacing east from Canon City, contract price, $50,548.30.

The danger of picking out the main street of a town and arbitrarily making it a through street, as pointed out in recent studies made by the National Safety Council, has recently been emphasized in several Illinois towns.

Petitions have been received by the state highway commission, at Springfield, from representatives of small towns and villages asking that state roads, around which many of them have been built, be re-routed so that the constant stream of traffic may be diverted from their centers.

According to the representatives, it was once thought advantageous to bring as much traffic into the main street as possible, for transient trade meant increased business.

The flow of cars, however, has become so great and the speed at which they travel so rapid that few stop at all. The increased volume has reached a stage where it endangers the lives of the inhabitants.

Even large cities are now finding that the most successful system shunts non-stop traffic around the business district to avoid congestion in the downtown centers.

Financing State Highways

By Warren F. Bleecker

ENTHUSIASTS for more miles per gallon will welcome the possibility of Colorado's having longer stretches of smoother roads. More miles per gallon, more miles per tire, more miles per day, in fact, more miles per dollar if the gasoline tax is put to work according to the proposed road program.

The present system of building with small surplus funds spots the state with inadequate and disconnected links of a highway system. Such amounts as are available, even though placed to the best advantage, furnish little more than maintenance in the way of road building.

Once a highway system is constructed, it can be maintained by the income from the gasoline tax, inasmuch as conservative estimates of the yearly increase in gasoline consumption taken from data in the annual report of the state inspector of oil, show for 1943 an income of $9,000,000 from our 4-cent gasoline tax.

The present income from the gas tax amounts to less than $6,000,000 a year, of which the state department receives only 70 per cent, or $4,200,000. After maintenance costs are taken out, money left for construction of new roads is extremely limited and with sectional demands for local road improvement not much is accomplished toward a continuous and efficient arterial system.

The program for financing road building which is being advocated and is finding favor generally has been carefully worked out so as to get the most out of the road dollar. In order that we may have good roads and have them now, the plan proposes the issuance of debentures amounting to $5,000,000 a year for a period of five years. This $25,000,000, together with income from the gasoline tax, plus federal aid, will provide about $65,000,000 for the five-year period for building, allowing extensive construction work as well as maintenance. Widening acquaintance with the plan is bringing to it support of citizens who have the state's economic welfare at heart. The reason is that the plan costs the taxpayer nothing beyond what he is already paying; it pays for itself out of the gasoline tax. Interest on the bonds and their total redemption can be effected in thirteen years by appropriating only one-half the gasoline tax.

The proposed road bonds call for a limited and definite amount, put no tax on property and have a definite plan for redemption so that the money will be collected and used for redemption and for no other purpose.

Four changes in the present administration of road funds have been devised to further increase the value of the road dollar. They are: (1) The entire gasoline tax shall be allocated to the Highway Department. It now gets, as you know, 70 per cent; (2) the entire vehicle tax shall be allocated to the counties after 1932. This tax is now divided between the counties and the state, 50-50; (3) the State Highway Department shall maintain all state highways; (4) all refunds and exemptions of every nature shall be abolished.

Completion of trunk lines would be a first-aid measure to a state whose tourist trade is a promise needing only encouragement and promotion to develop into a leading business asset; but so long as funds are diverted from the central highway department and wasted by small and scattered projects we will never have a unified net of arterial highways.

By the proposed plan, in which the entire gasoline tax will be applied to road building and maintenance through the State Highway Department, greater projects may be undertaken and larger contracts let, thereby reducing building cost per mile. Counties will be relieved of the responsibility and expense of upkeep for state highways and can devote their funds to purely county projects.

Under the present road financing arrangement,

A fine stretch of Federal Aid highway located east of Florence, in Fremont County, constructed by the State Highway Department in co-operation with the Federal government. Plans are now being made to oil surface this project. Photo by Leo Driscoll.

One of the State Highway Department's oil processing crews at work on four miles of oil processed roadway located between Englewood and Littleton. Arapahoe County courthouse in background. Photo by M. W. Bennett.

counties receive 27 per cent of the gasoline tax and one-half the vehicle tax. In the new plan all the gas tax will go to the state department and all the vehicle tax to the counties. Figures for Boulder county are a fair example of the adjustment possible in a well-populated district. In 1928 Boulder county's share of the gasoline tax was $18,000 and of the vehicle tax $33,000, a total of $51,000. In the proposed plan, Boulder county will receive all of the vehicle tax, or $66,000, a gain of $15,000 over the present allotment.

The less thickly populated counties will not benefit by an increase in funds, but they will benefit by a decrease in expense, since they will no longer bear maintenance costs of state roads.

Those who have been following closely the lawsuits of the state inspector of oil for collection of refunds will be interested to learn that the proposed plan would abolish all refunds and exemptions. As long as refunds were limited to farmers they accomplished the intended end, i. e., a direct aid to the agricultural industry. It was conceded for the farmers' benefit that gasoline used in tractors and not in travelling roads should not be taxed to support road building. The plan that was designed to help the farmer is destroying the highway program, for a slowly growing comprehension that others than farmers might claim exemption on the same grounds has gradually increased the amount refunded from 1.4 per cent of collections in 1919 to 8.3 per cent in 1929. A startling rise in this percentage is anticipated for 1930 by Mr. Duce, inspector of oil, who predicts the refunds will rise to 25 per cent of the collections this year. This means we will get a 3-cent benefit from a 4-cent tax.

Counties and cities are refusing to pay the tax on gasoline used in machines engaged in highway maintenance, repair, and construction work, claiming that gasoline should be taxed only when used to drive vehicles over the highway when these vehicles are wearing out the roads. Some interests claim that exemptions intended to benefit only farmers is class legislation and would, therefore, be unconstitutional.

The recent suit of the people of the state against Weld county has an important bearing on the question of exemptions. Weld county was sued in order that the state might collect about $25,000 in unpaid gasoline taxes, which the county held that it was not liable to pay because the gasoline was consumed by machines engaged in highway repair and maintenance. The decision of the court in favor of Weld county means the law is interpreted to grant exemption to the gasoline tax when used in these machines. If, as it has been officially estimated, 95 per cent of the gasoline bought by the county is used for this type of equipment, the influence of this decision on exemption claims is easily predicted.

It would be far better for the farmer if every penny of gasoline exemptions were removed. Hundreds of other lines of industry have applied for exemption, until the thing has become a curse rather than a benefit to the farmer. Although in the proposed plan the farmer would necessarily pay where he is now exempt from the gasoline tax he would benefit immeasurably because other industries and interests now receiving exemption on the plea that they do not use the roads would be forced to pay the tax. Exemptions have depleted the available funds for road building so that the farmer is not getting the road he is paying for.

It is quite obvious that a plan of financing to be sound must contain guarantees by means of which promises can be fulfilled. With our history of increase in gasoline consumption, with the gasoline money going to the highways, with the exemptions removed, with the issuance of serial bonds and a relatively short period in which repayment is to be made, the taxpayer can be reasonably certain that his gasoline dollar which is now being spent will be sufficient to carry out the program as outlined. From the standpoint of our present plan of operations, the citizens of Colorado can have roads for which they are now paying and not getting and at the end of the period will have ample income to continue, if they choose, a pay-as-you-go plan on the basis of having a highway system equal to or better than that of any other of the mountain states.

Developments in Highway Research

By R. L. Downing
Assistant Professor of Civil Engineering
University of Colorado, Boulder, Colo.

WITH the advent into general use of the motor vehicle about 1914, a field of construction was started that already has eclipsed all previous engineering enterprises. Begun without adequate personnel, equipment, standards or funds, it has risen to a high plane of engineering service and bids fair to become the example for all large engineering work. At present, practically every adult person in the United States is vitally interested in highway improvement while formerly only a small proportion, representing the road users, were interested in this development.

Preliminary figures for 1929 indicate a total expenditure for rural roads of more than one billion six hundred million dollars. This sum is increasing at the rate of about seventy million dollars per year. There are more than three million miles of rural roads in the United States and of this amount less than seven hundred thousand miles are surfaced.

These data should indicate to anyone not familiar with highway enterprise the extent of the problem confronting highway engineers and the real need for further research. If we are to secure maximum transportation at minimum cost, much remains to be done to improve the design and construction of adequate highways.

The report on coordination and research presented at the last meeting of the Highway Research Board brings together in concise form the most important problems that are in need of solution. An attempt is made to designate the priority of these demands. The program outlines the need of highway research under the following divisions:

1. Highway administration.
2. Highway finance.
3. Highway transportation costs.
4. Highway design.
5. Materials and construction.
6. Maintenance.
7. Use of roads.

A summary of the investigation completed to date in each of the above divisions is first given, followed by what is considered necessary for immediate solution through further research. Certainly the program covers the highway field adequately and with a definite schedule of necessary research outlined, each contributing agency may more fully co-operate to improve working standards. The Highway Research Board definitely pledges itself not only to co-operate in carrying out this problem of research, but to compile and have available for dissemination all available knowledge of the various parts of this research. This will serve as a stimulus to further work on the part of the individual investigator.

The number of permanent committees of the board has been reduced to six to comply more nearly with the outlined research: Administration and finance, highway transportation, design, materials and construction, maintenance and traffic and safety.

Highway Financing

Financing appears to be the most important problem in the highway field at present and its early solution is imperative if we are to keep pace with transportation demands. The particular methods of highway financing employed in each state is the result of following the line of least resistance rather than of adhering to well-considered plans. The fact that most of these methods have considerable merit can be attributed to the following factors: First, the methods of securing funds have not yet reached the point where a particular group is subjected to undue hardship; and, second, the demand for improved highways is coming from so large a proportion of the people that, for the present, each group can forget its personal grievances.

According to a recent survey, the sources of revenue for highways in 1929 was as follows:

	Per cent
Motor vehicle fees	30½
Gasoline tax	27½
Borrowed funds	14½
Property tax	16½
Federal aid	9½
Miscellaneous	1½

The so-called motor-vehicle fee can be justified: First, as a charge for service rendered in the registration of the vehicle and the cost of the license plates; and secondly, as a special tax on motor vehicles which corresponds to a readiness-to-serve charge. The gasoline tax represents a direct-use tax based upon the use the motor vehicle makes of the highways. This tax is extremely fair providing all of it is devoted to the improvement of highways.

Bonds or borrowed funds are justified in order to complete the primary and secondary roads at an earlier date, thereby producing income by means of decreased transportation costs, provided that the credit of the state is not impaired and provision is made for retiring the bonds from users' taxes.

Property tax may be justified by virtue of a local benefit and an increase in valuation of property due to improved roads, by increased transportation facilities that permit larger returns from the land, and as a readiness-to-serve charge.

Federal aid is justified for the construction of national roads that are of general benefit to the nation and which may be of use in time of war. It is rather interesting to note that the total amount of federal-aid appropriations to September 30, 1929, amounted to $840,000,000 or about one-half of the total expended for rural highways in 1929.

It would appear from a resume of current papers on highway finance that the following conclusions might be drawn:

1. The user tax is the most fair tax which has been devised for highway purposes and as long as this tax is used in the improvement of highways, no injustice will be done providing the rate does not become too

high. A tax of 5 cents per gallon of gasoline does not appear to be too high a charge at the present time.

2. The user tax should be applied to state highway systems until these are completed. These funds may then be spent on the improvement of local roads in co-operation with the local authority.

3. Federal aid should always be used in cooperation with the state on roads of national importance. The amount of federal aid might well be increased until such time as the major highway system is completed.

4. Motor-vehicle taxes should go to the highway authority in the locality in which the tax was collected and be used for the improvement of local highways. The valuation tax on motor vehicles should be abolished.

5. A small property tax for use on local roads is justified because of the increased valuation of property resulting from the improvement of the road and as a readiness-to-serve charge based upon maintaining a highway for a potential user.

6. Bonds constitute a legitimate and proper means of financing improvements provided their life is well within the useful life of the improvement.

7. Bus and truck fees should not be so large that the public will be penalized by reason of high transportation rates.

8. State aid should be given to the local authorities to the limit of state finances as soon as the state system is completed.

9. In order to decrease transportation costs highways should be improved as soon as it is economically justifiable. To do this will require use of the credit of the state.

Soils

Some very extensive soil investigations have been carried on in Russia from 1923 to the present time. A large portion of these data might well be studied in connection with the results of subgrade studies in the United States, although the investigations mentioned were applied to earth roads. It was shown that either a high barometer or cold weather or both would cause an increase in the water content of a clay soil. Considerable attention was given to the classification of soils from the viewpoint of highway use with the indication that further research along this line is necessary.

Permanently frozen soils are given considerable attention and the effect of these soils upon the different classes of bridge abutments are shown. For example, wooden piles which are poor conductors of heat may be used to support bridge abutments, while masonry or concrete, which are better conductors of heat, will thaw the frozen soil and thereby disturb the stability of the structure.

Another series of tests shows that the soil underlying the highway remains frozen much longer than the soil of the adjacent fields. Special methods were devised for studying soil characteristics which include an opaloscope for studying the size and shape of soil particles and the reflectometer for studying the water content of the soil optically without disturbing the arrangement of the soil particles. It was noted that rolling earth roads not only compacted the soil particles vertically but also displaced the material laterally and frequently changed some of the characteristics of the soil.

Aerial Mapping

Aerial mapping, while in itself not essentially research, was presented to show new methods that have been evolved which may be employed in the planning of a highway system. Highway engineers in this country are cited as being backward in becoming acquainted with the possibilities of aerial mapping. The relocation of highways was shown to have been accomplished more economically by this method of mapping.

Sapinero arch bridge over the Lake Fork of the Gunnison River, one of the highest bridges in the West, constructed by the State Highway Department in co-operation with the U. S. Bureau of Roads. A big thrill to motorists.

Traffic Studies

The report of the committee on highway traffic analysis is interesting and discloses that the trend of traffic is approaching the point where seasons or storms play little part in the change of amount of traffic. Studies conducted in the vicinity of Baltimore from 1917 to date indicate a decided approach of seasonable traffic to the yearly average. The percentage of change of seasonable traffic has varied from 160 in 1917 to 76 in 1929. Similar studies made during good and bad weather indicate that the time is near when the weather will have small influence in changing the total amount of traffic.

The conclusions of this committee are interesting and are as follows: "Highway departments are amply justified in employing every practical means for the improvement of road surfaces during bad weather.

"The importance of parking as an adjunct to shopping is greatly exaggerated. It is not the responsibility of the public to provide either curb parking or vehicle storage space.

"Advance signals should be used with train actuated crossing signals, where 500 feet clear view is not possible.

"Traffic control signals should not be used to control traffic at intermediate intersections.

"Left turns at intersections should be made on the inside and with the green light."

Climatology

The subject of climatology as applied to highway design and construction is perhaps the most interesting compilation presented to the Highway Research Board. The different elements comprising the climate throughout the United States were plotted on the national map in the form of isolines. From these graphs, the maxi-

mum and minimum conditions of the various phases of the climate can be told at a glance. It is suggested that this study be used in the design and construction of highways. The data shown by these curves include temperature, rainfall, snow, days of sunshine, fog, run-off, evaporation and frost. It is recommended that information be secured on the depth of frost penetration and be added to these data. This information may be of value in a number of ways. The maximum and minimum temperature may influence the selection of type of wearing surface for a particular locality. The amount of snowfall will have to be cared for in winter maintenance. The prevalence of fog affects the design of the roadway width or the alignment. Run-off is a primary factor in the design of waterway for drainage structures. Evaporation, sunshine and wind in connection with precipitation influence the amount of moisture in the roadway surface and shoulders and affects the maintenance of the road.

All this has an influence on construction. From the information given, a contractor may be able to make a more intelligent deduction from the total working time as an allowance for delays caused by the climate. The time of early and late frost indicates to the contractor when he may have to consider protection for concrete work. It is suggested that the degree-hour values of the cold spells be used to determine the total extent of frost damage so that some rational basis may be used in this study.

Corrugations in Gravel Surfacing

Study of the formation of washboards in gravel highways was continued from last year. The current observations seem definitely to limit the formation of washboards to cars and trucks equipped with high-pressure tires. When an adequate shock absorber was used with the high-pressure tires, it was not possible to produce severe corrugations with any reasonable amount of travel. In no case were washboards formed with balloon tires, although the number of trips was increased to 570 compared with only 36 necessary to produce washboards with high-pressure tires at a speed of 40 miles per hour.

It was very conclusively proven that washboards form much sooner with high speeds than low speeds. Speeds varied in the tests from 25 to 40 miles per hour. In one set of observation with high-pressure tires 100 trips were necessary at 25 miles per hour to form washboards, while only 36 trips were necessary at 40 miles per hour to produce equally good corrugations.

These tests demonstrated that the front and rear axles of automobiles do not synchronize in their period of vibration, the frequency of vibration being much higher on the front axle. At a road speed of 40 miles per hour it was observed that the front axle of the tested car vibrated four times as fast as the rear axle. This ratio decreases quite rapidly as the speed decreases. Observations were made on both circular tracks and on a tangent roadway. Further tests will be made this year on tangent roadway.

Control of Water for Concrete

Further studies of water control at concrete mixers were made. Extended tests were made on a number of different mixers, both in the laboratory and under construction conditions. The results of these tests follow:

1. It was found that every water measuring device tested showed some variation from the true amount and each mixer measuring device required calibration previous to the tests.
2. Interconnected valves, designed to prevent both intake and discharge valves being open at the same time, made it possible in every case to supply any additional amount of water desired by the mixer operator. The variation depends upon the speed of operating the valve.
3. Cylindrical tanks mounted horizontally were materially affected by placing the mixer either on a grade or a cross slope. The variation was much less when the measuring cylinder was mounted vertically.
4. The amount of water delivered to the measuring tank varied considerably because of change of pressure in the pipe line and because of air seal due to inadequate air valves. All air valves tested showed some discrepancy.

A number of recommendations were made by the committee with a view to overcoming these faults. The variation caused by pipe line pressure may be eliminated by interposing a supplementary tank, open to the atmosphere, from which the water is fed to the measuring tank. The entrapped air in the measuring tank may be eliminated by substituting an open pipe for the air valve with a height equal to the receiving tank. This method was successfully used on 60 mixers on Iowa paving work in 1929. The flow of water into the receiving tank is controlled by a float valve. The flow from the receiving tank to the measuring tank and from the measuring tank to the mixer drum is controlled by a three-way connected gate valve.

Credit was given by the committee to a number of mixer manufacturers who have already taken advantage of these tests and are improving their product in accordance with the recommendations.

Control of Concrete Mixtures

The value of concrete mixture control was brought out by comprehensive studies made during 1928 on Iowa concrete road construction. This compilation was compared with results obtained in 1920-1923 and indicated major advances in the design and control of concrete.

The 1928 data were secured from 69 projects covering 634 miles of pavement. A total of 3,754 transverse and 3,303 compression test specimens were made and tested. The average compressive strength obtained was 4,538 pounds per square inch. The maximum and minimum ranges from the average of each job were 17.2 per cent and 4.7 per cent, respectively. The values from all projects for maximum and minimum values were 5,404 and 3,600 pounds per square inch, respectively. Gravel was used for coarse aggregate on 39 projects, crushed limestone was used on 29 projects and both materials were used on one project. All materials were measured by weight and it is interesting to note that the maximum variation from the estimated quantity of content was only 2.7 per cent.

Flexural strength of the concrete as measured by beam tests averaged 600 pounds per square inch with maximum and minimum values corresponding to 725 and 450 pounds per square inch, respectively.

The following general conclusions were drawn by the committee:

(Continued on page 28)

Denver Reduces Maintenance Costs With "Mat" Oil Method

By F. J. Altvater
Highway Commissioner, City and County of Denver

A FEW years ago the Denver newspapers—morning and afternoon—severely criticized the city administration for the use of oil on our streets. This criticism extended over a period of two summers. And, besides the newspaper criticism, we received scores of complaints from citizens residing along the streets receiving the oil treatment.

But that's all changed now. Almost daily we now receive requests from citizens that their streets be oiled. A change of "oil diet" brought about the change in sentiment.

The city of Denver started oiling its streets in 1917. The idea was to alleviate the dust evil, which is one of our greatest causes of complaint, occasioned by our high, dry climate. At that time we only attempted to oil those streets which we called "boulevard streets," carrying the greatest traffic.

The oil purchased was a kind which caused us considerable trouble and proved most objectionable to the people residing on the streets where this oil was placed. If we put much sand on it the oil soon made a fine brown dust, which, while not being as objectionable to the motorists as other dust, still this fine oil dust was very objectionable to residents, as it sifted into the houses, onto the carpets and furniture. As a result, housewives became particularly bitter in their complaint.

In 1928 we changed the oil. And while the oiling we did previous to 1928 caused a general dissatisfaction, it did assist in keeping the dust from becoming too much of a nuisance. In 1928 we made an examination of the oil that was being used on the streets and roadways in California. We discovered this oil contained a high asphalt content and when properly "laid" made a splendid dust palliative. Laying of dust was our principal object at that time. We found that the oil we had been using was of such a greasy character that it would not "set" properly.

We immediately demanded that all oil furnished for dust-laying should meet the California specifications. And since that time we have oiled approximately 85 miles of our streets and we find that the new oiling is very satisfactory not only to our department, but to the people in general.

In fact, it has become so satisfactory that we are having more requests for oiling than we can possibly take care of under our present budget.

All of our oiling activities have been paid for out of the sprinkling division funds, as it was assumed that the benefit accrued from oiling would be of a greater value and saving to the sprinkling division than to any other. However, we have now found that the highway department is possibly securing as great a benefit as the sprinkling division. Our oiled streets today compare favorably with a good share of the paved streets, while the cost of the oiled streets is really negligible in comparison to asphalt.

We find that these oiled streets save a considerable sum in the maintenance costs and also in the wearing cost of gravel. I will venture to say that our cost of

A scene on York Street in Denver which was treated with the "mat" method of oil processing by highway forces of the City and County of Denver. This street carries an average of 4,000 vehicles per day.

oiling streets is more than saved each year in reduced maintenance costs and sprinkling. The oiled streets also give ten times the value of a dirt street in being in proper repair 95 per cent of the time.

A traffic count shows that some of these streets carry as high as 5,000 cars per day and some of them seem to improve with increased traffic.

After a storm our gravel surfaced streets demand immediate attention and if it were not that our main thoroughfares were oiled it would be necessary to have at least twice the equipment that we have in order to get on our streets promptly after a storm and take out the "pot holes."

It will be readily seen from this that not only in the cost of daily maintenance we are saving considerable money, but we are also saving from the fact that it is not necessary to purchase a great amount of equipment which would be idle probably two-thirds of the time awaiting calls to be placed on the streets.

In every way the new oil is giving us greater value, better satisfaction and saving a great deal of money. This saving of money allows us to build and install culverts and make other improvements which otherwise would necessarily be spent for temporary maintenance.

Our cost for oiling streets during 1929 was practically 7⅛ cents per square yard, which we feel is a fairly reasonable price. We also have in connection with our general oiling program a small crew of men who daily make it their business to patch holes in the oiled streets. During 1929 the cost of the actual patching was 9¼ cents per square yard, but as this patching was but a fraction of one per cent of the entire total, the real cost of this patching maintenance for our entire oil-street system was but .00087 cent per square yard.

Nearly all of this oiling is what is known as the "mat method," which is simply the spraying of oil upon a surfaced street and covering same with gravel. As travel goes over this new oil it works the gravel into the oil until same has received its sufficient amount of gravel and the balance of the gravel will be pushed to one side by the traffic.

During 1929 we oiled Santa Fe Drive for a distance of 1⅛ miles with what is known as the "mixed-in-place" method, which cost us at the rate of 17 cents per square yard. This has proved a very successful method up to the present time. The work was finished late in October, and if the work stands up as well during the coming summer months as it has throughout the winter I am sure that this method will be used more extensively on Denver streets in the future.

The oils that we have used the past two years have been Midwest of Wyoming and Gilmore of California.

There is no question in my mind that oiled roads have a definite place in our state and county road systems and will provide smooth, dustless surfaces in sections that never can afford pavement. There are hundreds of miles of roads in Colorado that can be oiled at comparatively small expense, and will save the state and counties thousands of dollars yearly in maintenance cost.

And while the low cost oiled roads give excellent service with moderate traffic they should not be confused with pavements. Naturally, the oiling operations must be varied and adapted to each individual soil condition.

It has been our experience that the making of a satisfactory oiled road surface by the "mat method" is a matter of gradual development. Unless exceptionally favorable conditions prevail a satisfactory surface cannot be obtained until the second year, or until two or three applications of oil have been made. Each application of oil is made at the rate of approximately three-fourths of a gallon per square yard of surface.

Upper picture shows "mat" method on street connecting with the Brighton paved state highway. Lower photo shows "mixed-in-place" oil processing on Santa Fe Drive.

In order to take advantage of weather conditions the oiling should be done during the months of June, July, August and September. It has been found that oiling operations during the winter months do not prove very satisfactory.

Complete details of the "mat method" of oil surfacing may be obtained from any of the large oil companies handling road oil.

The following letter, taken from the Voice of the People column of the *Detroit Free Press,* confirms the argument of the State Highway Department that commercial advertising should not be combined with official highway signs:

"To the Editor: The policeman did not give her a ticket. He stopped a lady driver when she did not stop at a through street and said, 'Lady, don't you know that you went right through that stop street?' The lady stated that she did not know it was a stop street. Then the officer asked if she did not see the stop sign, and the lady said, 'Do you mean that sign over there with "Stop AAA" on it? I thought that was advertising some AAA Products, such as I see on the country roads, "Stop—Hot Dogs," and "Stop—Get Gas."' Well, she did not get a ticket. The advertising space on these stop signs is worth $100,000 to the city if they would sell the space.

THE KOP."

NEWS OF THE MONTH

Concrete highways in Colorado will cost $3,000 a mile less in 1930 than they cost in 1929 and during the ten preceding years. Analysis of bids on the twenty-seven miles of paving between Colorado Springs and Pueblo disclosed that the bids for the paving on these two projects are the lowest received by the state highway department since 1918. In round figures the saving will amount to 60 cents a running foot or to over $80,000 on the two projects.

Over 50,000 yards of dirt was moved on the new oil project located east of Aurora on the Denver-Limon road during the month of April and the first week in May. C. B. Owen is the contractor on this project. From the present rate of progress it is expected the eight miles of oil surfacing will be completed by the first of August. Plans are now being drafted for an extension of the project for another seven or eight miles. Contracts for this additional work probably will be let in another month. This project is the first of approximately $300,000 worth of improvements to be placed on the route between Denver and Limon this summer.

H. E. Fresh, forest supervisor, announced the first of May that a new gravel surfaced road will be completed to Blue Lakes, thirty-four miles southwest of Walsenburg early in the summer. Forest service crews will do the work.

Work of opening the Million Dollar Highway located between Ouray and Silverton has been started by state maintenance crews under the supervision of D. Kirk Shaw, divisional maintenance superintendent. It is expected the road will be in first class condition for motorists June first.

Work has been started on a new road between Akron and Brush. This new road will be about twenty-one miles in length, shortening the present distance seven miles between the two towns. A. B. Collins, division engineer of the state highway department, is supervising the work.

Collier-Latimer, Inc., Denver contractors, are working on a mile of concrete pavement south from the city limits of Colorado Springs on state road No. 1. Their bid for the work was $17,877. They expect to finish the work June first.

Phelps Brothers of Fowler were low bidders on a project involving the reconstruction of an old railroad steel bridge over Maroon Creek near Aspen on state road No. 82. This is a state project and Phelps' bid was $11,443 for the work.

With a bid of $32,485 Pople Brothers Construction Co. of Trinidad were successful bidders on 3.133 miles of gravel surfacing and grading on state road No. 10 located between Mortimer and Fort Garland in Costilla County. The bids were opened April 22. One hundred and twenty working days are required for the work. Twenty-five items were included in the project, the largest being 10,600 tons of gravel surfacing, on which Pople bid 85c per ton.

C. A. Sweitzer of Arvada was the successful bidder on 4.184 miles of grading and gravel surfacing, located south from Muddy Pass on state road No. 2. His bid was $103,270. The largest item in the contract is 60,400 yards of unclassified excavation, on which Sweitzer bid 64c per yard, or $38,565 for the total. The next largest item was 13,700 tons of gravel surfacing, on which he bid $1.20 per ton.

On April 22, Pople Bros. Construction Co. were low bidders on five miles of gravel surfacing located west of La Veta Pass on state road No. 10 in Costilla County. Their bid was $11,-932.

During the first four months of 1930 Boulder County expended $62,-000 on county roads, according to E. B. Hill, chairman of the board. Extensive improvements on the road through Boulder Canon were included in the expenditures.

A special committee from the chambers of commerce of Fort Collins, Wellington and Cheyenne has been appointed to work out, if possible, some co-operative plan for getting a better highway from Fort Collins to Cheyenne. Need for a "faster" highway between the cities was stressed at the joint meeting of the three chambers, both from a tourist and freight traffic angle.

At the recent meeting of the state highway advisory board that section of the D. L. D. highway from Hudson to Wiggins, via Prospect Valley, was rededicated as a state highway. State aid in graveling and grading of this stretch of road is now assured. It is expected that Weld and Morgan Counties, through which the road runs, will co-operate in these improvements.

A snowslide—to be more exact—"Slippery Jim Slide," located between Ouray and Silverton on the Million Dollar Highway—just one of the many snow-fighting jobs for the state maintenance forces. Photo submitted by George Toupain.

Gardner Brothers & Glenn have resumed work on gravel surfacing five miles of Tennessee Pass, under a contract with the U. S. Bureau of Public Roads. Four miles of surfacing will be done from Leadville to Tennessee Park by Robert Haynes, Boulder contractor, this summer.

H. C. Lallier, Denver contractor, expects that traffic will be moving over two and one-half miles of standard concrete pavement west of Rocky Ford by June 1. Lallier's crew started pouring concrete on April 25.

A premix asphalt plant has been located at Glenwood Springs for the oil surfacing of two miles of state road south of that city. This will be the first premix project laid in this state. The work will be done under the supervision of the state highway engineer's office in co-operation with Garfield County.

Good progress is being made by Wood & Morgan in their four-mile graveling project south of Cortez for the state highway department. Leslie Burnett of the Burnett Transfer Co. of Durango is foreman on the project. The latter concern are sub-contracting a part of the work. When completed this four miles of new surfaced highway will directly tie up Cortez with Gallup, New Mexico, giving an all-season road to the Colorado line. At present traffic is mostly routed from Gallup through Farmington and Aztec to Durango. The new road will give alternate routes.

The annual task of removing snow from the top of Fall River Pass has been started by the road crews employed by the Rocky Mountain National Park. Reports indicate that the snowdrifts are much smaller this spring than a year ago. Drifts in the worst places are 12 feet deep compared to 30 feet a year ago. Several weeks will be required to clear the road. The Fall River Road is usually opened from June 10 to June 15, the latter date being the official one for starting travel across the Continental divide.

Hoosier Pass was cleared of snow on May 1 by state and county forces. The huge highway rotary plow was used in the work. This sets a record for the opening of this pass.

A. R. Mackey, Fort Morgan contractor, is constructing a 185-foot timber bridge and approaches on state road No. 4, east of Simla, for the state highway department. His contract price is $9,288. The bridge is located in Elbert County and when completed will eliminate one of the bad places on the Colorado Springs-Limon highway.

The work of oiling the highway between Monte Vista and Alamosa was started on April 19. This project is under contract to the Mountain States Construction Co. of Pueblo. It is expected that the work will be completed the latter part of July, depending upon weather conditions. The Gunbarrel road north of Monte Vista is being prepared for paving. Tile has been laid in the wettest places. The paved grade will be 26 feet in width. The present grade will be surfaced before the paving is laid.

Berthoud Pass, 11,315 feet high, was opened for travel on May 10, more than two weeks earlier than ever before. The state highway department's rotary snow plow is now working on Monarch Pass, which it is expected will be opened by the first of June. Maj. L. D. Blauvelt, state highway engineer, started snow crews out earlier than usual this year, owing partly to the comparatively open winter in many regions and also to give motorists the maximum use of the roads this season. The department now classifies six passes as all-year-round highways, though occasionally some of them are blocked for short periods. The six are Poncha, La Veta, Tennessee, Cumbres, Cochetopa and Raton. Robt. H. Higgins, head of the state highway maintenance department, expects all passes in the state to be opened by the latter part of June.

Highway department officials now feel confident that the entire concrete paved stretch under construction between Colorado Springs and Pueblo will be thrown open to traffic by September 1. Both contractors on this 26-mile improvement are now pouring concrete with a large force of workmen.

Bids on two federal aid road projects were opened by the highway department on May 8, and on which work has been started. These include: F. A. P. 122-R, calling for 10.122 miles of grading and a bridge extending east through Ovid and Julesburg on highway No. 2 in Sedgwick County. Low bidder was Bedford & Woodward of Greeley with $49,976. F. A. P. 298-C, 3.78 miles of grading and gravel surfacing on Wolf Creek Pass between Twin Bridges and South Fork on highway No. 10 in Mineral County. Low bidder H. C. Lallier Construction Co. of Denver with $116,864.

The state highway department's oiling crew have started work on five miles of mixed-in-place oil surfacing from Englewood to Littleton in Arapahoe County. The work is being done under the supervision of Elza Montgomery, division engineer, and Clyde Walters, resident engineer. Funds for the work is being contributed by the city of Littleton, Arapahoe County, and the state. Sand and gravel for the work was furnished by Arapahoe County, under the supervision of Tom Shearer, county road supervisor. The work should be completed by June 15.

Cole Brothers have completed over fifty per cent of their 41-mile grading project east of Sterling. This is the longest grading project ever let by the highway department. Work was started on the project last fall, and the contractors have had four draglines and a large force of workmen busy nearly all winter. This project connects with a 10-mile project recently awarded on contract to Bedford & Woodward, extending the new road from Sterling to the Colorado line, east of Julesburg. The new road will eliminate a score of right angle turns and several railroad crossings. When the grading is completed the entire 52 miles will be gravel surfaced.

Hamilton & Gleason, Denver, will complete two contracts for the improvement of the road between Silverton and Ouray by the middle of the summer. This five miles of improvement is located north of Silverton, and will give a broad, smooth highway to Chattanooga.

Thirty-six federal aid contracts, involving over $4,500,000 worth of road work, are now in course of construction by the state highway department. In addition there are now under way a score of state projects and the regular maintenance work. By the middle of June the state will have under construction a half dozen gravel surfacing projects in various parts of the state, which will be under the supervision of the state maintenance division.

Clippings, Letters and Comments

DEALING WITH STATE HIGHWAYS

Highway Program Well Under Way

Western Construction Corporation

The following is from the *Sterling Advocate:*

Colorado's 1930 highway program is well under way at the earliest season in years. Some contracts must necessarily wait on the receipt of revenues from the gasoline tax, but the highway department is proceeding with all possible dispatch. Colorado citizens and tourists will be less bothered with detours than is usual; more of the projects will be completed than in other recent years; and farmers delivering their crops to market will be less hampered by unfinished construction work. The long delays in other years on the part of governors in approving the budgets have been costly to the state. Fortunately, we have none of them this year.

Prosperity on the Way

The *Montrose Press* publishes the following article:

A continuing upward veer of road and general building contracts in Colorado has foretold temporary mitigation of the unemployment problem.

Jobs were made for nearly 200 men recently when construction gangs swung into action on six state projects in highway division No. 4, covering a territory of 11 counties from Salida to the Kansas and New Mexico borders, James D. Bell, state division highway engineer, said.

Remaining projects in this division will employ a maximum of 300 men on an average day wage basis of $5 to the man for the next six months, Bell announced. One-third of Colorado's major highway construction program totaling $16,000,000 for the fiscal year has already been contracted. That means that more than 600 men will find employment immediately for five or six months.

Business leaders predicted employment for an additional 500 men who will benefit directly or indirectly from the extensive highway programs. Additional forces are expected to be added to Colorado cement mills, of which the Portland Cement Co. is probably the largest. More men will be needed at the rock plant in Cripple Creek, and additional employment will be furnished in steel fabricating mills.

The highway department has estimated that approximately 50 per cent of the construction budget will also be expended for labor.

$16,000,000 for Colorado Roads

The following article is clipped from the *Silverton Standard:*

Every one of the 48 states this year will make a record of highway construction and related improvements that will involve total expenditure of more than a billion dollars, according to statistical tabulation of federal and state road officials. Every commonwealth has adopted a program of keen rivalry, backed by greater appropriations than for any prior year since the advent of the automobile, which has served as an insistent demand for extension of highways in every county of the country, their number exceeding 3,000.

Colorado's road and bridge building program for the current year ranks with the same line of improvements of other southwest states, calling for relative expenditures totaling $16,000,000, revenues for which have been provided by the federal and state governments and 63 counties. The state highway department will spend upwards of $9,000,000, $3,138,363 representing the amount left over from last year's road budget. Contracts for new and uncompleted projects costing $4,000,000 have already been awarded by the department and work on some of these already started, which relieves the unemployment situation to some extent in certain localities. The announced policy of the state highway department is to start work as early as possible on many projects so as to furnish employment for as many idle men as can be utilized.

Highway Work to Be Speeded Throughout State

This is from the *Rocky Mountain News:*

Speeding up early spring state highway construction, the state highway department opened bids yesterday for $200,000 additional work on seven projects.

"More construction is actually under way than any previous April," Maj. L. D. Blauvelt, state highway engineer, said.

"We have aimed to start work as early and rapidly as possible this year to help the general effort to relieve unemployment and to co-operate with the national administration in expanding public improvements this year."

Colorado Highway Budget Largest on Record

The *Hayden Republican* in its issue of April 4 printed the following:

Nineteen thirty promises to be the best road building year Colorado ever had. The sum to be spent is the largest, the plans of the highway department are such and its organization so efficient that greater results per dollar are counted on this year than ever before. Just as early as the weather will permit work on the scores of projects will start. Many projects are being worked on now and the call for bids on several others has been made. The appropriations for the Victory Highway which particularly concern this section are the largest ever, being placed at a million dollars.

Blauvelt Makes Good On Early Promises

This from the *Grand Junction Sentinel:*

Major Blauvelt, head of the state highway department, is making good on his promises to push all construction work on highways in Colorado this spring and summer with the utmost speed. He has made it plain that there will be no delay tolerated in the matter of awarding contracts or in the matter of those who secure the contracts getting the work under way immediately. It is a most commendable policy on the part of Major Blauvelt and the earlier the many construction contracts get to going in Colorado this spring, the sooner the unemployment situation will be relieved.

2,799 Miles of Surfaced Highways

The following comment is from the *La Junta Democrat:*

Colorado has 2,799 miles of local roads that are surfaced. This may be interesting to the road cranks. Indiana has a greater mileage of surfaced roads than any state in the Union with 46,403 miles, with Ohio second and Minnesota third. California, which would be everybody's guess for first place, is further down in the list.

Start Work on New Canon-Florence Road

The *Florence Citizen* comments on the new oil processed project between Canon City and Florence as follows:

The actual work of building a road between Florence and Canon City started this morning, when C. V. Hallenbeck put his crew to work officially. This means the road must be completed in 90 working days.

Won't that be somethin'? A real road between here and Canon City? Some of us won't know how to act when we get on a real road where it doesn't seem like we are riding on four flats.

Indications are that the state road to the summit of Mount Evans will be completed and open to motorists the middle of the summer. Work on this project will be resumed as soon as the contractor's outfit can be moved on the job. There is one mile of the work to be completed, after which additional rock must be blasted out to clear a space at the summit for cars to turn around.

Dependable Mobile Power *for* Roads

<< >>

THE McCormick-Deering Industrial Tractor is an increasingly important unit in road programs the country over. Thousands of miles of roads and streets are being built and kept in shape every year by McCormick-Deering Power.

As a separate unit, the McCormick-Deering furnishes efficient mobile power on any job. It handles trailers, semi-trailers, dump wagons, graders, scrapers, street flushers, etc., with ease, at the drawbar. It delivers its power at the belt, and at either the side or rear power take-off.

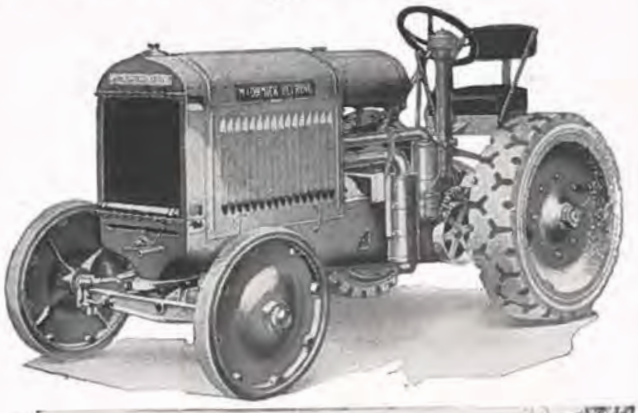
As the power heart for a variety of equipment, the McCormick-Deering provides an abundance of economical power for operating shovels, excavators, dump bodies, back-fillers, trenchers, graders, subgraders, scarifiers, rollers, maintainers, and what not.

Thousands of McCormick-Deerings are in road service, reducing construction and maintenance costs. Many individual states have fleets of several hundred working the year around. Everywhere, they are giving a good account of themselves.

It will pay you to look up the McCormick-Deering—sold and serviced by 117 Company-owned branches in the United States and Canada, and by McCormick-Deering distributors and dealers near you.

INTERNATIONAL HARVESTER COMPANY
606 So. Michigan Ave. *of* America (*Incorporated*) Chicago, Illinois

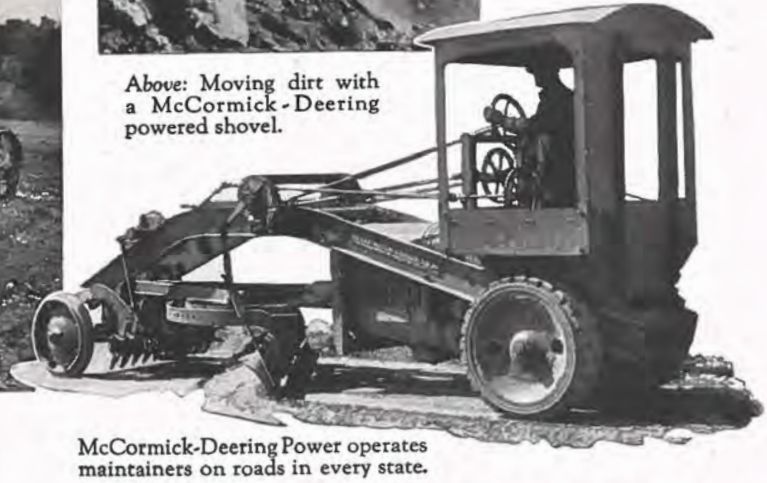
Branches serving Colorado: Denver, Colorado, Cheyenne, Wyoming, Dodge City, Kansas.



Above: McCormick-Deering Industrial Power is used to operate loading and hauling equipment in road construction work.

One man can load, transport, and place a lot of dirt in a day with outfits of this type.

Above: Moving dirt with a McCormick-Deering powered shovel.



McCormick-Deering Power operates maintainers on roads in every state.

McCORMICK-DEERING INDUSTRIAL TRACTORS

H. W. MOORE EQUIPMENT CO. *Sales Representatives*

120 West 6th Avenue, DENVER
Phone Tabor 1361

ROAD BUILDERS' AND MACHINERY NOTES

MOORE EMPLOYS TWO NEW FIELD AGENTS

George Meffley, general manager, announces two new field representatives for the H. W. Moore Equipment Company. They are Clyde E. Whitescarver and John R. Kuntz. Whitescarver goes into northeastern Colorado. He has held responsible positions in road construction and maintenance with the Colorado State Highway Department, the city of Trinidad and with Las Animas county. Until recently he was construction superintendent on light plants in Sterling, Lamar and Colorado Springs. He knows equipment and how to use it.

Kuntz goes to the western slope, with headquarters at Grand Junction. He was employed nine years with the city of Pueblo as assistant superintendent of parks and highways. He was the foreman in construction of the Pueblo airport. For two years he was in the U. S. aviation service.

Meffley announces the appointment of his firm as sales agents for the well-known Rosco road oil distributor. Road oiling methods have changed in the last few years and the Rosco oiler meets the demand of the state and county highway departments for a machine which will efficiently and economically distribute road oils. Features of the Rosco oiler include low initial cost, even distribution, regulated pressure—penetration with evenness of spread—speed in loading and convenient discharge of road oils, according to Meffley. It is equipped with a 1,000-gallon tank. It can be mounted on trucks, but the most economical way is to use a trailer. It has a patented seven-way valve which is operated by means of one lever. One of the oilers is now in Denver for inspection.

The Moore company is now showing one of the new Wehr one-man maintainers with closed cap and a dozen other new features. This machine has attracted much attention among road officials.

A report from C. B. Owen, contractor on the new oil project east of Aurora, shows that 42,000 yards of dirt was moved during the month of April with a General excavator.

Clyde E. Whitescarver (left) and John R. Kuntz.

SELANDER PURCHASES NEW KOEHRING PAVER

Edward Selander, progressive Fort Morgan contractor, has started pouring concrete on his sixteen-mile state highway contract north of Pueblo. For this job Selander purchased one of the new Koehring pavers from the Wilson Machinery Co., Denver. It is the very latest type, being all-automatic and high speed in operation.

If low cost dirt moving interests you, write to Harry P. Wilson, president of the Wilson company, for particulars on the Ball Wagon Grader produced by the Blaw-Knox people. This is something new.

Six new Monarch 50 model tractors have just been delivered to the highway department by Wilson. These power units are used in connection with heavy graders. They have been placed in various parts of the state on heavy maintenance work.

Yes, there has been a picking up trade of late, says Wilson. Sales this year have run far ahead of 1929. All lines have shown a strong demand.

E. W. Arnold, western representative of the Monarch Tractor Co., has located his district office with the Wilson Machinery Co. His territory comprises Colorado, New Mexico, Arizona, Utah, Montana and Wyoming.

CATERPILLAR SALES SHOW BIG INCREASE

Caterpillar tractor sales in the Denver territory show a 30 per cent increase the first three months of 1930 over the same period of a year ago, according to L. L. Clinton, president of the Clinton-Held Company, Denver distributors.

Sales to contractors, counties and farmers have been steady since the first of the year. Prospects for the ensuing nine months look better than at the same time in 1929. Business in farm tractors has been particularly brisk this year.

A 60 model was delivered to C. B. Owen for his state road contract located east of Aurora last month. This is being used with a rotary scraper. Several deliveries were made during the month to counties for road maintenance.

ROAD OIL CONTRACTS

Contracts were let on April 11 by the Wyoming Highway Department for road oil in the amount of

(Continued on page 26)

Pioneer gravel crushing plant used by Cole Bros. on Federal Aid project located west of Sapinero. Picture submitted by Elton T. Fair Company.

Road Builders' Notes

(Continued from page 24)

2,000,000 gallons, this being divided among the three lowest bidders, which were the Standard Oil Company (Indiana), with refineries at Casper and Greybull; the Texas Company at Cody and the Yale Company in Billings, which receives its supply from the Oregon Basin field in Wyoming. The Colorado department awarded a contract for 50,000 gallons to the White Eagle Refining Co., also of Wyoming.

CLETRAC SALES ON THE UPGRADE

Three carloads of Cletrac crawler tractors passed through the sales department of the Liberty Trucks and Parts Co. during the month of April, according to Richard Carlson, sales manager.

Carlson returned to Denver the middle of April from a trip to the Hawaiian Islands. J. H. Hankins, manager of the spare parts department, was in charge of sales during Carlson's absence.

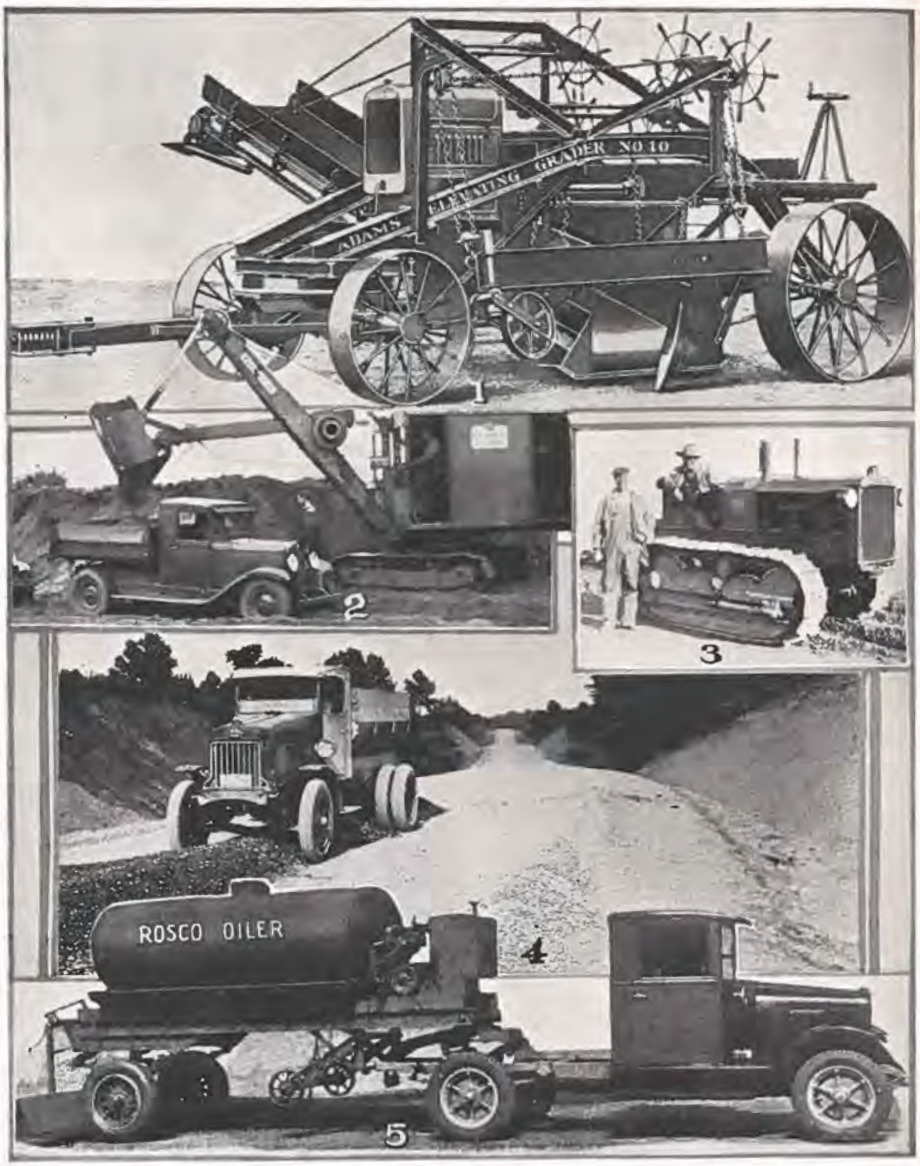
James Warner, a Salida granite contractor, purchased his second FWD three and one-half ton truck during the month. Several of the Four Wheel Drive trucks have been sold to counties for maintenance work during the past few weeks.

FORDSON TRACTORS ARE NOW READY FOR INDUSTRIAL USE

Deliveries of Fordson tractors are now being made in the industrial field, according to announcement made by Sanderson & Rader, Inc., Denver sales distributors. Until the first of April sales of these new and heavier Fordson tractors were limited to the agricultural field. Increased power, easy starting and better traction are some of the features of the improved Fordson. A big stock of the tractors and parts are being carried in Denver by the Sanderson-Rader company, ready for immediate shipment to any part of the territory. A request to this company will bring you a bulletin giving all details of the new Fordson.

A CORRECTION

In last month's advertisement of the Clinton & Held Co. there appeared a typographical error in the Denver price of the model 60 caterpillar tractor. The delivered price of this model in Denver is $4,415. The factory price is $4,175, which was erroneously given as the delivered price.



1. New Adams elevating grader No. 10, recently placed on market by J. D. Adams Co. Photo by Elton T. Fair Co. 2. Digging a hole you could bury an elephant in with a General excavator on the Denver-Limon road. Photo by H. W. Moore Equipment Co. 3. A county tractor crew with a Monarch "35" in Kit Carson County. Horace Borger (right) and O. E. Maag. Photo by T. R. Elkins of Wilson Machinery Co. 4. An International motor truck hauling crushed gravel on the Pueblo-Walsenburg state highway. Photo by Denver branch International Harvester Co. 5. A new model Rosco oiler now displayed by the H. W. Moore Equipment Co.

A NEW ELEVATING GRADER BY ADAMS

A new elevating grader with a number of new features has been announced by J. D. Adams Company, manufacturers of Adams Leaning Wheel Graders and other road-building and maintenance equipment.

The new features include the use of anti-friction bearings throughout —Timken roller bearings in wheels and Timken and ball bearings throughout carrier and carrier drive —a new shaft and gear-driven carrier, a new carrier construction which provides unusual rigidity with light weight, a new automatic pan cleaner, belt tightener, etc.

The machine is furnished with power take-off or auxiliary motor, either of which drives the carrier with much less power than required by the old rear axle drive, and makes the carrier operation independent of tractive conditions. The machine uses a 42-inch belt and is regularly equipped with 28-inch disc plow.

Anyone interested in elevating graders or dirt moving will be interested in a profusely illustrated special catalog issued on this new machine. Just address E. T. Fair Company, Denver, Colorado.

Developments in Highway Research

(Continued from page 10)

1. The pavements built under these methods of control cost no more than under the older systems. In fact, it is believed that the definiteness of the quantities of materials required by the specifications has been a factor in lowering costs.

2. The cost of inspection has not been increased although higher grade inspectors are needed.

3. The concrete is of higher quality and of more uniform character.

4. It is, therefore, reasonable to conclude that the results of the methods of control of the quality of concrete described are more than commensurate with the efforts expended.

An effort was made to determine the relative effect on scaling of different methods of curing concrete pavements. Although this survey covered existing pavements in many states, the results differed so widely that no conclusions could be drawn. The primary object of the study was to determine if any difference existed between earth covering and calcium chloride methods of curing concrete pavements.

Subgrade

Subgrade stability was discussed from the standpoint of soil characteristics. It was recommended that soils be classified under the following heads: (1) Internal friction; (2) cohesion; and (3) permeability. The author indicated that an adherence to these properties permitted soils to be recombined to obtain stability for different classes of use.

Culvert Strength

Final results of the long continued studies conducted at Iowa State College on culvert strength were presented in the form of a mathematical theory of earth loads on culverts. The complete report is soon to be published in a bulletin of the Engineering Experiment Station of Iowa State College.

The shortest and narrowest paved motor road in existence is believed to be the road on Smith's Island, one of the little islands in the lower Chesapeake Bay, near Crisfield, Maryland. It is less than a mile long and just wide enough to permit the passage of one motor car at a time.

PLANS FINISHED BUT PROJECT NOT YET ADVERTISED FOR BIDS

Proj. No.	Length	Type	Location
144-E	1.286 mi.	Pavement and Brs.	North of Ft. Collins
246-DR 92-R 272-BR	18.429 mi.	Oil Processed Surfacing	East of Pueblo

PLANS BEING DRAFTED

Proj. No.	Est. Length	Type	Location
91-R	6 mi.	Oil Processed Surfacing	Northeast of Trinidad
144-F	10 mi.	Oil Processed Surfacing	Northwest of Ft. Collins
248-B	2 mi.	Gravel Surfacing	South of Buena Vista
262-J	4 mi.	Gravel Surfacing	East of La Veta Pass
271-F	0.5 mi.	R. R. Overhead Crossing	West of Portland
279-H	2 mi.	Graded	East of Kenosha Pass
282-I	3 mi.	Gravel Surfacing	South of Craig
189-B	4 mi.	Gravel Surfacing	West of Hayden

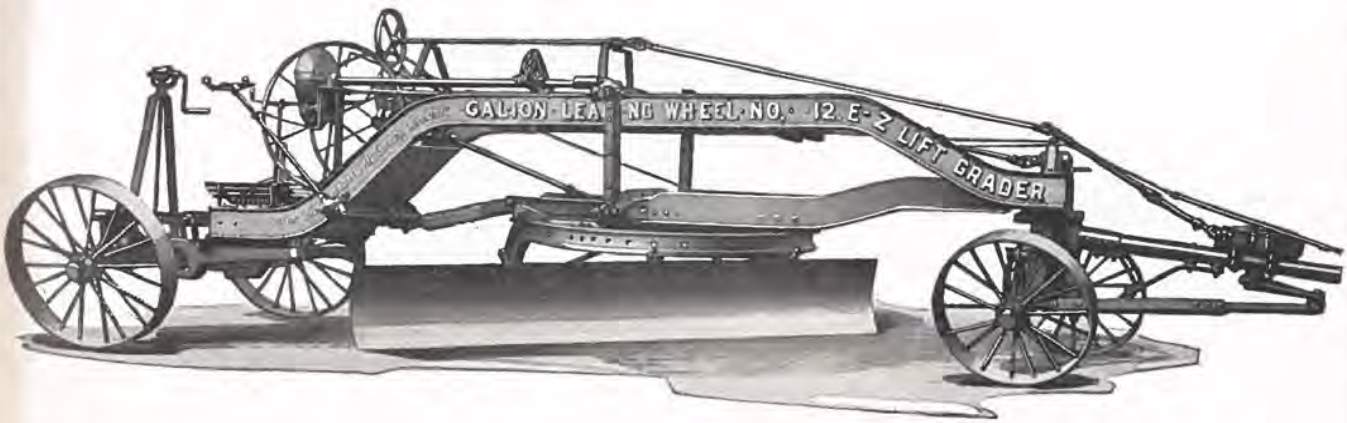
STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per Cent Complete	Proj. No.
2-R9	Starkville	1.35 mi.	Concrete Pavement	H. C. Lallier Const. & Eng. Co.	$ 59,180.60	45	2-R9
57-R2	North of Lamar	0.502 mi.	Bridge	J. Fred Roberts & Sons	140,102.96	75	57-R2
68-R1	North of Monte Vista	1.900 mi.	Gravel Surfaced	J. Finger & Son	24,124.00	94	68-R1
78-R	Near Minturn	0.709 mi.	Gravel Surfaced	J. Fred Roberts & Sons	96,342.90	27	78-R
138-B	North of Kremmling	3.133 mi.	Gravel Surfaced	F. L. Hoffman	76,363.35	66	138-B
138-C	South of Muddy Pass	4.184 mi.	Gravel Surfaced	C. A. Switzer	103,270.20	0	138-C
144-D	Northwest of Ft. Collins	2.834 mi.	Gravel Surfaced	J. Fred Roberts & Sons	66,430.10	62	144-D
147-D	Betw. Cortez & Utah Line	2.903 mi.	Gravel Surfaced	Wood-Morgan-Burnett Co.	43,432.60	25	147-D
149-B	East of Aurora	7.911 mi.	Oil Processed Surf.	Chas. B. Owen	134,611.10	10	149-B
149-B Detour	Betw. Aurora and Watkins	12.5 mi.	Gravel Surfaced	W. F. Pigg & Son, Inc.	16,432.00	69	149-B Detour
150-A	West of Craig	8.227 mi.	Gravel Surfaced	Gardner Bros. & Glenn	93,477.35	27	150-A
165-R1	East from Canon City	9.325 mi.	Oil Processed Surf.	C. V. Hollenbeck	50,548.30	1	165-R1
175-A	Between Sterling and Ovid	41.979 mi.	Graded	Cole Bros.	193,055.75	59	175-A
243-C	West of Dyke	3.837 mi.	Gravel Surfaced	Grant Shields	47,404.40	7	243-C
253-D	West of Milner	2.547 mi.	Gravel Surfaced	Hamilton & Gleason Co.	147,192.00	63	253-D
258-H	West of Sapinero	4.921 mi.	Gravel Surfaced	Cole Brothers	123,700.60	74	258-H
262-G2	West of La Veta Pass	5.014 mi.	Gravel Surfaced	Pople Bros. Const. Co.	11,932.50	0	262-G2
263-A	Betw. Mortimer & Ft. Garland	3.404 mi.	Gravel Surfaced	Mtn. States Constr. Co.	47,509.20	87	263-A
263-B	Betw. Mortimer & Ft. Garland	3.133 mi.	Gravel Surfaced	Pople Bros. Const. Co.	29,532.40	0	263-B
265-C	Betw. Durango & Bayfield	2.500 mi.	Gravel Surfaced	Grant Shields	36,022.90	0	265-C
266-D	South of Bondad	4.111 mi.	Gravel Surfaced	Engler, Teyssler & Co.	96,075.30	89	266-D
267-C	Near Model	4.491 mi.	Gravel Surfaced	E. H. Honnen	45,801.00	70	267-C
270-D	Betw. Alamosa & Monte Vista	3.978 mi.	Gravel Surfaced	Mountain States Constr. Co.	32,679.40	65	270-D
272-E	West of Rocky Ford	2.562 mi.	Concrete Paved	H. C. Lallier Const. & Eng. Co.	76,199.00	49	272-E
277-D1	Betw. Colo. Springs & Pueblo	15.566 mi.	Grading	M. E. Carlson	218,277.80	99	277-D1
277-D2	North of Pueblo	15.566 mi.	Concrete Pavement	Edw. Selander	333,257.80	1	277-D2
277-E1	South of Colorado Springs	10.2 mi.	Grading	J. L. Busselle	221,389.65	90	277-E1
277-E2	South of Colorado Springs	10.2 mi.	Concrete Pavement	J. Fred Roberts & Sons	238,207.30	2	277-E2
282-G	South of Craig	5.147 mi.	Gravel Surfaced	Chas. B. Owen	61,645.22	32	282-G
282-H	Between Rifle and Meeker	7.029 mi.	Gravel Surfaced	Winterburn & Lumsden	82,589.74	99	282-H
287-BR1	East of Greeley	7.413 mi.	Concrete Paved	New Mexico Constr. Co.	145,875.00	0	287-BR1
293-C	North of Ouray	3.661 mi.	Grading	C. V. Hollenbeck	62,997.80	100	293-C
295-D	North of Antonito	2.460 mi.	Oil Pro. Gravel Surf.	Levy Const. Co.	72,676.75	100	295-D
296-E	South of Greenhorn	7.210 mi.	Gravel Surfaced	Mountain States Constr. Co.	93,594.88	29	296-E
297-C	Southwest of De Beque	9.953 mi.	Gravel Surfaced	Hinman Bros. Const. Co.	312,453.50	57	297-C
298-B	North of Pagosa Springs	2.414 mi.	Surfacing	Engler & Teyssler	38,426.00	49	298-B
300-B	North of Silverton	2.828 mi.	Graded	Hamilton & Gleason Co.	35,647.80	43	300-B
300-C	North of Silverton	1.937 mi.	Grading	D. G. Son	15,287.80	0	300-C

WEHR
Maintainer

The First Time You
Are in Denver

Don't miss seeing the new "Wehr" McCormick-Deering one-man "1930" type machine—new circle—new lifting device—fully enclosed cab — electric lights — generator and plumb full of quality. We have 'em in Denver stock.



"Galion"

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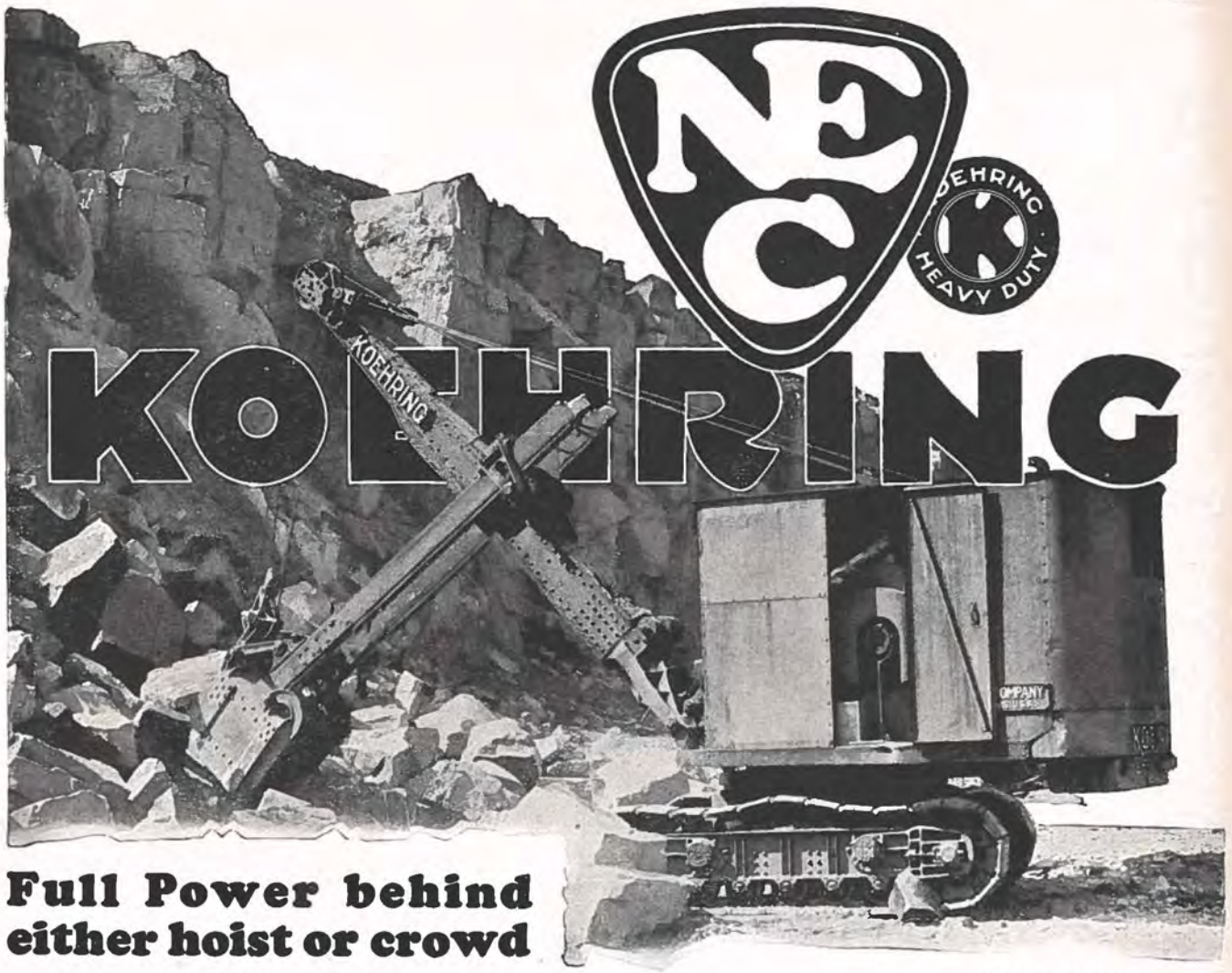

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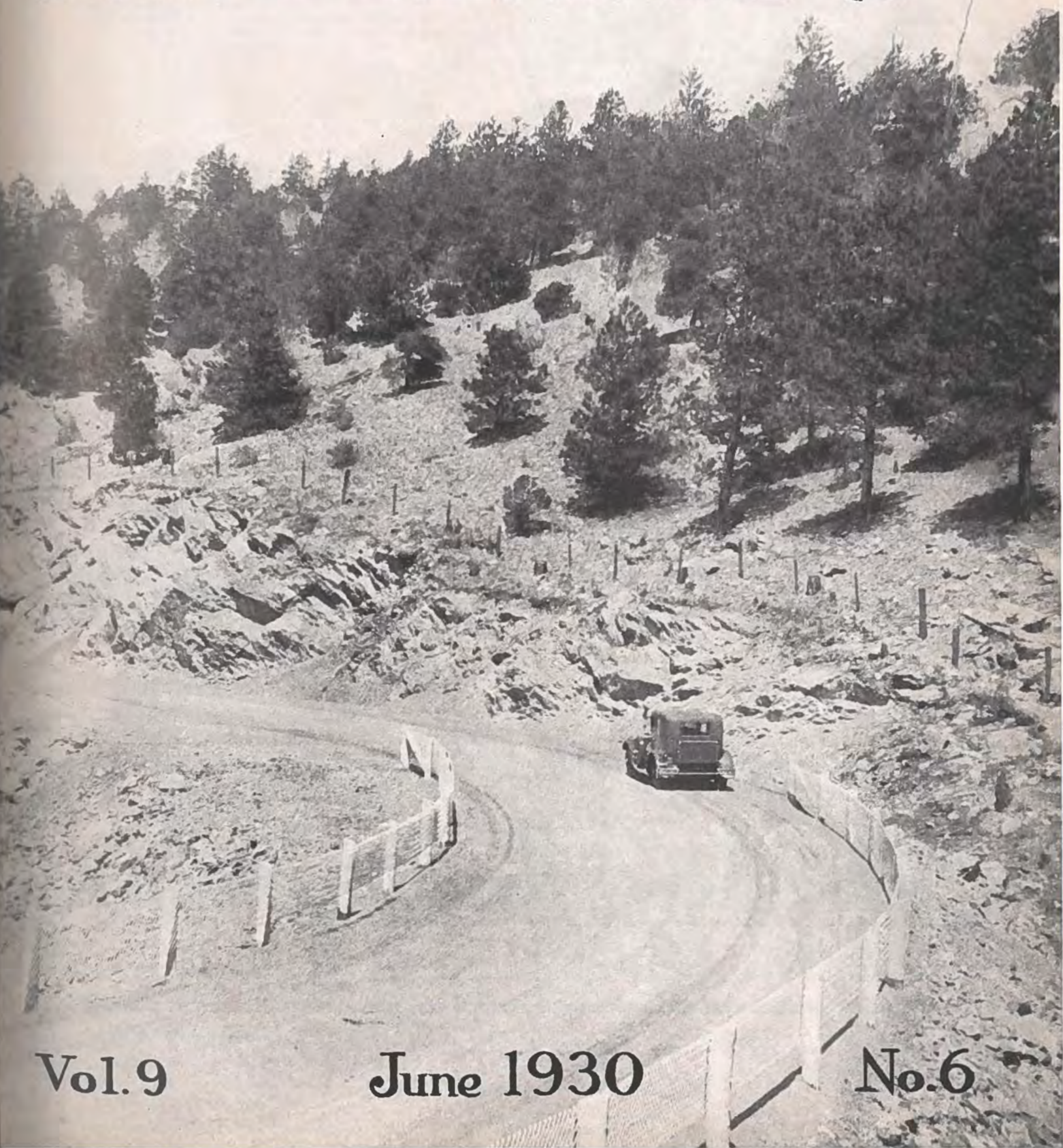

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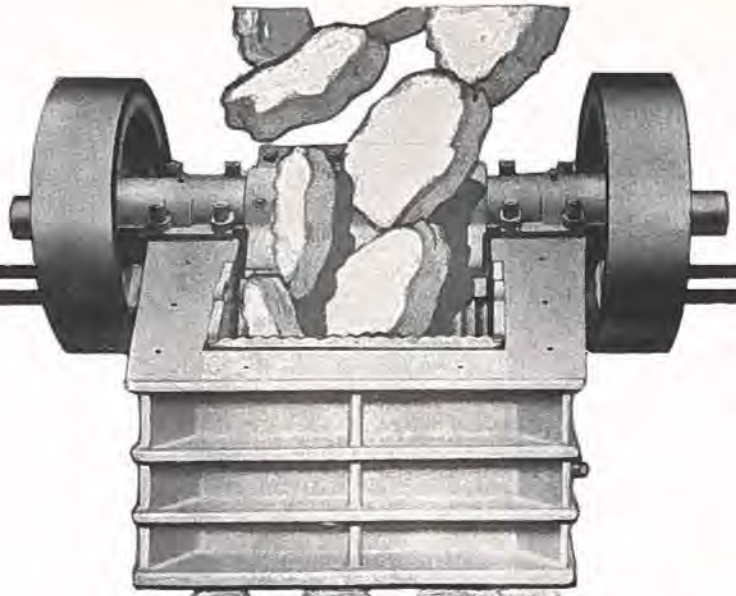

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Colorado Highways

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Denver, Colorado

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Our Cover Picture

ON the front page of this month's COLORADO HIGHWAYS there appears a view taken on Crow Hill, near Baileys in Jefferson County. The picture shows a curve on the new Federal Aid road which was completed last year, eliminating one of the worst and most dangerous stretches of roadway on the Denver-Leadville highway. Broad, smooth curves on an easy grade, have replaced narrow, sharp turns with steep grades, eliciting much favorable comment from all motorists who travel over this route. Photo by M. W. Bennett.

Colorado Highways
"BETTER ROADS"
VOLUME IX. JUNE, 1930 NUMBER 6

Bad Road Tax Totals Huge Sum

ALTHOUGH both state highways and secondary roads have been better this spring than in previous years, many car owners of Colorado paid "bad road taxes" during the past eight or ten weeks greater than the total sum they pay for good roads in a whole year.

How much the motoring public as a whole has paid in bad road taxes no one can estimate, but although weather conditions have been unusually favorable, there are plenty of individuals ready to testify that single trips have cost them more than their year's license and gas tax.

Unlike some recent years, when many of the unpaved roads have been impassable to all traffic for weeks at a time, this year very few stretches have been impassable very long. But on nearly all of the unpaved routes there have been some frost boils and soft stretches which have caused many cars and trucks to get stuck. In some cases it is the skillful driver who gets through; in other cases it is just luck in guessing which rut has the best bottom. But even those who get through on their own power will agree that a trip of one or two hundred miles over muddy and badly rutted roads takes more out of a car in tire wear, repairs and depreciation than 1,000 miles on good roads.

Last year the Colorado Highway Department gave special treatment, such as tiling, trenching and gravel filling, to dozens of short stretches where frost boils had been prevalent in former years. This spring many, but not all, of these stretches came through in good shape, but new frost boils popped up in unexpected places. At times when the weather turned suddenly warm, frost boils would appear at places which had been dry and dusty for several weeks before.

The maintenance division has kept records for all places where frost boils treatment was applied last year, and is making a detailed study of the results this year, for future guidance in frost boil prevention.

Paving and bituminous treatment kept some routes in good condition this year which formerly were impassable during the spring break-up, but there are still several thousand miles of heavily traveled state highways, to say nothing of secondary roads, which cannot be depended upon for all-year transportation.

An unprecedented record also was made by the maintenance forces of the State Highway Department this year in the early opening of the mountain pass roads, some of them being available to traffic three weeks earlier than ever before. A notable achievement was the snow-removal work accomplished by patrols operating throughout the last winter over Tennessee Pass.

Constant maintenance on the plains roads of eastern Colorado also made a big difference in the condition of these roads throughout the spring break-up.

More Gasoline Used Where Tax Is High

Gasoline taxes do not discourage the use of gasoline, to judge by an analysis of the figures on motor vehicle registration and gasoline consumption in 1929. The states which had the highest taxes used the most gasoline.

Three states had a six-cent tax in force all or part of the time in 1929. The number of gallons used per car in these states was: Florida, 646; Georgia, 612; South Carolina, 510.

Eight states which had a five-cent tax used the following number of gallons per car: Arkansas, 573; Kentucky, 465; Mississippi, 564; Montana, 410; New Mexico, 580; North Carolina, 539; Tennessee, 537; Virginia, 511.

This makes the average per car 589 gallons where the tax was six cents and 522 gallons where the tax was five cents. The average for the entire United States was 506 gallons per car. The average tax for all states was 3.22 cents per gallon.

Colorado, which had a 3-cent tax part of the year and 4 cents part of the year, used 510.4 gallons per car. Wisconsin, with a 2-cent tax, used 472 gallons, and Minnesota, with a 2-cent tax part of the year and 3 cents part of the year, used 464 gallons per car.

The figures do not include gasoline used for other purposes than motor vehicles. Gasoline purchased by tourists is included. High gasoline taxes apparently do not keep tourists away.

Gasoline taxes build more roads, and good roads increase the use of gasoline. Motorists recognize the gas tax as the fairest road tax of all. Each individual pays in proportion to his use of the roads.

Colorado has hundreds of miles of well graded and graveled roads. But under heavy rains many of these roads become next to impassable. Fact is that in wet weather these roads will not carry the weight of the trucks and busses. If we are to permit freight trains to operate on the highways, we must make the roads adequate to carry them. What say, yes?

Picture of the new steel and concrete bridge constructed by the state highway department with Federal co-operation over the Fountain River near the town of that name in El Paso County, forming a link in the new concrete pavement now under construction between Colorado Springs and Pueblo. It will soon be open to traffic.

U. S. Building Greatest Roads in History

By Roy D. Chapin
Chairman of the Highways Committee, National Automobile Chamber of Commerce

WITH a decade of actual construction under the Federal Aid act just closed, the highway engineering forces of the country are rapidly completing the first stage of development of the greatest system of roads the world has ever known.

As the 1930 construction season gets under way, three states have completed initial improvement of all of the roads within the 7 per cent system designated as the Federal Aid roads, while others are reaching down into the last one-third of this mileage.

By and large, most of the main traveled roads of the United States have now been improved to some degree, even though only the grading and drainage have been accomplished.

No Community Without Roads

There is now no community in the United States which is not accessible by a highway of some sort.

Six roads taking off from Maine, New York, Michigan, Wisconsin, Minnesota and Oregon are now improved from the northern to the southern boundaries of the United States. One from points east to St. Louis and on to San Diego is now improved from east to west and two others, one along the northern route, the second over the route of he Lincoln highway, are improved for all but short stretches.

In Maryland, Rhode Island and Delaware, the state engineers in co-operation with the secretary of agriculture are already devoting portions of their annual allotment of Federal Aid to the improvement of roads outside of the original 7 per cent system as the law provides they may.

Secondary Roads Improved

Elsewhere, attention is now being given to the secondary roads of the primary system and as their development is pushed, more and more of the farmers will be brought into direct contact with the cities.

As the initial degree of improvement is completed, the states are going ahead with the second and more costly stage of their work. Wherever traffic justifies it and funds permit, highways are being raised to new standards of service. A constant program of resurfacing to higher types is being carried on in every part of the country.

Main arteries of communication are being widened and strengthened to meet the increasing demands of a traffic which today numbers more than 26,000,000 motor vehicles of all kinds.

Elimination of railroad grade crossings through relocation as well as by separations, realignments and superelevations, is among the tasks which Federal and state engineers have set for themselves as major contributions to the safety of the motor-using public.

Federal Funds Lagging

In the accomplishment of this great feat it is a striking fact that more miles of road within the Federal system have been improved by the states without Federal Aid than with it. Of the certified system of Federal

mileage, 80,000 miles have been paid for in part by the nation, while 90,000 miles have been improved at the sole expense of the states, despite the fact that every mile in the system is of national importance.

During the eight-year period from 1921 to 1929, state and local expenditures for road purposes have increased from slightly more than $1,000,000,000 to an estimated total of $1,700,000,000.

During the same period Federal Aid expenditures have decreased from $88,000,000 in 1921 to $77,500,000 in 1929, with a peak of $91,000,000 in 1925.

Motor Taxes Increasing

In the same period motor vehicle revenues in the form of registration and gasoline taxes have risen from around $120,000,000 to an estimated total of $775,000,000, an amount which without personal property and municipal taxes virtually equals the entire state expenditures of $860,000,000 for 1929.

In other words, during a period of intensive highway construction when every other agency increased its appropriations, Federal highway aid has remained static.

Where it was once around 8 per cent of the total, Federal Aid is now but 5 per cent, despite the fact that the roads which are of interstate importance, generally speaking, are the heaviest traveled and consequently the most expensive.

Road Engineers Continue Fight On Grade Crossings

THIRTY-THREE main line grade crossings on state highways in northeastern Colorado have been eliminated by the State Highway Department since the department was reorganized in 1921.

Only four grade crossings of main line track remain in this section of the state and preliminary work has already been started upon plans to do away with these.

Elimination of the death-dealing crossings was accomplished in a majority of cases by changing the route of the highways. The North and South highway between Greeley and the state line is an instance of this method. Simply by changing the route seven crossings were eliminated there, leaving but one crossing to be bridged with an overpass.

A view of the new U. S. Highway No. 36, east of Byers, which was improved by Arapahoe County forces. Photo by Tom Shearer.

A stretch of roadway west of Canon City near the entrance to the Royal Gorge, maintained by state forces.

The crossings were eliminated under the direction of A. B. Collins, division engineer of the highway department in charge of construction in Division 7. This division embraces the following counties: Adams, Weld, Morgan, Logan, Sedgwick, Phillips, Yuma and Washington.

The main line crossings yet to be eliminated are as follows:

At the eastern edge of Greeley on the Greeley-Fort Morgan highway.

In Brush, on the Fort Morgan, Brush and Sterling highway.

At Beta, south of Sterling, on the Fort Morgan, Brush and Sterling highway.

North of Sterling, on the Sterling-Julesburg highway.

Engineers and draftsmen are now at work on plans for an overhead crossing over the Burlington tracks in Brush and for paving 3.5 miles of the highway, the only unpaved section between Fort Morgan and Sterling.

Inability of the highway and railroad engineers to agree upon a location of the overhead crossing has delayed the elimination of this dangerous crossing for two or three years. Recently an agreement was reached, under the terms of which the highway will cross the railroad tracks back of the Brush sugar factory.

Estimates place the cost of constructing this overpass and paving the 3.5 miles of road at about $180,000. Undoubtedly an appropriation for this work will be contained in the next highway budget.

AUTOMOBILE TAX DODGERS

Scattered through this state there are automobiles on which no tax is paid at any time during the year. There are other cars on which only three-fourths of a year's tax is being paid. In some sections of the state the cars are laid up for the winter and are not brought out until around the middle of May or the first of June. The owners of these cars are usually ranchers living in isolated sections. They pay the three-quarter rate. Other owners are getting by under "dealer's" tags, and they are not being put to the use intended by the law governing the taxing of motor vehicles in Colorado. Detection of the abuse of the use of "dealer's" tags is one of the most difficult problems confronting the state motor vehicle license department.

Highways Are Nation's Business Builders

By Dr. Julius Klein
Assistant Secretary of Commerce

THOSE of us who are persistent readers find a great many quotations from the classics and the near-classics, but I imagine that none of these has been used more often than the rhyme about "the pioneer souls that blaze their paths where highways never ran—but let me live by the side of the road and be a friend to man."

We are all ready to applaud the humanitarian ideal that animates this last line—but we must not forget to place a few laurel wreaths on the brows of the practical pioneering spirits who build those roads which the rest of us "live beside" and thus enable us to ride along nowadays with such ease and speed in search of pleasure or pursuit of business.

The meaning of good roads in the social life and commercial activity of the United States was brought home to us very vividly a few short weeks ago when President Hoover signed the Dowell bill. This act authorized an additional expenditure of 300 million dollars of Federal money (supplementing the previously planned outlay) to aid the states in the construction of roads during the next three years. The economic importance of this appropriation would be difficult to exaggerate.

The subject of the commercial value of roads is particularly timely now, I feel, because reports just made to Secretary Lamont by the governors of thirty-five states indicate really striking activity in highway construction this year. Thirty states report increases, and sixteen of the governors announce contract awards for the first quarter of 1930, 100 per cent or more above the same period last year. Figures covering almost three-quarters of the country show road building contracts awarded during the first quarter of this year valued at about 114 million dollars, against 51 million dollars for the corresponding period last year.

It is calculated that nearly 50 cents of each dollar spent for highway building and maintenance is paid for the labor involved. And this does not mean merely the able shovelwielders out in the hot sun; it includes makers of cement in distant cities, chemists in explosive plants, steel workers, lumber yard employes and countless others who contribute to the creation of purveying of road and bridge materials. So, workers everywhere should benefit greatly from these road-building enterprises. And transportation agencies will derive appreciable profits from the shipment of the essential equipment and material.

The extent and quality of a nation's roadways determine, to a high degree, its rank in the material civilization of the present day. For contemporary commerce, the highway is absolutely indispensable. Backwardness and sluggishness, or turmoil and bewilderment, may result from a lack of highways over any considerable area of the surface of the earth.

What one may call, perhaps, the "religion of the road" was established for the modern world by the practice of ancient Rome. The Roman road—incomparably magnificent in the skill and solidity of its construction, and in the undeviating pertinacity with which it was thrust out in every direction from the city by the Tiber—enabled Rome to become the mistress of

Showing new and old gravel surfaced highway east of Florence in Fremont County. A contract was recently awarded for the oil surfacing of this road. It was constructed with federal co-operation.

Lake Agnes, one of Grand County's beauty spots, is located on the Victory Highway north of Kremmling. It is one of the largest and most beautiful bodies of water in the State of Colorado—an emerald in the heart of the Rockies.

the Mediterranean and of practically all the then-known world. Those roads formed an intricate and gigantic network—stretching out to Spain, to Scotland, to Germany, to Syria, to Egypt and through northern Africa. Sometimes as much as three feet thick and almost as enduring as primeval rock, these Roman highways struck straight for definite goals. They penetrated forests—surmounted morasses—formed an avenue of life through barren wilderness—or functioned as the busy arteries of a rich and smiling countryside. Over them thundered the Roman legions—and in the wake of the legions came the Roman law, the "Roman peace."

Most of our early American statesmen were passionately enthusiastic about the value of roads. We find that brilliant Carolinian, Calhoun, saying, in the year 1819, that "a judicious system of roads, constructed for the convenience of commerce and the transportation of the mail, would—by consolidating our Union and increasing our wealth and fiscal capacity—add greatly to our resources."

The Turnpike Era of Early Days

So, in those early days, there was a period that was called "the turnpike era," when roads were penetrating far into the stagnant rural "back country," and when turnpike and bridge companies became a veritable "craze." In swampy places the people had so-called "corduroy roads"—consisting of logs placed close together and covered lightly with earth. I must not forget to mention the "Wilderness road" which Daniel Boone hewed out from North Carolina to the heart of the Kentucky country. It was ungraded—it was partly obstructed by stumps—it was full of annoying cavities—but over it journeyed the grandparents of Abraham Lincoln. Then there was the famous "National road" which was started from Cumberland, Md., in 1808; as Malcolm Keir reminds us, it took three presidents, ten congresses and fourteen governmental acts to get that road even as far as Wheeling, W. Va., about 135 miles, within a period of nine years.

Occasionally, even in the early nineteenth century in this country, one might see the typical two-wheeled peasant's cart of Europe; but the real long-distance freight carrier came to be the Conestoga wagon, high from the ground to clear those stumps and rocks, and with a peculiar curved shape—actually a crude boat on wheels, useful in crossing deep streams.

All that life upon the highways was extremely picturesque, but uncomfortable and trying, because, by our modern standards, those roads were very poor.

Most of us Americans who are not excessively young can recall very well the "pregood-roads" days out in the country districts—the narrow dirt strips; the ruts and bogs and bumps and ridges; the treacherous holes where the old gray mare might stumble and collapse; the jolting and bouncing; the "slithering" through long sections of the highway which, as a result of rains, had become little more than swamps. It was a task in those days—a feat of endurance and hardihood, in many cases—merely to make fifteen miles to "get to town" in a buggy or in one of the hard, lumbering, old-fashioned country wagons, to say nothing of undertaking any prolonged or extended trips.

And what, may we ask, was the social effect—or, more specifically, the business effect—of that condition? Transportation was impeded. The movement of people and of goods was slowed up, made difficult. There was a natural hesitation about venturing far from one's own bailiwick, in any case where roads alone were available for movement. The tendency was one of isolation, of segregation, of social and commercial life concentrating contentedly in and around a countless number of small centers—the crossroads settlement, the hamlet, the village, the little city.

Each of these centers enjoyed a rather high degree of economic independence, being in large measure self-sufficient and self-sustaining. Each had its "sphere of

influence," in which a spirit of neighborly understanding reigned and commercial interchange was restricted very largely by the geographic limitations of the given region. A business establishment in any one of these more or less isolated centers had a trade it could depend upon as long as its service should continue satisfactory—a trade that came to it naturally and inevitably in consequence of the lack of hard, smooth highways and speedy transportation.

Good roads have revolutionized the business of the nation and "the end is not yet." A profound change in commercial habits has been wrought by those thousands and thousands of miles of sleek, gleaming road-ribbons that we have created for ourselves and over which we dash so swiftly and exultantly, with the exhilarating sensation that we are setting space at naught.

Auto Responsible for Road Progress

Under the resistless compulsion of the automobile's spread, the good roads movement here in the United States has advanced with giant strides. Let us hark back for a moment to the year 1904. How much money do you think was being expended by state and Federal governments in that year for rural highways? Only a little more than two and one-half million dollars—incredible as that tiny figure may seem to us today! In 1928, the most recent year for which we can obtain complete statistics, the comparable figure was more than 827 million dollars—330 times as much. And, in addition to that huge sum, the expenditures of the counties and other local governments for roads in 1928 reached a total of 832 million dollars. Since 1921 the aggregate expenditures for roads in this country have mounted above a billion dollars every year.

According to the very best estimates I can obtain, we now have in the United States more than three million miles of public roads. This, to be sure, includes roads of all classes outside the limits of municipalities and is made up largely of local roads of small importance. We have 60,000 miles of surfaced roads. The "Federal Aid system"—which includes the roads of highest traffic importance — comprises nearly 190,000 miles, a system of splendid highways which would extend almost eight times around the world if it were in one unbroken road. Our roads form an admirable system, in many respects, but it is widely felt that we need more.

I spoke previously about the enormous annual expenditure in this country for road construction. But (as Mr. T. H. MacDonald, the chief of the bureau of public roads, has pointed out) this expenditure equals only one-half of the annual expenditure by owners of motor vehicles for gasoline alone. The public applauds the expenditure of money for good roads. It recognizes that this use of funds is economically wise, far-sighted and remunerative. Because of the existence of the fine, hard-surfaced roads the great motoring public spends vastly less than it otherwise might for such items as gasoline, operating expenses and upkeep of cars. There can be no doubt whatever that the amount thus saved exceeds the sums that we have been spending on our roads.

During 1929, by the way, our motor vehicles probably consumed more than 14 billion gallons of gasoline. If we figure twelve miles per gallon—which appears to be the approximate average consumption by vehicles of all makes and types—we are compelled to conclude that the motor cars of the United States traveled more than 168 billion vehicle miles last year. As Mr. MacDonald says, this is "an almost inconceivable figure," made possible by our improved roads and streets.

Showing how snow was removed from Milner Pass, located between Estes Park and Grand Lake. Snow twenty-five feet in depth was encountered in places. The work was done by the forces of the Rocky Mountain National Park.

Modern Highways Are Invaluable

I know I need not stress the commercial value and the value in health and pleasure of such great modern roads as the Lincoln highway, the Victory highway, the Dixie highway, the Boston post road, the Santa Fe trail, the Lee highway, the Yellowstone trail, the Pacific highway from British Columbia to San Diego and numerous others that come readily to mind. Along these superb roads our millions of motor cars whirl us over ground that once resounded to the clatter of the hoofs of red warriors—that witnessed the desperate struggles and determined advance of the "covered-wagon" days —or that shook under the tread of the gallant heroes wearing the uniforms of Blue and Gray.

To illustrate effectively the specific benefits from roads, let us take just one state as an example. North Carolina should serve admirably as a "test case." Between 1919 and 1926 that state constructed 125 million dollars worth of highways. And with what economic result? The number of farms in the state was increased by 13,000 during a period when the number of farms for the country as a whole was falling off. It may be objected that, in view of existing surpluses, greater agricultural production is not needed; but the point to be borne in mind is that the roads make it possible to organize the situation more deftly and efficiently.

Forty co-operative farm marketing associations were developed in North Carolina—engaged in shipping carload after carload of poultry, eggs, hogs, fruits and vegetables that the state formerly never grew for outside sale. Roadside markets and city curb markets—the immediate result of the good roads—stimulated the

growing of truck produce and formed an outlet for the farm surplus; with the cash thus obtained, the farm women put modern conveniences into their homes, dressed better, painted their houses and beautified their yards—thus creating substantial business for a variety of merchants.

The true value of North Carolina property multiplied eight times between 1900 and 1926, while the entire United States was increasing the true value of property by four times. Through the new roads, the state was enabled to recover its "lost provinces"—those sections to the far east and west that were formerly foreign to the state, so far as transportation connections of any kind were concerned.

Consolidated Rural Schools Follow

As a direct accompaniment and outgrowth of the new good roads, North Carolina built consolidated rural schools valued at 35 million dollars. At Asheville there was a 200 per cent increase in dollar business between 1919 and 1926—the period during which the good roads were built. In the Winston-Salem trade territory the retailers reported a 65 per cent increase in purchasing power per capita. The Greensboro chamber of commerce testified that the good roads widened the retail trade territory of the city to an irregular area extending from fifteen to fifty miles. The fine roads have given a simply tremendous boost to the state's tourist traffic. In 1920 North Carolina itself had about 140,000 motor vehicles, now it has not less than 485,000.

Here we see concrete proofs of the business benefits from highways—not idle theories, but authentic and attested facts. And since those facts were summarized four years ago, no doubt the benefits have multiplied.

The modern motor road has given to the businessman, as an individual, a wonderful freedom of movement—an ease and flexibility in the scope of his activity—which he never enjoyed in other eras. It has relaxed all kinds of once-rigid commercial bonds. It has helped to make business fluent, copious, easily impelled and diffused, swift to reach its goals—and vastly more complex than anything our fathers knew.

U.S. Raises State Aid Fund for Roads

THE national road building program is being gauged to an estimate that the number of automobiles in service in the United States will double within the next 10 years.

The Bureau of Public Roads has presented to Congress an enlarged scheme for Federal Aid highways, under which state allotments from the Federal treasury will be increased by 66 per cent annually during the next three years.

The new program is based on calculations that before 1940 there will be on the highways of the United States one motor vehicle for every two adult persons in the country.

Against 23,000,000 autos and trucks now operating there will be approximately 50,000,000 ten years hence, according to these studies. The layman's dictum, "it simply can't be done," is to be answered with broader highways, more trunk routes, express lanes for through traffic on the principal interstate arteries, and a system of heavy-traffic routes for busses and cargo trucks.

A beginning on the enlarged program will be made this year under increased appropriations for the Federal Aid system inaugurated in 1917.

A new Federal law authorizes $125,000,000 annually for the next three years, against $75,000,000 a year since 1917.

Under the national program these appropriations must be matched dollar for dollar by the states, which assures a minimum of $250,000,000 annually for new road projects through the fiscal year 1933. An equal amount, officials estimate, will be spent independently by the states, counties and municipalities, making a total of $500,000,000 a year for highway improvement.

Although already leading the world with 626,000 miles of improved roads, out of a total of 962,000 miles on the globe, the United States has only begun to surface. Less than 125,000 miles of its improved network of highways are classified as "hard surface" roads, and there are still 2,390,000 miles of unimproved earthen highways in the country.

A section of the Sterling-Fort Morgan concrete highway, showing a bridge over the Platte River; pavement and bridge constructed with Federal Aid co-operation.

Here is a view taken from the summit of Berthoud Pass on May 26th, showing results of the work done by the state maintenance forces under the direction of John Stamm. This pass was opened a month earlier than usual this year.

Early Colorado Trail Blazers

By MAURICE LECKENBY

WE of the present day think too little of the road builders of early day Colorado. We are wont to look upon the old means of transportation, the wagon haul from east of the range, as a makeshift of early times, something that occurred as a matter of course because there were no railroads and no other base of supplies.

In the early history of northwestern Colorado all supplies came from Empire and Georgetown. But few people stop to think how these roads were built across the great barrier of the eastern range. Fewer still stop to think that had not enterprising and far-sighted men put large sums of money into constructing these wagon roads, the settlement and development of northwestern Colorado would have waited many years longer than it did.

Two men stand out prominently as trail builders of early days—men who slightly realized the importance of the northwestern section of the state and aided in its development—John Q. A. Rollins and Capt. E. L. Berthoud.

The latter discovered Berthoud Pass, and he also surveyed the first railroad into that section of the state and came very near inducing the Union Pacific Railroad to build that way instead of by way of Wyoming in crossing the continent. John Q. A. Rollins built the road over Rollinsville Pass and it crossed at almost the exact spot where the Denver & Salt Lake Railroad ran before the Moffat Tunnel was built.

Both of these roads opened communication between Denver and the northwestern part of Colorado. Fortunately, the early hunter and adventurer, Sir George Gore, had discovered the easy pass across the range which bears his name and opened a passable road between Middle Park and the northwestern corner of the state. Thus communication was opened. Supplies had to be hauled in during the summer months, for in winter the high passes were piled with snow. Men on snowshoes carried the mail across them once a week, but no supplies could be brought in except during the five or six months of summer. This has been changed greatly since the State Highway Department took over the maintenance of roads and at the present time Berthoud and Gore passes into northwestern Colorado are open most of the winter.

Capt. Edward L. Berthoud was prominent among the men who rendered effective and valuable service in establishing the railroad system of Colorado and in other material improvements. He was born in the city of Geneva, Switzerland, in 1828. He came to America in 1830, his father residing in New York City. In 1832 the family removed to central New York, where young Berthoud received his early education. He graduated from Union college, and having devoted his studies mainly to scientific matters, he embraced the profession of engineering. As such he went to Central America in 1851 as an engineer on the Panama railroad. He remained there until September, 1852. Returning to the United States he followed his profession in Kentucky, Ohio, Indiana, Wisconsin and Iowa. Going to Kansas in 1855, he settled at Leavenworth, where he remained until 1860, when, becoming attracted by the glowing accounts of Pike's peak, he packed his belongings in a four-mule wagon, and with his wife crossed the plains to Golden, then the chief city of the Rocky Mountain region. He became interested in mining and followed this occupation with good success. In 1861 he started to explore the range at the head of Clear Creek and on May 15, 1861, discovered the pass leading into Middle Park, which has been named in his honor and is traveled yearly by thousands of tourists who want to see one of the most scenic parts of Colorado.

Following this discovery he was engaged by the Central Overland and California Express companies to survey a route to the Great Salt Lake. Starting about June 21, 1861, the whole country from the head of Clear Creek to Provo, Utah, was reconnoitered and examined by him and his party, reaching Provo July 31, 1861. Returning August 22 of the same year the complete survey of a wagon road from Golden to Provo was completed by September 19, along the line of the early wagon road in this section. The distance from Golden to Provo was given as 413 miles, and the result was hailed throughout Colorado as solving the transcontinental problem, and it also was believed it insured the building of a transcontinental railroad over this route.

Golden was then the most ambitious town in the west, and about this time two claims were put forward regarding the new road. First, that the main difficulties of a good direct wagon road were the first ten miles of the canon of Clear creek and the main central road at Berthoud pass, 10,914 miles above sea level. Second, that the country traversed west of this pass was fine valleys and that excellent coal abounded, while the distance over the so-called overland route by Wyoming was shortened fully 200 miles.

Here are some of the facts and claims set forth by the Golden newspaper at that time:

"Mr. Berthoud having arranged with William H. Russell and Ben Holliday that he should survey a wagon route from Golden City to Salt Lake City by the new pass, organized a party of ten picked men, among whom was Major James Bridger. Starting June 21, 1861, the party crossed the valley of Clear creek, past Idaho Springs and Empire to Berthoud pass, thence by Middle Park, Gore's pass, Bear and Snake river valleys to below Williams' fork, thence over to White river just above the mouth of Uintah river, up the Uintah valley and the Duchesne fork to the Wasatch mountains, crossing these mountains from the head of Duchesne and Red fork to Timpanago's river, thence to Provo City and on to Lake Utah.

"After refitting in Provo and Salt Lake City, the party in August started on their return journey, beginning the survey and the measurement of the route from the northeast corner of Brigham Young's house in the town of Provo, arriving at and completing the survey to Golden September 17-18. This route demonstrated the fact that from Golden City to Provo City, a wagon route direct and easy by the valley of Clear creek, Middle Park, head of Bear and White rivers can be easily and cheaply constructed.

"Again this survey plainly indicates that the technical difficulties for a railroad course are nominal; that it is one of the easiest lines by which to overcome the main Rocky Mountain, the Park range and the Wasatch mountains, and would give a route fully 200 miles shorter than the present route via Cheyenne, while it would open up a succession of fertile valleys, extensive coal fields and open up two new mining districts west of the Snowy range."

In August, 1866, the Union Pacific railroad sent a corps of engineers to Golden to make a survey of this line. The survey had full success. A good route was surveyed but it would require a tunnel five-eighths of a mile in length. The railroad company rejected the route in favor of the one by Cheyenne "on account of the time required and the high cost of such a laborious undertaking."

In 1863 W. A. H. Loveland and E. B. Smith, leading citizens of Colorado, went before the territorial legislature and procured a charter for a wagon road over Berthoud pass. In 1865 Loveland chartered a railroad to build over this route.

In 1867 the matter was revived when the Colorado Central was organized. Jefferson county voted $100,000 in bonds. This railroad was finally constructed to the booming mining camps of Clear Creek and Gilpin counties, but it never got over the range.

John Q. A. Rollins, another Colorado road builder, was born in Gilmanton, N. H., June 16, 1816, and he had a remarkable career. He experienced the extremes of varying fortune in the early days of Colorado, several times making large sums of money and losing them again, but his spirit was so buoyant and he was so hopeful and energetic that he was quick to recover from business adversity.

At the age of eighteen Mr. Rollins left his home in New Hampshire, arrived at Boston and found employment with Curtis Guild. Young Rollins proved so capable that within one year he was entrusted with the receiving and disbursing of all the goods of the store, at that time the largest wholesale grocery in Boston.

In 1835 the active spirit of John Rollins called him to the west. With carpet bag in hand he took a boat to New York City and Albany, thence by rail to Schenectady over the first railroad westward, thence by canal, part of the distance working his way on the "tow path" to Buffalo, thence to Detroit by steamer,

Two more views taken near the summit of Berthoud Pass on May 26th. The surface of the road was in such excellent condition that chains were unnecessary. A traffic check showed over 2,000 cars passed over this road on Decoration Day.

and thence to Chicago on foot, making forty-five miles a day and glorying in beating the stages and boats into the young city. His first experience was being robbed of $60 and a gold watch, all of his earthly possessions. In a few weeks he was possessed of $200 and with this he got possession of the ground between Clark and Randolph streets by the river, 400 feet, and soon after sold out for $400, a quick sale and large profits, but now the property is worth millions.

He then took up a quarter section of government land on the west side of the Chicago river, cut 200 tons of hay the first year and sold the same and a part of the land for $2,000, and abandoned the rest of the land, as it was then nothing but a mudhole, though now built with the most costly buildings in Chicago. After this Rollins obtained 5,000 acres of land near Belvedere, Ill., went into merchandising, invested in Wisconsin pine land, freighted, bought cattle and did many other things, prospering most of the time.

In the spring of 1860 Mr. Rollins caught the Pikes peak gold fever and outfitting at the Belvedere farm with nineteen teams started for Colorado. Arriving in Denver late in the season he sent part of his goods to a new town he and others had started at the junction of the Platte and Poudre rivers and part to Gold Dirt in Gilpin county, where he set up a quartz mill in the winter of 1860-61. This was a six-stamp mill, completed in February and the first week's run resulted in cleaning up $1,475 from six cords of ore taken from his own claim on the famous Gold Dirt lode. He enlarged his mill to sixteen stamps and bought all the claims he could on Gold Dirt.

Mr. Rollins soon was wealthy, and in company with New York people organized mining companies with millions of capital to work Colorado mines. At this time he had spent $300,000 of his own money in the purchase and development of mines, owning 20,000 linear feet of gold-bearing veins, 300 acres of placer land and 2,000 acres of timber and farming lands. He made his home at Rollinsville, and the residence still can be seen at Rollinsville station on the Moffat road.

Mr. Rollins engaged in a number of important enterprises in addition to those mentioned. He was at one time the partner of D. A. Butterfield of early overland freight fame. He put $75,000 into the firm of Butterfield & Rollins, most of which he lost. He put $60,000 into the salt works in South Park, which was not a success.

He took rank among the first of Colorado road builders, being the builder of the wagon road from Rollinsville over the range to White Sulphur Springs in Middle Park, where he built the first bridge over the Grand river. This road was forty miles long and cost $20,000. It was conducted as a toll road and was used by many of the early settlers when coming into what are now Grand, Routt and Moffat counties. Its construction gave great impetus to the settlement of northwestern Colorado and John Q. A. Rollins deserves one of the first places as an early day developer of Colorado.

According to the Ohio Farm Bureau Mutual Automobile Insurance Company, automobile drivers between the ages of 18 and 20 are the greatest hazard to traffic. This finding was made on an examination of 2,000 traffic accidents.

Statistical Story of U. S. Highways Is Told In Booklet

A STATISTICAL story of the growth of highway systems in the United States and in the world is recited in Highways Handbook, recent illustrated publication by the Highway Education Board.

"The building of the modern highway system," says Thos. H. MacDonald, chairman of the Board, in a brief introduction, "has no counterpart in the public works of any nation.

"The construction of the Panama Canal was a task of large magnitude; its completion a great national achievement; yet large as it was the contribution of the Federal government alone to the construction of highways far outmeasures it, and the part of the Federal government in the program of road improvement has been relatively small. The greater part of the work has been done by the states and their subdivisions.

"'The story of this great constructive work wants no elaboration. The bare figures of miles built and money invested are impressive beyond need of added emphasis; and it is such an unembroidered story that is told by the facts and figures presented in this booklet."

Data and information used in the booklet are from governmental tabulations, the Board says, the United States Bureau of Public Roads and the automotive division of the Bureau of Foreign and Domestic Commerce being the principal sources of supply. The 97 pages of the handbook, the first comprehensive grouping of highway statistics into one volume, are divided into ten chapters, each treating of a separate phase of the subject.

One chapter is devoted to a general summary, an itemization of interesting features in connection with the subject. What is the longest paved road in the world? What state has the largest highway mileage? What is the shortest road and the most narrow street? What is the proportion of the United States highways to the rest of the world? These and a hundred other pertinent questions are answered in the section on "Milestones."

For the student, the book is a treasure trove. Tables giving total road mileage, road income, and expenditures, and other related data, by years, by types, by states and by counties appear frequently in the booklet. The total road expenditure for 1928, for instance, was $1,423,870,278, which is broken up into various subdivisions covering construction, maintenance, administration, purchase of equipment and bond interest.

Of the total 1928 highway income of $1,566,946,170, 20 per cent was derived from motor vehicle fees, 18 per cent from gasoline taxes, 5 per cent from Federal Aid, 17 per cent from bonds, 27 per cent from general taxes and 13 per cent from miscellaneous funds. General taxes fall 2 per cent short of covering the cost of maintenance alone.

Average automobile receipts for highway improvement have increased steadily from year to year, the booklet shows, despite or perhaps because of the growing number of automobiles. In 1919, with a registration of 7,566,446 vehicles, the average receipts per car were $8.68, while ten years later, with a registration in excess of 24,000,000 automotive vehicles, the average income per car was $25.63.

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NEWS OF THE MONTH

At the spring meeting of the State Highway Advisory Board the road from Hudson to Wiggins was rededicated a state highway. This road was once an official state highway, but when a shortcut route was designated along the north side of the Burlington tracks two years ago from Wiggins to Hudson, the road went back to its former status as a county highway and no state funds could be spent on it. Extensive improvements are now planned for the old DLD route.

As usual, the highway over the Fall River Pass, a connecting link between Estes Park and Grand Lake in the Rocky Mountain National Park, was officially opened on June 5. The road passes through snow banks twenty feet deep. The pass is 11,798 feet in altitude.

A new road to the top of the Royal Gorge over the Grape Creek route has been completed by Fremont County. The road was opened on May 23. Commissioner D. N. Cooper was in charge of the work.

The state route over Monarch Pass was opened to traffic on May 23. State maintenance forces with a giant rotary snow plow were in charge of the work. This was the earliest the pass has been opened.

C. V. Hallenbeck submitted the low bid for oil surfacing 7.4 miles of road between Florence and the Fremont-Pueblo county line, on May 23. He is now working on an oil-surfacing contract between Canon City and Florence. His bid on the new work was $34,975.

Bids were also opened on four other projects on the same day. They are as follows:

H. M. Fox of Florence was low bidder for gravel surfacing three and a half miles of state highway No. 16, north of Granby. His estmate was $13,662.

Hinman Brothers, Denver, entered the low bid for surfacing four miles of highway in Mesa County, with a figure of $185,229.50. The Mountain States Construction Co., of Pueblo, also entered a bid for the project.

W. F. Pigg & Son, Denver, were low bidders for gravel surfacing 9.883 miles of highway in Weld County, with a proposal of $35,567. A. M. Grover, Denver, entered a low bid of $6,224 for constructing a concrete bridge abutment on the Denver-Golden road.

Showing a section of the Independence Pass highway, now open to traffic—the highest pass road in Colorado.

Crews of the New Mexico Construction Company have started work on the concrete pavement east of Greeley. It is expected this work will be completed the latter part of August.

The new oil-surfacing project between Littleton and Englewood was completed the first of June. The project formed a connecting link with the pavement in Englewood and the state pavement in Littleton. The new surfacing is greatly relieving the traffic on the Denver-to-Littleton paved highway. Cost of the surfacing, approximately $18,000, was borne by the State Highway Department, Arapahoe County and the funds allotted to Englewood and Littleton from the 3 per cent state gasoline tax fund.

J. L. Busselle Const. Co. has completed the 561-ft. steel and concrete bridge over Fountain Creek near the town of Fountain. This structure forms a link in the new paved highway now under construction between Colorado Springs and Pueblo. Concrete has been poured on six miles of the twenty-six-mile project.

Bids for $280,000 additional highway construction for this year were let by the State Highway Department May 30. They represented seven projects, most of them Federal Aid.

The projects and the low bidders were:

Federal Aid project for gravel surfacing of .236 mile of road on state highway No. 123, northwest of Fort Collins, Larimer County; low bidder, J. Fred Roberts & Sons, Denver, at $15,566.

Federal Aid project for concrete paving of 1.9 miles of road on state highway No. 15, north of Monte Vista, Rio Grande County; low bidder, Driscoll Construction Co., Pueblo, at $43,566.40.

Oil for surfacing Federal Air projects 270-AR, BR and D; low bidder. White Eagle Oil Corporation, Casper, Wyo., at $13,552.

Federal Aid projects for gravel surfacing of 6.262 miles of road on state highway No. 10, east of Monte Vista, Rio Grande County; low bidder, Mountain States Construction Co., Pueblo, at $44,875.40.

Federal Aid project for gravel surfacing of 6.412 miles of road on state highway No. 4, north of Minturn, Eagle County; low bidder, Luke E. Smith & Co., Inc., Denver, at $38,860.

State project for a 140-foot timber bridge with graded approaches on state highway No. 12, northeast of Bloom, Otero County; low bidder, Pueblo Bridge & Construction Co., at $4,880.

Federal Aid projects for oil process surfacing of 21.764 miles of road on state highway No. 6, between Lamar and the Kansas state line, Prowers County; low bidder, J. Fred Roberts & Sons, Denver, at $120,489.

Wolf Creek Pass was officially opened to traffic on May 28, according to word coming from D. Kirk Shaw, division maintenance superintendent. Crews were employed on both sides of the pass in clearing winter snow from the roadway. The road was reported in good condition when opened. H. C. Lallier has started a large crew of men on the grading contract which begins at Twin Bridges and runs eastward. Over $200,000 has been appropriated for new construction on the pass.

State highway forces have completed the work of gravel surfacing the Victory highway between Granby and Hot Sulphur Springs, according to John Donovan, state maintenance engineer. This work included the raising of the grade through Blayney's Lane and the hill east of Windy Gap. This was a "mean" piece of roadway when wet.

State maintenance forces are busy improving the road between Salida and Canon City. Four crews are employed in the work. Trucks are being used to haul gravel on the bad spots. "In some places the roadway is being widened, and is greatly improved," says the Salida Mail in comment on the work.

The first "pre-mixed" oil surfacing to be laid in Colorado is now being placed on the state highway south of Glenwood Springs, leading into the Carbondale and Frying Pan country, and also on the direct route to the Carlton Tunnel. The big oil mixing plant and other equipment used on the project is being used in co-operation with the H. W. Moore Equipment Co., the plant being placed on the job to demonstrate what it will do on this kind of surfacing. "Pre-mix" oil surfacing is now being used almost exclusively in some states, this method replacing the "mixed-in-place" type. There will be two and one-half miles of the new surfacing in the Glenwood project, which is being laid in co-operation with the state and Garfield County.

W. F. Pigg and Sons of Denver have moved their contracting outfit on the new grading and gravel project between Ault and Nunn, in Weld County. The road camp is located at Pierce. Howard Pigg is in charge of the work for the contractors. This work is being done preparatory to oil surfacing, which will be done by the state forces.

The outfit of the Pioneer Construction Co., which has been awarded a $150,000 road contract in the Mesa Verde National Park, has arrived on location and started work. The contract calls for grading and gravel surfacing of several miles of roadway in the park.

The following was printed in the Cortez Herald, issue of June 4:

The highway contract for the road from the Colorado line to Shiprock, N. M., was yesterday awarded to the Maloney Construction Company.

This completes the last link in the Cortez-Shiprock-Gallup highway, and means much for the future of Montezuma County and the territory west from here to Monticello, Utah.

Maloney's bid on this contract was $234,000—the engineers' estimate for the work was $315,000.

The next lowest bid for this work was by the Armstrong Company, with a bid of $236,700, or $2,700 higher than the Maloney bid.

Work on this 16-mile stretch of highway must start in 30 days and be completed in 300 days.

The Maloney contractors are fine highway builders and the fact that they landed the contract means that the work will be done in first-class shape.

Hurrah for the highway outlet south! Westward to the Utah state line is the next goal.

On June 8 the Pueblo Star-Journal printed the following news item relative to the paving being done by Edw. Selander on the state highway north of the southern metropolis:

Three miles of paving have been completed north of Pueblo on the Colorado Springs highway by the Edward Selander Construction Co., which has a contract for paving 15 miles of the 26-mile unpaved stretch of the road. The remainder, starting the other side of Fountain, is being laid by the Roberts Construction Co., of Denver.

During the past week the Selander Company laid about 6,000 feet of paving, according to Selander, and now has the road paved on the other side of the Bragdon crossing. More than a mile a week is being laid by use of the new, up-to-date machinery in operation.

As soon as about nine miles of the project have been completed travel will be routed over the south end and through the underpass, thus obliterating one of the dangerous railroad crossings, before all of the work has been finished.

Plans are practically completed for the construction of a new road over the Black Mesa from Sapinero to Hotchkiss. About three years will be required to complete the work. Besides serving as an important artery of commerce, the new highway when finished will be one of Colorado's real scenic routes that can be traveled the year 'round, according to Leslie J. Savage, of Hotchkiss. The Colorado Highway Department is co-operating with the Bureau of Public Roads in the construction of the new highway.

Independence Pass was opened to traffic on June 6. The road was in fair condition when the first motorists went over. Independence is the highest pass n the state, having an elevation of 12,095 feet.

View of the modern gravel surfaced highway between Salida and Buena Vista in Chaffee County, constructed and maintained by state forces.

Clippings, Letters and Comments

DEALING WITH STATE HIGHWAYS

New Road Will Shorten Distance to East

The Grand Junction Sentinel has the following to say relative to the big highway project now in course of construction between Palisade and DeBeque:

Cutting 30 minutes off the driving time from this city to DeBeque and shortening the distance by eight miles, the road now being constructed down the east side of the Colorado river to the mouth of the Plateau canon will be a dream realized for many of the forward-thinking residents of this section of the country.

The use of this road will enable tourists and local drivers to make this trip without passing over the road from the upper end of the Plateau canon, a road which is characterized by steep slopes and short turns, and has always been responsible for slowing up the time from this city to DeBeque and points beyond.

The part of the project now under construction is about 10 miles of grading and gravel surfacing, together with the necessary structures for the DeBeque bridge, down the east side of the Colorado River to a point within about four miles of the mouth of Plateau canon.

More Good Road Completed

Relative to an improvement made on the road to Loveland Pass, the *Georgetown Courier* printed the following:

Another important piece of road work was finished this week when cars started going over the new stretch of road about a mile north of Georgetown, which has been under construction for some time. This new piece of work takes out a number of twists and turns in the road and makes it almost a straight stretch for over a mile.

This work was made possible by the co-operation of the State Highway Department and the county commissioners of Clear Creek County and with the aid of Senator Fred W. Flebbe, who exerted considerable influence in securing an appropriation from the highway department for this purpose.

One point of special interest in the construction of this new road is the fact that the filling was accomplished at a cost of less than 25 cents a cubic yard, where estimates had been made by engineers that it would cost not less than 35 cents.

Money saved on this project will be used in the further improving of the road in the near future.

Southwestern Weld Roads Are Improved

The following appeared in the *Erion* of Erie relative to the roads around Erie:

Townspeople of Erie are very grateful to the county commissioners who are responsible for the improvement being made in the roads in and around the vicinity of Erie.

Red ash is the material being used in this work and it is being obtained from the Columbine mine. For a long time the condition of the roads has been very poor and they were next to impassable in the winter time. But now, however, a very thorough job is being done of improving them.

Road Building

The following comment is from the *Fort Collins Courier:*

It is a long step from the rough, unsurfaced roads which prevailed a few years ago to the present improved highways with well-surfaced roads leading to them.

Plans of the state of Colorado and the Federal government to unite in paving about a mile of highway north of the city, and for continuing the oiling and graveling of the highway leading to Laramie, Wyo., are of significance to Fort Collins people not only because of the elimination of bad stretches of road which have failed to keep up with the automobile age, but because they indicate the tendency in Federal Aid road building — well-surfaced highways that will serve as military highways in time of war, with networks of good secondary roads leading to them from all directions.

The spending of $262,676 by the state and nation upon roads in Larimer County this year is a part of a well-defined program which is only in its beginning.

Highway Finances Call for Action

Colorado was unable this year to avail itself of some $200,000 of Federal Aid funds for highway construction. Next year an additional million dollars is appropriated. Under the pay-as-you-go plan of financing highway construction, there is no flexibility. The receipts of the automobile license fees, or the half which goes to the state, are used to retire such bonds as are outstanding. The receipts of the gasoline tax are divided between state, counties and cities. Once more, apparently, the legislature must revamp the highway revenue laws, if Colorado is not coolly to pass up a million dollars that is held out to it on a platter.

Aid Secured for Black Mesa Road

The Delta Tribune, issue of June 5, carries the following item in regard to the proposed new road over the Black Mesa:

A dream that is sure to come true, such is the story told by Leslie Savage, Crawford and A. E. Penley, Delta, following a meeting with road officials in Denver last week, concerning the construction of a new Black Mesa highway. The two men, representing the chambers of commerce of Delta County, flew to Denver with Captain Carlos Reavis a week ago, and there met with A. E. Palen and Mr. Hamilton of the Bureau of Public Roads, and Mr. J. L. Brownley, district engineer of the Forestry department to discuss plans on the new road and settle any differences. Savage and Penley reported Friday night at a meeting of the civic groups at Hotchkiss. Their report was accepted and they were thanked for their work.

The program as outlined calls for an expenditure of approximately $46,000 this year, with the possibility of obtaining enough more to bring the total to $80,000. The money will not be available until July 1, and work will begin at that time. Work will begin at Currecanti Creek and will go this way. Next year approximately $125,000 will be available for the project with work being started from each end of the project and in 1932 the center of the road will be completed.

President Signs Forest Road Budget

The following comment on the forest aid fund appeared in the *Grand Junction Sentinel* of May 9:

The President has signed the national forest highway bill recently passed by Congress, increasing the amount to be spent annually on highways in the national forests from $7,500,000 to $12,500,000. It is expected that the benefit of this increase will be felt during the coming summer and fall. It goes without saying that western Colorado will receive a share of benefits from this increased appropriation. It is one of the few congressional actions that have been taken that will provide some benefit to the West.

State Makes Effort to Complete Victory Highway

Writing in the *Rocky Mountain News,* E. C. McMechan says the following relative to construction work on the Victory Highway in Colorado:

Year by year now the Victory highway is approaching realization of the dream of its original sponsors—a dream of a great, central transcontinental route of traffic and travel nothing less than a boulevard along its entire course between the Atlantic and Pacific coasts.

Already, for hundreds of miles east and west, it is that now—a boulevard. And in Colorado this year great strides will be accomplished in converting more of it through the most difficult remaining sections to the condition of smooth, easy, safe driving that is the modern motorist's demand. All in all, 1930 will mark significant progress.

Gov. William H. Adams has approved the budget of the Colorado State Highway Commission providing for expenditures on the Victory highway totaling $1,000,000, including some unexpended funds from last year. In addition, exhaustive studies and analyses have been made as the basis of a co-operative effort by Colorado and Utah to enlist the participation of the Federal government in construction of an important section of the highway surrounded almost entirely by public domain. Together, these projects and activities denote the last major offensive in financing and construction of the Victory highway through the Rocky Mountain states.

Gasoline Consumption Shows Big Increase

AN AVERAGE of 510.4 gallons of gasoline was used by each motor vehicle in Colorado during the year 1929, according to the annual report of James Duce, state oil inspector.

This report shows the total gasoline consumption last year to be 155,507,842 gallons, an increase of 9.5 per cent over the previous year. At the present rate of consumption the total number of gallons used in Colorado this year will again break all previous records, despite the 4-cent gas tax charged to motorists.

The following table shows the gasoline consumption in comparison to number of registered motor vehicles from 1914 to 1929, inclusive:

Calendar Years	Motor Vehicles Registered	Gasoline Consumption	Per Cent Increase	Average Gallons per Machine
1914	21,439	10,372,238	....	483.8
1915	31,836	14,482,629	39.63	454.9
1916	48,027	19,988,001	38.01	416.2
1917	71,355	29,879,153	49.49	418.7
1918	87,116	32,800,910	9.78	376.5
1919	108,501	42,361,550	29.15	390.4
1920	130,913	51,917,098	22.56	396.6
1921	148,607	60,390,692	16.32	406.4
1922	165,098	65,891,220	9.11	399.1
1923	191,429	75,258,403	14.22	393.1
1924	215,473	94,031,766	21.33	423.8
1925	241,959	98,741,301	5.01	408.1
1926	254,696	112,380,309	13.81	441.2
1927	269,854	128,304,024	14.16	475.4
1928	284,543	142,013,099	10.69	499.1
1929	304,631	155,507,842	9.5	510.4

Note—Increase of consumption per machine from 1924 to 1929 is caused by large increase of bus lines, heavy truck lines, taxicabs, closed cars and general use of tractors and gasoline-operated machinery.

To estimate the amount of gasoline used in a county, multiply average gallons per machine by number of motor vehicles registered in said county.

Collection of Inspection Fees and Gasoline Tax for Calendar Years 1913 to 1929

	Year	Inspection Fees	Gasoline Taxes	Total
	1913	$ 9,660.91	.....	$ 9,660.91
	1914	15,692.69	.....	15,692.69
	1915	20,457.38	.....	20,457.38
	1916	25,410.22	.....	25,410.22
	1917	37,083.99	.....	37,803.99
	1918	40,878.27	.....	40,878.27
1c Tax	1919	46,177.74	$ 274,401.06	320,578.80
	1920	47,246.98	458,394.82	505,641.80
	1921	59,751.98	566,570.36	626,322.34
	1922	63,332.96	644,912.30	708,245.26
	1923	73,684.82	922,643.73	996,328.55
2c Tax	1924	113,642.02	1,773,361.66	1,887,003.68
	1925	108,313.29	1,845,470.48	1,953,783.77
	1926	115,147.86	2,169,456.07	2,284,603.93
3c Tax	1927	73,649.57	3,272,537.05	3,346,186.62
	1928	26,618.08	4,115,298.82	4,141,916.90
3c and 4c Tax	1929	.....	5,560,348.03	5,560,348.03
Total		$876,748.76	$21,603,394.38	$22,480,143.14

Note—No Inspection Fees were collected in 1929, as Supreme Court decided against collection thereof, and all fees collected from the inception of the 3c Tax, May 1, 1927, were returned.

ROAD OFFICIALS CONFER ON NEW 11-MILE CANON HIGHWAY

Commissioners of Park County will report soon to Denver and the State Highway Department the share their county can assume in building a new highway at the site of Denver's proposed new $1,100,000 dam at Eleven-Mile Canon.

Denver is ready to contribute the cost of building a road around the dam, estimated at $80,000, or to give this amount to the county and highway department's appropriation for a more direct, standardized road, water commissioners said.

That amount already has been included in the city's estimate for the cost of the dam.

Suggestion from Maj. L. D. Blauvelt, state highway engineer, and Jefferson H. Davis, Colorado Springs, highway advisory board member, that such a standardized road be constructed met with general approval. The cost would be $500,000 to $750,000, it was estimated.

The county, State Highway Department and possibly Federal Aid funds would raise the amount.

This road would leave the present canon route at Lake George and go over Wilkerson Pass. The county commissioners said it would give residents near Fairplay and Hartsel a much shorter route into Colorado Springs, Denver and other plains cities.

At present the road at the dam site follows the old Colorado Midland Railroad grade. It has never been designated formally as a state or Federal Aid highway.

About 11 miles of the present route will be covered by the reservoir the dam will create.

STATE CREW IMPROVES HIGHWAY BETWEEN COMO AND JEFFERSON

Maintenance forces with heavy equipment are being employed in the raising of the grade on the roadway between Jefferson and Como in Park County. This improvement is located on the present main road from Denver to Buena Vista, Leadville and the Western Slope. When finished the present work will eliminate one of the worst stretches on the entire route. John P. Donovan, maintenance engineer, is supervising the work. The new grading will be graveled later in the summer.

CONTRACTOR RUSHES WORK ON NEW ROAD SOUTH OF GREENHORN

Work on the $92,000 road project near Greenhorn, which involves realignment and surfacing, will be finished by July 15, nearly five months ahead of schedule, according to Ray Jewell, president of the Mt. States Const. Co., contractors. The project is 7.2 miles in length. A portable crushing plant is now turning out approximately 600 tons of crushed rock per day, says Jewell.

The sum of $34,000 will be expended this summer on improving the Colorado Springs-Canon City highway. The proposed graveling, widening of curves, and making of new alignment will start as soon as weather permits. El Paso and Fremont County road equipment will be used. Twenty-five miles of the work will be located in El Paso County.

Overhead Dangers

Secretary of Agriculture Enlists Support of A. A. A. Air Travel Division in Effort to Combat Menace of Forest Fires Caused by Lighted Cigars and Cigarettes Thrown From Airplanes

IN an effort to combat the growing menace of forest fires caused by lighted cigars and cigarettes thrown from airplanes, the Secretary of Agriculture, Arthur M. Hyde, has enlisted the support of the Air Travel Division of the American Automobile Association in a campaign against this comparatively new hazard.

Thos. P. Henry, to whom the appeal for co-operation was addressed, declared that immediate steps will be taken to educate the traveling public in the importance of protecting the national resources.

"The tremendous increase in the number of planes now used in civil aviation," said Mr. Henry, "has made the fire hazard from lighted cigars and cigarettes a problem affecting not only the forests, but wooden structures along the airways as well."

Secretary Hyde said that lighted cigarettes and cigars were dropped from altitudes of from 500 to 1,000 feet in a test at a Spokane airport, and six cigarettes and five cigars were recovered. Of these, he asserted, all the cigars and four cigarettes were still burning.

"The American Automobile Association and its affiliated organizations are taking an active and gratifying interest in travel by air as well as on the roads," Mr. Hyde declared. "I am writing to you to request the co-operation of the Association and its members in reducing the fire hazard to our forests that grows out of the careless disposal of burning cigars and cigarettes." His letter continues in part:

"The Forest Service, as you probably know, has been striving for years to induce motorists to make sure that cigarette butts are extinguished before throwing them away. At least two states, California and Idaho, have laws prohibiting this dangerous practice, and these laws probably will apply to airplane passengers as well. The hazard exists everywhere and deserves the thoughtful attention of motorists until their safety responses have become habitual.

"Careless disposal of burning cigars and cigarettes from airplanes would introduce one factor that would make forest fires from such sources worse than those that grow out of similar carelessness by motorists driving on the highways. The starting points of these latter fires are near the roads and are consequently accessible to fire fighting crews. Fires kindled by burning objects dropped from airplanes might easily start in districts remote from highways and difficult of access by fire fighters and their equipment.

"Prevention of fires in forests is a matter of such high importance that this department urges all motorists and flyers to exercise self-control and to adopt safe practices which will minimize the serious annual losses from fires in the forests."

"A change of air often does harm to a piano," says a writer. Perhaps that is why the young lady next door has kept to the same one for the last six months.

ROAD BUILDERS' AND MACHINERY NOTES

CATERPILLAR ANNOUNCES LEANING WHEEL GRADER

A new type leaning wheel grader has been designed and produced by the Caterpillar Tractor Company and will be available to purchasers in Colorado in July, according to announcement made by L. L. Clinton, president of the Clinton-Held Company, local Caterpillar distributors.

Contractors are watching with keen interest the work being done by a new Ateco rotary fresno on the gravel contract held by Tyler & Baker on the state project east of the town of Aurora. These contractors are getting out the sand and crushed rock for the oil surfacing which will be done on this eight-mile stretch. Ateco fresno is of 2-yd. capacity and is handled by a "30" Caterpillar in feeding gravel to the crusher. Clarence Lee, formerly road overseer of Boulder County, is foreman on the job for Tyler & Baker. The crusher is located south of the Brighton road on Sand Creek.

MONARCH INTRODUCES ROUND WHEEL TRACTOR

Allis-Chalmers has entered the Colorado field with a small wheel tractor and three models with various wheel attachments are now on exhibit in the display rooms of the Wilson Machinery Co.

During the first week of June all salesmen of the Wilson concern were called into the home office and spent three days going over the sales efforts that will be made by Wilson in introducing this tractor in Colorado. Ray Corson, general sales manager, was in charge of the sales meetings.

Forty different attachments are available for this new Monarch round wheel machine. These include air compressor, crane, shovel, sweeper, snow plow, graders, etc. The Wilson Company have the agency for the industrial field, and will be sold in conjunction with the Monarch crawler tractor.

Corson announces the sale of a 501 Koehring 1½-yd. 45-ton shovel to H. C. Lallier Const. Co. This machine is the first of its kind shipped into Colorado. It is being used by Lallier on his $116,000 grading contract on Wolf Creek Pass.

John Bertrand, Inc., entered the contracting field the last month with a modern paving outfit, including a monster 27-E 1930 Koehring paver and a Monarch tractor. Fourteen of the latter machines have been sold in the Colorado territory during the past eight weeks, according to Corson.

"Yes, business has been good. Happy days are here again," he concluded.

(1) An elevating grader outfit at work in Bent County. Photo by Clinton & Held. (2) One of the new sure-trac Galion one-man maintainers purchased by Baca County. Photo by H. W. Moore Equipment Co. (3) Here we have a photo of a FWD utility truck equipped with Willett Spring scraper, purchased by Crowley County. Photo by T. W. Monnell of Liberty Trucks & Parts Co. (4) Two Bates tractors in use on oil process work near Littleton. Photo by George Meffley. (5) A Cletrac "thirty" used by L. C. Schutte, the U. S. potato champion, near Monte Vista. (6) Pioneer portable rock crushing plant of the Mountain States Construction Co. near Greenhorn.

FOUR PIONEER PLANTS SET ON GRAVEL JOBS

Four Pioneer portable gravel crushing plants have been set up in Colorado during the last sixty days, according to Elton T. Fair. Two of these went into Delta County, one located at Hotchkiss and the other at Austin. A third was set up at Ute in Montrose County, while the fourth

(Continued on page 26)

2,000 HOURS of HEAVY WORK

and no time lost for repairs

TWELVE months ago Platte County, Mo., added a Cletrac to the county's equipment. It was a Cletrac "40"—famous for power and dependability. One of its first jobs was grading and dragging 120 miles of roadway. Within one year's time this rugged Cletrac rolled up a total of 2000 working hours and no time lost for repairs.

Such performance is typical of Cletracs. Inbuilt stamina is one of their strongest characteristics. They have proved their ability to stay on the job day after day and month after month—to keep going without loss of time for adjustments or repairs. That is the kind of service Cletracs are giving to thousands of satisfied users.

Whatever the class of work there is a Cletrac size and model to handle it—better and at a lower cost! Five units to choose from, with a power range from 20 to 100 h.p. See the Cletrac distributor near you or write direct to us for literature.

THE CLEVELAND TRACTOR CO.
19380 Euclid Avenue CLEVELAND, OHIO

Cletrac Crawler Tractors

LIBERTY TRUCKS & PARTS CO. 150 West 6th Ave. TAbor 5711 **Denver**

Four Pioneer Plants Set on Gravel Job

(Continued from page 24)

went to the Mountain States Const. Co. and is now working on the state highway gravel surfacing contract south of Greenhorn on the Pueblo-Walsenburg road.

Sales of eight Adams leaning wheel graders also were reported by Mr. Fair during the past month. His sales also included four improved Adams maintainers.

FIRST PRE-MIX ASPHALT PLANT INSTALLED AT GLENWOOD

George Meffley, general sales manager of the H. W. Moore Equipment Co., has been having his hands full during the past three weeks, what with the installation of a new Cedar Rapids pre-mix asphalt plant at Glenwood Springs and sales of various other pieces of equipment to county commissioners and contractors.

The pre-mix plant at Glenwood Springs is the first brought into the state, and the work it is doing in mixing the material for two and one-half miles of oil surfacing south of Glenwood Springs on the Carbondale road is being watched with much interest. Guy Frazee, one of the officials of the Iowa Mfg. Co., accompanied by Mrs. Frazee, made a special trip to Colorado to see the plant started on "its local way." A number of state highway engineers, contractors and county officials have made the trip to Glenwood to see the plant in operation.

The Moore concern opened their third branch house the first of June at Grand Junction, with Johnny Kuntz in charge. Several months ago a branch was established in

A giant Coleman four-wheel-drive truck clearing snow from Berthoud Pass.

An Adams Leaning Wheel Grader in tough going on State Highway No. 8. Owned by the State Highway Department.

Cheyenne, Wyo., with Johnny Werthan in charge.

NATIONAL SENDS OUT INTERESTING PAMPHLET

One of the most interesting "broadsides" to come to our attention during the past month was that sent out by the National Equipment Corporation, giving information on the six companies which comprise this corporation. Pictures of the seven plants included in the group are shown, these including two Koehring plants, the Insley, Smith mixer plant, Parsons ditcher, C. H. & E. pump and wood working machinery and the Kwik-Mix concrete mixer manufacturing plants.

"This broadside lists the 54 different items of equipment produced by our organization, and presents what is probably the most complete line of construction equipment manufactured by one organization today," writes O. C. Dahlman, advertising manager.

The principal units of the NEC line are Koehring crane and shovel; Koehring paver and Dandie mixer; Insley shovel and concrete placing equipment; CHE hoists, pumps and saw rigs; Parsons ditchers and backfillers; Smith tilting and weigh-mix mixers, and the Kwik-Mix mortar and trailer mixers.

The National Equipment Corp. line is handled by the Wilson Machinery Co. in Denver.

It takes two to dump the load. One of the pieces of equipment owned by F. W. Pigg & Son, contractors. It's a Caterpillar "twenty."

COLORADO ROAD JOB GIVEN NATIONAL PUBLICITY

In the May issue of the International Trail, a monthly illustrated magazine issued by the International Harvester Co. to truck users throughout the nation, there appears an article relative to the use of a fleet of trucks by Cole Brothers on their grading and gravel surfacing project west of Sapinero.

The article was written by J. W. Travis, and is entitled "Road Building in the Rockies," in which he describes how winding mountain trails are replaced by smooth highways.

In the summer of 1929 Cole Brothers, Pueblo contractors, were awarded a contract to grade and gravel five and one-half miles of trail between Sapinero and Cimarron, on the Gunnison River. Six International trucks played a big part in the completion of the work on schedule time. Mr. Travis describes how these machines were operated in sub-zero weather over an eight-mile continuous upgrade haul, the maximum of which was 11 per cent and the average gradient 6 per cent. On the entire job, long and short hauls alike,

(Continued on page 28)

One of Arapahoe County's Galion one-man maintainers, working on South Broadway.

Colorado Road Job Given National Publicity

(Continued from page 26)

an average of 240 yards of gravel was spread in a ten-hour day. Some days in hauling gravel each truck traveled from 170 to 200 miles at an altitude of 8,800 feet. The Cole Bros. contract is one of the spectacular road projects which the State Highway Department has been building during the past nine years.

CLETRAC MAKES FIVE MODEL TRACTORS

Five tractors, said to span the full range of crawler tractor needs, are now manufactured by the Cleveland Tractor Co., and all of these models are now on display at the Liberty Trucks & Parts Co., Denver distributing agents.

The models include the 20, 30, 40, the new 80-60, and the model 100, used for extra heavy construction work.

Crowley County purchased one of the new Utility 6 FWD trucks during the month. This was equipped with a Willett Spring scraper for maintenance work and a 3½-yd. Woods body and hoist. This machine will be used in J. G. Bogert's district, and besides serving as a maintenance unit, will be used as a general utility truck in hauling gravel and bridge lumber.

Tony Monnell, general sales manager of the Liberty concern, announced the sale of three Indiana trucks equipped with gravel bodies.

The state, Federal government and the counties will spend over $16,000,000 this year on roads in Colorado. Add to this the amounts that will be spent by towns and cities on streets, alleys and sidewalks and the total will be over $25,000,000.

PLANS FINISHED BUT PROJECT NOT YET ADVERTISED FOR BIDS

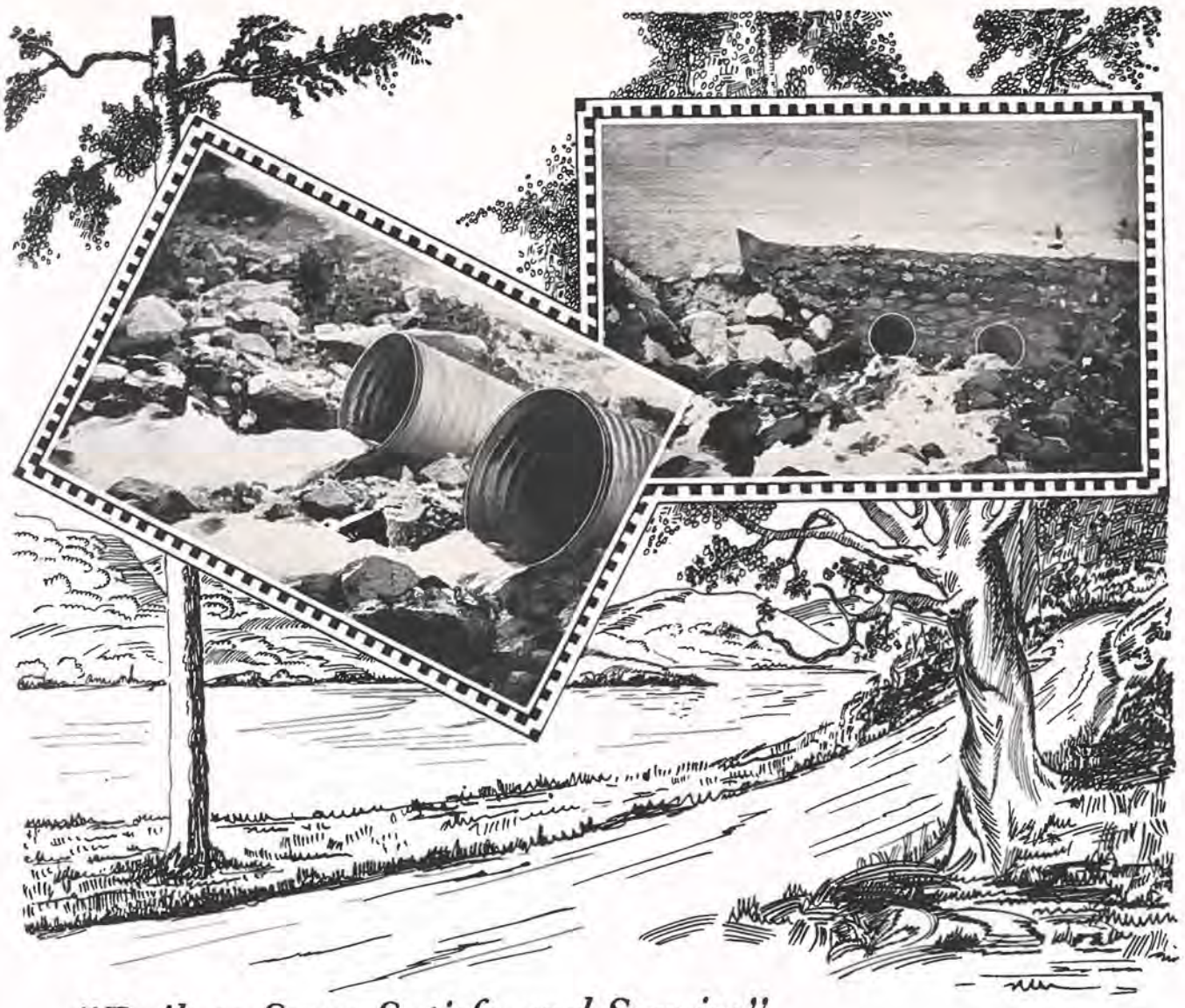
Proj. No.	Length	Type	Location
248-B	2.766 mi.	Gravel Surfacing	South of Buena Vista
258-I	1.249 mi.	Gravel Surfacing	East of Cimarron
262-J	2.723 mi.	Gravel Surfacing	Northwest of La Veta
279-I	1.207 mi.	Asphalt Pavement	Southwest from Denver

PLANS BEING DRAFTED

Proj. No.	Est. Length	Type	Location
91-R	6 mi.	Oil Processed Surfacing	Northeast of Trinidad
144-F	10 mi.	Oil Processed Surfacing	Northwest of Fort Collins
271-F	0.5 mi.	Railroad Overhead Crossing	West of Portland
189-B	4 mi.	Gravel Surfacing	West of Hayden
282-I	4 mi.	Gravel Surfacing	South of Craig
292-D	8 mi.	Gravel Surfacing	South of Wolcott
134-AR&C	14 mi.	Oil Processed Surfacing	West of Burlington
265-D	3 mi.	Gravel Surfacing	South of Durango

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per Cent Complete	Proj. No.
2-R9	Starkville	1.35 mi.	Concrete Pavement	H. C. Lallier Const. & Eng. Co.	$ 59,180.60	57	2-R9
57-R2	North of Lamar	0.502 mi.	Bridge	J. Fred Roberts & Sons	140,102.96	80	57-R2
68-R1	North of Monte Vista	1.900 mi.	Gravel Surfaced	J. Finger & Son	24,124.00	100	68-R1
68-R2	North of Monte Vista	1.9 mi.	Concrete Pavement	Driscoll Construction Co.	43,566.40	0	68-R2
78-R	Near Minturn	0.709 mi.	Gravel Surfaced	J. Fred Roberts & Sons	96,342.90	32	78-R
122-R1	Between Ovid and Julesburg	10.122 mi.	Grading	Bedford & Woodman, Inc.	49,976.65	7	122-R1
97-R2 168-AR1 216-AR1 273-R1	Betw. Lamar & Kas. State Line	21.764 mi.	Oil Processed Surfacing	Hamilton & Gleason Co.	122,216.20	0	97-R2 168-AR1 216-AR1 273-R1
138-B	North of Kremmling	3.133 mi.	Gravel Surfaced	F. L. Hoffman	76,363.35	74	138-B
138-C	South of Muddy Pass	4.184 mi.	Gravel Surfaced	C. A. Switzer	103,270.20	5	138-C
144-D	Northwest of Ft. Collins	2.834 mi.	Gravel Surfaced	J. Fred Roberts & Sons	66,430.10	70	144-D
144-D2	Northwest of Fort Collins	0.236 mi.	Gravel Surfaced	J. Fred Roberts & Sons	15,566.00	0	144-D2
147-D	Betw. Cortez & Utah Line	2.903 mi.	Gravel Surfaced	Wood-Morgan-Burnett Co.	43,432.60	48	147-D
149-B	East of Aurora	7.911 mi.	Oil Processed Surf.	Chas. B. Owen	134,611.10	24	149-B
149-B Detour	Betw. Aurora and Watkins	12.5 mi.	Gravel Surfaced	W. F. Pigg & Son, Inc.	16,432.00	100	149-B Detour
150-A	West of Craig	8.227 mi.	Gravel Surfaced	Gardner Bros. & Glenn	93,477.35	39	150-A
165-R1	East from Canon City	9.325 mi.	Oil Processed Surf.	C. V. Hollenbeck	50,548.30	12	165-R1
175-A	Between Sterling and Ovid	41.979 mi.	Graded	Cole Bros.	193,055.75	67	175-A
229-AR1 271-AR1 271-BR1 271-CR1 271-ER1	East of Florence	7.435 mi.	Oil Processed Surfacing	C. V. Hollenbeck	34,975.85	0	229-R1 271-AR1 271-BR1 271-CR1 271-ER1
243-C	West of Dyke	3.837 mi.	Gravel Surfaced	Grant Shields	47,404.40	13	243-C
253-D	West of Milner	2.547 mi.	Gravel Surfaced	Hamilton & Gleason Co.	147,192.00	80	253-D
258-H	West of Sapinero	4.921 mi.	Gravel Surfaced	Cole Brothers	123,700.60	80	258-H
262-G2	West of La Veta Pass	5.014 mi.	Gravel Surfaced	Pople Bros. Const. Co.	11,932.50	3	262-G2
263-A	Betw. Mortimer & Ft. Garland	3.404 mi.	Gravel Surfaced	Mtn. States Constr. Co.	47,509.20	100	263-A
263-B	Betw. Mortimer & Ft. Garland	3.133 mi.	Gravel Surfaced	Pople Bros. Const. Co.	29,532.40	2	263-B
265-C	Betw. Durango & Bayfield	2.500 mi.	Gravel Surfaced	Grant Shields	36,022.90	0	265-C
266-D	South of Bondad	4.111 mi.	Gravel Surfaced	Engler, Teyssier & Co.	96,075.30	89	266-D
267-C	Near Model	4.491 mi.	Gravel Surfaced	E. H. Honnen	45,801.00	92	267-C
270-AR1 270-BR1	East of Monte Vista	6.412 mi.	Gravel Surfacing	Mtn. States Const. Co.	44,875.40	0	270-AR1 270-BR1
270-D	Betw. Alamosa & Monte Vista	3.978 mi.	Gravel Surfaced	Mountain States Constr. Co.	32,679.40	98	270-D
272-E	West of Rocky Ford	2.562 mi.	Concrete Paved	H. C. Lallier Const. & Eng. Co.	76,199.00	100	272-E
277-D1	Betw. Colo. Springs & Pueblo	15.566 mi.	Grading	M. E. Carlson	218,277.80	100	277-D1
277-D2	North of Pueblo	15.566 mi.	Concrete Pavement	Edw. Selander	333,257.80	14	277-D2
277-E1	South of Colorado Springs	10.2 mi.	Grading	J. L. Busselle	221,389.65	100	277-E1
277-E2	South of Colorado Springs	10.2 mi.	Concrete Pavement	J. Fred Roberts & Sons	238,207.30	14	277-E2
282-G	South of Craig	5.147 mi.	Gravel Surfaced	Chas. B. Owen	61,645.22	54	282-G
282-H	Between Rifle and Meeker	7.029 mi.	Gravel Surfaced	Winterburn & Lumsden	82,589.74	99	282-H
286-D	North of Ault	9.883 mi.	Gravel Surfacing	W. F. Pigg & Son, Inc.	35,567.00	0	286-D
287-BR1	East of Greeley	7.413 mi.	Concrete Paved	New Mexico Constr. Co.	145,875.00	14	287-BR1
292-AR	North of Minturn	6.262 mi.	Gravel Surfacing	Luke E. Smith & Co., Inc.	36,860.00	0	292-AR1
296-E	South of Greenhorn	7.210 mi.	Gravel Surfaced	Mountain States Constr. Co.	93,594.88	43	296-E
297-C	Southwest of De Beque	9.953 mi.	Gravel Surfaced	Hinman Bros. Const. Co.	312,453.50	61	297-C
297-D	South of DeBeque	4.198 mi.	Surf. & Bridge	Hinman Bros. Const. Co.	185,230.50	0	297-D
298-B	North of Pagosa Springs	2.414 mi.	Surfacing	Engler & Teyssier	38,426.00	50	298-B
298-C	Bet. Twin Bridges & South Fork	3.780 mi.	Gravel Surfacing	H. C. Lallier Const. & Eng. Co.	116,864.50	0	298-C
300-B	North of Silverton	2.828 mi.	Graded	Hamilton & Gleason Co.	35,647.80	70	300-B
300-C	North of Silverton	1.937 mi.	Grading	D. G. Son	15,287.80	14	300-C



"Built to Serve, Satisfy and Survive"

In certain cases where there is not sufficient head-room to install one large Keystone Culvert, it is often advisable to place two smaller culverts side by side to handle the same volume of water. The discharge and intake ends of such an installation are shown in the pictures above. You will note the patented reenforcements at each end of the Culvert, a distinctive feature of Keystone Culverts.

KEYSTONE COPPER STEEL

COLORADO CULVERT & FLUME CO.

PUEBLO, COLORADO

Announcing

THE DISTRIBUTION IN THE
STATE OF COLORADO OF

Allis Chalmers
Industrial Type "U" Tractor

FOR CONSTRUCTION AND INDUSTRIAL PURPOSES

TRACTOR—35 H. P. Brake—24 H. P. Drawbar. Four speeds forward, one reverse. Equipped with Wehr Single or Dual Rubber Tires, French & Heck Pneumatic Tires, Regular Steel Wheels or the Traction Co. Crawlers. Also patented Spring Disappearing Lug Wheels.

VARIOUS ATTACHMENTS

Including Rear or Center Control Blade, Arc Welder, Air Compressor, Broom Sweeper, Weed Mower, Snowplow, Crane, Shovel, Bulldozer, Backfiller, Single or Double Drum Hoist, Road Roller, Locomotive, and various other attachments which find many applications.

LOTS OF POWER – STURDY – SIMPLE

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Sizes 35—50—70

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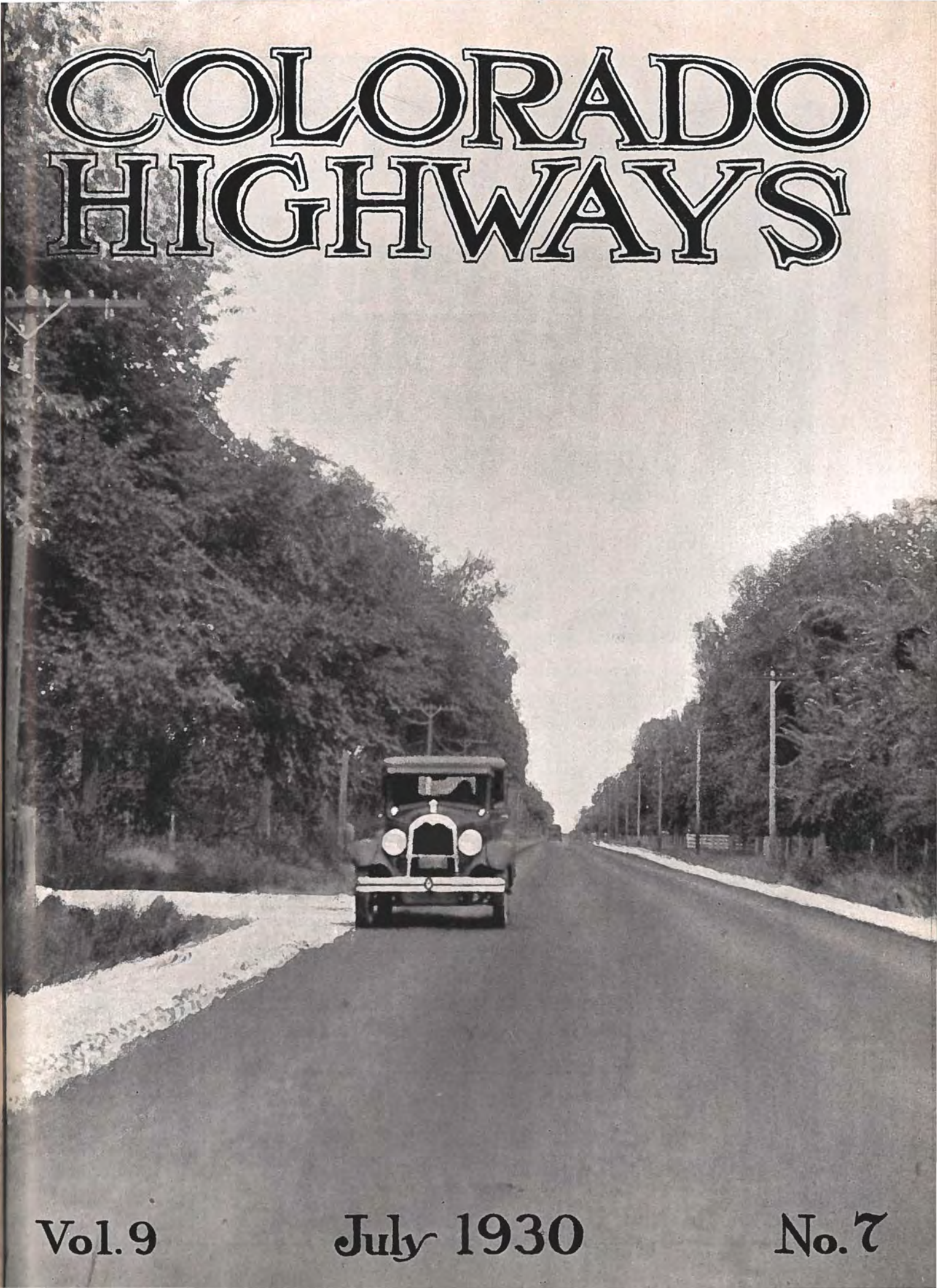
THE BRADFORD-ROBINSON PTG. CO., DENVER

COLORADO HIGHWAYS



Vol. 9 July 1930 No. 7

DURING the month of April, 1930, we shipped road building equipment that will produce a 10-hour daily capacity of 14,970 tons of road materials for the highways of the world. That is just for one month of one year. Road contractors everywhere are demanding service and capacity in their equipment and that is exactly what they get when they buy Cedar Rapids equipment.

Whatever your requirements are in the road material handling field, there is a piece of Cedar Rapids equipment that will do the work better, quicker and more economically.

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Iowa Manufacturing Company
Cedar Rapids, Iowa

MATERIAL HANDLING EQUIPMENT SINCE 1923

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Sales Representatives

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Colorado Highways

"BETTER ROADS"

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M. W. BENNETT, Editor

Articles on the subject of road building and highway development in Colorado are solicited. Manuscripts should be addressed to the Editor, with return postage. Photographs should accompany articles whenever possible.

10 CENTS A COPY. $1.00 A YEAR.

Our Cover Picture

ON the cover of this month's COLORADO HIGHWAYS we print a picture of the new oil-surfaced highway between Canon City and Florence in Fremont County. The new road surface is smooth, is dustless and does not throw oiled stones onto the fenders of a car as most oiled roads do. This stretch of road passes through a rich, fruit-growing section and the elimination of the dust nuisance alone has proved a boon to the growers. The new surfacing was laid by the State Highway Department with federal co-operation. Photo by M. W. Bennett.

Colorado Highways
"BETTER ROADS"

VOLUME IX. JULY, 1930 NUMBER 7

Highway Traffic Patrol Proposed

DURING the past few years there has been considerable agitation among motorists for the employment of a state highway traffic patrol in Colorado. A bill authorizing the organization of such a force was introduced in the last general assembly, but was voted down.

The recent epidemic of deaths from accidents on state roads has again focused attention on the necessity of such a police force in Colorado. Since the heavy summer traffic started two months ago, more than a dozen of the state's road maintenance employes alone have been injured by motorists.

To give the readers of Colorado Highways some idea of the work being done by the traffic patrols in other states, we print a summary of the report of the Minnesota Highway patrol for the month of May. Like the traffic patrols of California, Pennsylvania, New York, New Jersey, etc., the Minnesota patrol operates under the supervision of the State Highway Department.

According to Earle Brown, chief patrol officer, the 35 Minnesota traffic officers made 262 arrests in May, took 251 cars into custody, issued 1,763 tags for improper licenses, 4,632 tags for faulty equipment, gave warnings to 7,049 violators of traffic rules, and gave aid to 6,889 motorists. Fines imposed totaled $7,535 and license corrections brought in $2,283.

We give below some of the figures on arrests, tags and warnings, because they indicate some of the common traffic errors of motorists.

"There were 106 arrests for drunken driving. A total of $5,481 in fines was imposed on these drivers and 97 of their cars were taken into custody. There were 26 arrests for careless driving, 8 for passing on curves, 15 for failure to stop at 'STOP' signs, 1 passing on crest of hill, 2 for improper lights and 2 for overweight.

"Tags for illegal equipment included 1,960 no rear light, 1,202 with one head light, 430 license obscured, 260 inadequate, improperly adjusted or glaring lights, 163 no clearance lights, 196 with no muffler, 225 without rear vision mirror, 50 faulty brakes, 86 no windshield wiper, 70 miscellaneous. The tags require the driver to mail a card within 48 hours certifying that the correction has been made.

"Warnings were given to 2,660 drivers for improper parking, 978 for speed in congested area, 957 for not driving in right lane, 525 going through stop sign, 532 for improper passing, 353 for faulty lights, 162 for cutting in on traffic, 49 for livestock on highway, 41 for overloads, 37 for passing on curves, 132 miscellaneous.

"Improper licenses brought arrests to 102, in most cases for using licenses on a car other than the car for which they were issued. The patrolmen took 134 cars in custody for improper licenses, issued tags to 245 who had only one plate, 681 who had no plates, 205 with wrong class of plates, 39 out of state cars requiring Minnesota plates, 31 requiring visitor's permit, and 562 drivers who required chauffeur's license.

"The patrolmen attended 37 accidents, gave first aid to 14, gave road information or directions to 6,276 and aid in various ways to 599 others. Three stolen cars were recovered and 15 abandoned on highways were taken into custody."

HOW TIMES CHANGE

Years ago when the roads were poor and the farmers had horses and wagons and buggies and no automobiles, circus day was the one day sure to bring hundreds of farmers to town.

Nowadays with good roads and cars, distance and time are annihilated and the farmers attend picture shows and other entertainments and attractions in town in such a continued manner, that it is all taken as a matter of course and they add to any crowd at any time.

There is no line between town and country these days. We drive the same cars, we wear the same clothes, we eat the same foods, we read the same papers. As the country grows, farms become next door neighbors to the towns.

This solidifying of town and country is a good thing.—Brainerd Dispatch.

Contracts for 41 miles of paving were let by the Iowa Highway Commission June 24. This will bring the Hawkeye state 1930 paving program to 1,014 miles, with a possibility that additional contracts will be let during the summer.

Iowa had 2,317 miles of paving at the beginning of 1930. If all the contracts are completed, the state will have 3,331 miles at the end of the year. By 1933 the paving will exceed 5,000 miles, and every county seat will have a paved highway.

In 1926 Iowa had only 568 miles paved, and held 17th place. Today she holds sixth place, the five leaders being Illinois, Pennsylvania, New York, Wisconsin and Michigan. Iowa has more pavement than any other state west of the Mississippi.

The Missing Link on the Denver-Pueblo Paving Being Placed

THE final chapter in laying the concrete pavement between the City of Denver and the City of Pueblo is now being written and the contracts have been let, signed and work is under way to complete this ribbon of 18 ft. wide concrete between these two cities. The last stretch consists of approximately 25 miles, of which there are two sections. One section, approximately 10 miles long, is south from Fountain, and this project was awarded to the J. Fred Roberts & Sons Construction Company of Denver. The other section, approximately 15 miles long, north from Pueblo, was awarded to Ed. Selander of Fort Morgan, and before the end of the summer it is predicted that we may ride in comfort between the Capital City and the Industrial City of Colorado.

Both of these above mentioned contractors, when they were awarded these contracts, knowing that time was an essential factor, proceeded to do this work with the very latest and modern equipment for making good concrete and laying it speedily. Both of these contractors have had a number of years' paving experience and are entirely capable of giving a most satisfactory job in the least possible time.

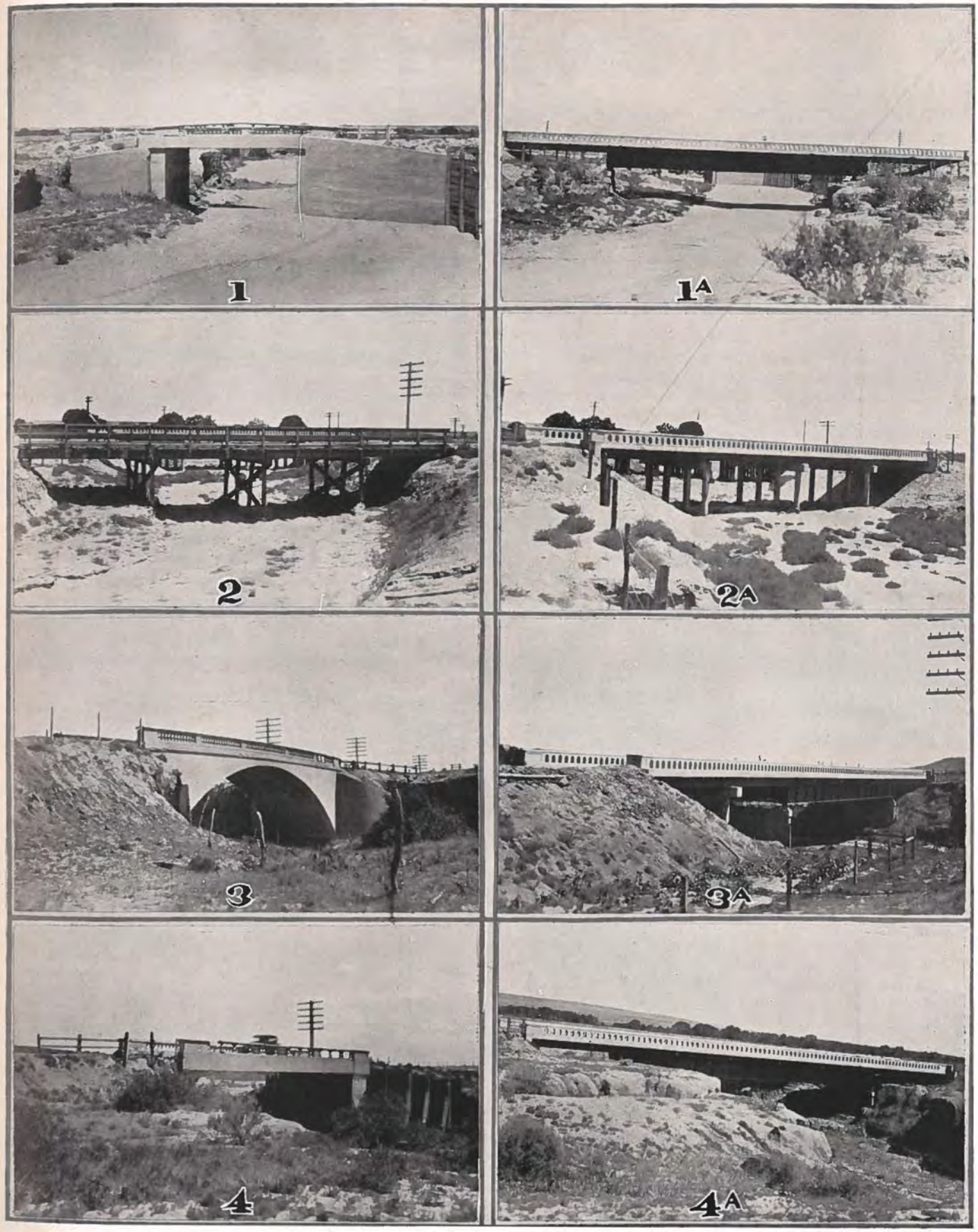
The Colorado State Highway Department has learned from experience that good concrete is not only produced by having good materials and being mixed properly, but that the water-cement ratio should remain constant, batch to batch, and the amount of materials proportioned to each batch should be accurate. This has necessitated equipment to weigh the gravel and sand, weigh the cement and the water to be accurately measured. This, of course, has all been taken care of in this new, modern equipment, and J. Fred Roberts & Sons Construction Co. and Ed. Selander are both equipped to handle this to the Colorado State Highway's satisfaction.

The material of crushed rock is hauled in gondola cars to a spur track and there unloaded by cranes equipped with clamshell buckets. This material is then placed in Blaw-Knox steel bins, as well as the sand which is taken from the river screened, and hauled to the stock pile at the central proportioning plant. Then the sand and gravel are placed in separate compartments of these steel bins and under each bin there is attached a set of Blaw-Knox heavy duty duplex weighing batchers. One weighs the correct amount of aggregate and the other the sand.

Central proportioning plant which enables contractor to speed up work.

The cement is taken in on the spur track in bulk and the proper amount of cement is loaded by hand into standard concrete buggies, run across a set of accurate platform scales, mounted on a specially built platform, and then as the trucks supplying the paver leave the central proportioning plant, having obtained their proper batch of sand and gravel, they are driven to the cement proportioning plant where the proper amount of cement is dumped on top of the sand. This gives each one a complete load of the proper weighed ingredients with the exception of the water for each batch in the mixing. Before this truck leaves the cement proportioning plant it is covered with a canvas to prevent the wind from blowing the loose, dry cement from the top of the load. There is a fleet of these trucks; in fact, a sufficient number to keep the large paving mixer constantly in operation. These trucks are then driven from the cement proportioning plant to the paver on the road. Before the truck reaches within a hundred feet of the mixer it is placed on a

Showing finished concrete pavement before gravel shoulders have been laid.



***BEFORE AND AFTER**, might well be the title to this group of photos showing old and new bridges on the new road between Colorado Springs and Pueblo. The new bridges form a part of the concrete pavement now being laid between the two cities. They run from 100 to 200 feet in length, and are 20 feet in width, being constructed of steel and reenforced concrete. These improvements were made by the State Highway Department in co-operation with the Federal government. M. E. Carlson was the contractor. Photos by M. W. Bennett.*

hand-operated turntable on the subgrade and turned around. The truck then goes a short distance to the paver skip backward, and of course this allows the truck to drive out after it has disposed of its load without backing the whole distance.

The subgrade is prepared by light grading and trimming. The heavy steel forms are laid for several hundred feet ahead of the mixer to grade and the proper distance apart, and then the sand cushion on which the concrete is laid is placed between the forms. The paver as used by the J. Fred Roberts and Sons Construction Co. is a Smith 27-E full crawler, gasoline driven with boom and bucket distribution. The paver used by Ed. Selander is a Koehring 1930, 27-E on full crawlers, and equipped with a gasoline engine for power and a boom and bucket distributor. Both of these pavers are capable of mixing 1 yard of concrete per batch and both are equipped with automatic water measuring devices and with a registering batchmeter. This instrument times the amount of mixing time that the material is retained and mixed in the drums. When the skip raises it starts this in motion and at the expiration of the time that

Showing concrete paver and finishing machine in operation on the Selander contract.

this batchmeter is set for, it is automatically released and allows the operator to discharge the batch of mixed concrete. This concrete is then distributed between the forms, the proper expansion joints placed and then an Ord power driven double screed finishing machine compresses the mass of concrete, finishing it as to crown and all that is necessary to do is for two men to follow with a hand edger to finish the edges both at the joints and at the sides adjacent to the forms, and a few strokes of a hand finishing belt and the pavement is complete for curing. The method of curing is of the water wetting down procress.

The heart of the job aside from the paving itself is the water supply, and in both cases water is supplied by heavy duty C. H. & E. triplex pumping units. This pump is capable of delivering 500 lbs. of pressure and 80 gallons of water a minute. These pumps are located at a well or river and deliver the water consistently through 2½-in. pipe to the paver, supplying the paver with water and for wetting down purposes for curing.

On these jobs everything is working like clockwork. The equipment is functioning 100%, and we predict a road of not only good concrete but a speedy completion of the jobs.

The Bragdon surface-crossing which will be eliminated with the opening of the new paved underpass.

As stated in the first part of this article, considerable equipment is being used on both jobs, and for getting out the sand for the sand cushion as well as the sand for the batchers, additional auxiliary equipment is being used, including revolving screens, Barber-Greene belt conveyors, a small dragline outfit, and even "friend horses" pulling fresnoes are also doing their bit. It is quite a hook-up. See one of these jobs in operation and follow it from the source of material supply until you ride leisurely along this ribbon of concrete which has been laid out to eliminate all grade crossings of the railroads and with easy curves and light grades to pull.

Progress plus!

The average passenger car trip in Vermont is 31 miles; in New Hampshire, 34 miles; and in Ohio, 38 miles. The average number of passengers per car in Vermont is 2.7; in New Hampshire, 2.8; and in Ohio, 2.2.

There are approximately 20,000 grade crossings on the entire federal aid highway system of 187,753 miles as of December 31, 1928. On the 76,000 miles of the system improved with federal aid from 1916 to 1928 nearly 4,300 have been eliminated.

Texas, with 188,564 miles of roadway, has the most highway mileage of any state.

One of the powerful high-speed pumps used for supplying water to mixer and for curing.

State Rushes Highway Projects

ONE hundred road building projects are under way in Colorado and 16 more will be started within a short time, according to J. E. Maloney, assistant engineer of the State Highway Department.

The projects are a part of the largest road building program ever outlined in Colorado and involve the expenditure of more than $6,000,000.

Decision to push the road building program was made by the Highway Department officials as one means of ending unemployment in Colorado.

Fifty of the projects now under way are being made in co-operation with the Federal government. The other 50 are carried on by state funds alone.

The engineering department is hurrying plans for the other projects called for in the state highway budget and most of the additional contracts will be let during August, Maloney said.

Bids on four additional Federal Aid projects were opened on July 25.

Plans now being drafted call for the oil surfacing of two large projec's, one for six miles northeast of Trinidad and the other for 10 miles northwest of Fort Collins.

A 14-mile oil surfacing project also will be started soon west of Burlington.

Work already is under way on the oil surfacing of 21 miles of road between Lamar and the Kansas state line. This project will cost $122,216.20.

The Victory highway, one of the principal transcontinental routes, is receiving the benefit of a large amount of the expenditures.

West of Denver two projects are under way on the Muddy Pass in Grand County and west of Bear River in Routt County.

Improvements costing $100,000 will start on a project between Hayden and Craig and another $100,000 will be spent west of Craig.

Counting the funds left over from last year, nearly $1,000,000 will be spent this year on development of the Victory highway.

No section of the state is being neglected in the highway work and large crews of men are at work in nearly every county.

One of the longest projects is between Ovid and Sterling, where slightly over 41 miles is being graded at a cost of $193,055.75.

The seven-mile oil surfacing project east of Aurora is costing the state and Federal governments $134,-611.10.

Ten miles of paving south of Colorado Springs will cost $238,207.30 and grading in the same vicinity will cost $221,389.65.

Paving north of Pueblo is a project involving $33,-287.50, and another grading project between Colorado Springs and Pueblo, which has been completed, cost $218,277.80.

1930 HIGHWAY CONTRACTS TOTAL TWICE 1929 FIGURES

Contracts for highway construction, awarded during the first three months of this year in 35 states, more than doubled the awards for the same period last year, and reached a total of more than $114,000,000, according to a statement by the Department of Commerce.

Increases reported by 30 states more than made up for reductions in five; Ohio and Idaho led in percentage of increase, while Pennsylvania's was the greatest in dollar value. The showing of some states was affected adversely by litigation and other factors not readily controllable and the returns still leave one-fourth of the country to be heard from, the statement points out.

NAIL-PICKER SAVES NEW MEXICO MOTORISTS $267,300

The electric nail-pickers (five in number) used by the New Mexico Highway Department have saved the motorists of New Mexico $267,300 in tire and tube repairs, according to figures recently compiled by the statistical division of the State Highway Department. The operations of these machines cover 5,500 miles of the main trunk line highway system of the state. They are kept in continuous operation throughout the year except for periods of snow and rain, when there is necessarily a temporary cessation of work.

A stretch of the new oil process surfacing recently completed near Canon City.

A shady stretch of roadway west of Florence which has been improved by the State Highway Department with Federal Aid co-operation.

Colorado Drops to 31st Place in Gasoline Consumption

COLORADO stands 31st in the amount of gasoline consumed for highway use, according to statistics compiled by the U. S. Bureau of Public Roads. The net total of gasoline taxed and used by motor vehicles in Colorado in 1929 was 141,466,891 gallons. California was first with 1,139,736,244 gallons. Pennsylvania came second and New York third.

The 48 states and the District of Columbia collected $431,636,454 in taxes on the sale of 13,400,180,062 gallons of motor fuel in 1929, reports received by the Bureau of Public Roads of the U. S. Department of Agriculture show. This includes a 12-month collection in 46 states and the District of Columbia, a 5-month collection in Illinois and the collections of 8 months in New York. Illinois and New York were the last states to adopt this method for part payment of the highway bill. The pioneer states—Oregon, Colorado, North Dakota and New Mexico—led the way in 1919. Now all the others have followed, but the tax did not become effective in New York until May 1 and in Illinois until August 1.

The average fee per gallon was 3.22 cents as against 3 cents in 1928. In the course of the year 20 states increased the rate of taxation either one or two cents. The highest tax per gallon was 6 cents; the lowest 2 cents. At the close of the year, three states had a 6-cent tax; eight a 5-cent tax; 19 a 4-cent tax; one, Utah, a 3½-cent tax; 10 a 3-cent tax and seven states and the District of Columbia a 2-cent tax.

In 1929 the rate per gallon was increased one cent in Colorado, Florida, Indiana, Kansas, Minnesota, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, South Carolina, Vermont, Washington and Wyoming; 2-cent increases became effective in Georgia, Louisiana, Montana, Nebraska, Tennessee and Texas.

Comparison of the total number of vehicles registered in 1929, with the total tax collected and with the taxable gallonage in all states (except New York and Illinois) and in the District of Columbia shows an average tax revenue of $17.72 per vehicle and an average purchase of 532 gallons of gasoline.

After deducting collection costs, the entire net revenue in 34 states was used for construction and maintenance of rural roads. In the other fourteen states and the District of Columbia, a total of $24,405,207 was used for other purposes. In three states part of the tax money helped support public schools. In eight states, a part of the revenue went to cities for repair and improvement of streets, as did the entire collection for the District of Columbia. In six states, small sums were deposited in general funds; in Mississippi, a special, extra tax was collected in two counties for seawall protection of highways and in New Jersey a small fraction of the receipts was turned over to the Department of Commerce and Navigation.

Of the revenue applied to rural roads, $297,967,756 was used for construction and maintenance of state highways; $85,113,708 for construction and maintenance of local roads; and the remainder, $23,371,785, applied as payments on state and county road bonds.

The following table shows the total number of gallons taxed in the several states:

STATE	Net gallons of gasoline taxed and used by motor vehicles
Alabama	178,162,903
Arizona	63,995,783
Arkansas	133,620,566
California	1,139,736,244
Colorado	141,466,891
Connecticut	202,354,590
Delaware	31,198,248
Florida	223,373,467
Georgia	219,609,473
Idaho	48,658,984

(Continued on Page 20)

Congress Urged to Increase Park Funds

AT its recent meeting held in Salt Lake City, the members of the Western Association of State Highway Officials passed a resolution urging congressional appropriation of $7,500,000 a year instead of $5,000,000 for national park highway work.

Attending the conference as representatives of the Colorado Highway Department were Maj. L. D. Blauvelt, highway engineer, and Edwin Mitchell, auditor.

Officials elected to serve the coming year were: Henry H. Blood, chairman of the Utah State Road Commission, president; Z. E. Sevison, Wyoming State Highway Department, vice-president, and J. D. Wood, Idaho State Commissioner of Public Works, secretary.

The association went on record favoring the establishment of a committee to co-ordinate highway work in its broadest scope, performing such tasks as formulating the general policy for improvement and priority of all classes of roads throughout the western states together with methods of financing, traffic surveys where needed, and all other pertinent matters. The committee is to be composed of one representative from each state and two each from the Bureau of Roads, Forest Service and Park Service. The state representatives will be appointed by the road department of each state soon and will meet in the near future to put in line the committee work.

The value of an organization such as the Western Association of State Highway Officials may be recognized from the nature of the resolutions drawn up at their meeting in Salt Lake City last week. Several of the resolutions in substance follow:

1. Expression of appreciation for congressional adoption of the Dowell bill, enabling a greater co-operative construction program than heretofore, and the Colton-Oddie legislation, which has supplied sufficient additional funds for improvements of necessary stretches of national forest highways.

2. Favoring authorization at the session of congress convening in December of a sufficient amount to meet the needs of the public land states for the purposes set forth in the basic highway act.

3. Urging congressional appropriation of $7,500,000 a year instead of $5,000,000 for national park highway work so these highways may meet the present traffic requirements with reasonable completion under present government standards of construction.

4. Recognizing the necessity of a more complete secondary transport service within the national forests for the purposes of protection, development and community service.

5. Commending to the states whose highway officials are members of the association, and to other associated agencies, that more specific attention be given to the safety problem and to that end the appointment of a specially trained officer charged with the duty of investigations and prevention of accidents, and with the study of traffic congestion and hazard, be given serious consideration, urging study and attention be given to the uniform vehicle code recommended by the National Conference of State and Highway Safety looking toward suitable legislation.

6. Favoring a study having in mind a model law to govern the collection and governmental handling of gasoline taxes, including the payment of refunds in states where refunds are allowed.

7. Affirming a previous stand recommending that the limitation of $15,000 a mile be removed, and that the secretary of agriculture be authorized to determine the basis of mile participation in all cases.

Concrete paved highway between Eaton and Greeley in Weld County.

NEWS OF THE MONTH

The pouring of concrete on the even-mile project east of Greeley on he Sterling road has been completed y the New Mexico Construction Co. A. B. Collins, division engineer, re-orted that 900 to 1,000 feet of con-rete was poured daily on the job. It s expected that the entire project vill be completed by the middle of August. When opened to traffic here will be nine miles of concrete avement east of Greeley. As funds ecome available the pavement will e extended to connect with the resent pavement near Wiggins.

On July 18 Edw. Selander has oured ten miles of concrete on his 5-mile contract located north of Pueblo. He expects to have the en-ire project opened for traffic by September 15, including shoulders, nd drainage structures. Five miles f the project south of Colorado Springs had been poured on July 18, y J. Fred Roberts & Sons, contrac-ors. They also expect to be finished y September 15. With the comple-ion of these two contracts the state vill have 43 miles of pavement be-ween Pueblo and Colorado Springs, hus connecting these two cities with ribbon of concrete.

In May the State Highway Depart-nent paid out $500,000 to contrac-ors on road projects; $600,000 in June, and when the final estimates are in for July it is expected the sum vill reach $900,000, according to Ed-vin Mitchell, auditor. One contrac-or had an estimate for $102,000 for work done in June. These are the argest sums ever paid by the Colo-ado department in one month to contractors.

During the past month nine miles of oil-surfaced highway between Canon City and Florence was com-pleted by C. V. Hallenbeck, contrac-or. This stretch of road runs hrough a rich, fruit-growing sec'ion nd the new road is a great benefit o growers by giving a smooth rid-ng surface and the elimination of he dust nuisance. Hallenbeck is now working on seven miles of oil-surfac-ng located east of Florence. This should be completed in sixty days with favorable weather.

Rapid progress is reported on the construction of the new highway through De Beque canon, connecting with the main highway at the mouth of Plateau canon. Opening of the new road will eliminate several miles of very crooked road now used through Plateau canon. Excavation has been started at the south end of the project for the building of a bridge to cross Plateau creek and join with the new road that is under construction from the north end, according to J. J. Vandemoer, division engineer.

J. R. Cheney, division engineer, reports the completion of four miles of grading and surfacing by C. V. Hallenbeck, north of Ouray. This is a road located on the "Million Dollar Highway."

Fifteen miles of new grade have been completed between Akron and Brush, according to A. B. Collins, division engineer. Two elevating graders and thirty men are employed on the work. The new road will shorten the distance between these two points by six miles. Later the new road will be heavily graveled. The high grade will prevent snow drifting in the winter and assure proper drainage. When the entire completed highway is finished between Akron and Denver a distance of about thirty miles will have been eliminated.

Several dangerous curves are being eliminated in Salt Creek canon between Canon City and Colorado Springs. The work is being done by Fremont County. The work involves the construction of several bridges and dirt fills. A half-yard General shovel is being used on the work. The new road will be gravel surfaced.

Two miles of concrete pavement located north of Monte Vista will be completed the middle of August, according to J. R. Cheney, division engineer.

Rapid progress is being made by W. F. Pigg & Son, contractors, on nine miles of grading and gravel work located south of Nunn, on the Greeley-Cheyenne highway. Following the completion of the new work the road will be oil surfaced by state highway forces. The present work connects with twenty miles of oil surfaced road on the north.

Work has been started on two miles of heavy grading located between Kenosha and Webster on State Road No. 8 by Anderson, Sheldon & Miller, contractors. Completion of this work will eliminate the last steep grade on Kenosha Pass, located in Park County. The new road will cost $76,636.

The F. C. Dreher Construction Co. is working on two miles of concrete pavement located north of Fort Collins. The project includes a bridge and considerable excavation. Dreher's contract price for the completed job is $99,187.

The Steamboat Transfer & Storage Co. is gravel surfacing fifteen and one-half miles of new road extending from Muddy Pass to Spicer in Jackson County. The contract price is $18,400.

Five and one-half miles of road east of Avondale is being oil surfaced by Lumsden-Hall Construction Co. About 8,000 tons of crushed gravel and 114,000 gallons of asphaltic road oil will be used in the project. Engineering work will be supervised by Preston C. Thurmond, resident engineer.

Hamilton & Gleason Construction Co. have started work on 22 miles of oil surfacing on the Santa Fe Trail between the state line and Lamar, according to a report by James D. Bell, division engineer. The project will cost $122,000. It is to be completed in 110 working days, after July 3, the date set for beginning the work. L. A. Rose is the resident engineer for the State Highway Department.

P. C. Thurmond, resident engineer, on the paving project north of Pueblo, reports that Edw. Selander, contractor, will have three draglines in use on "shouldering" the ten miles of concrete already poured. About ten days will be required for the completion of this work. Twenty trucks will be used in the shouldering work.

State highway forces have completed the work of gravel surfacing the Victory highway between Granby and Hot Sulphur Springs. The work included the raising of the grade through Blayney's Lane and the hill east of Windy Gap. It was considered a bad piece of road when wet.

Another important piece of road work was completed the first part of July when cars started going over the new stretch of highway about a mile north of Georgetown on the route to Loveland Pass.

Colorado will receive $692,824 for the building of roads in the national forests for the fiscal year beginning July 1, as a result of the increase in federal appropriations from $7,500,000 to $12,500,000 annually. In the past Colorado has received $327,943 annually for this purpose.

This new program will enable the construction of highways in the national forests to be speeded up at least 100 per cent. It has been estimated in the past that an average of 40 years would be required to bring these roads up to standard. With the increased funds it can be done in approximately 20 years.

E. H. Honnen, Colorado Springs contractor, is working on seven and one-half miles of gravel surfacing on Berthoud Pass, starting at the town of Empire. The work is being done by the U. S. Bureau of Public Roads.

Unless early fall storms interfere with work, the State Highway Department expects to complete this year the highway over Loveland Pass into Dillon, which will give motorists the shortest route between Denver and Leadville. A force of workmen, equipped with a steam shovel and a big air compressor, are now working near the summit of the pass.

Construction work on the new road from South Fork to Twin Bridges on Wolf Creek has been started by H. C. Lallier Construction Co. The work was started at Park Creek and will continue up the pass for a distance of four miles. About 50 men are employed on the job with William Kimmett, foreman, according to report of J. R. Cheney, division engineer. It is expected that the work will be completed this fall. A 1½-yard shovel, the largest of its kind in the state, is being used on the project which involves the expenditure of over $100,000.

State highway forces have oil surfaced streets connecting with state roads in Boulder and Loveland, and are now engaged in oil surfacing ten miles of highway in Larimer County, between Fort Collins and the state line on the Laramie route. Following the completion of this work the crew will be switched to the new work now in course of construction south of Nunn in Weld County on the Greeley-Cheyenne highway. All of this work is expected to be completed by the middle of September, according to A. B. Collins, division engineer.

Twenty-five miles of the road between Limon and Watkins will be gravel surfaced before winter weather sets in, according to Robt. Norvell, division maintenance superintendent, with headquarters at Hugo. This work is being done by state forces. A fleet of six trucks recently purchased by the State Highway Department is being used in the work. Eight miles of this road east of Denver is now being oil surfaced, eliminating one of the worst stretches of the road between Denver and the state line.

Seven miles of gravel surfaced road on the Rifle-Meeker highway was recently completed by Winterburn & Lumsden and has been turned over to the state forces for regular maintenance.

Cole Brothers, contractors, have completed 75 per cent of the grading on 42 miles of new road between Sterling and Ovid in Morgan County. Plans are being made to oil surface this road to the state line east of Julesburg as funds become available during the next two years. Gravel surfacing will be applied preparatory to oiling.

Plans are now being drafted by the Highway Department for an overhead crossing west of Portland. This will eliminate a dangerous crossing of the main line of the Denver & Rio Grande Western Railroad, between Portland and Florence in Fremont County.

Rapid progress is being made by Charles B. Owen, contractor, on five miles of grading and gravel surfacing south of Craig. This work is costing about $12,000 per mile.

By the end of the present construction season the Highway Department expects to have completed fifty miles of oil surfaced roadway between Monte Vista and Antonito, via Alamosa.

Plans have been completed by the department for oil process surfacing 18½ miles east of Pueblo on the Santa Fe Trail. Plans also are being drafted for six miles of the same type of surfaced road northeast of Trinidad. Surveys also are being made for twenty miles of this type of surfacing west of Burlington and east of Cheyenne Wells, approximately ten miles in each project. An effort will be made to complete all of this work during the present construction season.

Gravel surfacing is now being laid on approximately forty miles of the road between Aguilar and Pueblo. This work will be completed by the middle of September.

Gardner Bros. & Glen are fifty per cent completed with their work on eight miles of grading and gravel surfacing west of Craig on the Victory highway. C. A. Switzer is working on four miles of new road east of Rabbit Ears Pass on the same road. This work connects with the ten-mile project north of Kremmling recently completed by Frank L. Hoffman, Denver contractor.

Two and one-half miles of premixed oil surfaced highway south of Glenwood Springs was completed the first part of July. This work was done by state and county forces under the supervision of H. L. Jenness, division engineer. This was the first pre-mixed oil surfacing laid in the state.

Plans are being made by the U. S. Bureau of Public Roads for the construction of a new road from the summit of Milner Pass to Grand Lake in the Rocky Mountain National Park. It is estimated the new highway, which will follow a new survey line, will cost approximately $600,000. The new road will connect with a new road now under construction from Estes Park to Milner Pass, eliminating the old Fall River road, constructed by the state of Colorado several years ago.

Three miles of concrete pavement west of Rocky Ford has been completed by H. C. Lallier Construction Co. and opened to traffic.

Clippings, Letters and Comments

DEALING WITH STATE HIGHWAYS

Motorists Praise New Oiled Road

The following comment on the new oiled road connecting Lyons and Boulder is taken from the *Boulder Camera*:

Many Boulder motorists expressed praise for the new oiled Twelfth Street road as part of it was thrown open to traffic last night by the State Highway oiling crew.

The new road is smooth, does not throw any dust, and does not throw oiled stones onto the fenders of a car as most oiled roads do.

Work Started On Tin Cup Pass Road

The *Salida Record* printed the following news article on the work which has been started on the new Tin Cup Pass road:

Work on Tin Cup Pass, direct route between Denver and Gunnison, has started and it is thought that within the near future the road over the pass will be completed and a well traveled highway. The road over the pass at present is practically impassable, but with considerable work could be developed into one of the best roads in the state. The road is noted for its scenic beauty as well as "mile-saving" quality. The pass leads directly into the Gunnison country where some of the best fishing in the state is enjoyed.

Colorado Road Improvements

In the columns of the *Silverton Standard* appeared the following article on the 1930 Colorado road program:

Colorado's 1930 highway construction and related improvement program calls for total expenditure of $16,000,000—$4,000,000 more than were expended for similar purposes last year. The Highway Department has awarded scores of project contracts, embracing every one of the 63 counties, which is giving needed employment to hundreds of men.

Where needed the Million Dollar highway, extending from Durango to Ouray, via Silverton, a distance of 77 miles, is being regraded, curves reduced, widened, additional culverts laid and stretches south of Molas Lake gravel surfaced. The two contracts for improving five miles of this famous scenic and important commercial highway north from Silverton will soon be completed. When the sectional betterments, now underway south from Silverton, are finished the double service (tourist and commercial) highway will be in excellent travel condition its entire distance of 77 miles.

The steel bridge being erected over Cement Creek in the northeast part of town is nearing completion and is a substantial, imposing structure, displacing the wooden bridge that has been in service for more than a score of years. The new bridge is being constructed at joint expense of state and county.

Oiled Highway Opened to Traffic

The *Canon City Record* comments on the new oiled highway between that city and Florence, as follows:

State Highway No. 50 from the South Nintn Street bridge to Hell's Half Acre is now oiled and open to traffic. The work on this stretch, however, is not fully completed. The roadway is wide, smooth and dustless. Indications are that when the surfacing is fully completed and seasoned the oiled highway will be as efficient and as good as hard-surfaced paving.

Contrary to popular belief, there is not any oily residue to be picked up on the tires or chassis of the autos. The foundation is well prepared and the oil is worked into the surfacing thoroughly, and packed down hard. This makes a smooth surface which the tires can grip effectively. There is absolutely no dust.

If the roadway, thus prepared, can stand up under the traffic then there will be little or no regret that the roadway was not hard-surfaced. The effect of traffic on the oiled highway will be watched with interest during the next 18 months.

Citizens Welcome Road Builders

The following item was clipped from the *Cortez Herald*:

Nothing has occurred in Yellow Jacket district in years that has given the residents so much satisfaction as the arrival of the road men with their equipment to build the new cut-off highway between this district and Ackmen where it joins the state highway. This two and one-half-mile stretch saves a seven-mile trip and is a big step in the development of our progressive community. The road will undoubtedly be completed in the next ten days.

Good Roads First Step Towards Farm Aid

Better highways mean better marketing of farm produce says the *Walsenburg Independent*, in a caption over the following article:

Farm relief as well as the building up of business generally depends largely on the building of good roads. The building of such a road from Walsenburg east to the lower Arkansas Valley was discussed at the last luncheon of the Kiwanis Club.

The result of road conditions on business has been thoroughly studied by the Cornell University Agricultural Experiment Station.

The report from this investigation shows:

"Farmers on improved roads possessed more motor trucks than those on gravel or dirt roads. The number of days farmers on dirt roads could not employ their trucks was more than double the time farmers on hard-surfaced roads could not use them.

"Of greater importance is the statement that of farmers on hard-surfaced roads only 12 per cent reported loss in marketing due to roads being blocked with snow, while on gravel and dirt roads 25 per cent and 61.7 per cent, respectively, reported loss from this cause. The estimated loss in dollars varied from $100 to $2,000."

Record Set In Road Construction

The *Denver Post* records the following on the 1930 construction program of the State Highway Department:

Colorado is now in the midst of the greatest period of highway construction in its history and disbursements of the State Highway Department for construction and maintenance will run to approximately $950,000 for July alone.

With a record amount of money available for highway work and with weather conditions ideal for pushing construction, the department, with greatly augmented forces, has been rushing this work as rapidly as possible. Never before have so many projects been under way or so many miles of highway under construction or improvement in any one season. This condition is making itself felt materially in reduction of unemployment in all sections of the state.

Disbursements this year to June 30 were $2,237,000, a new high record.

Problems Connected with the Design of Track-Type Tractors is the title of a paper presented by H. S. Eberhard, of the engineering department of the Caterpillar Tractor Co., before the Pacific Coast Division S. A. E. recently. Tractor problems of the farmer, contractor, logger and engineer are all touched upon in this paper, which discusses dirt and dust, ice and snow and other conditions to be met and overcome by the tractor.

Concrete-paved underpass, eliminating grade crossing at Bragdon, Colorado Springs-Pueblo highway. Ideal Portland Cement used exclusively.

ROAD BUILDERS' AND MACHINERY NOTES

ADAMS ANNOUNCES NEW MODEL MAINTAINER

A new, improved model of Adams Road Maintainer No. 6, hundreds of which have been used so successfully for the past four years, is now on the market by the J. D. Adams Company. The new maintainer is called Model No. 61.

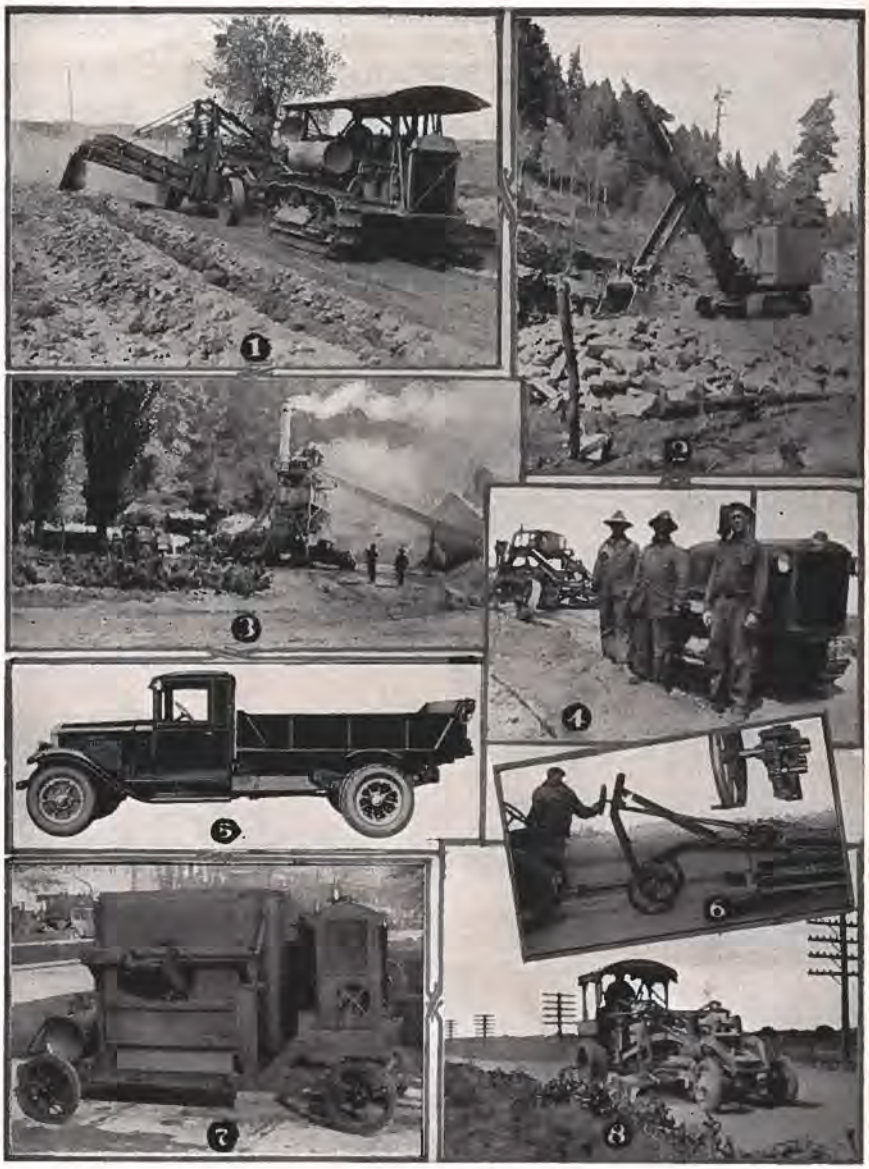
The principal advantages of this machine over the No. 6 are summed up in easier and more convenient operation, better adaptability to all tractors because of the single control, better adaptability to all conditions of roads because of the front truck and greater effective weight on the blades.

One man, taking his normal position on the tractor, has quick, easy and complete control of both tractor and maintainer. The machine is furnished with hitch and controls adapted to any wheel or crawler tractor, and the tractor can always be unhitched instantly for use on other work. Use of the front truck is generally to be desired, but the machine is furnished without front truck on order, in which case a special clevis is provided for hitching directly to the tractor.

One easy working control, operating through enclosed transmission gears, adjusts the front and rear blades independently, or raises and lowers all blades at one time. This control can be adjusted forward, backward, up and down, and the length of the tongue can be adjusted to suit the tractor and convenience of the operator.

This machine maintains earth, gravel, stone, sand-clay and similar roads at the rate of 35 to 40 traveled miles per day at a very low cost per mile. Power required varies from 10 to 30 drawbar H. P., depending on the character of the roads, and how heavily the machine is to be worked. As a chatter bump remover on gravel roads, it has no equal.

Adams Maintainer regularly cuts 9 feet wide but blade extensions can be used to increase the cutting width to 10½ feet or 12 feet. With extensions, the maintainer will cover the traveled surface of practically any road in one round trip.



Various types of road building equipment used on Colorado construction and maintenance work. (1) Elevating grader outfit, with Caterpillar tractor, working on new road east of Brush. Photo by Clinton-Held Co. (2) Huge Koehring 1½-yard shovel owned by H. C. Lallier Construction Co. and working on Wolf Creek Pass project. (3) Cedar Rapids pre-mix asphalt plant owned by the H. W. Moore Equipment Co. mixing materials for 2½ miles of oil surfacing south of Glenwood Springs. (4) Monarch tractor crew employed by State Highway Department. (5) New model International contractor's truck. (6) Showing new type No. 61 Adams maintainer. Photo by Elton Fair Company. (7) Chausse portable sand drier and oil mixing plant. (8) Galion one-man maintainer, operating on Pueblo-Colorado Springs highway.

BLAW-KNOX HANDLING AND BATCHING PLANT FOR BULK CEMENT

The Blaw-Knox Company extends the scope of its engineering service to contractors interested in the handling and batching of bulk cement for road paving and for central mixing, enabling the contractor to secure the price benefit of buying his cement in bulk.

NEW HAND BOOK FOR THE AUTO MECHANIC PUBLISHED

A new Auto Mechanic's Hand Book No. 33, sixth printing, has just been published by the South Bend Lathe Works, South Bend, Indiana. This 32-page 6x9-inch booklet, in two colors, fully explains how a back-geared screw-cutting precision lathe may be used to advantage on many servicing jobs that come up in repair shops, service shops, garages, etc.

Fully illustrated sections describe how to service brake drums, make drive and axle shafts, finish pistons, reface valves, true armature commutators, undercut mica insulation, and many other jobs which are practical for the lathe.

OIL-BURNING EQUIPMENT FOR CLIMAX ENGINES IS DEVELOPED

The application of equipment for the burning of distillate on their new Blue Streak engines is announced by the Climax Engineering Co., of Clinton, Iowa. These models are produced in five sizes, varying from 70 to 200 h. p., and are to be used extensively in the general industrial field. This statement has just been made by Allen C. Staley, director of sales and engineering.

The outstanding feature of the oil burning as applied to these new engines is the high power and economy being obtained on cheaper fuel, giving about the same performance as gasoline on the average engine of the same displacement. With this increased power, economy in the cost of fuel is very marked, runing about half that of gasoline.

CHAUSSE BRINGS OUT PORTABLE SAND DRIER FOR OIL MIXES

A new type portable sand drier or reheater for paving mixes has been announced by the Chausse Oil Burner Company of Elkhart, Indiana.

This machine has been developed to meet necessity for rapidly heating and drying sand or stone for railway and contractor's uses, or for reheating pre-mixed and natural asphaltic paving repair materials.

It consists of rotating drum with internal cascading blades, mounted on SKF self-aligning ball bearings and enclosed in steel housing. The drum is turned by a LeRoi single cylinder, 4 horsepower, radiator-cooled engine, with Twin Disc clutch and Cotta reducing gear, through hardened roller chain.

"Big Hearted" George Mefley, general sales-manager of the H. W. Moore Equipment Company.

An important feature of this machine is the indirect application of heat. It is equipped with two Chausse self-generating kerosene burners, located within the steel housing underneath the rotating drum. These apply the heat effectively on the outside of the drum and no high temperature flame comes into contact with the drying or heating materials. This is especially valuable in handling bituminous mixes which can be very easily damaged in open flame type heating. It is also important in drying certain mineral sands and aggregates which explode and turn to fine dust if too severely or highly heated.

Edward Selander, Fort Morgan contractor, who is now making a record on fifteen miles of the Pueblo-Colorado Springs paved highway. He expects to finish his section of the new pavement by Sept. 15.

The machine is mounted on rubber tired steel wheels, with roller bearings, and has steel towing tongue. Kerosene is stored in 30-gallon welded steel tank and pressure is supplied by a 3-inch hand-operated air pump. Several sizes and capacities can be furnished.

This new Chausse sand drier is handled in the Denver territory by the H. W. Moore Equipment Co.

BATCHER FOR WHEELBARROW BATCHING OF AGGREGATES

A small batcher for wheelbarrow batching of accurately weighed aggregates, for building culvert, small bridge and curb and gutter work where the job does not justify the setting up of a complete bin and batching unit, has been brought out by C. S. Johnson Co., Champaign, Ill.

Weighing but 280 lbs. it can be loaded and unloaded easily from trucks—and with the two large diameter wheels can be moved around on the job by one man. The shoveling height is 42 in., a height tested to prevent easy tiring. The capacity is 4 cubic feet or 400 lbs. a full wheelbarrow load.

The discharge is a simple sliding gate with nothing to get out of order—high enough for any standard wheelbarrow. The hopper is round, free from any obstructions that might allow the materials to build up—and only the material directly in it affects the weight.

LINK-BELT ANNOUNCES NEW CRAWLER LOADER

The Link-Belt Co., Philadelphia, Pa., announces the development of a new high-capacity crawler bucket loader, known as the Grizzly, 1930 model; and that, after having given the machine a thorough tryout under actual working conditions, they are going into production on a large scale.

Particular stress is laid on the construction of the self-feeder with which the loader is equipped. This new feeder is of the continuous helical ribbon type, which feeds and cleans up uniformly. The action of its self-sharpening spiral and correct cutting edge serves to cut, dig and convey the material to the elevator buckets in a smooth, continuous, uniform stream. There are no blows or shocks. The adjustment of the feeder is controlled by a handwheel within easy reach of the operator, who rides with the machine on a conveniently-placed side platform.

Need Better Usage of Local Highway Funds

Too Frequently Money Is Spent On Too Many Roads

ALTHOUGH nearly every state in the Union has a highly efficient state highway department, nearly half of all road money is spent through counties and townships for the improvement of local roads.

Two things are indicated by this situation: Strictly local or farm-to-market roads are getting their share or more than their share of financial attention; and local communities, charged with the spending of two-thirds of a billion dollars annually, should protect their citizens by guilding themselves by the activities of the more efficient state highway departments.

No one would care to estimate how much money is poorly spent through local roadbuilding agencies. Counties and townships of limited resources cannot provide themselves with either the best equipment or men. Their road funds, so they say, must be spread over too many miles of highways to permit of permanent construction.

Here is where one of the great problems in local roadbuilding enters. Oftentimes circumstances or politics prevent those in charge of roadbuilding from concentrating money on one or two important local roads, but rather compel the spreading out of the income over all the roads in the community, regardless of their importance.

In the township and county, as in the state, the most used roads should be improved first. These main local roads, perhaps leading into the chief markets, serve the most traffic, the logical aim of any well-planned program. Then, after they have been improved, attention can be directed to feeder roads.

For the most part, the larger the roadbuilding agency the greater the efficiency and the better the value received by taxpayers. In some instances, counties have grouped themselves in road districts. By concentrating their funds on the most traveled roads, through the larger road body, they have, at no greater cost, speeded up construction and laid more permanent roads.

AGITATION TO ABOLISH REFUNDS ON STATE GAS TAX

The Colorado General Assembly which convenes next January will be asked to consider the abolishment of refund privileges in the present gas tax law. Refunds in April alone amounted to $57,589.96 or 11½ per cent of the total collected. Sponsors urging the repeal declare that if the refunds continue to mount, as they have done at an alarming rate since the four-cent tax went into effect, the revenue derived by the Highway Department from this source will not be sufficient to meet the heavy budget adopted for the year.

Prior to the building of the railroads, freight was moved by road in conestoga wagons. In 1819 one of these regular services dispatched two conestoga wagons daily from Philadelphia to Pittsburgh, making the trip in 12 days and charging $120 a ton.

STATE HIGHWAY DEPARTMENT

Financial Statement July 1, 1930

BALANCES 12-31-29		
State Treasurer	$1,310,302.64	
County Time Warrants	10,333.42	
Revolving Fund	9,500.00	
Total Balances		$1,330,136.06
RECEIPTS		
Internal Improvement	$ 49,100.00	
Gas Tax	1,862,482.64	
U. S. Government	501,000.00	
Bus Licenses	43,569.17	
Highway Receipts	23,774.58	
Cancelled Warrant	2.75	
Total Receipts		2,479,929.74
Total Balances and Receipts		$3,810,065.80

DISBURSEMENTS		
Federal Aid Projects	$1,188,235.56	
State Projects	224,594.60	
Maintenance	606,773.93	
Maintenance, Equip. and Repairs	190,170.11	
Property and Equipment	18,403.19	
Surveys	6,927.60	
Traffic Signs and Census	8,923.88	
Administration	83,068.37	
Total Disbursements		$2,327,097.24
BALANCES 6-30-30		
State Treasurer	$1,463,135.14	
County Time Warrants	10,333.42	
Revolving Fund	9,500.00	
Total Balances		1,482,968.56
Total Disbursements and Balances		$3,810,065.80
3% SPECIAL GAS TAX FUND		
Balance		$ 169,718.86
Receipts		14,400.00
Total Receipts		$ 184,118.86
Total Disbursements		31,932.20
Balance		$ 152,186.66

Colorado Drops to 31st Place in Gasoline Consumption

(Continued from Page 8)

STATE	Net gallons of gasoline taxed and used by motor vehicles
Illinois	388,659,266
Indiana	410,936,759
Iowa	311,859,516
Kansas	288,716,546
Kentucky	154,717,831
Louisiana	176,645,631
Maine	91,610,422
Maryland	157,429,197
Massachusetts	487,940,778
Michigan	710,300,302
Minnesota	338,631,771
Mississippi	140,902,401
Missouri	384,033,575
Montana	57,514,249
Nebraska	208,869,358
Nevada	16,307,535
New Hampshire	56,676,294
New Jersey	498,063,808
New Mexico	45,479,332
New York	962,601,285
North Carolina	260,210,528
North Dakota	71,591,708
Ohio	910,154,885
Oklahoma	314,388,292
Oregon	152,090,900
Pennsylvania	1,047,914,175
Rhode Island	77,826,879
South Carolina	118,038,130
South Dakota	88,644,138
Tennessee	194,497,225
Texas	761,421,692
Utah	56,546,967
Vermont	43,990,554
Virginia	197,898,821
Washington	233,333,570
West Virginia	121,654,788
Wisconsin	374,251,957
Wyoming	34,242,816
District of Columbia	71,409,032

PLANS BEING DRAFTED

Proj. No.	Est. Length	Type	Location
91-R	6 mi.	Oil Processed Surfacing	Northeast of Trinidad
144-F	10 mi.	Oil Processed Surfacing	Northwest of Fort Collins
271-F	0.5 mi.	Railroad Overhead Crossing	West of Portland
189-B	4 mi.	Gravel Surfacing	West of Hayden
282-I	4 mi.	Gravel Surfacing	South of Craig
292-D	8 mi.	Gravel Surfacing	South of Wolcott
134-AR&C	14 mi.	Oil Processed Surfacing	West of Burlington
265-D	3 mi.	Gravel Surfacing	South of Durango
258-I	3 mi.	Gravel Surfacing	East of Cimarron

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per Cent Complete	Proj. No.
2-R9	Starkville	1.35 mi.	Concrete Pavement	H. C. Lallier Const. & Eng. Co.	$ 59,180.60	84	2-R9
57-R2	North of Lamar	0.502 mi.	Bridge	J. Fred Roberts & Sons	140,102.90	90	57-R2
68-R2	North of Monte Vista	1.9 mi.	Concrete Pavement	Driscoll Construction Co.	43,566.40	58	68-R2
78-R	Near Minturn	0.709 mi.	Gravel Surfaced	J. Fred Roberts & Sons	96,342.90	42	78-R
92-R1, 246-DR1	East of Avondale	5.509 mi.	Oil Processed Surfacing	Lumsden-Hall Const. Co.	33,363.00	0	92-R1, 246-DR1
122-R1	Between Ovid and Julesburg	10.122 mi.	Grading	Bedford & Woodman, Inc.	49,976.65	34	122-R1
97-R2, 168-AR1, 216-AR1, 273-R1	Betw. Lamar & Kas. State Line	21.764 mi.	Oil Processed Surfacing	Hamilton & Gleason Co.	122,216.20	0	97-R2, 168-AR1, 216-AR1, 273-R1
138-B	North of Kremmling	3.133 mi.	Gravel Surfaced	F. L. Hoffman	76,363.35	83	138-B
138-C	South of Muddy Pass	4.184 mi.	Gravel Surfaced	C. A. Switzer	103,270.20	24	138-C
144-D	Northwest of Ft. Collins	2.834 mi.	Gravel Surfaced	J. Fred Roberts & Sons	66,430.10	90	144-D
144-D2	Northwest of Fort Collins	0.236 mi.	Gravel Surfaced	J. Fred Roberts & Sons	15,566.00	31	144-D2
144-E	North of Ft. Collins	1.286 mi.	Concrete Paving	F. C. Dreher Const. Co.	109,106.30	0	144-E
147-D	Betw. Cortez & Utah Line	2.903 mi.	Gravel Surfaced	Wood-Morgan-Burnett Co.	43,432.60	68	147-D
149-B	East of Aurora	7.911 mi.	Oil Processed Surf.	Chas. B. Owen	134,611.10	37	149-B
150-A	West of Craig	8.227 mi.	Gravel Surfaced	Gardner Bros. & Glenn	93,477.35	50	150-A
165-R1	East from Canon City	9.325 mi.	Oil Processed Surf.	C. V. Hollenbeck	50,548.30	86	165-R1
175-A	Between Sterling and Ovid	41.979 mi.	Graded	Cole Bros.	193,055.75	74	175-A
229-AR1, 271-AR1, 271-BR1, 271-CR1, 271-ER1	East of Florence	7.435 mi.	Oil Processed Surfacing	C. V. Hollenbeck	34,975.85	0	229-R1, 271-AR1, 271-BR1, 271-CR1, 271-ER1
243-C	West of Dyke	3.837 mi.	Gravel Surfaced	Grant Shields	47,404.40	50	243-C
253-D	West of Milner	2.547 mi.	Gravel Surfaced	Hamilton & Gleason Co.	147,192.00	84	253-D
258-H	West of Sapinero	4.921 mi.	Gravel Surfaced	Cole Brothers	123,700.60	89	258-H
262-G2	West of La Veta Pass	5.014 mi.	Gravel Surfaced	Pople Bros. Const. Co.	11,932.50	81	262-G2
263-B	Betw. Mortimer & Ft. Garland	3.133 mi.	Gravel Surfaced	Pople Bros. Const. Co.	29,532.40	35	263-B
265-C	Betw. Durango & Bayfield	2.500 mi.	Gravel Surfaced	Grant Shields	36,022.90	0	265-C
266-D	South of Bondad	4.111 mi.	Gravel Surfaced	Engler, Teyssier & Co.	96,075.30	89	266-D
267-C	Near Model	4.491 mi.	Gravel Surfaced	E. H. Honnen	45,801.00	99	267-C
270-AR1, 270-BR1	East of Monte Vista	6.412 mi.	Gravel Surfacing	Mtn. States Const. Co.	44,875.40	34	270-AR1, 270-BR1
270-D	Betw. Alamosa & Monte Vista	3.978 mi.	Gravel Surfaced	Mountain States Constr. Co.	32,679.40	99	270-D
277-D2	North of Pueblo	15.566 mi.	Concrete Pavement	Edw. Selander	333,257.80	45	277-D2
277-E2	South of Colorado Springs	10.2 mi.	Concrete Pavement	J. Fred Roberts & Sons	238,207.30	37	277-E2
279-H	Betw. Kenosha & Webster	1.691 mi.	Grading	Anderson, Sheldon & Miller	76,636.12	0	279-H
282-G	South of Craig	5.147 mi.	Gravel Surfaced	Chas. B. Owen	61,645.22	65	282-G
282-H	Between Rifle and Meeker	7.029 mi.	Gravel Surfaced	Winterburn & Lumsden	82,589.74	99	282-H
286-D	North of Ault	9.883 mi.	Gravel Surfacing	W. F. Pigg & Son, Inc.	35,567.00	16	286-D
287-BR1	East of Greeley	7.413 mi.	Concrete Paved	New Mexico Constr. Co.	145,875.00	52	287-BR1
292-AR	North of Minturn	6.262 mi.	Gravel Surfacing	Luke E. Smith & Co., Inc.	36,860.00	17	292-AR1
296-E	South of Greenhorn	7.210 mi.	Gravel Surfaced	Mountain States Constr. Co.	93,594.88	66	296-E
297-C	Southwest of De Beque	9.953 mi.	Gravel Surfaced	Hinman Bros. Const. Co.	312,453.50	68	297-C
297-D	South of DeBeque	4.198 mi.	Surf. & Bridge	Hinman Bros. Const. Co.	185,230.50	0	297-D
298-B	North of Pagosa Springs	2.414 mi.	Surfacing	Engler & Teyssier	38,426.00	65	298-B
298-C	Bet. Twin Bridges & South Fork	3.780 mi.	Gravel Surfacing	H. C. Lallier Const. & Eng. Co.	116,864.50	22	298-C
300-B	North of Silverton	2.828 mi.	Graded	Hamilton & Gleason Co.	35,647.80	83	300-B
300-C	North of Silverton	1.937 mi.	Grading	D. G. Son	15,287.80	60	300-C

POWER AND TRACTION TO MOVE MORE DIRT

IT doesn't pay to handicap good equipment. Match it with POWER that can make it work—that can get *capacity*—that doesn't ask for half loads when the going gets difficult. Full loads pay the profits! And Cletrac power is designed for them — in good weather or bad — winter or summer — over the roughest footing or the toughest grades.

Cletrac power and sure-grip traction makes good equipment better. It permits scrapers to carry more and work faster. It permits blades to bite deeper. It moves more dirt ahead of bull-dozers. It scores with extra yards and more work done on any job you put it to.

Cletrac
Crawler Tractors

Cletracs are built in five different sizes—twenty to one hundred horsepower—ranged to meet your power needs. Askt he Cletrac distributor near you to demonstrate, or write direct for complete literature.

THE CLEVELAND TRACTOR COMPANY
19380 Euclid Avenue Cleveland, Ohio

LIBERTY TRUCKS & PARTS CO. 150 West 6th Ave. TAbor 5711 **Denver**

Safe, Fast Batchmeter Control!

N. E. C. LINES

KOEHRING
Pavers, Mixers; Power Shovels, Pull Shovels, Cranes, Draglines; Dumptors.

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Excavators; Concrete Placing Equipment, Cars, Buckets, Derricks.

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Tilting and Non-tilting Mixers, Pavers, Weigh-Mix.

PARSONS
Trench Excavators, Backfillers.

C. H. & E.
Portable Saw Rigs, Pumps, Hoists, Material Elevators.

KWIK-MIX
Mixers: Concrete, Plaster and Mortar.

SAFE, because batchmeter sounds pre-alarm warning bell just before mixing period is ended. This gives operator time to check if skip is loaded and free of trucks before starting up the skip automatically by pressing foot pedal.

Fast, because at expiration of mixing period, batchmeter in the fraction of a second, starts discharge and starts the charging skip up to shoot new materials and water into drum at the exact split-second that discharge is completed!

All this gives operator plenty of time to operate distributing bucket, to "spot" concrete exactly and to spread it so as to cut down the work of shovelers to a minimum — and to swing boom by power ready to "spot" the next batch!

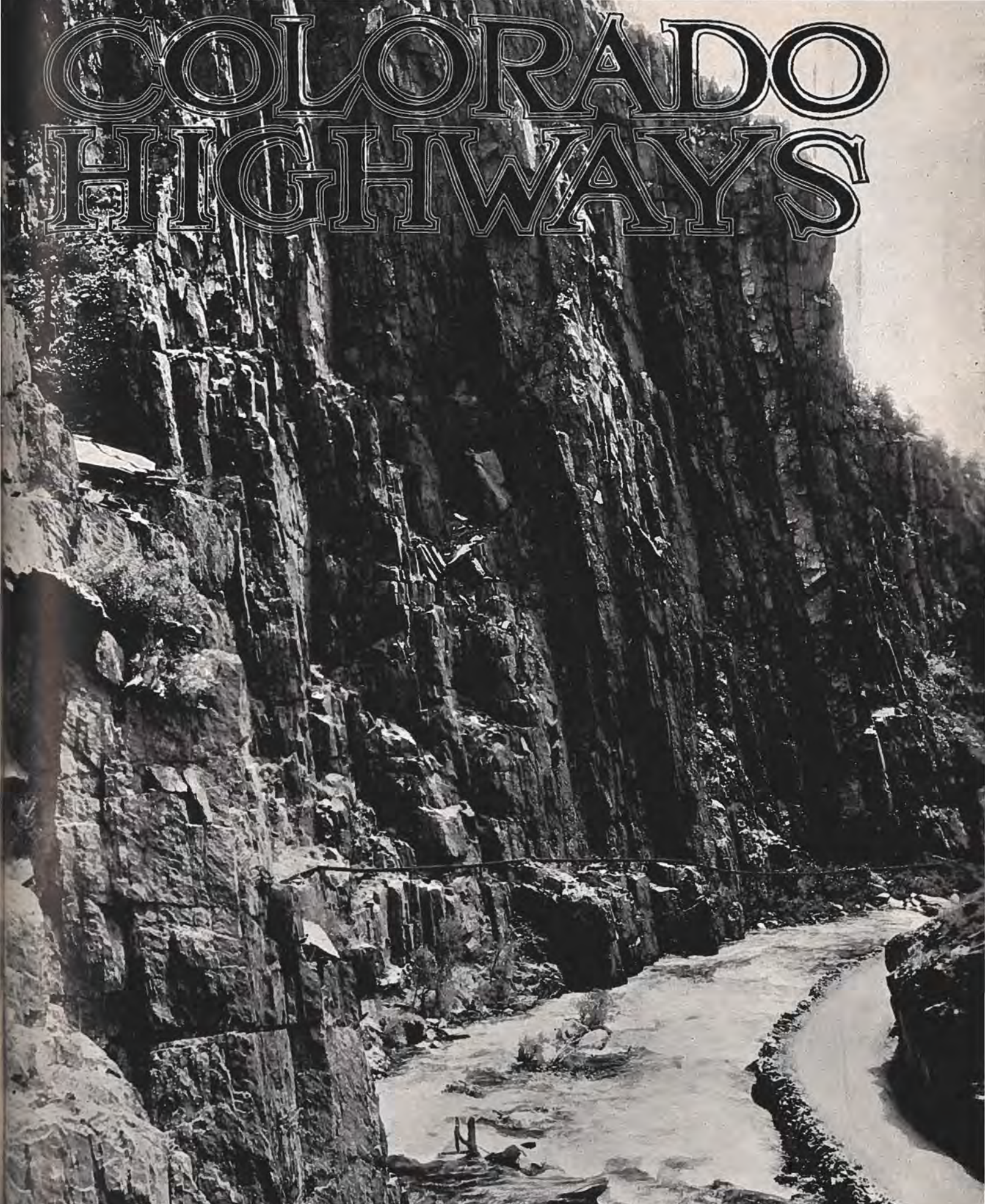
Koehring Speed — Koehring Heavy Duty construction are the two greatest profit factors you can take into partnership.

HANDLING the entire N. E. C. line, we are obligated to maintain a standard of localized service consistent with the national service standard of N.E.C.! The scope of N.E.C. lines gives you all advantages of centralized buying.

Wilson Machinery Co. 1936 Market St. Phones: TAbor 0135-0136 **Denver**

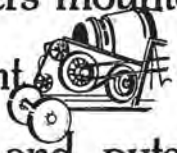
THE BRADFORD-ROBINSON PTG. CO., DENVER

COLORADO HIGHWAYS



Vol. 8 August 1930 No. 8

THE CEDAR RAPIDS LINE

In nearly every corner of the world  there are CEDAR RAPIDS Hoists  pulling road materials in CEDAR RAPIDS Buckets  on to traps and into our reciprocating feeders  . From there the materials move on up our conveyors  into the CEDAR RAPIDS One Piece Outfit  where the oversize goes into one of our 8 sizes of primary crushers  and then out and up our elevator  back thru our revolving screen  into our new 336 Reduction Crusher  . These two CEDAR RAPIDS Crushers mounted together make up the CEDAR RAPIDS Tandem Plant  which produces over 400 specification tons daily and puts it into a CEDAR RAPIDS Steel Bin  , portable if you want it, mounted on one of our steel trucks  . Other portable CEDAR RAPIDS equipment combinations are the portable stone plant  , sized stone plant  , portable and semi-portable steel washing plants  , screening and loading plant  and our new Pre Mix Plant  . Catalog mailed upon request 

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Colorado Highways

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COLORADO STATE HIGHWAY DEPARTMENT
Denver, Colorado

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Our Cover Picture

ON this month's front cover we print a view taken in the Big Thompson canon, a link in the road leading to Estes Park and the Rocky Mountain National Park. During the summer months it is traveled by thousands of tourists from all parts of the country and is a marvel of scenic beauty. A large part of the road was blasted from solid rock.

Colorado Highways
"BETTER ROADS"

VOLUME IX. AUGUST, 1930 NUMBER 8

Highways and Unemployment

UNEMPLOYMENT is one of the biggest problems confronting American business today. The Portland Cement Association recently released a most interesting statement on the effect of highway activities on unemployment. It follows:

Highways Give Employment to Many Workmen

Because there is urgent need for more smooth pavements, and because pavement construction provides a considerable volume of work, communities throughout the country are discovering that accelerated highway programs are greatly relieving unemployment.

Representative of what a pavement program can do for a state is the present situation in Iowa, a state with a penchant for determining the whys and wherefores of its road expenditures. Thirty thousand workmen on Iowa roads are engaged this year in earning for themselves no less than $18,000,000. This means that more than half of the $33,000,000 Iowa is spending in 1930 on roads will go directly into the pockets of workmen. Further, all this road money will represent backed up purchasing power that will stimulate businesses and industries not even remotely connected with highways.

Incidentally, Iowa's roads were nine-tenths mud in 1920; at the end of 1930 they will be 80 per cent surfaced through the wise use of bond issue money. Iowa is keeping her money in circulation.

Superior, Wisconsin, has, like many other cities, been engrossed in solving the unemployment problem. And Superior, similar to countless other cities, has a real need for additional smooth, hard-surfaced streets. Accordingly, advantage is being taken of present bargain prices of pavement construction, with 50 blocks of concrete pavements doubtless to be installed before the year is ended. This construction program is not only providing considerable employment, but the example is inducing private businesses to broaden their activities and employment.

Stimulation of construction by governmental units might seem at first glance an artificial means of bringing back natural prosperity. However, in regarding public construction on the basis of need alone, it becomes obvious that the requirement for public structures is not imaginary. For example, no community as yet can say that it has enough, or almost enough, well paved highways. Consequently, those communities that are doing nothing to speed up the building of needed improvements are really contributing to a continued lull in business.

Business conditions are considered good when money is kept in circulation. Conditions are normal when the working man has money to spend for necessities and luxuries.

In Colorado the State Highway Department has already expended this year $4,000,000 for new construction and maintenance. State Highway Engineer Blauvelt expects expenditures to reach over $8,000,000 by the end of the year.

Reports reaching the state industrial commission show that expenditures by the state and counties for road improvements have been a tremendous factor in relieving the unemployment situation in Colorado.

Decision to push the road program to the utmost was reached by Governor Adams and highway officials early this year and a $10,000,000 program was mapped out, with a result that the department has placed under contract more road work this summer than ever before. Expenditures have exceeded by nearly $2,000,000 those of any previous year at this time.

Colorado Makes Rapid Progress On Road Program

COLORADO is making record progress on its road program this year. The state is now going ahead at more than $1,000,000 a month. Before the end of the construction season State Highway Engineer Blauvelt expects more than $8,000,000 will be expended on the state road system.

To date more than $4,000,000 has been expended by the department on Federal Aid and state road projects. Early in the year it was decided to rush this year's program as much as possible as a means of relieving the unemployment situation in the state. Recently it was decided to carry on as much work as possible throughout the coming winter in order to give employment to as many men as possible.

Information gathered by the Colorado Highway Department is that many farmers in this state have been employed on road building projects this year, despite the fact there will be bumper crops.

The total highway budget for 1930 is nearly $10,000,000. There are 189 projects in the budgets. In addition to this the various counties are making large expenditures and the forest service through the U. S. Bureau of Roads is doing a large amount of road building.

The much-discussed Mount Evans road—the Harding Memorial highway—will soon be a reality. The contractors have assured the public the road will be open during the 1930 season and are straining every resource to make that possible. Workers have completed a seven-mile stretch between Greeley and Kersey. The paving of the Gunbarrel road into Monte Vista was completed just in time for motorists to use it in attending the famous Ski-Hi Stampede, an annual event in that city. Another stretch of oil surfacing between La Jara and Alamosa will make 50 miles of oil-surfaced road extending from Antonito to Monte Vista.

The Bureau of Public Roads is rushing work on the Skyline highway, the Trail Ridge road from Estes Park to Grand Lake over Fall River Pass.

The State Highway Department awarded a contract late in July for the first piece of work the department has ever undertaken within the Denver city limits. This is in accord with a law passed by the last legislature providing that 3 per cent of the gas tax revenue be devoted to work within city limits on connecting links with state highways. Denver's share, with the consent of the city council, will be used first in paving one and one-half miles on West Alameda avenue, which will connect with the paved road to Morrison.

Two contractors are engaged in completing the ribbon of concrete between Denver and Pueblo, one of the most expensive projects in the highway budget for 1930.

It is believed by the end of the summer that the 18-foot strip will be completed, as the last link is the 25 miles now being built between Colorado Springs and Pueblo.

The work will cost well over $500,000.

Another expensive project which is nearing completion is southwest of De Beque, where over $300,000 is being expended for 10 miles of gravel-surfaced road.

Another project nearing completion is the grading of 41 miles of highway between Sterling and Ovid, at a cost of $193,000.

Work also is progressing on the oil surfacing of seven miles of highway east of Aurora at a cost of $134,611.

East of Greeley seven miles of concrete paving is being built at a cost of $145,875.

Along the Victory highway a two and one-half mile gravel surfacing project in Routt County has just been completed and plans are being completed for $100,000 projects west of Hayden and west of Craig.

The last stretch of road over Muddy Pass in Grand County is nearing completion at a cost of $103,000, and a gravel project north of Kremmling has been built at a cost of $76,363.

UNIFORM VEHICLE CODE LEGISLATION

Twenty-three states have enacted legislation based upon the uniform vehicle code, approved by the National Conference on Street and Highway Safety and adopted by the National Conference of Commissioners on Uniform State Laws and the American Bar Association.

The code is divided into four Acts and embodies all the needs of state supervision.

Act I. *A Uniform Motor Vehicle Registration Act* outlines methods for setting up a state motor vehicle department. The particular advantage of this Act lies in the fact that it incorporates those registration and administrative provisions found to be most essential and practical in the more progressive states.

Act II. *A Uniform Motor Vehicle Registration Act* provides for a universal certificate of title law to eliminate the bootleg industry in stolen cars.

Act III. *A Uniform Motor Vehicle Operators' and Chauffeurs' License Act.* Producing standard practices of great convenience to all vehicle drivers.

Act IV. *A Uniform Act Regulating Traffic on Highways* outlines a uniform set of "rules of the road" dealing with traffic signs and signals, control of reckless drivers, etc.

Plans are being made to submit a new highway code to the General Assembly of Colorado next spring. This legislation will be sponsored by the Rocky Mountain Motorists, Inc.

HIGHWAY TRANSPORT LIBRARY ORGANIZED

Announcement of the organization of a library on highway transport has been made by Thomas H. MacDonald, chairman of the Highway Education Board and Chief of the United States Bureau of Public Roads. The library will be for the use of engineers, economists and others interested in highway transportation and related questions, Mr. MacDonald said in making the announcement.

Showing a section of the new concrete pavement east of Greeley recently completed by the highway department with Federal co-operation.. Traffic was moving over this section of modern highway the middle of August.

Contacts of a Highway Superintendent With the Public

By HARRY BYRON JAY,
Superintendent of Construction, Illinois Highway Dept.

A SUPERINTENDENT'S contacts with a new community begin when he makes his first trip to go over the ground where his season's work is laid and to apprise the leading citizens that he may bring his organization to their town provided they promise to forego the time-honored custom of gouging because they are dealing with a state outfit.

His contacts are as varied as are communities; within a given community they are as varied as the individuals. Some communities are friendly, some the reverse, to the coming of an industry for a season. I have gone into places where the mayor has come to meet me with the keys to the city and all its equipment. I have gone into other places where an extra police force was put on because the "hard-road" folks were coming. I have gone into localities where I might make my plant set-up in some man's front yard if necessary; in others, quite as needy of roads, I have been asked $2,000 an acre for $200 land in my negotiations for a plant set-up.

A superintendent's contacts with both the officials and the private citizens of a community are bound to be intimate. If he would make maximum progress with minimum friction, it is for him to be a diplomat. He must know the fifty-fifty game of give and take. He will be wanting many favors to expedite this work, and these come almost invariably if he makes an effort to establish friendly relations with the city fathers. Perhaps this is accomplished by no greater effort than it takes to talk over with them his plans, to explain methods. The "hard" road may be the first thing that has happened in their village for a score of years, and they want to know all about it. They are friendly, hospitable folk as a rule, these city fathers, and should find in the superintendent a sincere, square-dealing, well-mannered person with a capacity for seeing their viewpoint as well as his own, and with a desire to make his organization co-operate in upholding the ideals of the town they are to call home for a few months.

Where Diplomacy Is Required

This is not always so easy, and requires patience and philosophy. Into the community the superintendent has brought an organization made up of all sorts and conditions of people, from his high-type foremen and assistants to the lowest type of laborer—picked up wherever he may be found, and of whom the superintendent knows nothing. Yet, to the citizens of the town, the superintendent is the organization, responsible for the conduct of its least member. Grocers who have trusted irresponsible laborers come to him: "Will you make Fred Jones pay his grocery bill? He is two months in arrears now." The laundryman: "Can you talk to Pete Simpson about letting his laundry bill run so long?" The widow: "Will you use your influence

to get Tom Brown to move out of my house? I do not like him, and have a chance to get friends of mine in there." So the superintendent sighs or groans or laughs or says things under his breath, and plays wet nurse to the tradesmen of the community.

There are farmers who appreciate that they must be inconvenienced for awhile in order to get a road, and these stand it with good grace. Others insist upon the most unreasonable demands in the use of pavement before it is old enough. Some of these farmer-engineers can tell merely by looking at it when pavement is old enough to support a given load—just as they can offer startling and original advice as to where and how the road should be built.

These are generally the ones who want to do the most borrowing. They ask if they may take the concrete mixer, some sand and stone and cement. They would like the loan of the tractor and grader and a gang of men to fix up a road a few miles west. After refusing one of these borrowers and explaining that I could not spend money on other than the road I was building, he said, "Well, I thought it wouldn't do any harm to ask. It cost me only my breath."

Then there is the farmer who demands a culvert in front of his place because his neighbor down the road has one. It makes no difference that his neighbor needs one to take care of drainage and that his place is on a hill where there is no drainage to take care of. Perhaps he would like it as sort of a monument to show the world he is as good as his neighbor.

No One Believes in Signs

Why is it that the traveling public, almost to a man, can be depended upon to disregard *Closed Road* and *Detour* signs—at least to question them? Perhaps for the same reason that we all must touch the green paint to see if a *Wet Paint* sign is really true. We are all devoted patrons of the great American game *I Doubt It.*

Most of the trespassers are innocent of any malicious or criminal intent, and when they are reasonable and courteous they are given considerate treatment. However, there are some who get arrogant and hard-boiled, but they don't get away with it as a rule. A road gang is not noted for its "softies."

Sometimes, though, we run up against a situation where discretion is the better part of valor. I have in mind a time when an automobile loaded with thugs from a neighboring city came along, tore down the barricade which closed the road, and went down the new pavement. A watchman tried to stop them. He was motioned to one side by a member of the gang with a gun in his hand. "Get out of the way," he cautioned, "or I'll croak you!" The watchman got out of the way. But he took precautions against a recurrence of the offense. He got a couple of planks, drove large spikes through them close together, and laid the planks across the pavement with the spike points up, sprinkled some dirt over the whole affair to conceal it, and awaited results. Another car crashed the gate and passed over the innocent looking accumulation of dirt, but needless to say didn't get far enough to damage any green pavement.

There are smart alecs who sneak onto the fresh pavement. But the most dangerous offender probably is the drunk driving a car. He is a serious danger to the workmen, to the machinery and to the recently laid pavement. I recall an instance where one of these drivers got around a barricade and drove down fresh pavement until he arrived at the work that had been done that very day, his wheels gradually sinking deeper and deeper until he was stuck in the soft concrete. It cost him plenty in fines and damages.

Happily, though, these offenders are in the minority and the one we have to deal with mostly is the average citizen who can't resist following the pavement stretching out invitingly ahead even though he has seen a *Detour* and *Road Closed* sign. A certain engineer, knowing the propensity of the average driver to figure that perhaps he *could* get through, added below the conventional *Road Closed* sign the following:

"Do not argue with the sign.
The sign is right."

Testing the Pavement

I have seen several ways of testing pavement to determine its strength for supporting traffic. The method generally accepted is that of breaking small beams of concrete by means of a beam tester. A small beam, similar to a small fence post six inches square and three feet long, is cast from the same batch of concrete which is being placed on the road. After several days this beam is placed in the tester and broken by it. That experiment, at the time of breaking, records its breaking strength. If this sample of concrete shows sufficient strength it is logical to believe that the pavement itself has similar strength.

But not long ago I encountered a new method for testing. A woman came down the road driving a Ford alongside the pavement until she was stopped by the foreman at the mixer. She wanted to go on, but he told her that she could not; that she would have to turn around and go back. Then he went back to his work.

But, happening to glance in her direction shortly after, he saw her on the green pavement with her car. Rushing back he stopped her and gave her an eloquent discourse upon her injury to the pavement by her act.

She apologized and explained, "It looked dry, and I got out of my car and walked on it. It held me up all right, so I didn't think it would hurt to drive the Ford over it."

After sizing her up—she weighed about 250 pounds—he informed her that even though he admitted the severity of her test, it hardly could be called official and that he didn't believe it would be acceptable to the engineer.

Must Be Impervious to Criticism

Such are a superintendent's contacts with the public. The impressions he and his organization make upon it are quite as varied, and in the variety lies his assurance of keeping balanced. He is in no danger of becoming either unseemingly vainglorious nor yet too low. He learns that his cost records, and they only, must be his Bible—his comfort or his chastisement. The Rotary Club or editor of the Town Astonisher may acclaim him as little short of a hero, making unprecedented progress in the face of obstacles, but he mustn't let the praise go to his head. He knows that with his equipment and organization he should make that progress. A local engineering club may visit his job and report that he is making unsatisfactory progress; that with his equipment he should average 1,600 feet a day. And he mustn't let the criticism make him feel low. For he knows that the full capacity of his mixer is but 1,600 feet and that it is impossible to average a capacity run.

(Continued on Page 20)

When A Highway Maintenance Crew Goes Fishing

"Casting Bait."

"Gets a Rise."

"Hooked."

"Playing Him."

"Tired Out."

"Landed; no net handy."

The above photographs show how a state highway maintenance crew recently recovered a tractor from 12 feet of water in the Colorado River near Glenwood Springs. The crew were working on a washout when the earth gave way, dumping the machine into the swift and swollen stream. Fortunately, the operator escaped by jumping. Except for a thorough drenching from the water, the machine was not damaged, and was placed in service immediately after it had been "landed." Photos submitted by John P. Donovan, state highway maintenance engineer.

Self-Discipline in Accident Prevention

SAMUEL INSULL, JR., of Chicago

WHEN Rear Admiral Richard Byrd flew over the South Pole a few months ago the civilized world at once set down the achievement as one of heroic daring. It was an adventurous accomplishment.

Yet those who know Commander Byrd tell us that he does not follow the popular pattern of the dare-devil. His deeds undoubtedly reflect boldness and daring—but fundamentally they are the offspring of deeper and more serious qualities. His leadership in the field of modern exploration has come from carefully planned procedure rather than brazen chance-taking.

I do not minimize the honor due the leaders of forlorn hopes. The accomplishments of unpremeditated inspiration are essential to the progress of civilization. The lessons that you and I draw from feats of daring for application to our day-to-day life, however, are few if any. Conversely, the more serious and less spectacular virtues of men such as Commander Byrd—foresight, perseverance; in a word, self-discipline—we might well strive to emulate as we go about our workaday affairs.

Stefansson, the Arctic explorer, once uttered an interesting bit of philosophy. He had been in the Arctic for five years—apparently lost. On his return he was asked to tell of his adventures. His reply was that he had had none; that so-called adventures occurred only to those who are not prepared to meet them. His contention was that adventure, when rightly handled, becomes a commonplace experience.

A Safety Fundamental

Therein Mr. Stefansson unconsciously struck the keynote of the modern safety movement. The cornerstone of safety achievement is preparedness. It teaches us how to secure the fullness of life to which we are entitled. It tells us to heed—but not to fear; to take reasonable risks—but to avoid foolish hazards. It urges us to plan first—and only having planned, to act. It tells us to count the cost. In short, safety teaches self-discipline.

I well imagine that if Commander Byrd were asked to give the outstanding reason for the success of his polar flight he would promptly answer: "Preparedness." It was a consideration in every one of a thousand details before he ever sailed from New York. It was the anticipation of every possible hazard that might have meant failure.

This same spirit of preparedness, this same self-discipline, which plays such an important part in dramatic achievements, should play an equal major role in the daily conduct of each of us to ensure our personal security, our freedom from accidents. We should all plan to reach this objective.

Certain instincts of danger are pretty well defined in every one of us. We know for example that if we place our hands in the fire we will get burned. We know pretty well what will happen if we fall off a high building. Such instincts are natural. They are part of us. They are basic.

Mechanical Mental Processes

The trouble is that most of us fail to consider other dangers which, although not so apparent, may be equally disastrous. We become calloused. We ease up on our self-discipline. Our mind becomes saturated with less important but more pleasant thoughts. Our mental

Showing section of new oil-processed highway northeast of Fort Collins recently opened for traffic.

processes become mechanical and we ignore risks on a stepladder at which we would shudder on a scaffolding.

Only a few weeks ago a window-washer who had gone about his day's work on the dizzy heights of a Chicago skyscraper, started to wash the windows of his second story apartment. He never thought about putting on his life belt. He fell and was very seriously injured. He had not counted the cost because the hazard was less impressive. He had eased up on self-discipline.

Self-Discipline at the Grade Crossing

Daily we read of grade crossing tragedies. Hourly they are occurring. I venture the opinion that tomorrow's papers will carry such a story. They have become a part of the day's news. Lives snuffed out unnecessarily! And nearly always because someone fails to stop—to look—to think. Lack of discipline again—for certainly we all know the probable results if we crash into a moving train. It was at one time my duty to serve as the operating official, responsible for day-to-day happenings, of an inter-city motor coach company. Our drivers were obliged to come to a dead stop at all railroad crossings, setting the hand brake and throwing the gear-set to a position of neutral. To enforce such a rule at first was not easy, but it was enforced. As I was driving along the same roads as the motor coaches, I was myself obliged to observe the rule. No infractions by officials were tolerated. The experience was indeed fortunate. I now find myself unconsciously still adhering to the good old hard-boiled motor coach rule—in spite of the fellow behind who honks impatiently. I presume to cite this personal experience as an example of how easy it becomes for a normally thoughtless person to behave safely if he is trained safely. Most of us are not so fortunate as to be trained by circumstance. All the more then we must train, must discipline ourselves. Burdensome though this effort may be, the ultimate reward we secure in safety without effort more than justifies it.

If we are to avoid accidents we must train our minds to make calm analysis of every act where possible danger is involved. Others can only point the way. The decision on the road to follow depends, in the final analysis, on ourselves. It is my problem—just as it is yours. The motivating power must come from within—not from without.

The great majority of us look both ways before we start across the highway. Why? We have trained ourselves to do this. Unfortunately, many have not so trained themselves. Those are the cases we read about in the daily papers.

SOME TAXATION FACTS

THE following bulletin on "Taxation" contains much condensed "food for thought" that should be of live interest to every citizen of this country: "The power to tax is the power to destroy."

More than 10 per cent of the incomes of the people of the United States is paid out in taxes of one kind or another, directly or indirectly.

In the past seven years the railroads of the United States have paid in local, state and federal taxes some $14,000,000 more than they paid out in dividends.

The average man pays federal income taxes, personal and property taxes to his home town, county and state, license taxes for business, for automobiles, for hunting and fishing, poll taxes, school and road taxes, special assessments, gasoline taxes, inheritance taxes. These are some of the direct taxes he pays.

Another view of the new concrete pavement located east of Greeley. Seven and one-half miles of this standard pavement were recently opened to traffic. It extends east to Kersey from Greeley and provides a modern roadway through a rich dairy and agricultural section of Weld County.

Indirectly, he pays customs duties on all the imported merchandise he purchases and the equivalent of customs duties on all the tariff-protected domestic merchandise he buys.

Corporation income taxes are passed on to purchasers in the form of higher prices. Some eleven billion dollars each year are directly paid out in taxes by the people of the United States, whose annual incomes total just a little less than ninety billions of dollars.

Most of these eleven billions paid in direct taxes go just as rent goes. Mighty little of it finds its way into constructive channels for the development of new earning power by the people who pay it.

The next great burning issue to engage the attention of the American people should and probably will be tax revision all along the line, and greater care in supervising the expenditure of public funds. At small cost the people of Europe prevent holes from developing in their roads. At great expense, the people of the United States usually repair their roads only after great holes have all but made their roads impassable.

Enough food values are destroyed each day in the United States, via the garbage can, to feed a good size nation.

Each year a cubic mile of valuable silt—the equivalent of three inches from the top of 13,000,000 acres of land—is washed down as waste by the Mississippi River floods.

Much of the money we pay in taxes is wasted, in that it passes into unprofitable channels. Waste is largely preventable. Every country in the world except the United States seems to have found that out.

Methods and Costs on Colorado Oil-Surfacing Project

By J. J. VANDEMOER,
District Engineer, Colorado State Highway Department

A NINE and one-quarter mile project which was completed during the past construction season is the first oil-surfacing project to be constructed in the writer's division. The original gravel surfacing over which most of this oil treatment has been applied had been constructed about seven years ago. Crushed river gravel having a maximum size of 1½ inch and placed 4 inches thick and 18 feet wide with a top course of ¾-inch crushed gravel 2 inches thick was used in its construction. This surfacing was thoroughly wetted, rolled and compacted, using a natural silt binder which contained little clay or adobe.

Preliminary Work

This road had carried heavy traffic for about seven years with little renewal of the surfacing and with no subgrade failures until last spring. Last winter there was a great deal of snow and rain in this region and as the drainage system was not in good repair, when the spring breakup occurred there were a few subgrade failures. These failures occurred as "frost boils" and were corrected by raising the grade at these places and by reestablishing the drainage system during the construction of the oil-surfacing project. Pit-run gravel with a maximum size of 2 inches was used in the grade raises. This was placed in thin layers and thoroughly compacted under traffic.

On account of heavy traffic the original gravel surfacing was practically worn away, so it was necessary to rebuild this to a minimum thickness of 4 inches before the surfacing gravel was placed. The new surfacing was thoroughly compacted by traffic before the oil-surfacing material was placed.

It is thought that the subgrade is stable and that it will carry traffic satisfactorily as long as the drainage is kept open, and in order to protect the subgrade as much as possible the drainage on this project was brought back to the original plans. The surfacing gravel was spread 20 feet wide and approximately 3 inches thick. This compacted to about 2½ inches.

Analyses

Frequent mechanical analyses of the process material were made and the mix was held as uniform as possible. The material passing the 200-mesh screen varied from 9 per cent to 15 per cent. Average analyses were as follows:

	Per Cent
Passing ¾-inch screen	99.7
Passing ¼-inch screen	62.4
Passing No. 10 screen	57.7
Passing No. 200 screen	12.2

On one section an average of 9 per cent of the surfacing material passed the 200-mesh screen and only 1.52 gallons of oil per square yard was used on this section. This seems to have been ample, for it is one of the best sections on the project.

The same relative conditions seemed to hold on the entire project and indicated that in order to keep the cost of oil as low as possible it was advisable to use a material of which 9 or 10 per cent would pass the 200-mesh screen.

The specifications on this project permitted from 5 to 15 per cent of the surfacing material to pass the 200-mesh screen, but it is believed that from 5 to 10 per cent would have been more economical and would have resulted in the construction of just as good a road as was built.

From 1.52 to 2.21 gallons of oil per square yard was used on this project. The average was 1.88 gallons per square yard exclusive of the seal coat.

Rain Causes Difficulties

The most serious difficulty occurred on a 2-mile section which was placed under ideal weather conditions. This stretch of road was oxidizing satisfactorily under heavy traffic when the fall rains set in. Rain fell for about two weeks. The traffic was heavy and wherever water stood on the road the oil seemed to leach out of the surfacing. Grades are very flat on this project and for this reason water does not drain off quickly; the shoulders had not been sufficiently pulled down and the finished surface had not been brought to as smooth a condition as possible, so there were depressions in which water collected. As a result of this combination of circumstances raveling started. It was decided to tear this section up and to add another quart of oil per square yard. Satisfactory results were obtained.

Experience indicates that too much care cannot be taken to insure that the processed material is thoroughly dry. Frequent moisture tests should be made. More than 2 or 3 per cent of moisture is likely to cause cracking followed by corrugations.

Owing to the difficulties which had been encountered and on account of the presence of excessive moisture during construction and after the oil surfacing was completed, it was decided to seal coat the entire project. An average of 12-hundredths of a gallon of oil per square yard was spread over the entire project. Fine sand and silt were used to absorb the excess oil and for a mulch on the surface of the roadway. The seal coat was about ⅛-inch thick. Traffic was turned on each section as fast as it was seal coated.

Costs

The seal coat cost 2.7 cents per square yard. It is believed that the money which was spent on the seal coat was wisely used. To date practically no raveling has occurred on this project. This road has carried as high as 2,000 cars per day during the fruit season, and seems to be handling traffic satisfactorily.

A stretch of oil-processed highway northeast of Fort Collins in Larimer County, near Virginia Dale, recently opened to motorists. This work was accomplished by state highway forces under the supervision of Engineer Clyde Walters.

The unit prices and other items of interest on this project are as follows:

Item		Unit Prices
per cu. yd.	Borrow excavation	$0.35
per ton	Pit-run gravel	0.98
per ton	¾-inch gravel	1.10
per gallon	Asphaltic road oil	0.085
per sq. yd.	Processing	0.055
per sq. yd.	Scarifying and harrowing	0.04
per sq. yd.	Cost of seal coat (F. A.)	0.027
gal. per sq. yd.	Oil used exclusive of seal coat	1.88
gal. per sq. yd.	Oil used for seal coat	0.12
per cent	Total oil used on project	6.05
per sq. yd.	Total cost oil surfacing complete in place	0.517

The total cost was $5,175.52 per mile. This includes a section 1,800 feet long and 30 feet wide through the town of Palisades and the necessary deferred maintenance cost.

Adverse weather conditions increased the costs, as did tearing up and re-laying the above-mentioned two miles of oil surfacing.

The total contract cost per mile as submitted in the final estimate was $6,169.56. This includes grade raises, new surfacing material, asphaltic road oil, processing (scarifying and harrowing the section that had to be torn up), seal coating, drainage and incidentals. These costs are high, but considering conditions are not believed to be excessive.

Equipment Used

The contractor used the following equipment:

1 gravel crushing and screening plant.
1 set of scales to weigh gravel.
5 new 2-ton G. M. C. trucks.
1 set heavy road disc harrows.
2 Adams leaning-wheel graders with 8-ft. blades.
2 Caterpillar tractors, No. 30.
1 2-ton Caterpillar tractor maintainer.
1 light rubber-tired maintainer.
1 distributor, capacity 1,150 gal., owned and developed by the Gilmore Oil Co., which company furnished the oil.
1 10-ton steam roller, used for heating the oil in the railroad cars.

Conclusions Drawn

As a result of experience on this project, the following conclusions may be drawn:

(1) The subgrade must support traffic satisfactorily before oiling.

(2) Water in any form is the most dangerous enemy of an oiled road.

(3) Drainage must be as thorough as possible or failures will occur at points of insufficient drainage. In other words, ground water and surface water must be kept as low as possible.

(4) At least 4 inches of old, well compacted surfacing makes a stable sub-grade. If loose material is put between the base and the oiled surfacing, there is a tendency toward rutting, shoving and breaking.

(5) Too much oil is almost as bad as insufficient oil.

(6) No clay should be present in the process material.

(7) Sufficient inert fines to fill the voids will produce the most economic road with a minimum amount of oil. Fuel oil will not bind clean, coarse material, and if the material will not pack without oil, it will not pack satisfactorily with oil.

(8) Heavy clay binder in the process material is not desirable.

(9) A road that breaks up in the spring or becomes muddy in wet weather should not be oiled without making the necessary drainage corrections.

(10) The processed material should not be laid down if it contains an appreciable amount of water.

(11) A satisfactory oiled road may be built with one-inch maximum surfacing material.

(12) Careful maintenance is necessary.

Acknowledgment—A paper presented at the 1930 Highway Conference at the University of Colorado.

NEWS OF THE MONTH

With a new crushing outfit, Hamilton & Gleason are now applying two inches of gravel on six miles of roadway south of Meeker. "When this second course of gravel is put on the road from the river bridge to the Federal Aid job on the other side of the hill we will have an all-weather road which will stand up under heavy haul," writes Richard Lytle in the Meeker *Herald.*

The new paved highway between Greeley and Kersey was opened to traffic on August 20. There are seven and one-half miles of 18-foot concrete in the project. There are now 20 miles of unpaved road between Greeley and Fort Morgan. It is planned to continue the pavement as funds become available. Highway officials describe the Kersey job as one of the best organized pieces of paving work yet done in Colorado. Thomas Burtch, treasurer of the New Mexico Construction Co., which constructed the paving, came by plane from Albuquerque to witness the opening of the paving.

Motorists may now travel over a beautiful gravel-surfaced highway from Leadville to Redcliff over Tennessee Pass. Work of placing the last of the gravel on the Leadville end of the road was finished the middle of August.

Construction of the west section of the new Fall River road in Rocky Mountain National Park will be started probably about October 1, according to officials of the U. S. Bureau of Roads. When completed this will give a new highway over an easy grade from Estes Park to Grand Lake.

The highway department will receive bids for the construction of five and one-half miles of gravel-surfaced highway north of La Jara on August 29.

The sum of $2,315,948 has been set aside for road building in Colorado by the Federal government, and this state must match the amount to bring it here. It is to be available July 1, 1931. Revenue of the highway department at present is not sufficient to match this sum. It has been suggested that repeal of the present refunds on gasoline tax will provide over $500,000 for this purpose.

Colorado's biggest highway improvement campaign is now in full swing. Projects totaling close to five million dollars are now actually under construction, with nine big Federal Aid projects and some thirty state projects being drafted in order that construction contracts can be let before winter.

The state is making every effort to rush through highway projects in order to aid in relieving the unemployment situation.

O. T. Reedy, senior assistant highway engineer for the state, estimates that there are 69 per cent more highway projects now under way in Colorado than ever before in history. In addition to 51 Federal Aid projects under construction, there are some 35 state projects and a score or more municipal projects being constructed with state highway "3 per cent money."

Seven miles of standard gravel-surfaced highway have been completed by the Mt. States Const. Co. between Greenhorn and Apache Creek on the Pueblo-Walsenburg highway. A similar graveling job is under way by the Driscoll Const. Co. between Walsenburg and Aguilar.

At its May meeting the highway advisory board dedicated the road between Marble and Schoefield Pass, in Gunnison County, as a state highway. In the future state funds may be appropriated for this road.

Surveys are being made by Division Engineer Ernest Montgomery for the improvement of four miles of the Ute Pass highway above the town of Manitou next year. The road will be widened and the grades reduced. The project will be carried out in 1931, according to present plans.

Congress will be asked to appropriate $3,500,000 for forest roads. Of this amount Colorado's share is $119,000.

Equipment has been erected for the oil surfacing of the entire highway over Raton Pass from Trinidad. With the completion of the concrete pavement at Starkville and the new oil surfacing in place, the highway will be surfaced from Trinidad south to the state line, where the oil surfacing will connect with like work now in progress to Raton, New Mexico.

Nine miles of the new road in DeBeque canon, on the Rifle-Grand Junction highway, have been completed by Hinman Bros., contractors. Work has been started on a four-mile connecting link, which is expected to be completed this fall. The entire project will be gravel surfaced. A bridge is now being constructed over Plateau Creek as the west entrance to the canon. The new work will eliminate one of the worst stretches of highway on the Western Slope.

Late tourist travel in the Rocky Mountain National Park will be taken over the new Trail Ridge road from Estes Park to Grand Lake, officials of construction announce. Indications are that work on the road will be completed in another month. The road follows an old Indian trail to the top of the ridge from the top of the High Drive above Estes Park and joining the former highway to Grand Lake at the top of Fall River Pass.

Heavy rains in all parts of Colorado during the first two weeks in August kept maintenance crews working long hours. There were many cases where these men worked day and night without thought of food or rest, with the sole object of keeping the highway traffic moving. Some of the storms were of cloudburst proportions, resulting in heavy damage to highways, bridges and culverts.

Appreciation of the efforts of the highway workmen is often overlooked by the general public. But those who are in a position to know what these men have accomplished are passing along a token of appreciation of the faithful service rendered.

Excavation has started on three miles of new roadway on the east side of La Veta Pass in Huerfano County. Mountain States Const. Co. have the contract at $39,659. The engineer's estimate was $53,690.

J. Finger and Son are working on three miles of new road near Buena Vista in Chaffee County. The bid was $51,979; engineer's estimate $55,284.

The largest grading contract ever let in Colorado, including excavation and installing bridges and culverts on 42 miles of highway between Sterling and the Colorado-Nebraska line, is about 85% completed by Cole Bros., Pueblo contractors. The project is costing $250,000. This stretch of new road will be open to traffic this fall. Later the project will be gravel surfaced and oil surfaced as funds become available.

Cole Bros. are moving road equipment to Pando, on Tennessee Pass, where they will start an eleven-mile gravel-surfacing project at once. The work will cost approximately $50,000 and is expected to be completed this fall.

Plans are completed for grading, graveling and oil surfacing six miles of highway northeast of Trinidad. Bids will also be asked for in the near future for the construction of a new overhead crossing of the Denver & Rio Grande Western railroad tracks east of Florence.

Three miles of new road north of the Forks Hotel, on the Ft. Collins-Laramie highway, were completed August 10. The new road was oil surfaced by state highway forces. Plans of the department call for the completion of this road to the Wyoming state line in 1931. About twelve miles of the road through Virginia Dale remain to be constructed.

A new steel bridge over the Arkansas River near Lamar was completed the first of August. This structure cost $140,000 and was constructed with Federal co-operation.

Projects being planned by the highway department during August included: Oil processing 10 miles northwest of Fort Collins; oil processing 14 miles west of Burlington; graveling four miles west of Hayden; graveling eight miles south of Wolcott; graveling three miles south of Durango, and graveling three miles east of Cimarron.

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Clippings, Letters and Comments

DEALING WITH STATE HIGHWAYS

Another Bootlegging Racket

The *Rocky Mountain News* comments on the gasoline refund as follows:

A new form of bootlegging will receive an airing when the next legislature meets.

The belief is general in highway circles that the 4-cent-a-gallon tax on gasoline has led to the starting of a new and lucrative form of law evasion that calls for drastic action.

The present law allows a refund of the gasoline tax to those having tractors for farm use, the industrial plants, to aviators and to road contractors. When the tax was 1, 2 and 3 cents a gallon there were few attempts to obtain excessive refunds.

With the boost of the tax to 4 cents a gallon, many persons are said to have realized they could reap a handsome profit by putting the tax in their own pocket.

As a result, many complaints have been made to the State Highway Department that the law is being abused. Farmers are reported to be buying gasoline and retailing it to their neighbors who do not own tractors. Cleaning plants and other industrial establishments are reported to be diverting gasoline to filling stations. Reports have been received that road contractors are forcing truck drivers to buy gasoline from them and are pocketing the tax.

The refunds are reaching serious proportions. Over a quarter of a million dollars that otherwise would have gone for road building purposes has been turned back to purchasers already this year. This is nearly a tenth of the amount collected.

The situation is growing serious enough to demand the prompt attention of the next legislature and, if no other method can be found to remedy the abuse, all refunds should be abolished.

Oil Surface Ideal for Feeder Roads

The following is taken from the *Colorado Springs Gazette:*

"When an oiled-surface road is smooth, it is very, very, smooth, but when it is rough it is the roughest road made," J. Fred Roberts, Denver contractor, told Kiwanians yesterday noon at their weekly luncheon in the Ann Louise cafeteria. Roberts has the contract for installing the concrete paving south of Colorado Springs on the Pueblo highway. He discussed various phases of the highway situation in Colorado.

The speaker said that oiled-surface roads can never be a substitute for the type of paving surface now in use on main traveled highways, but that there is a large mileage of roads in Colorado for which this seems the ideal type of surface.

"We are inclined to doubt," continued Roberts, "whether this smooth surface can be maintained under the heavy traffic of the main arteries, as for instance the highway between Colorado Springs and Pueblo."

He believes that the oiled surface will probably be greatly used in this section in the future, not because it is a cheap substitute for pavement, but because of three qualities: first, it sheds water and does not become muddy; second, it is dustless; third, it saves the road material, which on the ordinary road is ground to a powder under traffic and blown away as dust. It is also not costly and saves much gravel.

Loveland Pass Nears Completion

The *Clear Creek Mining Journal-Gazette* writes as follows regarding the work now in progress on Loveland Pass:

Here's good news for the loyal boosters of the Loveland Pass highway. Within a few weeks at most, cars will be able to make the trip over the pass either way, making a saving in mileage of nearly 100 miles between points directly west and northwest and Denver.

This announcement is made possible by the visit of Senator Fred Flebbe and Mr. Peter Seerie, chairman of the board of control of the State Highway Department, to the scene of activity on top of the pass Wednesday of last week.

New Akron-Brush Highway Graded

The following news item appeared in the *Yuma Pioneer:*

The new Federal Aid highway between Akron and Brush is progressing rapidly under the able supervision of Mr. Edwards, of the State Highway Department. The work is being carried on both in Washington County and Morgan County. There is a gang of twenty-five men at work on the road at present. These men are equipped with two large elevator graders and ten fresnoes.

In addition to the men at work elevating the grade for the road, there is also a bridge gang at work. The work has been pushed about eight miles in Washington County and about seven in Morgan County, making a total grade of about fifteen miles.

The work will progress rapidly from now until the highway is completed and according to the best available information, it will be opened some time this fall.

In spite of all arguments to the contrary, this road will prove to be a good thing for this section of the country, since it will shorten the distance between Denver and McCook to such an extent that the longer, partially paved route will have more strenuous competition than ever.

Work Proceeds on New Road to Northwest

The *Sterling Advocate* says the following regarding the work the highway department is doing between Sterling and Ovid:

Good progress is being made on the new highway which is being constructed between Sterling and Ovid. The highway has been thrown up to its desired height on the route in Logan County, between the Ford beet dump and Red Lion. The rough work is finished.

The work on the new road has been under way since the contract was awarded last fall. The task is one of the biggest projects ever attempted in Logan County and will be appreciated. The short turns and the grade crossings at railroads will be eliminated. Detours have been necessary since last spring, but such difficulties are always endured during the progress of improvements.

Rabbit Ears Road Surveyed

The *Hot Sulphur Times* prints the following in regard to the proposed work on Rabbit Ears Pass through the National Forest:

The U. S. Department of Agriculture is putting on a survey for the highway through the National Forest over Rabbit Ears Pass. The work is in charge of Engineer Wallace and the first stretch will be from the top of Muddy Pass westward.

Eventually the entire Rabbit Ears highway will be rerouted. The change is being made to avoid the huge snowdrifts that block the road. Mr. Wallace says that the money is now available to construct the 8 or 9 miles designated. There will be no grade above 5 per cent. At some places on the present road the grade runs as high as 8 or 10 per cent.

The new highway will follow the contour of the country where the snow blows off instead of where the snow piles up. The survey will be made so that the wind current will blow parallel with the road instead of across it. The wind invariably blows from west to east and the road will be routed as nearly west and east as it is possible to make it. Some places it will be graded up so that the snow will pile against the grade and blow off the top. The ridges and pinnacles where the snowdrifts lodge will be avoided.

As soon as the details of routing the first stretch are completed the work will begin, possibly this fall or early next spring. The Rabbit Ears highway is part of U. S. 40 and the Victory highway and established as a permanent route. The change of the whole road will be made as rapidly as possible. Snow on the level will be easy to handle so that the road can be kept open all year.

HIGHWAYS CLOGGED WITH MORE CARS DURING 1929

Colorado had 18,622 more motor vehicles on January 1, 1930, than it had at the beginning of 1929, and Wyoming had 4,344 more, according to figures compiled by Rocky Mountain Motorists, Inc.

New York led the nation with an increase of 179,317 motor vehicles, while California was second with a gain of 174,451. Michigan was third with 145,810, and was trailed by Texas, with 133,810 and Ohio, with 116,915.

For the nation as a whole the number of motor vehicles increased 2,008,319 during 1929 and served to add to the congestion already on the highways.

One of the greatest problems of road building agencies has been to keep pace with the need for new highways, and at the same time take care of maintenance of existing roads.

Despite an apparent slump in many lines of construction, it is most encouraging to know that road building has been speeded up.

This has been largely due to the constructive leadership of President Hoover in urging that all public works be pushed to the limit. The various states have been quick in responding to this appeal, and as a result the construction of highways is proceeding in an orderly manner.

Road building has so rapidly become a part of our national life that it is still a bit hard for us who have been accustomed to feel a proprietary claim upon the road near us to realize that it is no longer "our" road to Homeville, but that it is the road from Boston to San Francisco. It belongs to the man in Massachusetts as well as to the Coloradoan, for it is being built with the help of our Uncle Sam for whoever chooses to drive that way.

The traffic survey will show local requirements only in so far as citizens co-operate in furnishing information by filling out the cards offered by the recorder. The man who refuses to stop is working against his own interests.

FORTY MILLION TOURISTS SPEND $3,000,000,000

Now is the season when one of the country's biggest businesses flourishes—the "vacation industry."

The motor army this summer will number more than 40 millions, says Dr. Julius Klein, assistant secretary of commerce.

This tourist business, he says, has been estimated to be equal in monetary value to the gigantic iron and steel industry. The annual expenditure by the motorist caravan has been placed at more than three billion dollars.

MANY NATIONS EXPECTED AT SIXTH ROAD CONGRESS

Already 27 countries have accepted invitations to participate in the Sixth International Road Congress to be held in Washington, D. C., next October and approximately that many more acceptances are expected to come in during the next six or eight weeks, according to an announcement by Thomas H. MacDonald, secretary-general of the American organizing commission. Invitations were sent out last January by the State Department to a total of 58 countries, Mr. MacDonald said.

ROAD BUILDERS' AND MACHINERY NOTES

Monarch Organization Will Handle Wheel Tractor Line

Sales control of the Allis-Chalmers Model U industrial tractor has been transferred to the company's Monarch Tractors Division at Springfield, Illinois. This decision was announced recently by H. C. Merritt, general manager of the Tractor Division. R. W. Gotshall, Springfield Works sales manager, and W. Ellzey Brown will have charge of the new industrial line.

The Allis-Chalmers industrial and allied equipment was formerly sold through the United Tractor and Equipment Corporation.

All district managers of the Monarch organization recently attended a three-day demonstration of the complete Model U industrial line in Milwaukee.

Several manufacturers of industrial and road building equipment co-operated with Allis-Chalmers in the demonstration. This equipment, built for use with the Allis-Chalmers industrial tractor, included Wehr center control, rear control and pull type graders, Galion graders, Shaw-Enochs Century and Shawnee graders, Schramm air compressors, Blair hydraulic shovel and back filler, Waterman back filler, Trackson shovel, Perry scraper, Trackson hoist, Sauerman dragline, Hughes-Keenan iron mule and roustabout crane, Detroit Harvester Co. power mower and street sweeper, Bay City shovel, Winsor scraper, Wehr road roller, W. K. M. hoists and pipe line equipment, Northwestern Mfg. Co. arc welders, Trackson Co. crawler attachments.

Addition of the Model U line to the Monarch line will give the Monarch organization both wheel type and crawler type tractors. Monarch distributors and dealers will also have both types of tractors available together with the allied equipment.

Schramm Compressor Used on Mt. Evans Road

The H. W. Moore Equipment Company is proud of the achievements of the Schramm portable air compressor now being used atop Mount Evans, an elevation considerably above 14,000 feet. It is the 360-foot size, the largest made, and is feeding two jack hammers on this highest road in the country.

The Pre Mix unit which the Moore Company set up in Glenwood Springs for demonstration purposes gave a most satisfactory demonstration and has been returned to Denver for further demonstration work.

A Sure-Trac rubber crawler Galion machine is to be taken on a demonstration tour of eastern and southern Colorado counties.

Equipment being used on Colorado road projects: 1. A Pioneer gravel crushing plant owned by Montrose County working near Naturita. Photo by Elton T. Fair Co. 2. A pair of Caterpillar tractors pulling Ateco hydraulic scrapers to crusher furnishing gravel for project east of Denver. Photo by Clinton-Held Co. 3. Here we have a General excavator working in 13,000 ft. altitude on Mount Evans. Photo by George Meffley, of H. W. Moore Equipment Co. 4. A giant Schramm compressor running two jack-hammers on Mount Evans road project, 13,882 ft. altitude. Photo by H. W. Moore Equipment Co. 5. A Monarch "30" with drag operating on state highway south of Pueblo. Photo by Wilson Machinery Co. 6. Before and After—with an F. W. D. truck equipped with a Willett scraper in Weld County. Photo by Liberty Trucks & Parts Company.

St. Louis Gets the 1931 Convention of the American Road Builders' Association

St. Louis has been chosen as the site of the 1931 convention and road show of the American Road Builders' Association. This announcement, following the annual business meeting of the association and the installation of new officers in Washington May 15-16, carries out the new policy of giving the annual gathering to a new section of the country each year. The Missouri metropolis was chosen over the rival bids of Houston, New Orleans and other cities of that region, because of what are thought to be superior facilities for accommodating the delegates and the mammoth exposition of road machinery and equipment, both of which lead the industrial field in point of size.

Contacts of a Highway Superintendent With the Public

(Continued from Page 6)

The other day a large crowd stood watching the work of a great mixer. Everything was running smoothly, and perhaps I was preening myself a little over this organization running like one perfect machine. It was a moving spectacle to me, understanding as I did all the apprenticeship and co-operation and interest in the good job that was back of this perfect functioning. I was observing especially a certain foreman—a man of high native ability with years of training and experience behind him. There wasn't a leak in his operating gang; not a wasted movement; not a wasted second. He was demonstrating perfectly that progress and low costs are achieved by saving seconds. His efficiency was enough to make a humbler man than he feel a bit "upstage." Was this crowd appreciating his hitchless performance? I was answered shortly.

A woman accosted me, seeking a job for her son.

"But Tom," I told her, "is just a high school lad. Light, soft, quite unfitted for labor of this sort."

"Why," she demanded, indicating the foreman, "can't you give him a job such as that man has? All he does is to walk up and down."

The first federal aid road act as now administered was passed in 1916, carrying an appropriation of $75,000,000 to be expended in five years.

PLANS BEING DRAFTED

Proj. No.	Est. Length	Type	Location
91-R	6 mi.	Oil Processed Surfacing	Northeast of Trinidad
144-F	10 mi.	Oil Processed Surfacing	Northwest of Fort Collins
292-D	8 mi.	Gravel Surfacing	South of Wolcott
134-AR&C	14 mi.	Oil Processed Surfacing	West of Burlington
265-D	3 mi.	Gravel Surfacing	South of Durango
151-A	6 mi.	Gravel Surfacing	North of Fraser

FINISHED PLANS NOT ADVERTISED

282-I	2 mi.	Gravel Surfacing	South of Craig
189-B	2.6 mi.	Gravel Surfacing	West of Hayden

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per Cent Complete	Proj. No.
2-R9	Starkville	1.35 mi.	Concrete Pavement	H. C. Lallier Const. & Eng. Co.	$ 59,180.60	87	2-R9
57-R2	North of Lamar	0.502 mi.	Bridge	J. Fred Roberts & Sons	140,102.90	100	57-R2
68-R2	North of Monte Vista	1.9 mi.	Concrete Pavement	Driscoll Construction Co.	43,566.40	99	68-R2
78-R	Near Minturn	0.709 mi.	Gravel Surfaced	J. Fred Roberts & Sons	96,342.90	47	78-R
92-R1 246-DR1	East of Avondale	5.509 mi.	Oil Processed Surfacing	Lumsden-Hall Const. Co.	33,363.00	0	92-R1 246-DR1
122-R1	Between Ovid and Julesburg	10.122 mi.	Grading	Bedford & Woodman, Inc.	49,976.65	54	122-R1
97-R2 168-AR1 216-AR1 273-R1	Betw. Lamar & Kas. State Line	21.764 mi.	Oil Processed Surfacing	Hamilton & Gleason Co.	122,216.20	8	97-R2 168-AR1 216-AR1 273-R1
138-B	North of Kremmling	3.133 mi.	Gravel Surfaced	F. L. Hoffman	76,363.35	91	138-B
138-C	South of Muddy Pass	4.184 mi.	Gravel Surfaced	C. A. Switzer	103,270.20	41	138-C
144-D	Northwest of Ft. Collins	2.834 mi.	Gravel Surfaced	J. Fred Roberts & Sons	66,430.10	93	144-D
144-D2	Northwest of Fort Collins	0.236 mi.	Gravel Surfaced	J. Fred Roberts & Sons	15,566.00	82	144-D2
144-E	North of Ft. Collins	1.286 mi.	Concrete Paving	F. C. Dreher Const. Co.	109,106.30	6	144 E
147-D	Betw. Cortez & Utah Line	2.903 mi.	Gravel Surfaced	Wood-Morgan-Burnett Co.	43,432.60	68	147-D
149-B	East of Aurora	7.911 mi.	Oil Processed Surf.	Chas. B. Owen	134,611.10	57	149-B
150-A	West of Craig	8.227 mi.	Gravel Surfaced	Gardner Bros. & Glenn	93,477.35	69	150-A
165-R1	East from Canon City	9.325 mi.	Oil Processed Surf.	C. V. Hollenbeck	50,548.30	98	165-R1
175-A	Between Sterling and Ovid	41.979 mi.	Graded	Cole Bros.	193,055.75	76	175-A
229-AR1 271-AR1 271-BR1 271-CR1 271-ER1	East of Florence	7.435 mi.	Oil Processed Surfacing	C. V. Hollenbeck	34,975.85	1	229-R1 271-AR1 271-BR1 271-CR1 271-ER1
243-C	West of Dyke	3.837 mi.	Gravel Surfaced	Grant Shields	47,404.40	74	243-C
248-B	South of Buena Vista	2.766 mi.	Gravel Surfacing	J. Finger & Son	51,979.50	0	248-B
253-D	West of Milner	2.547 mi.	Gravel Surfaced	Hamilton & Gleason Co.	147,192.00	94	253-D
258-H	West of Sapinero	4.921 mi.	Gravel Surfaced	Cole Brothers	123,700.60	99	258-H
262-G2	West of La Veta Pass	5.014 mi.	Gravel Surfaced	Pople Bros. Const. Co.	11,932.50	97	262-G2
262-J	Betw. La Veta & La Veta Pass	2.724 mi.	Surfacing & Bridge	Mountain States Constr. Co.	39,659.85	0	262-J
263-B	Betw. Mortimer & Ft. Garland	3.133 mi.	Gravel Surfaced	Pople Bros. Const. Co.	29,532.40	44	263-B
265-C	Betw. Durango & Bayfield	2.500 mi.	Gravel Surfaced	Grant Shields	36,022.90	5	265-C
266-D	South of Bondad	4.111 mi.	Gravel Surfaced	Engler, Teyssier & Co.	96,075.30	89	266-D
267-C	Near Model	4.491 mi.	Gravel Surfaced	E. H. Honnen	45,801.00	99	267-C
270-AR1 270-BR1	East of Monte Vista	6.412 mi.	Gravel Surfacing	Mtn. States Const. Co.	44,875.40	71	270-AR1 270-BR1
270-D	Betw. Alamosa & Monte Vista	3.978 mi.	Gravel Surfaced	Mountain States Constr. Co.	32,679.40	100	270-D
277-D2	North of Pueblo	15.566 mi.	Concrete Pavement	Edw. Selander	333,257.80	67	277-D2
277-E2	South of Colorado Springs	10.2 mi.	Concrete Pavement	J. Fred Roberts & Sons	238,207.30	51	277-E2
279-H	Betw. Kenosha & Webster	1.691 mi.	Grading	Anderson, Sheldon & Miller	76,636.12	0	279-H
279-I	West Alameda, Denver	1.207 mi.	Asphalt. Conc. Paving	J. B. Bertrand, Inc.	51,604.90	0	279-I
282-G	South of Craig	5.147 mi.	Gravel Surfaced	Chas. B. Owen	61,645.22	74	282-G
282-H	Between Rifle and Meeker	7.029 mi.	Gravel Surfaced	Winterburn & Lumsden	82,589.74	99	282-H
286-D	North of Ault	9.883 mi.	Gravel Surfacing	W. F. Pigg & Son, Inc.	35,567.00	72	286-D
287-BR1	East of Greeley	7.413 mi.	Concrete Paved	New Mexico Constr. Co.	145,875.00	90	287-BR1
292-AR	North of Minturn	6.262 mi.	Gravel Surfacing	Luke E. Smith & Co., Inc.	36,860.00	73	292-AR1
296-E	South of Greenhorn	7.210 mi.	Gravel Surfaced	Mountain States Constr. Co.	93,594.88	82	296-E
297-C	Southwest of De Beque	9.953 mi.	Gravel Surfaced	Hinman Bros. Const. Co.	312,453.50	75	297-C
297-D	South of DeBeque	4.198 mi.	Surf. & Bridge	Hinman Bros. Const. Co.	185,230.50	3	297-D
298-B	North of Pagosa Springs	2.414 mi.	Surfacing	Engler & Teyssier	38,426.00	74	298-B
298-C	Bet. Twin Bridges & South Fork	3.780 mi.	Gravel Surfacing	H. C. Lallier Const. & Eng. Co.	116,864.50	30	298-C
300-B	North of Silverton	2.828 mi.	Graded	Hamilton & Gleason Co.	35,647.80	83	300-B
300-C	North of Silverton	1.937 mi.	Grading	D. G. Son	15,287.80	60	300-C

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COLORADO CULVERT & FLUME CO.

PUEBLO, COLORADO

COLORADO HIGHWAYS

Vol. 8 Sept. 1930 No. 9

10 CEDAR RAPIDS CRUSHERS for Mr. Weaver

CONSTRUCTION FEATURES THAT HAVE MADE CEDAR RAPIDS CRUSHERS THE LEADERS IN THE FIELD

Rugged electric steel base.
Reversible manganese steel jaws.
Quick adjustment.
Strength without excessive weight.
Ring and gravity oiling system.
Wide interlocking bronze bearings.
Large shafts (special heat treated steel).
Counter balanced fly wheels.
Large capacity.

NUMBER 1436

NUMBER 336

M. O. WEAVER
CRUSHED ROCK AND GRAVELED HIGHWAY CONSTRUCTION
IOWA FALLS, IOWA
May 20th, 1930

Iowa Manufacturing Company,
Cedar Rapids, Iowa.

Gentlemen:

During the past five years or more I have been using Cedar Rapids Crushers exclusively and have been operating them in some forty or fifty counties in both Iowa and Arkansas. At the present time I have ten of your crushers ranging in sizes from your 336 to the 1436.

When it comes to performance and turning out real yardage every day I have not seen any crushers in my territory that have beaten the record that I have obtained with your equipment. Cedar Rapids Crushers have performed very well for me, and I do not hesitate to recommend them to anyone who wants to make money on his contracts.

Yours very truly, M O Weaver.

M.O.WEAVER

To

Five years ago Mr. M. O. Weaver purchased his first Cedar Rapids Crusher. The results he obtained from this unit induced him to enlarge his field of operations and since then he has added nine more Cedar Rapids Crushers to his equipment. Operating one of our 1436 primary crushers in connection with a 336 Reduction crusher near Preston, Iowa, this season, Mr. Weaver has averaged well over 400 tons of ¾ inch material a day. It is performance that counts, and that is what you get when you buy a Cedar Rapids Crusher.

With 8 sizes of crushers, we have a size for practically every stone or gravel requirement. You can buy them on skids, on portable steel trucks, built in as part of your ORIGINAL One Piece Outfit, as a unit in our portable stone plant, or mounted on an Industrial Tractor.

PERFORMANCE is what counts.

Made by

Iowa Manufacturing Company
Cedar Rapids, Iowa

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Colorado Highways

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Our Cover Picture

THIS month we show on our cover a view of newly completed high-type gravel-surfaced roadway on Muddy Pass, west of Kremmling in Grand County. This new road was recently opened to traffic by the state highway department. It was constructed with Federal co-operation. Frank L. Hoffman was the contractor. A four-mile extension of this road is now under construction, which will connect with a five-mile section on Rabbit Ears Pass, being constructed by the United States Forest Service. The old Muddy Pass road was all the word would imply. Photo by M. W. Bennett.

Colorado Highways
"BETTER ROADS"

VOLUME IX. SEPTEMBER, 1930 NUMBER 9

No Depression in Road Building Industry

One industry in the United States that shows no signs of financial depression is road building, which will involve expenditure of $2,000,000,000 this year, according to W. A. Van Duzer, president of the American Road Builders' Association. Van Duzer has just completed a study of the progress of this great industry over a period of twenty years.

Research, education and the advent of motor vehicles and automotive power have been the greatest contributing factors, Van Duzer says. He cites the research and educational efforts of the Road Builders' Association, shown by the year book for 1930, in comparison with those of former years.

In 1911 the organization, then eight years old, held its annual convention and road show in Rochester, N. Y., with 1,461 persons in attendance.

"Attendance at our conventions recently averaged more than 23,000 persons," Van Duzer continues, "and we expect that record to be considerably eclipsed when we gather in St. Louis next January.

"It is noted that in the 1911 proceedings that delegates were present from Alabama, Maine and Washington. A modest exhibit of road building and paving equipment and materials was participated in by fifty-five manufacturers.

"The 1930 road show overflowed the capacity of the largest auditorium in America, and we were actually forced to turn down applications for space. The St. Louis arena offers us almost 250,000 square feet of floor space and it is a foregone conclusion that it will be taxed to capacity with the exhibits of more than 400 manufacturers of road building equipment and materials."

FORTY-EIGHT STATES IMPROVE 32,522 MILES OF HIGHWAY

In 1929 the highway departments of the 48 states improved a total of 32,522 miles of state highways, according to reports received from the departments of the Bureau of Public Roads, United States Department of Agriculture. In the year they expended a total of $910,485,291 for highways. They also reported a total of 314,136 miles of highways in the state systems at the end of 1929.

The total mileage improved is an increase of 3,270 miles over the 1928 figure, and includes 7,451 miles of graded and drained earth roads and 25,071 miles of new surfacing. New surfaces were placed on three types of roads—on unsurfaced roads, on roads already improved with a lower type of pavement, and on roads of the same type of surfacing, which is classed as reconstruction work. Of the 25,701 miles of new surfacing, 14,014 miles were laid on unsurfaced earth roads, 4,337 miles on a lower type of surfacing, and 6,720 miles on the same type of surfacing.

WILL COMPLETE NUMBERING OF U. S. HIGHWAY ROUTES IN 1930

Reports received by the Bureau of Public Roads, U. S. Department of Agriculture, indicate that the work of erecting the standard markers for numbered routes in the United States system of highways will be practically complete at the end of the construction period of 1930. The system was adopted less than five years ago by state highway departments, and comprises approximately 97,000 miles of the most important highways of the nation. Practically all of these routes are also in the Federal Aid highway system.

The numbering of the United States highways, which are really the main streets of the nation, is doing for the rural communities what the naming of streets has done for the cities. Because of their convenience, the numbers have established themselves and have become popular with motorists. They not only indicate direction but are coming into use as a means of identifying locations. Manufacturers and business houses are using the numbers in advertisements as a medium of location. Novelists and cartoonists are using them in their stories and comic strips.

CONCRETE PAVING AWARDS FOR 1930 BREAK ALL RECORDS

Total awards for concrete pavements for this year in the United States passed the 100,000,000 square yard mark August 2, according to Wm. M. Kinney, general manager of the Portland Cement Association. This mark was reached three weeks ahead of last year and the total was greater than that of any previous year. Mr. Kinney declares that this is in response to the urgent need for more motoring space and that it expresses confidence in American economic conditions.

Of the total awards 77,700,000 square yards are for concrete roads and 23,000,000 square yards for streets and alleys. August 2 of last year concrete road awards totaled 62,190,000 square yards and in the record year of 1928, 62,400,000 square yards. The 1930 road total of this date is, therefore, over 15,000,000 square yards ahead of last year and the record-breaking year of 1928.

Road Work Relieves Unemployment Situation in Colorado

AN average of eight thousand men have been given steady employment on road construction and maintenance work on Colorado roads during 1930. This is the largest number of men employed on this class of work in the state during the past ten years, according to a report by Maj. L. D. Blauvelt, state highway engineer.

To date the state highway department has expended approximately $5,000,000. By the end of the season over eight million will have been expended on the various projects under the supervision of the state.

The eight thousand men have been employed on state, county and government road projects in various parts of the state. Reports reaching the highway department show that the work being done on road projects this summer has greatly relieved unemployment with a consequent brightening of general business.

It has been found that this activity on the part of the government, state and counties has meant bigger payrolls and a widespread spending and businesses having no apparent connection with construction have benefited.

Since early spring the highway department has had an average of fifty Federal Aid projects in course of construction. At the same time the department has had more than seventy state aid projects going under its supervision. The number of men employed directly by the highway department in its various activities, including construction, gravel surfacing, oil processing and straight maintenance, has numbered 1,200.

"Speed has been the watchword of all employes of the department this year," said Maj. Blauvelt. "Favorable working conditions has helped materially in completing projects. By the end of the season we will have completed more than forty miles of standard concrete pavement. We will also complete nearly a hundred miles of oil processed highways, besides there will be added more than two hundred miles of gravel surfaced roads to our primary highway system.

"Every section of the state has benefited from the road construction. All of the sixty-three counties have had road work under way; the U. S. Bureau of Public Roads has had a number of forest projects being worked, and the various municipalities are busy with local improvements.

"We find that this extensive road work has done much to relieve the unemployment situation in Colorado.

"And while our road program is being rushed, motorists and other good roads enthusiasts are looking forward to next year and the amount of federal aid the state can secure. We have already been notified by the Secretary of Agriculture that there will be available for Colorado next year $2,315,948, which amount must be matched by the state.

"The sum of $900,000 additional was made available by the government with the passage of the $125,000,000 by the last congress. To secure this amount Colorado must match it dollar for dollar. A suggestion of how this amount can be raised will probably be made by members of the state highway advisory board to the next general assembly."

At the present time there is available in the United States treasury the sum of $2,300,000 for federal aid road work in Colorado. During the present year Colorado has been able to match $1,300,000 and thus get that amount in federal aid. More was available but could not be obtained because of insufficient funds.

The new Federal law authorizes $125,000,000 annually for the next three years, against $75,000,000 a year since 1917. This means that Colorado must raise approximately $7,000,000 to meet a like amount put up by the government to finance federal aid projects through the fiscal year 1933, giving the state a $14,000,000 road program for federal aid projects during the next three years. How to raise sufficient funds to meet this huge sum already appropriated to the state by the government is a problem which confronts the governor, members of the state highway advisory board and the state highway engineer.

At present the principal source of revenue of the highway department comes from the gasoline tax. It is estimated that the revenue from this source accruing to the state highway department during 1930 will total $4,086,000. This sum equals 70 per cent of the total gas tax collections. It is estimated that more than $600,000 will be refunded to those exempt from paying the tax under the present law. In 1929 the refund

One of the state's maintenance crews working on Vernon Canon route—recently oil surfaced.

amounted to $459,910.50. The expenses of the oil inspector's office in 1929 was $46,330.34. This amount is deducted from the total gas collections.

The counties of the state, excepting Denver County, receive 27 per cent of the total gas collections for local roads. The cities with over 2,500 population receive 3 per cent.

In 1929 $5,054,207.19 was the total net collected available for state roads.

The General Assembly, scheduled to convene on the first Monday of January, 1931, will face the task of reorganizing the finances of the highway department as a result of the increased federal appropriations for roads in the various states—the so-called Federal Aid roads.

Unless additional revenue is provided, the highway department will be unable to obtain the increased appropriation provided by Congress—in round figures $900,000—and the state will lose the increase Federal Aid money, and the sum apportioned to Colorado will be divided among those states which have the money to cover it.

Present revenues of the highway department are scarcely sufficient to meet the old Federal Aid appropriations, properly maintain the Federal Aid roads and leave a modest sum available for the improvement of more than 6,000 miles of state roads not embraced in the Federal Aid system in this state. It is a matter of record that at this time the state is something like $600,000 behind in meeting Federal appropriations.

If the $600,000 is added to the $2,700,000 required under the new appropriation, then Colorado it will be seen is face to face with the necessity of raising about $3,300,000 within the next three years, over and above the amount it is providing for Federal Aid construction at this time. And even this amount may have to be increased materially. All indications are that, despite the increased consumption of gasoline, the revenue from the state gasoline tax will not come up to estimates.

Officials who are watching the gas tax collections are admittedly worried about the revenue from this tax, practically the department's only source of revenue aside from Federal Aid. Enormously increased refunds of this tax and the refusal of the counties to pay the tax on gasoline used by them in road construction and maintenance work, are materially reducing the net revenue from this tax, until it is not beyond the realm of possibility that the revenue will not be sufficient to finance even the present building program.

A number of measures have been suggested to increase the highway department's revenue to meet the increased Federal Aid appropriation. No doubt some or all of them will be presented to the members of the next general assembly in the hope that the lawmakers will enact some law to enable the highway department to take full advantage of the additional Federal funds for the improvement of the state's main highway system.

Following are some of the measures which have been suggested by motorists as expressed through their clubs and associations:

Elimination of the refund provision of the present gasoline tax law.

Repeal of the provision in the present gasoline tax law which apportions 27 per cent of the net collections to the various counties.

Increase of the motor vehicle license fees. Increase of the gasoline tax from 4 to 5 cents per gallon.

Increase of the fees collected from bus and truck lines.

Apportion entire proceeds from bus and truck taxes to highway department.

Elimination of the refund provision from the gasoline tax law will net the highway department, provided the present arrangements by which it is given 70 per cent of the tax proceeds is continued, something like $400,000 over and above the present income.

Under the present gasoline tax law the tax can be collected only on gasoline used for the propulsion of motor vehicles used on highways. Gasoline used for tractors, gasoline motors, airplanes, cleaning, etc., is tax free. Many other states realizing that the refund provision is an invitation to gross abuses, have done away with refunds and are collecting the tax on all gasoline sold within their borders.

A raise in the fees charged automobile bus and truck lines for the use of the state highways would add something to the highway fund, though not nearly so much as the elimination of the tax refunds. This year the department estimates its revenue from this source at $60,000. If the counties' half of this tax, which is apportioned among the 62 counties, were added to the state fund, and matched with Federal Aid, the total would be $120,000, or a sufficient sum to construct five miles of high type pavement on one of the main roads of the state.

Among road experts the opinion prevails that these fees should at least be doubled, if not trebled. Heavy trucks and busses, it is pointed out, receive more benefits from the road improvements that are being made and they do more damage and cause greater expenditures for maintenance than all other motor vehicles.

Automobile license fees in Colorado are among the lowest in the country. Only three or four states have fees as low or lower than Colorado.

Eliminating the refunds; apportioning the entire proceeds of the gasoline tax, excepting the 3 per cent to the cities, to the state highway department; and giving the entire proceeds of the bus tax to the department, sufficient funds could be raised to construct during the coming three years approximately four hundred miles of high type pavement in the state.

And this, added to the pavement already laid, would give Colorado approximately 725 miles of high type pavement.

BUS AND TRUCK TAXES INCREASE

Colorado counties received $19,815 as their 50 per cent of the state bus and truck mileage tax collections for the first six months of 1930. The collections for the same period in 1929 were only $14,413 as represented in the counties' share.

The bus companies pay on the basis of passenger miles traveled and the truck lines on the basis of ton miles hauled.

Planning County Roads

By NORMAN M. BLANEY
Director, Farm-to-Market Road Department, American Farm Bureau Federation

A GREAT deal has been written about the economics of roads, about the advantages obtained by road improvement, about the detrimental effect of poor roads and about the cost of various types of roads. But one topic has been neglected. One topic has not been discussed to as great length. Not much has been said about the necessity of drawing up, in advance of operations, a road-building plan for the entire county.

Importance of Planning

It is well known and readily accepted that no one would care to consider or deal with a builder who did not start out with a full and complete plan for his project. Take, for example, the manufacturer who decides to expand his market. First of all he will outline a plan of action, taking all the factors into consideration, such as advertising, sales helps, demonstrations, publicity, etc. He will figure the cost of each and the total cost. He will decide which section of the country will give him the best results. He will decide the order of importance of the various factors. Knowing these factors and knowing the amount of the funds available for the work, he can fit the one to the other so that the whole will be taken care of in such a manner as will render the best service and assure the maximum return on the investment.

Suppose, now, that all the appropriated money should be expended on, let us say, the advertising and no allowance made for the sales assistance, or vice versa. Naturally the plan would not be complete, nor would the greatest benefit result. In other words, from beginning to end of the campaign, all the factors must be considered.

Many readers of this article are familiar with the problem of draining marshes or other swampy areas. You will grant, I am sure, that the most economical and the most efficient drainage system is the one which will drain the entire area. Certainly it would be false economy to expend the entire sum available on a main drain, which, because it will carry off the greatest quantity of water, will need to be the largest, and will therefore cost the most. The objective—draining of the whole field—would not be accomplished without the lateral or secondary drains.

The instances when one solitary drain will remove the water from any given area are few. They are, however, no fewer than the instances when a single improved road will serve the entire community. Yet this illogical, haphazard manner of procedure is the one used in many counties. It is not unheard of to see practically all the available funds being spent on one stretch of road. It is argued that by doing so and adding to it each year a superior type is obtained. Try to fancy someone with a need for a $10,000 house and a fund of $1,000 per year to build it. The first year the cellar would be constructed; the second year one of the main floor rooms; another will be added the following year. The tenth year the roof will be finished.

Survey First Step

Now that main highway systems are being cared for by Federal and state authorities, it remains the duty of the county administrators to assume responsibility for providing means of access to that system, as well as a system of highways for the transportation of merchandise and population within county boundaries. This can be accomplished by a progressive plan, based on a survey of the country, its present facilities and requirements. The survey must precede all other activity towards highway construction and must take into consideration even the least-used piece of road. Such a survey is not necessarily a costly undertaking; in fact, the cost will be found quite justifiable and a many-fold saving effected by the carrying out of the plan or program which will be subsequent to it.

The factors which must be known are not numerous. The more important ones are population and its distribution, products grown and manufactured (classified according to kind, how and when marketed or shipped and type of vehicle used in marketing or shipping), vehicle registration (distribution, kind, use) and future growth and development (whether the county is continuing as a rural county or becoming urban; if the latter, whether its growth is centering in one or two large cities or in several smaller ones).

From such a survey, modified, if need be, to include whatever extraordinary peculiarities exist, the road requirements may be set down. Traffic counts may be necessary to supplement the information. Consideration of traffic counts alone is not sufficient, however. Improvement made on a road leading to any given point will cause traffic to center on the road, in preference even to a shorter route if the latter is not in as good condition as the former.

Road Information

After the survey is completed, information may be obtained from the state highway department or the U. S. Bureau of Public Roads, or both, as to the various types of roads which have been built in other localities, together with their approximate construction and maintenance costs and the amount of traffic each can be expected to carry under average or normal conditions.

It should be realized that it is no more economical to build or consider only one type of road than it is to buy only one size of motor truck or only one type or style of clothes. Many experiments have been made and many different types of roads have been built by the road departments of Federal, state and county governments. A study of these will make it possible to choose the type which will prove the most economical and yet provide adequate facilities for the traffic requirements.

Absolute costs cannot be definitely stated. Nor can it be expected that information can be had which will be positive in recommending any one or more type to

suit all conditions of climate, soil, traffic and finances. Nevertheless, with a knowledge of the traffic needs and a knowledge of the various types of roads which have been built and are proving economical in other sections, supplemented by a knowledge of the finances available and of what road building materials are to be found locally, a plan can be evolved which, when carried out, will assure the maximum economy and which will provide roads, not only adequate for present requirements, but of such a nature as will allow future improvement with the least loss of capital investment.

Trunk and Tributary Roads

Main-line railroads, main drainage pipes and main-line or trunk-line highways are essential in any scheme of such things, but the railroad will not show as great returns, the main drainage ditch will not prove as beneficial nor the main trunk highway perform its maximum duty without the branches or tributaries.

To construct roads which connect one state to another—the entrance and exit roads—is provided for, or such provision is intended by the Federal Aid road act. To provide roads which are exits from and entrances to each county within the state itself is the objective of the state highway department of the state in question. The county, therefore, should not be called upon to concern itself with any roads falling within either of these categories. Its interest should lie in providing roads which will permit the products grown and manufactured within the confines of the county to be transported in the most economical manner to the market place or shipping point within the county, and to the inter-county road, if shipment is made by truck or wagon to a point outside the county.

The value of the road must be determined by the value of the travel or income which it carries, in ratio to the total travel value or income of all the roads in the community. Thus it may be seen that a road leading into a town or city over which is transported products which provide labor for men and business for merchants is of more value to that town or city than another road which does not bring in as much business.

The writer can recall a particular instance in which certain residents within a certain city became rather vehement in their criticism of the farmers in that territory because the latter objected to another road being built through their properties on which they would have been taxed to no small degree.

The road in question would have reduced the distance to a large neighboring city by approximately five miles. The merchants in the large city were naturally in favor of the road. It would be more convenient for prospective purchasers to reach their stores. Peculiarly enough, the merchants in the smaller city were also in favor of this addition to the ease with which their legitimate customers could buy in the other city. Yet in the same breath they were deploring the fact that their customers were actually doing just that.

The farmers in question were informed that they would benefit by the increased values of their properties. If this increase in value were to mean an increase in income, undoubtedly the farmers would have been favorable to the proposition. The facts of the case, however, are to the contrary. An increase in value of farm land, with the subsequent increase in assessment value, unless it is accompanied by a corresponding decrease in tax rate (which seldom, if ever, occurs), invariably means an increase in taxes and hence reduction in net income. Nor can it be shown that the

A giant "horseshoe" turn on the spectacular Ouray-Silverton "Million Dollar" highway, which has attracted tourists from all over the world—constructed with Federal Aid.

farmer would save sufficient in cost of transport operation over another less costly but still adequate road to pay this increase.

No one who has made any material study of the economics of roads would attempt to show the lack of necessity for trunk or main highways. As has been stated previously, they are and always will be the backbone of the vehicular transportation system. However, it is not a difficult matter to show where they are not as economical as they would be if the vehicle owners are forced to pay twice the vehicle operation cost on the poorly constructed tributary roads which lead onto the main highway.

Basic Planning Data

And now a word about obtaining the information on which any intelligently planned county road system must be based. There are, in almost every county, organizations which will assist in obtaining the necessary information. Each and all are vitally interested in the welfare of their community. Their members are taxpayers and will be willing to help any movement for the advancement of the county.

The automobile and motor truck registration, the population distribution and the available income may be found from the official records. The trend and type of growth can be ascertained from a review of the past.

The information needed regarding the manufactured and industrial production and the systems of distribution used in marketing can be obtained through the various chambers of commerce or similar associations.

The information regarding agriculture can be obtained through the county agricultural organization. In 1,837 counties scattered through 45 states the American Farm Bureau Federation, with which I am associated, has set up county farm bureaus.

Work of the A. F. B. F.

The American Farm Bureau Federation is most keenly interested in every movement for the advance of agriculture. Transportation is vital to the success of every farmer. For that reason the farm bureau has thrown the full weight of all the prestige and authority it may possess to promote the cause of improved farm-to-market highways. Since January 1 of this year we have been working to organize in every one of the 1,837 county units of the federation a county road planning committee. Membership in the farm bureau includes the most progressive farmers in the community, the men who are working out solutions to the problems peculiar to their business. They are tackling the problem of equalizing their tax burdens, of improving their schools, of lowering the cost of producing a unit of the produce of their fields, of finding ways and means to get better prices for this produce.

They have been trained to work together on all these matters of common interest to their calling. Now they are uniting to work on the county road planning project. In each county unit of the organization there has been appointed or will shortly be appointed a farm-to-market road committee whose intention it will be to work closely with the local government authorities, the highway engineers, the finance officials and all others directly responsible for the administration of highway funds. It will be their duty to assist the officials in designing an intelligent and economical system of roads, without regard to political expediency but definitely drawn to fit local requirements, and to be built on a long-time program.

In addition to the county committees, state committees will be organized through the state farm bureau office in each state, to centralize and head up the work of the county committees and to work with the farm-to-market department of the national organization, the American Farm Bureau Federation.

I do not know when there has been greater necessity for intelligent group action by public-spirited leaders to control the expenditure of road building funds. It has been the policy of the American Farm Bureau Federation and all of its branches since they were created to take the lead in all projects affecting the welfare of rural America. For this reason the organization has embarked on this ambitious project and is making an effort to see that the greatest possible benefits are secured for the people most affected, from the vast sums available for highway construction.

Our road planning committees in 1,837 counties will be found willing to confer with and render valuable assistance to county officials in performing any work which has the advancement of their county as its motive.

SAFETY RULES EMPHASIZED

Here are a few safety hints that are especially applicable over all week-end holiday periods, when all the highways will be crowded with motorists hurrying to "go places and do things":

Keep sober. Gasoline and liquor make a dangerous mixture.

Keep on the right side of the highway, except when passing.

Do not pass other cars unless you have ample clear space ahead.

Do not pass other cars at curves and intersections where the view is obscured.

Do not pass other cars on the crest of a hill.

When parking, be sure your car is entirely off the pavement or traveled portion of the highway.

See that your lights are all O. K. Have lights visible front and rear when parking.

Do not be in too big a hurry. Slow down when going through cities and towns. Watch for pedestrians crossing the highway. Watch for other cars at intersections.

Keep your car under control at all times so that you can stop in the clear space ahead.

The above rules are good rules at all times. The heavy traffic over week-end holidays, however, makes caution doubly necessary.

The first important road in the United States was the old York Road between New York and Philadelphia, established by the colonies in 1711. The first company incorporated to build and operate a toll road was the Philadelphia and Lancaster Turnpike Company. It was incorporated in Pennsylvania in 1792 and had a road from Philadelphia to Lancaster, a distance of 62 miles. This was later taken over by the state in the public interest.

Questions and Answers on Gas and Bus Taxes

Q. How much revenue is annually collected from the gasoline tax in this country, and how much do the various states tax gasoline sales?

How is this money spent?

Is there any prospect of reduction of the gasoline tax?

A. According to figures compiled by the United States Bureau of Public Roads, the total amount collected in gasoline taxes in this country in 1929 was $431,636,000,000. In 34 states all of the revenue thus collected was used for construction and maintenance of rural roads. In the other 14 states and the District of Columbia a total of $24,405,207 was used for other purposes. Three states used part of their gasoline tax money for the support of public schools. Eight states applied part of the revenue to cities for repair and improvement of streets. The entire collection for the District of Columbia also went for this purpose.

Seven states and the District of Columbia impose a two-cent tax; ten states levy a three-cent tax; nineteen states a four-cent tax; eight a five-cent tax and three a six-cent tax. One imposes a tax of 3½ cents.

The various gasoline taxes and the states in which they were effective as of December 31, 1929, follow:

Two cents: Connecticut, Massachusetts, Missouri, New Jersey, New York, Wisconsin and Rhode Island.

Three cents: California, Delaware, Illinois, Iowa, Kansas, Michigan, Minnesota, North Dakota, Washington.

Three and one-half cents: Utah.

Four cents: Alabama, Arizona, Colorado, Indiana, Louisiana, Maine, Maryland, Nebraska, Nevada, New Hampshire, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Texas, Vermont, West Virginia and Wyoming.

Five cents: Arkansas, Idaho, Kentucky, Mississippi, Montana, North Carolina, Tennessee and Virginia.

Six cents: Florida, Georgia, South Carolina.

The average tax in 1929 was 3.22 cents as compared with 3 cents in 1928, indicating a definite trend in the direction of higher taxes. Fourteen states increased their tax on gasoline by one cent during the year and six states added two cents to the tax they impose.

In view of the fact that every state in the Union now imposes a gasoline tax, that same is considered a fair measure of the use of the highways, and brings into many states revenue from tourists who would otherwise contribute nothing to the upkeep of the roads they help to wear out, does not appear likely that the gasoline tax will be reduced, but rather that it tends to increase. It is the only consumption tax that is levied by all states.

Q. What methods are used by the different states in taxing commercial motor transportation as a business?

A. The following indicates the methods used in levying taxes upon commercial busses and trucks:

Alabama: Bus, 3 per cent of gross income.

Arizona: Bus, 2 per cent of gross income; truck, 2½ per cent of gross income.

Arkansas: Bus, $2.50 per passenger capacity.

California: Bus, 4½ per cent of gross receipts; truck, 5 per cent of gross receipts.

Colorado: Bus, 1 mill per passenger mile; truck, 5 mills per ton mile.

Connecticut: Bus, 3 per cent on gross receipts.

Delaware: Bus, seating capacity, gross receipts.

Florida: Bus, seating capacity.

Georgia: None.

Idaho: Bus, 1 per cent gross income (after January); truck, same.

Illinois: None.

Indiana: Bus, seating capacity.

Iowa: ¼ cent per ton mile; truck, same.

Kansas: Bus, passenger capacity; truck, ton capacity.

Kentucky: Bus, $1.50 to $15 per passenger seat—tax on capitalized net earnings.

Louisiana: Bus, one million or more gross income, $4,000; less than $750, $5; truck, same.

Maine: None.

Maryland: Bus, fee based on passenger miles; truck, fee based on ton miles.

Massachusetts: Bus, $1.20 per seat to 6; $1.50 more than 6.

Michigan: None.

Minnesota: None.

Mississippi: Bus, county taxes on seat and mileage.

Missouri: Bus, $10 per seat.

Montana: None.

Nebraska: None.

Nevada: Bus, $10 per passenger capacity; truck, $40 per ton capacity.

New Hampshire: None.

New Jersey: Bus, gross receipts.

New Mexico: Bus, passenger mile, 1¼ cents to 2 cents; truck, ton capacity, ¼ cent to 3 cents.

A view of the road leading north from Durango into the San Juan country, taken near Cascade Creek divide.

New York: Bus, ½ of 1 per cent of gross earnings; truck, same.

North Carolina: Bus, $5 per seat regular termini operators; 6 per cent on gross receipts; state income tax.

North Dakota: Bus, passenger capacity.

Ohio: Bus, passenger capacity; truck, ton capacity.

Oklahoma: Bus, mile, seating capacity 3 mills to 15 mills; truck, ⅖ cent per mile traveled, capacity.

Oregon: Bus, ½ mill per passenger mile; truck, 1 mill per ton mile.

Pennsylvania: Bus, seating capacity.

Rhode Island: None.

South Carolina: Bus, gross receipts; truck, ton capacity.

Tennessee: Bus, passenger capacity to $750; truck, capacity.

Utah: Bus, 2½ mills per passenger mile; truck, ⅔ of one cent tax per ton mile.

Vermont: None.

Virginia: Bus, 1-50 to 1-30 of 1 cent per seat mile; 1-10 of 1 per cent of gross receipts.

Washington: Bus, $3 per passenger capacity; truck, 50 cents for each 100 pounds capacity.

West Virginia: Bus, 1-15 of 1 per cent per seat mile; truck, ¼ to ⅓ of 1 per cent per ton capacity.

Wisconsin: 1-10 of 1 cent per passenger mile; truck, ⅖ of 1 cent per ton mile.

Wyoming: None.

—Arizona Taxpayers' Magazine.

Federal road building for other than military purposes began with the "National Pike" or "Cumberland Road," said to have been the original conception of General Washington. On March 28, 1806, President Jefferson signed the bill appropriating $30,000 for a preliminary survey, and actual work was begun not long after.

GAS TAX RATES

Since 1919, when three states of the Union had one-cent gasoline taxes, such levies on gasoline sold have crept steadily upward until every state now has a tax ranging from two to six cents per gallon, according to compilations reaching the Automobile Club of Southern California.

Colorado, North Dakota and Oregon were the first to start the tax on gasoline, and Kentucky joined this group in 1920 with a one-cent tax. This method of deriving funds for road construction, chiefly, has proven so successful that in this year, eleven years later, six states collect a tax of six cents per gallon on gas, nine ask five cents per gallon, while the majority of states, 19 in all, demand a tax of four cents on the gallon.

California is one of ten states requiring a tax of three cents per gallon this year. One state has a tax of three and one-half cents, while the seven remaining states ask two cents on the gallon of gas.

HIGHWAY MILESTONES

New Jersey established the first state highway department in 1891.

No motorist is killed who takes two seconds of time to stop before he ventures upon a railroad crossing.

New York state was the first to license motor vehicles, beginning in 1901, and collecting $954 that year.

There are 6,579,826 miles of highways in the world, of which 3,000,000 are in the United States. This compares with 764,238 miles of steam railways in the world.

Governmental studies indicate that it costs an average automobile approximately 2.06 cents more per mile to drive on an earth road than on a hard-surfaced road.

Castle Rock, as seen from the Denver-Colorado Springs paved highway—one of the landmarks of Douglas County.

Bureau of Public Roads to Test Pavement Designs

TO determine the relative efficiency of several designs of concrete pavements and to develop more exact knowledge of the amount and distribution of stress in pavement slabs resulting from loads applied to them in various positions, the Bureau of Public Roads of the United States Department of Agriculture is constructing numerous full-size concrete pavement slabs at the Experiment Farm of the department at Arlington, Va. The slabs will later be subjected to an elaborate series of tests.

Some slabs will be of uniform thickness throughout. Tests on these are expected to furnish information regarding the relation between loads applied at various points and the stress and strain of the concrete at all points in the loaded cross section, and the relation between load resistance and slab thickness.

Other slabs will be thickened at the edges and for a certain distance from the edges, in accordance with the different designs now used in several states. In some slabs the thickening will be provided for by excavating the subgrade under their edges. In others the surface of the concrete slabs will be raised at the edges to form a low, rounded lip curb. In still others the lip curb will be combined with a thickening of the edge of the slab at the bottom. Observations of these sections will furnish information regarding the relative load-resisting properties of designs now in use in various states.

The test slabs, which will be 20 feet wide by 40 feet long, will have central longitudinal and transverse joints. The object of one test is to determine the efficiency of various methods in use for transferring load across these joints.

Other experiments will include bond tests of dowel bars to determine the length of embedment necessary; the measurement of subgrade friction, with particular attention to the effect of edge thickening of transverse joints on resistance to the sliding of the slabs on the supporting surface; and the measurement of the movement of the slab in the subgrade as a result of temperature and moisture changes.

The work of constructing the slabs has just begun, and the concrete will be laid in late summer. The tests will be under way in October, when they may be observed by engineers from all parts of the world who will be in Washington from October 6 to 11 to attend the Sixth International Road Congress, to be held in this country at the invitation of the United States government.

BULLFIGHT FINANCES ROADS IN MEXICO

The entire proceeds of a bullfight were recently donated to the building of better Mexican roads, according to a statement issued by the automotive division, Department of Commerce.

The fiesta, conceived and promoted by the "Pro-Highway Committee Dolores Hidalgo-San Luis de la Paz," was described by spectators as "one of the best bullfights held in these parts in many years." An excellent spirit of co-operation was shown by the breeders of this region, each one furnishing a bull as his contribution to the project. A high degree of enthusiasm was also demonstrated by the public, which attended in large numbers to make the venture a financial success.

In taking this unique method o raising funds the highway committee brought to attention the many benefits to the community and to commerce resulting from road construction. The immediate benefits are additional employment, opportunity for the sale of road-building machinery and materials, automobiles, trucks and busses, etc. Thereafter, when the highway is opened, various commercial enterprises often spring up along the road, creating additional employment and a market for many types of commodities such as building materials, clothing, food products and the like.

UNITED STATES OPENS FIELD OFFICE IN PANAMA

To co-operate with the governments of the Central American countries in making preliminary surveys to determine the most desirable route for an inter-American highway, the Bureau of Public Roads is opening a field office in Panama City, according to an announcement by the U. S. Department of Agriculture. E. W. James, chief of the Division of Highway Transport of the bureau, who is in charge of organizing the work, sailed for Panama on June 21. Thomas A. Forbes and D. Tucker Brown, senior highway engineers, and Marcel J. Bussard, assistant highway engineer, will constitute the bureau force of the Panama City field office.

Congress authorized this co-operative effort and appropriated $50,000. The Inter-American Highway Congress in October, 1929—held at the invitation of the Republic of Panama in Panama City to discuss the road problems that each country would have to solve to make possible a connecting road — asked the Pan-American Union to appoint an inter-American highway commission of from three to eight members from the participating countries to carry on the work of planning and constructing such a trunk line. Delegates from each of the Central American republics and from the United States attended the congress.

The Bureau of Public Roads will co-operate with the commission, the department explains, and will assist in making surveys only as the several countries request such help. Five of them, Costa Rica, Nicaragua, Guatemala, Salvador and Panama, have requested assistance or indicated their adherence to the plan. Guatemala, Costa Rica and Panama have asked for assistance. Mexico has already planned a route from the Rio Grande at Laredo, Texas, to the Guatemalan frontier at Suchiate.

Moving Out of the Mud

IN the opinion of Timeon Covert, of the Department of the Interior, there are many rural communities which do not realize the value and necessity of good roads. To bring the need before them, educational campaigns are necessary.

Mr. Covert gives as an illustration a community which wished to consolidate its small schools into one strong, centralized institution. But it was found that, due to unimproved roads, pupils could not be transported to school in bad weather.

The community then studied road building. Data was collected; the U. S. Bureau of Public Roads and the state highway commission furnished assistance; debates were held and problems worked out. A scientific system of all-weather roads resulted.

"Today," in the words of Mr. Covert, "one may see big, powerful motor busses transporting pupils regularly over good roads to the central school in that community. The farmers have moved out of the mud, so to speak. It was found in the school project that * * * most of the money spent for road improvement would remain in the community; that transportation over good roads would bring a good 12-grade school within reach of every boy and girl; that farm produce could be marketed over surfaced roads on any day of the year; and that all of these improvements, which no one would now think of doing without, could be brought about at a reasonable outlay of funds."

South Carolina

In the recent session of the legislature of South Carolina there were a number of additions and changes in the laws affecting construction of highways and financing thereof.

There has been considerable complaint throughout the country in reference to various methods being used to dodge the gasoline tax. In South Carolina an act was passed designed to prevent any company, municipality, person, firm or corporation from bootlegging in gasoline. It is believed that this legislation will add considerable amounts to the gasoline fund.

An act was passed requiring motor vehicles used for hire to pay the annual license tax. These drivers' license fees are to be used for the establishment and maintenance of a state highway patrol.

An act was passed limiting the state highway department from adding more than 20 miles per year to the state system. The department was also authorized to fix the eligibility requirements for bidders.

The highway department was authorized to provide medical and surgical attention, including hospitalization of employes injured in discharge of official duty.

A law was created requiring license to drive or operate motor vehicles. A law providing for the establishment and operation of a state highway patrol was one of the new features added by this legislature.

A law was passed placing a limit on weight, size and loads of vehicles operated on public highways.

Another law fixes the limit of damages collected on account of defective highways at $1,000 for property damage and $5,000 for personal injury or death.

Exemption of motor vehicles owned by non-residents from paying a license fee when in the transportation of agricultural products from place of production to the markets was enacted.

ENGINEERS WILL MEASURE IMPACT OF BUSSES ON MODERN ROADS

Tests of the impact of motor busses on modern highway surfaces will be initiated this month by the Bureau of Public Roads, United States Department of Agriculture, in co-operation with the Society of Automotive Engineers and the Rubber Manufacturers' Association. The War Department has made available for the tests a stretch of concrete paving at the Aberdeen Proving Grounds, Aberdeen, Md., and a manufacturer has loaned a large bus of interurban type which will be operated at speeds up to 50 or 60 miles an hour. It is expected that the tests will continue for about two months.

Apparatus developed in connection with the bureau's previous co-operative studies of motor-truck impact will be used to determine the magnitude of the impacts produced by large, heavily loaded busses equipped with various types and sizes of tires. The tires for the tests are to be furnished by the tire manufacturers and include both high-pressure and balloon types of the latest designs.

These studies of the impacts of bus traffic are the latest of a series of impact investigations the bureau has been making for the last ten or eleven years. The earliest studies dealt with the destructive effect on pavements of heavily loaded motor trucks, especially those with poor tire equipment. These tests demonstrated in a striking manner the protection afforded to pavements by the pneumatic tire and by the six-wheel vehicle, both of which are widely used today.

WORLD DISTRIBUTION OF HIGHWAY REPORTS TO BE MADE

Beginning the distribution of more than half a million copies of reports on world highway problems, officials in charge enter the final stage of preparation for the reception of delegates expected to be in attendance at the Sixth International Road Congress to be held in Washington, D. C., October 6 to 11.

The Congress will be held under the auspices of the Permanent International Association of Road Congresses, with headquarters in Paris, and the immediate direction of the American Organizing Commission, Roy D. Chapin, president, with offices in Washington. More than 50 nations have accepted the invitation of the United States government to send delegates.

Seventy-six separate reports, printed in French, German, Spanish and English, the four official languages of the Congress, will form the basis for discussion at the sessions in October. The reports represent the studied opinions of 170 of the principal world authorities on the moot questions of highway construction, design, material, maintenance, administration, finance and traffic.

NEWS OF THE MONTH

Work has been started by C. B. Owen, contractor, on the gravel surfacing of forty-two miles of new graded roadway between Sterling and Ovid, in northeast Colorado. It is planned to carry the work into the winter as far as possible. The contractor is allowed 120 working days to complete the project. Twenty-five miles of this project is now entirely finished. The remainder is being "shaped up" for the gravel surfacing which will be placed later.

Two projects in northwestern Colorado were completed during the month. They include five miles of grading and graveling between Craig and Hamilton, on the Craig-Meeker road, and three miles of new road between Bear River and Mt. Harris on the Victory highway. Nearing completion is 8.2 miles of new gravel roadway west of Craig, connecting with Lay.

October 20th is the tentative date set for the opening of the new paved road between Colorado Springs and Pueblo. Plans are being made for the holding of a celebration, with good roads enthusiasts from the Springs, Pueblo, Denver, and "way points" participating.

Contractors have started an eleven-mile gravel-surfacing project on Tennessee Pass, which is scheduled to be completed before snow flies. The road camp, with gravel crushing equipment, has been established at Pando, which is about half way between the two ends of the project.

Information has been received that the cut-off road from Wiggins to Denver, via Hudson, has been officially designated by the government as a Federal Aid highway. The highway department asked the designation of approximately 400 miles of Colorado roads as primary or Federal Aid highways. To date the United States bureau has reported the designation of 166 miles of additional road.

A new road is to be constructed by the United States Bureau of Public Roads over Rabbit Ears Pass. A contract for the first five miles of the proposed project has been let and is now under construction. The state is now completing a connecting link up Muddy Pass. This will be completed within thirty days, thus giving a new graveled road from Kremmling west to the summit of Rabbit Ears Pass, a distance of thirty miles.

Right—Looking down the famous Ralston Hill, now easily made in high since it was treated with STANDARD Asphalt Road Oil.

Denver's Famous Mountain Parks

Are now free of DUST thanks to . . .

STANDARD ASPHALT ROAD OIL

Below—View of STANDARD Asphalt Road Oil treated road through Genesee Park.

At Bottom—Beautiful Mt. Vernon Canon is now free of dust since this splendid road has been treated with STANDARD Asphalt Road Oil.

NOW you can drive with pleasure and comfort through the pine-clad hills and dales of Denver's Mountain Parks since this wonderful system of roads has been treated with STANDARD Asphalt Road Oil. No longer is magnificent scenery obscured by clouds of road dust . . . no longer is this trip to be dreaded because of the discomfort and danger from dust. Mountain flowers and foliage along the roadside are fresh and beautiful for the first time in years. More than this, these expensively constructed roads are being PRESERVED . . . road material is firmly bound in place, loss of road material from erosion and traffic is reduced to the minimum and a firm, lasting, dustless, mudless road is assured the year around!

LET US ASSIST YOU IN SOLVING YOUR STREET AND ROAD PROBLEMS

STANDARD ASPHALT ROAD OIL will improve ANY street or highway. Our experienced Highway Engineer will gladly assist you in planning lasting, mudless, dustless streets and highways AT LOW COST. His services to you are free.

STANDARD OIL COMPANY (INDIANA)

ROCKY MOUNTAIN DIVISION

CHEYENNE, WYO. DENVER, COLO. BILLINGS, MONT.

What are *Your* Power Problems?

McCormick-Deering-powered grader preparing the road bed ahead of the paver. McCormick-Deering is the power heart of this and countless other types of equipment.

You'll find the solution to them in McCORMICK-DEERING Industrial Tractors

McCormick-Deering Power is operating this shovel, engaged in building approaches to the bridge shown.

On the roads the year around. During the winter months you'll see McCormick-Deering-powered units keeping the roads open, as this outfit is doing in Minnesota.

IN the selection of mobile power for the extensive road program throughout the country this season, hundreds of contractors wisely decided on McCormick-Deering Industrial Tractors. Experience and observation convinced them of the great efficiency and dependability of McCormick-Deering Power—and of the fact that it is a real money maker, especially when bids are cut to the bone.

McCormick-Deering Tractors are building the roads of a nation because they are correctly engineered to handle the power problems of construction and maintenance. The dominant position of McCormick-Deering as the standard power for road work has been gained by sheer merit. They stepped into an industry in which costs had to be lowered. They are doing their job exceptionally well.

As individual units, and in combination with all kinds of construction and maintenance equipment, McCormick-Deering Tractors are flexible, versatile power plants, ready for any work. A visit to the nearest of 115 Company-owned branches and 42 distributors in the United States and Canada will be worth while. You will learn just what McCormick-Deering Industrial Tractors can do on your job. Write us for a catalog.

INTERNATIONAL HARVESTER COMPANY
OF AMERICA
(*Incorporated*)
606 So. Michigan Ave. Chicago, Illinois

A fleet of McCormick-Deering Industrial Tractors and dump trailers moving dirt quickly and at low cost on a new road in Missouri.

McCORMICK-DEERING INDUSTRIAL TRACTORS

Sales Representatives H. W. MOORE EQUIPMENT CO. 120 West 6th Avenue, DENVER

Notice has been received by the state highway department that the Big Thompson Canon highway, from Loveland to Estes Park, known as the gateway to the Rocky Mountain National Park, has been approved as a Federal Aid project. This stretch of roadway has thus been included in Colorado's Federal Aid system, and in the future will be favored with Federal Aid funds as they become available. Over $25,000 was expended on the upkeep of this road by Larimer County in 1930. The road is used by thousands of tourists during the summer months.

Construction of a new scenic mountain highway between Deckers and Buffalo on the South Platte River will be started shortly by the United States Bureau of Public Roads. The new road will be 15 miles in length.

A survey has been completed for the widening of the west side of Berthoud Pass. This work will probably be started next spring. The project includes the elimination and "day-lighting" of several bad curves.

R. S. Corlew, highway engineer with the Federal Bureau of Public Roads, was a Gunnison visitor recently, here on his annual inspection trip of Federal Aid roads in this section.

Expressing the hope that the state of Colorado will devise ways and means of taking advantage of increased Federal Aid road appropriations now available voiced his theory that the state will get greater efficiency from money expended, with a better class of contractors attracted to bid on highway projects if bigger and fewer projects are attempted.

Instead of a large number of five and six-mile projects scattered around over the state, the federal engineer feels that work should be concentrated on fewer projects covering a larger mileage. This system, in his opinion, would give Colorado a complete mileage of standard federal road at less expense and in faster time than is now possible.—Crested Butte Pilot.

Al. E. Palen, district engineer for the Federal Bureau of Roads, announced that L. P. Lawler of Butte, Montana, was the successful bidder for the construction of the connecting link of the scenic Fall River Road in the Rocky Mountain National Park.

Lawler had agreed to grade the 11 miles of mountain road from Fall River Pass to the Colorado River for $437,178, the United States Bureau of Public Roads stated.

Four other bids were entered for the work. Lawler's bid will be forwarded to Washington for approval by Secretary of the Interior Ray Lyman Wilbur.

When completed, the Fall River Road is expected to have a total cost of more than $1,000,000. It will be 28 miles long and is expected to be completed in 1932.

Let the farm bureau help you get your facts together; then call in the highway engineer, the county treasurer, the auditor and sufficient representation from whatever other civic organizations may be interested, and evolve a plan which will be the best for both user and taxpayer.

Facts and finance are all that need to be considered. When road building is based on these and these alone, a new day will have dawned for those who must use and pay for the highways of America.

ROAD BUILDERS' AND MACHINERY NOTES

S. R. Ives Made Manager of Armco Association

According to an announcement from the Armco Culvert Manufacturers Association, Stuart R. Ives, vice-president and general manager of the Lyle Culvert & Pipe Company, Minneapolis, has been appointed general manager of the Armco Culvert Manufacturers Association, with headquarters at Middletown, Ohio.

Previous to joining the staff of the Lyle Culvert & Pipe Company early in 1929, Mr. Ives was connected with the American Rolling Mill Company for 13 years. He was manager of that department for seven years. The appointment of Mr. Ives involves no change in the aims or policies of the Armco Association, which will continue to sponsor thorough-going research in all matters pertaining to drainage, engineering assistance in the solution of specific drainage problems, and educational publicity.

Ingersoll-Rand Announces New Pile Driver for 3-Inch Sheeting

A new and larger air-operated pile driver that will drive 3-inch sheet piling is announced by Ingersoll-Rand Co. This tool, the R-30, weighs 148 pounds. It can be readily carried by two men and can be operated by one after it has been placed in position. By adding removable cheek plates, it can be used to drive 2½ and 2-inch piling as well as 3-inch.

Circular Describes Trackson Trench Roller

The new Trackson trench roller which eliminates hand tamping and puts back all of the dirt over newly laid conduit and pipe is described in an attractive circular which may be obtained by writing the Trackson Co., 1311 So. First St., Milwaukee, Wis.

Catalog Describes Cedar Rapids Equipment

The Iowa Manufacturing Company of Cedar Rapids, Iowa, has recently published a new catalog descriptive of the Cedar Rapids line of crushers, one piece outfits, and other material handling equipment. The attractive 56-page book gives a good idea of the scope and completeness of the Cedar Rapids line and is illustrated with many photographs and diagrams.

Wilson to Handle Buda Sales

The Wilson Machinery Company has closed negotiations with the Buda Motor Company whereby the Denver firm becomes exclusive representative for Buda Diesel and gas engines for Colorado, northern New Mexico and southern Wyoming. The representation covers sales in the construction field only. The local firm will work closely with the home organization, which maintains parts stations all over the country and has a station in Denver. Purchasers of Buda equipment thus have an unlimited and full supply of parts to draw from.

R. K. Mangan, sales manager of the Buda Company, was in Denver recently to close the deal.

National Equipment Catalog

The new pictorial catalog of the National Equipment Corp., Milwaukee, Wis., illustrates the products of the six divisions of this organization in service on construction jobs of every type throughout the country. Koenring, T. L. Smith, C. H. & E., Insley, Parsons and Kwik-Mix products are represented.

New P. & H. Equipment Announced

Paul Fitzgerald announces a new P. & H. product, a pipe hustler for handling and laying pipe which is expected to prove very popular with contractors in the mountain states.

New Man on Moore Payroll

Frank Egan, formerly with the Hardesty Manufacturing Company in Denver, has been added to the staff of the H. W. Moore Equipment Company and will cover the Wyoming territory.

26.2% Gain Over Same 1929 Period

Reports of the first six months 1930 sales of the Four Wheel Drive Auto Co., as compared with the same period for 1929, offer small comfort to Mr. Lugubrious Blue, for a gain of 26.2 per cent is the gratifying figure issued by the chief accountant for the company. "Twenty Years of Progress" is the slogan appearing on reports of FWD, as their records over that period of time since the establishment of their organization show a steady growth from year to year.

Monarch Tractor

A 30-page illustrated booklet on the new Allis-Chalmers Monarch 35 tractor is being distributed by Monarch salesmen and dealers. It contains a brief but complete description of the tractor, including mechanical features and performance. Approximately 50 photographs add interest to the booklet and help make it easy reading.

Concrete Airports

A concise, authoritative and attractive summary of airport needs and services is contained in the booklet, "Air Terminals," recently published by the Portland Cement Association, Chicago, Ill. For a number of years this association has been carefully watching the development of airports. Now, on the basis of experience in the use of concrete and other cement products in airport equipment, "Air Terminals" is offered as a guide to commercial and civic airport operators. Among the subjects discussed are airport design, buildings, runways, lighting facilities, drainage, hangar floors and aprons. There is also a section on European experience with concrete airport installations. Copies may be had, without charge, on application.

Shovels

The Marion Steam Shovel Co. has recently issued a new bulletin, No. 343, describing their line of Type 450 1¼ cu. yd. excavators with electric, Diesel-electric and gas-electric power. This 16-page bulletin illustrates in detail the construction of Marion small revolving electric-powered excavating equipment. A similar bulletin, No. 339, has just been issued on the Type 450 steam machines. A new bulletin has also been published illustrating and describing the Type 490 electric heavy duty quarry or coal-loading shovel. The Type 490 has a dipper capacity of 2¼ and 3 cu. yds., depending on its use as a quarry shovel or coal loader. Copies of any of these bulletins may be obtained by writing directly to the Marion Steam Shovel Co., Marion, Ohio.

Spi-Cor Culvert Pipe

A recent bulletin of the American Casting Co., Birmingham, Ala., gives information concerning Spi-Cor spiral, corrugated culvert pipe, including specifications and dimensions.

Straight-Line Compressors

Sullivan WG-6 straight-line single-stage compressors of the belt-driven type are described in Catalog 83-X of the Sullivan Machinery Co., Chicago, Ill. This 16-page bulletin is fully illustrated, with details of the machine and installation photographs.

Concrete Bodies

Bulletin 65, describing the Bartlett-Snow movable V-type concrete body, may be secured from the C. O. Bartlett & Snow Co., Cleveland, Ohio.

Buckets

Bulletins 400-A and 500-A of the Page Engineering Co., superseding bulletins 400 and 500, cover Page buckets both small and large. The struck measure capacities of the various sizes of buckets are listed, and these have been adjusted to compensate for curved bottoms and backs. This measurement has not been given heretofore.

STATE HIGHWAY DEPARTMENT

Financial Statement, September 1, 1930

BALANCES

State Treasurer	$1,310,302.64	
County Time Warrants	10,333.42	
Revolving Fund	9,500.00	
Total Balances		$1,330,136.00

RECEIPTS

Internal Improvement	$ 56,300.00	
Gas Tax	2,683,387.96	
U. S. Government	836,724.95	
Bus Licenses	43,569.17	
Highway Receipts	26,026.85	
Cancelled Warrant	2.75	
Total Receipts		3,646,011.68
Total Balances and Receipts		$4,976,147.74

DISBURSEMENTS

Federal Aid Projects	$2,479,578.32	
State Projects	392,418.01	
Maintenance	889,667.55	
Maintenance, Equip. and Repairs	202,729.27	
Property and Equipment	22,438.62	
Surveys	13,777.77	
Traffic Signs and Census	18,742.44	
Administration	111,391.26	
Total Disbursements		$4,130,743.24
BALANCE 8-31-30		
State Treasurer	$ 825,571.08	
County Time Warrants	10,333.42	
Revolving Fund	9,500.00	
Total Balances		845,404.50
Total Disbursements and Balances		$4,976,147.74

3% SPECIAL GAS TAX FUND

Balance		$ 199,800.52
Receipts		19,500.00
		$ 219,300.52
Total Disbursements		66,476.23
Balance		$ 152,824.29

HALF MILLION GAIN IN COLORADO GAS TAX RECEIPTS

The first six months of 1930 showed an increase of $551,876 in gas tax receipts in Colorado over the same corresponding period of 1929. The increase is partly due to the fact that for the first five months of last year a three cent tax was in effect, while since that time a four cent tribute has been levied. Actual increase in gasoline consumption is slightly less than 10 per cent.

The tax receipts are divided on a 70, 27, 3 per cent basis, the first to the state highway department, the second to the counties and the small share to cities for maintenance of connecting links of state highways.

Statistics prepared by the U. S. Bureau of Public Roads show that Colorado stood 31st among the states in gasoline consumption during 1929.

SURVEY SHOWS INCREASE IN MILEAGE OF OILED ROADS

Increasing use of oil in the Rocky Mountain states is shown in a survey of Colorado, Montana, Wyoming, Utah and Idaho. In 1927 the total mileage of oiled roads was 146 and by the end of 1930 it will be 1,855.

The following table shows the accumulated total miles at the end of each year:

Year	Idaho	Utah	Wyoming	Montana	Colorado
1927.....	74	28	35	9	none
1928.....	315	68	87	34	10
1929.....	410	200	192	72	65
1930.....	710	340	311	285	209

Automobile drivers today average more than two per car; in other words, there are twice as many drivers as cars.

PLANS BEING DRAFTED

Proj. No.	Est. Length	Type	Location
91-R	6 mi.	Oil Processed Surfacing	Northeast of Trinidad
144-F	10 mi.	Oil Processed Surfacing	Northwest of Fort Collins
292-D	8 mi.	Gravel Surfacing	South of Wolcott
134-AR&C	14 mi.	Oil Processed Surfacing	West of Burlington
265-D	3 mi.	Gravel Surfacing	South of Durango
151-A	6 mi.	Gravel Surfacing	North of Fraser

FINISHED PLANS NOT ADVERTISED

282-I	2 mi.	Gravel Surfacing	South of Craig
189-B	2.6 mi.	Gravel Surfacing	West of Hayden

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per Cent Complete	Proj. No.
2-R9	Starkville	1.35 mi.	Concrete Pavement	H. C. Lallier Const. & Eng. Co.	$ 59,180.60	87	2-R9
57-R2	North of Lamar	0.502 mi.	Bridge	J. Fred Roberts & Sons	140,102.90	100	57-R2
68-R2	North of Monte Vista	1.9 mi.	Concrete Pavement	Driscoll Construction Co.	43,566.40	99	68-R2
78-R	Near Minturn	0.709 mi.	Gravel Surfaced	J. Fred Roberts & Sons	96,342.90	47	78-R
92-R1, 246-DR1	East of Avondale	5.509 mi.	Oil Processed Surfacing	Lumsden-Hall Const. Co.	33,363.00	0	92-R1, 246-DR1
122-R1	Between Ovid and Julesburg	10.122 mi.	Grading	Bedford & Woodman, Inc.	49,976.65	54	122-R1
97-R2, 168-AR1, 216-AR1, 273-R1	Betw. Lamar & Kas. State Line	31.764 mi.	Oil Processed Surfacing	Hamilton & Gleason Co.	122,216.20	8	97-R2, 168-AR1, 216-AR1, 273-R1
138-B	North of Kremmling	3.133 mi.	Gravel Surfaced	F. L. Hoffman	76,363.35	91	138-B
138-C	South of Muddy Pass	4.184 mi.	Gravel Surfaced	C. A. Switzer	103,270.20	41	138-C
144-D	Northwest of Ft. Collins	2.834 mi.	Gravel Surfaced	J. Fred Roberts & Sons	66,430.10	93	144-D
144-D2	Northwest of Fort Collins	0.236 mi.	Gravel Surfaced	J. Fred Roberts & Sons	15,566.00	82	144-D2
144-E	North of Ft. Collins	1.286 mi.	Concrete Paving	F. C. Dreher Const. Co.	109,106.30	6	144 E
147-D	Betw. Cortez & Utah Line	2.903 mi.	Gravel Surfaced	Wood-Morgan-Burnett Co.	43,432.60	68	147-D
149-B	East of Aurora	7.911 mi.	Oil Processed Surf.	Chas. B. Owen	134,611.10	57	149-B
150-A	West of Craig	8.227 mi.	Gravel Surfaced	Gardner Bros. & Glenn	93,477.35	69	150-A
165-R1	East from Canon City	9.325 mi.	Oil Processed Surf.	C. V. Hollenbeck	50,548.30	98	165-R1
175-A	Between Sterling and Ovid	41.979 mi.	Graded	Cole Bros.	193,055.75	76	175-A
229-AR1, 271-AR1, 271-BR1, 271-CR1, 271-ER1	East of Florence	7.435 mi.	Oil Processed Surfacing	C. V. Hollenbeck	34,975.85	1	229-R1, 271-AR1, 271-BR1, 271-CR1, 271-ER1
243-C	West of Dyke	3.837 mi.	Gravel Surfaced	Grant Shields	47,404.40	74	243-C
248-B	South of Buena Vista	2.766 mi.	Gravel Surfacing	J. Finger & Son	51,979.50	0	248-B
253-D	West of Milner	2.547 mi.	Gravel Surfaced	Hamilton & Gleason Co.	147,192.00	94	253-D
258-H	West of Sapinero	4.921 mi.	Gravel Surfaced	Cole Brothers	123,700.60	99	258-H
262-G2	West of La Veta Pass	5.014 mi.	Gravel Surfaced	Pople Bros. Const. Co.	11,932.50	97	262-G2
262-J	Betw. La Veta & La Veta Pass	2.724 mi.	Surfacing & Bridge	Mountain States Constr. Co.	39,659.85	0	262-J
263-B	Betw. Mortimer & Ft. Garland	3.133 mi.	Gravel Surfaced	Pople Bros. Const. Co.	29,532.40	44	263-B
265-C	Betw. Durango & Bayfield	2.500 mi.	Gravel Surfaced	Grant Shields	36,022.90	5	265-C
266-D	South of Bondad	4.111 mi.	Gravel Surfaced	Engler, Teyssier & Co.	96,075.30	89	266-D
267-C	Near Model	4.491 mi.	Gravel Surfaced	E. H. Honnen	45,801.00	99	267-C
270-AR1, 270-BR1	East of Monte Vista	6.412 mi.	Gravel Surfacing	Mtn. States Const. Co.	44,875.40	71	270-AR1, 270-BR1
270-D	Betw. Alamosa & Monte Vista	3.978 mi.	Gravel Surfaced	Mountain States Constr. Co.	32,679.40	100	270-D
277-D2	North of Pueblo	15.566 mi.	Concrete Pavement	Edw. Selander	333,257.80	67	277-D2
277-E2	South of Colorado Springs	10.2 mi.	Concrete Pavement	J. Fred Roberts & Sons	238,207.30	51	277-E2
279-H	Betw. Kenosha & Webster	1.691 mi.	Grading	Anderson, Sheldon & Miller	76,636.12	0	279-H
279-I	West Alameda, Denver	1.207 mi.	Asphalt. Conc. Paving	J. B. Bertrand, Inc.	51,604.90	0	279-I
282-G	South of Craig	5.147 mi.	Gravel Surfaced	Chas. B. Owen	61,645.22	74	282-G
282-H	Between Rifle and Meeker	7.029 mi.	Gravel Surfaced	Winterburn & Lumsden	82,589.74	99	282-H
286-D	North of Ault	9.883 mi.	Gravel Surfacing	W. F. Pigg & Son, Inc.	35,567.00	72	286-D
287-BR1	East of Greeley	7.413 mi.	Concrete Paved	New Mexico Constr. Co.	145,875.00	90	287-BR1
292-AR	North of Minturn	6.262 mi.	Gravel Surfacing	Luke E. Smith & Co., Inc.	36,860.00	73	292-AR1
296-E	South of Greenhorn	7.210 mi.	Gravel Surfaced	Mountain States Constr. Co.	93,594.88	82	296-E
297-C	Southwest of De Beque	9.953 mi.	Gravel Surfaced	Hinman Bros. Const. Co.	312,453.50	75	297-C
297-D	South of DeBeque	4.198 mi.	Surf. & Bridge	Hinman Bros. Const. Co.	185,230.50	3	297-D
298-B	North of Pagosa Springs	2.414 mi.	Surfacing	Engler & Teyssier	38,426.00	74	298-B
298-C	Bet. Twin Bridges & South Fork	3.780 mi.	Gravel Surfacing	H. C. Lallier Const. & Eng. Co.	116,864.50	30	298-C
300-B	North of Silverton	2.328 mi.	Graded	Hamilton & Gleason Co.	35,647.80	83	300-B
300-C	North of Silverton	1.937 mi.	Grading	D. G. Son	15,287.80	60	300-C

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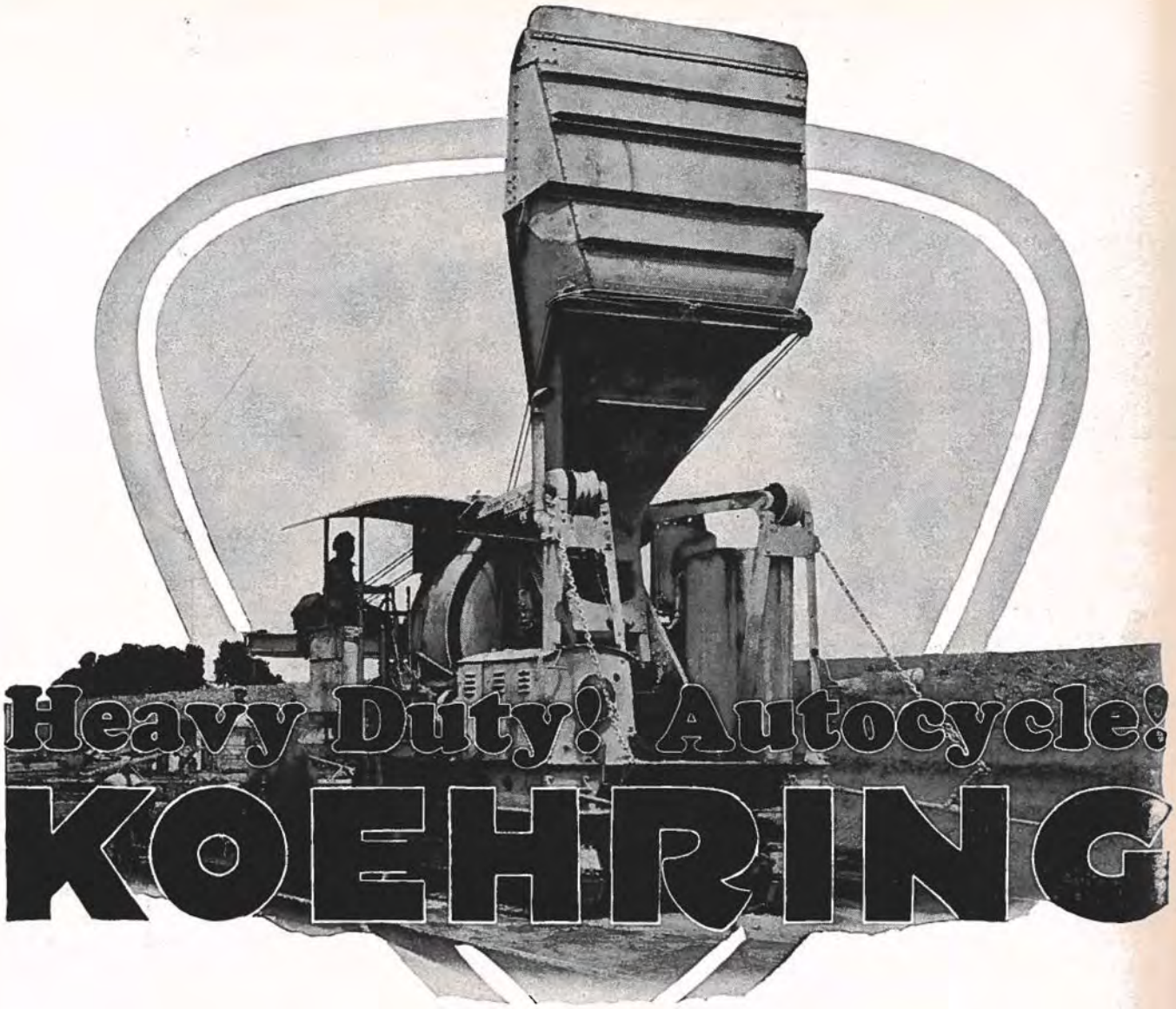

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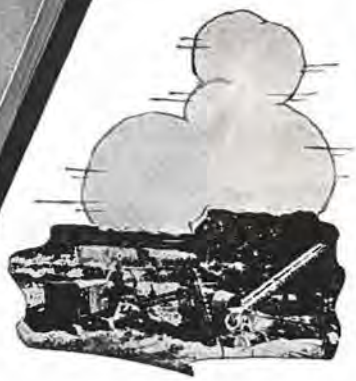

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Our Cover Picture

THIS month we print on our front cover a view of the newly gravel-surfaced highway on Tennessee Pass, which was recently completed by the U. S. Bureau of Public Roads construction department. This is one of the finest mountain highways in the world. It has been graded and gravel surfaced for a distance of 26 miles between Leadville and Redcliffe. All the steep grades and sharp curves of the old road have been eliminated, and the running time between these two points has been reduced about one hour. Tennessee Pass will be kept open for traffic throughout the winter months by maintenance forces of the State Highway Department.—Photo by Joseph Roma.

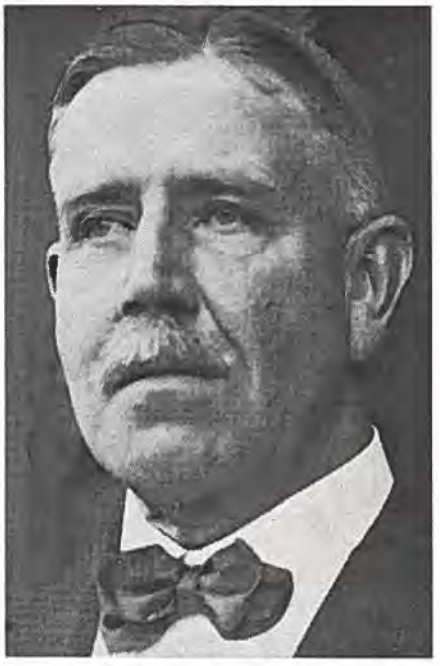
Colorado Highways
"BETTER ROADS"
VOLUME IX. NOVEMBER, 1930 NUMBER 11

Colorado Mourns Death of Maj. Blauvelt

ROAD builders throughout the country were saddened to learn of the death of Major Louis D. Blauvelt, Colorado highway engineer, in Denver on October 26.

He had been ill for several months with arthritis, but his condition was not considered serious until a few days before his death. His passing came as a shock to the highway engineering fraternity throughout the country. He was a nationally known authority on highway problems.

He is survived by his wife, a daughter, Mrs. Howard E. Parks of Denver, and a sister, Mrs. A. O. Miller of Montclair, N. J. The body was shipped to Tappan, N. Y., for interment.



MAJOR LOUIS D. BLAUVELT

Major Blauvelt was 63 years old. He was engineer of the Colorado highway department from May, 1921, when he was appointed by Former Gov. Oliver H. Shoup, until his death. Under his direction more than $75,000,000 was expended on state roads in Colorado, and most of the major improvements on the highway system carried out during the past ten years were executed under his supervision. This work included improvements on more than 2,000 miles of roads, including the pavements from Denver to Fort Collins, Greeley, Sterling and Colorado Springs.

Born in Rockland county, New York, Major Blauvelt was educated in Rutgers preparatory school and college, receiving his civil engineering degree from the latter institution.

He came to Colorado in 1887, and for a time soon after his arrival was engaged in a minor capacity on the Colorado Midland railroad. Leaving that employment, he went to New Mexico, where he was in irrigation construction.

He assisted in the construction of the Cripple Creek Short Line between Colorado Springs and Cripple Creek, and later was a member of the engineering force on the construction of the San Pedro & Salt Lake railroad, now a part of the Union Pacific system.

In 1910, he was named chief engineer of the Moffat road, now the Denver & Salt Lake railroad, and remained in that capacity until 1917, when he resigned to undertake rehabilitation work on the Maxwell grant properties in Mexico.

From 1902 to 1904, Major Blauvelt was in charge of the construction of 17,000 feet of tunneling, steel and frame bridges for the Moffat road.

On May 17, 1918, he was commissioned a major in the United States army construction division, and assigned to the Edgewood arsenal, Maryland, where he was in charge of the construction of a 40-million-dollar toxic gas plant.

Named by Colorado Railroad Commission

In September, 1918, he was ordered to Alton, Ill., where he supervised the construction of a five-million-dollar ammunition plant, and when that work was finished he was transferred in March, 1919, to Fort Bliss, Texas, where he was in charge of construction on two regimental cantonments, which cost three million dollars. He resigned from the army, and in August, 1919, was honorably discharged. His work brought commendation from Brig. Gen. James B. Irwin and Col. G. Trask.

In September, 1919, he was appointed chief engineer of the Colorado railroad commission, and when construction of the Moffat tunnel was in prospect he was frequently mentioned as the chief engineer on that project. He was named permanent Colorado highway engineer in 1922.

In 1925, Major Blauvelt was elected vice president of the National Highway association, and in 1926 he was chosen president of the American Association of State Highway Officials. He was a member of the American Society of Engineers and the Colorado Engineers Society.

Governor Adams Names C. D. Vail Highway Engineer

GOVERNOR WILLIAM H. ADAMS announced the appointment of Charles D. Vail as state highway engineer on November 18th. Mr. Vail was formerly manager of parks and improvements of the City and County of Denver.

He has assumed his duties as head of the Colorado highway department and will participate in the preparation of the state road budget for 1931, at a meeting to be held by the state highway advisory board the second week in December.

Mr. Vail was appointed to fill the vacancy caused by the death of Maj. L. D. Blauvelt on October 26th. All the rigid requirements for appointment as state highway engineer were met by Mr. Vail, who is widely known as a most capable engineer and who has had many years of engineering experience.

One requirement is that an applicant must have had at least 10 years of practical engineering experience and at least five years of actual experience in highway construction and maintenance.

"It will be impossible to give a statement concerning my plans at this time," said Mr. Vail after the appointment had been announced. "I will do everything possible to carry out my duties in a most efficient manner and hope to be able to push the work along as rapidly as possible, to give some relief to the unemployment situation."

One of the first things the new engineer will do will be to consult with the governor and the state highway advisory board concerning construction work to be done this winter and next year. He will meet with the members of the advisory board the second week in December to prepare the tentative 1931 highway budget for submission to the governor for final approval.

Mr. Vail has been actively engaged in engineering work since 1891, when he was graduated from the college of engineering of the University of Illinois.

He was appointed manager of improvements and parks by Mayor Stapleton on September 1, 1923, succeeding Walter B. Lowry, who resigned. Last April, Mr. Vail, who has been active in politics for many years, was elected president of the Democratic club for the third consecutive term.

He has had wide engineering experience. At the time of his appointment as manager of improvements and parks he was engineer for the state public utilities commission.

CHAS. D. VAIL

Previously he had held many positions. He had been assistant engineer for the Union Pacific railroad at Cheyenne, Wyo.; chief draftsman in the United States surveyor general's office at Cheyenne; locating engineer for the Trinity, Cameron & Western railway at Georgetown, Texas; assistant engineer for the Mexican International railroad in Mexico; assistant engineer for the Union Pacific railroad at Ogden, Utah; division engineer for the Oregon Short Line at Salt Lake City, Utah; assistant engineer for the Butte Water company at Butte, Mont.; locating engineer for the Chicago, Milwaukee & St. Paul railroad; general manager of the Ely Water company at Ely, Nev., and other positions.

He was engaged in general engineering practice in Denver from 1908 to 1917, during which time he did a great deal of engineering work on the western slope for the city of Grand Junction and was also chief engineer of the Uintah railroad. He was appointed engineer for the state public utilities commission in 1917.

Mr. Vail has been a resident of Colorado since 1908. Mr. and Mrs. Vail, who were married here in 1893, live at 875 South Corona street and have three children. A son, Allan P. Vail, is mechanical engineer for the Public Service Company of Colorado, and another son, Kenyon C. Vail, is testing engineer for the city. Mrs. Vera Winslow of Denver is a daughter.

Mr. Vail is a member of the American Society of Civil Engineers, the American Water Works association and the American Association of Municipal Engineers. He is a director of the county commissioners' division of the American Road Builders' association.

State to Spend Eight Millions on Roads

WITH over $3,300,000 available in federal funds, the road building program in Colorado for 1931 probably will exceed by $2,000,000 any previous year in the history of the state. This will make total road building expenditures for the year more than $8,000,000.

Numerous preliminary meetings already have been held on the 1931 budget by the state highway advisory board and the plan of expenditures will be completed at meetings early in December.

Part of the burden of making the increased highway building program will fall on the next legislature, as means must be devised of matching nearly $1,500,000 in federal funds if the immense construction work is to be carried on.

In 1930 the state received $1,796,202 from the federal government. Nearly $1,000,000 was available and will be lost to the state unless it can be matched by state appropriations before next summer.

The federal government made a big increase in its regular appropriations for highway work, through legislation passed by the last congress.

Abolition of all gasoline tax refunds has been discussed as one means of raising additional state funds, but this plan already is meeting with strenuous opposition from the farming districts and may have to be abandoned.

Highway officials declare that it might be necessary to ask the counties to give up the 27 per cent of the proceeds from the gasoline tax which they now receive. This would make nearly $1,500,000 more available to match federal appropriations.

In addition to the state funds necessary to match federal appropriations, the state also will need more than $1,500,000 for maintenance work and more than $500,000 for state highway projects.

Financing is such a problem that a conference of state legislators may be called before the meeting of the legislature in January to map out a plan of action to allow plans to be completed for a record-breaking year in highway construction.

Governor Adams has interested himself in the financing details and will work with both the highway advisory board and members of the legislature in solving the money problem.

Colorado Roads and Unemployment

CONGRESS can take an important step toward unemployment relief in the West if it will provide funds to make the Colton-Oddie bill effective. The measure, passed by the last congress, gives authority for federal construction of roads through public lands. No funds were provided for the construction, but passage of the bill was a constructive step and a distinct victory for western house and senate members.

If congress, when it reconvenes, is really sincere in its efforts to push public works as much as possible, it will make the necessary appropriations to make the bill more than a gesture.

One of the most important projects that should be constructed under the provisions of the act is a link on the Victory highway or U. S. 40.

One of the most important transcontinental routes and a very desirable one to bring tourist traffic to this state, certain stretches of the road have brought much undesirable publicity and led to many travelers taking routes that led far away from this state.

For several hundred miles in eastern Utah and western Colorado the road runs entirely through government land. The state is pushing its development program as fast as possible, but it will be at least 10 years before Colorado can extend a gravel-surface road to the Utah line unless better financing means are found. Utah faces the same problem.

If funds are provided for carrying out the Colton-Oddie bill, it is possible that a $2,000,000 project, carried on entirely by the federal government, could be started and provide work for many men who are now unemployed.

Much is heard about congressional action to aid the unemployment situation, but one of the surest means would be for the government to start work as early as possible on highway building projects without asking the state governments to find means of raising additional revenue to match appropriations.—Denver News.

Hamilton & Gleason, contractors, have finished half of their 23-mile oil-surfacing project between Lamar and the Kansas state line. Work will continue on this project throughout the winter and will be ready for spring traffic.

Showing section of famous Battle Mountain highway between Redcliffe and Gilman—always a thrill to motorists.

Nation's Road Builders to Meet

A MAJOR objective in the long drive for wider, longer, smooth-surfaced highways is near at hand. Taking this campaign to the very heart of friendly territory, the American Road Builders' Association will hold its twenty-eighth annual convention and road show in St. Louis January 10-16, 1931.

Great gains will be made in this meeting. Probably never in its history has the association had a more opportune time to advance the cause of good roads. President Hoover has asked congress to consider the furtherance of road programs. He has called highway leaders to the White House for conferences on general business promotion to offset the industrial depression. Highway construction has been set in first place on the list of remedies for the unemployment situation.

The seventy-first congress has been styled "the good roads congress" because of its friendliness to highway legislation. Almost every appropriation asked for road purposes was granted.

The International Road Congress, which met in October for its first sessions on American soil, stirred good roads enthusiasm around the world. Official delegates from 61 nations went away with the feeling that the United States intends to retain her place of world leadership in the road-building art.

Despite a general industrial slump, the road-building industry has kept unswervingly ahead throughout 1930. Expenditures for the year by state, city and county street and highway departments instead of trending downward, will reach a new high record of some two billion dollars. Increased federal aid for the next three years forecasts a continuation of these annual expenditures, with increases likely.

Rapidly expanding organization of local units for greater coordination of highway systems and increased road mileage is shown in the activities of the city and county highway officials' divisions of the American Road Builders' Association.

This organization is joined with every important association in the highway field in seeking improved methods and lowered costs of both construction and maintenance. The manufacturers are bending their resources to vast improvement of all types of equipment and refinement of materials.

Automobile registration over a period of 30 years has increased in the United States from a paltry 3,000 to the present figure of 26,501,443. In 1929 the United States and Canada produced 5,621,709 motor vehicles.

The motor vehicle is paying its way over America's highways. Just short of one billion dollars were collected in 1929 in registration fees, gasoline taxes, municipal and personal property taxes from motor vehicle owners. Probably 90 per cent of this fund was returned to the road programs of the various state and local governments.

Among a host of vital arguments for improved roads, such as the investment possibilities, facilitation of commerce, improvement of living conditions, that of traffic demand probably strikes with most force to the average citizen. The motorist army is larger than ever before, and every member is an ardent advocate of greater road mileage, wider roads, smoother roads, better construction and maintenance.

St. Louis is a splendid place to concentrate early in the new year all the forces of road-building activity. The spot is well chosen, for about 55 per cent of the estimated state and county highway expenditures of the nation lie in states within a 500-mile radius. Approximately $888,000,000 is being spent this year within this area. The state of Missouri has a program involving the expenditure of $57,000,000. All nearby state programs are large.

Cities in a state group comprised of Oklahoma, Arkansas, Texas and Louisiana show an estimated increase of 58 per cent in paving expenditures for 1930 as compared with 1929, the greatest increase of any section of the country, according to a survey made by "Public Works" magazine through questionnaires to city officials.

This region lies directly to the south of Missouri and logically might be called St. Louis territory.

The American Road Builders' Association will bring to this scene its convention sessions participated in by highway leaders of the entire nation. The committee reports and discussions will deal with the most important subjects in the field today.

The road show will bring a highly diversified display of every instrument with which the modern road builder accomplishes his task. The improvements this year in equipment will be shown, and discussed by engineers, contractors and highway officials as they visit the show.

By radio, by the daily press and the technical magazines, by word of mouth of 30,000 highway men, the results of the St. Louis meeting will be made known to the nation and to its taxpayers who pay the bills for road improvement.

Great gains will be made.

Cole Brothers have taken a contract for three miles of gravel surfacing near Cimarron on the Montrose-Gunnison highway. They have a crusher and a fleet of trucks on the job.

Eliminating a bad "kink" in road between Gilman and Minturn with bridge and overhead railroad crossing.

NEWS OF THE MONTH

An effort will be made by Ed Honnen, contractor, to keep his large outfit working all winter on Berthoud Pass. He has a contract calling for the widening of six miles of roadway on the famous pass. The work starts at the foot of the pass on the west slope, and will reach near the summit.

Contractor H. C. Lallier announces he has finished removal of rock on his four-mile contract on Wolf Creek Pass. The work was located in the box canyon above Twin bridges. A 1½-yard shovel was employed in the rock removal.

Plans are being made by the state highway department to oil another stretch of the Denver-Limon road between Watkins and Deertrail. Eight miles of this road east of Aurora was oil-surfaced this past summer.

An effort will be made by the Colorado good roads enthusiasts to obtain an appropriation from congress under the terms of the Colton-Oddie law which was passed by the last congress. Congress will be asked to appropriate $2,000,000 for the completion of the road from Maybell to the Utah state line on the Victory highway. This stretch of road runs through government lands. Congressman Taylor will handle the bill.

Contractor C. A. Switzer has completed the grading and gravel surfacing of four miles south of Muddy Pass. The approximate cost was $103,000. This connects with previous construction work leading west from Kremmling.

Work is practically completed on seven miles of gravel surfacing between Rifle and Meeker. Winterburn & Lumsden are the contractors.

Contractor H. C. Lallier has started work on an 18-mile stretch of oil-surfaced highway between Burlington and Stratton. So when the great tourist army which enters Colorado over this route next spring it is going to find its way made easier. Lallier's bid for the work was $111,217.

Tearing away 100,000 yards of rock on a new road over Kenosha Pass in Park County.

Engineers have completed a survey for a 10-mile stretch of new road between Hadley and La Junta. The new road will be located on the south side of the river. The changing of the route of the Santa Fe trail at this point has been contemplated for several years.

Utah Construction company has a contract for the construction of a nine-mile stretch of new roadway over Rabbit Ears Pass. This work will be done by the U. S. Bureau of Public Roads. A large crew of men and equipment will be employed on the work starting next spring.

Plans are being made to start work on the first five-mile stretch of a proposed new road over the Black Mesa out of Sapinero. This will connect with work now under way by the state highway department. The new work will be done by the government through forest lands. Eventually it will connect Hotchkiss with Sapinero.

Surveys looking to the rebuilding of 18 miles of road between Pueblo and the Fremont county line have been completed. This road has been oil surfaced from Canon City, via Florence to the line in Fremont county.

Highway Engineer Vail announces that plans have been completed for keeping Berthoud, Tennessee, La Veta and Poncha passes open throughout the coming winter. All but Berthoud were kept open last winter.

Bids will be called for shortly for the construction of 16 miles of oil surfacing from the Kansas line west to the town of Cheyenne Wells on U. S. South 40. The new road will be entirely in Cheyenne county. State road engineers hope to have the road ready for spring travel.

There is an index of prosperity which shows an ever-mounting curve apparently affected but little by sluggish conditions in the business world. This is the capacity of the American public to consume gasoline. Despite the decrease in production and sales of the automobile industry, the use of gasoline continues to increase, not only in the total number of gallons consumed, but in per capita consumption.

The American Petroleum Institute reports that the per capita consumption for the year for every man, woman and child in the United States will be 135 gallons, as compared to per capita consumption in 1929 of 129 gallons, 115 in 1928, 105 in 1927 and 94 in 1926. Consumption in Colorado is expected to show a 10 per cent increase over 1929.

Plans are being drafted for eight miles of oil-processed surfacing west of Bennett on the Denver-Limon road. This work will be done under the 1930 budget, but will not be started until next spring.

Announcing the McCormick-Deering Model 30 Industrial Tractor » » » »

A fleet of McCormick-D eering-powered dump bodies moving dirt on a road construction job in Illinois

The Street Department of Philadelphia operates this chip spreader with a McCormick-Deering Industrial Tractor on new macadam road work

This McCormick-Deering-powered grader and scarifier is favorite equipment for street and road work

Greater Power for the Big Jobs

THE powerful new Model 30 is a large industrial tractor embodying the many features in construction, performance, and control found in the popular Model 20. It is a heavy-duty tractor in every sense of the word, yet it can be operated readily in close quarters. It furnishes power to pull, push, and lift, and to operate a wide variety of equipment especially built to make the most of the Model 30's extra power.

The Model 30 is powered by the large McCormick-Deering 4-cylinder engine — developing 40 h. p. on the belt — which has powered municipal and industrial operations in hundreds of communities. Removable cylinders and a ball-bearing crankshaft are famous features of this powerful engine.

Regular equipment includes a factory-sealed governor, oil filter, air cleaner, fuel strainer, hand and foot brakes, foot accelerator, cushion spring seat, spring-mounted front axle, demountable rear tires, and industrial drawbar.

The nearest Company-owned branch or McCormick-Deering distributor will be glad to demonstrate the Model 30 and discuss your power needs with you. Write us for literature.

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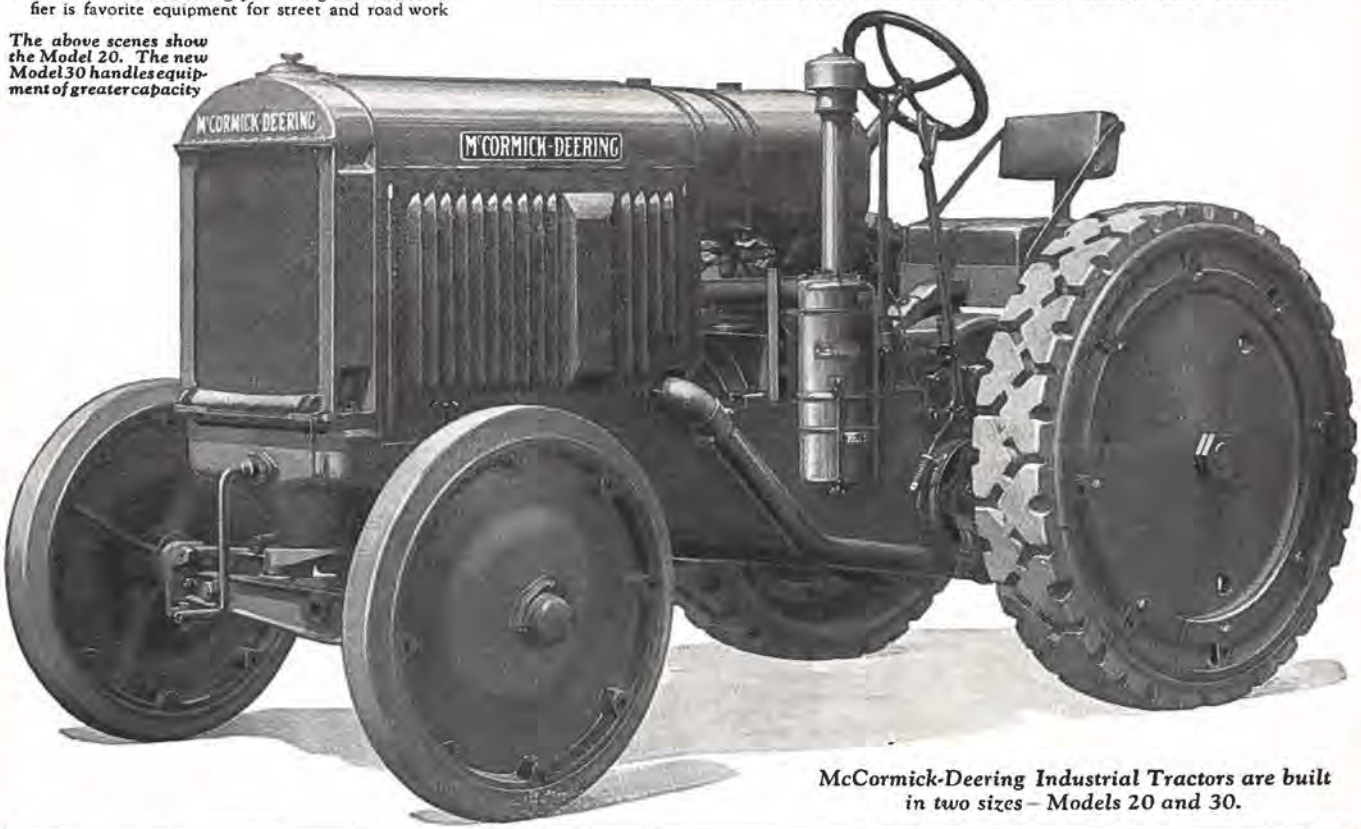
The above scenes show the Model 20. The new Model 30 handles equipment of greater capacity



McCormick-Deering Industrial Tractors are built in two sizes – Models 20 and 30.

An effort will be made to keep the Million Dollar highway between Ouray and Silverton open until the first of January, according to D. Kirk Shaw, district maintenance supervisor. Snow fighting equipment already is at hand to be used in the work.

For the first time since the present highway department was organized, an effort will be made this winter to keep Berthoud open to traffic. Two outfits of snow-removal equipment will be employed on the work, according to Charles D. Vail, newly appointed highway engineer. It is estimated that the work proposed will cost less than it would to wait until next spring.

Motorists paid more than 58 per cent or above one-half of the cost of building and maintaining all the state highways in this country last year, according to records of the U. S. Bureau of Public Roads.

Plans have been made to keep the steam shovel working on Loveland Pass all winter. At present the shovel is working two miles above Keystone on the west slope of the pass. An effort will be made to open this road to traffic early next summer.

Surveys are being made for the laying of four miles of pavement between Rocky Ford and Manzanola in Otero county next year. With the laying of this work, it will give a stretch of continuous pavement between La Junta and Manzanola, a distance of 21 miles.

Highway Engineer Vail will attend a meeting of aviation experts to be held in Portland, Oregon, on December 4th and 5th. He will attend this conference at the request of Governor Adams. Mr. Vail's connection with the construction of Denver's municipal airport caused the governor to send him as a delegate.

Secretary Fred O. Pearce announces the next meeting of the State Association of County Commissioners will be held in Denver on December 16th, 17th and 18th. Sessions will be held in the state capitol building.

J. H. Miller & Company has been awarded a contract for the construction of seven miles of new road between Fraser and Tabernash in Grand county. The new road will follow the line of the Moffat railroad between the two points. The contract price was $76,000.

Eighteen teams and 20 men have been given employment on a state graveling project in Elbert county Local laborers were given the work in order to alleviate the unemployment situation.

Gravel surfacing of 42 miles between Sterling and Ovid has been practically finished by Charles B. Owen, contractor. Forty trucks and a large crew of men were employed on this work.

Pueblo county expects to expend $200,000 on local roads in 1931, according to announcement by board members. The county will contribute $105,000 and $90,000 will come from other sources.

Blanchard Bros., contractors, have under way 10½ miles of grading and gravel surfacing northwest of Fort Collins. This work is being done preparatory to oil surfacing.

Contractor H. C. Lallier has completed two miles of concrete pavement through the town of Starkville in Las Animas county. This piece of road eliminates a dangerous grade crossing.

Chairman Peter Seerie, of the state highway advisory board, has called a meeting of that body, to be held on December 9th. A final draft of the highway budget for 1931 will be made at that time. It will then be submitted to Governor Adams for his approval. It is expected the budget for the next year will total $6,350,000 for new construction and maintenance.

Draftsmen are working on plans for an underpass east of Boulder, completing the pavement between Denver and Boulder. Plans also are being worked up for two miles of pavement south of Trinidad. Work also is progressing on plans for 15 miles of grading and gravel surfacing east of Sterling.

Utah Construction Company has two state contracts, one for 10 miles of grading and graveling between Avon and Wolcott in Eagle county, and the other for two miles of graveling south of Craig in Moffat county.

Driscoll Construction Company is working on six miles of oil processed surfacing north of La Jara in Alamosa county. The work is about three-fourths completed.

Five miles of new road was finished this year north of Silverton on the Million Dollar highway.

Work is progressing rapidly on six miles of oil surfacing east of Avondale on the Santa Fe trail. This work is being done by the Lumsden-Hall Construction Company.

Ten miles of grading and graveling has been completed in Plateau canyon between DeBeque and Palisade by Hinman Brothers, contractors. This work cost $312,000. These contractors are now working on five miles of surfacing and a bridge over Plateau creek on the same road. This work is nearly 50 per cent complete and when completed will cost $185,000.

PLANS BEING DRAFTED

Proj. No.	Est. Length	Type	Location
15-B	15 mi.	Graded	East of Sterling
149-C	8 mi.	Oil Processed Surfacing	West of Bennett
2R210	2 mi.	Pavement	So. of Trinidad
251-D	0.3 mi.	R. R. Underpass	East of Boulder
298-D	4 mi.	Gravel Surfacing	So. of So. Fork

FINISHED PLANS NOT ADVERTISED

150-B	4.630 mi.	Gravel Surfacing	West of Craig
265-D	1.903 mi.	Gravel Surfacing	So. of Durango
278AR&C	15.967 mi.	Oil Processed Surfacing	East of Cheyenne Wells

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per Cent Complete	Proj. No.
2-R9	Starkville	1.35 mi.	Concrete Pavement	H. C. Lallier Const. & Eng. Co.	$ 59,180.60	100	2-R9
68-R2	North of Monte Vista	1.9 mi.	Concrete Pavement	Driscoll Construction Co.	43,566.40	100	68-R2
78-R	Near Minturn	0.709 mi.	Gravel Surfaced	J. Fred Roberts & Sons	96,342.90	91	78-R
91-AR	East of Trinidad	5.613 mi.	Oil Processed	Pople Bros. Const. Co.	77,655.05	11	91-AR
92-R1, 246-DR1	East of Avondale	5.509 mi.	Oil Processed Surfacing	Lumsden-Hall Const. Co.	33,363.00	21	92-R1, 246-DR1
122-R1	Between Ovid and Julesburg	10.122 mi.	Grading	Bedford & Woodman, Inc.	49,976.65	86	122-R1
97-R2, 168-AR1, 216-AR1, 273-R1	Betw. Lamar & Kas. State Line	21.764 mi.	Oil Processed Surfacing	Hamilton & Gleason Co.	122,216.20	58	97-R2, 168-AR1, 216-AR1, 273-R1
134-AR&C	West of Burlington	11.174 mi.	Oil Procesed Surf.	H. C. Lallier Const. Co.	111,217.20	0	134-AR&C
138-B	North of Kremmling	3.133 mi.	Gravel Surfaced	F. L. Hoffman	76,363.35	100	138-B
138-C	South of Muddy Pass	4.184 mi.	Gravel Surfaced	C. A. Switzer	103,270.20	71	138-C
144-D	Northwest of Ft. Collins	2.834 mi.	Gravel Surfaced	J. Fred Roberts & Sons	66,430.10	100	144-D
144-D2	Northwest of Fort Collins	0.236 mi.	Gravel Surfaced	J. Fred Roberts & Sons	15,566.00	100	144-D2
144-E	North of Ft. Collins	1.286 mi.	Concrete Paving	F. C. Dreher Const. Co.	109,106.30	53	144-E
144-F	Northwest of Ft. Collins	10.386 mi.	Gravel Surfaced	Blanchard Bros.	141,180.80	7	144-F
147-D	Betw. Cortez & Utah Line	2.903 mi.	Gravel Surfaced	Wood-Morgan-Burnett Co.	43,432.60	100	147-D
149-B	East of Aurora	7.911 mi.	Oil Processed Surf.	Chas. B. Owen	134,611.10	87	149-B
150-A	West of Craig	8.227 mi.	Gravel Surfaced	Gardner Bros. & Glenn	93,477.35	99	150-A
151-A	Between Granby and Tabernash	6.663 mi.	Gravel Surfaced	J. H. Miller & Co.	76,909.90	0	151-A
165-R1	East from Canon City	9.325 mi.	Oil Processed Surf.	C. V. Hollenbeck	50,548.30	99	165-R1
175-A	Between Sterling and Ovid	41.979 mi.	Graded	Cole Bros	193,055.75	82	175-A
175-A-2	Between Sterling and Ovid	41.979 mi.	Gravel Surfaced	Chas. B. Owen	60,690.00	58	175-A-2
189-B	Between Hayden and Craig	2.567 mi.	Gravel Surfaced	C. A. Switzer	91,497.00	0	189-B
229-AR1, 271-AR1, 271-BR1, 271-CR1, 271-ER1	East of Florence	7.435 mi.	Oil Processed Surfacing	C. V. Hollenbeck	34,975.85	81	229-R1, 271-AR1, 271-BR1, 271-CR1, 271-ER1
243-C	West of Dyke	3.837 mi.	Gravel Surfaced	Grant Shields	47,404.40	85	243-C
248-B	South of Buena Vista	2.766 mi.	Gravel Surfacing	J. Finger & Son	51,979.50	43	248-B
253-D	West of Milner	2.547 mi.	Gravel Surfaced	Hamilton & Gleason Co.	147,192.00	100	253-D
258-H	West of Sapinero	4.921 mi.	Gravel Surfaced	Cole Brothers	123,700.60	99	258-H
258-I	Between Montrose & Gunnison	2.481 mi.	Gravel Surfaced	J. H. Miller	50,272.60	21	258-I
262-G2	West of La Veta Pass	5.014 mi.	Gravel Surfaced	Pople Bros. Const. Co.	11,932.50	100	262-G2
262-J	Betw. La Veta & La Veta Pass	2.724 mi.	Surfacing & Bridge	Mountain States Constr. Co.	39,659.85	74	262-J
263-B	Betw. Mortimer & Ft. Garland	3.133 mi.	Gravel Surfaced	Pople Bros. Const. Co.	29,532.40	86	263-B
265-C	Betw. Durango & Bayfield	2.500 mi.	Gravel Surfaced	Grant Shields	36,022.90	86	265-C
266-D	South of Bondad	4.111 mi.	Gravel Surfaced	Engler, Teyssler & Co.	96,075.30	100	266-D
267-C	Near Model	4.491 mi.	Gravel Surfaced	E. H. Honnen	45,801.00	100	267-C
270-AR1, 270-BR1	East of Monte Vista	6.412 mi.	Gravel Surfacing	Mtn. States Const. Co.	44,875.40	100	270-AR1, 270-BR1
277-D2	North of Pueblo	15.566 mi.	Concrete Pavement	Edw. Selander	333,257.80	95	277-D2
277-E2	South of Colorado Springs	10.2 mi.	Concrete Pavement	J. Fred Roberts & Sons	238,207.30	74	277-E2
279-H	Betw. Kenosha & Webster	1.691 mi.	Grading	Anderson, Sheldon & Miller	76,636.12	42	279-H
279-I	West Alameda, Denver	1.207 mi.	Asphalt. Conc. Paving	J. B. Bertrand, Inc.	51,604.90	94	279-I
282-G	South of Craig	5.147 mi.	Gravel Surfaced	Chas. B. Owen	61,645.22	88	282-G
282-H	Between Rifle and Meeker	7.029 mi.	Gravel Surfaced	Winterburn & Lumsden	82,589.74	100	282-H
282-I	South of Craig	1.981 mi.	Gravel Surfaced	Utah Construction Co.	70,225.16	16	282-I
286-D	North of Ault	9.883 mi.	Gravel Surfacing	W. F. Pigg & Son, Inc.	35,567.00	99	286-D
287-BR1	East of Greeley	7.413 mi.	Concrete Paved	New Mexico Constr. Co.	145,875.00	100	287-BR1
292-AR	North of Minturn	6.262 mi.	Gravel Surfacing	Luke E. Smith & Co., Inc.	36,860.00	100	292-AR1
292-D	Between Wolcott and Avon	9.834 mi.	Graded Surface	Utah Construction Co.	159,143.40	0	292-D
295-A	North of La Jara	5.703 mi.	Oil Processed Surf.	Driscoll Construction Co.	49,210.50	64	295-A
296-E	South of Greenhorn	7.210 mi.	Gravel Surfaced	Mountain States Constr. Co.	93,594.88	100	296-E
297-C	Southwest of De Beque	9.953 mi.	Gravel Surfaced	Hinman Bros. Const. Co.	319,453.50	87	297-C
297-D	South of DeBeque	4.198 mi.	Surf. & Bridge	Hinman Bros. Const. Co.	185,230.50	34	297-D
298-B	North of Pagosa Springs	2.414 mi.	Surfacing	Engler & Teyssler	38,426.00	84	298-B
298-C	Bet. Twin Bridges & South Fork	3.780 mi.	Gravel Surfacing	H. C. Lallier Const. & Eng. Co.	116,864.50	64	298-C
300-B	North of Silverton	2.828 mi.	Graded	Hamilton & Gleason Co.	35,647.80	100	300-B
300-C	North of Silverton	1.937 mi.	Grading	D. G. Son	15,287.80	100	300-C

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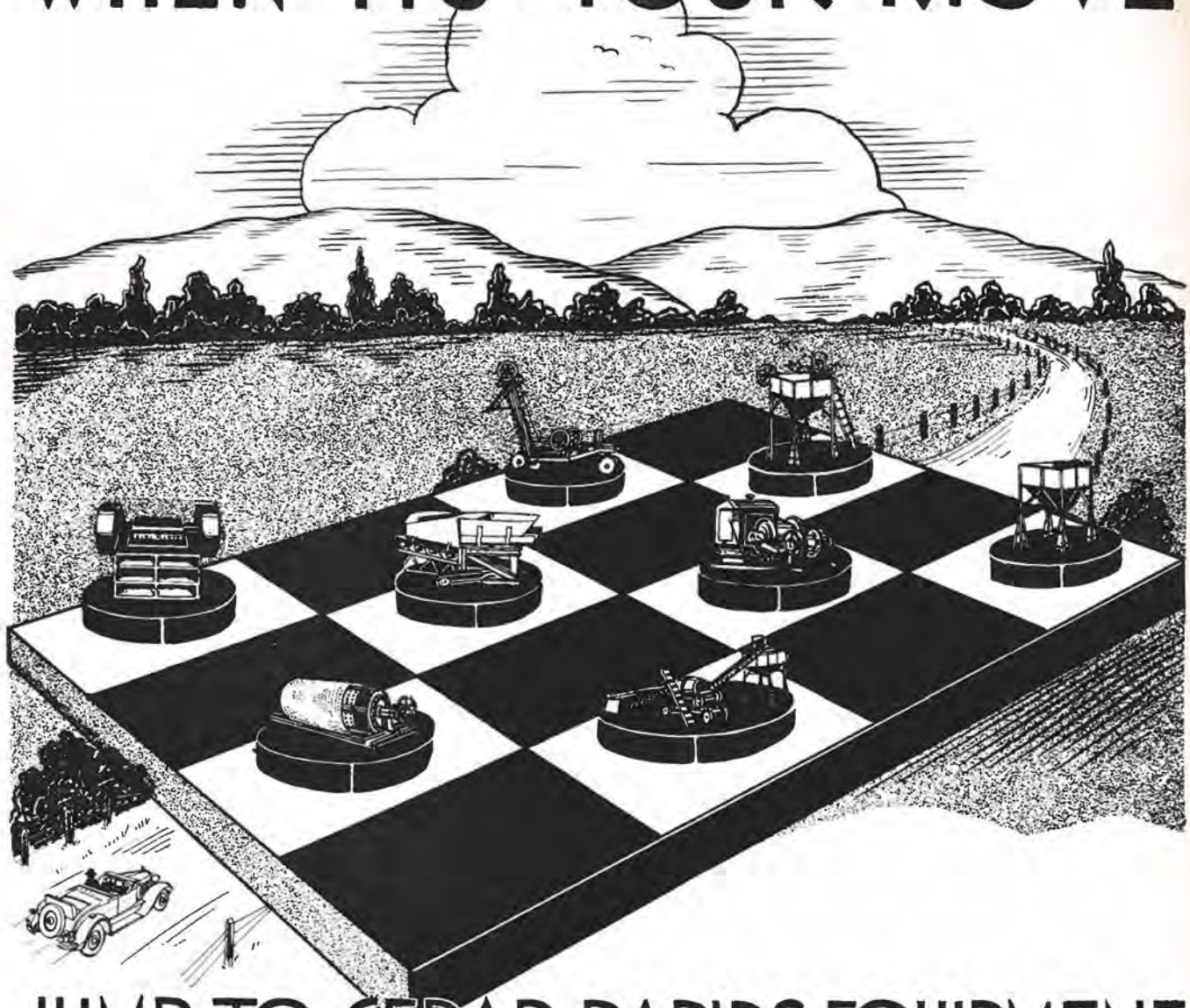
COLORADO HIGHWAYS

Vol. 9 Dec. 1930 No. 12

WHEN ITS YOUR MOVE



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Our Cover Picture

A SCENE along the Santa Fe Trail near Avondale in Pueblo County is shown on the cover of this month's COLORADO HIGHWAYS. This concrete pavement was laid last year, and is part of a fifteen-mile stretch east of the steel city. Further improvement of the Santa Fe Trail route is planned for the coming year. Pavement laid with Federal Aid co-operation. Photo by George Meffley.

Colorado Highways
"BETTER ROADS"
VOLUME IX. DECEMBER, 1930 NUMBER 12

Motoring Costs Can Be Reduced

By E. E. DUFFY

THE year 1930, while a banner year in the building of rural pavements, was not such a happy one for city motorists. Rural concrete pavement building, largely through the auspices of well-organized and equipped state highway departments, was some 17 per cent greater than the previous peak year of 1928. Concrete street building was less by about 34 per cent than in 1928, and less by about 23 per cent than in 1929.

Most motoring and trucking is, of course, done over city streets. But although nearly all streets are covered with some sort of a surface, for the most part they are inadequately surfaced from the point of those two important factors, economy and smooth traveling.

The automobile is a flexible machine; it will go anywhere. But it is this very flexibility that leads to carelessness in the operation of automobiles. Few are the motorists who realize that in the contemplated driving of 10,000 miles in the ensuing year the cost is going to be in the neighborhood of $700, all things considered.

One of the important ways in which this high cost can be reduced is that of driving over smooth highways. Rough roads and streets are passed over with comparative ease by the modern car, yet holes and bumps have a telling effect. The ailing speedometer, bruised casings, a broken brake connection or spring, a short circuit, even water or oil pump trouble, may all develop from driving over rough surfaces. It would be costly to maintain even a railroad engine if driven over tracks as rough as only moderately smooth streets.

On the whole, car maintenance is an item directly chargeable to highway conditions. It may be said with truth that vast mileages of city streets have as their only function the keeping of cars out of the mud. But that is not the full purpose of the modern street, for it must provide smooth motoring at a cost low to both the city and the motorist.

Usually street maintenance is charged to general taxes, so that ordinarily the taxpayer does not realize what a large sum he pays for street upkeep. When he realizes this, and considers his car costs, perhaps he will take an active part in inducing the construction of proper streets.

GOOD ROADS VALUES

"The value of good roads cannot be expressed in money. Like all other good things, hard-surfaced roads have immense collateral values. Collateral advantages and intangible values spring up around every useful enterprise. To this rule there are no exceptions, and good roads form a particularly happy illustration of its truth.

"Good roads answer the need of humanity for one of the three essentials of organized society—food, shelter and transportation. And roads serve all three. Good roads are lines of easy transportation and communication. They relieve the tedium and isolation of the country, and offer the blessings of rural life to the city worker. They form lines for the development of community interest. They foster and create community development; bring educational and recreational values to dwellers in the city and country alike; develop national and state patriotism."—Arthur M. Hyde, Secretary of U. S. Department of Agriculture.

STRANGE—BUT TRUE

The average automobile, including passenger cars and trucks, consumes about one gallon of motor oil to every 27.32 gallons of gasoline.

The New York Automobile Club recently asked some 21,000 metropolitan motorists what they considered the worst motoring sin that drivers are guilty of. Thirty-eight per cent voted as most objectionable the driver who insists on keeping in the middle of the road.—*Texaco Star.*

EXPENSIVE ECONOMY

A contracting concern hauled an over-width machine on a highway at night to save daylight tie-up of work. Lights were not at hand so it was moved without them. Three accidents occurred which cost the concern over $30,000.—*Minnesota Highway News.*

HIGHWAY BONDS VOTED: $35,000,000 FOR BRIDGE

Road and bridge bond issues were up before the voters in several states at the November election. New Jersey approved an $83.000,000 highway bond issue, Louisiana voted $75,000,000 and Wyoming $2,800,000. Arizona defeated a $10,000,000 highway bond plan.

The San Francisco district approved a $35,000,000 bond issue for a bridge over the Golden Gate. The proposed structure will have the longest span in the world, 4,200 feet. This is 700 feet longer than the Hudson bridge now nearing completion in New York City, which has a main span 3,500 feet long.—*Minnesota Highway News.*

School Fund Loan May Be Used For Road Building

USE OF THE state school and state compensation insurance funds is being considered by the state highway advisory board as the quickest and safest means to enable the state to accept all appropriations made by congress for highway construction in Colorado.

Use of $2,000,000 during the next two years would enable the state to get an equal amount now available in Washington and result in the expenditure of twice that sum, or $4,000,000, on highway construction in addition to some $4,000,000 already provided for.

In view of the fact that the greater part of highway construction cost is paid out for labor, expenditure of $4,000,000 over and above the sums appropriated in the regular highway budget would greatly alleviate the unemployment situation throughout the state.

The highway advisory board met December 8th for its annual budget meeting. Its members took up the suggestion that the state land board, administrator of the school fund, and the state industrial commission, administrator of the compensation insurance fund. Governor Adams met with them to discuss the highway department's finances.

The situation facing the highway department, so far as Federal aid appropriations by congress are concerned. is this: Present income of the department enables the department to accept $2,016,000 of the appropriations. leaving a balance of $1,413,400 unclaimed in Washington. It must be understood that for every dollar appropriated by congress, the state must put up a dollar. Unless Colorado covers this balance of $1,413,400, the money will be given those states which express a willingness to match it.

In 1932 an additional $500,000 that the state cannot now cover will be available, making a total of about $2,000,000 that the highway department will be lacking in 1931 and 1932. In 1933 the department will be able to meet Federal aid appropriations because in that year the department will again get the use of one-half of the automobile license fees that are now pledged to retire a highway bond issue.

At present the state school and compensation insurance funds are invested in bonds of the nation, state and the latter's political subdivisions. The investments of the school fund total about $10,000,000 and net the fund about 4 per cent. There is about $3,000,000 in the insurance fund, yielding an income of 4.2 per cent annually.

The plan to be considered by the governor and the advisory board is very simple: Instead of purchasing bonds with the money in the funds, the managers of the fund permit the money to remain in the custody of the state treasurer and give the highway department authority to draw upon the funds to the extent of $2,000,000. The highway department obligates itself to pay 4½ per cent for the use of the money and to pay back the principal used within ten years.

The department's income from the gas tax, the motor vehicle fees and other sources are pledged as security for all moneys advanced. Neither school fund nor compensation insurance fund, it is pointed out, can lose a

Showing a stretch of gravel surfacing on Tennessee Pass recently completed, giving a fine, wide, smooth highway from Leadville to Red Cliff. Photo by Joseph Roma.

This fine stretch of gravel surfaced highway, located near Avon in Eagle County, was recently completed by the State Highway Department with Federal co-operation.

cent because the state treasurer has full charge of all the money belonging to the highway department.

State officials who favor the plan point out that it would be good business. In the first place, they say, the two funds would get a larger interest return than they now receive, and then again the state would get $4,000,000 worth of additional highways, to say nothing of the benefits derived from putting to work a large number of unemployed.

A simple amendment of the law governing administration of the school and compensation insurance funds by the general assembly is all that is necessary to put the plan into effect.

Aside from the money that may be made available through the carrying out of this plan, the advisory board will have about $6,600,000 to dispose of in the 1931 budget. Income of the department is estimated as follows: Gasoline tax, $4,400,000; Federal aid, $2,016,000; internal improvement fund, $50,000; bus tax, $60,000, and participation by Denver, $85,000.

This money will probably be spent as follows: Federal aid projects, $4,032,000; maintenance, $1,750,000; state projects, $504,000; administration, $210,000; miscellaneous purposes, $115,000.

U. S. Court Holds Colorado Bus Tax Valid

The constitutionality of the Colorado public utilities act and the right of the state to levy a tonnage tax on automobile truck lines were upheld by the United States supreme court, in Washington, D. C., recently when it dismissed the appeal of Harvey Cox, Denver and Colorado Springs truck operator, from a decision of the Colorado supreme court denying him a writ of habeas corpus.

Cox had applied for a writ after he had been sentenced to three months in jail for violating an injunction restraining him from operating a truck line between Denver and Pueblo.

Cox has been in the courts since September, 1929. He applied to the state public utilities commission for a permit to operate a truck line between Denver and Pueblo. Denied a permit he brought suit in the Denver district court to compel the utilities commission to give him a permit. District Judge McDonough, instead of giving him the permit, issued an injunction restraining him from operating his fleet of trucks.

Cox claimed that the Colorado public utilities act was unconstitutional insofar as it imposes a tax for the upkeep of highways. He also contended that the road between Denver and Pueblo was a Federal aid road and that for that reason the state courts had no jurisdiction. He disobeyed the injunction, with the result that District Judge Henley A. Calvert found him guilty of contempt of court and sentenced him to three months in jail.

The Colorado supreme court declined to release him on a writ of habeas corpus. He then appealed to the United States supreme court. He was released from the county jail on December 26th last year upon order of Justice Willis VanDevanter of the United States supreme court. Justice VanDevanter fixed his bail at $3,500.

Cox had still seventeen days of his three-month sentence to serve when Justice VanDevanter came to his rescue.

In announcing the dismissal of the case, the United States supreme court announced that it was without jurisdiction.

Other nations claim distinction in the matter of streets and roads. Havana, Cuba, claims the Via Sol, only 47 inches in width, as the narrowest street in the world.

The highest motor road in the United States is on Pike's Peak in Colorado, 14,109 feet above sea level.

Hundred Crews Battle Drifts On State Roads

A FEW hours after he assumed charge of the state highway department, Charles D. Vail, newly appointed highway engineer, was confronted with one of the most difficult situations to ever confront state and county road officials.

Huge snowdrifts covered the roads in many parts of the state. Highways in the plains counties of the state, east of Denver, Greeley, Colorado Springs and Pueblo, were blocked to traffic. Snow in some places filled cuts to a depth of twenty feet. Scores of motorists were marooned, some in danger of freezing in the raging blizzard.

With appeals for help pouring in from a score of towns and cities in the eastern and southern part of the state, Engineer Vail ordered the entire equipment of the highway department mobilized to open up the roads and rendered every assistance possible to the traveling public. The huge rotary snow plow of the department was rushed from Buena Vista to Colorado Springs and cleared the road east to Limon, and from there was used in clearing the snow on the Denver-Limon route.

Under the direction of John P. Donovan, maintenance engineer, crews of men were rushed to the southern part of the state, and with hugh caterpillar tractors cleared huge drifts from the highway both east and south of Pueblo. Every available man and piece of equipment in the department was put to work. The men were worked in shifts in weather ranging from freezing to 20 degrees below zero.

The storm was particularly heavy in the eastern section of the state, where "old-timers" said it was the worst in fifty years. Drifts ranged from five to twenty feet in depth. In some places, due to high winds, the roads were opened as many as five times. The huge snow plows would force their way through the drifts, and in less than an hour the "cuts" would be filled with snow again.

While the maintenance crews were having their troubles fighting the snow in the eastern part of the state, other crews were battling heavy drifts on the mountain passes. The latter roads were cleared in less than twenty-four hours in most instances, but it was a week or more before traffic was able to move over roads in some sections of the plains region.

For seventy-five miles east of Fowler on the Santa Fe Trail, extending to Las Animas, and to the Kansas line, snow drifted on the roadway from a foot to ten feet in depth. There was five feet of snow on the road between Rocky Ford and La Junta, a condition unheard of before in the history of the department. Use of the heaviest tractors and snow plows was required in its removal.

A like condition existed east of Sterling in the direction of Holyoke, and likewise between Greeley and Brush. At several points along the route from Denver to Limon, the snow drifted over the telephone lines and poles. All traffic over this route, including the trains over the Union Pacific railroad, was tied up for nearly a week. One-way trails first were opened on the highways, and later these were widened to the full width of the road. At many points it was necessary to station traffic officers to handle the traffic through the one-way snow lanes, which ranged from one to five miles in length.

In South Park the crews started work with the first snowfall and worked almost continuously for fifty-two hours, with a heavy gale blowing and the thermometer registering around twenty below zero. As a result, for the first time since the present department was organized, traffic is moving through the park after the first big snowfall of the winter. An effort will be made to keep the road from Denver to Buena Vista, through South Park, open all winter. Two large snow-removal outfits will be employed on this work.

Showing snow conditions five miles east of Deerfield, on Greeley-Fort Morgan highway, following November blizzard. Photos by Wesley Stevens.

Views showing state highway maintenance crews clearing snow from highway near Limon, following one of the worst blizzards in the history of Colorado. Drifts in places were 20-foot in depth and traffic was blocked for several days. Upper right picture shows crew hand-shoveling snow from roadway. Photos by John P. Donovan.

It was necessary to employ a score of men to "hand muck" the snow which filled the underpass at Manzanola. In other places scores of men are still being employed to clear the snow. For miles on nearly every route east of Denver the snow is piled four to ten feet high on each side of the roadway.

Berthoud, Rabbit Ears, Tennessee, La Veta, Poncha and Eaton passes, in the high mountain country, were kept open. Plans to keep Berthoud pass open throughout the winter were announced meanwhile by the state highway department. Under arrangements worked out by the highway advisory board and Engineer Vail, traffic will be routed through Middle Park and over the Trough road to the northwestern section of the state.

Although it may be necessary to obtain a rotary plow to keep Berthoud pass open, highway officials believe this will cost less than it does to move the huge drifts and snow slides to reopen the pass in the spring.

Hundreds of workers were employed in efforts to keep the roads open. Most of the workmen were recruited in eastern Colorado towns as the deep drifts necessitated the use of shovelers to move the snow. The only rotary snow plow owned by the highway department, which for several winters has been used to keep Tennessee pass open, was moved to the eastern section of the state.

Many of the snow-fighting crews worked for days with little sleep in an effort to relieve traffic conditions.

In northeastern Colorado, John Stamm was in charge of the work; Robert Norvell was stationed at Hugo, while Douglas Stewart supervised the snow removal in the Arkansas valley. In the meantime, D. Kirk Shaw was busy in the Durango district; George Toupain had his hands full on the western slope, including Tennessee pass, Battle Mountain and Monarch pass, and at the same time J. O. Francisco and his crews were wrestling with drifts on Rabbit Ears and Muddy passes and in Middle Park.

During the storm D. Kirk Shaw, maintenance head in Durango, wired Highway Engineer Vail as follows:

"Every piece of equipment is in service and if the men can last the storm out we will keep roads open. Loyal men in this division deserve the highest commendation for their work during the emergency, as they have worked for a week with little sleep or rest."

More than forty snow plow outfits, consisting of tractors and blades of various types, were employed in the removal work in eastern Colorado. In all there was more than 100 snow fighting outfits busy during and after the storm.

At the time of going to press with this issue of "Colorado Highways," the men in the eastern section were just beginning to "see daylight" over the huge drifts, and traffic is moving once again in all parts of the state.

County Road Officials To Discuss State Highway Finance Problem

MATCHING of $3,500,000 of Federal aid moneys by the Colorado state highway department will be one of the road problems that will be discussed by the delegates to the twenty-third annual convention of the State Association of County Commissioners, when they convene in Denver on December 16th. The commissioners will be in session for three days.

On December 31st the state highway department will have more than $3,500,000 in the Federal treasury to its credit, which must be met by an equal amount by the state. Various methods of raising this sum has been advanced by road officials. These plans will be taken up by commissioners, because most of the plans advanced for increasing the state road fund affect the counties.

Governor William H. Adams will address the members the opening morning of the convention. The delegates will be welcomed to Denver by Hon. Benj. F. Stapleton.

Other speakers who will address the convention during the three-day conference include: Charles D. Vail, newly appointed state highway engineer; D. M. Rastall, of the Colorado Association; Ralph Fishel, of the Rocky Mountain Motorists; Allen C. Peck, U. S. Forester; E. A. Palen, U. S. Bureau of Roads; E. G. Middlecamp, member state highway advisory board, and Frank Comstock, of Gunnison.

The full program, as announced by Secretary Fred O. Pearce, is as follows:

Tuesday Morning, December 16, 1930

9:30—Call to Order.
Registration of Counties.
Introduction of New Members.

9:50—Invocation.....Rev. J. C. Hoover
Pastor First Baptist Church, Englewood.

10:00—Address of Welcome.....Hon. Benj. F. Stapleton
Mayor of Denver.

10:10—Response.....Wm. H. Bartell
Chairman Board, El Paso County.

10:20—Address.....Hon. Wm. H. Adams
Governor of Colorado.

10:30—Reports.

10:45—Report of What Has Been Done by the Colorado Association.....Dr. B. M. Rastall
Executive Vice President.

11:30—Uniform Motor Vehicle Code for Colorado.....
.....Ralph Fishel
Rocky Mountain Motorist, Inc., A.A.A.

Appointment of Committees.

Adjournment for lunch. The Convention to be the guests of H. P. Wilson Co., at their office and warehouse, 1936 Market street. Cars will be in readiness at 12 M. sharp.

Afternoon

2:00—U. S. Forestry Department, "Roads and Grazing".....Hon. Allen C. Peck
U. S. Forester.

2:20—Federal Aid and Maintenance.....E. A. Palen
Federal Aid Department, U. S. A.

2:40—Relation Between County Commissioners and State Highway Department.....E. G. Middlecamp
Member State Highway Advisory Board
District No. 4, Pueblo.

3:10—Maintenance of Adobe, Sand and Graveled Roads.....J. G. Boget, Ordway, Colo.
Questions and Discussion by Members of the Association.

3:40—Maintenance of Mountain Roads.....
.....Frank Comstock, Gunnison, Colo.
Questions and Discussion by Members of the Association.

4:10—Experience with Oiled Roads.Mr. Heuschel, Rifle, Colo.
Questions and Discussion by Members of the Association.

8:30—Mr. and Mrs. John A. Crook at Home to County Officials at 1801 York street, Denver, Colo.

Wednesday Morning, December 17, 1930

9:30—Call to Order.

10:00—Subject to Be Selected.....
.....Senator W. L. Knouse, Montrose, Colo.

10:20—Questions and Discussions by Members of the Association.

10:30—Fairs.....Senator John J. Tobin, Montrose, Colo.
Time Given for Questions and Discussions by Members of the Association.

11:00—Taxation.....Rep. Rudolph Johnson, Boulder, Colo.
Discussion by Members of the Association.
Adjournment for lunch. The convention to be guests of H. W. Moore & Co., at their office and warehouse, Sixth and Acoma. Cars will be in readiness at 12 M. sharp.

Afternoon

2:00—A Few Observations.....Hon. Lee Taylor Casey
Feature Writer, *Rocky Mountain News*, Denver.

2:45—The Members of the State Association of County Commissioners will assemble in executive session, at which time questions of vital importance to the association will be considered.

4:30—Adjournment.

6:30—Traditional Hardesty Banquet at the Albany Hotel.

Thursday Morning, December 18, 1930

9:30—Report of Legislative Committee.....
.....Judge V. H. Johnson, Cheyenne Wells, Colo.

10:15—My Policy as State Highway Engineer..Hon. C. D. Vail
State Highway Engineer, State of Colorado.

10:45—Discussion and Questions by Members of the Association.

11:15—How to Control Tuberculosis in Colorado....
.....Senator Chas. F. Horn, Pueblo, Colo.

11:35—Public Trustee's Fees Belong to the County...
.....Senator Teller Ammons, Denver, Colo.

Noon

Afternoon

2:00—Report of Committees.
Necrology.
Eulogy by some member from the county where deceased served.
Auditing.
Resolutions.
Appointment of Standing Committees.
Meeting place, next convention.
Election of Officers.
Adjournment.

Emergency Highway Fund To Relieve Unemployed Urged By Roadbuilders

RESOLUTIONS advocating increased Federal appropriations for road construction throughout the country were passed by the delegates to the annual convention of the American Association of State Highway Officials held recently in Pittsburgh.

At the same time the association went on record as favoring a substantial emergency fund be set up by the government to be advanced to the several states, to be used by such states to match Federal funds, said advances to be later repaid from state revenues or from future installments of Federal highway appropriation.

On December 4th a bill was introduced in congress to provide $80,000,000 for the emergency fund. This measure is said to have an excellent chance of being enacted into law. It is said to have the backing of the Hoover administration.

In another resolution the association recommends to congress that the limitation of $15,000 per mile Federal aid participation be removed, and that the bureau of roads be authorized to approve road projects at 50 per cent of the cost of construction. Colorado and other western states would materially benefit from the passage of this measure. There have been numerous projects in this state costing as high as $100,000 per mile.

The association asks that congress provide such funds as may be deemed adequate to make the Colton-Oddie bill effective. This act provides for the construction of roads through public lands, but no funds have been made available to carry out the provisions of the act. Colorado has sixty miles of road from Maybell to the Utah state line, west of Craig on the Victory highway, which would come under the provisions of the Colton-Oddie law.

A resolution of condolence on the death of Maj. Louis D. Blauvelt, Colorado state highway engineer, and a former president of the national association, was spread upon the minutes of the conference.

The resolutions adopted by the association are as follows:

WHEREAS, Under the conditions of unemployment resulting from widespread drought and industrial depression, public works, and particularly the building of public highways, offer one of the major opportunities to afford prompt relief, and

WHEREAS, Unemployment is not limited to any section of the United States, but is universally felt to the degree that millions of our fellow citizens are out of employment and themselves and their families are in distress,

NOW, THEREFORE, BE IT RESOLVED by the American Association of State Highway Officials, that prompt measures should be taken to stimulate and enlarge the present cooperative state and highway building program to the fullest extent that the funds provided can be wisely and economically used by the Federal and state road building agencies that are already in existence.

BE IT FURTHER RESOLVED, That a substantial emergency Federal appropriation be set up and be expended under the existing Federal highway legislation, and only through such legislation; that in addition thereto a substantial emergency fund be set up by the Federal government to be advanced to the several states, to be used by such states to match Federal funds, said advances to be later repaid from state revenues or from future installments of the Federal highway appropriation.

BE IT FURTHER RESOLVED, That the amendments necessary to expedite the placing under construction of Federal highway funds be made and that the benefits of the emergency appropriation and this recommended legislation be limited to those states which shall in no way decrease or remove from the control of the State Highway Department the present incomes or adversely change the sources of revenue.

BE IT FURTHER RESOLVED, That a substantial emergency Federal appropriation be made to be used to expedite the completion of the forest highway system to be expended by established agencies.

BE IT FURTHER RESOLVED, That the basic principles of the Federal highway legislation have been demonstrated over a long period to be an effective and sound method of cooperation between the Federal government and the several states, and this association vigorously recommends the continuation inviolate of this basic legislation.

Appreciation of Increased Federal Aid

WHEREAS, The congress of the United States has passed and the president has approved an act increasing Federal aid highway funds from $75,000,000 to $125,000,000 per annum, and

WHEREAS, said increase has been put into effect and is proving of great benefit to the several states; Therefore, Be It

RESOLVED, That this association by this resolution wishes to express its appreciation to the president of the United States and to congress for this welcome and much-needed increase of Federal funds.

Unemployment

WHEREAS, The president of the United States, through the Emergency Committee for Employment, has requested the cooperation of the American Association of State Highway Officials in providing additional employment at this time, and

WHEREAS, This association has, in response to such request, instructed the executive committee to furnish all cooperation possible and given it power to act, and

WHEREAS, At this convention numerous requests have been received for action leading toward the relief of the unemployed by increased appropriations, by advancing the date of availability [illegible] those already made or by other means of state or Federal highway finance to secure the desired result; Therefore, Be It

RESOLVED, That the executive committee be directed to give its cooperation to the president and to congress in these matters and be authorized to act for the association as its judgment may direct.

Removal of Federal Aid Limitations

WHEREAS, The present limitation of $15,000 per mile on Federal participation in highway construction has no relation to the cost of any project; Therefore, Be It

RESOLVED, That this association recommends to congress that the limitation of $15,000 per mile be removed and that the secretary of agriculture be authorized to approve projects at 50 per cent of the cost of construction.

Financing Improvements for Various Classes of Roads

WHEREAS, There is at the present time considerable agitation for improvement of secondary roads, in some cases classed as farm-to-market roads, with resultant demand for diversion of state funds now available for state systems in the several states and Federal participation in the improvement; Now, Therefore, Be It

RESOLVED, That in general it may be stated that approximately 10 per cent of the public road mileage in the several states composes the combined Federal aid and state systems, which may be called primary roads, and an additional 20-25 per cent composes the principal county trunk or state aid highways, which may be called secondary roads, and the remaining 65-70 per cent composes purely local township or third class roads:

a. That it is the sense of this association that until such time as the above defined primary routes have reached an

funds, exclusively, and the major portion of state funds should be used entirely to expedite work on this system;

b. That when the present designated Federal aid systems have been improved to an advanced degree advantage should then be taken of the provision of the Federal Highway Act to increase the mileage of the Federal aid system, upon which Federal aid funds may be used, by applying said Federal money to what might now be considered secondary roads;

c. That when the primary routes have reached a reasonably advanced stage of improvement, in keeping with traffic demands, then the states should recognize their responsibility to traffic on the secondary system of highways or county trunk highways, which supplement the general traffic and farm-to-market service of the primary routes, and the states should stimulate such improvement by the allocation of a definite and reasonable proportion of state collected funds for such secondary system of highways or county trunk highways, if the state has not as yet made such funds available for such systems;

d. That the expenditure, however, of all such state funds, allotted for the improvement of the secondary systems or county trunk highways, should be made with such state supervision as will insure tangible, well-planned, worth-while improvements, all administered on a sound business and economical basis;

e. That where state trunk highways, roads of the secondary system or county trunk highways pass through municipalities funds available for the improvement of such routes may logically be used under proper supervision for the construction and maintenance of such routes through such municipalities, but such funds should not become available to the municipalities to be used on thoroughfares which are not used by the traffic carried on such routes.

More Uniform Gasoline Taxes

WHEREAS, It is felt that there should be more uniformity of gasoline or motor fuel taxes in the several states, and

WHEREAS, It is the sense of the committee that such fuel taxes should not be in lieu of the other forms of motor vehicle taxes now in effect; Now, Therefore, Be It

RESOLVED, That this association favors the principle of a gasoline or motor fuel tax, which tax shall be considered as a charge for the use of the highway system; that this tax, however, shall not be in lieu of motor vehicle license fees or personal property taxes; and that such gasoline or motor fuel taxes shall be as uniform in rate in the several states as practical and consistent with the constitutions, road bond obligations or road needs of the individual states.

More Uniform Motor License Fees

WHEREAS, It seems desirable that the rate of taxation for motor vehicles in each of the several states should be as uniform as possible; Now, Therefore, Be It

RESOLVED, That it is the sense of this association that we favor a fixed charge per annum by each state for each class or weight of motor vehicle, which charge shall be considered as a legal protection charge and as a "ready-to-serve" charge for the highway system; that this may take the form of a motor vehicle license fee, which is in lieu of all other property taxes or a combination of personal property taxes and motor vehicle license fees; and that the total rate of such taxes for each class or weight of vehicle in the several states shall be as uniform in amount as practical and as consistent with the constitutions, road bond obligations or road needs of the individual states.

Looking downstream at Animas River bridge, located near Bondad, on highway between Durango and Farmington, New Mexico. This beautiful structure was recently completed by the state with Federal co-operation. Photo by J. R. Cheney.

Funds for Roads Through Public Domain

WHEREAS, The Oddie-Colton Bill, providing for the construction of roads through public lands, has been passed by congress and signed by the president and no appropriation has been made to carry out its provisions; Be It

RESOLVED, That congress be requested to provide such funds as may be deemed adequate to make this act effective.

Favoring Roadside Beautification

WHEREAS, Roadside beautification and its varied activities reduces highway maintenance costs by checking erosion, preventing slides and controlling drifting snow, reduces accidents, increases adjacent property values, promotes civic pride, equalizes temperatures, opens and reveals natural beauty, advertises the state and provides a healthful recreation and enjoyment for all highway users; Therefore, Be It

RESOLVED, That

First. Adequate width of highway right-of-way be acquired at the earliest time to provide for future widening and a detailed plan of beautification.

Second. Conservation of natural growth be recognized of first importance and that unnecessary destruction of roadside plants be prohibited.

Third. The absolute control of the right-of-way be vested in the department of highways.

Fourth. Responsibility for roadside beautification be vested in a competent person to carry out the work of the department and to encourage individuals and organizations to assist in beautifying town entrances and the roadsides in their localities.

National Airway System

WHEREAS, The establishment of a national airway system is a problem similar in most respects to the establishment of a Federal highway system, and

WHEREAS, The necessary ground facilities of an airway are highway in character including as essential features adequate highway connections with airports and intermediate landing fields and in some cases involving the readjustment of highway locations to properly serve traffic to and from airports; Therefore, Be It

RESOLVED, That the American Association of State Highway Officials does, in the interest of greater efficiency in our national transportation problem, recommend full coordination of highways and airways, including the coordinated service of the personnel and equipment of the existing Federal and state governmental agencies now having administration of highways and airways.

Louis D. Blauvelt

WHEREAS, The Creator, who allotted a span of earthly life to our friend and comrade, Louis David Blauvelt, has proclaimed that his work is done and has called him from this life, and

WHEREAS, Major Blauvelt was an outstanding member and a former president of the American Association of State Highway Officials, a competent and acknowledged leader in his chosen profession and field of service, a stalwart and worthy citizen of the community in which he lived; Be It Therefore

RESOLVED, That this association in convention assembled at Pittsburgh, Pennsylvania, on November 19, 1930, does hereby record its feeling of great and sustained loss in his passing from us, at the same time rejoicing that it has been our lot to know him and to have been associated with him; and, Be It Further

RESOLVED, That this action be spread on the minutes of this meeting, and that a copy thereof be sent to his family as indicating not only our high and sincere esteem of Major Blauvelt, but also our deep sympathy in this, their bereavement.

JOHN H. JAY

Former Cedar Rapids Official Heads Concern to Manufacture Portable Shovel in Denver

JOHN H. JAY, former president of the Iowa Manufacturing Company, the makers of "Cedar Rapids" one-piece gravel crushing outfits, has sold his interest in the latter concern, and now heads the Quick-Way Shovel Company, with headquarters in Denver. The new concern is manufacturing a truck shovel.

Mr. Jay is well known in road machinery circles throughout the country, having had twelve years' experience in directing the affairs of the largest manufacturing plant in the country devoted exclusively to the making of gravel and sand handling equipment.

During the last year Mr. Jay and his associates in the Quick-Way Shovel Company produced and sold nine of these machines. Machinery has been installed in a large building in Denver for an expansion of the business and they expect to be in full production after January 1st.

The "Quick-Way" shovel is fully convertible to dragline, clam-shell and crane service. Inquiries have been received from all parts of the country regarding the shovel, which is a new departure in portable shovels and cranes. It can be mounted on a three and one-half to five-ton truck and its portability is one of the most attractive features.

The original machine constructed by Luke E. Smith, head of the contracting firm of Luke E. Smith & Company, has thoroughly demonstrated the practicability of the machine from every standpoint. The slogan of the new concern, "The Quick-Way to the job—the Quick-Way to do it and the Quick-Way to the next one," adequately describes the machine.

HIGHWAY FACTS

From the Highways Handbook

New Jersey established the first state highway department in 1891.

New York state was the first to license motor vehicles, beginning in 1901, and collecting $954 that year.

There are 6,579,826 miles of highways in the world, of which 3,000,000 are in the United States. This compares with 764,238 miles of steam railways in the world.

Governmental studies indicate that it costs an average automobile approximately 2.06 cents more per mile to drive on an earth road than on a hard-surfaced road.

The first important road in the United States was the old York road between New York and Philadelphia, established by the colonies in 1711. The first company incorporated to build and operate a toll road was the Philadelphia and Lancaster Turnpike Company. It was incorporated in Pennsylvania in 1792 and had a road from Philadelphia to Lancaster, a distance of sixty-two miles. This was later taken over by the state in the public interest.

Federal road building for other than military purposes began with the "National Pike" or "Cumberland Road," said to have been the original conception of General Washington. On March 28, 1806, President Jefferson signed the bill appropriating $30,000 for a preliminary survey, and actual work was begun not long after.

The predecessor of the present U. S. Bureau of Public Roads was the Office of Road Inquiry, established in the Department of Agriculture by the Act of March 3, 1893. The name was changed to Office of Public Roads in 1901.

The first Federal aid road act as now administered was passed in 1916, carrying an appropriation of $75,000,000 to be expended in five years.

Prior to the building of the railroads, freight was moved by road in conestoga wagons. In 1819 one of these regular services dispatched two conestoga wagons daily from Philadelphia to Pittsburgh, making the trip in twelve days and charging $120 a ton.

There are approximately 20,000 grade crossings on the entire Federal aid highway system of 187,753 miles as of December 31, 1928. On the 76,000 miles of the system improved with Federal aid from 1916 to 1928, nearly 4,300 have been eliminated.

Approximately 627,000 miles, or more than one-fifth of the 3,000,000 miles of highways in the United States, are surfaced in varying degree.

STATE HIGHWAY DEPARTMENT

Financial Statement, December 1, 1930

BALANCES		
State Treasurer	$1,310,302.64	
County Time Warrants	10,333.42	
Revolving Fund	9,500.00	
Total Balances		$1,330,136.06

RECEIPTS		
Internal Improvement	$ 67,600.00	
Gas Tax	3,857,887.96	
U. S. Government	2,127,146.85	
Bus Licenses	43,569.17	
Highway Receipts	66,647.33	
Cancelled Warrant	2.75	
Total Receipts		6,162,854.06
Total Balances and Receipts		$7,492,990.12

DISBURSEMENTS		
Federal Aid Projects	$3,819,789.63	
State Projects	600,500.07	
Maintenance	1,381,443.74	
Maint., Equipment and Repairs.	228,014.97	
Property and Equipment	26,055.81	
Surveys	41,328.64	
Traffic Signs and Census	22,036.68	
Administration	155,143.48	
Compensation Insurance	24,771.28	
Total Disbursements		$6,299,084.30

BALANCES 11-30-30		
State Treasurer	$1,164,072.40	
County Time Warrants	20,333.42	
Revolving Fund	9,500.00	
Total Balances		1,193,905.82
Total Disbursements and Balances		$7,492,990.12

3% SPECIAL GAS TAX FUND	
Receipts	$ 269,500.52
Disbursements	158,618.35
Balance	$ 110,882.17

NEWS OF THE MONTH

In urging congress to increase funds for road construction in the Rocky Mountain National Park, Horace M. Albright, director of national parks, declared the new transdivide road now under construction over Milner Pass will be a "national sensation."

"It is hard to describe what a sensation this new road is going to make," he said. "It winds up the east side of the mountain, reaches the top at something over 12,000 feet and stays at that altitude for seven miles. We are going to have a rest station in the middle of the 12,000-foot section, where you can look down between 600 and 800 feet on a lake filled with icebergs. Water will be pumped out of the lake to the rest station on top, and you will have the whole sweep of the Rockies before you in all directions. It is just going to give you the quintessence of the Rockies in one view."

The committee expressed a desire to find some way to work out the annexation of Grand Lake and surrounding lands to Rocky Mountain park, Albright suggesting that the mountain road should be brought out onto the ledge above Grand Lake and swung down past the lakeside, which would result in "it being talked about more than any other road in Colorado."

Congress has authorized the lake to be added to the park by presidential proclamation, but no method of acquiring privately owned land around the lake has been found.

In line with the policy of pushing state highway improvements as rapidly as possible, and keeping as many men employed as possible, Highway Engineer Charles D. Vail announced the letting of three construction contracts on December 8th totaling $234,000.

The contracts included the following:

F. A. P. project 122-R, consisting of ten miles of gravel base course for oil processing between Julesburg and the Nebraska state line—contract awarded to J. Fred Roberts; bid price, $15,103.

F. A. P. 150-B, consisting of 4.630 miles of grading and gravel surfacing, located between Maybell and Craig in Moffat county. Contract awarded to N. M. Monaghan; bid price, $73,181.

F. A. P. 265-D, consisting of 1.930 miles of grading and gravel surfacing, located between Durango and Bayfield in La Plata county. Contract to Grant Shields; bid price, $29,455.

F. A. P. 278, consisting of sixteen miles of oil-processed roadway complete, located between Cheyenne Wells and the Kansas state line. Contract awarded to W. F. Pigg & Son; contract price, $116,829.

After months of intensive research work, the special report stressing the necessity of standardizing the earth-road section of the Victory highway, between Maybell, Colo., and Jensen, Utah, has been completed and will be delivered to Congressman Edward T. Taylor for presentation to the seventy-first congress at Washington this winter.

The object of the report is to secure from congress, under the Colton-Oddie bill, passed at the last session and signed by President Hoover, a federal appropriation for construction of this section.

The work of preparing the report was done by David Thomas, agricultural manager for the Colorado Association, who was assisted by M. S. Wheeler, of Steamboat Springs, secretary of the Moffat Tunnel League, and Wilson Murray, of Vernal, Utah. While the economic report was being prepared by Thomas, the state highway department, through parties in the field since last spring, has been completing an engineering report, which will be presented to Congressman Taylor at the same time.

Expenditures of the state highway department during 1930, ending on November 30th, totaled $6,299,-084.30. During the year there was completed forty-two miles of concrete pavement, one mile of bituminous concrete pavement, seventy miles of oil-processed roadway. 105 miles of gravel surfaced and fifty-five miles of graded roadway. These projects were constructed with Federal aid cooperation. In addition there was constructed during 1930 approximately 100 miles of state projects, consisting of seventy miles of grading, twenty miles of gravel surfacing and ten miles of oil-processed roadway.

We would like to suggest to some of our well-known speed fiends that they visit the back yards of some of our wayside garages and see the twisted wrecks that belonged to the speed fiends of yesterday.—West Concord (Minn.) Enterprise.

View shows crew opening road over Riordan Hill, ten miles east of Sterling. Snow five feet in depth. Photo by W. E. Harris.

Highway Washboards Studied

HIGH pressure tires produce washboards, and they are formed more quickly at higher speeds, but balloon tires and shock absorbers will prevent their formation, according to reports of a series of road tests made by the engineering experiment station of the State College at Pullman, Wash.

The tests were made on a dry gravel road, 1.4 miles long, carrying no traffic except the test car. A device which measured the movement of the springs was used in recording the bumps, so there was no guesswork. The surface was scarified and bladed smooth between each test.

Using high pressure tires and no shock absorbers, the corrugations began to appear after thirty-six trips when the car was going at forty miles an hour, but did not appeal until the one hundredth trip when the car was going twenty-five miles an hour.

Using the same tires and shock absorbers, ninety-two trips were required to produce washboards when the car went forty miles an hour, and 188 trips when the car was driven twenty-five miles an hour.

When balloon tires were substituted and the shock absorbers taken off, no washboards appeared up to 360 trips, and with the shock absorbers added, none appeared up to 570 trips. "Whether or not balloon tires would promote or retard the formation of washboards on an already deeply washboarded highway is a question yet to be answered," says the report.

While the percentage of high pressure tires on passenger cars has greatly diminished and is at present very small, the report points out that the percentage of trucks on the highways is constantly increasing, and truck tires are nearly all of the high pressure type. The report suggests that if some type of shock absorbers could be applied to all vehicles using high pressure tires, large savings in the maintenance of gravel roads might be accomplished.

PLANS BEING DRAFTED

Proj. No.	Est. Length	Type	Location
15-B	15 mi.	Graded	East of Sterling
149-C	8 mi.	Oil Processed Surfacing	West of Bennett
2R210	2 mi.	Pavement	So. of Trinidad
251-D	0.3 mi.	R. R. Underpass	East of Boulder
298-D	4 mi.	Gravel Surfacing	So. of So. Fork

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per Cent Complete	Proj. No.
2-R9	Starkville	1.35 mi.	Concrete Pavement	H. C. Lallier Const. & Eng. Co.	$ 59,180.60	100	2-R9
68-R2	North of Monte Vista	1.9 mi.	Concrete Pavement	Driscoll Construction Co.	43,566.40	100	68-R2
78-R	Near Minturn	0.709 mi.	Gravel Surfaced	J. Fred Roberts & Sons	96,342.90	91	78-R
91-AR	East of Trinidad	5.613 mi.	Oil Processed	Pople Bros. Const. Co.	77,655.05	11	91-AR
92-R1, 246-DR1	East of Avondale	5.509 mi.	Oil Processed Surfacing	Lumsden-Hall Const. Co.	33,363.00	21	92-R1, 246-DR1
122-R1	Between Ovid and Julesburg	10.122 mi.	Grading	Bedford & Woodman, Inc.	49,976.65	86	122-R1
97-R2, 168-AR1, 216-AR1, 273-R1	Betw. Lamar & Kas. State Line	21.764 mi.	Oil Processed Surfacing	Hamilton & Gleason Co.	122,216.20	58	97-R2, 168-AR1, 216-AR1, 273-R1
134-AR&C	West of Burlington	11.174 mi.	Oil Procesed Surf.	H. C. Lallier Const. Co.	111,217.20	0	134-AR&C
138-B	North of Kremmling	3.133 mi.	Gravel Surfaced	F. L. Hoffman	76,363.35	100	138-B
138-C	South of Muddy Pass	4.184 mi.	Gravel Surfaced	C. A. Switzer	103,270.20	71	138-C
144-D	Northwest of Ft. Collins	2.834 mi.	Gravel Surfaced	J. Fred Roberts & Sons	66,430.10	100	144-D
144-D2	Northwest of Fort Collins	0.236 mi.	Gravel Surfaced	J. Fred Roberts & Sons	15,566.00	100	144-D2
144-E	North of Ft. Collins	1.286 mi.	Concrete Paving	F. C. Dreher Const. Co.	109,106.30	53	144-E
144-F	Northwest of Ft. Collins	10.386 mi.	Gravel Surfaced	Blanchard Bros.	141,180.80	7	144-F
147-D	Betw. Cortez & Utah Line	2.903 mi.	Gravel Surfaced	Wood-Morgan-Burnett Co.	43,432.60	100	147-D
149-B	East of Aurora	7.911 mi.	Oil Processed Surf.	Chas. B. Owen	134,611.10	87	149-B
150-A	West of Craig	8.227 mi.	Gravel Surfaced	Gardner Bros. & Glenn	93,477.35	99	150-A
151-A	Between Granby and Tabernash	6.663 mi.	Gravel Surfaced	J. H. Miller & Co.	76,909.90	0	151-A
165-R1	East from Canon City	9.325 mi.	Oil Processed Surf.	C. V. Hollenbeck	50,548.30	99	165-R1
175-A	Between Sterling and Ovid	41.979 mi.	Graded	Cole Bros.	193,055.75	82	175-A
175-A-2	Between Sterling and Ovid	41.979 mi.	Gravel Surfaced	Chas. B. Owen	60,690.00	58	175-A-2
189-B	Between Hayden and Craig	2.567 mi.	Gravel Surfaced	C. A. Switzer	91,497.00	0	189-B
229-AR1, 271-AR1, 271-BR1, 271-CR1, 271-ER1	East of Florence	7.435 mi.	Oil Processed Surfacing	C. V. Hollenbeck	34,975.85	81	229-R1, 271-AR1, 271-BR1, 271-CR1, 271-ER1
243-C	West of Dyke	3.837 mi.	Gravel Surfaced	Grant Shields	47,404.40	85	243-C
248-B	South of Buena Vista	2.766 mi.	Gravel Surfacing	J. Finger & Son	51,979.50	43	248-B
253-D	West of Milner	2.547 mi.	Gravel Surfaced	Hamilton & Gleason Co.	147,192.00	100	253-D
258-H	West of Sapinero	4.921 mi.	Gravel Surfaced	Cole Brothers	123,700.60	99	258-H
258-I	Between Montrose & Gunnison	2.481 mi.	Gravel Surfaced	J. H. Miller	50,272.60	21	258-I
262-G2	West of La Veta Pass	5.014 mi.	Gravel Surfaced	Pople Bros. Const. Co.	11,932.50	100	262-G2
262-J	Betw. La Veta & La Veta Pass	2.724 mi.	Surfacing & Bridge	Mountain States Constr. Co.	39,659.85	74	262-J
263-B	Betw. Mortimer & Ft. Garland	3.133 mi.	Gravel Surfaced	Pople Bros. Const. Co.	29,532.40	86	263-B
265-C	Betw. Durango & Bayfield	2.500 mi.	Gravel Surfaced	Grant Shields	36,022.90	86	265-C
266-D	South of Bondad	4.111 mi.	Gravel Surfaced	Engler, Teyssier & Co.	96,075.30	100	266-D
267-C	Near Model	4.491 mi.	Gravel Surfaced	E. H. Honnen	45,801.00	100	267-C
270-AR1, 270-BR1	East of Monte Vista	6.412 mi.	Gravel Surfacing	Mtn. States Const. Co.	44,875.40	100	270-AR1, 270-BR1
277-D2	North of Pueblo	15.566 mi.	Concrete Pavement	Edw. Selander	333,257.80	95	277-D2
277-E2	South of Colorado Springs	10.2 mi.	Concrete Pavement	J. Fred Roberts & Sons	238,207.30	74	277-E2
279-H	Betw. Kenosha & Webster	1.691 mi.	Grading	Anderson, Sheldon & Miller	76,636.12	42	279-H
279-I	West Alameda, Denver	1.207 mi.	Asphalt. Conc. Paving	J. B. Bertrand, Inc.	51,604.90	94	279-I
282-G	South of Craig	5.147 mi.	Gravel Surfaced	Chas. B. Owen	61,645.22	88	282-G
282-H	Between Rifle and Meeker	7.029 mi.	Gravel Surfaced	Winterburn & Lumsden	82,589.74	100	282-H
282-I	South of Craig	1.981 mi.	Gravel Surfaced	Utah Construction Co.	70,225.16	16	282-I
286-D	North of Ault	9.883 mi.	Gravel Surfacing	W. F. Pigg & Son, Inc.	35,567.00	99	286-D
287-BR1	East of Greeley	7.413 mi.	Concrete Paved	New Mexico Constr. Co.	145,875.00	100	287-BR1
292-AR	North of Minturn	6.262 mi.	Gravel Surfacing	Luke E. Smith & Co., Inc.	36,860.00	100	292-AR1
292-D	Between Wolcott and Avon	9.834 mi.	Graded Surface	Utah Construction Co.	159,143.40	0	292-D
295-A	North of La Jara	5.703 mi.	Oil Processed Surf.	Driscoll Construction Co.	49,210.50	64	295-A
296-E	South of Greenhorn	7.210 mi.	Gravel Surfaced	Mountain States Constr. Co.	93,594.88	100	296-E
297-C	Southwest of De Beque	9.953 mi.	Gravel Surfaced	Hinman Bros. Const. Co.	312,453.50	87	297-C
297-D	South of DeBeque	4.198 mi.	Surf. & Bridge	Hinman Bros. Const. Co.	185,230.50	34	297-D
298-B	North of Pagosa Springs	2.414 mi.	Surfacing	Engler & Teyssier	38,426.00	84	298-B
298-C	Bet. Twin Bridges & South Fork	3.780 mi.	Gravel Surfacing	H. C. Lallier Const. & Eng. Co.	116,864.50	64	298-C
300-B	North of Silverton	2.828 mi.	Graded	Hamilton & Gleason Co.	35,647.80	100	300-B
300-C	North of Silverton	1.937 mi.	Grading	D. G. Son	15,287.80	100	300-C

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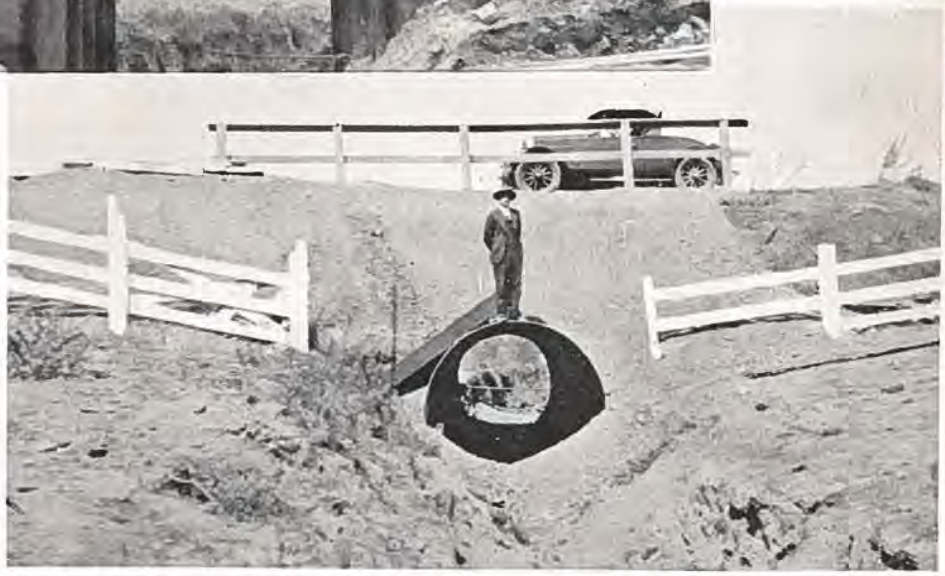

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