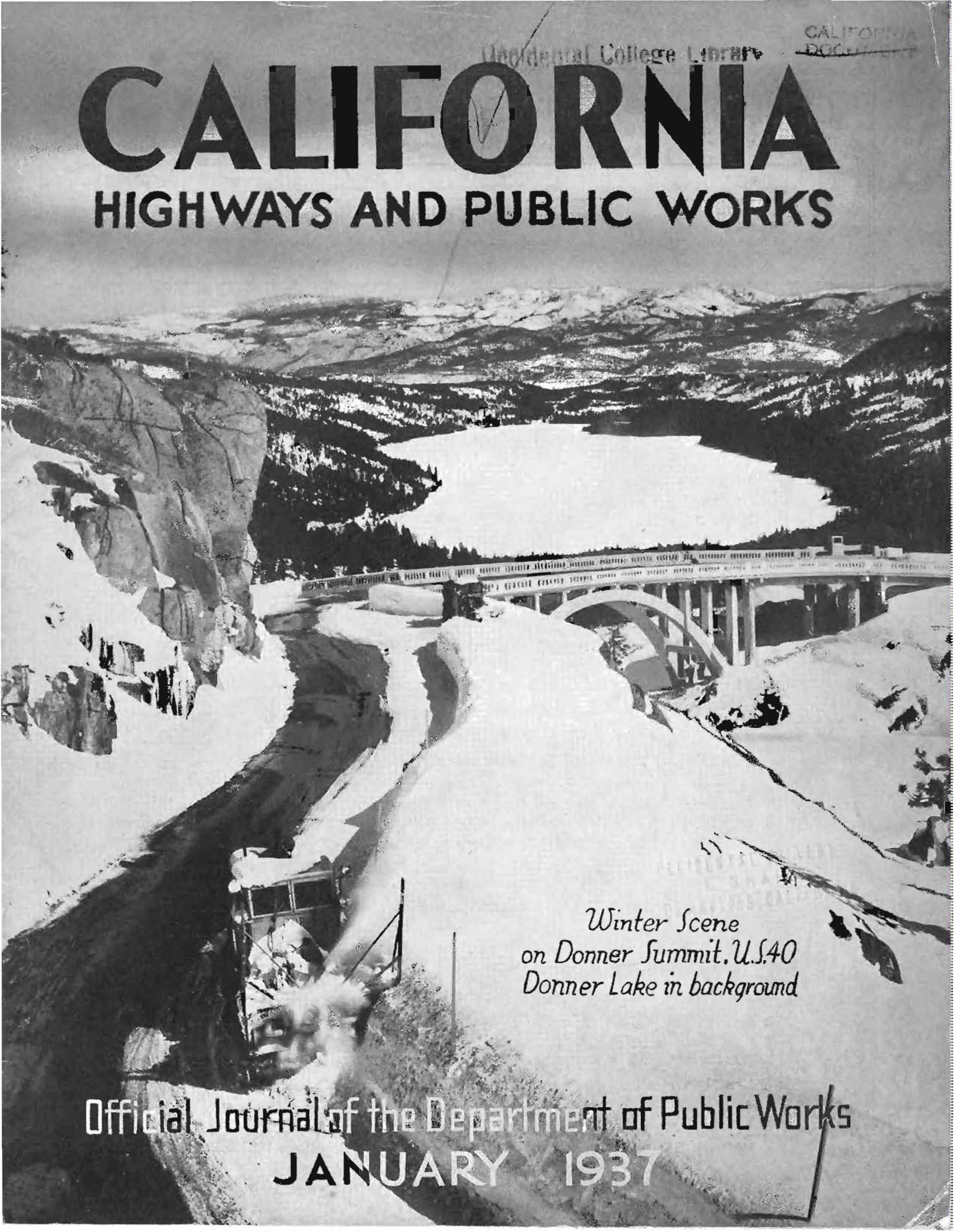
CALIFORNIA

HIGHWAYS AND PUBLIC WORKS



Winter Scene
on Donner Summit, U.S.40
Donner Lake in background

Official Journal of the Department of Public Works

JANUARY 1937

CALIFORNIA HIGHWAYS AND PUBLIC WORKS

Official Journal of the Division of Highways of the Department of Public Works, State of California

EARL LEE KELLY, Director C. H. PURCELL, State Highway Engineer JOHN W. HOWE, Editor

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Table of Contents

$27,576,900 for Construction of Major Projects in State Highway Biennial Budget

By HARRY A. HOPKINS

Chairman California Highway Commission

THE Biennial State Highway Budget for the 89th and 90th fiscal years, July 1, 1937, to June 30, 1939, was adopted by the California Highway Commission on December 19, 1936, and transmitted to Governor Merriam.

The budget shows that after deduction for maintenance of the 14,000 miles of State highway, for the ½ cent allocation to cities, for rights of way, joint highway districts, engineering, minor improvements and betterments, administration and contingency reserves, the total amount available for major project construction throughout the State will be $27,576,900.

There are three sources from which State highway revenues are derived. They are, first, the gas tax, which is estimated to produce $58,000,000 in two years; second, motor vehicle fees for which the State's share of the net amount available for distribution to the State and the counties is estimated at $6,200,000; and third, Federal Aid appropriated for the fiscal years 1938 and 1939 in the Hayden-Cartwright act of 1936, California's share of which is estimated at $9,500,000. The following tabulation shows this estimate of revenues:

Gas tax (State highway share) $58,000,000; motor vehicle fees (State highway share) $6,200,000; Federal aid (1938-1939 fiscal year appropriation) $9,500,000; total, $73.700,000.

The estimated revenues for the 89th and 90th fiscal years are available for and must cover all purposes included in the administration of State highways. The allocation of these revenues is made in accordance with various provisions of legislative enactment, requires distribution to the north and south sections of the State to primary and secondary highways, to cities, joint highway districts and

HARRY A. HOPKINS

to the various purposes and functions involved in State highway administration.

The general functions to which moneys are apportioned include administration, maintenance and cities. For administration $2,571,680 is set up; for maintenance $16,478,320. The half-cent, allocated to cities on the basis of population that each city bears to the total city population, is $14,500,000. The total of these three amounts is $33,550,000, leaving a balance available for major project construction and improvement, engineering, rights of way, joint highway districts and contingencies of $40,150,000.

Distribution of this amount for the various purposes provided by statute to the north and south county groups, to primary and secondary roads, shows the final amount available for major project construction is $27,576,900. This amount has been allocated to 169 major projects shown in the tabulations accompanying this article.

Federal appropriations for feeder or secondary roads and for grade crossing elimination made by the Hayden-Cartwright act of 1936 are not included in this budget since the funds are not yet available for programming or for distribution. These appropriations are Federal contributions for special and definite purposes to be distributed in accordance with Federal regulations, not yet promulgated and over which the Federal government will exercise final approval, and for the expenditure of which the State acts primarily only as an agent for the Federal government.

Tabulations of budgeted major construction projects will be found on pages 10, 11 and 12 detailing the county, State Highway route, location, extent and nature of improvement and proposed expenditure.

(Continued on page 10)

Grading Marin Approach to Gate Bridge Nears Completion on Schedule

By JNO. H. SKEGGS, District Engineer

BRIDGE-CONSCIOUS in a large way, the people of the San Francisco Bay metropolitan area, with the San Francisco-Oakland Bay Bridge a reality, are looking forward with eager anticipation for the opening to traffic of the Golden Gate span, largest over-water suspension structure in the world.

The San Francisco-Oakland Bay Bridge was opened for automobile travel on November 12, 1936, and the occasion was duly celebrated and this record breaking monument to engineering skill now is serving millions of persons monthly.

The Golden Gate Bridge is scheduled for completion during next May, and San Francisco and the North Coast Counties of California's Redwood Empire, comprising the Golden Gate Bridge and Highway District, are now planning the celebration for this historic achievement.

APPROACHES IMPORTANT

Paralleling the preparations for the Golden Gate Bridge celebration, construction progress is approaching its final stages on the various related portions of the project. Steel work on the bridge has been completed, paving is under way, and to the casual observer, the magnificent structure now has every appearance of a completed monument; but spectacular and gigantic as is this important structure, its fundamental usefulness depends upon the approach highways and system of roads serving it at either end.

The Division of Highways of the State Department of Public Works has assumed the responsibility of constructing the mountainous Marin County highway approach connecting the bridge with the Redwood Highway at Waldo. The scope of the heavy grading and tunneling contracts involved was discussed in the May, 1936, issue of this publication. Construction progress to the first of the year is briefly reported as follows:

T. E. Connolly, Inc., the contractor on the construction of the 1000-foot length tunnel, with portals and roadway approaches, has been fortunate in encountering no particularly unstable formations. This contractor has followed a construction scheme involving an 8 by 8 foot crown drift and two 14 by 12 foot wall drifts, with frequent stoping sections connecting the wall and crown drifts for ventilation and safety measures.

MUCH WORK COMPLETED

The crown drift was started at the south portal on June 2d; at the north portal on June 16th; and was holed through, at a point 375 feet from the north portal, on June 30th. All drilling was with jackhammers, all material was hand-mucked, and this drift required timbering for approximately 57 per cent of its length, mostly at the northerly end.

The left wall drift was started at the south portal on June 9th; at the north portal July 30th; and was holed through on September 14th at a point 134 feet from the north portal. The heading from the south portal was drilled with water leyners, the material being machine-mucked. The heading from the north portal was drilled with jackhammers and was hand-mucked.

WALL DRIFTS CONNECTED

The right wall drift was driven from the south portal only, and dead-ended at a point 54 feet from the north portal, being the approximate division line between tunnel excavation and roadway excavation. An 8 by 8 foot cross drift was constructed, diagonally connecting the right wall drift at its northerly dead-end with the left wall drift, to provide access for concreting. The right wall drift was drilled with water leyners, material being removed by machine muckers. It was necessary to provide ventilation equipment in one drift.

Although both the left and right wall drifts were timbered through with sets of 8 by 8 inch posts and 10 by 10 inch caps at approximate seven-foot centers, there was no evidence of any weight upon the timbering. It was used as a safety measure and as a basis for mucking traps for ringing-out operations.

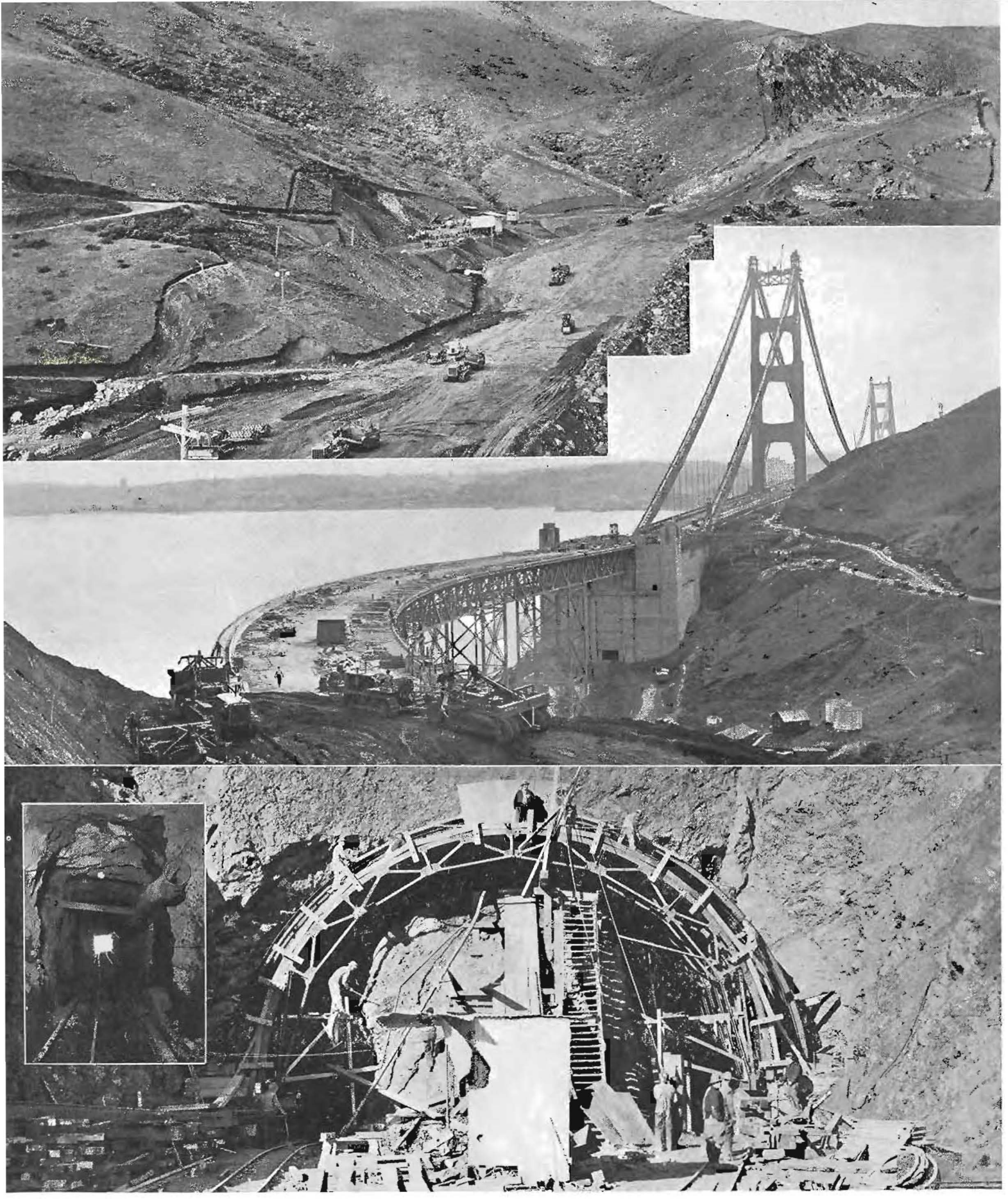
The concrete aggregate bunkers for this project are located at Waldo Point. The concrete mixing plant is located on an access roadway (Prospect Avenue) near, but about one hundred feet in elevation below the north portal. A concrete pump located at the north portal is connected with the mixing plant by means of a skip incline. One to two inch slump concrete has been pumped a distance of 1100 feet, using but one cylinder of the pump.

Concreting of the side walls to the spring line was started October 10th and finished December 11th. Ringing-out of the arch ring and setting of steel beams was started November 30th. One jumbo form for concreting the arch rings was ready for operation the first of the year, and a second scheduled to start shortly thereafter.

HEAVY SLIDES ENCOUNTERED

Preparations for installation of a sodium vapor lighting system in the tunnel are progressing with the tunnel construction. Macco Construction Co., contractor on the grading between Waldo and the bridge on both sides of the tunnel, has been making good progress in spite of a number of anticipated heavy slides. This contractor has been using eleven large tractors, varying from 75 to 90 h.p.; eleven Le Tourneau carryalls of 13-yards capacity, and three 2–2½-yard semi-diesel power shovels, with some forty trucks, varying from five to eight yards capacity.

(Continued on page 9)



Upper—View from near north abutment of Golden Gate Bridge shows heavy grading work on Marin approach. Center—Constructing highway approach at north abutment of bridge. Lower—Placing of steel and form work at south portal of tunnel through hills. Inset—Ventilation precautions in wall drift.

Highway Crews Fight Blizzard Snowstorm, Rescue Autoists

By A. COONROD, District Office Engineer

SNOW storms which started on Sunday, December 27, and three days later developed into one of the worst blizzards in the history of San Bernardino County tested the mettle of the maintenance crews of the Division of Highways in District VIII to the utmost.

Hundreds of persons were marooned at various resorts in the San Bernardino mountains and District Highway Engineer E. Q. Sullivan kept huge snowplows working day and night to clear roads for their release.

With the blizzard still raging and with a snowfall of from three to five feet in Big Bear Valley, all highways into the mountain area were ordered closed on December 30. The day before, snowfall on the level in Big Bear Valley was 54 inches.

The storm brought the season's rainfall for San Bernardino to 13.28 inches on January 1, a record second only to that of the year 1889.

PLOWS WORKED ALL NIGHT

Coming as it did during the holidays, the blizzard presented the snow removal crews with a most serious traffic problem. Great snow banks, fallen trees and landslides sealed roads in many places. State highway crews struggled night and day to force snowplows through great drifts of snow and debris.

Without careful regulation, all cleared roadways would soon have filled with cars blocking their own way. Such a blockade would have resulted in much human suffering, if not loss of life. It was necessary that careful supervision of traffic be maintained and during the storms only such vehicles as were on urgent business were allowed to pass into the snow area.

Outgoing machines were permitted to move first, thus relieving congestion and forestalling a possible food shortage among those marooned.

By January 1, Nature was in complete control of the San Bernardino Mountains while fatigued highway crews, after opening a road to Crestline and Lake Arrowhead, battled their way toward Big Bear Valley and upper Santa Ana canyon resorts. In Lake Arrowhead, snow was two to three feet deep.

RELEASED 800 YOUTHS

Shortly before travel was prohibited, State highway maintenance crews were successful in releasing 800 southern California boys and girls in a number of mountain camps.

Efforts of Division of Highways workers to break through to Running Springs against snow drifts 16 to 18 feet deep were temporarily halted on New Year's Day by fallen trees and a landslide.

On this day traffic conditions at Big Pines and Wrightwood taxed the ingenuity of the California Highway Patrol and the maintenance department. All cars were compelled to discharge passengers at Big Pine and then were turned around facing out of the resort. At one time there was a line of parked cars six miles long.

MAROONED RESORTS AIDED

On the Rim of the World road high winds piled up 14-foot snow drifts and blew big trees down across the highway.

The night of January 2, Lake Arrowhead had been without electric lights and telephone service for four days and the water system was not functioning. A convoy of trucks with food supplies was taken into the resort on that night by the Division of Highways.

Considerable fear was aroused for the safety of 150 Boy Scouts encamped in the Barton Flats area. Superintendent John Davidson of the highway forces went into the district on snowshoes and reported to District Engineer Sullivan that he had found the boys with plenty of food. Sullivan ordered the largest of his rotary plows to clear a road to Barton Flats, a job that required three days.

KEPT TOUCH BY RADIO

During the storm the only communication with Big Bear Valley was between amateur radio stations W6MN of Big Bear and W6LRX of San Bernardino. These stations kept the Division of Highways in constant touch with the situation in the isolated area.

When the roads finally were opened no cars were allowed to proceed into the Big Bear and Lake Arrowhead districts until all persons confined there who wanted to leave had come out.

Throughout the blizzard, highway maintenance crews succeeded in keeping open the State highway into Los Angeles County's playgrounds at Big Pines.

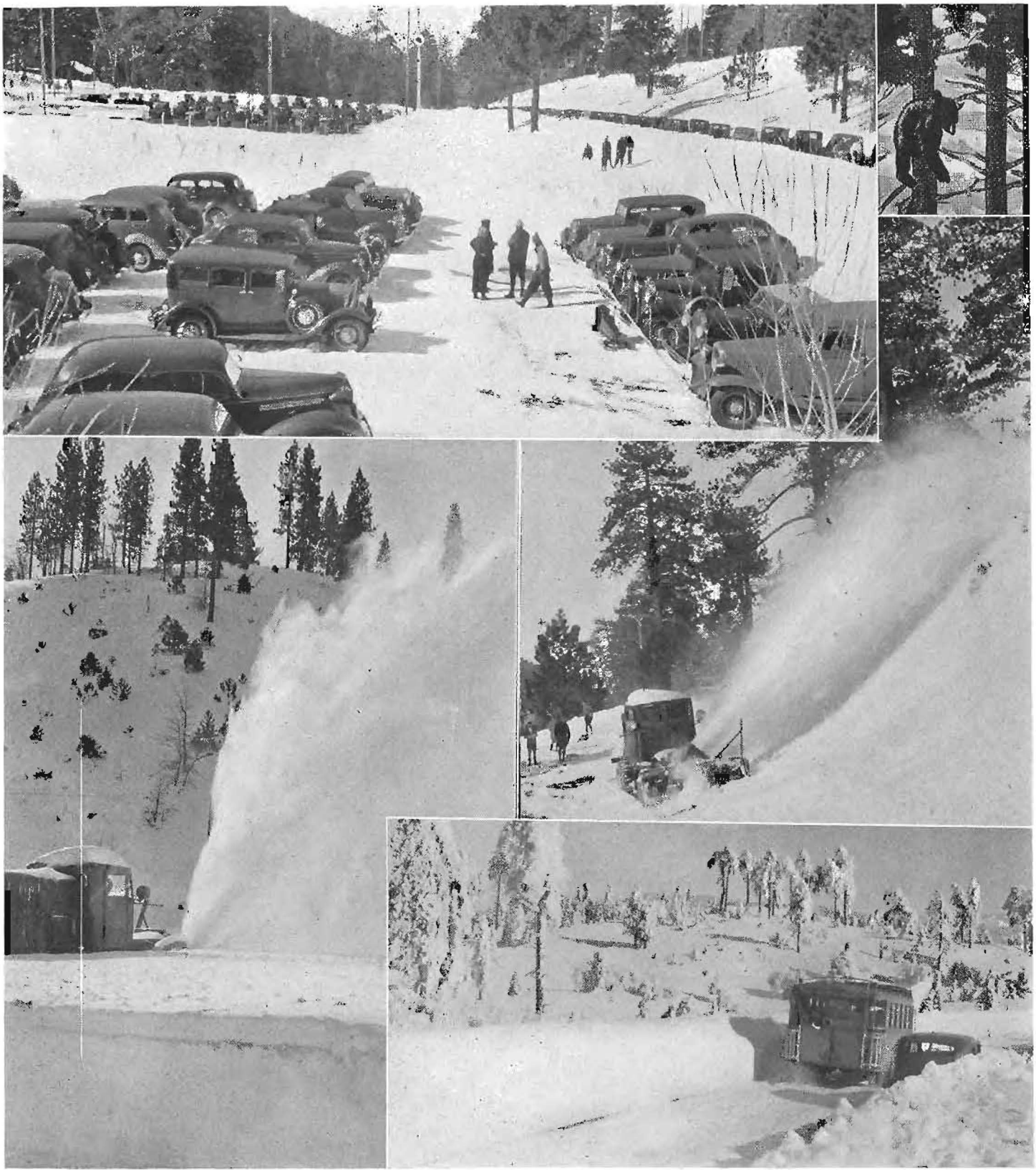
CONVOYS OF AUTOS

Sleet and snow iced the National Old Trails highway in Cajon Pass, where between three and five feet of snow fell. All cars bound for Lake Arrowhead, Big Bear Valley, Crestline and other mountain resorts were halted at the Arrowhead arch.

On the Waterman canyon road from San Bernardino convoys of cars were taken up on New Year's Day by the California Highway Patrol. District Engineer Sullivan adopted this precaution to lessen the danger to motorists from falling rocks and slides on the road.

Tireless work on the part of snow plow crews opened the Rim of the World highway for travel to Lake Arrowhead at 6 a.m. on the morning of January 3.

For ten days every man of the maintenance crews of District VIII and every piece of snow removal equipment was in continuous service.



Scenes in San Bernardino Mountains where crews of the Maintenance Department of the Division of Highways battled for ten days and nights to clear roads leading to Lake Arrowhead, Big Bear Valley, Barton Flats, Big Pines and other points where motorists and pleasure seekers were marooned by the worst snow storm in a decade. Upper—Cars parked at Big Pines headed out of the region to prevent traffic jam. Center right—Blower plow at work opening road. Lower left—Plow working way through five-foot snow drifts. Lower right—Two way road opened through heavy drifts of "No man's" land.

Opening of Newport Overhead Solves Bad Traffic Problem

By A. D. GRIFFIN, District Office Engineer

SOUTHERN California motorists were provided with a new Gateway to the Sea when Governor Frank F. Merriam on Saturday, November 28, officially dedicated the Newport Beach Grade Separation in Orange County.

Ceremonies attending the opening of the new overhead crossing were unique in that the usual procedure of cutting a ribbon barrier across the roadway was replaced by an innovation. An imitation stone wall was erected across the viaduct with a gate in the center. The oldest farm gate in Orange County, one that had served for many years on the great Irvine Ranch, was used. It was held closed with bailing wire and bore a "Keep Out" sign.

With the words, "I dedicate this overpass to the use of the people of the Golden State of California," Governor Merriam cut the wire with a pair of heavy pliers, tore down the warning sign disclosing one that read "Welcome," and flung open the ancient gate.

The Governor then entered his automobile and led a procession of cars across the viaduct to Newport.

SERIOUS TRAFFIC PROBLEM

At Newport Beach, where the roadway entering the city crossed the Coast Highway, there existed for years a serious traffic problem. Travel on both roads during the summer months is very heavy. With the Coast Highway carrying the limit of vehicles, especially on Sundays and holidays, the crossing traffic was enormous and hours of delay resulted.

With completion of the overhead crossing, the viaduct now carries all traffic entering and leaving the city of Newport Beach and permits the travel along the Coast Highway from Long Beach to San Diego to flow without interruption.

Four ramps connect the Coast road with the Newport-Santa Ana highway running overhead. These ramps are so planned that all turns are to the right, thus doing away with cross-traffic.

Motorists using the new crossing should remember that no vehicle shall cross the Coast Highway, either east or west, except by the overhead roadway, and that no left hand turns are permitted at any intersection created by the construction of the bridge.

NO RIGHT TURNS

Autoists wishing, for instance, to go from Santa Ana to Laguna Beach must cross the viaduct toward Newport, make a right turn at the right-hand ramp after crossing, go down the ramp and turn right onto the Coast Highway. Those wishing to go from Laguna Beach to Newport pass under the bridge on the Coast Highway, turn right at the right-hand ramp after passing under the bridge, go up the ramp and turn right, crossing over the bridge.

The Newport Beach Grade Separation was first proposed about eight years ago to carry the Newport-Santa Ana Road, then a County highway, over the State Coast Highway.

Newport-Santa Ana Road, now State Highway Route 43, was taken into the State Highway system on August 14, 1931.

RIGHTS OF WAY OBTAINED

In the early part of July, 1935, after many months of negotiation, the State entered into an agreement with the Southern Pacific Railroad Company whereby the State purchased the railroad's Newport Beach Line right-of-way between Dyer Road and Newport Beach, a total distance of almost eight miles, for the sum of $8,428.

A portion of this right-of-way is now used for the new grade separation and the balance of this right-of-way will be used at some future time for the widening and improvement of State Highway Route 43, northerly from the Newport Beach Grade Separation. The city of Newport Beach, through agreement with the Southern Pacific Railroad, purchased that portion of the railroad's right-of-way within the city that was needed for construction of the grade separation.

All other rights-of-way for this improvement were secured by donation from abutting property owners.

HEAVY TRAFFIC COUNTS

Traffic counts taken on Sunday, July 12, 1936, show a count of 12,397 vehicles between 6 a.m. and 10 p.m. on the Santa Ana-Newport Road, State Highway Route 43, and a count of 15,818 vehicles between the same hours on the coast road, State Highway Route 60.

This project was financed from the Major Project Allocation for Construction and Improvement of Highways—Primary South, in the budget for the 85th-86th fiscal years, which allocated $180,000.00 for the improvement.

Completion of it has eliminated a congestion point which frequently on Sunday afternoons during the summer months has held up cars an hour or more in negotiating this intersection.

APPROXIMATE COST $170,000

Bids for the project were opened October 31, 1935. The contract was awarded by the Director of Public Works on November 7, 1935, and approved by the Attorney General on November 25, 1935. Work was started on November 12, 1935, and was completed November, 1936. The total cost of the project will be approximately $170.000.

Construction consisted of a new bridge over the Newport Bay Channel, a new bridge to carry the Santa Ana-Newport Bay Road over the Coast Highway, grading and paving of approaches, grading and paving of the northwest ramp and the southwest

At top, view of Newport overhead, showing east and west ramps and Coast Highway passing under viaduct. Center—Official party at dedication; (left to right) City Engineer R. L. Patterson, Newport; S. V. Cortelyou, District Highway Engineer; Assistant Director of Public Works Justus F. Craemer; Mayor Harry Williamson, Newport; Mrs. Philip A. Stanton, Julien D. Roussel, secretary California Highway Commission; Highway Commissioner Philip A. Stanton; Governor Frank F. Merriam.

Inset—Governor Merriam cuts wire which held closed old gate barrier. At bottom—Portion of crowd attending dedication, including Sea Scouts, and ancient ranch gate unlocked by Governor Merriam.

ramp connecting the Coast Highway with the high line of the Santa Ana-Newport Beach Road, grading and paving of the east ramp to provide connection between Newport Beach and points southerly along the coast.

The bridge over the Coast Highway is of reinforced concrete girder type, is 158 feet long and has a 44-foot clear roadway width and two three and one half foot sidewalks.

WIDE APPROACHES

The bridge over the Newport Channel is of reinforced concrete girder type, is 206 feet long, has a 44-foot clear roadway width and one five-foot sidewalk, and is built on five bents consisting of 84 reinforced concrete piles.

There are 2015 cubic yards of concrete, 400,000 pounds of reinforcing steel and 75,000 pounds of structural steel in the two structures. The approaches to the two bridges have a 52-foot roadway and are paved 40 feet wide with Portland cement concrete and asphalt concrete. Curbs have been constructed on both sides and a five-foot sidewalk on one side.

The northwest ramp is graded 76 feet wide and paved with Portland cement concrete 20 feet in width.

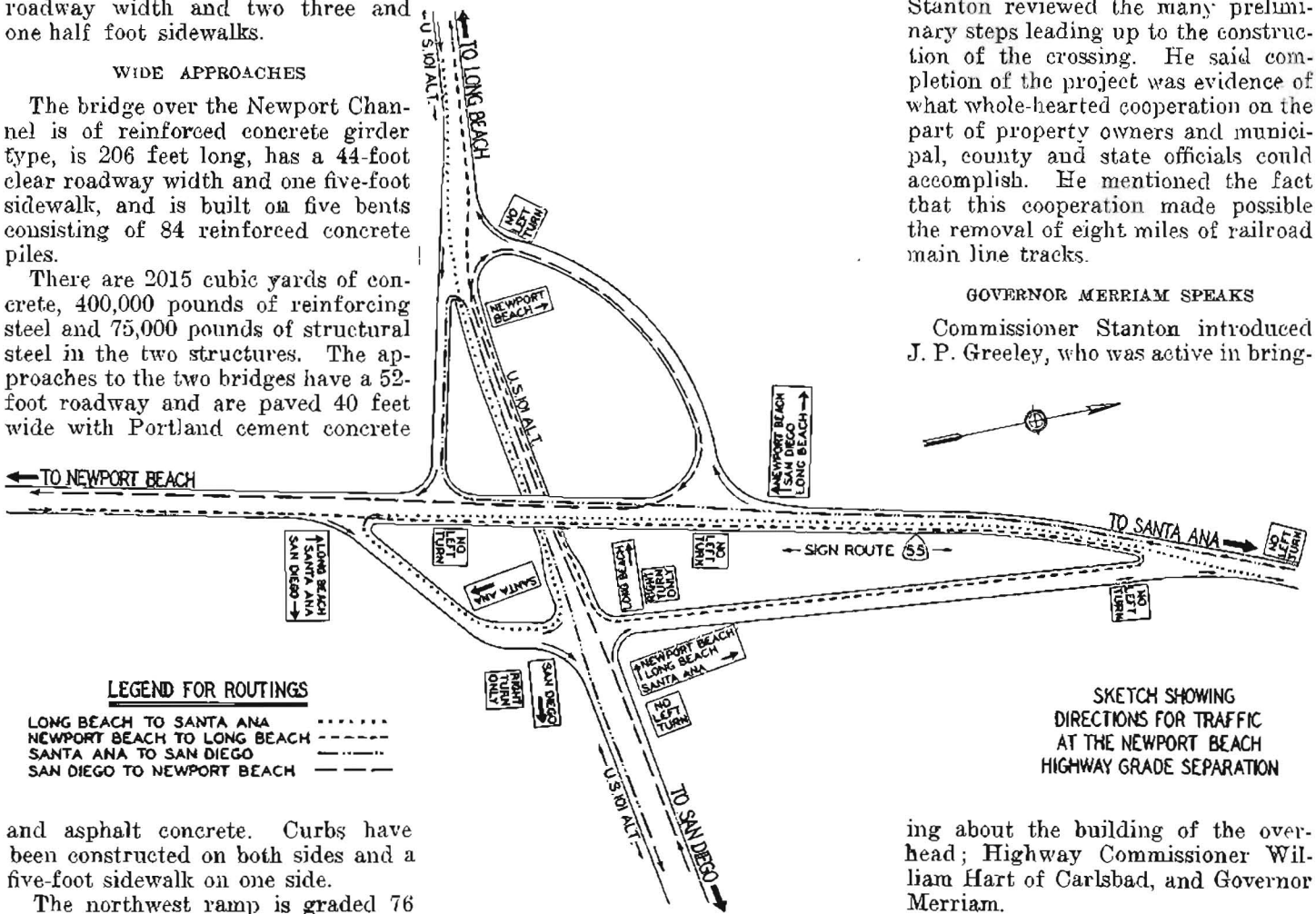
ALL RAMPS PAVED

The southwest and east ramps are paved with Portland cement concrete 20 feet wide and Portland cement concrete curbs and two-foot concrete gutters have been constructed.

The existing grade of State Highway Route 60 (Coast Route) was raised approximately three feet in order to eliminate the dip in pavement under the old road separation and a new 40-foot asphalt concrete pavement was laid with Portland cement concrete curbs and one five-foot Portland cement concrete sidewalk, an overall length of 800 feet.

The Newport Channel Bridge has one removable span to comply with Federal regulations governing navigable streams.

The system of side road ramp connections will permit of a free flow of traffic in all directions, whatever the destination may be of vehicles coming into the grade separation.



SKETCH SHOWING DIRECTIONS FOR TRAFFIC AT THE NEWPORT BEACH HIGHWAY GRADE SEPARATION

The lighting system which consists of 32 ornamental light standards, each containing 250 candle power lamps, and will provide illumination for the entire project, was paid for from funds provided by the city of Newport Beach.

All slope cuts are to be planted immediately after construction.

SPLENDID COOPERATION

This project embodies all the modern developments in highway grade separations gained by many years of construction experience and extensive studies of traffic flow at this location and elsewhere, and in the future the traveling public journeying in the vicinity of Newport Beach will find a traffic facility that will greatly add to their comfort, convenience and safety and save them many wearisome and nerve-wrecking delays.

State Highway Commissioner Phillip A. Stanton presided at the dedication ceremonies, being introduced by Sam A. Meyer, president of the Newport Chamber of Commerce. Mr. Stanton reviewed the many preliminary steps leading up to the construction of the crossing. He said completion of the project was evidence of what whole-hearted cooperation on the part of property owners and municipal, county and state officials could accomplish. He mentioned the fact that this cooperation made possible the removal of eight miles of railroad main line tracks.

GOVERNOR MERRIAM SPEAKS

Commissioner Stanton introduced J. P. Greeley, who was active in bringing about the building of the overhead; Highway Commissioner William Hart of Carlsbad, and Governor Merriam.

The Governor stressed the point that in the working out of the project there was complete harmony among all interested parties. He predicted that by the end of 1937 the unfinished section of the Coast Highway in the Wilmington and San Pedro district would be completed.

Touching upon the subject of gas tax revenues with which the project was built, the Governor said that the definite expression of the voters at the November election against gas tax diversion, left no doubt that the people of California are determined that their gas tax monies shall be used for highway purposes exclusively and not diverted to any

other uses. He said that as far as he is concerned, the gas tax diversion issue is settled and that gasoline tax funds will be devoted solely to highway construction and maintenance.

SEA SCOUTS ATTEND

Adding color to the dedication ceremonies were five hundred Sea Scouts from five western states, who were reviewed by the Governor. The Sea Scouts, who were in "Rendezvous" at Newport Harbor for three days, November 27, 28 and 29, provided a guard of honor for the Governor. Present were the mayors of all Orange County cities, the mayors of Long Beach, Riverside and Pasadena, members and members-elect of the legislature from Orange, state and county officials and officers and members of the Newport Harbor Yacht Club, of which the Governor is an honorary commodore. For the occasion, the Governor wore a commodore's cap.

Preceding the viaduct opening, the Governor and visiting officials were entertained at a luncheon in the ballroom of the Yacht Club. President Meyer of the Chamber of Commerce acted as toastmaster and introduced the guest mayors.

Former Speaker of the Assembly Ted Craig introduced Senator-elect Harry Westover and Assemblymen-elect T. H. Kuchel and Clyde Watson. Highway Commissioner Hart, Julien D. Roussel, secretary of the California Highway Commission, and S. V. Cortelyou, District Highway Engineer, were presented by Justus F. Craemer, Assistant Director of the Department of Public Works.

During the ceremonies at the viaduct a salute of 21 aerial bombs announced the arrival of the Governor and a display of daylight fireworks followed the opening.

In the course of the celebration, Division of Highway officials joined with their hosts in acknowledging the aid given to the project by R. L. Patterson, City Engineer of Newport; N. H. Neff, Orange County Engineer; R. C. Mize, attorney for most of the property owners who cooperated; F. M. Strobridge, who donated large areas of land needed for the work, and George and Alfred Machris, who donated necessary rights-of-way.

In the construction of the Bay Bridge the labor alone amounted to the equivalent of 55,000,000 men, each working for one hour.

U. S. Confers High Honor on Chief Engineer Purcell

The following correspondence recently released by State Highway Engineer C. H. Purcell reveals his appointment by President Roosevelt as a representative of the United States on the International Road Congress Commission.

November 18, 1936

Honorable Cordell Hull,
Secretary of State,
Washington, D. C.

Dear Mr. Hull:

I am in receipt of letter dated November 11th, together with certificate of designation covering my appointment as a representative of the United States, on the Permanent International Commission of the Permanent International Association of Road Congresses.

It is indeed a gratification to me to accept this appointment, and I feel greatly honored to be included in this very able representation as designated by the President of the United States. It will be my pleasure to serve on this Commission for the promotion of highway development in the United States and our neighboring countries.

I wish to express to you and, through you, to President Roosevelt my deep appreciation for the confidence reposed in me.

With kindest personal regards, I am,

Yours very truly,

(Original signed by)
C. H. PURCELL,
State Highway Engineer.

At the cable anchorages, huge splay castings were applied to the suspension cables before wrapping. These graduated the size of the cable from its fan-shaped spread at the eyebars to its closely-compacted load-carrying size. After being spirally wrapped with wire, the cables were given four coats of paint.

Heavy Grading Involved in Marin Approach to Bridge

(Continued from page 2)

This contractor has averaged more than a quarter of a million yards of roadway excavation per month since starting work, with a high monthly yardage of approximately one-third of a million yards.

BIG GRADING JOB

Including slide removal, more than two million yards of material had been moved as of the first of January, 1937, with grading practically completed for the 2.6 mile section north of the tunnel. The grading south of the tunnel in the U. S. Military Reservation consists primarily of taking material from one major cut of some 500,000 cubic yards, the major portion of which has been removed at the present time.

The difficulties of construction of the four-lane Marin approach highway are not readily apparent. Mountainous highways have been built elsewhere, but have generally been limited to two traffic lane capacity, due to combined light travel and prohibitive construction costs. This particular area, however, is so shaken by earthquakes of the past and is located so close to a major earthquake fault, that the disturbance of its present equilibrium with the heavy cuts and fills required, provides unpredictable hazards from slides.

Provision for stable foundations for the heavy fills has required removal of soft material to depths of as much as forty feet, with rock backfill and other special drainage provisions.

It is probable that this section of highway will not become fully stabilized for a number of years to come, but the achievement in opening it to traffic with the Golden Gate Bridge is one of the remarkable features of the project as a whole.

All-risk insurance to the extent of thirty-three million dollars was carried by the contractors on the various units of Bay Bridge construction.

"I can not learn to love you."
"But I've saved $10,000."
"Give me one more lesson."

DETAIL OF MAJOR PROJECT ALLOCATIONS BUDGETED FOR

PRIMARY NORTH

County	Route	Location	Approximate mileage	Nature of Improvement	Proposed expenditures 89th and 90th fiscal years detail
Mendocino	1	South Boundary to Hopland	10.9	Surfacing and shoulders	$115,000
Humboldt	1	Beatrice Overhead to Bucksport	6.6	Surfacing and shoulders	70,000
Mendocino	1	Bridges Creek		Bridge and approaches	16,000
Del Norte	1	Myrtle Creek		Bridge and approaches	49,000
Humboldt	1	Big Lagoon	0.7	Bridge and approaches	50,000
Mendocino	1	Crawford Ranch to Ukiah (portions)	5.0	Grading, surfacing and bridges	200,000
Del Norte	1	1 mile north Wilson Creek to Last Chance Slide	2.0	Grading and surfacing	190,000
Mendocino	1	Sapp Creek to Pepperwood School	2.0	Grading and surfacing	195,000
Mendocino	1	McCoy Creek to Piercy	2.7	Grading and surfacing	160,000
Humboldt	1	Phillipsville to Jordan Creek (portions)		Grading and surfacing	250,000
Tehama	3	Sacramento River at Red Bluff		Bridge and approaches	300,000
Lassen-Modoc	28	Nubieber to Adin	15.4	Surfacing	165,000
Butte-Plumas	21	West Fork to Keddie (portions)	53.0	Surfacing and misc. structures	138,000
Modoc	28	Hot Creek to Alturas	7.6	Grading and surfacing	200,000
Modoc	28	In Alturas	1.2	Grading and surfacing	25,000
Lassen	29	Coppervale to Susanville (portions)	5.0	Grading and surfacing	260,000
Shasta	3	China Gulch		Structure, grading and surfacing	25,000
Plumas	21	Spanish Creek		Bridge and approaches	65,000
Glenn	7	Willows to Artois	6.0	Grading, paving and bridges	225,000
Colusa-Glenn	7	Delevan to Logandale	6.7	Grading and paving	200,000
Nevada-Sierra	38	Hirschdale to Nevada State Line	10.0	Grading and surfacing	300,000
Placer	17	Roseville to Rocklin	2.6	Grading and paving	100,000
Placer	37	At Colfax	1.5	Grading and paving	75,000
El Dorado	11	El Dorado to Clarks Corners and Webber Creek	5.0	Grading, paving and bridges	250,000
Nevada-Yuba-Sierra	25	Nevada City to Downieville (portions)		Grading and surfacing	100,000
Alameda	6	Greenville to Mountainhouse	9.0	Grading and surfacing	800,000
Santa Cruz-Santa Clara	5	Oaks to Inspiration Point	5.7	Grading, surfacing and structures	765,000
Santa Clara	2	Coyote to Paradise Valley Road and Llagas Creek	9.3	Grading, paving and bridges	392,000
Santa Clara-San Benito	2	1 mile south Pajaro River to Sargent Crossing	1.9	Bridge, grading and paving	242,000
Santa Clara	68	Route 5 to San Antonio Street and Coyote Creek (portions)	2.5	Grading, paving and bridge	275,000
Alameda	5	Foothill Blvd.-San Leandro to Castro Valley	3.2	Grading and paving	300,000
Alameda-San Francisco	5-68	San Francisco-Oakland Bay Bridge		Operation, insurance and maintenance	600,000
Monterey	2	Salinas River at Soledad	1.0	Bridge, grading and paving	415,000
Monterey	2	Welby Grade Change	0.7	Grading and surfacing	43,000
Fresno	4	½ mile south to ¾ mile north of Selma	2.0	Grading and paving	150,000
Merced	4	8 miles south of Merced to Black Rascal Creek	10.1	Grading, paving and bridges	450,000
Solano	7	Carquinez Bridge to 1 mile north	1.0	Grading and paving	75,000
San Joaquin-Sacramento	4	Jahant Corners to Galt and Dry Creek	5.0	Bridge, grading and paving	385,000
Stanislaus	4	Ceres to Hatch Crossing and Modesto to 4 miles north	5.4	Grading and paving	250,000
Calaveras	24	Valley Springs to San Andreas and Calaveras River (portions)	6.0	Grading, surfacing and bridge	260,000
Merced	4	At Livingston	1.7	Grading and paving	100,000
Total Primary North					$9,225,000

PRIMARY SOUTH

County	Route	Location	Approximate mileage	Nature of Improvement	Proposed expenditures 89th and 90th fiscal years detail
Santa Barbara	2	Nojoqui Canyon and Nojoqui Creek	3.0	Grading, paving and bridges	$374,000
Santa Barbara	2	Rincon to 1 mile north	1.1	Grading and paving	48,000
Santa Barbara	2	Refugio Creek to Tajiguas Creek	2.0	Grading, paving and bridge	200,000
Kern	4	Grapevine to 10 miles south of Bakersfield	18.5	Grading and paving	720,000
Tulare	10	Venida to Yokohl	2.8	Grading and pavement widening	100,000
Tulare	4	Kings River		Bridge and approaches	205,000
Los Angeles	23	Newhall Tunnel	0.4	Grading and paving	215,000
Los Angeles-Ventura	2	Calabasas to Conejo Grade (portions)		Grading and surfacing	200,000
Orange	2	Capistrano to Galivan Overhead		Drainage correction	25,000
Ventura	60	Big Sycamore Canyon	0.7	Grading, paving and bridge	120,000
Los Angeles	9	Foothill Blvd.; Lorraine Ave. to Claremont	8.0	Widening roadbed, culverts	50,000
Los Angeles	60	Encinal Canyon to Winter Canyon	11.0	Grading, paving and bridges	800,000
Ventura	60	Point Magu to Little Sycamore Creek		Shore protection and widening roadbed	150,000
Los Angeles	23	Newhall Tunnel to Mint Canyon Cut-off	1.0	Grading and paving	65,000
Los Angeles	23	1 mile north Newhall Tunnel to Solamint	5.6	Grading, paving, bridge and grade separation	550,000
Ventura	2	North of Sea Cliff		Storm protection, drainage	25,000
Los Angeles	60	Lincoln Blvd.; Olympic Blvd. to Washington Blvd.	3.0	Grading and paving	250,000

CONSTRUCTION OF HIGHWAYS IN 89th-90th FISCAL YEARS

PRIMARY SOUTH—Continued

County	Route	Location	Approximate mileage	Nature of Improvement	Proposed expenditures 89th and 90th fiscal years detail
Los Angeles	23	Tunnel Station to Newhall Tunnel	0.9	Grading and paving	$70,000
Los Angeles	2	Whittier Blvd.; Philadelphia St. to Painter Ave.	1.5	Grading and paving	45,000
San Bernardino-Riverside	26	Beaumont to Redlands (portions)		Grading, surfacing and paving	75,000
San Bernardino	26	Reservoir Canyon Road; Highland Ave. to East City Limits	1.7	Grading and paving	80,000
San Bernardino	9	West County Boundary to San Bernardino	21.9	Grading and pavement widening	483,000
San Bernardino	26	West County Boundary to Ontario	2.2	Grading and pavement widening	50,000
San Bernardino	26	Ontario to Colton	17.1	Grading and pavement widening	380,000
Riverside	26	Lime revision near Whitewater		Grading and paving	50,000
Kern	23	Through town of Mojave	0.8	Grading and surfacing	36,000
Inyo	23	Through town of Lone Pine	0.6	Grading and surfacing	32,000
Inyo	23	Through town of Independence	0.6	Grading and surfacing	32,000
Kern	58	Mojave to East County Boundary	6.5	Grading and surfacing	58,000
Inyo	23	2 miles south to 2 miles north of Alabama Gate; Los Angeles City Aqueduct	4.0	Grading and surfacing	86,000
Kern	23	South County Boundary to 8.2 miles north	8.2	Surfacing	54,000
San Diego	2	2 miles south San Onofre to north County Boundary	3.3	Grading, paving and bridges	165,000
San Diego	13	West City Limits, La Mesa to El Cajon	3.7	Grading and paving	250,000
Riverside	26	Oasis St. to South City Limits in Indio	0.8	Grading and pavement widening	55,000
Riverside	26	Indio south to Route 64	1.5	Grading and pavement widening	66,000
Riverside	26	South County Boundary to Avenue 62		Storm protection	130,000
Riverside	84	Ehrenberg Bridge		Principal and interest on purchase	5,900
San Diego	2	Barnett Avenue to Head of Rose Canyon	9.7	Grading and pavement widening (cooperative)	100,000
Total, Primary South					$6,389,900
Total, Primary, North and South					$15,614,900

SECONDARY NORTH

County	Route	Location	Approximate mileage	Nature of Improvement	Proposed expenditures 89th and 90th fiscal years detail
Mendocino	56	Various Bridges		Bridge replacement and approaches	$235,000
Lake	15	Old Quarry to Scott Valley	3.0	Grading and surfacing	100,000
Humboldt	46	Weitchpec to Orleans	15.0	Grading and surfacing	80,000
Humboldt-Trinity	20	Horse Mountains Summit to Bib Bar (portions)		Grading and oiling	150,000
Humboldt	36	Bridgeville to Carlotta (portions)		Grading and surfacing	35,000
Mendocino	48	Christine to Flynn Creek (portions)		Grading and surfacing	100,000
Siskiyou	72	Cougar to Macdoel	17	Grading and surfacing	300,000
Trinity	20	Junction City to Weaverville	8	Grading and oiling	270,000
Trinity	20	Oregon Mountain	1	Grading	75,000
Siskiyou	46	Scott River Bridge Approaches	1	Grading and oiling	30,000
Modoc	73	Pitt River in Alturas		Bridge	25,000
Siskiyou	82	Scott River		Bridge and approaches	25,000
Trinity	35	Big Creek and Hayfork Creek		Bridge and approaches	40,000
Sutter	15	Sutter City to Tarke; Sutter By-Pass	5.0	Bridge, grading and surfacing	400,000
Yuba	15	Dry Creek	0.6	Bridge and approaches	50,000
Yolo	50	Cache Creek near Rumsey	0.5	Bridge and approaches	75,000
Contra Costa	106	1 mile west of Muir to Willow Pass	10.3	Grading, surfacing and grade separation	470,000
Santa Clara	42	Saratoga Gap to Los Gatos (portions)	1.5	Grading and surfacing	125,000
Santa Clara	32	1 mile east Bell Station to east county boundary	4.5	Grading, surfacing and bridges	575,000
Sonoma	104	Stony Point Road to Sebastopol and Guerneville to Northwood Park	4.0	Grading and surfacing	250,000
Santa Cruz	56	Davenport to north boundary	8.0	Grading, surfacing and bridge	180,000
Santa Cruz	116	Near Waterman Gap	1.0	Grading and surfacing	40,000
Marin	56	Stample Creek		Bridge	20,000
Monterey	56	Big Creek and Mud Creek		Bridges	195,000
Monterey	10	Peachtree Valley to Ridge	5.0	Grading and surfacing	206,000
San Benito	119	Tres Pinos to Paicines	4.8	Grading and surfacing	140,000
Madera	125	½ mile north Kelshaw to Coarse Gold	8.0	Surfacing	25,000
Madera	125	7.7 miles No. Lanes Bridge to ½ mile No. Kelshaw	11.3	Grading and surfacing	400,000
Fresno	41	Boulder Creek easterly	7.5	Grading	350,000
Fresno	41	Dunlap to Forest boundary	3.5	Grading and oiling	150,000
Kings	10	Hanford to 4 miles west	4.0	Grading and surfacing	100,000
Tuolumne	13	Stoddard Springs to McCoy Saddle	6.3	Surfacing	55,000
Merced	32	Los Banos to easterly boundary	19.9	Grading, surfacing and bridges	320,000
Total, Secondary North					$5,591,000

DETAIL OF MAJOR PROJECT ALLOCATION FOR CONSTRUCTION OF HIGHWAYS

SECONDARY SOUTH

County	Route	Location	Approximate mileage	Nature of Improvement	Proposed expenditures 89th and 90th fiscal years detail
San Luis Obispo	125	Atascadero Summit to 2 miles west of Atascadero Atascadero Creek	3.3	Grading, surfacing and bridge	$128,000
Santa Barbara	80	Los Olivos to Zaca	2.9	Grading and surfacing	92,000
Santa Barbara	149	Santa Ynez River		Bridge and approaches	81,000
Santa Barbara	148	Guadalupe to Santa Maria	7.0	Grading and paving	210,000
Kern	58	Bear Mt. Ranch to Tehachapi (portions)		Grading	350,000
Kern	58	East of Monolith Plant		Bridge and approaches	20,000
Kern	33	West County Boundary, easterly (portions)		Surfacing	50,000
Tulare	129	Porterville northerly	1.0	Grading and paving	40,000
Los Angeles	158	Sepulveda Blvd.; Centinella Ave. to Jefferson	0.6	Grading and paving	50,000
Los Angeles-Ventura	79	Castaic to Santa Paula (portions)		Grading, surfacing and bridges	400,000
Orange	178	Center Street; jog at Placentia Ave	0.5	Grading and paving	40,000
Orange	43	Tustin Ave.; jog at 17th	0.5	Grading and paving	25,000
Los Angeles	168	Rosemead Blvd.; Center St. to Foothill Blvd. (portions)		Grading and paving	175,000
Ventura	138	Line changes on Ventura Ave.; San Antonio Creek Bridge approaches and Ferguson Grade		Grading and surfacing	120,000
Los Angeles	175	Artesia Ave.; Alameda St. to Normandie Ave.	5.0	Grading and paving	265,000
Los Angeles	205	Arroyo Seco Parkway; Avenue 22, Los Angeles to Colorado St., Pasadena	7.2	Grading, paving and structures	500,000
Orange	184	Main Street extension, route 60 to route 43, Newport Bay	6.4	Grading, surfacing and bridge	175,000
Orange	181	Glassell St.; Olive to Orange	1.0	Grading and surfacing	50,000
Los Angeles	26	Barranca St. to Pomona	6.1	Widening roadbed, drainage	70,000
Orange	43	Line change east of Olive	0.8	Grading and paving	75,000
Los Angeles	166	Figueroa St.; 190th St. to Lomita Blvd.	5.0	Grading and surfacing	160,000
Orange	171	Huntington Beach Blvd.; Coast Blvd. to Garfield Avenue	2.6	Grading and surfacing	70,000
Orange	43	Santiago Creek on Tustin Ave.		Bridge	40,000
Los Angeles	163	Route 60 southerly, Santa Monica and Los Angeles (cooperative)		Grading and paving	100,000
Los Angeles	61	Verdugo Road; Glendale to Foothill Blvd.	0.8	Grading and paving	90,000
Los Angeles	173	Olympic Blvd. in city of Los Angeles (cooperative)		Grading and paving	400,000
Los Angeles	61	Angeles Crest Road; Chilao Flats easterly		Grading	350,000
Orange	179	Garden Grove Blvd.; through Garden Grove Millwood Ave. to 6th St.		Shoulders	20,000
Orange	171	Stanton and Grand Avenues; Garden Grove Ave. to north county boundary (portions)		Grading and paving	60,000
Los Angeles	77	Valley Blvd.; El Monte to Route 26	0.7	Pavement widening and shoulders	32,000
Los Angeles	62	Coldbrook Camp to Crystal Lake Park (portions)	7.0	Grading and widening	40,000
Orange	64	San Juan Capistrano to 1.6 miles east	1.6	Surfacing and widening	45,000
Los Angeles	26	Harrison Ave.; Soto St. to Indiana St.	0.6	Grading and paving	32,000
Los Angeles	26	Atlantic Ave. to New Avenue (portions)		Paving and resurfacing	65,000
San Bernardino	191	Cable Canyon Drain		Bridge and approaches	20,000
Riverside	43	West county boundary to Corona	4.7	Grading and paving	360,000
San Bernardino	43	South county boundary to Colton	2.6	Grading and paving	135,000
Riverside	187	Snow Creek to Route 26	3.9	Grading and surfacing	125,000
Riverside	187	South of Palm Springs (portions)		Grading and surfacing	30,000
San Bernardino	190	Mill Creek to Igo	3.0	Grading and surfacing	50,000
San Bernardino	188	Mt. Anderson to Crestline	1.3	Grading and surfacing	35,000
Mono	111	Route 23 (Cain ranch) to Grant Lake Dam	3.0	Grading and surfacing	43,000
Inyo	76	Route 23 (Texaco corner) to Owens River	3.0	Grading and surfacing	35,000
Kern	145	Near Rademacher	2.2	Grading and surfacing	16,000
Mono	40	Easterly Park boundary to Gardisky's	2.2	Grading and surfacing	54,000
Inyo	127	Soda Plant to 8 miles easterly	8.0	Grading and surfacing	35,000
Kern	145	Railroad crossing to 3 miles south Inyokern	0.5	Grading and surfacing	6,500
Kern	145	Randsburg Junction to 5.7 miles north	5.7	Grading and drainage	17,500
Mono	96	2.4 miles north of Bridgeport to State Line	10.0	Grading and oiling	20,000
Inyo	127	Towne's Pass to 3 miles west	3.0	Grading and surfacing	41,000
Inyo	127	East boundary Nat'l. Monument to 10 miles east	10.0	Grading and surfacing	68,000
San Diego	195	Rincon to Lake Henshaw (portions)		Grading	350,000
Imperial	202	3 miles East Calexico to East Highline	9.4	Grading, surfacing and bridge	197,000
Riverside	64	Junction Routes 187 and 64 easterly		Storm protection	35,000
Imperial	187	Holtville to Brawley (portions)		Grading and surfacing	120,000
Imperial	187	Brawley to Mulberry Ave.	4.6	Grading, surfacing and bridges	80,000
Riverside	187	Whitewater River and approaches	1.0	Grading, surfacing and bridges	78,000
Total, Secondary South					$5,371,000
Total Secondary, North and South					$11,962,000
Grand Total, Primary and Secondary					$27,576,900

California's Uniform Highway Sign System Described

By F. M. CARTER
Assistant Maintenance Engineer

IN ESTABLISHING a system of highway signs adequate to the great task of safeguarding and expediting traffic, certain principles must be observed that have resulted from careful studies and experiments over a period of years. It is necessary in the placing of signs that they be located at points where control, warning or guidance of traffic is imperative for public safety and convenience. The necessity for installing them at these points should be determined by all obtainable facts on traffic and accident hazard conditions and backed up by field studies.

The value of a sign depends upon its visibility and the correct and consistent use of the same sign, identically situated, to give the same meaning wherever it is seen. Uniformity of signs will enable the traveler to obtain the same message, in the same manner, in every locality in our state as well as in other states. This is the aim of our road signing.

The position of the signs is for normal conditions. The proper distance in advance at any place or condition to which its message applies depends on the usual speed of approach, the character of alignment and the nature of the topography.

EVERY SIGN ESSENTIAL

Every sign displayed is for a definite and specific purpose, and unless necessary would not be on the highway.

Special attention is given to placing only those signs considered absolutely essential at intersections.

A too free use of warning signs would soon breed disregard of all such signs and the very purpose intended to be accomplished by their use would be defeated. Therefore this is one of the factors considered in the study of each individual location made before signs are placed.

A highway, where curves are frequent does not need so many curve signs as a highway having fewer curves. On highways having long tangents (long, straight stretches) curve signs are placed at every curve approached.

Signs must tell the motorist the truth, or they will soon be disregarded.

There are three major functional groups of highway signs, namely, Regulatory, Warning and Guide. This grouping or classification follows the standard adopted by the United States Bureau of Public Roads, and published in its Manual on Uniform Signing and Traffic Control.

IN DISTINCTIVE GROUPS

In order that the signs in each group may be readily distinguished, a special color and shape is used to designate each group. This provides uniformity of significance in the signs themselves and enables motorists to rapidly acquire familiarity with them.

Since the effectiveness of signs must depend upon established legal authority, traffic signs are placed only under authorization of the Director of the State Department of Public Works, pursuant to the provisions of the Vehicle Code and established rules of the road, for the purpose of regulating, warning and guiding traffic on State highways.

The signs tell the motorist exactly what he needs to know, with regard to hazards ahead, as well as routes and distances, and are of uniform aspect, location and meaning all over the country.

PLACING SCHOOL SIGNS

One of the greatest problems of the Division of Highways is to care for and safeguard school children. Signs placed for them should always be at locations where protection is needed. Signs giving information or warning at crossings, using the word "school," should be used only for school hours and should be positioned only for the hours when school children are crossing the highway and should be removed when such crossing is not used for school children.

School zone signs should be used only when the school or the grounds of the school are contiguous to the highway.

The first definite step towards standardization of traffic control devices was taken by the American Association of State Highway Officials in the preparation of its Manual on Uniform Traffic Devices for Streets and Highways originally published in January, 1927. That manual was prepared primarily for use on rural highways and covered signs only, including STOP signs and a few other regulatory signs, warning signs and guide signs. It established definite shapes and color combinations for different purposes and included standards for marking the newly adopted system of major United States highways.

CERTAIN SYMBOLS ADOPTED

In response to a popular demand for a similar manual for urban use, the American Engineering Council, at the request of the National Conference on Street and Highway Safety, undertook the compilation of such a manual which, after extensive study, was approved by the Third National Conference on Street and Highway Safety in 1930. It dealt with traffic signals, marking for pavements, curbs and objects and safety zones in addition to signs.

This work was performed by the Joint Committee on Uniform Traffic Control Devices with the primary purpose of bringing all standards for traffic control devices under one cover and to keep pace with the rapid developments in the art of traffic control. The committee reports:

"The new manual is in strict harmony with the Uniform Vehicle Code and Model Municipal Traffic Ordinance, including the changes adopted by the Fourth National Conference on Street and Highway Safety held in May, 1934. It also takes into account the recommendation of the Sixth International Road Congress,

(Continued on page 20)

California's Uniform Road Sign System Pro

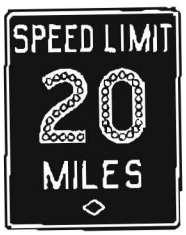
Regulatory Group

Color: Red with White letters Reflectorized

This sign is placed at entrances to "through highways" and "through streets" to stop all traffic entering the highway. This sign is so important and failure to observe its message is so hazardous, that a special shaped *red* sign, unlike any other sign, is defined for this one purpose. The shape and color of this sign is provided by the Vehicle Code. All State Highways are "through highways" and city ordinances designate through city streets.

Color: White with Black letters Not Reflectorized

Placed to mark the end of a residence district, defined as 13 dwellings or business houses in ¼ mile on one side or 16 on both sides of highway.



Color: Black with White letters Reflectorized

Placed to mark the beginning of a "Business District." Section 511 of the Vehicle Code provides a speed limit of 20 miles an hour in any business district, defined as 50% of business houses in 600 feet all on one side or 50% in 300 feet on both sides.

Color: White with Black letters Not Reflectorized

Placed on our highways at suitable locations, to notify traffic of legal speed limit.

Color: White with Black letters Not Reflectorized

Placed to mark the end of a business district. This is a courtesy sign to inform the motorist he is leaving the speed limit zone.

Color: Black with White letters Reflectorized

Placed in advance of locations where this message is necessary because of some restriction in the road, such as divisional parking strip, or traffic circle where traffic is divided, or on center piers of overhead structures which divide traffic.

Color: Black with White letters Reflectorized

Placed to mark the beginning of a "Residence District." Section 511 of the Vehicle Code provides a speed limit of 25 miles per hour in any residence district.

Color: Yellow with Black letters

This is a city sign usually placed at a school or other important pedestrian crossings. Section 560 of the Vehicle Code makes it mandatory for all vehicles to yield the right of way to any pedestrian at a marked cross walk. Placed by cities under permit and removed immediately when not needed. In the case of a school, sign should be in place only for hours of crossing.

ides Drivers An Infallible Guide to Safety

Regulatory Group

Color: Black with White letters Reflectorized

Placed at frequent intervals along a three-lane highway to caution traffic not to drive in the center lane except when overtaking and passing a slower moving vehicle.

Color: Black sign with White letters Reflectorized

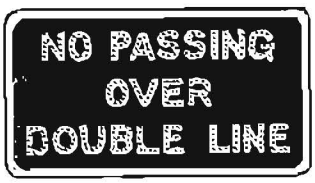
Placed only where this restriction is absolutely necessary to safeguard traffic and prevent accidents. Failure to obey this restriction is extremely hazardous.

Color: Black with White letters Reflectorized

Placed to caution traffic to remain on the proper side of the road. Used on two-lane pavements for long straight stretches of highway, and frequently on four-lane pavements to restrain traffic from crossing the white center stripe.

Color: White with Black letters Reflectorized

Placed at each end of a bridge or approach to inform traffic not to overtake slower vehicles. This sign is used when the view of traffic on a bridge is obstructed to approaching vehicle.

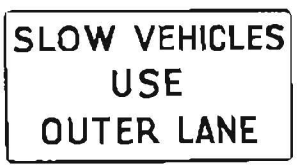


Color: Black with White letters Reflectorized

Placed approximately 500 feet in advance of crests of blind vertical curves. Section 530 of the Vehicle Code prohibits the passing or overtaking of vehicles when approaching the crest of a grade or upon a curve in the highway. Special double white stripes are painted in the center of the pavement at locations where this sign is installed.

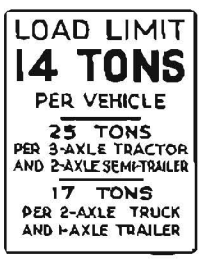
Color: White with Black letters

Used in conjunction with bridge Load Limit signs, and placed on same post with them, where a speed restriction has been placed upon a bridge.



Color: White with Black letters Not Reflectorized

Used only on four-lane pavements to permit fast moving traffic to proceed without unnecessary delay. Section 526 of the Vehicle Code provides that signs may be erected directing slow moving traffic to use a designated lane.



Color: White with Black letters

Placed not closer than 100 feet nor more than 150 feet from each end of a bridge. Used the same as the SPEED LIMIT 15 MILES ON BRIDGE sign. This is a newer type sign, permitting heavier gross loads for certain types of vehicle combinations.

Mt. Palomar Observatory "Highway to the Stars" Opens Next Spring

By E. E. SORENSON, District Construction Engineer

EXTENDING from Rincon on the border of the historic Indian reservation of that name in San Diego County to the site of the $6,000,000 observatory being constructed on top of Mt. Palomar, the first link of the "Highway to the Stars," which bids fair to become one of America's greatest tourist attractions, will be completed by next April.

The State Division of Highways anticipates that this new scenic mountain route will be one of the busiest roads in southern California this summer.

Starting at Rincon it follows State Highway No. 195 for 5.3 miles to the Cu Cu Mesa. The upper portion of 2.8 miles known as the Cu Cu Grade, is now being constructed by the R. E. Hazard Company of San Diego under contract with the Division of Highways. At Cu Cu Mesa the road leaves the State Highway and this second link, 6.8 miles in length, climbs the south slope of Mt. Palomar in wide, easy turns to Crestline. This section will be completed about next May by two county crews working toward each other from camps located at both the top and the bottom of the mountain.

THIRD LINK OPEN

The third link of 1.6 miles extending from Crestline to Iron Springs, has been opened for travel by the county, and there remains only the final finishing to complete it.

The fourth link from Iron Springs to the observatory site at an elevation of 5568 feet, is now nearing completion under the direction of the State Division of Highways, which has contracted the work to Basich Brothers of Torrance, California. This section will be completed in the spring.

Thus the beautiful and scenic "Highway to the Stars" will be open to public traffic over its entire length next summer.

This, however, does not constitute the chief reason for the speed in constructing this difficult road; but rather the necessity for a suitable road over which to transport the massive and heavy equipment to be used in the observatory construction has urged the builders on. Now, thanks to the interest and cooperation of the Federal, State and county governments, "The Highway to the Stars" has passed from a dream to a reality.

Amazing progress has also been made in the construction of the astronomical observatory, which is the largest in the world. Even officers of the California Institute of Technology observatory council express their pleasure at the rapidity of the work which is transforming a mountain platean into a scene of bustling activity.

ALL STEEL WORK ERECTED

Following are interesting sidelights on the scientific institution which is directing world-wide attention to San Diego County:

Virtually all of the structural steel comprising the base structure for the 200-inch telescope has been erected, the last rivet having been placed during November.

The power house and machine shop is completed. An example of the extreme care being taken to protect the 200-inch mirror is the fact that the two 75-kilowatt generators in the power house, situated more than 300 yards distant from the observatory, are so mounted that they are vibrationless.

STRUCTURES COMPLETED

Completed structures include the 18-inch observatory, five cottages to be occupied by astronomers and scientists, the 1,000,000-gallon water reservoir and 50,000-gallon water tank, both filled to capacity, a 25,000-gallon oil storage tank, a 4000-gallon liquid gas tank, and a dormitory for the permanent Caltech staff of workers numbering 20. Electrically operated pumps will enable the observatory to draw 17,000 gallons of water daily from the springs on the 720-acre site.

The 200-inch observatory is a three-story structure, rising 128 feet with a dome 135 feet in diameter. The top floor will be known as the observing floor, the second will be a mezzanine, while the lower floor will be divided into photographic dark rooms and laboratories, well equipped library, reading room and a compact kitchen.

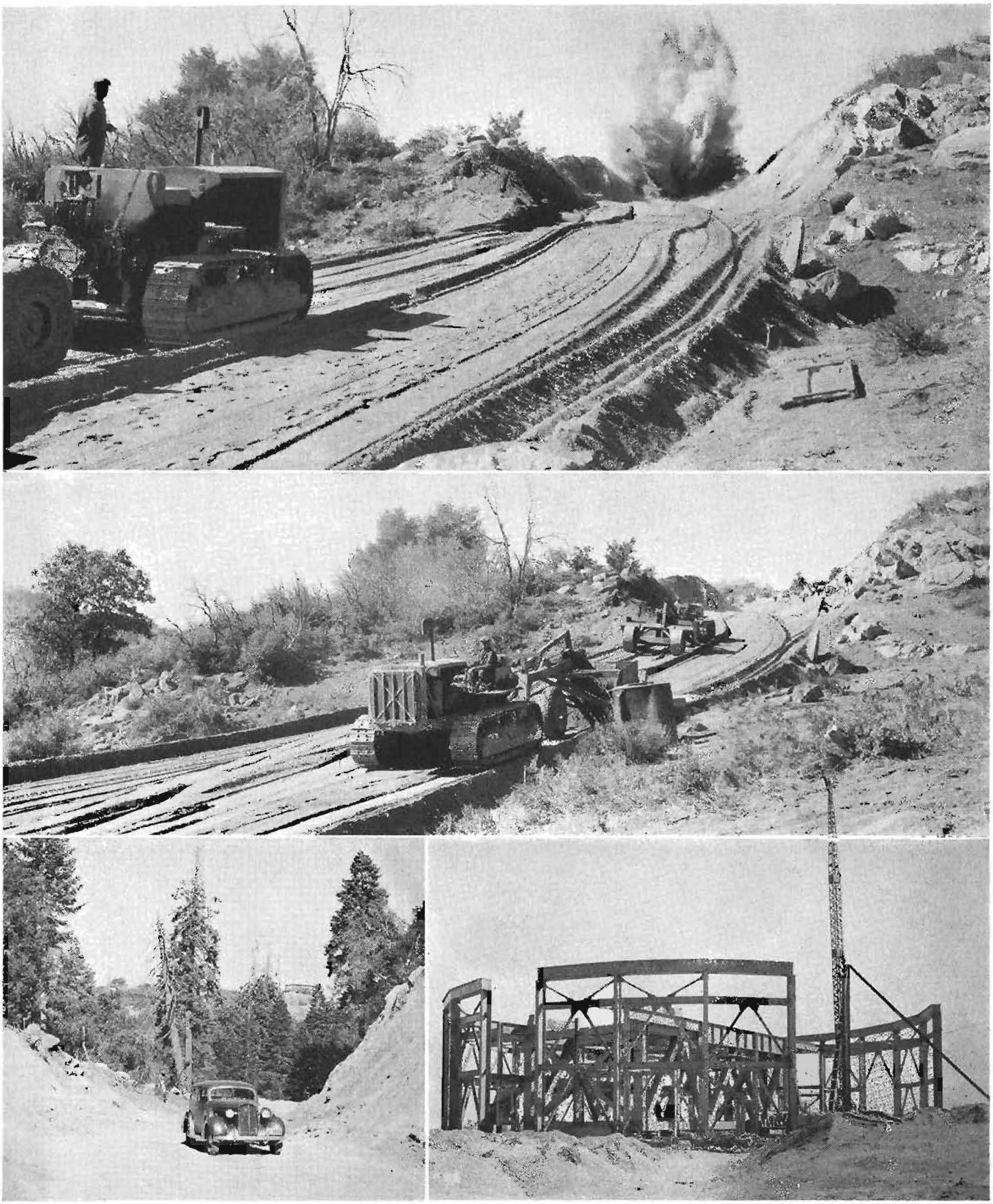
Two arduous tasks yet await Caltech observatory officials. The first of these will be the transportation, starting in April, of the huge sections of the dome and machinery for the 200-inch observatory. Sections of the dome and rotating machinery weigh 60 tons.

TWENTY TONS OF MIRROR

The second and most exacting task will occur in July, 1939, when the costly mirror, approximating 20 tons has to be moved up the mountain and fitted into position at the bottom of the 65-foot cage in the observatory dome. A special truck will have to be built to transport the massive mirror to the summit of Mt. Palomar and carry the weight safely.

In coming years, countless thousands of San Diegans and visitors probably will ask, as did former President Hoover on his recent visit to Palomar, why High Point, 200 feet higher, was not selected as the site for the 200-inch observatory in preference to the site near the center of the plateau.

Three years of investigation by Caltech scientists disclosed that the air in the center of the plateau is much more stable than at High Point. There is no rapidly fluctuating air currents to stir up the dust, and the atmospheric conditions are in general much better.



Upper—Powder blast breaks down the last obstruction on Palomar Mountain road. Center—Graders opening the last cut on State-constructed portion of highway to Palomar summit. Lower left—Looking toward the observatory site from head of French Valley with steel structure for telescope in center background. Lower right—Steel structure being erected which will support huge telescope of world's greatest observatory.

Accomplishments of Highway Engineering Research Reviewed

By H. S. MATTIMORE, Pennsylvania Department of Highways

(Excerpts from Address at Convention of American Association of State Highway Officials)

A REVIEW of the accomplishments toward betterment in the highway field, attributable to research, can be pointed to with pride by all highway engineers. Although the number actually engaged in what is normally classed as research is a small percentage, the executives, the construction, maintenance and planning engineers, and in fact engineers in all phases of highway work have been a factor in this accomplishment. Needs are discovered in the field and office and presented as research problems. For successful accomplishments this work must be encouraged by executives, and what is the greatest encouragement and incentive to the research worker is that his fellow engineers are ready and anxious to put research findings into practice.

Accomplishments have been made in practically all branches of highway work, and the problem in a brief discussion is to select those findings that are expected to have the greatest effect in improvement in methods and results in the field of planning, construction and operation.

Traffic and transport surveys which are carried on mainly through cooperation of the Bureau of Public Roads and individual states, together with other agencies have placed or will place the highway designer in a position where he has fairly accurate data of the kind and volume of traffic for which he is to plan. This is especially applicable to the redesign of inadequate highways either by partial relocation or widening to take care of an increase in traffic volume. At the same time if accurate data has been secured on traffic accidents consideration will be given to relocating and redesign for safety.

Probably one of the main accomplishments in the construction field has been the advance made on the studies of soils pertaining to their use

H. S. MATTIMORE

as subgrades and road surfaces. The difference in soils used for low cost road surfaces and subgrades under high type pavements has been realized for many years by all highway engineers but detailed methods for testing and classifying soils to determine their quality for road surfacing or subgrades were not available until the last few years.

Intensive work on this problem by research agencies, chiefly among which was the Bureau of Public Roads, has lead to a classification of soils from the standpoint of bearing power and subgrades uses. Having such data available the highway engineer is in a position to ascertain the difference between soils and methods for correcting poor soils so as to better their stability under all weather conditions.

The application of the findings of soil research can be fully conceived from the standpoint that the soil is a foundation and the basis for all road construction. The investigators in this line state that they feel they have just scratched the surface in the soil investigation, but enough has been accomplished to date to indicate the possibility of some corrections in the so-called frost heaves, improvement in drainage, and great possibilities of bettering the subgrades from the bearing power standpoint so as to reduce the depth of some pavement surfaces.

RESEARCH PROVES VALUABLE

These findings from soil research are being applied throughout the United States in construction of stabilized road surfaces either by changing the characteristics of soils or adding materials of a waterproof character from the standpoint of constructing an all year round traffic surface for road of the farm and market type.

One problem on which it is hoped some information will be available in the near future is that of definitely classifying stabilized road surfaces which can be successfully treated with bituminous materials. Engineers who have had experience in the maintenance of earth and gravel roads know that occasionally there are some roads of these types on which bituminous treatments prove detrimental to the stability of the road under wet and freezing conditions. The probable factor involved is that soils containing a large amount of fine material and that of a colloidal nature develop high capillarity. When such soils are waterproofed with bituminous materials the opportunity for evaporation is lost and the accumulation of water leads to failure.

Another line in which soil studies are being applied is toward the correction of slides and lack of stability in earth fills.

A study of soils has lead to further studies on the correction of frost heaves

eventually resulting in the so-called frost boils. The theory in this work is to apply salts to the subgrade to lower the freezing point of the water contained in such soils, thereby eliminating the forming of ice layers the basic cause of such heaves. Some of these reports are available on work which has been carried on in the State of Michigan, and other reports are expected from states now experimenting with this possible corrective measure to reduce or eliminate such heaves.

Vibration for the placing of concrete has been used both in the form of internal and surface vibrators. The internal vibrator is largely used for structures and has proved very efficient as a method to properly place dry concrete in heavily reinforced structures, concrete of greater density is produced and the general evils of overwet concrete are avoided. The internal vibrator is also useful in the placing of concrete around transverse joints of the load transfer character. Vibrator speeds are of some importance and reports are available on the efficiency of vibrators running at different speeds.[1]

Surface vibrators for pavements have been in use for the past several years. Various claims have been made for the concrete so placed and reports are available indicating that such vibration produces an increase in density and possible increase in strength. Naturally the value of all vibrators, whether the internal or surface class, will be a method for laying a drier concrete leading toward the general betterment in durability.

BITUMINOUS BINDERS

A difference in efficiency of the bituminous binders on various types of flexible surfaces has been noted for a number of years but very little has been determined relative to the cause. Studies for the past several years on this problem have indicated that the production of a successful bituminous bound road depended on factors other than securing the proper grade of bituminous material and the proper proportioning of the mix. The work of Riedel and Weber,[2] is quite enlightening on the subject. These investigators in their painstaking manner have carried on extensive research on the adhesiveness of bituminous binders on aggregates, and as a result of their work Dahlberg, another research worker, states: "Experiments carried on by these two men show that the materials in the stone exert more influence on the adhesiveness than did the binder." In accordance with their results stones of acid nature, such as quartzite, granite, synites, etc., furnish poor adhesion with asphalts and tars, while stones of the basic or alkali nature produce good adhesion. This is generally true but exceptions have been noted by the authors, in that some limestones furnish good adhesion while others do not.

The several tests used to determine adhesiveness of binder to different stone are of value in determining the efficiency of the bond within a limited time after mixing and to some extent to determine the relative life of the pavement.

TESTS ARE SUCCESSFUL

These proposed tests are:

1. The water test which consists of shaking a mixture of bitumen and aggregate for one hour with water at varying temperature.
2. The solubility test which is conducted in such a way that the mixture is treated with varying quantities of a solvent and subsequently is subjected for one hour to water at ordinary temperature.
3. The sodium carbonate test in which the mixture is subject to action of sodium carbonate solutions of different concentrations.

The authors state that they have found the results of these tests to check very closely with results in practice. * * * *

SAFETY PARAMOUNT ISSUE

Probably no highway subject has been more discussed than safety. It is a paramount issue to all automobile users and it is affected by practically everything relating to a road—from the general alignment, type of surface, grades, curves, driving conditions, etc * * * *

The protections of the driver from running off the road is a vital problem especially in countries of rough topography. The guard rails used for this purpose are now subject to some studies on design, but some years ago the idea of a guard rail was to furnish some barrier which was either too light to serve other than warning, or of such a substantial nature that contact with it under many conditions would result in serious injuries or fatalities. Research studies on this problem have indicated that such rails can be designed to take care of average accidents. These research studies have been in the nature of actual trials where vehicles have collided with rails of different types which is followed by the theoretical analysis of general design.

WINTER BRINGS HAZARDS

The use of automobiles during all weather conditions has led to studies of methods to protect the driver against hazards involved in winter driving. Probably one of these worst hazards is ice conditions, when the brake is practically useless, in that the coefficient of friction between the rubber tire and icy road surface is practically zero. Covers of various types have been used for this purpose and maintenance committees of different highway associations have reported on the efficiency of such methods.

It has been found generally that gritty material such as sharp sand, cinders, and stone chips, have corrected this condition by increasing the coefficient of friction. Further studies have shown that the use of a salt in this covering material has a tendency to melt the ice to the extent where the covering material becomes embedded, developing more or less of a rough texture upon refreezing and increasing the braking efficiency, thereby reducing this hazard to a considerable extent. The use of such salts have proved an economic procedure in that investigation in one state has shown that it increases the life of the covering material about three times where the salt has been used, from the standpoint that it is more readily retained on the road or not brushed or swept off with traffic.

The use of salt has been largely confined to calcium chloride until the past several years when sodium chloride has been used in the same manner as calcium chloride and data are being obtained relative to its efficiency and ultimate effect on the road surfaces.

The use of either calcium or sodium chloride straight on the road surface is not good practice. If it is considered necessary to remove the ice by melting, salt solution remaining on the highway should be swept off a concrete road surface as soon as possible as it has been found to be quite detrimental to such surfaces.

(Continued on page 28)

[1] M. O. Withey Proceedings of Highway Research Board, 1935.
[2] Asphalt and Teer 33,677 (1933), 34,209 (1934).

California's Uniform Highway Sign System Described

(Continued from page 15)

held in Washington in 1930, that consideration be given to the more extensive use of symbols.

"The committee, while believing that on a great majority of signs symbols can not safely replace word messages, sees very definite advantages in certain simple symbols, such as those for curves, and has eliminated the former word message from CURVE signs."

The committee urges universal adoption of the sign shapes as basic symbols.

The committee calls attention to the fact that traffic control devices are increasingly necessary for regulating, warning and guiding traffic and points out that adequate but not excessive use of signs to warn of hazards, signs to indicate the applicability of traffic regulations, route markers and destination signs all have great value in facilitating the orderly flow of traffic, as do well-considered pavement and curb markings and islands properly designated and located.

INCREASING NEED FOR CONTROL

In many communities, it is stated, the responsible authorities have not met the problem with scientific analysis but rather by haphazard experimentation, and as a result two fundamental errors have been prevalent. These are (1) placing traffic control devices without adequate study of the possible evil effect produced either there or at other points, and (2) in the case of traffic signals, operation at times not justified by the conditions.

Care is exercised by the Division of Highways to see to it that not too many regulatory or warning signs are installed. Traffic will move with less delay and more safety at many average intersections, curves, hills or other potential accident or congestion points if there is no artificial control. On the other hand, a frequent display of judiciously placed route signs will not lessen their value.

Regulatory signs are placed to notify traffic of provisions in the law which, if disregarded, constitute a misdemeanor. This group contains STOP signs, speed limit signs and signs regulating movement or parking.

The STOP sign has a distinctive red color and octagon shape. All other signs in this group are either square or rectangular in shape and have white backgrounds with black letters, or if reflectorized, black with white letters. Parking signs are generally white with red letters.

Reduced replicas of the more important signs in this regulatory group are shown in the accompanying illustrations. The shape, relative size and color of each sign is reproduced just as it appears to the motorist on the highway.

Warning and guide signs will be considered in forthcoming articles.

New Conejo Grade Route Approaching Completion

WITH construction work nearing completion, the realigned Conejo Grade on the "Ventura Boulevard" route between Los Angeles and Ventura on the Coast Highway is scheduled to be opened to traffic early in March.

This $550,000 highway improvement project will eliminate forty-nine sharp turns on the existing road which for years have been a menace to automobile traffic and the direct cause of numerous serious accidents. Four accidents on the present grade during 1932 and 1933 resulted in the deaths of seven persons and injuries to four others.

FIVE MILE PROJECT

The realignment of the route extends from near Newberry Park southwest of Conejo Summit to Conejo Creek, a distance of approximately five miles. There will be only twelve curves on the relocated highway, all wide and long.

Located in 1912 as one of the first undertakings of the original State Highway Department, Conejo Grade within a few years proved inadequate to accommodate the steadily increasing motor vehicle traffic and the route became more and more hazardous.

In 1929, following completion of the new Coast Highway route between Oxnard and Santa Monica the Conejo Grade was so overcrowded that the Division of Highways realigned some of the worst sections of it, but traffic increased so rapidly that by 1934 it was realized that only a radical relocation of the entire route between Newberry Park and Conejo Creek would solve the growing danger to motorists.

THREE LANES ON GRADE

Realignment presented many technical engineering difficulties. The Division of Highways was confronted with three alternative routes, the "North Route," the "Middle Route" and the "South Route."

The Middle Route, while the most direct, called for a grade somewhat in excess of the allowable 6 per cent maximum grade for the two miles down the west slope of the Conejo Range, but because it offered a shorter distance and fewer curves it was approved.

The new highway is a 20-foot concrete pavement constructed on a 46-foot roadbed except down the westerly slope of the range where there will be two 10-foot strips of concrete pavement separated by a 10-foot width of plant-mix oil surfacing. This will provide a 10-foot traffic lane between the concrete strips for vehicles to pass on the grade.

WIDE SHOULDERS PROVIDED

Throughout the length of the project shoulders will be oiled the full width of the roadbed, thus providing ample space for machines to park well off the paved section. Oil and rock surfacing instead of concrete will be used on some of the high fills until the latter have fully settled.

Conejo Creek bridge at the westerly end of the project will be widened to a width of 44 feet to conform to the width of roadbed on each side.

Completion of the Conejo Grade project will eliminate one of the worst traffic hazards on the entire State Highway System.

This aerial view taken on the south side of Conejo Summit and looking west toward Oxnard and Ventura shows existing State Highway and realigned route in left foreground, and the realignment down the grade. Photograph taken by Fairchild Aerial Surveys, Inc.

Broadside aerial view shows how new Conejo Grade eliminates curves on highway between Conejo Summit, extreme left, and Conejo Creek, extreme right. The new route pursues a straight course down through the hills by means of cuts and fills. The new route is indicated by arrows. Curves eliminated are marked by crosses. Photograph by Fairchild Aerial Surveys, Inc.

Improved Drag Finisher for P. C. Concrete Pavement

By H. D. JOHNSON, Assistant Resident Engineer

A RECENT development in the field of finishing Portland cement concrete pavement is a drag float which eliminates all other floats and the skilled labor ordinarily used behind the mechanical spreader, with the exception of the joint finisher and edgerman.

During the past ten years, the riding qualities of our pavements have been greatly improved. This can be attributed to the rivalry among field engineers of the Division of Highways and the cooperation of the District and Headquarters staffs in permitting them to deviate from established methods and to try out new construction ideas.

In 1926, the finishing crew and equipment consisted of one mechanical spreader with its operator and a longitudinal float operated by two men. This float was drawn transversely across the pavement surface with a longitudinal sawing motion, thus cutting off the high spots and filling the depressions. This was an important feature because the riding quality of the pavement was largely dependent upon the operation of this float, as the subsequent finishing consisted of drawing a pliable float transversely across the pavement surface to remove minor inequalities and improve surface appearance. This float was made of a 1" x 6" board 16' long and was equipped with swivel handles on each end. Following the pliable float came the joint finisher and edgerman who finished joints and edges as soon as the set of the concrete would permit.

ONE-MAN FLOAT USED

In 1929, the one-man rib float was introduced and took the place of the pliable float. This released one man so that two ten-foot rib floats were substituted and were used at an interval of approximately 100 feet between floats. Through the use of these rib floats, the fact was established that uneven subsidence occurred during finishing operations, and was accepted as the reason for many rough jobs completed prior to this change in finishing methods. Soon thereafter, these 10-foot rib floats were lengthened to 16 feet.

The 16-foot float was a step toward smoother pavements in that it detected long rolling irregularities not revealed by the ten-foot floats, and this also speeded up finishing operations. Improved mixing and placing equipment with its consequent increase in capacity would have made it imperative to increase the finishing forces if ten-foot floats had been used.

In order to secure the maximum subsidence before finally striking off the surface with a float, it was found necessary to hold back on the final floating until the mass of concrete had obtained its set, with the exception of the surface mortar which still preserved its workability due to previous floating operations. This is now known as retarded finish and is accepted as standard procedure on State work.

Two years later, in 1931, a new float was introduced to take the place of the longitudinal float. This float was an enlarged rib float weighing around 250 pounds and was drawn diagonally back and forth along the pavement in much the same manner as the blade on a road grader. Because of its weight, it was drawn by a truck or horse by means of a cable approximately 100 feet long, traveling on the shoulder along the outside of the header.

This float further aided retarded finishing by working back of the mechanical spreader as far as 400 feet or more, thus preserving the surface mortar in a workable condition, allowing the rib floats to stay back still further, permitting additional subsidence to take place.

INTRODUCED IN 1935

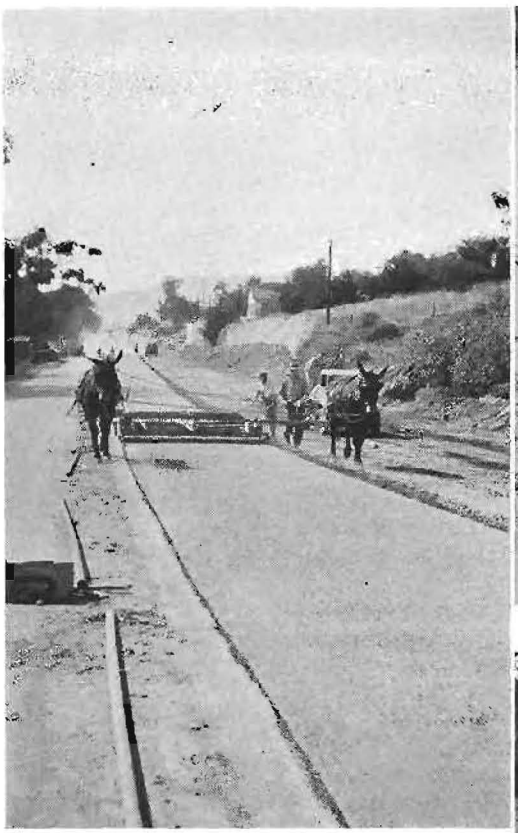
With the approval of the Construction Department, in April, 1935, on Contract 67VC20-47VC24, road VII-Ora-60-C, in Laguna Beach, the drag finisher was first introduced, which works somewhat on the principle of the road plane. It is 20 feet long by 9'-10" wide, and is drawn back and forth over the surface of the concrete and parallel to the header line. It rides on transverse skids mounted at each end of the drag which has the double function of supporting the machine and striking off the concrete to a plane surface. Between these end skids, a series of cutting blades are set at an angle of 3° with the header line similar to the blades of a subgrader. This blades the mortar into three windrows which are then struck off and smoothed by the rear skid. A roller attached ahead of the front skid brings up the mortar and rolls down the surface rock.

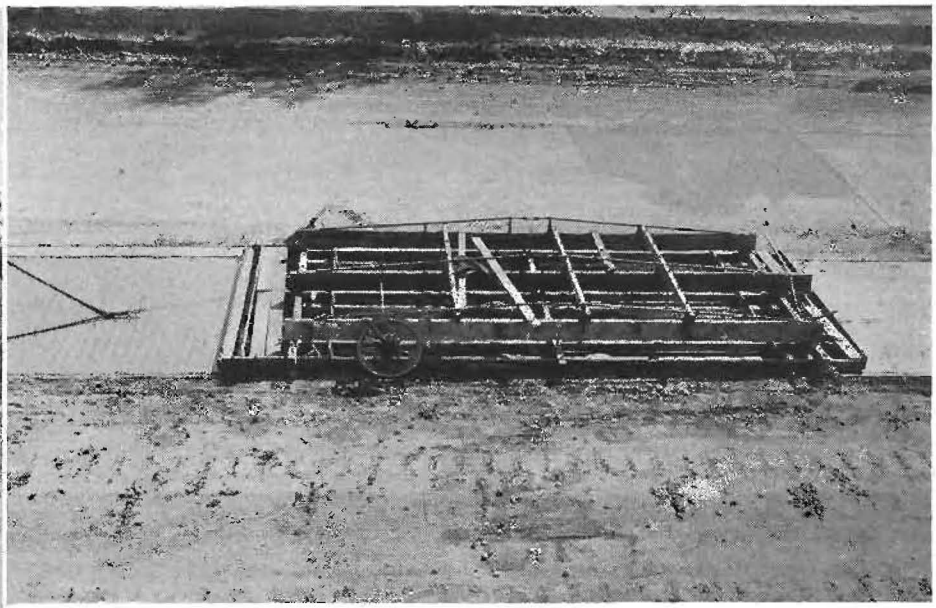
The machine is guided by double-flanged wheels on one side, which act as guides and carry only enough

Highway Creed Adopted by AAA

We must have roads suitable and adequate for the movement of modern motor traffic with safety. There must be multiple lane highways with opposing traffic streams divided. They must be free and not toll roads.

These roads must, in every instance, be predicated on traffic needs, and the State highway planning surveys should point definitely to where needs exist. They must embody every possible safety aid. We must not overlook the growing need for an adequate system of secondary roads and arterial routes through cities. Every State should have a long-range program of development and the administration and conduct of such a program should be divorced entirely from politics.





Upper—Close-up view of new type drag finisher being used in road construction by Division of Highways. Upper left—Showing operation of mule-drawn float which reduces cost of highway finishing. Lower—Appearance of highway after use of drag finisher.

weight to hold them down on the header, otherwise the float works independently of the headers. The drag finisher is drawn back and forth by a tractor or by means of two horses, the tractive effort required being about 700 pounds.

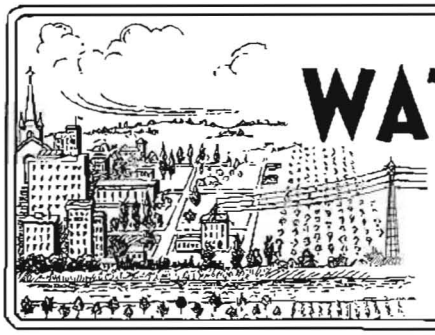
The drag finisher follows the mechanical spreader and is operated over a distance of 300 to 500 feet. Under ordinary conditions it should not operate closer than 100 feet behind the spreader, this distance depending upon the atmospheric conditions and the type of concrete mix used. This float has many advantages over other methods now in use because it reduces the human element to a minimum. It reduces the labor cost of finishing and does better work under adverse conditions. Experiments indicate that this machine could easily handle the capacity output of two one-yard pavers.

QUICKLY RESTORES SURFACE

One instance in which this drag finisher really proved its worth occurred after a heavy shower which ruined the surface of approximately 700 feet of freshly finished surface. Ordinarily the repair of this surface would require two hours of work on the part of the finishing crew and two hours lost time for the mixer. With the drag finisher, it required approximately 15 minutes to correct the damage and the only additional work required was the refinishing of joints and edges.

The surface appearance of the finished pavement when using the drag finisher differs from the ordinary finish in that the float marks are longitudinal instead of transverse. It gives a better surface because it reduces the element of side skidding and the longitudinal marks are more pleasing to the eye than are the float scars on the average job.

The Construction Department desires to add that the riding qualities of this experimental section are not quite up to the average for this season's work on concrete paving. However, it is believed that a further perfection of this device is possible which will eventually lead to a consistent quality of finish which at least is equal to the present day average surface.



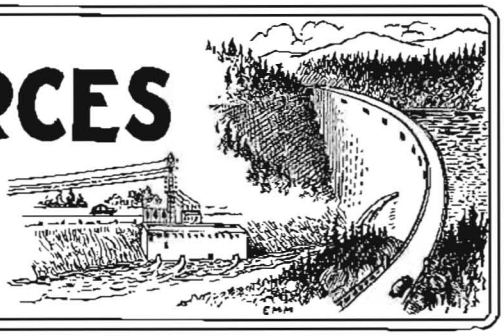
DIVISION OF WATER RESOURCES

OFFICIAL REPORT

FOR THE MONTH OF

December, 1936

EDWARD HYATT, State Engineer



The United States Bureau of Reclamation continued work during the month on the preparation of plans necessary for starting construction on the initial units of the Central Valley Project. Preliminary investigations and exploration work have been continued at Kennett and Friant dam sites as has the survey along the Contra Costa Conduit and Friant-Kern Canal. Appraisers are working in the field evaluating lands and necessary rights of way to be acquired. The Division of Water Resources is conducting surveys and making investigations in the San Joaquin and Sacramento valleys preliminary to the acquisition of properties and water rights and the preparation of agreements necessary for the construction of the project.

During the month of December, the Consulting Board of the United States Bureau of Reclamation consisting of Charles A. Paul of Dayton, Ohio, Dr. F. W. Durand of Stanford University, Dr. Charles P. Berkey of Columbia University, and R. V. Meikle of Turlock, California, met with the Consulting Board of the Water Project Authority of California, consisting of F. C. Herrmann of San Francisco, B. A. Etcheverry of the University of California, Dr. George D. Louderback of the University of California, and J. D. Galloway of San Francisco, for a study and inspection of the dam sites and amount of storage required on the Sacramento River for the Central Valley Project.

IRRIGATION DISTRICTS

At the request of La Mesa, Lemon Grove and Spring Valley Irrigation District, a field inspection and report was made on the proposed reconstruction of El Monte Pumping Plant. The district and the city of San Diego have recently completed a steel pipe line leading from El Capitan Reservoir and reconstruction of the El Monte plant will be necessary to link this source of supply with the district's distribution system.

Investigation of the proposed power construction program in Imperial Irrigation District is now in progress. In addition to a proffered loan of $700,000 from the Rural Electrification Administration, for construction of transmission and distribution lines, a tentative allotment of $2,760,000 has been made by the Public Works Administration which would provide for construction of hydro-electric plants on the All-American Canal.

Favorable reports were submitted to the boards of supervisors of Fresno and Tulare counties in connection with the organization procedure of Orange Cove and Ivanhoe Irrigation districts which plan to secure their water supply from the Friant-Kern Canal of the Central Valley Project.

DISTRICTS SECURITIES COMMISSION

At the regular monthly meeting of the commission held in San Francisco, December 11, 1936, the request of Lindsay-Strathmore Irrigation District for approval of a proposed compromise agreement effecting settlement of water litigation pending in the superior court of Tulare County was granted. Following this approval, a stipulated judgment was signed by Judge E. W. Owen of Kern County on December 18, 1936, which brought to an end the famous water suit between Tulare and Lindsay-Strathmore Irrigation Districts that has been in the courts for more than twenty years.

FLOOD CONTROL AND RECLAMATION

Extensive repairs have been made on Bridge E-2, consisting of reinforcing the piling and renewing deck timbers. A dragline excavator has been operating during the entire period cleaning the drainage canals tributary to Pumping Plant No. 3.

In the Sacramento by-pass the work of installing concrete and rock erosion protection along the south levee and near the weir has been completed.

All of the Sacramento Flood Control Project units for the maintenance of which this office is responsible are in excellent condition to withstand floods.

Relief Labor Work

A relief labor crew of 20 men has been engaged during this period in clearing the flood channel of the Feather River north of Marysville.

A transient relief labor camp has been established by the State Relief Administration at Camp No. 7 in Reclamation District No. 1500 in Sutter Basin. Approximately 90 men are now available for labor and are engaged in clearing the Tisdale by-pass under the direction of this division and along the river levee of Reclamation District No. 1500. Tools, transportation and supervision are being furnished by this office for the work in Tisdale by-pass.

The War Department has continued activity in the construction of bank protection works on the Sacramento River under the State-Federal cooperative program of June, 1932. The program, involving an expenditure of approximately $500,000, is at this time about 70 per cent complete. While there has been a slight raise in the river above the summer low stage, this has resulted in no interference with the work.

Sacramento Flood Control

The new Sacramento River levees constructed by the U. S. War Department in cooperation with the Reclamation Board, on both sides of the river extending from Colusa to Princeton, have been completed. Therefore, at this time the levees on the Sacramento River contemplated under the project are complete, with the exception of a few small sections requiring raising on set-back. The entire project is now in excellent condition to care for floods.

SUPERVISION OF DAMS

Application was filed on December 17, 1936, for approval of the Atascadero Park Dam in San Luis Obispo County, owned by the county of San Luis Obispo. The dam is 12 feet in height and has a storage capacity of 150 acre-feet. It is used for recreation purposes.

Application was filed on December 4, 1936, for the enlargement of the Danhauser Dam in Modoc County. The dam is owned by P. C. Weber. The increase in height is approximately two feet and the increase in storage capacity about 350 acre-feet. The estimated cost of the work is $800.

Construction is being actively continued on Cajalco Dam of the Metropolitan Water District, San Gabriel Dam No. 1 of the Los Angeles County Flood Control District; O'Shaughnessy Dam of the city of San Francisco; Grant Lake and Long Valley dams of the city of Los Angeles, and White House Creek Dam located in San Mateo County.

Work has been completed on the West Valley Dam of the South Fork Irrigation

District in Modoc County; Judson Dam of the Metropolitan Water District in San Diego County; Mono Creek Dam of the City of Santa Barbara; and Eaton Wash Dam of the Los Angeles County Flood Control District.

Repair work to the Lake Hodges Dam of the city of San Diego is practically completed. Work on the Mad River Dam of the city of Eureka has been discontinued as had the construction work at the Arcata Dam of the city of Arcata.

WATER RIGHTS

Supervision of Appropriations of Water

During the month of November there were 19 applications received to appropriate water; 9 were denied; 16 were approved; 10 permits were revoked and 3 licenses were issued.

Among the applications which were received was one by California Water and Telephone Company to appropriate from Tia Juana River in San Diego County for irrigation and domestic purposes at a cost of $350.000 and an application by the Indian Valley Mutual Water Company to appropriate 185,700 acre-feet by storage on North Fork of Cache Creek in Lake County for irrigation and domestic uses upon 60,000 acres now supplied by Clear Lake Water Company.

During the month reports were received from 344 permittees and 82 licensees, which reports are under study.

Water Distribution

Reports covering water master service in the following districts for the current season will be prepared during the winter: Owl, Soldier, Emerson, Cedar, Deep and Mill Creek Water Master districts (In Surprise Valley, Modoc County); New Pine, Davis and Franklin Creek Water Master districts (in Goose Lake Valley, Modoc County); South Fork of Pit River, Pine Creek, Hot Springs Valley and Big Valley Water Master districts (in Modoc and Lassen counties); Shasta River Water Master District (in Siskiyou County); Hat, Burney and Cow Creek Water Master districts (in Shasta County).

SACRAMENTO-SAN JOAQUIN WATER SUPERVISION

During the past month the activities of this office have been confined to office work in making ready the data to publish a report showing the amount of water diverted from and returned to the streams in the Sacramento-San Joaquin territory. The report will also show the amount of land irrigated, the flow in the stream channels and the rate of advance and retreat of salinity in the delta.

During the month there has been no increase in the flow in the valley streams. The flow of the Sacramento River at Sacramento is about 5000 second-feet.

There has been no appreciable change in salinity conditions in the delta. Sampling is being done at certain key stations throughout the delta.

W. V. Darling Is Honored on Eve of Retirement

Retiring after 18 years as an official of the Maintenance Department of the State Division of Highways, W. V. Darling, superintendent of highways in the west end of Riverside County, was tendered a testimonial dinner in the Tetley Hotel in Riverside on the night of December 29 by members of the staff and maintenance crews of District VIII.

The affair was in the nature of a surprise party and was attended by sixty of the personnel of the maintenance department of the district. Mr. Darling's retirement was mandatory under the State age limit law.

Mr. Darling entered State service in 1918 when he resigned as superintendent of streets of Riverside to join the forces of the Division of Highways.

E. Q. Sullivan of San Bernardino, District Highway Engineer, presided at an after dinner program during which Fred Brouse, one of the five foremen in Mr. Darling's jurisdiction, presented the guest of honor with a radio, a gift of the department personnel.

SPEAKERS EXPRESS REGRET

Speakers expressed regret at Mr. Darling's enforced withdrawal from State service. J. E. Stanton of San Bernardino, District Maintenance Engineer of the Division of Highways, said that California was losing a valuable highway authority in Mr. Darling, who has a wide reputation as a highway maintenance expert, and who pioneered in bituminous road surfacing.

Former State Highway Commissioner Frank Tetley of Riverside recalled many years of friendship and association with Mr. Darling and voiced his regret at the latter's retirement.

Mr. Sullivan related that he first met Mr. Darling in 1913 when he went to Riverside to work with him in the construction of the reinforced concrete thin-slab bridge over north Main Street in Riverside, a structure still in use. Mr. Sullivan said that recently he had occasion to write an article for a magazine concerning this bridge and found that it is one of the oldest of such jobs in the United States, a tribute to its builder, Mr. Darling.

Born in Maine, Mr. Darling passed his young manhood in New England and then moved west, engaging in farming and lumbering in South Dakota and Washington. He came to California in 1895 and two years later went to Riverside. In 1902 he became associated with the city street department of Riverside and in 1909 became Superintendent of Streets, a post he filled until he entered State service in 1918.

COOPERATIVE SNOW SURVEYS

All work on this project during the past month has been routine office procedure necessary to bring up to date all data pertaining to the precipitation and run-off experienced during the past year; this is preparatory to resuming the publication of monthly snow survey bulletins beginning next February first.

Actual discharge figures of all mountain streams for the water year ending September 30th have been received from the Water Resources branch of the U. S. Geological Survey while records of reservoir storages and stream diversions during the same period have been supplied by the various organizations exercising artificial control over the run-off from the many mountain watersheds.

With these data available, the figures of full natural flow for the past year are now being compiled. Those completed to date show a very close agreement with the forecasts published in the 1936 April and May bulletins. A tabulation showing a comparison of the forecasted figures with those of the historical run-off actually realized will be published as soon as the compilations have been completed for all watersheds.

Ten sets of snow measuring equipment have been received from the Division of Irrigation, Bureau of Agricultural Engineering, U. S. Department of Agriculture and these are being distributed to those organizations which this winter are beginning their first year of cooperative work with the California Cooperative Snow Surveys.

The bridge terminal in San Francisco which will accommodate railway traffic over the Bay Bridge has been designed to care for the anticipated 35,000 000 commuter trips a year. The building will be 55 feet high and 900 feet long.

Some of the steel sections built into the Bay Bridge towers weigh as much as 78 tons and the average is about 50 tons. Specially built railroad cars were required to transport the heavier sections to the waterfront to be loaded on barges.

with an Engineer

BY GLADYS CRAIG POTTER,
Wife of C. A. Potter, Resident Engineer, District II.

WHEN the tired business man wants to lighten his cares
He goes to a snappy show,
And forgets about work and the market reports
As he sits in the very front row;
While a doctor, they say, on a vacation bound,
Will hie himself off to the hills,
Where he'll fish and he'll hunt to his heart's content,
Forgetting his overdue bills;
And a lawyer may pass his holiday
Inspecting the bathing beauties,
As he lies in the sand at a beach resort
And forgets his judicial duties.

BUT an engineer, let me say right here,
Has a very different code!
With his two weeks pay from the State Highway
He will head for the open road!
So don't envy the life of an engineer's wife,
Ye maidens of high social station,
For here's what you'll get when you go on a trip
With an engineer on his vacation:

YOU'LL start bright and early because, don't you see,
He's not used to sleeping late.
And you'll rush through your breakfast and make up your face,
'Cause an engineer hates to wait;
And then when you're out on the wide white road,
Speeding toward your goal,
You'll come to a stretch where they're shooting oil
And the traffic is under control.
Then you'll sit in the car in the broiling sun
With nothing at all to do,
While your husband "talks shop" with the maintenance man,
And at least three patrols go through!

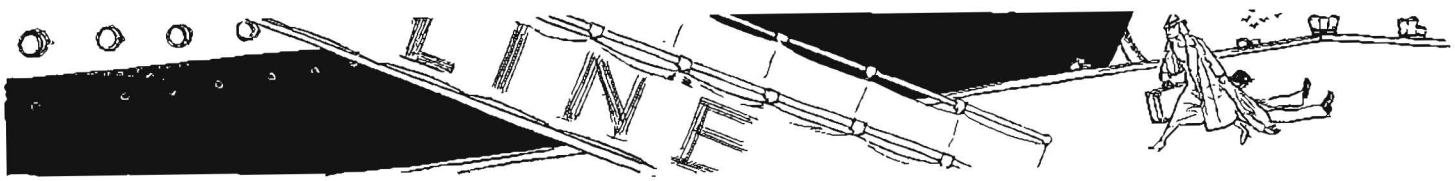
AND when you're at last on your way again
He'll seek your attention to fix
By explaining how smooth is the surface you get
With a D. G. and bitumen mix.
By this time you're thirsty and hot and tired,
So you say, "What about some beer?"
But he passes each stand for the next ten miles
'Cause a new drinking fountain is near.
And he wants to inspect the rubble wall
And the way that the pipes are laid—
So you fill up on water that spills down your dress
And ruins your new pumps of black suede.

ALONG about noon you look for a sign of The Inn
That your friends have all told you about:
"They serve the best luncheon that ever was cooked,
"And, my dear, you should taste their broiled trout!"
But about this same time, as you go up the grade,
You come to a contractor's camp,
And your engineer-husband brakes down with a shout
Of, "There's good old Sammy, the scamp!"
Then he's pounding the back of a gray haired man
As though he were not quite sane,
And saying, "Why Sam, what the hell do you mean,
"Going into the contracting game?"

YOU wait in the car while they talk of old times
When they worked on a location party,
And he finally remembers he's got you along
So he brings over Sam, very hearty,
Who says, "What's the matter with you and your wife
Having lunch in the cook shack with me?"
So you eat a beef stew with hot coffee and pie
While you long for broiled trout and iced tea!
And when finally they put up the layout sheets
And you're once more on your way,
He regales you with stories of S. I. life
For the rest of the long summer day.

NEXT morning you come to a six mile stretch
Which he built back in thirty-two.
And he tells you in detail just how it was done,
From the time that the line was run through
And the first stake punched and the first dirt moved,
And the road built up to grade,
To the hour when the headwalls were polished up
And the last yard of pavement laid!
You try all in vain to point out the beauties
Of village and city and field.
His only reply is to give a long sigh
And say, "This piece should really be sealed."
He admires a deep cut or the arch of a bridge,
He sees nothing else but the highway;

HE can never be urged to turn off and explore
Some interesting-looking old by-way.
So you learn about tangents and angles and curves,
You get quite a good education,
And that's about all that you get when you go
With an engineer on his vacation.
But when you near home, on the last weary mile,
You are struck with a very bright notion!
And "Darling," you say, in your most honeyed way,
"Next year for our trip let's go on a ship!"
(For, thank God, there's no roads on the ocean!)



Bids and Awards for October-December, 1936

ALAMEDA COUNTY—On Castro Hill about 0.4 miles, existing roadbed to be graded and widened with plant-mix surfacing. District IV, Route 5, Section B. Independent Constr. Co., Ltd., Oakland, $11,360; Frank Embleton, Albany, $11,975; E. A. Forde, San Anselmo,, $10,365.50; Lee J. Immel, Albany, $12,097.30; W. H. Larson, Oakland, $10,454. Contract awarded to Jones E. King, Hayward, $8,435.

EL DORADO COUNTY—At Webber Creek, about 1.5 miles south of Placerville, an existing steel bridge to be removed and a timber bridge to be constructed. District III, Route 65, Section C. M. A. Jenkins, Sacramento, $6,127; F. H. Neilson, Orland, $6,068. Contract awarded to Donald Edwin Morton, Placerville, $5,989.55.

HUMBOLDT COUNTY—Between Beatrice Overhead and Eureka about 5.2 miles in length to be graded and surfaced with gravel base and screen gravel. Widen existing concrete bridge. District I, Route 1, Section G. Hemstreet & Bell, Marysville, $185,742.30; Hanrahan Company, San Francisco, $171,798.50. Contract awarded to N. M. Ball Sons, Berkeley, $152,342.40.

IMPERIAL COUNTY—Between Mulberry Avenue and Calipatria, 6.0 miles to be graded, surfaced with gravel and treated with liquid asphalt and a timber trestle to be constructed. District XI, Route 187, Section D. V. R. Dennis Const. Co., San Diego, $74,600; B. G. Carroll, San Diego, $69,928; Dimmitt & Taylor, Los Angeles, $75,779; J. E. Haddock, Ltd., Pasadena, $84,012; R. E. Campbell, Los Angeles, $94,730; Oswald Bros., Los Angeles, $76,233. Contract awarded to R. E. Hazard & Sons, San Diego, $58,459.

INYO COUNTY—Between 3.5 miles east of Saline Valley Road and Panamint Sink about 17.6 miles to be graded. District IX, Route 127, Sections E, F. D. W. Thurston, Los Angeles, $197,254.75; Basich Bros., Torrance, $238,749; Morrison-Knudson Co., Inc., San Francisco, $188,949; A. Teichert & Son, Inc., Sacramento, $217,728.50; Isbell Construction Company, Reno, Nevada, $219,905.50. Contract awarded to Peninsula Paving Co., San Francisco, $168,125.50.

KERN COUNTY—Bridge over Calloway Canal, 2 miles west of Bakersfield. District VI, Route 58, Section L. Wm. C. Horn Co., Pomona, $11,960; R. P. Moore, Fresno, $10,943; Opperman & Co., Bakersfield, $10,258; Griffith Co., Los Angeles, $11,612; F. O. Bohnett, Campbell, $11,860; D. A. Loomis, Glendale, $10,622; F. A. Greenough, Bakersfield, $11,510. Contract awarded to Carl Ingalls, Inc., Bakersfield, $7,637.

LOS ANGELES COUNTY — Marengo Street in Los Angeles, between Cornwell Street and Lord Street, 0.6 miles to be graded and paved with asphalt concrete. District VII, Route 4, Section L.A. Geo. R. Curtis Pavg. Co., Los Angeles, $65,218; P. J. Akmadzich, Los Angeles, $67,528; Southwest Paving Co., Roscoe, $66,923; United Conc. Pipe Corp., Los Angeles, $67,108; Griffith Co., Los Angeles, $73,627; W. E. Hall Co., Alhambra, $65,389. Contract awarded to Oswald Bros., Los Angeles, $57,412.

LOS ANGELES COUNTY—Rosemead Blvd. between San Gabriel Blvd. and Ramona Blvd., 3.5 miles plant-mixed surfacing to be applied to shoulders. District VII, Route 168, Sections B, C. Contract awarded to L. A. Decomposed Granite Co., Los Angeles, $10,780.

LOS ANGELES COUNTY—At Rosemead Ave., 2 miles west of El Monte, a reinforced concrete girder bridge to be constructed across Rio Hondo. District VII, Route 168, Section C. Donald Atkinson, San Francisco, $72,185; Griffith Co., Los Angeles, $82,189; Byerts & Dunn, Los Angeles, $75,555; J. E. Haddock, Ltd., Pasadena, $87,557; Oscar Obers, Los Angeles, $72,442; T. A. Allen Construction Co., Los Angeles, $67,300; John Strona, Pomona, $66,555. Contract awarded to Carlo Bongiovanni, Hollywood, $65,843.

LOS ANGELES COUNTY—On Atlantic Ave., between 68th Street in Long Beach and Olive Street, 0.7 miles to be graded and paved with P.C.C. District VII, Route 167, Section L. Bch. and A. Basich Bros., Torrance, $78,940; Griffith Co., Los Angeles, $71,325.50; Matich Bros., Elsinore, $75,692; C. R. Butterfield, San Pedro, $83,414; J. F. Knapp, Oakland, $99,120; J. E. Haddock, Ltd., Pasadena, $75,217.50; Oswald Bros., Los Angeles, $76,289.50. Contract awarded to United Concl. Pipe Corp., Los Angeles, $71,284.20.

LOS ANGELES COUNTY—At the junction of Whittier and San Gabriel boulevards, about 0.3 mile to be graded and paved with Portland cement concrete. District VII, Route 168, Section B. Kovacevich & Price, Southgate, $28,500. Contract awarded to J. E. Haddock, Ltd., Pasadena, $25,110.75.

LOS ANGELES COUNTY—Between Wilmington Boulevard and Alameda Street in the city of Los Angeles, 1.6 mile to be graded and paved with asphalt concrete and plant-mixed surfacing. District VII, Route 60. P. J. Akmadzich, Los Angeles, $173,315; Sully-Miller Contracting Co., Long Beach, $188,020; Geo. R. Curtis Paving Co., Los Angeles, $179,941; Southern California Roads Co., Los Angeles, $188,128; Griffith Co., Los Angeles, $182,793; Oswald Bros., Los Angeles, $176,447; R. E. Campbell, Long Beach, $199,759. Contract awarded to United Concrete Pipe Corporation, Los Angeles, $156,859.

MENDOCINO COUNTY—Between Eleven Oaks and Willits, 1.1 mile to be graded and surfaced with screened gravel on gravel base and reinforced concrete bridge to be constructed. District I, Route 1, Section E. Hemstreet & Bell, Marysville, $61,813; C. W. Caletti & Co., San Rafael, $66,709. Contract awarded to A. Soda & Son, Oakland, $53,260.

MONTEREY COUNTY—On Market St. in Salinas between Lincoln St. and the west city limits, 0.9 mile to be graded and surfaced with crusher run base and plant-mixed surfacing. District V, Route 118. A. J. Raisch, San Jose, $29,575. Contract awarded to Granite Construction Co., Ltd., Watsonville, $28,889.

MONTEREY COUNTY—At the Molera Ranch, about 26 miles south of Monterey, a reinforced concrete water tank to be constructed. District V, Route 56, Section F. E. T. Lesure, Oakland, $3,955; F. O. Bohnett, Campbell, $3,419. Contract awarded to M. J. Murphy, Inc., Carmel, $2,417.98.

MONTEREY COUNTY — Construct a steel beam bridge with concrete deck across Castro Canyon, about 35 miles south of Monterey, consisting of one 51ft. span, two 50-ft. spans and two 42-ft. spans. District V, Route 56, Section E. Lindgren & Swinerton, Inc., Oakland, $45,737; A. H. Vogt Co., Inc., San Francisco, $43,552; Peter J. McHugh, San Francisco, $43,681.75; F. O. Bohnett Co., San Jose, $44,512; R. R. Bishop, Long Beach, $46,521; Frank C. Amoroso & Sons, San Francisco, $51,147. Contract awarded to E. T. Lesure, Oakland, $42,517.75.

NEVADA and PLACER COUNTIES — Between one-half mile west of Soda Springs and Donner Summit, 3.7 miles to be graded and paved with Portland Cement concrete and a parking area to be constructed near Donner Summit Bridge. District III, Route 37, Sections B, C, G. A. Teichert & Son, Inc., Sacramento, $233,228; Basich Brothers, Torrance, $234,621; United Concrete Pipe Corporation, Los Angeles, $231,329. Contract awarded to Fredericksen & Westbrook, Lower Lake, $225,380.50.

NEVADA COUNTY—Between Donner Grade and east end of Donner Lake, two and five-tenths (2.5) miles, to be graded and surfaced with plant-mix surfacing on crusher run base. District III, Route 37, Section C, D. A. Teichert & Son, Inc., Sacramento, $120,634. Contract awarded to Pacific States Construction Co., San Francisco, $118,588.

ORANGE COUNTY—Between Carolina Ave. and Yorba Linda, 3.6 miles to be graded and surfaced with plant-mixed surfacing and timber trestle bridge to be constructed. District VII, Route 176, Section A. C. R. Butterfield, San Pedro, $112,205; United Concrete Pipe Corp., Los Angeles, $112,562; Dimmitt & Taylor, Los Angeles, $106,736; Oswald Bros., Los Angeles, $101,626; J. E. Haddock, Ltd., Pasadena, $101,374; R. E. Campbell, Los Angeles, $119,607; A. S. Vinnell Co., Los Angeles, $96,148. Contract awarded to C. O. Sparks & Mundo Engineering Co., Los Angeles, $91,115.

ORANGE COUNTY—Between Dowling Avenue and Linda Vista Street, 1.2 miles to be graded and surfaced with plant-mixed surfacing and a timber bridge to be constructed. District VII, Route 175, Section B. United Concrete Pipe Corp., Los Angeles, $49,107; Geo. R. Curtis Paving Co., Los Angeles, $44,998; C. R. Butterfield, San Pedro, $44,457; R. E. Campbell, Los Angeles, $50,413; Oswald Bros., Los Angeles, $42,191. Contract awarded to A. S. Vinnell Co., Los Angeles, $37,598.50.

RIVERSIDE COUNTY—At Snow Creek, 1.0 mile to be graded, surfaced, and a reinforced concrete bridge to be constructed. District VIII, Route 187, Section D. Geo. Herz & Co., San Bernardino, $137,097; B. G. Carroll, San Diego, $140,524; R. E. Campbell, Los Angeles, $135,672; Dimmitt & Taylor, Los Angeles, $139,894; United Concrete Pipe Corp., Los Angeles, $137,199. Contract awarded to Oswald Bros., Los Angeles, $121,600.

SACRAMENTO COUNTY—4 miles and 2.5 miles south of Brighton and 4.5 miles east of Perkins, concrete box culvert, 2-span timber bridge, and 3-span concrete bridge to be constructed. District III, Routes 54 and 98, Section A. F. O. Bohnett Co., Campbell, $14,996. Contract awarded to Lord & Bishop, Sacramento, $13,153.

SAN BERNARDINO COUNTY—Water supply well to be drilled at the Camp Angelus. District VIII, Route 190, Section E. D. A. Beck & Sons, Inc., Alta Loma, $870.

SAN BERNARDINO COUNTY—In Colton at Maple and 7th Streets, a steel and concrete pedestrian overhead crossing to be constructed. District VIII, Route 43, Section Col. E. S. and N. S. Johnson, Pasadena, $10,458.50; D. A. Loomis, Glendale, $10,072.20. Contract awarded to Geo. Herz & Co., San Bernardino, $9,302.80.

SAN BERNARDINO COUNTY—Between Colton and San Bernardino-Riverside County line, 2.9 miles, palm trees to be removed and reset. District VIII, Route 43, Section F.Col. R. W. Hamsher, Los Angeles, $3,944; J. A. Brodrich, Los Angeles, $8,285. Contract awarded to P. E. Carr, San Bernardino, $3,081.

SAN BERNARDINO COUNTY—Hinkley Maintenance Station, a water supply well to be drilled. District VIII, Route 58, Section C. Contract awarded to D. A. Beck & Sons, Alta Loma, $757.

SAN BERNARDINO COUNTY — At Sand Creek, about 3 miles east of San Bernardino, a reinforced concrete box culvert to be constructed. District VII, Route 190, Section C. Peter J. McHugh, San Francisco, $9,195.80. Geo. Herz & Co., San Bernardino, $7,975.50.

SAN DIEGO COUNTY—Between 2.5 miles east of Rincon and Rancho Cuca, 2.8 miles to be graded and road mix surface treatment applied. District XI, Route 195, Section D. Miracle Co., San Diego, $47,816; V. R. Dennis Const., San Diego, $34,533; B. G. Carroll, San Diego, $42,909; A. S. Vinnell Co., Los Angeles, $33,271; Martin Bros. Trucking Co., Long Beach, $40,049; Dimmitt & Taylor, Los Angeles, $59,671; C. F. Robbins, Los Angeles, $41,338.60; Basich Bros., Torrance. $42,644. Contract awarded to R. E. Hazard & Sons, San Diego. $32,921.10.

SAN DIEGO COUNTY—Main Street between Division Street and 32d Street in the city of San Diego. 1.1 mile to be graded and paved with concrete and plant-mixed surfacing. District XI, Route 2. David H. Ryan, San Diego, $99,466; R. E. Hazard & Sons, San Diego, $101,191; Daley Corp., San Diego, $109,849; Basich Bros., Los Angeles, $99,574; Griffith Co., Los Angeles, $101,897. Contract awarded to V. R. Dennis Construction Co., San Diego, $96,796.

SAN DIEGO COUNTY—Between Oceanside and Las Flores Underpass, 7.9 miles to be graded and paved and bridges to be constructed. District XI, Route 2, Section Oen. C. D. V. R. Dennis Const. Co., San Diego, $435,906; Jahn & Bressi Const. Co., Inc., Los Angeles, $416,914; D. W. Thurston, Los Angeles, $553,562; Basich Bros., Torrance, $430,648; Griffith Co., Los Angeles, $431,545; David H. Ryan. San Diego, $423,503; Hueser & Garnett, Glendale, $428,234; J. E. Haddock, Ltd., Pasadena, $457,630; Oswald Bros., Los Angeles, $441,613. Contract awarded to Wood & Bevanda, Stockton. $399,157.50.

SAN MATEO COUNTY—Between San Mateo and Redwood City. 5.6 miles to be graded and paved with asphalt concrete. District IV, Route 2, Section S. M. Bmt. B. S. Car, Redwood City. A. Teichert & Son, Inc., Sacramento, $395,130; Hanrahan Company, San Francisco. $354,838; David H. Ryan, San Diego, $384,483; Union Paving Co., San Francisco, $348,737; Eaton and Smith. San Francisco, $393,364; Peninsula Paving Co., San Francisco, $344,259. Contract awarded to Basich Bros., Torrance, $340,785.

SANTA BARBARA COUNTY—Bridge across Zaca Creek, about 9 miles south of Los Alamos, to be widened, District V, Route 2, Section C. R. R. Bishop, Long Beach, $6,432.50; L. A. Brisco, Arroyo Grande, $6,382.50; M. G. Torson Constr. Co., Long Beach, $7,712. Contract awarded to Robert D. Paterson, Santa Barbara, $5,388.50.

SANTA BARBARA COUNTY—In the city of Santa Barbara within the grounds of the proposed State Teachers College, 0.3 miles to be graded. Guerin Bros., San Francisco, $17,520.80; Granfield, Farrar & Carlin, San Francisco, $19,754.70; C. R. Butterfield, San Pedro, $17,777.40; R. E. Campbell, Los Angeles, $21,467.60; L. A. Brisco, Arroyo Grande, $21,257.80; Dimmitt and Taylor, Los Angeles. $14,020.20; A. S. Vinnell Co., Los Angeles, $16,175.40; C. G. Willis & Sons and Chas. G. Willis, Los Angeles, $13,939.70; Western Motor Transfer, Inc., Santa Barbara, $14,736.68; Oneal & Smith, North Long Beach, $15,627.20; Robert D. Paterson, Santa Barbara, $19,805.90. Contract awarded to C. O. Sparks & Mundo Engineering Co., Los Angeles, $12,137.70.

SANTA BARBARA COUNTY—Between 1 mile north of Rincon Creek and Carpinteria, 1.5 mile to be graded and paved with asphalt concrete or natural asphalt. District V, Route 2, Section H. Oswald Bros., Los Angeles. $130,411; Southwest Paving Co., Inc., Roscoe, $131,817. Contract awarded to Heafey-Moore Co., Oakland, $123,321.

SANTA CRUZ COUNTY—At Inspiration Point between Los Gatos and Santa Cruz, 0.1 mile to be graded. District IV, Route 5, Section B. Oneal & Smith, Long Beach, $36,325; Earl W. Heple, San Jose, $37,885; Peninsula Paving Co., San Francisco, $39,135. Contract awarded to J. L. Conner. Monterey, $33,425.

SANTA CRUZ COUNTY—Concrete girder bridge across Corralitos Creek, about one mile E. of Watsonville. District IV, Route 32, Section A. F. O. Bohnett Co., Campbell, $15,925; Lorance C. Karstedt, Watsonville, $14,394. Contract awarded to A. Soda & Son, $12,962.

SOLANO COUNTY—1 mile west to 0.7 mile east of Vacaville, 2.5 miles to be graded and paved with P. C. C. District X, Route 7, Section C. A. Teichert & Son, Inc., Sacramento, $130,071; Union Paving Co., San Francisco, $123,676; N. M. Ball Sons & Larsen Bros., Berkeley, $134,379; Wood & Bevanda, Stockton, $144,266; D. McDonald, Sacramento, $134,763; Hanrahan Company, San Francisco, $146,354. Contract awarded to Fredericksen & Westbrook, Lower Lake, $114,341.

STANISLAUS COUNTY — At Bassos Ferry, 2 miles west of La Grange, Tuolumne River Bridge to be repaired. District X, Route 110. Section E. Martin Murphy, Albany, $19,840; M. B. McGowan, Inc., San Francisco, $15,313; Garbarini & Orselli, Oakland, $17,885. Contract awarded to F. O. Bohnett Co., Campbell, $14,530.

YOLO COUNTY—Between Woodland and Knights Landing, about 11.4 miles of nonskid surface treatment and natural rock asphalt to be applied to portions of pavement. District III, Route 87, Section A. Independent Const. Co., Ltd., Oakland. $12,367; W. H. Larson, Oakland, $12,844; A. Teichert & Son, Inc., Sacramento. $11,776; Hanrahan Co., San Francisco, $12,390. Contract awarded to E. A. Forde. San Anselmo, $11,579.

HIGHWAY ENGINEERING RESEARCH REVIEWED

(Continued from page 19)

The use of heated sand has been reported to give satisfactory results on some highways in Canada. This operation is carried on by having supply stations at convenient locations.

The research developments discussed, are few of the many under way. The yearly publication of research results indicates how practically all highway problems are being studied and remedies proposed.

A man wrapped up in himself makes a very small package.

Day Labor Plan Assailed at Road Builders' Session

COMPARATIVE opportunities of the working man under the day-labor system and under the contract system, and the resulting effects that the day-labor system has upon him, were discussed by Frederick Hoitt, at the highway contractors' sessions of the 34th annual convention of the American Road Builders' Association, in New Orleans, January 11-15. He also touched upon the present day trends toward organization of the highway industry.

Mr. Hoitt is secretary of the New England Road Builders' Association, an organization affiliated with the American Road Builders' Association.

"There is hardly a contractor who has not, over the years, taken men from ordinary routine positions and advanced them step by step to positions of greater responsibility until they reached top places in the organization, and ultimately graduated into business for themselves," declared Mr. Hoitt.

ATTACKS DAY LABOR PLAN

"Other men have been trained regularly and advanced by contractors from employments of an unskilled nature to places as skilled machine operators, with the accompanying rewards of increased wages," he continued. These opportunities for advancement do not exist under the day-labor system, he pointed out.

The day-labor method and the accompanying practices under that method breed inefficiency, wastefulness, indifference and irresponsibility, according to Mr. Hoitt. The effect upon the moral fibre of working men is unwholesome and definitely destructive, he believes. "That, we think, is a much more serious indictment of the day-labor system than is the fact that it deprives contractors of work that is properly within the scope of their business activities," he declared. "It is wiser and sounder—and certainly best for the interests of the taxpayers—to do public works construction in the most efficient and economical manner, free from abortive unemployment relief devices.

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