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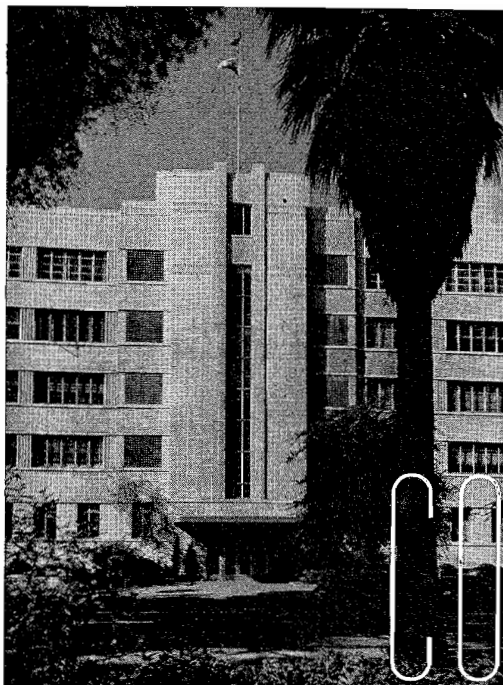
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CONTENTS

	Page
Burney Falls in Shasta County. Photograph by John Shaver, Photographic Section, M. R. Nickerson, Chief.....	Cover
Federal Aid Secondary Highway Program in County of Los Angeles, Illustrated By C. W. Sprotte, Los Angeles County Assistant Chief Deputy Road Commissioner.....	1
Wanton Damage, Illustrated..... By F. Walter Sandelin, Member, California Highway Commission.....	9
Gyroscopic Equipment, Illustrated..... By James T. McWilliam, Assistant Highway Engineer.....	12
Dr. L. I. Hewes Award, Illustrated.....	19
Recent Raised Traffic Bar Developments, Illustrated..... By Blair Geddes, District Traffic Engineer.....	20
Montalvo Freeway, Illustrated..... By Milton F. Masters, Senior Highway Engineer.....	23
Retirements From Service.....	27
Early Contract, Illustrated.....	29
Freeway Through San Luis Obispo—A Sketch by Van der Goes.....	32-33
Santa Ana Canyon, Illustrated..... By W. M. McKnight, Resident Engineer.....	36
Quality Control..... By Glen Morgan, Department of Finance.....	38
District IX, Illustrated..... By Alan S. Hart, District Engineer.....	39
Idea Pays Off, Illustrated.....	42
Early Days, Illustrated..... By R. C. Kennedy, Secretary, California Highway Commission.....	44
New Eastshore Freeway Unit Open to Traffic, Illustrated.....	48
State Fair, Illustrated.....	52
Successful Tour, Illustrated..... By Chester H. Warlow, Highway Commissioner.....	54
Cost Index.....	56
Harbor Freeway Temporary Field for Helicopters, Illustrated..... By P. O. Harding, Assistant State Highway Engineer.....	58
Highway Bids and Awards.....	60

F. A. S. Highway Program in Los Angeles County

*A Story of Careful Highway
Planning and Execution*

THE FEDERAL AID Secondary Program in the County of Los Angeles has been extremely successful. It has initiated, partially financed, and given impetus to the delineation and construction of a defined secondary highway feeder system. The establishment and improvement of this feeder system which is essential to the economic life of this area, has been implemented by federal aid secondary funds to such an extent that some of the bottlenecks on the existing routes have been removed. Much still remains to be done on these routes, but definite progress can be shown for the few years the program has been in operation.

The Federal Aid Highway Act of 1944 provided funds to assist the individual states in the construction of secondary and feeder roads including farm-to-market routes, rural free delivery mail, and public school routes which were either outside of municipalities or inside of municipalities of less than 5,000 population.

Cooperation

Federal regulations require that this secondary highway system be selected by the State Highway Department in cooperation with the county supervisors, county road commissioner and the Commissioner of Public Roads. The State Division of Highways, in accordance with the above directive, and its normal practice of allowing local governments as much freedom as possible in the determination of their needs, delineated a federal aid secondary system for Los Angeles County and requested that the county review and comment on the proposed system. The county, in the main, concurred and with minor changes recommended the approval of the federal aid secondary system for the County of Los Angeles as it now exists.

This system was envisioned by the Board of Supervisors and the Road

By C. W. SPOTTE, Los Angeles County
Assistant Chief Deputy Road Commissioner

For key to locations of bridges
illustrated in this article, see map
on pages 2 and 3.

Commissioner of the County of Los Angeles as a series of feeder routes which would be an integrated part of the county, state, and federal road network. The main F. A. S. routes in the county are shown on the accompanying map. It should be noticed that these routes invariably connect major county or state highways and are predominately located in the southeast section of the county. At the time these routes were delineated, the Division of Highways and the county anticipated rapid industrial and residential growth in the rural, unincorporated, and corporate areas of this section of the county. The actual growth of this area in the last few years not only reflects merit upon the foresight shown by the agencies which planned these routes, but demonstrates clearly the advantages of the State Division of Highway's attitude of local self-determination.

Are Feeder Roads

The secondary highway system as feeder roads in the County of Los Angeles are to a large extent the traffic arteries through which the economic life of the area is maintained. Metropolitan Los Angeles is the economic heart of the county and the surrounding communities and cities are dependent to a large extent for their economic existence upon the manufacturing and industrial potential, labor supply, and shipping and commercial facilities of metropolitan Los Angeles.

Unlike many areas of the United States which have highly centralized

and concentrated industrial and residential areas, the County of Los Angeles and its corporate cities are noted for their decentralization. This decentralization together with the lack of adequate public transportation results in a greater dependence and usage of the county road network.

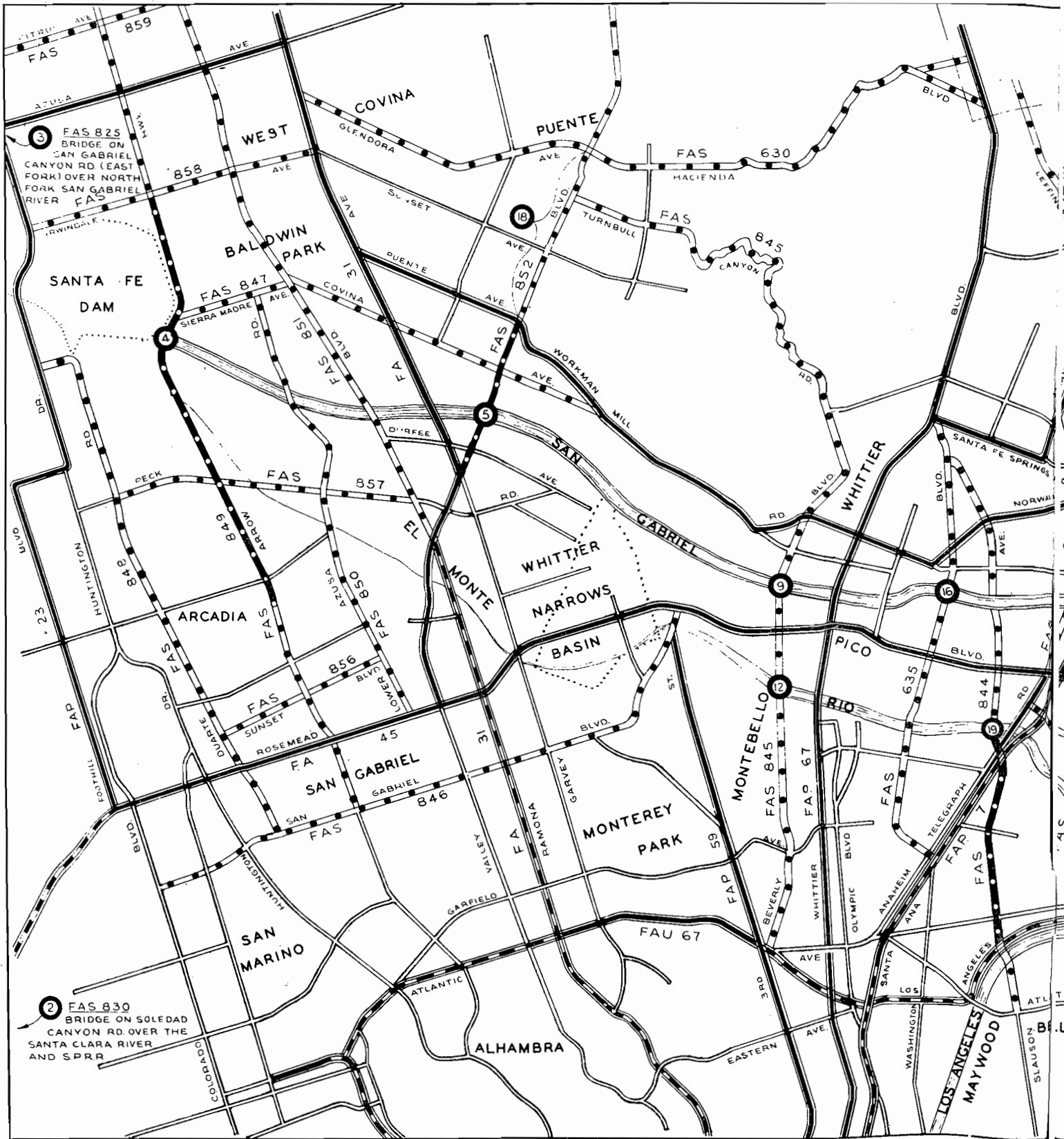
Bridge Problems

From 1940 to 1950, the County of Los Angeles had a population increase of 49 percent and an increase of 33.6 percent in registered vehicles which included a 135.9 percent increase in registered trucks. The above increase in population and vehicle density combined with the restrictive maintenance and construction features of the depression and World War II years to confront the road department with numerous bridges which had either an inadequate roadway width or had deteriorated, through age and the enforced lack of maintenance to such an extent as to cause a serious hazard to the public. These bridges presented a particularly acute problem on the federal aid secondary system where the traffic volumes show an enormous increase.

The road department with the concurrence of the board of supervisors decided initially to expend the federal aid and county highway aid funds on progressively replacing these load limited or bottleneck bridges. *Chart I* lists the projects by their construction sequence while the accompanying map delineates their location. The source of funds, description, limits of the individual projects, and estimated 24-hour traffic count is also included.

Four Other Projects

At this time four additional projects are proposed for the current federal aid secondary program. Two of these are road improvement and construction projects.



They are:

1. The resurfacing of existing pavement together with the construction of new pavement to provide a four-lane

highway with eight-foot shoulders on Rosecrans Avenue from Lakewood Boulevard to 1,500 feet east of Woodruff Avenue.






2. The resurfacing of existing pavement and the construction of new pavement to provide a four-lane highway on Valley Boulevard from Puente

COUNTY OF LOS ANGELES

FAS SYSTEM

SOUTHERLY PORTION

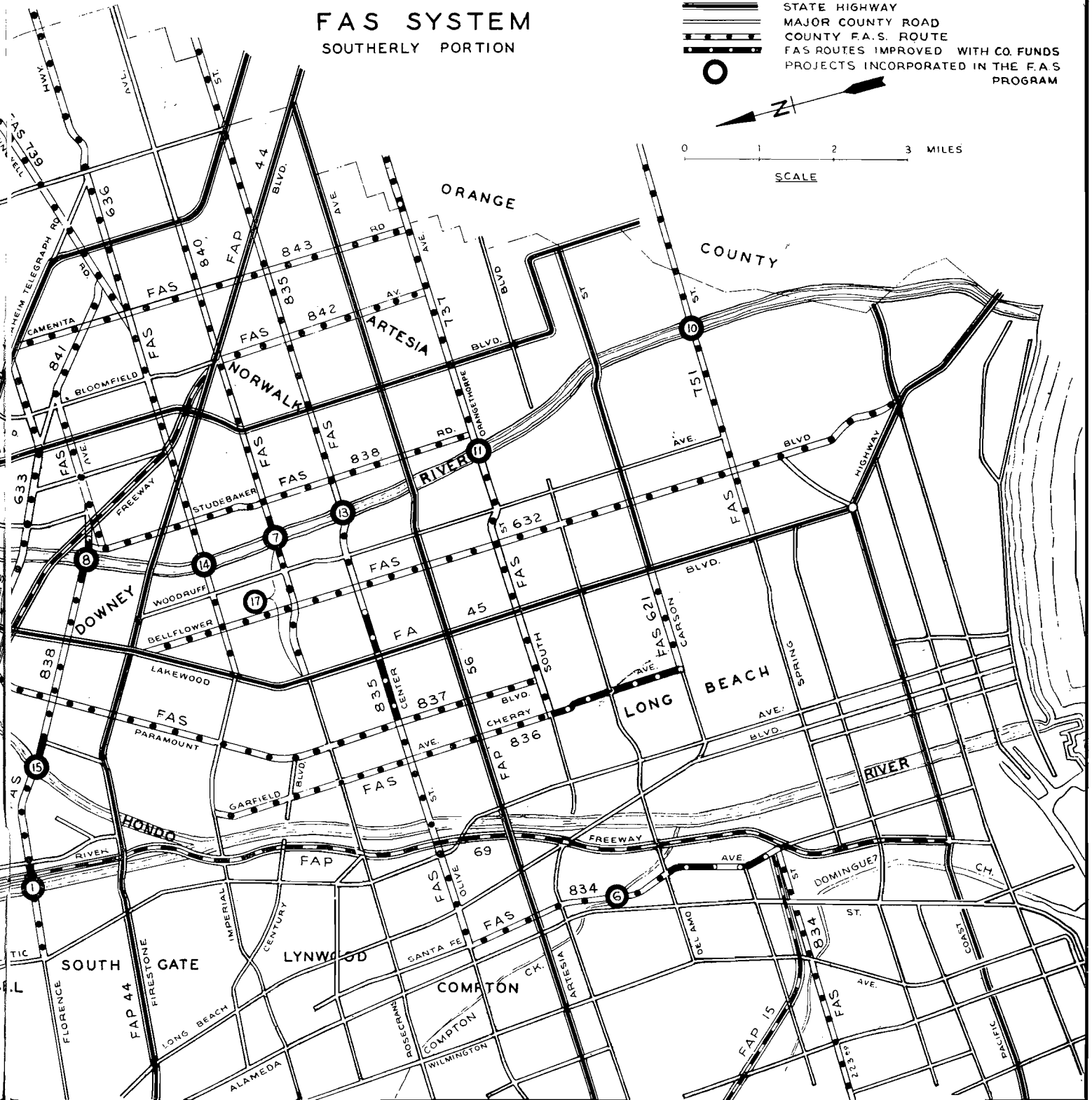
LEGEND

-  STATE HIGHWAY
-  MAJOR COUNTY ROAD
-  COUNTY F.A.S. ROUTE
-  FAS ROUTES IMPROVED WITH CO. FUNDS
-  PROJECTS INCORPORATED IN THE F.A.S PROGRAM



0 1 2 3 MILES

SCALE

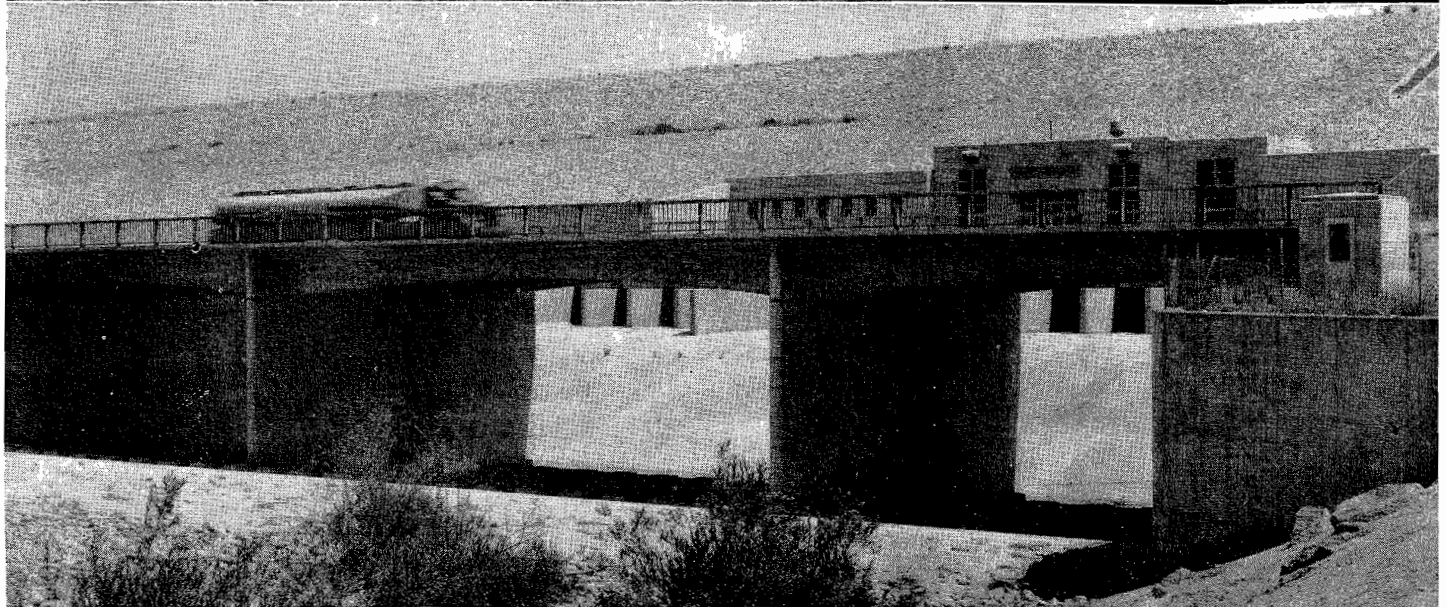
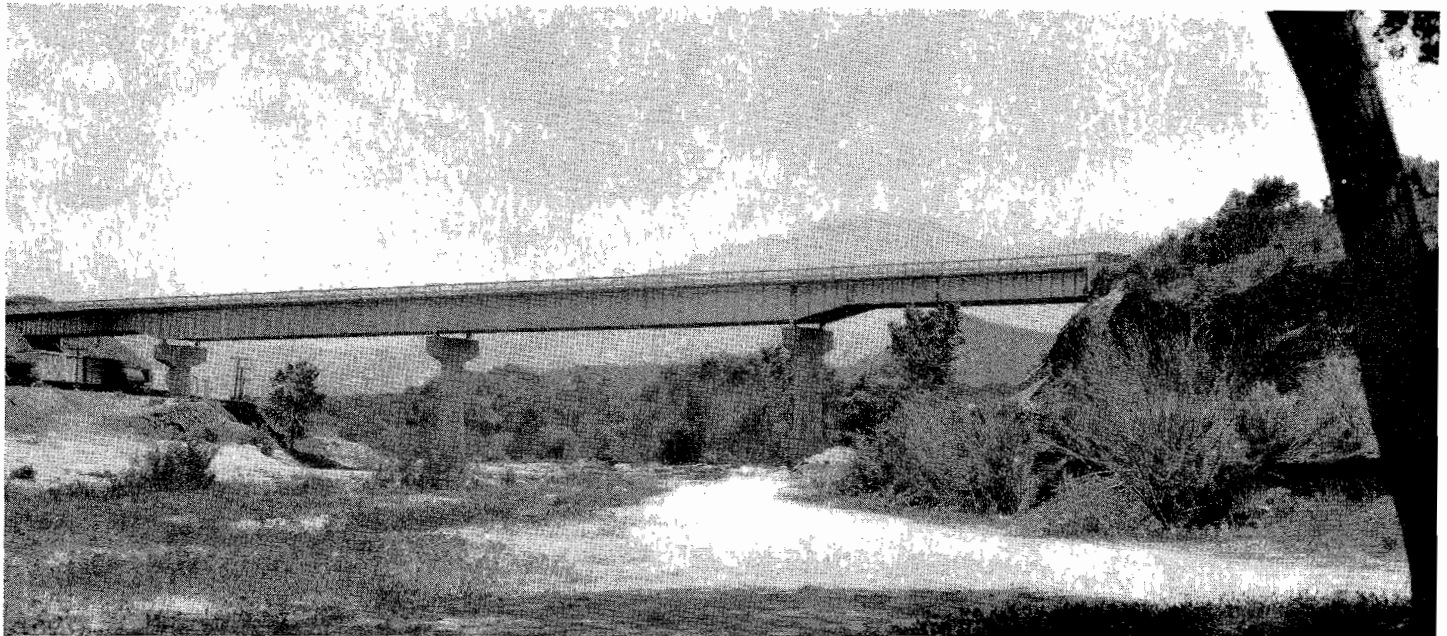


Avenue to 1,000 feet west of Hacienda Boulevard.
The other two are bridge and approach projects which include:

1. The construction of a four-lane reinforced concrete girder bridge on Washington Boulevard over the San Gabriel River and the Southern Pa-

cific Railroad together with the necessary approaches.

2. The construction of a four-lane highway on Slauson Avenue from Rose-



UPPER: Bridge 2—Bridge over Santa Clara River and Southern Pacific tracks on Soledad Canyon Road (F. A. S. Route 830). Single column bents used to reduce stream obstruction. LOWER: Bridge 4—Bridge over Santa Fe Dam outlet works on Arrow Highway (F. A. S. Route 849).

mead Boulevard to Montebello city limits which includes a reinforced concrete bridge across the Rio Hondo.

Total Value \$5,300,000

These 19 projects will have an estimated total completed cost of over \$5,300,000 of which approximately \$2,650,000 will be federal aid funds; \$1,200,000 County Highway Aid Act funds; and \$1,450,000 county funds.

State Helps Out

All of the projects with the exception of Soledad Canyon Road over the

Santa Clara River and the Southern Pacific Railroad, which was designed by the State Division of Highways, were or will be designed by the County of Los Angeles. All bridge projects were designed for H20-S16-44 loading under the design specifications of the American Association of State Highway Officials. The tracings of the plans, a preliminary report, and suggested special provisions were furnished the State Division of Highways by the County of Los Angeles for all projects. The projects were reviewed,

approved and prepared for advertising by the Division of Highways, which administers the federal aid secondary funds. The Division of Highways advertised and with the concurrence of the county, awarded the contracts for the individual projects.

Construction inspection and engineering were performed by the County of Los Angeles. In all cases the rights of way, design and construction engineering costs were financed by the County of Los Angeles from funds other than federal aid secondary. This

FEDERAL AID SECONDARY PROJECTS SINCE 1945

CHART I

Project, limits, and description	24-hr. traffic count	Total funds	Federal funds	County Highway Aid Act funds	County funds
1. Florence Ave. over the Los Angeles River, F. A. S. 838 (1): The construction of a 4-lane, 452' long, reinforced concrete girder bridge and east approach.	12,000	\$394,889.74	\$227,000	\$167,889.74	-----
2. Soledad Canyon Road over Santa Clara River and S.P.R.R., F. A. S. 830 (1): The construction of a 2-lane, 349' long, reinforced concrete deck plate girder bridge.	3,000	227,832.93	128,000	99,832.93	-----
3. San Gabriel Canyon Road East Fork over North Fork San Gabriel Canyon, F. A. S. 825 (2): The construction of a 2-lane, 650' long, steel truss bridge with reinforced concrete deck.	3,200	371,881.83	210,000	161,881.83	-----
4. Arrow Highway over Santa Fe Dam Release Channel, F. A. S. 849 (1): The construction of a 4-lane, 203' long, reinforced concrete girder bridge.	7,000	66,061.18	38,000	28,061.18	-----
5. Valley Blvd. over the San Gabriel River, F. A. S. 852 (2): The construction of a 2-lane, 943' long, reinforced concrete deck plate girder bridge together with the reconstruction of an existing through plate girder bridge to a reinforced concrete deck plate girder bridge providing a divided 4-lane crossing of the San Gabriel River together with the necessary approaches.	18,000	578,998.28	330,000	248,998.28	-----
6. Santa Fe Avenue over Compton Creek, F. A. S. 834 (1): The construction of a divided 6-lane, 226' long, reinforced concrete slab bridge.	10,000	187,170.65	108,000	79,170.65	-----
7. Rosecrans Avenue over the San Gabriel River, F. A. S. 840 (1): The construction of a 4-lane, 304' long, reinforced concrete girder bridge.	12,600	208,196.09	120,000	88,196.09	-----
8. Florence Avenue over the San Gabriel River, F. A. S. 838 (2): The construction of a 4-lane, 304' long, reinforced concrete girder bridge.	10,000	208,000.85	120,000	88,000.85	-----
9. Beverly Blvd. over the San Gabriel River, F. A. S. 845 (1): The construction of a 4-lane, 355' long, reinforced concrete girder bridge together with a 4-lane, 35' long, steel and timber interim approach span.	13,000	295,918.36	160,000	2,116.18	\$133,802.18
10. Spring St. over the San Gabriel River, F. A. S. 751 (1): The construction of a 4-lane, 237' long, reinforced concrete girder bridge.	7,000	203,310.00	110,610	92,700.00	-----
11. Orangethorpe Ave. over the San Gabriel River, F. A. S. 737 (3): The construction of a 4-lane, 304' long, reinforced concrete girder bridge.	8,000	217,700.00	116,000	100,500.00	1,200.00
12. Beverly Blvd. over the Rio Hondo, F. A. S. 845 (2): The construction of a 4-lane, 142' long, reinforced concrete girder bridge together with 399' of 4-lane, steel and timber interim approaches.	13,100	400,000.00	215,000	-----	185,000.00
13. Center St. over the San Gabriel River, F. A. S. 835 (1): The construction of a 4-lane, 316' long, reinforced concrete girder bridge.	8,000	231,700.00	125,000	-----	106,700.00
14. Imperial Hwy. over the San Gabriel River, F. A. S. 636 (2): The construction of a 4-lane, 304' long, reinforced concrete girder bridge.	11,000	231,200.00	125,000	-----	106,200.00
15. Florence Ave. over the Rio Hondo, F. A. S. 838 (3): The construction of a 4-lane, 174' long, reinforced concrete girder bridge together with 237' of 4-lane steel and timber interim approaches.	17,300	291,500.00	73,317	71,725.27	146,457.73
*16. Washington Blvd. over the San Gabriel River and S.P.R.R., F. A. S. 635: The construction of a 4-lane, 309' long, reinforced concrete girder bridge and a 4-lane, 24' long, reinforced concrete rigid frame over the S.P.R.R. together with the necessary approaches.	20,000	455,000.00	130,000	-----	**325,000.00
*17. Rosecrans Ave. from Lakewood Blvd. to 1,500' east of Woodruff Ave., F. A. S. 840: The construction and resurfacing of 1.8 miles to a 4-lane pavement with 8' shoulders.	12,600	164,000.00	88,600	-----	75,400.00
*18. Valley Blvd. from Puente Ave. to 1,000' west of Hacienda Blvd., F. A. S. 852: The construction and resurfacing of 2.1 miles to a 4-lane pavement.	18,000	130,000.00	70,200	-----	59,800.00
*19. Slauson Ave. from Rosemead Blvd. to Montebello City Limits, F. A. S. 841: The construction of 0.9 mile of 4-lane pavement with 7'8" shoulders including a 4-lane, 495' long, reinforced concrete girder bridge across the Rio Hondo.	14,000	520,000.00	188,880	-----	331,120.00
Totals-----	-----	\$5,383,359.91	\$2,683,607	\$1,229,073.00	\$1,470,679.91

* Proposed projects in current F. A. S. program.

** Includes \$214,500 for participation by Southern Pacific Railroad.

minimized the bookkeeping and records for the individual projects. Specialized inspection and testing was performed by the Division of Highways upon the county's request when-

ever its existing facilities were located to conveniently perform this service. These operations included the testing of paint and structural steel as well as the shop inspection of structural steel

fabrication. The design and construction engineering were performed by the county in close cooperation with the Division of Highways.



Bridge 3—Bridge on San Gabriel Canyon Road (F. A. S. Route 825) over North Fork of San Gabriel River

County Spends Millions

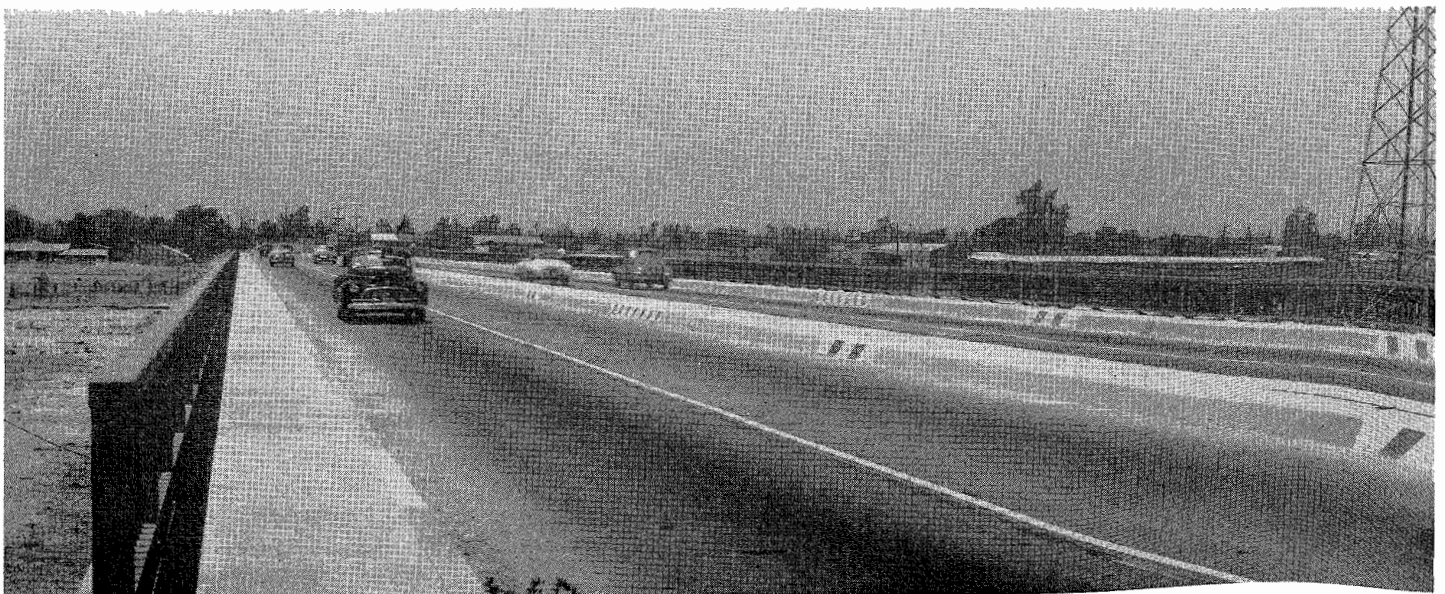
This coordination and high degree of cooperation between the Division of Highways, the County of Los Angeles, and the Bureau of Public Roads in the planning, design, and construction of these 15 federal aid secondary projects have resulted in work of the highest caliber. These projects represent about 52 percent of the funds expended since 1945 on federal aid secondary routes within the County of Los Angeles. The actual road net-

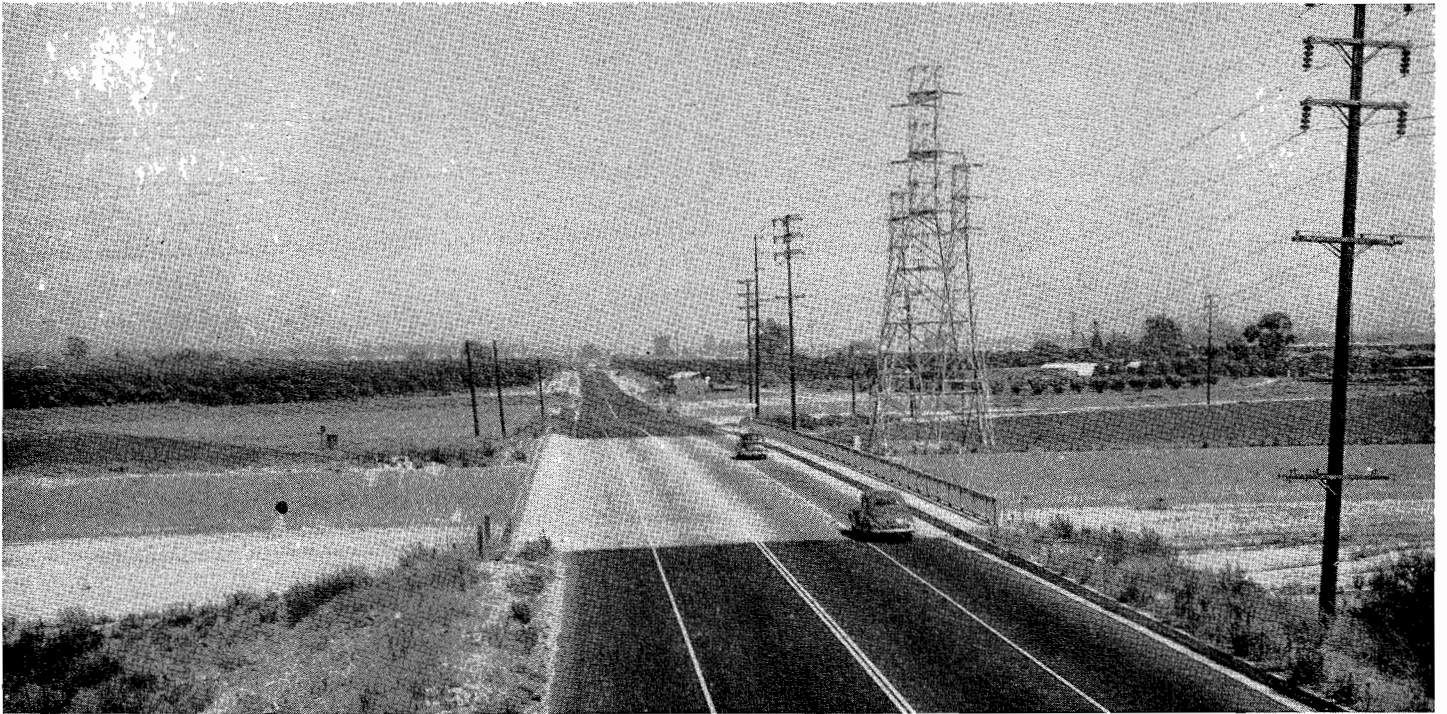
work deficiencies on the federal aid secondary system within the county have been so extensive that numerous additional projects were constructed entirely with county funds. The high degree with which the federal aid secondary program was integrated into the county-wide road network is clearly demonstrated by the fact that the county, without federal aid, financed and expended almost \$6,000,000 on federal aid secondary routes or extensions of federal aid secondary

routes for new construction since 1945. The above figure does not include funds expended for maintenance, street lighting, or traffic safety signal installations.

Chart II delineates these county projects together with the county projects proposed to be constructed by 1955. Included in *Chart II* are the limits of the projects, the construction cost or estimate, the federal aid secondary route, or federal aid secondary project which initiated the project or

Bridge 5—Four-lane divided highway bridge over San Gabriel River on Valley Boulevard (F. A. S. Route 852)





Bridge 8—Bridge over San Gabriel River on Florence Avenue (F. A. S. Route 838)

improvement which the county project carries through.

Program Achieves Purpose

A comparison and examination of the map and *Charts I and II* clearly

demonstrates that the federal aid secondary program in the County of Los Angeles has achieved its purpose. It is doing much toward furthering the program of developing and improving a definite system of secondary feeder

roads within the county. This progress may be attributed to the fact that the federal aid secondary program requires a defined system of roads, sets minimum design and construction standards, and furnishes funds to assist in the

Bridge 13—Old narrow bridge over San Gabriel River on Center Street (F. A. S. Route 835) with new four-lane reinforced concrete bridge under construction on right



CHART II
COUNTY PROJECTS ON F. A. S. ROUTES
JOBS COMPLETED SINCE 1945

Name	F. A. S. route	Limits	Construction cost
Arrow Highway	849	Azusa Canyon Rd.—Irwindale Ave.	\$36,382.35
Arrow Highway	849	Bridge over Little Dalton Wash	62,900.00
Arrow Highway	849	Bridge over Sawpit Wash	94,065.00
Arrow Highway	849	Longden Ave.—Azusa Canyon Rd.	165,961.63
*Camp Baldy Rd.	831	½ mi. E. of Padua Ave. to Camp Baldy	1,050,000.00
Center St.	835	Downey Ave.—Clark Ave.	83,754.60
Center St.	835	Paramount Blvd.—Downey Ave.	61,279.43
Cherry Ave.	836	South St.—Carson St.	186,329.89
Duarte Rd.	848	Bridge over Sawpit Wash	33,467.00
Florence Ave.	838 (1)	Los Angeles River Bridge approaches	92,421.46
Florence Ave.	838 (2)	San Gabriel River Bridge approaches	88,025.45
*Imperial Highway	636	Bridge over Los Angeles River	502,567.00
*Imperial Highway	636	Los Angeles River Bridge approaches	62,022.65
Live Oak Ave.	849	El Monte Ave.—Peek Rd.	75,603.76
Lower Azusa Rd.	850	At Peek Rd.	15,000.00
Orangethorpe Ave.	737	Bridge over Coyote Creek	179,753.30
Paramount Blvd.	837	Florence Ave.—Telegraph Rd.	73,567.94
Peek Rd.	857	At Lower Azusa Rd.	50,000.00
*Peek Rd.	857	Garvey Ave.—Durfee Ave.	163,972.46
*Rosecrans Ave.	840	Bridge over Los Angeles River	1,110,000.00
Rosecrans Ave.	840 (1)	San Gabriel River Bridge approaches	54,982.62
*Rosecrans Ave.	840	Temple St.—Atlantic Ave.	107,728.61
Slauson Ave.	844	Garfield Ave.—Telegraph Rd.	127,367.15
Slauson Ave.	844	Garfield Ave.—Los Angeles River	80,850.59
Santa Fe Ave.	834	Carson St.—U.P.R.R.	16,283.70
Santa Fe Ave.	834	Dominguez St.—Del Amo Blvd.	90,798.80
*Santa Fe Ave.	834	Independence Ave.—Laurel St.	61,889.50
Soledad Canyon Rd.	830	Bridge over Nelson Ranch cattle pass	34,144.48
*Soledad Canyon Rd.	830	Santa Clara River Bridge—Sierra Highway	800,000.00
Valley Blvd.	852	Garvey Blvd.—Puente Ave.	79,730.26
Valley Blvd.	852	Lemon Ave.—La Puente Ave.	77,433.65
Valley Blvd.	852	Pomona Blvd.—Bellevue Ave.	112,181.06
*Washington Blvd.	635	Atlantic Ave.—City limits of Vernon	122,744.35
*Washington Blvd.	635	Atlantic Ave.—Eastern Ave.	9,136.14
*Washington Blvd.	635	U.P.R.R.—City limits of Vernon	29,079.85
Total			\$5,991,424.68

* Extension of F. A. S. route.
** Under construction.

PROJECTS PROPOSED FOR CONSTRUCTION BY 1955

Name	F. A. S. route	Limits	Construction cost
Arrow Highway	849	Irwindale Ave.—Azusa Ave.	\$211,000.00
Beverly Blvd.	845 (1)	Rosemead Blvd.—U.P.R.R.	350,000.00
Beverly Blvd.	845 (2)	Rosemead Blvd.—Bluff Rd.	350,000.00
Center St.	835 (1)	San Gabriel River Bridge approaches	170,000.00
Florence Ave.	838 (3)	Rio Hondo Bridge approaches	135,000.00
Florence Ave.	838	Eastern Ave.—Emil Ave.	170,000.00
Imperial Highway	636	Lakewood Blvd.—Downey Ave.	72,000.00
Imperial Highway	636 (2)	San Gabriel River Bridge approaches	174,000.00
Orangethorpe Ave.	737	Coyote Creek Bridge approaches	10,000.00
Orangethorpe Ave.	737	Palo Verde Ave.—Studebaker Rd.	100,000.00
Orangethorpe Ave.	737 (3)	San Gabriel River Bridge approaches	65,000.00
Rosecrans Ave.	840	Lakewood Blvd.—Garfield Ave.	125,000.00
Rosecrans Ave.	840	Los Angeles River Bridge approaches	175,000.00
Santa Fe Ave.	834	Artesia Ave.—Del Amo Blvd.	330,000.00
Slauson Ave.	844	San Gabriel River Bridge and approaches	350,000.00
Spring St.	751 (1)	San Gabriel River Bridge approaches	90,000.00
Valley Blvd.	852	Baja Ave.—Lemon Ave.	55,000.00
Valley Blvd.	852	Baja Ave.—Hacienda Blvd.	210,000.00
Valley Blvd.	852	Thru Puente	10,000.00
Total			\$3,152,000.00

construction of definite authorized projects. Of the more than 4,500 miles of county roads and highways, only about 310 miles or about 7 percent is incorporated in the federal aid secondary system.

On this 7 percent of county highways, there has been expended for new construction since 1945, approximately \$2,200,000 federal funds; \$1,200,000 state funds; and \$4,500,000 county funds. The county further proposes to expend for new construction during the next three years

In Memoriam

MICHAEL N. DOBROTIN

Michael N. Dobrotin, a member of the office staff of District VII, Division of Highways, for over 12 years, died on November 3, 1951, at the Queen of the Angels Hospital in Los Angeles, after a long illness.

Mike, as he was known to all his friends, was a very soft-spoken, quiet individual, whose personal history reads like an adventure story. Born in Danilov, Russia, in 1896, he was educated in Yaroslavl grade and high schools and at the Karkov Institute of Forestry. This was in 1916, and after a year in a military school, he became a lieutenant in the tsar's artillery. After the fall of the Kerensky regime Mike retreated with the "White" forces into Siberia. For about a year he worked as a forester at Perm, but finally was forced to flee Russia and went to Harbin in Manchuria. Here he was employed by the Chinese Eastern Railroad as an engineering draftsman. By 1925 he had made his way via China proper to the United States.

Before coming to the Division of Highways Mike worked for the Yuba Dredge Manufacturing Co., the Southern Pacific Railroad, the University of California, and the U. S. Forest Service. He took time out from work to secure a B.S. degree from California in 1933. All of his state service was with District VII.

He is survived by his widow, Katharine, and two sons, Mischa, an engineering student at the University of Southern California, and Boris, studying agriculture at California Polytechnic College at San Luis Obispo.

on F. A. S. routes and extensions of F. A. S. routes \$3,000,000 county funds in addition to any federal aid secondary funds which may become available during that period. The expenditure of these contemplated funds will materially improve the federal aid secondary system within the county. However, even this large expenditure will not bring up to required standards the entire F. A. S. system. Many times the amount expended and many times the amount proposed to be expended could be efficiently used in improving and developing this system of essential and highly traveled feeder roads.

Wanton Damage

*Overloaded Logging Trucks
Destroying Northern Highways*

By F. WALTER SANDELIN, Member, California Highway Commission

ANY PERSON who will take the trouble to investigate, will find that a district engineer for the Division of Highways does not live a life of ease and contentment.

Practically every one of our district engineers is a combination of Solomon for his wisdom and a practical person for his ability to keep everybody in his district seemingly satisfied. He has one standard excuse when somebody asks him why he doesn't do a certain job. His answer is that the Highway Commission won't vote the money for the job.

To find out just what was going on in District I, it was my pleasure, not so long ago, to take a two-and-a-half-day trip with A. M. "Pete" Nash, our

district engineer whose headquarters are in Eureka. After meeting Nash my dunnage was transferred to his car and we were off for Crescent City.

Heavy Logging Traffic

One of the phases of our highway work is the building of roads that will stand up under legal loads. In traveling to Crescent City from Eureka one is immediately struck with the idea "where are all the logs going?" Truckers are hauling logs in both directions. So I had to ask "Pete" the big question of "Why?"

Nash tells me that there are so many mills in his section of California and so many loggers cutting timber that it seems no one has a short haul. All the

hauls would seem to be some place else but where the timber is cut. Later on I was to find out more about this.

The next morning we started out on U. S. 199. This is the highway between Crescent City, Cal., and Grants Pass, Ore. It's a fine road and one upon which plenty of scenic beauty abounds.

Huge Slide

About one mile south of Idlewild we came upon the location of a "big slide" which came into the highway last winter. Here about 30,000 cubic yards of dirt and rock slid down the hillside and covered the highway. It took three weeks to remove the slide, but that did not put the road back in

The driver of this overloaded truck is hiding out off the highway awaiting a time when an officer of the California Highway Patrol and the weigher at the Division of Highways scales depart



condition. From the Contingency Fund the money was voted by the Highway Commission to repave this particular section. The contract was advertised for bids the last of May and the job should be done sometime this summer.

Just beyond the slide we turned around and retraced our tracks to Crescent City and continued south on U. S. 101. While driving along we noticed, and passed, several unusually large loads of logs and several loads of lumber. The State has recently completed a new pit scale adjacent to the highway at Dows Prairie, to provide the Highway Patrol with a better means of intercepting overlegal loads, and it was our good fortune to see the initial use of this scale for the purpose intended.

Scales in Operation

When we pulled up at the scale we found that the Sealer of Weights and Measures was there and had just checked the scale and declared that it was perfect and could be put into operation. The sergeant of the California Highway Patrol in charge of commercial enforcement in this territory and an officer were also there, as was the resident engineer who supervised the construction of the scales. Nash informed them of the large loads we had passed, so the sergeant and his assistant declared the scales open for business. Of the first three truckloads weighed, two were 'way overweight. The sergeant immediately gave the drivers tickets.

Just to show you how close those fellows can load, when they want to, I copied several results of the weighing operations. One truck and trailer which legally can carry 76,000 pounds, weighed in at 76,880 pounds. The law is so written that a truck has a leeway of 1,000 pounds over specified weight. Another truck weighed 76,940 pounds. And a truck whose limit is supposed to be 72,000, weighed in at 72,900 pounds.

No wonder our highways are going to pieces in Del Norte, Humboldt and Mendocino Counties.

Overloads Do Great Damage

While damage from overloads on the Redwood Highway has its serious aspects, the effects of these heavy loads on the bridges and traveled way of the "feeder"

highways in the northwestern part of the State is even more devastating. The cross-roads, as I call them, were not built for the vast amount of heavy trucking that they are now carrying. Originally, the main purpose of these roads was for recreational service and to serve the few people who settled in the mountains.

In the old days of logging, the loggers built railroads to get their logs to market. But with the development of the present-day modern heavy-duty truck, during the past few years all logging is now done with these vehicles. The loads are now being carried on our highways and many of our highways in the timber areas are being broken down due to the greediness of those contract log haulers who have no respect or consideration for legal weight limits.

Log Haulers Selfish

The contract log haulers get paid for the total board feet of timber they carry, and too many of them don't seem to care whether we have highways in California or not. Just as long as they get their logs out to the mill and get paid for the job they seem satisfied.

There are some operations where the men running them know that our highways are not capable of standing up under such abuse and they have ordered their truckers to stay within the law regarding their loads. But this kind of operators are few and far between.

After weighing some dozen or so loads we noticed that there were no more coming down the highway. Knowing that the word had been passed by the northbound trucks, we knew it was no use staying there unless we wanted to stay all night. As soon as a trucker signals a scale open and working, all overloads headed that way pull off to the side of the road and lie "doggo" until they get the signal that all is clear. The only way to catch all of the "overloaders" is to have sufficient crews on the job so that the scales can be manned around the clock.

Big Gold Haul

After leaving the scales we headed south as we were going to go over U. S. 299. This is the highway that goes east a few miles north of Arcata and leads across the mountains to

Redding. We have just installed a new scale on this road, but it was not open for service so we did not stop there.

You know many of our highways have historically interesting stories connected with them. Nash showed me the evidence of an old tunnel at Big French Creek, where the Trinity River makes a big bend. The story is that many years ago four men dug this tunnel across the bend and then damned the river during the low water season. The water was diverted through the tunnel and it is related the four men took \$400,000 in gold from the bed of the river in a matter of a month.

Logging Poses Problems

The logging industry is very busy on this road, as they are on all roads in our northern counties. The way some of them are logging cannot help but pose serious problems for the future, not only to the Division of Highways, but to others as well.

Before the loggers cut all the trees, rain had a chance to soak into the ground. But with the denuding of the hills of all forest growth, mountain rain water is going to run off the hill-sides and cause erosion as well as a lot of high water in all the streams, in the future. This will, no doubt, react to the detriment of our highways in more ways than one.

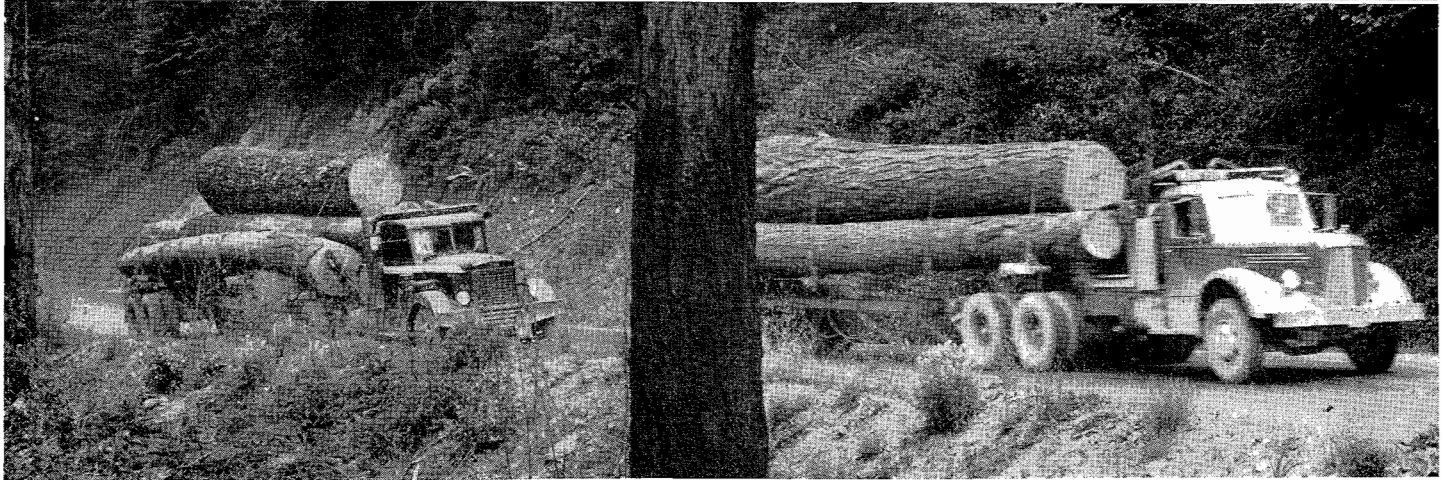
Tuesday evening we spent at our Convict Camp No. 36 at Burnt Ranch. Dinner and breakfast were both good meals and the guest cabin is well arranged and has comfortable beds.

On to Weaverville

Wednesday morning we were up bright and early and on our way to Weaverville. Here we turned south through Douglas City, Hayfork and Peanut; then west over a state highway known as State Route 35. Portions of this road from Bridgeville west have caused much controversy, not only in that neighborhood but all over District 1.

The State Forestry Department and the United States Government have stated that one of the greatest stands of uncut timber is tributary to this road. Many timber operators have started operations in the areas contiguous to this highway during the last

... Continued on page 18



UPPER—Heavily loaded lumber truck kicks up dust on Sign Route 36 in Humboldt County. CENTER—Van Duzen River Bridge damaged by logging trucks. LOWER—Logging trucks on U. S. 299.

Gyroscopic Equipment For Alignment, Grade Surveys

By JAMES T. McWILLIAM, Assistant Highway Engineer

A GOOD DEAL of experimentation and research has been carried on by the California Highway Planning Survey section of the Department of Public Works in conjunction with the Sperry Gyroscope Company of San Francisco with the purpose of developing an instrument and technique that would measure and calculate data concerning alignment and grades on existing roads accurately and rapidly.

The need for such an instrument was occasioned by a request in 1947 by the Bureau of Public Roads that the department cooperate in testing a sight distance and curvature manual proposed by them. This manual among other things proposed that curve radii and degree of central angle data be furnished. The manual also proposed that data be collected to show length and percent of grade for the various grades.

Such an instrument and an operational technique have been devised that seems to have some promise in the field of rapid surveying.

The Gyro Car

The instrument is in brief a station wagon (See Appendix D) equipped with an *odometer*, reading to the thousandth mile and two *gyroscopes*, one horizontally and one vertically installed that make possible the measurement of azimuths to the nearest degree and the measurement of grades and superelevations to the nearest percent.

The *odometer* works from a junction off the regular speedometer connection and has the desirable qualities of a reset, preset and a backup registering dial. It was devised and installed by the firm of Roy DeMartini Speedometer Sales and Service Company of Sacramento.

The *horizontal gyroscope* or the "Gyrosyn" as it is termed in the trade, is so devised that it indicates azimuth to the nearest degree. It has a declination adjustment so that for a given

Since the preparation of the accompanying report on the development of gyroscopic equipment and its use in making rapid surveys, the Division of Highways "gyro car" has been in almost constant operation throughout the State.

More than 3,000 miles of state highway have been surveyed by means of this equipment in a period of a few months, and surveys of another 5,500 miles are under way or scheduled. The grade and alignment data thus rapidly obtained are being made available to the Automotive Safety Foundation for inclusion in the study of California highway deficiencies which the foundation is making for the California Legislature.

locality it can be set to register true azimuths. A "flux valve" mechanism keeps it from precessing from the true reading by causing magnetic lines of force to be applied against the proper gimbal of the gyro thereby continually "slaving" or bringing the gyro axis back to its relationship to the earth's magnetic field.

Vertical Gyroscope

The *vertical gyroscope* is an adaptation of that used in the automatic landing control mechanism of aircraft, more particularly described as the "A-12 Precision Gyropilot." The phenomenon of precession in this gyro is controlled by two level bubbles mounted parallel to each of the two gimbals of the gyro. Through a system of induced voltages, current is caused to be circuited through two finely adjusted voltmeters when the car body deviates from the horizontal plane. The amount of the deviation is measured in percent of grade and superelevation.

These two gyroscopes were installed by the Sperry Gyroscope Company of San Francisco, under the supervision of the Aeronautical Service Depart-

ment of that company headed by Norman Thompson.

Combination of Three Instruments

A combination of these three instruments, the *odometer*, the *gyrosyn*, and the *vertical gyroscope* make possible the measurement of:

1. Distances to the nearest 1/1000 mile,
2. Azimuths to the nearest degree, and
3. Grades and superelevations to the nearest percent.

Supplementary installations in the vehicle consist of:

1. A 110-volt 750-watt generator to furnish the electrical current necessary to run the gyros,
2. A converter to change the cycle of the electric current from 60 to 400,
3. A voltage regulator to guarantee a steady flow of current to the registering dials,
4. Two inclinometer tubes to make initial settings of the vertical gyro and to make possible quick intermediate checks at frequent stops, and
5. An aiming device installed on the front bumper to aid in setting the car in the correct position for an azimuth or generalized grade reading.

Recordings Taken

In the operation of the vehicle, recordings are taken that indicate:

1. The *odometer* location of the beginnings and endings of all curves and tangent sections,
2. The azimuth reading of each tangent and at points of compounding or reversing of curves,
3. The superelevation of each curve encountered,
4. The *odometer* location of the estimated points of intersection of extended grades,
5. The percent of grade between those points, and
6. Such notes as may be judged necessary for the use of the draftsman in delineating the final line traversed.

These notes are given to the Planning Survey's IBM Section where they are processed mechanically and

tabulations made that show in addition to the recorded data the following:

1. Azimuth of the chord of the curve in degrees and half degrees.
2. Central angle of curves in degrees.
3. Intervening distances, i.e., lengths of tangents or curves in 1/1000 miles.
4. Lengths of chords of curves in 1/1000 miles.
5. Radii of curves in feet.
6. Safe driving speeds on curves in miles per hour.
7. Progressive departures or X coordinate values (eastings or westings) in 1/1000 miles.
8. Progressive latitudes or Y coordinate values (northings or southings) in 1/1000 miles.
9. Grade profile or elevations in tenths of feet.

The data above are then plotted on 10 x 10 cross-section paper at a scale of usually 10 inches equals one mile and the result is a plan and profile of the traversed road limited only to the degree of accuracy the fundamental instruments are designed to give.

What Experience Shows

Experience gained in the operation of this vehicle over about 3,000 miles of roads indicates that:

1. Accuracies of 0.2 percent can be reliably expected in the odometer distances taken.
2. Accuracies of from 0.5 percent to 0.9 percent may be reliably expected on the closure of traverses calculated. (By the application of a factor in the IBM processes the error of closure can be eliminated.)
3. Grades can be reliably estimated to within one-half of 1 percent.
4. The field operation phase can be done at a rate of about five miles per hour.
5. The combined costs of operating the equipment in the field and of processing the field notes mechanically are well under \$10 per mile of road traversed.
6. The time taken to plot the IBM tabulations and to trace to a reproducible copy, varies a good deal depending on the topography. Early figures indicate that a mile can be plotted and tracings made in about three hours.

Accuracy of Results

The accuracy of the results of the gyro traverse, which is the name given



this technique, indicates that it compares favorably with the accuracies that might be expected of the more formal method of stadia traverse. An experimental project comprising 406 miles of gyro traversing conducted in San Bernardino County showed that data could be taken in the field, delivered to the IBM Section for processing and a usable plot prepared within a period of four days. In regard to the IBM processing, the larger the project the greater the speed that can be attained on a per mile basis as this processing lends itself to handling of mass data.

Uses of this technique have so far been confined to the preparation of a plan and profile plot of such state highways that have never been formally surveyed; to the establishing of a key net of roads within a county which forms the basic net in road inventory procedures; and to furnish quick statistical data concerning alignment and grades on certain routes that can be obtained at much less expense and time than that required to review the existing plans.

The equipment has just recently concluded a project that required traversing the greater part of the rural highways in the State. This project

encompassed the collecting of basic alignment and grade data on about 10,000 miles of highways which are to be used in determining horizontal and vertical restrictions due to the alignment and grade characteristics of the road.

It is anticipated that new uses will develop as the existence of the vehicle and the technique is made known on a broader basis. Up to the present, its operation has been confined to the Planning Survey section necessarily in order to establish an operational procedure, to test its accuracy and determine basic costs, and, all in all, to determine the practicality of the instrument and its attendant technique.

Description of Basic Instruments

A. THE ODOMETER

The odometer designed for and installed in the gyroscopic equipment vehicle (*See Appendix D*) is merely a revolution counter turned by a cable off a junction with the regular speedometer cable. It is geared so that it registers each time the car goes through 5.28 feet or one-thousandth mile of distance. It has a five digit registering dial hence it can register a distance up to 99.999 miles. It can be manually set to any predetermined figure as well as

reset to zero. It also is reversing, that is, it will subtract when the car is backed up. This is useful for cases occur where a mileage reading is left out or a position is overrun and when discovered merely backing up will establish it.

Tests made in regard to tire pressure, operating temperature and tire slippage indicate that accuracies of horizontal distance could be kept around two-tenths of 1 percent. Greater accuracies could be achieved in all likelihood by using a fifth wheel where these factors would be minimized. The inconvenience of attending such a device was considered to outweigh the advantages of the additional accuracy likely to be attained.

The odometer used was designed and installed by the Roy DeMartini Speedometer Sales and Service Company of Sacramento, and it has developed no problems of maintenance in its operation to date.

B. GYROSYN OR HORIZONTAL GYROSCOPE

The horizontal gyroscope or "Gyrosyn" is the instrument that has been selected for measuring azimuth, that is indicating the direction of travel. (See *Appendix D.*) It operates on 115 volts, 400-cycle A.C., 3-phase current and 28 volts of D.C. It takes 28 watts of A.C. and 20 watts of D.C. Its rotor spins at near 24,000 r.p.m. A perfect gyroscope—that is one where all friction is reduced to zero and perfect balance is achieved—will maintain its axis of rotation fixed in relation to its position in space. This frictionless and perfectly balanced gyro obviously is not possible of attainment. Friction and unbalance ever so little as it might be causes a gyroscope to precess, that is, move its axis to counteract those forces.

This leads to the necessity of applying certain controls on the instrument in order to cause its axis to remain fixed. The earth's magnetic field furnishes a very handy reference to use for this purpose. It is relatively static and bears a constant relationship to true north within the area of any project we are likely to devise.

The Flux Valve

Just how the gyro rotor axis is caused to keep its alignment fixed in



relation to the earth's magnetic field is understandable generally only to those with a more than ordinary knowledge of electricity so its detail will be covered but sketchily here. The *flux valve* or the ball that is mounted about three feet above the top of the vehicle contains the instrument that accomplishes this. (See *Appendix D.*) It senses the earth's magnetic field and transmits it to a signal selsyn in the gyro housing, that in turn, electrically causes a force to be applied to the proper gimbal forcing the axis of the rotor to align itself with the magnetic field.

When the axis is correctly oriented that fact is made known by what is called an annunciator that shows in the upper right corner of the face of the Gyrosyn. This annunciator alternates from a dot to a plus sign when the axis is aligned, indicating that forces are being applied on both sides of the gimbal alternately and in the same relative amount. This annunciator has a dual purpose—it not only indicates that gyro axis is aligned properly (by its alternating dot and plus) but it also indicates whether a field is being encountered where the magnetic lines of the earth are disrupted or abnormal. Such an abnormality will cause either

the dot or the plus sign to appear constantly, according to which way the new magnetic lines are causing the axis to be moving. When this situation exists or when it is feared that it might happen, the influence of the flux valve is cut off by means of a switch and when the disturbance is over, the flux valve influence is cut back in and a check is made that the signal alternates before making further azimuth readings.

Friction and Unbalance

While running with the control cut off the gyro will precess at a rate proportional to its friction and unbalance. However, this rate is reduced by proper maintenance to be less than roughly one-half degree in five minutes. This causes little concern for the areas of abnormal influences of the earth's magnetic lines are not large and are passed through rather quickly.

C. THE VERTICAL GYROSCOPE

The installation and operation of the Vertical Gyroscope posed greater problems than did that of the Horizontal Gyroscope. (See *Appendix D.*) For one thing, it was desired that the grade and superelevation be recorded

in percent. This is equivalent to reading an angle of less than half a degree ($45^\circ=100$ percent). The gyro axis is but some three inches long, and half degree of movement means about 0.01 inch in actual displacement.

Just as previously explained, a perfect gyro is not possible of attainment. Friction, and unbalance forces, tend to move its axis of rotation. We must apply controls on the vertical gyro to keep its axis plumb, or it is the deviation of the plane normal to the plumb that gives the grade and super readings.

Mounted on the top of the gyro axis gimbals are *two level bubbles*, one on the long axis of the car and the other at right angles to it. These bubbles are bridged with an electric current, that is, an electric terminal is drawn out of each end and another terminal is drawn from the middle. The liquid in the level tube is a conductor of electricity and as long as the bubble remains center an equal amount of current flows from the center terminal to either of the end terminals. However, when the bubble is displaced—one side or the other—more current flows through the terminal away from the bubble. This causes a force to be applied to the proper gimbal to erect the axis and bring it back to the vertical. There is no way of detecting whether the vertical reference is truly vertical or not. This gyro is housed in a metal case and the operation of it cannot be observed. And, if it could be observed, it is not likely that one could detect what would be an appreciable error in this vertical reference.

Bubbles on Gyro Gimbal

Conceivably, if the two bubbles explained were depended upon solely to keep the gyro axis plumb then situations of acceleration and deceleration, or turning curves with the incident lateral forces would cause disturbances that would tend to force the vertical axis out of plumb. To take care of these conditions another set of bubbles parallel to the two mentioned are placed on the same gyro gimbal. These bubbles when molested by acceleration or deceleration or lateral turning forces cause a relay to be tripped which cuts out the effect of the primary control bubbles and the gyro

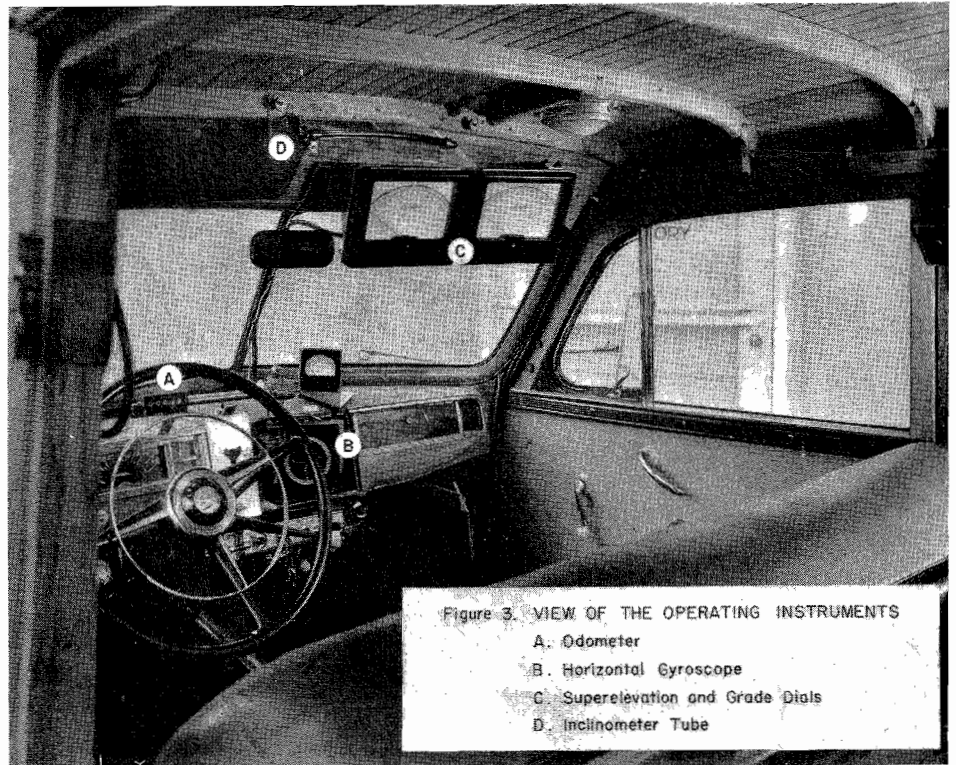


Figure 3. VIEW OF THE OPERATING INSTRUMENTS

- A. Odometer
- B. Horizontal Gyroscope
- C. Super-elevation and Grade Dials
- D. Inclinometer Tube

runs free for the period during which that situation exists. And, as before when running free, the gyro precesses according to friction and unbalance forces. The conditions that cause these disturbances exist for periods of very short duration when it is realized that the rate of travel is around 5 to 10 miles per hour.

It is necessary to take all the *spring action* out of the vehicle to get true grade and super readings. If this were not done, variations of loading would change the car body with respect to the axles and readings of grade and super-elevation would be appreciably in error.

When the spring action is taken out of the car the vibration is necessarily increased, making it harder to take notes and limiting the roads over which the vehicle can be operated.

FIELD OPERATION

Two men operate the equipment in the field. The party chief acts as driver and selects all the points at which observations are to be made. At these points he reads the various instruments and the assistant records all the data on a form (*Appendix A*) especially designed so that subsequent IBM procedures are facilitated. The

manner in which this field work is accomplished is roughly as follows:

The general information such as road description, date, personnel, time, etc., are recorded in the "notes" section of the form; the odometer is set to zero and movement is started forward. As each change of alignment detail is encountered, the odometer position of that change, the identifying code describing the change, and the azimuth of the new direction is recorded in the proper column of the form. In regard to curves the odometer position of their beginning and the proper code that is CR or CL indicating a right curve or a left curve and an entry in the super-elevation column is made.

In respect to grades, the odometer position of the estimated intersection of the grades extended is recorded, but the actual grade is not read for that position until the maximum or minimum grade is reached. This gives information needed to roughly calculate the elevation at any point along the route. It has been found difficult to identify beginnings and endings of vertical curves and there is no quick way of calculating the elevation of points on them.

In order to properly orient the traverses the position of every available *triangulation station* encountered is noted. In fact, special traverses are run to such positions if they are not too far out of the way. Triangulation stations are known geodetic positions established by precise survey methods. Locations of and data from all *bench marks* are also recorded. These serve to give an idea of the accuracy of the work done in the vertical sense.

THE IBM PHASE OF THE GYRO SURVEY OPERATION

In order to make the gyro type survey a practical procedure, it is necessary to devise a mass mechanical method of calculating the field notes of the traverses. When it is considered that 680 miles of traverses taken in Humboldt County meant the taking of 24,000± observations, their calculation by ordinary methods would take quite a time. A short cut method has been devised such that roughly within a week a tabulation showing certain data can be produced. This tabulation includes a great deal of information, most of which is mechanically calculated from the notes as shown on the field sheet form of *Appendix A*. For instance, machine processes give the—

1. Azimuth of the chord,
2. Central angle of curve,
3. Intervening distance,
4. Length of chord of curve,
5. Radius of curve,
6. Safe driving speed on curves,
7. Departures or X values,
8. Latitudes or Y values and,
9. Elevations in feet.

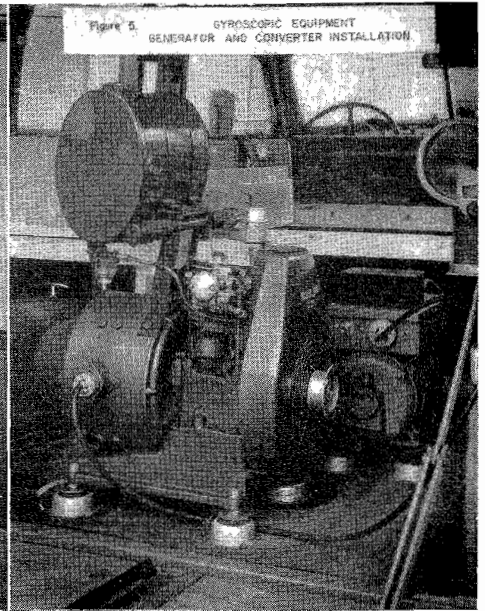
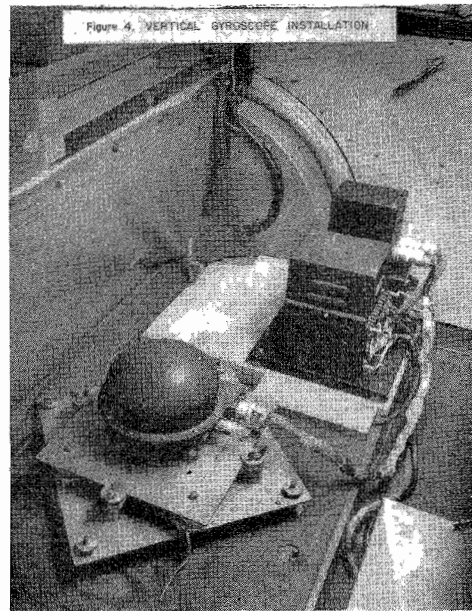
—all from the field note detail. *Appendix B* shows the form upon which this is printed.

Without going into too much technical detail of just how these calculations are done on the machines, a brief review of each one is outlined.

1. THE AZIMUTH OF THE CHORD

The azimuth of the chord is gotten by adding to that azimuth at the beginning of a curve, the azimuth upon leaving, and then dividing by two.

There are certain complications that enter into the picture when the entering azimuth and the leaving azimuth are on opposite sides of zero or 360 degrees. These complications are not



great and it is only necessary to add 360 degrees to the azimuths and then divide by two. Cases where the angular turn is greater than 180 degrees are relatively few and are handled manually.

2. CENTRAL ANGLE OF CURVE

The central angle of the curve is gotten merely by subtracting the two

azimuths, the entering azimuth and the leaving azimuth. Again special consideration must be made for the central angle that embraces the transition from 360 degrees to zero degrees.

3. INTERVENING DISTANCE

Intervening distance is gotten by subtracting the beginning odometer

CALIFORNIA STATEWIDE HIGHWAY PLANNING SURVEY
GRADE AND ALIGNMENT SURVEY

CHPS RA 111		CHIEF <i>MCW</i>		RECORDER <i>RJM</i>		TIME OF BEGINNING	DATE	SHEET <u>1</u> OF <u>8</u>	
ROAD DESCRIPTION <i>Hum 1 K</i>		BEGINNING ODOMETER	ENDING ODOMETER	GRADE	ALIGN. CODE	AZIMUTH	CENTRAL ANGLE	SUPER ELEVATION	
NOTES	SEQUENCE NUMBER								
<i>TRAVERSE NO 34</i>	<i>1</i>								
<i>NORTH ON HUM 1 K</i>	<i>2</i>								
<i>TIME 1300 23 MAY 51</i>	<i>3</i>								
<i>MCW MARTIN</i>	<i>4</i>								
<i>COOL CLOUDY</i>	<i>5</i>								
<i>ALIGNMENT TRUE</i>	<i>6</i>								
<i>BEGIN SEC HUM 1 K</i>	<i>7</i>								
<i>AT ODOMETER 1998.3</i>	<i>8</i>								
<i>OF TRAVERSE NO 33</i>	<i>9</i>	<i>00.000</i>							
		<i>.000</i>			<i>LL</i>	<i>96</i>			
		<i>.060</i>			<i>0</i>	<i>CL</i>			<i>6L</i>
		<i>.618</i>		<i>-1</i>	<i>T</i>	<i>89</i>			
<i>ORICK</i>		<i>.640</i>							
<i>HWY MTCR STA ON RT</i>		<i>.665</i>			<i>CL</i>				<i>6L</i>
		<i>.790</i>			<i>T</i>	<i>40</i>			
		<i>.885</i>			<i>CL</i>				<i>2L</i>
		<i>.925</i>		<i>+2</i>					
<i>BR 4 28 REDWOOD CR</i>	<i>1</i>	<i>.992</i>							
<i>USCGS BM J74</i>	<i>2</i>								
<i>ELEV 33 FT</i>	<i>3</i>								
<i>BEGIN TRUSS</i>		<i>1.024</i>			<i>T</i>	<i>05</i>			
<i>END TRUSS</i>		<i>1.070</i>							
		<i>1.075</i>		<i>-6</i>	<i>CR</i>				<i>3R</i>
<i>END BR</i>		<i>1.115</i>							
		<i>1.157</i>		<i>-1</i>	<i>T</i>	<i>25</i>			
		<i>1.240</i>		<i>0</i>					
		<i>1.630</i>		<i>+2</i>	<i>CR</i>				<i>2R</i>
		<i>1.810</i>			<i>T</i>	<i>38</i>			

APPENDIX A

from the ending odometer of the recorded section concerned.

4. LENGTH OF CHORD OF CURVE

For every given central angle of a curve there is a definite ratio that the length of the chord bears to the arc or circular segment. By matching these ratios to the central angles by groups, mass calculations are made on the arcs or curve intervening distance, and the length of chord is established. This length is necessary in order to convert all points of recorded data to equivalent X and Y coordinate values.

5. SAFE DRIVING SPEEDS ON CURVES

The formula* for estimating safe driving speeds on curves might seem to pose difficulties in the IBM mechanical calculation machines. This is not so, for the 602 calculating punch machine can do an unbelievable number of additions, subtractions, multiplications and divisions, take the result and operate upon it etc., etc. This makes the calculation of the expression $\frac{R(S-0.16)}{.067}$ a very simple one. However, though it can be made to do it, the operation of extracting square root is not a practical operation for the number of curves that are encountered in a project. Instead the results are grouped and the proper speed is punched on cards by consulting a table of squares.

6. RADIUS OF CURVES

As in the chord length calculation there is a definite ratio for each central angle that expresses the relationship of the radius to the arc length. Like central angles are grouped, an operation is made on the arc length and the result is the radius.

7 AND 8. DEPARTURES AND LATITUDES OR X & Y COORDINATE EQUIVALENT LENGTH

At this stage of the procedure all travel has been reduced to equivalent straight lines of which the corresponding direction of travel is known. Knowing these distances and directions, all that is left to do is to apply the proper trigonometric function and

$$* V = \sqrt{\frac{R(S-0.16)}{.067}}$$

where V = Safe driving speed in m.p.h.
 R = Radius of curve in feet
 S = Superelevation in percent and
 0.16 = Friction factor.

GYROSCOPIC EQUIPMENT - ALIGNMENT AND GRADE SURVEY

Stationing	Remarks	Course	Angle		Distance		Latitude		Departure		Elevation	Curve Data	Remarks
			Interior	Exterior	By Chord	By Arc	By Chord	By Arc	By Chord	By Arc			
	TRAVERSE NOTES												
	TRAVERSE NO 34												
	NORTH ON HUM 1 K												
	TIME 1300 23 MAY 51												
	MCM MARTIN												
	COOL CLOUDY												
	ALIGNMENT TRIP												
	BEGIN SEC HUM 1 K												
	AT ODOMETER 199R3												
	OF TRAVERSE NO 33												
		LL	9.60										
		CL	92.5	7	6L	6.0		6.0	259.8	9.2			
60		T	8.90			55.8		55.8				80.834	89.078
61		T	8.90			55.8		55.8				81.384	89.088
61.8		T	8.90			2.2	1.5	2.2				81.406	89.088
64.0		T	8.90			2.2	1.5	2.2				81.430	89.088
66.5		CL	6.415	49	6L	12.5	1.5	11.21	7.71	5.0		81.538	89.140
79.0		T	4.00			9.5	1.5	9.5				81.598	89.213
88.5		CL	3.50	10	2L	4.0	1.5	4.0	12.09	5.7		81.621	89.246
92.5		LL	3.00				1.5						
92.5		CL	2.15	17	2L	6.7	2	6.7	11.93	5.7		81.641	89.308
99.2		BR	4.23										
99.2		USCCS	BH J74										
99.2		ELEV	35 FT										
99.2		LL	1.30				2						
102.4		CL	0.90	8	2L	3.2	2	3.2	12.09	5.7		81.646	89.340
102.4		T	0.50			4.6	2	4.6				81.650	89.316

APPENDIX B

reduce all the distances to the X (east west) equivalent and the Y (north south) equivalent. By tabulating a progressive total of these distances a scalable trace is gotten (expressed in 1/1000 mile coordinates) of the actual route covered.

Now in this respect, if the vehicle is brought back to the point of beginning, axiomatically it has gone as far east as it has west, or it has gone as far south as it has north, and the algebraic sum of the latitudes and departures should be zero. If it happens that this algebraic sum is not zero, then the difference or error is taken and applying a proper factor it can be distributed proportionately through all the legs of the traverse concerned.

9. ELEVATION IN FEET

A machine calculation that applies the grade against the distance traveled gives a figure representing the change of elevation between all points. These results can be accumulated and what is seen on the tabulation (*Appendix B*) is a grade profile of elevations expressed in tenths of feet.

DRAFTING THE FINAL TRAVERSE

The final phase of the series of events is that of drafting and tracing a reproducible copy. Coordinates of the trace are gotten from the furnished completed tabulation. These are plotted on 10 x 10 cross section paper usually at a scale of 10 inches to the mile. This

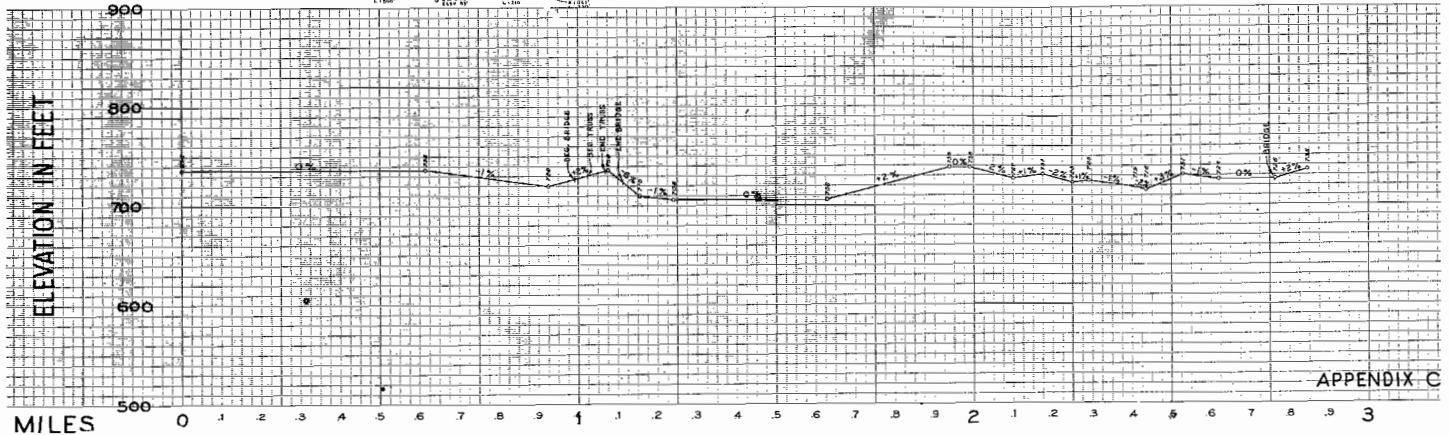
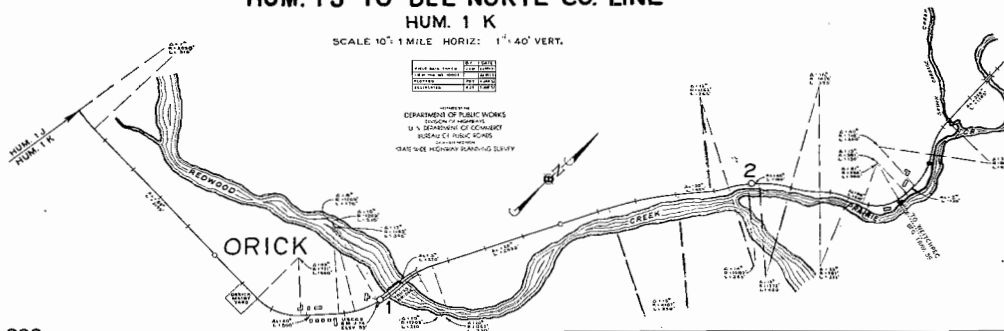
is a very convenient scale because the coordinate alignment positions are given in 1/1000 miles which makes each inch a tenth mile and each tenth inch a hundredth mile, etc. As each curve is encountered on the tabulation the radius is scaled off on dividers and the center of curve established. The curve is then drawn in on the hard copy. Tangents between proper points are drawn and topographic detail shown in the "notes" section of the tabulated traverse is delineated. The grade elevations are likewise plotted and plotted points connected. This resulting "hard copy" is then traced to convenient sheets embodying strips of complete administrative sections or is traced in sheets of standard size whichever is the most convenient for the use intended. An example of a print taken from a portion of one of the traverses is included as *Appendix C*.

SOME NOTES ON THE PRACTICAL APPLICATION OF THE GYRO SURVEY TRAVERSE TECHNIQUE

Some 3,000 miles of state highways and county roads have been gyro traversed using the techniques outlined in the body of the report. A large percentage of this mileage was traversed in order to assist the road inventory parties in establishing the proper alignment of roads on county maps. Some mileage was run in order to provide certain statistical detail for

GYRO TRAVERSE NO. 34
HUM. 1 J TO DEL NORTE CO. LINE
HUM. 1 K

SCALE 10" = 1 MILE HORIZ: 1" = 40' VERT.



APPENDIX C

APPENDIX C

special legislative reports. Still other mileage was run in a research sense.

The results of the operations are quite satisfactory as is shown by the horizontal closures obtained on several large closed circuits. It is interesting to note a few of these.

Circuit	Miles	Error	
		In miles	In % of total
Roseville-Lincoln-Newcastle No. 1	33.1	.04	.1
Roseville-Lincoln-Newcastle No. 2	33.1	.1	.3
Roseville-Lincoln-Newcastle No. 3	33.1	.1	.3
San Bernardino County No. 1	85.9	.4	.6
San Bernardino County No. 2	5.3	.1	2.1
San Bernardino County No. 3	29.3	.4	1.4
San Bernardino County No. 4	9.1	.1	.6
Humboldt County No. 1	123.2	1.4	1.2
Humboldt County No. 2	80.0	.4	.6
Humboldt County No. 3	38.5	.2	.6
Humboldt County No. 4	135.9	1.1	.8
Humboldt County No. 5	99.3	1.0	1.0
Humboldt County No. 6	136.1	.8	.6
Humboldt County No. 7	6.3	.1	1.6

It is noted that the percent of error of closure varies from 0.1 percent to 2.1 percent. The magnitude of these errors of closure should not be looked at with too much alarm as a factor can be introduced in the mechanical calculating process and they can be reduced as previously explained. However, such errors may occur or ac-

cumulate in traverses that are not closed. For these traverses, corrections can be made based on the established position of triangulation stations that may have been encountered. If such stations are not available, then the traverse should be run a second time either in the same direction or the reverse direction and a correction made based upon such a circuit.

In respect to the accuracy in regard to the taking of grades as outlined in the report, experience to date indicates gratifying results. On a portion of U. S. 101 that was run from the south to the north line of Humboldt County, a distance of 137 miles, a calculated difference of 38 feet in elevation from the true was noted. When the total 385 miles of U. S. 101 from San Francisco north to the Oregon state line was considered, the error in elevation between point of beginning at the Golden Gate Bridge (elevation 241 feet) and the U.S.G.S. Azimuth Mark Hytree in Del Norte County (elevation 63 feet) as registered by the gyro notes was an aggregate of 1,440 feet. The distance between these points is 374 miles.

Wanton Damage

Continued from page 10...

few years, including some of the largest mills in this territory. In addition, many new mills have been built along the westerly section of the highway between Alton and Bridgeville and are using the road for both log and lumber hauling.

One of the strange things to me is that several operators are hauling logs east, over the hump, to Red Bluff and other cities on U. S. Highway 99. We met several of these trucks and it was plainly evident that they were all overloaded.

Tricks of Trade

Nash stopped and talked to one logging superintendent and asked him why he was overloading and the superintendent asked if the load law held on secondary roads. That may give you an idea of how much attention some of those loggers are paying to our highways.

One of the loggers hauling east over the hump let a cat out of the bag. He told us that they stopped at some small

... Continued on page 43

Dr. L. I. Hewes Award for Outstanding Contribution to Highway Development



State Highway Engineer George T. McCoy, right, presents to James T. McWilliam, Assistant Highway Engineer, the Dr. L. I. Hewes award

THE WESTERN Association of State Highway Officials, meeting in Seattle in June, 1952, announced the first recipients of the Dr. L. I. Hewes award for outstanding contribution to western highway development. The award, established last year to honor the memory and achievements of the late Western Regional Chief of the U. S. Bureau of Public Roads, was shared by two men, one from the State of Washington and the other from California.

The California recipient was James T. McWilliam, Assistant Highway Engineer. His contribution to highway development which earned him the award plaque and half the annual \$500 prize which accompanies it was in connection with the use of gyroscopic equipment.

McWilliam Devised Methods

McWilliam was only one of several Planning Department staff engineers who participated in the development of the equipment and in perfecting its use in the field. His nomination for the Hewes award was based primarily on his devising and applying methods for using modern tabulating machines to process the field notes obtained with the gyroscopic equipment. The calculation of survey notes by tabulating machines instead of traditional methods made it possible to complete a rapid survey of a road in a matter of days instead of weeks.

Both his educational background and his experience provided the knowledge which McWilliam put to effective use in using tabulating machines for the survey computations. He has had more than 20 years of

experience in surveying and highway engineering work, and was graduated from the University of California with a bachelor of arts degree, with mathematics as his major.

McWilliam was born in Pleasant Grove, Sutter County, in 1909, and attended schools in his native county and in Sacramento. He was engaged in surveying between 1924 and 1930, and then entered the university. He was graduated in 1934, and in 1936 joined the California Division of Highways. After working in District X (Stockton) for a few years, he was transferred to Headquarters Office in 1939, and assigned to the state-wide highway planning survey. He has remained with that unit since, except for active military service from 1940 to 1947, most of it with an engineer topographic unit.

Major in Army Reserve

Currently he is a major in the 381st Engineer Maintenance and Supply Group, U. S. Army Reserve. Since May of this year, he has been assigned to work with the Automotive Safety Foundation staff which is conducting a survey of California highway needs and deficiencies under the supervision of the Legislature's Joint Fact-Finding Committee on Highways.

The award was accepted in Seattle on McWilliam's behalf by R. M. Gillis, Deputy State Highway Engineer. The presentation in Sacramento of the plaque and the money award was made to the recipient by State Highway Engineer G. T. McCoy, who had nominated McWilliam for the award.

The corecipient of the Dr. L. I. Hewes award for 1952 was H. W. Humphres, District Soils Engineer for the Washington Department of Highways, whose contribution to highway development was in the field of preventing landslides on mountain highways through the design of drainage systems based on soil testing.

The Dr. L. I. Hewes award was instituted and funds were provided by *Western Construction* magazine.

Big accidents may make the headlines, but it's the little ones that annoy most of us while driving. It is a simple matter to avoid most minor accidents. Courteous and careful driving will usually do the trick.

RECENT RAISED TRAFFIC BAR DEVELOPMENTS

By BLAIR GEDDES, District Traffic Engineer, District III

IN THE NOVEMBER, 1942, issue of *California Highways and Public Works*, a report was made of new methods then developed for placing raised traffic bars composed of asphalt concrete, in lieu of plant mix, because of the difficulty of placing and maintaining the plant mix bars.

Bars were placed on the two projects at that time, which were 8 inches wide by 3 inches high in San Francisco and 6 inches wide by 1½ inches high in Daly City.

In 1946, John E. Perry, of San Francisco, called at the District IV office with samples of a fiber concrete which he had developed, and discussed with the writer possible uses of the material for highway purposes. It was suggested that the material, which developed high tensile and compressive strengths, although weighing only 50 pounds per cubic foot, might be used for precast traffic bars.

New Industry Born

Some bars were cast, trial installations were made at several locations and a new industry was born. The next four years were required to solve several related problems pertaining to the development of a proper cementing agent, a paint that would adequately bond to the material and the elimination of curl in the bar, which lifted the ends of the bar, breaking the bond with the cementing agent. Each of these problems was successfully overcome and the product proved so satisfactory that the Division of Highways adopted an "in lieu" specification allowing these precast bars to be substituted for the types covered in its Standard Specifications for the standard 3-inch high bar.

In the interim, several experiments were conducted on a 1-inch bar of the precast type but because of the difficulties of handling and placing, particularly where the pavement surface

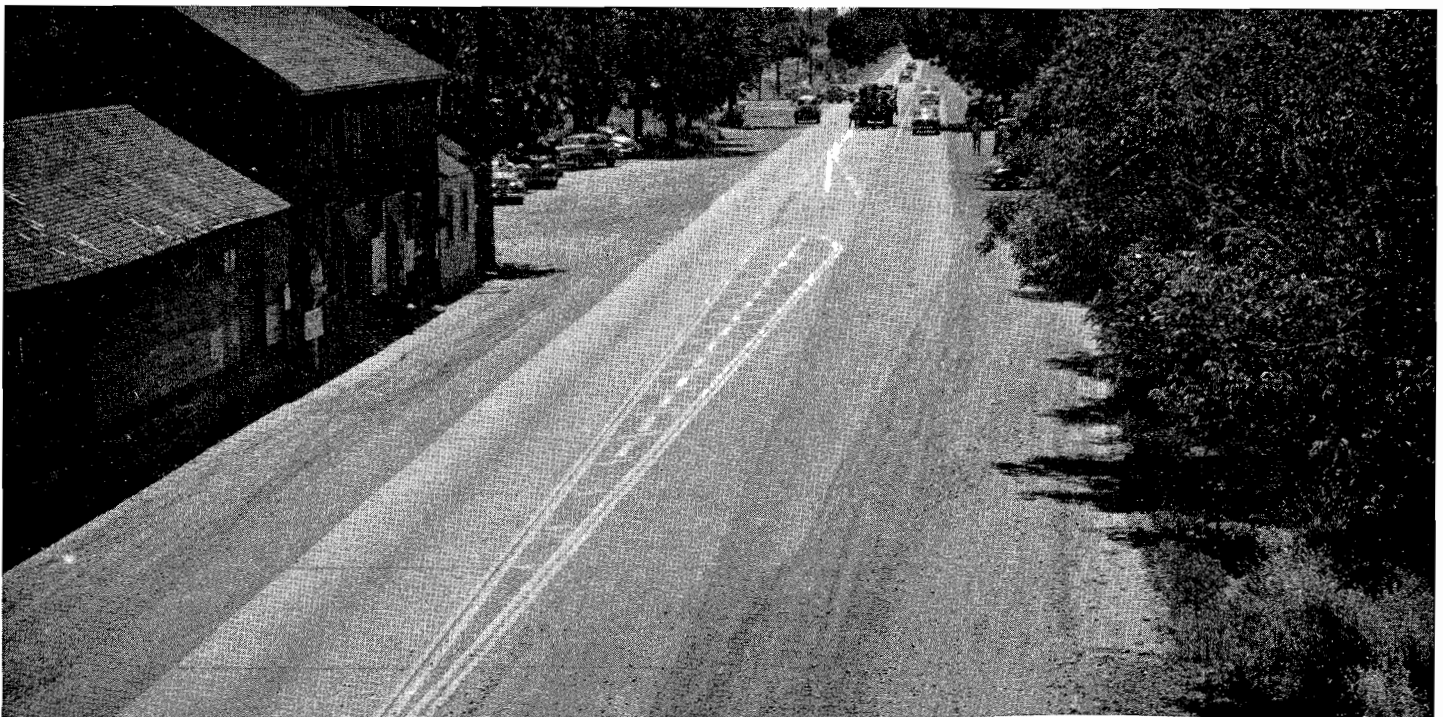
had slight irregularities, satisfactory results were not obtained. In addition, the rising labor costs indicated that a different approach to the problem should be investigated. The fiber concrete bars were being precast by the extrusion method and the question was raised as to why they could not be extruded into place rather than cast and then placed.

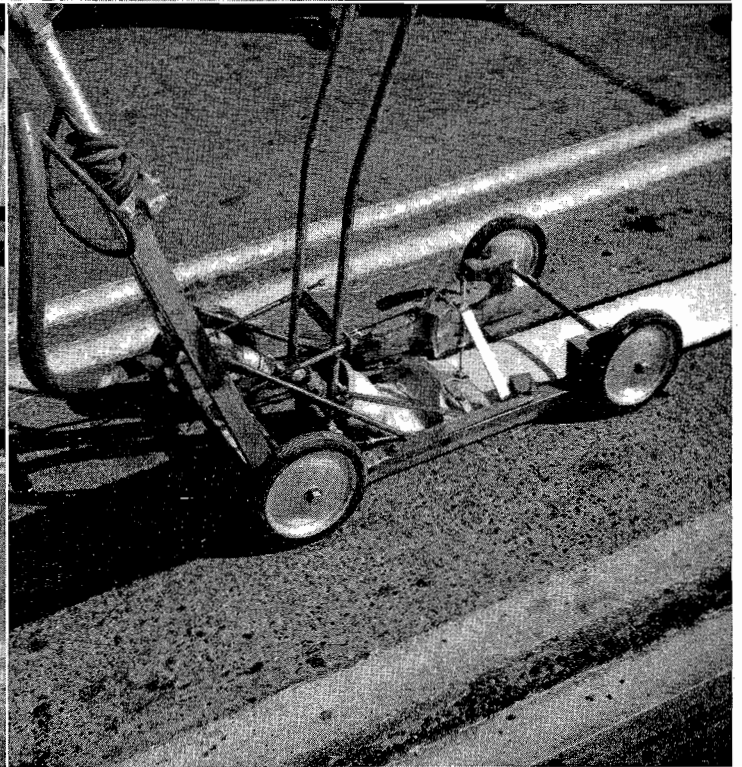
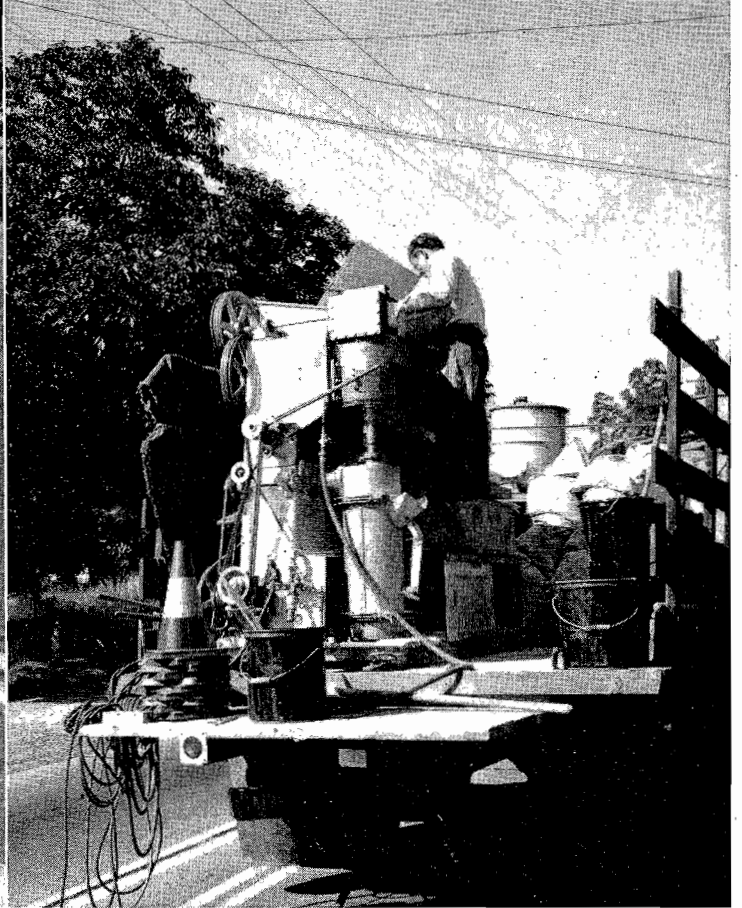
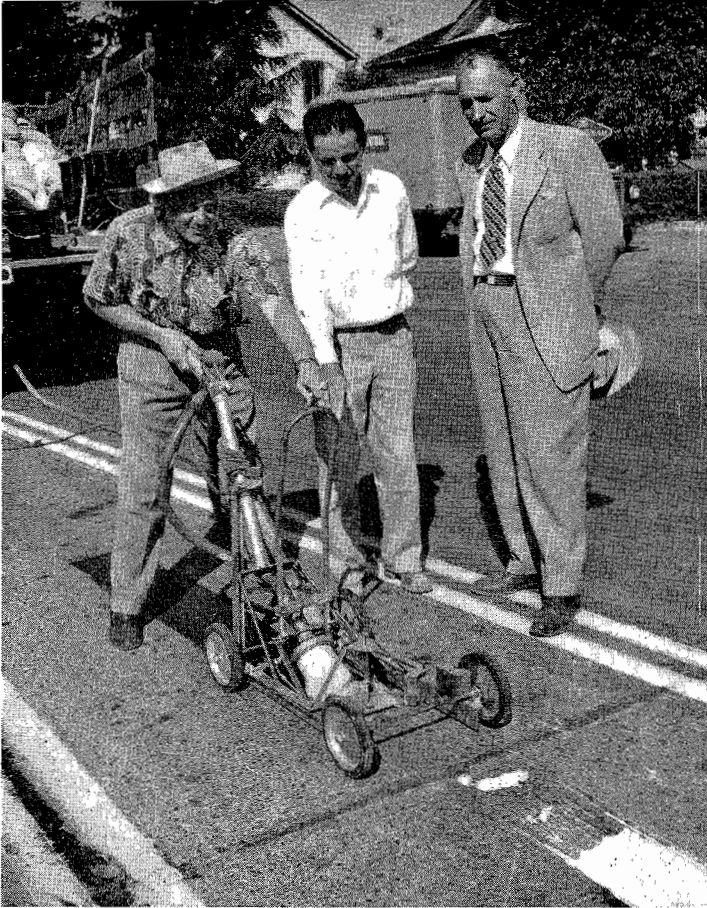
Further Experimentation

Further experimentation followed and during 1951 a pilot model of the necessary machine was completed. For the machine casting in place a new material mix was devised which would provide for rapid setting time. On May 21, 1952, the maiden flight of the machine was consummated and the installation pictured in the accompanying photographs was made.

The truck-mounted mixer is of the continuous type and proportions the dry material and water into a rotating

This photo shows completed traffic bars in foreground and work proceeding on "T" bar along pavement center line





UPPER LEFT—John Perry explains the features of the casting carriage, operated by Ed Pirro, to the author, on right. UPPER RIGHT—Proportioning and mixing machine mounted on truck. Hose to casting carriage comes out from below truck frame directly below mixing chamber. LOWER LEFT—Applying cementing agent to pavement immediately ahead of casting. LOWER RIGHT—Casting carriage in operation. Yoke handle raises nozzle when pump is stopped.

paddle-mixing chamber. A pump at the bottom of the mixing chamber, electrically controlled by the forming carriage operator, delivers the material through a plastic hose to the casting shoe. The material control to the mixing chamber is connected to the discharge pump and the mixing chamber only receives material when the pump is actually discharging.

Tests Are Made

The materials used consisted of white Monterey sand, white cement and an additive developed by Mr. Perry. By varying this additive, the setting time of the mixture can be varied from a low of 15 minutes to 4 hours. On this installation, a mix with a 1-hour setting time was used.

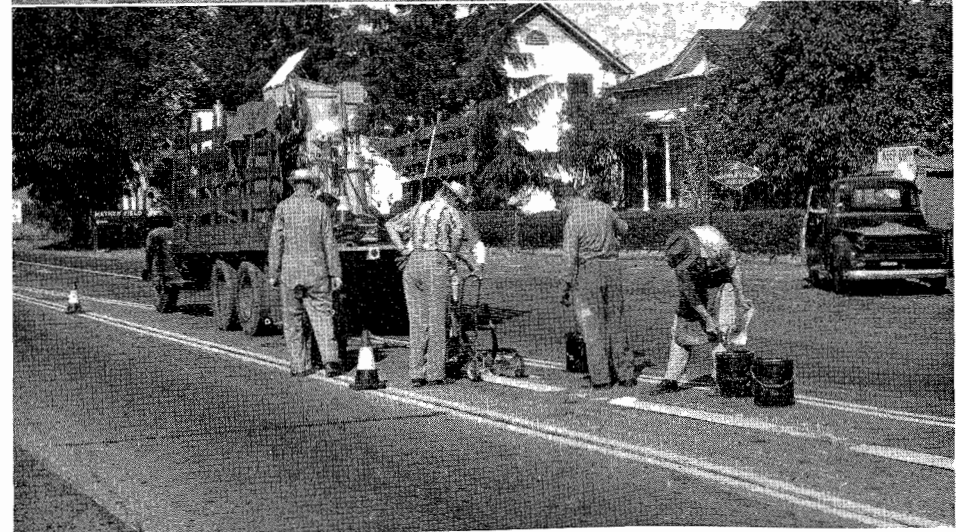
Two experimental projects were set up by District III for tests of the new method. The one here pictured consisted of delineating a left turn storage lane on existing Portland cement concrete on U. S. 50 at the main entrance to Mather Air Force Base. The second project consisted of two intersections on State Sign Route 49 between Auburn and Grass Valley at the main and freight entrances to DeWitt State Hospital. These installations delineated left turn storage lanes on a plant mixed surfacing.

Operators Learn Machine

By the time the installation at the main entrance to DeWitt State Hospital was made (the third intersection), the operators were fully acquainted with the characteristics of the machine and had developed an efficient procedure. The installation consisted of 404 feet of raised bar varying in length from a minimum of 2 feet to a maximum of 12 feet per bar. The majority of the bars were of 2 feet to 4 feet in length with only a very few falling in the 4-foot to 12-foot category. The elapsed time from start to finish of casting of this installation was 42 minutes.

The entire installation including laying out and clean up required less than four hours with a crew of seven men. With further development of the casting carriage to incorporate mechanical end forming of the bars and spray application of the cementing

... Continued on page 35



UPPER—Trimming end of a recently cast bar. CENTER—Side view of casting carriage. Buttons on the handle control the delivery pump including a reverse pumping to eliminate slobber from the nozzle. LOWER—General view of the operation. End trimming is done immediately following casting.

Montalvo Freeway

Last Link Connecting
Oxnard and Ventura

By MILTON F. MASTERS, Senior Highway Engineer

PRIOR TO World War II, U. S. Route 101 and U. S. 101 Alternate between Oxnard and Ventura consisted of a three-lane roadway which at that time was adequate for both local and through traffic. The 1940 census showed the population of Oxnard and Ventura to be 8,519 and 13,264 respectively.

Shortly after that fateful day on December 7, 1941, when the Japanese attacked Pearl Harbor, the Federal Government started a rapid and extensive expansion of naval facilities including the installations at Point Mugu and at Port Hueneme in the vicinity of Oxnard. This expansion program, particularly at Point Mugu, has continued

even after the cessation of hostilities and up to the present day. The large influx of military personnel and complementary civilian personnel to man these installations, plus the natural growth in this area, caused a rapid increase in population as indicated by the 1950 census. The last census showed the population of Oxnard to be 21,567, and Ventura was close behind with 16,532. Oxnard is still rapidly expanding and the estimated population for Oxnard at the end of 1952 is 24,496.

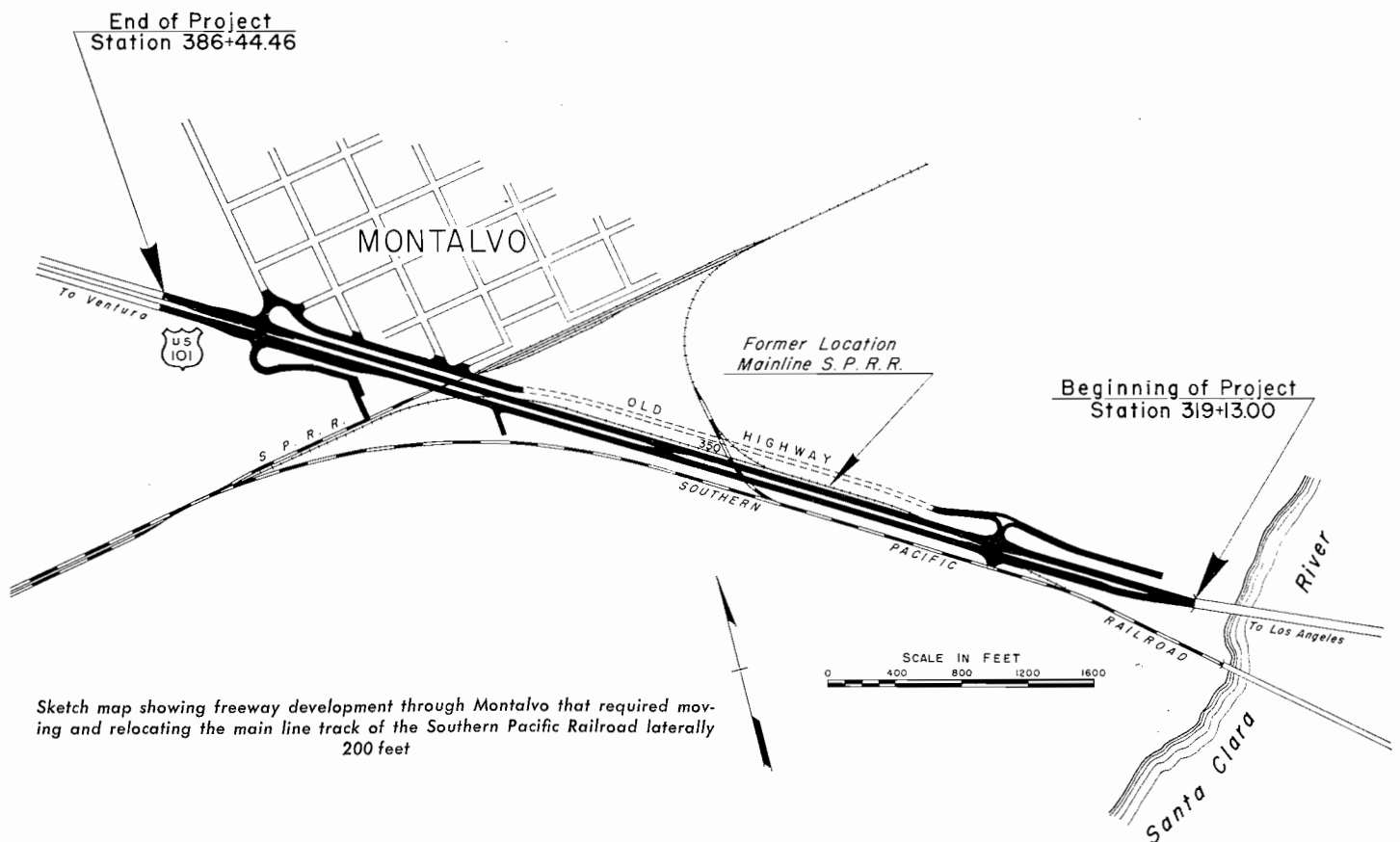
Increase in Traffic

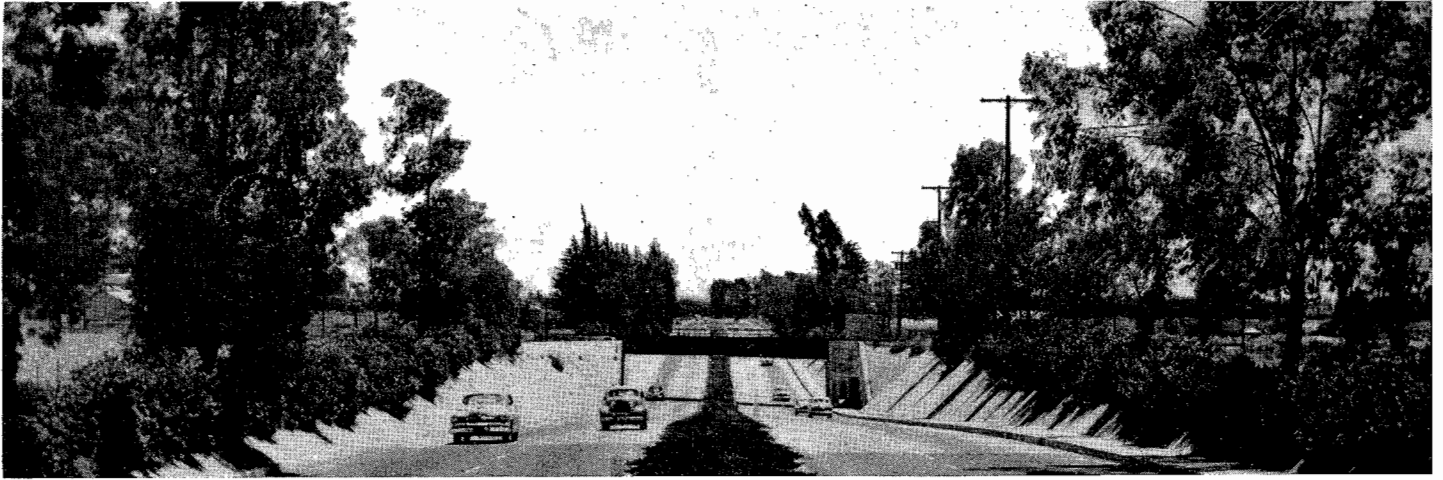
Paralleling this phenomenal population increase was a corresponding increase in traffic density on the con-

necting coastal highway between these two cities. For comparison, the following data is shown from district traffic counts through Montalvo, which is approximately halfway between Oxnard and Ventura:

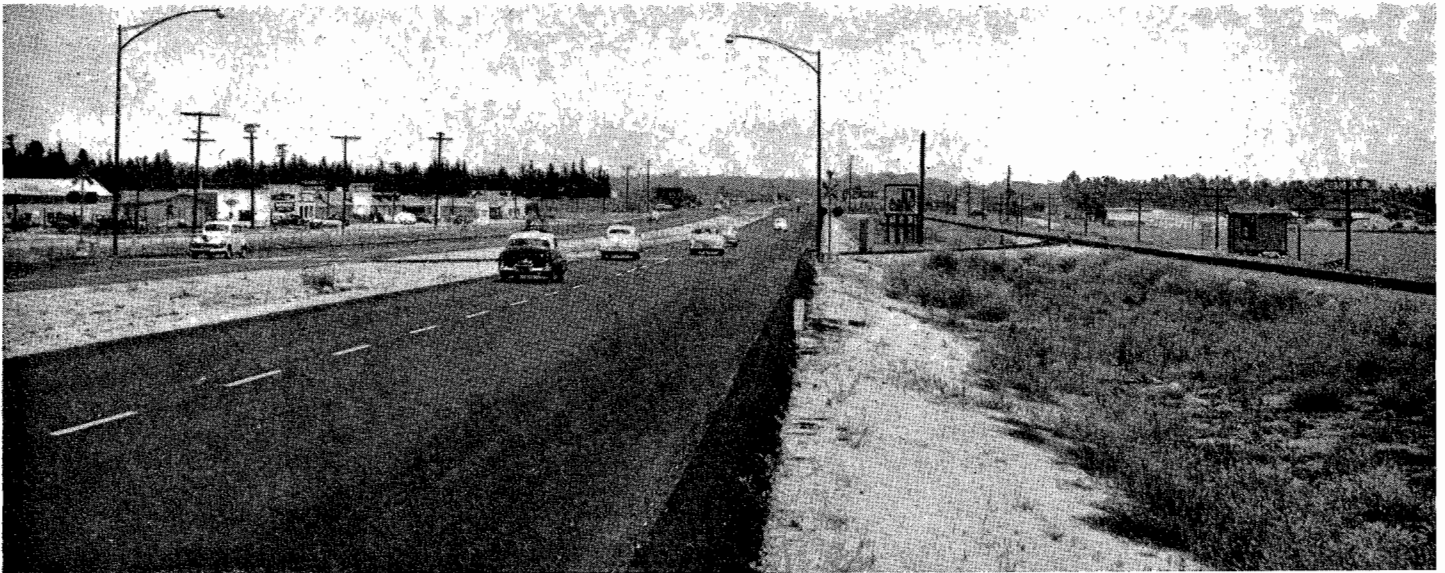
	1940	1951
Average daily traffic (both directions)	10,000	20,700
Peak hourly traffic (both directions)	1,290	2,685

After World War II, when highway construction was renewed, work was started in Ventura County to convert this existing three-lane facility to a four-lane divided highway. The first contract was let to J. E. Haddock, Ltd., in February of 1947 and consisted of improving the section between Montalvo and Ventura, a distance of 3.4



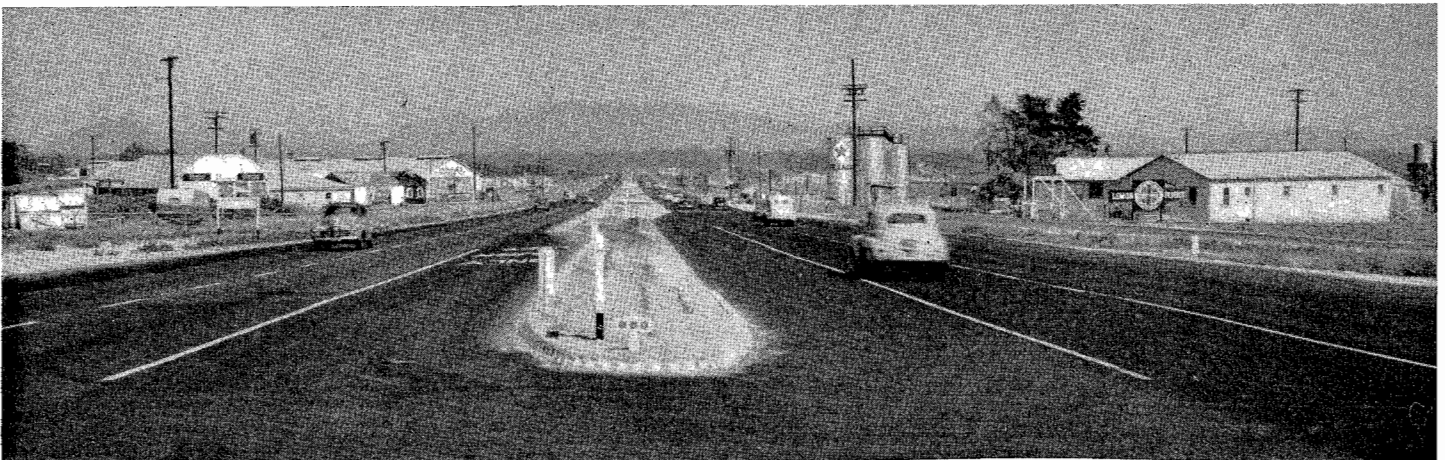


Looking southeasterly along U. S. 101 Alt. toward Oxnard, showing grade separation underpass with main line of Southern Pacific Railroad



Looking southeasterly along freeway through Montalvo toward Santa Clara River bridge, showing business development along old highway on left and relocated Southern Pacific tracks on right

Completed section of four-lane divided highway through Montalvo





Looking northwesterly toward Ventura along completed freeway. Main line track of Southern Pacific in relocated position at extreme left.



Looking southeasterly at El Rio channelized intersection between U. S. 101 and U. S. 101 Alt.

miles at a construction cost of \$601,139. This contract was completed in December of 1947.

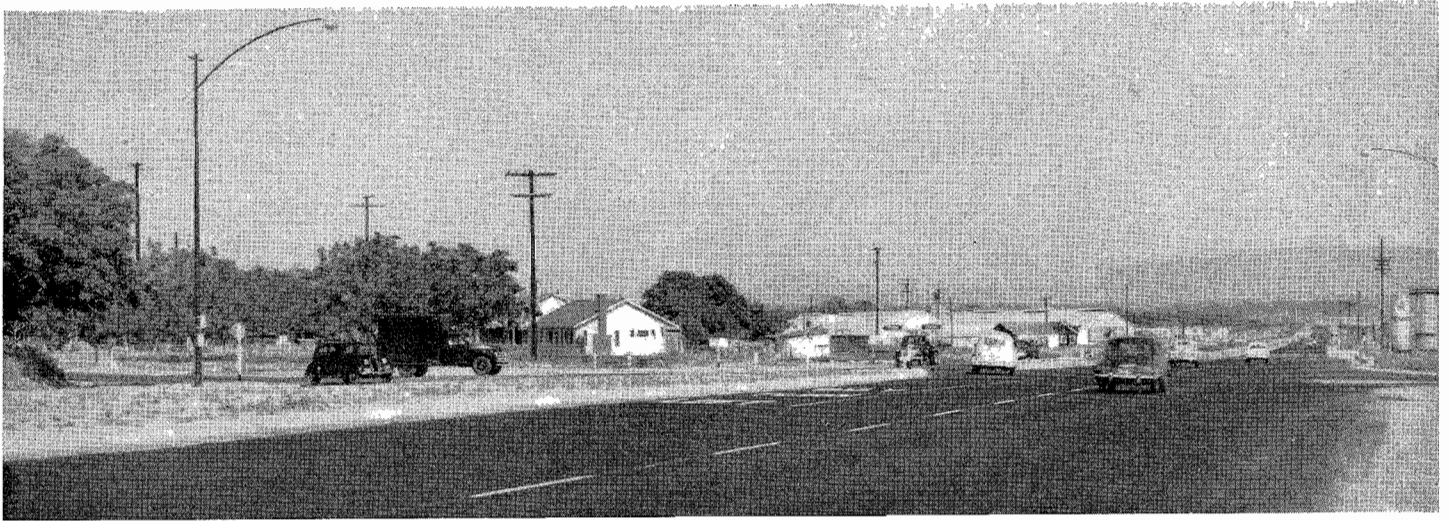
Four-lane Divided Highway

In February of 1948 a section of 1.3 miles, including the junction of U. S. Route 101 and U. S. 101 Alternate at El Rio, was let to contract to provide a four-lane divided highway with channelization islands and frontage roads. This contract was completed in the latter part of 1948 by the Smith-Edmondson Company at a cost of \$169,552.

An additional bridge span to widen the existing grade separation underpass of the Southern Pacific Railroad near El Rio was let to contract in November of 1948 to Grant L. Miner at a cost of \$122,345. This project was completed in the early summer of 1949 and provided the required width for the highway contract of 2.1 miles let in June of 1949 to Griffith Co. of Los Angeles. This last project provided for the improvement of the existing three-lane highway to a four-lane divided section from the north city limits of Oxnard to connect to the

Smith-Edmondson Co. contract previously mentioned. This was completed in the spring of 1950 at a construction cost of \$238,518.

The above-mentioned contracts completed the four-lane divided construction between Oxnard and Ventura with the exception of 1.3 miles between the Santa Clara River Bridge and the northerly limits of Montalvo. In the meantime the exceptionally heavy morning and evening commuter traffic to Point Mugu and Port Hueneme sorely taxed the capacity of this one



The photograph above and the one below show two additional sections of the freeway through Mantalvo

remaining stretch of three-lane pavement. Because of this traffic bottleneck, it was not an uncommon sight during the morning and evening peak hours to see traffic packed bumper to bumper through this section.

Right of Way Problem

The State Division of Highways was confronted with a difficult problem in acquiring the right of way through Mantalvo to provide a limited access freeway section with necessary adjacent frontage roads. For most of the distance the main-line tracks of the Southern Pacific Railroad were close

to the existing highway on the southwesterly side, whereas residences, small businesses, and industries were close to the highway on the northeasterly side. To widen on the northeasterly side would have meant the wiping out of all the highway frontage development, whereas to widen on the southwesterly side would require moving the main-line railroad tracks. It was found more economical to move the railroad and to acquire the needed right of way from the agricultural lands on the southwesterly side.

Negotiations were started early in 1949 but it was not until March of

1951, after an agreement had been reached between the State and the Southern Pacific Railroad, that the railroad company let a contract to Baker & Pollock of Ventura to relocate their facilities. The railroad relocation included the construction of railroad embankment and drainage structures for approximately 6,000 linear feet of new main-line track, and some adjustments to the Santa Paula Branch line and "Y" track crossings at Mantalvo. This relocation was financed by state funds.

... Continued on page 35



Retirements *from* Service

EDWARD L. EVANS

After 45 years of engineering work, 24 years with the California Division of Highways, Edward L. Evans, Supervising Highway Engineer, retired on July 1, 1952.

Evans was educated in the public schools of Wyoming and was graduated from the South Dakota State School of Mines in 1907. His first few years after graduation followed the pattern of most young engineers of that period, commuting from state to state as the short seasonal jobs were completed. Briefly, this consisted of about one year on railroad survey parties in Nevada, California, and Oregon and three years on irrigation projects in California and Wyoming, followed by three years on subdivision work in the San Francisco Bay area.



EDWARD L. EVANS

Worked in Arizona

Moving to Arizona, the next five years were spent working for the mining companies and on state and county highway work.

In 1918, Mr. Evans opened an office in Globe, Arizona, and engaged in the private practice of engineering and contracting in Arizona and Southern California, specializing in the surveying of mining claims. In addition to survey work, contracts were entered into and completed for paving city streets in San Bernardino, constructing a sewer system in Globe, Arizona, and constructing a one-mile section of the well-known Miami-Superior Highway through the Superstition Mountains east of Phoenix.

The early 1920's were depression years in Arizona with the three "C's"

... Continued on page 28

T. A. ROSEBERRY

A luncheon was given on May 28th at the Imperial Cafe on Garden Grove Boulevard, Orange County, for T. A. Roseberry, who retired from the Division of Highways, District VII, on May 31, 1952, after 29 years' service.

Present to honor Mr. Roseberry were District Engineer W. L. Fahey, Assistant District Engineer F. B. Cressy, Assistant District Engineer A. D. Griffin, retired members C. N. Ainley, W. D. Eaton, C. P. Montgomery, E. R. Seitz, T. C. Peterson, and some 40 other friends and associates. P. O. Harding, Assistant State Highway Engineer, sent a letter expressing his regret at being unable to attend, his appreciation of Mr. Roseberry's years of service, and his good wishes.

Congratulations and Gifts

A booklet, extending congratulations on his years of devoted service and best wishes for his future happiness, over the signatures of many of his friends, and containing a brief illustrated history of his engineering experience, had been prepared for presentation to Mr. Roseberry on this occasion. Bill Fahey, who presented the booklet, supplied full and complete details regarding the illustrations, which covered some of the more humorous incidents of Mr. Roseberry's career as a highway engineer.

A gold wrist watch, suitably inscribed to commemorate the occasion, which had been purchased with funds contributed by his friends, was presented to the guest of honor by Frank Cressy.

Mr. Griffin recalled some of the incidents on the contract to which Mr. Roseberry was assigned as his assistant when he first came to District VII 27 years ago.

... Continued on page 28

EDWIN B. NORMINGTON

August 1, 1952, marked the end of over 30 consecutive years of service with the Equipment Department of the Division of Highways for genial Edwin B. Normington, automobile electrician leadman at Headquarters Shop in Sacramento.



EDWIN B. NORMINGTON

Since his entry into state service on March 6, 1922, Mr. Normington has been in charge of the installation and maintenance of electrical equipment in highway shops and of steam-heating plants in highway maintenance stations throughout California.

Ed was born in Bellevue, Idaho, in 1889. When he was four years old, his parents moved to Sacramento, making the entire trip in a covered wagon. Their stay in Sacramento was short and for the next few years the family lived in the gold towns of Amador County, but eventually moved to Auburn.

In Auburn, Ed went to work on his first job in the largest blacksmith shop in town. Here he learned to shoe horses and to build and repair wagons and carriages.

When the family moved to Sacramento in 1906, Ed went to work for the Pacific Gas and Electric Company in the local car shops, where the once familiar yellow streetcars used in Sacramento were built, as well as many of those used in Fresno and San Jose. It was here that Ed learned the trade of electrician. Later, when the company began to purchase automobiles, he was put in charge of the maintenance of these new, modern units of transportation.

... Continued on page 43

EDWARD L. EVANS

Continued from page 27 . . .

—copper, cattle and cotton—all hitting the toboggan. In 1922, Mr. Evans was engaged by the Riverside Portland Cement Company on the survey of placer mining claims, the preparation of topographic maps and supervision of diamond drilling operations on limestone and clay deposits at various locations in Arizona. The following year, he accepted a position as chief civil engineer with this company in the reconstruction, enlargement and operation of the cement plants at Riverside and Oro Grange in Southern California.

Enters State Services

In August, 1928, he entered state service as assistant resident engineer on highway work in San Diego County and was promoted to resident engineer the following February. During the next seven years, he was employed as resident engineer in Districts III, VII, and XI. In June of 1936, he transferred to headquarters office and accepted a position preparing specifications under R. H. Wilson, at that time office engineer. Mr. Evans has remained in this department for the past 16 years, advancing from associate highway engineer to supervising highway engineer.

After catching up on his hunting and fishing, he will be available for consultation on highway and other engineering problems.

T. A. ROSEBERRY

Continued from page 27 . . .

Born in California

Mr. Roseberry is a native son, having been born at Adin, Modoc County, California. He began his engineering career as chainman for the U. S. Indian Service in 1900. A couple of years of this work was sufficient to develop a considerable portion of bona fide S. I. blood in his veins, and he decided that some formal engineering training was in order. The next two years were spent at the Van der Naillen Engineering School at San Francisco, after which he resumed work with the U. S. Indian Service as transitman.

ORA T. EASTERDAY

A specifications writer for the Division of Highways since August, 1928, Ora T. Easterday retired from state service on July 31 of this year.

When Mr. Easterday began his employment with the State in 1928, the annual value of highway construction work amounted to less than \$20,000,000. Last year, comparable work put under way by the Division of Highways totaled more than \$108,000,000. In 1928, the mileage of highways in the state system aggregated approximately 4,100. Today the total is 14,000 miles.

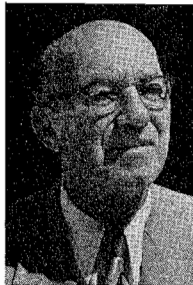
Mr. Easterday came to California from Michigan in 1913 and was employed by the City Engineering Department of Sacramento under Albert Givan, City Engineer. In 1914, the late Frank C. Miller was named city engineer and in 1915, Mr. Easterday was appointed chief draftsman.

Because of the ill health of his parents, Mr. Easterday returned to his old home in Michigan in 1918 and was employed as assistant to the plant engineer of a unit of the Union Carbide Company. Upon his return to Sacramento in 1928, he worked temporarily for the late Joseph Gross, consulting engineer on irrigation projects, and then accepted employment with the Division of Highways as a specifications writer under L. V. Campbell, now Engineer of City and Cooperative Projects.

During the year 1906, "Rosey" came down with "gold fever" and spent the next seven years in the mining country at Rawhide, Nevada, overcoming this malady.

The years 1913 to 1918 were spent mostly on survey work, chiefly for the County Surveyor of Lassen County.

In July, 1918, "Rosey" began his service with the State Division of Highways in District II. He worked as instrument man on survey party, draftsman in the district office, and as



ORA T. EASTERDAY

HORACE M. STURGES

Horace M. Sturges, Associate Bridge Engineer of the Bridge Department, retired from state service June 30, 1952.

Mr. Sturges was born September 16, 1887, at Kansas City, Mo. His family later moved to Chillicothe, Mo., where he attended school. He came to California shortly after the turn of the century. From 1910 to 1918 he was engaged in bridge construction with various contractors located in the San Francisco area. From 1918 to 1919 he was in the Air Service, U. S. A., stationed at Mather Field. Following the war he worked for shipbuilding companies in Oakland.

His state service started July, 1921, with District III. He worked with District III, State Reclamation Board and Bridge Department until March, 1926, when he resigned.

In 1930 he was married to Miss May Danforth, a teacher in Sacramento schools.

He returned to work for the Division of Highways in 1930, working for District III. From 1934 to 1936 he worked for the laboratory inspecting steel fabrication for the Bay Bridge.

In January, 1936, he went to work for the Bridge Department and has been with the Bridge Department continuously since that time to the date of his retirement. His assignments have been both in the field and in the office.

Mr. Sturges enjoys the outdoors, particularly hunting, in which sport he can now indulge to the limit without any limitation on his vacation period. He is also very active in community church work and undoubtedly will keep himself well occupied during his retirement.

Through his long years of service he has made many friends in the Bridge Department and throughout the Division of Highways organization.

Assistant Resident Engineer. Resigning his position in 1920, he spent the next five years in the Engineering Department of the Southern Pacific Company at Dunsmuir. In 1925 he returned to the Division of Highways in District VII, where he was employed as Assistant Resident Engineer.

Early Contract

Martin C. Polk Recalls Yuba
County Highway Project in 1912

ALTHOUGH an official breaking of ground for the start of construction under the State Highway Act of 1909, the first of three highway bond acts in California, took place in San Mateo County on August 7, 1912, old time road builders recall that the first actual turning of earth on an early bond-financed California highway project took place in Yuba County a full month earlier.

The start of work on State Highway Contract No. 1, for 5.4 miles between Burlingame and South San Francisco (U. S. 101), was the occasion for a well publicized celebration in which the history-making shovelful of earth was manipulated by Burton A. Towne, first chairman of the California Highway Commission.

But by that time grading was already well under way on Contract No. 4, south of Marysville on what is now U. S. 99E. It had begun on July 7th or 8th, without benefit of officialdom or photographers. Two members of the subcontracting firm on the grading portion of the project held a mule-drawn plow as it bit into the earth alongside the railroad tracks near Morrison's Crossing, three miles northwest of Wheatland, and the job was started.

Polk Was There

One of the witnesses to this hitherto unsung bit of state highway history was Martin C. Polk, who was the engineer for the Chico Construction Company. Polk is still active in the engineering profession in Chico, although he passed his eightieth birthday on July 22, 1952.

On May 21, 1912, the California Highway Commission had authorized State Highway Engineer A. B. Fletcher to call for bids on the first four projects on the newly adopted state highway routes. On June 24th, bids were opened on all four. The San Mateo County project was designated as No. 1; a Mendocino County job as No. 2; a Madera County job as No. 3; and the Yuba County project, con-



Martin C. Polk, about 1902, shortly after beginning his engineering career

sisting of about nine miles of bituminous macadam highway, 15 feet wide, as No. 4.

F. E. Frey of Sacramento was low bidder on the Yuba County job, and was awarded the contract by the commission on his bid of \$67,780.50. But the commission's action had to be approved by the Advisory Board of the State Department of Engineering before it became official. The Advisory Board took this action on July 23d, which became the official award date. Final approval by the Attorney General took place on July 26th.

Work Is Started

Meanwhile, Frey had arranged with the Chico Construction Company to do the grading. Going on the assumption that final approval of Frey's contract was assured, the Chico firm decided to go ahead at once.

"The president of the firm was William Perley," Polk recalls, "and one of the principal stockholders was Wendell Miller, a banker and rancher who furnished the mule rig for the job. We

had heard about plans for an official start of work in San Mateo County, but we saw no reason to delay our own work."

"I don't remember the exact day, but sometime early in July I went down to Morrison's Crossing with Mr. Perley, Mr. Miller, and the foreman, Peter Cuddeback. And while Mr. Perley and Mr. Miller held the plow, the driver started up his six mules and we broke earth for the job."

One record places the start of grading as July 7th; the resident engineer's field notebook (see illustration) fixes it as July 8th.

Polk had helped figure the grading job for the Chico firm, but after the work got under way he had only occasional contact with the project. He remembers the resident engineer, H. C. Boyden (whom he recalls best by the nickname "High Pockets" because of his tall stature) as an exacting inspector.

Project Completed 1913

The grading was completed within a few months. Laying of the bituminous macadam surfacing began on August 7, 1912. Work was suspended for about two months during the winter and the road was opened to traffic in July, 1913, with final completion of the project on September 10, 1913.

The final report of the Division (District) Engineer, William S. Caruthers, reflected several problems with which the contractor had to cope, including the two months of wet weather which "softened the ground so as to make hauling out of the question." He also encountered some delays in getting rock screenings.

In accordance with the prevailing practice under the first state highway bond issue, the state funds were available only for construction of the highway. The counties had to furnish the right of way and build the bridges. Yuba County built four bridges in advance of Contract No. 4.

Bridges Tested

The county supervisors questioned the strength of the bridges, and refused to pay for them until they were tested. Resident Engineer Boyden represented the State Highway Commission at the tests, which consisted of using two-horse rollers connected and loaded with sacks of screenings so as to approximate the load of a typical early-day traction engine. From these tests it was concluded that the bridges were satisfactory.

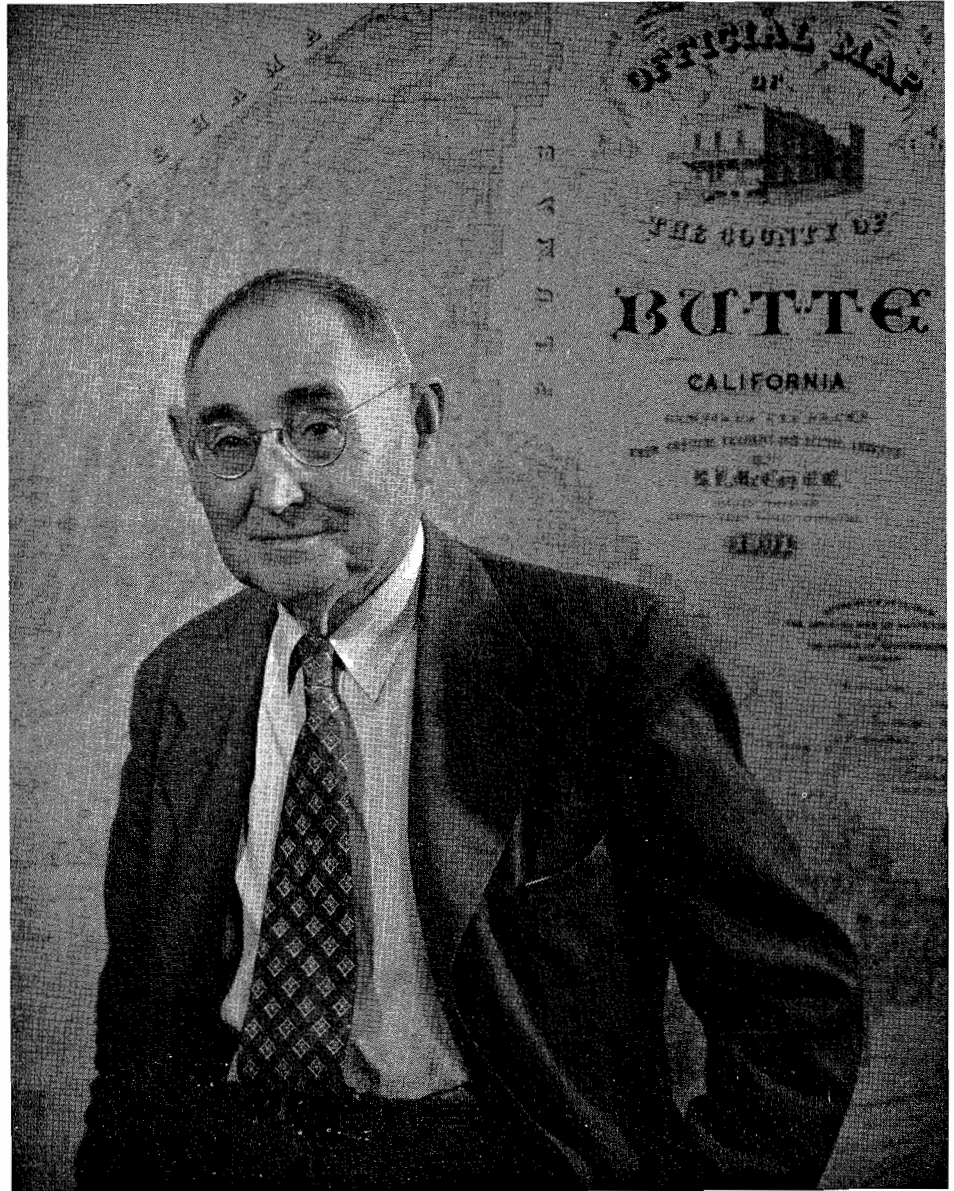
That early-day project south of Marysville was the first of several state highway contracts with which Polk was closely associated. The others occurred a decade later, with Polk acting as contractor.

Actually, his connection with and influence on the development of the State Highway System in the Sacramento Valley and northern Sierra Nevada region stem far more from his frequent role as adviser and consultant than from his contract work. In his various capacities as city engineer, county surveyor, consulting engineer and county assessor over the course of half a century, he has contributed valuable assistance to the Division of Highways.

Early Road Campaign

Polk's active interest in highways has been continuous since June, 1908, when he represented the City of Chico at a meeting called in Stockton for the purpose of dealing with the growing highway problem on a state-wide basis. That meeting was the occasion for the launching by Governor James N. Gillett of the campaign for the first state highway bond issue, and for the organization of the Good Roads Association. Stockton was chosen for the meeting, Polk recalls, because the County of San Joaquin had displayed leadership in road matters.

The veteran engineer literally grew up with his region. Born in Iron County, Missouri, he came to California as a child in 1873. His father was a distant cousin of President James K. Polk. At the end of an 11-day train trip the senior Polk was met in Sacramento by Henry Gerke, owner of the Peter Lassen grant, who offered him a plowing job at his ranch near Vina,



Martin C. Polk, 1952, standing in front of the official map of Butte County which dates back to the time he began his engineer career at the turn of the century

Tehama County. A few years later, the family moved to the upland areas to the east, and the name of Polk Springs, in the Deer Creek country, marks one of their homesites.

Enters Stanford

Martin Polk got his basic education in a one-room school at Cohasset, in the Butte-Tehama hill country. A teacher of exceptional ability helped him with advanced studies, including trigonometry, and in 1892 the young man entered California College, a denominational school, in Oakland, where he was graduated in 1894.

During the next three years Polk worked in logging camps and at odd jobs. In 1897 he traveled to Palo Alto, enrolled at Stanford, and crammed all the engineering he could into one academic year—all he could afford on the \$100 he had saved, even with the strictest economy in matters of room and board. He returned to Butte County in the spring of 1898, went to work as a sawmill yard foreman, and saved enough to buy a transit. With it he surveyed timber range for the logging company.

In 1901 Polk made the move to Chico and opened an engineering

office. He was just in time. The city was planning a sewer system, and the city engineer took him on as an assistant. The city engineer resigned the following year, and Polk stepped into his post to complete the sewer installation.

First Bond Issue

At about the same time he was elected county surveyor, a part-time job. He continued to serve as county surveyor for many years, although he relinquished the Chico city engineer post for a while in order to survey railroad lines for the Diamond Match Company. But in 1908 he was back in his combination city engineer-county surveyor position, and was in the midst of studying street paving methods in various Northern California cities when the first state highway bond issue came up as a result of the Stockton meeting in which Polk took part.

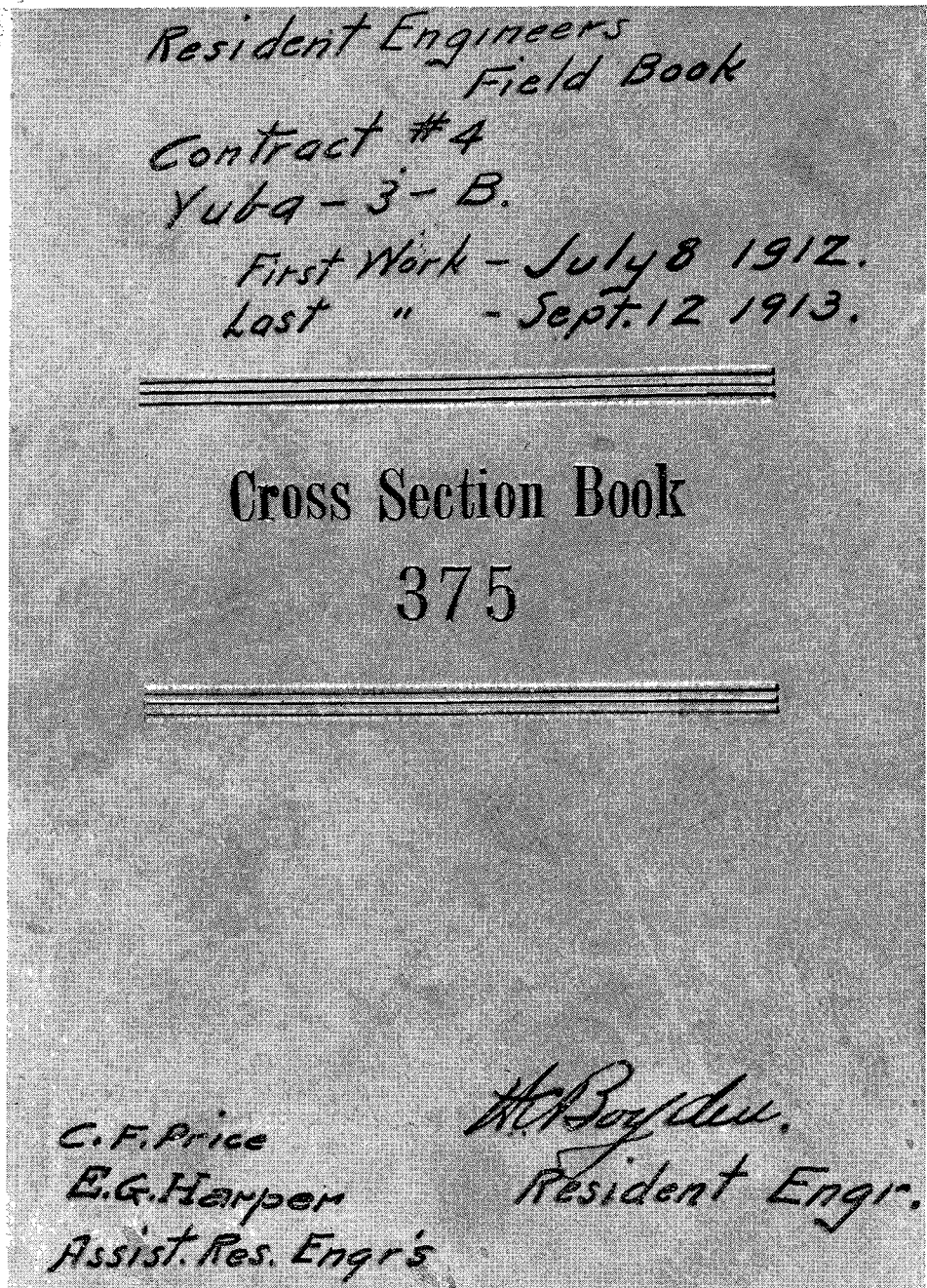
The Yuba County State Highway project was the forerunner of a busy and eventful 20 years of engineering for Polk. He built canals for a number of irrigation and drainage districts which he helped to organize; he played a part in organizing the state-sponsored agricultural colony at Durham; he helped the Western Pacific develop its construction road through the Feather River Canyon, and later, when the Feather River Highway was being planned, walked the canyon for 40 miles with former State District Engineer T. A. Bedford and the late A. W. Keddie, former surveyor of Plumas County. Bedford is now retired and lives in Redding.

Organizes Road Department

His combination Chico-Butte County position ended in 1918, when the county enacted a charter and created the position of road engineer on a full-time basis. Polk resigned then as Chico City Engineer, but took an active part in drafting a new city charter in 1921. He returned to city employment in 1929 as a consulting engineer for the extension of the sewer system and then as city engineer again until 1934.

Polk held the county road engineer post for less than two years, just long enough to organize the road department.

and Public Works



Documentary evidence that work on Contract No. 4 started well in advance of others is provided by this photograph of the cover of the resident engineer's field notebook. The book is on file at the District III office of the Division of Highways at Marysville.

ment. Then he concentrated on irrigation district work for the next decade or so, although he again served the county in 1927 as a part-time adviser to the board of supervisors.

Polk built the system of canals for the Sutter-Butte Canal Company which have now been taken over by various irrigation districts in the area. He built them by both day labor and contract, using mules, steam shovels

and other available methods and equipment. He operated the canal system for some years with headquarters in Gridley, and developed the extensions of the system into Sutter County.

Enters Contracting Business

He left his home region occasionally, once in 1924 to make a report on the Cuyama River watershed for the

... Continued on page 34



Grand Avenue Undercrossing

BR. 49-84R6L

Fragment Of Bent

BUENA VISTA BLVD

BR. 49-94

BR. 49-84R8L

Buena Vista Avenue Overcrossing

BR. 49-94

Ida Street Underpass

BR. 49-147



FREEWAY THROUGH

Traffic Relief

*San Luis Obispo Project
Nearly Completed*

THE City of San Luis Obispo, strategically located on the Coast Highway midway between the great metropolitan areas of Los Angeles and San Francisco, is, and has been for some time, suffering from extreme traffic pains. The heavy traffic load on U. S. 101 passes through the center of San Luis Obispo on narrow city streets, heavy cross traffic on most of the intersecting city streets, heavy pedestrian traffic in the vicinity of the business district, two traffic signals, and two right angle turns.

Congestion has reached the point where many drivers, familiar with conditions, by-pass the congested area and by so doing create a minor problem on other local streets. The congestion within the city is particularly noticeable to through traffic as long stretches of four-lane divided highway exist both north and south of the city.

... Continued on page 58

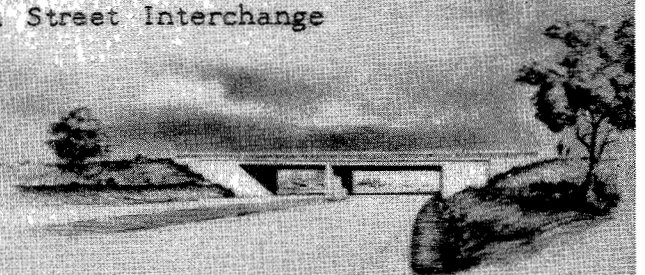


Marsh Street Interchange



Chorro Street Undercrossing

BR 49-39 R&L



56-2 Separation

BR 49-144

H SAN LUIS OBISPO



Early Contract

Continued from page 31 . . .

ranchers of the Santa Maria Valley in Santa Barbara County, and at other times to serve as expert witness in lawsuits over water rights, particularly in the Sacramento Valley and foothill area. He served as a member of the State Reclamation Board from 1940 to 1943.

With his brother Tom, now a member of the Butte County Board of Supervisors, Polk had a fling at contracting in the 1920's, but the firm failed because of insufficient capitalization. He recalls underbidding Henry Kaiser by \$60 on a gravel-laying job between Chester and Westwood. Polk Bros. also built a number of bridges and paved several sections of highway in various parts of Northern California.

Helps Western Pacific

When the Western Pacific's Utah Construction Company was working on its construction road for the Feather River rail route, miners in the area interfered so effectively with the work gangs that Emery Oliver, chief engineer for the railroad, turned to Polk for help. In his capacity as county surveyor, Polk proceeded to swear in Oliver's chiefs of survey parties as deputy surveyors for Butte County; then he and two "viewers" completed a map of the construction road so as to make it an official county road. Before this procedure was completed, however, the Western Pacific and the miners reached mutually satisfactory terms on the value of the latter's claims, and the rail company retained the road for itself.

Polk returned to the Feather River Canyon again in 1917 with Highway District Engineer Bedford. The State Highway Commission was in the process of selecting a route through that portion of the Sierra Nevada, and Surveyor Keddie of Plumas County went to the Butte County supervisors in Oroville with the suggestion that the Utah Construction Company route be recommended.

Feather River Highway Route Picked

Bedford, Polk and Keddie (who was then 75 years old) took the train as

PROGRESS OF THE STATE HIGHWAY IN YUBA

The Natomas Consolidated is filling an order placed by Contractor Frey, who is building a 10-mile strip of the state highway from Marysville southward, of 24,000 tons of crushed rock. The first shipment of the material was made August 5, 1912. Up to the present time, something over 7,225 tons have been delivered.

Contractor Frey has graded over eight of the 10 miles which he has contracted to construct, and at this time has about three miles covered with rock, leveled and rolled, ready to be surfaced with oil and screenings.—From *California Highway Bulletin*, Volume I, Number 1, October 15, 1912.

far as Pulga, and then walked the construction road for 40 miles, taking two days for the journey. Their decision was made even before they completed it: the highway should follow the river canyon, and not the higher-level construction road. In 1937 Polk had the pleasure of participating in the Feather River Highway dedication ceremony at which Governor Frank F. Merriam officiated.

The slump which struck the engineering profession as well as other occupations in the early 1930's did not spare Martin Polk. There was a vacancy in the Butte County assessor's post, and he ran for it in 1934, winning out over several other candidates by a narrow margin. He retired from this office in July, 1950.

Meanwhile he had formed a partnership with Frank Robinson, who took over the Chico city engineer's job from Polk in 1934, and held it until he died in 1947. Polk then returned as city engineer on a consulting basis, but resigned in 1951 when it was again made a full-time position.

Many Activities

Polk is still a consultant to the City of Chico, but that is the least of his engineering activities. He is city engineer of Biggs, and a consulting engineer for the City of Gridley. At Gridley he has just completed construction of a sewage disposal plant under a \$250,-

000 bond issue, and is now getting the pipe laid for the system.

He is engineer for two irrigation districts (serving one of them since 1927), for three drainage districts and two reclamation districts. Some of them he also serves as secretary.

Polk's office in downtown Chico is a busy one. He is confined to it more now than he likes, but he finally had to make one concession to his otherwise well-carried years: he no longer goes out on survey parties, leaving that to his younger partner, Oscar J. Batham. Naturally, a good deal of his time is also devoted to assisting younger engineers—including those of the Division of Highways—with any problems which may come before them in Butte County. No one else has such a profound knowledge of the region from an engineer's point of view.

His continuing interest in state highway development centers at present on the newly reactivated movement to improve Sign Route 32, the Deer Creek Highway between Chico and Lake Almanor, to modern standards.

Polk's son, Martin, Jr., is an employee of the Division of Highways, working in the Right of Way Department of District III, with headquarters at Marysville.

PUBLIC WORKS CONVENTION

The 58th annual Congress and Equipment Show to be held in Los Angeles by the American Public Works Association from August 24th to 27th promises to be the largest in attendance and interest ever held by the organization composed of city engineers and public works officials of virtually every city, county and state in the United States, according to Donald F. Herrick, executive secretary of the association, and Harry S. Swearingen of the Board of Public Works of the City of Los Angeles, general chairman of the meeting.

The official headquarters hotel for the convention will be the Amambassador Hotel and meetings will be held in the exhibit hall at the Shrine Auditorium. Free and continuous bus service will be available between the two points for registered delegates and their families.

Montalvo

Continued from page 26 . . .

Railroad Contract

The railroad contract was completed within the 90-day time limit and the State immediately thereafter called for bids for the new highway construction through Montalvo. This project, extending from the northerly abutment of the Santa Clara River Bridge to the northerly limits of Montalvo, a distance of 1.3 miles, was awarded to Fredericksen and Kasler of Sacramento on May 23, 1951. The new highway parallels the old highway; however, the numerous existing curves were eliminated by the improved alignment. Portions of the old road remain as a frontage road on the northeasterly side and with the additional new construction of frontage roads provide ample local traffic facilities for this area.

In the past this area has been subjected to considerable flooding from storm run-off waters originating in the range of mountains northeasterly of Montalvo. This problem has been aggravated by the recent numerous tract developments in this area, with a consequent increase in surface run-off. To meet this problem, considerable work was included in the contract to provide adequate drainage, and the grade of the new highway was established higher than the old highway.

Typical Section

The typical section for this project provided for 0.33 feet of plant-mixed surfacing on 0.67 feet of plant-mixed cement treated base, overlying 0.50 feet of imported subbase material. As the amount of roadway excavation was small, the deficiency borrow for the embankment construction was set up as a contract item and designated as "Imported Borrow." The contractor elected to obtain all the imported materials from the nearby commercial plants that produce their aggregates from the Santa Clara River bottom. These materials were of excellent quality and very satisfactory in all respects. The plant-mixed surfacing was subcontracted to the El Rio Rock Company, which also obtained its

In Memoriam

HENRY F. MEIER

Henry F. Meier of Courtland, Sacramento County, a highway maintenance foreman in District III, died June 13th in the Veterans Administration Hospital in Oakland following a lingering illness.

Born in Meridian, Sutter County, on May 4, 1891, Mr. Meier had been employed by the Division of Highways since July, 1935, when he went to work as a highway equipment operator in Marysville. He was made a foreman in 1945, with responsibility for maintenance of State Sign Route 24 along the Sacramento River from Isleton to Hood.

A veteran of World War I, Mr. Meier was a member of both the Veterans of Foreign Wars and the American Legion. He also was a member of the Native Sons of the Golden West.

Surviving are his mother, Mrs. Caroline Meier; a daughter, Mrs. Melba Crozier; a grandson, Robert Henry Crozier; and four sisters, Mrs. Eda Judy, Mrs. Mathilda Manville, Mrs. Lydia Hess, and Mrs. Frieda McDaniel.

mineral aggregates from the Santa Clara River.

This project was completed on April 18, 1952, at a construction cost of \$397,650, and it was surely a happy day for the thousands of commuters between Oxnard and Ventura to be able to make this trip without a case of jangled nerves from the old traffic "bottleneck."

The contract was ably supervised for the contractor by Superintendents Mel Stover and Jeff Kasler. The writer was resident engineer under the supervision of Frank B. Cressy, Assistant District Engineer in charge of construction in District VII, and C. P. Montgomery, who recently retired from state service.

Everyone knows that there are too many cars on the highways at peak hours. Whenever possible choose the off-hours when traffic is lightest to do your driving. Plan your trip so you do most of your driving early in the day.

Raised Traffic Bars

Continued from page 22 . . .

agent in place of hand mopping, the crew can be substantially reduced and over-all time cut.

Barrings Expected

Cost per foot for these experimental installations was comparable to unit bid prices on plant mixed bars in the same areas. With additional experience in operating the machine and with the addition of the previously mentioned mechanical features, it is anticipated that a substantial reduction will be made in completed cost.

Initial cost, however, is not the ruling criterion. From present indications, it is evident that maintenance costs on these bars will be only a fraction of the cost of maintaining bars made of asphaltic products, particularly with reference to the paint.

The most significant value of this development, however, is in the elimination of inconvenience to the traveling public. A complete raised bar channelization can be installed between the morning and evening traffic peaks during the lighter traffic period of the day, and be turned over to full use within an hour after completion without protective barricades, lights, flares or other barriers. Plant-mix bars require several days for curing, sealing and painting after original placing before they can be opened to full traffic use. It may be that this is the solution for making installations where the minimum of time, equipment on the traveled way, and inconvenience to the traveling public is to be considered.

USEFUL TO COLLEGE

COMPTON COLLEGE

Compton 3, California

KENNETH C. ADAMS, *Editor*

DEAR EDITOR: I am writing to again express the appreciation of myself and our institution for your magazine, *California Highways and Public Works*, during the past school year.

This publication has been circulated in our economic and government classes, now numbering in excess of 600 students. We find such material to be of practical value in supplementing the basic course content.

Cordially yours,

ROBERT C. GILLINGHAM, Chairman
Social Science Department

Santa Ana Canyon

Widening to Four-lane Highway Is Completed

By W. M. McKNIGHT, Resident Engineer

THE LAST link in the four-lane divided highway through Santa Ana Canyon, locally called the "Santa Ana Canyon Road," was completed on June 10, 1952, by Contractor A. Teichert & Son, Inc., of Sacramento, California.

This State Division of Highways Contract No. 51-7VC37-F is located in Orange County on State Sign Route 18. This route is an important arterial connecting the cities of Riverside and San Bernardino Counties with the harbor areas and beaches of Los Angeles and Orange Counties. A large volume of truck traffic and considerable through traffic utilize this route.

The Santa Ana Canyon Road, originally constructed by Orange County, was adopted as a state highway in 1934 and was later declared a freeway by resolution of the State Highway Commission on December 19, 1947.

Converted to Divided Highway

The work done under this contract consisted of constructing a graded roadbed parallel to the existing high-

way, reconstructing portions of the existing highway on revised alignment and grade, and widening and resurfacing other portions of the existing highway to provide a four-lane divided highway. Plant mix surfacing was placed on existing pavement and on cement-treated base over a subbase of selected material. The two existing bridges within the job limits, Gypsum Creek Bridge and Coal Creek Bridge, were both widened to provide an additional clear roadway 37 feet wide for use by westbound traffic. This bridge construction work was under the supervision of Don Alden, Bridge Department representative.

The contract was approved on March 7, 1951, and the contractor began work the following day. There were 255 working days allowed under the contract. A total of 280 days were used to complete the contract. Due to the extremely severe winter rains 34 days were credited as nonworking due to weather or conditions resulting therefrom.

This contract had the distinction of having, at different times, three superintendents and two resident engineers. The superintendents for A. Teichert & Son, Inc., were L. F. deStwolinski, A. Bauer, and R. Skinner. The resident engineers were A. W. Carr and the author. Carr left the job in order to accept appointment in Sacramento. The two mainstays for the contractor were Paul Shaw, Assistant Superintendent, and Ruth Wyndham, Project Office Manager. Both were on the job from beginning to end and assisted the state engineering personnel in every way possible. Their cooperation was greatly appreciated.

Plant-mix Surfacing

Among the various items of work, the plant mix surfacing was of particular interest. The contract special provisions stated that material of satisfactory quality for use in the production of mineral aggregate for plant mix surfacing could be obtained from within the highway right of way but

Completed construction of four-lane, limited access freeway on Santa Ana Canyon Road in Orange County

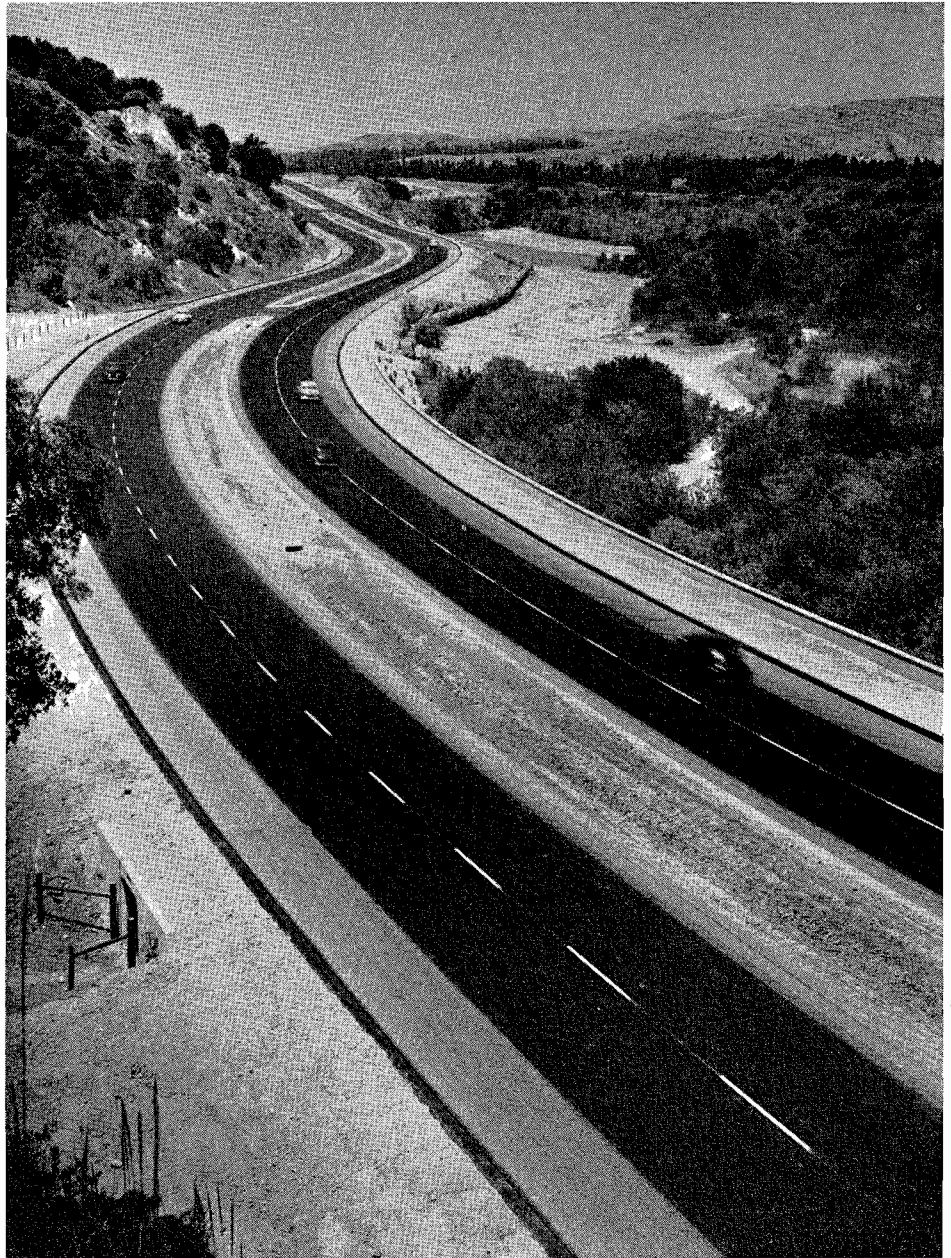


outside of the roadway prism, between Stations 461 and 476. The contractor elected to use this source of material for his mineral aggregate for plant mix surfacing as well as his mineral aggregate for cement treated base. His rock plant setup was stationary type and not portable type of equipment. From the beginning of operations, it was known from field tests that the contractor would have difficulty in getting this material to meet the grading requirements, particularly on the No. 200 sieve. After producing approximately 13,000 tons of plant mix surfacing and trying various means of meeting the grading requirements, it was agreed that the problem could not be licked by ordinary means.

Aggregate Problem

During the initial production period, the aggregate was either within the grading requirements on the 200 sieve and out on the 30, 8, 4, and sometimes the $\frac{3}{8}$; or it was within the grading requirements on the $\frac{3}{8}$ and 4 and was out on the 8, 30, and 200. There were just too many fines. The contractor tried blowing out the fines with fans and blowers, but the fines stuck to the larger size rocks. Various size screens were tried; wasting a portion of the material passing the $\frac{3}{8}$ -screen was tried; and blowing the excess fines out the stack of the dryer was tried; but nothing worked until the material was washed. This was accomplished by the installation of a spray bar and two pipe jets above the top deck of the vibrating screens, (all 2-inch diameter pipe) and so arranged as to create the greatest amount of washing possible to the material as the water was sprayed against it.

The source of water was the Santa Ana River, flowing nearby where a 40 h.p., 4-inch centrifugal pump was installed to provide a rated 650 gal./min. at 50 lb./sq. in. pressure. This water was supplied to the crusher in a 4-inch pipe with a 4-inch standpipe running from the ground up to the screens. The mixture of water and minus $\frac{3}{8}$ -inch material fell through the screens into a trough below where it was carried into a sand dehydrator of the single strand paddle type. The sand dehydrator fed the minus $\frac{3}{8}$ -inch material back into a bunker and al-



This shows another section of the completed access freeway on Santa Ana Canyon Road

lowed the water and suspended fines to be carried off in a flume back into the Santa Ana River.

From the time of washing the mineral aggregate, no other serious difficulties were encountered. The contractor was able to keep the material within the grading requirements on all screen sizes, and satisfy all specification requirements.

The cost of this contract, which was 6.1 miles in length, amounted to \$1,013,600 in contract items and additional work. Among the state person-

nel assigned to this contract were Pat Kennelly on roadway excavation, Bill Brady on structures, Frank Teeter on cement treated base, Roy Gardner on plant mix surfacing and Joe Truxaw on plant mix surfacing plant.

THE DANGERS OF NIGHT

Three times as many pedestrians are killed during hours of darkness even though there are fewer cars operating. When you're driving at night, be alert for pedestrians.

Quality Control

Program of Purchasing Division
Is Outlined for Departments

By GLEN MORGAN, Specifications Analyst, Department of Finance, Purchasing Division

ALTHOUGH the Purchasing Division seldom makes print in this magazine, we have recently launched a program which we hope will eventually affect all state departments. This program is the culmination of over two years of constant effort on the part of Lawrence E. Hobart, State Purchasing Agent, to improve state purchases through a "quality control" system.

The Division of Highways has the greatest number of specifications of any of the departments by far. Most of these specifications deal with materials used directly in the construction and maintenance of our highways. Until the advent of Highways' Service and Supply Department, little thought was given to non-highway items. Thanks to Milton Harris and his able crew of Service and Supply Engineers, a great deal of progress has been made in the standardization of these non-highway items.

Over-All Policy

In planning a procedure of operation for this quality control program, it seemed logical to establish an over-all policy and guidance group composed of the directors of the various state departments or their selected representatives.

The first meeting of this group was called to order by James S. Dean, Director of Finance, July 9, 1952. Mr. Dean pointed out the need for such a standards program and the desirability of having the committee composed of top level management. A. Earl Washburn, Deputy Director of Finance, was elected as Chairman and Glen Morgan, Specifications Analyst, Purchasing Division, Executive Secretary. This group is known as the "State Purchases Standards Committee."

Clearing House

The primary purpose of this committee is to lend to the various subcommittees and working groups, a degree of official sanction. It is to serve

as a clearing house for ideas and suggestions between departments and the Purchasing Division. Appointments to all committees are to be made by department heads or committee members in every instance.

Any committee member may initiate a study and appraisal of any item needing investigation. Those departments having similar problems will be requested to appoint an active member, qualified to serve on a working subcommittee. Standards recommendations will be put into effect on a trial basis and then expanded to full scale operation as experience indicates.

Some agencies claim that standardization will smother the individual and stifle his initiative. This is not so, for we must depend on information and ideas from within the organization to set the standard. The man who uses the equipment or material, knows what he wants and needs. It is the duty of the committee to translate this know-how to precise terms, formally called a specification.

Items peculiar to a single department and already adequately covered by specifications are of no particular concern to this program. Our primary aim is to standardize those items purchased most frequently and in large amounts. It will be necessary to develop but few standards from scratch. There are over 16,000 federal specifications and countless others used by purchasing agents throughout the Nation. The problem is to find a suitable, basic specification, which can be so altered to fit the needs of the agencies involved.

These committees we speak of must be democratic; they must be composed of a complete cross-section of those affected by the program. This insures a maximum number of viewpoints and objections—real or fancied—are dealt with openly. Most important of all, anyone having a chance to air his views and to champion his cause will be much more likely to abide by

the resulting decisions. You have your say—you have a vote—you support the outcome.

The results of the many fine projects on which some of the departments are working, are to be incorporated into this program. There is no intent to swallow up any of the committees already in operation throughout the State.

A serious effort will be made to keep the operation of the committee and working subcommittees free of excessive rules and regulations. All action will have to be on a voluntary basis—each recommendation will have to stand on its own merits. No arbitrary decisions will be made. Each problem will be worked out to everyone's satisfaction before any final action is taken.

The departments which are the major users of paints have been asked to appoint members to serve on a "Protective Coatings Committee." This committee's project is to determine the types of protective coatings most commonly used and assign to these types of paints, acceptable specifications that will assure us of a proper, uniform quality. Each department, each locality, each vendor, has a need, a duty, some honest complaint. All of these must be welded into a specification which will be acceptable to all.

All agencies will be furnished with specifications and all necessary information for properly identifying the items on the requisition or estimate.

Let us think of this program, not as standardization but as "quality control." Quality control does not simply mean the best—it means the best quality for the intended use of the article purchased.

Briefly, this program is based on the democratic principle of everyone involved having a voice, a vote and a willingness to accept a decision. The degree of success at which we can operate will depend upon the wholehearted effort of each participant.

District IX

Highways in Inyo and Mono Counties Carry Heavy Tourist Traffic

By ALAN S. HART, District Engineer

U.S. HIGHWAY 395 from the San Bernardino County line northerly approximately 300 miles to the Nevada state line at Topaz Lake forms the very backbone of the network of state highways in District IX.

Together with an assist from U. S. Highway 6, it is the economic lifeline of an area which has no through railroad lines nor any scheduled airline flights. The highway also provides this great eastern empire with its commercial outlet. A branch line of the railroad does penetrate on broad gauge as far north as Long Pine and then sticks forth a tiny sliver of narrow gauge rails to Laws, north of Bishop; but the part it currently plays in the transportation of goods, products, raw materials and personnel is small compared to that of the fleets of motor trucks which daily rumble over the highways.

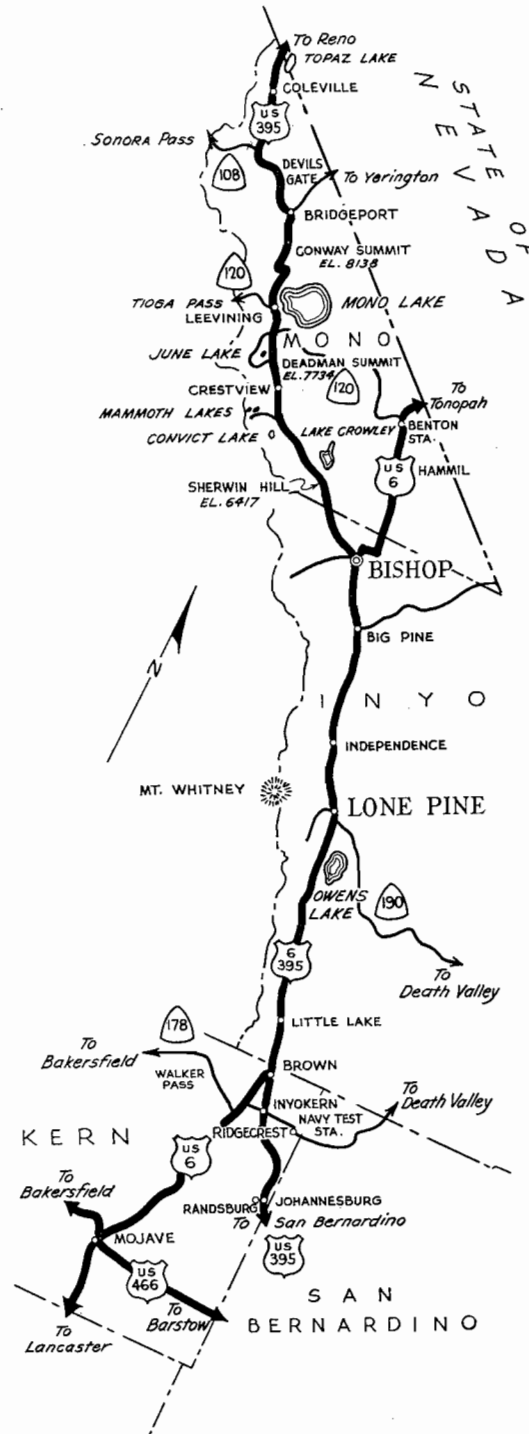
Mono County is entirely bereft of rail, air or sea transportation and depends entirely upon the highway for its daily bread and for its economic existence. Mining, lumbering and cattle raising, which once were the dominant economic factors in the well-being of this remote mountain country, are all now relegated to subordinate positions to that of the tourist industry. Catering to the desires and necessities of the tourists has now become the top-ranking industry in Mono County, and this has been made possible by reason of the highways not only in the county but in the approaches thereto.

Recreational Area

While Inyo County is not so dependent upon the tourist trade, it is still a major county industry, inasmuch as by far the largest percentage of the tourists are from the southland and must of necessity pass through Inyo County to reach the playgrounds of Mono.

Looking at the map, U. S. Highway 395 appears to be solidly supported on the south by two well-braced legs: U. S. Highway 395 extending toward San Bernardino and U. S. 6 extending toward Los Angeles. Together they accommodate the traffic from Southern California and speed travelers on their way northerly. U. S. Highway 395 in District IX starts at the mining town of Johannesburg, just north of the San Bernardino-Kern County line, and projects itself northerly through the rolling hills of the Mojave Desert. Just a mile north of Johannesburg is the historic and still active mining community of Randsburg.

This portion of U. S. 395 is State Highway Route 145 and has been progressively rebuilt since World War II to current highways standards on a two-lane basis. The most recent project was completed in late 1951 by E. C. Young of San Fernando. This project, costing





Convict Lake as seen from U. S. 395. The turnoff to the lake from U. S. 395 may be seen in the lower left foreground.

\$75,000, was five miles long and closed two gaps between previous construction projects so that a continuous portion of Route 145 from the southerly boundary to the Ridgecrest turnoff, a distance of 15 miles, is now being traveled by the public.

Desert Highways

From the Ridgecrest turnoff northerly to the Junction of U. S. 395 and U. S. 6 at Brown the highway is typical improved desert highway but not modernized. Sharp dips, right-angle turns and inadequate pavement thicknesses characterize the next 20 miles as the highway passes through the town of Inyokern on its way to its junction with U. S. 6. Plans are in the making for the progressive modernization of this last remaining desert section of U. S. 395.

Inyokern is the gateway to the huge Naval Ordnance Test Station at China Lake some eight miles easterly. The growing town of Ridgecrest is just outside the gates of the test station and supplies the Navy with considerable housing, as well as merchandise and consumer services. Easterly of Ridgecrest lie West End, Argos, and Trona with their oversize potash and other chemical plants. Altogether, this area comprises the "metropolitan" area of

District IX with some 20,000 to 25,000 people living in this region. A new county F. A. S. road leading northeasterly out of Trona now provides a different and shorter entrance into Death Valley via Wildrose Canyon for tourists from the south.

Improvement Under Way

Near Brown in northern Kern County, U. S. 6 and U. S. 395 become one and jointly use the same roadbed northerly to Bishop. The settlement of Little Lake in Inyo County is located at the ridge which separates the Mojave Desert on the south from the Owens Valley on the north. Rice Brothers of Marysville currently are engaged in a \$130,000 contract for regrading portions of the highway both north and south of Little Lake and for building improved road-mixed surfaced shoulders over a total distance of 17.6 miles. This project is unique in District IX in that it will provide the first section of four-lane divided highway in the district. This has come about not because the volume of traffic warrants, but because it was more economical to widen to four lanes than to deepen the cuts for sight distances.

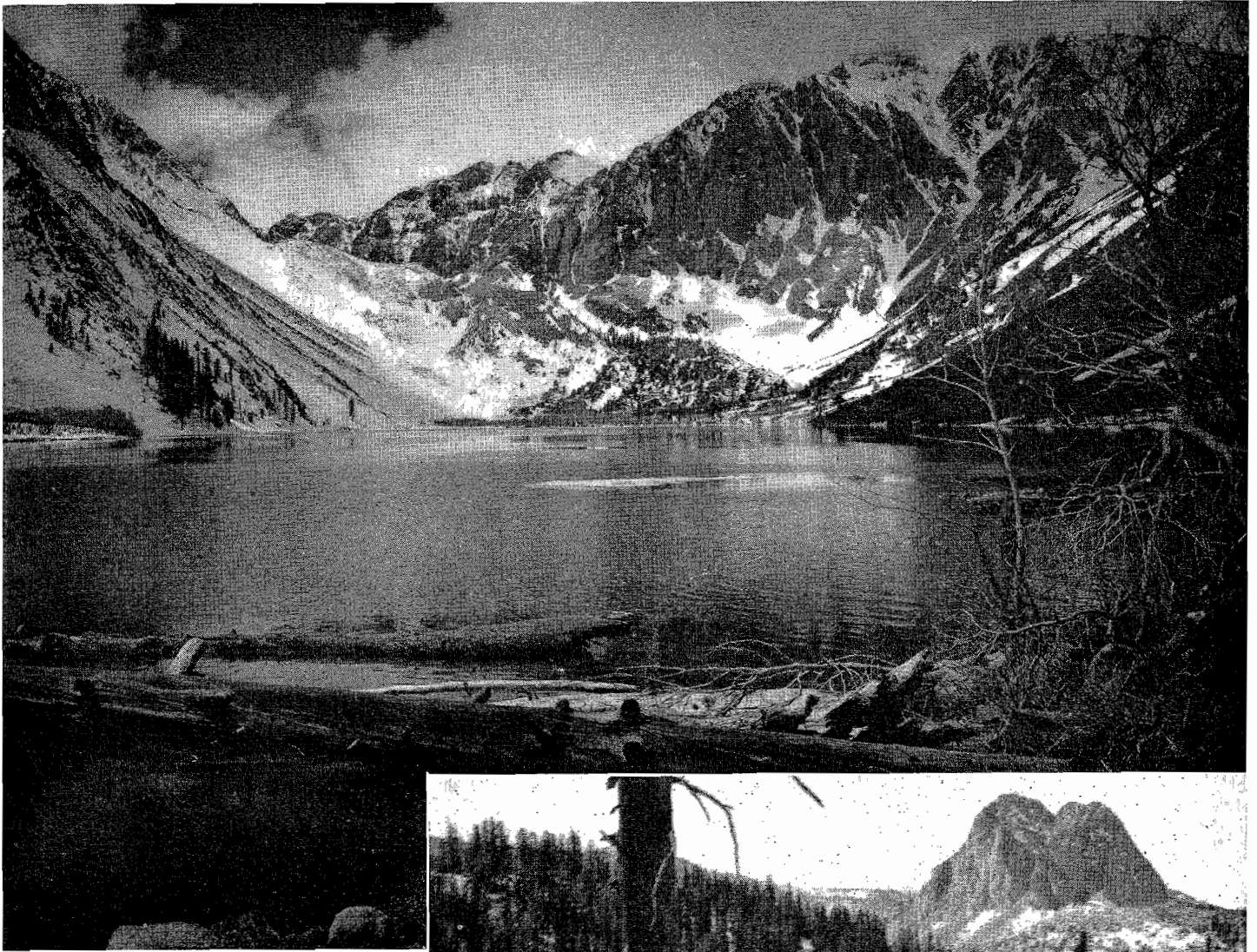
U. S. 395 in the Owens River Valley enables the tourist to enjoy real awe-inspiring scenery along the east slope

of the Sierra Nevada Mountains. These highest mountains in the United States are viewed in complete reality culminating in the view of Mt. Whitney at Lone Pine. Lone Pine is also the gateway to Death Valley to the east.

Deficiencies Exist

While U. S. 395 in the Owens Valley is of such a high standard that vehicle speeds of the highest order are easily and actually obtained, there are still deficiencies to overcome. The horizontal alignment of State Route 23 is almost without exception of the best but the vertical alignment leaves much to be desired. The current program on Route 23 is pointed toward the elimination of these vertical alignment restrictions and the providing of additional width of pavement by supplying oil-mixed shoulders. Only the fact that traffic is still relatively light, as major highway traffic goes, prevents more accidents than do occur. Speed, fatigue, and stray animals on the highway account for nearly all of the accidents within the district.

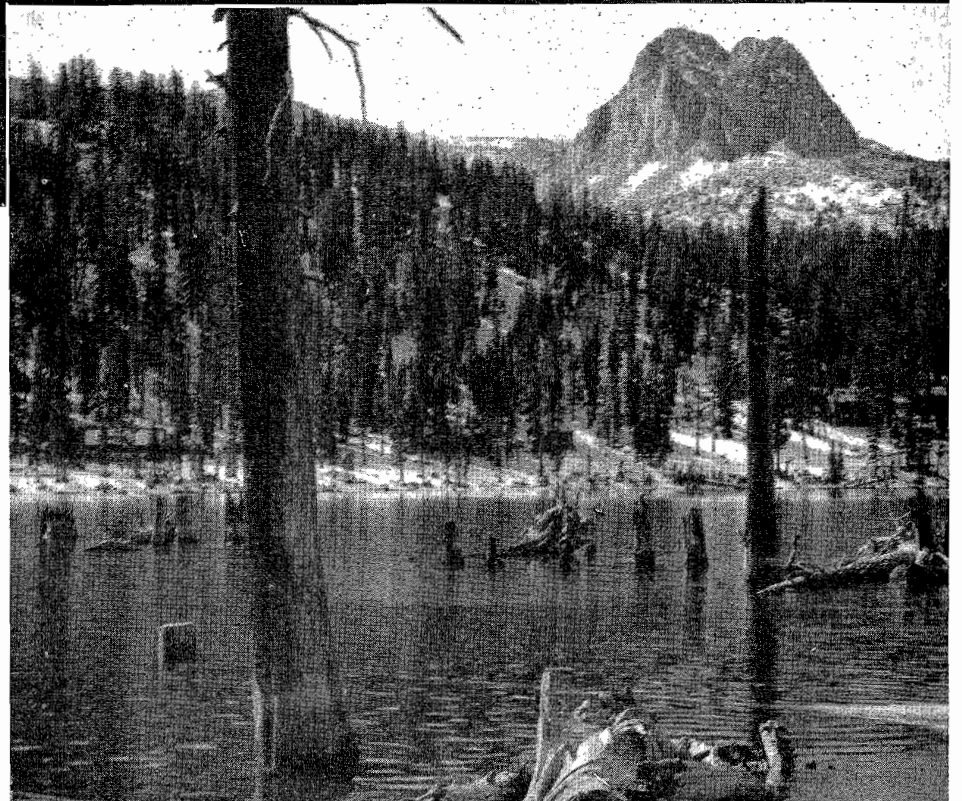
The heaviest concentration of traffic in District IX occurs within and just northerly of the City of Bishop. To alleviate this condition the G. W. Ellis



Construction Company of North Hollywood is engaged in a \$150,000 project to provide a new surface for Main Street and to widen the northerly approach to Bishop to a four-lane undivided street section. This will allow for a smoother flow of traffic and for the elimination of minor accidents due to side friction from the built-up area of service stations and motels.

Tourist Traffic

Just north of Bishop U. S. 6 strikes off boldly toward Nevada and Montgomery Pass. The tourist-conscious people of Bishop and the lower Owens Valley are anticipating a considerable increase in tourist traffic with the completion of the last unconstructed gap of U. S. 6 in southern Utah.



UPPER—Close up view of Convict Lake in Mono County. LOWER—Lake Mary in Mono County, popular recreational spot reached by U. S. 395.

... Continued on page 58

Idea Pays Off

House Condemned on Freeway Is Made Into Beautiful Home

Mrs. JOAN H. WOODBURY, a woman nearly 80 years of age, gazed critically at a bungalow which was condemned to be sold and moved from where it stood, to make room for the Hollywood Freeway, being constructed to insure safer and speedier motor travel in Los Angeles.

Mrs. Woodbury had recently returned from a Central and South American tour to discover, with housing shortages, how difficult it was to find the type of building she desired. For years she had owned and managed large hotels and apartment houses, in fact had, before her latest sight-seeing jaunt sold herself out of a home, by disposing of two apartment houses.

And now, she longed for a small home. One she could artistically furnish with household goods which would perfectly fit into a Cape Code cottage. She examined critically the construction and design, both inside and out, of the building before her. Although old, it had been built by excellent craftsmen. She readily imagined what this small cottage could be made to look like with the touches she would add to improve its appearance.

Moves House 15 Miles

She wrote a check as a deposit and received in writing an allowance of three weeks for removal. The next day she scanned the newspapers for a lot. She wanted to live near the ocean. Being a native San Franciscan, she craved sea air with a bit of fog thrown in. As her daughter, Joan Woodbury—wife of Henry Wilcoxon, movie director and producer—with her three small daughters, lived in Brentwood, Mrs. Woodbury sought a lot so as to have residence near to them, as well as the sea breezes and fog. This she achieved in buying a lot in Mar Vista, high above sea-level.

Fortunately, she found a house mover who agreed to move the building 15 miles and set it down on its new foundation without a crack in

the plaster. After buying the lot Mrs. Woodbury was requested to make a drawing of what she intended to make the building look like, for the building inspectors, so as to receive a permit to construct. She fulfilled all demands, adding a colored drawing of the finished product.

Garage to Match House

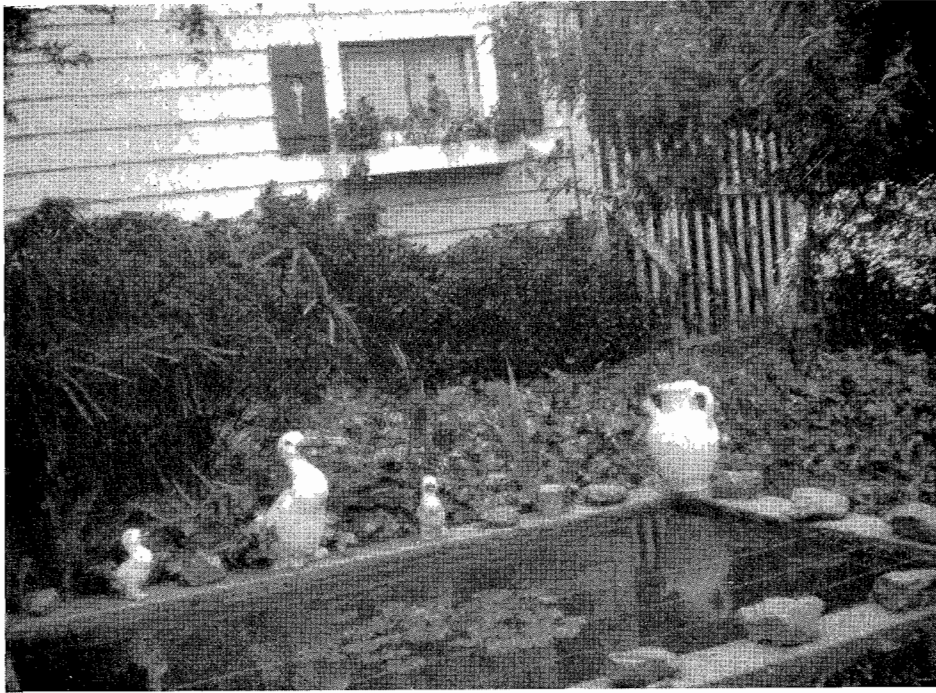
As there was no garage with the bungalow, this meant a search for one to match the house. It was accomplished and a double garage was moved to the end of the lot with its door facing the alley. To make the garage further match the house, shutters and window boxes planted with coral and

white flowers were added. It now looks like a small bungalow.

The house contains two bedrooms with color scheme, one in Delph blue, the other in ashes of roses. Furniture is Italian hand decorated, blending well with the color scheme. The living room is 14 by 28 feet with windows looking out at window boxes. The walls of the room are done in a soft tan which lends itself as a fitting background to the fine collection of original oils—water colors and pastels collected by Mrs. Woodbury and her ancestors. Mrs. Woodbury had the light hardwood floors sanded and stained dark. They look like mahogany and their

UPPER—House after being moved 15 miles and located on Mrs. Woodbury's lot. LOWER—View of house one year later after redecorating had been done and landscaping started.





Fish pond in center of Mrs. Woodbury's garden near the back of her garage

polish is so bright that the hand-carved furniture and antiques standing above are reflected in the rich surface.

Attractive Patio

Through French doors one descends into an attractive patio. Here the walls are adorned with Indian baskets and curios gathered during Mrs. Woodbury's many travels. There is patio furniture and a grill, and a broad table

covered with a hand-woven table cloth made by Guatemalan Indians. Here Mrs. Woodbury entertains with teas, luncheons, and Sunday morning breakfasts. While dining, her guests are made happy with the enchanting view of the beautiful back garden, enhanced with a goldfish pond with pond lilies in bloom, garden seats, a Madonna shrine, fruit trees and the colorful garage in the background.

EDWIN B. NORMINGTON

Continued from page 27 . . .

In 1918, Mr. Normington left the Pacific Gas and Electric Company to enter the service of the Western Pacific Railroad Company at Sacramento, as electrician and armature winder, remaining with them until shortly before the nation-wide railroad strike in 1922, when he joined the then newly formed Equipment Department of the Division of Highways.

The years Ed spent in carriage-building and wood-working in earlier years have made it possible for him to enjoy many pleasant hours and to derive much satisfaction from his rather complete workshop in his Sacramento home.

Mr. Normington's retirement date almost coincides with that of the 43d anniversary (August 4, 1952) of his marriage to Theresa Belle (Schwartz) Normington. They have two married daughters, Reba Tugaeff and Desirée Flynn, a son, Elmer Normington, and seven grandchildren—a continual source of pride for Ed and Mrs. Normington—all of whom reside in the Sacramento area.

Mr. and Mrs. Normington plan to spend their retirement on their pine-tree studded 14-acre farm on Pleasant Valley Road, four miles east of Diamond Springs, near Placerville.

Ed is well-known in highway circles throughout California and over the years has made a host of friends who wish him and Mrs. Normington a long and happy retirement.

Wanton Damage

Continued from page 18 . . .

mill west of Red Bluff and transferred their load. Logs that were to be cut into lumber stayed at the mill. But all logs that were to be used for plywood were reloaded and hauled to the plywood mill at Anderson, I think he said. In this way they can check their loads that are going to be hauled on U. S. 99 and stay within the limit. But up to the point of transfer they seem to be overloading to their heart's content.

As we were driving through Grizzly Creek Redwood Park we came to a place where the Van Duzen River has cut away the bank until something is going to have to be done to save our highway. There are two large redwood trees that should be removed. If we can remove those two trees the Division of Highways can save about \$50,000. If the trees cannot be removed we are going to have to spend that sum for a log or concrete crib to hold the river from cutting any farther into the road. If we can remove them we can move the road into the bank 10 or 20 feet and have a safer and better road.

The conclusion I reached, after this trip, is that our Legislature should be made aware of what is happening to our highways due to excessive loads, and some method arrived at to curtail the excessive overloads that are being hauled over highways that were not built to stand them.

Bad weather doesn't stop these log haulers. Even if the road becomes almost impassable to an ordinary car they still continue to haul over it, and that only makes the road more difficult to keep in shape or repair.

SKID DANGER

Whenever possible, avoid use of brakes when making a turn or taking a curve. Your car is more apt to go into a skid when you apply the brakes on a turn or curve than when you use them on a straight stretch of road.

CROSS AT CORNERS

One out of every three pedestrian deaths last year was caused by jaywalking. Safety is only as far as the next corner. Play it safe; use the crosswalks.

Early Days

Minutes of First Highway Commission
In 1912 Make Interesting Reading

By R. C. (CASS) KENNEDY, Secretary, California Highway Commission

(Continued from last issue)

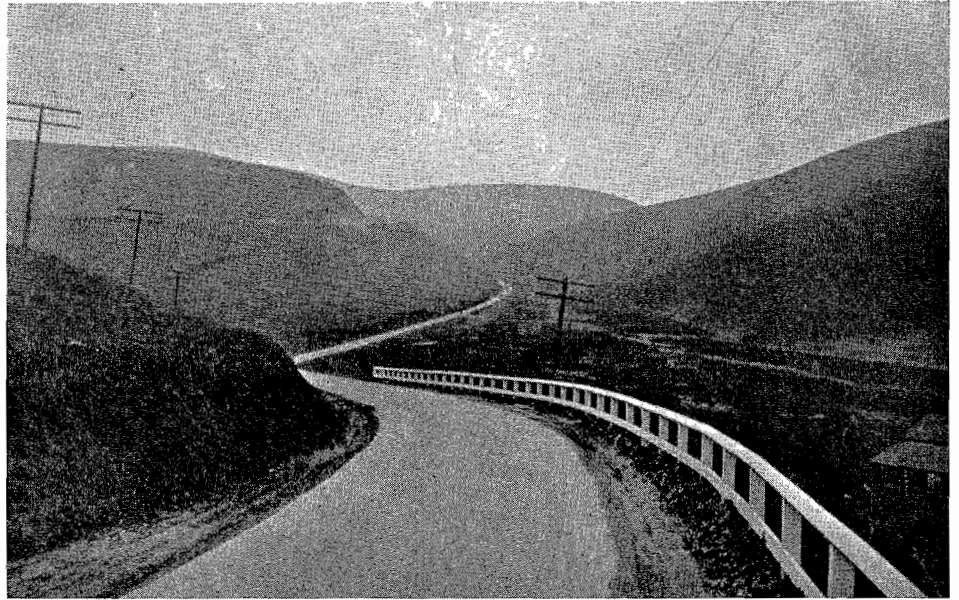
THERE IS one paragraph in the rules that I would like to read into this article. Paragraph 3 of the general rules stated that every letter in reply to another "shall cite the date of the letter replied to and, in addition, shall contain a sufficient repetition of the subject matter of such letter as to permit of a complete understanding of the subject of the correspondence should the incoming letter become lost or misplaced."

I am wondering how many readers have ever received a letter from the Director of Public Works or the Division of Highways. If they will remember, nearly every letter starts out "Reference is made to your letter of (a certain date) regarding (so and so)" and the content of the letter addressed here is then stated.

This idea that was promulgated on January 22, 1912, is still in effect. I would like to cite other rules and regulations, made years ago, which still stand. When a file becomes thick, and it is a chore to delve through it to find out what it is all about, if, in the first, or topmost, letter you can find a resume of the content, it makes it much easier for everybody concerned.

Filing of Correspondence

In these same rules it was designated that "one person in each office shall be designated a file clerk and that no other person shall be permitted to place or to restore correspondence to the files." As time goes on the files grow, and grow, and grow. At the present time the files of the Division of Highways and of the Director of Public Works are quite large. In the case of the Division of Highways there is a separate section devoted to files, in which there are a number of people employed. These people are the only ones authorized to place or take anything from the files. The same thing holds true for the office of the Director of Public Works. In 1912 they made a rule that



Old Altamont Pass in Alameda County before it was improved by gas tax funds

one person only should be responsible for the files.

And here again, in this same lot of rules, is the designation set up regarding how to identify different routes. I think the same idea is still in existence.

On this same day, January 22, 1912, the commission adopted a list of approved abbreviations for the different counties, and I am almost certain that this same list of abbreviations is still in use all over the Division of Highways.

Jobs Filled

Further business that afternoon consisted of voting jobs for a number of people. There was no civil service in that day, and everybody who wanted a position with the commission or with the Highway Department applied to the Highway Engineer and he recommended to the commission that they be employed. Every person so employed was voted into office or into the position by the commission, and their salary was stated in the vote. There are about three or four pages of votes

taking people into the system, and usually they are starting on February 1, 1912. It would seem that the commission, by this time, had decided that February 1st was going to see the start of the California Highway Commission and the Highway Department.

On the morning of January 23, 1912, the commission met in regular session and approved some claims for expenditures, and then recessed to meet with Governor Johnson and the advisory board. The minutes of what transpired with the advisory board are not in the minutes of the California Highway Commission, so there is no way of finding out what transpired there. But that afternoon the commission reconvened and Mr. Blaney read a preamble and resolution which had been passed by the advisory board that morning, which had approved their expenditures and gave the Highway Commission further powers for signing papers legally and also gave it power to conduct its business as it saw fit. Six more people were voted jobs that afternoon.

Delegations Received

On January 24, 1912, the commission met at 9 a.m. It had promised to hear a number of delegations. There is a record that each half hour, even up to 12.10 p.m., the commissioners listened to different delegations. They evidently recessed for lunch, although there is no statement in the minutes that this had been done, but the minutes show that they were still listening to different groups at 4 p.m. that afternoon. That afternoon they also voted 21 more people positions with the highway department.

Also, on January 24, the first signs of expansion appear, for on that day the highway engineer was authorized to negotiate with the owners of the Forum Building for a room, or rooms, on the sixth floor of that building, to be used for a road material testing laboratory and for photographic purposes. This, of course, in addition to the office spaces the commissioners already had made the necessary arrangements for.

Route Numbers Approved

On January 25th the commission met at 10 a.m., and received several different delegations from different spots of California regarding roads. It also voted, tentatively, route numbers for certain different roads. There were nine of them, and there is no use numbering them or telling where they happened to be at that time. The commissioners specified that the sections of the several routes be each, as nearly as they may be, 20 miles long, and that no contract or estimate include work in more than one county. They were evidently looking far ahead so that estimates would not straddle over into another division. They also, on this date, authorized the highway engineer to cause to be made surveys, plans, and estimates for several roads. At least one road was in every division, so that this would mean that every division office was now ready and willing to go and was evidently equipped both as to office space and personnel and the necessary surveying instruments, desks, etc., to operate. They also voted that they buy four different automobiles—one for San Luis Obispo,



State highway in San Benito County, typical of early highways made possible by first bond issue

one for Fresno, one for Los Angeles, and one for San Francisco. These were evidently for the use of the division engineers at these division offices.

Office of File Clerk

On January 26th the commission did not meet until 1.30 p.m., but all members being present, it proceeded to hear delegations from San Joaquin County regarding roads in that district.

It also established the office of file clerk at headquarters, and the file clerk was to have charge of all of the headquarters correspondence, including the opening and distribution of the mail, the copying of outgoing letters, the sealing and mailing of letters, and the custody of the postage stamps. All letters were to be marked by him for filing, and he was to be held responsible for the filing thereof. No letters or other papers were to be placed in the files except by the file clerk, and all persons who took papers from the files were to give a proper receipt to him therefor.

George G. Davis, who was then employed as a clerk, was designated as a file clerk at headquarters with a salary of \$60 per month.

It was also voted that thereafter all official outgoing letters and telegrams from headquarters shall be written with copying ribbons and copied by the wet process. I am wondering how

many of my readers remember what the wet process was of copying a letter. The writer remembers in his younger days when he had a position as office boy that he was responsible for the copying of all outgoing letters. In those days a real copy book was made, and used, by different corporations and companies. The books were bound and contained probably 100 tissue sheets, all numbered. You had a water bucket, or tank, full of linen cloths which were always wet. You placed a piece of cardboard back of the tissue sheet, placed one of these sheets of wet linen on it, pulled over a tissue on top of that, and placed your letter face down on it, put on this another piece of cardboard, and then put it in a press and squeezed the press down. After a certain time you released the press and took out a wet letter and put the linen piece back into the tank, and placed blotters on each side of the wet tissue in the book. And this was your record of your outgoing correspondence and was the way of keeping a copy of your outgoing letters. Certain organizations used individual pieces of tissue, so that they could be placed in a file along with the rest of the correspondence.

I wonder how far our Division of Highways would get today if it still had to use the wet process for copying all of its outgoing letters. It was rather a messy job.

Accounting System Set Up

On this same January 26, 1912, the commission voted that Room D, at its headquarters, be assigned to the secretary of the commission for his offices, and that Room C be assigned to the secretary's stenographers and the file clerk, and that Rooms A and B be assigned to the chief accountant and his subordinates.

The commission had made arrangements to have a conference with Klink, Bean & Company of San Francisco, called, in those days, expert accountants. So it recessed to meet again at 8.30 that evening with Messrs. Klink and Bean regarding the organization of an accounting system for the commission. It was voted that Messrs. Klink, Bean & Company be engaged by the commission to work with the highway engineer and the commission in installing a proper business system and method of accounts. The charge from Klink and Bean being \$250 per week for principal's work and \$150 per week for principal assistants. It was judged that two or three weeks would be necessary to install the first system, with additional work later as needed. Messrs. Klink and Bean were authorized to proceed at once with the preparation of a report to be taken up with the highway engineer on February 6th and then be submitted to the commission not later than February 8th.

Cortelyou Employed

In checking back over some of the things I might have missed I discovered that on January 23, 1912, it was voted that a man by the name of Spencer V. Cortelyou, who resided in Los Angeles, be appointed and employed as the chief assistant attached to Division VII, his term of service to begin on February 21st and to continue subject to the pleasure of the commission. His salary was to be \$175 per month. For the benefit of the readers, Spencer Cortelyou retired on October 1, 1949, as Assistant State Highway Engineer in charge of District VII which includes metropolitan Los Angeles. A great deal of our highways and our freeways in Los Angeles County resulted from the employment of this man. Mr. Cortelyou is the one who laid out the original system of free-



Spencer V. Cortelyou, who entered service with the first California Highway Commission in 1912

ways and had a great deal to do with the initial construction of them.

On the afternoon of February 8, 1912, the commission met and received a verbal report from Mr. Bean of the firm of Klink & Bean, relative to the organization of an accounting system for the commission. He was given further time in which to prepare a written detailed statement of the plan offered, so that the commission could further consider the idea.

The rest of the meeting on February 8th was devoted to voting different men into different positions. Late that afternoon, a recess was declared until 10 a.m. the following day, when the commission met at 10 a.m., and voted that the highway engineer cause a reconnaissance to be made of the portion of Route 3 in Division II, between Redding and Dunsmuir. The highway engineer was instructed to cause a survey to be made of the portion of Route 4 in Division III between the southerly boundary of San Joaquin County near Ripon and extending in a southerly and easterly direction

through Modesto to the southerly boundary line of Stanislaus County.

Miss Murray Appointed

A number of communications recommending various proposed highway routes were read and filed. That afternoon the commission voted that its attorney be directed to prepare forms of bonds to be executed and filed by the division engineers, and at the same time it voted that Miss Myrtle Murray be appointed to the position of stenographer, to begin on February 13th. Miss Murray later served as administrative assistant to several public works directors and for two days under Governor Rolph was Director of Public Works, an honorary appointment.

It would seem that the expansion program was taking up more time than the two previous stenographers could handle, so that it was necessary to expand the headquarters office of the commission so that work could be done. On February 19th the commission met at 2 o'clock and voted two or three people into jobs, and then recessed until 8 o'clock in the evening.

At that time the attorney, C. C. Carleton, was instructed to prepare and forward a letter to the various boards of supervisors of the counties of California in form and substance as directed. In this letter it was stated that a number of counties, through their representatives, had offered to provide free rights of way and to build all bridges necessary for such state highway, or highways, as may be located within their respective limits. It was beginning to be evident that the bond issue of \$18,000,000 was going to be inadequate for the great work projected, and the commission believed that each county which might be benefited by the routing of the State Highway System through its territory should be ready to do its part in making the state highway undertaking an unqualified success. The commission asked that the boards of supervisors consider this important matter at once, and trusted that they would adopt a resolution agreeing to furnish free rights of way and to build necessary bridges for such state highways as might be located in their counties.



Fred W. Haselwood, deceased, who became a principal assistant highway engineer in 1912

Haselwood Employed

On this date, also, it was voted that Fred W. Haselwood should be employed as a principal assistant engineer in Division I at a salary of \$175 per month. Mr. Haselwood retired from state office on May 31, 1950, as district engineer and passed away shortly after that. The rest of the day, or rather the evening, was taken up with voting a number of people into positions.

New Automobiles

One of the things that was done on February 19th was to order three 1912, Model G, Franklin touring cars, fully equipped with top, glass front, trunk rack, Stewart speedometer, side tire carrier, and one set of Weed tire chains, for \$2,500 in cash, and a 1912 48-h.p. seven-passenger Locomobile, now in their service, in trade. One of these new Franklins was to go to Sacramento, one to Redding, and one to Willits. The last paragraph states:

"In addition, you will agree to furnish for the purpose of instruction, a man with each of these cars for a period of two, and not to exceed four or five, days."

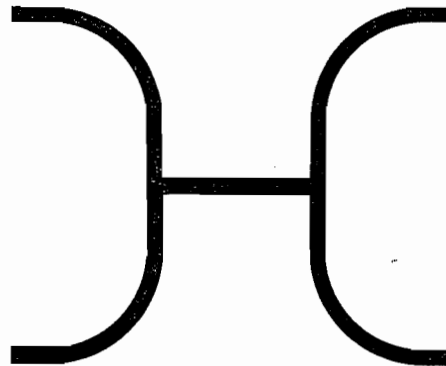
By this time you probably realize that this Highway Commission was meeting every day. It would seem that

this was a full-time job in 1911 and 1912.

Stock Brand Designed

On February 20th the commission met again at 10 a.m., and passed Schedules 17, 18, 19, 20, and 21. These appear to be warrants for paying the salaries and for various supplies of all kinds.

At 4 o'clock that afternoon the session was resumed and on the recommendation of the Highway Engineer, a brand was authorized for use on stock used by the State and under the control of the commission, and the Highway Engineer was instructed to cause every animal so owned to be properly marked on the left hind-quarter with said brand. The brand was composed of a letter "C" drawn backwards and a letter "C" drawn the correct way with a short space between them connected with a bar, leaving the brand to be "C-C."



UPPER—This brand was adopted by the first California Highway Commission for use on livestock owned by the highway department. LOWER—Today the old brand is no longer used and this emblem is emblazoned on all motor vehicles owned by the Division of Highways.

Chairman Towne reported that the commission had met in session with the Advisory Board in the Governor's Office and that the board had ratified everything the commission had done.

Surveys Authorized

On February 21st the commissioners met at 10 a.m. and listened to six different groups presenting their ideas of where highways should go through different counties and different cities. They recessed at 4.30 p.m. to meet again the next morning. February 22d, in my memory, is Washington's Birthday, but this seems to have made little, or no, difference to the Highway Commissioners in 1912. They met on Washington's Birthday and listened to people from other portions of the State regarding roads and finally recessed about 12 o'clock to pick up again at 1.30 p.m.

At 1.30 p.m. they listened to more groups talking about their trials and tribulations and where their roads should go.

Also, on Washington's Birthday of the year 1912, the Highway Engineer was authorized to make surveys and plans and estimates on a route in Division III on a main road beginning at the southerly boundary of Tehama County below Vina and extending in a general southeasterly direction through Chico, Yuba City to Marysville; also, the main road beginning at the southerly boundary of Tehama County near Orland and extending southerly and southeasterly through Willows and Williams to Woodland. Division V was ordered to run a reconnaissance of a line from King City Bridge passing through Jolon and Pleyto to San Miguel.

The commission also approved the bond of Mr. Carruthers as Division Engineer of the Fifth Division.

Tom Stanton on Road

On February 23d the commission adjourned and didn't meet again, according to the minutes, until March 18, 1912. On that date it met at 2 p.m. and listened to Mr. Bean of the accounting firm of Klink & Bean. He talked relative to the organization of the accounting department. The bond of Mr. Woodson, the Division Engineer of Division VI, was approved,

and the secretary was asked to take up with the Governor's Office the necessity of the appointment of Miss Murray as a notary public in and for Sacramento County, with offices to be with headquarters of the commission.

The balance of the day was used up in voting a number of people into jobs—a total of 65 if I have counted correctly. And among those voted in on that date, to start work on April 1, 1912, was Thomas E. Stanton, Jr., who was appointed as principal assistant engineer in Division VI. Mr. Stanton retired on May 1, 1951, after 39 years with the State Highway Department.

On March 19th the commissioners attended to routine matters and adjourned to meet with the Advisory Board of the Engineering Department in the Governor's Office at 2 o'clock that afternoon.

On March 20th, the commissioners heard residents of San Joaquin County and Santa Barbara County, who appeared and advocated certain proposed highway routes.

Chairman Towne reported that the advisory board, at its meeting of the preceding day, had passed on all of the work that had been done and had approved the minutes. He further reported that at the conference a general discussion was held at the request of the Governor, regarding the relation of the Board of Control to the work of the California Highway Commission, ensued. It seems that the discussion ended up in a stalemate.

And that same afternoon the commission listed a number of banks—at least one bank in each division—which would be depositories for any money received by the commission in those different divisions. On March 21st, a delegation from the Tulare Board of Trade was heard.

Late that afternoon, Thomas H. Dennis, who at that time resided in Roseburg, Oregon, was appointed and employed as an instrument man attached to Division V, to start work on April 1st and to get \$100 a month. Tom Dennis retired as Maintenance Engineer on October 1, 1949, after 37 years in the Highway Department. On that same day Spencer W. Lowden, who resided at Redding, was appointed



Thomas E. Stanton, Jr., started his highway career in 1912



Thomas H. Dennis, who retired as maintenance engineer in 1949 after 37 years in the highway department

as a rodman attached to Division II, to start work on April 1, 1912, at a salary of \$70 a month. "Spence" Lowden is now our District Engineer in District VIII at San Bernardino.

(To Be Continued)

New Eastshore Freeway Unit Open to Traffic

WITH A CARAVAN of over 100 automobiles, the City of San Leandro and San Lorenzo Village on Friday, June 13th, helped dedicate a new section of the Eastshore Freeway. The newly opened section, costing \$3,531,212, is 4.2 miles long and extends from the 98th Avenue separation structure in Oakland to Lewelling Boulevard in San Lorenzo.

Friday, June 13th, is supposed to be an omen of bad luck but the residents of these well-populated districts of Alameda County count it a mighty lucky day. For this day opened a bottleneck that had been bothering them for a number of years.

Cost \$3,500,000

Costing something over three and one-half million dollars, the new freeway takes care of a vast number of industrial plants which have settled in the section besides hundreds of commuters. According to the people of San Lorenzo Village, the new freeway will put Oakland within 20 minutes of their homes. Before the completion of this section they have said that the time to get to Oakland varied anywhere from 45 minutes to an hour.

Everybody connected with the parade met an hour before the starting time in a get acquainted gathering and proceeded to just south of the 98th Avenue separation structure. Here a symbolic golden chain was across the highway. With gas and a cutting torch, Ridgeway Gillis, Deputy State Highway Engineer, severed the chain.

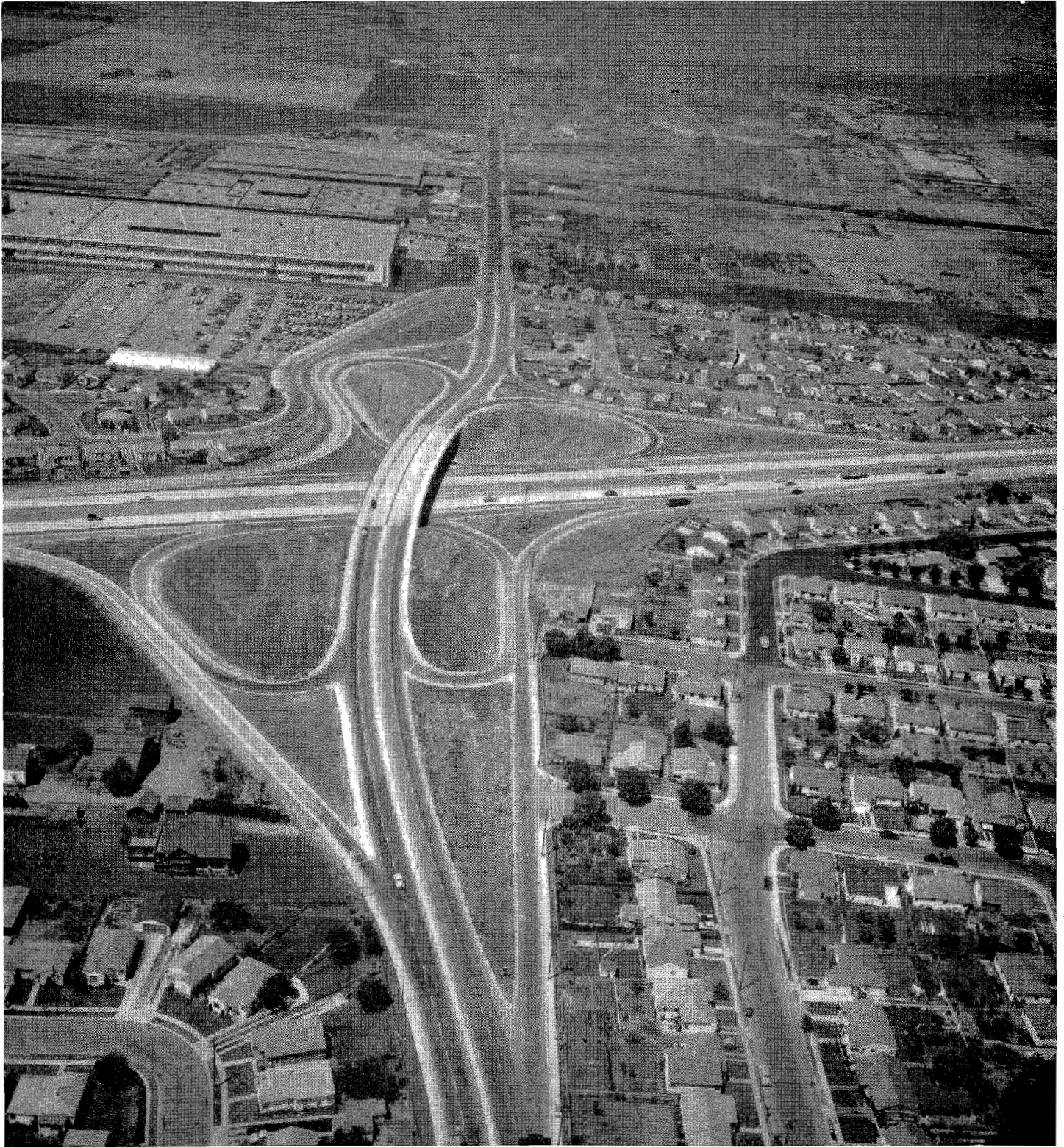
The caravan then proceeded to near Lewelling Boulevard where a purple ribbon stopped the crowd. Here, again, Gillis was called upon to do the honors, flanked by John H. Skeggs, former Assistant State Highway Engineer, now retired; David Bohannon, developer of San Lorenzo Village and George Janssen, Supervisor of Alameda County.



UPPER—Deputy State Highway Engineer Ridgeway Gillis severs ribbon near Lewelling Boulevard. LEFT TO RIGHT—Col. Jno. H. Skeggs, former assistant state highway engineer; David Bohannon, developer of San Lorenzo Village, and Alameda County Supervisor George Jansen. LOWER—Deputy State Highway Engineer Gillis severs chain near 98th Avenue separation structure. LEFT TO RIGHT—Miss Marjorie Junet, queen of the San Lorenzo festival; Gillis; Charles Grant, Air Reduction Company; Hal Saunders, Pacific Coast Manager of Air Reduction Company.



Eastshore Freeway, looking north, showing Washington Avenue interchange. Recent housing development shown in left background. Underpass in foreground is future on-ramp from State Route 228. Frontage road in foreground provides for access to future residential area.



*Eastshore Freeway, showing Davis Street interchange in San Leandro, and showing fully developed interchange.
Dodge assembly plant and parking area shown in left background.*

State Fair

Highways Will Carry Thousands To Big Show in Sacramento

CALIFORNIA families by the thousands will take to the State's splendid highways and head for the State Fair in Sacramento, August 28th through September 7th, to view the spectacular representation of the State's history and future, its natural resources, its progress and people.

Official theme of the 1952 event is "The Family" and fittingly, the fair will offer a variety of attractions in both educational and entertainment categories that will offer appeal to young and old. Like California's economy itself, the State Fair is many-sided and seeks to present an over-all picture of the Golden State.

Parking Areas

Centering on Sacramento from the network of California highways and roads will be not only scores of thousands of visitors traveling by automobile, but the vast amount of shipments of livestock, machinery, equipment, supplies and many exhibits that will be seen during the 11-day run of the fair. All possible will be done to accommodate the visitors who arrive at the fair by motor vehicle (there were an estimated 160,000 of them in 1951). Some 40 acres of public parking areas, well-supervised and patrolled, will be provided within or adjacent to the fairgrounds. The trailer lot on the grounds is being nearly doubled in capacity and utility service is being improved for families who reside in their mobile homes while attending the State Fair.

From every standpoint, the 1952 State Fair promises to be the biggest and best ever. Exhibits will total into the thousands and more than 40 free entertainment events are scheduled. An extensive program of building and grounds improvements has been carried out and the State Fair adheres to its long established admission scale even though the program has grown vastly. Gate admission is 50 cents with children under 12 admitted free.

The admission price permits the visitor to see most of the State Fair free. There are three extra-admission events

... the horse show, night theatrical spectacles and horse races.

Many Attractions

Products of the soil and agriculture in general naturally are a basic part of the State Fair. The livestock shows, including both open and junior divisions, are the largest in California. The program includes separate, five-day shows by Future Farmers of America and 4-H Clubs. A total of \$118,000 in premiums are offered for livestock... \$75,000 in the open division and \$43,000 in the junior classes.

There will be hundreds of entries and keen competition in the poultry, pigeon and rabbit department, while the finest output of a vast California industry will be exhibited in the dairy products department. The huge Counties Building will be a teeming center of the entire State Fair. Some 40 counties will exhibit products from within their own boundaries... products of agriculture, floriculture, horticulture, minerals, lumber, textiles, bees and honey and wines. Several foreign nations will have booths on the mezzanine of the Counties Building.

WASHO ELECTS NEW OFFICERS

Mark U. Watrous, chief engineer of the Colorado Department of Highways, has been elected president of the Western Association of State Highway Officials. He succeeds W. A. Bugge, Washington State Highway Director.

Other officers elected during the association's annual conference in Seattle June 5th-7th included:

Vice president, E. V. Miller, Idaho highway engineer, and secretary-treasurer, W. E. Willey, engineer, division of economics and statistics, Arizona Highway Department.

Members elected to the executive committee are Bugge, D. C. Greer, Texas highway engineer, and W. C. Williams, Oregon assistant highway engineer.

Art Exhibit

The art exhibit, California's largest and one nationally known, will show the best works of living California artists and include divisions for crafts and for entries of art students. Prints from many parts of the world will be shown in the photographic salon.

The California Fashion and Fabric Exposition and its companion Pageant of California Fashions again will be a highlight of the State Fair. The pageant will be staged nightly at the open air theater, with professional models showing winning entries of California manufactured apparel.

The list of special events is a long one, and affords virtually continuous entertainment, including band concerts, square dance groups, drill teams, puppet shows, variety acts, a drill by sheriff's posses and many others. Two nationally broadcast radio shows will go on the air coast-to-coast directly from the fairgrounds, September 1st through 5th. They are Lucky-U Ranch and Big Jon and Sparky, both programs of the American Broadcasting Company. Broadcast times are from 12.30 to 1 for Lucky-U Ranch and from 2 to 2.30 p.m. for Big Jon and Sparky.

A feature of the free shows will be a mock amphibious attack on an island of the race track infield the afternoon of September 7th. Demolition squads, "frog men," tanks and flame throwers will take part.

Rafael Mendez, world's greatest trumpeter, is returning by popular request to play twice daily at the bandstand. John Molinari, noted accordionist, is another headliner in the free entertainment program.

A star of the night theatrical spectacles will be Xavier Cugat and his orchestra, with outstanding supporting acts. Fireworks will be presented nightly, and the gayway of carnival and many other attractions will be open daily from 10 a.m. to midnight.

All exhibit buildings will be open daily from 10 a.m. to 10 p.m.



Thousands of visitors to the State Fair in Sacramento this year will motor to the attraction over state highways. Some may even come in autos of this vintage.

Successful Tour

Highway Commissioners Inspect
Projects in San Joaquin Valley

By CHESTER H. WARLOW, Highway Commissioner

FIVE DAYS away from our offices, over 700 miles of travel through Highway Districts VI and X in the San Joaquin Valley, 18 stops for informal meetings with local officials and community representatives, and a pleasant and comfortable trip, sums up the latest inspection tour of the California Highway Commission.

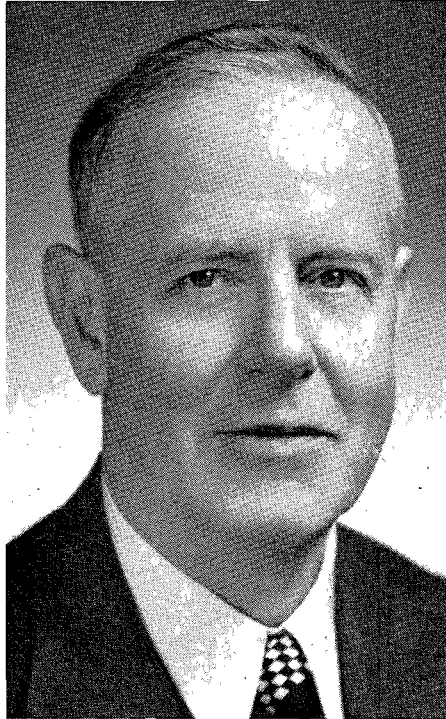
After two and one-half days of formal sessions at Sacramento as our regular June meeting, the entire commission, with the exception of Commissioner Walter Sandelin, left on the afternoon of June 12th for Merced, our first overnight stop. Mr. George T. McCoy, the State Highway Engineer, several members of his headquarters staff, and engineers from the two districts completed the official party.

Major informal meetings were held at Merced on June 12th, at Madera, Hanford, Porterville, and Lindsay on June 13th, at Tulare, Visalia, and Woodlake on the 14th, at General Grant Grove and Cedar Grove in Kings Canyon National Park on Sunday, and at Fresno and Bakersfield on June 16th. Many minor stops were made along the way, and at the major meeting places many near-by communities were represented and made presentations of their highway problems.

Purposes of Trip

The purpose of the trip was multifold: (1) To see what had been accomplished in the way of highway construction and betterments since the commission, as now constituted, took office in September, 1943, under the reorganizing statutes of that year. (2) To observe major projects now under construction in Districts X and VI. (3) To inspect the unbudgeted critical highway deficiencies, and high accident points in the territory.

A further, and highly important, purpose was to give the local officials, and the other community representatives, an opportunity to discuss with us informally and at leisure, their highway matters and to give us, the mem-



CHESTER H. WARLOW

bers of the Highway Commission, an opportunity to tell them of the problems of the State Division of Highways, and the conditions of our State Highway System.

At these meetings, in addition to giving our attention to highway needs, we tried to make it clear that it is not within the province of the Highway Commission to advocate additional taxes for highway purposes, nor were we so doing. What we tried to do was to give the people of the San Joaquin Valley the truth regarding our stewardship over the nine years of our office tenure.

Millions Allocated

We told them that, during the nine years, we had allotted over six hundred million dollars for rights of way and construction. We told them that we had approximately one hundred million dollars per year available for

rights of way, construction engineering, and construction.

We pointed out that in 1946 we had some one billion six hundred thousand dollars of highway deficiencies and that today we have over three billion dollars in deficiencies. We pointed out that the increase in the deficiencies is partly due to the higher costs of construction but that it is mostly due to the increased number of motor vehicles now using our highways.

We told them that the State is losing ground in relation to current overall highway needs. We also told them that this problem is theirs, and theirs alone. We suggested that if they wished this highway deficiency corrected it was their duty and that of their legislative representatives.

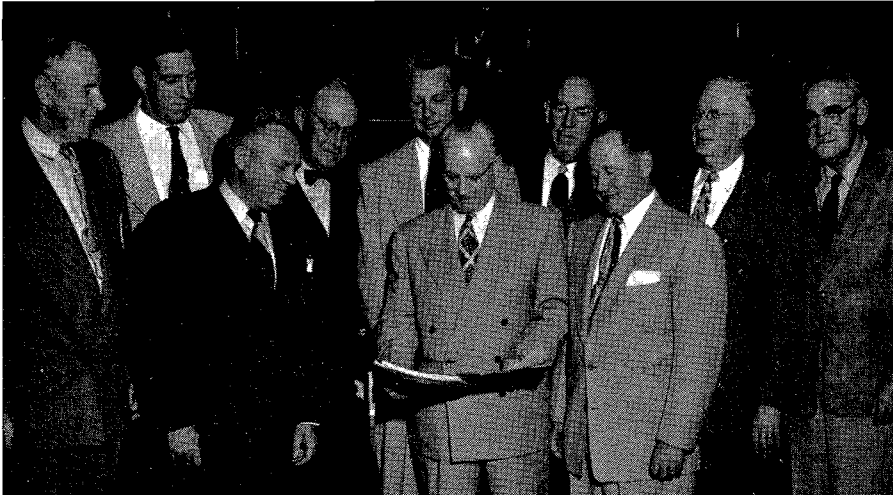
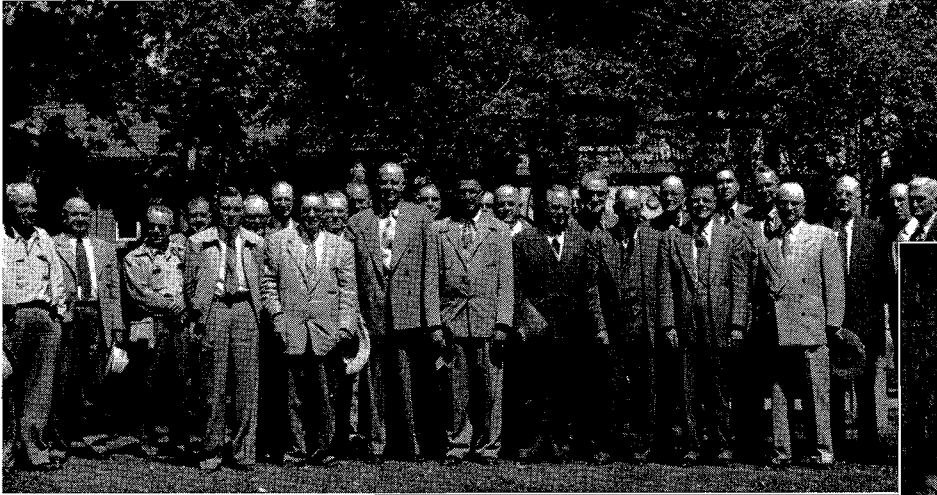
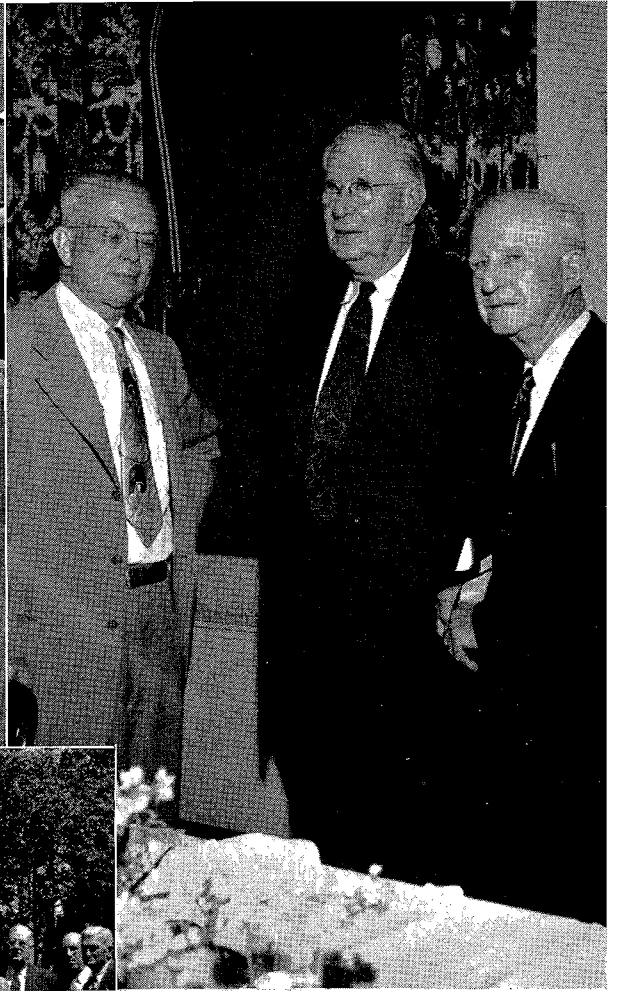
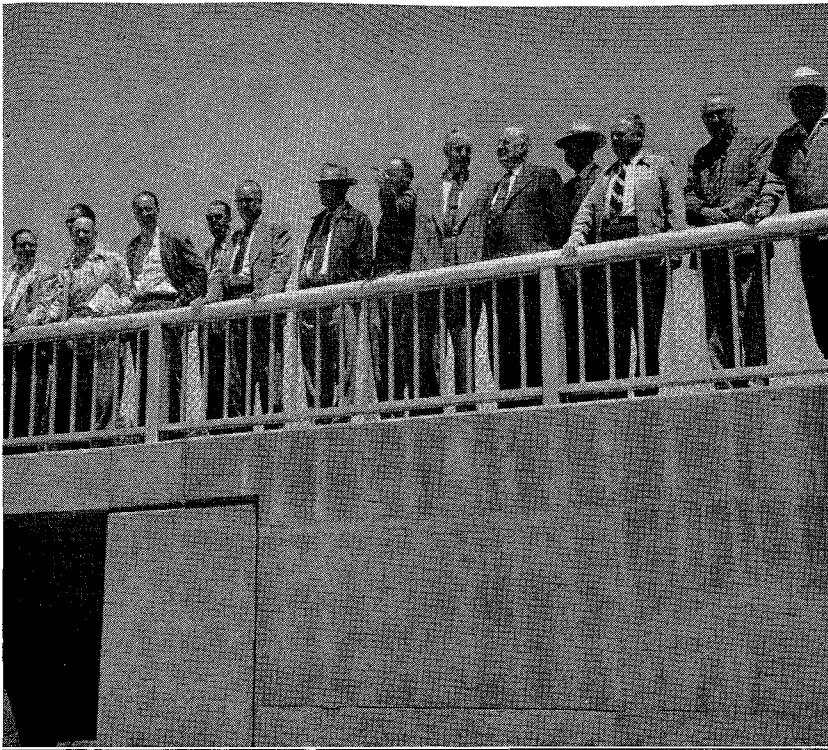
State-wide Picture

In the interest of clarity we cut down the state-wide picture to the local county levels of what had been spent under the provisions of the Collier-Burns Act of 1947, what was left to be done locally, and how long under present financing it would take to do necessary jobs. Upon this basis we then requested the communities to be patient with us, the California Highway Commission, and to understand why all their requests for construction work could not be immediately complied with, because what was happening in their areas in relation to traffic increases, accidents, travel inconveniences and hazards, was being duplicated in every part of our State.

We also impressed upon them that the primary function of the commission was to allocate the available funds in the manner required by our present statutes, and on projects in sequence of their prime necessity with fairness to all parts of the State.

We explained that the responsibility of the State Highway Engineer, among other things, is to construct projects to present and immediately impending

. . . Continued on page 64



UPPER, LEFT—Commissioners view Tulare bypass. UPPER, RIGHT—Ford Chatters and A. L. Evans, publishers of the Lindsay Gazette pose with Commissioner James A. Guthrie. CENTER—Highway Commission and group at Madera. LOWER, LEFT—Touring party stops at Fresno. LEFT TO RIGHT—Commissioner Warlow, Mayor Gordon Dunn of Fresno, Commissioners Harrison R. Baker, Charles T. Leigh, and H. Stephen Chase; Director of Public Works Frank B. Durkee, chairman of the commission; District Engineer E. T. Scott, Fresno; Melville E. Wilson, President of the Fresno Chamber of Commerce; Commissioner Guthrie and State Highway Engineer George T. McCoy. LOWER, RIGHT—Director of Public Works Durkee addressing group at Bakersfield.

Cost Index

Shows Little Change in Highway Costs During Second Quarter 1952

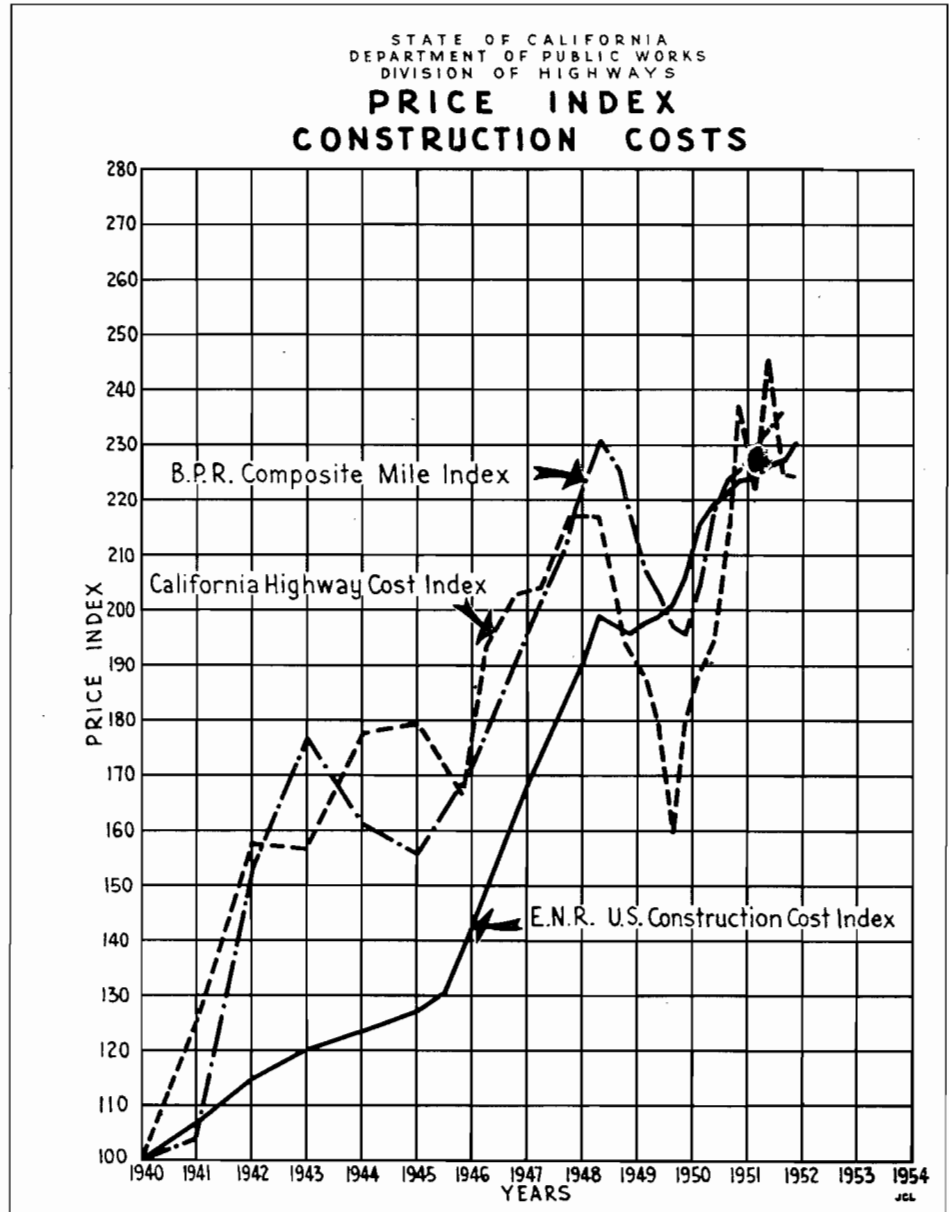
By RICHARD H. WILSON, Assistant State Highway Engineer;
H. C. McCARTY, Office Engineer;
JOHN D. GALLAGHER, Assistant Office Engineer

COMPUTATION of the California Highway Construction Cost Index for the second quarter of 1952 shows that during the months of April, May, and June construction prices held to the level of the first quarter, the index dropping only two-tenths of one percent. The cost index for the second quarter was 224.4 (1940=100) as compared to 224.8 for the first quarter. This second quarter figure is 21 points or 8.6 percent below the high of 245.4 in the fourth quarter of 1951.

Lack of Stability in Trend

In reporting on the drop of the California index during the first quarter in the May-June issue of this periodical the current lack of stability in the trend of California highway construction costs was noted and the comment was made that a firm downward trend was not anticipated for some time. This statement still holds as it is thought that the standstill of the second quarter is the result of a "watchful-waiting" policy on the part of contractors who appear to be holding prices at a level until the steel situation and other management-labor disputes are settled. With wage increases anticipated in connection with the several current strikes it is difficult to foresee anything but increased construction costs when the new agreements become effective.

Compared with the 0.2 percent drop in the California Highway Construction Cost Index during the second quarter of 1952, the Engineering News-Record Construction Cost Index continued its steady upward trend rising 1 percent from 227.0 to 230.5 (1940 = 100) during the months of April, May and June. The Engineering News-Record Index, based upon labor and material costs of all types of construction over the entire Nation, will, of course, vary to some degree from the California index which is based on actual bid



prices of highway construction only and which is more noticeably subject to fluctuations due to local economic conditions.

The Bureau of Public Roads Composite Mile Index for the second quar-

ter of 1952 shows an increase of 1.6 percent over the first quarter of the year. This nation-wide highway cost index of the Bureau of Public Roads rose from 236.2 to 240.0 (adjusted to a base of 1940 = 100). Because of its

national characteristics the Composite Mile Index follows the trends of the Engineering News-Record Index more closely than does the California Highway Construction Cost Index.

Unit Price for Cement at High Level

In general, the average contract unit prices for the eight major construction items on which the index is based eased off slightly during the second quarter, with the exceptions that structure concrete and plant-mixed surfacing increased 3.5 percent and 7.8 percent respectively. While there was little change in the average unit price for Portland cement concrete pavement it should be noted that it remains at the same high level which has obtained in recent months. The rise in the average price of structure concrete probably

stems from increased labor costs for carpenters and it is thought that the rise in the average price of plant-mixed surfacing results from the current strike and demands for wage increases by equipment operators in Southern California.

A tabulation of these average contract prices from 1940 to the present accompanies this article.

No Lack of Competition

The California Division of Highways cannot register any serious complaint on the grounds of lack of competition in bidding on state highway work. The accompanying tabulation of average number of bidders, broken down to jobs of various sizes awarded during the past fiscal year conforms to experience of previous years; the smaller

CALIFORNIA HIGHWAY CONSTRUCTION COST INDEX

Period	Index 1940=100	Change from previous period	Change from 1948	Change from 1st qtr. 1950
1940	100	-----	-----	-----
1941	125.0	+25.0%	-----	-----
1942	157.5	+26.0%	-----	-----
1943	156.4	- 0.7%	-----	-----
1944	177.8	+13.7%	-----	-----
1945	179.5	+ 1.0%	-----	-----
1946	179.7	+ 0.1%	-----	-----
1947	203.3	+13.1%	-----	-----
1948	216.6	+ 6.5%	-----	-----
1949	190.7	-12.0%	-----	-----
1950 (1st qtr.)	160.0	-10.5%	-26.1%	-----
1950 (2d qtr.)	180.0	+12.5%	-16.9%	+12.5%
1950 (3d qtr.)	189.2	+ 5.1%	-12.7%	+18.3%
1950 (4th qtr.)	194.8	+ 3.0%	-10.1%	+21.8%
1951 (1st qtr.)	215.4	+10.6%	- 0.6%	+34.6%
1951 (2d qtr.)	238.3	+10.6%	+10.0%	+48.9%
1951 (3d qtr.)	221.9	- 6.9%	+ 2.4%	+38.7%
1951 (4th qtr.)	245.4	+10.6%	+13.3%	+53.4%
1952 (1st qtr.)	224.8	- 8.4%	+ 3.7%	+40.5%
1952 (2d qtr.)	224.4	- 0.2%	+ 3.5%	+40.3%

CALIFORNIA DIVISION OF HIGHWAYS

AVERAGE CONTRACT PRICES

	Roadway excavation, per cu. yd.	Crusher run base, per ton	Plant-mix surfacing, per ton	Asphalt con- crete pavement, per ton	PCC * pavement, per cu. yd.	PCC structures, per cu. yd.	Bar reinforc- ing steel, per lb.	Structural steel, per lb.	
1940	\$0.22	\$1.54	\$2.19	\$2.97	\$7.68	\$18.33	\$0.040	\$0.083	All projects
1941	0.26	2.31	2.84	3.18	7.54	23.31	0.053	0.107	
1942	0.35	2.81	4.02	4.16	9.62	29.48	0.073	0.103	
1943	0.42	2.26	3.71	4.76	11.48	31.76	0.059	0.080	
1944	0.50	2.45	4.10	4.50	10.46	31.99	0.054	0.132	
1945	0.51	2.42	4.20	4.88	10.90	37.20	0.059	0.102	
1st Half, 1946	0.41	2.31	4.00	4.54	9.85	37.38	0.060	0.099	Federal aid projects only
2d Half, 1946	0.39	2.27	4.12	5.04	12.39	49.84	0.079	0.142	
1st Half, 1947	0.48	2.62	4.52	6.46	12.41	47.03	0.080	0.133	
2d Half, 1947	0.54	2.39	4.02	6.48	11.58	50.15	0.089	0.123	
1st Half, 1948	0.56	2.45	4.42	4.91	13.37	49.51	0.094	0.145	
2d Half, 1948	0.52	2.64	4.80	7.00	14.01	49.08	0.103	0.131	
1st Quarter, 1949	0.49	2.48	4.54	5.70	11.84	48.11	0.089	0.113	All projects
2d Quarter, 1949	0.43	2.91	4.63	4.06	11.74	48.63	0.083	0.110	
3d Quarter, 1949	0.41	2.40	5.05	4.60	11.53	45.35	0.080	0.093	
4th Quarter, 1949	0.43	2.55	3.78	3.50	12.66	44.54	0.078	0.092	
1st Quarter, 1950	0.34	2.22	3.65	3.74	-----	40.15	0.077	0.081	
2d Quarter, 1950	0.40	2.13	4.48	3.74	10.86	43.03	0.080	0.105	
3d Quarter, 1950	0.41	2.32	4.25	5.50	10.91	44.34	0.093	0.131	
4th Quarter, 1950	0.42	2.81	4.64	4.61	12.55	43.18	0.098	0.120	
1st Quarter, 1951	0.45	3.07	4.06	5.22	11.71	46.38	0.103	0.206	
2d Quarter, 1951	0.63	3.88	4.56	4.63	12.93	51.50	0.105	0.166	
3d Quarter, 1951	0.56	2.88	4.59	3.90	12.41	46.14	0.107	0.165	
4th Quarter, 1951	0.66	2.91	5.66	4.89	12.71	49.38	0.105	0.169	
1st Quarter, 1952	0.56	3.25	4.88	4.77	14.25	47.46	0.094	0.152	
2d Quarter, 1952	0.53	3.19	5.29	4.13	14.20	49.12	0.091	1.143	

... Continued on page 64

Traffic Relief

Continued from page 33 . . .

Relief, however, is now in sight for both local and through traffic as actual construction work on a full freeway through the City of San Luis Obispo started last March. To date three separate contracts have been let covering various portions of the work. The first contract provides for the construction of a railroad underpass and grade separations at the freeway intersections with Santa Rosa and Ida Streets. The second contract provides for the construction of grade separation structures at the freeway intersections with Marsh and Chorro Streets and a large culvert at Stenner Creek. The third contract provides for the construction of grade separation structures at the Grand and Buena Vista Avenue intersections. Work on the second and third contracts is well under way. However, due to difficulties in obtaining structural steel for the railroad underpass, work on the first contract has not yet started. The contractor was informed recently that the structural steel would be rolled in the east and that he would receive it this fall. The steel strike could cause a somewhat longer delay in the progress on this contract.

A contract for grading and paving will be necessary to complete the full freeway development through the city. Plans for this work are in the final stages and it is hoped work on the structures will have advanced sufficiently to permit letting this final work to contract shortly after January 1, 1953. Provided no unforeseen difficulties develop and the work can be carried to completion without interruption, it is anticipated the entire project should be completed in the latter part of 1954.

FAST RESURFACING JOB DONE ON FIRST STREET

Livermoreans who observed the improvement of First Street were amazed by the speed and efficiency with which the State Division of Highways crew operated.

A truck dumped a load of surfacing material into the hopped of a spreader which deposited it evenly in a strip and

District IX

Continued from page 41 . . .

Fifteen miles north of Bishop and just over the Inyo-Mono county line U. S. 395 is confronted with the once formidable Sherwin Grade which rises to an elevation of 6,417 feet on 4.6 miles of sustained 6 percent grade. For the next 120 miles, all in Mono County, U. S. 395 traverses what is a fairyland in winter and a wonderland in the summer.

U. S. 395 leads the tourist through the heart of this recreation area; past Crowley Lake, the home of the big fish; Convict Lake; Whitmore Hot Springs; Mammoth Lakes and Mammoth Mountain whose slopes provide skiing well into the middle of the summer months; Casa Diablo Hot Springs; Deadman Summit at elevation 8,041 feet; then down past the Devil's Punch Bowl; magnificent June Lake; Leevining, where the Tioga Pass road joins U. S. 395, the Mono Craters, saline Mono Lake; then up and over bleak Conway Summit, again above 8,000 feet elevation; and into Bridgeport, the quaint and quiet county seat of Mono County. Northerly U. S. 395 rises over Devil's Gate Summit and then takes the tourist past Fales Hot Springs, picks up the Sonora Pass traffic and winds through the canyon of the West Walker River to the verdant pasture lands of Antelope Valley and the town of Coleville.

North of Coleville, Robert Downer of Reno, Nevada, has a \$36,000 contract under way to remove three bad curves and to substitute one tangent in their stead.

U. S. 395 leaves California at Topaz Lake and enters the State of Nevada, after having passed through some of the most beautiful and breath-taking scenery in the world.

a roller immediately following completed the job. The three machines moved along slowly but steadily, and the job was done in surprisingly short time, with virtually no interference with traffic and parking interfered with less than had been expected.

Cars were driving over the new surface within a few minutes after it was laid.—*Livermore Herald*.

Harbor Freeway Temporary Field For Helicopters

By P. O. HARDING

Assistant State Highway Engineer

FROM JULY 9 to 12, 1952, inclusive, the City of Los Angeles was host to the Aviation Writers Association during its fourth annual convention. Starting from headquarters at the Ambassador Hotel, the convention activities included trips through the local aircraft manufacturing plants and to the more distant military installations at Muroc, Inyokern, and El Toro.

On July 11th the morning program included demonstrations at the El Toro Marine Air Base near Santa Ana, and the afternoon schedule called for demonstrations at MacArthur Park in Los Angeles. Going by bus would have consumed too much time; therefore, the U. S. Marines undertook to transport the delegates by plane and helicopter. The delegates left early in the morning by plane from the Los Angeles International Airport, flying to the El Toro Marine Air Base, and at noontime they were transported by U. S. Marine Corps helicopters from the El Toro Marine Air Base back to Los Angeles.

It was determined by the convention managers that one and one-half hours' time could be saved if a landing field for the helicopters could be secured in close proximity to MacArthur Park in the Westlake District. The two recently completed Portland cement concrete roadways, each paved 60 feet wide with a 12-foot central dividing strip, on the Harbor Freeway between First and Second Streets, offered ideal landing field for helicopters. This newly constructed pavement is on the Webb & White unfinished contract calling for grading, paving, and miscellaneous construction to complete the Harbor Freeway from Temple Street to Fourth Street, and arrangements were made with this contractor for the helicopters to land on the pavement.

The City of Los Angeles, as host, provided a number of police officers to keep the crowds back, city street

. . . Continued on page 63



UPPER—View looking northerly along Harbor Freeway with 4-level grade separation structure in background, showing two U. S. Marine helicopters about to land on the freeway pavement between the First Street and Second Street undercrossing bridges. NEXT—U. S. Marine helicopter discharging delegates attending the Aviation Writers Association convention in Los Angeles. CENTER—Looking northerly along Harbor Freeway with 4-level grade separation bridge in background (right), showing U. S. Marine helicopter above First Street undercrossing bridge about to make landing. LOWER—U. S. Marine helicopter heading south on Harbor Freeway about to land and discharge passengers on the completed pavement between Second and Third Streets undercrossing bridges.

HIGHWAY BIDS AND AWARDS

May, 1952—Continued

CONTRA COSTA COUNTY—Across Carquinez Straits at Crockett, a portion of the existing bridge at the southerly end to be repaired with reinforced concrete construction. District X, Route 7, Section A. Contract awarded to Bos Construction Co., Oakland, \$11,090.

CONTRA COSTA COUNTY—On Standard Avenue between Oil Street and Marine Street in Richmond, about 0.6 mile to be graded and surfaced with plant-mixed surfacing on cement treated base. District IV, Route 69. J. Henry Harris, Berkeley, \$259,968; James R. Armstrong, El Cerrito, \$268,839. Contract awarded to Lee J. Immel, San Pablo, \$246,780.

LOS ANGELES COUNTY—In the City of Burbank, on San Fernando Road, between Brighton Street and Cohasset Street, about 1.1 miles, paving with asphalt concrete pavement on existing surfacing and on cement treated base material. District VII, Route 4. Jesse S. Smith, Glendale, \$75,460; Griffith Company, Los Angeles, \$78,980. Contract awarded to Schroeder & Company, Sun Valley, \$72,350.

LOS ANGELES COUNTY—On Pear Blossom Highway, between Palmdale and Old Nadeau Road, a distance of 1.4 miles, to be graded and surfaced with plant-mixed surfacing on untreated rock base. District VII, Route 59, Section J. Baker & Pollock, Ventura, \$108,821; Jesse S. Smith, Glendale, \$109,014; Schroeder & Company, Sun Valley, \$118,380; Osborn Co., Pasadena, \$124,901. Contract awarded to E. C. Young, San Fernando, \$94,666.90.

LOS ANGELES COUNTY—On Harbor Freeway at Olympic Boulevard, in the City of Los Angeles, a reinforced concrete bridge to be constructed and about 0.1 mile of city streets to be reconstructed. District VII, Routes 165, 173. Oberg & Cook, Gardena, \$322,995; Tumblin Co., Bakersfield, \$329,613; J. E. Haddock, Ltd., Pasadena, \$334,575; W. J. Distel, Los Angeles, \$334,732; Webb & White, Los Angeles, \$356,157; George W. Peterson & Jack W. Baker, Los Angeles, \$359,019; Charles MacClosky Co., San Francisco, \$368,288. Contract awarded to Oberg Bros. Construction Co., Inglewood, \$313,814.

LOS ANGELES COUNTY—On Los Angeles River Freeway, between 0.2 mile south of Dominguez Street and Del Amo Boulevard, two railroad underpasses to be constructed and about 0.7 mile to be graded and surfaced with Portland cement concrete pavement on cement treated subgrade over imported base material and imported subbase material or imported pervious material, for a six-lane divided highway. District VII, Route 167, Section A. Guy F. Atkinson Co., Long Beach, \$1,174,906; B. J. Ukropina, T. P. Polich, Steve Kral, Baldwin Park, \$1,207,544; J. E. Haddock, Ltd., Pasadena, \$1,236,318; Griffith Company, Los Angeles, \$1,351,616. Contract awarded to Webb & White, Los Angeles, \$1,155,929.50.

MADERA COUNTY—Between 3.5 miles and 10.8 miles east of Merced county line, about 7.2 miles to be widened with imported borrow and imported subbase material and surfaced with plant-mixed surfacing on untreated rock base. District VI, Route 32, Section A. Clements & Co., Hayward, \$254,700; Stewart & Nuss, Inc., Fresno, \$261,074; Harms Bros., Sacramento, \$282,975; Granite Construction Co., Watsonville, \$287,315; B. J. Ukropina, T. P. Polich, Steve Kral, Baldwin Park, \$287,532; Ball & Simpson, Berkeley, \$290,613; A. Teichert & Son, Inc., Sacramento, \$317,694; M. J. B. Construction Co., Stockton, \$326,509; Leo F. Piazza Paving Co., San Jose, \$353,109. Contract awarded to Volpa Brothers, Fresno, \$226,920.

ORANGE COUNTY—Between Route 60 and 0.2 mile north of Garfield Avenue, about 2.8 miles to be graded and surfaced with plant-mixed surfacing on untreated rock base. District VII, Route 171, HntB.A. Sully-Miller Contracting Co., Orange, \$374,041; R. J. Noble Co. & R. J. Noble, Orange, \$381,957; Pacific Contracting Corp., Newport Beach, \$429,264; Roland R. Reynolds, Anaheim, \$469,930. Contract awarded to Cox Bros. Construction Co., Stanton, \$360,264.50.

SACRAMENTO COUNTY—Across American River near Elvas, about one mile northeast of Sacramento, the superstructure for a bridge to be constructed. District III, Route 98, Section B. Bates & Rogers Construction Corp., San Francisco, \$1,026,825; George Pollock Co., Sacramento, \$1,053,374; Lord & Bishop, Sacramento, \$1,054,655; Carl N. Swenson Co., Inc., San Jose, \$1,058,185; Chas. L. Harney, Inc., San Francisco, \$1,071,338; Granite Construction Co., Watsonville, \$1,072,645; John C. Gist, Sacramento, \$1,091,355; Rothschild, Raffin & Weirick, San Francisco, \$1,106,222; A. Teichert & Son, Inc., Sacramento, \$1,108,760. Contract awarded to B. J. Ukropina, T. P. Olich, and Steve Kral, Baldwin Park, \$1,003,903.70.

SAN FRANCISCO COUNTY—On Bayshore Freeway between 16th Street and 7th Street, a portion of a bridge and miscellaneous road work to be constructed. District IV, Route 68. Peter Kiewit Sons' Co., Arcadia, \$2,993,237; Charles MacClosky Co. & Eaton & Smith, San Francisco, \$3,076,555; Chas. L. Harney, Inc., San Francisco, \$3,083,537; Bates & Rogers Construction Corp., San Francisco, \$3,148,273; Stolte Inc. and The Duncanson-Harrelson Co., Oakland, \$3,117,205; Fredrickson & Watson Construction Co. & M & K Corp., Oakland, \$3,168,143. Contract awarded to Guy F. Atkinson Co., South San Francisco, \$2,986,961.10.

SANTA BARBARA COUNTY—Between Black Road and Point Sal Road, about 5.5 miles, to be surfaced with untreated rock surfacing and imported base material, and seal coat and penetration treatment to be applied. District V, Route 56, Section E. Baker & Pollock, Ventura, \$92,721; Hermreck & Easter, Santa Maria, \$97,008; Granite Construction Co., Watsonville, \$99,348; Madonna Construction Co., San Luis Obispo, \$99,595. Contract awarded to Valley Paving and Construction Co., Inc., Pismo Beach, \$77,927.50.

SHASTA COUNTY—Portions between Montgomery Creek and 0.7 mile east of Hatchet Creek, about 3.4 miles, to be surfaced with plant-mixed surfacing and drainage facilities to be installed. District II, Route 28, Section C. Morgan Construction Co., Redding, \$55,684; O'Connor Bros., Red Bluff, \$63,054. Contract awarded to Fredrickson & Watson Construction Co., Oakland, \$49,354.50.

TEHAMA COUNTY—Across Deer Creek about 48 miles northeast of Chico, a reinforced concrete slab bridge to be constructed and approaches and a detour to be graded. District II, Route 47, Section B. Tumblin Co., Bakersfield, \$88,656; Young & Smith Construction Co., Salt Lake City, \$95,152; E. A. Forde Co., San Anselmo, \$97,977; Al Erickson & Co., Napa, \$110,822; B. S. McDeldery, Berkeley, \$112,856; LeFever & Bing, West Sacramento, \$124,124; O'Connor Bros., Red Bluff, \$127,421; Bos Construction Co., Oakland, \$133,223. Contract awarded to R. E. Hertel, Sacramento, \$87,465.

TULARE COUNTY—City of Tulare, at the intersection of Tulare Street and M Street, furnishing and installing traffic signal system. District VI, Route 134. Robinson Electric, Fresno, \$6,200; Dale Electric, Fresno, \$6,500; R. O. Ferguson Co., Visalia, \$8,068. Contract awarded to Leonardi Electric Construction Co., San Rafael, \$5,150.

F. A. S. County Routes

MENDOCINO COUNTY—On Ukiah-Boonville Road, between 2.9 miles and 4.8 miles west of State Highway Route 1, about 1.9 miles to be graded. District I, FAS Route 980. Cecil L. Moore, San Leandro, \$161,041; Ball & Simpson and T. E. Irving, Berkeley, \$167,986; Huntington Bros., Napa, \$168,584; Eaton & Smith, San Francisco, \$173,294; Harms Bros., Sacramento, \$173,339; Humboldt Constructors, Inc., Eureka, \$179,045; H. Earl Parker, Inc., Marysville, \$205,659. Contract awarded to C. V. Kenworthy, Stockton, \$140,378.

June, 1952

ALAMEDA COUNTY—Between the Toll Plaza and the easterly terminus of the San Francisco-Oakland Bay Bridge, underground multiconductor

control cable to be constructed. District IV, Route 5. Manning & Whitaker, Inc., San Francisco, \$49,232; Underground Electric Construction Co., Oakland, \$55,875; H. S. Tittle Co., San Francisco, \$55,267; Hall Sloat Electric Co. Inc., Oakland, \$57,800; Crabbe Electric, Pittsburg, \$65,438. Contract awarded to Severin Electric Co., San Francisco, \$47,839.

ALAMEDA COUNTY—Eastshore Freeway, between Distribution Structure and Ashby Avenue, about 1.5 miles to be graded and surfaced with portland cement concrete pavement and plant-mixed surfacing on cement treated base and separation structures to be constructed. District IV, Route 69. Charles L. Harney, Inc., San Francisco, \$2,563,058; Carl N. Swenson Co. Inc., Ball & Simpson, Berkeley, \$2,690,723; Stolte Inc., The Duncanson-Harrelson Co. & Lee J. Immel, Oakland, \$2,834,730; Fredrickson & Watson Construction Co. and M & K Corp., Oakland, \$3,112,896. Contract awarded to Peter Kiewit Sons' Co., San Francisco, \$2,552,500.

ALAMEDA COUNTY—Three miles east of Niles, the girder spans of bridge across Alameda Creek to be cleaned and painted. District IV, Route 107, Section A. R. W. Reade & Co., Berkeley, \$1,684; D. E. Burgess Co., San Francisco, \$2,297; John P. McGuire, San Jose, \$3,400; D. Zelinsky & Sons, San Francisco, \$3,600; Deemer & Deemer, San Francisco, \$3,850. Contract awarded to Russell Hinton Co., San Francisco, \$1,645.

AMADOR AND CALAVERAS COUNTIES—Between 0.4 mile southeast of Jackson and 1.5 miles west of Mokehume Hill, about 4.5 miles to be graded and surfaced with plant-mixed surfacing on imported base material. District X, Route 65, Sections C, A. R. P. Shea Co., Indio, \$399,972; Elmer J. Warner, Stockton, \$409,244; Harms Bros., Sacramento, \$418,530; A. Teichert & Son, Inc., Sacramento, \$445,905; H. Earl Parker, Inc., Marysville, \$456,368; McCammon-Wunderlich Co., Palo Alto, \$472,481; B. J. Ukropina, T. P. Polich, Steve Kral, Baldwin Park, \$552,470. Contract awarded to Claude C. Wood Co., Lodi, \$361,574.40.

BUTTE COUNTY—Across Dry Creek about 11.5 miles south of Chico, repairing a bridge. District III, Route 87, Section B. O'Connor Bros., Red Bluff. Contract awarded to Ted Schwartz, Grass Valley, \$12,580.

COLUSA COUNTY—Between 0.2 mile east of Colusa Basin Bridge and Colusa, about 2.2 miles, cement treatment to be applied to the existing surfacing and Class "B-Single" seal coat placed. District III, Route 15, Section A. Clu. Harms Bros., Sacramento, \$32,677; Clements & Co., Hayward, \$38,160; W. H. O'Hair Company, Colusa, \$38,225; Lefever & Bing, West Sacramento, \$38,915; Rice Brothers Inc., Marysville, \$40,003. Contract awarded to Claude C. Wood Co., Lodi, \$31,742.50.

CONTRA COSTA COUNTY—In the City of San Pablo, at the intersection of San Pablo Avenue with Broadway Avenue-Balboa; a traffic signal system and highway lighting to be furnished and installed and channelization to be constructed. District IV, Route 14. J. Henry Harris, Berkeley, \$13,214; R. Flatland, San Francisco, \$13,750; Underground Electric Construction Co., Oakland, \$14,505. Contract awarded to Goold & Son, Stockton, \$12,860.

CONTRA COSTA COUNTY—Between one mile south of Pacheco and Monument, about 1.5 miles, shoulders to be constructed of untreated rock base and borders to be surfaced with plant-mixed surfacing. District IV, Route 75, Section H. Louis Biasotti & Son, Stockton, \$63,359; J. Henry Harris, Berkeley, \$64,314; Lee J. Immel, San Pablo, \$65,735; John B. Paroline, Morgan Hill, \$71,059; Eugene G. Alves, Pittsburg, \$86,435; O. C. Jones and Sons, Berkeley, \$80,777. Contract awarded to J. R. Armstrong, El Cerrito, \$59,985.25.

DEL NORTE COUNTY—Portions along the Smith River, between 14.1 miles and 30.8 miles northeast of Crescent City, about 1.4 miles, existing roadbeds to be widened and graded and road-mixed surfacing to be placed. District I, Route 1, Sections C, D, E. J. Henry Harris, Berkeley, \$249,302. Contract awarded to John Burnan & Sons, Eureka, \$248,802.50.

DEL NORTE COUNTY—Between Oregon Mountain and Oregon state line, about 1.8 miles, to be surfaced with plant-mixed surfacing on cement treated base and a reinforced concrete bridge across Elk Creek to be widened. District I, Route 1, Section E. Contract awarded to Mercer Fraser Co. & Mercer Fraser Gas Co., Inc., Eureka, \$144,999.70.

HUMBOLDT COUNTY—Across Eureka Slough and Mad River and over the Northwestern Pacific Railroad Company tracks near Beatrice and near Arcata, four existing steel bridges to be cleaned and painted. District I, Route 1, Sections G.H.I. J. S. Morris Co., Berkeley, \$29,880; John P. McGuire, San Jose, \$42,950; J. P. Carroll Company, Los Angeles, \$87,578. Contract awarded to Orrell-Keefe Co., Oakland, \$28,853.

HUMBOLDT COUNTY—At first crossing of Van Duzen River, imported base material to be furnished and stockpiled. District I, Route 35, Section B. Contract awarded to Mercer, Fraser Co. & Mercer, Fraser Gas Co., Inc., Eureka, \$19,800.

IMPERIAL COUNTY—Between East Highline Canal and junction with Route 202, about 11.8 miles of roadbed to be resurfaced with plant-mixed surfacing. District XI, Route 27, Section A. G. W. Ellis Construction Co., North Hollywood, \$147,790; R. R. Hensler, Sun Valley, \$150,778. Contract awarded to Basich Bros. Construction Co., N. L. Basich-R. L. Basich, Garvey, \$141,650.

LOS ANGELES COUNTY—In the City of Los Angeles, portions between Virginia Avenue and Los Angeles Street, about 2 miles, roadside areas to be prepared and planted. District VII, Route 2, Justice-Dunn Co., Oakland, \$123,187; Jannoch Nurseries, Altadena, \$132,813; James E. Boothe, Compton, \$142,710. Contract awarded to Henry C. Soto Corp., Los Angeles, \$96,074.07.

LOS ANGELES COUNTY—Completion of a partially finished contract for the construction of State Route 4 between north city limits of Los Angeles, near Tunnel Station Bridge, and Pico Canyon Road, about 5.1 miles in length. District VII, Route 4, Section L.A.F. Bressi & Bevanda Constructors, Inc., North Hollywood, \$530,842; J. E. Haddock, Ltd., Pasadena, \$533,820; Peter Kiewit Sons' Co., Arcadia, \$552,659; Basich Bros. Construction Co., N. L. Basich & R. L. Basich, Garvey, \$576,553; Ball and Simpson, Berkeley, \$615,849. Contract awarded to A. Teichert & Son, Inc., Sacramento, \$508,216.

LOS ANGELES COUNTY—On Ramona Freeway, in the Cities of Pomona and Claremont, seven reinforced concrete bridges to be constructed and about 0.54 mile of city streets to be widened and surfaced with asphalt concrete pavement. District VII, Route 26. Charles MacClosky Company, San Francisco, \$1,227,966; W. F. Maxwell & C. G. Willis & Sons, Inc., Los Angeles, \$1,233,687; Guy F. Atkinson Co., Long Beach, \$1,234,315; Winston Bros. Company, Monrovia, \$1,267,516; A. Teichert & Son, Inc., Sacramento, \$1,294,964; Ukropina, Polich, Kral, Baldwin Park, \$1,295,478; W. J. Disteli & R. J. Daum Construction Co., \$1,301,165; Oberg & Cook, O. B. Pierson & P. D. Ware, Paramount, \$1,312,745; J. E. Haddock, Ltd., Pasadena, \$1,409,607. Contract awarded to R. M. Price, Altadena, \$1,206,625.30.

LOS ANGELES COUNTY—In the City of Redondo Beach, on Pacific Coast Highway at Elena Avenue and Avenue H, traffic signal system and highway lighting to be furnished and installed and channelization to be constructed. District VII, Route 60. Harry F. Brewer, Long Beach, \$8,605; Fischbach and Moore, Inc., Los Angeles, \$9,488; Ed Seymour, Long Beach, \$9,750; Westates Electrical Construction Co., Los Angeles, \$10,325. Contract awarded to Electric and Machinery Service, Inc., South Gate, \$7,756.

LOS ANGELES COUNTY—At the intersections of Atlantic Boulevard with Bandini Boulevard and with Shiela Street and Firestone Boulevard with Pioneer Boulevard, traffic-actuated signal systems and highway lighting to be furnished and installed or modified. District VII, Routes 167, 174, Sections A,B. Electric and Machinery Service, Inc., South Gate, \$38,200; Fischbach and Moore, Inc., Los Angeles, \$39,100; Ed Seymour, Long Beach, \$40,895. Contract awarded to Westates Electrical Construction Co., Los Angeles, \$37,898.

LOS ANGELES COUNTY—Artesia Avenue, between east city limits of Long Beach (Downey Avenue) and Palo Verde Avenue, about 2.5 miles in length, a graded roadbed to be constructed and surfaced with plant-mixed surfacing on untreated rock base; portions of the existing roadbed to be surfaced with plant-mixed surfacing on existing

pavement, and seal coats to be applied, to provide a four-lane divided highway. District VII, Route 175, Section B. Vido Kovacevich Co., South Gate, \$377,286; R. J. Noble Co. and R. J. Noble Joint License, Orange, \$396,165; C. O. Sparks, Inc., and Mundo Engineering Co., Los Angeles, \$407,242; J. E. Haddock, Ltd., Pasadena, \$415,187; Griffith Co., Los Angeles, \$431,267. Contract awarded to Warren Southwest, Inc., Torrance, \$374,873.40.

MARIN COUNTY—At Dolan's Corner, about 2.5 miles northwesterly of Sausalito, about 0.4 mile to be surfaced with plant-mixed surfacing on crusher run base and crusher run base (cement treated). District IV, Route 56, Section A. A. G. Raisch Co., San Rafael, \$60,651; J. Henry Harris, Berkeley, \$68,490. Contract awarded to Brown-Ely Co., Contractors, Corte Madera, \$56,290.60.

MENDOCINO COUNTY—At Ten Mile Creek, about three miles south of Laytonville, about 0.3 mile to be graded and roadmixed surfaced on cement treated base. District I, Route 1, Section H. J. Henry Harris, Berkeley, \$68,125; O'Connor Bros., Red Bluff, \$77,596. Contract awarded to Pike & Hill, Carey Bros. & Bailey, San Rafael, \$60,310.

MENDOCINO COUNTY—At Rattlesnake Creek, about one mile south of Cummings Post Office, a reinforced concrete arch culvert to be constructed, a fill to be placed thereon, and about 0.45 mile of road to be graded and surfaced with road-mixed surfacing on cement-treated base. District I, Route 1, Section I. Fredrickson Bros., Emeryville, \$612,132; Tumblin Co., Bakersfield, \$682,125; Rothschild, Raffin & Weirick, San Francisco, \$685,406. Contract awarded to Eaton & Smith, San Francisco, \$516,184.60.

MENDOCINO COUNTY—Between the Northwestern Pacific underpass and Eleven Oaks, about two miles, portions to be surfaced with plant-mixed surfacing on cement treated base and portions to be graded and surfaced with plant-mixed surfacing on cement treated base. District I, Route 1, Section E. Harms Bros., Sacramento, \$253,439; Eaton & Smith, San Francisco, \$269,235. Contract awarded to Pike & Hill, Carey Bros. & Bailey, San Rafael, \$241,716.75.

MERCED COUNTY—Between 5.6 miles south of Merced and Merced, about 5.6 miles, existing road to be resurfaced with plant-mixed surfacing on untreated rock base. District X, Route 4, Section A, Mer. A. Teichert & Son, Inc., Sacramento, \$329,279; Stewart & Nuss, Inc., Fresno, \$352,394; Munn & Perkins, Modesto, \$353,268; Granite Construction Co., Watsonville, \$353,967; Ukropina, Polich & Kral, Baldwin Park, \$357,570; M. J. B. Construction Co., Stockton, \$391,288; Gordon H. Ball & San Ramon Valley Land Co., Berkeley, \$413,303. Contract awarded to Fredrickson & Watson Construction Co., Oakland, \$310,747.60.

MERCED COUNTY—Across the Merced River at Cox Ferry, about 12 miles north of Merced, a reinforced concrete girder bridge to be constructed and about 0.6 mile of approaches to be graded and surfaced with plant-mixed surfacing on untreated rock base. District X, Route 123, Section B. Granite Construction Co., Watsonville, \$212,853; Ukropina, Polich, Kral, Baldwin Park, \$245,725; Trewhitt, Shields & Fisher, Fresno, \$248,105; Young & Smith Construction Co., Salt Lake City, \$248,823; Bishop, Younger, Bradley Co., San Francisco, \$257,387; Thomas Construction Co. & H. Earl Parker, Inc., Fresno, \$262,736; C. K. Moseman, Redwood City, \$278,648; Charles MacClosky Co., San Francisco, \$322,613. Contract awarded to Tumblin Company, Bakersfield, \$190,717.

MONTEREY COUNTY—Between Alisal Road in Salinas and 0.5 mile northwesterly of North Main Street, about 1.6 miles, to be graded and portions to be surfaced with Portland cement concrete pavement on cement treated subgrade and plant-mixed surfacing on cement treated base and two reinforced concrete bridges and two double 12-foot box culverts to be constructed, to provide a four-lane divided highway. District V, Route 2. Granite Construction Co., Watsonville, \$1,010,710; Lord & Bishop & M. J. B. Construction Co., Sacramento, \$1,061,971; Fredrickson & Watson Construction Co., Oakland, \$1,084,853; Fredericksen & Kasler, Sacramento, \$1,104,774; Charles MacClosky Co. & Madoona Construction Co., San Francisco, \$1,298,432. Contract awarded to Dan Caputo & Edward Keeble, San Jose, \$984,064.

ORANGE COUNTY—In Huntington Beach State Park, construction of a road and furnishing and installing electrical equipment. District VII. Sully-

Miller Contracting Company, Orange, \$7,995; R. J. Noble Co., Orange, \$8,260. Contract awarded to Cox Bros. Construction Co., Stanton, \$7,418.

PLACER COUNTY—Between one mile east of Auburn and one mile west of Applegate, about 6.1 miles, seal coat to be applied. District III, Route 37, Section A. J. P. Breen, Sacramento, \$19,200; O'Connor Bros., Red Bluff, \$19,392; J. Henry Harris, Berkeley, \$19,544. Contract awarded to Howard B. Folsom, Westwood, \$18,799.80.

PLACER AND EL DORADO COUNTIES—Between 0.4 mile west of Auburn city limit and 1.3 miles south of North Fork American River, about 2.2 miles to be graded and a Class "B-Double" seal coat applied to cement treated imported base material. District III, Route 65, Section A, A. Harms Bros., Sacramento, \$188,486; R. P. Shea Co., Indio, \$202,672; J. Henry Harris, Berkeley, \$211,794; M. W. Brown, Redding, \$212,514; O'Connor Bros., Red Bluff, \$228,077; Eaton and Smith, San Francisco, \$253,832. Contract awarded to C. W. Peterson, North Hollywood, \$178,537.

RIVERSIDE COUNTY—At the intersection of Magnolia Avenue with Arlington Avenue-Palm Avenue in the City of Riverside, traffic signal system to be furnished and installed and channelization to be constructed. District VIII, Route 43. Fischbach and Moore, Inc., Los Angeles, \$14,766; Electric and Machinery Service, Inc., South Gate, \$15,162. Contract awarded to Paul R. Gardner, Ontario, \$12,595.07.

RIVERSIDE AND SAN BERNARDINO COUNTIES—Between Russell Street and San Bernardino county line, about 2.3 miles, shrubs and ground cover to be planted and a watering system to be furnished and installed. District VIII, Route 43, Sections Riv. C, F. Jannoch Nurseries, Altadena, \$37,732; Justice-Dunn Co., Oakland, \$40,527; James E. Boothe, Compton, \$41,598; Tetley Nurseries, Corona, \$41,996; Keith E. Card, Long Beach, \$44,956; D & M Sprinkler Co., Long Beach, \$48,679. Contract awarded to Henry C. Soto Corp., Los Angeles, \$31,481.65.

SAN BERNARDINO COUNTY—Between the Los Angeles county line and Route 192, eight reinforced concrete bridges to be constructed. District VIII, Route 26, Section C, Upl. Guy F. Atkinson Company, Long Beach, \$787,228; Ukropina, Polich, Kral, Baldwin Park, \$787,402; W. F. Maxwell, Los Angeles, \$788,475; Winston Bros. Company, Monrovia, \$793,622; Granite Construction Co., Watsonville, \$828,299; J. E. Haddock, Ltd., Pasadena, \$835,501; W. J. Disteli, Los Angeles, \$842,085. Contract awarded to Charles MacClosky Company, San Francisco, \$746,708.20.

SAN BERNARDINO COUNTY—In the cities of Colton and San Bernardino at the intersections of Mt. Vernon Avenue with Colton Avenue and with La Cadena Avenue-Citrus Street-Grant Avenue, traffic-actuated signal systems and highway lighting to be furnished and channelization to be constructed. District VIII, Route 31, Fischbach and Moore, Inc., Los Angeles, \$25,610; Electric and Machinery Service, Inc., South Gate, \$26,256. Contract awarded to Paul R. Gardner, Ontario, \$25,321.

SAN BERNARDINO COUNTY—At Cajon Maintenance Station, foreman's cottage to be constructed. District VIII, Route 31, Section B. W. L. Castleman, San Bernardino, \$10,600; The Mahoney-Morrison Co., Sunland, \$11,050; Ted Rehwald Construction Co., San Bernardino, \$11,957. Contract awarded to Joseph B. Wallace, San Bernardino, \$10,181.93.

SAN BERNARDINO COUNTY—Between Cronise Valley and three miles west of Halloran Springs, about 26.7 miles, existing roadbed to be widened and plant-mixed surfacing placed thereon, and plant-mixed surfacing to be placed on a portion of existing surfacing. District VIII, Route 31, Sections J, K, L. Basich Bros. Construction Co. N. L. Basich and R. L. Basich, Garvey, \$249,022; Madonna Construction Co., San Luis Obispo, \$254,007; George Herz & Co., San Bernardino, \$288,960; R. R. Hensler, Sun Valley, \$334,848. Contract awarded to G. W. Ellis Construction Co., North Hollywood, \$217,987.

SAN DIEGO COUNTY—Portions between Balboa Avenue in the City of San Diego and Las Flores, about 7.6 miles, to be surfaced with plant-mixed surfacing. District XI, Route 2, Section SD, A, C. Cox Bros. Construction Co., Stanton, \$126,419; Griffith Company, Los Angeles, \$139,101. Contract awarded to R. E. Hazard Contracting Co., San Diego, \$101,921.

SAN DIEGO COUNTY—In the City of San Diego on Pacific Highway at De Anza Cove, about

F. A. S. County Routes

0.4 mile of roadway to be graded and surfaced and channelization to be constructed. District XI, Route 2. Griffith Company, Los Angeles, \$38,967; V. R. Dennis Construction Co., San Diego, \$42,874; R. E. Hazard Contracting Co., San Diego, \$45,978. Contract awarded to Cox Bros. Construction Co., Stanton, \$37,719.25.

SAN FRANCISCO CITY—At the junction of Richardson Avenue off-ramp and Marina connection to Golden Gate Bridge, modify lighting system and construct a gore. District IV, Route 2. R. Flatland, San Francisco, \$12,727; L. H. Leonardi, Electric Construction Co., San Rafael, \$12,915. Contract awarded to Abbott Electric Corp., San Francisco, \$8,551.

SAN JOAQUIN COUNTY—Across the Calaveras River at Bellota, a reinforced concrete bridge to be constructed and about 0.15 mile of approaches to be graded and surfaced with plant-mixed surfacing on untreated rock base. District X, Route 5, Section D. Elmer J. Warner, Stockton, \$57,082; George Pollock Co., Sacramento, \$57,356; Wheeler Construction Co., Oakland, \$60,082; Tumblin Co., Bakersfield, \$66,084; Lefever & Bing, West Sacramento, \$68,225. Contract awarded to Thomas Construction Co., Fresno, \$54,571.20.

SAN LUIS OBISPO COUNTY—Between one mile south of Templeton and 0.2 mile north of Paso Robles, about 9 miles, existing lanes to be widened with plant-mixed surfacing on cement treated base and new lanes to be surfaced with plant-mixed surfacing on cement treated base. District V, Route 2, Section B, PsRs, A. M. J. B. Construction Co., Stockton, \$710,911; Griffith Co., Los Angeles, \$750,035; Fredrickson & Watson Construction Co., Oakland, \$787,888; Madonna Construction Co., San Luis Obispo, \$789,972; Ukropina, Polich, Kral, Baldwin Park, \$858,411; Fredrickson Bros., Emeryville, \$966,655. Contract awarded to Granite Construction Co., Watsonville, \$674,331.

SAN MATEO COUNTY—City of South San Francisco, at the intersection of El Camino Real with Hazelwood Drive-Spruce Avenue, full traffic actuated signal system and highway lighting to be furnished and installed and channelization to be constructed. District IV, Route 2. R. Gould & Son, Stockton, \$14,781; J. Henry Harris, Berkeley, \$15,568; Fred Johnson Electric Co., San Francisco, \$16,609; Ets, Hokin & Galvan, San Francisco, \$18,182. Contract awarded to R. Flatland, San Francisco, \$14,500.

SANTA CLARA COUNTY—At the intersection of Bayshore Highway with Brokaw Road, a traffic signal system and highway lighting to be furnished and installed and channelization to be constructed. District IV, Route 68, Section B. R. Flatland, San Francisco, \$13,830; L. H. Leonardi Electric Construction Co., San Rafael, \$14,290; Roy M. Butcher, San Jose, \$14,864; Howard Electric Co., Gilroy, \$14,961; Fields Electric Works, Santa Clara, \$15,030; Kurze Electrical Works, San Jose, \$16,418. Contract awarded to R. Gould & Son, Stockton, \$13,690.

SHASTA COUNTY—At Montgomery Creek, about 32 miles northeast of Redding, a reinforced concrete slab bridge and approaches to be constructed. District II, Route 28, Section C. J. P. Brennan, Redding, \$99,094; O'Connor Bros., Red Bluff, \$103,299; Eaton & Smith, San Francisco, \$107,707; Fredrickson & Watson Construction Co., Oakland, \$131,601. Contract awarded to B. S. McElderry, Berkeley, \$95,719.

SONOMA COUNTY—Near Honeycomb Gulch, about seven miles north of Jenner, about 0.4 mile to be graded, imported subbase material and imported base material to be placed and surfaced with road-mixed surfacing. District IV, Route 56, Section C. J. Henry Harris, Berkeley, \$96,179; Eaton & Smith, San Francisco, \$105,510; Contract awarded to Huntington Bros., Napa, \$84,196.

SONOMA AND SOLANO COUNTIES—Across Sonoma Creek near Shellville, and across Sonoma Creek and Napa River, about 10 and 2 miles west of Vallejo, three existing bridges to be cleaned and painted. District IV, Route 8, 208, Sections B, A. D. Zelinsky & Sons, San Francisco, \$12,320; Bill Reid Painting Service, Sacramento, \$18,445; J. S. Morris Co., Berkeley, \$19,180; John P. McGuire, San Jose, \$35,354. Contract awarded to R. W. Reade & Co., Berkeley, \$11,345.

STANISLAUS COUNTY—At five locations in the vicinity of Newman, Crows Landing, and Westley, a total distance of about 19 miles, to be graded and

surfaced with plant-mixed surfacing on untreated rock base. District X, Route 41, Sections A, B, Nev. M. J. Ruddy & Son, Modesto, \$174,465; Chas. L. Harney, Inc., San Francisco, \$216,458. Contract awarded to Ukropina, Polich & Kral, Baldwin Park, \$155,225.60.

TULARE COUNTY—Between 0.5 mile north of Pixley and one mile south of Tipton, about 4.8 miles to be graded and paved with Portland cement concrete on cement treated subgrade and the existing pavement to be resurfaced with plant-mixed surfacing. District VI, Route 4, Sections A, B. Griffith Co., Los Angeles, \$590,161; M. J. B. Construction Co., Stockton, \$643,926; Ukropina, Polich & Kral, Baldwin Park, \$692,531. Contract awarded to Gordon H. Ball and San Ramon Valley Land Co., Berkeley, \$552,246.

TUOLUMNE COUNTY—Furnishing and installing highway lighting systems in Jamestown. District X, Route 13, Section B. L. H. Leonardi Electric Construction Co., San Rafael, \$6,375; R. Gould & Son, Stockton, \$6,930; Collins Electrical Co., Inc., Stockton, \$7,162. Contract awarded to Sacramento Electric Works, Sacramento, \$5,160.

VENTURA COUNTY—In San Buenaventura Beach State Park, parking areas to be graded and surfaced with plant-mixed surfacing on untreated rock base. District VII, Jesse S. Smith, Glendale, \$21,390. Contract awarded to Baker and Pollock, Ventura, \$20,805.

VENTURA COUNTY—Portions between point Mugu and Little Sycamore Creek, embankment slopes to be reconstructed and heavy, medium extra heavy and extra heavy stone riprap to be placed. District VII, Route 60, Section A. Contract awarded to J. B. Stringfellow Co., Riverside, \$143,857.

VENTURA COUNTY—Across Arroyo Las Posas, about 0.5 mile south of Moorpark, a reinforced concrete bridge to be constructed and about 0.1 mile of approaches to be graded and surfaced with plant-mixed surfacing on untreated rock base. District VII, Route 155, Section B. W. F. Maxwell, Los Angeles, \$71,452; Norman I. Fadel, North Hollywood, \$74,540; Jesse S. Smith and Service Construction Co. of Southern California, Burbank, \$76,051; E. G. Perham, Los Angeles, \$79,537; F. Fredenburg, Temple City, \$79,881; Charles MacClosky Co., San Francisco, \$84,875; N. M. Saliba Company, Los Angeles, \$86,957; E. S. & N. S. Johnson, Fullerton, \$91,513. Contract awarded to O. B. Pierson, Bellflower, \$69,743.20.

YOLO COUNTY—West Sacramento Freeway, near Sacramento, at Third Street west of Tower Bridge, a bridge to be constructed. District III, Route 6, Section C. Lord & Bishop, Sacramento, \$73,110; George Pollock Co., Sacramento, \$79,990; A. Teichert & Son, Inc., Sacramento, \$87,392; Young & Smith Construction Co., Salt Lake City, \$87,559. Contract awarded to Ukropina, Polich & Kral, Baldwin Park, \$71,944.10.

YOLO COUNTY—On West Sacramento Freeway, between 0.8 mile and 0.1 mile west of Tower Bridge, about 0.7 mile of four-lane divided roadbed to be constructed and a drainage pumping plant to be installed. District III, Route 6, Section C. A. Teichert & Son, Inc., Sacramento, \$195,572. Contract awarded to Ukropina, Polich & Kral, Baldwin Park, \$188,365.

YOLO COUNTY—Between ½ mile north of Kiesel and 2 miles south of Kiesel, about 2.4 miles, portions to be graded and surfaced with plant-mixed surfacing on untreated rock base and portions to be widened and surfaced with plant-mixed surfacing on untreated rock base. District III, Route 50, Sections E, F. Ukropina, Polich & Kral, Baldwin Park, \$217,400; Harms Bros., Sacramento, \$253,348; McGillivray Construction Co., Sacramento, \$286,533. Contract awarded to A. Teichert & Son, Inc., Sacramento, \$217,026.50.

YUBA COUNTY—At the northeasterly city limits of Marysville, about 0.2 mile, construct a graded roadbed, furnish and place untreated rock base and apply Class "B-Double" seal coat. District III, Route 15, Section Mvl, A. Contract awarded to Rice Brothers, Inc., Marysville, \$18,828.20.

YUBA COUNTY—Between 0.3 mile west and 1.6 miles east of Seven Mile House, about 1.7 miles, the existing traveled way to be surfaced with road-mixed surfacing on untreated rock base. District III, Route 15, Section A. H. Earl Parker, Inc., Marysville, \$28,233; Harms Bros., Sacramento, \$32,594. Contract awarded to Rice Bros., Marysville, \$25,910.30.

BUTTE COUNTY—Between Pennington Road and Wage Road, about 3.3 miles to be graded, imported base material and untreated rock surfacing to be placed and bituminous surface treatment to be applied. District II, Route 758. W. H. O'Hair Co., Colusa, \$121,535; LeFever & Bing, West Sacramento, \$121,786; Harms Bros., Sacramento, \$126,567; O'Connor Bros., Red Bluff, \$153,492. Contract awarded to Clements & Co., Hayward, \$109,581.50.

INYO COUNTY—Between Glacier Lodge and 4 miles westerly of Big Pine, about 6.4 miles of roadway to be graded and surfaced with road-mixed surfacing. District IX, Route 1069. Nappe Construction Co., Inc., North Hollywood, \$222,222; George Herz & Co., San Bernardino, \$231,948; Huntington Bros., Napa, \$262,060; R. P. Shea Co., Indio, \$291,518. Contract awarded to Ball & Simpson, Berkeley, \$202,204.10.

MODOC COUNTY—Between Lassen county line and Eagleville, about 9.8 miles to be surfaced with plant-mixed surfacing. District III, Route 513. Clements & Co., Hayward, \$155,720; Contract awarded to Harms Bros., Sacramento, \$140,066.

SACRAMENTO COUNTY—On El Centro Road, between Sacramento River Levee and Elkhorn Road, about 5.8 miles to be graded, imported subbase material and crusher run base to be placed and surfaced with armor coat and plant-mixed surfacing. District III, Route 926. A. Teichert & Son, Inc., Sacramento, \$349,357; Harms Bros., Sacramento, \$350,495; Ukropina, Polich & Kral, Baldwin Park, \$361,026. Contract awarded to Brighton Sand & Gravel Co., Sacramento, \$348,143.75.

July, 1952

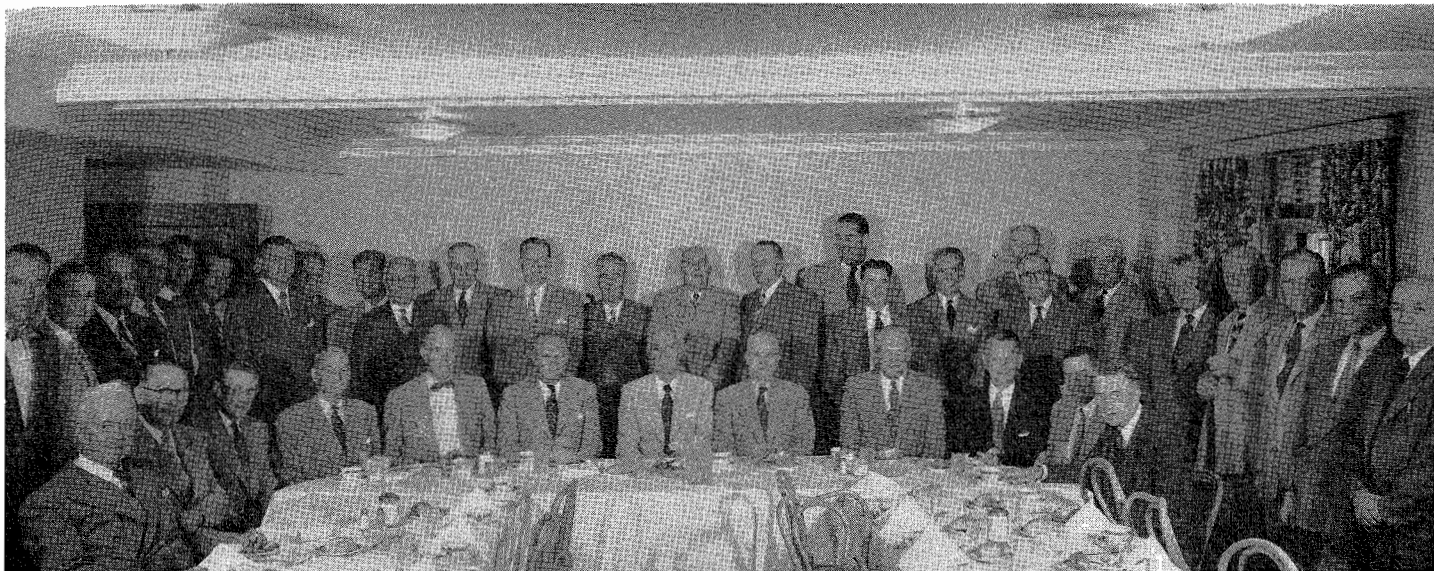
ALAMEDA COUNTY—In the City of Oakland, between San Francisco-Oakland Bay Bridge toll plaza and west end of distribution structure, about 0.25 mile, the existing pavement to be resurfaced with plant-mixed surfacing. District IV, Route 5. J. Henry Harris, Berkeley, \$29,310; Chas. L. Harney, Inc., San Francisco, \$33,773. Contract awarded to Lee J. Immel, San Pablo, \$28,590.50.

ALAMEDA COUNTY—Between Greenville and Hopyard Road, about 11.1 miles, of roadside areas to be prepared and planted. District IV, Route 5, Sections F,B. Stephen L. Visitica, San Mateo, \$14,298; Dana R. Tyson Co., Sacramento, \$17,479; Huettig, Schrom & Bennett, Inc., Palo Alto, \$19,845; Leonard Coates, Nurseries, Inc., San Jose, \$20,731; Justice-Dunn Co., Oakland, \$21,531. Contract awarded to Watkin & Sibbald, San Anselmo, \$13,455.50.

CONTRA COSTA COUNTY—On Tunnel Road at Upper Happy Valley Road and Acalanes Valley Road, channelization to be constructed and highway lighting system to be furnished and installed. District IV, Route 75, Section A. J. Henry Harris, Berkeley, \$30,422. Contract awarded to O. C. Jones & Sons, Berkeley, \$29,362.40.

KERN COUNTY—Between Scale House and Oak Glen, about 2.2 miles to be surfaced with plant-mixed surfacing over existing Portland cement concrete pavement and perforated metal pipe underdrains to be installed. District VI, Route 4, Section A. Schroeder and Company, Sun Valley, \$52,702; Dico, Inc., Bakersfield, \$54,045. Contract awarded to Griffith Company, Los Angeles, \$50,420.

KERN COUNTY—Portions between 4.4 miles east of San Luis Obispo county line and 5.6 miles west of Maricopa, about 1.6 miles in net length, to be graded and surfaced with road-mixed surfacing on cement treated base to provide a four-lane highway. District VI, Route 57, Section A. Nappe Construction Co., Inc., North Hollywood, \$161,120; Clyde W. Wood & Sons, Inc., North Hollywood, \$163,357; Granite Construction Co., Watsonville, \$166,199; John Delphia, Patterson, \$181,463; M. J. B. Construction Co., Stockton, \$188,675; M. Malfitano & Son, Inc., Pittsburg, \$190,914; Madonna Construction Co., San Luis Obispo, \$256,113. Contract awarded to Hermreck & Easter, Santa Maria, \$149,837.90.



Annual luncheon given by California State Chamber of Commerce to California Highway Commission and staff on July 17, 1952. *Left to right, standing:* John Hislop, District Manager, State Chamber of Commerce, Fresno; Edward Sipe, District Manager, State Chamber of Commerce, Stockton; Clark Galloway, District Manager, State Chamber of Commerce, Los Angeles; H. Sprenger, Road Commissioner, Orange County, Santa Ana; Robert M. Shillito, Assistant General Manager, San Francisco Chamber of Commerce; Dudley Frost, Vice Chairman, Alameda County Highway Development Committee, Oakland; Vince Cooper, Assistant Manager, County Supervisors Association, Sacramento; Clarence Breuner, Regional Vice President, State Chamber of Commerce, Sacramento; William Sparling, General Manager, Oakland Chamber of Commerce; Wallace Boggs, County Surveyor, Alameda County; Frank H. Mogle, Chairman, California Major Highway Development Committee, San Bernardino; A. J. Vanderschoot, Member Highway Committee, North Coast Council, State Chamber of Commerce, Santa Rosa; William J. Tunison, Chairman, Sacramento Valley Council Highway Committee, Westwood; Claude Faw, Chairman, Central Coast District Highway Committee, San Francisco; A. H. Clark, Vice Chairman, Central Coast Highway Committee, Soledad; Charles Erhorn, Vice Chairman, San Joaquin Valley District Highway Committee, Visalia; Chester W. Walker, Vice Chairman, Sacramento Valley Council Highway Committee, Hamilton City; Irving Symons, Chairman, Central Valley Highway Committee, Sonora; Chas. E. Waite, Assistant State Highway Engineer; Frank Forward, Chairman, Southern California District Highway Committee, San Diego; F. W. Panhorst, Assistant State Highway Engineer; Robert Reed, Chief, Division of Contracts and Rights of Way, Department of Public Works; Lou Arnold, Administrative Engineer, Los Angeles; E. E. East, Chief Engineer, Automobile Club of Southern California; J. W. Vickery, Assistant State Highway Engineer; Harmer Davis, Director, I. T. & T. E., Berkeley; J. C. Womack, Planning Engineer, Division of Highways.

Left to right, seated: Walter Hogan, Consulting Engineer, Stockton; F. H. Gibson, Chairman, Board of Supervisors, San Diego; Sam Kennedy, Road Commissioner, Los Angeles; "Cass" Kennedy, Secretary, California Highway Commission; Chester H. Warlow, Highway Commissioner, Fresno; Harrison R. Baker, Highway Commissioner, Pasadena; Milo Bekins, Chairman, State-wide Highway Committee, State Chamber of Commerce, Los Angeles; Frank B. Durkee, Director of Public Works and Chairman, California Highway Commission; F. Walter Sandelin, Highway Commissioner, Ukiah; H. Stephen Chase, Highway Commissioner, Sacramento; R. H. Wilson, Assistant State Highway Engineer; R. M. Gillis, Deputy State Highway Engineer.

Harbor Freeway

Continued from page 58 . . .

maintenance equipment to wash the pavement and sprinkle it to keep down dust, and also furnished stand-by fire department apparatus for instant use in the event an emergency developed.

Landings were made by 10 helicopters, arriving two at a time and landing side by side on the two strips of pavement. Each helicopter carried five or six passengers, and landings were directed from the ground by radio control. As is the case with everything the U. S. Marines do, the landings were carried out very expeditiously and efficiently without even the slightest

kind of an accident marring the occasion.

It should be pointed out that the only reason it was possible to make this freeway pavement available for helicopter landings was because of the strike conditions that had tied up all freeway and highway construction work in this area.

Had it not been for the shut-down of work caused by the strike, the contract on the Harbor Freeway for grading and paving between Temple Street and Fourth Street would have been completed and this section of freeway would have been opened to public traffic.

CORRECTION

Two photographs were inadvertently transposed in the article on Erosion Control, by H. Dana Bowers, pages 23 and 24, May-June issue of *California Highways and Public Works*.

The picture of the slope above an old road at the bottom of page 23 belongs under the caption at the bottom of page 24, and vice versa. The captions are in their correct places.

Cost Index

Continued from page 57 . . .

projects do not appear to attract the competition that obtains for the larger jobs, as work under \$50,000 averaged only 4.5 bidders per letting while jobs from \$500,000 to \$1,000,000 averaged 6.7 and projects over \$1,000,000 averaged 7.0 bidders for each bid opening.

The last two lines in the tabulation of average bidders, which show a comparison of the breakdown by months for each of the last two fiscal years, present interesting information on the seasonal aspect of bidding by highway contractors.

The accumulation of data and preparation of the California Highway Construc-

tion Cost Index appears to indicate that we enter the third quarter of 1952 poised in a state of suspense, with trends in the cost of construction pending the settlement of many and diverse economic and political factors. The next six months should see a definite trend established and there appears no firm assurance that it will be downward.

CALIFORNIA DIVISION OF HIGHWAYS
Number and Size of Projects, Total Bid Values and Average Number of Bidders
(July 1, 1951, to June 30, 1952)

Project volume	Up to \$50,000	\$50,000 to \$100,000	\$100,000 to \$250,000	\$250,000 to \$500,000	\$500,000 to \$1,000,000	Over \$1,000,000	All Projects						
Road Projects													
Number of projects.....	120	38	70	28	15	11	282						
Total value (bid items).....	\$2,692,758	\$2,836,211	\$11,273,888	\$9,315,037	\$10,443,407	\$17,064,964	\$53,626,265						
Average number bidders.....	4.4	5.4	5.3	5.2	6.3	6.5	5.0						
Structure Projects													
Number of projects.....	39	19	13	12	5	5	93						
Total value (bid items).....	\$815,457	\$1,364,296	\$2,321,039	\$4,458,008	\$3,297,076	\$7,513,519	\$19,769,395						
Average number bidders.....	4.8	5.7	7.1	6.4	7.6	8.6	5.9						
Combination Projects													
Number of projects.....	---	---	---	---	---	9	9						
Total value (bid items).....	---	---	---	---	---	\$18,539,234	\$18,539,234						
Average number bidders.....	---	---	---	---	---	6.9	6.9						
Summary													
Number of projects.....	159	57	83	40	20	25	384						
Total value (bid items).....	\$3,508,215	\$4,200,507	\$13,594,927	\$13,773,045	\$13,740,483	\$43,117,717	\$91,934,894						
Average number bidders.....	4.5	5.5	5.6	5.6	6.7	7.0	5.3						
Total Average Bidders by Months													
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Year
Last year.....	4.3	4.0	4.6	4.4	8.0	7.3	7.6	6.4	6.9	6.0	4.5	4.8	5.3
This year.....	4.9	5.6	5.8	6.2	6.7	5.7	5.5	5.3	4.8	4.7	3.7	3.2	5.0

Successful Tour

Continued from page 54 . . .

future requirements. He shall also design and construct all projects so that later expansion by additional traffic lanes, and other facilities, would be on presently acquired rights of way. In this way all economic disturbances incident to possible future reroutings would be eliminated, insofar as humanly possible.

We pointed out that the commission acknowledges its responsibility to allocate initially the necessary funds to facilitate the probable ultimately required expansions, and that we were building the California highways upon this basis.

Appreciation

The presentation thus made to the people, and their delineation of projects they considered of prime impor-

tance to their communities, constituted an exchange of facts that all considered mutually beneficial, and in the general public interest.

On the morning of June 17th, the members of the official party left Bakersfield for their respective homes, each convinced that every purpose of the trip had been accomplished.

On behalf of the members of the California Highway Commission, and of the Division of Highways, it is my pleasure to express our appreciation for the opportunities afforded for renewing old friendships, and acquiring many new friends. We are especially grateful to the Chambers of Commerce of Merced, Madera, Hanford, Porterville, Lindsay, Tulare City, Tulare County, Visalia, Woodlake, Fresno, and Kern, and to the Regional Council of the California State Chamber of Commerce, for their cooperation and

assistance in arranging the tour and the details of the various meetings, for their several hospitalities, and for their brief, yet explicit, presentations of their highway problems.

We were thus able to accomplish much in a very short time. We also express our appreciation to the Rotary Club of Fresno for devoting its Monday meeting to our highway business; and to Evind Scoyan, Superintendent of Sequoia and Kings Canyon National Parks, and to George Mauer, Manager of the Park Company, for their personal attention and courtesies on our Sunday "off-day," which was primarily devoted to the pleasures of existence in California's scenic Sierra.

All in all, our travels and our sojourns were exceedingly pleasant and highly beneficial, a happy combination of business and pleasure, which, in life, is always highly satisfactory.

EARL WARREN
Governor of California

FRANK B. DURKEE
Director of Public Works

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EARL WITHCOMBE Assistant State Highway Engineer
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R. H. WILSON Assistant State Highway Engineer
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GEORGE S. PINGRY Assistant Chief
R. S. J. PIANEZZI Assistant Chief
E. M. MacDONALD Assistant Chief

District IV

B. W. BOOKER Assistant State Highway Engineer

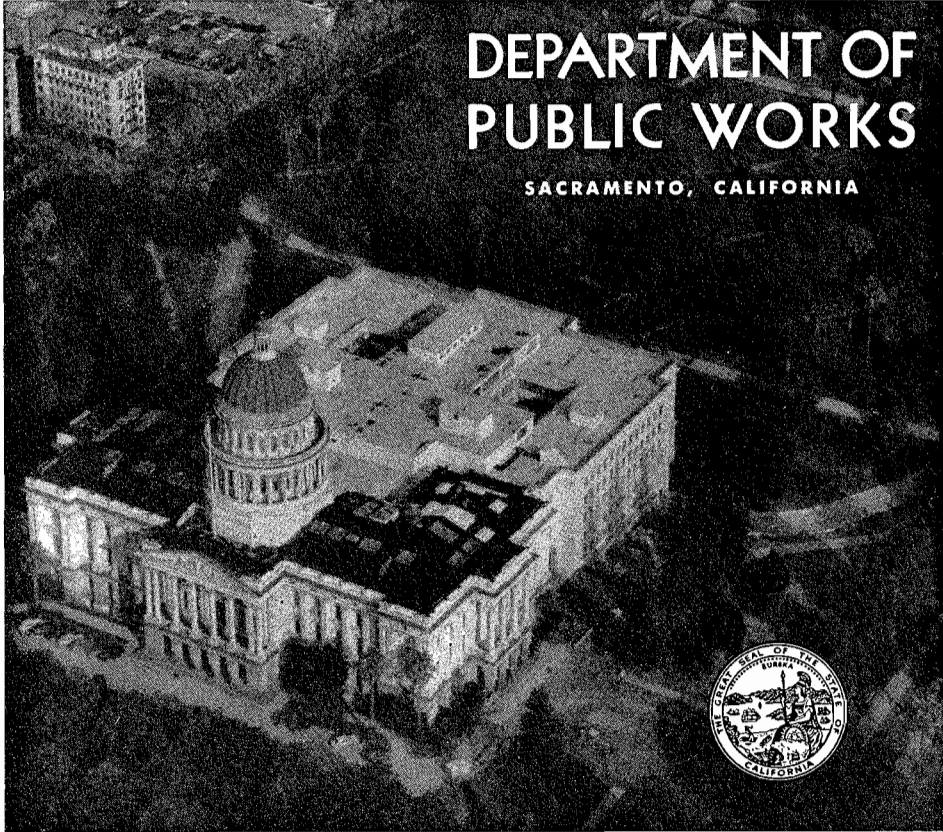
District VII

P. O. HARDING Assistant State Highway Engineer

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District Engineers

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J. W. TRASK District II, Redding
CHARLES H. WHITMORE District III, Marysville
JOSEPH P. SINCLAIR District IV, San Francisco
L. A. WEYMOUTH District IV, San Francisco
E. J. L. PETERSON District V, San Luis Obispo
E. T. SCOTT District VI, Fresno
W. L. FAHEY District VII, Los Angeles
M. E. CESSNA District VII, Los Angeles
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JOHN G. MEYER District X, Stockton
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**DEPARTMENT OF
PUBLIC WORKS**

SACRAMENTO, CALIFORNIA



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GEORGE C. HADLEY Attorney
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WADE O. HALSTEAD Principal Estimator of Building Construction
CARLETON PIERSON Supervising Contracts Writer

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C. L. IVERSON Chief Architectural Draftsman
WALTER E. LORD Supervising Specifications Writer
JAMES A. GILLEM Supervisor Area III (Los Angeles)

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JOHN S. MOORE General Construction Supervisor
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G. H. JONES Assistant State Engineer, Sacramento
River Flood Control Project, Supervision of Safety
of Dams, Sacramento-San Joaquin Water Supervision
T. B. WADDELL Assistant State Engineer, Water Resources Investi-
gations, Central Valley Project, Irrigation Districts
GORDON ZANDER Assistant State Engi-
neer, Water Rights and Water Quality Investigations
MAX BOOKMAN Supervising Hydraulic Engineer, Los Angeles Office
HENRY HOLSINGER Principal Attorney
T. R. MERRYWEATHER Administrative Officer

DIVISION OF ARCHITECTURE

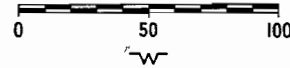
ANSON BOYD State Architect
H. S. HUNTER Deputy Chief
ROBERT W. FORMHALS Administrative Assistant to State Architect
EARL W. HAMPTON Supervisor of Contract Architects

**Area Structural Engineers,
Schoolhouse Section**

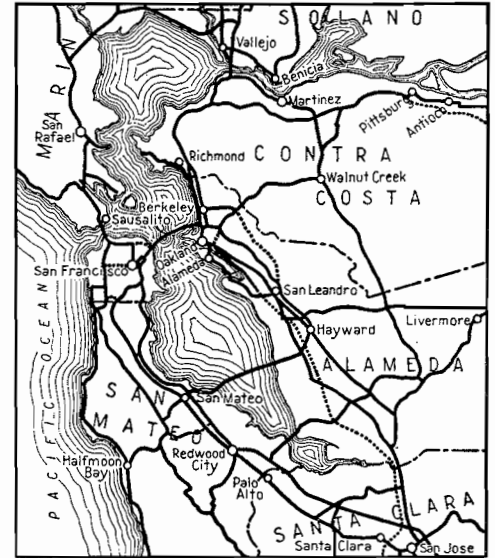
C. M. HERD Area I, San Francisco
M. A. EWING Area II, Sacramento
H. W. BOLIN Area III, Los Angeles

CALIFORNIA STATE HIGHWAY SYSTEM

SCALE IN MILES



SAN FRANCISCO AND VICINITY



LOS ANGELES AND VICINITY

