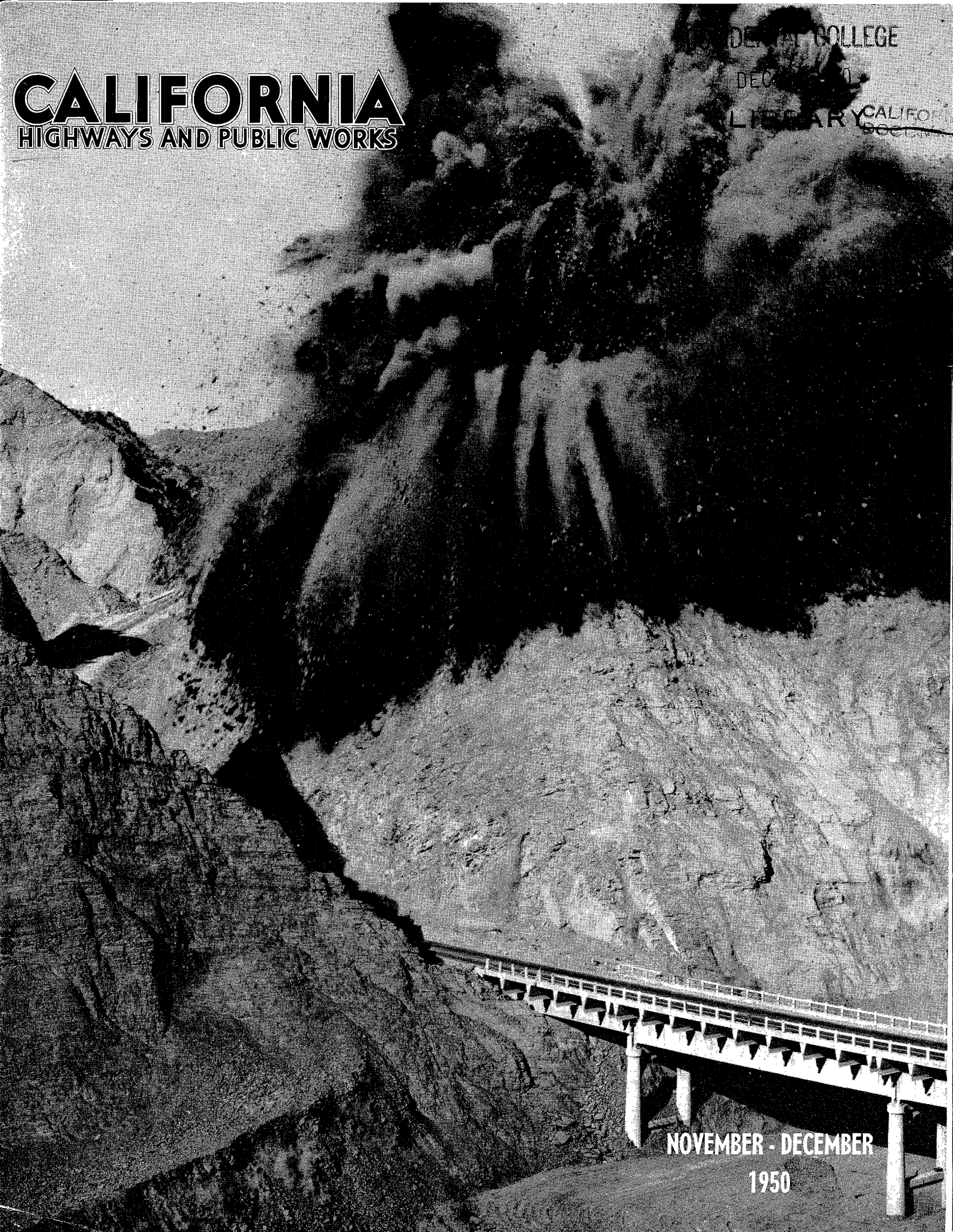
CALIFORNIA
HIGHWAYS AND PUBLIC WORKS



NOVEMBER - DECEMBER
1950

California Highways and Public Works

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

CHARLES H. PURCELL, *Director*
GEORGE T. McCOY, *State Highway Engineer*
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MANY THANKS

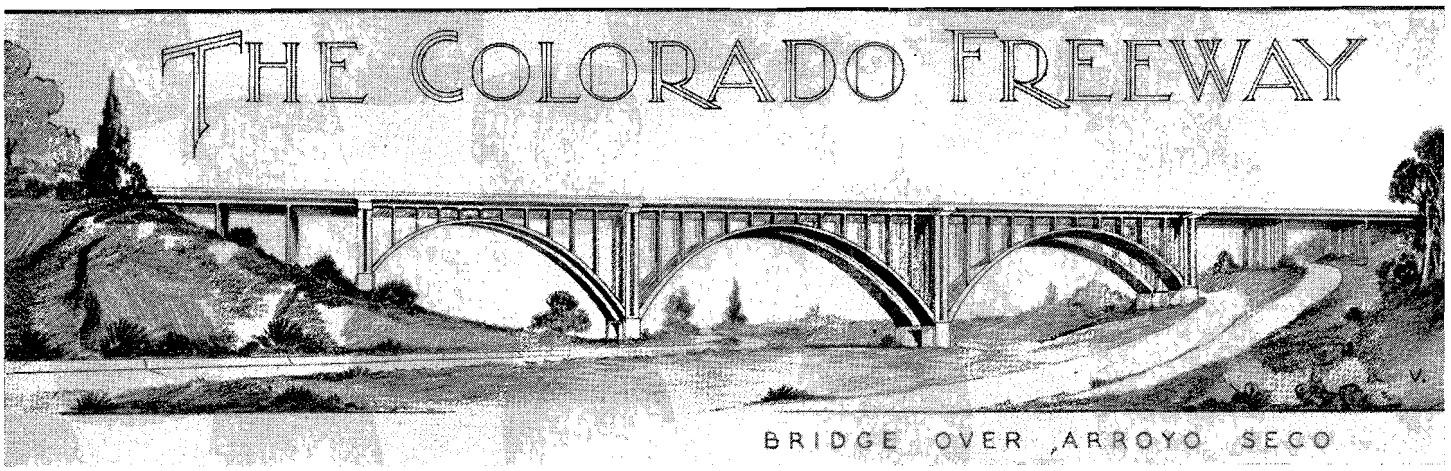
CALIFORNIA HIGHWAYS AND PUBLIC WORKS deeply appreciates the many hundreds of letters and postcards complimenting the Department of Public Works on the publication of the Centennial Edition.

The editors of the magazine would like very much to have answered all these communications personally, but the volume of the letters received made this impossible.

Our sincere thanks to all those who took the time to write in.

Editor

THE COLORADO FREEWAY



BRIDGE OVER ARROYO SECO

By HARRISON R. BAKER
Highway Commissioner

THE NEW Arroyo Seco Bridge on the Colorado Freeway in Pasadena is destined to have the longest concrete span of any bridge ever built in Southern California. This structure, to be built alongside the famous Colorado Street Bridge in Pasadena, will consist essentially of three long concrete arch spans —230 feet, 319 feet, and 230 feet. These arches, detail plans of which are now being drawn, will rank among the longest of their type in the western United States.

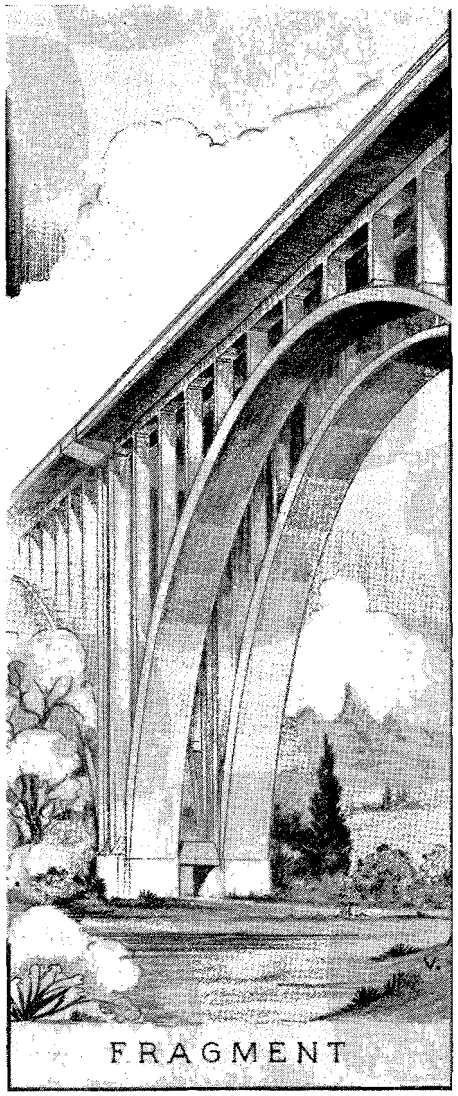
Especially designed to harmonize with the architectural features of the existing bridge and to enhance the natural beauty of a site already famed for its picturesque and parklike setting, the new Arroyo Seco Bridge will be a structure in which the residents of Pasadena may justly take pride.

Will Relieve Traffic Jam

However, the new structure will be noteworthy not only for its imposing appearance, but also for the relief it will afford to what has become an intolerable traffic congestion situation. Furthermore, it is expected to be the first link of the new six-lane Colorado Freeway, an arterial highway which it is anticipated will ultimately be the main east-west route through the northerly portion of the Los Angeles metropolitan area. The bridge, construction on which is expected to start early in 1951, together with its approaches, is expected to cost in the neighborhood of $3,500,000, which will make it the most costly nontoll highway structure ever built in California.

Important Highway Link

The proposed Colorado Freeway is expected to be one of the most important links in the Southern California highway system. It will connect U. S. Highways 99 and 101 on the west and north with U. S. Highway 66 on the east, and thereby serve as a by-pass around downtown Los Angeles. It will also carry heavy local traffic between the Cities of Burbank, Glendale, Pasadena, and the foothill cities extending on the east to San Bernardino. Except for the inadequate road crossing the Devil's Gate Dam there is no traffic artery between the communities on the east and west sides of the Arroyo Seco in this vicinity.



FRAGMENT

The existing Colorado Street Bridge was built in 1912 and 1913. When it was completed, there were about 35,000 automobiles in all of Los Angeles County; in 1949 the county's total motor vehicle registration exceeded 1,800,000. Small wonder that it is inadequate for present-day traffic.

Plan New Bridge

The old bridge was added to the State Highway System in 1933. Shortly thereafter, an extensive investigation of the existing structure was undertaken to determine the best method of increasing the traffic capacity, since the bridge by that time was already a cause of acute traffic congestion. As a result of the investigation, it was proposed at that time that a parallel bridge duplicating the existing structure be constructed. But this proposal met with such a storm of protest in the newspapers that the entire project became dormant and remained so until funds made available by the Collier-Burns Act made it possible to plan for the new bridge.

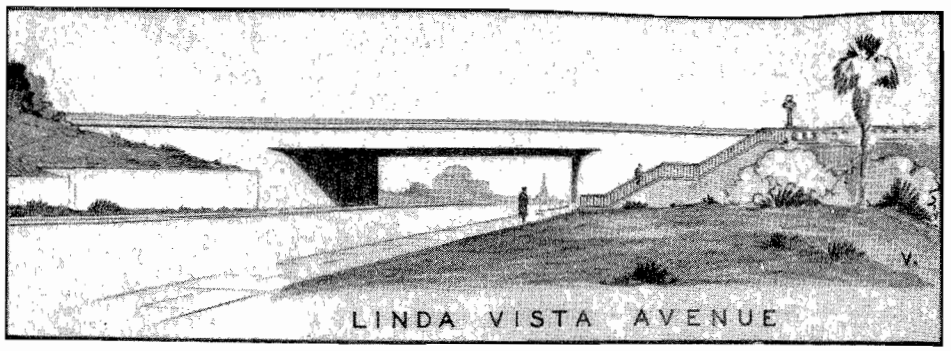
Architectural and engineering studies of various types of bridges adaptable to the site were then undertaken. After all factors of economy, aesthetics, and local preference were weighed it became apparent that the

chosen type was best suited to this difficult crossing.

Design of Bridge

The total length of the new bridge will be 1,366 feet—more than a quarter of a mile. The three main arch spans, in the central portion of the structure, will have concrete box girder viaduct approaches at each end. The easterly approach viaduct will be 215 feet long, and the westerly viaduct 372 feet long. The maximum height of the structure from the ground to the deck will be 130 feet. Each of the two three-lane roadways will be 40 feet wide, and they will be separated by an eight-foot-wide dividing strip. The total width of the bridge will flare out from a width of 94 feet at the west end to a width of 168 feet at the east end.

The existing two-lane Colorado Street Bridge is one of the most severe traffic bottlenecks in the Los Angeles area, carrying over 20,000 vehicles per day. The narrow roadway width together with the sharp reverse curves on this structure frequently cause jams which back up traffic at both ends for many blocks. This critical traffic congestion will be alleviated by the construction of the new freeway, for the latter is being designed to carry an average daily traffic load of some 31,000 vehicles, with a peak hourly traffic capacity of 3,100 vehicles. After the completion of the freeway, the beautiful Colorado Street Bridge, one of Pasadena's most treasured landmarks, can continue to serve local traffic, estimated at 1,800 vehicles per day.



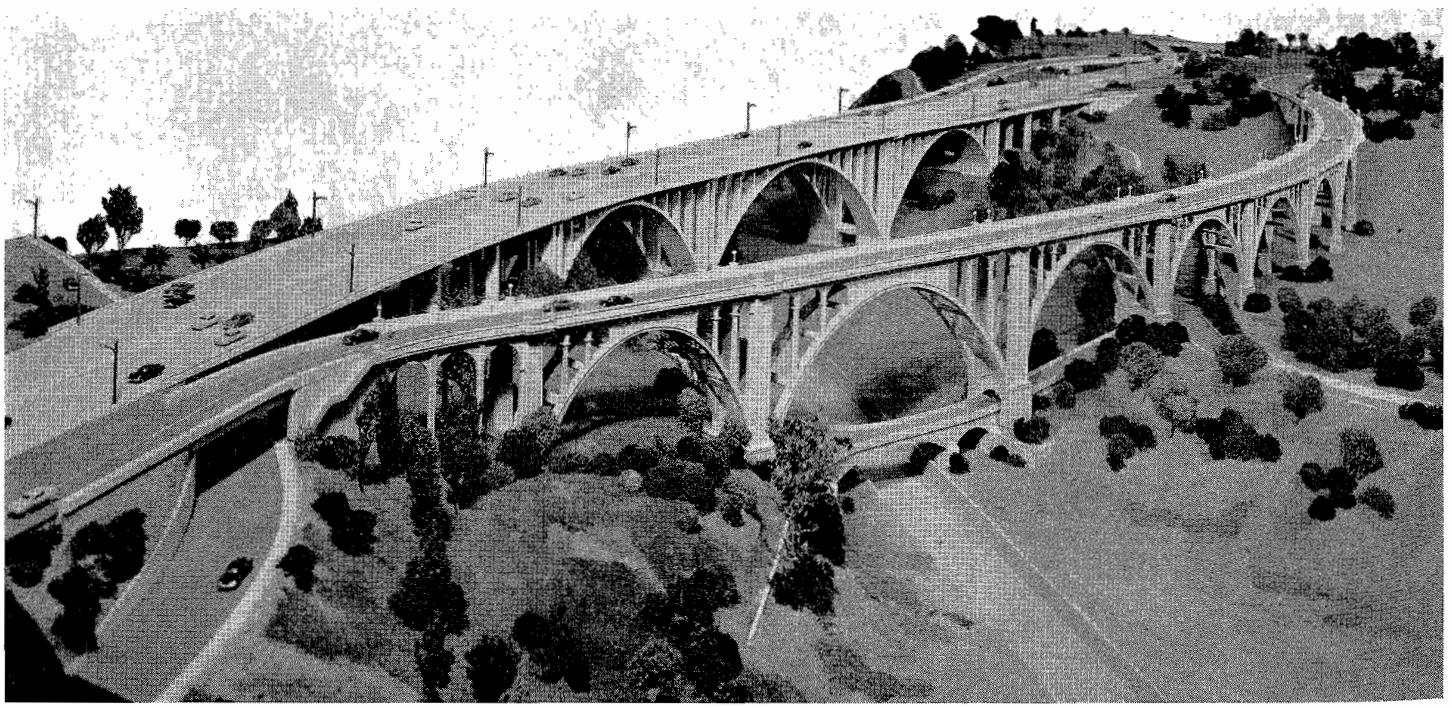
Freeway Location

The Colorado Freeway location is approximately one block north of Colorado Street at the Pasadena side of Arroyo Seco, and joins it at the westerly end. The major portion of the new bridge will be about 400 feet north of the old structure. The existing bridge will carry two-way traffic as a frontage road with connections to Grand Avenue and to Orange Grove Avenue via Green Street. The westerly approach of the old bridge will be rebuilt on a curved alignment to connect with the frontage road and to provide an undercrossing for the Linda Vista Avenue off-ramp of the freeway.

The layout of the bridge and its approaches is complicated by several unusual problems. The westerly end of the bridge is on a 2,000-foot radius curve, which requires that many supporting structural members of the bridge be constructed on curved lines. The Linda Vista Avenue off-ramp crosses under the bridge at a sharp angle, requiring a unique triangular bent to preserve the pleasing appearance of the structure. Minor relocations of El Circulo Drive, Arroyo Drive, and Arroyo Boulevard will be required to accommodate the bent columns and piers adjacent to these streets.

. . . Continued on page 19

This is a scale model of the proposed Colorado Street Bridge (left) alongside the existing structure at right



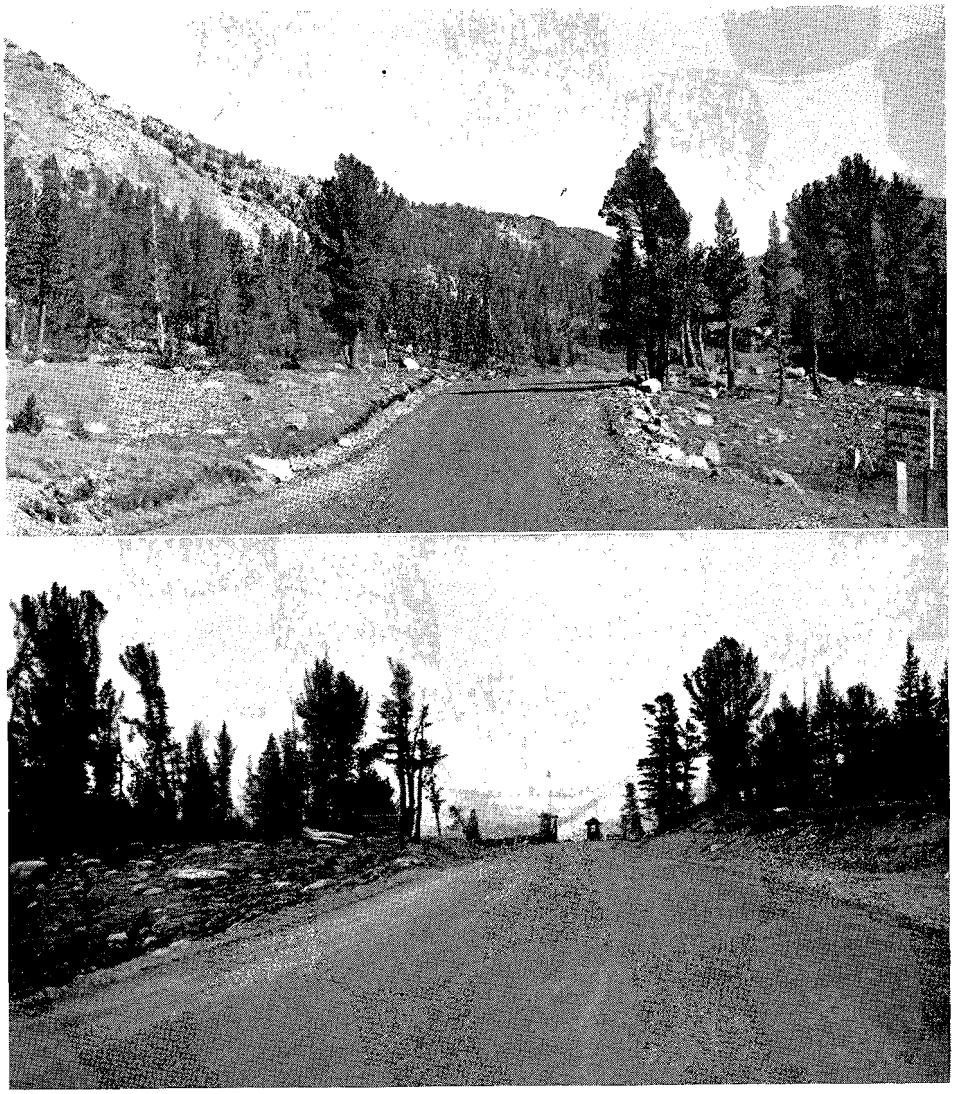
Tioga Pass

Cement-Treated Base Successful at 10,000 Feet Elevation

By S. LEWIS ROHRER, District Materials Engineer

TIOGA PASS (IX-Mno-40-A) is the highest pass over the Sierra Nevada Mountains in the State Highway System, reaching an elevation of nearly 10,000 feet. It is the eastern approach to Yosemite National Park, as well as having high scenic value in itself, passing beside Lake Ellery and Lake Tioga. Both of these lakes, and other lakes and streams in the vicinity, offer excellent fishing in the summer and a good deer hunting area in the fall.

The greater part of the traffic is composed of vacationists taking advantage of both these recreational facilities and the proximity of Yosemite National Park. It is also considered by many of the automobile clubs of the eastern states as being a more direct and scenic route for their members coming via U. S. Highway 6 to Benton Station and then across to the Central Valley and San Francisco via Yosemite National Park. It passes within a mile of the old town of Tioga which had a number of producing mines in the latter part of the nineteenth century. At the present time these mines are not in operation. The only operating mine in the immediate area is at Saddlebag Lake about five miles from the eastern end of the project.



UPPER—Yosemite National Park looking east on old road, 1947. LOWER—1950, showing new road after two winters. Looking west to Yosemite National Park Gate

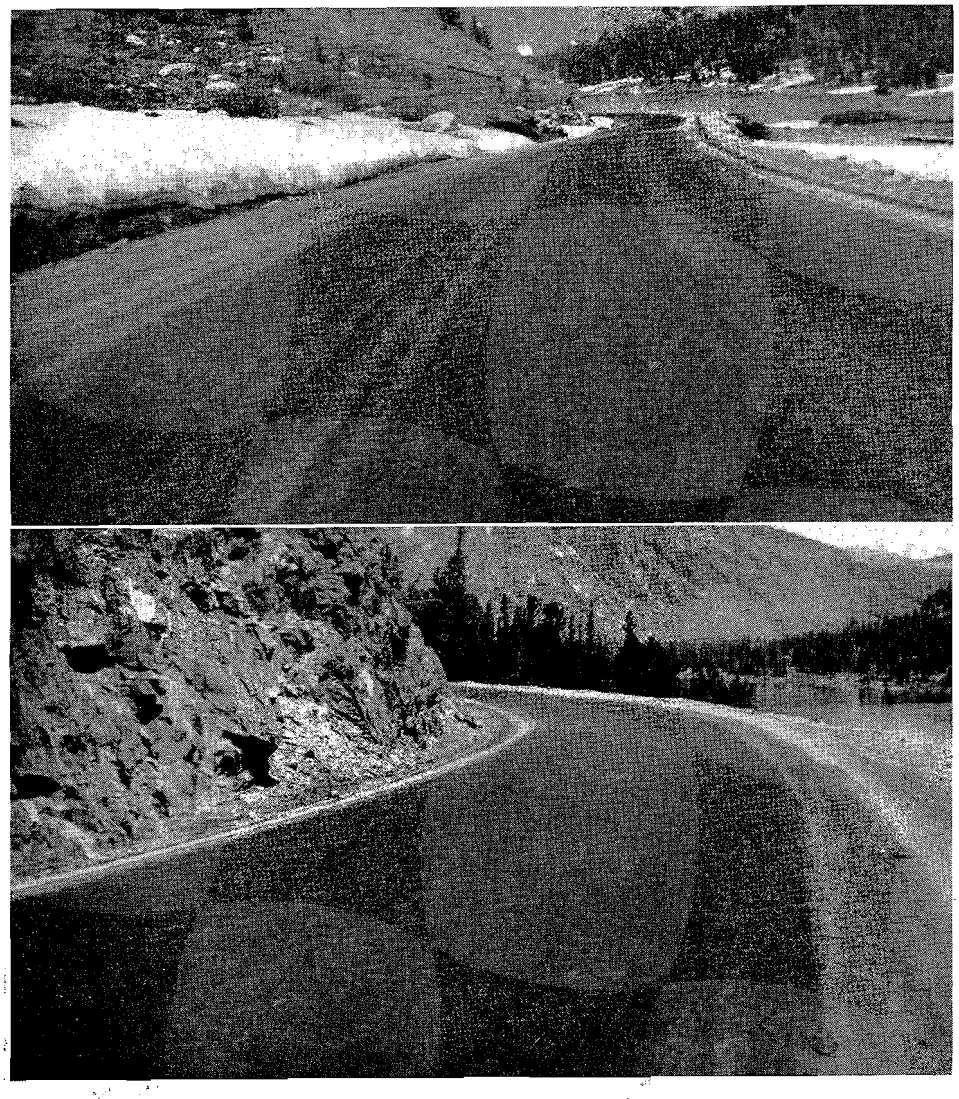
Spongy Roadbed

In 1947, the existing graded earth road with a light bituminous surface treatment had reached a stage where traffic safety was jeopardized by reason of the spongy roadbed from the top of the pass, Yosemite National Park Gate, to 2.5 miles east. At that time it was decided to reinforce the base and cover with plant-mixed surfacing. Bids were opened June 5, 1948, but due to the fact that only a single bid was received, and that greatly in excess of the engineer's estimate, the bid was rejected. It was then decided to cement-treat the subgrade and pave with road-mixed surfacing, using state forces on a day labor basis.

The entire 2.5 mile area was affected by springs and seeps, and the melting snow presented an extra problem due to the fact that the road is not opened until the National Park Service opens the remaining portion of the road through the park in the latter part of June. This allows a long period, possibly several months, for the snows on the roadway to thaw and freeze at night. It was hoped that the cement-treating of the subgrade, in connection with drainage improvement, might obviate these factors.

Imported Material

The material in place on the road averaged about 17 percent passing the number 200 mesh sieve. Headquarters Laboratory preferred to cement-treat material with about 12 percent passing the 200 mesh sieve. This necessitated



UPPER—Looking east from Station 22 showing where failure occurred during construction. Taken July, 1950 after two winters. LOWER—Looking east from Station 28 showing where failure occurred during construction. Taken July, 1950 after two winters

importing material in order to lower the passing 200. The National Park Service allowed the district forces to enter the park and obtain material superior to anything to be found outside. It was intended to scarify three inches of the roadbed and to import sufficient material to cement-treat six inches and thus bring the passing 200 within the specified range. In the course of construction it was found that in much of the project it was only necessary to import about 25 percent of the material and still stay within the grading range.

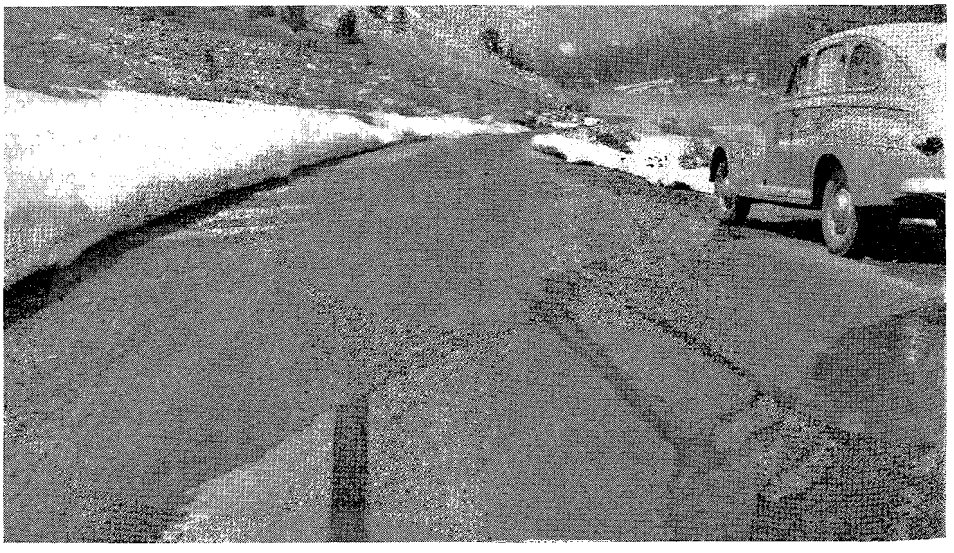
The original material, placed in 1940, was taken from a pit on the Saddlebag Lake Road near the eastern end of the project. This material, on both preliminary and construction tests, showed satisfactory results, even though the surcharge was not then in use on the California Bearing Ratio. This material when tested in 1947, despite the fact that it had definitely failed, still showed satisfactory test results, including plasticity index. The only available clue to the failure in the material itself was the fact that cementing value tests showed a decided slump when the forms were removed.

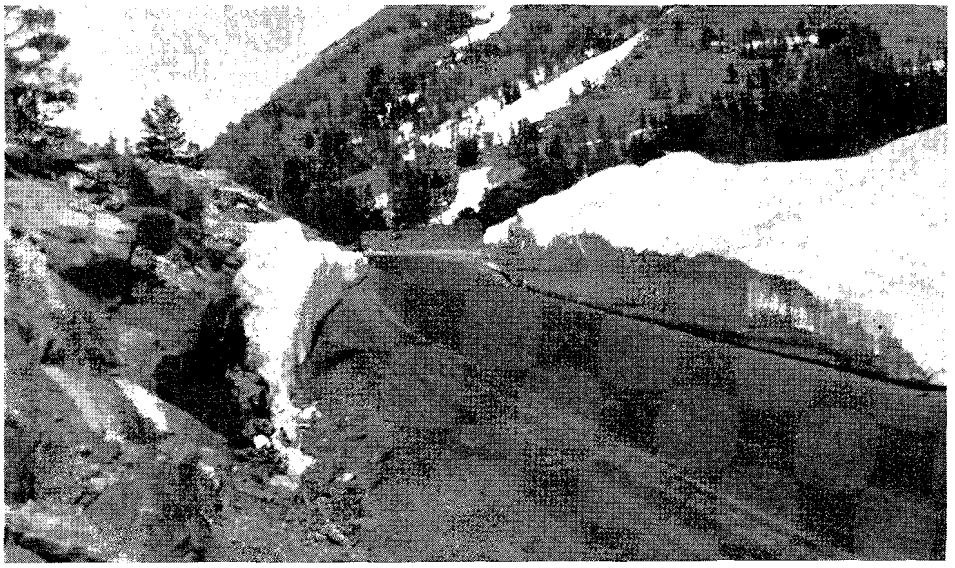
National Park Cooperates

At the time of the original construction in 1940, a thorough search was made in the vicinity of the project to find the best material available locally. All of the material was either glacial moraine or material derived from glacial moraines, all of which showed a high percentage passing the 200 mesh sieve, and with relatively high percentage of silt and very little clay.

In 1947, through the courtesy of the National Park Service, the search was extended within the park boundaries and three possible material sites were located, one of which was too close to the National Park Highway and therefore discarded. Of the other two, one had only a limited amount of material and was in a hummock (monadnock) at the lower end of a meadow about 1½ miles west of the project. This material was similar to DG and was used until the small quantity available was exhausted. The final pit, which

Looking east from Station 20 showing melting snow condition, July 1950





Looking east from Station 74 showing snow condition, July 1950

was used for the majority of the import, was located on a hillside and composed of a combination of water-borne material and DG. Possibly the water-borne material had contained many large boulders which in the course of time had disintegrated. This pit was located 4½ miles west of the project and necessitated an up-hill haul with the loaded trucks.

Glacial Results

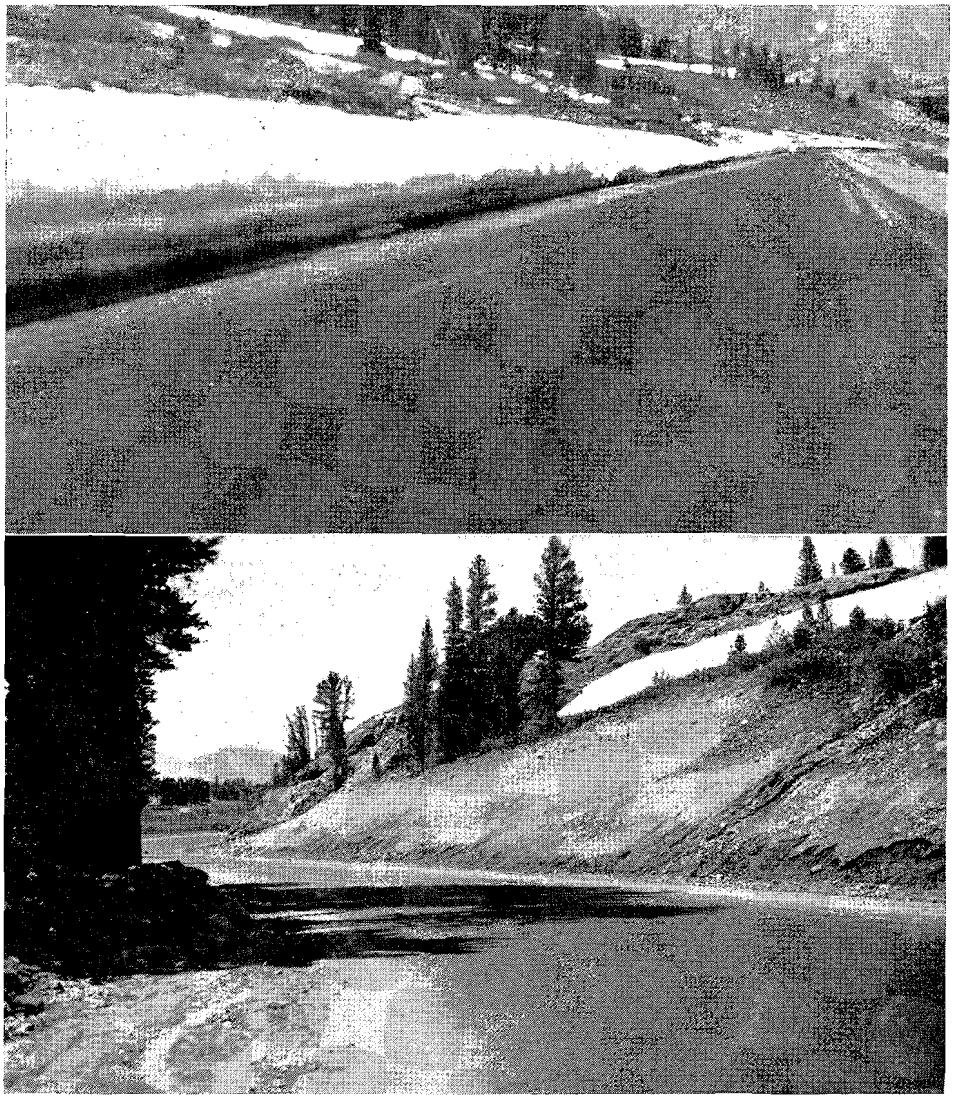
The geologic map shows the area to the east of the park boundary as being Jurassic-Triassic meta-volcanics, and the material inside the park as being Jurassic acid intrusives. However, the writer believes that it was not so much this possible variation in source material as it was the glacial action which caused the one material to be satisfactory and the other unsatisfactory. This is borne out by the fact that clays would not be expected from volcanic source material (and clays were not found in the existing base material, as shown by low PI or NP), and by the fact that the material taken from inside the park was of a post glacial origin, both by water transportation and weathering, and clays from the kaolinization of the feldspars had not progressed sufficiently to cause a large clay fraction to be present. The failure was apparently caused by the original material being too amenable to flow under saturated conditions, and it was hoped that the addition of coarser imported material and cement treating, as well as drainage correction, would eliminate this flow.

Hard Hauls

Tests showed a psi of about 200 for 4 percent cement, and 250 psi for 5 percent. It had been hoped to obtain 500 psi but this was economically impossible. Due to the steep adverse grade and numerous short radius curves all trucks and trailers bringing materials had to be bob-tailed at the foot of the hill near Leevining. This meant double handling of the cement and it was therefore decided to use 4 percent cement with a minimum of 175 psi.

At a 10,000 foot elevation the efficiency of internal combustion engines is lowered to 60-70 percent of normal,

UPPER—Looking east from Station 13 showing melting snow condition, July 1950. LOWER—Looking west where spring appeared in traveled way, July 1950

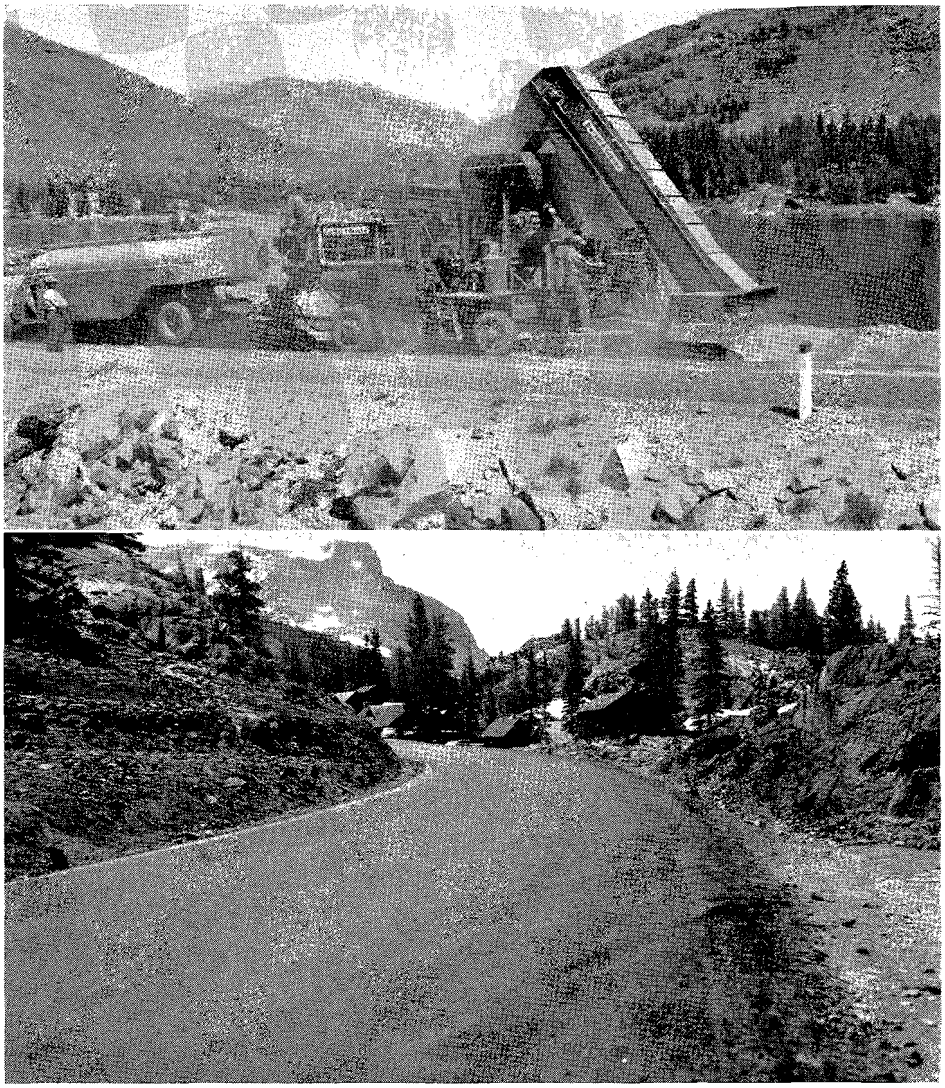


and the efficiency of human beings suffered likewise. Added to these factors was the early cold weather. The project started on August 10, 1948, and by August 15th, it was below freezing at night. The asphaltic emulsion for the seal on the cement-treated material was stored in a steel tank with outside wooden walls, and flares were left lighted around it at night to keep it from freezing.

Scarified Material

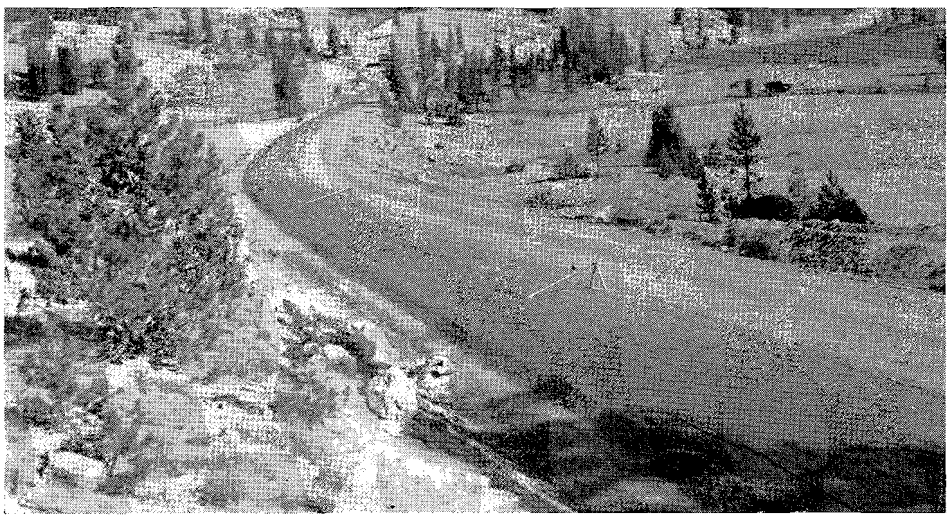
The scarified material was rolled with a 6-ton tandem roller to break it up and then windrowed with the imported material. This combined material contained about 2.5 percent moisture. Tests showed 6.5 percent average optimum moisture; however, it was found that at this elevation and climate a better result was obtained by using about 8 percent. The additional 1½ percent moisture was necessitated by the drying and powdering of the finished surface before the seal could be applied. By placing half of the water in the windrow and half in the mixer a more workable mix was obtained.

The material was mixed with a Barber-Greene heavy duty travel plant, Model 848. This was followed within 250 feet by a motor grader and a 12-ton three-wheel roller, and then sealed with penetration type asphaltic emulsion, using 0.2 gallons per square yard applied from an emulsion kettle, and then sanded using an Oregon type sand spreader. The maximum time lapse between mixing and sealing was 1½ hours and usually more nearly one hour. One half of the road was mixed at a time.



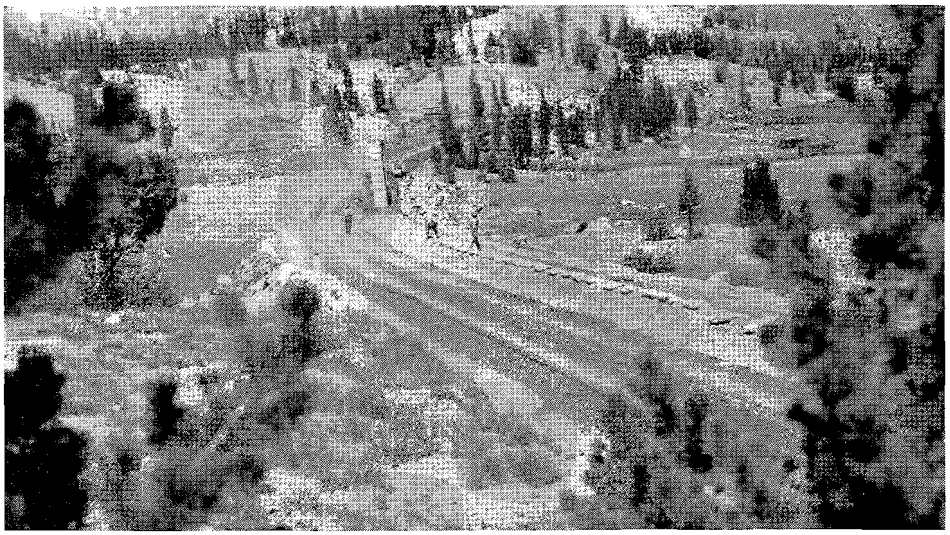
UPPER—Barber-Greene heavy duty travel plant in operation. Tioga Lake in background, 1948. LOWER—Looking west at Camp Tioga. Cut in foreground was one of worst failures before construction due to seeps and winter frost boils. Taken July, 1950 after two winters

Looking east showing cement-treated material completed on left side. Traffic controller on right. 1948, during construction



Slight Failure

Between Stations 18 and 25, a slight failure, chuckholing, occurred on September 15th due to construction truck traffic and unusually heavy traffic during the hunting season. This failure was caused by the combination of a sharp curve and sudden steepening of the grade. Cars going upgrade had to round the curve at a comparatively slow speed and then shift gears, and cars coming downgrade were forced to apply their brakes suddenly to ap-



Looking east showing 4.5-foot windrow being mixed. Traffic controller on left side on already laid cement-treated material. During construction, 1948

proach the curve at a reduced speed. Also, tests had shown this to be the poorest material, about 190 psi. The chuckholes were filled and a light 1-inch-2-inch cover of roadside material was bladed over them. The cement treatment was finished on September 22d and the first snow came on September 24, 1948.

In July, 1949, work was resumed. A surfacing of three inches of road-mixed surfacing was laid in two courses, using imported mineral aggregate from the pit inside the park and SC-3 at the rate of 0.75 gallons per square yard one inch thick. There was very little and only minor damage showing to the cement-treated surface from the winter season.

A Class "D" seal of penetration type asphaltic emulsion was applied at the rate of 0.1 gallon per square yard. The project was completed October 13, 1949, and the first snow fell on October 14th.

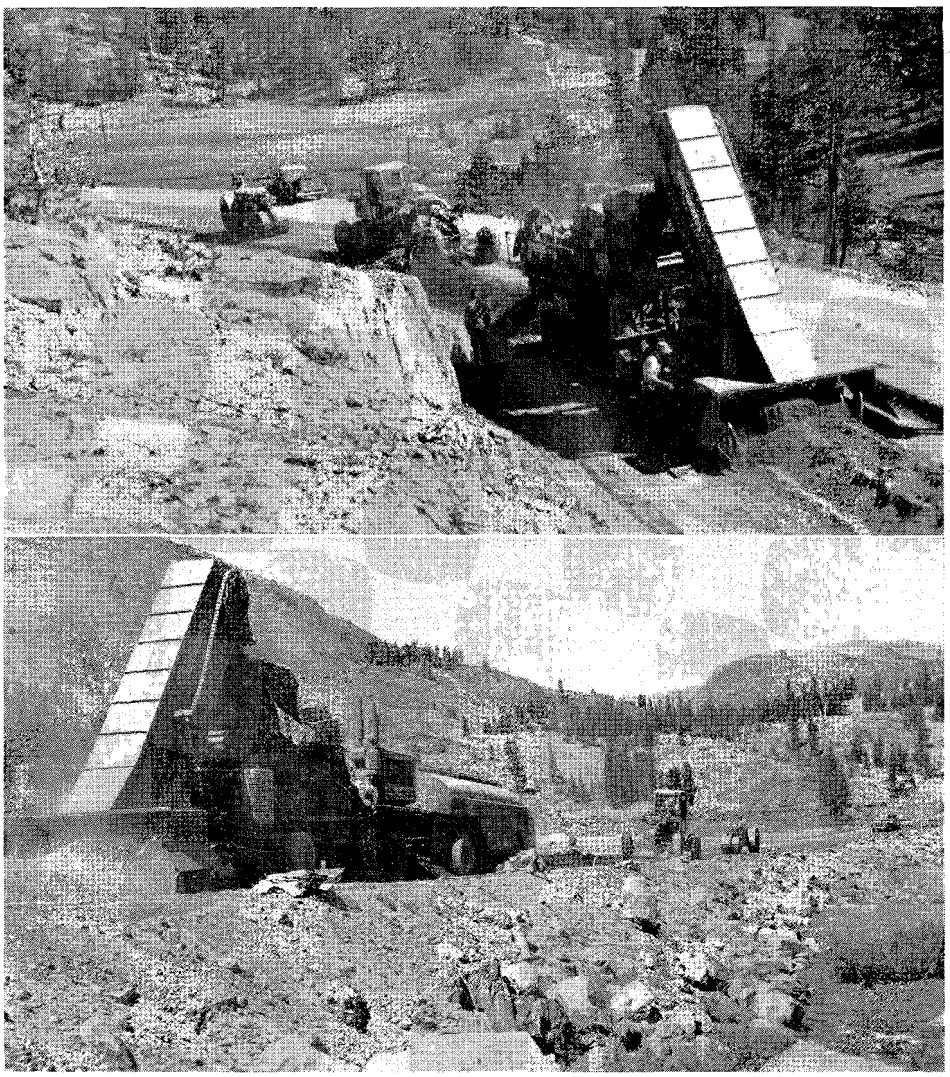
Inspections Show Success

Inspections were made in June, 1950, by M. E. Fischer, District Maintenance Engineer, and the writer, at the time the snow removal equipment was in operation, and again in July. There was very little apparent damage from either snow removal equipment or effects of winter weather. The Snogo did not sink in as was experienced previous to this treatment. There was only one place showing effects of frost boil, and that was where construction operations had opened up a spring in the middle of the traveled way. This was corrected by placing suitable rock drains.

Experience to date has shown that low cement-treated base can be successfully laid at the higher altitudes under adverse weather conditions; however, consideration must be given to the cost of such treatment with particular emphasis on the reduced efficiency of all power driven equipment, as well as to the reduced efficiency of the human being at 10,000 feet elevation.

The project was performed under the general direction of S. W. Lowden, District Engineer, since transferred to San Bernardino; M. E. Fischer, District Maintenance Engineer; and under the immediate supervision of C. P. Carter, Highway Superintendent; Vaughn Marker, Resident Engineer; and J. Van Dyk, Highway Foreman.

UPPER—Showing mixing operations. Note spacing of equipment. 1948. LOWER—Mixing operations. Note spacing of equipment. 1948



Livermore By-Pass

Section of Freeway on Route U. S. 50 Completed

By J. F. O'BRIEN, Resident Engineer

COMPLETION of the 5.8 mile section of freeway from the foot of the Altamont Pass to one and one-half miles west of Livermore in Alameda County, provides much needed traffic relief between the San Francisco Bay area and the San Joaquin Valley on this portion of Route U. S. 50. The traffic count taken on this route east of Livermore, in July, 1950, showed a 24-hour Sunday volume of over 19,000 and a Monday volume of over 11,000 vehicles.

Another section of this route from the westerly terminus of this contract, for a distance of 5.9 miles westerly to a connection at Hopyard Road, is now under contract and should be completed for the summer traffic in 1951.

A third section from Hopyard Road westerly to Boomer Hill in Dublin Canyon is now on the drafting tables and is planned for contract construction in the near future.

An 8.4 mile section of the Altamont Pass between Greenville and the Mountain House was constructed as a four-lane divided highway in 1938; and while this construction was completed before the freeway law became effective, its design carried many of the present freeway features and provides satisfactory traffic service over its length.

Future projects are progressively planned to provide freeway transportation facilities from the Oakland Metropolitan area to the San Joaquin Valley, and connecting outlets north, south and east to meet the heavy traffic demands of the area.

This route, in addition to the heavy passenger car traffic, carries a very heavy truck traffic, as it serves as a primary outlet for produce from the fertile San Joaquin Valley and adjacent areas, recent traffic counts indicating 19.6 percent of the traffic volume being trucks.

The importance of this route from a military standpoint has been well established, as in addition to its cross-country connections it is the most direct route from Lyoth Quartermaster Depot and the Lathrop Holding and Reconsignment Point to the San Francisco Port of Embarkation.

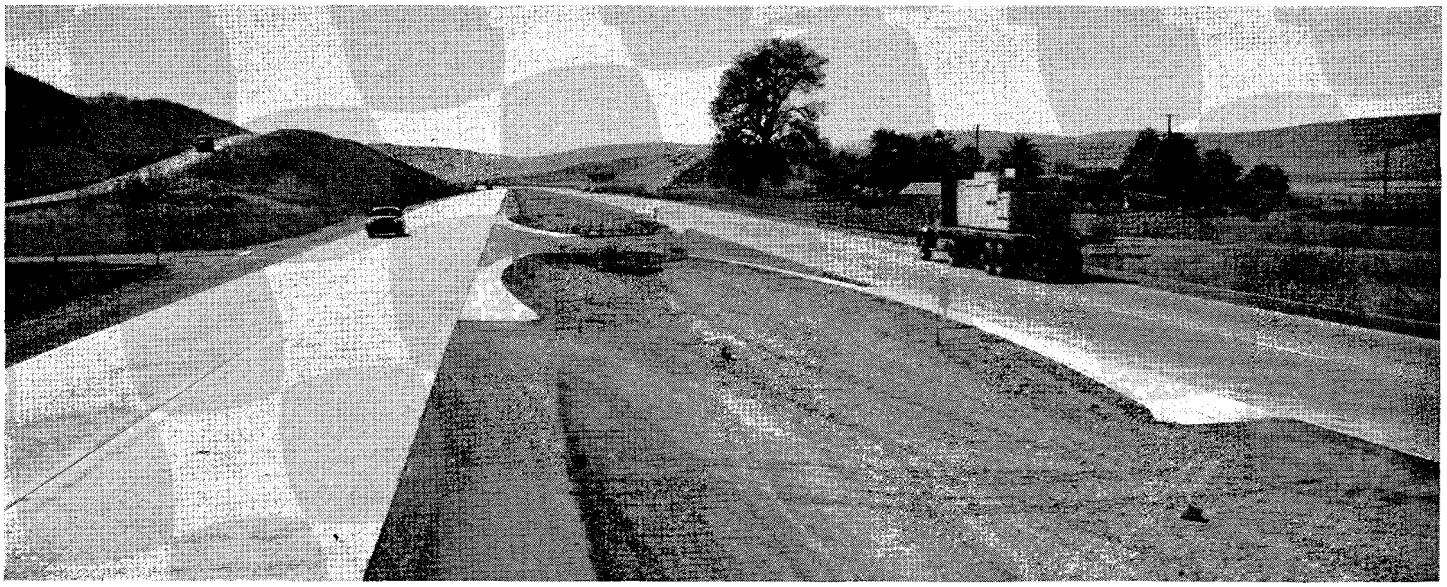
The 5.8 mile section of freeway just completed replaces an outmoded two-lane roadway. A portion of the project follows the old location for approximately two miles, this portion being reconditioned to serve as the eastbound lanes of the new freeway.

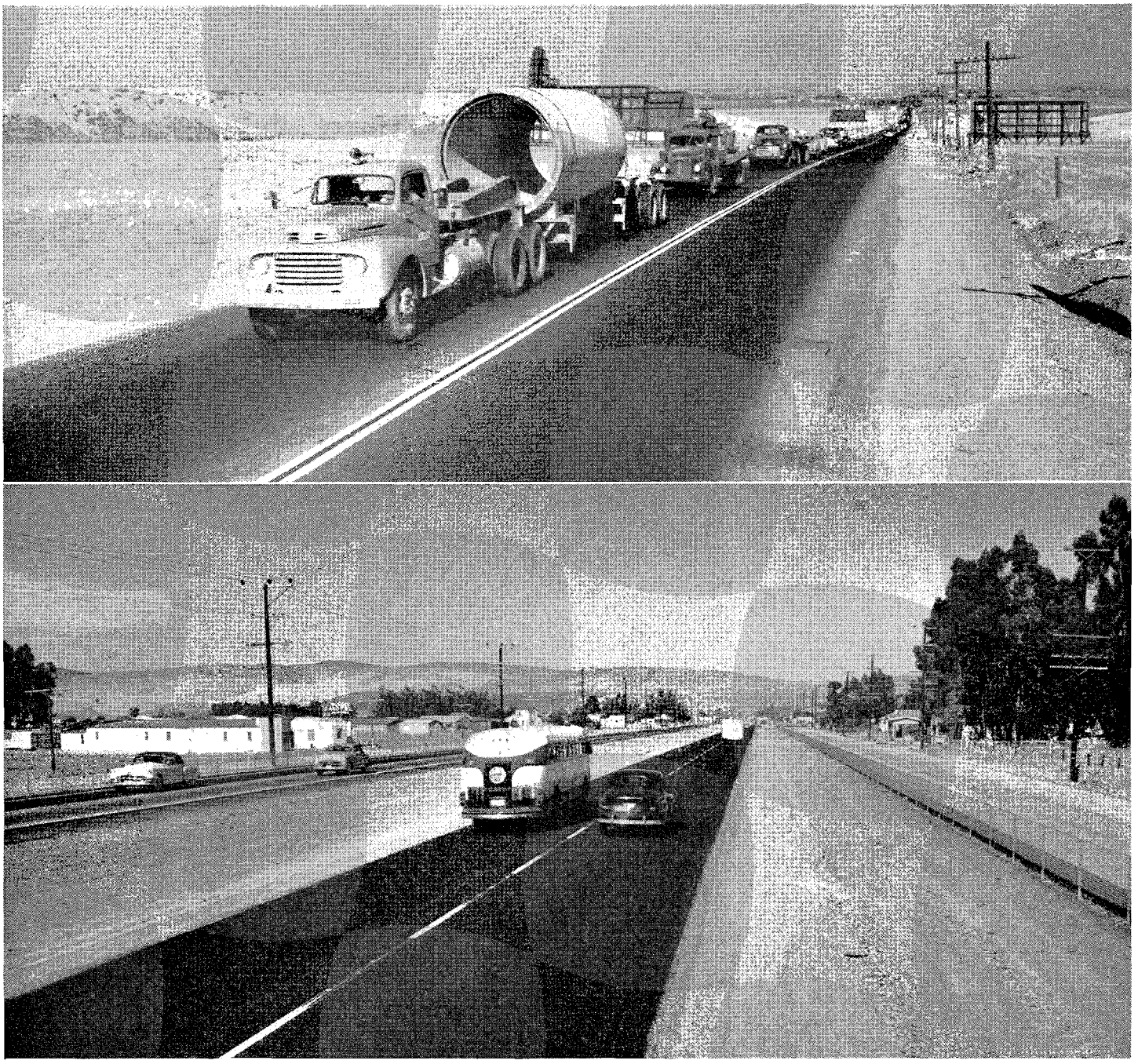
A line change northerly of the old route on direct alignment between terminal limits of the project on easy grades and long radius curves, saves 2,800 feet in distance, the maximum grade being 1.56 percent and the minimum radius being 3,000 feet.

The right of way for this project is of variable width as necessary to fit the development, providing 220 feet where frontage roads are constructed to 180 feet in the flat farm land areas, and was acquired at a cost of approximately $410,000, including the cost of clearing improvements and utilities.

This project was let to contract in two stages, the first being for the initial grading and separation structures at Beck Road and a bridge over Las Positas Creek, and was awarded to Dan Caputo and Edward Keeble of San Jose in October, 1948, and completed

Showing section of completed freeway with relocated county road on left





UPPER—Showing typical traffic congestion on old road before improvement. LOWER—Looking east, showing section of freeway where old road was developed as eastbound lane. Frontage roads shown right and left

in September, 1949, at a construction cost of $497,000.

Roadway Widened

A second contract for paving the graded section and development of the portion of the old road to incorporate same into the completed four-lane divided freeway, was awarded to Harms Bros. and N. M. Ball Sons of Berkeley, in June, 1949, and completed in September, 1950, at a construction cost of $945,000.

This project consisted of widening 2.2 miles of the old 20-foot pavement to 24 feet, and resurfacing same to form the eastbound lanes of the freeway in this area.

The balance of the freeway pavement is Portland cement concrete construction, which provides two 12-foot traffic lanes in each direction divided by a 36-foot division strip.

Illuminated channelizations at grade are provided at the easterly and westerly ends of the project, at Laughlin and Vasco roads, and at the connection to State Highway Route 108.

Frontage Roads

Frontage roads were constructed along both sides of the freeway for

... Continued on page 19

PROMOTIONS IN DIVISION OF HIGHWAYS RANKS

Ridgway M. Gillis, Assistant State Highway Engineer, has been appointed by State Highway Engineer George T. McCoy to be Deputy State Highway Engineer to succeed Fred J. Grumm, who retired on July 31, 1950.

Gillis has been in state service since 1929 when he came to the California Division of Highways to be Assistant Construction Engineer. He remained in that position until 1933, when he was promoted to District Engineer at

EARL WITHYCOMBE

Fresno, in which capacity he served until 1938. From 1938 to 1947 he was State Highway Construction Engineer and when the division was reorganized in 1947 to meet the increased work under the Collier-Burns Act, Gillis became Assistant State Highway Engineer in charge of Operations, which includes construction, maintenance, equipment and laboratory.

Gillis, a native Californian, was born in Oakland, October 22, 1885, and is a graduate of Whitman College and of Massachusetts Institute of Technology, C.E. degree. After graduation from college he was with the Wash-

R. M. GILLIS

ington State Highway Department from 1912 to 1926, and thereafter with the Pacific Bridge Company until 1929. He is president of the Sacramento Section of the A. S. C. E. and a member of the Advisory Committee of the Institute of Transportation, and Traffic Engineering of the University of California, representing the Division of Highways. He resides in Sacramento with his wife.

McCoy appointed Earl Withycombe, Construction Engineer of the Division of Highways, to succeed Mr. Gillis as Assistant State Highway Engineer, Operations, and Chas. E. Waite, Engineer of Design, to be in charge of personnel and public relations with the rank of Assistant State Highway Engineer, succeeding J. G. Standley who retired on September 30th.

Withycombe graduated from Oregon State College, Corvallis, in civil engineering in 1911. His early training was largely in railroad and highway location and construction on the Pacific Coast. He served with the engineering forces during World War I, coming to California as engineer for the Napa Valley Electric Railway in 1921.

In February, 1922, Withycombe entered state service as Resident Engineer on pavement construction in District VI of the Division of Highways. He advanced to Assistant Construction Engineer in March, 1924, and covered all construction projects in the State for Headquarters Office for many years. He advanced to the post of Staff Highway Engineer in the construction department in May, 1931, and in Octo-

CHAS. E. WAITE

ber, 1947, was elevated to the position of Construction Engineer for the Division of Highways.

Waite, who graduated in civil engineering from the University of Oklahoma in 1922, came to California in 1927, and was engaged in private practice until March, 1929, when he entered the service of the Division of Highways as a designer in District II, Redding. He transferred to construction in 1930, and for three years was on the Feather River Highway project. From 1933 to 1935, he was Assistant District Maintenance Engineer in District VI, Fresno.

. . . Continued on page 13

Traffic Count

Figures for 1950 Show an Increase of 9.4 Percent Over 1949

By G. T. McCOY, State Highway Engineer

THE ANNUAL state-wide traffic count taken on Sunday and Monday, July 16th and 17th, shows an increase of 9.4 percent over the immediately preceding annual count of 1949. Sharply reversing the 1949 count, which showed passenger car traffic increasing at a greater rate than freight vehicles, this year's count shows a greater increase in freight vehicles than in passenger cars. The "Main North and South Routes" and the "Interstate Connections" show the greatest traffic increases while the "Recreational Routes," which carry a minor percentage of the total traffic volume, show a slight decrease. All route groups show a greater gain in Monday than in Sunday traffic, with the "Interstate Connections" registering the greatest increase in Monday traffic.

No change was made from the regular procedure of previous years in the manner of taking the count. Actual recording covers the 16-hour period from 6 a.m. to 10 p.m. for both Sunday and Monday, totals being shown for each hour. At selected representative stations, counts are also continued for the entire 24-hour period and are extended to record each of the seven days of the week. Traffic is segregated into the following vehicle classifications: California passenger cars, out-of-state passenger cars, busses, pickups, two-axle commercial units, three-axle units, four-axle units, five-axle units, and six-or-more-axle units.

Each year some minor changes in the census become necessary, such as the relocation, addition, or discontinuance of individual stations; but in every instance these are excluded in determining comparison with the previous year, only those stations that were identical during both years being taken into consideration.

These comparisons for the various route groups are as follows:

PERCENT GAIN OR LOSS FOR 1950 COUNT AS COMPARED WITH 1949

	Sunday	Monday
All Routes	+ 7.99	+ 9.56
Main North and South Routes	+10.86	+11.10
Interstate Connections	+ 9.88	+14.59
Laterals Between Inland and Coast	+ 5.21	+ 7.81
Recreational Routes	— 1.20	— 0.14

The gain or loss of traffic volume for State Highway Routes 1 to 80, inclusive, which constitute the basis for the foregoing summary, is shown in the following tabulation:

Route	Termini	1950 Percent gain or loss Sunday Gain	Sunday Loss	Monday Gain	Monday Loss
1.	Sausalito-Oregon Line	9.00		17.03	
2.	Mexico Line-San Francisco	16.19		11.15	
3.	Sacramento-Oregon Line	8.24		10.28	
4.	Los Angeles-Sacramento	10.90		9.23	
5.	Santa Cruz-Jct. Rt. 65 near Mokelumne Hill	0.65		6.26	
6.	Napa-Sacramento via Winters	10.24		16.66	
7.	Crockett-Red Bluff	8.53		14.11	
8.	Ignacio-Cordelia via Napa	6.48			0.13
9.	Rt. 2 near Montalvo-San Bernardino	6.54		9.07	
10.	Rt. 2 at San Lucas-Sequoia National Park		5.66	0.10	
11.	Rt. 75 near Antioch-Nevada Line via Placerville	8.13		8.03	
12.	San Diego-El Centro	1.47		6.59	
13.	Rt. 4 at Salida-Rt. 23 at Sonora Jc.		3.17		0.15
14.	Albany-Martinez	8.30		12.11	
15.	Rt. 1 near Calpella-Rt. 37 near Cisco	2.40		7.27	
16.	Hopland-Lakeport	16.00		18.92	
17.	Rt. 3 at Roseville-Rt. 15, Nevada City	13.99		13.78	
18.	Rt. 4 at Merced-Yosemite National Park	5.81		7.39	
19.	Rt. 2 at Fullerton-Rt. 26 at Beaumont	13.41		10.76	
20.	Rt. 1 near Arcata-Rt. 83 at Park Boundary	15.20		17.27	
21.	Rt. 3 near Richvale-Rt. 29 near Chilcoot via Quincy		5.05		2.35
22.	Rt. 56, Castroville-Rt. 32 via Hollister		27.62		30.27
23.	Rt. 4 at Tunnel Sta.-Rt. 11, Alpine Jc.	15.30		8.91	
24.	Rt. 4 near Lodi-Nevada State Line		3.58	4.32	
25.	Rt. 37 at Colfax-Rt. 83 near Sattley	6.34		28.73	
26.	Los Angeles-Mexico via San Bernardino	4.89		5.50	
27.	El Centro-Yuma	7.07		9.60	
28.	Redding-Nevada Line via Alturas	3.00			1.28
29.	Peanut-Nevada Line near Purdy's	8.24		11.04	
31.	Colton-Nevada State Line	18.04		25.86	
32.	Rt. 56, Watsonville-Rt. 4 near Califa	9.76		10.20	
33.	Rt. 56 near Cambria-Rt. 4 near Famoso	14.75		10.36	
34.	Rt. 4 at Galt-Rt. 23 at Pickett's Jc.	15.81		10.24	
35.	Rt. 1 at Alton-Rt. 20 at Douglas City	13.04		16.59	
37.	Auburn-Truckee	3.05		20.07	
38.	Rt. 11 at Mays-Nevada Line via Truckee River	1.57			3.26
39.	Rt. 38 at Tahoe City-Nevada State Line	21.22		5.96	
40.	Rt. 13 near Montezuma-Rt. 76 at Benton	7.09		6.99	
41.	Rt. 5 near Tracy-Kings River Canyon via Fresno	8.04		13.71	
42.	Redwood Park-Los Gatos		1.95		4.97
43.	Rt. 60 at Newport Beach-Rt. 31 near Victorville		3.18	1.71	
44.	Boulder Creek-Redwood Park		16.35		6.49
45.	Rt. 7, Willows-Rt. 3 near Biggs	7.82		12.78	
46.	Rt. 1 near Klamath-Rt. 3 near Cray	33.45		27.77	
47.	Rt. 7, Orland-Rt. 29 near Morgan	3.58		4.37	
48.	Rt. 1 N. of Cloverdale-Rt. 56 near Albion	22.93		14.22	
49.	Napa-Rt. 15 near Sweet Hollow Summit	4.14		5.48	
50.	Sacramento-Rt. 15 near Wilbur Springs	2.89		13.91	
51.	Rt. 8 at Shellville-Sebastopol	15.98		12.00	
52.	Alto-Tiburon		7.41	21.01	
53.	Rt. 7 at Fairfield-Rt. 4 near Lodi via Rio Vista	13.52		37.66	
54.	Rt. 11 at Perkins-Rt. 65 at Central House	9.71		8.00	
55.	Rt. 5 near Glenwood-San Francisco		7.75		6.60
56.	Rt. 2 at Las Cruces-Rt. 1 near Fernbridge	0.26		0.60	
57.	Rt. 2 near Santa Maria-Rt. 23 near Freeman via Bakersfield		5.37	3.10	
58.	Rt. 2 near Santa Margarita-Arizona Line near Topock via Mojave and Barstow	8.37		9.16	
59.	Rt. 4 at Gorman-Rt. 43 at Lake Arrowhead	4.47		5.56	
60.	Rt. 2 at Serra-Rt. 2 at El Rio	2.00		7.59	
61.	Rt. 4 S. of Glendale-Rt. 59 near Phelan	2.96		6.98	
62.	Rt. 171 at Northam-Rt. 61 near Crystal Lake	9.37		6.81	
63.	Big Pine-Nevada State Line	44.28			0.20
64.	Rt. 2 at San Juan Capistrano-Blythe		0.73	5.68	
65.	Rt. 18 near Mariposa-Auburn	2.96		8.66	
66.	Rt. 5 near Mossdale-Rt. 13 near Oakdale		3.21		0.61
67.	Pajara River-Rt. 2 near San Benito River Bridge		39.85		34.56
68.	San Jose-San Francisco	5.17		13.13	
69.	Rt. 5 at Warm Springs-Rt. 1, San Rafael	7.24		9.30	
70.	Ukiah-Talmage	23.57		2.50	
71.	Crescent City-Oregon Line	22.55		29.74	
72.	Weed-Oregon Line	23.09		10.70	
73.	Rt. 29 near Johnstonville-Oregon Line	20.37		24.94	
74.	Napa Wye-Cordelia via Vallejo and Benicia	1.05		6.00	
75.	Oakland-Jc. Rt. 65 at Altaville	20.35		20.04	
76.	Rt. 125 at Shaw Ave.-Nevada State Line near Benton		15.51		18.65
77.	San Diego-Los Angeles via Pomona	17.09		10.33	
78.	Rt. 12 near Descanso-Rt. 19 near March Field	6.53		3.51	
79.	Rt. 2, Ventura-Rt. 4 at Castaic	8.47		14.78	
80.	Rt. 51, Rincon Creek-Rt. 2 near Zaca	6.25		6.25	

HELP SAFETY PATROLS

School Safety Patrols are again on duty, protecting classmates against traffic hazards. When you see a Safety Patrol boy, slow down immediately and be prepared to stop if children are about to cross. Your cooperation will save young lives.

Covered Bridges

Last Two of Such Structures Removed From State Highways

DURING California's Centennial Year, 1950, the last covered bridges were removed from the State Highway System. The covered bridge has long been a nostalgic symbol of what we like to regard as "the good old days," when life was simpler and less mechanized.

Although several covered bridges still remain on the County Road System, during recent years only two had survived on the state highways. These last two covered bridges were well off the beaten track over Clear Creek and Dillon Creek near Orleans, on the road which follows the Klamath River from Weitchpec to U. S. 99 near Hornbrook.

Paradoxically, however, rather than being holdovers from a previous era, these two bridges were built in 1921 and 1922, by the U. S. Bureau of Public Roads when at that time the first road was constructed into this primitive area. Prior to building the road through, the only means of access to this part of Siskiyou County had been over pack trails. These two covered bridges, basically timber trusses under their sheet metal housings, served miner, logger, and vacationer alike for almost 30 years. With the increase of highway loads, however, and the advance of decay and general deterioration, they became inadequate and it was found necessary to replace them.

Narrow Bridges

In addition to this deterioration, both bridges were one-way and dangerously narrow, Clear Creek having a roadway width of 11 feet, while Dillon Creek provided only 15 feet 9 inches between curbs.

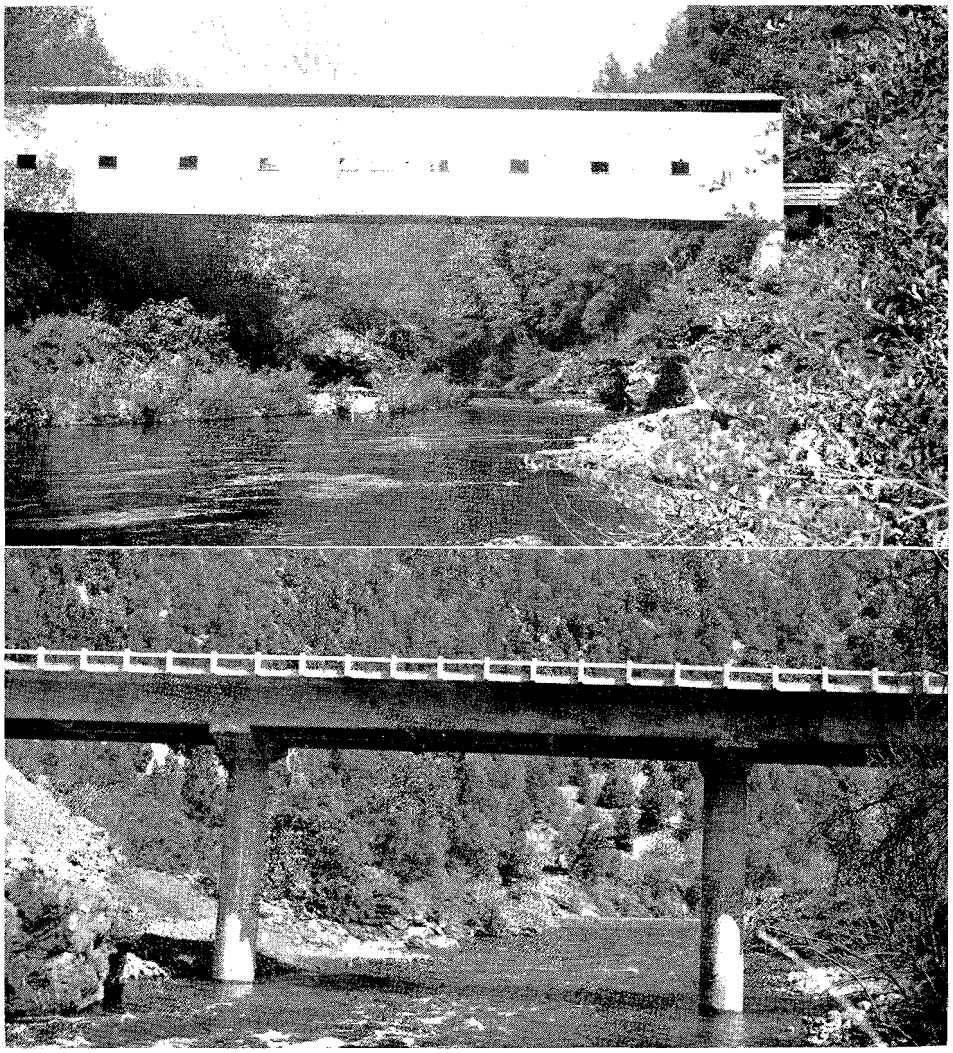
Designed to serve extremely infrequent traffic, these narrow widths were considered adequate, as was the tortuous alignment with sharp curves at each end of the bridges. The old structures were designed to carry only a 10-ton truck, whereas the design of the new structures is capable of sustaining a 20-ton truck pulling a 16-ton semi-trailer. Clearances also were limited on the old structures. Less than 14 feet were provided, whereas the new bridges of girder design allow an unlimited vertical height.

Will Aid Logging

The replacement of these two old covered structures will remove the last serious load limit restriction from this highway. It will now be possible for logging trucks to bring out the full legal limit of logs and for the miners to haul in their heavy equipment over new structures which will sustain all the law allows.

Although they were old and had exceeded their economic service life, when it came to knocking down the old bridges, they still resisted strongly. Holes were drilled in each panel point of the upper and lower chords of the trusses. The holes were then loaded with powder and simultaneously detonated. The old Dillon Creek Bridge splintered under the blast, but the trusses did not fall. The second blast was necessary to bring the bridge crashing into the canyon.

Upper—Old covered bridge across Clear Creek replaced by new structure, lower

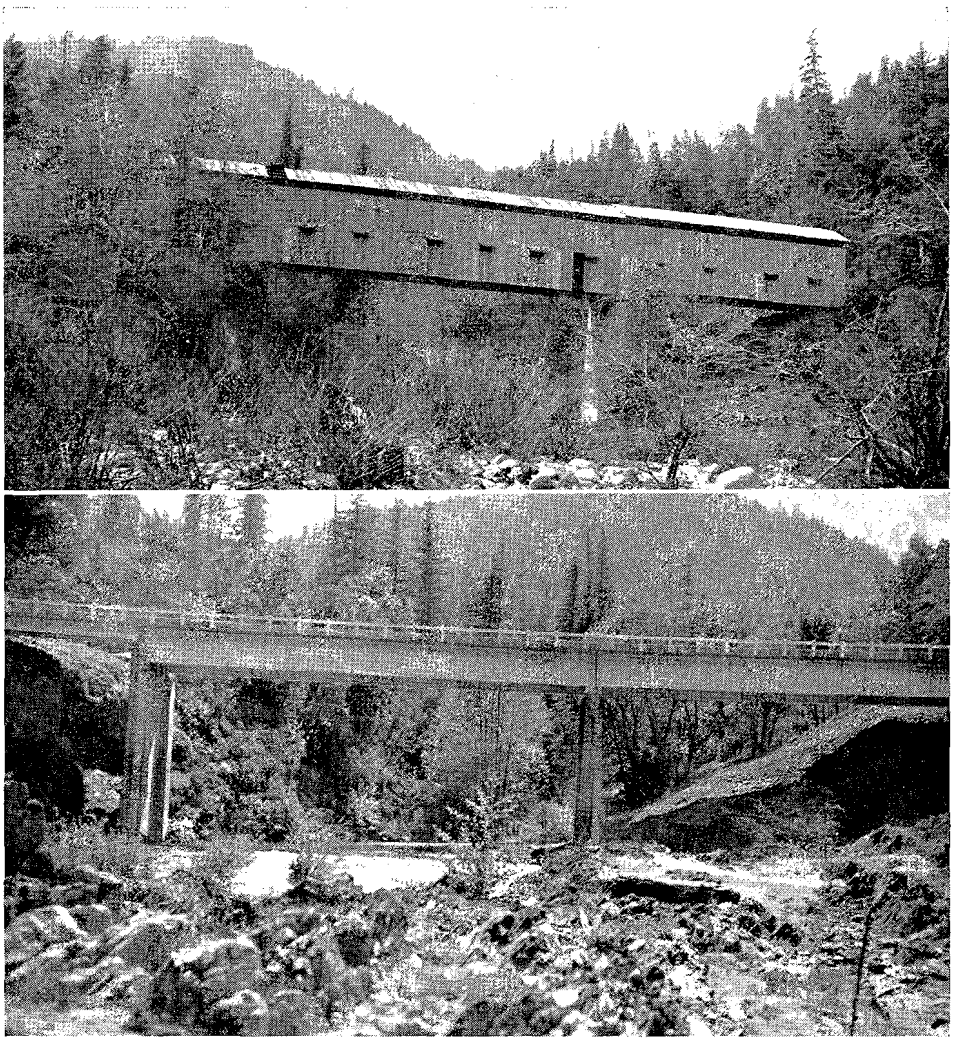


The new Clear Creek Bridge is a modern concrete girder structure on single column bents. It has a center span of 70 feet and two side spans each 58 feet long. A 24-foot roadway is provided and the alignment is improved so that the entire structure as well as the approaches are on a 1,400-foot radius horizontal curve. The contract cost was about $135,000, including two-thirds of a mile of highway approach.

The new Dillon Creek Bridge is a steel girder structure with a 101-foot main span and two short approach spans. Twenty-four feet is also provided for the roadway on this structure and the alignment has been improved to provide a 600-foot radius horizontal curve. The approximate cost of the Dillon Creek Bridge was $170,000.

The structures were both built under Bridge Department contracts and both were constructed by the same contractor, G. M. Carr and Bati Rocca. Mr. John Gressitt was Resident Engineer on the Clear Creek Bridge and A. F. Kay was Resident Engineer on the Dillon Creek Bridge.

Completion of these two new bridges should do much to open the timber, mineral and recreational resources of Siskiyou County and will prove valuable additions to the highway system as California enters her second century.



Picturesque old covered bridge across Dillon Creek, upper, replaced by modern structure shown below

Promotions

Continued from page 10 . . .

During the period 1935-42, he was Assistant Office Engineer in Headquarters, Sacramento. From 1942 to 1947, he was District Construction and Location Engineer in District V, San Luis Obispo. For two years, 1947-49, he was District Engineer in District X, Stockton and in 1949, was transferred to Headquarters in Sacramento as Design Engineer, from which post he was elevated to Assistant State Highway Engineer.

Waite is a member of the American Society of Civil Engineers, and a member of the Design Committee of the American Association of State Highway Officials and the Highway Research Board.

E. T. Telford was appointed Engineer of Design in the Sacramento office to succeed Waite. Telford has been employed with the Division of Highways continuously from 1932 to the present except for five years when was with the Army. He has been in the Design Department as assistant since August, 1946.

F. N. Hveem was appointed Construction Engineer at Headquarters to succeed Earl Withycombe who is now Assistant State Highway Engineer in charge of Operations. Hveem has been with the department since 1917, his latest assignment having been Supervising Materials and Research Engineer at the highway laboratory, Sacramento.

J. P. Murphy was appointed Principal Highway Engineer in the office of Public Relations and Personnel at Headquarters. Murphy has been with the Division of Highways since 1930, with the exception of three years in the Marines during World War II. Prior to this appointment he was Assistant District Engineer at District II, Marysville.

E. J. Saldine was appointed Principal Highway Engineer in the Operations Office. He has been employed by the Division of Highways continuously since 1924. For many years he was assigned to the office of personnel.

S. W. Lowden was appointed District Engineer of District VIII, San Bernardino. He has been with the division since 1912, except for about a year. Prior to this appointment he was District Engineer at Bishop.

Alan S. Hart succeeds Lowden at Bishop. He has been with the division since 1930, prior to this appointment having been Assistant District Engineer, District I, Eureka.

County Project

Butte County Completes Chico-Paradise Skyway

By E. H. WYMAN, Associate Highway Engineer, and B. N. PAXTON, Butte County Road Commissioner

ON AUGUST 30, 1950, in Butte County, the Chico-Paradise Skyway, F. A. S. 757, was officially opened to traffic by Frank B. Durkee, Deputy Director of Public Works, at a dedication ceremony climaxing a two-day opening celebration in Paradise, the terminus of the nine-mile project.

The project is an outstanding example of effective state-county cooperation. The county secured necessary rights of way, a considerable portion of which were donated, and the County Road Organization, which is set up under the Butte County Charter as a definite department of the county government, did the major portion of the preliminary engineering. The work of the county in this regard was reviewed and approved by the state and federal authorities.

The project has been received with enthusiasm throughout the Chico-Paradise district, as the most important highway development accomplished in northern Butte County in over 25 years.

The new road closely parallels the Chico-Stirling City branch of the Southern Pacific Railroad and traverses a narrow lava ridge overlooking the 300- to 500-foot sheer walls of rugged Butte Creek Canyon. The road virtually eliminates travel over the steep, narrow and winding Honey Run Road with its historic old three-span covered timber bridge. A greater portion of the Neal Road traffic will also be diverted over the new alignment. The unique community of Paradise will be serviced by the new road which reduces the distance to Chico by three and one-half to four miles and cuts the travel time to approximately one-third of the old.

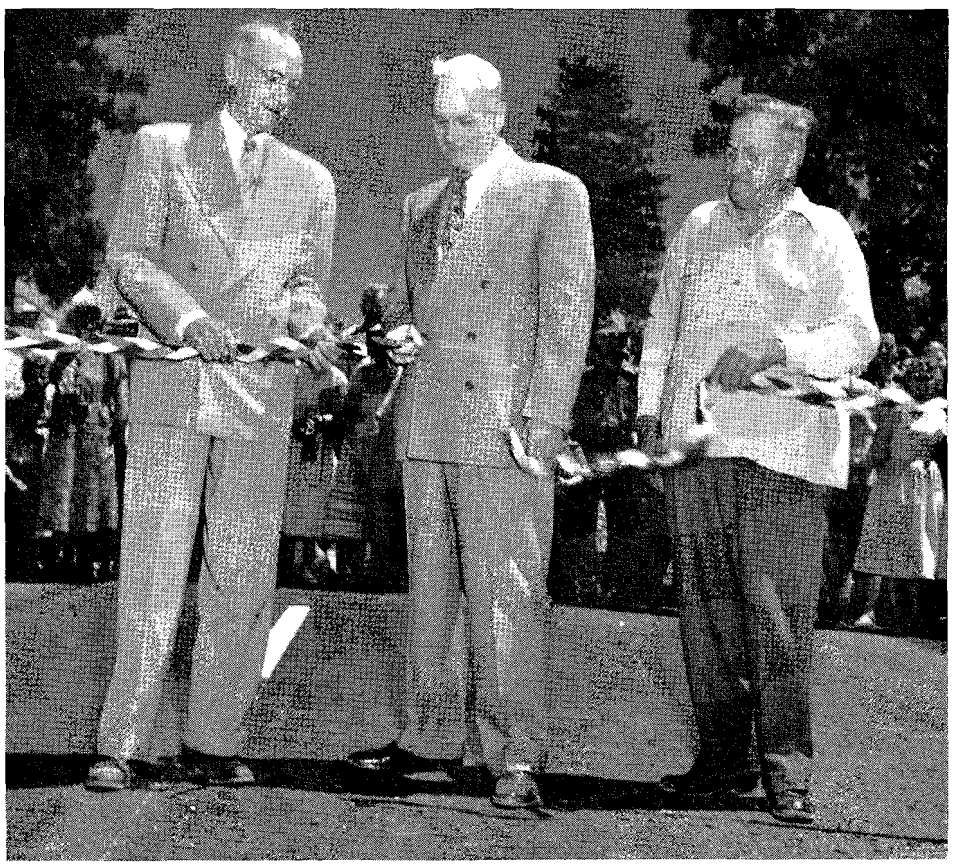
Traffic counts taken since completion of the project indicate 2,300 to 2,500 vehicles per day are using this improved route.

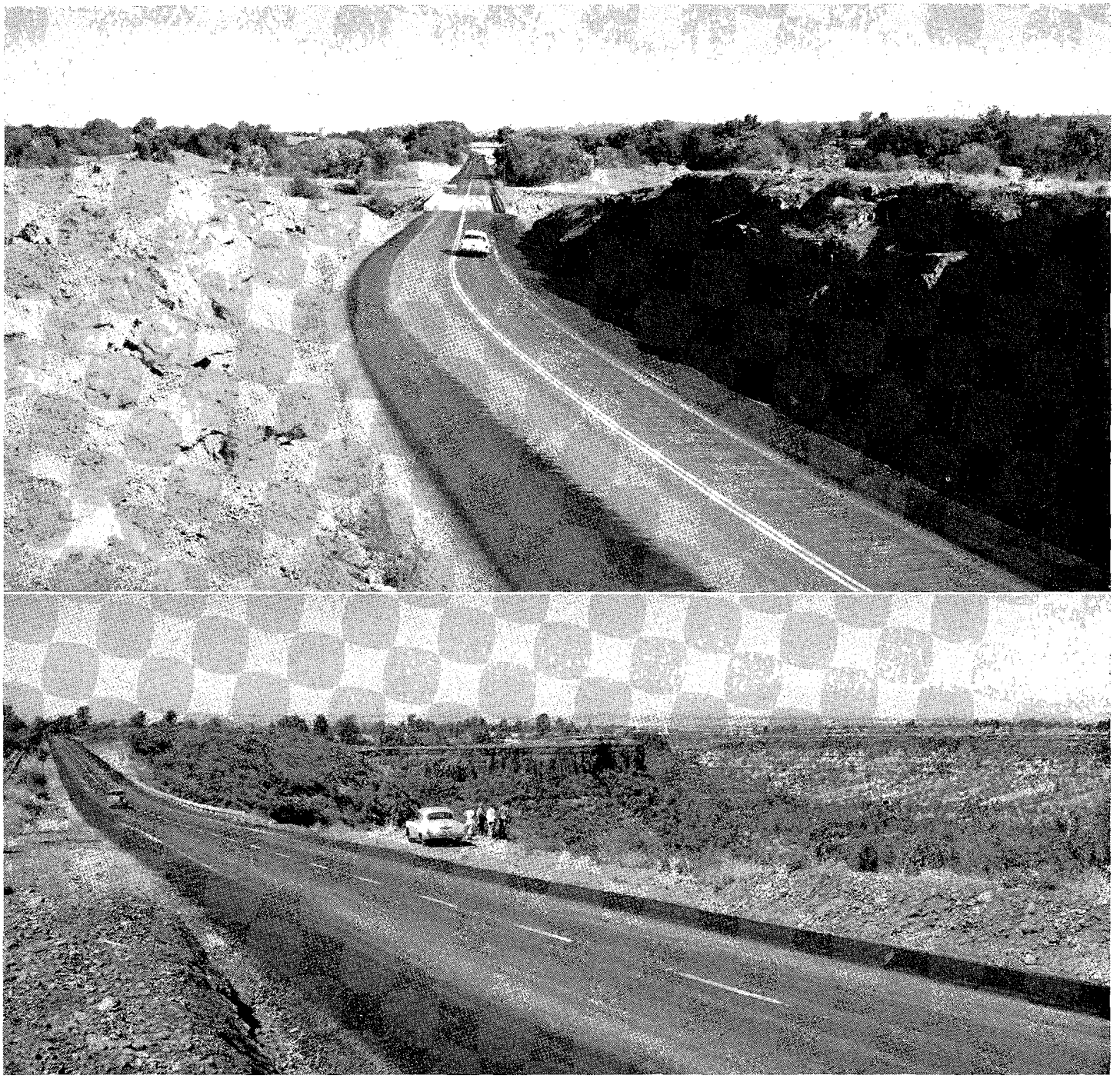
History of Paradise

Located on Paradise Ridge and in the immediate vicinity are many pioneer mining camps dating from the days of the Argonauts of '49. Among these are Dogtown, Helltown, Toadtown, Cherokee Diggings (where diamonds still are found), Ramsey Bar, Whiskey Flat, Nimshew, Nelson's Bar, Yankee Hill, and many others whose names were made memorable in the writings of Bret Harte and other western writers. One of the world's largest nuggets and the second largest ever found in California, the famous Dogtown or Magalia nugget, was found August 14, 1859, at the Willard Mine near Sawmill Peak, directly across the canyon from Magalia. The nugget weighed 54 pounds in the rough and when reduced it produced 49½ pounds of gold, worth at that time $10,960.

Following the gold rush, between 1853 and 1855, "diggin's" were discovered nearby, and because of its mild climate, Paradise became the winter home of many miners. During the Civil War period the first sawmills in the vicinity began producing lumber—among them that of "Uncle Billy" Leonard's. From that time this section was known officially as "Leonard's Mill" until about 1865 when "Uncle Billy" gave it the name of Paradise.

Deputy Director of Public Works Frank B. Durkee (center) cuts ribbon at opening of Chico-Paradise Skyway. On his right is Supervisor Frank L. Patty, and on his left is Supervisor John N. Bille, both of Butte County





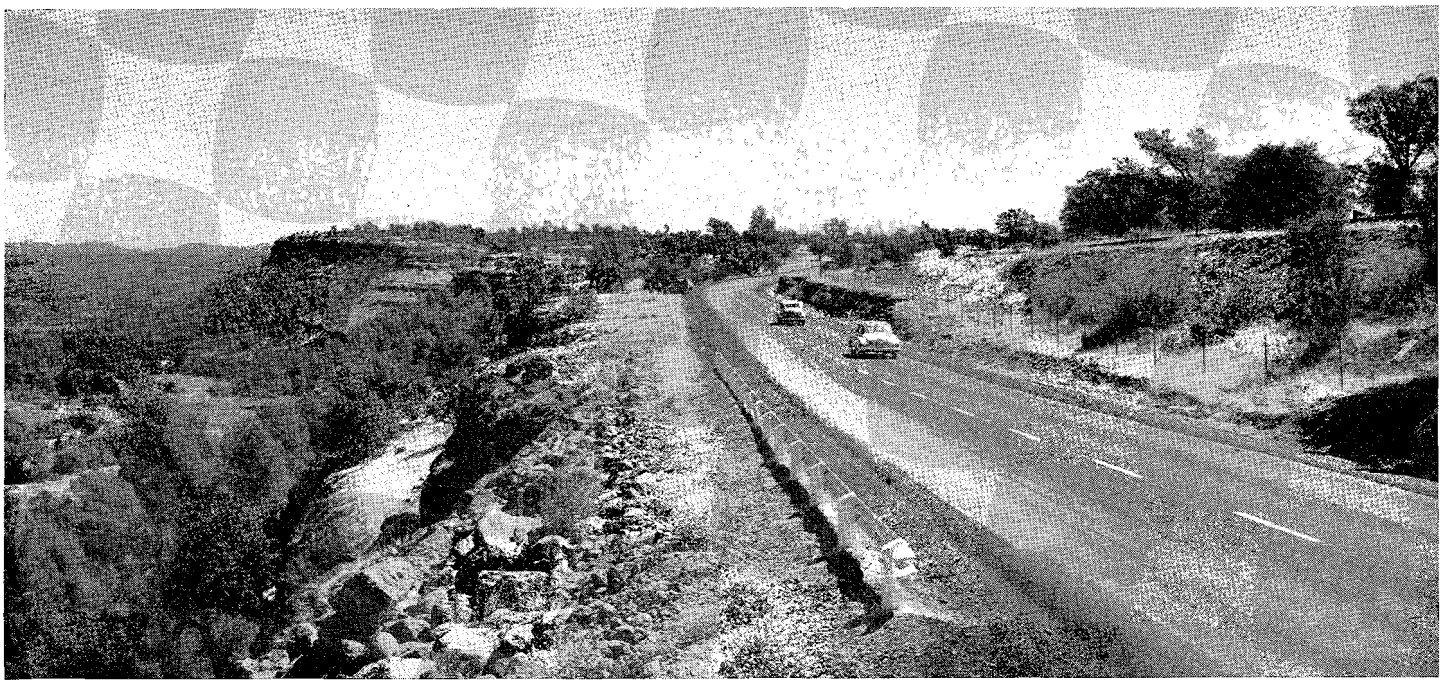
UPPER—Completed section of Chico-Paradise Skyway, showing lava cut and Butte Creek Bridge. LOWER—View looking westerly showing sheer walls of lava cap. Five hundred feet of retaining wall had to be constructed below guard rail on left

Rapid Growth

Since the mid-forties this residential community has had a phenomenal influx of residents due to retired city dwellers seeking a mild climate and restful homesites, and because of Sacramento Valley residents building here to escape the summer heat and winter fogs. Due to this rapid growth it became more and more apparent that the existing roads were inadequate.

Money Allotted

With the appropriation of state funds under authority of Chapter 565, Statutes of 1943, location surveys and construction plans were started in the fall of 1944 under the direction of B. N. Paxton, County Road Commissioner. The proposed project was first reviewed December 10, 1945, by representatives of the State, the B. P. R., and Butte County. The estimated cost of construction exceeded the amount Butte County could allot at that time. The following year after supplemental allotments became available and by utilizing F. A. S. and state funds, together with A. B. Chapter 20 and

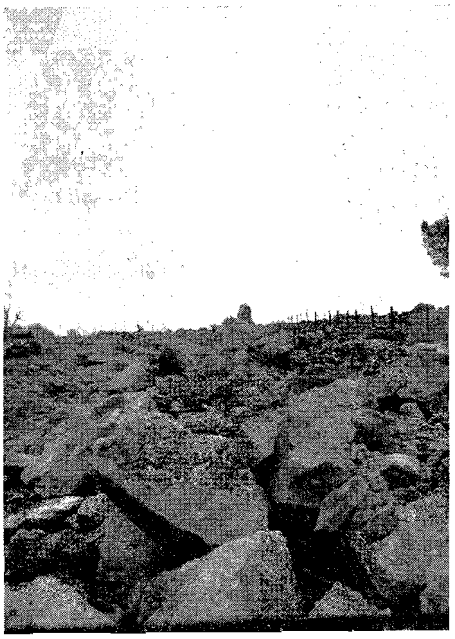


Looking easterly showing right of way constructed between railroad embankment and edge of bluff

county funds over half a million dollars was programed for the project.

The project began about two miles east of Chico and extended northeasterly a distance of nine miles over new alignment and rights of way to Paradise. It was done in stage construction, the first stage being the construction of a graded roadbed with crushed gravel base, and the construction of a reinforced concrete bridge over Butte Creek. Granite Construction Company of Watsonville, the contractor, completed this section at a cost of $420,000. This was by no means an easy job and the contractor, his personnel and the engineers are to be commended on the excellent work they accomplished under adverse conditions.

The greater portion of the excavation areas were either a hard lava cap or cemented lava boulder formation, and considerable difficulty was encountered in blasting the formations. Although the contractor experimented with different patterns of shooting and the use of different percent dynamite, a great amount of secondary shooting was necessary. Some cuts had to be reshot four and five times. Ed Spaith was superintendent for the contractor. Engineering was supplied by both Butte County and the State with P. J. Totman representing the county and



Looking up center line, showing typical construction difficulties encountered for nearly full length of project

M. E. Ryan representing the State. Construction started in November, 1948, and was completed in November, 1949.

After a winter layover the final stage, placing of 0.25-foot plant-mixed surfacing and construction of shoulders, was started in early May of 1950 and completed in late July at a cost of $112,000. C. E. Harless was superintendent for the A. G. Raisch Company of San Rafael, the contractor on this phase. E. H. Wyman of Butte County was resident engineer with R. E. Biggs representing the State.

The new two-lane construction consists of a 40-foot graded roadbed with 0.5-foot to 0.67-foot x 34-foot crushed gravel base, and 22-foot x 0.25-foot plant-mixed surfacing with 5-foot x 0.25-foot untreated rock surfacing shoulders. There are only 12 curves in the nine miles, the minimum radius being 800 feet and the grades are generally easy with one short section of 6.2 percent. There is a rise of 1,300 feet between the beginning and the end of the project.

TRUCK TURNING LANES

REPRINTS of an article which first appeared in *California Highways and Public Works*, March-April, 1950, by J. C. Young, Traffic Engineer of the California Division of Highways, on truck turning lanes and off-tracking of trailer combinations, are available by writing him at P. O. Box 1499, Sacramento, California.

U. S. 395

Route Now Has 59 Miles of Freeway in San Diego County

ANOTHER new section of U. S. 395 was opened in San Diego County on Thursday, September 14, 1950. With the completion of this 18.3 mile, $3,476,000 improvement, this route gained the distinction of having 59 miles of freeway or limited access construction.

Dedication ceremonies were held at 3.30 p.m. at Miramar, 4.5 miles north of San Diego. Participants in the opening were, Aubrey Davis, President of the Highway Development Association, and representatives of the Chambers of Commerce in Riverside, San Bernardino, and San Diego Counties; State Highway Commissioners C. T. Leigh of San Diego, Harrison R. Baker of Pasadena, and James A. Guthrie of San Bernardino; C. H. Purcell, Director of Public Works; G. T. McCoy, State Highway Engineer; E. Q. Sullivan, former District Engineer at San Bernardino, and E. E. Wallace, District Engineer, San Diego.

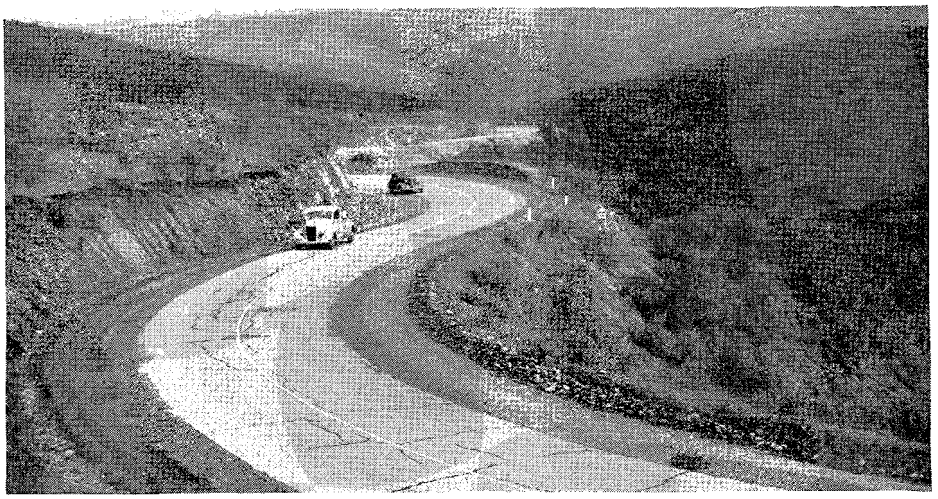
Three Nations Represented

C. Arnholt Smith, former State Highway Commissioner from San Diego, had the honor of cutting the ribbon, as it was during his term that the Cabrillo Freeway, another section of U. S. 395, was built, and the grading contracts started on the section just completed.

Since this highway links three nations, Canada, Mexico, and the United States, it was appropriate that representatives from those two countries be present. Miss Enid Lickorish of Canada, and Senor Luis Orci of Mexico, assisted Smith as he cut the ribbon which permitted a five-mile caravan of over one hundred cars to sweep northward over the new freeway and into Escondido, where the ceremonies were concluded with a dinner at the Daughtery Ranch.

Many Years of Planning

The completion of this new freeway culminates many years of planning.

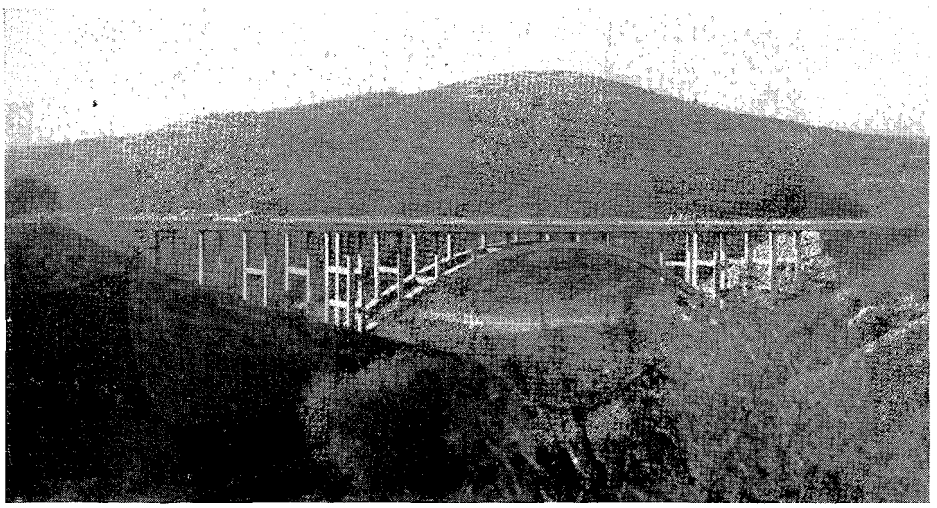


Section of U. S. 395 as it existed prior to opening of new route

The original reconnaissance report was submitted in June, 1938, and considered four routes between San Diego and Escondido. At that time, improvement of the existing alignment was favored due to the possibility of a Poway-Ramona connection at Poway Creek Bridge. Then, as in so many cases, the war clouds developed and no action was taken. In 1943, the project became a part of the postwar program, and another reconnaissance study on the new alignment was authorized extending from Miramar to Lake Hodges. This report was submitted in March, 1944. Surveys were begun and preliminary report submitted in December, 1944. Finally, in 1948, it was possible to again resume work on the project.

The length just completed was divided into two sections, from the North City Limits of San Diego to Miramar, and from Miramar to Lake Hodges. Two contracts were let in June of 1948 covering the grading and

Los Penasquitos Creek Bridge on new highway



structures. Three bridges were included in these contracts, a reinforced concrete girder at San Clemente Canyon, a reinforced concrete box girder bridge at Green Valley Creek, and a reinforced concrete open spandrel arch bridge, 434 feet over-all length with an arch span of 220 feet, at Penasquitos Creek. The two surfacing contracts were awarded in April, 1950, and progressed simultaneously.

Cost of Project

Surfacing of the southerly end, from the north city limits to Miramar, 6.5 miles in length, was done by Cox Bros., at a cost of $1,114,577. The cost of the northerly section, 11.8 miles in length, on which Peter Kiewit was the contractor, amounted to $1,873,561. Both of these figures are exclusive of right of way and engineering costs.

One large, and several small, unsuspected slides which developed on the northerly grading contract complicated matters considerably for a time.

The largest slide occurred under conditions which are ordinarily stable, and was somewhat unique in that respect. This slide was of a circular type, the back trace was at a maximum distance of 200 feet from center line, with the upheaval crack or toe approximately along the roadway center line. The total mass of earth involved was approximately 80,000 cubic yards.

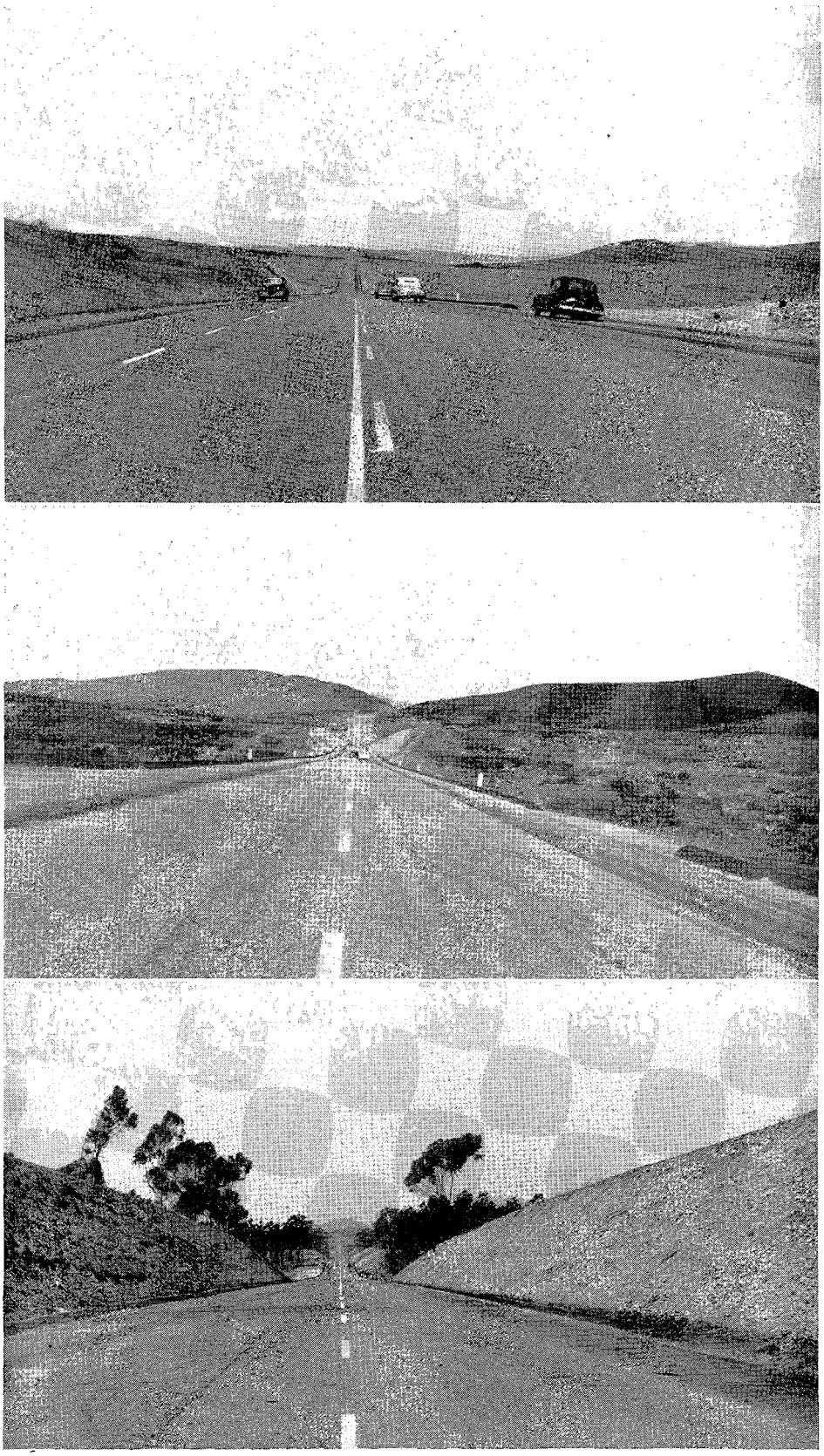
Several power borings 36 inches in diameter were made in order to confirm the assumption that no earth movement was expected elsewhere subsequent to unloading this slide.

This slide continued to move during the six-day period following the initial movement and cracking. Free water was found in some of the borings near the slip plane.

Stability Achieved

Following field studies and conferences, a method was evolved for achieving stability, which consisted of removal of 22,777 cubic yards from the slide area and raising of the roadway grade through the cut sufficiently to obtain calculated stability.

The only section of U. S. 395 between A Street in San Diego and the Riverside County line remaining unim-



UPPER—Looking north on new route, showing transition from four lanes to two lanes. CENTER—Looking north, showing transition from two lanes to four lanes at blind curve, top center. LOWER—This view is looking north on the new route

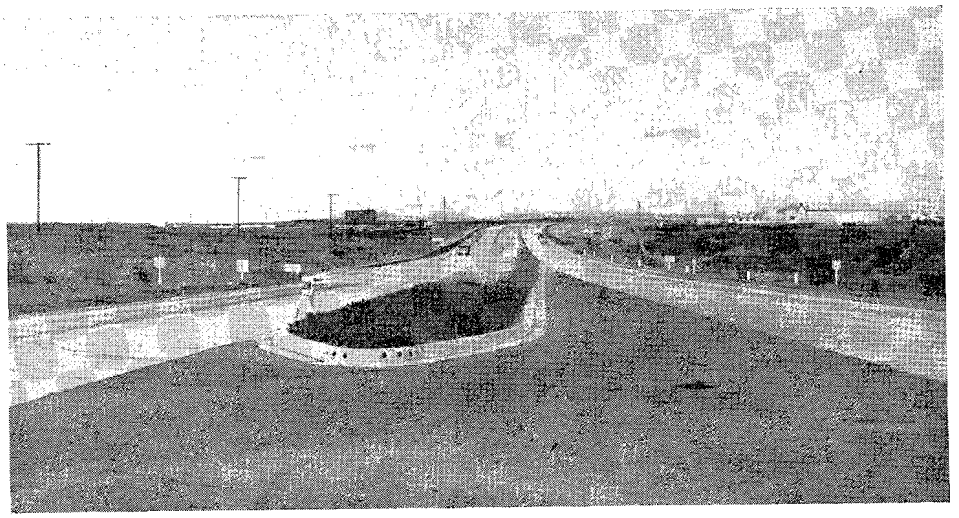
proved is the bridge across Lake Hodges. Progress on this proposed bridge is dependent on a decision by the City of San Diego with regard to a contemplated increase in the capacity of the reservoir, which would require a bridge at approximately 75 feet higher elevation than the present one. Anticipating this increased reservoir capacity, the roadbed of the new highway southerly from Lake Hodges was placed at elevations that would clear the probable raise in level of the lake.

The savings in distance, and the cost of the projects accomplishing these savings are listed below. These figures cover the entire length of the reconstructed U. S. 395 between A Street in San Diego, over the Cabrillo Freeway, continuing through Miramar, Escondido, to Lake Hodges, and north to the Riverside County line.

Section	Cost	Saving in distance
A St. to north city limits	$4,020,592	3.3 miles
North city limits to Miramar	1,114,577	
Miramar to Lake Hodges	1,873,561	2.3 miles
1 mi. S. Escondido to N. C. L.	654,305	0.5 miles
N. C. L. Escondido to Rainbow	2,283,839	11.0 miles
Rainbow to Riverside County line	217,490	0.4 miles
	$10,164,865	17.5 miles

Future Four-lane Widening

The project was designed for future four-lane widening without having to acquire additional right of way. Two hundred-foot width of right of way was acquired to permit this future development when traffic warrants. In the meantime, the section from the north city limits to Miramar is entirely four-lane divided highway. The section from Miramar to Lake Hodges is a combination two- and four-lane design, having four lanes on all blind summits or other locations where sight distance is impaired, and two lanes where the four-lane section is not warranted.



Looking north from Linda Vista Road

A rather interesting feature of this construction is in the planning and work which was required through the Navy's Homoja Housing Development. Eighteen buildings had to be moved, utilities relocated, etc. The Eleventh Naval District extended every cooperation in this operation, moving the families to temporary housing during the relocation. It also cooperated to the fullest extent in clearing the rights of way through the Camp Elliott properties.

As is indicated in the following tabulation, the traveler will save both time and mileage, with less fatigue when driving over this reconstructed highway, and the improvements already accomplished, together with those contemplated in Riverside County will make the San Diego County Beaches and the harbor much more accessible to our northern neighbors.

Comparative Data—Alignment and Grade

Item	New	Old
Length	12.2 miles	14.5 miles
Number of curves	13 *	79
Total central angle	194° *	2684°
Maximum radius	15,000′	6,000′
Minimum radius	2,000′ *	180′
Number of curves under 500′ radius	None	38
Maximum grade	6%	6.13%
Roadbed width (including shoulders)	38′	30′ avg.

** Temporary connection with one 800-foot radius curve and limited sight distance not included.*

The Colorado Freeway

Continued from page 2 . . .

Channel Work Required

Major regrading and filling will be necessary along the channel of the Arroyo and on the easterly slope. It is proposed to flatten the precipitous east bank by placing excess excavation material in this area and to provide a park-like right of way which can be readily landscaped.

Ultimate protection of the piers of both bridges requires completion of the remaining link of the channel lining by the Los Angeles County Flood Control District. The new location for the lined channel will be under the 319-foot arch span. This change will provide a more symmetrical setting for the arch spans, the existing channel being too close to the east side of the arroyo.

As the new bridge will carry freeway traffic, no provision will be made for pedestrians. Stairways will be provided at the west end of the existing bridge for pedestrian access to Linda Vista Avenue and the areas under the bridges.

A model on a scale of 1 inch = 20 feet has been made so that the bridge and its surroundings may be viewed in three dimensions. By this means it is possible to see the harmonious appearance of both the old and new structures in relationship to their surroundings.

Livermore By-Pass

Continued from page 9 . . .

approximately two miles from the easterly end, to serve the built-up sections of adjacent property.

New truck scale sites were constructed on each side of the freeway near its easterly end; and 40-ton platform scales as truck weighing facilities for use by the California Highway Patrol have been installed.

This work was done under the general direction of Assistant State Highway Engineer Jno. H. Skeggs, with the author as Resident Engineer, and was financed by state gas tax and federal-aid funds.

Progress Report

On Santa Ana Freeway From Norwalk to Miraflores

By WALLACE M. McKNIGHT, A. J. A. LYNN and PATRICK J. KENNELLY
Assistant Resident Engineers

COMPLETION of three current projects in District VII will add a total of 11.4 miles to the Santa Ana Freeway from Rosecrans Avenue about one mile southeasterly of Norwalk in Los Angeles County to Miraflores in Orange County.

This represents the first extension of the Santa Ana Freeway into Orange County. Construction is along the present alignment of U. S. Highway 101 Alternate (Manchester Boulevard), which is the principal route from Los Angeles into Orange County and also is a main highway to the coast cities and San Diego. The present three-lane road paved 30 feet wide was built in 1935. The increase in volume of traffic in the past 10 years, including a large proportion of heavy trucking, has resulted in overcrowding of the existing facility.

First of Three Projects

The first of these three projects extends from Rosecrans Avenue to the Los Angeles-Orange County line, a distance of approximately 3.5 miles. This job consists of construction of a new two-lane roadway of asphalt concrete on plant-mixed cement-treated base on the southerly side and adjacent to Manchester Boulevard to provide a four-lane divided limited access freeway. The new roadway will be the eastbound portion of the freeway and westbound traffic will be carried by the existing pavement. Outer highways of plant-mixed surfacing on untreated rock base are being constructed on each side of the freeway throughout the length of the project. Traffic will be allowed to cross the freeway at three intersections, Carmenita Street, Alondra Boulevard and Valley View Road, all of which will be controlled by traffic-actuated signals installed under a separate contract.

Three New Bridges

It was necessary to construct three new bridges to carry the eastbound roadway and the two outer highways over Coyote Creek about 1,500 feet westerly of the Los Angeles County line. These bridges are of the reinforced concrete slab type. The timber spans of the approaches to the existing bridge were removed and replaced with reinforced concrete spans. Construction on these bridges is virtually completed at the present time.

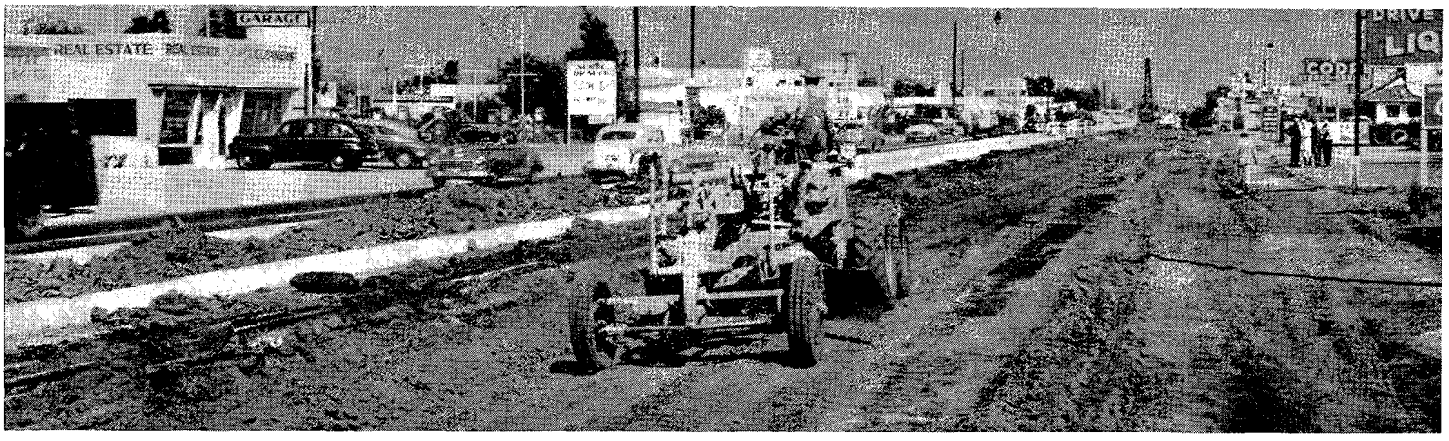
This contract was approved by the Attorney General on January 13, 1950, and the contractor began work on January 16, 1950. The work is more than 50 percent completed at present. Contractor on the project is Peter Kiewit Sons' Co. of Omaha, Nebraska, with T. H. Kelly as superintendent. The contract allotment is $715,700.

Second Project

The second of the three projects extends from the Los Angeles-Orange County line to Euclid Avenue in Orange County, a distance of approximately five miles. The project is, briefly, a new two-lane roadway of asphalt concrete on cement-treated base, the existing roadbed widened with asphalt concrete on cement-treated base and portions of the existing pavement resurfaced with asphalt concrete and plant-mixed surfacing. Shoulders are to be constructed of untreated rock surfacing and bituminous surface treatment applied, and outer highways constructed to provide a four-lane divided highway.

The entire project follows the existing alignment of Manchester Boulevard. From the Orange County line to the Fullerton Creek bridge, approximately 1.6 miles, the new construction will carry the eastbound traffic and the existing roadway will carry the westbound traffic. From the Fullerton Creek bridge to the end of the project,

Looking southeasterly showing construction under way through Buena Park



UPPER—Looking northwesterly showing construction under way near Miraflores in Orange County. LOWER—Looking northwesterly showing construction under way near county line

the existing Manchester Boulevard will be the eastbound roadway and the new construction will be the westbound roadway. An existing reinforced concrete bridge across Fullerton Creek has been widened to accommodate the new roadway.

The second contract, for which the allotment is $516,900, was approved by the Attorney General on April 12, 1950, and work was started the same day by Sully-Miller Contracting Company, the successful bidder. Work was rather slow the first month due to right of way clearance and the development of a new borrow pit on the Sunny Hills Ranch about one mile west of Fullerton by the contractor. However, construction is moving rapidly now and the project is more than 60 percent complete at the time of this writing. E. L. White is the job superintendent for the contractor.

Not Ultimate Freeway

The first 1.6 miles of this project from the Los Angeles County line to a point easterly of Buena Park is an improvement to the existing roadway and is not the ultimate freeway. The ultimate freeway within these limits will by-pass the Buena Park business houses fronting on Manchester Boulevard by another alignment, thus improving local traffic conditions as well as expediting through traffic.

On the freeway portion of the work, traffic will be allowed to cross the freeway at five intersections, Artesia Avenue, Orangethorpe Avenue, Magnolia Avenue, La Palma Avenue and Euclid Avenue. These intersections will be controlled by traffic-actuated signals installed under a separate contract.

The third contract, for which the allotment is $330,500, was awarded to the Griffith Company of Los Angeles, and approved by the Attorney General on April 13, 1950. Work on the project was started April 25, with J. F. Porcher as superintendent for the contractor until June 1st when T. W. Oglesby was placed in charge and Mr. Porcher was assigned to another project. The work is now over 50 percent complete at the present time. Construction work progressed fast until right of way complications were encountered in the way

. . . Continued on page 62

Cuesta Grade

Freeway Is Completed on Tortuous Section of U. S. 101

By E. J. L. PETERSON, District Engineer

LAST REMNANT of the once steep and tortuous Cuesta Grade has been obliterated by four-lane divided freeway construction recently completed on the Coast Highway, U. S. 101, in San Luis Obispo County between Cuesta Siding and one mile south of Santa Margarita.

This modern improvement is a marked transition from the primeval trail used by Franciscan Fathers, Spanish courtiers and brigands to cross the Santa Lucia Mountains through the Cuesta Pass. The first road over the pass came into being about the turn of the nineteenth century as a result of the Padres widening the foot and hoof carved trail so that it might be negotiated by wagons. In 1850, the Court of Sessions spent $1,000 improving the road, and in 1876, a road, modern for those time, was provided by the issuance of $20,000 in bonds.

Early Day Problem

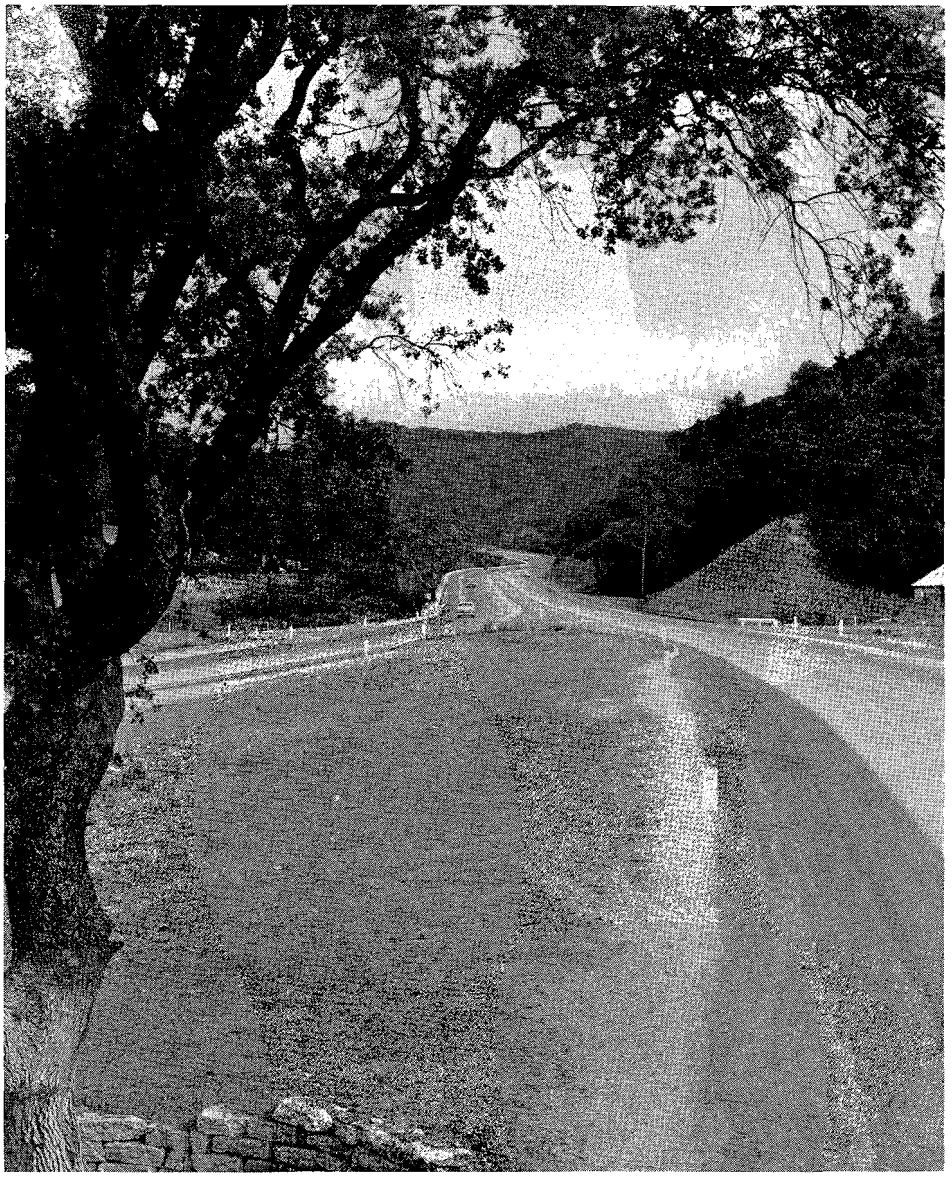
On formation of the California Highway Commission in 1912, one of the first problems presented was that of providing a road through the pass which could be traversed without undue difficulty by the forerunners of the present-day automobiles and trucks. Surveys were immediately undertaken from San Luis Obispo to Santa Margarita. The first project for grading a 24-foot width roadbed and paving a 15-foot width with a 4-inch thickness of Portland cement concrete on portions of both approaches to Cuesta Pass was advertised, with bids received on October 30, 1913. On failure to receive acceptable bids the work was accomplished by day labor. Construction of the intervening portion over the pass was let to contract in 1914.

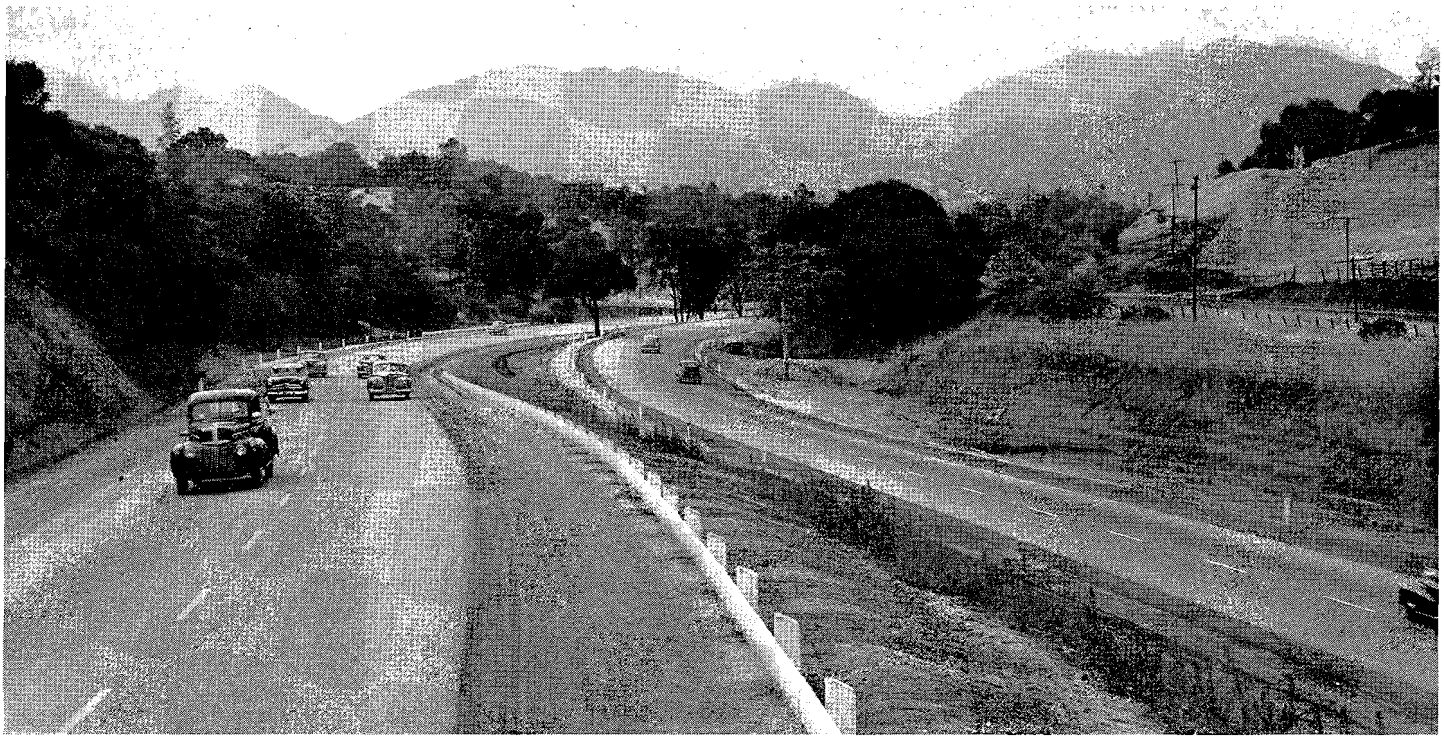
In 1929, this section of highway was reconstructed to a 36-foot width graded roadbed and a Portland cement concrete pavement 20-feet in width and 9 inches-6 inches-6 inches-9 inches in section.

Initial Project

The initial project looking toward development of Cuesta Grade into a highway adequate for present day traffic was accomplished in 1937-38, when the portion between San Luis Obispo Creek and Cuesta Siding was reconstructed to provide a four-lane divided roadbed. (Described in July, 1936; January, 1937; and May, 1938, issues of this magazine). Rights of way for this section were not acquired on a limited access basis as is being done at the present time on main highways, having been purchased prior to initiation of this procedure. However, the precipitous nature of the terrain limits access to effect a limited freeway. In

View looking southerly toward Cuesta Pass





New lanes constructed for southbound traffic on left. North bound traffic carried by resurfaced existing roadbed on right

1948, reconstruction of the portion from San Luis Obispo to San Luis Obispo Creek to a four-lane divided freeway was completed. (Described in September-October, 1948, issue of this magazine.)

With completion of the present reconstruction of the section from Cuesta Siding to one mile south of Santa Margarita, a four-lane divided limited freeway is provided throughout the entire length of Cuesta Grade.

Natural Landscaping

Terrain traversed by the project just completed made it advantageous to differentiate the grade line of the new two lanes from that of existing roadbed and to provide a variable width of median strip. These features and preservation of many large sycamore and oak trees serve to afford natural landscaping in keeping with the adjacent heavily wooded mountains. Only those trees of the abundant growth falling within the traffic lanes and shoulders or which were so close to the traffic lanes as to constitute a potential hazard to traffic were removed.

Throughout an appreciable portion of the project it was necessary to provide a new channel for Santa Margarita Creek. Confines of the canyon dictated that the channel be in close proximity to the roadbed. Sacked concrete riprap was constructed along the channel at critical locations to obviate erosion while broken concrete pavement was placed on the channel slopes as protection where it was anticipated that only moderate erosion might occur. Runoff from early rains indicated that portions of the channel bottom would be subject to excessive cutting. On these portions of the channel check dams were constructed of broken concrete to retard the stream velocity.

Exact Planning

Portions of the 24-inch concrete cylinder pipe line, aggregating 2,200 lineal feet in length, which is a part of the system that transmits water from the Salinas Reservoir east of Santa Margarita through the Santa Lucia Mountains to the City of San Luis Obispo fell within the limits of construction. Exigency of keeping the length of time the pipe line was out of service to a minimum, and to less than 24 hours during any one period, required exact planning and coordination of the work of installing and connecting the new sections of pipe line.

Basement soils throughout the project are of poor quality, having resistance values of 43 or less with a prevailing range of from 20 to 30, requiring a total base and surfacing thickness of 24 inches to carry the anticipated 5,000 pound equivalent wheel loads. A subbase of material having a bearing ratio at 0.1 inch penetration of not less than 60 percent and a plasticity index of not more than six was placed to a 1-foot minimum thickness, except where new surfacing was underlain by existing pavement.

Construction Design

Surfacing is composed of a 4-inch thickness of plant-mixed surfacing over an 8-inch thickness of imported base material, except where placed on existing pavement the base material has a minimum thickness of six inches. The upper four inches of imported base material was stabilized by mixing it with 1.8 percent of Portland cement to increase its supporting value. Tests indicated that addition of this small percentage of cement increased the resistance value of the material from an average of 72 to an average of 80, and the average California Bearing Ratio

... Continued on page 27

An Experiment

Successful Tests in Reworking Pavement Foundations Are Made

By EARL WHITHYCOMBE, Assistant State Highway Engineer

THE UNEXPECTED increases in traffic and the rapidly mounting axle load repetitions of maximum intensities that have taken place in recent years make it necessary to rework and strengthen many miles of pavement foundations that were not designed for such usage. Reworking of the base with the addition of cement to overcome plasticity and to impart a limited amount of slab strength has been the generally accepted practice. This work has been highly successful; however, it has been expensive due to the fact that the existing bituminous surfacing had to be broken up and incorporated into the base solely for the lack of a method of salvaging. New surfacing was necessary after the base had been corrected.

The Shell Oil Company recently developed an aromatic solvent that it has been marketing as an asphalt softener. This material seemed to hold promise in the reworking and salvaging of bituminous pavements. As an experiment to determine if this material could be used successfully to reclaim surfaces where base failures made reworking necessary, it was decided to make a full-scale field test to determine the practicability of the method and to develop the technique of handling such work.

Failing bituminous surfaces of all descriptions were considered for the test and it was finally decided to attempt to rework a section of asphalt concrete on Yolo 6 C, known as the Davis Highway, just west of the junction with Route 99 to Rio Vista. This pavement was laid in 1936 using 50-60 penetration asphalt as a binder and was an extremely tough and hard pavement that had commenced to break up into slabs of small area due to structural failure.

The principal reason for selecting this section for the experiment was the extremely difficult task of breaking up the pavement due to the nature of the mixture. It was acknowledged that successful reworking of this section would insure that anything on the State Highway System could be handled similarly.

Commission Gives Authority

Authorization for the project by day labor was obtained by vote of the Highway Commission on June 21, 1950. C. A. Neville, local representative of Gardner Mixers, Inc., did the work of lining up the equipment owners who successfully bid in the rental of the equipment on a service

Gridroller and tractor pulverizing and motor grader sizing windrow for Athey loader. Athey loader and crusher operating, extreme right. Note windrow of material crushed by Athey in right foreground

agreement. The equipment was rented fully operated. Work was commenced July 10th and completed August 17, 1950. The work was carried out under the supervision of C. H. Whitmore, District Engineer, and directed by R. E. Biggs, Resident Engineer.

The asphalt concrete was broken up by a Caterpillar D-8 tractor and LeTourneau heavy-duty rooter fitted with three teeth. Laboratory tests on the recovered asphalt in the mix indicated the penetration was down to 25 and the rip-up was most difficult as is illustrated in the accompanying photograph. The average depth of the pavement was approximately 8½ inches and some 1,825 tons were broken up and processed.

Chunks Broken Up

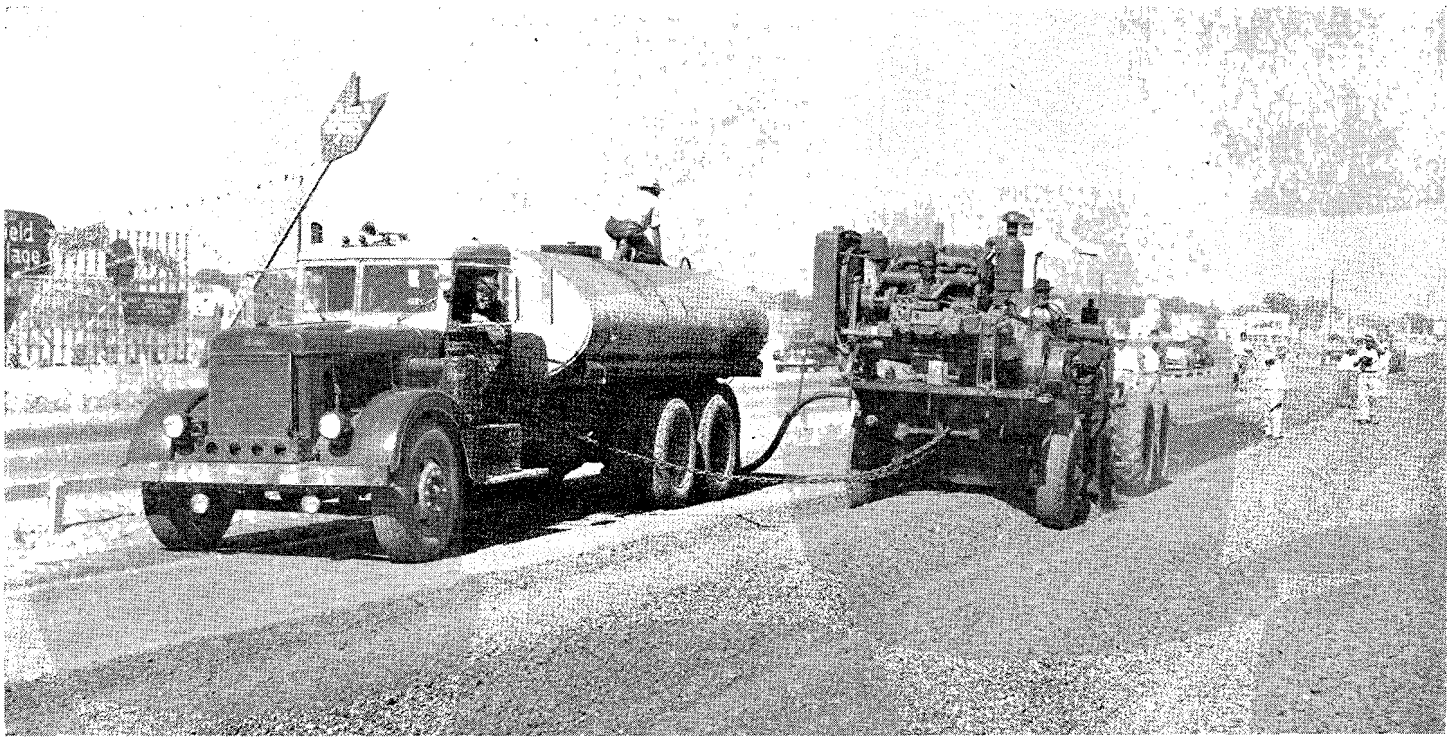
Following the original rooting, a Hyster grid roller loaded to 28,000 pounds was towed behind the D-8 to break the large chunks down to crusher size. Due to the depth of material it was necessary after a few passes to bring the large chunks up from the bottom so that the rolling would be effective. A hitch was welded to the back of the rooter and the grid roller was then towed behind the rooter and drawn by the tractor. This combination worked admirable well in breaking down the chunks to 8 or 10 inches in diameter.

Breaking the mixture down to proper size for road-mixing operations was performed by an Athey Model 3 force feed loader towing an Athey Model PB-3 portable breaker. This proved to be an indispensable tool to reduce the aggregate to a uniform size. The Athey operations created somewhat of a dust nuisance, but this was overcome by applying a small amount of water to the windrow in advance of the crushing. This equipment would readily handle a 1½-cubic-foot windrow in this type of material at a speed of one mile per hour.

Asphalt Softener

The asphalt softener was introduced through a Gardner mixer. The extraction tests on the pavement mixture showed 6½ to 7 percent of 25 penetration asphalt and 11 to 12 percent of material passing the 200-mesh sieve.

UPPER—Newly scarified pavement. LOWER—Texture of finished pavement. Average depth of pavement was approximately 8½ inches and about 1,825 tons were broken up and processed



Applying asphalt softener through Gardner mixer

The Shell Oil Company recommended 1.3 to 1.4 percent of softener and 1.35 percent was added in two applications 24 hours apart to the first section treated. This appeared visually to be too much and was reduced progressively until finally 0.8 to 0.9 percent was all that was being added.

A three-inch lift of the mixture with 1.35 percent of softener was laid out for traffic over one weekend. This resulted in a complete failure from excessive corrugations. Stabilometer determinations disclosed a stability of 35 percent for the pavement when first broken and crushed, 20 to 25 percent immediately after the softener was added and 5 to 7 percent 48 hours after adding the softener. Thirty-five percent is considered a desirable stability for a bituminous mixture.

Stability Increased

Laboratory tests were then made on the softened mixture with the addition of dry material and it was found that 33 percent of five-sixteenths inch by No. 8 screenings increased the stability to 36 percent. This percentage was added to all but one section 1,000 feet in length where dry sand from the subgrade was incorporated into the mixture and the resulting stability was satisfactory. The added screenings did not readily coat with bituminous binder and at the time of laying the mixture, the added screenings remained probably 75 percent uncoated but fairly well distributed and the results are entirely satisfactory. No pitting has taken place and the surface is uniform in appearance.

Difficulty was experienced with one section of subgrade due to the material being a loose sand. The condition of the undisturbed asphalt concrete pavement on this particular section was the poorest of all that was reworked and cement treatment of the subgrade with 5 percent of cement by weight was decided upon. The cement was spread by hand from sacks on the windrow and the mixing was performed with the Gardner. Having the reconditioned and salvaged mix in a windrow alongside eliminated the necessity of applying a curing seal to the cement-treated base. One inch of the bituminous mixture was spread immediately after the base was compacted.

Construction Procedure

Single-lane tear-up is practical by deeply scoring the pavement surface in advance with one tooth on a 12-foot grader as a line to break to.

It was found that the rooting operation was most satisfactorily performed during the heat of the day. The breakage into smaller sizes was improved.

Breaking down to crusher size with tractor, rooter, and grid roller should follow immediately behind the rooting operation.

Crushing was best accomplished at lowest temperatures and was made the first operation in the day.

The introduction of the softener and the mixing and aerating were all performed by means of the Gardner mixer. It was found that the mixing and aeration were best performed in the heat of the day and was therefore confined to the afternoon.

The layout was accomplished with a 12-foot motor grader in the manner specified for road-mixed surfacing.

Compaction was obtained on the lower courses by means of the grid roller with the counterweights removed. The top course was compacted

by means of a steel-tired eight-ton tandem roller.

Costs Surprisingly Low

Due to the nature of the work, the limited quantity involved, necessarily short runs for the equipment, excessive standby of men and equipment waiting for the completion of a prior operation and the wasted work necessary to develop successful procedure on an untried process, the unit costs were expected to be excessive. The final costs of breaking up, mixing and re-laying, including all added materials, amounted to $4.62 per ton of mixture, which is considered surprisingly low under the circumstances. This cost represents about the current price of new mix replacement.

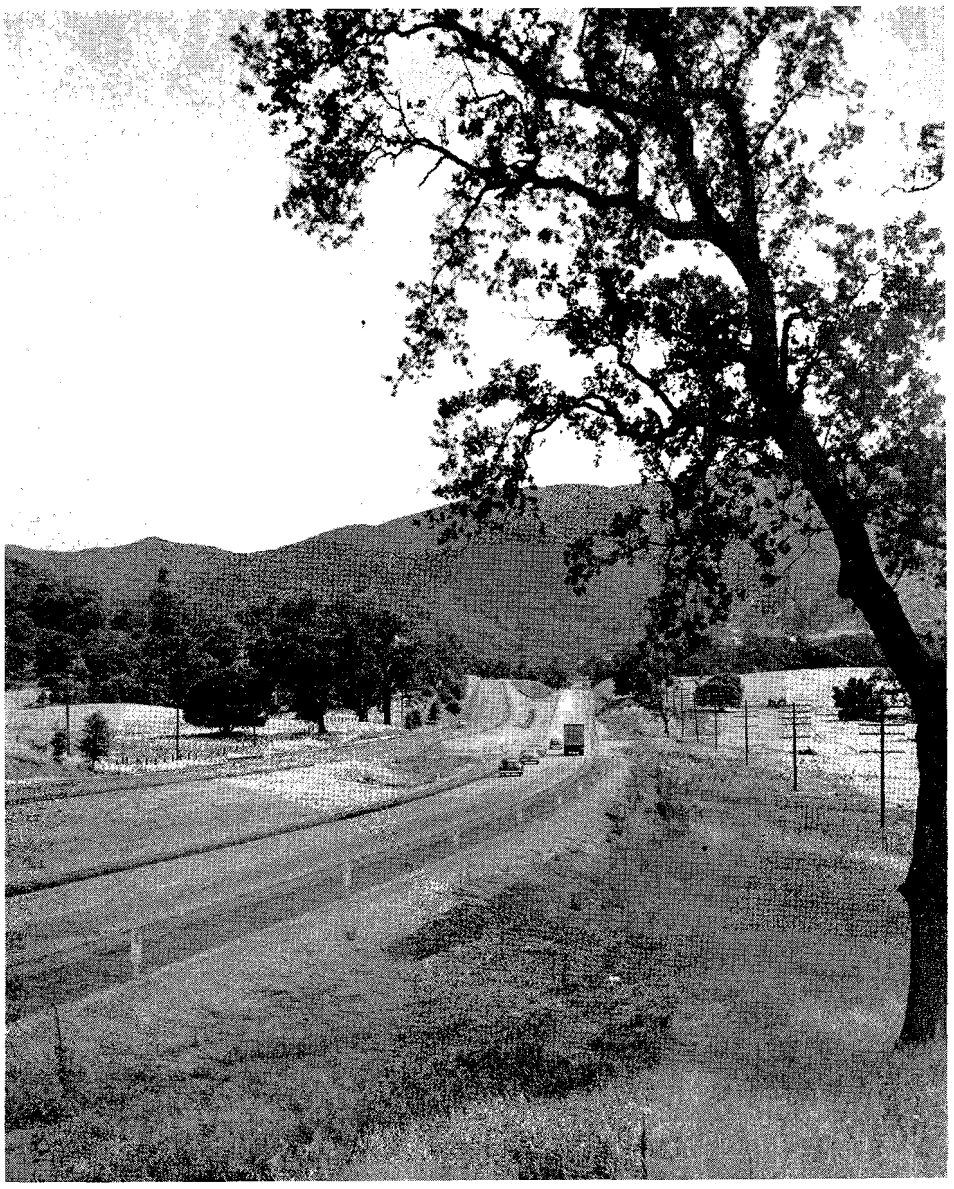
We firmly believe that on a sizable project by contract these costs can be reduced to the extent that salvaging bituminous pavements will be a very profitable procedure for the owner.

Results Attained

The experimental section has been under traffic for two months carrying an average of 17,000 vehicles per day and is in excellent condition. The surface texture is granular and non skid as are most surfaces laid by the blade method. There is no evidence of any flushing of asphalt to the surface and the entire section is free of any indication of distortion. The riding qualities are excellent.

Sufficient funds were provided in the work order to apply a seal coat to this reworked mixture. Due to the satisfactory appearance at the time of completion, the seal coat was deferred. Now that the pavement has gone through considerable rainfall without any distress whatever, the seal coating has been abandoned and the funds reverted.

In all physical respects the work has been highly successful.



View showing variation in width of median and between grading lines of two sets of lanes. Santa Lucia Mountains in background

Cuesta Grade

Continued from page 23 . . .

at 0.1 inch penetration from 163 percent to 278 percent.

Each set of traffic lanes is 24 feet in width with a 2-foot surfaced border along the inside edge and a 3-foot surfaced border along the outer edge. A seal coat with fine screening cover applied to the traffic lanes serves to demarcate them.

Construction Items

Principal construction items on the project included 110,000 cubic yards of roadway excavation; 32,100 cubic yards of ditch and channel excavation; 10,400 cubic yards of structure excavation; 51,700 tons of imported subbase material; 27,260 tons imported base material; 12,900 tons imported base material (cement stabilized); 1,200 barrels of Portland cement (cement stabilization); 18,800 tons plant-mixed surfacing; 510 cubic yards of Portland cement concrete (structures); 82,300 pounds bar reinforcing steel; and 2,200 lineal feet of 24 inch concrete cylinder pipe.

The firm of Granite Construction Company was contractor on the project with Mr. V. E. Pearson of the Division of Highways as Resident Engineer.

Access to Alpine

Pioneer Road Construction On a 1950 Highway Project

By J. H. CREED, Design Engineer, District IX

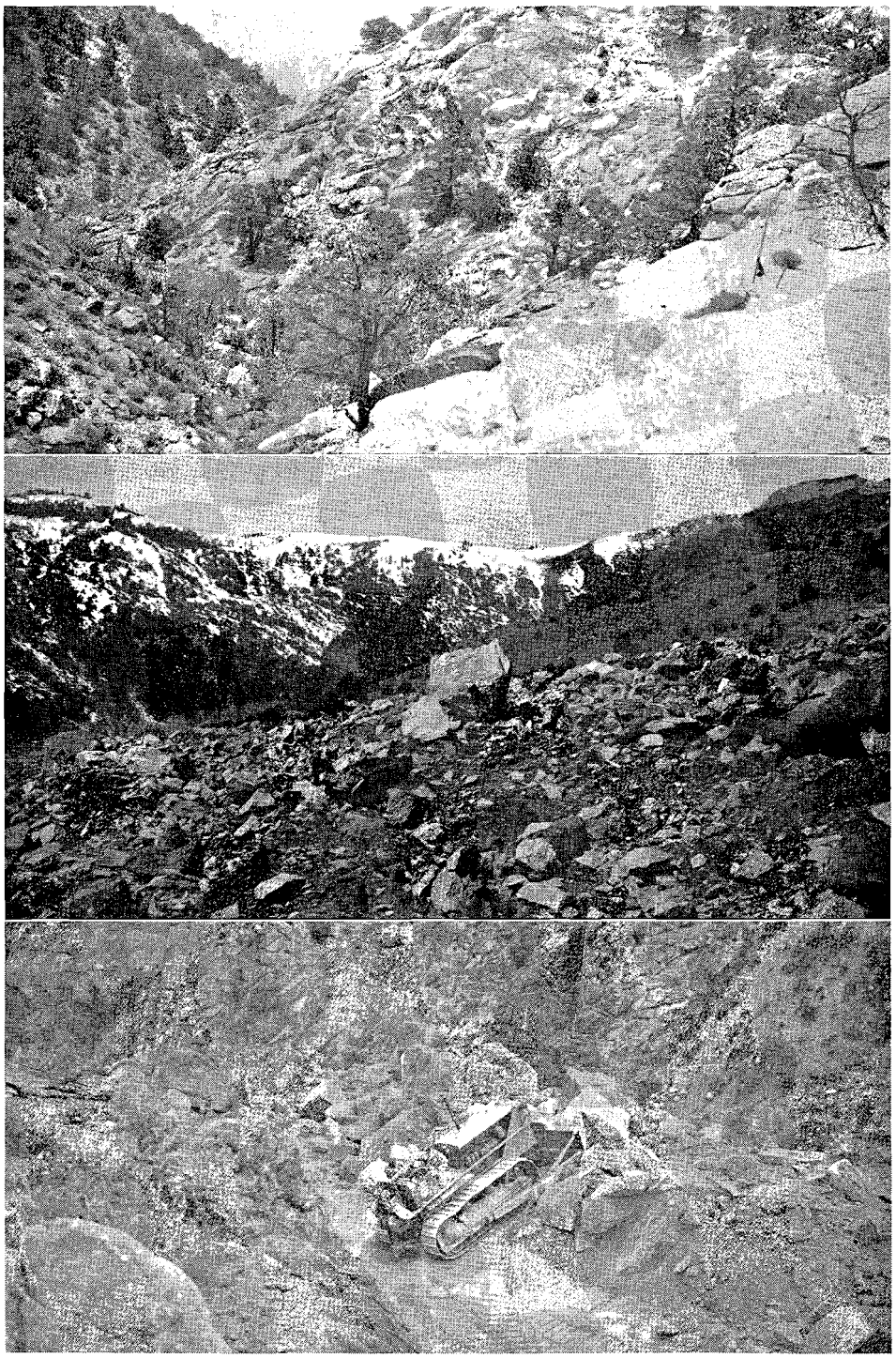
With the present road system in California developed as it is, nearly all the road work consists in bringing existing roads up to modern standards, rather than constructing new roads on virgin alignment. An exception to this trend is the route now under construction in Alpine and Mono Counties, connecting U. S. 395 near Topaz, and the Ebbetts Pass highway about five miles west of Markleeville. It is being constructed jointly by Alpine and Mono Counties as a Federal Aid Secondary Project. Technical assistance is being given by the State Division of Highways, but the route is a county highway, and not in the state system.

For many years there has been considerable pressure to have a connection made at or near this location. At present the only access to Alpine County and Lake Tahoe from the south is through Minden, Nevada, more than 20 miles out of the way.

Forest Service Starts Work

The first start on the new construction was made by the Forest Service which constructed about one-half mile of road up Slinkard Canyon from U. S. 395. In 1947 Mono County contracted with a consulting engineer to make a survey from Heenan Lake to the end of the Forest Service road in Slinkard Canyon, a distance of 15 miles over virgin country. The only access was by foot or horseback, and much working time was lost getting to the job and back. The daily rodeo of getting the survey party off was quite a local attraction for some time.

This contract produced a stadia, preliminary line on which, in part, a construction centerline was laid from Heenan Lake to the Alpine-Mono county line. In the summer of 1949 a contract for grading was pushed through to completion on this part of the route. The engineering work on this portion was handled by the Alpine County Road Department, under the



UPPER—Looking west up Slinkard Canyon before blasting. CENTER—After shooting boulders. LOWER—'Dozer moving rock after shooting

direction of N. H. Kearns, County Road Commissioner. The contract covered grading, drainage, and imported base, but no oiling.

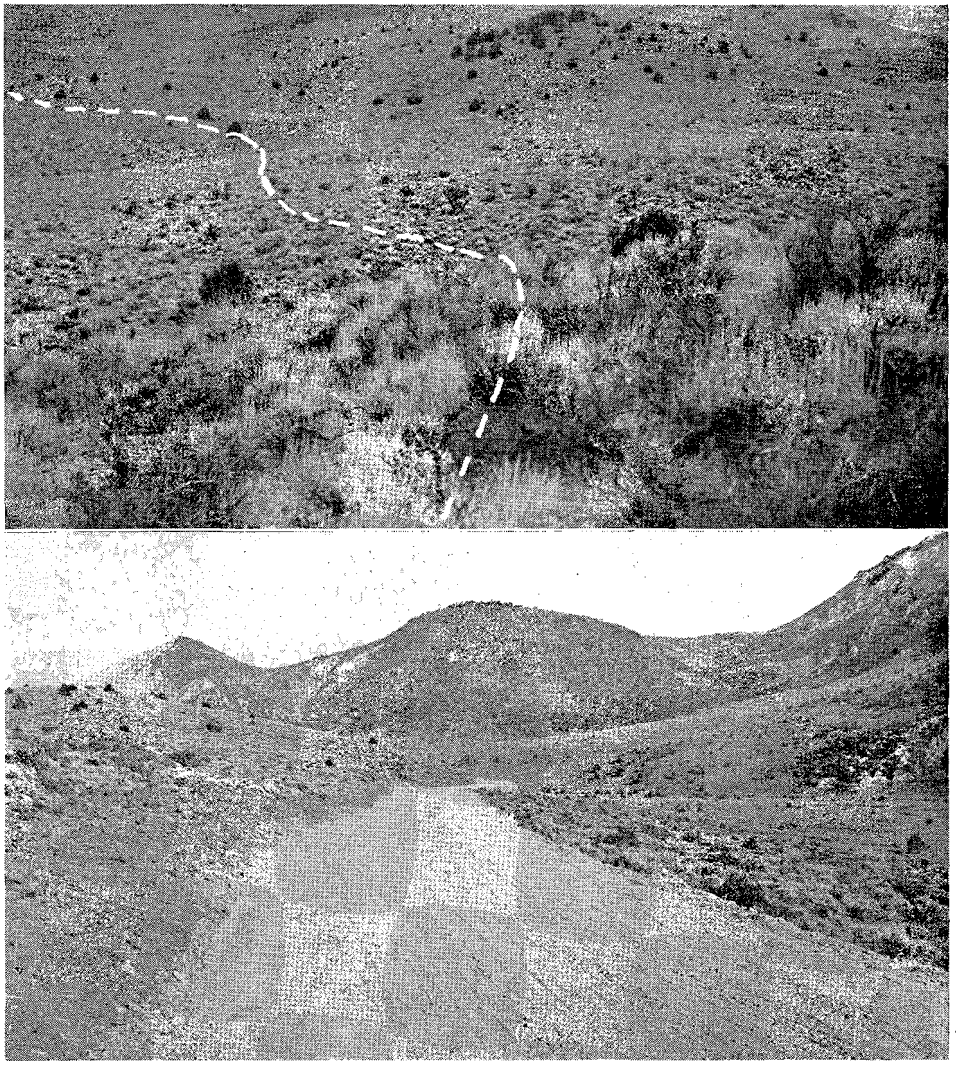
Transportation Problem

In the summer of 1949 a located line was run four miles in from the end of the Forest Service road from U. S. 395. This work was also plagued with the transportation problem, and at the last a camp was set up near the end of the line. This saved about four hours walking time daily for the survey party. Survey and design work was done by District IX forces.

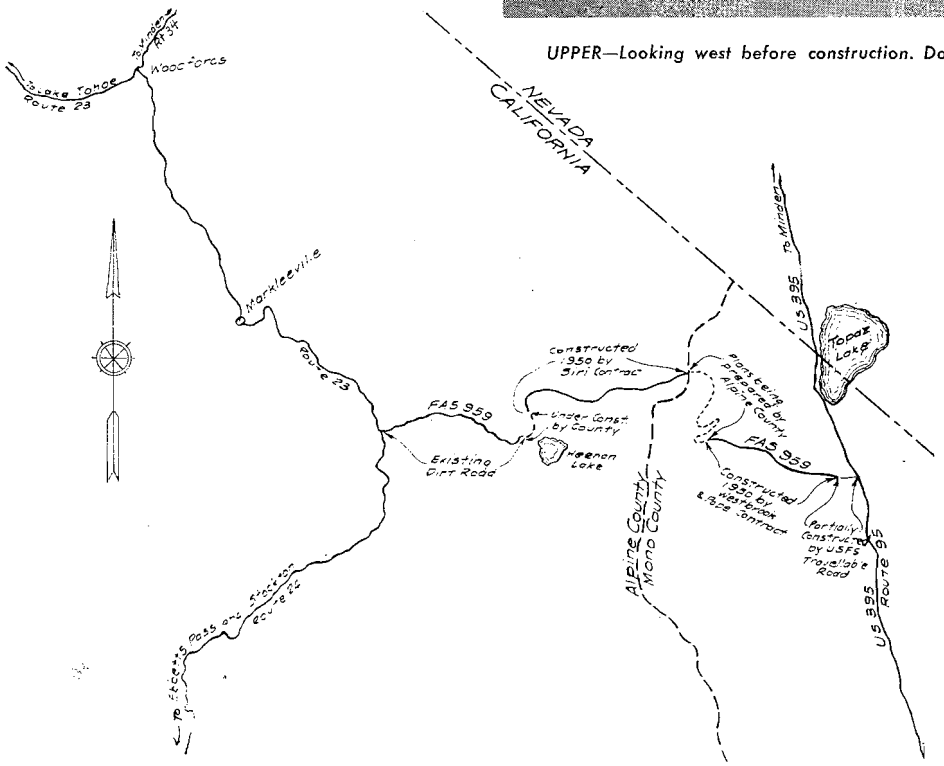
This section went to contract for grading and drainage in January, 1950, and was completed in the middle of the summer.

The connecting section of three and one-half miles comprises rather difficult location and construction up a steep mountain side. The location and design is being done by the Alpine County Road Department, and it is anticipated that this section will go to contract this winter with the work completed some time next summer.

This will make a travelable road across the mountain. However, the existing road from Heenan Lake to the Ebbetts Pass Highway will have to be improved to make it a standard light traffic mountain highway, and the entire route will have to be surfaced. When these things are done, access to Alpine County will be opened up from the south without the necessity of "detouring" through the State of Nevada.



UPPER—Looking west before construction. Dotted line shows route. LOWER—After construction



The construction from Heenan Lake to the Mono County Line was done by Arthur B. Siri, contractor, under the supervision of the Alpine County Road Department. The section up Slinkard Canyon was done by Westbrook and Pope, contractors, under the supervision of District IX, with S. W. Lowden, District Engineer *; J. Dekema, District Construction Engineer; and G. J. Snyder, Resident Engineer. Combined cost of the two contracts was in excess of $200,000.

* *Mr. Lowden now is District Engineer of District VIII with headquarters at San Bernardino.*

Piru Gorge

Spectacular Blasting Required on Ridge Route Project

By C. J. McCULLOUGH, Associate Highway Engineer, Resident Engineer

COMPLETION of four state highway projects on U. S. 99, now under construction, will provide a four-lane divided highway from Pico Canyon 85 miles over the Ridge Route to Bakersfield. The projects now being constructed are located at Castaic, for a length of 5.1 miles, through Piru Gorge, 5.3 miles, Holland Summit through Lebec 11 miles, and a contract at Greenville south of Bakersfield.

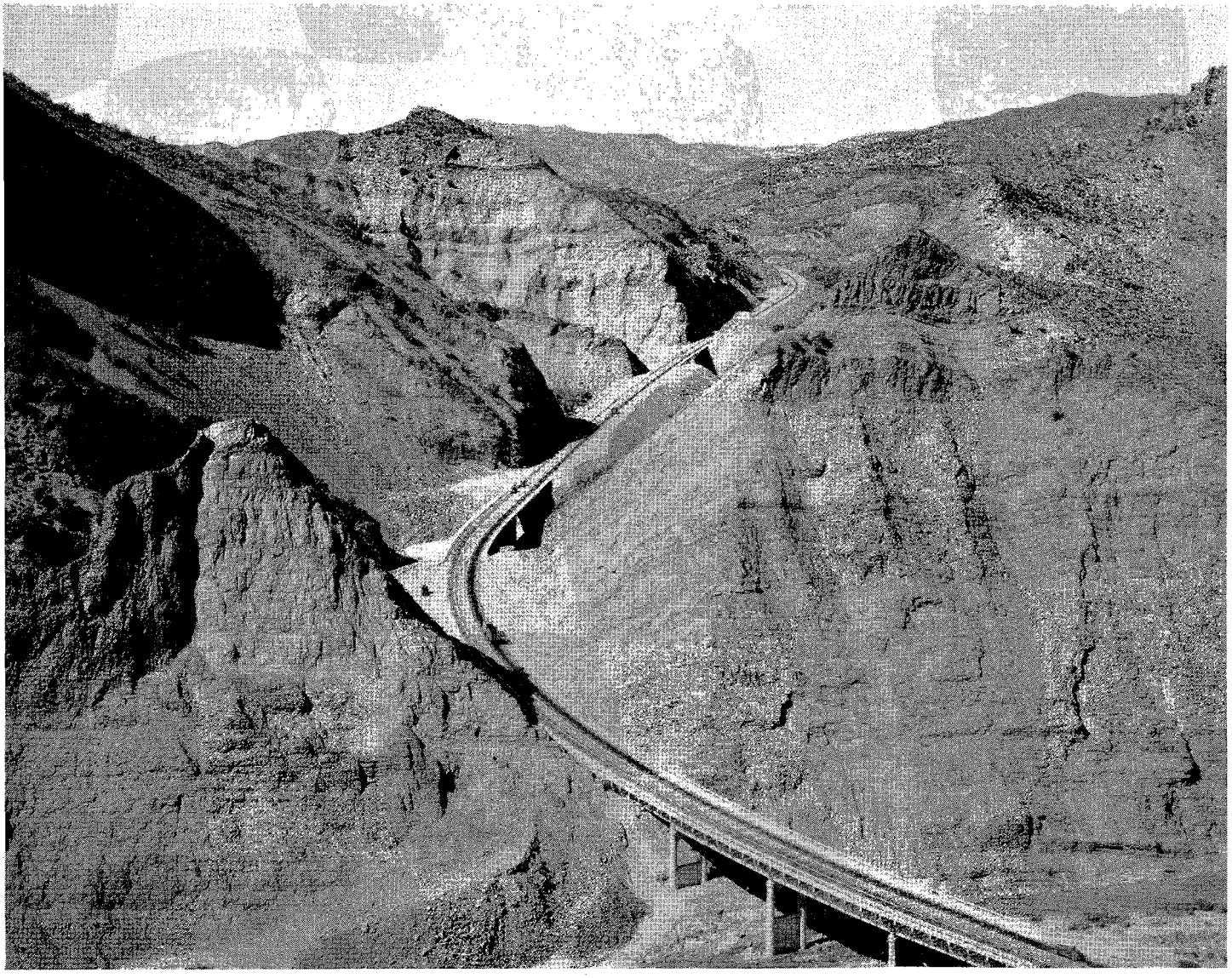
Probably the most difficult of these projects is the Piru Gorge section, extending from Frenchmans Flat northward to connect with the divided highway just north of the State Maintenance Station.

Huge Excavation Job

Awarded to A. Teichert and Sons, of Sacramento, this contract involves roadway excavation in the amount of 1,100,000 cubic yards, overhaul amounting to 15,000,000 station yards, the construction of two concrete bridges across Alamos Creek and the widening of the existing bridge across Piru Creek at Frenchmans Flat.

The contractor will set up a crushing plant at the state-owned quarry site several miles north of the northerly end of the contract, for the production of 192,000 tons of base material

This is U. S. 99 through Piru Gorge on the Ridge Route which is being widened to a four-lane divided highway



Blasting in Pyramid Cut in Piru Gorge. Left to right—Powder is in place in 350 holes in this cliff. Blast has just been set off. Blast eruption at its height. Huge smoke clouds begin to settle. The highway was closed for only 42 minutes before, during and after the blast when bulldozers cleared the roadway for traffic

and 45,000 tons of aggregate for plant-mix paving.

The 40,000 cubic yards of selected rock for the protection of fill slopes will be obtained from the rock cut just south of Pyramid Cut.

Existing drainage structures, concrete box culverts and corrugated metal pipes are to be extended through the widened roadway and additional drainage installed.

Division of Traffic

The division of the traffic is accomlished over a portion of the distance by an unpaved dividing strip 8 feet wide. Over a slightly longer section the pavement is continuous for the full width of the roadway and a 6-foot dividing strip consisting of raised bars separates traffic.

Where the unpaved dividing strip provides two separate pavements, these pavements are each 24 feet wide, with 3-foot and 2-foot paved borders, with penetration-treated shoulders 5 feet and 3 feet wide.

Where the dividing strip consists of raised bars, the pavement decreases from a width of 78 feet in cut sections to 72 feet over fills.

All pavement is plant mix, supported by eight inches of untreated rock base over eight inches of imported subbase.

Spectacular Work

The most spectacular work in connection with this contract is the widening of Pyramid Cut to provide an additional roadway and a new channel for Piru Creek parallel to and below the roadway. This channel will obviate the necessity for two bridges across Piru Creek. The two existing bridges will be removed and replaced with a fill and the salvaged steel girders used in the bridges across Alamos Creek.

To get the pioneering equipment to the top of the cut, it was necessary to work the bulldozers in from Reservoir Summit on the old Ridge Road. This equipment then graded a circuitous and rather precipitous trail down into the bed of Piru Creek.

Considerable time was consumed in grading a bench at the peak of the cut 310 feet above the grade of the channel to provide room for drilling operations. The cut has been brought down about 100 feet and sufficient working area secured to allow room for a large drilling crew.

Rock Loosened by Blasts

The drilling is done to a depth of 24 feet. Using low strength powder, the laminated rock is loosened for a depth of 30 feet at each round of shooting. By using a heavy rooter the material is further loosened so that it can be shoved over either end of the cut, from where it is loaded into Euclid trucks and hauled to the grade.

A birdseye view of the Piru Gorge, as shown in the accompanying photograph shows quite clearly the rugged nature of this location.

When one views the steep high slopes rising above the narrow roadway and realizes that 70 percent of the 1,100,000 cubic yards of rock slate and shale to be moved comes from the 4,000 feet of roadway shown in the picture and near vicinity, he will appreciate the difficulty of maintaining traffic while grading is in progress. This problem is uppermost in the minds of those in charge of the work and always is the chief consideration in all plans of procedure.

Detour Provided

Large signs have been placed on San Fernando Road at Tunnel Station and at Gorman warning motorists of possible delays of from 15 to 45 minutes and stating that the construction zone may be detoured by way of Lancaster.

In widening the high steep cuts through the Gorge section, the pioneering work must necessarily start at the top. This material is shoved over the cut slope to the roadway beneath. While this material is being worked down from the slope, traffic is stopped. The bulldozers shove down material for 10 minutes, then a tractor cleans off the pavement and the waiting traffic is allowed to proceed.

When the loose material has accumulated to a point where it is encroaching on roadway width, it is moved by shovel and trucks. It is at times necessary to control traffic past shovel operations.

Dust Clouds

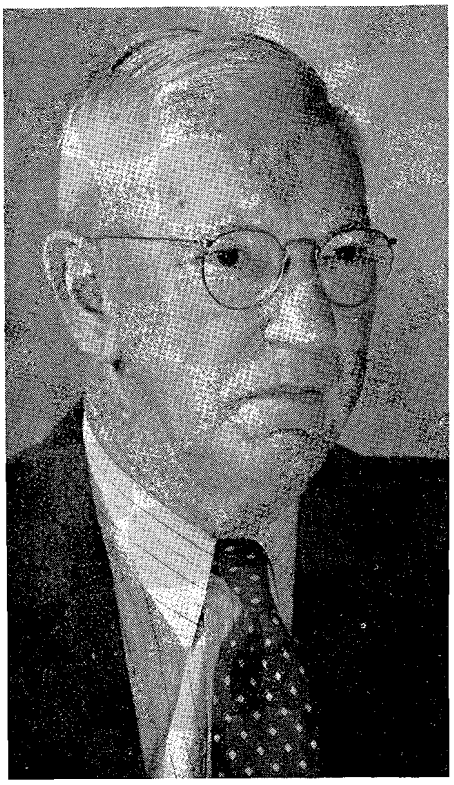
When these sliver cuts are brought down to a point where there is a bench of sufficient width to use scrapers, traffic may pass without interference.

. . . Continued on page 43

Time Takes Steady Retirement Toll Among

Wm. F. Faustman

ANOTHER "old-timer" in state highway work will soon join the ranks of engineers who have recently left active work for the more leisurely role of



WILLIAM F. FAUSTMAN

retired veterans in Sacramento. William F. (Bill) Faustman, Associate Highway Engineer in the Construction Department, will leave on January 1, 1951, after 39 years of service with the State.

"Bill" came to California from New York in 1907, soon after graduation from Cornell University in civil engineering. His first job was with the former Peoples Water Co., of Oakland (now East Bay Municipal Utility District), engaged in experimental filtration work. This was followed by work with the City of Oakland. In 1908, he

. . . Continued on page 35

J. M. Hollister

ON AUGUST 22, 1950, J. M. Hollister retired after 27 years of faithful service as Resident Engineer with the Division of Highways. He was born in Kuna,

J. M. HOLLISTER

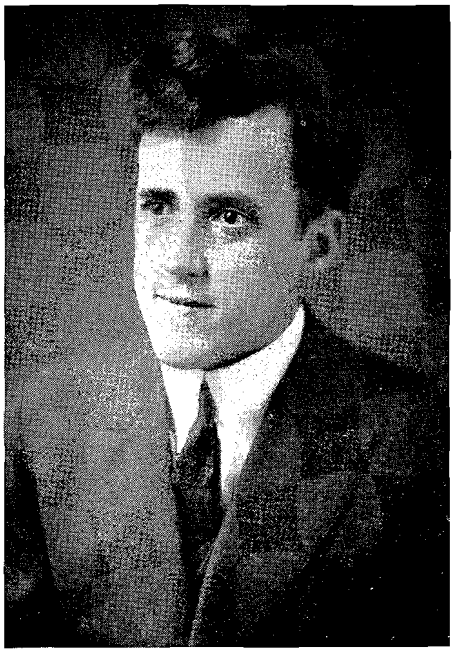
Idaho, July 16, 1887. He received his formal education and extensive construction and paving experience in the City of Boise, Idaho. He served with the A. E. F. Army Engineers in France during World War I. He began work with the Division of Highways in District V in 1923, and after two years transferred to District VIII where he was employed until the time of retirement.

Joe, as he was affectionately known by his many friends, was a construction man of the old school. Even though he had a background in early paving tech-

. . . Continued on page 34

JAMES G. S

KNOWN to hundreds of employees of the Division of Highways who were processed through his office to civil service positions, Assistant State Highway Engineer James G. "Jim" Standley



JAMES G. STANDLEY—1914

retired on October 1st after 36 years of service with the division.

Jim Standley, fresh from the University of Missouri, worked for the Santa Fe Railroad in Kansas from August, 1910, to August, 1914, as instrumentman. He then came to California and began work with the division in August, 1914, as a junior civil engineer in District II, which then had its headquarters at Dunsmuir. From July, 1915, until early 1919 he was chief draftsman in the district office. He then became office engineer, a position he held until June, 1923, when he was promoted to assistant division engineer.

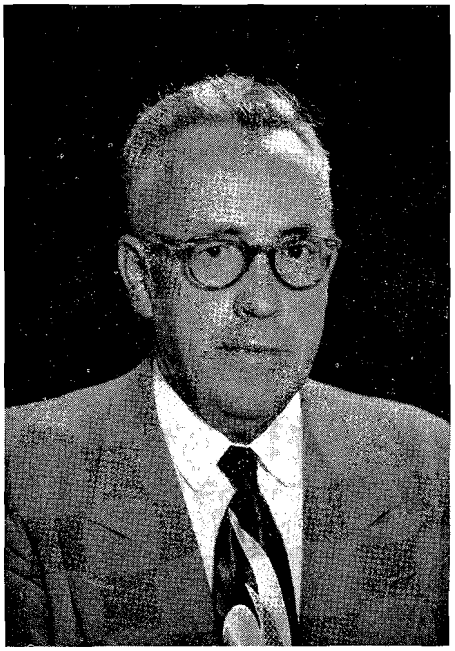
When Standley reported to Dunsmuir as the first man to be appointed from the newly created civil service

Veterans of Department of Public Works

STANDLEY

list, there were 10 people employed there in the office of T. A. Bedford, then division engineer.

Of those early days, R. H. Stalnaker, recently retired as equipment engineer,



JAMES G. STANDLEY—1950

and who then was assistant division engineer at Dunsmuir, relates:

"Young Standley was a hustler, an earnest and hard working young engineer, and advanced rapidly. Our headquarters office then was on the upper floor of a private residence on Butterfly Avenue. In 1915 we moved into two small residential houses. We were snowed in four or five months every year and during the winter months took our vacations or worked on surveys and plans prepared during the previous summer. In good weather it took us all day to drive from Dunsmuir to Redding, to which the district offices were later transferred. Jim Standley saw the California Highway System

. . . Continued on page 53

Chas. O. Palm

CHAS. O. PALM retired voluntarily from state service on August 31, 1950, at the age of 67.

Mr. Palm entered state service on

CHARLES O. PALM

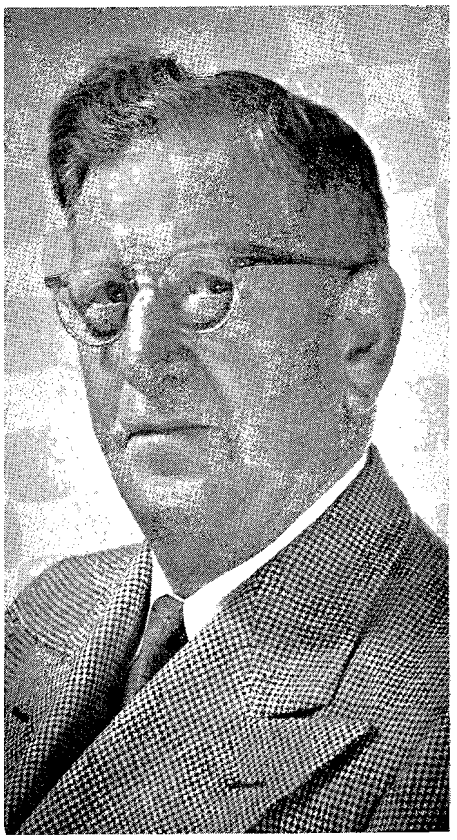
July 13, 1911, as a clerk with the Division of Architecture in Sacramento. He advanced to the position of supervising account clerk in 1931, which position he held at the time of retirement.

He was in charge of the clerical staff of the division, involving pay rolls, civil service, office supplies, inventory, automobiles, invoices, and office services.

He served 39 years of continuous service with the State, six years with the Purchasing Department and 33 years with the Division of Architecture.

The Montgomerys

ON SEPTEMBER 28, 1950, a testimonial banquet was given at the Hotel Whitcomb in San Francisco for Mr. and Mrs. Z. J. Montgomery of the

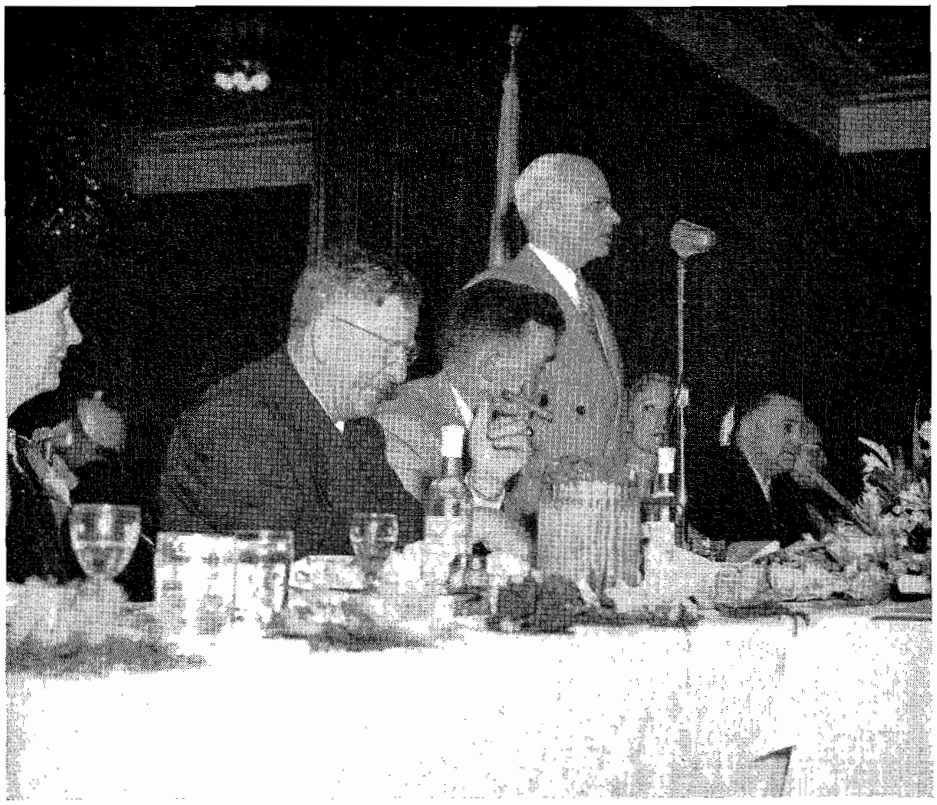


Z. J. MONTGOMERY

Division of Architecture, honoring them on their retirement after 30 years of service with the State. The banquet was arranged by the state employees of District No. III; T. T. Thompson, chairman.

Three hundred friends of Mr. and Mrs. Montgomery attended the banquet.

W. K. Daniels, Assistant State Architect, introduced Joe O'Sullivan, Master of Ceremonies. The speakers for the evening were: Carl Henderlong, Division of Architecture; Dan Mac-



Speakers table at banquet given to Mr. and Mrs. Z. J. Montgomery. Left to right, Mrs. Montgomery, Mr. Montgomery, Joe O'Sullivan, master of ceremonies, Deputy Director of Public Works Frank B. Durkee, Mrs. W. K. Daniels, Dr. Walter Rapaport, Superintendent, Agnews State Hospital

Donald, Pacific Coast Representative of Plumbers and Steamfitters; Lawerence Hobart, State Purchasing Agent; James Ricketts, Manager of the Golden Gate Bridge; E. S. Thompson, Controller of San Jose State College; J. W. Peters, Contractor; Frank B. Durkee, Deputy Director of Public Works; M. F. Small, Secretary to Governor Earl Warren; J. W. Montgomery, Attorney, son of the honored guests; Anson Boyd, State Architect.

Montgomery was employed by the State as Foreman of Construction in 1920, and he supervised the construction of many buildings at the Mendocino State Hospital. In 1930 he was transferred to District III, which is known as the San Francisco Bay District, comprising San Francisco, Alameda, Contra Costa, San Mateo, Santa Clara, San Benito, Santa Cruz, and Monterey Counties. He advanced to District Construction Supervisor when he took over supervision of District III.

Montgomery supervised the construction of many state buildings, but he is particularly proud of having supervised the construction of Langley Porter Clinic in San Francisco, the Highway District IV Office Building in San Francisco, the Cow Palace in San Mateo County, and the starting of the Medium Security Prison at Soledad.

From 1926 to their retirement date, Mrs. Montgomery acted as office manager to Mr. Montgomery, and he states that 85 percent of the credit for the work accomplished by him belongs to her.

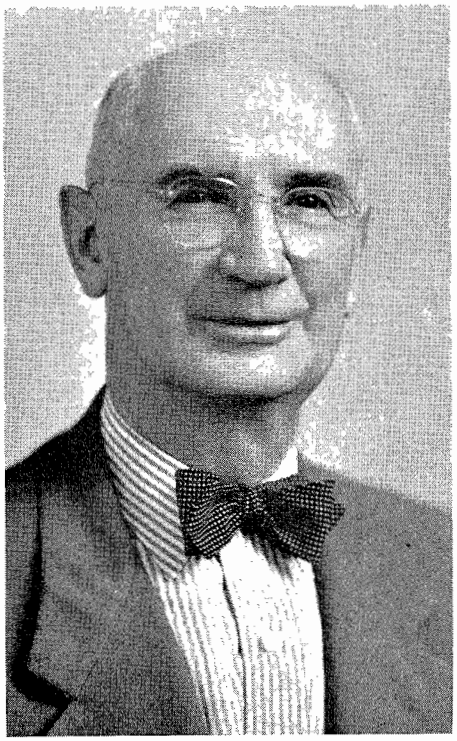
J. M. Hollister

Continued from page 32 . . .

niques, he was always receptive and eager operating under new-fangled ideas. He is especially popular with the many men who have worked under his direction, and he conservatively estimates that he has "trained" enough young college graduate engineers to staff construction organizations of several districts.

Clifford M. Weber

CLIFFORD M. WEBER, 30 years in charge of the construction work of the Division of Architecture in the Los Angeles area, retired from active state service on April 15, 1950. "Web" had been an employee of the division for 38 years, excluding a brief period of illness in 1916, and service in World War I in 1917 and 1918.



CLIFFORD M. WEBER

Weber was a third generation Californian, both he and his father being natives of Nevada County. He was born at Nevada City, California, on January 15, 1888. Weber's mother, a native of England, was a naturalized American. He received his education in the public schools of Nevada County and extension work through I. C. S. courses.

He began his career in the construction field in San Francisco. In the winter of 1912, he went to work for the Architectural Division of the Department of Engineering. His first work was at Santa Barbara State College un-

der Reilly McNeill, who was the project mechanical engineer. He afterwards worked in San Francisco on the construction of the fairgrounds there and in 1915 was appointed to the Division of Architecture crew at Folsom State Prison, under the supervision of Jack Dutton. Weber was foreman in charge of a crew of both free and inmate labor working on the new granite and concrete cell block.

Served in World War I

After a period of illness and recuperation in Nevada, Weber entered the Army during the first World War. Upon his discharge after the war, he returned to the Division of Architecture at Stockton State Hospital where he worked under the supervision of Construction Supervisor, Oliver Morton.

Weber was sent as Construction Supervisor for the division, to Arcata and began the erection of the first buildings of Humboldt State College, when, in 1920 he was appointed to succeed H. E. Mackey as supervisor in charge of the Division of Architecture work in Southern California.

During his incumbency in this post, he supervised the construction work at Norwalk State Hospital, Fred C. Nelles School for Boys at Whittier, Patton State Hospital at San Bernardino, Pacific Colony at Spadra, State Office Building at Los Angeles, Ventura School for Girls, armories at Santa Barbara, Van Nuys, Burbank, Riverside, San Bernardino, Colton, throughout the Los Angeles metropolitan area, Long Beach, San Pedro, the Institution for Women at Tehachapi, the Vocational Institution at Lancaster, and many others. In particular, the large institution at Camarillo State Hospital, the entire Institution for Men at Chino, and recently, the Division of Highways Office Building on Spring Street in Los Angeles were erected under his supervision. The total amount of building construction which was erected under the direction of C. M. Weber is in excess of $57,540,638 and during this period he supervised more than 2,000 individuals on state forces.

Ernest Evers

On October 1, 1950, after nearly 25 years, Ernest Evers, District VI Office Engineer, retired to a well earned rest.

Mr. Evers was born in Iowa and obtained most of his primary and secondary education in Des Moines. He graduated from the University of California in 1908, specializing in railroad engineering. His collegiate work was interrupted for two years during which he was engaged in location work with the Western Pacific Railroad in Feather River Canyon. Following his graduation, he was employed by the New Mexico Central Railway in the capacities of Transitman and Chief of Party on both location and construction.

Railroad Location Work

In 1909-1910 he was engaged in general city engineering for the City of Albuquerque. The next four years were spent on interurban railway location in Salt River Valley and as Chief Locating Engineer on a projected location for the Albuquerque, Cortez and Salt Lake Railway in Montezuma County, Colorado.

After a brief period of office work on a subdivision near Atascadero, California, in the fall of 1914, he accepted an appointment in District V of the California Division of Highways as Assistant Resident Engineer, later Resident Engineer. Walter C. Howe was District Engineer at that time.

Returns to California

He continued, except for nine months, as Resident Engineer on grading and bridges with Santa Barbara County with the Division of Highways until June 5, 1919, when he moved to the State of Washington, where he served the Washington State Highway Department for approximately six years in the capacities of Resident Engineer on grading and P.C.C. paving, District Office Engineer and District Maintenance Engineer. He was later employed in a private engineering firm on location, design and construction on an irrigation project in Fergus County, Montana.

Returning to California in 1929 he joined the Construction Engineering staff of District VI under District Engineer E. E. Wallace. He continued in District VI until October 1, 1950, having served as Resident Engineer, District Maintenance Engineer (18 years) and District Office Engineer. He is an associate member of the American Society of Civil Engineers.

Wm. F. Faustman

Continued from page 32 . . .

came to Sacramento for structural and inspection work with the State Architect for a period of about three years. In 1911, he spent a year in the real estate business, and was married to Berenice E. Smith of Sacramento, in March, 1912.

Mr. Faustman's highway experience began in 1914, continuing for a period of 36 years, and covering field and office work in District III, Bridge Department, Central Office and Construction Department; 1928-1950 being in the latter office, as Associate Engineer. During World War I, he was an engineer with the Bureau of Yards and Docks, Washington, D. C., in 1917. In addition to his highway work, he was an instructor in the Adult Evening School in Sacramento from 1913 to 1942. Mrs. Faustman, who passed away in 1948, was prominent for many years in musical and cultural circles and as a music teacher, at her home in Land Park, 1362 Eighth Avenue. Mr. Faustman has continued to live there, sharing his home with army personnel from Mather Field, in addition to "Traffic," his fox terrier. D. Jackson Faustman, his son, is traffic engineer for the City of Sacramento.

"Bill" has no particular hobbies, with the exception of golf, baseball and other sports, and a healthy interest in music and cultural activities. He has been east to New York and other points several times during recent years, visiting relatives, and contemplates doing some more traveling in the not too distant future.

New

Tools, Techniques and Talents Used In 1951 Model Bridge Foundation Studies

By C. H. HARNED, Senior Engineering Geologist

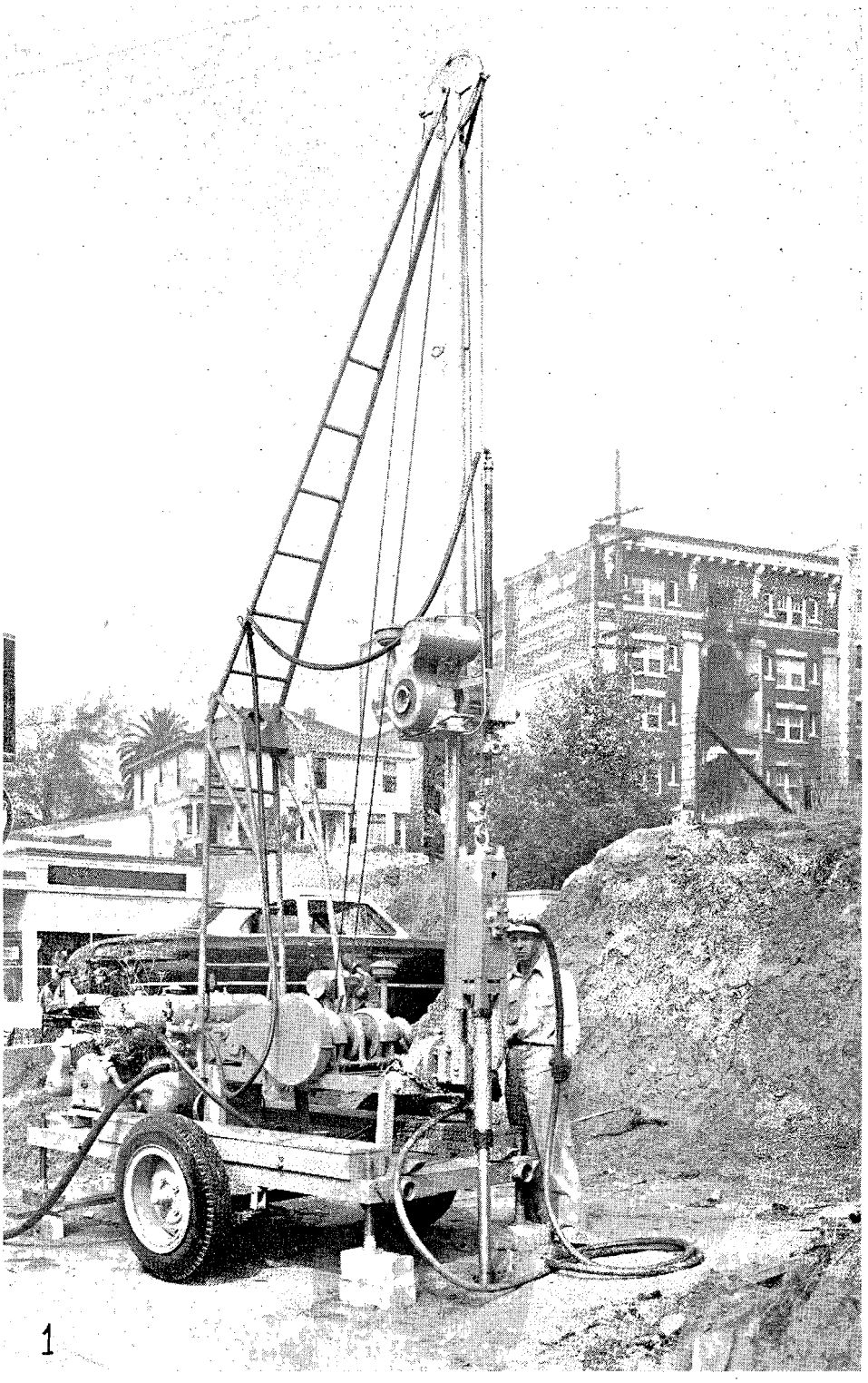
ABOUT three years ago the Bridge Department of the California Division of Highways became aware of the necessity of expanding and improving existing facilities for the specific purpose of conducting bridge foundation studies. This decision was, in part, prompted by the rapidly expanding highway program and the enormity of foundation problems anticipated in conjunction with the proposed system of modern freeways but was largely the result of a growing insistence among bridge engineers that large sums of money could be saved if complete and reliable foundation data were available during the design stage.

The "make it stout" complex so prevalent among bridge designers and builders of a few years ago is rapidly being replaced by a healthy and progressive realization that the maximum in bridge foundation economy can result only from the application of structure loads to earth materials in manner and amounts dictated by the nature of the material itself and the minimum safety factor required for good engineering.

Area of Geologic Interest

During the latter part of 1947 the Bridge Department made a study for the purpose of establishing the personnel and equipment requirements for work of this nature. California represents an area of geologic interest and complexity equaled elsewhere on earth only upon rare occasion. Stratigraphic formational units record the geologic history of the State from the Pre-Cambrian dawn days of the earth to the present with but few chapters in omission. The record although known to be exceptionally complete has been so thoroughly scrambled by complex folding, faulting, igneous activity, and other geologic processes that a true and complete interpretation will be a challenge to men forever.

Rotary drill and pneumatic drive hammer



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In order to obtain tools capable of fulfilling the requirements of troublesome relief, portability, rugged mechanical constructioin, diversity of tool function, and the widest conceivable range of natural foundation conditions, a survey of available equipment was made which clearly indicated that satisfactory tools were not readily available and would therefore have to be designed and built.

Drilling Equipment

The drill rig proper consists of a revamped version of the standard exploration drill built by a Los Angeles drill manufacturing company. It is a skid-mounted, gasoline-engine-powered, rotary type drill (*see Photo 1*). The drill and accessory tools are mounted on a two-wheel trailer and towed behind a truck. The drill was trailer-mounted in preference to the conventional truck mounting since this method of mounting simplified the unloading operation of the drill in those cases in which topographic conditions or inaccessible stream-crossing sites required skidding the rig to the job. The rig is capable of pulling itself along on its steel skids by means of its own power winch and cable. Sufficient power is available to pull the rig up, or lower it, over the face of a vertical cliff should this extreme necessity arise. In addition, the trailer mounting puts the entire drilling operation close to the ground, reduces the height of mast requirement, and eliminates one truck per foundation study unit.

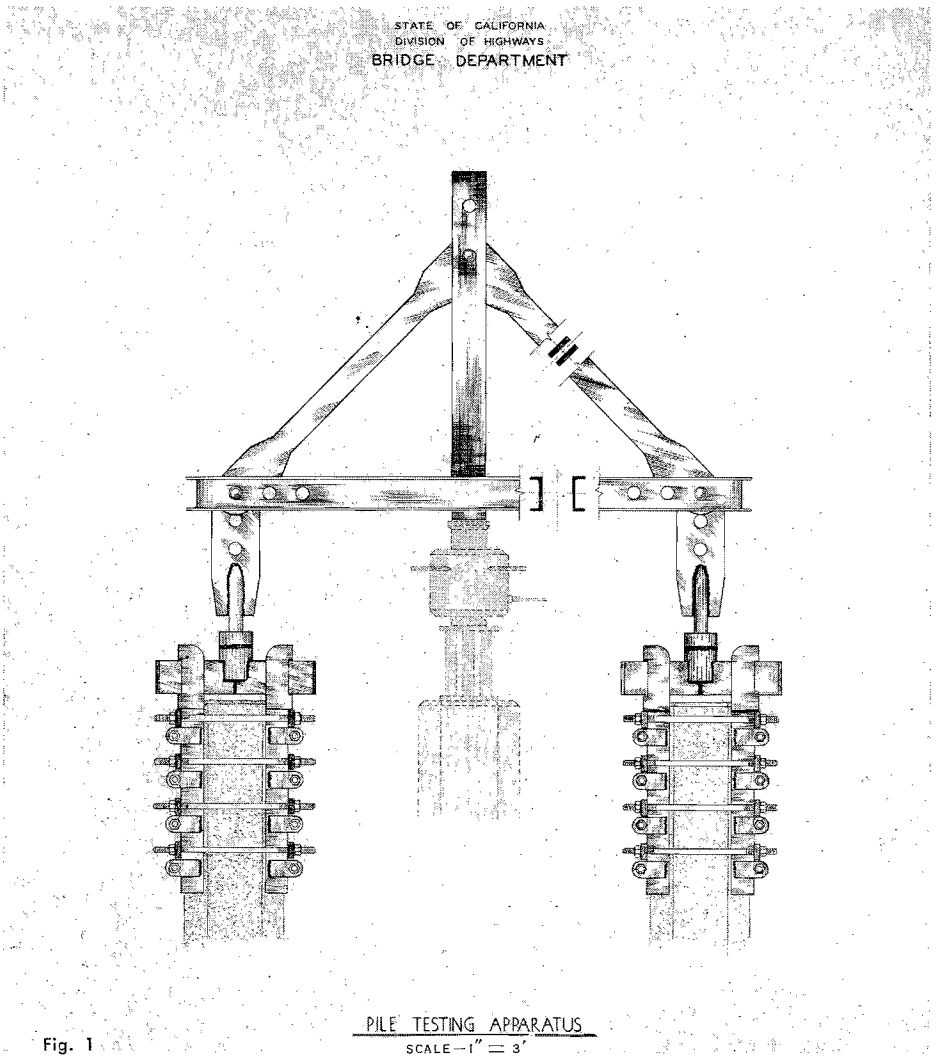
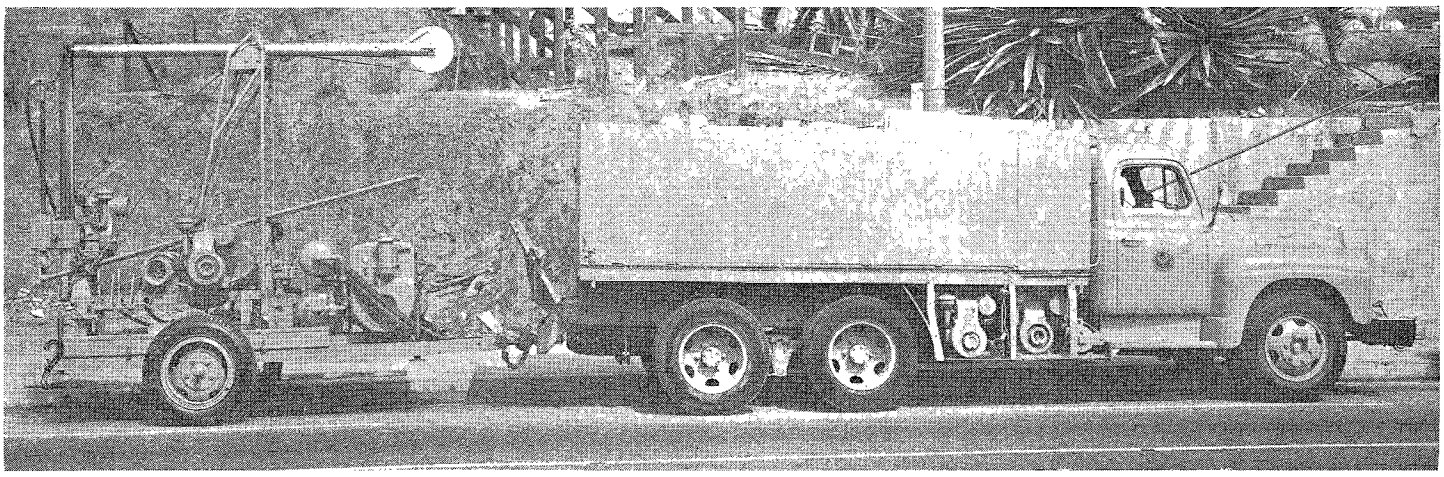


Fig. 1

Detail sketch of pile load test apparatus

Field laboratory, tank and tool truck towing drill rig



Drilling Machine Efficiency

The drilling machine is capable of conducting rotary wet sample borings (wash borings), jet borings, bucket auger borings, undisturbed drive sampling operations, diamond or hard metal core borings, penetrometer tests, spud borings, or any other conceivable drilling operation in any kind of earth material to depths of about 400 feet.

A small, double-acting, pneumatic hammer is mounted on the rig and replaces the conventional drop hammer. This results in an increase in casing or penetrometer driving speed from 30 or 40 blows per minute to a maximum of about 500 blows per minute. The hammer is reversible which also facilitates and simplifies tool extraction.

The hammer is rigged in such a fashion that it may be used as a 140-pound drop hammer for conducting the standard penetration test or as a 350-pound drop hammer for making penetrometer tests. Air for the hammer is supplied by a 70-cubic-foot compressor. The pneumatic equipment, including tanks, compressor and engine, is mounted on a set of steel skids separate from those of the drilling machinery. This separate mounting was considered essential in order to insure the maximum in portability for the drill rig proper and at the same time maintain a low center of gravity for the entire unit.

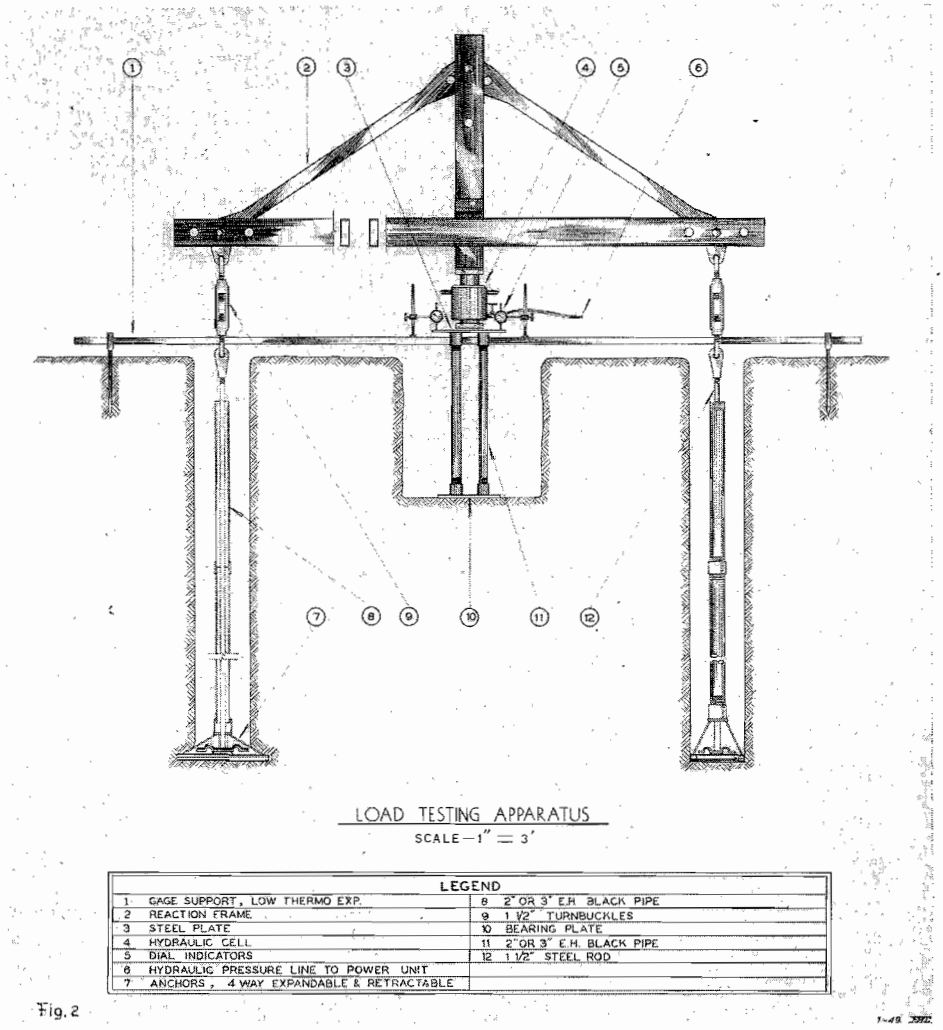
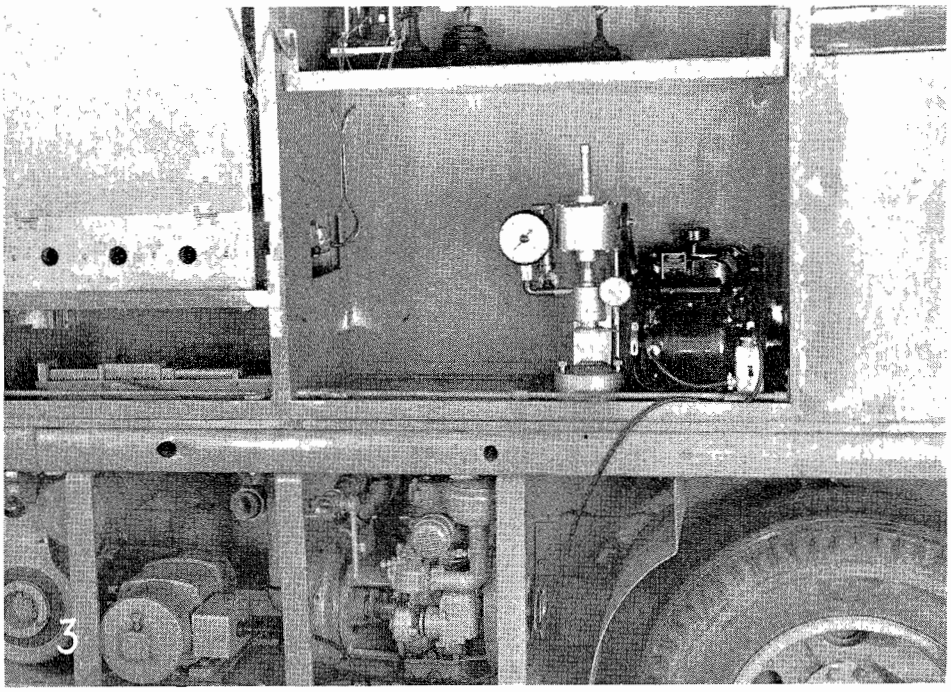


Fig. 2

Detail sketch of plate bearing load test apparatus

Laboratory area on truck



Drill Motor Rotations

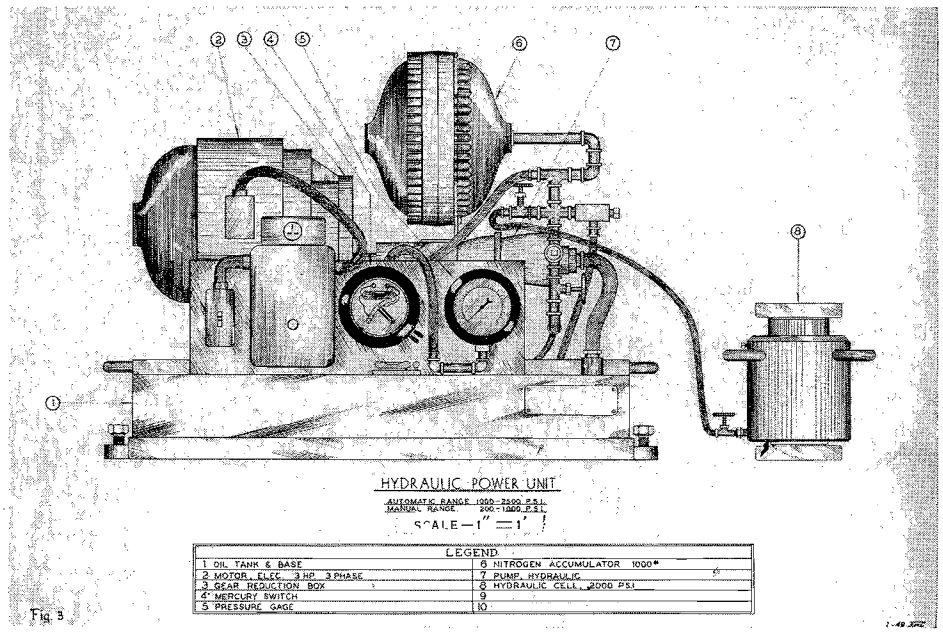
The drill head may be rotated 360 degrees in one plane or 270 degrees normal to the plane of full-circle rotation, thus permitting directional drilling in any direction. The drill motor is attached to the drill head and the motor mount is designed for full rotation to insure verticality of the motor regardless of drilling direction. A hand-crank feed was preferred to a power pull-down or hydraulic feed since it permits the driller to accumulate a feel-as-you-go experience so important to many drilling operations.

Three sets of quick-change gear ratios are available for the drill head to enable high-speed low-power tool rotation, or low-speed high-power operation. The drill head is powered by an 8-h.p. gasoline engine, and the

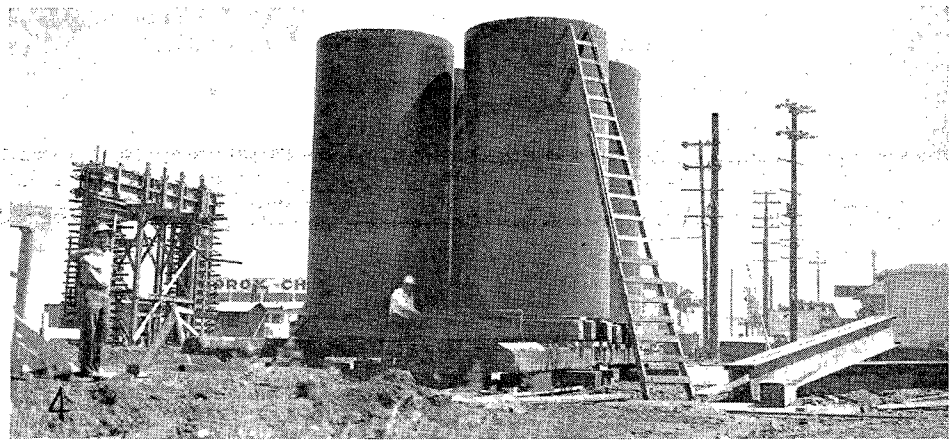
double drum hoist and water pump are powered by a similar 8-h.p. engine. Power to the drums is applied through a four-speed truck transmission mounted on the drill. The mast is of tubular design, hinged above the gear rack, and of sufficient height to handle 10-foot lengths of drill line, a two-foot bit and a one-foot water swivel with ample operating clearance between the swivel and the sheave.

Testing Apparatus

Men charged with the conduct and interpretation of bridge foundation studies must have available sufficient testing apparatus to permit on-the-job measurement of important physical characteristics of foundation materials. This is important if the drilling, sampling, and testing program is to match the complexity or simplicity of natural



Detail sketch of hydraulic power unit



Conventional method of conducting pile load test using water tanks (64T load)

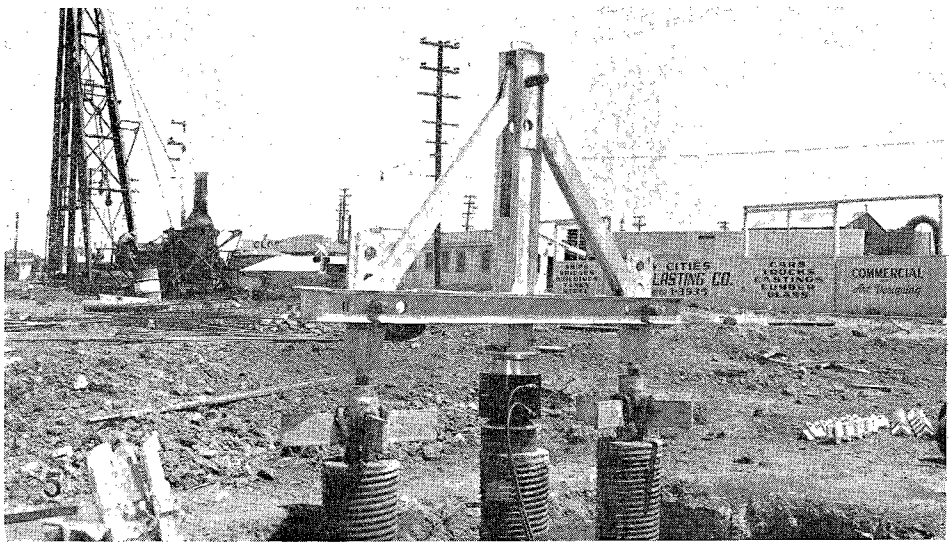
etc., also has a built-in compartment designed as a field testing laboratory. This area (*see Photo 3*) houses an unconfined compression apparatus, a small engine generator set, a constant temperature gas oven, a balance and other required testing equipment.

A constant pressure hydraulic power unit, powered by a lightweight, portable, 5-kw. engine generator set, is mounted in a one-ton panel truck. This vehicle is equipped with two full-width seats and is used for both personnel and equipment transportation.

conditions, or if the field men are expected to acquire a valuable store of interpretative experience. Soil tests, such as unit weight, moisture content, resistance to penetration, permeability, and unconfined compressive strength, (*see Figure 4*) etc., lend themselves readily to field methods and equipment. Others, such as plate bearing tests for footing foundations, skin friction tests for determining required lengths for friction piles, and pile load tests, can adequately be conducted in no other place.

A truck (*see Photo 2*) designed to tow the drill rig, haul a 500-gallon water tank required for rotary drilling, carry casing, drill line, samplers, testing beams, hydraulic equipment,

Pile load test using "A" frame truss and jack applying a load of 115T (note anchor pile connection using bar steel)



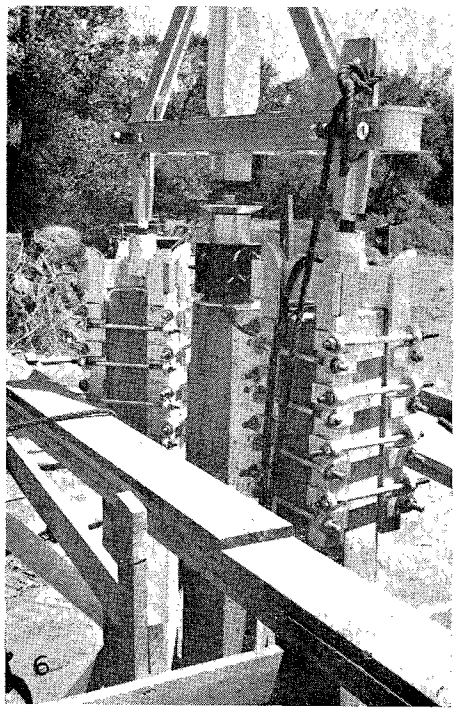
Pile Testing Apparatus

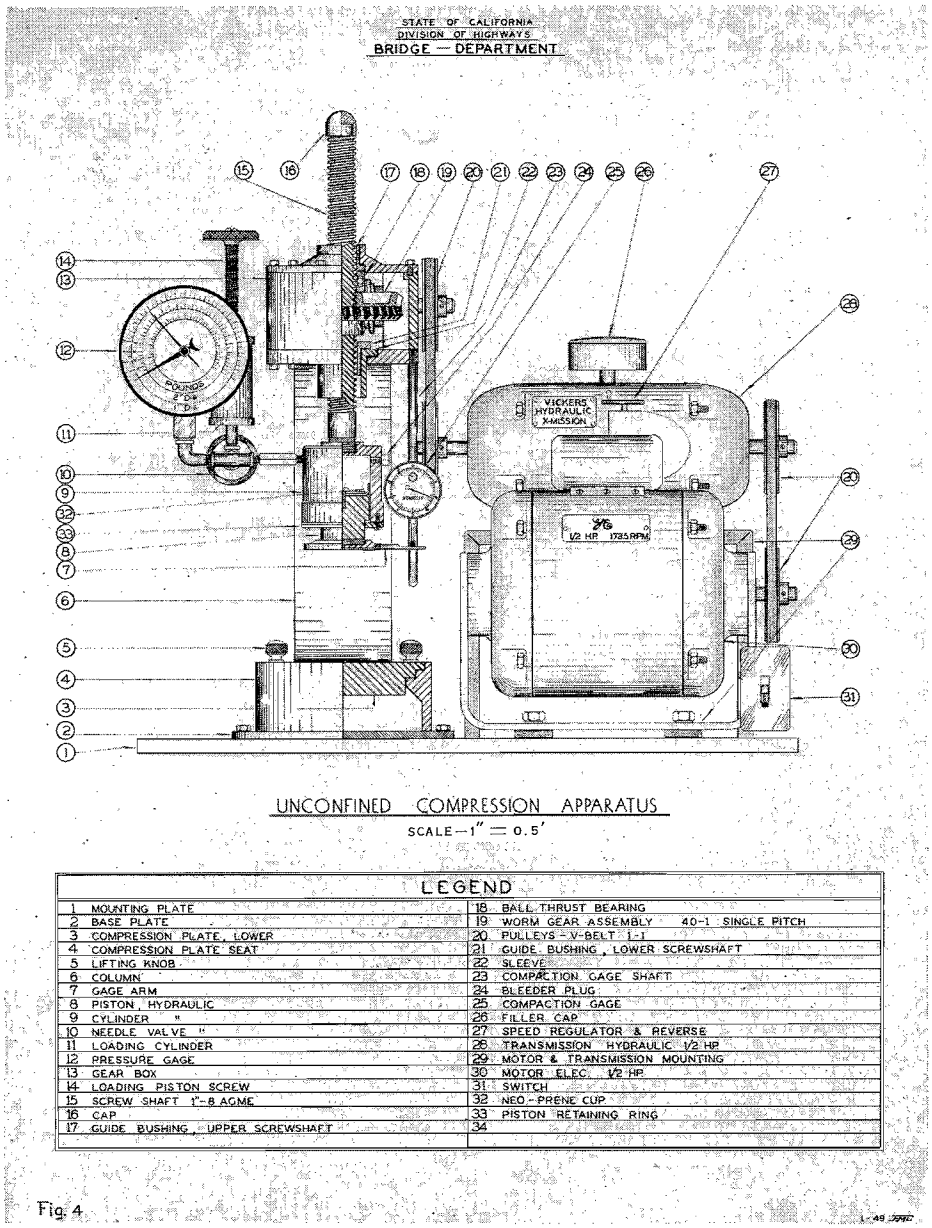
Both contractors and bridge engineers have long desired a method of test loading piles which does not require the use of large bulky water tanks (*see photo 4*) or equally bulky loading platforms. The apparatus shown in *Photo 5* may be used on a satisfactory basis in all cases in which adjacent anchor piles develop sufficient skin friction to furnish the desired reaction against the loaded pile. Since it is usually unnecessary to load test end-bearing piles the truss-anchor pile method can be use in practically all cases.

The truss is of steel construction and the members are pin-connected (*see Figure 1*). Pin holes are spaced at proper locations to permit sufficient horizontal adjustment to meet the normal requirements of variations in pile spacing. The truss is either tied to anchor piles by bending reinforcing steel over and around the pile clamp flanges (*see Photo 5*) or by means of friction type pile clamps as shown in *Photo 6 and Figure 1*. Both methods have been used with equal satisfactory results.

Load is applied to the test pile through a 115-ton pressure cell acti-

Load testing precast concrete piles at an awkward site 25 feet above ground level (note anchor pile clamps)





Detail sketch of unconfined compression

vated by a constant pressure hydraulic power unit (*see Photo 7 and Fig. 3*).

Automatic Power Unit

The power unit is automatic in operation and incorporates a constant pressure mercury switch and a 1,000 PSI nitrogen loaded accumulator. The gas accumulator cell insures the maintenance of constant pressure of the desired increment even though the loaded pile settles. This feature eliminates the necessity of constant gage observation and frequent manual applications of load. The constant observation requirement has, in the past, been the principal objection to the use of hydraulic tools for work of this nature.

The method, in addition to utilizing light and easy-to-assemble apparatus, permits the application of load increments of any desired amount and at any desired time interval. Loads may be applied, reduced, or completely removed merely by turning a valve and thus a great deal of additional information may be acquired concerning the reaction of the pile to load than has been possible in the past due to the labor expense involved in loading or unloading piles by conventional methods.

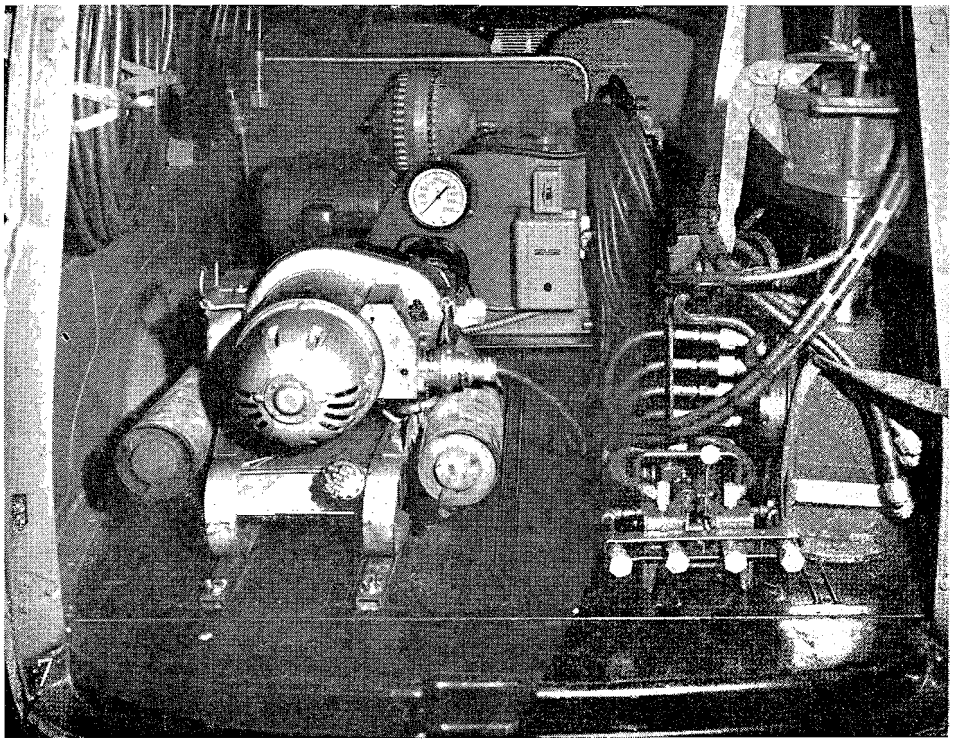
Load Tests for Footing Foundations

An "A" frame truss, similar to that used in the conduct of pile load tests, is utilized for loading bearing plates to determine safe allowable loads for footing foundations.

The truss in this case is of lighter construction than that used for pile load tests, and the horizontal beam is considerably longer in order to insure that anchor points are far enough away to be outside the influence area of the loaded plate (*see Figure 2*). Reaction against load is obtained by means of 12-inch expanding anchors placed in holes drilled at the ends of the horizontal beam. The anchors are collapsible upon completion of the test and may be recovered for future use. Load is applied in the same manner as stated above for pile load tests (*see Photo 8*).

Skin Friction Tests for Determining Pile Lengths and Bearing Capacities for Friction Piles

Five-foot lengths of 2½-inch O.D. flush joint, thick wall steel tubing, are driven into the soil in strings of desired length and permitted to remain in place for periods of time varying from a few hours to several days as dictated by the consistency of the sediment. Double-acting power-operated hydraulic jacks with suitable gages (*see Photo 9*) extract the tool and measure the frictional resistance offered to pulling. Data obtained in this manner are then used in conjunction with standard penetration, and unconfined compression data to furnish a basis for estimating the safe allowable load and required pile lengths for friction-type piles.

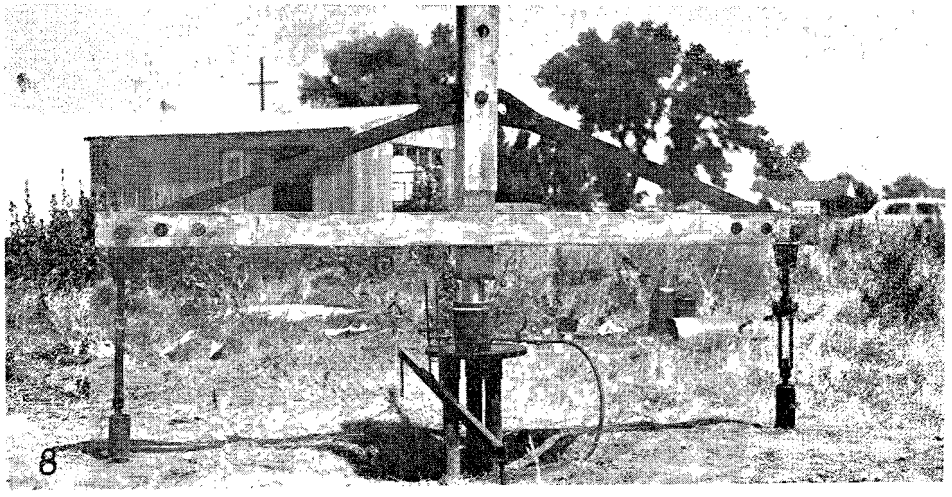


Hydraulic power unit, five-kilowat engine generator and straddle jacks mounted in panel truck

Personnel

A new state civil service classification was established in order that suitable personnel might be obtained for work of this nature. Men were needed who, by academic training, interest, and experience, were prepared to do professional grade work in the three fields of geology, soil mechanics and civil engineering. The civil service title adopted for men doing work of this nature was that of engineering geologist. The examinations were so thoroughly packed with questions in all three fields that only those men who met the prescribed prerequisites were capable of competing for employment on a satisfactory basis.

Conducting a load test for a footing foundation, using a five-square-foot area bearing plate



Two Study Units

The Bridge Department now has two complete foundation study units, one of which works out of the Sacramento office and the other out of the Los Angeles office. Each unit requires the services of three men consisting of an engineering geologist, a foundation drilling foreman, and a driller.

There has been no change from the department's former policy of making preliminary foundation investigations for bridges by the use of preliminary survey crews and the soil tube method. In many cases review of such data clearly indicates that further study is not desirable or necessary, and by the same token preliminary studies of this nature furnish the Foundation Section with sufficient data to make it clear when further studies are needed to in-

sure the maximum in design and construction economy. In all such cases additional data are now readily obtainable.

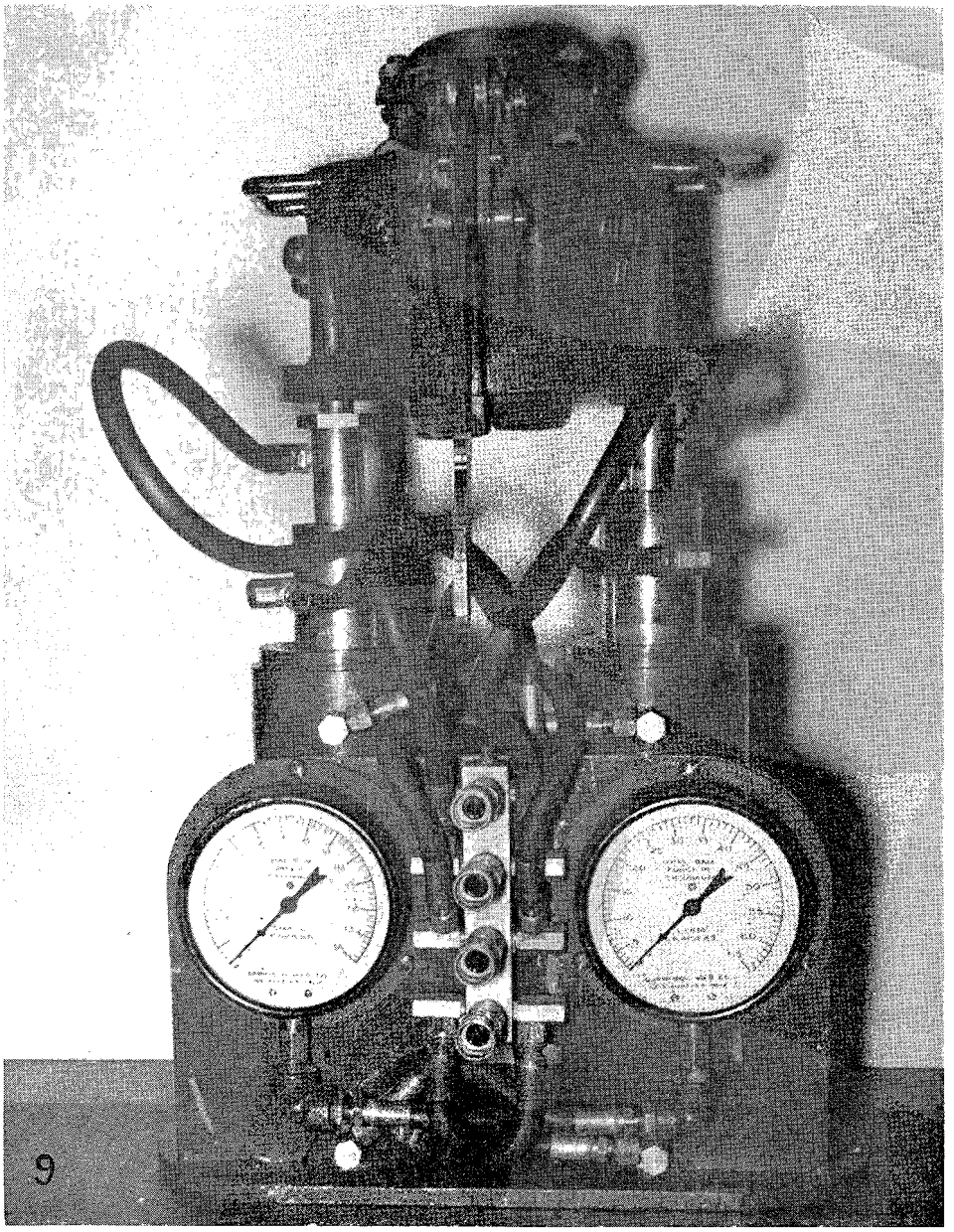
All field testing apparatus of a laboratory nature was designed for the dual purposes of measuring significant mechanical properties of earth materials and assisting field personnel in the accumulation of a store of valuable experience which will ultimately result in reduced testing requirements. It is not feasible to conduct important laboratory tests such as consolidation studies, triaxial shear or compression strength determinations of weak, cohesive, or cohesionless, sediment, etc., in the field since permanent laboratory facilities are required for such work. A recent study of complex foundation conditions for a section of the Bayshore Freeway near South San Francisco between Sierra Point and Candlestick Point was conducted as a joint study by the Materials and Research Department and the Bridge Department. The Bridge Department made the borings and took the samples (*see Photo 10*), and the Laboratory made the required soil mechanics tests and interpretation of sediment character. The data thus obtained were then presented in a joint report for design consideration.

We can be proud of our existing facilities for conducting modern foundation studies since they are second to none, and as we or others improve old or develop new and better methods they will be adopted.

Acknowledgments

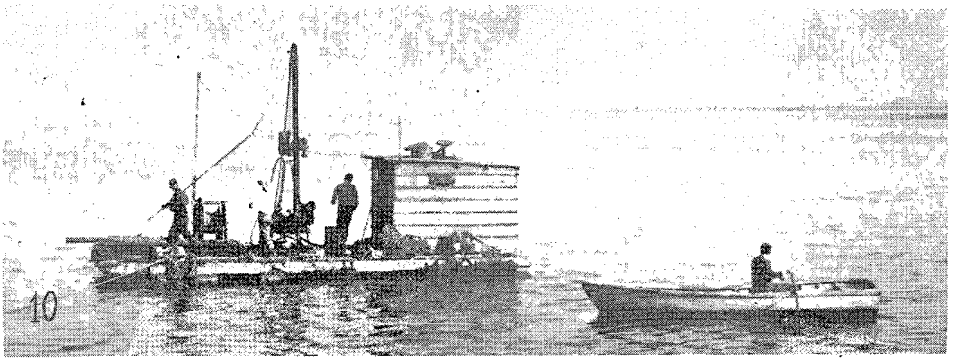
Space does not permit the listing of all who contributed time, ideas, cooperative spirit, and encouragement in developing these new tools and methods, but special recognition is due:

1. The California Division of Highways Headquarters and District VII shops;
2. The Garrison Hydraulic Manufacturing Company of Los Angeles;
3. The Frank L. Howard Drill Engineering Company of Los Angeles;
4. The Division of Highways Materials and Research Department.



Double-acting hydraulic straddle jacks

Making power borings from 14 x 28-foot pontoon barge in San Francisco Bay



Piru Gorge

Continued from page 31 . . .

The variable winds through the Gorge create a dust problem, especially after blasting. The dust clouds sometimes take off in an unanticipated direction and travel farther than expected, sometimes to the discomfort of waiting motorists.

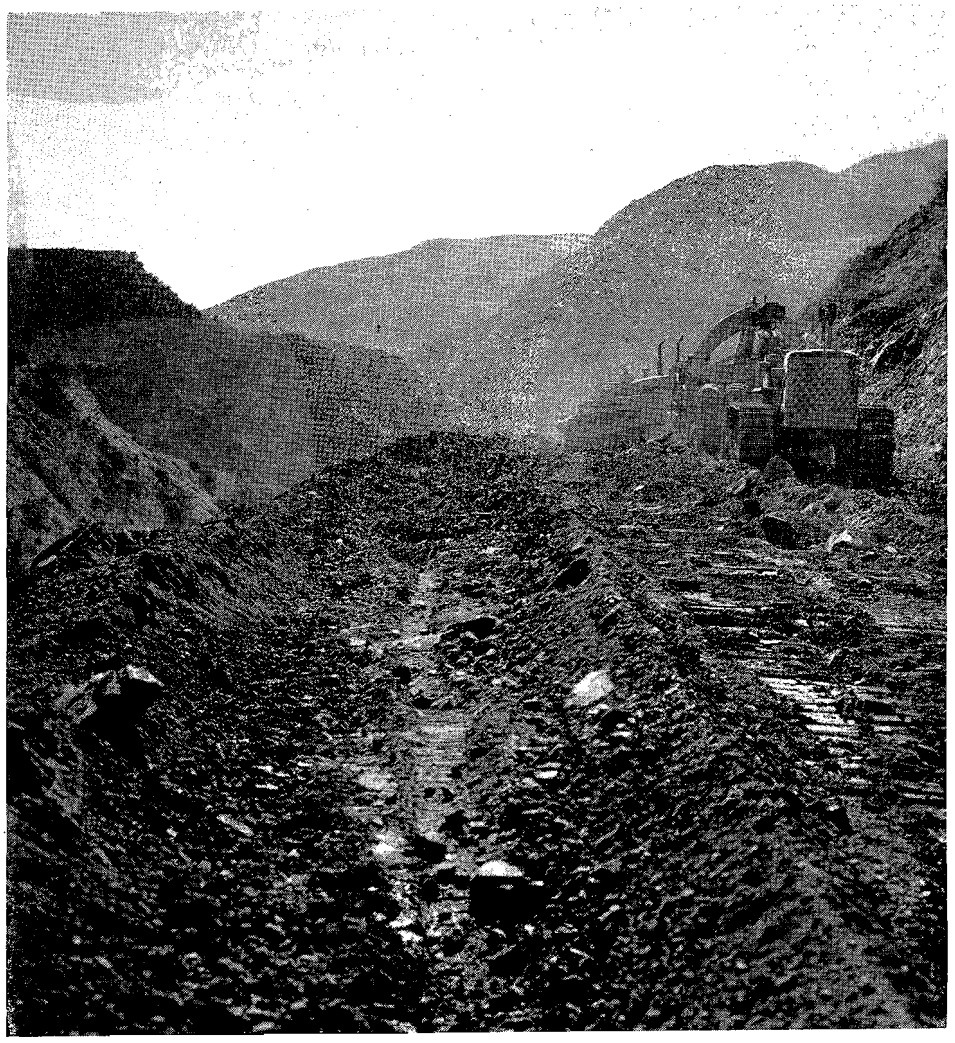
Fortunately Piru Creek, which closely follows the road for almost its entire length, furnishes ample water.

Basins have been dug at several points along the grade and lined with drilling mud to prevent seepage. Water is hauled to these basins by tank trucks and pumped through temporary pipe lines to soak all material possible to reach, before being loaded into trucks.

The application of the water before the material is delivered to the fill has not only been a great help in the alleviation of the dust nuisance but, in conjunction with supplementing the sheepsfoot tampers with 25-ton pneumatic tampers, has resulted in very satisfactory compaction of fills.

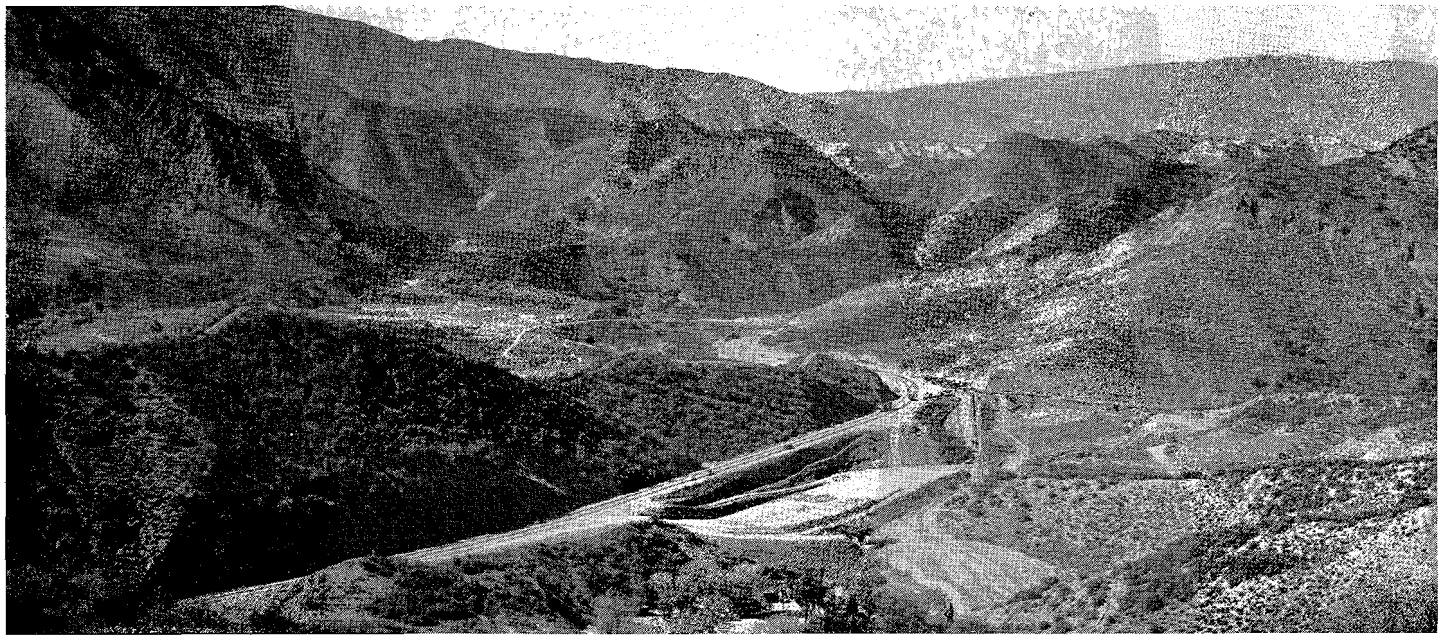
While the contractor's operations are retarded by the frequent shutdowns of his equipment to allow for the passage of traffic, advantage has been taken of favorable weather conditions and weekly reports show a continual gain on the time cycle.

. . . Continued on page 62



This is a real job for bulldozers in Piru Gorge

Contractors on the job in Piru Gorge call this "The Big Fill"



Cordelia Project

Another Freeway on U. S. 40 in Solano County Is Under Way

By E. L. CRAUN, Resident Engineer

Director of Public Works C. H. Purcell on November 21st authorized the Division of Highways to advertise for bids for construction of the final unit of four-lane divided highway on U. S. 40 between the western end of the Yolo Causeway and the Carquinez Bridge. The project will be 1.7 miles in length between Alamo Creek and Ulatis Creek, for which the California Highway Commission has budgeted $980,000. Construction of the West Sacramento Freeway from the Tower Bridge across the Sacramento River to the eastern end of the Yolo Causeway, is under way.

IN JULY of this year, construction started on another section of limited freeway on U. S. 40 in Solano County between the Cordelia Underpass and Ledgewood Creek.

This section of highway carries all the traffic from the Bay area to the east and north of Sacramento. There is also an appreciable amount of traffic bound for Stockton and way points in the delta region.

The present construction will convert the existing 20-foot, two-lane pavement into a four-lane divided highway having two 12-foot traffic lanes on each highway, with five-foot shoulders on the inside and eight-foot shoulders on the outside of the pavement.

The underpass under the Southern Pacific railroad will be widened to accommodate an additional three 12-foot traffic lanes.

A shoofly around the underpass during its construction is necessary to care for the railroad traffic.

Railroad Cooperates

Under an agreement signed by the State and the Southern Pacific Company, a shoofly 1,426 feet long, consisting of 1,172 feet of fill and 254 feet of trestle over the highways has been constructed by the contractor under bid items. The railroad company is placing the ties, rails, and ballast with its own forces.

The Founding Fathers Had Their Traffic Troubles!

A lot of folks wail about the traffic jams they get tangled up in every now and then. "Traffic," they contend, "is getting to be the country's No. 1 problem."

Well, we'll just have to grin and bear it; for the traffic problem, like free speech and a lot of other things, seems to be a good old American heritage. Way back in 1757, 16 years before the Boston Tea Party, the Founding Fathers were having their traffic troubles—and on the Lord's Day, too!

Several years ago, the Boston *Transcript* dug down into the city's musty files and came up with a quaint old ordinance to that effect, executed by the selectmen of Boston 193 years ago.

"Owing to great danger," declared the City Fathers, "arising oftentimes from Coaches, Slays, Chairs, and other Carriages, on the Lord's Days, as people are going to or coming from the several Churches in this Town, being driven with great Rapidity, and the Public Worship being oftentimes much disturbed by such Carriages, it is therefore Voted and Ordered, that no Coach, Slay, Chair, Chaise or other Carriage, shall at such times be driven at a Greater Rate than a foot Pace, on Penalty to the Master of the Slave or Servant so driving, of the Sum of ten shillings." —A. F. S.

A short distance northeast of the underpass, a new structure will carry eastbound traffic coming through the Jameson Canyon from the Napa Valley over both highways of U. S. 40.

New bridges on the added highway are being constructed at Green Valley, Dan Wilson, and Suisun Creeks.

Bridges on the present highway at Green Valley and Suisun Creeks are to be widened. The bridge crossing Dan Wilson Creek is to be rebuilt because of structural weakness.

Eight-foot by eight-foot cattle passes are being constructed under U. S. 40 a short distance south of the underpass and under the Jameson Canyon Road a short distance west of the overpass. These structures are for the use of a property owner having large holdings on each side of the two highways.

The project starts in the southbound highway at the end of the American Canyon pavement placed last year and goes through the new portion of the underpass to a connection with the existing highway approximately 1,450 feet northeast of the underpass.

Joins Fairfield By-pass

The new construction starts in the northbound highway at the underpass and carries on parallel and 62 feet easterly from the existing highway to a connection with the Fairfield By-pass pavement near Ledgewood Creek.

The new construction consists of 8 inches by 24 feet of Class 'B" concrete pavement on 10 inches of imported base material, the top 4 inches of which is to be stabilized with Portland cement. Six inches of select material is to be placed under the imported base on U. S. 40.

The shoulders are to be constructed of untreated rock base from 6 inches to 4 inches thick, and topped with 2 inches of dense graded plant-mixed surfacing 8 feet wide on the outside and 2 feet wide on the inside of the pavement.

On the southerly 1.22 miles of the existing pavement, border trenches 6 inches deep and 3 feet wide are to be

On the opposite page is an aerial view looking toward Fairfield with the Cordelia Underpass now under construction in the immediate foreground. On page 46 is an aerial photograph showing construction between Fairfield and the Napa Wye. On page 47 is an aerial view graphically showing the recently completed Fairfield Bypass looking toward Fairfield. The old route through Fairfield is shown on the left. The relocated highway is on the right

excavated on each side of pavement and filled with cement treated rock base.

Pavement Construction

The shoulders on the remainder of the old pavement were previously cement treated by maintenance forces.

The southerly 1.09 miles of this stretch is to be blanketed with 24 feet by 2 inches of open graded plant-mixed surfacing. Borders 2 feet wide on the inside and 1 foot wide on the outside are to be constructed of like material. The remainder of the 8-foot shoulder on the outside is to be covered with 2 inches of dense graded plant-mixed surfacing.

The remainder of the old pavement and shoulders are to be covered with a 6-inch blanket of untreated rock base, after which the central 24 feet are to be paved with 3 inches of dense graded plant-mixed surfacing. A 2-foot by 2-inch border is to be placed on the inside shoulder and the outside shoulder is to be paved full width.

Grading Not Heavy

Compared to other completed jobs in this vicinitiy, grading is not heavy.

The material is being loosened with a rooter and moved with scrapers.

The largest cut is near the center of the job and is composed of a fair grade of tuff that varies in quality to such an extent that it could not be used for imported base material, but was of considerably better quality than the soil encountered elsewhere.

Approximately 34,000 cubic yards of deficiency fill is being obtained from this cut and is being used as select material under the imported base material. Extensive preliminary investigations were made in this cut which proved the tuff was not satisfactory for subgrade material. Inasmuch as this cut was a logical and attractive source from a bidder's standpoint, prohibition of its use was included in the special provisions.

The imported base material is being obtained from another deposit of tuff approximately three miles north of the job.

Soft Rock Deposit

Specifications require that the maximum size for the lower 4 inches be 2½ inches, and for the upper 6 inches, the maximum will be 1½ inches. It is also required that the material be reduced to these sizes before being delivered to the job.

The deposit is a soft rock that builds up on crusher surfaces and for this reason the ordinary type of crushing equipment will not work efficiently in reducing the material to size.

The contractor has elected to do the necessary crushing in the pit with a rooter, a disk, and the tracks of the tractors.

Items of Work

Following are approximate quantities of the major items of work:

Roadway excavation	191,000 cu. yds.
Structure excavation	10,500 cu. yds.
Structure backfill (bridges)	2,420 cu. yds.
Overhaul	4,315,000 sta. yds.
Imported base material	59,000 tons
Mixing and compacting cement treated subgrade	80,000 sq. yds.
Plant-mixed surfacing	25,000 tons
Class "B" Portland cement concrete (pavement)	18,000 cu. yds.
Class "A" Portland cement concrete (structures)	3,800 cu. yds.
Structural steel	462,600 lbs.
Furnishing concrete piling	8,360 lin. ft.
Driving concrete piling	224 each
Chain link fence	1,800 lin. ft.
Culvert pipe	3,400 lin. ft.
Bar reinforcing steel	396,000 lbs.

To date the grading is 90 percent done, the three bridges on the new highway are poured, and the shoofly tracks are finished. The work of placing imported base has just started. Most of the culvert pipes crossing the highways are in, and work has started on the construction of the two cattle passes.

It is expected that the work will be complete by July of next year.

The contractor for the project is Parish Bros. of Benicia.

The writer is the resident engineer working under the general supervision of M. C. Fosgate, District Construction Engineer. Mr. Gayner is the Bridge Department's representative in charge of structures.

CODE OF ETHICS OF EMPLOYEES OF RIGHT OF WAY DEPARTMENT OF DIVISION OF HIGHWAYS OF STATE OF CALIFORNIA

RECOGNIZING our responsibility to our department and to the people of the State of California and feeling that we should encourage and foster high ethical standards in our organization, we do hereby subscribe to the following code of ethics for our constant guidance and inspiration, predicated upon the basic principles of trust, justice and fair play.

1. To show faith in the worthiness of our profession by industry, honesty and courtesy, in order to merit a reputation for high quality of service and fair dealing.
2. To add to the knowledge of our profession by constant study and to share the lessons of our experience with our fellow employees.
3. To build an ever increasing confidence and good will with the public, our employers, by poise, self-restraint and constructive cooperation.
4. To ascertain and weigh all of the facts relative to real properties in making an appraisal thereof using the best and the most approved methods of determining just compensation.
5. To conduct ourselves in the most ethical and competent manner in our negotiations with affected property owners, thus meriting confidence in our knowledge and integrity.
6. To accept our full share of responsibility in constructive public service to community, State and Nation.
7. To strive to attain and to express a sincerity of character that shall enrich our human contacts, ever aiming toward that ideal — the practice of the "Golden Rule."

In Memoriam

GEORGE A. TILTON, JR.

With the passing of George A. Tilton, Jr., on July 31, 1950, the California Division of Highways lost one of its most experienced and valued employees and his associates a loyal and esteemed friend.

Tilton was born at Delano, California, on December 20, 1890. He entered the service of the Division of Highways in 1918 as Chief of Party on surveys in the San Luis Obispo District, rising to Assistant District Engineer in 1931. In 1933 he transferred to Sacramento as Assistant Construction Engineer in the Headquarters Construction Department and served in that capacity until his death.

While employed in District V under the supervision of then District Engineer Gibson, Tilton had a great deal to do with the location and construction of the state highway along the Monterey Coast between San Simeon and Carmel, as well as several other large projects.

Always interested in the more important features of highway construction, Tilton became an authority on highway drainage, being coauthor of the handbook entitled "California Culvert Practice," which has been in great demand by road building agencies throughout the world since its publication in 1944.

Over the years Tilton has been intimately connected with prison labor work, first in District V along the Monterey Coast and later as Headquarters' representative on all such work in the various districts throughout the State. He eventually became a national authority on the administration of prison labor camps and a series of articles on this subject recently appeared in *California Highways and Public Works*. It is proposed to publish these articles in booklet form.

In 1925-26, during an intermission in state service, Tilton was employed as an engineer by William Randolph Hearst in the laying out and construction of the road from San Simeon to Hearst's "castle" on one of the hills several miles away. According to Tilton one of the interesting conditions of this assignment was that either the castle or the ocean must be in view from every point on the road; also, that no trees would be allowed to be destroyed.

Several years ago he became interested in boating on the Sacramento River and acquired a cabin cruiser on which he spent many happy days with his family and friends on the river and in the delta region. During World War II he was appointed commander of the local flotilla of the U. S. Coast Guard Auxiliary. In recent years he was very active in the Sacramento Yacht Club and was instrumental in the development of Miller Park.

Tilton was an ardent philatelist and possessed one of the finer Sacramento collections. Another of his pet avocations was hunting, and every year Tilton roamed the fields and mountains in search of pheasants, waterfowl and deer. He was considered a crack shot with the rifle.

In 1919 Tilton joined the American Society of Civil Engineers and, at the time of his death, was an Associate Member, Sacramento Section.

George Tilton's passing has left a void not only in the ranks of those who are following his profession but also among those in the many other walks of life with whom he was so closely associated.

Rodney C. Richardson Succeeds W. H. Hamblin

DIRECTOR of Public Works C. H. Purcell has announced the appointment of Rodney C. Richardson of Sacramento to succeed W. H. Hamblin as Assistant to the Director. Hamblin has been called back into service with the Navy as a commissioned officer. Richardson will serve until Hamblin returns.

WILLIAM H. HAMBLIN

After attending the University of California at Los Angeles and the University of Southern California, Richardson served in the Marine Corps during World War II. He first entered state service as executive secretary of the Governor's Veterans Committee, which later became the California Veterans Commission, in November of 1944. He served successively as assistant chief, Airport Master Planning Staff; coordinator of centennial affairs and then as Deputy Director, Governor's Office of Planning and Research. He left state service in 1948 and has been engaged in general insurance business in Sacramento during the last two years.

Traffic Interchange Design

By SAM HELWER, Assistant Engineer of Design

A TRAFFIC INTERCHANGE is defined as: "A system of interconnecting roadways in conjunction with a grade separation or grade separations providing for the interchange of traffic between two or more roadways or highways on different levels." A traffic interchange permits safe and uninterrupted flow of the through traffic and minimizes the hazards and interruptions to the turning movements by elimination or reduction of the conflicts inherent to an intersection at grade.

It must be understood that complete elimination of conflict and uninterrupted direct flow of all of the turning movements is not achieved. While the interchange minimizes these conflicts, there is always a residual minor conflict at the ramp entrances and exits due to weaving at these points. Some interchange types require left turns at grade on the roadway of secondary importance, while others require unnatural and circuitous movements which introduce an element of confusion. Complete elimination of these features is usually not economically justifiable. However, in spite of this trading of points of conflict, the reduction in number and degree of hazards makes the traffic interchange the safest and most efficient method of providing traffic service at the intersection of two or more roadways.

INTERSECTION CONFLICTS

The area within an intersection at grade is at once an integral part of each road, resulting in conflicts which can be divided into three general types: head-on, cross and turning. Although the head-on conflict between movements in opposite directions on the same roadway pertains to the entire facility and not just the intersection, this conflict does add to the intersection problem. It can be eliminated by construction of a divided roadway.

WARRANT FOR DIVIDED HIGHWAY

The most important factor in determining the warrant for construction or improvement of a facility to four lanes divided is traffic capacity. An accepted figure of 5,000 A.D.T. has been used in California. This figure must be carefully analyzed, however, because the average daily volume does not give a complete picture of traffic capacity. Peak hour volumes, cross and turning movements, grade rates, sight distance and percentage of trucks all have a direct bearing on the capacity of any facility. There are circumstances where construction of a four-lane divided highway is warranted where the A.D.T. volume is less than 5,000. In other circumstances a volume in excess of 5,000 may not be sufficient warrant, in itself, to construct a divided highway section.

CROSS CONFLICT

The cross conflict between the four straight through movements can be eliminated by providing a grade separation structure, with the necessary raising or lowering of the grade line of one or both of the crossroads. Having accomplished this, however, the solution of the intersection problem has only started.

TURNING CONFLICT

In addition to the four through movements, there are four right turn and four left turn movements, making a total of 12 movements, which must be segregated to provide the interchange facilities between the two through roads. It is relatively simple from a design standpoint to provide free-flowing connections for the four right-turn movements. These connections can depart naturally from the right side of one facility to join in a merging movement on the right side of the cross facility. The four left-turn movements, however, are a different problem. If the left turns could be eliminated, one basic interchange pattern could serve all intersections. It is the left turns that are responsible for the various types and shapes of interchanges.

WARRANTS FOR GRADE SEPARATION

The elimination of the intersection at grade has always been more of a problem in economics than a problem in engineering. It is quite evident that a system of priority must be established in order that the most important intersections will be taken care of first.

The only recognized numerical warrant is the American Association of State Highway Officials' warrant for grade separations on the Interstate Highway System, which states, "For a design traffic density of 3,000 vehicles *per hour* or more on an interstate highway or equal, every effort shall be made to eliminate all cross traffic at grade." This warrant is satisfactory as far as it goes, but there are many situations not covered in this statement where grade separations are warranted.

The usual engineering approach to a problem is to reduce all variables to a numerical quantity or to set up a formula which can be solved for a negative or positive answer. For this problem, however, no satisfactory mathematical solution has yet been devised.

1. Topography Warrant

There are, however, several general warrants for grade separations which must be given consideration. Of these, the most obvious is where topography is such that other types of intersection design cannot be utilized. This warrant is not frequently encountered due to the ability to change topography cheaply with modern earth-moving equipment.

2. Bottleneck Warrant

Another warrant is the elimination of a bottleneck where existing intersection facilities are no longer adequate to carry peak hour flow. Although a separation structure will eliminate this

type of bottleneck, there are locations where a cheaper solution can be used effectively, if cooperation of the local governing bodies can be obtained. Many cities have already demonstrated that one-way streets and elimination of parking and left turns are inexpensive methods of relieving existing traffic problems. Due to the high costs involved in interchange construction and the large number of existing congested intersections, it will be many years before relief can be obtained by this method. It will be necessary in many instances to obtain the support of local governing bodies to set up a more effective local street traffic pattern.

The recently completed Roseville railroad underpass illustrates another example of this warrant. Traffic counts made prior to construction indicated 11,000 vehicles and 3,500 pedestrians used the crossing daily. Since this grade crossing was situated at the throat of one of the busiest railroad classification yards in the country, there were an unusually large number of train movements. Checks showed the crossing was blocked 20 percent of the time, including an average of 15 trains a day which stopped traffic for five minutes or more.

3. Isolated Intersection Warrant

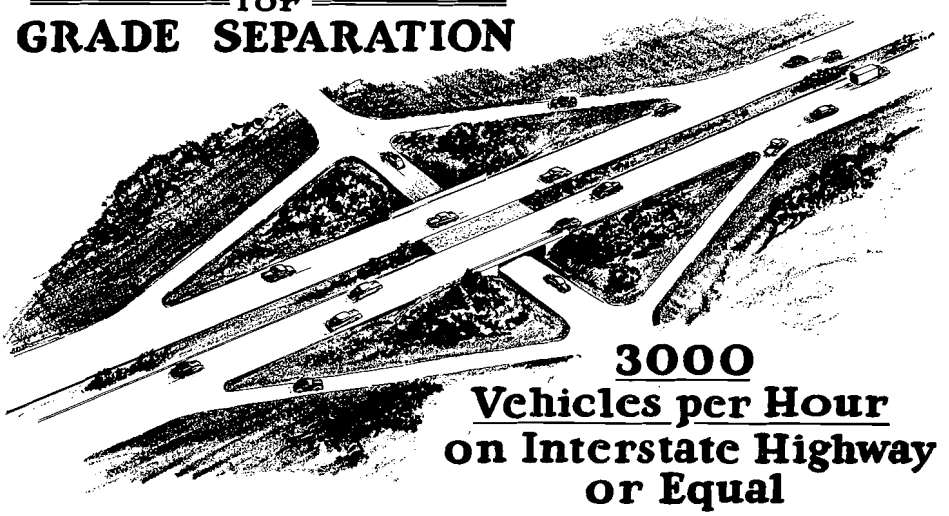
Still another warrant is the prevention of accident at an isolated intersection where high speed and the element of surprise result in a site of recurring accidents.

4. Freeway Development Warrant

A freeway or expressway development, for the safe and rapid movement of heavy traffic volumes, furnishes the most important warrant for a grade separation. A freeway, by definition, requires the complete elimination of all intersections at grade. Similarly, an expressway, by definition, generally requires grade separations at intersections. On this type of highway development, the actual numerical warrants of a particular grade separation must be submerged in the design of the artery as a whole.

There is a further ramification of this particular warrant. A community being served by a conventional type of highway, with its attracted commercial strip developments and heavy volumes

A.A.S.H.O. WARRANT for GRADE SEPARATION



3000 Vehicles per Hour on Interstate Highway or Equal

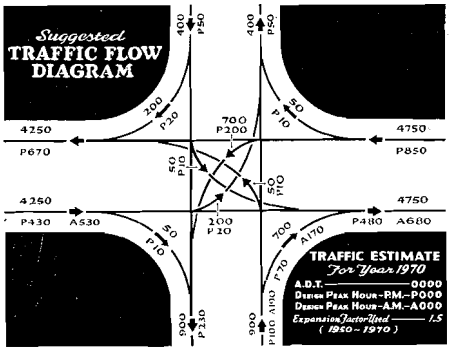
of through traffic, is effectively severed by the attendant hazard, confusion and congestion. Replacement by freeway construction with free-flowing interchanges and safe crossings of the traffic streams on grade separations, has the effect of binding the community together again. Therefore, for this type of development, strict numerical warrants must be tempered with community service, land use and local street circulation considerations; obviously no empirical formula would be satisfactory.

DETERMINATION OF INTERCHANGE TYPE

After selection of the interchange locations, the next step is the selection of the type of interchange. A determination of type must be based on several influencing factors, including a complete traffic analysis, available funds, topography, building developments and right of way limitations. These factors and subsequent development of interchange requirements are frequently so extensive that their fulfillment reflects on the location of the entire freeway. The location of a freeway should not be fixed to a definitely located center line until the traffic interchange problems have been carefully analyzed and evaluated along with other factors influencing location.

1. Traffic Analysis

The design of a traffic interchange should not be undertaken until a complete traffic analysis covering both present and future needs has been made. This analysis should include A.D.T., peak hour volumes and time of peak hour flow for all 12 of the movements through the intersection. In California, the design of an interchange is based on the traffic movements anticipated 20 years after construction. The traffic flow diagram gives an indication of the most desirable interchange type from a traffic service and safety standpoint.



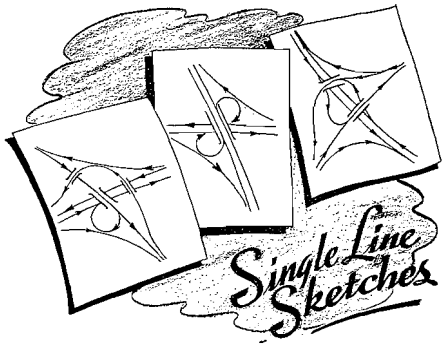
2. Other Factors

If economy could be overlooked, it would be unnecessary to list any other factors influencing design except traffic. Since this is not the case, it is necessary to give a complete study to topography, building development and right of way limitations which control the type of design and construction to the funds available for the project.

3. Single Line Design Sketches

An experienced designer, with full knowledge of the traffic, topography and developments at a given location, can recognize a suitable design for that

location, provided it is one of the simpler design types. However, for major interchanges and complicated conditions of traffic and physical controls, it is necessary to study and develop a series of designs which must be carefully analyzed before a determination can be made of the most suitable design.



At this stage of design, the preferred method of study is a development of freehand scale sketches, showing each one-way pavement as a single line. This method is time saving to the designer who is not yet concerned with details and dimensions. An excellent discussion of this method of preliminary design is contained in the Bureau of Public Roads pamphlet by Loutzenheiser and Leisch on the Preliminary Design of the Kenilworth Interchange near Washington, D. C.

For the purpose of headquarters review and approval of a general plan for a complicated interchange, it is recommended that several single line sketches of possible alternate plans be submitted at early plan stage. The single-line drawings should be on a relatively small scale, say 1 inch=200 feet, and should also include proposed profiles on an appropriate scale.

INTERCHANGE CLASSIFICATION

Interchanges can be classified into two general types—direct and indirect. In the direct type of interchange, left movements turn more or less naturally toward the left, while right movements turn directly right. This is in contrast to the indirect type of interchange where both left and right movements first turn right. The left turn then goes through a 270 degree loop or turns across traffic at grade on the cross facility before going over or under the stream of traffic on the road in the original direction of travel.

1. Direct Type

Direct type interchanges are usually designed for heavy turning volumes where an indirect loop arrangement would be inadequate and the circuity of travel would develop a substantial economic loss in operating costs. This type may be used at the intersection of two major highways and frequently requires multiple structures or multiple vertical-level single structures. The direct type provides a maximum of traffic service, but may be expensive to construct.

At the intersection of two major traffic arteries, it is sometimes necessary to eliminate interchange connections for the minor movements in order to provide free-flowing direct connections for the major movements. The minor movements that are sacrificed for the major movements can usually be provided for at other locations removed from the major interchange site. From an operation standpoint, the simplest traffic interchange is the most desirable interchange. This is particularly true where heavy volumes of interchange traffic must be accommodated.

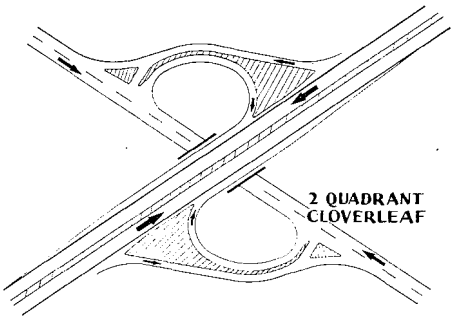
The definition of a traffic interchange includes the interchange of traffic "between two *or more* roadways or highways." Unfortunately this is a true statement; interchanges are required occasionally at the intersection of more than two roadways. When this happens it is extremely difficult to achieve a design that can be called either simple or direct. The answer to this problem does not lie wholly in the field of interchange design. Its solution is in proper location of line in the advance planning stage. When the location of a freeway results in an intersection of more than two roadways, every effort should be made to relocate either the freeway or one or both of the intersecting roadways.

2. Indirect Type

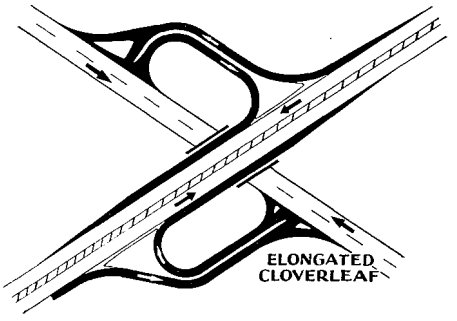
The indirect interchange includes the cloverleaf design with its various modifications, the diamond type, the bridged rotary, the trumpet type and hybrid combinations of all of these.

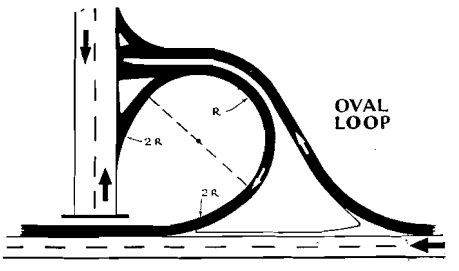
TWO-QUADRANT CLOVERLEAF

There are other types of cloverleaf design that have been used more frequently, the principal variation being a two-quadrant cloverleaf design. This design is used where the principal turning movements are in two quadrants, with only minor movements in the other two. The loops are arranged to eliminate left turns for the major movements while the minor movements are required to turn left across traffic on the cross facility. This type of design has been used successfully on many freeways throughout the country. Judgment must be used, however, in the design of the alignment of the loops.



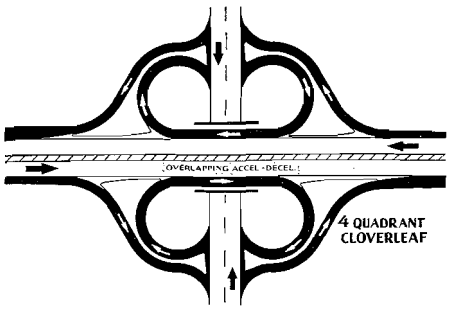
Elongated loops sometimes fit the topography and developments more easily than circular or oval-shaped loops, but the short radius curves at each end of an intervening section of tangent are vulnerable to turning difficulties caused by the induced increased speed on the tangent section. From an operation standpoint, an oval-shaped loop, having curves at each end, whose radii are about double the radius of the central portion of the loop, induce more uniform operating speeds.





FOUR-QUADRANT CLOVERLEAF

A discussion of the advantages and disadvantages of some of the more common design patterns is now in order. The four-quadrant cloverleaf



design is probably most familiar, although its adaptability is rather limited. The chief advantage of the cloverleaf is that *all* left-turn conflicts are eliminated on both cross facilities. This type of design is particularly warranted where the turning movements are approximately equal in all quadrants and where the through traffic on the cross facility is heavy enough to warrant elimination of all left-turn movements.

The disadvantages of a four-quadrant cloverleaf frequently outweigh the advantages. This design requires extremely large areas of right of way for even moderate ramp connection design speeds, which makes it prohibitive in many highly developed areas. There is also an economic charge for circuity of travel where substantial turning volumes are to be accommodated. Another disadvantage of any cloverleaf loop is the necessity of driving beyond the intersection and then

. . . *Continued on page 60*

STATE MERIT AWARD PROGRAM

To the Employees of the Department of Public Works

Each and every employee of the Department of Public Works is urged to participate in the State Merit Award (Employee Suggestion) Program, which is being inaugurated pursuant to legislative authorization.

This is an opportunity for employees to contribute to more efficient government through suggestions that reduce of eliminate expenditures. Each of you may be assured your ideas will receive careful consideration by a broadly representative committee, which in turn will refer your proposals to qualified personnel for comprehensive study.

I am asking the chief of each division to give this program his wholehearted support and to designate one of his immediate assistants to actively sponsor and stimulate this effort. I want every employee to have an opportunity to demonstrate his interest in improving our working methods and our service to the public.

We know that many of you have good ideas—let's be "suggestion conscious" and don't forget the cash awards!

C. H. PURCELL, Director of Public Works

WHAT IS THE STATE MERIT AWARD PROGRAM?

It is a program authorized by the Legislature to compensate employees by CASH AWARDS for suggestions that are adopted by the State, which make possible an elimination or reduction of state expenditures. If the adopted suggestion does not merit a cash award, the suggester will receive a letter or certificate of commendation.

WHO IS ELIGIBLE?

Every employee of the Department of Public Works is eligible to participate in this program—every employee of the State of California, as a matter of fact.

WHERE SHOULD SUGGESTION BE SENT?

A self-explanatory "Employee Suggestion Form" has been prepared, which also serves as a self-addressed envelope, which is addressed to:

State Merit Award Board
1020 N Street
Sacramento 14, California

A supply of these forms have been sent to each office of the Department of Public Works, so just ask your supervisor for your copy.

CAN MORE THAN ONE SUGGESTION BE SUBMITTED?

Yes, you may submit as many as you have ideas, although there is a limit of 10 awards that can be made to any agency in any year.

ARE THERE ANY RESTRICTIONS ON SUGGESTIONS?

Only that the suggestion must be outside the scope of your normal job responsibilities to be eligible for a cash award.

DOES THE IMMEDIATE SUPERVISOR OF AN EMPLOYEE HAVE TO APPROVE ANY SUGGESTION THAT IS SUBMITTED?

No, you may submit your suggestion directly to the Merit Award Board, and it will be forwarded without personal identification to the person or persons qualified to determine its feasibility.

WHO ARE MEMBERS OF THE MERIT AWARD BOARD?

The Merit Award Board has been appointed by the State Board of Control and is composed of five members: a representative of the Department of Finance, a member of the State Employees' Association, a representative of the Personnel Board, an employee at the supervisory level, and an employee at the nonsupervisory level.

HOW ARE THE SUGGESTIONS CONSIDERED?

Your suggestion goes first to the Merit Award Board and then is referred at once to a state agency or agencies for consideration. Within 30 days the agency reports its findings and recommendations to the board, along with the estimated cash savings from adoption of the idea.

The Merit Award Board will then evaluate the suggestion and determine the award.

DO THE SUGGESTIONS HAVE TO COVER ALL TECHNICAL POINTS?

No, however enough information must be furnished to allow the proper consideration of the idea on its own merits. You must make some outline of the method of procedure by which your idea can be put into practice. Be as thorough as possible.

WHEN DOES THE PROGRAM START?

Right now! See your employee's magazines and bulletin boards for further details—or ask your supervisor—NOW IS THE TIME FOR YOU TO OFFER YOUR SUGGESTIONS!

James G. Standley

Continued from page 33 . . .

develop from 1914 to the present and played an important role in that development."

In May, 1929, Jim was transferred to headquarters in Sacramento as assistant maintenance engineer and served in this capacity until January 1, 1931. At this time he was transferred to the State Highway Engineer's Office to be in charge of personnel and organizational matters. He continued in this assignment until his retirement.

He became widely acquainted not only with the Division of Highways personnel throughout the State, but with representatives of labor organizations, the State Personnel Board and its staff, and representatives of other state agencies. For many years he served as a member of the Board of Review of Contractors' Claims, and has a wide acquaintanceship among highway contractors.

Jim received almost all grievances from state-wide highway employees and earned their confidence. He instigated continuing salary surveys and was able to convince the Personnel Board by logical presentation of facts of the equity of many salary increases. As a matter of fact, his salary increase presentations were watched and followed by other state agencies.

"The Division of Highways is a great outfit. We who have retired hate to leave it," says Jim.

Kennedy New Secretary of Highway Body

BORN in Wisconsin, educated in Oregon and a citizen of California since 1916, R. C. "Cass" Kennedy is the new Secretary of the California Highway Commission.

R. C. (CASS) KENNEDY

Named Rolland Cashel by his doting mother, he got dubbed Cassiday while a freshman at the University of Oregon. That was soon shortened to "Cass" and few of his hundreds of friends really know what his real name is.

Kennedy was educated as an electrical engineer and followed engineering for a number of years but broke away from the profession to do many other things. For years he was part of the automotive department of the Oakland *Tribune*. As such he was continually boosting good roads and making the Motorlog trips for the *Tribune*.

But he branched out for himself as a public relations and advertising man and has had his own business as a free lance writer for a number of years.

During World War I Kennedy was in the Army and when World War II came along he signed up with Lockheed Aircraft Corporation and was there for the duration. After VJ day a couple of years were spent in San Diego in the industrial relations field. But Northern California called and back to Oakland he came.

And from there he came to Sacramento as Secretary of the California Highway Commission.

Kennedy is married and boasts that he has had the same wife all the time. A son in Los Angeles and a daughter in Massachusetts have, between them, made him a grandfather three times—but you would never know it to watch him in action.

Carter Honored by Traffic Institute

F. M. CARTER, Senior Highway Engineer of the Division of Highways, at the recent New York convention of the Institute of Traffic Engineers was elected a member of the Board of Direction.

The institute is a national organization of the outstanding traffic engineers and leading authorities, not only from the United States but from many other countries, on the design of and traffic operation on streets and highways.

The institute sponsored and assisted in producing the Manual on Traffic Control Devices, through which uniformity is being obtained in all the states.

Organized 20 years ago, its influence in traffic operation and safety is evidenced by the inclusion of its members on all national committees concerning traffic operation and safety.

The institute, in the interest of traffic safety and advancement of the profession of traffic engineering, sponsors annual awards to those states and cities showing outstanding achievements in traffic engineering during the year. California received this award in 1948.

Maintenance Men And Patrolmen Are Honored

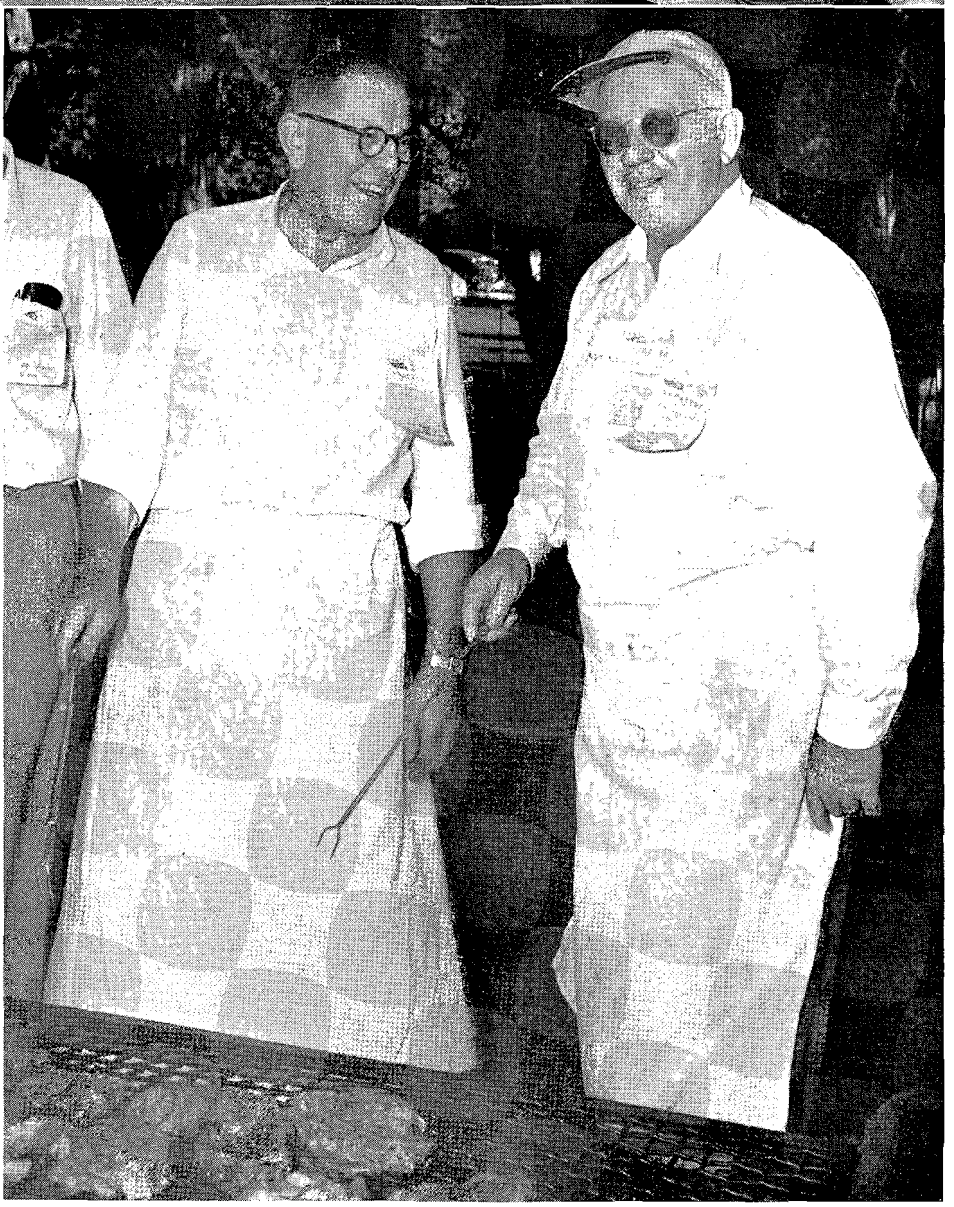
HEADS OF SOME of the largest motor carrier organizations in the West put on white aprons on the afternoon of August 26th and cooked steaks, served refreshments and otherwise acted as hosts at a barbecue honoring more than 150 California State Highway maintenance employees and highway patrolmen. The event, sponsored by the Western Highway Institute, took place in Bear Valley, near Emigrant Gap, at picnic grounds loaned for the occasion by the Pacific Gas and Electric Company.

The party began at 3 p.m. and lasted until dusk, giving the various groups represented a chance to become acquainted with each other. These included, besides the guests of honor, representatives from many of the principal motor carrier organizations operating regularly over Highway U. S. 40, from the Western Conference of Teamsters, and from manufacturers of motor truck equipment. Total attendance exceeded 175.

There were no speeches, with the exception of a very brief greeting by John L. Springer, president of W. H. I., who gave recognition to the work being done by state highway employees, especially during winter, in keeping Highway U. S. 40 safe for traffic.

Among the guests were R. B. Millard and E. L. Miller of the California Department of Public Works in Sacramento, and Chief E. Raymond Cato and Captain Thad J. Douarin of Highway Patrol headquarters in the state capitol. Also attending were R. I. Nicholson, District Maintenance Engineer from Marysville, Captain George Peterkin of the patrol office in Roseville, and Tom Buell, head of the highway maintenance division at Truckee.

Another group of prominent guests came over from Reno, Nev., to attend the outing. These included: Chief Ed Gily of the Nevada Highway Patrol; G. F. Armstrong, maintenance superintendent of the Nevada High-



UPPER—Scene at barbecue in Bear Valley. LOWER—Barbecue cooks, Hal Kern, left, Chief E. Raymond Cato, California Highway Patrol, right

way Department; and Matt Walsh, J. L. Hancock, and W. H. Gibson, all Nevada Highway Department engineers.

The Western Highway Institute committee in charge of arrangements was headed by Jos. A. Gritsch, of the Oregon - Nevada - California Fast Freight, Inc., San Francisco, as chairman; Tony Lombardi, Western Truck Lines, Los Angeles, Cal., and Howard A. Wells, Wells Cargo, Reno, Nev. They were assisted by H. A. Kern, Bekins Van Lines, San Francisco; Wm. S. Darnell, Redding Trucking Service, Redding, Cal., and L. M. Jenkins, J. T. Jenkins Co., San Francisco.

Motor carrier organizations affiliated with the Western Highway Institute who sponsored the barbecue included Bigge Drayage Co., Oakland; Consolidated Freightways, Inc., Portland; Fortier Transportation Co., Fresno; Garrett Freightlines, Inc., Pocatello; Inland Freight Lines, Salt Lake City; Interstate Motor Lines, Inc., Salt Lake City; Kentner Truck Line, Inc., San Francisco; Lang Transportation Corp., Los Angeles; North American Van Lines, Inc., Fort Wayne; Oregon-Nevada-California Fast Freight, Inc., San Francisco; Pacific Intermountain Express, Inc., Oakland; F. N. Rumbley Co., Fresno; Sacramento Freight Lines,

. . . Continued on page 63

HIGHWAY BIDS AND AWARDS

July, 1950

KERN COUNTY—Over the tracks of the Southern Pacific Company at Oil Junction the existing steel bridge to be cleaned and painted. District VI, Route 4, Section G. R. W. Reade and Co., Berkeley, $3,429; The O'Connor Rustproofing Co., Los Angeles, $5,950. Contract awarded to Acme Spray Painters, Long Beach, $2,840.

KERN COUNTY—Between Isabella Dam Site and Route 57, about 1.9 miles to be graded and surfaced with imported base material bituminous surface-treated and reinforced concrete and structural steel bridge to be constructed. District VI, Route 142, Section F. Dimmitt and Taylor, Monrovia, 233,466; Oilfields Trucking Co. and Phoenix Construction Co., Inc., Bakersfield, $271,505; J. A. Payton, Riverside, $326,657; Rexroth and Rexroth, Bakersfield, $329,849; Frederickson and Kasler, Sacramento, $331,290. Contract awarded to Dix-Syl Construction Co., Inc., Bakersfield, $217,743.

LOS ANGELES AND ORANGE COUNTIES—Over Alamitos Bay in the City of Long Beach and over the Santa Fe Railway tracks at Irvine, two steel bridges to be cleaned and painted. District VII, Routes 60, and 2, Section L Bch, B. Contract awarded to Acme Spray Painters, Long Beach, $3,726.

LOS ANGELES COUNTY—On Rosemead Boulevard, at Ramona Freeway interchange area, furnish and install highway lighting system. District VII, Route 168, Section C. C. D. Draucker, Inc., Los Angeles, $14,470; Clinton Electric Corp., Los Angeles, $14,633; Electric and Machinery Service, Inc., South Gate, $14,888. Contract awarded to Newbery Electric Corp., Los Angeles, $10,410.

MENDOCINO COUNTY—Across Alder Creek and Greenwood Creek, about 9 and 20 miles north of Point Arena, respectively. District I, Route 56, Sections B, C. D. E. Burgess Co., San Francisco, $4,344. Contract awarded to R. W. Reade and Co., Berkeley, $2,578.

MODOC COUNTY—In the Town of Cedarville. District II, Route 28, Section C. C. C. Gildersleeve, Nevada City, $14,985. Contract awarded to Rand Construction Co., Bakersfield, $13,875.

MONTEREY COUNTY — Across the Salinas River at Bradley, existing steel bridge to be cleaned and painted. District V, Route 2, Section I. Williams and Kelly, Los Angeles, $13,870; R. W. Reade Co., Berkeley, $16,990; D. E. Burgess Co., San Francisco, $17,596; The O'Connor Rustproofing Co., Los Angeles, $19,942. Contract awarded to Allied Painters and Decorators, Inc., Oakland, $11,376.

MONTEREY COUNTY—At the Del Monte Junction, in the City of Monterey, furnishing and installing highway lighting system. District V, Routes 56, 117. R. Flatland, San Mateo, $2,800; Louis Electric Co., Salinas, $3,100; Granite Construction Co., Watsonville, $4,844. Contract awarded to L. H. Leonardi Electric Construction Co., San Rafael, $2,495.

RIVERSIDE COUNTY—Across Almar Ditch about one-half mile north of Oasis. District XI, Route 26, Section G. E. G. Perham, Los Angeles, $25,962; Anderson Co., Visalia, $26,152; W. J. Disteli, Los Angeles, $28,204; J. E. Haddock, Ltd., Pasadena, $29,397; E. S. and N. S. Johnson, Fullerton, $31,655; E. L. Thornsten, Santa Monica, $36,960; Walter H. Barber and H. R. Breeden, La Mesa, $41,641. Contract awarded to C. B. Tuttle Co., Long Beach, $25,891.

SACRAMENTO COUNTY—On 16th Street, between Broadway in Sacramento and 12th Street north of Sacramento, about 2.3 miles, plant-mixed surfacing to be placed on existing pavement. District III, Routes 4, 3. Section B. J. B. Reeves, Sacramento, $35,010; A. Teichert and Son, Inc., Sacramento, $35,228; McGillivray Construction Co., Sacramento, $37,940. Contract awarded to Brighton Sand and Gravel Co., Sacramento, $34,830.

SACRAMENTO COUNTY—Across San Joaquin River, about 5 miles north of Antioch, the fenders of the existing bridge to be repaired. District X, Route 11, Section C. Healy Tibbits Construction Co., San Francisco, $24,122; Ben C. Gerwick, Inc., San Francisco, $28,651; The Duncanson-Harrelson Co., Richmond, $28,776; M. B. McGowan, Inc., San Francisco, 32,191. Contract awarded to Howard F. Lauritzen, Pittsburg, $19,479.

SACRAMENTO COUNTY—Across American River, near Elvas, about 1 mile northeast of Sacramento, the substructure for a bridge and portion of north embankment to be constructed. District III, Route 98, Section B. Erickson Phillips and Weisberg, Oakland, $623,191; Bates and Rogers Construction Co., San Francisco, $682,320; C. B. Tuttle Co., Long Beach, $684,022; Underground Construction Co., Oakland, $697,290; Granite Construction Co., Watsonville, $724,168; George Pollock Co., Sacramento, $756,882; Charles MacClosky Co., and Harms Bros., San Francisco, $771,918; United Concrete Pipe Corp., and Ralph A. Bell, Baldwin Park, $784,804; A. Teichert and Son, Inc., Sacramento, $792,840; Guy F. Atkinson, South San Francisco, $794,310; John C. Gist, Sacramento, $842,292; Walsh Construction Co., San Francisco, $871,913. Contract awarded to Lord and Bishop, Sacramento, $608,569.

SAN DIEGO—In the City of San Diego, Pacific Highway, between Couts Street and Rosecrans Street, about 0.7 mile to be graded and surfaced with plant-mixed surfacing, District XI, Route 2. Griffith Co., Los Angeles, $54,464; R. E. Hazard Contracting Co., San Diego, $59,897; V. R. Dennis Construction Co., San Diego, $62,583; Daley Corporation, San Diego, $63,768. Contract awarded to Cox Bros. Construction Co., Stanton, $52,965.

SAN DIEGO COUNTY—In the City of Oceanside, on Mission Avenue, between Horne Street and Canyon Drive, about 0.7 mile, bituminous surfacing treatment to be applied to portion of existing roadway. District XI, Route 195. E. S. and N. S. Johnson, Fullerton, $45,180; Cox Bros. Construction Co., Stanton, $49,491; Ralph B. Slaughter, Julian, $58,006. Contract awarded to Arthur A. Johnson, Laguna Beach, $40,063.

SAN FRANCISCO COUNTY—On Funston Avenue, between West Pacific Avenue and Junction Route 2 in City of San Francisco, District IV, Route 56. R. W. Reade and Co., Berkeley, $4,995; Giampolini and Co., San Francisco, $5,335; Russell Hinton Co., San Francisco, $5,474; Martin Fried, San Francisco, $8,398. Contract awarded to D. E. Burgess Co., Colma, $4,809.

SAN LUIS OBISPO AND MONTEREY COUNTIES—Across Pico Creek and Little Pico Creek, about 4 miles north of Cambria, and across Limekiln Creek, about 2 miles south of Lucia, three existing steel bridges to be cleaned and painted. District V, Route 56, Sections B, C. Allied Painters and Decorators, Inc., Oakland, $16,674; G. C. Hewitt and Co., Ltd., Los Angeles, $20,653; R. W. Reade and Co., Berkeley, $25,488. Contract awarded to Acme Spray Painters, Long Beach, $11,369.

SANTA CLARA COUNTY—Between Palo Alto and Sunnyvale, about 5.9 miles, constructing additional roadway width by constructing plant-mixed surfacing on cement treated base and placing plant-mixed surfacing on portions of the existing pavement. District IV, Route 2, Section A, MVw. Leo F. Piazza Paving Co., San Jose, $375,263; A. J. Raisch Paving Co., San Jose, $379,529; Chas. L. Harney, Inc., San Francisco, $397,672; Clements and Co., Hayward, $410,234; A. Teichert and Son, Inc., Sacramento, $418,560; Granite Construction Co., Watsonville, $442,321. Contract awarded to Frank B. Marks, Jr., Newman, $367,478.

SANTA CRUZ COUNTY—Across Blooms Creek about 23 miles N.W. of Santa Cruz in Big Basin Redwoods State Park; a timber and log bridge to be constructed. District IV. Granite Construction Co., Watsonville, $4,899; Huettig, Schromm and Bennett, Palo Alto, $6,661. Contract awarded to Leo F. Piazza Paving Co., San Jose, $4,556.

SIERRA, NEVADA, AND PLACER COUNTIES—Across North Fork Yuba River, 3.9 miles north of Yuba County line. North Fork of North Fork Yuba River at Downieville, over Southern Pacific Rail Road Co. tracks, 4 miles east of Emigrant Gap, and across Bear River, 9 miles north of Auburn, four existing steel bridges to be cleaned and painted. District III, Routes 25, 37, and 17, Sections A, A, C. Allied Painters and Decorators, Inc., Oakland, $14,864. Contract awarded to R. W. Reade and Co., Berkeley, $14,790.

SONOMA COUNTY—At various locations between Healdsburg and Santa Rosa and at Sonoma, about 6.4 miles to be graded and surfaced with plant-mix surfacing. District IV, Routes 1 and 51, Section B. James R. Armstrong, El Cerrito, $149,567; Lee J. Immel, San Pablo, $160,061; J. Henry Harris, Berkeley, $185,813. Contract awarded to A. G. Raisch Co., San Rafael, $148,749.60.

SONOMA, SAN MATEO, SANTA CLARA, AND SAN JOAQUIN COUNTIES—District IV, various locations, sealing pavement joints. Contract awarded to Concrete Pavement Maintenance Co., San Francisco, $37,994.

SUTTER COUNTY—On the Sutter Causeway about 12 miles north of Knights Landing, about 1.0 miles to be surfaced with plant-mix surfacing and applying seal coat. District III, Route 87, Section B. Contract awarded to Rice Bros., Inc., Marysville, $14,478.

TULARE COUNTY—At the intersection of Mineral King Avenue with Mooney Boulevard in Visalia, a full traffic actuated signal system and highway lighting to be furnished and installed. District VI, Routes 10, 132, Section B. C. D. Draucker, Inc., Los Angeles, $13,746; L. H. Leonardi Electric Construction Co., San Rafael, $14,999; R. O. Ferguson Co., Visalia, $16,489. Contract awarded to Westates Electrical Construction Co., Los Angeles, $13,301.

YUBA COUNTY—Between Marysville and Butte County line (portions) at mile 1.8, mile 2.8, and mile 3.8 about 0.7 mile to be graded, imported, subbase material and crusher run base to be placed and surfaced with plant-mix surfacing. District III, Route 87, Section A. H. Earl Parker, Inc., Marysville, $34,581. Contract awarded to Rice Brothers, Inc., Marysville, $31,142.

Federal Aid Secondary County Highways

ALAMEDA COUNTY—Between Alvarado and 3 miles southeasterly, portions about 2.8 miles in length, constructing a graded roadbed, placing imported subbase material and crusher run base, and surfacing with plant-mix surfacing. District IV, Route 1025. Eugene G. Alves, Pittsburg, $164,870; Silva Brothers, Hayward, $169,227; Harms Bros., Sacramento, $194,532; J. Henry Harris, Berkeley, $210,081. Contract awarded to Clements and Co., Hayward, $159,852.

GLENN COUNTY—Between 4.7 miles east of U. S. 99 W. and State Route 45 at Four Corners, about 5.1 miles to be graded and surfaced with imported base material. District III, Route 1121. Browne and Krull, Hayward, $47,831; W. H. O'Hair Co., Colusa, $51,582; Volpa Brothers, Fresno, $51,688; Nevada Constructors, Inc., Reno, $53,464; Baker Trucking Co., Hamilton City, $54,753; Harms Bros., Sacramento, $58,267; P. J. Moore and Son, North Sacramento, $61,049; McGillivary Construction Co., Sacramento, $63,310; O'Connor Bros., Red Bluff, $64,713; Eugene G. Alves, Pittsburg, $66,381; H. Earl Parker, Inc., Marysville, $67,762; C. M. Syar, Vallejo, $85,171. Contract awarded to Westbrook and Pope, Sacramento, $47,155.

HUMBOLDT COUNTY—Between 0.7 mile east of Fortuna City Limits and Hydesville (portions), about 3.3 miles to be graded and surfaced with road-mix surfacing on imported base material constructed on imported subbase material. District I, Route 975. John Burman and Sons, Eureka, $84,259; C. M. Syar, Vallejo, $92,952; Tyson and Watters, Inc., Sacramento, $99,565. Contract awarded to Mercer Fraser Co. and Mercer Fraser Gas Co., Inc., Eureka, $84,092.

SAN DIEGO COUNTY—Between Cabrillo Freeway in the City of San Diego and Fairmount Extension, about 3.7 miles to be graded and surfaced with plant-mixed surfacing on cement-treated base to provide a four-lane divided highway. District XI, Route 732, and City Streets. Fredericksen and Kasler, Sacramento, $704,255; R. E. Hazard Contracting Co., C. G. Willis and Sons, Inc., San Diego, $704,785; Peter Kiewit Sons Co., Arcadia, $767,190; N. M. Ball Sons, Berkeley, $780,444; Clyde W. Wood and Sons, Inc., North Hollywood, $789,375; Cox Bros. Construction Co., and J. E. Haddock, Ltd., Pasadena, $823,563; Daly Corporation, San Diego, $923,530. Contract awarded to Griffith Co., Los Angeles, $691,205.

SOLANO COUNTY—Between Vanden and Vacaville and between Vacaville and Elmira, about 2.4 miles in length; about 0.7 mile to be graded and surfaced with plant-mix surfacing placed on untreated rock base constructed on imported borrow; and about 1.7 miles to be graded and surfaced with untreated rock base constructed on imported borrow. District X, Routes 1107 and 1108. Browne and Krull, Hayward, $73,462; Harms Bros., Sacramento, $73,645; Karl C. Harmeling, Stockton, $74,428; Eugene G. Alves, Pittsburg, $80,514; Asta Construction Co., Rio Vista, $81,074; Warren and Drayer, Oakland, $85,423. Contract awarded to Fredrickson Bros., Emeryville, $71,377.10.

STANISLAUS COUNTY—Between City of Oakdale and Town of Waterford, about 9.5 miles, existing pavement to be widened with borders of untreated rock base, plant-mix surfacing to be placed on existing pavement and new base and bituminous surface treatment to be applied to shoulders. District X, Route 904. River Rock, Inc., Merced, $95,563; M. J. Ruddy and Son, Modesto, $99,376; Frank B. Marks, Jr., Newman, $104,669; Munn and Perkins, Modesto, $121,591. Contract awarded to United Concrete Pipe Corp., Baldwin Park, $92,691.

STANISLAUS COUNTY—Between Turlock and Crows Landing Road, and between Monte Vista Avenue and Turlock, about 9.0 miles, the existing roadbed to be widened with untreated rock base and resurfaced with plant-mix surfacing. District X, Routes 916 and 914. Frank B. Marks, Jr., Newman, $88,474, River Rock, Inc., Merced, $93,813; M. J. Ruddy and Son, Modesto, $93,880. Contract awarded to United Concrete Pipe Corp., Baldwin Park, $84,903.70.

STANISLAUS COUNTY—Between Modesto and 5.4 miles westerly, about 5.4 miles, existing pavement to be widened with borders of untreated rock base, plant-mix surfacing to be placed on existing pavement and new base, and penetration treatment to be applied to shoulders. District X, Route 917. M. J. Ruddy and Son, Modesto, $70,745; River Rock, Inc., Merced, $70,919; Munn and Parkins, Modesto, $73,017; Valley Paving and Construction Co., Inc., Pismo Beach, $78,854. Contract awarded to United Concrete Pipe Corp., Baldwin Park, $66,876.

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AMADOR COUNTY—Between Silver Lake and Alpine County Line, about 3.6 miles, to be graded, surfaced with imported surfacing material on imported base material and bituminous surface treatment and seal coat to be applied. District X, Route 34, Section H. Contract awarded to Harms Bros., Sacramento, $226,035.

BUTTE COUNTY—Between Biggs Road and Route 3, about 2.0 miles to be graded and gravel base material placed. District III, Route 45, Section A Rice Brothers, Inc., Marysville, $34,712. O'Connor Bros., Red Bluff, $35,274; Baker Trucking Co., Hamilton City, $35,592; J. P. Brennan, Redding, $39,354; Miles and Bailey, Madera, $42,144. Contract awarded to Eugene G. Alves, Pittsburg, $33,656.

CONTRA COSTA COUNTY—Portions between Monument and Concord, a net distance of about 2.1 miles to be graded and surfaced with plant-mixed surfacing. District IV, Route 75, Section B. Parish Brothers, Benicia, $108,391; Lee J. Immel, San Pablo, $112,638. J. Henry Harris, Berkeley, $121,864. Contract awarded to J. R. Armstrong, El Cerrito, $107,098.84.

DEL NORTE COUNTY—At Hunter Creek, about 2.4 miles north of Klamath, an existing bridge to be removed and a new reinforced concrete slab type bridge to be constructed and approaches thereto to be graded and surfaced with plant-mixed surfacing. District I, Route 1, Section A. Contract awarded to Harms Brothers and C. M. Syar, Sacramento, $84,362.

HUMBOLDT COUNTY—At Salt River, about three miles southwest of Fernbridge, a bridge and approaches to be constructed. District 1, Route 56, Section A. Contract awarded to Mercer Fraser Co., and Mercer Fraser Gas Co., Inc., Eureka, $109,910.60.

LOS ANGELES—In the City of Redondo Beach at the intersection of Pacific Coast Highway with Avenue "F," traffic signal system to be furnished and installed. District VII, Route 60. Electric and Machinery Service, Inc., South Gate, $2,249; Ed Seymour, Long Beach, $2,274; Clinton Electric Corp., Los Angeles, $2,389. C. D. Draucker, Inc., Los Angeles, $2,474; Westates Electrical Construction Co., Los Angeles, $2,478. E. D. Johnson, Anaheim, $2,553. Contract awarded to Fischbach and Moore of California, Los Angeles, $2,173.

LOS ANGELES COUNTY—In the City of Los Angeles install sprinkling system, plant grass, trees and shrubs and install plant boxes in light well, at District Office Building. District VII. Moulder Bros., Glendale, $2,758; James E. Boothe, Lynwood, $3,335; Henry C. Soto Corp., Los Angeles, $3,341. Contract awarded to Jannoch Nurseries, Altadena, $2,310.30.

LOS ANGELES COUNTY—On Foothill Blvd., between Sierra Madre Villa Ave. and Michillinda Ave., about 0.8 mile to be graded and surfaced with plant mixed surfacing on cement treated base and existing pavement. District VII, Route 9, Section Pas, E. Vido Kovacevich Co., South Gate, $80,799; H. and H. Construction Co., Long Beach, $81,372; Warren Southwest, Inc., Torrance, $86,634. Griffith Company, Los Angeles, $92,675. Contract awarded to T. E. Haddock, Ltd., Pasadena, $78,924.

LOS ANGELES COUNTY—Over Harbor Freeway at Fourth Street, in the City of Los Angeles, a reinforced concrete box girder bridge to be constructed and road connections to be graded and paved. District VII, Route 165. K. B. Nicholas, Ontario, $529,140; J. E. Haddock, Ltd., Pasadena, $539,784; Webb and White, Los Angeles, $549,680; Oberg Bros. Construction Co., Inglewood, $560,978; Winston Bros. Co., Monrovia, $565,083; Carlo Bongiovanni, Hollywood, $566.690. Guy F. Atkinson Co., Long Beach, $598,760; Peter Kiewit Sons Co., Arcadia, $605,492; Charles MacClosky Co., San Francisco, $608,687. Contract awarded to W. J. Disteli, Los Angeles, $512.854.10.

LOS ANGELES AND VENTURA COUNTIES—Between 2 miles east of Los Angeles-Ventura County Line and 1 mile west of Moorpark Road, about 7.1 miles in length to be graded and surfaced with plant-mixed surfacing on untreated rock base. District VII, Route 2, Sections C, A. Peter Kiewit Sons Co., Arcadia, $928,642; Clyde W. Wood and Sons, Ins., North Hollywood, $980,884; Oilfields Trucking Co. and Phoenix Construction Co., Inc., Bakersfield, $1,032,019; Cox Bros. Construction Co. and J. E. Haddock, Ltd., Pasadena, $1,033,008. Winston Bros. Co., Monrovia, $1,046,691; Dimmitt and Taylor and T. M. Page, Monrovia, $1,053,051; Claude Fisher Co., Ltd., Los Angeles, $1,054,266. H. and H. Construction Co. and Hess Construction Co., Inc., Long Beach, $1,074.813. Griffith Co., Los Angeles, $1,144,493; Basich Bros. Construction Co. and R. L. Basich and N. L. Basich, San Gabriel, $1,164,902; Tomei Construction Co., Van Nuys, $1,197,405. Contract awarded to Fredericksen and Kasler. Sacramento, $823.334.65.

LOS ANGELES COUNTY—At the junction of Route 4 with Route 79 at Saugus Junction and at Castaic Junction, located approximately 8 miles and 9.6 miles northerly of the north city limits of Los Angeles, respectively, sprinkling systems to be installed. District VII, Routes 4, 79, Sections F, A, B, A. United Sprinkler Co., Los Angeles, $6,147; Forrest C. Cleveland, Los Angeles, $6.489; D. and M. Sprinkler Co., Long Beach, $6,589; Henry C. Soto Corp., Los Angeles, $8,606. Delno E. Hall, Arcadia, $9,509. Contract awarded to Jannoch Nurseries, Altadena, $5,876.

MADERA COUNTY—Between 1.5 miles north of Madera and 0.3 mile north of Dry Creek, about 3.7 miles to be graded and paved with Portland cement concrete on cement treated subgrade and plant-mixed surfacing on untreated rock base, and a reinforced concrete slab bridge to be constructed on concrete pile bents, District VI, Route 4, Section B. Harms Bros., Sacramento, $444,986; Griffith Co., Los Angeles, $447,804. Contract awarded to Guy F. Atkinson Co., South San Francisco, $397,539.

MADERA COUNTY—In the City of Madera, at the intersection of Yosemite Avenue with "D" Street; a fixed time traffic signal system and highway lighting to be furnished and installed. District VI, Route 126. Robinson Electric, Fresno, $4,000; Westates Electrical Construction Co., Los Angeles, $4,817. Contract awarded to Clinton Electric Corp., Los Angeles, $3,746.

MENDOCINO COUNTY—In the City of Willits, between the South City Limits and North City Limits, about 1.6 miles, cement treated base and imported subbase material to be placed on portions and the entire length to be surfaced with plant-mixed surfacing. District I, Route 1, Section Wlts. Contract awarded to Harms Bros. and C. M. Syar, Sacramento, $117,361.90.

MERCED COUNTY—Between Santa Clara County Line and 3.5 miles easterly, to be widened and surfaced with plant-mixed surfacing on cement treated base. District X, Route 32, Section A. Clements and Co., Hayward, $134,772. Clyde W. Wood and Sons, Inc.; North Hollywood, $135,503; Granite Construction Co., Watsonville, $148,506; A. Teichert and Son, Inc., Sacramento, $149,473; Harms Bros., Sacramento, $150,928. Contract awarded to Munn and Perkins, Modesto, $128,902.

MONO COUNTY—Between Conway Summit and Topaz Lake, producing and stockpiling medium screenings. District IX, Routes 23, 95, Sections JK, A. Harms Bros., Sacramento, $33,100; Roland T. Reynolds, Anaheim, $59,700. Contract awarded to Oilfields Trucking Co. and Phoenix Construction Co., Inc., Bakersfield, $27,900.

NAPA COUNTY—Between 1.5 miles and 4.5 miles south of Lake County Line, portions, about 2 miles in net length, to be surfaced with road-mixed surfacing and crusher run base. District IV, Route 49, Section A. Harold Smith, St. Helena, $69,792. J. Henry Harris, Berkeley, $69,864. Contract awarded to C. M. Syar, Vallejo, $52,552.50.

NAPA COUNTY—On Lincoln Road between Napa River and Foothill Boulevard in Calistoga, about 0.1 mile in length, curbs, gutters, and drainage facilities to be adjusted and plant-mixed surfacing to be placed on existing pavement. District IV, Route 49, Section Cstg. Slinsen Construction Co., Napa, $19,835; J. Henry Harris, Berkeley, $22,789. Contract awarded to Harold Smith, St. Helena, $17,879.

ORANGE COUNTY—In the City of Fullerton, at the intersections of Spadra Road with Amerige Avenue and with Union Avenue, traffic signal systems to be furnished and installed. District VII, Route 2. E. D. Johnson, Anaheim, $5,117; Clinton Electric Corp., Los Angeles, $5,160; C. D. Draucker, Inc., Los Angeles, $5,393; Westates Electrical Construction Co., Los Angeles, $5,427; Electric and Machinery Service, Inc., South Gate, $5,457. Contract awarded to Fischbach and Moore of California, Inc., Los Angeles, $4,659.

ORANGE COUNTY—On Manchester Avenue between Lincoln Avenue and Los Angeles Street, furnish and install full traffic actuated signal system at three intersections, furnish and install intersection lighting at three intersections and furnish highway lighting equipment for three intersections. District VII, Route 174, Sections Ana, A. Paul R. Gardner, Ontario, $35,042; Electric and Machinery Service, Inc., South Gate, $35,051; Clinton Electric Corp., Los Angeles, $35,630; Ets-Hokin and Galvan, Wilmington, $36,100. C. D. Draucker, Inc., Los Angeles, $36,857. Contract awarded to Westates Electrical Construction Co., Los Angeles, $34,909.

SAN JOAQUIN COUNTY—On State Route 4, between Mariposa Road and Waterloo Road, 3 traffic signal systems to be furnished and installed, and one state-furnished electrolier to be installed. District X, Route 4, Section E, C. R. Goold and Son, Stockton, $33,989; Clinton Electric Corp., Los Angeles, $34,246. Ets-Hokin and Galvin, Stockton, $37,776. Contract awarded to Westates Electrical Construction Co., Los Angeles, $31,974.

SAN MATEO COUNTY—At the intersection of Bayshore Highway with East Hillsdale Boulevard, a full traffic actuated signal system and highway lighting to be furnished and installed and channelization to be constructed. District IV, Route 68, Section C. Contract awarded to L. C. Smith, San Mateo, $18,559.

SANTA BARBARA COUNTY—Furnish and install highway lighting system at the Orcutt Wye, 1.9 miles south of the City of Santa Maria, District V, Route 2, Section L, N. E. H. Anderson, Santa Maria, $3,447; R. Flatland, San Mateo, $3,450; L. H. Leonardi Electric Construction Co., San Rafael, $3,499. Contract awarded to Westates Electrical Construction Co., Los Angeles, $3,199.

SANTA BARBARA COUNTY—Between Tequepis Canyon and one and one-half miles east of Santa Ynez River Bridge, about 3.3 miles to be graded and surfaced with plant-mixed surfacing on untreated rock base and seal coats to be applied. District V, Route 80, Section B. Fredericksen and Kasler, Sacramento, $355,332. Peter Kiewit Sons Co., Arcadia, $361,088; Dimmitt and Taylor and T. M. Page, Monrovia, $361,596; Eaton and Smith, San Francisco, $378,522; Granite Construction Co., Watsonville, $384,100; Valley Paving and Construction Co., Inc., Pismo Beach, $385,796; Clyde W. Wood and Sons, Inc., North Hollywood, $389,281. Roland T. Reynolds and Thomas Construction Co., Fresno, $392,342; J. A. Payton, Riverside, $404,-368. Oilfields Trucking Co. and Phoenix Construction Co., Inc., Bakersfield, $408,548; Madonna Construction Co., San Luis Obispo, $421,929; Cox Bros. Construction Co. and J. E. Haddock, Ltd., Pasadena, $432,860; Claude Fisher Co., Ltd., Los Angeles, $451,332. Contract awarded to Kirst and Sons, Altadena, $346,940.16.

SANTA BARBARA COUNTY—Between 0.6 mile east of Arroyo Quemado and 0.7 mile west of Arroyo Hondo; between Jalama Road and Route 149, and between Orcutt Wye and Santa Maria, a net distance of about 8.9 miles, a Class "C-Fine" seal coat to be applied. District V, Routes 2, 56, Sections F; L. A. B. Madonna Construction Co., San Luis Obispo, $17,680; E. S. and N. S. Johnson, Fullerton, $19,126. Contract awarded to Valley Paving and Construction Co., Inc., Pismo Beach, $15,509.75.

SANTA CLARA COUNTY—On Bayshore Highway at Mathilda Aveune, a full traffic actuated signal system and highway lighting to be furnished and installed and channelization to be constructed. District IV, Routes 68, 114, Sections B, A. A. J. Raisch Pav. Co., San Jose, $18,950. Contract awarded to L. C. Smith, San Mateo, $18,132.

SOLANO, YOLO COUNTIES—Across Putah Creek, about 5 miles north of Dixon, the existing bridge to be repaired. District III, Route 7, Section E. A. D. M. Sandling, San Pablo, $13,940; G. C. Gildersleeve, Nevada City, $14,193. Contract awarded to Ben C. Gerwick, Inc., San Francisco, $10,395.

SONOMA COUNTY—Across Tolay Creek, about 0.1 mile east of junction of Routes 8 and 208, the existing bridge to be altered. District IV, Route 208, Section A. D. M. Sandling, San Pablo, $185,-007; Bigge Drayage Co., Oakland, $243,000; J. H. Pomeroy and Co., Inc., San Francisco, $375,000. Contract awarded to Thomas Rigging Co., Emeryville, $118,900.

VENTURA COUNTY—In San Buenaventura Beach State Park, about 0.64 mile, highway to be graded and surfaced with plant-mixed surfacing and a reinforced concrete bridge to be constructed. District VII. E. S. and N. S. Johnson, Fullerton, $59,-077; Baker and Pollock, Ventura, $60,307; E. G. Perham, Los Angeles, $61,441; H. C. Johnson, Long Beach, $64,061; Charles T. Richardson, Santa Barbara, $66,900. Byerts and Sons and George K. Thatcher, Los Angeles, $69,845; Covina Construction Co., Covina, $71,901. Contract awarded to C. J. B. Construction Co., Oxnard, $55,027.38.

YOLO COUNTY—On West Sacramento Freeway, over Yolo Causeway Off-Ramp, about 4 miles west of Sacramento, a reinforced concrete slab bridge to be constructed. District III, Route 6, Section C. Lew Jones Construction Co., San Jose, $106,015; Continental Construction Co., Sacramento, $107,796. Dan Caputo, San Jose, $109,503; A. L. Miller, Sacramento, $111,136; H. W. Ruby, Sacramento, $114,-598; Fredrickson Brothers, Emeryville, $115,904. Chittenden and Chittenden and B. S. McElderry, Auburn, $116,115; R. G. Clifford, L. G. Lentz and C. O. Bodenhamer, South San Francisco, $118,646; Erickson, Phillips and Weisberg, Oakland, $120,214. Contract awarded to Charles MacClosky Co. and Harms Bros., San Francisco, $105,188.80.

Federal Aid Secondary County Highways

BUTTE COUNTY—Between Oroville and Oroville-Quincy Highway at Ward Boulevard, about 3.3 miles to be graded and surfaced with plant-mixed surfacing on crusher run base. District III, Route 759. McGillivray Construction Co., Sacramento, $134,339; A. G. Raisch Co., San Rafael, $141,816. Contract awarded to Rice Bros., Inc., Marysville, $129,542.10.

CONTRA COSTA COUNTY—On Byron Road between State Highway Route 75 and 1.6 miles southeasterly of Byron, about 3.2 miles existing roadbed to be widened. District IV, Route 610. Eugene G. Alves, Pittsburg, $91,298; Parish Bros., Benicia, $100,337; J. Henry Harris, Berkeley, $108,-105. Contract awarded to J. R. Armstrong, El Cerrito, $89,237.50.

EL DORADO COUNTY—Between Bell Ranch and 1.5 miles southeasterly, approximately 5 miles east of Diamond Springs, about 1.5 miles to be graded and penetration treatment and seal coat applied to imported borrow. District III, Route 1095. Paul E. Woof, Fresno, $54,894; Eugene G. Alves, Pittsburg, $55,009; Miles and Bailey, Madera, $55,-254; W. H. O'Hair Co., Colusa, $56,062; Thomas Construction Co., Fresno, $56,632; Harms Bros., Sacramento, $56,828; Nevada Constructors, Inc., Reno, $61,432; J. Henry Harris, Berkeley, $86,144. Contract awarded to John G. Mehren, Campbell, $41,791.50.

FRESNO COUNTY—On Jayne Avenue between Sacramento Avenue and Glenn Avenue, about 5 miles to be graded and surfaced with bituminous surface treatment. District VI, Route 808. Oilfields Trucking Co. and Phoenix Construction Co., Inc., Bakersfield, $103,148. Rexroth and Rexroth, Bakersfield, $109,383; Ted F. Baun, Fresno, $112,008; Roland T. Reynolds and Thomas Construction Co., Fresno, $115,255; Covina Construction Co., Covina, $118,114. A. A. Edmondson, Glendale, $118,133; Anderson Co., Visalia, $119,318; Valley Paving and Construction Co., Inc., Pismo Beach, $121,048; Clyde W. Wood and Sons, Inc., North Hollywood, $122,861; Westbrook and Pope, Sacramento, $123,-086; Rand Construction Co., Inc., Bakersfield, $123,-447; Gerald E. Brewster, Avenal, $130,845; Miles and Bailey, Madera, $132,343; Gene Richards, Fresno, $133,884; Harms Bros., Sacramento, $135,-850; W. H. O'Hair Co., Colusa, $160,196. Contract awarded to Volpa Bros., Fresno, $102,009.50.

MENDOCINO COUNTY—On Willits-Fort Bragg Road, between 14 miles and 10 miles westerly of Willits, portions, a distance of about 4 miles to be graded and corrugated metal pipes to be installed. District 1, Route 982. S. A. E. Co., Redwood City, $93,110; Parish Bros., Benicia, $105,762; Harold Smith, St. Helena, $120,240; Fredrickson and Watson Construction Co., Oakland, $120,260; M. Malfitano and Son, Inc., Louis Biasotti and Son, Inc., Pittsburg, $121,760; Piombo Construction Co., San Francisco, $127,045; Harms Bros., Sacramento, $128,-390; Stolte, Inc., Oakland, $149,605; Fredrickson Bros., Emeryville, $154,990; C. V. Kenworthy, Stockton, $169,968; Fred McKinley, Paramount, $171,631; Eugene G. Alves, Pittsburg, $176,585; Klein Smid Construction Co., and Frank Goodrick, Bakersfield, $191,620; J. P. Brennan, Redding, $246,750. Contract awarded to John Burman and Sons, Eureka, $89,580.

SONOMA COUNTY—Between 1.8 miles and 3.6 miles northwest of State Route 8, about 8 miles southeast of Petaluma, about 1.8 miles to be graded and surfaced with crusher run base on imported subbase material, and Class "B-Double" seal coat and penetration treatment applied. District IV, Route 878. Brown-Ely Co., Contractors, and E. A. Forde, Corte Madera, $113,597; Arthur B. Siri, Inc., Santa Rosa, $123,207; A. G. Raisch, San Rafael, $126,105; J. Henry Harris, Berkeley, $129,081; Nevada Constructors, Inc., Reno, $139,255. Contract awarded to Eugene G. Alves, Pittsburg, $119,889.

TEHAMA COUNTY—At Mill Creek and at McCarty Creek, respectively 11.5 and 18.1 miles west of Corning, two bridges to be constructed and at Willow Creek 16.9 miles west of Corning, an existing bridge to be widened, and a combined length of about 1 mile of approaches at the 3 bridges to be braded and surfaced with road-mixed surfacing. District II, Route 1078. Baker Trucking Co., Hamilton City, $106,802. Chittenden and Chittenden and B. S. McElderry, Auburn, $123,-441; O'Connor Bros., Red Bluff, $133,357; Eugene G. Alves, Pittsburg, $134,909; J. P. Brennan, Redding, $174,387. Contract awarded to H. W. Ruby, Sacramento, $106,546.50.

TULARE COUNTY—Between the east city limits of Dinuba and Orosi, a distance of about 4.8 miles, to be graded and surfaced with plant-mixed surfacing on existing pavement and on imported base material and bituminous surface treatment to be applied to portions of shoulders. District VI, Route 1142, Munn and Perkins, Modesto, $120,571; Valley Paving and Construction Co., Inc., Pismo Beach, $125,225; Volpa Bros., Fresno, $126,921; Ted F. Baun, Fresno, $130,157; George E. France, Inc., Visalia, $130,597; Covina Construction Co., Covina, $134,842; Gene Richards, Fresno, $137,264; Anderson Co., Visalia, $145,014; Guy F. Atkinson Co., South San Francisco, $163,396. Contract awarded to Oilfields Trucking Co. and Phoenix Construction Co., Inc., Bakersfield, $112,450.

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IMPERIAL COUNTY—Across New River, about 5 miles north of Brawley, a reinforced concrete slab bridge on concrete pile bents to be constructed and about 0.55 mile of roadway to be graded and surfaced with road-mix surfacing on imported base material. District XI, Route 187, Section D. Anderson Co., Visalia, $56,750; Walter Kaucher, Los Angeles, $57,413; Ralph B. Slaughter, Julian, $57,483; E. G. Perham, Los Angeles, $57,840; Walter H. Barber and H. R. Breeden, La Mesa, $59,585. Contract awarded to Norman I. Fadel, North Hollywood, $53,351.

LOS ANGELES COUNTY—In Arroyo Seco Park, over Arroyo Seco Channel, near Avenue 58, a prestressed concrete girder pedestrian bridge to be constructed. District VII, Route 205. J. E. Haddock, Ltd., Pasadena, $24,810; McClain Construction Co., Inc., Hawthorne, $42,280; Concrete Construction Service, Inc., Gardena, $46,811. Contract awarded to Walter Kaucher, Los Angeles, $23,770.

LOS ANGELES COUNTY—In the City of Glendale, at the intersections of Canada Boulevard with Wabasso Way, Del Valle Avenue, Glorietta Avenue, and Santa Maria Avenue-Country Club Drive, traffic signal systems and highway lighting to be furnished and installed. District VII, Route 61. Westates Electrical Construction Co., Los Angeles, $28,984; Clinton Electric Corporation, Los Angeles, $29,341; Electric and Machinery Service, Inc., South Gate, $29,963. Contract awarded to C. D. Draucker Inc., Los Angeles, $28,569.

LOS ANGELES COUNTY—Over Hollywood Freeway, at Belmont Avenue, a reinforced concrete pedestrian overcrossing to be constructed. District VII, Route 2. J. E. Haddock, Ltd., Pasadena, $31,-490. Contract awarded to Byerts and Sons, Los Angeles, $30,724.50.

LOS ANGELES COUNTY—In the City of Glendale, at the intersection of Canada Boulevard with Wabasso Way, Del Valle Avenue, Glorietta Avenue, and Santa Maria Avenue-Country Club Drive, traffic signal systems and highway lighting to be furnished and installed. District VII, Route 61. Westates Electrical Construction Co., Los Angeles, $28,984; Clinton Electric Corp., Los Angeles, $29,341; Electric & Machinery Service, Inc., South Gate, $29,963. Contract awarded to C. D. Draucker, Inc., Los Angeles, $28,569.

NEVADA COUNTY—At Donner Memorial State Park, near Truckee, bituminous surface treatment to be applied to existing Park roads and parking areas. District III. Miles and Bailey, Madera, $14,106; J. Henry Harris, Berkeley, $17,867. Contract awarded to Claude C. Wood Co., Lodi, $13,163.50.

RIVERSIDE COUNTY—At the intersection of Magnolia Ave., with Van Buren Street, in the City of Riverside, full traffic actuated signal system and highway lighting to be furnished and installed. District VIII, Route 43. Ets-Hokin and Galvan, Wilmington, $12,100; Westates Electrical Construction Co., Los Angeles, $11,961; C. D. Draucker, Inc., Los Angeles, $11,819; Clinton Electric Corp., Los Angeles, $11,783. Contract awarded to Paul R. Gardner, Ontario, $11,515.

SAN BERNARDINO COUNTY—Between 0.3 mile south of the south city limits of Ontario and Desau Street, about 1.4 miles, construct a graded roadbed for a channelized intersection and construct plant-mix surface on imported base material, placing plant-mix surfacing over the existing pavement and applying seal coats. District VIII, Route 192, Section A. Griffith Co., Los Angeles, $31,264; E. L. Yeager

Co., Riverside, $35,802; R. A. Erwin, Colton, $42,560. Contract awarded to Cox Brothers Construction Co., Stanton, $27,448.

SAN LUIS OBISPO COUNTY—At California State Polytechnic College, tennis courts to be graded and surfaced with portland cement concrete and walkways and basketball and volleyball courts to be graded and surfaced with plant-mix surfacing. District V. Tom C. Latham, Bakersfield, $32,143; O. R. Ochs and Son, San Luis Obispo, $41,293. Contract awarded to Madonna Construction Co., San Luis Obispo, $31,619.25.

SAN MATEO AND SANTA CLARA COUNTIES—On El Camino Real at Palo Alto Ave., a full traffic actuated signal system and highway lighting to be furnished and installed, channelization to be constructed, and existing electrical material to be removed. District IV, Route 2, Section MIP, PA, A. J. Henry Harris, Berkeley, $28,008. Contract awarded to A. J. Raisch Paving Co., San Jose, $27,677.50.

SANTA BARBARA COUNTY—In the City of Santa Barbara, at Salsipuedes Street and between Bath Street and Junipero Street, about 2.3 miles, an off ramp to be graded and surfaced with plant-mix surfacing on crusher run base and existing pavement to be widened on both sides with plant-mix surfacing on cement treated crusher run base. District V, Route 2. Madonna Construction Co., San Luis Obispo, $111,336; Baker and Polock, Ventura, $116,317; Valley Paving and Construction Co., Inc., $120,335. Contract awarded to N. M. Ball Sons, Berkeley, $110,935.50.

SANTA BARBARA COUNTY—Between Hot Springs and Tequepis Canyon, about 4 miles to be graded and surfaced with plant-mix surfacing on untreated rock base and seal coat to be applied. District V, Route 80, Section B. Clyde W. Wood and Sons Inc., North Hollywood, $55,624; Eaton and Smith, San Francisco, $574,076; Dimmitt and Taylor and T. M. Page, Monrovia, $576,576; Oilfield Trucking Co. and Phoenix Construction Co., Inc., Bakersfield, $578,603; Granite Construction Co., Watsonville, $597,857; McKinley and Kirk Construction Co., Paramount, $599,034; Madonna Construction Co., San Luis Obispo, $601,221; A. H. Famularo and Roland T. Reynolds, Anaheim, $602,499; Cox Brothers Construction Co., and J. E. Haddock Ltd., Pasadena, $660,175; M. J. B. Construction Co., Stockton, $670,202; Guy F. Atkinson Co., South San Francisco, $692,708; N. M. Ball Sons, Berkeley, $712,957; Peter Kiewit Sons' Co., Arcadia, $725,348. Contract awarded to J. A. Peyton, Riverside, $548,439.

YOLO COUNTY—On Merkeley Avenue between Jefferson Blvd. and Park Blvd. for placing crusher run base and surfacing with plant-mix surfacing. District III, Route 6, Section C. Harms Brothers, Sacramento, $10,906; A. Teichert and Son, Sacramento, $11,152. Contract awarded to Brighton Sand and Gravel Co., Sacramento, $9,936.

Federal Aid Secondary County Highways

LASSEN COUNTY—Between Grasshopper Valley Ranch and Hayden Hill Road, about 12.8 miles, to be graded and surfaced with road-mixed surfacing on gravel base. District II, Route 988, Joint Highway District No. 14. Isbell Const. Co., Reno, $280,166; H. Earl Parker, Inc., Marysville, $306,290; Eaton and Smith, San Francisco, $324,435; Eugene G. Alves, Pittsburg, $332,797; Rand Construction Co., Inc., Bakersfield, $389,214; Chittenden and Chittenden, Auburn, $434,935; Harms Bros. and M. W. Brown, Sacramento, $368,770. Contract awarded to W. H. O'Hair Co., Colusa, $273,390.84.

SAN BERNARDINO COUNTY—Central Ave., between Foothill Blvd. and Phillips Blvd., about 4.1 miles to be graded and surfaced with plant-mix surfacing on imported base material. District VIII, Route 692. Griffith Co., Los Angeles, $189,183; George Herz and Co., San Bernardino, $207,656; Peter Kiewit Sons' Co., Arcadia, $210,823; J. A. Payton, Riverside, $217,431; Crox Brothers Construction Co., Stanton, $220,888; K. and H. Co., Colton, $226,182; Dimmitt and Taylor, Monrovia, $240,279; R. P. Shea Construction Co., Indio, $264,693; E. L. Yeager Co., Riverside, $289,380; R. A. Erwin, Colton, $330,135. Contract awarded to Hess Construction Co., Inc., Long Beach, $175,172.90.

October, 1950

ALAMEDA COUNTY—On Eastshore Freeway between Lewelling Boulevard and 0.1 mile north of the south city limits of Oakland, about 4.2 miles to be graded and paved with portland cement concrete and plant-mixed surfacing and highway separation structures to be constructed. District IV, Route 69. Guy F. Atkinson Co., South San Francisco, $2,920,371; Peter Kiewit Sons' Co., Arcadia, $2,943,746; United Concrete Pipe Corp., Baldwin Park, $2,983,665; Harms Bros. and N. M. Ball Sons, Berkeley, $2,985,286; Fredrickson Bros. and Bates & Rogers Construction Corp., Emeryville, $3,078,943; Fred J. Early, Jr., Co., Inc. and Stolte, Inc., Oakland, $3,171,044; Cox Bros. Construction Co. and J. E. Haddock, Ltd., Pasadena, $3,189,529; A. Teichert & Son, Inc., Sacramento, $3,190,356; Parish Bros. and A. Soda & Son, Benicia, $3,565,005; Chas. L. Harney, Inc., San Francisco, $4,293,092. Contract awarded to Fredrickson & Watson Construction Co. and M. & K. Corp., Oakland, $2,871,212.12.

BUTTE COUNTY—Across Oak Knob Draw, about 6.7 miles south of Oroville, a reinforced concrete bridge and approaches to be widened. District III, Route 87, Section A. Rice Brothers, Inc., Marysville, $7,316; O'Connor Bros., Red Bluff, $7,921; D. M. Sandling, San Pablo, $8,282. Contract awarded to C. C. Gildersleeve, Nevada City, $6,841.35.

EL DORADO COUNTY — Between Railroad Crossing east of Placerville and Five Mile Terrace west of Camino, about 2 miles to be graded and surfaced with plant-mixed surfacing on crusher run base. District III, Route 2, Sections D, E. A. Teichert & Son, Inc., Sacramento, $288,663; Harms Bros., Sacramento, $288,729; M. Malfitano & Son, Inc., Pittsburg, $314,675; Clyde W. Wood & Sons, Inc., North Hollywood, $337,448. Contract awarded to H. Earl Parker, Inc., Marysville, $272,079.75.

FRESNO COUNTY—Between 2 miles east of Monterey County line and 0.2 mile east of Hot Springs Canyon Road, portions, about 3.4 miles to be graded, bituminous surface treatment applied, and a reinforced concrete slab bridge to be constructed. District VI, Route 10, Sections A, B. Louis Biasotti & Son, Stockton, $192,840; Roland T. Reynolds and Thomas Construction Co., Fresno, $220,726; Claude Fisher Co., Ltd., Los Angeles, $224,442; McKinley & Kirk Construction Co., Paramount, $224,746; L. A. & R. S. Crow, El Monte, $229,180; Nevada Constructors, Inc., Reno, $233,078; Westbrook & Pope, Sacramento, $234,482; Granite Construction Co., Watsonville, $236,446; Edward Keeble, San Jose, $236,654; Chittenden & Chittenden and B. S. McElderry, Auburn, $240,490; Dimmitt & Taylor and T. M. Page, Monrovia, $240,615; Eugene G. Alves, Pittsburg, $249,465; Harms Bros., Sacramento, $266,209; Gerald E. Brewster, Avenal, $271,467; S. A. E. Co., Redwood City, $279,195; Anderson Co., Visalia, $285,875; Eaton & Smith, San Francisco, $287,341; Clyde W. Wood & Sons, Inc., North Hollywood, $300,115. Contract awarded to John F. Blakemore, El Monte, $191,806.50.

KERN COUNTY—Between Democrat Springs and Bodfish, about 15.5 miles to be widened, bituminous surface treatment applied and a reinforced concrete bridge across Clear Creek to be constructed. District VI, Route 57, Section H. Clyde W. Wood & Sons, Inc., North Hollywood, $372,736; McKinley & Kirk Construction Co., Paramount, $380,772; Basich Bros. Construction Corp., San Gabriel, $378,825. Contract awarded to Dimmitt & Taylor and T. M. Page, Monrovia, $363,308.

KERN COUNTY—At Howling Gulch, 0.5 mile southwest of the town of Woody, about 0.1 mile of roadway to be graded, bituminous treatment applied, and a field-assembled metal plate pipe arch culvert to be installed. District VI, Route 142, Section C. Miles & Bailey, Madera, $6,271; Rexroth & Rexroth, Bakersfield, $7,305; Griffith Co., Los Angeles, $7,948; Thomas Construction Co., Fresno, $8,752; Phoenix Construction Co., Inc., Bakersfield, $8,882; Anderson Co., Visalia, $9,235; Richard J. Repsher & Sons, Bakersfield, $10,125; Dicco, Inc., Bakersfield, $10,792. Contract awarded to Rand Construction Co., Bakersfield, $6,193.50.

LOS ANGELES COUNTY—On Santa Ana Freeway, between Augusta Avenue and 0.1 mile easterly of the Rio Hondo, portions, about 2.3 miles to be graded and portions surfaced with portland cement concrete pavement on cement treated subgrade; interchange roadways, acceleration and deceleration lanes and outer highways to be surfaced, three grade separation structures and two pedestrian overcrossing structures to be constructed to provide a freeway with six-lane divided roadway. District VII, Route 166, Section A. Guy F. Atkinson Co., Long Beach, $1,711,614; Griffith Co., Los Angeles, $1,715,290; Webb & White, Los Angeles, $1,795,797; Winston Bros. Co., Monrovia, $1,808,543; Cox Bros. Construction Co. and J. E. Haddock, Ltd., Pasadena, $1,972,182. Contract awarded to United Concrete Pipe Corp. and Ralph A. Bell, Baldwin Park, $1 645.114.50.

LOS ANGELES COUNTY—In Arroyo Seco Park, over Arroyo Seco Channel, near Avenue 58, a prestressed concrete girder pedestrian bridge to be constructed. District VII, Route 205. J. E. Haddock, Ltd., Pasadena, $24,810; McClain Construction Co., Inc., Hawthorne, $42,280; Concrete Construction Service, Inc., Gardena, $46,811. Contract awarded to Walter Kaucher, Los Angeles, $23,770.

MADERA COUNTY—At Ash Slough and Berenda Slough, about 9 miles and 3.5 miles west of Califa, existing bridges to be repaired and resurfaced, highway embankments to be constructed and surfaced with plant-mixed surfacing and a detour to be constructed. District VI, Route 32, Section A. Guy F. Atkinson Co., South San Francisco, $48,775. Contract awarded to Thomas Construction Co., Fresno, $39,306.50.

MONO COUNTY—Between 0.8 mile north of McGee Creek and 1.6 miles north of McGee Creek, about 0.8 mile to be graded and surfaced with road-mixed surfacing. District IX, Route 23, Section D. Downer & Eckley, Reno, $44,949; Ken Lowe, San Bernardino, $47,252; Harms Bros., Sacramento, $47,289. Contract awarded to Conrad Construction Co., Inc., Ojai, $43,067.45.

MONTEREY COUNTY—Across Willow Creek and Villa Creek, about 65 and 69 miles south of Monterey, existing bridges to be repaired. District V, Route 56, Sections B, A. Wm. Radtke & Son, Gilroy, $61,367; Chittenden & Chittenden and B. S. McElderry, Berkeley, $78,943; Dan Caputo, San Jose, $63,820; William S. Shedd, Yuba City, $72,337. Contract awarded to E. G. Perham, Los Angeles, $58,243.50.

RIVERSIDE AND SAN BERNARDINO COUNTIES—On La Cadena Drive, at Russell Street, Down Street, Charles Street, Santa Ana Street-Columbia Avenue, Center Street, and at the north end intersection area, furnishing and installing highway lighting systems. District VIII, Route 43. Clinton Electric Corp., Los Angeles, $9,133; Fishbach & Moore of California, Inc., $10,537; Westates Electrical Construction Co., Los Angeles, $13,581. Contract awarded to H. C. Warren, Riverside, $7,450.

SAN BERNARDINO COUNTY—On Foothill Boulevard at Sierra Avenue and at Riverside Avenue, full traffic actuated signal systems with highway lighting to be furnished and installed at two intersections and channelization to be constructed. District VIII, Route 9, Sections B, Ria. Paul R. Gardner, Ontario, $32,951. Contract awarded to Westates Electrical Construction Co., Los Angeles, $32,464.

SAN DIEGO COUNTY—In the City of National City, at the intersection of Eighth Street with Harbor Drive, traffic signal system and highway lighting to be furnished and installed. District XI, Route 2. Ets-Hokin and Galvan, San Diego, $10,100; Westates Electrical Construction Co., Los Angeles, $9,983. Contract awarded to California Electric Works, San Diego, $9,827.

SAN DIEGO COUNTY—At the intersections of Grant Avenue with State Highway and Grand Avenue with Broadway, two traffic signal systems and one highway lighting system to be furnished and installed. District XI, Routes 77, 197, Section Esd, F, Esd. California Electric Works, San Diego, $14,264; Westates Electrical Construction Co., Los Angeles, $13,969. Contract awarded to Ets Hokin & Galvan, San Diego, $12,577.

SAN FRANCISCO COUNTY—In the City and County of San Francisco, at 129 Oak Street, State garage building to be painted. District IV. Dave Russ, San Francisco, $3,809; Russell Hinton Co., San Francisco, $3,898; Beck Brothers, San Francisco, $3,910; D. E. Burgess Co., San Francisco, $3,998; R. W. Reade and Co., Berkeley, $4,247; Abco Painting Co., San Francisco, $4,285; Gardner S. Wilson, San Francisco, $4,425; R. P. Paoli & Co., San Francisco, $5,573; Giampolini & Co., San Francisco, $5,588; Raphael Co., San Francisco, $7,622.

Contract awarded to H. L. Painter Co., Berkeley, $3,175.

SAN FRANCISCO COUNTY—In the City and County of San Francisco, furnish and install an automatic sprinkler system for fire protection of State Garage Building at 129 Oak Street. District IV. Barnard Engineer Co., of Northern California, San Francisco, $4,265; Automatic Sprinklers of Pacific, Inc., Los Angeles, $4,461; California Automatic Sprinkler Co., San Francisco, $4,610; Allan Automatic Sprinkler Service, San Francisco, $4,812. Contract awarded to Grinnell Co. of the Pacific, $3,900.

SAN JOAQUIN COUNTY—At branch of Mormon Slough and at Lone Oak Creek, existing bridges to be removed and culverts to be installed, roadbeds to be graded, and plant-mixed surfacing on untreated rock base to be placed. District X, Route 75, Section B. Paul E. Woof, Fresno, $31,908; Edward Keeble, San Jose, $31,980; Eugene G. Alves, Pittsburg, $32,162. Contract awarded to Thomas Construction Co., Fresno, $30,103.

SAN LUIS OBISPO COUNTY—Portions between Route 33 and Kern County Line, about 3.7 miles, cement treated imported base to be constructed, plant-mixed surfacing to be placed thereon and seal coat applied. District V, Route 125, Section D. Clyde W. Wood and Sons, Inc., North Hollywood, $131,666; Oilfields Trucking Co., and Phoenix Construction Co., Inc., Bakersfield, $137,693; Madonna Construction Co., San Luis Obispo, $142,168; Valley Paving and Construction Co., Inc., Pismo Beach, $159,124; R. P. Shea Construction Co., Indio, $159,897; E. S. and N. S. Johnson, Fullerton, $173,037. Contract awarded to Granite Construction Co., Watsonville, $126,348.40.

SAN MATEO COUNTY—At Alemany Boulevard and Skyline Boulevard and at Alemany Boulevard and Junipero Serra Boulevard, channelization to be constructed and full traffic actuated signal systems and highway lighting to be furnished and installed. District IV, Routes 55, 56, Sections A, E, DIC. J. Henry Harris, Berkeley, $101,245; Charles L. Harney, Inc., San Francisco, $108,354. Contract awarded to Eaton and Smith, San Francisco, $100,142.

SHASTA COUNTY—At Hatchet Creek line change, about 1.6 miles to be graded and surfaced with plant-mixed surfacing on crusher run base. District XI, Route 28, Section C. Harms Brothers, Sacramento, $368,257; Rand Construction Co., Inc., Bakersfield, $372,582; Fredrickson and Watson Construction Co., Oakland, $423,800; H. Earl Parker, Inc., Marysville, $430,274; Chittenden and Chittenden and B. S. McElderry, Auburn, $448,417; J. P. Brennan, Redding, $486,884; Fredrickson Brothers, Emeryville, $492,431; L. A. and R. S. Crow, El Monte, $594,256. Contract awarded to Eaton and Smith, San Francisco, $333,843.

SOLANO COUNTY—Across Cutoff Slough about 5.5 miles southeast of Suisun, a bridge consisting of a steelbeam span and timber trestle approach spans to be constructed. District X, State Waterfowl Refuge. Chittenden and Chittenden and B. S. McElderry, Auburn, $25,863; Ben C. Gerwick, Inc., San Francisco, $27,674; C. C. Gildersleeve, Nevada City, $28,978. Contract awarded to Al Erickson and Co., Napa, $23,928.

SONOMA COUNTY—Between Santa Rosa and Kenwood, portions, three bridges to be widened, culverts to be extended and approaches to be constructed. District IV, Route 51, Section A. Dan Caputo, San Jose, $85,781; Chittenden and Chittenden and B. S. McElderry, Auburn, $89,723; A. G. Raisch Co., San Rafael, $94,261; Eugene G. Alves, Pittsburg, $101,033. Contract awarded to R. G. Clifford and C. O. Bodenhamer, South San Francisco, $79,832.

SONOMA COUNTY—Between Jenner and the Mendocino County line at Gualala, portions, about 1 mile to be graded, imported base material to be placed, and surfaced with bituminous surface treatment. District IV, Route 56, Sections C, D, E. Parish Brothers, Benicia, $131,124; Eugene G. Alves, Pittsburg, $141,907; Arthur B. Siri, Inc., Santa Rosa, $149,108; J. Henry Harris, Berkeley, $152,649. Contract awarded to Huntington Brothers, San Anselmo, $120,138.80.

SONOMA COUNTY—Between Sears Point and Solano County line, about 2 miles, existing shoulders to be excavated, backfilled with imported base material and prime coat and seal coat applied. District IV, Route 208, Section A. Piombo Construction Co., San Francisco, $21,647; Brown-Ely Co. and E. A. Forde, Corte Madera, $23,457; J. Henry Harris, Berkeley, $24,750. Contract awarded to A. G. Raisch Co., San Rafael, $20,827.50.

STANISLAUS COUNTY—Near north city limits of Turlock, a highway lighting system to be furnished and installed; and at Keyes Road a traffic signal system and highway lighting to be furnished and installed. District X, Route 4, Section A. Howard Electric Co., Gilroy, $20,950; Clinton Electric Corp., Los Angeles, $22,242; Westates Electrical Construction Co., Los Angeles, $22,826; L. H. Leonardi Electric Construction Co., San Rafael, $24,164; R. O. Ferguson Co., Visalia, $24,918; Underground Electric Construction Co., Oakland, $25,989. Contract awarded to R. Goold & Son, Stockton, $19,912.

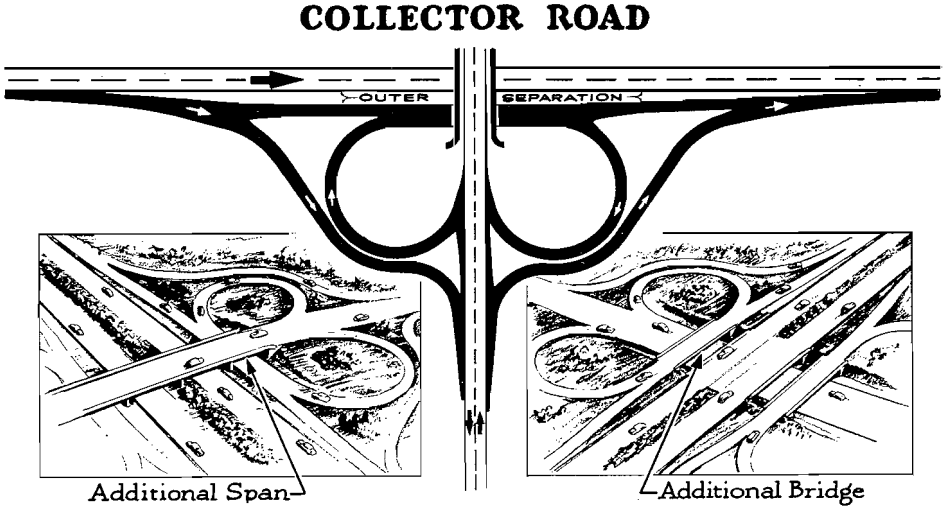
STANISLAUS COUNTY—At M. I. D. lateral No. 4, about one mile west of Modesto, about 0.3 mile to be graded, untreated rock base and plant-mixed surfacing to be placed; and an existing reinforced concrete bridge to be widened. District X, Route 110, Section B. Thomas Construction Co., Fresno, $29,102. Contract awarded to M. J. Ruddy & Son, Modesto, $24,419.95.

TULARE COUNTY—Between Tulare Airport and Tagus, about 7.8 miles to be graded, portions paved with Portland cement concrete pavement on cement-treated subgrade; portions to be surfaced with plant-mixed surfacing on untreated rock base or imported base material and two bridges to be constructed. District VI, Routes 4, 134, Sections B, Tul, F. B. Griffith Co., Los Angeles, $916,855; Fredrickson Bros., Emeryville, $956,680; Dan Caputo and Edward Keeble, San Jose, $966,703; N. M. Ball Sons, Berkeley, $986,446; Cox Bros. Construction Co. and J. E. Haddock, Ltd., Pasadena, $986,973; Guy F. Atkinson Co., South San Francisco, $991,304; Clyde W. Wood & Sons, Inc., North Hollywood, $1,005,660; Peter Kiewit Sons Co., Arcadia, $1,006,774; Webb & White, Los Angeles, $1,086,252; Basich Bros. Construction Co., San Gabriel, $1,147,919. Contract awarded to United Concrete Pipe Corp., Baldwin Park, $895,579.50.

Traffic Interchange Design

Continued from page 53 . . .

turning right to go left. This is an unnatural movement that may lead to confusion. The necessity of having two off-ramp and two on-ramp connections on the same side of the freeway adds to the potential confusion and introduces signing difficulties.



"Collector or Mixing Road" Modification

A further deficiency of design is the overlapping of the acceleration and deceleration lanes of the inner loops which may impair the operating efficiency of the interchange during peak hours. This deficiency can be relieved by a modification of design, known as a "Collector or Mixing Road." A collector road is an additional parallel road physically separated from the through lanes. All leaving interchange traffic departs from the freeway and enters the collector road as it approaches the interchange point. Right and left turns from this collector road are then made on the basis of a conventional cloverleaf pattern, with left turns required to weave across traffic entering the collector road from the cloverleaf loop provided for freeway "on" traffic. The "on" traffic is consolidated on the collector road beyond the interchange structure and brought into the freeway at a single point of entry. Although the weaving movement between leaving and entering traffic has not been eliminated, it is accomplished on a separate roadway clear of the high-speed through traffic.

This type of design increases construction cost, due principally to increased structure requirements. If the freeway passes under the cross street, an additional span over the collector road and an additional pier in the neutral area between the freeway and collector road are required. If the freeway passes over the cross street, an additional separate structure is required for the collector road over the cross street.

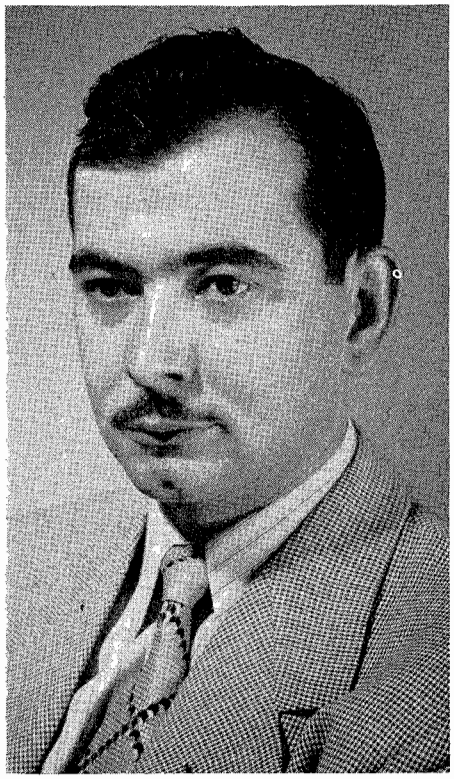
This article to be continued in the next issue

Stores Department

Turkey Sends Engineer to Study California Methods

By PHYLLIS MANTHE, Secretary, Stores Department

TURKEY, which has launched a $400,000,000 highway program, will pattern her supply system after California Highway Stores Department. Mr. Cemil Mutus has been selected by the Turkish Government to study the Highway Stores Department for a 10-months period under a grant from the Economic Corporation Administration and through the Federal Bureau of Public Roads.



CEMIL MUTUS

The California department is a new and unique venture in solving highway supply problems and, although organized only three years ago, has obtained considerable recognition at home and abroad.

Jimmy—the nickname given Mutus by American engineers with whom he worked in Turkey—is starting in the Stores Department as a junior clerk and will work his way up through each position to the top. In this way he will learn to handle the practical work of acquiring and moving supplies for his nation's construction program. This training, together with his Masters Degree in engineering will form the basis for his heading of Turkey's highway equipment depot at Iskenderun, which has a $10,000,000 stock.

T. C.
BAYINKIRLIK BAKANLIGI
KARAYOLLARI GENEL MUDURLUGU
Idari Isler, Dairesi Baskanligi
October 13, 1950

Mr. Milton Harris
California Division of Highways
Sacramento, California, U. S. A.

Dear Mr. Harris: Please accept our sincere thanks for the kind interest you have shown by helping Mr. Cemil Mutus of our organization, who is making studies on storage subjects in California. We are certain that the directorate will greatly benefit by your generous cooperation.

At the present we are making preparations to establish a new system of storage which will be based almost entirely on the system in use by the California Division of Highways. Thinking that it may interest you, therefore, we are planning by your approval, to establish correspondence with you on the relevant results we shall obtain and difficulties we may come to meet.

Thanking you again for your kind interest and assistance, I am

Yours very truly,

VECDI DIKER
Director of Highways

Highway Network Planned

The new Turkish highway network will cover 14,000 miles and is expected to take nine years to complete.

"Here, for instance will be new road" says Jimmy in his soft slurring accent as his finger runs across the width of Turkey on a highway map.

"Antakya to Erzurum will be all new road," he says pointing to a stretch which the map symbols identify as graveled or dirt road.

"And here, and here will be all new highway" as he points to many green lines cross-patching the map of Turkey and signifying foot trails.

Milton Harris, head of the Highway Stores Department, is supervising Jimmy's "on the job" education. The California Division of Highway Stores Department, the only unified public road building supply operation in the Nation, was selected as Jimmy's school room after Turkish officials read an article entitled "Efficiency" about the agency in *California Highways and Public Works* issue of January-February, 1949.

Tour of Education

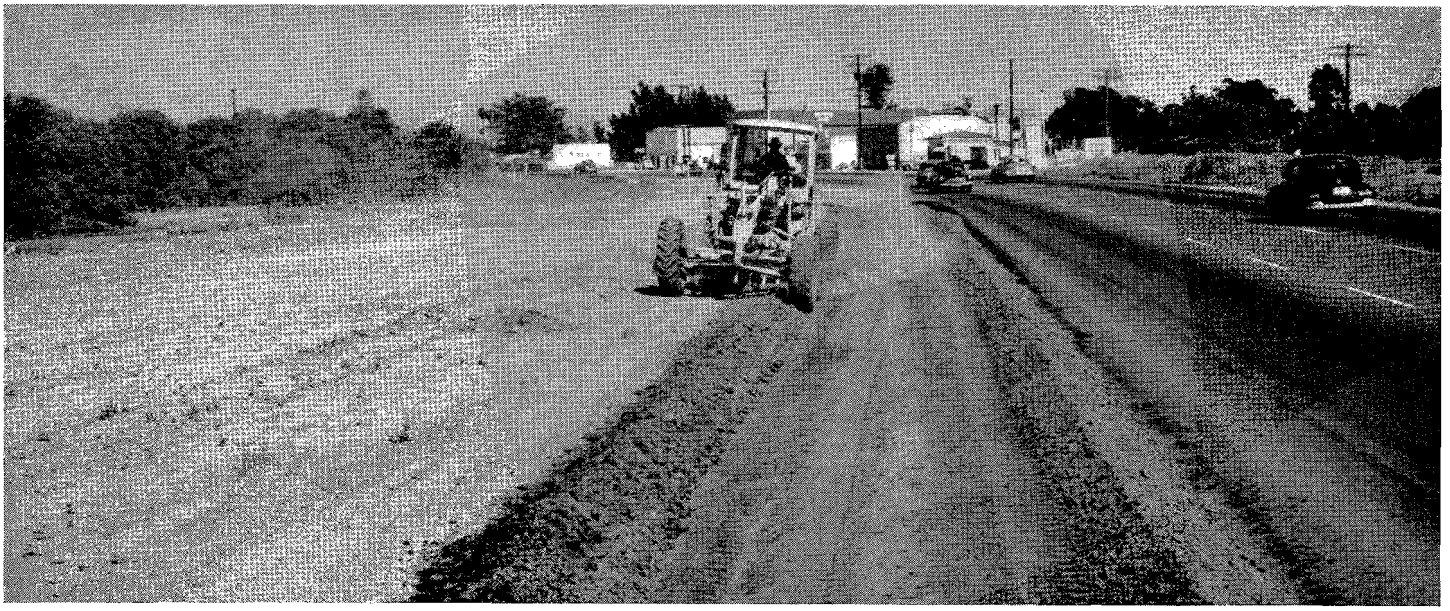
Mutus will not only work in the Stores Department Headquarters Office, but will work in both the Sacramento and Los Angeles Warehouses, and will also be an observer in other departments of the Division of Highways in order to learn the correlation between service and supply and the operation of the various agencies. He will also look in on the operations of private companies which manufacture road building materials and other commodities, as well as visit various road jobs under way.

Jimmy's new knowledge will be added to that of 22 other Turkish highway specialists studying road building techniques in other parts of the Nation.

Life in Sacramento, is of course, very different for Jimmy from life in Turkey. He has been in Sacramento about a month and seems to enjoy everything, particularly American living and American food.

He attended a college football game and although the game was interesting, he thought it was much slower than the soccer football played in Turkey.

He also is learning about family life, Sacramento style, living with the W. E. Combrink family at 3700 Brockway Court.



Looking southeasterly showing construction under way near the City of Anaheim

Progress Report

Continued from page 21 . . .

of unforeseen difficulties with numerous irrigation lines, which slowed down operations temporarily.

Third Project

The limits of the project are from Euclid Avenue to Route 2 (U. S. 101) near Miraflores on Manchester Boulevard, a distance of 2.88 miles. The work on the permanent part of the freeway, which is outside of the city boundaries of Anaheim, consisted of the constructing of a new highway paralleling the present Manchester Boulevard with a surface of asphaltic concrete pavement and a cement-treated base, thus providing a four-lane limited access divided freeway, with outer highways and other portions surfaced with plant-mix and an untreated crushed rock base. The new roadway will carry the northbound traffic, while the old pavement will carry the southbound traffic, outside the city limits of Anaheim.

This remaining portion of the freeway is in the southwestern section of the City of Anaheim, and at some future date will be by-passed by an overhead freeway cut-off, alleviating local traffic conditions. The construction work which is within the city limits consists of the widening of existing Manchester Boulevard pavement and building of traffic islands to control traffic which is supplemented with traffic-actuated controlled signals throughout the project. The installation of the signals was done under a separate contract.

Drainage Problem

The shoulders and portions of the outer highway are constructed of an untreated crushed rock base with a bituminous surface treatment.

The drainage structures constructed on this project consisted of box culverts with open topped flumes in the highway dividing strips, most of them having very flat gradients because of flat terrain. On two portions of the job it has been necessary to tie into the Orange County Flood Control storm sewer system.

The low, flat terrain adjacent to the highway throughout the length of these jobs has made it extremely difficult to obtain satisfactory drainage. All of the culverts are of necessity constructed to a very flat gradient and function in effect as equalizing structures.

Completion of these three contracts is expected sometime in January, 1951. These projects are of considerable significance when it is considered that they represent approximately 35 percent of the total mileage of the Santa Ana Freeway. Together they comprise by far the greatest step to date toward completion of this major freeway.

Construction is under the supervision of F. B. Cressy, Assistant District Engineer, Construction. The resident engineers are B. N. Frykland and C. E. Dresser. The Bridge Department representative is E. B. Brier. The writers of this article are the office engineers for the three contracts.

Piru Gorge

Continued from page 43 . . .

It is anticipated that this work will be completed well ahead of schedule.

The cooperative efforts of the contractor's forces have provided the traveling public with a maximum of safety and a minimum of delay and inconvenience.

The winter rains, snow and ice will present a different problem, but every effort will be made to keep traffic moving at all times.

Plans are being prepared for a similar improvement of the remaining five miles of three-lane highway in Weldon Canyon from Pico Canyon to San Fernando Road at Tunnel Station which will be placed under construction after the first of the year. Upon completion of this latter section, the divided highway will extend from the Los Angeles city limits to and through McFarland, north of Bakersfield.

In Memoriam

RALPH CATHER MYERS

On October 2, 1950, friends and associates of Ralph Cather Myers were saddened by news of his sudden passing.

Ralph was born in Bakersfield, California, on June 9, 1892, and upon his graduation from Stanford University in 1914, came to work for the California Highway Commission. His first association with highways was survey work in and around Fresno where he worked as rodman and instrument man on projects authorized by the first highway bond issue.

After an employment period of about two years, Ralph left state service to return again in 1917, and from then until 1918 he worked continuously in the positions of Chief of Party and Assistant Resident Engineer on construction jobs. In 1918, he left the employ of the State to enter into private practice which he pursued for the ensuing 10 years until his return to the Division of Highways in 1928 as an Assistant Resident Engineer. From then until his passing, he has been continuously employed by the Division of Highways in positions of increasing responsibility, and at the time of his death Ralph was an Assistant District Engineer in District VII.

He is survived by his widow, Winifred Myers, and his son, Chandler Myers, who is at present pursuing a pre-legal curriculum at Stanford University.

The heartfelt sympathy of the entire department is extended to his family.

In Memoriam

CYRIL P. PLUMMER

Friends and co-workers of Cyril Plummer were grieved to learn of his death in Pasadena on July 2, 1950. Cyril organized the District III traffic department and served as District Traffic Engineer most of the time until just a few months before his passing.

He was born in Pennsylvania April 2, 1891, and started his engineering career with a private engineer in Michigan in 1913. From then until 1928, with some time out for service in World War I, he worked as a surveyor and resident engineer for various employers in the Midwest and South.

In June of 1928 he came to work for District III as a draftsman. Soon progressing to Assistant Highway Engineer and later to Associate Highway Engineer, he served for over 10 years in the District Report Department preparing preliminary and final reports and specifications. In July of 1939 he was appointed District Traffic Engineer and he served in that capacity during the period when that department was developing from a minor function to its present position.

Cyril was well liked by all those who came in contact with him and had been active in state employees' work, having served as president of Peach Bowl Chapter No. 40, CSEA, some years ago.

Mr. Plummer is survived by his wife, Margaret H. Plummer, who also worked for District III for a period during World War II and at present is living in Loma Rica.

In Memoriam

MERLE H. GODWIN

Merle H. Godwin, Senior Bridge Engineer, died Saturday, October 28, 1950, in his home a few hours after being stricken with a fatal illness. His many friends in the Division of Highways mourn the loss of an exemplary man whose sincere friendliness and rich humor were the order of his life.

Merle, as he was known to everyone, was born in Napa on February 27, 1897, and there lived his youth and received his high school training. With the onset of World War I he enlisted and was one of the first to go overseas where he served with distinction in an aviation company.

Upon discharge he began his engineering career in the engineering office of his home county. Between college semesters he found short-term employment in private construction and in the Department of Public Works. His state service began in 1922 with an assignment in District I, and in 1924 he began his record with the Bridge Department. Aided by these assignments he graduated from the University of California in 1927 with a degree in civil engineering.

After graduation and a short sojourn in District V he returned to the Bridge Department where he was assigned to the newly-begun work of investigating the physical condition of all bridges in the State Highway System. Merle kept step with the growth and development of the department and developed a broad knowledge of the highway system and the endless variety of bridge maintenance problems. He was honored this year by being appointed chairman of a national committee on bridge maintenance of the Highway Research Board.

His engineering affiliations included membership in the American Society of Civil Engineers and the Structural Engineers Association of Central California. He was a member of the Del Rey Fraternity of the University of California and of Union Lodge No. 58 of Free and Accepted Masons.

Merle is survived by his widow, Frieda, and a sister, Doris Godwin.

Maintenance Men, Patrolmen Honored

Continued from page 55 . . .

Sacramento; Wells Cargo, Inc., Reno; Western Truck Lines, Los Angeles; also Bekins Van Lines, Inc., and Pacific Greyhound Lines.

The Donner Pass barbecue followed the same pattern as a similar affair given earlier this year by W. H. I. at Redding, Cal., to honor the maintenance men of Division II and the state highway patrolmen of U. S. Route 99.

In Memoriam

EDWARD N. (TED) WHITTEMORE

The many friends and co-workers of Ted Whittemore were shocked and saddened by his death on October 2, 1950, at his home, 935 North Magnolia Avenue, Whittier, California.

Ted was born June 2, 1896, in Denver, Colorado. In 1914 he graduated from Manual Arts High School in Los Angeles and was a graduate of the University of California at Davis, where he received degrees in civil engineering and agriculture.

In 1918 and 1919 he served with the United States Army in World War I. From 1919 until 1925 he was ranch manager and engineer with the Bastandury Ranch in La Habra. In 1925 and 1926 he engaged in private engineering work in Orange County.

From 1926 to 1927 Ted took his initial steps in public service as city engineer and street superintendent for the City of La Habra. From 1928 to 1933 he was a right of way agent for the Orange County Road Department, leaving there to join the Division of Highways of the State of California 17 years ago on October 2, 1933, where he served with distinction until his death.

He is survived by his widow, Eunice M. Whittemore, his daughter, Janet Whittemore Wood, and his son, Edward L. Whittemore.

Ted was instrumental in the development of the Division of Highways to its present status and was a charter member of the American Right of Way Association. He is deeply missed as a co-worker and even more as a friend.

His fellow workers and members of the American Right of Way Association join in extending their most profound sympathy to his family.

In Memoriam

WILLIAM O. VAN DEEVEN, JR.

The death of William O. Van Deeven, Jr., Assistant Highway Engineer in District III, on July 14, 1950, came as a sudden shock to his many friends and associates. Van died at the wheel of his state car while en route to the construction project in Sierra County on which he was Resident Engineer. Although he had been employed in District III only since March, 1947, his application to his work and his interest in working with and training younger employees already had won him many friends and an enviable reputation among his associates.

Born in Frankfurt, Germany, January 5, 1907, after coming to this country Van Deeven attended high school in Los Angeles and subsequently worked in various engineering capacities for several railroads and governmental agencies in California before entering the Army in 1942.

Starting as a private, Van rose rapidly through the ranks so that when he was discharged in 1946 he held the rank of major. During the early part of his service most of his time was spent in training engineering troops, after which he served with Army Engineering units in Okinawa and Korea.

In March of 1947 Mr. Van Deeven came to work with District III as an Assistant Highway Engineer and since that time he had handled assignments as Chief of Party and Resident Engineer in various parts of the District.

Survivors of Mr. Van Deeven include his wife and one small daughter who reside in Sacramento.

In Memoriam

HOWARD J. SHELLY

The sudden death on August 11, 1950, of Howard J. Shelly, a Junior Civil Engineer in District III, came as a severe shock to his many friends and acquaintances.

Joe was born in Minnesota on January 6, 1889, and received his schooling in that state until he went to work for a sawmill in Crookston in June of 1904. His first engineering experience came in 1907, when he went to work as a tapeman for the Great Northern Railway. From that time on, except for a few years in ranching and newspaper printing work and a short period in the Army during 1918, he was primarily a surveyor.

Most of his early engineering was done on railroads, one three-year period being with the Interstate Commerce Commission in connection with its valuation work on American railroads. His state service began in 1922, when he went to work for District IV in San Francisco. After a two-year break in service, during which he was with the Spring Valley Water Company, he returned to state work in 1926 with District X and was transferred to District III in 1927.

During his 23 years with District III, Joe spent most of his time as head chainman or instrument man on survey parties. Many of the supervisory employees in this and other districts will remember with approval the steadying influence which Joe Shelly had on the younger members of survey crews and the helpful attitude which he brought to all his assignments.

Survivors include his wife and two sons, Jerrold and James, all residing in the vicinity of Yuba City.

ENJOY YOURSELF

Enjoy the scenery, as you drive, but not at the risk of an accident. Driving on busy highways and mountain roads requires your full attention. When you want to look at the scenery, pull well off the roadway and stop.

BASIC SPEED LAW

California's basic speed law requires that speed must be governed by prevailing conditions, such as visibility, traffic volume, condition of the highway, and other factors.

CHILDREN AT PLAY

Expect the unexpected when you are driving near schools. Remember, children at play are impetuous and thoughtless. Keep alert and be prepared to stop quickly if a youngster runs into the street.

EARL WARREN
Governor of California

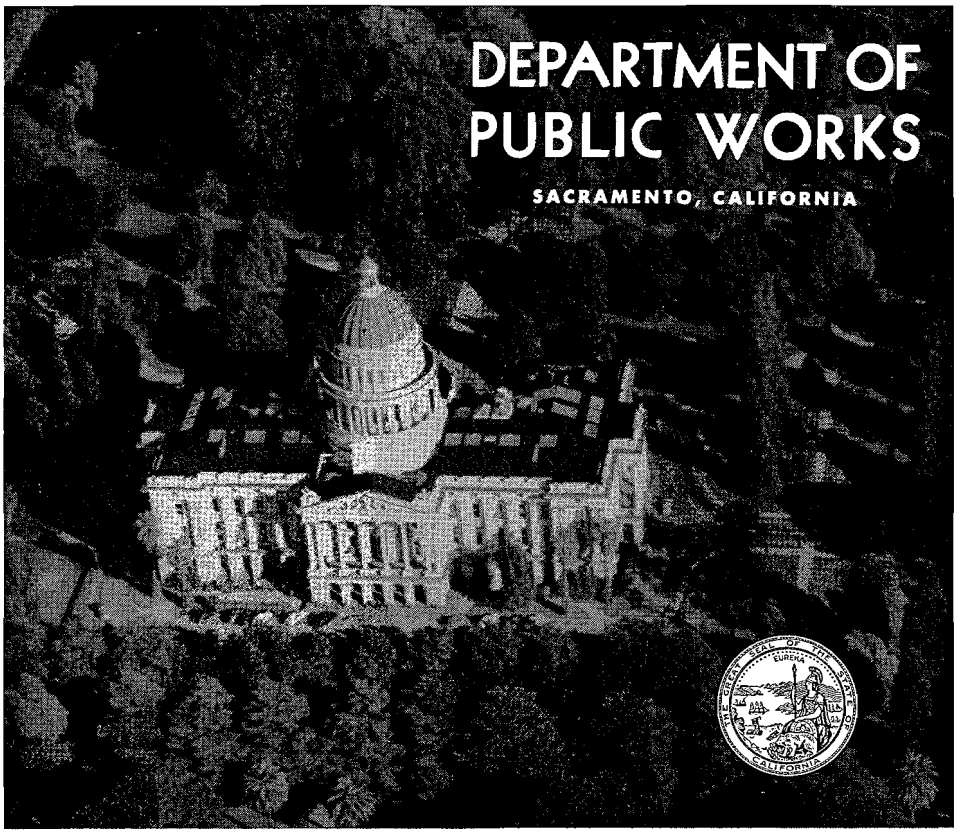
•

CHARLES H. PURCELL
Director of Public Works

•

FRANK B. DURKEE
Deputy Director

•



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