

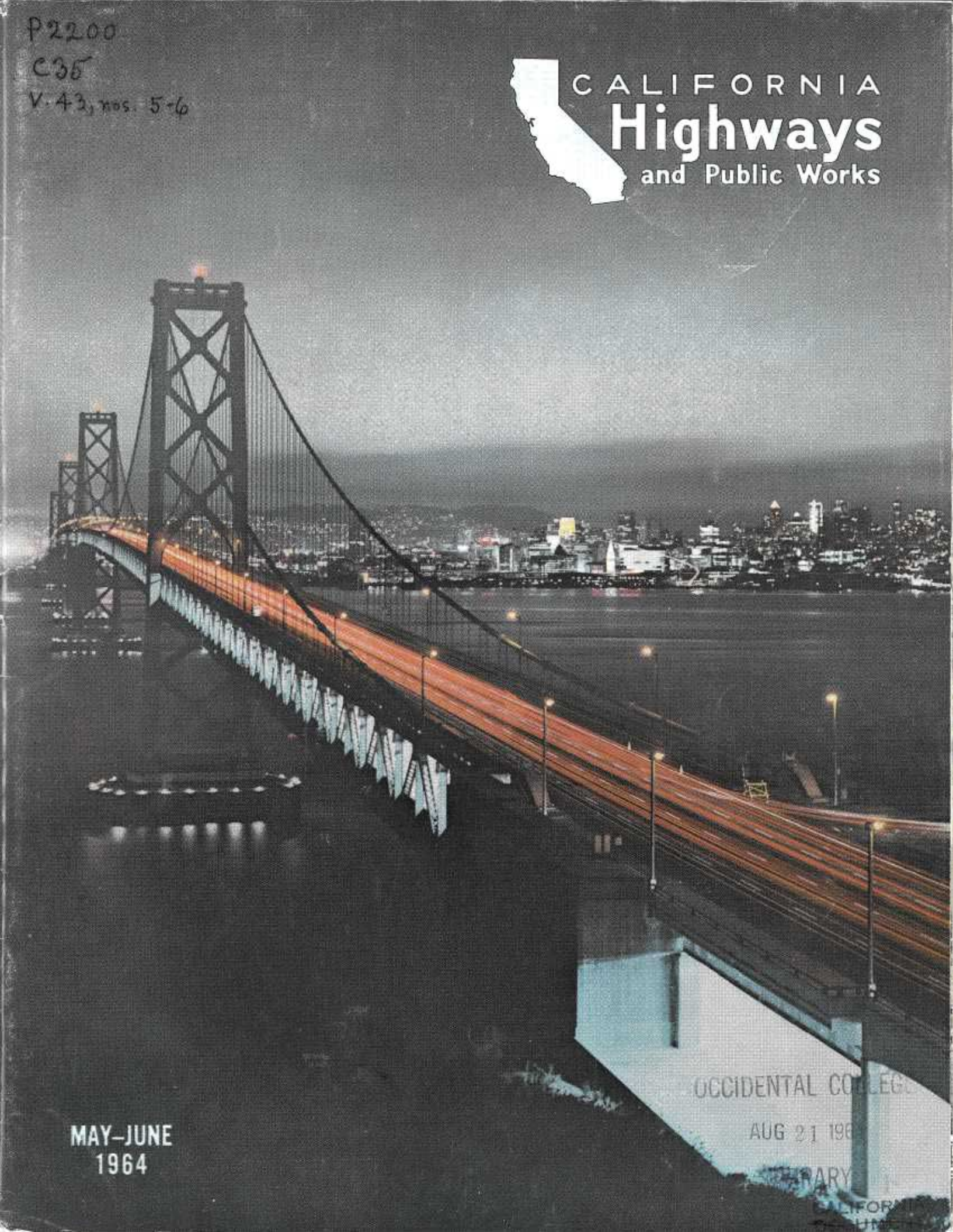
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CALIFORNIA  
**Highways**  
and Public Works



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# Landscaping on a Freeway Interchange



*Plantings at the Willow Road Overcrossing on the Bayshore Freeway in Menlo Park include rock roses in the extreme foreground backed by a bottle brush plant. Tree at left is a coast redwood and one on right is liquidambar. Masses of ground cover are ice plant, backed by a bank of mixed shrubs on the embankment. See "Bay Area Report—1964" beginning on page 24.*

**Editor's Note:** This landscaping project was designed by the Roadside Development Section, Division of Highways, headed by Supervising Landscape Architect H. Dana Bowers. The editorial, quoted below, appeared in the April 30 issue of the *Palo Alto Times* under the title of "Miss Interchange—Our Nomination." An editorial and photo along similar lines, referring to the Bayshore Freeway-Harbor Boulevard interchange in Redwood City, appeared in the May 8 issue of the *Redwood City Tribune*.

"Freeway interchanges devour money and land and when built usually have looks only a fatherly civil engineer could love.

"In many cases, however, landscaping can lift their curse of ugliness. In rare cases, plantings can transform the potential wasteland within the cloverleaves into really attractive scenery. One can, indeed, visualize some of these park-like byproducts of the automobile age as future oases amid

asphalt, concrete, steel, whizzing vehicles and boxy buildings.

"The Willow Road Overpass at Bayshore Freeway in Menlo Park is one such rare case. We dare, in fact, to advance the claim that it's the best landscaped interchange on the peninsula, if not in the whole State.

"This is the time of year when it looks best. We habitually cross it with a silent word of thanks to its designers, whoever they were."

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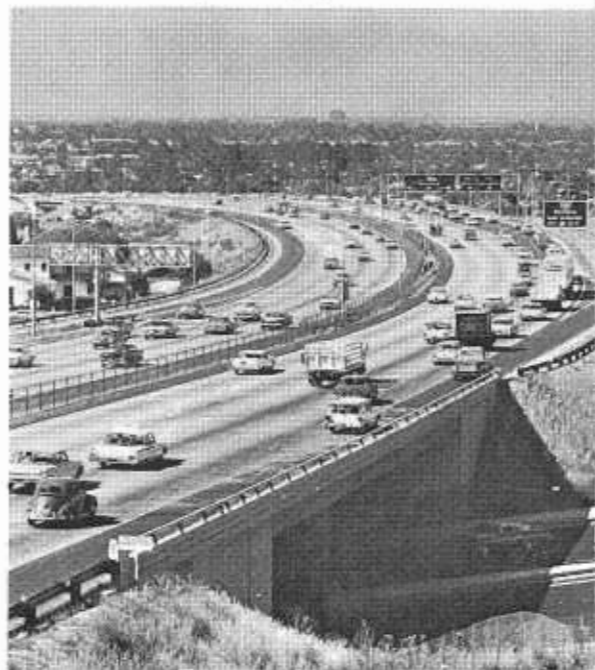
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FRONT COVER: One way to illustrate the new traffic flow on the remodeled San Francisco-Oakland Bay Bridge is to photograph it at night. Westbound traffic on the upper deck shows only its tail lights, while the lower deck is illuminated by the headlights of eastbound cars. Bright area lower right was once occupied by commute train rails. See "Bay Area Report," page 24. (Photo by Bill Ruland.)

BACK COVER: Modern freeways such as the San Diego Freeway (Interstate 405) in Los Angeles have built-in safety features. With grade crossings eliminated (note undercrossing for Sepulveda Boulevard in right foreground), adequate shoulders and a wide median strip enhanced by chain-link protection, eight lanes of traffic move smoothly through this metropolitan area. See "Freeway Fatalities" page 20. (Photo by John Meyerpeter.)



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*Crossing the Eel River from Scotia to Rio Dell in early 1900's. This was the ubiquitous Model T of the period, with the brass radiator shell.*

# The Redwood Highway

## Part I — *Early History of Transportation in the Northern Coastal Counties*

By John Robinson, Information Officer

In the first 50 years or so of settlement in the north coastal region of California, few people gave thought to a north-south highway from San Francisco to the Oregon line. The Redwood Highway was not even a dream. Eureka, Arcata, Trinidad, and Crescent City considered themselves seaports for freight to and from the Northern California valleys, and the smaller towns near the coast depended upon these ports for export of their raw materials, and import of their needs.

Almost all the early settlement along the north coast in Humboldt and Del Norte Counties was near harbors where supplies might be landed from ships and transported inland to the many mines and diggings in the Klamath Mountains. Today hardly any of these early mining townsites are marked, and many are completely ef-

faced; yet when they were operating they required tremendous amounts of freight every week to keep them going. It all came in by sea.

### **Sea Transport Cheapest**

By 1855 logging had taken its place as the leading industry in the north coast, but sea shipment was still much cheaper than any overland method, and the towns still faced toward the sea, were still oriented east and west. Although storms and tides sometimes kept shipping away for months, communication with the rest of California was infinitely easier by water than over the tortuous, frightening trails which wound their way southward. Also, because of the mining camp commerce, the roads and trails to Redding and Red Bluff were better marked and developed than to Ukiah.

Another deterrent to roadbuilding in Humboldt County was the early development of the railroad there. In 1854 Humboldt County had the first railroad in the state, and by 1890 a dozen railroads fanned out from the Humboldt Bay region. Most of these were primarily logging railroads, but several handled freight and passengers.

### **Early-day Railroading**

An anecdote of an early-day railroading incident on the outskirts of Eureka gives an idea of what this service was like on some railroads. The train, horse drawn, was proceeding downgrade toward the seaport with a load of passengers and their baggage, which were scheduled for embarkation on a ship sailing a few hours hence. Crossing a trestle over a ravine about 15 feet deep, the horse somehow got tangled in the traces

and fell over the side, kicking and whinnying as he hung suspended by the harness about halfway down.

One of the passengers, possibly somewhat under the influence, deciding a major catastrophe was upon them, yelled "Jump for your lives!" and sailed out into space to land feet first, waist deep, in the mud at the bottom of the ravine. In due time, with passengers assisting, the horse was cut free and hitched up again with patched harness, the hapless passenger rescued from the mud, and the train continued to its destination. No injuries were suffered.

#### Crescent City to Grants Pass

Although the northern end of the Redwood Highway, that section from Crescent City to Grants Pass, was not included in the state system until several decades after inclusion of the route from Arcata to Crescent City, it was a very important commercial route from the beginning. Crescent City, founded in 1853, for some time exceeded Eureka in freight tonnage, since it served all the southern Oregon mines as well as most of the diggings in Siskiyou and Del Norte Counties.

In the early 1850's most of the freight went out on pack trains, up Cold Spring Mountain Trail. This was roughly the route of today's US 199, although it veered a few miles east of the present summit. In these years sometimes 500 mules a week left Crescent City, and, until the construction of the Southern Pacific Railroad in 1875, almost all of the freight for towns as far east as Yreka went through Crescent City, as well as a great deal of southern Oregon's supplies.

#### Mule Packtrain

In the Crescent City of the 1850's mules were as common a sight as automobiles today. Packtrains were usually made up of 20-30 mules, which went out on the trail tied in a line, tail to head, a bell on the leader to warn other trains. Two to three men rode with the train, one leading, the others watching the rear.

A typical train carried about 2½ tons. The packs held sides of bacon, bags of flour, kegs of whiskey, sugar,

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Crescent City in 1855. Drawing by R. Hill. At that time the city had over 700 residents and many transients. Large numbers of mules left daily for Sailor Diggins, Alt House, Orleans Bay, Happy Camp, Indian and Deer Creeks, Jacksonville, and Yreka. (Courtesy of California Section, State Library.)



ABOVE: Road through Healdsburg, 1859, shows fine disregard for traffic hazards such as trees in the street. (Courtesy of California Section, State Library.) BELOW: Eureka in 1864. View is up G Street between third and fourth Streets. This is now heart of the city, and third and fourth are now a one-way couplet through town until a freeway can be built. (Courtesy of California Section, State Library.)





Pack train making up for trip from Humboldt Bay into Hoopa Valley, about 1880. This is a large train of perhaps 50 mules, with several packers. Note barrels and boxes in packs; and packer in center tightening hitch. (A. W. Ericson photo, courtesy of Clarke Memorial Museum, Eureka.)

coffee, baking soda, matches, whale oil, lard, salt, frying pans, gold pans, nails, hammers, shovels, picks, and ammunition, in the realm of necessities; and to the richer diggings almost anything a luxury-hungry miner might want. There is a story that a piano was carried by pack train from Crescent City to one mining camp gambling house.

Since a double freight wagon with an 8- or 10-horse team and one driver could carry more freight than a 30-mule packtrain, the "Crescent City Plank Road and Turnpike Company" was organized in 1854. Problems of financing and construction, as well as Indian wars, held up the road until 1858, when the first stage traveled over it from Oregon Territory. This was a toll road, with tolls collected at the ferry over the Smith River. A two-horse team cost \$5, a four-horse team \$8, a six-horse team \$10. The road was passable only from April or May until the return of wet weather, but a four-horse team could haul 3,000 to 3,500 pounds of freight "over the hump." By 1874 this road was in bad repair, and the citizens of Josephine County with difficulty raised \$3,000 in taxes to fix up their end. The levy provided that taxpayers could pay or work out their tax on the road.

In 1882 a new toll road, the Wimer Road, was opened; starting at the

coastal end farther north, it followed roughly along the state line, but reaching eventually the site of Cave Junction, as all the other routes had. It bypassed a hotel operated by a Frenchman named Gasquet who, since 1877, had been operating a large traveler's inn part way up the Smith River Canyon, with French cooking, sleeping cabins, store, saloon, blacksmith shop, butcher shop, and many other outbuildings for poultry and livestock. In clearings nearby he raised corn, potatoes, table vegetables, fruit and grapes. (In 1947 some of the Gasquet

buildings burned; the remaining ones were razed in 1959.)

#### Gasquet Toll Road

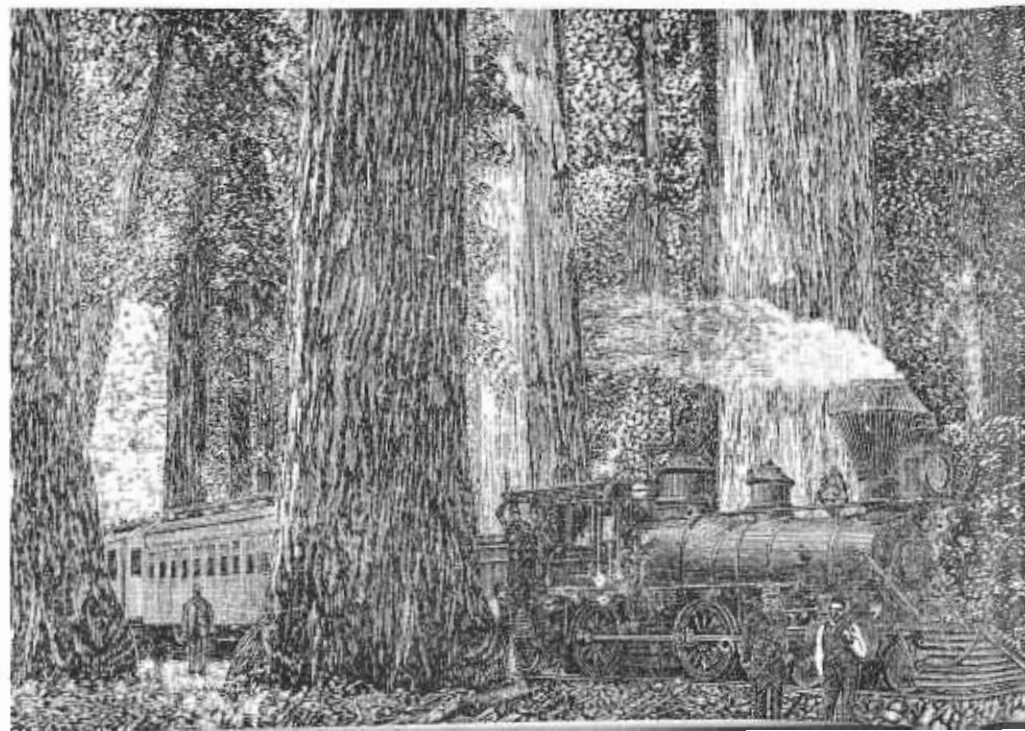
Apparently to protect his investment, Mr. Gasquet in 1887 opened the Gasquet Toll Road, the best road so far, built with black powder and Chinese labor. It eliminated one of the worst features of the Wimer Road: its 1,500-foot drop into the canyon of the North Fork of the Smith and out again.

The Gasquet route was essentially that of the present US 199, except that near the summit it ran a few miles west until it crossed the Oregon line. It joined the future US 199 route at O'Brien and proceeded on to Grants Pass via Vannoy's Ferry across the Rogue River. Much of this road can still be traced through the rugged mountainous terrain.

On the Oregon side the commissioners of Josephine County did their best to keep the route serviceable. The county was too poor to build bridges over the numerous streams, but the commissioners took over issue of ferry licenses and levied a \$3 fine if travelers were not taken in order of arrival. The ordinance stipulated priority was only to be given midwives and county commissioners.

By the late 1880's there was a bridge at Grants Pass over the Rogue, and stagecoaches left both terminus

Line drawing from photograph, showing Pacific Lumber Company's railroad between Scotia and Alton, about 1890. Although these were essentially logging railroads, they were important to local transportation as evidenced by passenger cars and full crew. (From "History and Business Directory of Humboldt County, 1890-91"; Daily Humboldt Standard.)



cities daily. There were 10-passenger coaches, with open sides and roll-down curtains. The body rested on six thick laminated leather strips four inches wide (thorbraces) which served as springs. The body was red; the wheels had two-inch-wide steel tires. Four to six horses drew these vehicles at six miles an hour on the level, with loudly squeaking axles and towering clouds of dust. In 1900 the fare for the 200-mile trip from Crescent City to Grants Pass was \$6.

#### Arrival of Telephone

The first symbol of modern civilization was the linkage of Crescent City and Grants Pass by telephone in 1897. In 1901, at the height of the bicycle craze, it became the thing to do to ride between the two cities, much as it became the craze recently to hike 50 miles.

In 1914 Frank Bosch put automobile stages on the Crescent City-Grants Pass run. These were two-cylinder International Harvesters with high wheels to cope with the ruts and ford the streams, and were designed with easily accessible parts for repairs and easily removable tires for replacement.

In the early 1920's the road was so much improved it was possible to make the trip from Crescent City to Grants Pass in 14 hours. An average of four to five miles an hour speed was good for substantial portions of the route.

Stewart Mitchell, Jr., remembers traveling this road as a child, about 1923, in a Pierce Arrow stage which took all day to make the trip. Passengers stopped for lunch at either O'Brien or Cave Junction, and arrived in Grants Pass after dark. The body of the stage stuck out a considerable distance beyond the rear wheels and on many of the sharp curves it was necessary to back and turn to negotiate the curve. Stewart, who was sitting in a rear seat, remembers looking over the side and discovering there was no road, only the cliff dropping sharply away beneath him.

The route became a state highway in 1927, and was realigned and paved within the next few years. In the early 1930's most of the old Gasquet route had been abandoned.



*Eight-horse team and double freight wagon photographed in Del Norte County around 1900. It would take about 100 of these or several thousand mules to equal the work of one modern truck and trailer combination. To equal today's 160-truck average on the route between Crescent City and Grants Pass, a constant line of loaded mules moving in both directions, head to tail, would be needed. (Photo courtesy of Rev. Don M. Chase of Jackson.)*



*Four-horse team and stage coach photographed at Old Shasta in 1912, typical of stages still operating in dry season over mountain roads in northern California at that time. Most roads were impassable in winter except on horseback.*

#### Eureka to Crescent City

The last section of the Redwood Highway to be developed was the connection between Crescent City and Eureka, despite the fact that Jediah Smith traveled part of this route in 1828, and Dr. Josiah Gregg in 1849-1850. Settlement was sparse, although Trinidad was a booming seaport in the early 1850's, where

mules for packtrains to the mines were pushed overboard from ships in the harbor and allowed to reach shore on their own initiative, then rounded up.

North of Trinidad the Klamath River was the big obstacle. It was too deep to ford, and riders had to swim their horses across. It was customary to wait around on the bank until an Indian came along in a canoe and then



### MAP OF HUMBOLDT COUNTY

This map of Humboldt County roads in late 1880's shows rugged Kneeland-Bridgeville-Blocksburg Route, also coastal route via Petrolia. Note there was no route up the South Fork of the Eel beyond Phillippsville. (From "History and Business Directory of Humboldt County, 1890-91"; Daily Humboldt Standard.)



hitchhike a ride across, or, if there was a boat in sight, to borrow it and tie it up on the other side. In 1890 a flock of 1,800 sheep was ferried across in Indian canoes.

Indians used canoes to travel from the Klamath to Crescent City. Whites sometimes used surfboats. A twisting, winding road through great redwood groves and along the beach, was completed in the early 1890's, with a ferry at the Klamath River at Requa. Through the groves it was necessary to pave with redwood slabs over the soft soil, and, although these were hard on a wagon, they were serviceable and picturesque.

By 1894 stages were running from Eureka to Crescent City, a two-day trip. In 1895 a cable ferry was installed on the Klamath, operating on river power. Later this was operated on gasoline until the bridge was opened in the late 1920's.

In 1911 auto stages were running over the route, taking 8-12 hours to travel the 100 miles or so of muddy forest and sand beaches in wet weather, dusty forest and sand beaches when dry, backing and filling two to three times in hairpin turns. Judge Falk of Eureka tells of a friend of his who drove this route about this time, in an election year. He particularly noted the posters for coroner, which aptly seemed to be located on every hair-raising curve.

#### Douglas Memorial Bridge

When the Douglas Memorial Bridge across the Klamath was opened in the



San Francisco Ferry House about 1890, when the horse was still the mainstay of short-haul transportation, but mechanization was on its way. Streetcars in photo are divided about fifty-fifty between cable-drawn and horse-drawn. Compare with transportation development in north coastal counties at this time. (Courtesy of California Section, State Library.)

late 1920's, a dream of more than 30 years was fulfilled for Del Norte County residents. There seemed at last promise of fulfillment of their other dream of a fine highway connecting them with Eureka and the San Francisco Bay area.

The history of the development of the routes to the south and north of Crescent City illustrates the problems of freight movement and commerce in the pioneer days in the north coastal area. Records of the State Engineer in the 1900's shed light on route selection and road building when the infant highway system was beginning to spread through the State.



Light stagecoach and surrey on the Redwood Highway on old alignment between McDonald and Hopland in southern Mendocino County in the 1900's.

Since most of the lowland counties had developed usable road systems on their own, the State first turned its attention to laterals through the mountains, where county taxes and organizations were weak and road building costs high. Most of these east-west laterals studied were across the Sierra, but the Legislature ordered study of a route connecting Red Bluff, Redding, Weaverville, and Eureka, making Humboldt Bay accessible to the interior cities.

#### Sacramento River Steamers

Although the northern mines were served by steamers operating far up the Sacramento River in high water, and one craft had reached Redding as early as 1850, this form of transportation was uncertain much of the year due to fluctuation in river flow. By



Dungan's Ferry across lower Eel River between Ferndale and Loleta when coastal route south through Petrolia was important. Picture made about 1885. Being transported are two young couples in one-horse gigs, one equestrienne, a young couple on foot, and two dogs, plus the operator. (A. W. Ericson photo, courtesy of Clarke Memorial Museum, Eureka.)



ABOVE: Sausalito Ferry Landing around 1890, with train of North Pacific Coast Railroad ready to pull out with transferred passengers. Note sailing ships anchored in harbor. (Courtesy of California Section, State Library.) BELOW: California Northwestern Railroad Station at Sebastopol early in this century. This is typical of the short-haul trains which connected many towns before adequate highways were built. As early as the 1870's this railroad ran to Duncan's Mills on the Russian River, whence stage coaches carried passengers north as far as Westport along coastal route now followed by SSR 1. Presumably, a traveler from here might make his precarious way via Usal and Petrolia to Eureka if conditions were favorable. (Courtesy of California Section, State Library.)



1854 the mines in the Weaverville vicinity were getting a big portion of their supplies from Eureka, by pack-train over a trail which in general followed the Trinity River along much the same route now followed by US 299.

With the development of the Salmon River mines, new trails were blazed, and existing trails were widened and improved as the people learned how to cope with the terrain. An example of how they learned "the hard way" was on one of these improved trails extending eastward from Orick which crossed the Klamath River at Martins Ferry, just downstream from the town of Weitchpec. In the early 1860's a suspension bridge hung here 97 feet above low water was swept away like matchwood, when the Klamath rose 120 feet.

As the mines around Weaverville were worked out, the Trinity route fell into disfavor, and most traffic

used the Van Duzen River-Mad River route. It was not a very good road, and stagecoaches took  $3\frac{1}{2}$  to 4 days to make the trip. Nevertheless, it was the only usable connecting link for some decades, and was important during the period when the hydraulic mines had silted up the rivers to the extent steamers could not travel them, and before the railroad reached up into the valley. There were many petitions for improvement, since  $3\frac{1}{2}$  to 4 days was too long a trip for the fruit and produce the hopeful Humboldt Bay farmers wanted to ship to market and agriculture languished.

#### State Orders Survey

In 1903 a survey party in charge of G. W. Conners, and assisted part of the time by the State Engineer himself, Mr. Nathaniel Ellery, began a study of possible routes across the Klamath Range to the Sacramento Valley. Because of shortage of funds

this was not completed until the Legislature got around to appropriating more funds in 1907.

Three possible routes were studied; the Trinity River route now used by US 299, the Van Duzen-Mad-South Fork of the Trinity route now used by State Route 36, and an intermediate route which lay north of the Van Duzen, but eventually worked southward and arrived at Peanut, the same destination as the Van Duzen route.

The engineers in charge of the surveys were told to keep in mind the following eight principles:

1. Public service.
2. Possible development of territory.
3. Distances, grades, elevations, and mileage to construct.
4. Character of ground traversed and bridges required.
5. County road approaches.
6. Cost of construction.
7. Snow and sun exposure.
8. Maintenance after construction.

These same principles are still today major factors in the economics of road construction.

#### Southern Route Recommended

After a thorough study of all three routes, it was decided to recommend the southern one. It was cheaper to construct, distances and grades were comparable to the other routes, county road approaches were equal in the west, but superior on the east end, and service would be about equal. The recommendation also urged start of construction at the earliest possible date in the spring of 1909.

Work was in fact begun in 1909, and during a  $5\frac{1}{2}$ -month period an average of 40 men were engaged on the project. They moved 2,845 yards of dirt with plow and scraper at a unit cost of \$0.125; 23,455 yards with pick and shovel at a unit cost of \$0.352; and 6,166 yards of solid rock at a unit cost of \$0.93. Specifications called for a 12-foot roadway with ample, 18-foot turnouts.

Construction continued each season, and on October 3, 1912, Department of Highways road engineer Fibson drove an automobile from the Mad River over the road to Peanut and thence to Red Bluff—the first motor vehicle over the new road. Later there was an official celebration with an

auto procession from Eureka to Red Bluff and Redding. Heavy traffic was immediately generated over the highway, with 200 automobiles and 50 teams in 1914, increasing to 670 automobiles and 150 teams in 1915. This road is in the state system today as Sign Route 36.

#### Eureka to San Francisco Bay Area

The road between Eureka and the Bay area, that section of the present Redwood Highway which today carries the most traffic, was almost as slow in being developed as the portion between Eureka and Crescent City. The L. K. Wood party in 1850 blazed a trail up the Russian River, through Long Valley, and down to the Eel South Fork at Garberville. As early as 1856 the State Surveyor General recommended to the Legislature a \$20,000 appropriation for a road from Petaluma to Humboldt Bay via Santa Rosa, the Russian River and the Eel. The Legislature voted no funds, but authorized counties to collect poll tax for road construction if they so desired.

This route was not developed very rapidly for a number of reasons. For one, the Indian wars in the north coast region in the 1850's and early 1860's were expensive and occupied considerable manpower.

For another, local support was not unanimous. Although the Humboldt *Times* continued to agitate for a road to the Bay area, it got little support in neighboring Mendocino County. In an election here in 1868 a measure to provide for a connection through the county to its neighbors on the north and south was defeated 1,038 to 134. The lumbermen did not want to pay for a road because they used the sea. The stockmen did not want settlers taking their range.

#### World's Most Difficult Terrain

Many people doubted an adequate road could ever be built through the brutal terrain drained by the Eel, and some were still saying it in the first decades of this century. Undoubtedly, road construction in Mendocino, Humboldt, and Del Norte Counties ranks high among the world's most difficult roadbuilding terrains, because of heavy rainfall, rivers that rise 60

to 100 feet almost overnight, nearly sheer slopes, and unstable foundations that are constantly sliding. There is a story of one section of the Northwestern Pacific Railroad in the Eel Canyon where all one winter crews had to go out each morning and move the tracks back up hill the several feet they had slid during the night.

In Marin and southern Sonoma Counties there was no feeling of urgency for a road north to Humboldt Bay, but in effect, the elements of this route were gradually taking shape as normal settlement and commerce developed. General ranching, dairying, and the provision of firewood for the growing Bay area cities, were prosperous occupations. Logging of the redwoods stimulated railroad construction.

There were three main ports for seaborne passengers and freight, the ferry landings at Sausalito and San Quentin, and small steamer traffic which wound up Petaluma River at high tide to landings at that city, giving northbound passengers and cargo

a 30-mile advantage over Sausalito. The northern side of the Golden Gate to which the bridge is now anchored was then only a windswept, uninhabited promontory.

#### Railroad Reaches Cloverdale

As the towns of Santa Rosa, Ukiah, and Willits increased and prospered, the roads connecting them to the Bay were improved. The railroad, also, slowly thrust northward, each succeeding terminus a jumping-off point. Started in 1869, by 1872 it had reached Cloverdale, but it was 1914 before it reached Eureka.

In Eureka the Humboldt *Times* continued to call for a road to the Bay. In July 1865 the Eel River and Mattole Plank and Turnpike Co., Inc., was formed. This was superseded shortly by the Petrolia and Centerville Plank and Turnpike Co., with an advertised capital of \$30,000. Construction started in 1869, and by 1871 a daily stage was running from Eureka to Petrolia via Table Bluff, Ferndale, and Centerville.



ABOVE: High water on the Salt River, January 16, 1909, near Ferndale, Humboldt County, on coast route. The road between Eureka and Ferndale is part of State Sign Route 1. (Courtesy of Andrew Genzoli, Eureka.) BELOW: Because lumber was cheap and other materials involved expensive shipment and haulage, most of the early bridges in the north coast counties were of wood. This typical bridge of that day, on the present Redwood Highway alignment, was built by a county. It has been replaced long ago, of course.





Redwood Highway a mile south of Willits in 1900's.



ABOVE: Section of plank road on Redwood Highway in Del Norte County a few miles south of Crescent City around 1915. BELOW: Devil's Knee on old highway in 1911 where it dropped from Mail Ridge Route down to McCann on Main Fork of the Eel.



This road was gradually extended up the Mattole to a point near its source, then it turned inland to Brice-land, and crossed the South Fork of the Eel close to Garberville. From Garberville it climbed straight up the mountainside to join the Alderpoint Road, which was being extended southward.

In 1911 Jack London did a magazine story on a trip from the Bay to Eureka which he and Charmian took in a "light Studebaker trap" with a three-horse team. They followed the usual route north to Willits, then crossed over to Fort Bragg, continued north through Usal, then inland to the Eel River via Brice-land, north to Eureka, and eventually to Crescent City, where they were lionized.

When the Legislature authorized county supervisors to issue road bonds in 1874, Humboldt County sold \$60,000 worth. The money was partly for the Petrolia-Brice-land road, but most of it was earmarked for a more direct route through Kneeland Prairie. This road headed almost due south to cross the Van Duzen at Bridgeville, and by 1875 had reached Blocksburg, 70 miles from Eureka.

The next year they reached Alderpoint, where the main fork of the Eel had to be forded. Later a water power ferry was installed here. Chinese labor was hired in 1876, and in two more years connection was made with the Bell Springs Road at Dark Canyon. This road dropped down a precipitous grade to Twin Rocks, from whence the route continued southward over much the same alignment now followed by the Redwood Highway.

#### Mail Ridge Road

Somewhat later a branch of this route was built along the top of the ridge (later getting the name "Mail Ridge Road"). This alternate was shorter but it dropped down the steep slopes in a series of switchbacks and hairpin turns to McCann on the main Eel, frightening many travelers. Another magazine article, written approximately the same time as was Jack London's, tells of following this route by automobile in 1911, and gives a good picture of auto travel in that day.

The party left San Francisco in the afternoon, landed from the ferry at Sausalito, then proceeded at a leisurely pace to Santa Rosa, where they spent the first night. Starting the next morning early, they made the sections from Santa Rosa to Ukiah, and from Ukiah to Willits without incident. From here north, the road worsened rapidly, being very dusty and deeply rutted from teaming.

Intending to stay at the inn at Twin Rocks that night, they pushed on past Laytonville, but darkness caught them negotiating a narrow canyon some distance from their destination. They broke several springs which they had to repair with oak branches, the pan dragged because of the deep ruts, and the narrow road along the edge of the precipitous canyon could be only dimly seen by the light of their oil lamps.

#### Bell Spring Mountain

They finally made Twin Rocks, and the next morning had to head straight up the side of Bell Spring Mountain, 4,600 feet high. On the way the motor was boiling so badly they had to stop and reset the carburetor. At the top of the grade they headed north along the ridge through Bell Springs, East View House, Harris, Hubbards Station, and Fruitland. At this point they started the plunge down to the Eel River, negotiating, among the many curves, two notorious ones called "The Devil's Knee" and "The Devil's Elbow," where it was necessary to back up to make the turn. The authors warned that under no circumstances should the motorist attempt to go farther than Dyerville on the third day of the trip.

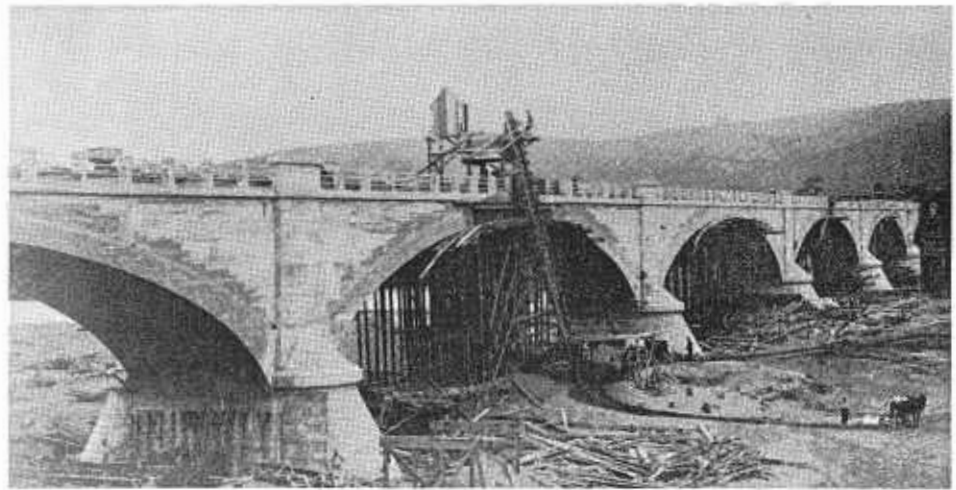
At Dyerville they crossed the river on the ferry, although the auto stages running over the route had high wheels and forded the stream. From the ferry it was only a half-day run to Eureka over a good gravel road, well watered. A comforting observation on the trip was the lack of fear evinced by teams met on the road, they being accustomed to the auto stage.

In 1912 Harvey M. Harper drove from Arizona to Eureka in a Model T to open a Ford agency there. In later years Mrs. Harper told of walking alongside the car on a particularly slippery clay section north of Willits, holding a rope tied to the car, to keep it from sliding sidewise in the creek. They made the trip with five children, including a babe in arms, for which Mrs. Harper carried a wash tub to wash out the baby's things each night when they camped.

#### Eureka to Willits in 16 Hours!

Judge Harry W. Falk of Eureka remembers his first automobile trip down to the Bay area in June 1913, when they traveled via Bridgeville, Blocksburg, and Alderpoint. They left Eureka at 4 a.m., and arrived at Willits at 8 o'clock that evening. On another trip, as late as 1920, when the new alignment was mostly completed, but not paved, he and three healthy young companions left Eureka in a rainstorm at 3 a.m. The ruts left by the high-wheeled auto stages were so deep they shoved mud all the way from Scotia to Garberville, with the three young men spending about half the time riding, the other half pushing when the car stuck in the mud. They reached Cloverdale at two the next morning.

These roads that the driver of that day took more or less as a matter of course, would be terrifying to most drivers today, and in today's vehicle, much more dangerous. Ignoring the low clearance of today's car, which would cause it immediately to stick in the mud, the driver's visibility and steering control in the old cars was far superior to today's low silhouette models. These changes in automobile design have had a profound effect on highway design.



*Ferndale Bridge under construction in 1911 was largest of its type in the world at that time. Design was concrete and reinforced-steel shell filled with earth. Each 180-foot arch required pouring of 1,000 tons of concrete in a nonstop operation. Mixers were gasoline engine driven, and wet concrete was transported in dumpcarts on rails. Bridge was built by Pacific Construction Company on bid of \$245,967, and contractor later admitted he lost about \$10,000 on job, but gained a great amount of experience. Two thousand people gathered in rain on November 16, 1911, to celebrate opening of span to traffic. Requiring only minor repairs, bridge still is in use after more than 50 years of Eel River floods. (Photo courtesy of Andrew Genzoli, Eureka.)*

*(Source material included Humboldt Bay Region, Coy, 1929, California Historical Association; History and Business Directory of Humboldt County, Daily Humboldt Standard, 1890; Pack and Saddles and Rolling Wheels, Chase and Helms, Triplicate, 1959; Redwood Frontier—Wilderness Defiant, Genzoli and Martin, 1962; Humboldt County Historical Society Quarterly; California State Engineer Biennial Reports; California Division of Highways files in Sacramento and Eureka; various newspaper files.*

*To these individuals thanks for aid must also be extended: Andrew Genzoli of Eureka; Stuart Nixon of the Redwood Empire Association; Dick Denbo and Staff of the Humboldt County Chamber of Commerce; Allan R. Ottley, Miriam T. Meyer, and other staff members of the California Section, State Library; Miss Clarke and Mr. Ekaas of the Clarke Memorial Museum, Eureka; Judge Harry W. Falk of Eureka; Reverend Don M. Chase of Jackson; members of photographic, reproduction, and audiovisual sections of Headquarters Staff, California Division of Highways.)*

*Eureka by 1910 was a sizable city, despite the fact that major transport was by sea. Railroad at this time reached about to Laytonville, with stage service to northern cities from railhead if condition of roads permitted. Virtually all freight came by sea. (Courtesy of California Section, State Library.)*



# San Marcos Pass

Modern Highway Built Through Historic Area

By J. M. Sturgeon, District Construction Engineer



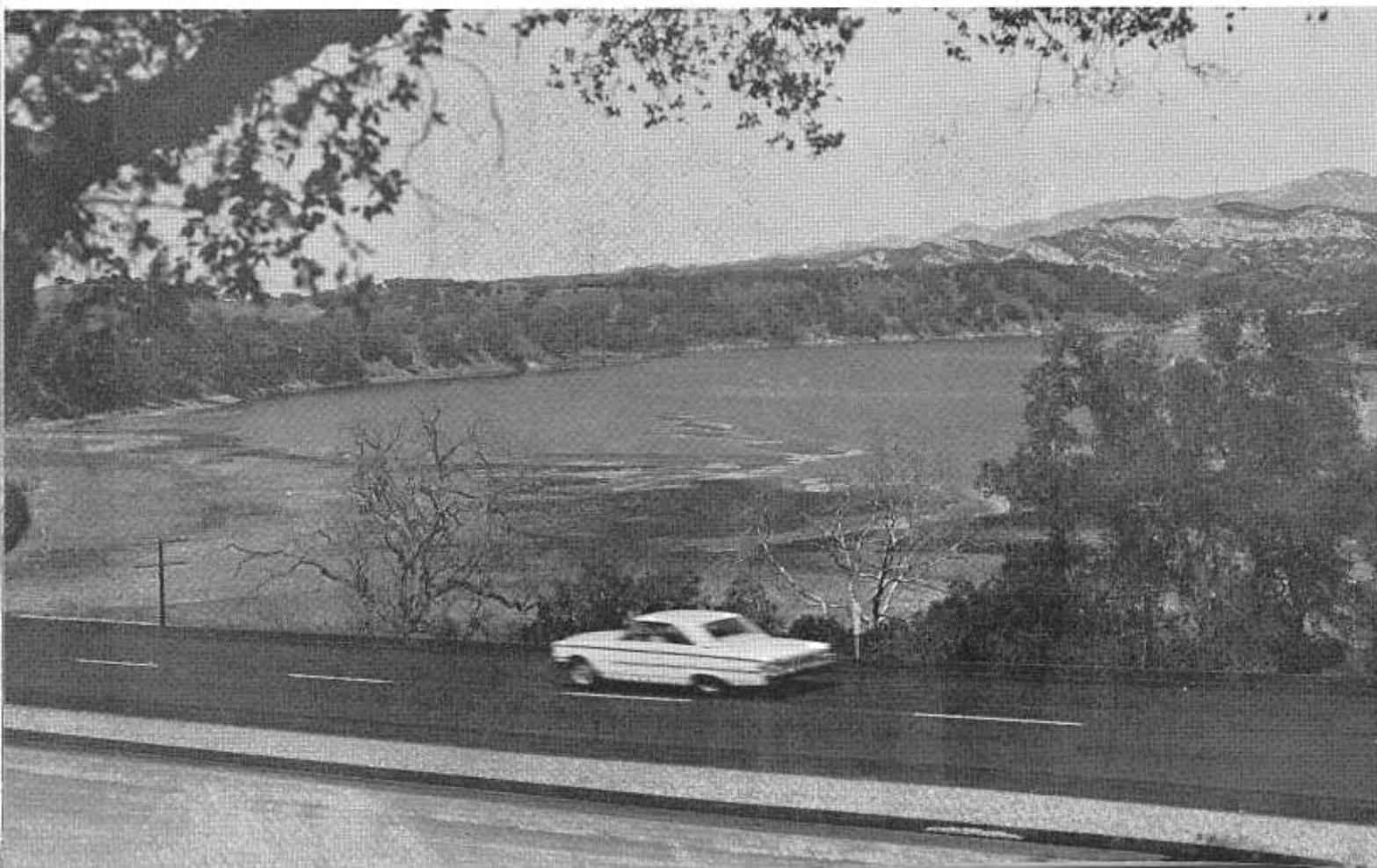
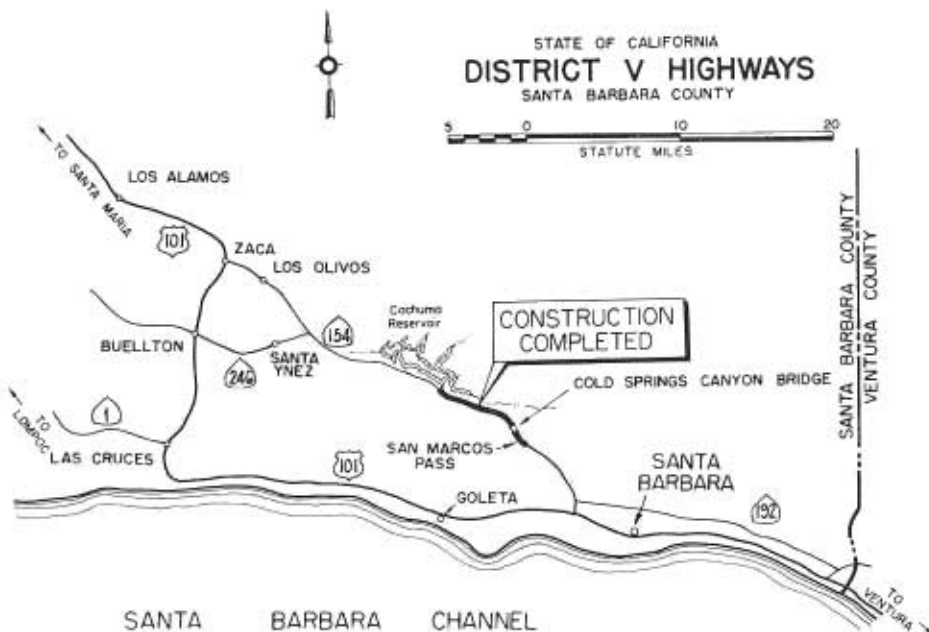
Construction of a modern, safe, easy-to-drive scenic highway in a mountainous recreational area was recently accomplished on State Sign Route 154, known locally as

the "San Marcos Pass" Road.

San Marcos Pass dropped into the history books in 1846 when Lt. John C. Frémont, guided by Julian Foxen, a local ranchero, marched over the pass and arrived in Santa Barbara while the Mexican forces waited at Gaviota Gorge, far to the west, ready to blast the cliffs of the lower Gaviota Pass area down on his army's head.

The San Marcos Pass Road was originally constructed by Santa Bar-

**PHOTO BELOW:** Looking east across the headwaters of Cachuma Lake near the north end of the new highway.



bara County and the Bureau of Public Roads. In 1931 it was taken into the state highway system.

The most recently completed highway reconstruction project in Santa Barbara County is in this historic and scenic area. Coxco Joint Venture has finished a realignment contract from the crest of San Marcos Pass to the floor of the Santa Ynez Valley.

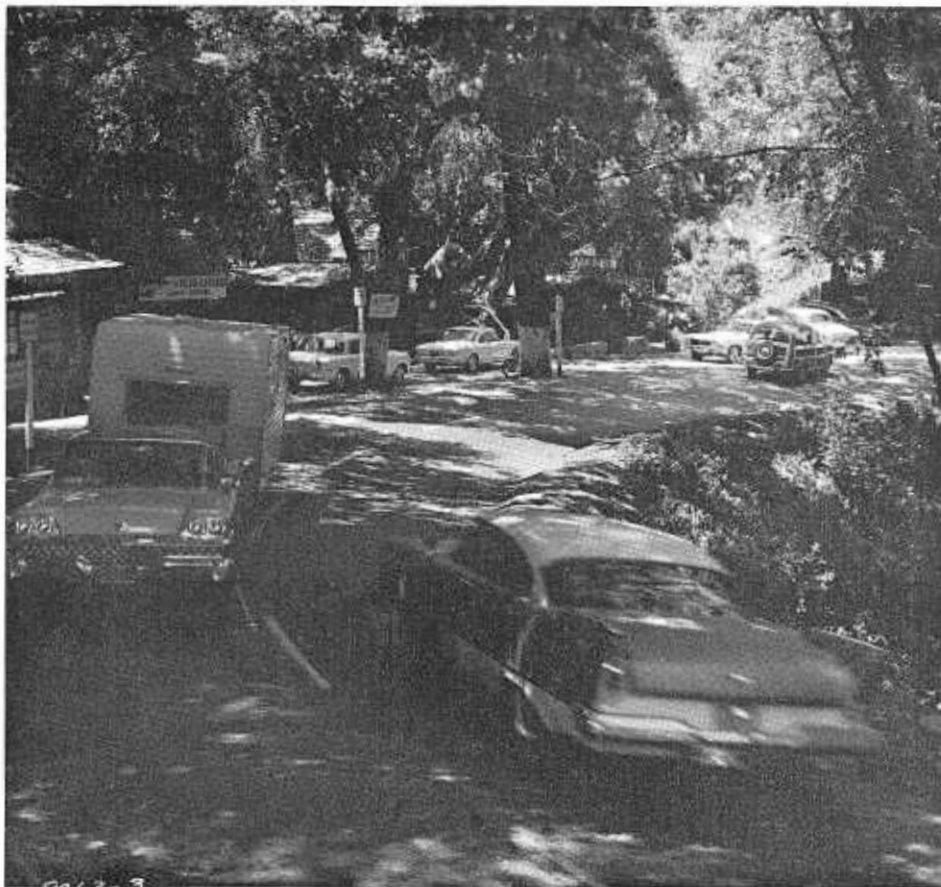
#### Scenic Area

Though almost the entire alignment of the highway between Santa Barbara and its junction with Highway 101 at the old railroad stop at Zaca provides scenery galore, the recently completed stretch provides the most dramatic. As the crest of the pass is approached from the south, the highway passes through an area of huge rock outcroppings. Just after passing over the crest, the new alignment provides a series of vistas over the upper Santa Ynez Valley to the mountains of the Los Padres National Forest and the San Rafael primitive area, location of the Condor Sanctuary, where these rare birds can be seen but not molested.

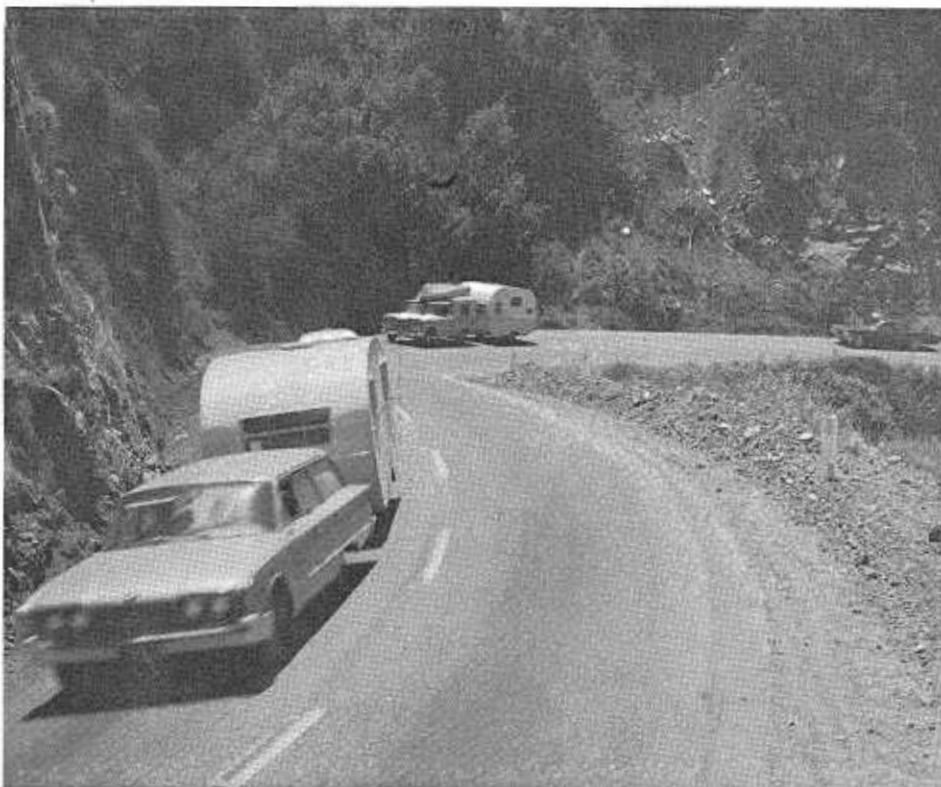
As the road drops down the hills on a steady grade, it transitions from a four-lane section to a two-lane section at the new 1,230-foot-long Cold Springs Canyon steel arch bridge, also recently completed under a separate contract. Past the Cold Springs arch the highway continues its steady descent to the floor of the valley. On the way it touches Paradise Road, the main access to the camping and recreational areas in Los Padres National Forest in southern Santa Barbara County. With several last sweeps that present views of the upper reaches of Lake Cachuma, the alignment ties into existing State Route 154 which was realigned in 1951 when Cachuma Dam was constructed, to replace an older section that was to be covered by rising waters as the lake formed behind the dam.

#### Road Serves Homes

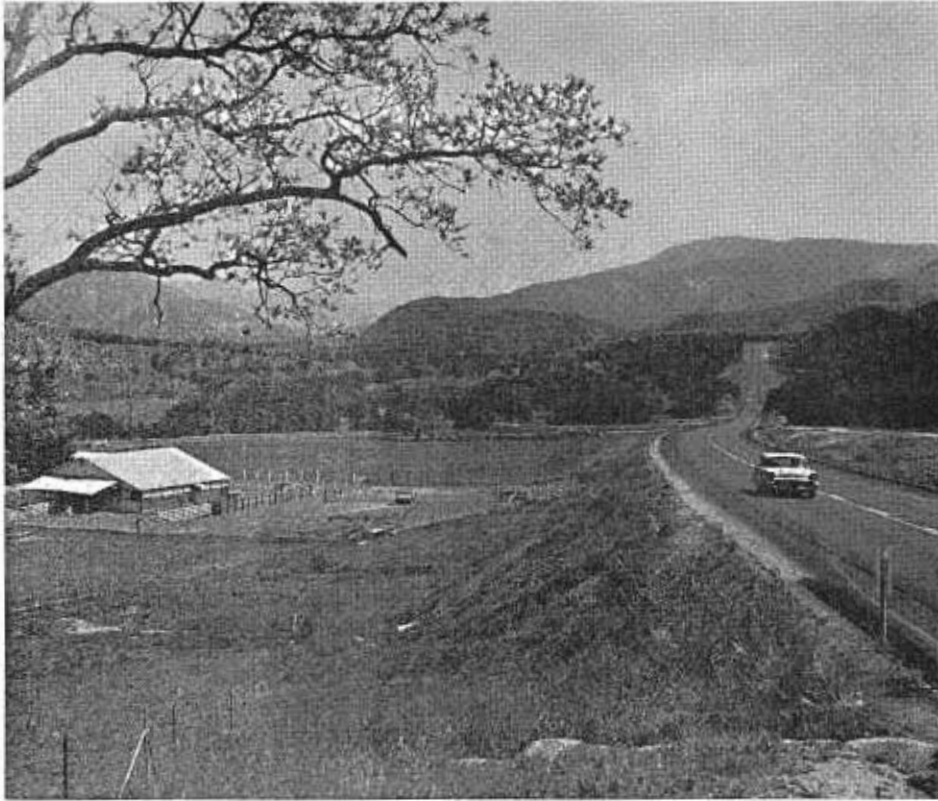
As Santa Barbara grew, more and more people moved up into hillside homes that offered spectacular views of coastal Santa Barbara County, the city of Santa Barbara, the ocean, and



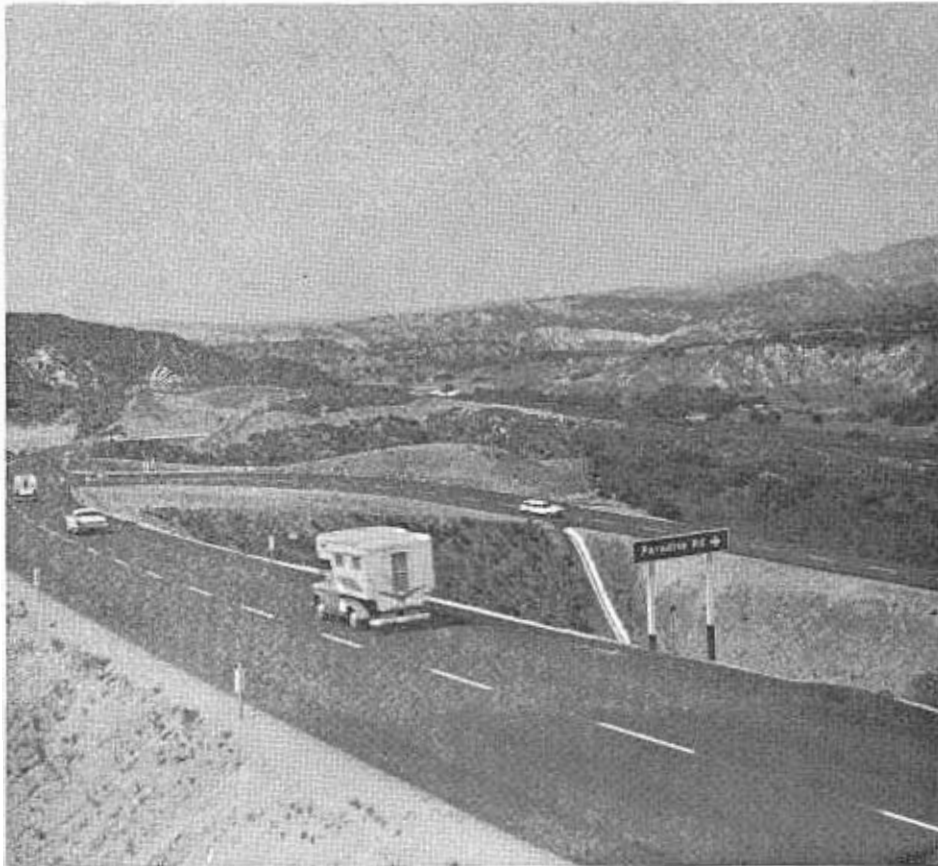
Summer traffic on the old route at Cold Springs Canyon Inn.



Vacation traffic on the old road leaving Cachuma Lake and headed for Santa Barbara.



*Looking south along the new highway from the floor of the Santa Ynez Valley.*



*The Paradise Road junction with the new highway looking north up the Santa Ynez Valley.*

the Channel Islands offshore. The San Marcos Pass Road was inevitably the main access facility for much of this development.

Also, as Santa Barbara and the general vicinity became more and more widely known as a recreational area, this road became more and more heavily used as a direct route to the Los Padres National Forest campgrounds, fishing sites, and hunting areas.

With the construction of this dam and the creation of Lake Cachuma behind it, a tremendous new recreational attraction was created. Boating, camping, and fishing enthusiasts swarmed into the valley for vacations and traffic soared in five years beyond the 20-year predictions that had previously been made.

And always, for passenger cars, the road has had the advantage of being a scenic yet shorter route than the coast highway, US 101, between Santa Barbara and towns to the north. With this latest project completed, the coast road, US 101, is almost 12 miles longer.

(This latter advantage was, for many years, however, a distance advantage only, not one of time. The narrow and twisting alignment and almost complete lack of safe passing locations kept traffic to the 25 to 35 miles per hour range for much of the distance.)

#### **Last Hazardous Section**

By the time the dam was complete, the necessary realignment around the developing lake and reconstruction projects on the coastal side of the Santa Ynez Range had left one seven-mile stretch of narrow twisting road between the crest of San Marcos Pass and the floor of the Santa Ynez Valley as the only high-hazard stretch between Santa Barbara and the towns of Solvang and Los Olivos. This seven-mile section had 62 curves with radii of less than 600 feet. Thirty-five of these had radii of 200 feet or less. Six had radii of 100 feet or less.

Initial studies showed that the most desirable location for a realignment was near the existing road though generally uphill from the lower portions of the existing route. One draw-



back was the necessity for constructing a long horseshoe curve around Cold Springs Canyon which, at best, would have to be built on a far too short radius curve, somewhere between 300 and 600 feet. The solution chosen was to construct the arch bridge across Cold Springs Canyon. In this way, the best sections of two different possible alignments could be used and a net overall economy could be realized.

It was also decided to split the reconstruction into two projects: one for the main roadwork, drainage, and paving; and one contract for the Cold Springs Bridge itself. (See *California Highways and Public Works*, September-October 1963.)

Bids for the road project were opened on June 6, 1962, and Coxco Joint Venture of Stanton was the low bidder at \$3,694,348. The contract was approved on June 29, 1962, with 390 working days allowed for completion. Weather nonworking days extended the allowable contract time

to April 30, 1964. However, work was actually completed and the contract accepted by the Director of Public Works on February 28, 1964.

#### **Forest Fire Danger**

Weather nonworking days on this project had a somewhat different definition than the usual "stormy weather" connotation. Because so much of the job was located in an area of national forest where forest fires were a matter of overriding concern, the special provisions for the project provided that the contractor could not work, and would not be charged a working day, on any day when the fire danger reached a burning index of 33. Above a burning index of 19, no welding or blasting was permitted.

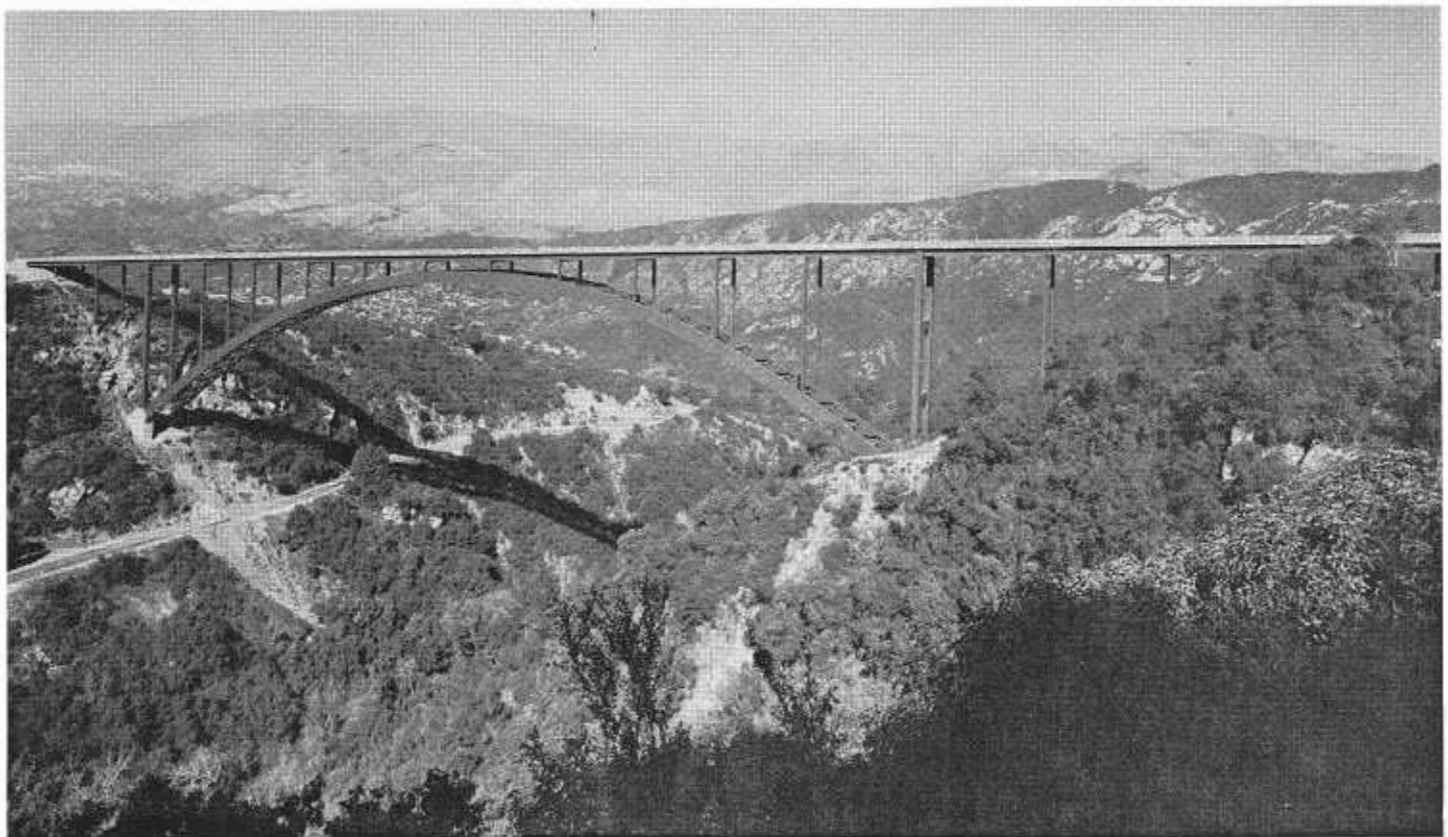
The cooperation between the United States Forest Service and contractor's forces was such that no fire incidents occurred, even though much of the project ran through "head-high" chaparral bushes which, in dry weather, presented an extreme fire hazard.

In view of the fire hazards on the project, no burning of brush or trees was permitted under the terms of the contract. Instead, the contractor used a mechanical chipper to dispose of all trees and brush under four inches in diameter. The larger trees were disposed of to a local rancher.

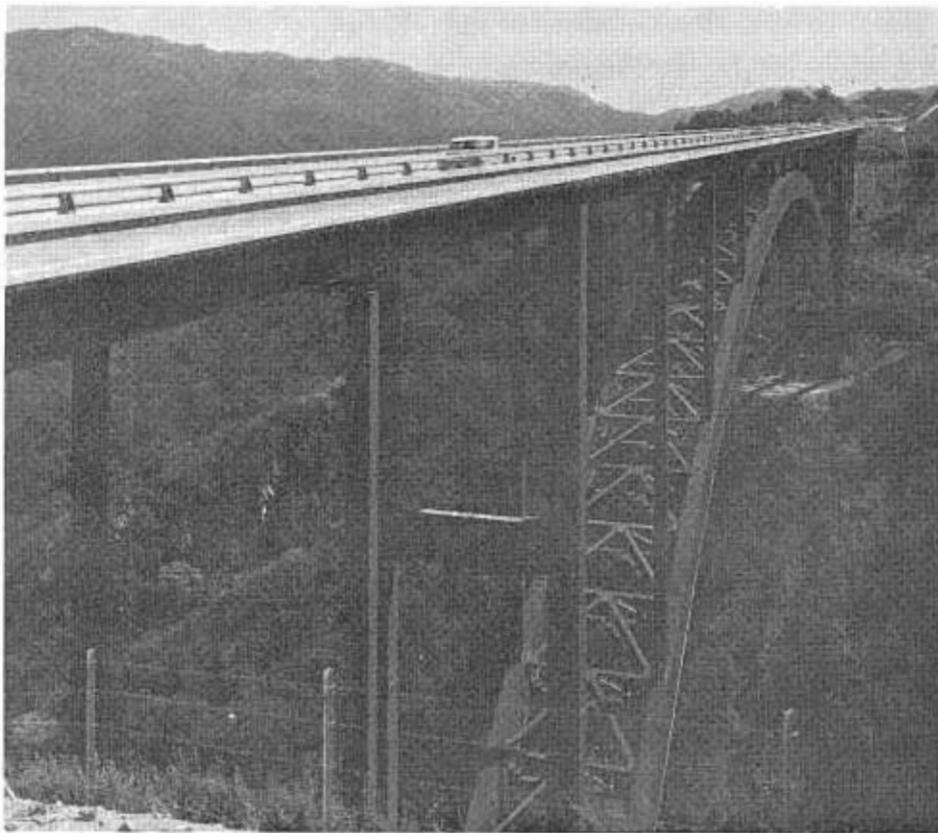
Clearing, grubbing and earthwork operations started near the center of the project. An unusual amount of development and pioneering work was needed to get access to the work areas in the upper part of the job. This decision to begin at the center of the project let the contractor work toward both ends with concentration of equipment and efforts.

#### **Sidehill Construction**

Extensive sidehill construction of embankments slowed initial earthwork as did the necessity of installing over 140 culverts for cross drainage. Culverts averaged about 20 per mile and ranged from 18 inches to 114 inches in diameter.



The new Cold Springs Canyon Bridge looking toward the Santa Ynez Mountains in the background.



Closeup of the Cold Springs Canyon Bridge looking toward Santa Barbara and the crest of San Marcos Pass.



A view of the Cold Springs Canyon Bridge when nearly completed, showing the alignment of the old road beneath.

One reinforced concrete pipe has been installed under 185 feet of embankment, representing one of the highest pipe overfills in the state highway system.

Earthwork totaled more than 3,000,000 cubic yards. Initially the job appeared to be "in balance" between excavation and needed embankment quantities. As grading progressed, a minor deficiency of dirt developed; however, this condition was soon reversed by the occurrence of several small slides which resulted in an excess of dirt. Fortunately, a property owner adjacent to the job could make use of the dirt to level and improve some extremely irregular ground on his property. A disposal agreement was obtained and economical disposal of the excess was thus made possible.

Much of the material on the job was a readily compactible shale, but some of the deposits were laced with large boulders two feet in diameter and larger. Many of these were used by the contractor to construct a long looping water energy dissipater of boulders locked in place with air-blown mortar.

#### Most Unusual Feature

Possibly the most unusual feature of the project was the contractor's solution to the problem of inadequate water supply for the greater length of the job. He elected to take water from Lake Cahuma at the northern end of the project and pump it through an eight-inch waterline to several skid-mounted water tanks spaced along the project. More than six miles of line was installed. While vehicular water rigs were used to handle much of the actual spread of the water for embankment construction, enough taps were placed on the water line itself to permit sprinkler application of water to excavation areas and many structure sites.

The project, at its initial inspection, seemed to present difficult problems on interlocked traffic handling, stage construction, coordination with the concurrent activities of Cold Springs Canyon Bridge, etc. The contractor, Coxco Joint Venture, as the same organization has done on several other projects in this district, proceeded to

make the complicated planning and scheduling look easy. Prior to submitting their bid, they had prepared a detailed analysis of possible and probable progress based in part on a seismic study they had made of the entire project. Their final plan for proceeding with the work, while not a true critical path study, was so complete as to contain all the data necessary for the creation of one. While inevitably some changes occurred as the project proceeded, their originally planned scheduling proved valid throughout the life of the job.

This planning on the part of the contractor, and most especially the cooperation exhibited by the contractor in making continuous efforts to keep the resident engineer informed of the plans, had a two-way benefit. First, progress was continuous and conflicts reduced to a minimum. Second, the resident engineer was able to plan and schedule his inspection efficiently. Construction engineering costs on this project, as a result, was sharply lower than the district average on similar projects.

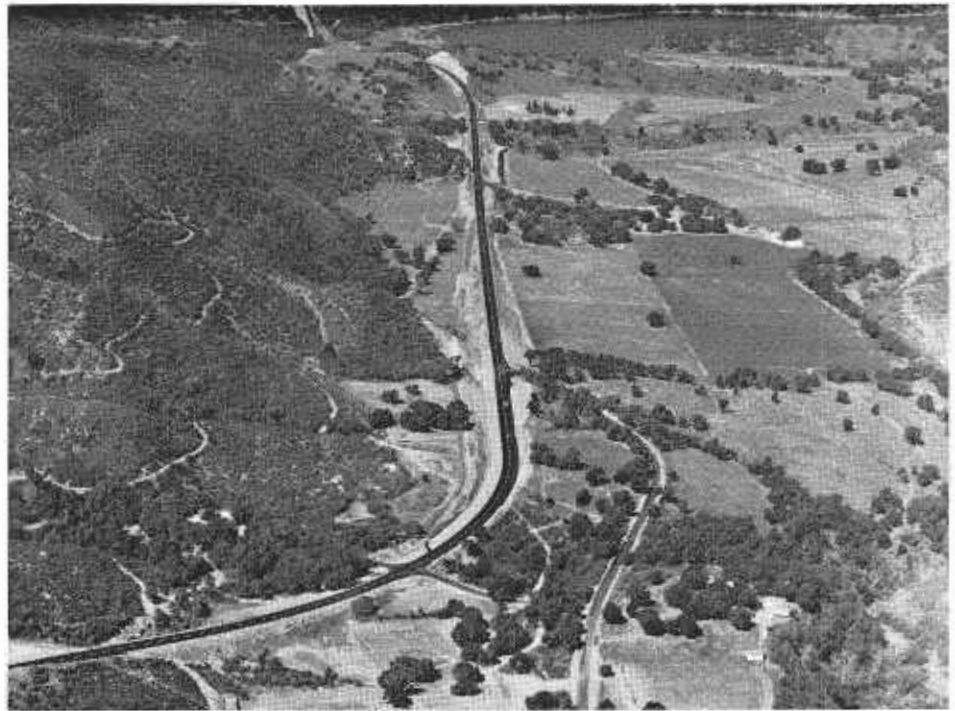
Resident engineer for the State on the project was C. G. Puder, Associate Highway Engineer.

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## New Traffic Record Set on Bay Bridge

A new traffic record was set on the San Francisco-Oakland Bay Bridge during May. On Friday, May 8, a total of 148,137 vehicles crossed the bridge in a single day, eclipsing the old record of 146,942 vehicles set on Friday, April 17, 1964.

Recently completed statistics indicate that 1964 may be a record-breaking year for Bay Bridge traffic. For the first four months of 1964 a total of 14,936,406 vehicles have crossed the bridge, an increase of about 9.7 percent over the corresponding 1963 period. The average daily traffic for the first quarter of 1964 has been 123,441 vehicles; in April the average daily traffic was 128,466 vehicles.



*The new relocated highway at the north end of the project with Cachuma Lake in the background. The old road ties into the new highway at center right.*



*Cut and fill construction on the new highway near the top of San Marcos Pass. Winding sections of the old alignment can be seen in left background.*

# Paper Management

Storage, Availability  
Is Program's Main Goal

By Alfred S. Roxburgh, Chief Management Analyst

Paperwork, the voluminous by-product of more and varied projects, is being handled more efficiently in the Division of Highways, thanks to advances in Paperwork Management. Until recently, the answer to the paperwork problem was to hire more clerks, buy more filing equipment, and rent more space.

Today, the Division of Highways is realizing a substantial monetary and space saving resulting from the implementation of a records management program. Two segments of the program are discussed in this article, and provide an example of the effects of a file reorganization study in District VII, and the results of a pilot map study in District VIII.

In the early 1950's, departments felt the first impact of the increased paperwork load, particularly in the records area. The Service and Supply Department and the Accounting Department were asked to undertake a survey of the storage and use of records in all division offices. It was determined that a records management program would be the first step in controlling the huge volume of accumulating paperwork. Accordingly, the National Records Management Council, in 1957, developed an overall records management program proposal for the division. A long-range program was approved by the State Highway Engineer, and in July 1957 the Management Analysis Section was born.

The first major task of the section was to help carry out the recommendations submitted by the National Records Management Council.\* Since that time, file reorganization studies have been completed in Districts I, III, IV, VII, VIII, and XI. The results of the studies, submitted to the districts, are either fully implemented, as in the case of Districts VII and VIII, or are in varying stages of implementation



An organized central index is the key to immediate retrieval in District VIII's central map files.



No wonder the work is enjoyable. This file clerk in District VIII is able to find maps, plans, and tracings effortlessly in the neat, orderly central map files.

in the other districts. It is planned to complete the studies in Districts II, V, VI, IX, and X during 1964-65.

There are several goals of the records management program:

1. Immediate access to the records—to find a record when it is needed.
2. Elimination of material not frequently used from office areas. This removal leads to storage of necessary but inactive or semiactive records at records centers, and destruction of obsolete records. It also results in space saving.
3. Saving of professional and clerical time.

The first step in the implementation of the file reorganization studies is to reevaluate the existing records disposition schedules. The immediate effect

\* John H. Stanford, "More Highways, Less Paper," *California Highways and Public Works*, Vol. 37, May-June 1958, page 1.



One benefit resulting from the implementation of District VII's file reorganization study—an efficient filing system for General Files personnel.

will be to relieve the office areas of increasing volumes of records.

Two of the districts, in which the study recommendations have been implemented with dramatic results, are Districts VII and VIII. A prime example is the success of the District VII program. With the growth of the district and the need to house various functions in several locations, a number of functional file units developed. This created duplication in filing and uncertainty in finding material.

During the period from February 24 to June 23, 1961, the Management Analysis Section conducted a District VII files usage survey; the findings were forwarded to the district in January 1962 and accepted in March of that year. As a result, operation and maintenance of almost all departmental files which were previously partly duplicated in General Files, have been taken over at the source of the file and decentralized. Also, a new systems flow has been established with project records originating in Advance Planning. The records are now forwarded as the project progresses to Design, Construction and finally into the Records Center.

The benefits in District VII have been:

1. Elimination of unnecessary filing equipment.

2. Establishment of effective records retention and disposition schedules. The amount of material destroyed in 1961 was 335 cubic feet of records. Following the study, the destruction of Records Center material was as follows: 1962, 897 cubic feet; 1963, 560 cubic feet.

3. Use of the Records Center for inactive or semiactive material. In 1962, 497 cubic feet were forwarded to the Records Center; and in 1963, 997 cubic feet were sent to storage.

#### Map Study

One of the most pressing problems in the division is that of filing maps, plans, and tracings. With an ever increasing volume of such records, the question of determining *how* they should be retained, *how long* they should be retained, and what mechanics there should be for review and possible clearance of certain categories, has become increasingly complex! To establish certain procedures to accomplish a periodic review, a pilot study was made in District VIII.

As a result of this study, specific procedures were developed which have been incorporated into the district's central map filing system.

These methods have been in effect since December 1962, and have provided the mechanics for periodic review (with a potential clearance) of maps, plans, and tracings once they have been transmitted to the Central Files. It is planned that, based on this pilot study, further analysis within the division will be undertaken in the near future.

#### Other Projects

Forms management, a further step in the effort to streamline the division's paperwork processes, is currently being studied by the Management Analysis Section.

Also, a coordinated library service is being established to provide a centralized index of obtainable reference material for division personnel.

Division management has recognized for some time the constantly increasing need for managing, controlling, and simplifying paperwork. The Management Analysis Section will continue to provide assistance in solving this and other administrative and management problems by consultation or study, looking toward sensible solutions which will assist the Division of Highways to improve operations and increase output.

# Freeway Fatalities

*Survey Shows Freeways Are Still Twice as Safe as Other Highways*

In 1961 and 1962, 26.1 billion miles were driven on California freeways, a distance equal to 140 round trips to the sun. Had this travel taken place on conventional roads and streets, 1,630 persons would have died. As it really happened, there were 802 persons killed. To highway engineers and others concerned with safety, this is 802 too many.

Almost all of the fatal accidents, reported in a study by Roger T. Johnson of the Division of Highways Traffic Department, might have been avoided. How? By safer public driving and pedestrian behavior.

It has been established that freeways are much safer than all other highways and roads. (See "Freeways Are Safer Highways," by J. C. Womack, *California Highways and Public Works*, July-August 1963.) It is also clear that statistics, studied and applied by design engineers, can be used to make freeways even safer in the future. But while the highway engineer can make it difficult for the motorist to have an accident, he cannot make it impossible. The needlessness of the deaths incurred is substantiated by the major findings of Johnson's report which are summarized in this article:



*Signs prohibiting pedestrians and cyclists are posted to protect the individual's own safety.*



*Freeways are unquestionably the safest known way of automobile travel, but they do have, by their nature, fixed objects which can be turned into hazards by the inattentive motorist.*

Freeways do prevent deaths. Projections indicate that more than 2,000 fatalities have been avoided since 1949 through the use of freeways instead of conventional highways. As more miles of freeways are completed and opened to traffic, the possibilities for accidents should decrease. Thus, as new stretches of freeway—396 miles opened to traffic in 1962 and 1963—become available, the motorist can protect his own safety by choosing to drive on them instead of on conventional highways.

Table I shows the significance of freeway driving: For a given amount of travel, less than one-half as many people are killed as on other roads and streets.

Although the freeway fatal-accident rate rose from 2.29 (per 100 MVM) in 1961 to 2.71 in 1962, it appears that this is mainly a matter of a cyclic variation in the long-term downward trend. This appraisal has been verified by an analysis of the 10 sections, totaling 175 miles, which accounted for 90 percent of the 1962 statewide increase in fatal accidents.

Surprisingly enough, the total accident rate (fatal and nonfatal) on the 175 miles reviewed in the study rose only slightly. Engineers point out that

there is a very fine dividing line between a serious injury accident and a fatal one, and that there were more people who crossed that thin line in 1962 than in 1961. For instance, there were 70 more fatal accidents on these 10 sections in 1962 (as compared with 1961). If these additional fatal accidents on the 175 miles of routes had not occurred, the statewide rate would not have risen.

The motorist needs insight into accident prevention. A breakdown of the most prevalent types of tragedy is given in Table II. It shows precisely where the most common dangers are:

Note that one-half of all freeway fatal accidents are *single-vehicle* accidents in which the driver usually has no one to blame but himself. Nearly one-third of all fatalities on freeways involve hitting fixed objects. These single-vehicle fixed-object accidents pose a dilemma because the safety of freeways evolves from the elimination of conflicting traffic. And yet the structures which make it possible to do away with grade intersections—overcrossings and undercrossings—necessitate supports which, in some cases, become fixed-object hazards. Freeway design studies may be able

to provide some answers to this problem but it is still the motorist's responsibility to steer his car down the road instead of off to one side into one of these "objects."

Median barriers are not without quandaries too. Although they are successful in preventing cross-median head-on collisions on freeways, they may also provide another "fixed object" target. The effectiveness of median protection in cross-median prevention, however, has led to a program, begun in 1959, to construct barriers on all state freeways having a traffic volume of 60,000 or more vehicles per day. Additional barriers will be constructed on other freeways as they reach this traffic volume, and on new freeways when the anticipated volume within two years of construction will be 60,000 vehicles per day.

Fatal accident reduction resulting from median barrier installation is cited in Table III.

TABLE I

	1961-1962 Accidents per million vehicle-miles	1961-1962 Fatalities per 100 million vehicle-miles
Freeways	1.43	3.07
All other roads and streets	4.21	5.77
Rural state highways other than freeways	2.47	9.17

TABLE III

Year	Percentage cross-median fatal accidents
1958 (before barriers)	19.0
1960 (after barriers)	10.9
1962	8.7

Rear-end accidents account for only 19 percent of all *fatal* freeway accidents. This is in contrast to nonfatal accidents of the same type, which account for 60 percent of the nonfatal total. Fifty percent of the 123 rear-

TABLE II  
NUMBER AND TYPE OF FATAL ACCIDENTS ON CALIFORNIA FREEWAYS

Type of accident	Fatalities per fatal accident (1961 and 1962)	Number (1961 and 1962)		Percent (1961 and 1962)		Percent (1960)	
Single vehicle			333		50.5		52.3
Hit fixed object	1.21	204		30.9		31.0	
Did not hit fixed object	1.07	129		19.6		21.3	
Pedestrian			84		12.7		14.4
Walkers	1.02	57		8.6		10.5	
Dismounted vehicle occupants	1.04	27		4.1		3.9	
Head-on collisions			104		15.8		16.7
Driving on wrong side of median	1.54	36		5.5		5.8	
Crossed median	1.68	68		10.3		10.9	
Overtaking and sideswipe			139		21.0		16.6
Rear-end	1.36	123		18.6			
Sideswipe	1.14	16		2.4			
Total	1.25		660		100.0		100.0

TABLE IV  
**FATAL PEDESTRIAN ACCIDENTS**  
 California Freeways, 1961 and 1962

Location of pedestrians when struck	Number of pedestrian accidents	Percent
Traveled way.....	64	76
Shoulder.....	12	15
Ramp.....	6	7
Ramp shoulder.....	1	1
Unknown.....	1	1
Total.....	84	100

TABLE V  
**AGE OF FREEWAY DRIVERS**  
 California Freeways, 1961 and 1962

Age	Percent of total		
	Fatal accidents	Total accidents	Licensed drivers
14.....	0.0	0.1	0.0
14-18.....	5.5	6.8	4.4
19-23.....	19.8	10.6	7.9
24-28.....	15.1	15.3	11.3
29-33.....	8.9	14.1	12.7
34-38.....	11.4	13.3	13.5
39-48.....	19.0	20.3	22.6
49-58.....	12.2	12.1	15.1
59-68.....	5.2	5.7	8.6
69+.....	2.9	1.7	3.9
	100.0	100.0	100.0

end fatal accidents involved trucks, even though only 6 to 8 percent of the traffic on freeways consists of trucks, attesting to the need for motorists to be alert.

An analysis of the types of rear-end fatalities provides other tips for the driver to note, especially when sustained grades are involved. Thirty-seven fatal accidents were caused by a car running into the back of a truck. In 22 rear-end fatal accidents, a truck ran into the back of an automobile. Besides keeping alert, the motorist should maintain a proper distance between his automobile and slow-moving vehicles.

The pedestrian on or near the freeway must exercise extreme caution. In 1961 and 1962, there were 84 fatal pedestrian accidents, accounting for 13 percent of all freeway fatalities. When a freeway is so posted, pedestrians are prohibited, although an emergency may make anyone a pedestrian upon occasion. Pedestrians should also stay clear of freeway ramps. A breakdown of the types of fatal acci-

dents which happen to pedestrians on freeways is given in Table IV.

A study of all freeway pedestrian accidents is underway to determine

what measures the Division of Highways can take to reduce these accidents.

To the pedestrian, the moral should be obvious: Stay away from the pavement; if you must be on the shoulder, put as much distance between you and the roadway as possible; and, if you can, await the arrival of a police officer for aid.

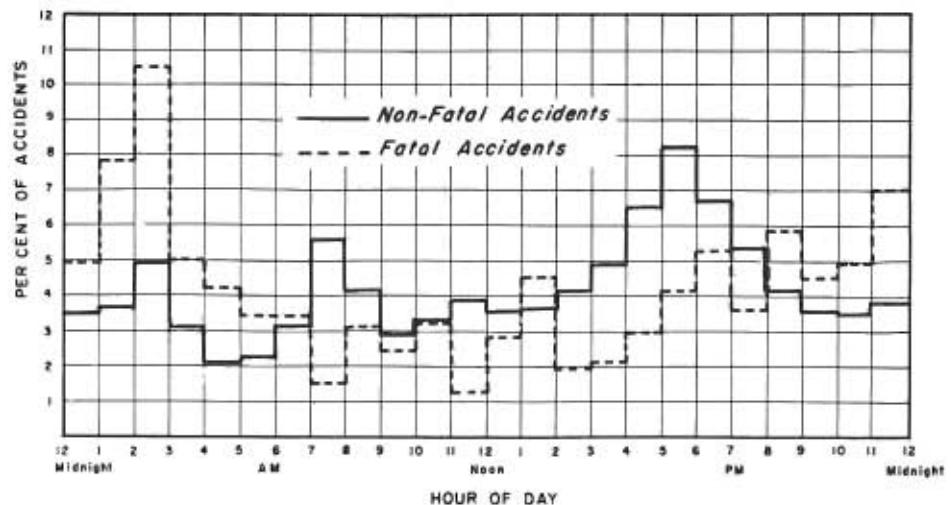
Ramps and ramp maneuvers were involved in 11.5 percent of freeway fatal accidents. Of these, 75 percent were *single-vehicle* accidents, stressing the necessity for the driver to approach a ramp cautiously, and again to watch for fixed objects which are needed for signing, lighting, and other essential purposes.

As has long been known, drivers between 19 and 23 years of age contribute disproportionately to both fatal accidents and total accidents. (See Table V.) Drivers in this age group were involved in 20 percent of the freeway fatal accidents while comprising only 8 percent of all licensed drivers. In fact, traffic accidents are the leading cause of death among all persons from age 5 to 31.

The distribution of freeway fatal accidents by hour of day does not change much from year to year. About 30 percent of the fatal accidents occur between 11 p.m. and 3 a.m., but only

... Continued on page 23

HOUR OF OCCURRENCE  
 FATAL AND NON-FATAL ACCIDENTS  
 CALIFORNIA FREEWAYS  
 1961 and 1962





## New 'Standard Specs' Edition Is Issued

A new edition of the Standard Specifications of the California Division of Highways, dated July 1964 has been issued.

It supersedes the previous edition dated January 1960 and will be effective for all contracts awarded after July 1, 1964.

Copies of the new Standard Specifications may be purchased from the Department of General Services, Office of Procurement, Documents Section, P.O. Box 1612, Sacramento, California 95807, at a price of \$1.50 plus 6 cents sales tax for a paper-covered copy. Remittance should accompany orders. The sales tax does not apply on orders originating outside California.

This new edition is the result of a continuing recheck and revision by many members of the staff of the Division of Highways and incorporates the latest ideas and developments in highway design and construction practices.

Significant changes have been made in 62 of the 94 sections making up the book, ranging from revisions of gradings for rock slope protection to minor changes in the definitions of "culvert" and "roadbed."

A new section has been added entitled "Relief of Bidders" calling attention to the State Contract Act which provides the bidder relief from a mistake after bids are opened.

The section on "Responsibility for Damage" has been rewritten.

Other changes provide for supplemental time limits on designated portions of the work under the "Time of Completion" section and the addition of labor disputes as a reason for an extension of time under "Liquidated Damages."

A few other examples of the many changes, chosen at random:

The "Slopes" section has been revised to provide a larger tolerance when embankments are constructed of large rock.



*Fifty percent of rear-end fatal accidents on freeways involve trucks. Sustained mountain grades usually mean slow-moving large vehicles.*

## Freeway Fatalities

*Continued from page 22 . . .*

about 5 percent of travel occurs during these hours. The *severity* of accidents is known to be considerably higher during hours of darkness, as suggested by the accompanying "hour of occurrence" chart.

Of the drivers who caused freeway fatal accidents, 36 percent had been drinking, 17 percent had physical shortcomings (fatigue, sleepiness, illness, poor eyesight, etc.), and 7 percent were driving defective vehicles. In addition, some drivers were emo-

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New sections on "Deficiency Material" and "Pervious Backfill Material" have been added.

Under "Aggregate Bases," the standard grading size of material has been changed from a 1½-inch maximum to a ¾-inch maximum.

Expansion joint spacing for curbs and sidewalks has been increased from 20 to 60 feet.

A new section on pumping plant equipment has been added.

tionally upset, and, while the degree of psychic disturbance is not readily measurable, it was considered to be a factor in fatal accidents. An emotionally upset driver will often times take chances and make errors he would not make in a better frame of mind.

After analyzing the 660 freeway fatal accidents, it became apparent that driver errors and physical shortcomings play an important role in accidents which result in death. Drivers get behind the wheel when they are physically incapable of operating a motor vehicle safely. They make errors which they cannot visualize themselves making, and they use vehicles which are not safe for the road.

Fatal accidents involve actions which are irrational to an extent not observed in nonfatal accidents.

Witness, for example, an accident report excerpted from the freeway fatality study:

"Pedestrian, who lived in neighborhood, was crawling on hands and knees across the freeway in the dark. The driver of Vehicle Number One saw the pedestrian just before impact."

# Bay Area Report—1964

By J. P. Sinclair, District Engineer



Planning the "freeways of the future" is probably the single most impressive development applying to highway construction in the San Francisco Bay area that has come to

light in the last year.

Increased emphasis is being placed on efforts to make freeways and structures more aesthetically pleasing and to blend the highways into the landscapes of the areas through which they pass, with due consideration given to the protection of both social and economic values by both state and local agencies.

The Design Department is meeting this emphasis by the addition of such features as contour-graded inter-

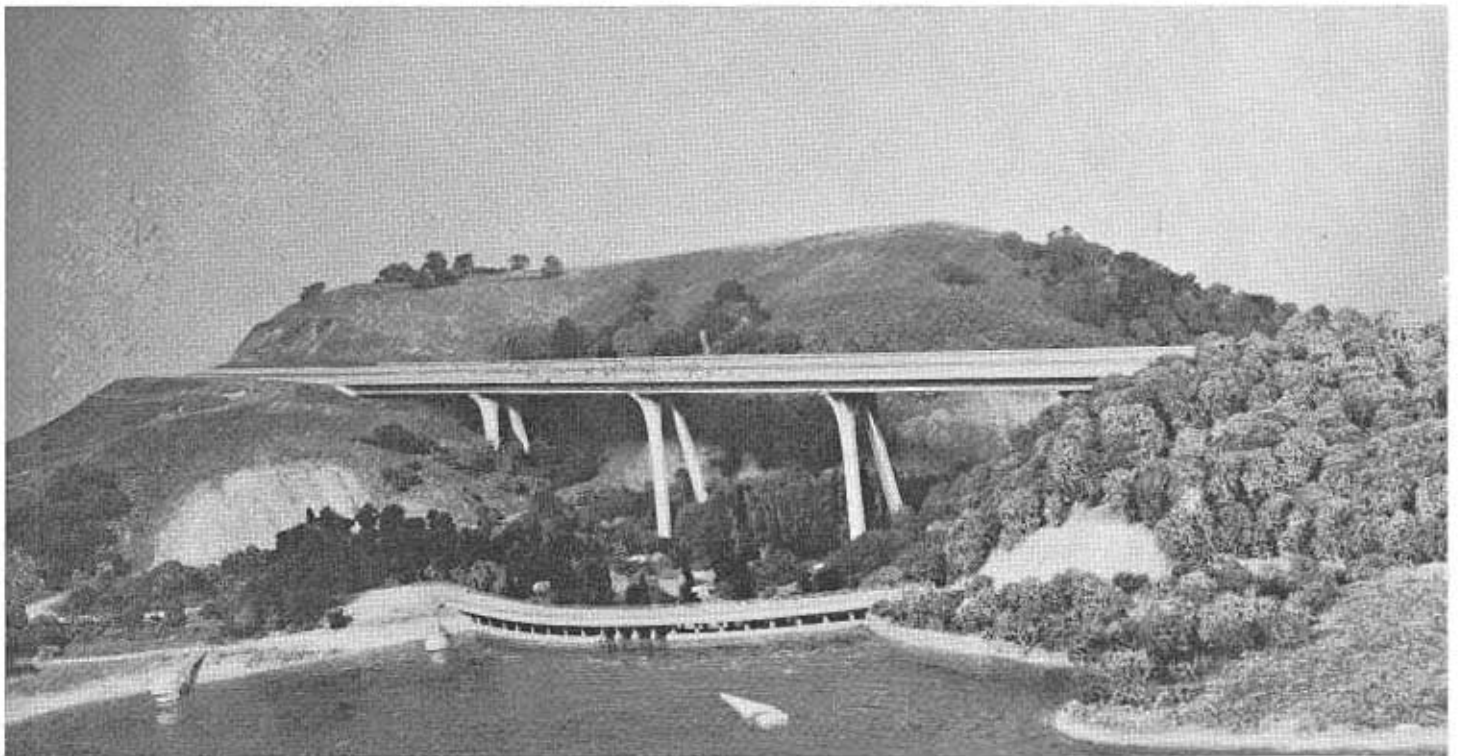
*Editor's Note:* This report was prepared shortly before Mr. Sinclair's death on May 24, 1964. For a summary of his career, see p. 69.

changes and increased attention to the impact of drainage and other structures on the appearance of the highways.

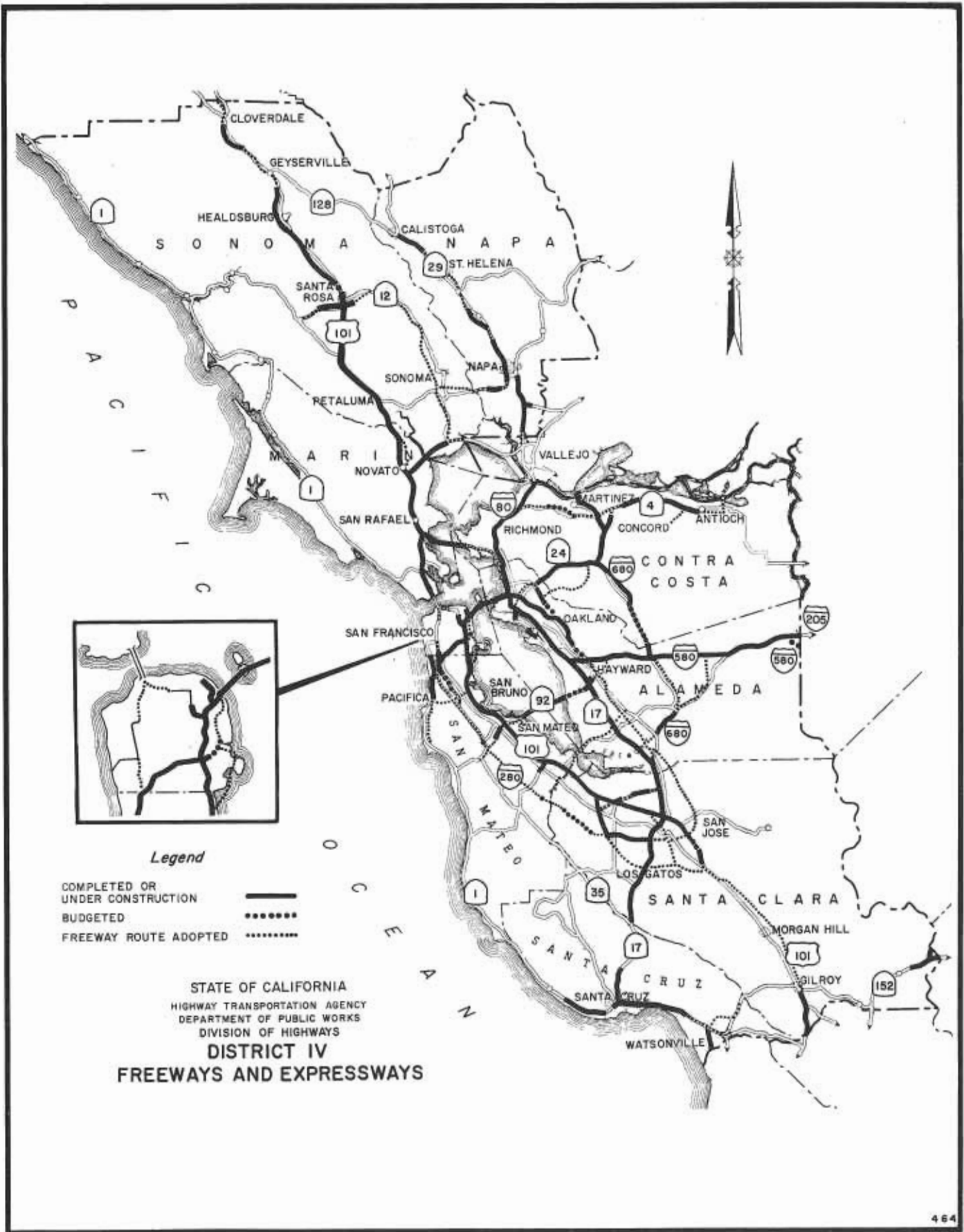
The Division of Highways has retained several prominent consulting architects and has worked with them in the development of pleasing aesthetic designs for sections of freeway and for structures in certain locations.

One such location is the future Interstate 280 (Junipero Serra) Freeway. Considerable time was spent working with the noted San Francisco architect Mario J. Ciampi, in the develop-

ment of designs for the structures in the first contract of this freeway. By combining some aspects of the aesthetic treatment proposed by the architect with economic structural requirements, a design has resulted which will bring many new and pleasing features to the more than 70 structures which will be built on this scenic freeway. This new look will include such items as curved edges on the bridge superstructure to create an illusion of thinness, variety in form and appearance of the supporting piers, and the extension of the bridge railing to dispense with the need for metal guard railing at the bridge ends. The liberal use of curved and oblique surfaces will soften the lines and enable the structures to better blend with the surrounding areas. Those structures which cross over the freeway will be prestressed in order to



This is a Bridge Department model of the proposed eight-lane bridge over San Mateo Creek on Interstate Route 280. Note the graceful concrete columns supporting the slim steel roadway which blends into the surrounding area. Crystal Springs Dam is shown in the foreground.



reduce the thickness of the overhead structure and provide a thinner, more pleasing profile.

Throughout the development of the plans for this freeway, the division has had the cooperation of the Peninsula Highway Policy Committee, an advisory group of planners and other officials and civic leaders from the area the freeway traverses. The committee has been shown the proposed designs, sketches, and some models of the work as it progressed. In March they reviewed the plans and several models of an eight-lane bridge over San Mateo Creek near the Crystal Springs Dam. This will be the major structure on this stretch of Interstate 280.

#### **Parallel Bridges**

The parallel bridges at San Mateo Creek will be a monumental pair of structures. Over 1,800 feet long and more than 250 feet above the streambed in the center, their very size required a great deal of study to assure a design which would be a credit to its surroundings. Four gracefully arched piers will support the twin structures. The superstructure will be of steel welded girders with a novel sloping support plate along each side to provide an interesting light and shadow effect masking the steel girders.

In the City of San Francisco a public hearing was held on April 6, 1964, for the presentation of a number of alternative routes and plans for carrying traffic from the present terminus of the Central Freeway at Franklin and Octavia Streets to the southern approaches to the Golden Gate Bridge.

This presentation resulted from a request by the Board of Supervisors of the City and County of San Francisco to the Division of Highways requesting the State to study alternative locations for a Crosstown Tunnel and a Panhandle Parkway. The material presented at the public hearing was based on a comprehensive technical report prepared in conjunction with a coordinating committee of city officials—the directors of planning and of public works and the general manager of the park and recreation department—and in association with San Francisco Landscape Architect

Lawrence Halprin and Associates. It represents a "new look" in urban trafficway design in that all facets of urban life have been considered—the resident as well as the motorist, the social and economic impact as well as the safe and efficient movement of motor vehicles.

#### **Hearing Is Held**

The California Highway Commission held a public hearing in San Francisco on May 21, looking toward adoption of a route location.

Placing increasing pressure on the urgency of planning the "freeways of the future" is the population explosion. California has become the largest state in the union, in terms of population, with almost 18,000,000 inhabitants. Of that number, about 4,096,700 lived in the Bay area as of January 1, 1964. In a speech of the Bay Area Council Conference of the Future of the Bay Area on February 29, 1964, Dr. Weldon B. Gibson, Executive Vice President of the Stanford Research Institute, stated that the population of the Bay area had increased 46 percent between 1951 and 1963. According to current estimates of the demographers, the Bay area population will have increased to some 6,500,000 people by 1980.

Stanford Research Institute points out that the San Francisco Bay area will enjoy a continuing economic boom in future years—sparked by missile and electronic work for the space agencies, increased employment in defense and the metal-using industries, greatly expanded primary steel production capacity, government employment (particularly in those areas concerned with higher education), and in central offices of finance and insurance companies, wholesale distributors, and similar businesses.

The San Francisco Bay area has the ability to attract top scientific and administrative personnel since it is already one of the five major research and development centers of the Space Age in the nation and is, in addition, the home of 14 Nobel Prize winners in the physical sciences—mostly teaching at the great local universities.

In addition, it has the benefits of year-round temperate climate, attractive housing, good schools, many

social and cultural amenities, and a great variety of recreational activities within reasonable distances.

One more significant projection that has been carefully considered by the freeway planners is the phenomenal increase in motor vehicle registration. For example, in San Francisco some 750,000 persons now own more than 300,000 automobiles. By 1985, it is predicted that 800,000 San Franciscans will operate nearly 500,000 motor vehicles.

San Francisco's streets and highways handled 1,300,000 automobile trips each day in 1960. By 1985, the city's streets will handle a predicted 2,000,000 vehicle trips per day, exclusive of almost 500,000 transit passenger trips.

The estimates for the mushrooming growth of travel are the same all over the Bay area. There are now probably some 7,000,000 vehicle trips per day taken by residents of the Bay area. It is predicted that by 1975 there will be in the neighborhood of 11,000,000 daily vehicle trips taken in the same area.

#### **Another Study**

Another Stanford Research Institute study reports that more than 27 percent of the households in the San Francisco Bay area had two or more automobiles in 1960. According to the estimates for increased motor vehicle registration, that figure should have increased substantially by 1980, when the California freeway and expressway system is scheduled to be substantially completed.

Use of the highways for travel to recreational and vacation sites has increased tremendously in recent years. This will be another major source of traffic in coming years. In fact, some 3,520,000 of the 11,000,000 daily vehicle trips taken in 1975 will be for social and recreational purposes.

By 1980, it is anticipated that some 3,700,000 registered motor vehicles, owned by about 6,500,000 people, will be using the 1,300 miles of freeway and expressway, which are expected to carry 59 percent of the total traffic in the San Francisco Bay area.

Following is a county-by-county report of progress made in District IV during the last year to attain that goal:

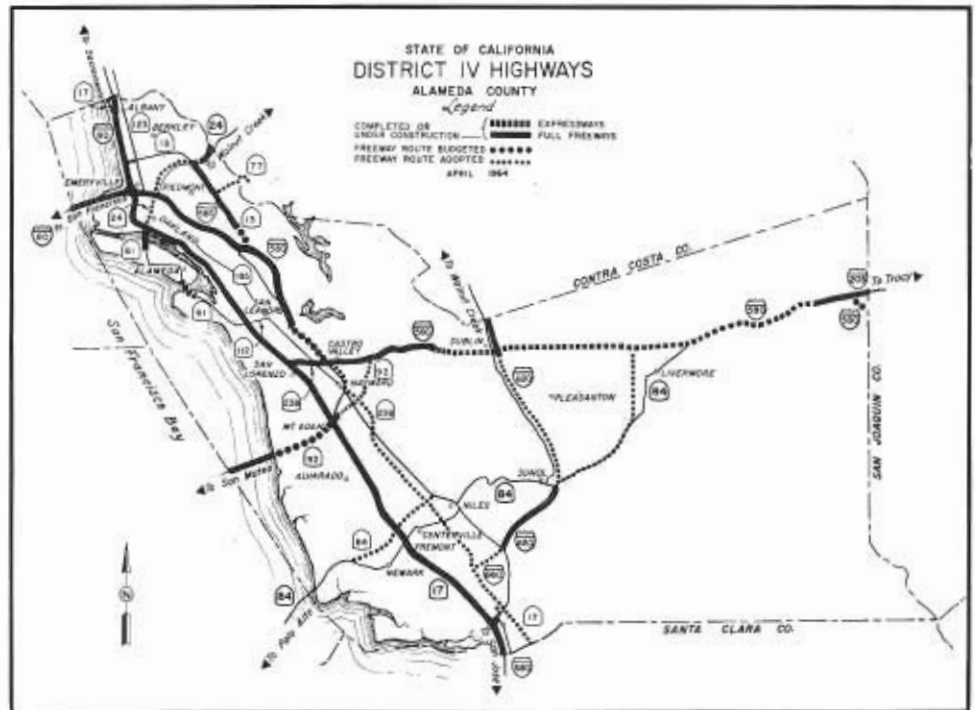
## ALAMEDA COUNTY

Impressive progress was made during the past year in highway construction throughout Alameda County as significant sections of brandnew or improved freeway were opened to traffic.

A 3-mile stretch of the Route 580 Freeway on new alignment and a 5.4-mile section of Interstate Route 680 were added to the county's highways, while a 5.6-mile segment of the Nimitz was widened to a full eight lanes between Fallon Street and Hegenberger Road in Oakland.

A big boost to the safety of travel between Alameda and Oakland came with the opening of the Posey Tube to eastbound traffic only, while westbound uses the new Webster Street Tube.

One more significant development in Alameda County came on December 16, 1963, when the new bore of the Caldecott Tunnel excavation was completed. When it is opened to traffic, in September 1964, it will help



Contractor's equipment touches up a portion of the three-mile section of Interstate Route 580 between Park Boulevard and Buell Street in Oakland in preparation for its opening to traffic on April 28, 1964.

relieve the bottleneck in travel between the growing communities of the north East Bay and the metropolitan areas of Oakland and San Francisco.

#### **Interstate Route 580**

The first of three contiguous projects which, when the final one is completed in November 1965, will allow the use of almost 14 miles of eight-lane divided freeway between the Bay Bridge distribution structure and Sybil Avenue in San Leandro, opened to traffic on April 28, 1964. The freeway replaces the old section of US 50 along MacArthur and Foothill Boulevards. The 3.8-mile section between the distribution structure and Park Boulevard was opened in 1962.

The newly opened section of the Route 580 Freeway runs for three miles between Park Boulevard and Buell Street. The work included construction of a number of grade separations for cross traffic, several interchanges for access to the freeway, and a pumphouse for drainage. It was done by a joint venture of Stolte, Inc., and Morrison-Knudsen Company, Inc., at a cost of \$7,685,000.

#### **Buell to Durant**

The second project, a 4.5-mile section of freeway on completely new alignment, generally follows Calaveras Avenue to the north of Mills College and to the west of the Oakland Naval Hospital, known locally as Oak Knoll, and Mountain Boulevard to the west of the Joseph R. Knowland State Park and Arboretum.

This contract, which is approximately 45 percent complete, is being accomplished by Gordon H. Ball, Inc., at a cost of some \$12,000,000.

Its most significant feature is the construction of a directional interchange northeast of Mills College to provide freeway-to-freeway service between Routes 580 and 13, the Warren Boulevard Freeway. It also includes rough grading on that portion of 13 north to Carson Street and a number of grade separations and interchanges for the use of local traffic.

Contributions of \$150,000 were received from both the City of Oakland and the County of Alameda Joint Highway District Funds, plus an additional \$46,000 from the Major City

Street Fund of the City of Oakland for this work on Route 13, which will not be usable by traffic, however, until paved on a future contract.

#### **Durant to 173d Avenue**

The third project under construction, the two-mile section between the east city limit of Oakland near Durant Avenue and Sybil Avenue in San Leandro, is expected to be open to traffic in August of this year.

Guy F. Atkinson Company is the contractor on this \$5,043,000 job. The major interchange on this unit will be at the intersection of the existing MacArthur and Foothill Boulevards at the north end of the project. Other structures include bridges over San Ramon Creek and several grade separations.

Bids were opened on a job to build an 2.9-mile eight-lane freeway on Interstate 580 from Sybil Avenue in San Leandro to 173d Avenue in Castro Valley on June 17, 1964. There is a budget item of \$6,000,000 to cover cost of the project.

#### **Castro Valley East**

A four-lane facility has been in service for some 10 years between the intersection of Routes 238 and 580 at Castro Valley Junction and 0.7 mile east of Crow Canyon Road. Studies for the proposed widening of this 3.1-mile portion of Interstate 580 were presented at a public hearing on December 12, 1963. Studies for widening the remaining 6.8 miles between Crow Canyon Road and Route 680 also have been completed and were presented at a public hearing in conjunction with a meeting of the board of supervisors in February 1964.

#### **Landscaping**

Two contracts for landscaping 3.3 miles of Interstate 580 between the Bay Bridge distribution structure and Park Boulevard have been in progress since mid-1963 by Watkin & Sibbald. The section between Grand Avenue and Park Boulevard was recently completed at a cost of \$194,000.

The work included installation of an irrigation system and the planting of 600 trees, 10,000 shrubs, and more than 300,000 Algerian ivy plants for ground cover.

On the remaining project, between Hannah Street and Grand Avenue,

planting of 1,000 trees, 10,000 shrubs, and more than 200,000 ivy and ice plant cuttings has been completed and the plant establishment period is underway. An irrigation system was also installed as part of this \$180,500 project.

Future landscaping projects on Route 580 include the newly opened section between Park Boulevard and Buell Street for which the sum of \$360,000 was included in the 1963-64 construction budget, and the section now under construction from Buell Street in Oakland to Gabriel Court in San Leandro—for which design studies are now in progress.

#### **Interstate Route 680**

The first section of Interstate Route 680 to be open to traffic in Alameda County is a 5.4-mile stretch between Route 238 near Mission San Jose and Route 84 at Scott's Corner. This \$5,940,000 job, which was built by the Fredrickson & Watson Construction Company, was opened on January 9, 1964.

Structural work included the construction of five interchanges and the widening and reconstruction of bridges over Alameda Creek.

A contract was awarded to a joint venture of Green Construction Company and Winston Brothers Construction Company to build 3.1 miles of six-lane divided freeway on a new north-south alignment on Interstate Route 680 between 0.4 mile south of Interstate 580 and 1 mile north of the Alameda-Contra Costa line near Dublin. The sum of \$5,312,000 has been allocated for the project. Work started on March 6, 1964.

Major structural feature of this job is a full cloverleaf interchange at the intersection of Interstate Routes 580 and 680. Interstate 580 will be widened from four to eight lanes within the limits of the interchange. Other structural features include construction of a diamond interchange at Alcosta Boulevard, bridges over the Alamo Canal, and other traffic separation structures.

Design studies are in progress for the 8.7-mile section of Interstate 680 between Route 84 at Scott's Corner and Interstate 580 east of Dublin, as well as the remaining 4.7 miles of In-

terstate 680 in Alameda County between Route 17 at Warm Springs and the junction with Route 238 near Mission Boulevard.

#### Route 13

The job to build an interchange at Moraga Avenue on the Warren Boulevard Freeway, Route 13, was completed on April 15, 1964.

Dan Caputo Company performed the \$1,292,000 job, which will eliminate the last signalized interchange on Route 13 north of Redwood Road and provide structures to carry the freeway over Moraga Avenue and to carry Moraga over one interchange ramp. The sum of \$45,000 has been budgeted to landscape this interchange now that construction work has been completed.

Some \$1,800,000 has been budgeted for the construction of 1.3 miles of four- and six-lane freeway on Route 13 between Atlas Avenue and Interstate 580 near Calaveras Avenue. This project is expected to be advertised for bid this summer. The rough grading between Interstate 580 and Carson Street, alluded to above, is preliminary to this job.

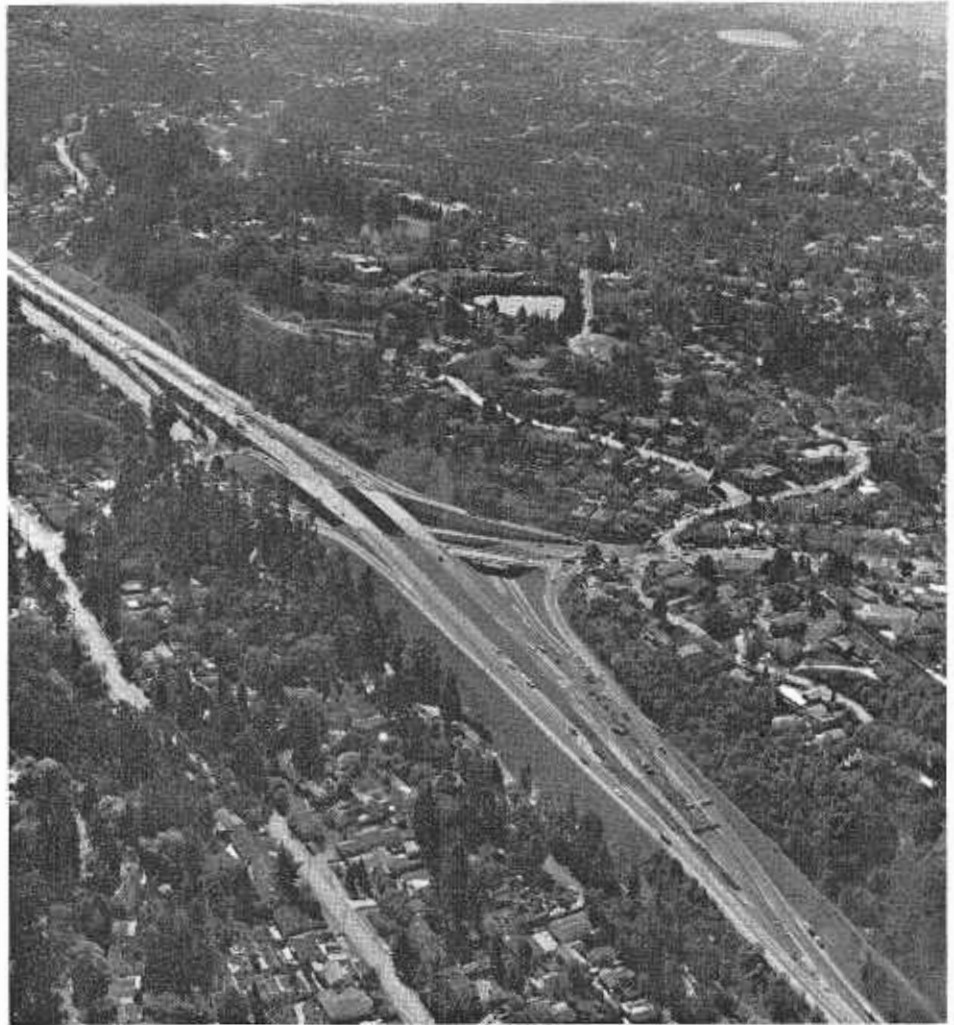
#### Route 17

Andell, Inc., completed work in March on the additional drainage outfall at the distribution structure east of the Bay Bridge Toll Plaza. This project, to minimize flooding at the distribution structure, cost approximately \$43,000.

A \$4,441,000 contract to widen 5.6 miles of the Nimitz Freeway between Fallon Street and Hegenberger Road in Oakland, including widening of overhangs and modification of interchange ramps within the bounds of the project, was completed on October 1, 1963, by a joint venture of Dan Caputo, Dan Caputo Company, and Cambrian Gateway. Eight lanes are now available for traffic on Route 17 between El Cerrito Overhead and Hegenberger Road.

The 1964-65 budget provides \$300,000 for resurfacing the Nimitz Freeway between San Lorenzo Creek in San Leandro and 0.3 mile north of Hegenberger Road.

Design studies have been completed for landscaping the Marina Boulevard



Looking south at the Moraga Avenue Interchange on Warren Boulevard Freeway, Route 13.

interchange, which was reconstructed in 1963, and for the erection of 6.8 miles of median barrier between Jarvis Avenue and Jackson Street on the Nimitz Freeway.

#### Caldecott Tunnel

Approximately 92 percent of the work on the new bore, which lies 150 feet north of the existing Caldecott Tunnel, has been completed. Here is a brief review of significant dates in this tunnel construction:

Holing through small wall plate drifts—January 9, 1963; holing through main arch drift—July 25, 1963; entire excavation completed—December 16, 1963; tunnel lining placed—December 26, 1963; tiling of walls completed—March 11, 1964; roadway paving completed—March 27, 1964; entire paving job, includ-

ing curbs and gutters, completed—April 2, 1964.

Completion date on this \$10,897,000 project, which was undertaken as a joint venture by Connolly-Pacific Company, Grafe-Callahan Construction Company, Brayer Electric Company, and Charles L. Harney, Inc., is September 1964.

The sum of \$1,250,000 has been budgeted for the renovation of the existing Caldecott Tunnel as soon as the new bore has been opened to traffic. It is planned to advertise the project in sufficient time before the new tunnel is opened to permit ordering the necessary equipment. This project will include painting, installation of improved ventilation equipment, traffic control systems, and drainage corrections. The existing bores will be closed, two lanes at a time, during renovation.

#### Route 24

Guy F. Atkinson Company started work on February 26, 1964, on a contract to grade, pave, and provide structures on a 1.26-mile section of eight-lane freeway on Route 24 between 0.4 mile west of Warren Boulevard Freeway and the west portal of the Caldecott Tunnel.

Interesting features of the job include construction of a 260-foot structure to carry Kay Avenue traffic over the freeway and grading of a sizable portion of the right-of-way for the future eight-lane freeway through the rugged canyons of the Berkeley Hills.

The sum of \$4,391,000 was allocated for the work, of which approximately \$40,000 is being contributed by the City of Oakland. The job is scheduled to be completed in the fall of 1965.

#### Rapid Transit

Studies are in progress for the re-design of portions of Route 24 to accommodate facilities of the Bay Area Rapid Transit District between south of Route 580 and Golden Gate Avenue in Oakland. A project for the completion of the freeway-to-freeway connector ramps for the Route 24/580 interchange between south of Route 580 and 42d Street is included in a

The largest freeway contract ever let in the San Francisco Bay area is now more than three-quarters complete. It is part of the construction on Interstate Route 680, which is planned for completion to full freeway standards for its entire length through Contra Costa County in the next several years. See below for specific details.

Another large contract (\$10,897,000) now under construction involves the Caldecott Tunnel, which lies in Contra Costa and Alameda Counties. The tunnel is expected to be open to traffic in September 1964. (See Alameda County for complete details.)

#### Interstate Route 680

Traffic started using the 1.7-mile section of Interstate Route 680 between Monument Boulevard in Con-

struction program in the next few years.

The rapid transit facilities will be carried in the median between 27th Street and Golden Gate Avenue. Agreements with B.A.R.T.D. have been negotiated and the additional right-of-way requirements for their facilities are being determined.

#### Route 92

A \$3,500,000 project is expected to be advertised this fall for the construction of a three-mile portion of Route 92 between the San Mateo-Hayward Bridge and Hesperian Boulevard.

Design studies for the remainder of Route 92 between Hesperian Boulevard and Interstate 580, including the recently adopted portion in Hayward, are in progress.

#### Route 84

A contract for the construction of a channelization and signal and lighting modifications on Mission Boulevard at its junction with Route 84 at Niles Canyon Road was completed on January 21, 1964, at a cost of \$32,000 by Del Monte Electric Company.

Design studies are underway for the construction of Route 84 to ultimate freeway standards between Dumbarton Road in Newark and Route 238, and for approximately 10 miles

of freeway on Route 84 between Route 680 near Sunol and Route 580 near Livermore.

#### Other Routes

Studies are underway for the ultimate development of Route 238 between Route 61 and the Route 238/580 Interchange at Castro Valley Junction. Design studies are also in progress for the development of Route 238 northerly from Washington Boulevard in Fremont to the same Route 238/580 Interchange.

Planning studies are in progress to determine the future alignment of Route 61 from Route 84 in Newark to south of Alameda. Aerial photography has been procured for this purpose.

The Posey Tube opened to traffic on November 21, 1963, after a \$1,110,000 modernization job by Stolte, Inc. The work included revisions to the electrical and mechanical equipment, installation of fluorescent tunnel and new roadway approach lighting, and emergency traffic control systems.

This permitted the use of one-way traffic in each tube—eastbound in the Posey Tube and westbound in the new Webster Street Tube. Design studies are well advanced for landscaping the approaches to the Webster Street and Posey Tubes.

## CONTRA COSTA COUNTY

cord and Willow Pass Road on January 6, 1964.

This work performed in conjunction with the construction of 3.8 miles of freeway on Route 242 between Monument Boulevard and Olivera Street, completed Route 680 to full standards between Walnut Creek and Interstate Route 80 in Vallejo, including the Benicia-Martinez Toll Bridge. Structural features included construction of the Monument Boulevard and Willow Pass Road interchanges, a new bridge over Walnut Creek, and a freeway-to-freeway interchange between the two routes.

This work was accomplished by a joint venture of Gordon H. Ball, Gordon H. Ball, Inc., and Price and Harris Construction Company. The balance of the project, extending easterly into Concord, is scheduled to be ready for traffic in September.

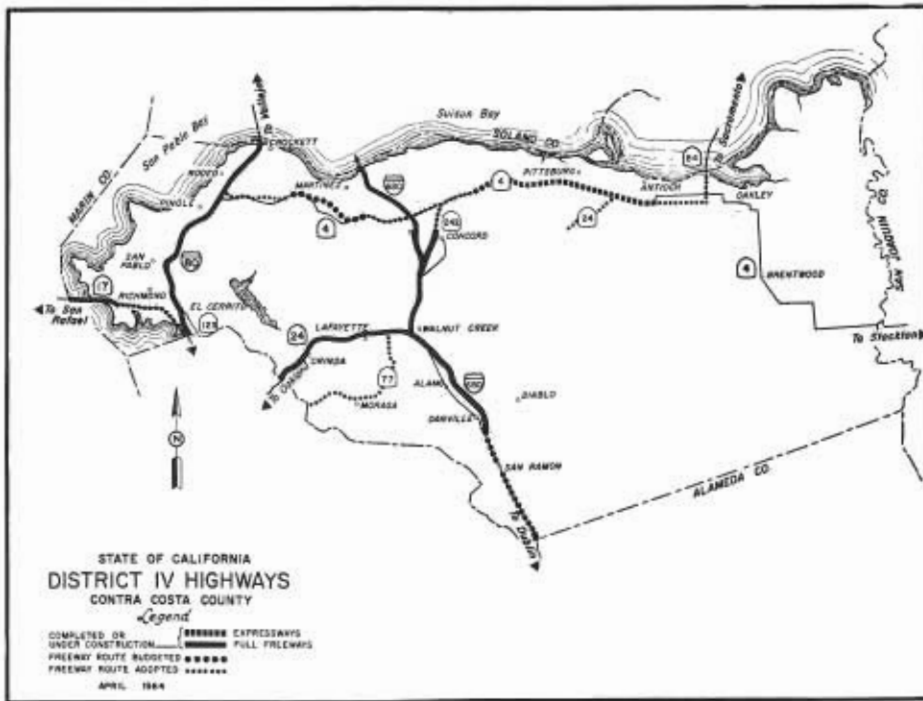
#### Largest Contract

The largest freeway contract in Bay area history is now under construction on Interstate 680. It is a \$13,750,000 job to construct 6.8 miles of four-lane freeway between Walnut Creek and Danville. Guy F. Atkinson Company is building the project, which is scheduled for completion in 1964.

The job includes the construction of 10 grade separation structures including overheads over the Southern Pacific Railroad at Danville and South Walnut Creek, and four bridges across San Ramon Creek. When the project is open to traffic this fall, it will replace existing Sign Route 21, which was built on an old wagon road between San Jose and Martinez that had been dedicated as a public road by the court of sessions in 1850.

On another part of Interstate 680, a 3.1-mile section on new alignment be-





tween 0.4 mile south of Interstate 580 and one mile north of the Alameda-Contra Costa line, work started on March 6, 1964. (See Alameda County.)

Design studies are nearing completion for the remaining 5.7 miles of Interstate Route 680 in Contra Costa County between the northerly end of the above project and one mile south of Danville.

Main structural feature of this section will be an interchange at Crow Canyon Road. Cost of the project will be an estimated \$7,700,000, \$4,700,000 of which has been budgeted for the 1964-65 fiscal year program and the remainder of which will be financed in the 1965-66 budget.

#### Landscaping and Drainage

A project for landscaping four miles of the completed freeway between Walden Road and the north city limits of Pleasant Hill is under design study.

A \$26,200 contract for drainage improvements on Route 680 between Center Avenue and Grayson Court in Pacheco was finished on April 1, 1964. Main feature of this job was the installation of a 24-inch reinforced concrete pipe culvert between the freeway and Berry Drive, the frontage road.

#### Route 4

Another sizable job in Contra Costa County planned for the near future is the construction of almost five miles

of four-lane freeway between 0.2 mile west of Cummings Skyway and 0.1 mile west of Howe Road in Martinez. This work, which is generally on new alignment, includes several interchanges and grade separation structures, as well as undercrossings for fire trails and farm roads.

Plans are complete and right-of-way is being acquired for this \$7,800,000 job, which is included in the 1964-65 fiscal year construction program. Another \$275,000 has been budgeted for resurfacing and reconstructing portions of the existing road between Willow Road and Cummings Skyway.

Freeway agreements have been executed for the remaining portions of Route 4 that are not up to freeway standards between Route 80 at Hercules and Willow Pass Road east of Concord.

The location of Route 4 has been adopted in the vicinity of Antioch and design studies are in progress for a four-lane freeway between A Street and the Route 4/84 interchange near Neroly Road. First construction on this project will also include the initial



Looking north along Interstate 680 in Pleasant Hill. This new 1.7-mile section between Monument Boulevard in Concord and Willow Pass Road opened to traffic on January 6, 1964.



Construction on an eight-lane freeway on Route 24 shows the east portal of Caldecott Tunnel<sup>1</sup> with the new bore directly to the right.

two lanes of a future four-lane freeway on Route 84 between the Route 4/84 interchange and the existing highway.

#### Route 24

Work on approximately two miles of eight-lane freeway between the east portal of Caldecott Tunnel and Orinda Highway on Route 24 is nearly 62 percent complete. The contract on this \$6,974,000 project is being performed by a joint venture of Frederickson & Watson Construction Company and the Granite Construction Company.

There will be interchanges at both the east portal of the tunnel and at Gateway Boulevard. Chain cable-link

median barrier will be installed in most of the project, with blocked-out metal beam barrier placed in the interchange areas. Completion of this job is scheduled for October.

#### Interstate Route 80

A \$182,500 job for emergency slide correction at San Pablo Creek was completed on February 26, 1964, by Oscar C. Holmes, Inc. The work included stabilizing the east bank of the creek for roadway embankment protection, slide correction, extending a concrete box culvert, and replacing 400 feet of channel lining.

Work is expected to be finished this summer on the Barrett Avenue off-ramp construction in the City of

## MARIN COUNTY

Although there are only two major construction projects currently underway in Marin County, the costs involved add up to almost \$8,500,000. When both have been opened to traf-

fic, which is expected early in 1965, US Highway 101 will have been converted to full freeway standards from the Golden Gate Bridge to south of Novato.

Richmond. O. C. Jones & Sons is performing the work on this \$438,000 contract, which will improve access to the downtown area. This project includes the installation of an irrigation system and the placing of 30 trees, 770 shrubs, and 2,500 plants for ground cover.

Marwais Steel Company started work on February 10, 1964, installing 9.6 miles of median barrier on Route 80 between San Pablo Dam Road and the Carquinez Straits Bridge. Some \$392,000 has been allotted for this work, which is scheduled for completion in July.

The 1964-65 budget includes \$300,000 of the construction of two ramps at County Road 20 on Route 80. This project is currently under design study. Also under study is the proposed addition of lanes to Interstate 80 between County Road 20 and the Carquinez Bridge.

#### Other Routes

Freeway agreements have been negotiated and design has been started for the construction of some six miles of four- and six-lane freeway on Route 17 between El Cerrito Overhead and Marine Street in Richmond.

A public hearing was held on February 19, 1964, for the presentation of planning studies for portions of Route 93 from San Pablo Dam to Route 17 in Richmond. This project involves cooperation with the Rapid Transit District in providing the proper locations for both highway and transit facilities.

Design studies are in progress for future construction on Route 77 between Route 13 and Route 24 near Lafayette. Some funds have been provided to permit purchase of right-of-way along this portion of the route to prevent the construction of expensive improvements within the future rights-of-way. Planning studies are under way for that portion of Route 77 between Route 24 and Route 680 near Concord.

#### Route 101

A project to construct 2.7 miles of six- (ultimate eight-) lane freeway between 0.2 mile south of Miller Creek Road and 0.3 mile north of Entrada

Drive is approximately 62 percent complete.

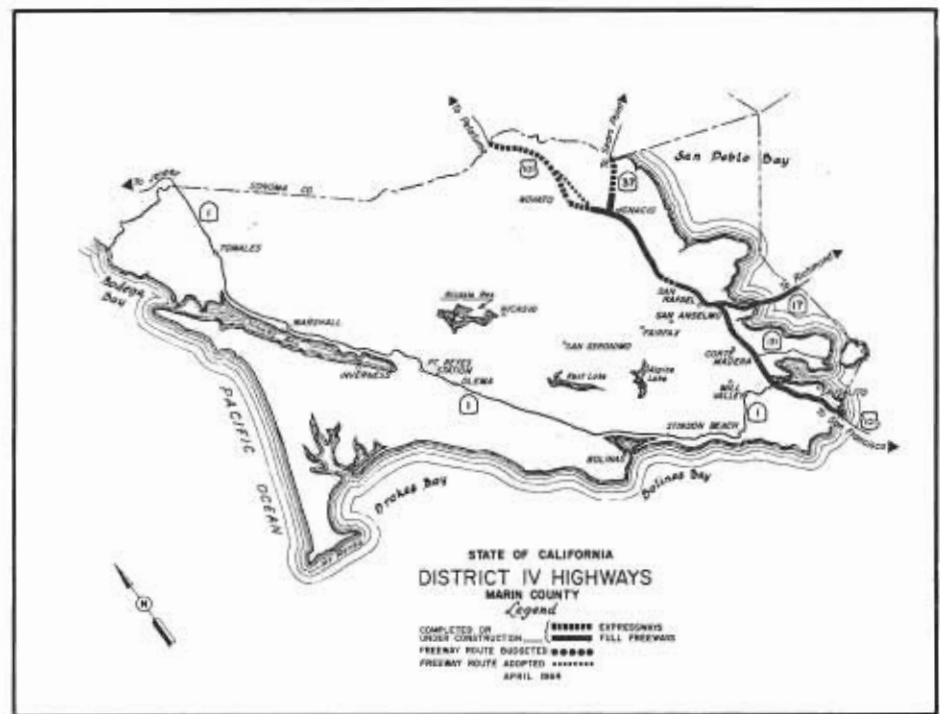
Interchanges at both Ignacio (San Jose) Boulevard and Bolling Drive in the vicinity of Pacheco Creek are being built, with access to Hamilton Air Force Base to be provided by a frontage road between these interchanges. Climbing lanes in both directions are being added over St. Vincent's Hill.

The work is being performed by a joint venture of Syar & Harms, Gordon H. Ball, and Gordon H. Ball, Inc. at a cost of \$4,241,000.

Immediately to the north of the above construction, a \$4,278,000 job is in progress to construct five major structures—most prominent of which is an interchange to provide freeway-to-freeway facilities between Route 101 and Route 37. This interchange will help eliminate traffic backup caused by commuters and weekend and summer travel to and from the resort areas. Peter Kiewit Sons' Company is the contractor.

#### Smaller Jobs

Work was completed on February 14, 1964, on the construction of four lanes uphill and the installation of new



signing and resurfacing on 3.2 miles of freeway between the Golden Gate Bridge and the Waldo Undercrossing. Healy Tibbitts Company accomplished this \$283,000 job.

Plans have been completed for the provision of rest room facilities for the comfort of visitors to the Vista Point area.

Reichhold & Jurkovich completed a \$131,000 job for the installation of underdrains and shoulder reconstruction on Route 101 between Route 37 and the Sonoma county line on August 16, 1963.

#### Median Barrier

Work started on March 9, 1964, for the installation of 5.5 miles of median barrier between 0.4 mile south of Waldo Undercrossing and Corte Madera Creek. Wulfert Company, Inc. is the contractor on the \$187,000 job, which will include the placing of both blocked-out metal beam and chain link barrier.

Several types of experimental glare shields are to be used, including both vertical and diagonal plastic strips and, in addition, expanded metal mesh screening. The federal government has contributed \$40,000 to this project.

A \$105,000 job to install 1.9 miles of median barrier between Willow Avenue and the San Rafael viaduct was completed on April 30, 1963, by Charles E. Milleman.



Aerial view of the recently completed section of Route 131, Tiburon Boulevard, looks west to the Alto Wye Interchange at Route 101.

#### Landscaping

Glens Falls Insurance Company is accomplishing an \$88,500 landscaping job at Terra Linda Interchange (Manual Freitas Parkway). This contract includes the planting of 80 trees, 700 shrubs, and 157,000 ground cover plants, as well as an irrigation system and a small maintenance building. Completion date is in August 1964.

A landscaping project between 0.3 mile south and 0.8 mile north of Corte Madera Creek is in the design stage.

#### Future Projects

Design is well advanced on the first of several projects for the conversion of six miles of Route 101 to eight-lane freeway between San Quentin Wye and Miller Creek Road interchanges.

Some \$500,000 has been budgeted for this work, which will consist of the realignment of streets and off-ramps between 0.3 mile south of Irwin Street and Third Street, in San Rafael in preparation for future freeway widening.

A job to resurface, reconstruct shoulders, and install underdrains on portions of Route 101 for 4.9 miles between Novato and the Sonoma county line is listed in the 1964-65 construction program, which contains an item of \$180,000 for this purpose. A similar project was completed last year and design studies are in progress to complete the remaining portions of this route within these limits.

#### Other Routes

Work was completed on October 20, 1963, on a \$618,000 job to convert

the one-mile section of Route 131, Tiburon Boulevard, from Route 101 at the Alto Wye to 0.4 mile east of Strawberry Drive to a four-lane divided highway by Brown-Ely Company.

Plans have been completed for the construction of approximately one



This view of the Ignacio Wye Interchange project on Route 101, the Redwood Highway, at Route 37 looks southerly toward Hamilton Air Force Base.

mile of four-lane divided roadway between Blackfield Drive and Reed's Underpass at Trestle Glen on the same route.

Studies are still in the planning stage on the Route 17 extension between Point San Quentin and Point Reyes Station.

Major highway development in recent years in Napa County has generally been confined to initial stage construction of two- and four-lane expressways on adopted freeway routes in the vicinity of the City of Napa.

This steady improvement to bring the state routes within the county up to modern highway standards is being continued, with work presently in

## NAPA COUNTY

progress along Route 29 and future plans for construction along Routes 121 and 128.

#### Route 29

Widening of 4.7 miles of Route 29 between south of Yount Road and Oakville was completed on September 18, 1963. This \$626,000 job, accomplished by Lee J. Immel, included the construction of frontage roads and

drainage improvements between Dry Creek and California Drive and required slightly more than one year to complete.

Major feature of a \$955,000 job currently in progress is the First Street Interchange in Napa (see photograph). Completion of the project this spring will eliminate traffic congestion at the present signalized intersection.

The balance of the work, which is being performed by Lee J. Immel, includes grading and surfacing 2.2 miles of two-lane pavement and resurfacing an existing two-lane highway to provide a four-lane freeway from Old Sonoma Road to Napa Creek. Also included are a bridge over Napa Creek and frontage roads.

**Future Jobs**

Design studies are in progress on a project to build 1.4 miles of four-lane freeway between Napa Creek and Trancas Street. This work, tentatively planned for construction in the next few years, includes a cooperative storm drain project with Napa City and County.

Bids were opened on April 29, 1964, for an interim project to increase skid resistance by resurfacing portions of the existing pavement on Route 29 between two miles north of Trancas Street and 2.7 miles south of Yountville. The construction budget provides \$22,000 for this work.

Design is also under way for a two-lane expressway (ultimate four-lane freeway) between two miles north of Yountville and Ritchie Creek, bypassing St. Helena.

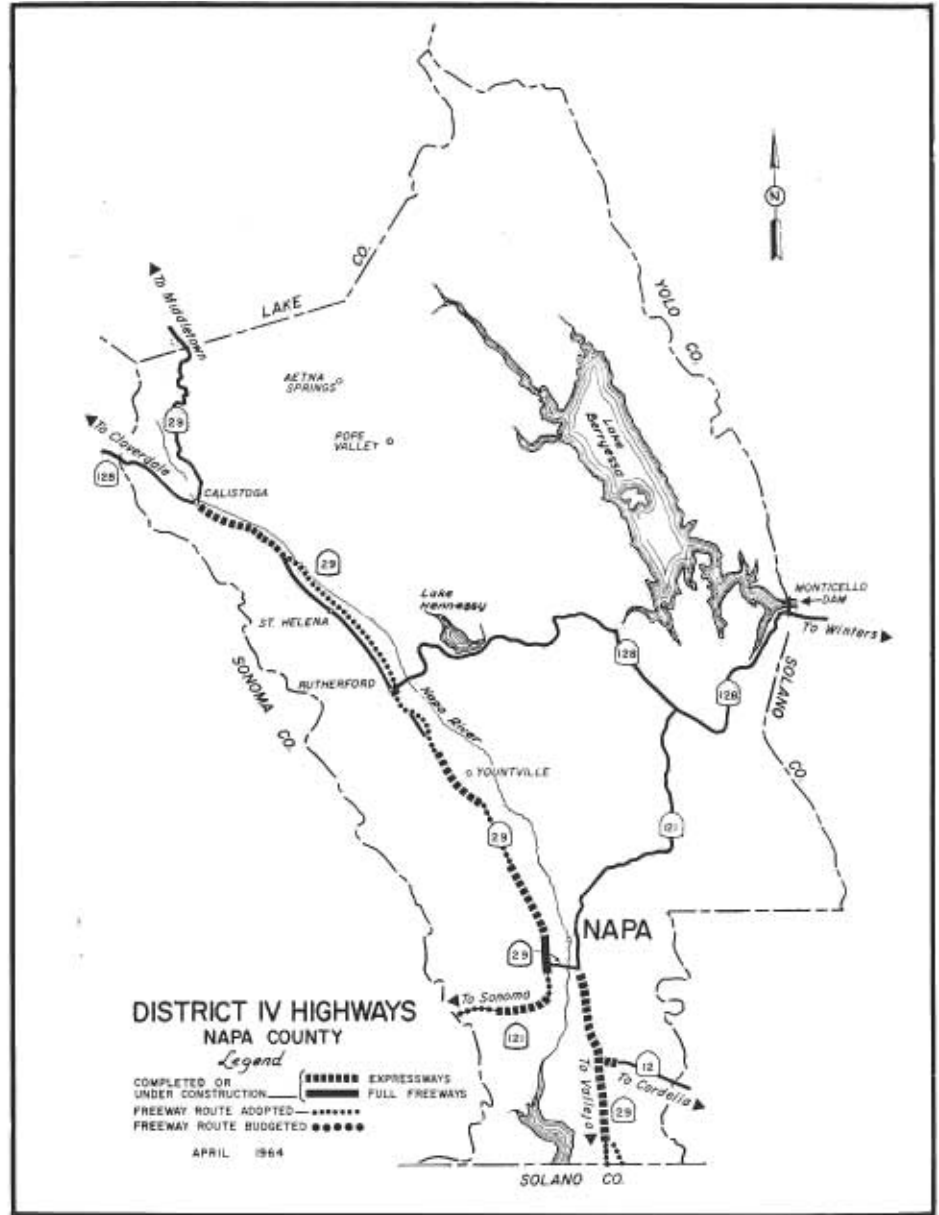
**Other Routes**

Bids were opened on June 3, 1964, for construction of a 1.2-mile section of 26-foot wide, all-paved roadway on Route 121 about two miles northeast of Vichy Avenue. Some \$65,000 has been included in the 1964-65 construction program budget for this purpose.

Design studies are in progress for the reconstruction of approximately one mile of Route 128 as part of the continuing improvement program.

Plans are complete and \$31,000 has been budgeted for minor realignment and widening of Route 128, about 10 miles east of Route 29.

Some \$185,000 has been budgeted for resurfacing approximately 20 miles of various routes in Napa and Sonoma Counties as part of a continuing program.



The First Street Interchange in the City of Napa on Route 29 will, when completed, help eliminate the traffic congestion shown here.

## SAN FRANCISCO COUNTY

In the City and County of San Francisco, freeway construction is almost always in the million-dollar bracket.

Of four contiguous contracts, which, when completed, will provide almost 10 miles of six-lane continuous freeway between the Route 101 interchange in San Francisco and Eastmoor Avenue in Daly City on Routes 82, 1, and 280, one has been completed, two are scheduled for completion in September of this year, and the last started in April of 1964.

### Route 82

A section of six-lane (ultimate eight-lane) freeway opened to traffic on October 18, 1963. The \$4,273,000 project, which was built by Charles L. Harney, Inc., runs between the interchange with James Lick (Bayshore) Freeway and Milton Street. The job included extensive relocation of Alemany Boulevard through the existing natural corridor to accommodate the freeway facilities and construction of two major overcrossing structures to serve local traffic, as well as other facilities.

East of Route 101, the James Lick Freeway, work was completed on February 14, 1964, on the two-level viaduct on Route 82 between the Route 82/101 interchange and Newcomb Avenue. This \$4,100,000 project, which was built by Peter Kiewit Sons' Company, will not be usable until the next unit, extending to Army Street, is constructed.

Bids will be opened on May 20, 1964, for the construction of this extension. Within this portion, between Newcomb Avenue and Army Street, the structure will gradually change from a double-deck to a single-deck viaduct in the vicinity of Evans Avenue. Ramp connections on this project, for which \$6,100,000 has been budgeted, are an integral part of the future Islais Creek Interchange at the junction of Routes 82 and 87.

The remainder of the route has been adopted by the California Highway Commission. When complete, this freeway will provide much needed

relief to Route 101 northerly of its interchange with Route 82.

### Projects Under Construction

Two projects are currently under way to complete Route 82 between the James Lick Freeway and Orizaba Avenue near the south city limits of San Francisco.

The first is a \$6,080,000 project for the construction of 1.1 miles of six-lane freeway between Mission Street and Ocean Avenue. It includes the construction of 13 traffic separation and interchange structures.

Traffic will not be able to use this unit until after the adjacent section, that between Ocean and Orizaba Avenue, has been completed.

Both projects, which are being built by Charles L. Harney, are scheduled to be finished this fall.

The unit between Ocean and Orizaba runs for 1.8 miles. This job, which is being built at a cost of \$4,581,000, includes the construction of an interchange at Ocean Avenue and a number of access ramps, overcrossings, and other traffic separation structures.



An unusual feature of this job is the construction of bus stop facilities at Ocean Avenue to permit passengers from express buses on the freeway to transfer to local buses on Geneva and Ocean Avenues.

#### Landscaping

As each construction phase on Route 82 is completed, landscaping will follow. Plans for landscaping that portion of Route 82 between Route 101 and Milton Street are complete. The sum of \$110,000 has been budgeted and bids will be received on June 3.

Design studies are underway for landscaping the one-mile section between Havelock and Mission Streets when the freeway construction within these limits has been completed. The 1964-65 construction budget contains \$75,000 for this purpose.

A project for landscaping that section of Route 82 between Orizaba and Ocean Avenues, currently under construction, will be included in a future budget.

#### Route 87

Freeway agreements have been executed for the portion of Route 87 between Evans Avenue and Sixth and Brannan Streets, which will eventually be a six- and eight-lane freeway. Design studies are now in progress, and the portion between Evans Avenue and 18th Street will be built first.

Design studies are being made and preparation of preliminary freeway agreements is under way for the section of Route 87 from Sixth Street to the junction with Interstate 480 in the vicinity of Howard Street.

#### Route 1

Route 1 is a connection between Route 82 near Orizaba Avenue in San Francisco and Interstate Route 280 in the vicinity of the Alemany Boulevard extension in Daly City.

Work on this route started on April 8, 1964, as a part of a \$9,978,000 contract on Interstate Route 280 in the vicinity of Daly City being built by Peter Kiewit Sons' Company. (See San Mateo County.)

The portion of the contract involving Route 1 includes the construction



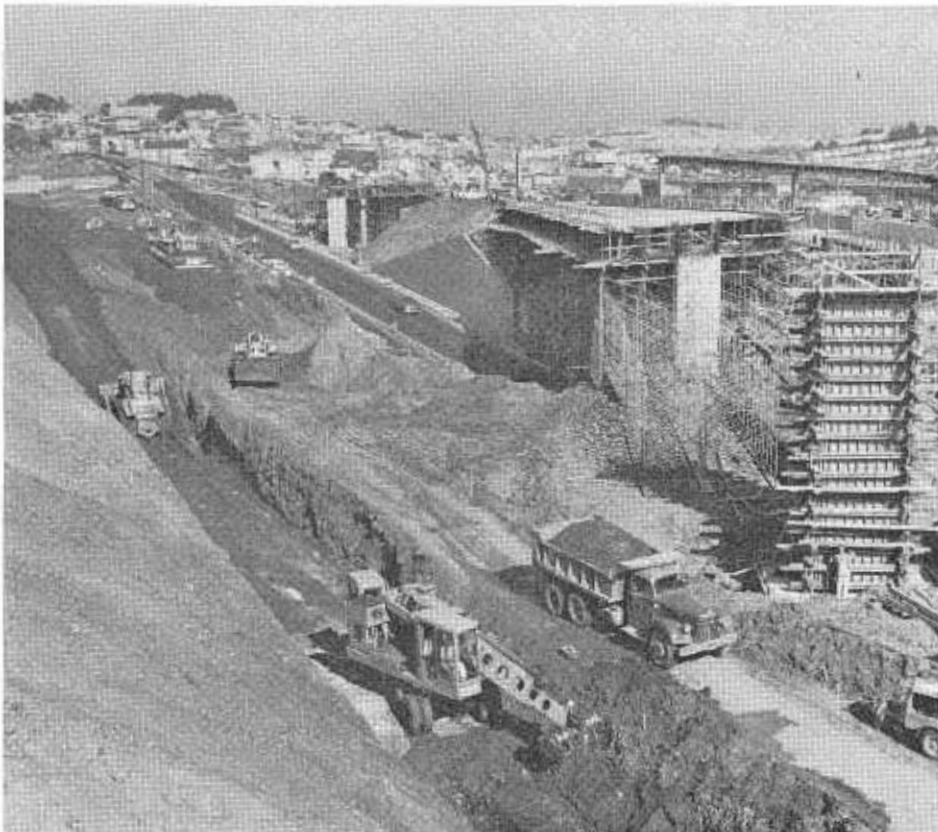
Aerial photo looks west from the vicinity of Newcomb Street toward the intersection with James Lick (Rayshore) Freeway showing the section of double-deck viaduct that was completed in February. This unit will not be usable until the next section, extending to Army Street, is constructed.



Paving operations along a section of six-lane freeway being built on Route 82 in San Francisco.



The Theresa Street Pedestrian Overcrossing is shown under construction with forms in place for pouring the side railing. The job is on the Ocean Avenue to Mission Street section of Route 82.



View looking east shows grading work in progress for the relocation of San Jose Avenue and falsework for the access ramp from San Jose Avenue on the Mission Street to Ocean Avenue section of Route 82.

of traffic separations at Alemany Boulevard and near St. Charles Avenue, in addition to the freeway connection between Routes 82 and 280.

#### Route 480

Work started on December 18, 1963, on a \$1,443,000 job to grade, pave and build the structures of the Clay and Washington Street ramps connecting Route 480 with the Golden Gateway Redevelopment project.

This job, which is being performed by Stolte, Inc., is due to be finished in December 1964. Work, which includes installation of sign structures, signs, and lighting, is being coordinated with a future city contract for the widening of Clay and Washington Streets and with another city contract, currently underway, for the installation of a city sewer main and pumping station on Drumm Street.

An interesting feature of this job is the driving of 37,000 feet of steel "H" piling, ranging in length from 150 to 210 feet.

Studies have started on the extension of Route 480 between the present end of the freeway at Broadway and the Golden Gate Bridge approaches as requested by the board of supervisors' resolution of October 21, 1963.

#### Other Routes

A public hearing, attended by some 500 San Franciscans, was held on April 6, 1964, for presentation of studies of several alternates, including variations of some of the alternates, for the Panhandle Parkway and Cross-town Tunnel as requested by the board of supervisors. The California Highway Commission held a public hearing on May 21.

These studies were prepared by the study coordinating committee, composed of state and city officials and aided by noted architectural consultant Lawrence Halprin.

The San Francisco Board of Supervisors has also requested that studies be made for the extension of Route 101 from McAllister and Franklin Streets to Ellis and O'Farrell Streets.



## SAN MATEO COUNTY

The freeway story in San Mateo County during the past year is one of going construction and plans for the future in all parts of the county.

The biggest project got underway with the start of construction on the new Interstate Route 280 at the north county limits, but other preliminary work and plans for the future are also very much in progress.

Other important work is taking place on Route 1, the Cabrillo Highway; Route 82, El Camino Real; Route 92; Route 101, the Bayshore Freeway; and on Route 114 in Redwood City.

### Interstate Route 280

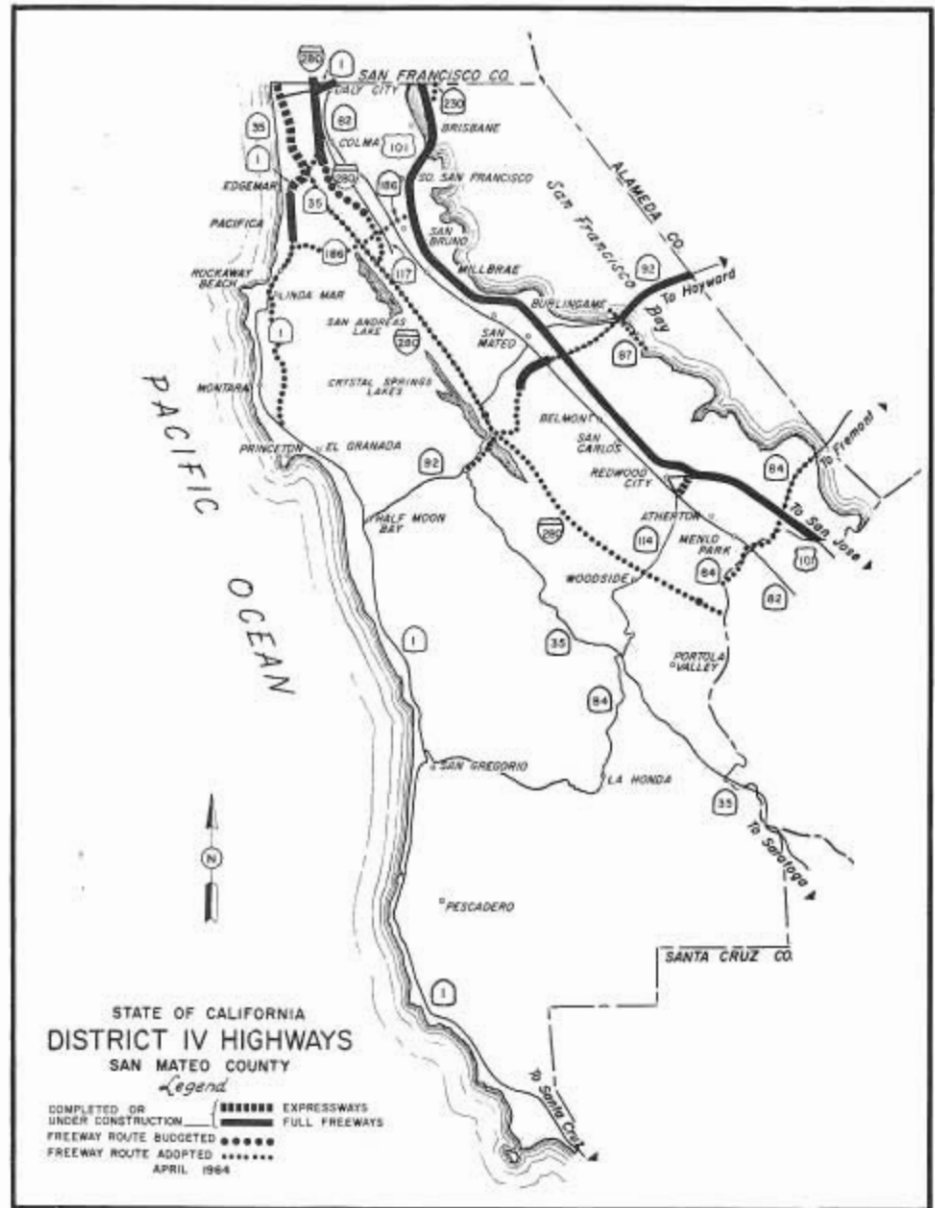
Work started April 8, 1964, on a \$9,978,000 job to build approximately four miles of eight- and ten-lane freeway on Routes 1 (see San Francisco County) and 280 between Orizaba Avenue in San Francisco and one-half mile south of Eastmoor Avenue in Daly City.

This work, being performed by Peter Kiewit Sons' Company, includes the construction of 12 grade separations and the modification of the existing Alemany Boulevard overcrossing. Major structural feature of this job will be the construction of a three-level interchange in the vicinity of Knowles Avenue in Daly City to channel traffic satisfactorily to and from San Francisco from two directions—Route 1 and the existing Junipero Serra Boulevard.

The work also includes the realignment of Junipero Serra Boulevard to serve adjacent properties as a frontage road and the construction of other interchanges to provide access to the new Route 280.

Construction on the Route 1 part of the job includes rough grading, drainage, and frontage road facilities westerly of Interstate 280 to Route 35 and construction of the six-lane freeway connection between Route 82 near Orizaba Avenue and Route 280 in San Francisco. (See San Francisco County.)

Preliminary to the freeway construction will be the relocation of



storm drains on Junipero Serra Boulevard about one-quarter mile south of Knowles Avenue. The sum of \$74,000 has been allocated for this work, which Lowrie Paving Company, Inc., started on March 6, 1964.

### Future Projects on 280

Partial financing has been provided in the 1964-65 budget for two separate projects on Route 280 immediately south of the above construction. Some \$1,800,000 is included for the extension of the route from Eastmoor Avenue in Daly City to south of Ar-

royo Drive in South San Francisco. An additional \$6,700,000 will be required in the 1965-66 budget to complete it.

The 1964-65 budget also includes partial financing in the amount of \$2,500,000 for construction of the proposed eight-lane bridge over San Mateo Creek near Crystal Springs Dam on Interstate Route 280. A model of this bridge was seen by members of the Peninsula Highway Policy Committee on March 11, 1964. (Photo on page 24).



Aerial view of the completed four-lane elevated freeway through the City of San Mateo on Route 92 looks west showing the cloverleaf interchange with Route 82, El Camino Real, in the center.

#### Stanford Linear Accelerator

Bids were opened on April 8, 1964, for a bridge to carry Interstate Route 280 over the two-mile linear accelerator at Stanford University. Although this portion of Route 280 will not be usable by traffic for some time after it is constructed, it is necessary to build the bridge at this time for coordination with other work in progress by the Atomic Energy Commission.

Some \$500,000 was included in the 1963-64 budget for this bridge and the required preliminary rough grading, which was completed in October.

Projects for construction of the remaining portions within San Mateo County of this important new interstate route are in various stages of design study. Some plans are being

developed on the basis of a variable width median with the opposing lanes separated by varying heights as well, particularly where Route 280 passes through watershed lands owned by the City and County of San Francisco.

Three other projects on Route 280 between Route 92 at Ralston Avenue and 0.2 mile south of San Bruno Avenue are proposed for forthcoming construction programs in the next few years. It is anticipated that the entire length of Interstate 280 between San Francisco and San Jose will have been completed or be under construction by 1968.

#### Route 1

Construction on 2.5 miles of four-lane freeway between Sharp Park Road and Manor Drive in Pacifica is

continuing, with completion expected in January 1965. McNamara Corporation, Ltd., is the contractor on this \$4,364,000 job, which includes construction of a full interchange at Sharp Park Road, traffic separations, and pedestrian crossings both over and under the freeway.

Almost one mile of reconstruction of the existing alignment of Cabrillo Highway southerly from Westport Drive is included in the work.

Work is nearing completion on the Gateway Drive Undercrossing northerly of the above project. Power Construction Company is performing the \$298,000 contract.

Plans are complete for an interim project to reconstruct Cabrillo Highway to four 10-foot lanes without shoulders between San Pedro Creek (Linda Mar Boulevard) and Sharp Park Road (Quarry Road). The 1964-65 budget provided \$200,000 for this work in which the City of Pacifica has participated by obtaining the necessary rights of entry and slope easements by cooperative agreement with the State. Bids were opened on May 27 for this job.

The rough grading of a portion of Cabrillo Highway, as well as drainage and frontage road facilities, easterly of Route 35 is included in the project on Interstate 280 between Eastmoor Avenue in Daly City and Orizaba Avenue in San Francisco.

#### Route 82

Work has been completed on a 1.7-mile stretch of Route 82 between Euclid Avenue in San Bruno and Millwood Drive in Millbrae in which El Camino Real was widened to a six-lane divided conventional highway, including the provision of parking aprons, sidewalks, and street lighting.

Lowrie Paving Company accomplished the \$821,000 job, to which the Cities of Millbrae and San Bruno contributed almost \$186,000.

This project was consistent with precedent established by other cities involved in the conversion of El Camino Real from a four-lane undivided road to a six-lane divided arterial. All cities involved have expressed willingness to participate in financing the re-

construction of such items as parking aprons, sidewalks, and street lighting.

Two other projects are currently being considered—between San Bruno Avenue in San Bruno and 0.1 miles north of Arroyo Drive in South San Francisco. Both cities have requested cooperative agreements for these projects and negotiations will soon be underway.

#### Route 92

Work was completed on August 29, 1963, on construction of 2.6 miles of four-lane freeway between West Hillsdale Boulevard and South Delaware Street in San Mateo.

L. C. Smith and Concar Ranch and Enterprises performed the \$4,652,000 contract, which included the construction of traffic separation structures and interchanges, including an overhead crossing of the Southern Pacific Railroad near Pacific Boulevard.

A project was advertised, with bids due May 20, to landscape this section with \$225,000 provided in the 1963-64 budget for this work and an additional contribution of \$1,000 from the owners of the Borel Estate, adjacent property owners, specifically for the planting of small oak trees in conjunction with the landscaping work.

Design studies are in progress for the remaining portions of Route 92 between Interstate 280 and West Hillsdale Boulevard to the west of the completed portion and between South Delaware Street and the San Mateo Bridge to the east.

The California Highway Commission had previously adopted a portion of Route 92 westerly of Interstate Route 280 and Route 35 on Cahill Ridge near Mountain House.

New location studies are well advanced for the extension of Route 92 westerly from Cahill Ridge to Route 1 near Half Moon Bay. Plans for the replacement of Pilarcitos Creek Bridge are nearing completion.

#### Route 101

Work started on March 16, 1964, on the construction of some 19 miles of median barrier on the Bayshore Freeway between Redwood Creek Bridge in Redwood City and Route 87 in San Jose.

The U.S. Steel Corporation is accomplishing this \$312,000 job, which includes the placing of one-half mile of single, blocked-out metal beam barrier, 18½ miles of cable-chain link, erection of sign structures, and the installation of sign lighting systems between University Avenue in Palo Alto and Redwood City.

Bragato Paving Company & Blomquist Oil Service, Inc., are carrying on an \$862,000 resurfacing and leveling job on the Bayshore Freeway between Fifth Avenue in San Mateo and Whipple Avenue in Redwood City. This job is scheduled to be completed in the fall.

Bragato Paving Company also started work February 27, 1964, on construction of a drainage correction project approximately one mile north

of Whipple Avenue in Redwood City at a cost of \$20,400.

Design studies are in progress for widening the existing freeway to eight lanes between 19th Avenue in San Mateo and Broadway in Burlingame.

#### Other Routes

A joint venture of Dan Caputo Company, Bragato Paving Company, and Bellshore Corporation has finished approximately one-fourth of a \$2,250,000 contract to build 1.3 miles of four-lane expressway on Route 114 between Cypress Avenue, south of El Camino Real, and the Bayshore Freeway.

The City of Redwood City has contributed \$1,000,000 to the cost of this project, whose major structural feature will be the construction of a full



Aerial view looks north along El Camino Real, Route 82, showing the recently completed six-lane divided highway from Millbrae to San Bruno. Tanforan Racetrack appears top right.

interchange to replace the existing, hazardous signalized intersection at "five points" on El Camino Real in Redwood City.

Design studies for widening Route 114, Woodside Road, between Locust Street and Interstate 280 in Woodside to a conventional four-lane highway and to provide for the construction of passing lanes on portions of Woodside Road are in progress.

The major emphasis on freeway construction in Santa Clara County during the past year continued to be work on the new Interstate Route 280 and the equally new State Route 85 along Stevens Creek.

#### Interstate Route 280

The first major unit of Interstate Route 280 was opened to traffic on March 16, 1964. It consisted of three miles of six-lane freeway on new alignment from Route 17 to a short distance west of Saratoga Avenue in San Jose.

A joint venture of Gibbons & Reed and Dan Caputo Company performed the \$4,754,000 contract, which included the addition of inside lanes to the existing four-lane section of Route 17 between Forest and Moorpark Avenues.

Major structural feature on the job was the modification of the cloverleaf interchange on the existing freeway to provide direct freeway-to-freeway connections and accommodate collector roads.

This contract included the grading of Route 280 from Saratoga Avenue westerly to Stevens Creek Road in the vicinity of Doyle Avenue. That portion is now being paved under a separate contract.

#### Widening Job

A \$1,124,000 project to widen 3.4 miles of Interstate 280 between Forest Avenue in San Jose and the Bayshore Freeway from four to six lanes was completed on December 6, 1963, by a joint venture of Gibbons & Reed and Dan Caputo Company.

The work included addition and revision of access ramps, installation

Design studies are in progress for Route 186 between Route 35 and the Bayshore Freeway. Aerial mapping has been completed and freeway agreements are being discussed with the local jurisdictions. The westerly projection of Route 186 from Sweeney Ridge, west of Route 35, to Route 1 was adopted by the California Highway Commission on December 19, 1963.

## SANTA CLARA COUNTY

of cable-chain link and metal beam median barrier, traffic signals, highway lighting, and sign illumination.

#### Work in Progress

Westerly of the above project, work is well underway on the construction of 4.7 miles of Interstate Route 280 between Saratoga Avenue in San Jose and Stelling Road in Cupertino.

Frederickson & Watson Construction Company is performing this \$4,432,000 job, which includes the construction of three interchanges and a traffic separation structure. The freeway will be elevated in the vicinity of Lawrence Expressway-Stevens Creek Boulevard and depressed from Saratoga-Sunnyvale Road to Stelling Road.

Bids were opened May 6 on a project for resurfacing Route 35 from 0.2 mile north of its junction with Route 1 and 0.2 mile south of the Alemany Boulevard extension in Daly City.

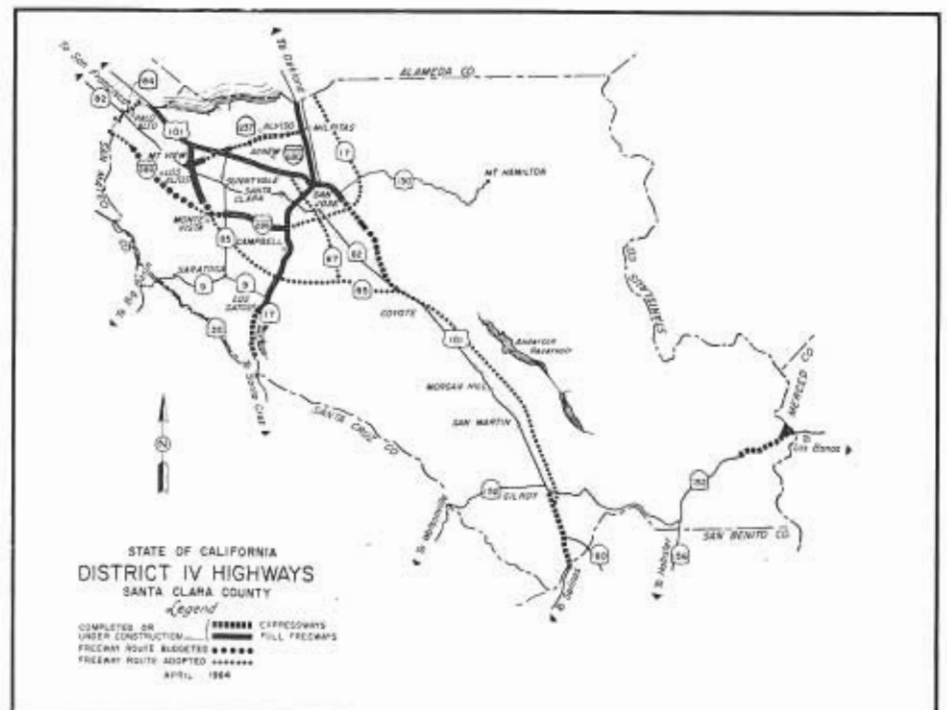
Design studies for an initial four-lane freeway between Crystal Springs Road in San Bruno and the junction of Routes 1 and 35 on Route 35 are proceeding sufficiently well to set right-of-way requirements.

When completed late this year, the project will be usable to Saratoga-Sunnyvale Road, with grading only having been accomplished from there to Stelling Road.

#### Foothill College

Work was completed on March 30, 1964, by L. C. Smith Company on the grading and surfacing of one-half mile of El Monte Avenue to provide a four-lane street with revised connection to Foothill College in preparation for the construction of El Monte Avenue Interchange on Route 280 in Los Altos Hills.

The project, which was undertaken in accordance with plans of the local jurisdictions to develop El Monte



Avenue as a major thoroughfare, cost \$212,000, of which \$31,500 was contributed by the Foothill Junior College District.

#### Plans for the Future

Funds for two separate projects on Interstate Route 280 have been included in the 1964-65 construction budget. One on which bids were opened on May 27, is for the construction of a six-lane, ultimate eight-lane, freeway between Saratoga-Sunnyvale Road and the Southern Pacific Railroad, including a four-lane connection to Route 85, for which \$1,100,000 has been budgeted.

The other is for the construction of seven miles of Interstate Route 280 between Foothill Boulevard and north of Page Mill Road. The 1964-65 budget contains \$3,000,000 for this purpose, with an additional \$5,900,000 required in the 1965-66 budget to complete the job.

Design studies are in progress for the remaining portions of Interstate 280 in Santa Clara County.

#### Route 17

Design studies are underway for revisions to the interchange at Camden Avenue on Route 17 to allow a connection with Santa Clara County's San Tomas Expressway.

Design studies are also in progress for the construction of Route 17 between Route 280 at Moorpark Avenue and Route 130 at Alum Rock Avenue. Freeway agreements have been executed and connection of the Capitol Expressway, which has been requested by local jurisdictions, is under consideration. This seven-mile project will be constructed to interstate standards because of its importance as a major traffic carrier.

Studies are also being made for the extension of Route 17 between Alum Rock Avenue and Route 680 near the Warm Springs area of Fremont.

#### Route 82

Work was completed on March 28, 1963, on the conversion of 2.1 miles of El Camino Real in the City of Palo Alto to six-lane divided highway. McGuire & Hester performed this \$1,440,000 contract, \$504,000 of which was provided by the City of Palo Alto.



Aerial view looks east at a section of Interstate Route 280 which was opened to traffic on March 16, 1964. The Saratoga Avenue Interchange is shown in the foreground.

Bids were opened on April 22, 1964, for the construction of five miles of four-lane, ultimate six-lane divided highway on Route 82 between Ford Road and Curtner Avenue in San Jose.

Completion of this project will eliminate one of the last remaining sections of three-lane highway in Santa Clara County. Some \$1,142,000 is available for this work.

Design studies are under consideration for cooperative improvements on El Camino Real between Santa Clara and Palo Alto to widen the existing highway to a six-lane conventional facility within a 120-foot right-of-way.

#### Route 85

Construction of 5½ miles of four- and six-lane freeway between Homestead Road in Cupertino and the Bayshore Freeway in Mountain View is in progress.

This first unit of a completely new freeway, which generally parallels Stevens Creek, is being built by a joint venture of L. C. Smith Company, Concar Ranch and Enterprises, Inc., and Gordon H. Ball Enterprises for a contract allotment of \$6,560,000, including some funds contributed by the City of Mountain View, the Department of the Navy, and the Cupertino Sanitary Sewer District.

The project includes the construction of seven interchanges, plus other traffic separation structures. Funds have also been budgeted for a cooperative project to build an overcrossing at Middlefield Road.

Design studies to continue Route 85 southerly from Homestead Road to Route 17 are in progress.

#### Route 101

A project for functional and tree planting on 2.2 miles of Bayshore

Freeway between Morse Avenue and Agnew Road in the vicinity of San Jose was completed on February 27, 1964, by a joint venture of Gravelle & McConnell, Inc., and Collishaw Sprinkler Company.

The \$90,700 job included the planting of 800 trees, more than 2,300 shrubs, and almost one-half million ice plants for ground cover. It also included installation of an irrigation system.

A project to resurface Route 101 between El Toro Avenue in Morgan Hill and the north end of Llagas Creek was completed on March 13, 1964. Raisch Construction Company accomplished the \$303,000 job, which included the installation of signals and the construction of left-turn storage lanes at the intersections with major roads within the limits of the project.

U.S. Steel Corporation started work on March 16, 1964, on the construction of some 19 miles of median bar-

rier between Redwood Creek Bridge in Redwood City and Route 87 in San Jose. (See San Mateo County for discussion of this \$312,000 project.)

#### Oregon Avenue Interchange

A joint venture of Gordon H. Ball and Homer J. Olsen started work on March 31, 1964, on the construction of a trumpet-type interchange on Route 101 in Palo Alto to serve the future Oregon Avenue Expressway of the County of Santa Clara, which is now under construction by the County south of and adjacent to existing Oregon Avenue.

The sum of \$724,000 has been allocated for this work, which will include the augmentation of the existing Embarcadero Road Interchange on Route 101 and the necessary revision of ramps and frontage roads that are required.

This job is scheduled to be completed late this fall.

#### Future Projects

Design studies have been completed on a project for the construction of the Capitol Expressway and Hellyer Avenue interchanges between south of Tully Road and Coyote Creek. The 1964-65 budget contains \$1,155,000 for this purpose.

Design studies are also in progress for the conversion of the present expressway between McKee Road in San Jose and Ford Road, and the 4.8 miles of expressway between Thomas Road and the San Benito county line, to future eight-lane freeway.

The first unit of this latter job will include a one-mile line change near and replacement of the southbound structure for the Sargent Overhead over the Southern Pacific tracks south of Gilroy. Surveys for this work are in progress.

Design studies are also under way for the freeway bypass of Gilroy and



Picture shows cleared right-of-way for the future Route 237, with a closeup of the Dana Road Overcrossing under construction.

Morgan Hill between Thomas Road and Route 82 near Ford Road.

#### Route 237

A joint venture of L. C. Smith Company and Concar Ranch & Enterprises, Inc., is building 1.6 miles of two- and four-lane freeway on Route 237 between El Camino Real and Bernardo Avenue in Mountain View at a cost of \$1,567,000.

The two-lane portion of this project, which is expected to be completed this summer, is between Sylvan and Bernardo Avenues. It will provide the northerly lanes of a future four-lane freeway.

Design studies have been initiated for the development of an initial four-lane, ultimate six-lane, freeway on Route 237 between Bernardo Avenue and Interstate 680 in the vicinity of Milpitas.

Freeman Paving Company & O. C. Holmes, Inc., are working under a \$243,000 cooperative contract to build 0.6 mile of roadway between the Santa Clara-Alviso Road and the Guadalupe Bridge Road and construct

a new bridge and approaches over the Guadalupe River.

The State's share of this work, which should be finished this fall, is \$30,000, with \$213,300 contributed by the Santa Clara County Flood Control and Water District for the replacement of the bridge over the new flood control channel and for rights-of-way.

#### Route 87

Design studies are in progress for the ultimate construction of 2.7 miles of freeway on Route 87 between Coleman and Market Streets in San Jose and Route 101. The remainder of the route between Coleman and Market and Route 85 has been adopted and aerial mapping has been requested.

The County of Santa Clara is furnishing rights-of-way for both projects and has approved the geometrics for that portion between Coleman and Market and Route 101.

#### Route 152

Granite Construction Company completed a \$401,000 job to widen

and resurface 5.7 miles of highway some 14 miles east of Gilroy in the vicinity of Bell's Station on December 19, 1963.

A similar widening and resurfacing project on Route 152 between 1.2 miles east of Bloomfield and San Felipe is financed in the 1964-65 budget, which provides \$350,000 for the purpose.

#### State Sign Route 9

Raisch Construction Company completed a \$696,000 job to widen 5.4 miles of the existing highway between Azule in Saratoga and El Camino Real in Sunnyvale on September 20, 1963. The job included provision of a four-lane arterial with channelization at five intersections to provide left-turn storage lanes and installation of signals.

Design studies are underway for a similar widening project on existing State Sign Route 9 between Oak Place and 0.1 mile north of the Southern Pacific Railroad at Azule on Route 85.

Rights-of-way for this work are being provided by the local jurisdiction.

## SANTA CRUZ COUNTY

The major highway construction emphasis in Santa Cruz County continues to be focused on the conversion of the existing expressway on the Cabrillo Highway to full freeway standards south of Santa Cruz.

#### Route 1

A joint venture of Granite Construction Company and Lew Jones Construction Company completed a \$1,372,000 job to convert 2.9 miles of expressway to full four-lane (ultimate six-lane) freeway from 0.2 mile west of Aptos Creek to 0.3 mile east of Soquel Wharf Road on November 22, 1963.

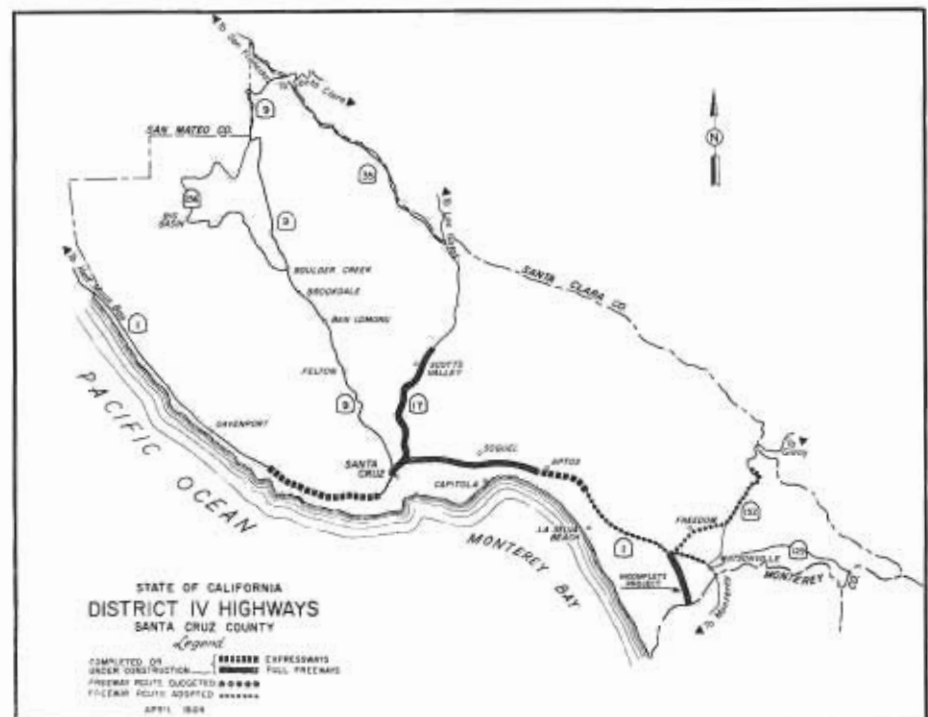
Major structural features of this work included construction of a two-quadrant cloverleaf interchange at State Park Drive and a diamond interchange at Park Avenue.

The Division of Beaches and Parks contributed \$18,000 to this project, which included the construction of frontage roads.

A \$2,063,000 project has been undertaken by the same contractors to

build the first stages of five miles of freeway between 1.2 miles south of

the Pajaro River and 2.3 miles northeast of Watsonville, including the



construction of structures and rough grading for the future Watsonville Bypass.

This construction, which is on new alignment passing to the west of Watsonville, crosses marshy ground, which requires the placing of a fill surcharge to hasten settlement and aid in stabilizing the roadway embankment. Plans are being completed to remove the surcharge after a one-year settlement period.

The project also includes rough grading on portions of Route 129 connecting Route 1 with Main Street in Watsonville.

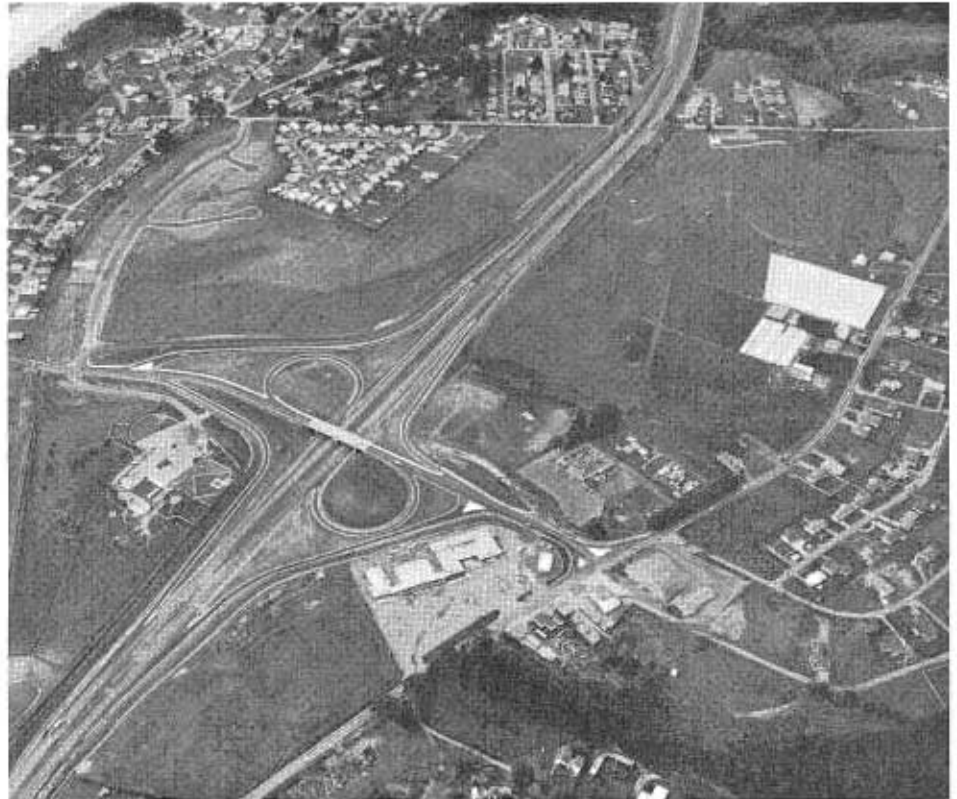
#### Plans for the Future

A future contract will provide for paving 3.4 miles of four-lane freeway and completing the structures between 1.2 miles south of the Pajaro River and 0.2 mile northeast of Roache Road on Route 1.

This job will include paving 1.6 miles of Route 129 between Cabrillo Highway and 0.1 mile east of Main Street in Watsonville. This project will provide access to Route 1 at the Route 1/129 Separation and at Harkins Slough Overcrossing.

Studies for the design of interchanges at Rio Del Mar Boulevard (Aptos Avenue) and Rob Roy Junction and the future addition of two lanes to the existing highway between Santa Cruz and Rob Roy, including the modification of existing interchanges, are in progress.

Conversion of the existing road between Rob Roy and the Watsonville



Photograph looks down at the two-loop interchange at State Park Drive with the Cabrillo Highway, Route 1. The job of which it was a part was completed on November 22, 1963.

Bypass to an initial four-lane (ultimate six-lane) freeway is also under design study.

#### Other Routes

A project for functional and tree planting on Route 17 between 0.2 mile north of Cabrillo Highway and 0.4 mile north of Granite Creek Road is almost complete. This \$98,000 job includes the planting of 1,100 trees, almost 5,000 shrubs, and 450,000 Hot-tentot figs for ground cover.

Studies are in progress for determination of rights-of-way for three miles of four-lane freeway between the new alignment of Cabrillo Highway west of Watsonville and a point one mile east of Casserly Road on Route 152.

Some \$174,200 has been budgeted for resurfacing about 25 miles of various routes in Santa Clara and Santa Cruz Counties as part of a continuing program.

## SONOMA COUNTY

The Sonoma County story in highway construction during the past year continued to feature steady improvement on both the Redwood Highway, US 101, and State Route 12 in the vicinity of Santa Rosa.

These improvements will insure safer traveling conditions to the motoring public and at the same time provide easier access to the recreational areas of western Sonoma County.

#### Route 101

A \$1,123,000 job is underway to build 1.7 miles of four-lane freeway between 1.7 miles north of Canyon Road and 0.8 mile south of Washington School Road.

Fredrickson Brothers is performing the work, which, when complete in January 1965, will eliminate the curve at Zanzi's Corner on the existing route.

Major structural feature on the job is the Chianti Undercrossing, which

will provide a connection between frontage roads on both sides of the freeway.

#### "Asti Bypass"

Another project, directly to the north, is nearing completion. Commonly known as the "Asti Bypass," it involves the construction of 3.6 miles of four-lane (ultimate six-lane) freeway between 0.8 mile south of Washington School Road and 0.6 mile north of Hiatt Road.





Construction on the new four-lane freeway on Route 101 at Asti, known commonly as the Asti Bypass. This interchange will provide easy access to the Italian Swiss Colony winery.

McNamara Corporation is performing this \$2,297,000 contract, including interchanges and traffic separations.

Design studies are in progress for construction of the remainder of the future freeway on the Redwood High-

way between Lytton and the Mendocino county line. Freeway agreements for the portion between Canyon Road and Lytton Springs Road are being negotiated.

A tree-planting project is under design study on some 12 miles of Route 101 between the Mendocino Avenue Overcrossing north of Santa Rosa and the Russian River, which was opened to traffic in December, 1962.

Design studies have been completed for the conversion of the present expressway on Route 101 through Santa Rosa to a full freeway. One major structural feature of this section, which lies between 0.1 mile south of Edwards Avenue and Russell Avenue, will be the Steele Lane Interchange. The sum of \$1,170,000 has been budgeted for this interchange, for which bids were opened on May 6, 1964.

#### Route 12

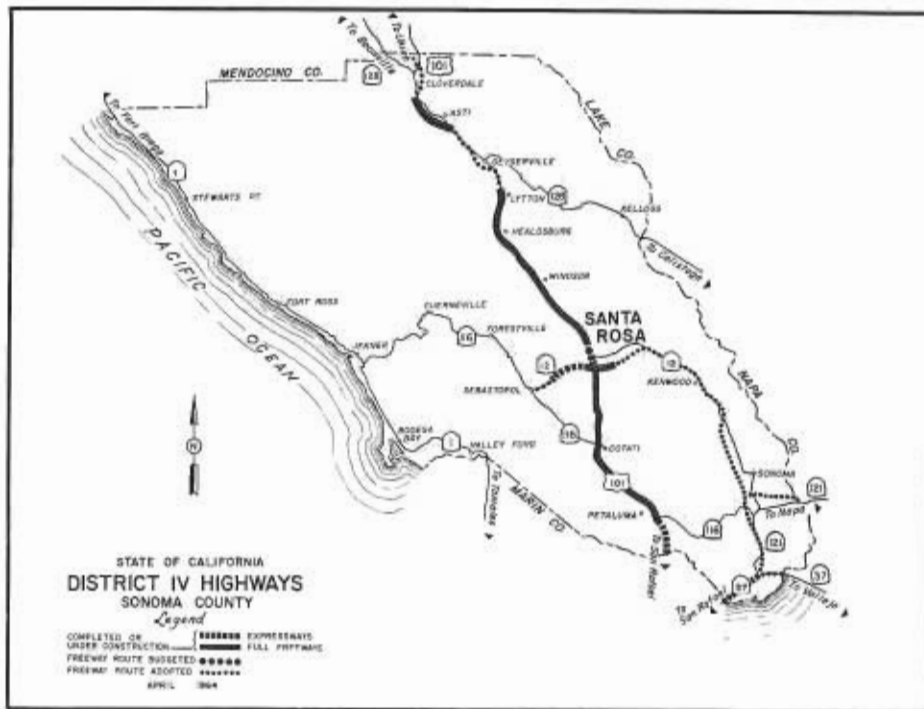
Peter Kiewit Sons' Company is nearly 90 percent finished with a \$4,896,000 job to build 5½ miles of freeway on Route 12 between Occidental Road east of Sebastopol and South E Street in Santa Rosa.

The most prominent feature of this construction project is the three-level traffic separation structure at the junction of Routes 12 and 101. (See photograph.) Other structures include construction of the Santa Rosa Creek Bridge on Route 12 and several traffic separations.

Design studies for landscaping and tree planting on the above project are



Traffic began using this 5½-mile section of Interstate Route 680 between Route 238 in Fremont and Route 84 in January 1964. The view is northeast towards Scott's Corner.



well advanced and \$200,000 has been budgeted for this purpose.

An interim project on existing Route 12 between Brush Creek and North Melita Road is under design study. The City of Santa Rosa and Sonoma County have offered to contribute \$250,000 each toward the cost of a 100-foot right-of-way to accommodate the proposed four-lane divided arterial, with the State providing the estimated construction cost of \$500,000.

#### Route 1

Charles I. Cunningham Company has a \$21,500 job to install draining improvements between three miles north of Bodega Bay and 0.2 mile south of Bridgehaven.

E. A. Forde Company finished work on October 25, 1963, on the installation of 1.5 miles of underdrains in the same vicinity.

A project to build approximately 1½ miles of improved two-lane, all-paved highway on Route 1 approximately 11 miles north of Fort Ross is under construction.

Planning studies are in progress for the relocation or widening of existing Route 1 between Route 116 and 3.2 miles north of Jenner.

#### Other Routes

Fabian Bobo completed a \$40,000 job of slide correction and installation of underdrains at Sears Point on Route 37 on June 6, 1963.

Survey maps have been received and design studies are underway for freeway development on Route 121 between Sears Point and the Napa county line. The portion of this route between Route 12 and the county line is being designed as an initial two-lane expressway.

The sum of \$200,000 has been budgeted for correcting the failing timber-steel retaining wall approximately 1.6 miles west of Guerneville on Route 116.

Plans are complete and design studies are in progress for the construction of the portion of Route 116 between Austin Creek and Monte Rio (Big Bend) to a two-lane conventional highway.



Photo shows the new three-level interchange of Routes 101 and 12 in Santa Rosa. The Earle Street Pedestrian Overcrossing is in the foreground.

**STATUS OF DISTRICT IV—FREEWAY AND EXPRESSWAY PROJECTS**

April 1964

New route	Description	Total miles	Completed projects		Under contract		Budgeted		Right-of-way expended and budgeted
			Miles	Construction cost	Miles	Construction cost	Miles	Construction cost	
IS 80	Central Freeway	1.8	1.8	\$11,653,000					\$8,533,099
IS 80	San Francisco to Carquinez Bridge (portions)	18.2	18.2	\$62,260,000		\$1,075,000	\$690,000		13,416,836
IS 280	Junipero Serra Freeway; from Bayshore Freeway (SSR 101) in San Jose to San Francisco county line	47.4	4.7	6,161,000	8.0	14,727,000	13.0	9,150,000	52,844,252
	Park Presidio Freeway; from Golden Gate Bridge to Fulton Avenue	2.1	1.2	1,448,000					2,582
IS 480	Golden Gate Freeway; from Embarcadero Freeway to Golden Gate Bridge	3.3							57,431
	Embarcadero Freeway	1.5	1.5	14,842,000		1,531,000			12,485,452
IS 580	MacArthur Freeway; distribution structure to Castro Valley	15.3	6.8	15,910,000	6.0	23,873,000	2.5	*6,360,000	65,393,501
	Castro Valley to San Joaquin county line	31.8	31.4	11,647,000	0.9	1,500,000	0.4	1,350,000	5,706,276
IS 680	Nimitz Freeway; from Bayshore Freeway to Warm Springs (Route 17)	8.9	8.9	4,435,000					883,608
	Warm Springs to IS 580 (US 50)	17.7	4.7	6,200,000					3,736,509
	IS 580 (US 50) to Walnut Creek	16.0	3.5	3,010,000	9.3	19,379,000	5.8	4,700,000	12,811,978
	Walnut Creek to Monument	3.4	3.4	9,322,000					6,415,451
	Monument to Solano county line	7.4	5.4	\$15,716,000	2.0	1,829,000			4,077,442

Route 1	Cabrillo Highway; from south of Watsonville to 4 miles south of Davenport (portions)	22.8	16.8	\$8,878,000	5.0	2,700,000			3,857,160
	Moss Beach to San Jose Avenue at Route 82 (portions)	17.8	5.4	2,804,000	4.1	5,453,000			10,405,438
4	Arnold Industrial Freeway; from Hercules to Antioch Bridge	34.1	14.7	4,737,000			5.0	7,800,000	2,270,705
12	Sebastopol to Kenwood	17.7			4.1	5,200,000		200,000	6,196,225
	Kenwood to south of Sonoma at SSR 121	14.0							
	From SSR 29 to Solano county line	3.3							
13	Warren Boulevard Freeway; from SSR 24 near Lake Temescal to MacArthur Freeway	5.6	3.1	\$5,681,000	1.2	1,892,000	1.3	1,845,000	1,270,461
17	From Santa Cruz to San Jose (portions) at IS Route 280	16.4	16.4	17,868,000					9,824,761
	From IS Route 280 at Moorpark Avenue to Warm Springs via Alum Rock Road	18.3							
	Connection from 17 to 680	4.4							581,303
	Nimitz Freeway; from Warm Springs to distribution structure	33.8	32.4	56,401,000				347,000	21,569,410
	From IS 80 near Albany to SSR 101 near San Rafael	9.9	2.2	1,973,000		19,000			2,685,250
24	Grove Shafter Freeway; from Nimitz Freeway (SSR 17) to Warren Boulevard Freeway	4.8							13,898,312
	From Warren Boulevard Freeway to Walnut Creek	11.0	6.4	9,860,000	4.6	22,834,000		1,295,000	1,521,846
29	From Solano county line to Calistoga (portions)	36.9	25.4	6,328,000				22,000	4,334,649
37	From SSR 101 at Ignacio to Solano county line	9.7	6.3	4,811,000					572,986

**STATUS OF DISTRICT IV—FREEWAY AND EXPRESSWAY PROJECTS—Continued**

April 1964

Route	Description	Total miles	Completed projects		Under contract		Budgeted		Right-of-way expended and budgeted
			Miles	Construction cost	Miles	Construction cost	Miles	Construction cost	
61	Bay Farm Island Bridge and approaches	0.6	0.6	2,062,000					165,033
	Webster Street and Posey Tubes	1.1	1.1	18,666,000					2,732,779
77	Shepherd Canyon Freeway; from Warren Boulevard Freeway to SSR 24 in Lafayette	10.3							663,009
82	Southern and Southern Embarcadero Extension Freeway; from SSR 1 at San Jose Avenue to SSR 87 near Army Street (portions)	5.3	1.5	<sup>b</sup> 16,938,000	3.8	16,488,000		185,000	33,102,428
84	From east of IS 280 to west end of Dumbarton Bridge	6.4							546,386
	From 2.6 miles east of Dumbarton Bridge to SSR 238 at Niles	5.7							
	From IS 680 near Sunol to IS 580 near Livermore	9.7							
85	West Valley Freeway; from SSR 101 south of San Jose to SSR 17	10.0							821,548
	From SSR 17 to Bayshore Freeway (SSR 101) at Mountain View	13.6			5.5	6,669,000			7,118,978
87	Guadalupe Freeway; from Bayshore Freeway (SSR 101) to West Valley Freeway (SSR 85)	9.5							
92	19th Avenue Freeway; from Junipero Serra Freeway (IS 280) to Alameda county line at San Mateo Bridge (portions)	8.0	2.3	4,800,000				225,000	7,635,758
	From San Mateo county line to Nimitz Freeway (SSR 17)	6.8					3.0	3,500,000	1,146,487
101	San Benito county line to Ford Road south of San Jose	27.9	5.8	1,093,000					545,839
	Bayshore Freeway; from Ford Road to Southern Freeway in San Francisco	52.9	52.9	<sup>a</sup> 60,864,000		2,037,000		1,155,000	29,006,801
	James Lick Memorial Freeway	3.0	3.0	11,445,000					12,870,844
	Redwood Freeway; Golden Gate Bridge to Mendocino county line	84.3	69.0	<sup>c</sup> 52,817,000	9.0	11,421,000	1.1	1,907,000	20,826,416
114	West of SSR 82 to Bayshore Freeway (SSR 101) in Redwood City	1.1			1.1	<sup>b</sup> 2,250,000			2,842,075
121	From SSR 37 near Sears Point to SSR 29 in Napa at Imola Avenue	16.8	1.1	1,124,000					123,885
152	Pacheco Pass; from 1 mile east of Bells Station to Merced county line	5.3	5.3	1,702,000					12,393
186	Sweeney Ridge, west of SSR 35, to Bayshore Freeway (SSR 101)	4.0							2,111,323
237	Mountain View-Alviso Freeway; from El Camino Real (SSR 82) to Nimitz Freeway (IS 680)	10.5	5.5	2,088,000	2.2	1,715,000			2,223,445
238	Freeway Connection from Nimitz Freeway to MacArthur Freeway (IS 580)	2.2	2.2	2,803,000					2,236,852
242	North of Monument in Pleasant Hill to SSR 4, Concord	3.4		226,000	3.2	3,150,000			1,940,405
		733.7	370.9	\$458,573,000	70.0	\$145,752,000	32.1	\$40,731,000	\$394,025,607

\* Advertising of project depends on coordination with S.F.B.A.R.T.D.

<sup>a</sup> Includes \$500,000 contributed by cooperating agencies.

<sup>b</sup> Includes total of \$1,600,000 by City of San Francisco.

<sup>c</sup> Includes total of \$5,000,000 by Golden Gate Bridge and Highway District.

<sup>d</sup> \$29,117,000 Toll Bridge Funds in this amount.

<sup>e</sup> \$6,833,000 from Toll Bridge Funds.

<sup>f</sup> City of Oakland and Alameda County contributions included in this figure.

<sup>g</sup> Includes \$690,000 by District V.

<sup>h</sup> Includes total of \$1,051,000 by City of Redwood City.

<sup>i</sup> County of Alameda contribution included in this figure.

<sup>j</sup> Remaining portion to be financed in 1965-66 fiscal year.

# New 70 mph Speed Zones

It is legal now to drive 70 miles per hour on five freeway stretches of California highway, totaling 120 miles.

The first exception to California's normal 65-m.p.h. maximum was a 47-mile stretch of Interstate Route 15 in the desert east of Baker, San Bernardino County.

A little later, three sections of Route 99 and a section of Route 101 were posted for 70 miles an hour.

The locations on Route 99 are: a 27-mile stretch between Sacramento and Lodi; south of Tulare, 25 miles; in the vicinity of Bakersfield, 11 miles. On Route 101, the section is north of Santa Rosa, 10 miles. Other sections of freeway are being investigated to determine if conditions are suitable for 70-m.p.h. speeds.

Robert B. Bradford, Administrator of Highway Transportation, warned motorists that the higher speed limit on these carefully selected stretches of freeway, permitted under legislation enacted in 1963, is still regarded as experimental.

"Safety is always our first concern," he said. "These locations were designated after careful surveys and consultation between the Division of Highways and the California Highway Patrol. They agree that the higher maximum speed is consistent with



Southbound traffic on the Route 99 freeway just south of Bakersfield enters one of the state's first 70-m.p.h. maximum speed limit zones just north of the Planz Road overcrossing.

safety in these cases. The burden of proof remains, of course, with the individual motorist."

Commissioner Bradford M. Crittenden of the Highway Patrol also emphasized the role of the motorist, indicating that the establishment of additional zones will depend on how drivers react.

"We intend to watch driver behavior patterns in the new zones very carefully," he declared. "Our experience with these first five will be a

strong factor in our recommendations regarding future extension of the higher speed limits."

Crittenden also pointed out that California's basic speed law—requiring motorists to drive no faster than conditions render safe—still applies in the new zones.

"The 70-m.p.h. sign doesn't mean 70, or even 65, if traffic is heavy, or the pavement slippery or the visibility reduced," he said. "We'll be watching driver reaction in this respect also."

... Continued on page 64



Eleven miles farther south, near the junction with the former Route 99, the maximum legal speed reverts to 65 m.p.h.

# Hot Springs Creek

Memo Shows Concern  
For Scenic Values

## BRIDGE DEPARTMENT

Hot Springs Creek  
Bridge No. 44-52  
V-Mon-56-D  
Contract 63-5T13C10  
July 23, 1963

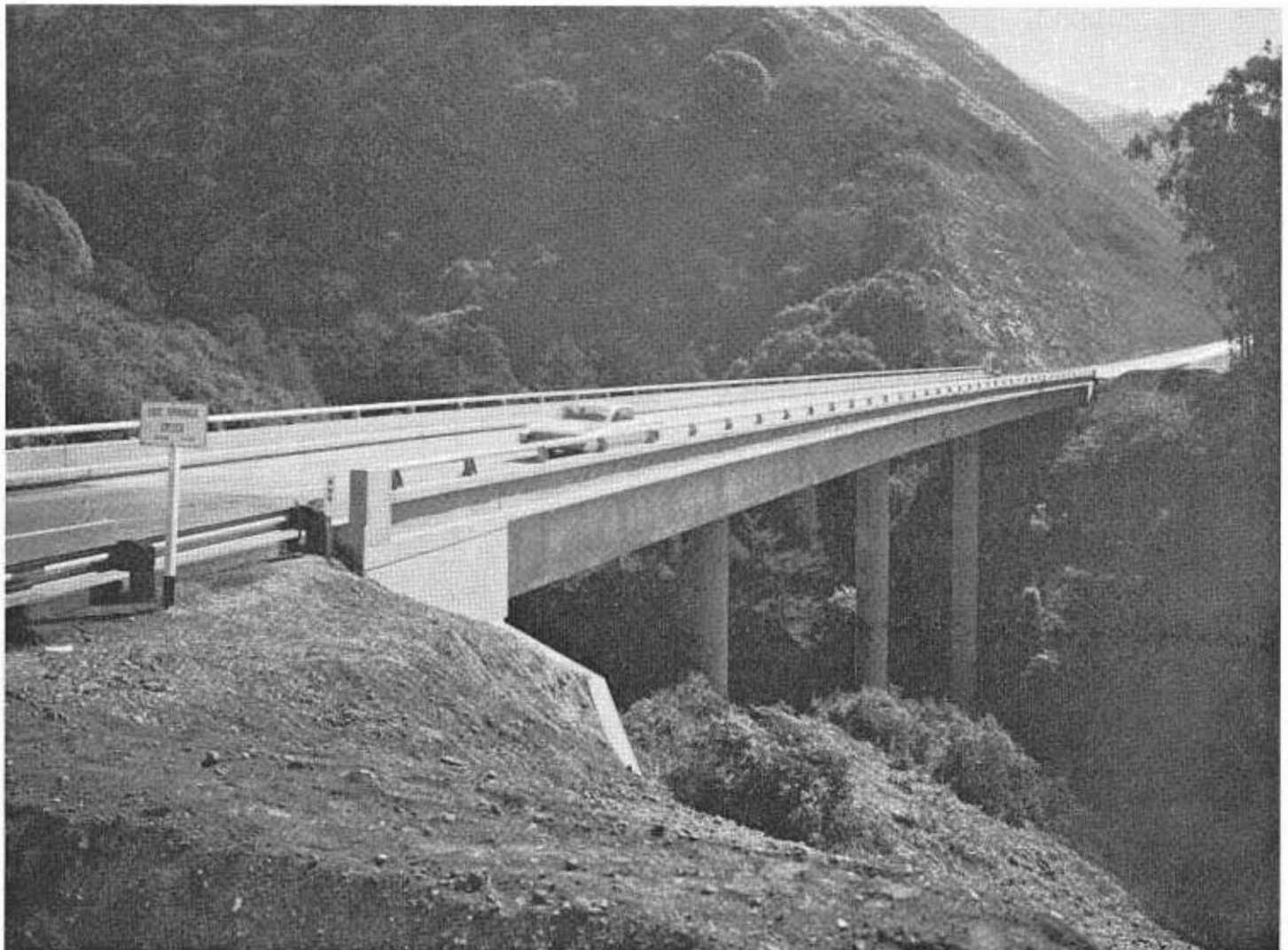
### MEMORANDUM TO DESIGNERS

Mr. I. O. Jahlstrom  
Operations Engineer  
Attention: Design Section No. 5

The appearance of the completed  
Hot Springs Creek Bridge, No. 44-52,

*Editor's Note:* Upon completion of most bridge contracts, the resident engineer prepares a memorandum to the design staff, reporting and commenting on significant features of the project, completeness of the plans and suggestions for improvement. The memorandum on Hot Springs Creek Bridge, recently constructed in State Route 1 between Big Sur and Lucia on the Monterey County Coast, is published to illustrate this type of report and to indicate how engineer-contractor teamwork and awareness of scenic values can serve the public purpose most effectively.

Published on another page is a copy of a memorandum to W. S. Ludlow, Bridge Architectural Senior, from Senior Bridge Engineer M. B. O'Gara (head of Design Section 5), summarizing design features of the project.



Precast, prestressed concrete girders were used in the new 360-foot bridge across Hot Springs Creek canyon on State Route 1 in the Big Sur area south of Carmel.



A view of the Hot Springs Creek Bridge from the streambed. To minimize disturbance to native shrubbery and for economy, the structure is supported on single, six-foot round column pier shafts mined into the rock of the steep canyon slopes.

would suggest a considerable step had been accomplished toward economical achievement of more harmonious scenic values in the area.

Contractor G. S. Herrington apparently gave much consideration, as evidenced by several exploratory conversations with the Bridge Department Representative, to the problem of selecting Alternate "A," the prestressed girder design, or Alternate "B," the box girder design.

Herrington stated that in view of the fact that the length, section and weight of the prestressed girder specified was the absolute maximum, and perhaps slightly more than the maximum, that could be moved over the intervening highways from a properly equipped casting base, it would seem that the box girder design might be the preferable risk if not the more economical. He stated that his calculations revealed no difference in estimated comparative costs between the two alternates.

Mr. Herrington finally stated that the deciding factor that motivated his selection of Alternate "A," the prestressed girder design, was the deeply entrenched feeling of the residents of the area against such construction operations on this scenic route as tend to leave unsightly scars on the terrain or damage the natural growth. The preparation of adequate bearing and the erection of falsework necessary to box girder construction on the steep

## DIVISION OF HIGHWAYS MEMORANDUM

To: Mr. W. S. Ludlow

From: Mr. M. B. O'Gara

DATE April 28, 1964

SUBJECT: Hot Springs Creek Bridge

This four-span 360-foot structure spans the 100-foot-deep Hot Springs Creek Canyon. The design attempts to preserve the scenic values of the site 50 miles south of Carmel in the Big Sur area of the Monterey coast. The project featured alternative designs giving the contractor options of precast prestressed girders continuous for live load or cast in place concrete box girder superstructures.

The low bidder, G. S. Herrington, elected to construct the precast prestressed option. The girders were manufactured by Basalt Rock Company of Napa.

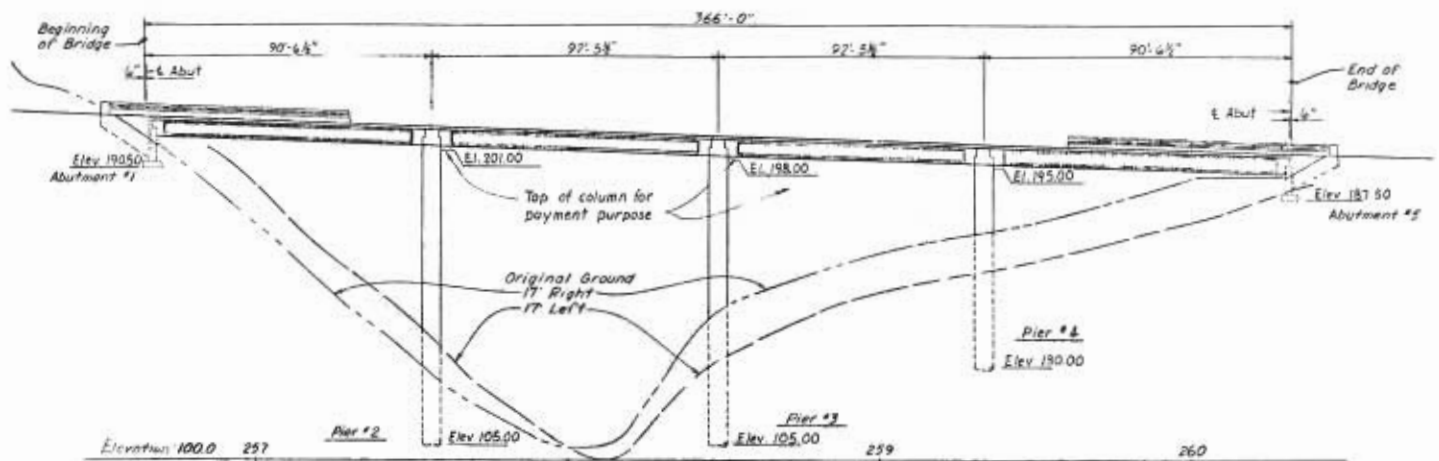
To minimize the disturbance to the native shrubbery and for economy on the steep canyon slopes, the structure is supported on single six-foot round column pier shafts mined into the rock, in lieu of footings.

Concealed wedge-shaped caps permit the use of constant-length girders, despite the curved alignment, and preserve the clean lines of the superstructure.

The recessed cap design and continuity of the deck slab cause the superstructure to act as a lateral beam carrying most of the lateral forces to the abutments. Monolithic construction of column and superstructure, combined with the reduced lateral forces on the columns, achieve economy in column reinforcement.

Designed by K. H. Johnson. Checked by W. T. Egloff.

M. B. O'GARA



A profile of the bridge showing overall length of the bridge, length of each span and elevation of the piers.

slopes of the site would have left such scars and have caused considerable damage to natural growth. The sincerity of the contractor in his efforts to consider the artistic sensibilities of the local residents was borne out in the nature of his carefully planned and executed construction operations.

In view of the absence of a stated position concerning the subject in the special provisions, the selection of prestressed girder construction was also predicated on permission to place the girders from the deck of the existing bridge. It developed that such an operation would necessitate the imposition of two 40- to 50-ton-capacity cranes carrying a cantilevered girder load of 72 kips or a total dead load of approximately 300 kips (300,000 pounds) on the old structure while placing each girder of the center two spans on cap-supported dollies for final positioning.

After thorough inspection of the existing structure with special attention to the nature of previous extensive repairs, it was decided that such load imposition constituted a reasonable risk and the requested permission was granted, with the qualifying provision that the contractor operate only with each of the two cranes positioned over separate bents and that he be prepared to cease the operation and devise another method of placing the girders should the engineer determine at any time that the existing bridge was showing evidence of impending failure.

#### Foundations

Abutment 1 spread footing was founded entirely on weathered base rock at planned elevation. Abutment 5 spread footing was founded on sound base rock largely at planned grade. A portion of the left footing step of abutment 5 was excavated to something less than one foot below planned grade to achieve same bearing value as was apparent at right of center line. Portion of retaining wall footing at left of abutment 5 was also deepened slightly to achieve uniform bearing in cemented sands and gravels.

Single six-foot-diameter column at each bent was designed to extend into excavation of such direct and transverse bearing values as to preclude the need of spread footings. Necessary point bearing values were accomplished by establishment of the lower end elevation in base rock at or near planned grade. Bent 4 column was transversely supported by lower two feet in base rock and next 28 feet in cemented sands and gravels interspersed with large sound boulders. Approximately 30 feet of column 4 is below original ground as compared to approximately 35 feet exposed. Columns 2 and 3 are founded in 23 and 24 feet of base rock respectively as compared to approximately 74 and 70 feet of respective exposure.

#### Methods

Excavation in base rock for columns 2 and 3 was accomplished to sound undisturbed material for both direct

and transverse bearing and with a comparatively small overexcavation by the following methods: Drilling and shooting was accomplished in increments of two feet of column length by use of a circle of holes drilled vertically at 2'4" radius and approximately 1'8" apart and a concentric circle of four holes at 1'0" radius and tapering progressively toward the center as drilled. All holes were loaded with one-half stick of 40 percent dynamite in the bottom and one-half stick in the upper foot of hole. The inner circle of tapered holes was then timed to explode just ahead of the outer circle of vertical holes. Thus the center was loosened ahead of the main charge resulting in the major portion of the main charge being directed toward the center. The net result was a minimum of air hammer excavation beyond planned excavation limits to effect removal of all shattered or disturbed material.

The approximately 5'3" clear diameter inside the column rebar cage was the minimum that would permit a standard 1-cubic-yard concrete pour bucket to be lowered to the bottom of the cage and tripped by an operator riding on the bucket. This procedure allowed the placement of lower slump concrete than could be poured through boots or tubes, thereby eliminating the danger of segregation and permitting a faster pour with less danger of form failure.

E. A. CAMPBELL  
Bridge Department  
Representative



# New Routes

## Highway Commission Adopts 50 Miles of New Freeways

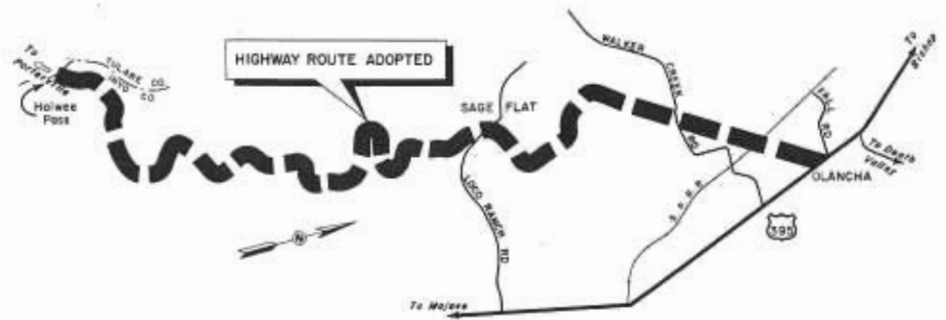
The California Highway Commission adopted nearly 50 miles of freeway routings at its March meeting, including two sections totaling 13.5 miles on State Sign Route 49, the "Mother Lode Highway," north and south of US 50 west of Placerville in El Dorado County.

The other freeway routings were for a 26-mile stretch of US 99 (future State Route 86) extending southerly from the Riverside county line in Imperial County, and a 9.7-mile section of US 395 in Lassen County between Long Valley Creek Bridge and 1.2 miles north of Doyle.

### Conventional Routing

Additionally, the commission adopted in April a 14.3-mile conventional highway routing for State Highway Route 127 (future State Route 190) in Inyo County. The adopted section is between US 395 near Olancho, about 24 miles south of Lone Pine, and Haiwee Pass at the Tulare county line.

The commission chose the "A" alternate for the northern portion of SSR 49, extending southeasterly between one-half mile northwest of the bridge across the South Fork American River and US 50 west of Placerville, and the "AB" combination extending southerly between US 50 at



Perks Corner and 5.7 miles north of the Amador county line.

### Choices Recommended

The choices were recommended by the State Highway Engineer, who described the "A" line as bypassing residential and recreational areas and as not conflicting with Gold Discovery Site State Park, and the "AB" combination as offering the least conflict with the existing highway which local citizens wish maintained as a scenic and historic route.

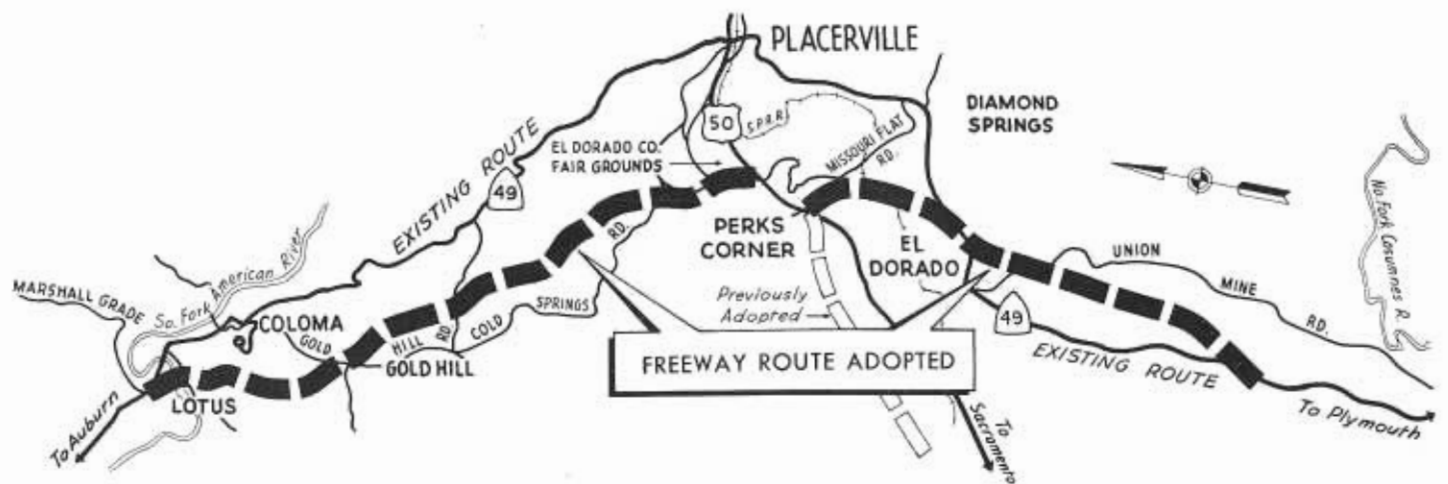
The adopted route for the US 99 Freeway in Imperial County follows the existing alignment of the present highway. The adopted US 395 Freeway section in Lassen County generally follows the existing highway ex-

cept near Doyle, where it passes west of the business district.

### Rugged Terrain

The newly adopted trans-Sierra route in Inyo County, future State Route 190, will traverse extremely rugged terrain varying from an approximate 3,800-foot elevation at Olancho to 8,200 feet at Haiwee Pass. It eventually will be extended westward to join SSR 190, now constructed east of Porterville in the San Joaquin Valley to Quaking Aspen Camp in the Sierra Nevada.

In another March action, the commission adopted a realigned routing for 0.6 mile of SSR 132, a conventional highway in Stanislaus County, about three miles east of Waterford, to ease sharp curves.



# Oroville Relocation

By ALAN S. HART, District Engineer



With the completion of the 6½-mile freeway between Oroville and the junction to the north known locally as Wicks Corner, the final section was opened in the relocation of

nearly 20 miles of State Sign Route 70 (old US 40-Alt.) around the Butte county seat.

The new route replaces the old Feather River Highway, between Oroville and Jarbo Gap, which will be flooded when Oroville reservoir begins to fill after completion of the dam. It was built under four contracts

totaling some \$19,000,000 and is about a mile shorter than the scenic but winding and narrow old road.

Adopted by the Highway Commission in 1956, the new route (see map) begins in Oroville at the west end of Montgomery Street, crosses the Feather River and runs through the area known as Thermalito, and then travels northwesterly roughly parallel to a section of the old Oroville-Chico road which will be relinquished to local agencies for maintenance.

### Ascends Into Sierra

At Wicks Corner it swings northeasterly to gradually begin its ascent into the Sierra. The route crosses the West Branch of the North Fork of the Feather River over a steep canyon at Vinton Gulch. Between the West Branch and Jarbo Gap, it generally parallels the Oroville-Concow county road via Yankee Hill.

The relocation was done under a cooperative agreement with the Department of Water Resources which financed a portion of the construction from legislative appropriations as a "replacement in kind" of the former highway. Highway funds were used to the extent that the new highway is an improved facility compared with the old.

The old Feather River Highway, or the Oroville-to-Quincy road, which totaled about 78 miles, was spectacular both as an engineering feat and a scenic wonder. It was literally carved out of solid rock. Of the 7,710,000 cubic yards of excavation which preceded the surfacing of the 71 miles to Keddie, 85 percent was rock.

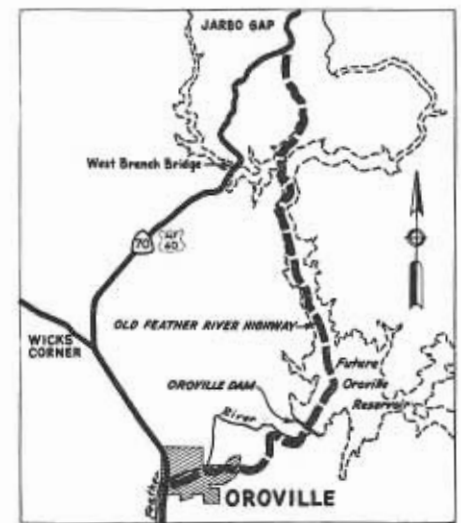
### Original Highway

This original highway followed an old narrow, tortuous road which was once only wide enough in some places for a single wagon at a time. It was an early access to the rich timber lands and mineral deposits in Plumas County and was originally surveyed

in 1867 by pioneer engineer Arthur Walter Keddie.

By the turn of the century, the Western Pacific railroad had begun to push through to the west via Beckwourth Pass, and by 1909 trains were in operation over the Sierra through the winding North Fork Canyon.

The people of the mountain area—mainly Plumas County—soon sought a practical motor vehicle route to end their near isolation from the valley and to connect the county seats of Butte and Plumas Counties.



Highway crews began surveying in 1919 for a feasible alignment, and nine years later the project was ready to go, it already having been determined that the entire route would have to be completed before it could be opened to the public.

By June 1928 two convict labor camps had been set up—one in each of the two counties—and were to supply more than half the labor for the entire project.

### First Link Completed

The first link, from Oroville to the site of the highway bridge about four miles easterly, was completed in 1930.





View of expressway running out of the valley toward Jarba Gap.

After a nine-year construction period, the route was dedicated during a three-day celebration in Oroville, Quincy, Reno, and Portola in August 1937.

The early location of the railroad along the sides of the North Fork Feather River canyon made it necessary for highway engineers to build the road on the opposite slope, creating a crisscross pattern of highway and tracks. The highway crosses the river six times in the canyon; at Pulga the highway bridge leapfrogs over the rail span, and at Tobin the road bridge passes beneath the railroad structure.

Extensive historical material and photographs on this old route that some said could never be built can be found in *California Highways and Public Works* for May 1930, June 1930, January 1932, March 1936, and especially August 1937.

#### Need for New Route

With the decision to build the Oroville dam, a new route had to be found and most of it placed in operation before work on the dam could start. Site of the dam is across the canyon just upstream from that first highway bridge east of Oroville.

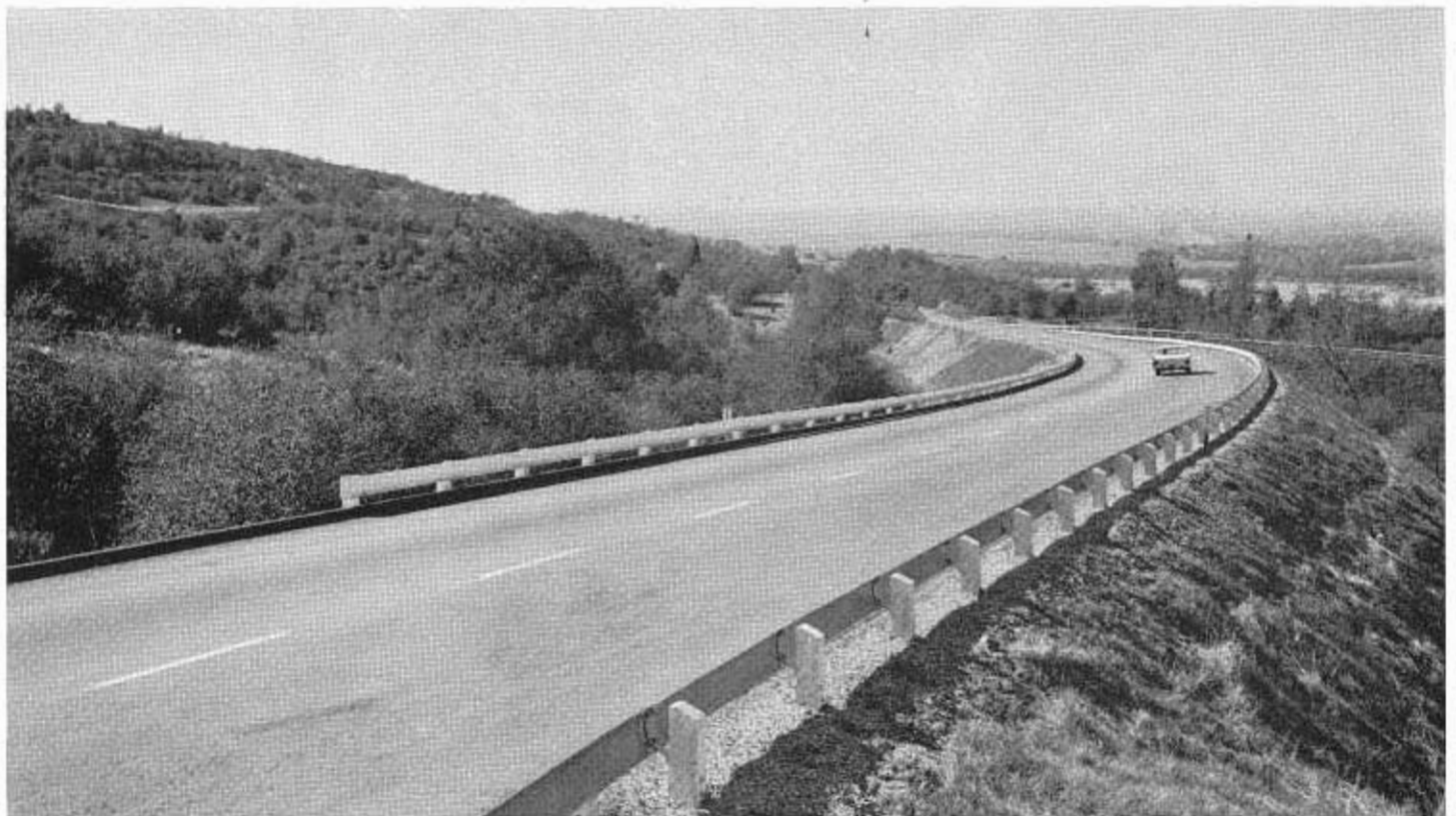
The first section of the new route around the other side of Oroville was



Beginning of relocated old U.S. 40-Alternate (now State Sign Route 70) immediately west of Oroville. Interchange in foreground is at Oroville Dam Boulevard and farther north at the west end of Montgomery Street. Bridge across Feather River also visible. Old road parallels freeway at right.



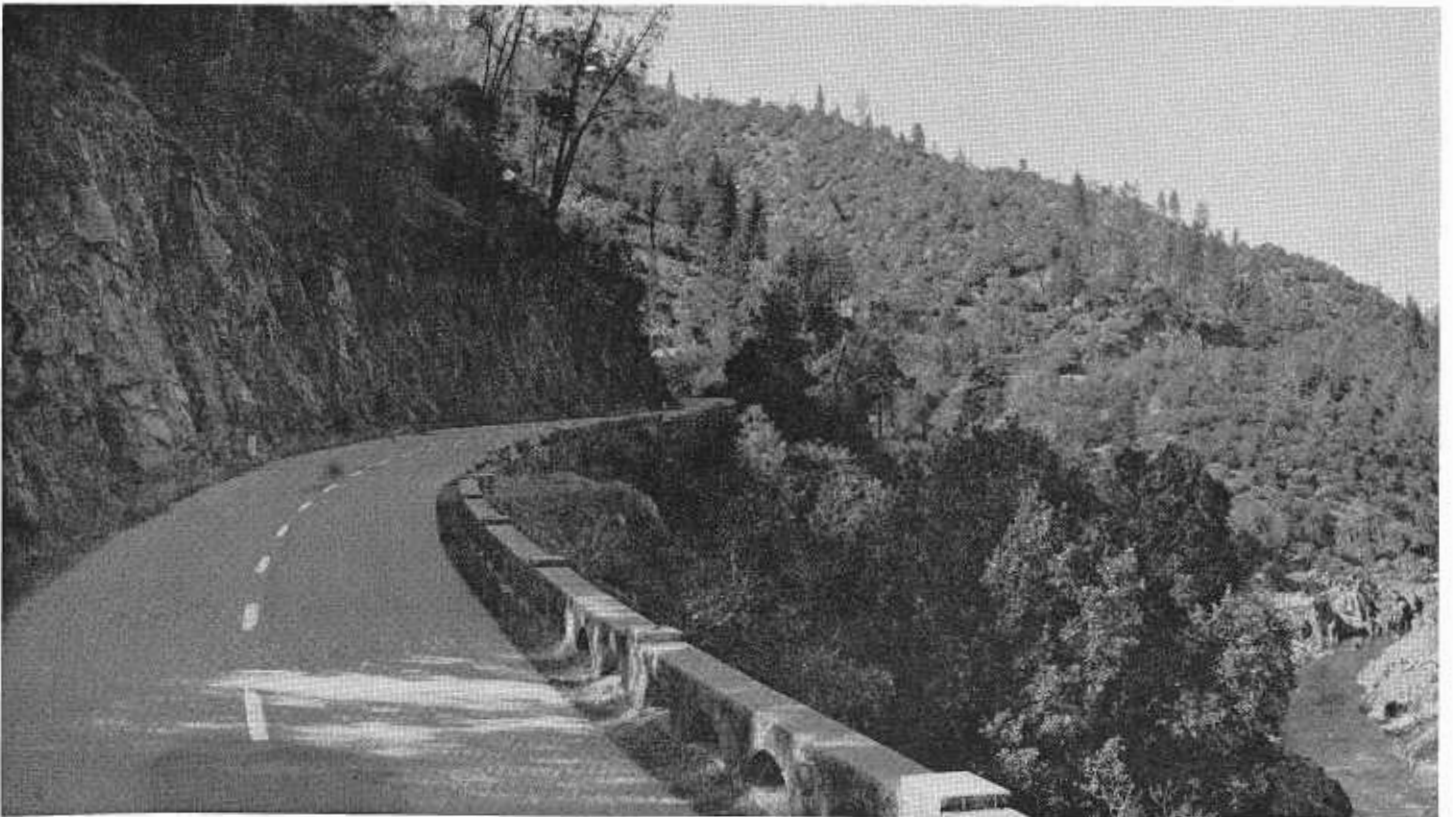
*Typical view of the Oroville-Wicks Corner freeway. This one is approaching the Grand Avenue interchange in Oroville from the south, located about one-half mile north of the Feather River.*



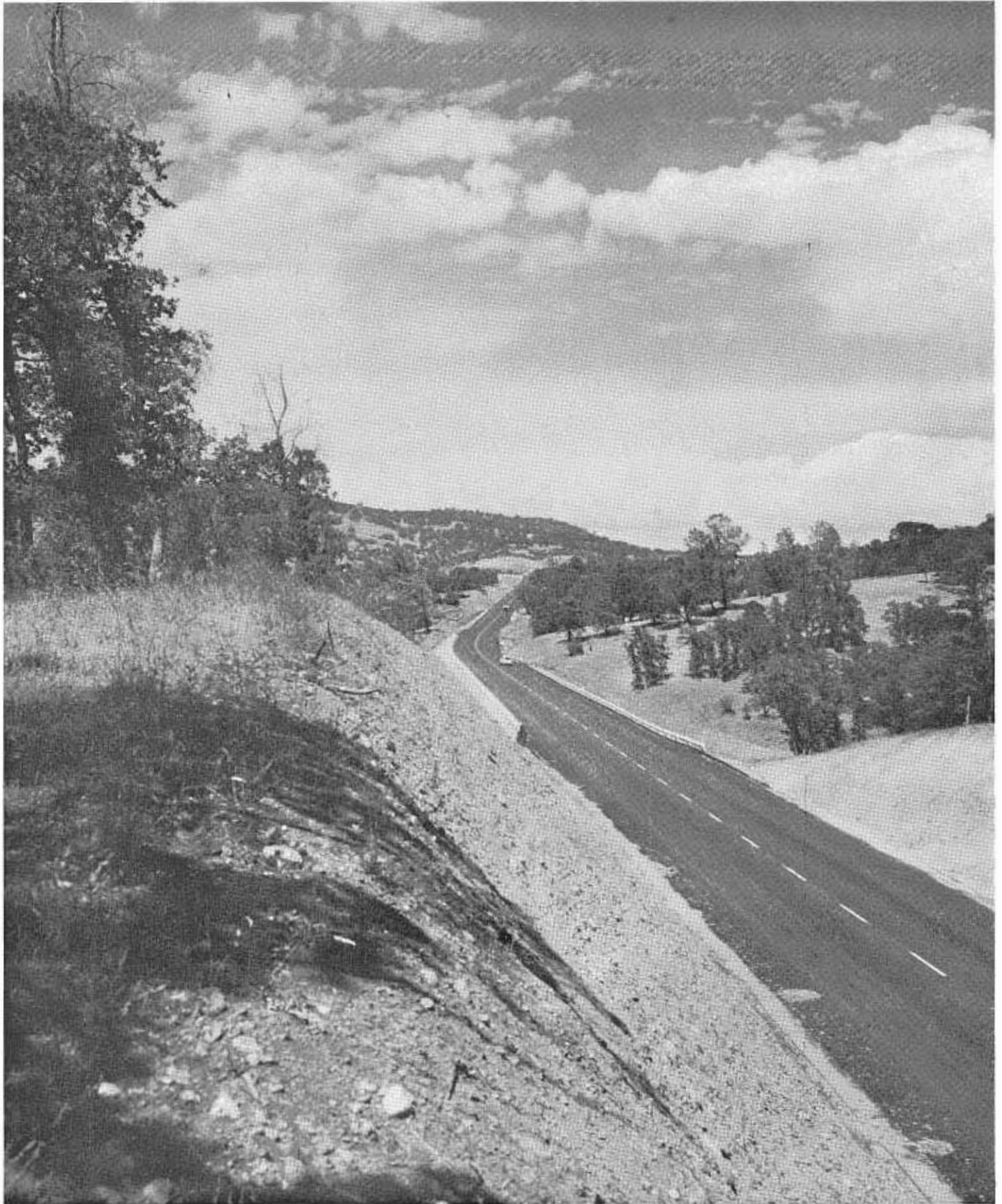
*Looking westerly from typical section of expressway coming down into the Sacramento Valley. Turnoff at right is State Sign Route 191 to Paradise.*



*A typical view up the narrow North Fork Feather River Canyon. Old road upper left, abandoned railroad lower right. All will be inundated when reservoir is full.*



*Section of old Feather River Highway, now closed to traffic since opening of relocated route. About half the former road was built by convict labor and completed in 1937.*



*Another view of a typical stretch of relocated highway, a little farther up the line than the upper photo on page 57.*

a contract for 13.75 miles of two- and four-lane expressway from Wicks Corner, elevation 300, in the valley to Jarbo Gap at elevation 2,330.

This \$8,550,000 job included grading about 2.7 miles of Western Pacific roadbed where the relocated railway paralleled the new highway in the vicinity of Vinton Gulch on the North Fork. This action permitted use of the surplus material excavated from the railroad right-of-way as embankment for the adjoining highway, resulting in a substantial saving on the overall project.

Also included in this contract was construction of a 1,285-foot siphon—a welded steel 42-inch pipe which carries the Upper Miocene canal across a canyon and under the highway.

#### West Branch Bridge

The second phase was construction of the West Branch bridge at Vinton Gulch at about the middle of the Wicks Corner-Jarbo Gap expressway. The double-deck structure consists of four steel truss spans on massive concrete piers towering 450<sup>+</sup> feet from the bottom and sides of the canyon.

Top deck of the \$8,600,000 bridge carries four traffic lanes and the lower level supports a single set of Western Pacific tracks. The impressive structure was dedicated and opened to traffic in gala ceremonies in August 1962.

A detailed construction article appears in *California Highways and Public Works*, May-June 1962.

A third contract was completed for approaches and minor repairs to the highway at the time the bridge was opened to traffic.

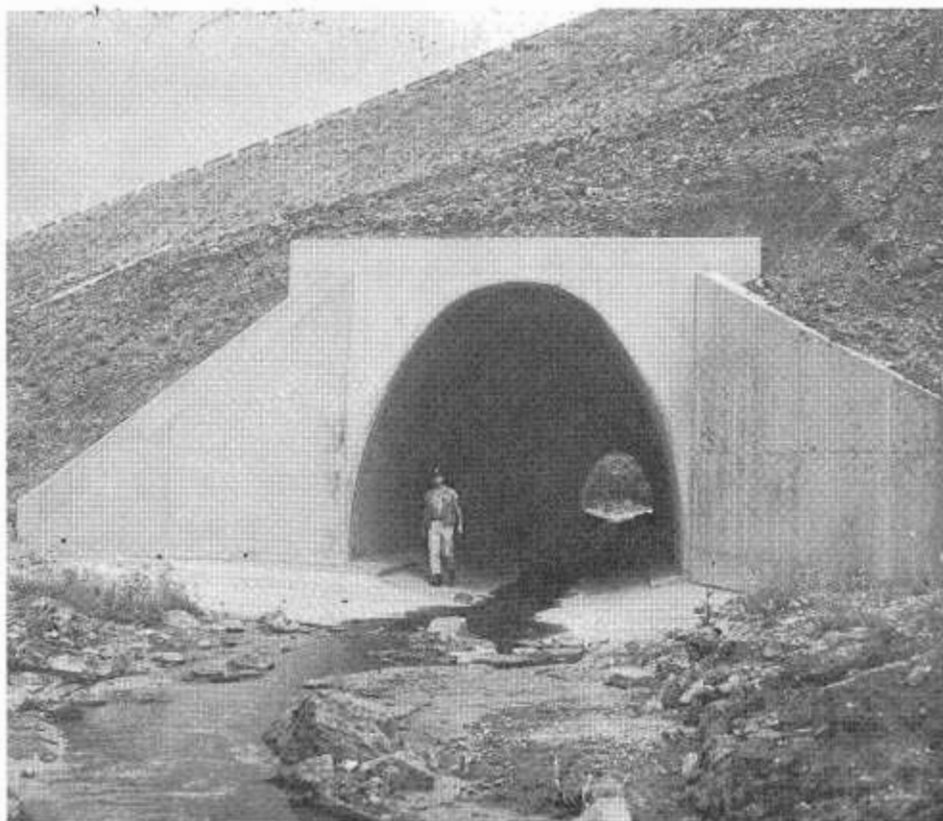
Comprehensive articles concerning this project as well and the overall relocation appear in *California Highways and Public Works* for May-June 1957 and September-October 1957.

#### Final Section

Final section was the four-lane full freeway from Oroville to Wicks Corner which was accepted from the contractor in January 1964. This \$3,800,000 job included an interchange at Montgomery Street in Oroville, a bridge across the Feather River, two other interchanges northwest of Oro-



Reverse view of lower photo on page 57. Feather River bridge in foreground with Montgomery Street interchange immediately adjacent. View is to the south.



Fifteen-foot arch culvert under embankment about one-third of the way between Wicks Corner and Jarbo Gap.



Aerial of the Garden Avenue interchange about one mile northwest of Oroville. The old Oroville-Chico road is at right as is a loop of the relocated Western Pacific railroad. Wicks Corner in upper center background.



Aerial of completed Wicks Corner intersection. Old road is at right. Freeway makes transition from four lanes to two and continues toward Garbo Gap as an expressway. Road at left goes to Chico.



Construction photo shows old and new alignment at Wicks Corner. Relocated highway turns to the right. Road at left goes to Chico.



Aerial shows four-lane section northeast of the West Branch bridge.



ville (Thermalito), and numerous smaller structures.

A fifth project, not a part of the cooperative agreement between the Division of Highways and Department of Water Resources, was built south of Montgomery Street and financed entirely by state gas tax funds.

This two-mile project relocated the south approach to Oroville through the old dredger tailings between the former road and the Feather River. The new alignment provides a straight shot connection to the Montgomery Street interchange while at the same time bypassing a congested condition along the built-up area fronting the narrow old road.

At the present time a planting contract is nearing completion along the Oroville-Wicks Corner Freeway which calls for the establishment of trees along the right-of-way.

Contractors and state resident engineers were as follows:

Wicks Corner to Jarbo Gap—The joint venture firm of McCammon-Wunderlich Co. and Wunderlich Contracting Co. was contractor, and Muller Chapman was resident engineer.

West Branch bridge—Stolte, Inc., and Morrison-Knudsen, Inc., a joint venture, was contractor, and P. C. Harris resident engineer.

West Branch bridge approaches—Baldwin Contracting Co., Inc., and Perry Lowden, Jr.

Oroville to Wicks Corner—Harms Bros. and Lord & Bishop, Inc., a joint venture, and Darrel McWhirk.

South of Montgomery Street project—Harms Bros., Inc., and John E. Gentz.

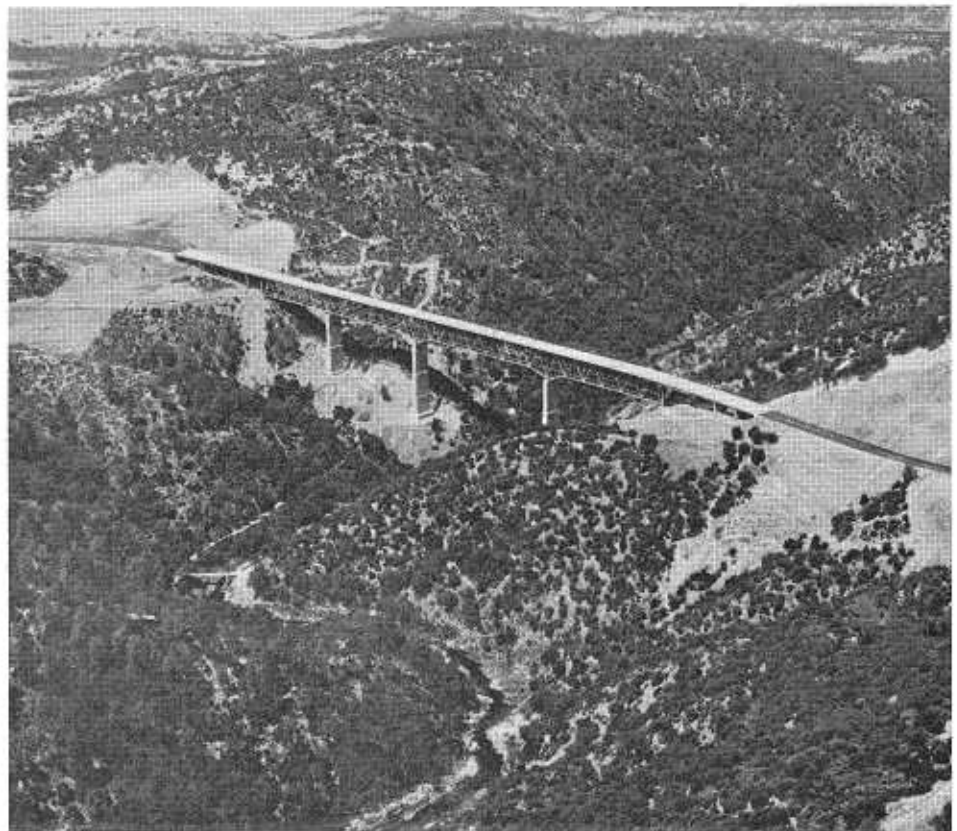
Oroville to Wicks Corner planting—Frank M. Smith, contractor, and Andy Drum, resident engineer.

### TUNNEL RENOVATION

The State Division of Highways has called for bids on the renovation of the existing two-bore Caldecott Tunnel in Alameda and Contra Costa Counties. In order to best serve commuters, the renovation will begin only after the new westbound Caldecott Tunnel bore is opened to traffic sometime in September.



Shows details of bridge construction prior to completion. Total structural steel, 11,000 tons; concrete, 40,000 cubic yards.



General view of the West Branch bridge over Vinton Gulch. Old county bridge on the Oroville-Concow Road visible lower left. Top deck is four lanes, lower deck carries single railroad track. Water will be a maximum 350 feet deep, or 8 feet from top of piers.

# British Transport Minister Revisits Freeways



Right Honorable Ernest Marples, second from left, Great Britain's Minister of Transport, is shown on his latest visit to California, where he inspected highway projects and conferred with highway officials in late April and early May. In this picture, he is being shown one of the current construction projects on Interstate Route 10 (Santa Monica Freeway) by District Engineer E. T. Telford (left) and Senior Resident Engineer J. D. Hetherington (right). Mr. Marples' private secretary, Trevor Lawman, is between him and Hetherington.

Mr. Marples' first stop in California was in the San Francisco area, where he inspected construction activities and equipment on Interstate 580 Freeway in Oakland under the guidance of Deputy District Engineer Haig Ayanian.

## New Speed Zones

*Continued from page 51 . . .*

State Highway Engineer J. C. Womack said every effort would be made by the Division of Highways to mark the beginning and end of each 70-m.p.h. zone clearly, so as to avoid motorist confusion.

At the beginning of each zone there will be 70-m.p.h. signs on both sides of the roadway, and a similar dual installation of "End 70 Mile per Hour" at the end of each zone. There will also be 70-m.p.h. signs along the right shoulder at intermediate points. Other signs, in the median strip, will direct slower traffic to keep right.

To reinforce the "End 70 Mile per Hour" signs, the Division of High-

ways will also install signs reading "Maximum 65 Miles per Hour" about 800 feet past the end of the zone.

The 1963 law provides the Administrator of Highway Transportation may declare the higher maximum speed on a section of freeway on the basis of engineering and traffic surveys indicating that "a speed greater than 65 miles per hour would facilitate the orderly movement of traffic and would be reasonable and safe."

The Division of Highways will consider only rural freeways for the higher maximum, according to Womack. The division's other criteria, which must be met before the location is even discussed with the High-

way Patrol, include: adequate width; traffic volume light in relation to capacity; accident rate below average for rural freeways; well-spaced interchanges; minimum continuous length, 10 miles.

If a section of freeway meets these standards, the district engineer of the Division of Highways confers with the area commander of the California Highway Patrol. If the latter is in agreement, the Division of Highways then conducts a detailed traffic study, including average daily and peak hour traffic flow, including percentage of trucks; accident and fatality rates; at least two speed surveys; and examination for visual obstructions, steep inclines or sharp curves.

## 'Tempus Fugit' Corner

The following items appeared  
25 years ago in California  
Highways and Public Works:

June 1939—Arroyo Seco Parkway

Construction of California's first freeway—the six-lane, nine-mile Arroyo Seco Parkway connecting downtown Los Angeles with Pasadena—is well underway. From the Figueroa Street tunnels in Los Angeles to Broadway and Glenarm Street in Pasadena, not a single stoplight, intersecting street, nor railroad grade crossing will be encountered. The raised divider strip will make it impossible to make left turns across traffic or to meet opposing traffic "head on."

For much of the distance between Avenue 22 and Hough Street near the south city limit of South Pasadena, the parkway is located adjoining and parallel to the Arroyo Seco Channel, which is paved and walled for the entire distance. Since adjoining property follows through Los Angeles park lands for a considerable portion of the distance, a large number of citizens will drive through the beautified park areas daily.

More than 170,000 cubic yards of excavation from the Los Angeles River bed, which had been excavated by the U.S. Engineering Department in connection with their channel lining project on Los Angeles River, was used for embankment.

Design and construction of this freeway is receiving closest cooperation between the State, Cities of Los Angeles, Pasadena and South Pasadena, the various railroads involved, and federal agencies. Construction or partial reconstruction of 16 street and railroad bridges crossing over the freeway is involved, and the project will encompass seven different contracts at a total estimated cost of \$3,745,000. Extensive landscaping has been planned by the Cities of Pasadena and South Pasadena in cooperation with the State, and at no cost to the State.

It is anticipated that the average driving time between the two cities will be reduced one-half, which esti-

## Twenty-five-year List

The following employees received their 25-year awards since the January-February issue of the magazine:

### DISTRICT I

Richard G. Day  
Ernest Lee La Mastus

### DISTRICT II

Ruth C. Hardman  
Margaret E. Weaver

### DISTRICT IV

June M. Brush

### DISTRICT V

John W. Horn

### DISTRICT VI

Lawrence H. Vance

### DISTRICT VII

Abner M. Beard  
Summy L. Lytken  
John W. Shaver

### DISTRICT X

Leonard C. Jones

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mate is not based on excessive speeds, but rather on the continuous flow of traffic without the interruption of intersecting streets and railroads. (The Arroyo Seco Parkway was dedicated by Governor Culbert L. Olson on December 30, 1940.)

\* \* \*

The lead article in the June 1939 issue concerns toll rate reductions on the San Francisco-Oakland Bay Bridge. A transaction was effected which resulted in a 20 percent toll saving for motorists: 40 cents per auto instead of 50 cents.

\* \* \*

T. E. Ferneau, Resident Engineer on the Presidio (Funston Avenue) Approach to the Golden Gate Bridge reports a speed-up of work on the project which extends from Lake Street to the Marina approach to the Golden Gate Bridge.

A unique feature of the work is the 1,300-foot four-lane tunnel being constructed by the open cut and backfill method. (The approach was dedicated and opened to traffic April 21, 1940.)

## Baxter, Hill Trade Headquarters Posts

State Highway Engineer J. C. Womack has announced shifts in assignments for two of his top staff members. Effective June 1, 1964, Frank E. Baxter, assistant state highway engineer—planning, traded positions with George A. Hills, assistant state highway engineer—administration.

The primary reason for the shift in assignments, Womack said, is to broaden the experience of the two engineers involved and thus strengthen the overall administration of the Division of Highways. Both men have had many years of service with the division, including assignments in various districts and Headquarters departments.

Baxter has been in charge of the functions associated with highway planning since January 1962. These activities include advance planning, design, traffic, urban planning and programs and budgets.

Before his advancement to assistant state highway engineer, he had served as maintenance engineer for six years. His earlier assignments with the division, starting in 1930, included service in the Fresno and Redding Districts, and later the Bishop District, where he was district engineer from 1954 to 1956.

Hill's area of responsibility as assistant state highway engineer—administration included the functions of office engineering, city and county projects, systems research, service and supply and management analysis.

Prior to his promotion to that position in August 1963, Hill had served as traffic engineer. Before that he had spent several years in charge of planning and design for the Los Angeles District. A division employee since 1937, he has also had a variety of assignments in the San Francisco District and in Headquarters office in Sacramento.

### SACRAMENTO W-X BRIDGE

The State Division of Highways has called for bids on constructing the superstructure of the W-X Street Bridge and its approaches as a part of the future Interstate 80 through Sacramento.

# Merit Awards

Employee Suggestions Are Adopted by Manufacturers

The resourcefulness and ingenuity of state employees, as manifested through the suggestion program of California's Merit Award Board, pay dividends — financial and otherwise — not only throughout state governmental agencies, but on statewide, regional and even national bases.

Two Division of Highways employees have recently submitted suggestions which were subsequently incorporated into the national manufacturers' product, thereby also contributing significantly to industrial progress.

This past January, George L. Richardson, recently retired supervising highway traffic signal technician in District IV, received a certificate of award and a cash payment of \$100 for proposing that a change be made in the internal wiring of automatic signal pedestrian timers (Model PT-1), in order that a "WALK" indication will not be displayed by the pedestrian timer unless the vehicle "GREEN" indication for the proper phase is being shown.

#### Safer Passage

This modification would result in safer passage of motorists through—and pedestrians across—intersections, and would generally improve Division of Highways service to the public.

Richardson's suggestion met with approval by all districts, who felt that the conversion of all future pedestrian timers should be done at the manufacturer's level. Accordingly, the suggestion was referred to Automatic Signal of Torrance, a division of Laboratory for Electronics, Inc. Chief Engineer H. A. Wilcox, in an internal memo to District Sales Engineer Ted L. Morehead, stated, "The suggestion . . . is a good one. In fact, as the old saying goes, 'It's such a good idea I don't know why I didn't think of it myself.' We'll add this feature to our next run of units." A subsequent letter from Morehead to State Highway Engineer J. C. Womack con-



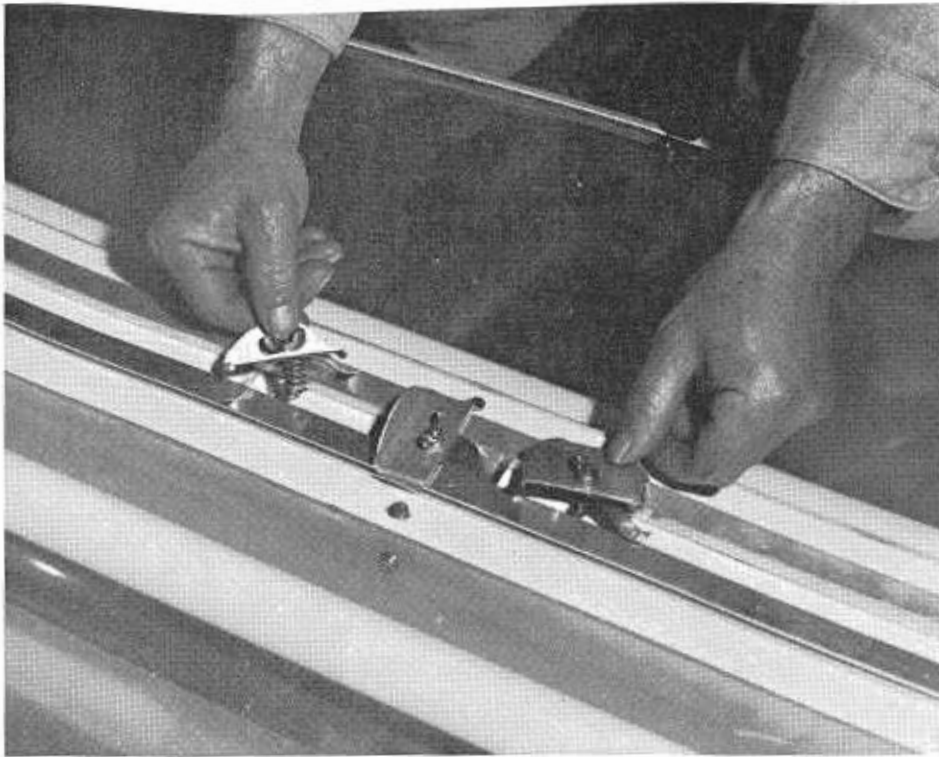
George T. Woodson, Highway Traffic Signal Technician of Eureka, demonstrating the use of the spring-loaded clip he recommended for fastening covers on outdoor fluorescent light fixtures.

firmed this, adding that "this modification is 'without charge' to the State of California or any other customer. . . . We are always most appreciative of comments received through the years suggesting improvements to our equipment. . . . I will be the Automatic Signal representative at the annual maintenance meeting, and will comment favorably on Mr. Richardson's suggestion."

#### National Benefits

Since Automatic Signal has nationwide distribution, the suggestion likewise provides nationwide industrial benefits.

Similarly, George T. Woodson, highway traffic signal technician of Eureka, made a suggestion which was incorporated into the manufacturer's product with the improvement representing no additional cost.



A closeup of the spring-loaded clip shows detail of design and application.

Woodson had recommended that a spring-loaded clip be used in fastening covers on fluorescent light fixtures used in outdoor lighting. These covers had previously been held in place by means of stainless steel nuts and bolts; but with Humboldt County's damp ocean air corrosion would take place within a few months, and the bolts would have to be cut in order to remove the cover.

The manufacturer, Electric Lighting Company, Stockton, readily approved and adopted the suggestion for future production.

#### Savings Evaluated

With the resultant savings being of intangible nature, Woodson's suggestion was evaluated on the "point" system, which rates various factors as they contribute to improved procedures and improved safety. He was awarded \$30.

Eugene F. Veglia, secretary of the Merit Award Board, points out that California state employees submit an average of 350 suggestions per month. Necessarily these run the gamut in content and feasibility; and range widely where monetary savings to the State are concerned. But these approximate 100,000 civil servants are

recognized as a wellspring of creative ideas, which benefit taxpayers locally and nationwide.

## U.S. Land Funds For Two Routes

California will receive \$470,000 in federal government public land funds for improvement of two roads—Salt Wells Canyon Road (State Highway Route 178, the former Route 212) and Tioga Pass Road (State Sign Route 120) near Yosemite National Park—during fiscal year 1965.

Route 178 connects to San Bernardino County Federal Aid Secondary Route 1065, one of the main roads leading to Death Valley National Monument. The \$140,000 in federal funds will allow for widening the two-lane road on improved alignment for 1.8 miles, between 12.9 and 14.7 miles east of Ridgecrest. Immediately west of the federal project, a state project is underway for improvement of another 1.2 miles of Route 178, so that the overall improvements will total three miles. This \$109,683 contract was awarded May 26, 1964.

## Jacques Zeeman

Jacques T. Zeeman, 72, retired assistant chief right-of-way agent for the State Division of Highways, died in Sacramento on April 12.

Born and educated in Holland, Zeeman entered the real estate and mortgage loan business in the 1920's in Los Angeles following U.S. Army service during World War I. In 1939, he became deputy land assessor in Los Angeles County.

He started work with the Division of Highways in 1944, serving as right-of-way agent in District X, which has headquarters in Stockton. Zeeman left this position to serve first as staff appraiser for the State Board of Equalization, and later as supervising appraiser for the State Savings and Loan Commissioner in San Francisco.

Returning to the Division of Highways in 1948, this time at Headquarters Office in Sacramento, Zeeman served as real estate appraiser and supervising right-of-way agent, appraising property needed for right-of-way purposes. He was also active in the purchase of land parcels for other state agencies, including acquisition of the new State Fair site in Sacramento, Sacramento State College, Grizzly Island, the State Printing Plant site, penal institution locations, and others.

He was promoted to the post of assistant chief in 1961 to supervise all right-of-way activities in the southern half of the State, and later became administrator of the appraisal department for all valuation activity concerning right-of-way throughout California.

Zeeman was a member of the American Right of Way Association, Sacramento Chapter; the American Institute of Real Estate Appraisers, Northern California Chapter; the Sacramento Real Estate Board, and the Commonwealth Club of San Francisco.

He is survived by his wife, Marie, and a daughter.

The two-lane Tioga Pass Road will be improved for 3.1 miles, between the eastern Yosemite National Park Boundary and 10.6 miles west of Lee Vining in Mono County, to facilitate travel from the park to US 395.

## Engineer-Geologist E. D. Drew Retires

Eldridge D. Drew, associate engineering geologist for the Division of Highways Materials and Research Department in Sacramento, has retired after a career of 31 years with the State.

Drew was born in Eureka, grew up in the Sacramento area and attended Sacramento High School. He started his state service in 1929 as an axman in District II. While working part time he studied geology and mining at Sacramento Junior College and through International Correspondence School courses.

After several years as a geologic aid with Shell Oil Company he returned to the State in 1939 and held geologic and engineering positions with the Division of Mines and the Division of Architecture.



ELDRIDGE D. DREW

Drew was appointed an assistant geologist with the Materials and Research Department in 1944 and in 1949 was promoted to associate engineering geologist. He has promoted the use of seismic and resistivity surveys in the solution of foundation problems and the design of cut slopes for many major projects in our highway construction program. He played a major role in the design of the "Big Cut" at Carquinez in Contra Costa County on Interstate Highway 80, which involved 8.5 million cubic yards of excavation. He also had a responsible part in the design of the Sepulveda Cut on the San Diego Freeway, Interstate Highway 405, in Los Angeles County involving approximately 13 million cubic yards of excavation.

The Drews have four children and one granddaughter. They will move to Grass Valley, where the Drew family pioneered in the early 1860's. Drew's wife, Marian, also retires after almost 25 years with the State as a clerk and stenographer, the last 10 years in the Attorney General's office.

## Evan G. Bower

Evan G. Bower, 52, assistant district engineer—operations, was killed April 29, 1964, while inspecting cleanup work on the new alignment of US 91 in the Yermo area. His auto struck a cable strung between two motor graders to support one of them working on an incline.

Bower was born in Hartford, South Dakota. He came to California in 1922 and went to school in Long Beach. He graduated from the California Institute of Technology with a B.S. degree in 1933.

Bower started to work for the Division of Highways in 1934 on a survey party working out of the Los Angeles office. Except for seven months in 1936, when he worked for the federal government, and for a little over 3½ years, when he served in the U.S. Navy as a lieutenant commander, he was continuously employed by the division. He also worked in Redding, Eureka, Sacramento, and San Luis Obispo before coming to the San Bernardino office in 1956.

As assistant district engineer in charge of operations, his duties covered all phases of construction and maintenance of state highways in San Bernardino County and the western portion of Riverside County.

He has supervised the construction of many major freeway projects in the district, including Interstate Highway 40 from Barstow to the Nevada state line and Interstate Highway 10 from Colton through Cabazon, as well as many others.

He is survived by his wife, Anita, and a brother, Harrill M. Bower of Long Beach.

### FREEWAYS 1,300 TIMES SAFER

If the established death rate of the 500-mile Memorial Day Classic at Indianapolis prevailed on California's public roads, 3,028,000 persons would have died in traffic accidents during 1962.

Drew is a member of the Polaris Masonic Lodge No. 730 and is a 32-degree Mason in the Sacramento Consistory of Scottish Rite.

## Division Announces Latest Retired List

### DISTRICT II

Aubrey, Charles E., assistant highway engineer, 12 years.

### DISTRICT III

Bernard, Paul E., highway foreman, 31 years.

### DISTRICT IV

Mack, Wille E., highway maintenance man I, 16 years; Henderson, Ben M., highway maintenance man III, 21 years; Shedd, Pansy Phyllis, intermediate typist-clerk, 4 years; Hinojos, Julio, highway maintenance man II, 12 years; Harrigan, Lawrence J., laborer, 11 years; White, Alexander, delineator, 30 years.

### DISTRICT V

Hysell, Clarence A., highway maintenance man II, 34 years.

### DISTRICT VI

Low, Lawrence J., highway foreman, 40 years; Allen, Edward N., highway maintenance man II, 30 years.

### DISTRICT VII

Tassaró, Louise A., intermediate stenographer, 7 years; Smith, Elmer L., assistant highway engineer, 30 years; Whiteley, George E., delineator, 10 years.

### DISTRICT X

Grove, Henry P., highway maintenance man II, 38 years; Lee, Harry W., highway landscape maintenance man, 16 years; Stice, Rollin K., senior highway traffic signal technician, 41 years; Stebbens, William G., drawbridge operator, 31 years; Tullis, Albert M., highway field office assistant, 35 years.

### DISTRICT XI

McAdam, James W., highway maintenance man II, 11 years; Youde, Austra I., intermediate stenographer, 14 years.

### HEADQUARTERS OFFICE

Baumgart, Walter M., records management analyst II, 33 years; Zick, Nell P., senior file clerk, 18 years.

### MATERIALS & RESEARCH

Clinton, Ross H., associate steel inspector, 19 years; Glen, William W., highway field office assistant, 13 years.

## Harlan F. Perdew

Harlan F. Perdew, 57, design engineer for District V, died on February 29 in San Luis Obispo.

A native of Ottumwa, Iowa, he attended grade and high school there and at Mount Pleasant and later studied at Iowa Wesleyan College.

Perdew's first engineering job was with the Northern Pacific Railroad in Wisconsin in 1925. He joined the Division of Highways in 1930 as an under engineering aid in District IV on a survey of the Pacheco Pass Road out of Gilroy. In 1934 he served on construction of the San Francisco-Oakland Bay Bridge and then returned to District IV to the newly organized city and cooperative projects department.

In June of 1941 he first came to District V as assistant traffic engineer. In 1944 he returned to District IV's traffic department, and subsequently spent three years with the U.S. Army in Europe as a traffic engineer on a civilian basis.

Returning from Europe in April of 1947, he spent the next three years with the traffic department in District IV, working on a Bay area traffic survey. In 1950 he was transferred to Headquarters Office in Sacramento, serving in the city and cooperative projects department as a senior highway engineer. In 1953 he returned to District V as district design engineer, and remained in that position until the time of his death.

He was a member of the Institute of Traffic Engineers. He was also a member of the Kiwanis, Executives Club, San Luis Yacht Club and the Commonwealth Club of California.

In addition to his wife, Adeline, Perdew is survived by five children and 13 grandchildren.

### EXPRESSWAY TO FREEWAY

The State Department of Public Works has awarded a \$1,056,815.63 contract for constructing an interchange at Steele Lane and frontage roads to convert US 101 between one-tenth mile south of Edwards Avenue and Russell Avenue in Santa Rosa from expressway to freeway standards.

## JOSEPH P. SINCLAIR DIES AFTER BRIEF ILLNESS

Joseph P. Sinclair, District Engineer of District IV, died in Redwood City on May 24 after a brief illness.

Sinclair, who was born on January 23, 1910, in Minneapolis, first joined the California Division of Highways in 1932 as rodman of a surveying party. With the exception of a few months during 1933 when he was employed by the Metropolitan Water District of Southern California and



JOSEPH P. SINCLAIR

his military duty with the Navy during World War II, Sinclair filled positions of ever-increasing responsibility with the Division of Highways.

A 1932 graduate of the University of Southern California, Sinclair held a bachelor of science degree in civil engineering. He was a member of Chi Epsilon, honorary civil engineering fraternity.

In 1933 he was assigned as a draftsman with District XI (San Diego). He remained with District XI until 1943 and served in several departments. Then he joined the U.S. Navy Seabees. At the time of his separation in late 1945, Sinclair was a lieutenant commander and the executive officer of the 126th U.S. Navy Construction Battalion.

Upon his return to civilian life, he resumed duties at District XI. In 1952 he was appointed assistant district engineer—design, for District VII (Los

Angeles) and two years later was promoted to Principal Highway Engineer in District IV (San Francisco), first in charge of operations and later planning. In May 1959, upon the retirement of the late B. W. Booker, Sinclair was placed in charge of District IV as an assistant state highway engineer.

In this capacity, he bore the primary responsibility for all aspects of state highway planning, design, construction and maintenance in nine counties of the San Francisco Bay area. In recognition of the increased complexity and magnitude of the highway program in District IV, in April 1964 he was promoted to the civil service classification of metropolitan district engineer.

Sinclair was a fellow member of the American Society of Civil Engineers. He was a member of the Commonwealth Club of San Francisco, and at the time of his death was serving as director of the state employees division of the United Bay Area Crusade.

He is survived by his wife, Elizabeth, and a son, Michael. Mrs. Sinclair lives in San Carlos.

Two newspaper editorials appearing shortly after his death paid tribute to Sinclair's public services.

The San Francisco *Examiner* said:

"Mr. Sinclair had the difficult and often thankless task of directing the Bay area's freeway construction program. To that task he brought professional skill, integrity, and a high sense of dedication. An even-tempered and kindly man, he bore patiently the unjustified abuse too often heaped upon him by the thoughtless. We mourn the passing of a good friend and a good man."

The Redwood City *Tribune*, on the same day, commented:

"He proved himself as an able administrator and a competent engineer. He knew this area's highway problems and what should be done to alleviate them. His loss will be felt heavily in highway construction."

## Paul Cowgill Retires; Has 31 Years Service

Paul Cowgill, district accounting officer in District IV, retired May 1, 1964, following more than 31 years of state service, all with the California Division of Highways.

Born in St. Louis, Missouri, Cowgill lived for a short time in Chicago, where he graduated from Austin High School. He completed his formal education at Georgetown University in Washington, D.C., where he studied for the foreign service, receiving a B.S. degree in 1924.

Prior to coming west, Cowgill was employed as an internal revenue agent in Washington, D.C., and New Orleans, and later as a cost accountant and auditor in Florida. For several years after his arrival in California in 1927 he worked for several private firms as an accountant and later as a tax collector with the County of Alameda.



PAUL COWGILL

Cowgill's first employment with the State of California was with District IV of the Division of Highways in its San Jose Maintenance Office. He served in that office as a timekeeper-clerk from 1933 until 1935, when he transferred to the Napa Maintenance Office. In 1937 he was promoted to supervising account clerk and transferred to Headquarters Shop in Sacramento. In 1943 he became chief clerk in the Bridge Department at Headquarters Office.

He returned to the San Francisco Bay area in 1946 as chief clerk of the District IV office.

Cowgill is an active member of the California State Employees' Association and has served that organization as regional director, director of law and legislation, secretary-treasurer and state president in 1944. Cowgill's primary interests have been in the retirement field and many benefits being enjoyed or which have been introduced for state employees are the results of his labors.

## District Engineer Title Now Standard

Whether he heads the State's largest highway district, including Los Angeles County, or its smallest, with headquarters in Bishop, his official title is *district engineer*.

State Highway Engineer J. C. Womack moved to end some confusion which has arisen in recent months over a variety of designations by which the men who are in charge of the State's 11 highway districts are known.

For some time, Womack explained, there have been titles other than district engineer applied to the heads of the larger districts, depending on the size of the district's program and responsibilities.

To complicate the situation further, the two metropolitan districts, with headquarters in San Francisco and Los Angeles, have chief assistants to the district head who have been themselves officially known as "district engineers." This is because their civil service classification—principal highway engineer—is the same as the men in charge of seven other highway districts, who have always been referred to by the working title of district engineer.

From now on, Womack ordered, there will be only one district engineer in each district—regardless of civil service classification of the district's head. In the Los Angeles and San Francisco Districts, the former "district engineers" serving under the chief of those districts will now sign their official correspondence as "deputy district engineer," a new designation.

"The hodgepodge of titles was confusing to the public and called for

He is a member and past master of California Lodge No. 1, Free and Accepted Masons. Other affiliations include the National Conference of Public Employee Retirement Systems and the Quarter Century Club of the State of California.

Cowgill and his wife, Ida, a hearing reporter with the Department of Industrial Relations, live in Millbrae.

## IN MEMORIAM

### District III

Harold Shilder, Engineering Aid II

### District V

Harlan F. Perdeu, Senior Highway Engineer

### District VII

Regina M. Begg, Intermediate Stenographer

### District X

Earl M. Bailey, Ferry Operator I

### Director's Office

Frances O. Mitchell, Senior File Clerk

clarification," Womack said. "We hope this change will simplify matters."

There are no changes in level of authority or responsibility involved, he pointed out—only the working titles in the case of four of the districts.

Here is the roster of district engineers and their deputies, under the redesignation of working titles:

District I (Eureka) .....	Sam Helwer
District II (Redding) .....	H. S. Miles
District III (Marysville) .....	Alan S. Hart
District IV (San Francisco).....	J. P. Sinclair
Deputy District Engineers—	Haig Ayanian, C. F. Greene, R. A. Hayler
District V (San Luis Obispo).....	R. J. Datel
District VI (Fresno).....	W. L. Welch
District VII (Los Angeles).....	E. T. Telford
Deputy District Engineers—	A. L. Himelhoch, A. C. Birnie, A. W. Hoy, R. E. Deffebach
District VIII (San Bernardino).....	C. V. Kane
District IX (Bishop).....	C. A. Shervington
District X (Stockton) .....	J. G. Meyer
District XI (San Diego) .....	J. Dekema

## INTERSTATE 5 PROJECT

The State Department of Public Works has awarded a \$7,135,780.90 contract for constructing 16 miles of Interstate 5 freeway in the Corning-Bed Bluff area (Tehama County) between Corning Road and Kimball Road (four lanes from Corning Road to the future interchange with Route 99 at Rawson Avenue, and six lanes from there north to Kimball Road), about a mile west of the existing US 99W.



# The Highway Motto

Or, First-year  
Latin Revisited

From time to time the question of how to translate the Latin motto on the Division of Highways seal seems destined to pop up for consideration. The current staff of editors, unwilling to endure the stigma of less intellectual pretensions than any previous crop, feel that we must face the issue head on and take a crack at it, too. (For latest previous attempt see page 55 of the January-February 1956 issue of *California Highways and Public Works*.)

In fact, we would like to go a bit farther. We would like to make our writeup what is known among scholars as definitive—or, in plain language, to wrap the matter up in gold foil and tie it with pink ribbon.

Now, as any reader can see from the accompanying cut, the inscription reads *Robur Directum Scientia Est Via Fortunae*, or, if you would prefer a more authentic-looking version, "ROBUR DIRECTVM SCIENTIA EST VIA FORTVNAE." (Romans didn't seem the least bit concerned about distinguishing a "U" from a "V.")

If luck were with us, this motto, as many mottos are, would have been lifted from Virgil or Horace or some other classical author and our worries would be over. All we would have to do would be to consult translations of these works by an eminent Latin scholar or two to find out what it means. However, a check of Latin concordances and dictionaries in the State Library failed to turn up any such classical phrase.

This leaves us with the likely assumption that it is a product of the mind of the man who designed the seal, Edward M. Muse, a former artist and delineator with the division who died some 20 years ago. Incidentally, Mr. Muse also designed the seals for the Department of Public Works, the Department of Motor Vehicles, the California Highway Patrol, the Division of Forestry, the California Toll

Bridge Authority, the California State Water Authority and the California State Employees' Association.

What we are probably trying to do, then, is to translate a Latin phrase back into English which is itself an earlier translation from the original English into Latin. Let's go ahead, anyway, and see what we come up with.

The first two words don't seem to afford much difficulty. *Robur* means "strength" and *directum* means "directed" or "guided." With *scientia*,



however, ambiguity rears its ugly head. (Or is it heads? Or horns? Or are we thinking of a dilemma?) Anyway, to continue, the classic meaning of *scientia* is "knowledge," or in this instance "by knowledge," being that it's in the ablative (Wow!) case. But with the rise of scientific research and method during the 16th and 17th centuries *scientia* acquired a second meaning, in scholastic Latin, of "science." In fact, as you can see from the closeness in spelling, it is the basis for our own English word.

This offers us two translation possibilities, then: "by knowledge" or "by science."

The next two words don't afford much of a problem. *Est* is "is" and *via* is "road" or "way," or here rather "the road" or "the way." (Romans

didn't clutter up their language with articles.)

Now comes *fortunae*, the genitive (or perhaps dative?) form of *fortuna*, which raises another translation problem.

Basically, *fortuna* was a sort of neutral word meaning "chance" or "fate" or "lot." Thus, an ancient Latin speaker could experience either *fortuna secunda* (good fortune) or *fortuna adversa* (bad fortune). Here we have only "fortune," standing stark and unbiased, waiting to go either way.

We think, however, that it is reasonable to assume that the seal designer, Edward Muse, meant to wish the division well. We can also cite an example from a classic Latin author where the unmodified word *fortuna* is used in a favorable sense, namely in the works of Cicero, and if this current group of editors has one basic tenet it is this: When it comes to Latin prose, what's good enough for Cicero is good enough for us!

The use of *fortuna* (fortune) in Latin seems to have a lot in common with our use of the word "luck."

There are times when we speak of "good luck" and "bad luck," using "luck" as a neutral word which must be modified with an adjective to show what kind we mean. Then we turn right around and wish somebody "lots of luck," obviously meaning to wish him well.

The word "fortune" in English has gone pretty much the same way. We might wish that someone would experience good fortune, but if it turned out that he did we would refer to him merely as "fortunate."

We conclude, then, by offering the following translation of the motto: "Strength Guided by Knowledge Is the Way to Fortune." That is, if you are a classicist at heart. If you're a modernist you'll probably want to change "knowledge" to "science."

—S.M.

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SAM HELWER . . . District Engineer

#### District II, Redding

H. S. MILES . . . District Engineer

#### District III, Marysville

ALAN S. HART . . . District Engineer

#### District IV, San Francisco

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R. A. HAYLER . . . Deputy District Engineer  
HAIG AYANIAN . . . Deputy District Engineer  
C. F. GREENE . . . Deputy District Engineer

#### District V, San Luis Obispo

R. J. DATEL . . . District Engineer

#### District VI, Fresno

W. L. WELCH . . . District Engineer

#### District VII, Los Angeles

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A. L. HIMELHOCH . . . Deputy District Engineer  
A. C. BIRNIE . . . Deputy District Engineer  
A. W. HOY . . . Deputy District Engineer  
R. E. DEFFEBACH . . . Deputy District Engineer

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State Sign Route 16 as it looks today. The present highway was realigned several hundred feet to the north of the original route in 1949, eliminating the curves, and reducing the steep grade by cutting through the hill in the background. Note that this hill is visible to the right in the older photographs.

## PLYMOUTH ROAD; SLOUGHHOUSE; SIGN ROUTE 16.

These photos of the "Plymouth Road" via Sloughhouse in its various stages of development were sent in to the editor by W. F. Darden, 324 32d Street, Sacramento, Associate Construction Inspector, Sacramento County Highway Department. Mr. Darden also included full captions for his pictures, and we are indebted to him for allowing us to give our readers this insight into the history of one small piece of road in our big system. We welcome old highway photos for our growing historical files, although we can publish only a few.



ABOVE: This was the road that was. This view of the Plymouth Road, now State Sign Route 16, was taken two-tenths of a mile west of Sloughhouse, and 16 miles east of the city limits of the City of Sacramento. The view is westerly. If the view of the road and the auto proves to us that times have changed, it also casts doubt on the old saying that "what was good enough for Grandpa is good enough for us."



ABOVE: Same view taken three years later. The roadbed was graded and a portland cement concrete slab 15 feet wide and 6 inches thick was installed. This pavement remained in use for 30 years. In 1949 when Highway 16 was realigned, this section was abandoned but not obliterated. Today a portion serves as an access road to the famous old landmark, Sloughhouse. BELOW: Easter Sunday, 1964, 45 years after the pavement was placed. The group in the background is enjoying an old fashioned Easter egg hunt.



