The complaints about the problem of getting through Sacramento are rapidly becoming a thing of the past, as the city's freeway system comes on apace. Construction on Interstate 80 is seen in lower portion of high altitude photo above, and its junction with US 50 at lower right. Here Interstate 80 turns north, and US 50 turns east. Here at left center, Interstate 5 will come down left-hand side of photo, along edge of downtown section. River across center is the American; larger one looping into lower left of photo is the Sacramento. Nine highway and railroad bridges can be seen, including the new Interstate 80 Pioneer Memorial Bridge at lower left. Two additional highway bridges are under construction, including Interstate 5 crossing Sacramento. Image copyright to the Sacramento Bee. Printed with permission.
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BYLINES

The yearly index is no longer printed as part of the magazine but on separate pages punched so that they can be inserted into a three-ring binder. Readers who want copies of the index covering the issues for 1966 should send their requests to the editor.
BY MRS. VALLEY KNUDSEN, PRESIDENT
LOS ANGELES BEAUTIFUL

Our landscaped freeways of today are forerunners of green belts through our cities of tomorrow—and they may be virtually the only ones we have. Thanks to our progressive California Highway Commission much of our freeway system is newly planted, and in a few years we will enjoy some of the most beautiful roadways in the country.

"Beauty is good business," as Los Angeles Beautiful has consistently maintained for the past 17 years. This is particularly applicable to our park-like freeways. Whether our visitors drive down concrete canyons or through avenues of flowering ground cover and blossoming trees and shrubs, the motorist prefers to travel highways that are surrounded by nature's beauty. To us who live here, the freeways are more than just an efficient way to get from one place to another. They are not only the fastest, safest route of travel but they are also the most enjoyable because of the beautifully landscaped surroundings.

Our freeways are more than just an efficient way to get from one place to another. They are not only the fastest, safest route of travel but they are also the most enjoyable because of the beautifully landscaped surroundings. 

Our sensitivity to beauty can be dulled unless we jealously guard our policy of landscaping freeways. We believe the motoring public prefers to travel highways that are surrounded by ivy, shrubs, flowers, trees and a variety of plants, rather than to be visually trapped by barren embankments, garish billboards and unsightly junkyards.

LOS ANGELES BEAUTIFUL
BY MRS. VALLEY KNUDSEN, PRESIDENT

BELOW: This recently completed landscaping near the approach to the Vincent Thomas Bridge in San Pedro features broad expanses of yellow hymenocyclus and white pelargonium against a backdrop of myoporum, phormium and pines.

To us who live here, work here, the beauty of our freeways is an integral part of our lives. We strive to maintain these beautiful roadways as areas of beauty for everyone. Our concern is not just for the present but for the future as well. We want to ensure that our freeways will be enjoyed by future generations as they are enjoyed by us today.
A view of the Harbor Freeway in downtown Los Angeles, which was planted in the mid-1950's. Ivy used as ground cover sets off the Mexican fan palms.
ABOVE: A section of the Harbor Freeway-Santa Monica Freeway Interchange in downtown Los Angeles, planted in 1962. An unusually high cut created a condition of dense shade on the south side. Ivy was used as ground cover. Shrubs and trees included eucalyptus, tipuana, oleander, and callistemon.

BELOW: The four-level structure in Los Angeles' landscaped in the early 1950's is probably the first multilevel freeway interchange to receive such treatment. The mixed shrubs included leptospermum, phyllophorum, and sycomores, with philinus added later.
ABOVE: Landscaping on the Glendale-Golden State Freeway interchange features a ground cover of mesembryanthemum edule and eucalyptus trees. Mixed shrubs included acacia melaleuca, pittosporum and callistemon.

BELOW: A landscaped section along the Hollywood Freeway near Glendale Boulevard. It stresses a simple but effective use of lawn and liquidambar trees.
Traffic separation at airports eliminates congestion. By Marcia J. Mickelsen

During the latter half of 1966, 31.5 miles were added to the District 7 freeway network. In the three counties of Los Angeles, Orange, and Ventura this makes a total of 526 freeway and expressway miles at year's end, or roughly one-third of the mileage called for by the master plan adopted in 1959.

The most important accomplishment was the simultaneous opening of 10.6 miles of the San Gabriel River Freeway (Interstate 605) on July 1. The work involved four individual contracts and the expenditure of $24,610,000, and brought to completion the San Gabriel River Freeway between the Santa Ana Freeway in Norwalk and the San Diego Freeway (Interstate 405) in and near Los Angeles and Long Beach. With the opening of this lengthy section it is possible for the motorist to travel for 22 miles on an eastern bypass of the Los Angeles Metropolitan area from the San Bernardino Freeway (Interstate 10) on the north to the San Diego Freeway on the south. A host of communities—Rossmoor to Santa Fe Springs—now are able to make unhindered connections with three major Interstate Routes-405, 5 and 10. Also, travel from the Long Beach area to the northeast part of Los Angeles County, and expressway mileage of years and routes of Los Angeles County and Ventura Freeway Network is possible for the first time.

Aside from freeway construction, and the expenditure of $22,000,000, the work involved four individual contracts and the expenditure of $23,610,000. The work involved four individual contracts and the expenditure of $23,610,000.

Eventually, noninterstate extensions will provide continuous travel for 30 miles from the Foothill Freeway (Interstate 210) on the north via Route 243 to the Pacific Ocean on the south via Route 240. Eventually, noninterstate extensions will provide continuous travel for 30 miles from the Foothill Freeway (Interstate 210) on the north via Route 243 to the Pacific Ocean on the south via Route 240.

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Eventually, noninterstate extensions will provide continuous travel for 30 miles from the Foothill Freeway (Interstate 210) on the north via Route 243 to the Pacific Ocean on the south via Route 240.
especially in terms of air-ground destination travel, was the summertime completion of a traffic separation project at Century and Sepulveda Boulevards near the passenger entrance to International Airport. A joint project of the City of Los Angeles and the state, this improvement cost about $1 million.

On the Ridge Route the task of converting this important highway to interstate standards continued, with the completion in September of the second of 12 projects planned to provide 45 miles of eight-lane freeway through the mountains between the Los Angeles city limits and the Kern County line. Cost of the 12 Los Angeles County projects will total $86 millions. The September opening added nearly four miles of freeway, including three bridges, to Interstate 5 along the top of the ridge from near Gorman to Cuddy Creek in Kern County, at a cost of $5.9 millions.

An extension of the Hollywood Freeway, a two-mile section from Magnolia Boulevard to Victory Boulevard in North Hollywood, was completed in September. Known numerically as Route 170, the Hollywood Freeway extension provides access to and from the San Fernando Valley, midway between Interstate Routes 405 and 5. The $5.9 million contract for this job was carried out in time for the section to be dedicated as a major feature of National Highway Week.

Early in October, a six-mile extension of the Antelope Valley Freeway (Route 14) between the Angeles Forest Highway at Vincent and Avenue P-8 in Palmdale was opened to traffic. This construction, performed at a cost of $5.4 million, completes 28 continuous miles of four- and six-lane
freeway for the motorist in the Antelope Valley region, from a point near Solimar to the north county line of Pala. Included in this work was a Route 14/Route 138 separation structure and a bridge to span the California Aqueduct. Since that, work has been started on a nine-mile segment of a 10.6-mile stretch of the San Gabriel River freeway following dedication July 1st. Below: The Santa Monica Freeway (Interstate 10) now open all the way to its junction with Route 1 at the coast, is carrying its share of traffic load.

In Orange County, six miles of the San Diego Freeway (Interstate 405) were dedicated on November 18. Cost of construction between Beach Boulevard and Harbor Boulevard in Costa Mesa was $10.7 million. With the opening of this section on December 8, the traveler can follow Interstate 405 continuously for more than 61 miles in two counties, bypassing the Los Angeles metropolitan area on the western side.

A project to convert the Riverside Freeway from expressway to six-lane freeway for 5.8 miles between Lemon Street in Fullerton and the Newport Freeway in Anaheim was completed in December. Cost of this project was $5.6 million.
An inspector applies film to a welded area before making a radiographic check for hidden flaws.

By Art German

Both radiography with gamma rays, and ultrasonic waves, are being used to test the many miles of steel welds inside the girders on the new San Mateo-Hayward Bridge now under construction. Only 17 inches of weld can be tested with each exposure.

E. R. Foley, Chief Engineer of Bay Toll Crossings, explained the unusual techniques in this way:

"A bridge is a major investment which must serve the public for a long time. The testing program is an important device to assure that the structure meets the required standards."

In radiography with gamma rays, radioactive isotopes are used, which require a much shorter exposure time than the cathode rays used in the more common X-rays used in the medical profession. Any imperfections in the welds are shown immediately. These may be porosity (bubbles of gas) inside the weld, slag (entrapped residue), lack of fusion with the metal, cracks, and lack of complete penetration.

Although the radiographic tests are being made at all six fabrication yards working on the bridge—Richmond, Oakland, Lockeford, Napa, Maywood, and Fontana—the major testing is at Richmond. Here the work proceeds virtually around the clock, and more than 10,000 "pictures" will be made at this one yard alone before the structure is completed.

The ultrasonic process is cheaper and faster, but the radiography yields a permanent record on film, much like a medical X-ray. Both processes are superior to visual inspection.
Gordon C. Luce, 41, of La Jolla, has been warned the new Administrator of the State Transportation Agency by Governor Ronald Reagan.

Prior to his appointment Luce was senior vice president of a savings and loan association in San Diego with which he had been associated for 12 years.

A specialist in business management and administration, Luce holds bachelor and master of arts degrees from Stanford University and is a graduate of the Indiana University School of Savings and Loan.

He served in the U.S. Infantry in Europe and the occupation of Japan from 1946 to 1948. He was awarded a Bronze Star.

Luce, a native San Diegan, is past president of the San Diego Downtown Association and the University Club of San Diego, and a member of the American Savings and Loan Institute. He is presently a director of the San Diego Symphony Association.

He and his wife, Karen, have two sons and a daughter.

Jennings was appointed to fill the unexpired term of the late James A. Guthrie, who died last August.

The first of recent new appointments to the California Highway Commission is Fred C. Jennings, 58, of Riverside. The appointment of a real estate firm in Riverside since 1958 and for 12 years before that was

Jennings has been president of a real estate firm in Riverside since 1958 and for 12 years before that was

He is a member of the board of directors of the

Jennings was appointed to replace the late James A. Guthrie, a Democrat appointed to represent the 56th Assembly District in the California Highway Commission in 1978.

The first of recent new appointments to the California Highway Commission is Fred C. Jennings.
THREE OTHER NEW MEMBERS

Another recent appointee to the California Highway Commission is Moon Lim Lee, 63, a businessman who long has been active in civic and highway association affairs in Weaverville, Trinity County. He replaces Roger Woolley of Rancho Santa Fe.

Lee operated a grocery business in Weaverville from 1922 to 1948 and since 1949 has been owner of an appliance firm.

He attended school in his native Trinity County and has been active in civic affairs in that area including the Weaverville Chamber of Commerce. He is a director of the Highway 299 Association, the Trinity County Recreation Park and Parkway District and the Weaverville Sanitary District.

Lee is past president of the Trinity County Historical Society, a member of the Chinese Historical Society of America and serves on the Advisory Committee of the California National Highway Week Committee.

Lee is married and has one daughter.

Appointed to the Highway Commission at the same time as Lee, was Vernon J. Cristina, 51, of San Jose, head of a warehouse company and active for many years in the transportation field. He succeeds Joseph Houghteling of Atherton.

From 1937 to 1948 he operated and managed orchard properties and a general store in San Benito County.

Cristina attended San Jose High School and graduated from the University of Santa Clara with a major in political science.

He has been active in numerous civic activities. He is past president of both the Santa Clara County Transportation Club and the Santa Clara County Truck Owners Association. He is also a member of the Board of Governors of the California Truck Owners Association.

Cristina is married and has three sons.
STORM HAVOC

Photos clockwise from top: (1) Widespread clogged culvert damage is typical of such storms. Pipe becomes clogged by debris and water rushes across road, washing out road. (2) Although water rose over deck, this bridge over Tule River on Route 190 east of Porterville did not fail. (3) Crane removing debris backed up against Clear Creek Bridge, Route 178, Kern County. (4) Typical damage to bridge understructure. (5) Destroyed section of Route 190 in Kings River Canyon, near national park boundary. Engineers used motorbike to travel road to assess damage, mule hauling it over washed-out places.

Record flood—5,000 acre-feet per hour—80,000 second-feet—peaking at 100,000 second-feet—these and other terms filled the San Joaquin Valley newspapers during the first week in December. They were used to try to describe the torrential rains and devastating floods that occurred during that period.

To engineers, these terms are meaningful for use in formulas for determining sizes of dams, reservoirs, channels and bridges to handle quantities of water. To the layman who has never seen water in those quantities—even to those who have had the absolutely helpless feeling of being exposed to floods—it is very nearly impossible to relate these figures to known quantities.
An acre-foot of water, the common unit of measure of water in a lake or reservoir, is the volume of water contained in an area of one acre one foot deep. Thus, when the water in the Success Reservoir in Tulare County was rising at the rate of 5,000 acre-feet per hour, one can think of a column of water covering an acre of ground and about a mile high being dumped into the reservoir every hour.

A flow of 80,000 second-feet means that 80,000 cubic feet, or about 600,000 gallons, of water passes a given point every second. The Kern River flowed at that rate above the Isabella Reservoir during the height of the storm. At this rate of flow, it would take a minute and a half to supply the 54 million gallons required daily by the City of Fresno.

The Counties of Tulare and Kern were hardest hit of the five counties making up District 6. Fresno and Kings Counties suffered more moderate damage, while Madera County experienced very little trouble.

**Kern County**

State Routes 178 and 155 were hit by flooding which caused rock slides and mud slides, washed out sections of roadway and severely damaged the Clear Creek Bridge. Pilings have been shored up as a temporary measure. Mud flows, a foot or more in depth, were troublesome for maintenance forces trying to clear the roads. However, they eased the removal of large boulders which almost floated in the mud.

State highways in Kern County suffered relatively minor damage. Preliminary cost estimates of repairs total about $83,000.

County roads were harder hit, with early estimates of over two million dollars for repairs and restoration of roads and bridges. Property damage estimates are in the area of four million dollars and expected to rise.

Three bridges were completely wiped out by the raging waters, including the bridge at Kernville which linked the two parts of town. A Bailey bridge—the type that was used so successfully after the 1964 floods in the northern part of the state—was installed as a temporary replacement for this vital structure. Among the county roads that had sections completely washed out was the important Kernville-Johnsondale Road. Kernville was completely isolated for several days, without telephones, electricity and drinking water except for that which was brought in.

**Tulare County**

State Route 190 lost a 40-year-old bridge just east of Springville, at the north fork of the Tule River. At Boul-der Creek, a complete washout was repaired about three weeks later with a temporary road.

The Kaweah River, flowing a mile wide and 15 feet deeper than normal for this time of year, chewed away at the town of Three Rivers, knocked out bridges and washed out sections of roadway. The section just above the junction with the Mineral King road will be restricted to one-way traffic for three or four months.

The raging Tule River poured so much water so fast into Success Reservoir that it went over the spillway and raced on downstream into the valley. For a time, it was feared that Route 99 might have to be closed at the Tule River Bridge between Tipton and Tulare. Water was bubbling up through the weep holes in the bridge deck, and, with the high-water mark about six inches below the surface of the deck, pressure was building up against the side of the structure. Fortunately, the flow subsided in time.

Early estimates place state highway damage in Tulare County at $337,000.

Again, it was the county road system and property that suffered most. Preliminary estimates place road damage at about 2½ million dollars and property damage at nearly 10 million dollars.
The county lost 13 bridges and damage to and loss of miles and miles of roads. Johnsondale suffered isolation for days, and, with the drinking water supply limited to that which could be brought in from the outside and sanitation facilities destroyed, there was fear of epidemics. County health officials were flown in and the threat curtailed. Springville, and as noted earlier, Three Rivers were the other communities hit hardest in Tulare County.

The town of Woodlake was almost isolated when State Routes 216 east and 69 were closed. Route 216 west was kept open under control. The town of Exeter was threatened when Yokohl Creek broke over its banks, flooding the nearby orchards. No one could remember this happening before.

Major damage to state highways in Kern and Fresno Counties was concentrated on Route 190 through the Sequoia National Forest area. The bridge at Ten Mile Creek west of General Grant Grove was damaged so severely that the 35-year-old structure will probably be replaced. The Kings River preempted the highway alignment in this area and will have to be brought back into its normal channel. Four clamshells were kept busy during the storm at various locations clearing debris away from bridges.

Estimates of cost of restoring this route range to $550,000, depending on the amount of bank protection work required on the river banks.

In the valley west of Route 99, Route 198 west of Coalinga was closed for two days because of mud and rocks on the highway. Route 43 in Tulare County was closed for about a week when the Tule River spilled over its banks; Routes 33 and 41 were blocked by mud flows for a couple of days near Kettleman City. A rancher, a veteran of 70 years in this area, said this was the heaviest rainfall he had ever seen there. Route 178 along Kern River west of Bodfish shows failure, rock slide, water and debris on pavement all problems for the many travelers.
The City of Ontario wants the California Highway Commission to hurry and build the De-
vote Freeway. The City Council urges haste on Devon Freeway improvements on US50.

Drivers will have long waits for improvements on US50.

The City of Ontario is in line to pay $1 million for last fiscal year's work on
Ontario Freeway.

The City's Freeway Committee wants to hurry up and build the Devon Freeway.

Bill Martin, the City's senior highways engineer, says the delays in building the Devon Freeway will mean higher costs for the City in the future.

By Martin Saldiver

The City of Ontario's Devon Freeway project is lagging behind schedule, which could mean higher costs for the City in the long run.

The Devon Freeway project, which was supposed to be completed in 2020, is now expected to be completed in 2025 due to delays in the construction process.

The City of Ontario is considering options to speed up the construction process and reduce the costs associated with the delays.
Although the overall situation changes, some traffic patterns remain constant. These two photos of the same location on the Pacific Coast Highway, near Santa Monica, were taken 36 years apart. During that period, the conventional two-lane highway was renovated by the addition of more lanes and today’s traffic flows smoothly but the thoroughfare still is inadequate. A freeway is needed now and this increases each year. The various alternate plans under consideration for freeway construction will all require the expenditure of several million dollars per mile.
During the 1966 Christmas week-end, the people in California traveled more than 662,000,000 miles on California's total road network. Approximately 10,000,000 vehicles were in operation and they traveled upon 2,700 miles of multilane freeways or expressways, 11,500 miles of conventional state highways and 150,000 miles of county roads and city streets.

The system of vehicle-miles there will be using some will lose their lives because of increased congestion and traffic hazards. In a loss of time and money to California in the next 12 months, it will result in the maintenance of roads, buses and trains, the number of licenses, taxes and other fees.

The number driven and the number of vehicles that will travel in California next Christmas will be even more impressive than the number driven and the number of vehicles that traveled in California during the 1966 Christmas week-end. The 770 miles of freeways at times over 100,000 vehicles a day have been increased by a storm. The situation varied on reaching the saturation point when the number of vehicles increased by a storm.

The situation varies with the number of vehicles, the number of people, the number of vehicles, the number of roads and the number of vehicles. From the total road network, approximately 662,000,000 miles are used on California roads, and the people in California traveled more than 662,000,000 miles on California roads.
The continuing phenomenal growth of California's population, quadrupled since the 1930's, with an even faster rate of growth in numbers of automobiles, is creating problems on urban and interurban highways, as well as on city streets. Compounding the problems is the arrival in the state every day of several thousand new automobiles.
need of modernization of our mountain and recreation highways. In the state are in badly in need of modernization and recreation highways. In the state are in badly need of modernization and recreation highways. In the state are in badly need of modernization and recreation highways.

The network highway system is not modern. In need of the local communities. To that end, traffic and traffic service the needs of the local communities. To that end, traffic and traffic service the needs of the local communities.

Along the popular route, from San Francisco to Los Angeles, the highway is in need of modernization and recreation highways.
HE IS ALMOST TOTALLY DEPENDENT ON IT

Granted, Californians drive more miles during a holiday weekend than at any other time, but, nevertheless, its economy is almost totally dependent upon rubber-tired vehicles so far as the transportation of people and goods are concerned.

A deep and lasting affinity has existed between the average California citizen and the automobile for many years. He seems to demand the independent mobility—the ability to go where he wants at his pleasure—that driving his own car provides, and he is more than willing to pay for it. He refuses to live in an environment that groups his home, place of work and shopping facilities all within easy walking distance of each other. He turns away from the use of mass transportation as a means of getting to work and even is reluctant to join in a car pool with fellow workers. He prefers to own at least two automobiles and for good reason. While he has one at work, the other is used by the rest of the family to transport the children to school and to permit his wife easy access to the thousand and one advantages and services that exist within the community—if she has convenient access to them.
With new exceptions, California's population and growth in large part depend on the automobile. In 1985, 96,100,000,000 vehicle-miles were driven in California, which is approximately 11 percent of the national total. In 1965, 9,900,000 motor vehicles were registered in California, which corresponds to about 11 percent of the national total. In 1985, the estimated number of motor vehicles registered in California will be approximately 20,000,000. These figures indicate the increasing importance of the automobile in California's transportation system.
WITH MANY AUTOMOBILES

VEHICLE REGISTRATION

VEHICLE MILES TRAVELED
Highway Needs Are Immense

A part of the study noted that, with the exception of walking, driving for pleasure is by far the most popular form of California outdoor recreation. The vehicle transportation needs of California have been and are continuing to be carefully evaluated under a comprehensive planning process.

The State Legislature has established the California freeway system, which is a master plan of development for meeting transportation needs over the major State highway routes. The plan established in 1959 is designed to serve and promote both the present and future economy of the state and the welfare of the people. The now partially completed system will eventually consist of 12,500 miles of controlled-access highways and is intended to connect and serve major areas of population, provide appropriate access to the various regions of the state and facilitate the enjoyment of the state's many scenic and recreational facilities.

Because of the many needs and the ever-present funding limitations in the total highway program, most careful evaluation is given to the type of development to be afforded each route and the priority or importance of the particular project. Where traffic volumes and other factors warrant, freeway facilities are provided because they have clearly been shown to be the safest and most effective form of roadway facility. In many other situations, conventional highways are reconstructed or partial access control highways are provided.

Through careful coordination with local officials and a system of meetings and discussions with interested groups throughout the state, all construction needs and priorities are systematically examined. An extensive spot improvement program is carried out in situations where financing is not available for total reconstruction.

The federal aid secondary and urban extension programs further assist in the vast job of providing an adequate local road system to meet ever increasing needs.
Although the Greater Los Angeles freeway system is still incomplete, it is gradually cutting down travel times in the area. Note how each freeway now in service greatly extends the distance a driver can travel in a set period of time, versus the distance he can travel in the same time on conventional highways and city streets.

Comprehensive urban transportation studies are now underway or definitely planned for the state's 13 major urban areas (50,000 population or more). These studies are being carried out under the provisions of the Federal Aid Highway Act of 1962 and will provide a continuing evaluation of overall transportation needs and will develop guidelines as to means of fulfilling these needs. These comprehensive studies take into consideration all facets of community and transportation planning and because of the high degree of local participation, will be of great assistance in the development of feasible, practical solutions.

The Los Angeles freeway system, although only partially completed, is at the present time the largest and most effective rapid transit system ever devised. The San Diego Freeway, which is only a 50-mile segment of the system, carries over three-quarter million people on an average day. The Harbor, Santa Ana, and Golden State Freeways within the metropolitan area each carry well over half a million persons. Other segments also carry high volumes.

The system too has the dual role of providing the means of transporting the predominance of freight originating or terminating in the vast Los Angeles metropolitan area. An analysis made in 1962 showed that the San Bernardino Freeway, for example, carried an average of 110,000 tons per day, or the equivalent of over 1,800 box cars or 11 Liberty ships. The Santa Ana, Hollywood and Harbor Freeways were also high-volume carriers. On an overall basis the Los Angeles system volume is now estimated at 3,300,000,000 ton-miles per year.

The need for additional freeway miles is increasingly important. Social scientists declare that by 1985 there will be a single urban area extending from north of Los Angeles past San Diego and on to the Mexican border. The people who will reside there probably will be like the ones who live there today—members of an automobile-oriented society who depend mainly on rubber-tired vehicles.

While the southern California area provides the most striking illustration of urban growth and consequent needs, this same general theme of growth and needs is true for the many other urban areas of the state.
TO SOLVE MANY PROBLEMS

1975-1985 NEEDS

1967 REVENUE

$13.35

$9.65

$23,000,000,000

000
Some of the Problems...

An older freeway section in Los Angeles now carrying more than 150,000 vehicles daily.

A major federal aid road. The California section has been closed to traffic with trucks, motorcycles, and bicycles.

Many Californians today have vacation or retirement homes in the desert, the mountains, and along the seacoast. Trip travel between urban areas and these new developments is heavy, particularly on weekends and in season. Shown is a typical such development which offers 3,500 building lots, but is 23 miles from the nearest state highway. It is currently serviced by a substandard county road.
Traffic problems, which the state now has more than a quarter million, present particular difficulties
in achieving in-state and national parks and forests, skiing and boating. Fortunately, with the rest of
the nation, traffic problems are decreasing because of increased national and international traffic.
Traffic problems are further complicated from the added burden of increased state and national
park use. The Federal Highway Administration is attempting to relieve some of the burden by
allocating additional funds to the states for highway construction. The federal government has
assumed a larger role in highway construction, but the states are still responsible for their own
highways. The California Highway Patrol has been assigned to coordinate the work done throughout the
state. The patrol is responsible for enforcing traffic laws and maintaining order on the highways.

Traffic problems are also increasing in California due to the growth of the state's population. The
population of California has increased dramatically over the past few decades, and this growth is
expected to continue. The increased population has led to increased traffic, and the state is
struggling to keep up with the demand for improved highways.

Efforts to improve the state's highways have been made, but there is still much work to be done.
The state has received some federal funding to help with this, but more money is needed. The
state legislature and local governments are working together to address the traffic problems,
but progress has been slow. The state's highways are in need of significant improvements, and
the state is working to prioritize these improvements.

In conclusion, traffic problems are a significant issue in California, and the state is working to
address them. However, more work needs to be done, and funding is still needed to make the
necessary improvements.
California Highway Facts

**MILEAGE–ROADS, STREETS, HIGHWAYS**

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**MOTOR VEHICLE REGISTRATION (ALL VEHICLES)**

1966—California—10.9 million—Rank, first (Percent of nation—approximately 11%)
1985—(Estimated) California—20.0 million

**MOTOR VEHICLE TRAVEL—VEHICLE-MILES**

1965—California—96,100,000,000 vehicle-miles
Rural—36,100,000,000
Urban—60,000,000,000 (Percent of nation—approximately 11%)
1985—(Estimated) California—199,000,000,000 vehicle-miles
Rural—60,400,000,000
Urban—138,600,000,000

Of the 1985 total, 86 billion vehicle-miles will be traveled on state highways annually. Of this, 37.9 billion will be on the Interstate system alone.

**TOTAL NEEDS ALL HIGHWAYS, ROADS AND STREETS—$23 BILLION**

Rural—$9.65 billion
Urban—$13.35 billion

**POPULATION**

1966—California—19.3 million—Rank, first (Percent of nation—approximately 10%)
1985—(Estimated) California—32.6 million

Eighty-eight percent of the population of California lives in urban areas. In 1985 it is estimated that 29 million people or 89 percent will live in urban areas.

**MILEAGE—FEDERAL AID SYSTEMS**

Interstate highway system .......................................................... 2,165 miles authorized
Completed .......................................................... 1,087 miles
Under construction or budgeted ................................................. 579 miles
Total .......................................................... 1,666 miles
Other federal-aid primary .......................................................... 7,623 miles authorized
Federal-aid secondary .......................................................... 12,667 miles
(State, 3,554 miles; local, 9,113 miles)

**PROGRESS ON CALIFORNIA FREEWAYS AND EXPRESSWAYS**

Completed multiline divided state highway
Freeway .......................................................... 2,046 miles
Expressway .......................................................... 661 miles
Freeway .......................................................... 2,707
Expressway .......................................................... 784
Multiline divided state highway under construction or budgeted
Freeway .......................................................... 720 miles
Expressway .......................................................... 64 miles
Freeway .......................................................... 784
Expressway .......................................................... 784
Total .......................................................... 3,491
The general said, "We must be able to evacuate this base in nine minutes."

This remark initiated a system of expressways for the great Vandenberg Air Force Base, located on the shores of the Pacific Ocean, north of Lompoc and southwest of Santa Maria, in Santa Barbara County.

Until recently, only two narrow, winding ribbons of asphalt passed through the old Camp Cooke area, but today's growing space center is now served by the best in modern highway facilities. With the opening of the Vandenberg Shortcut Number Two modern highway service is now completed to the space age center, where recently a new two-million-dollar contract was awarded to initiate a space probe program.

Lompoc, once a quiet nearby village of 4,000 souls, has become a thriving, growing city of 24,000, and Santa Maria has expanded until homes are springing up on pastureland miles from the city center. Most of the base's 20,000 workers travel from these two cities early in the morning and return late in the evening. The scramble at the base gate at these times resembles an exodus from a Dodger baseball game at Chavez Ravine.

An exchange of ideas from the Santa Maria Chamber of Commerce, the Bureau of Public Roads, the county road department, the VAFB engineering and personnel staff, and personnel from the District 5 engineering department cleared the way for the production of contract plans. This was a complicated project, financed by the federal government, administered by the U.S. Bureau of Public Roads, designed and constructed under the supervision of the State Division of Highways, reviewed by the staff of VAFB, and maintained by the County of Santa Barbara, but everything evolved in excellent form.
Photos left to right clockwise: (1) Where cuts were necessary, slopes were made 4 to 1 to blend into terrain. (2) Section through swamp area. Beneath surface, ground was almost all water, with material about the consistency of thin gruel to depth of 40 feet. More than 50,000 yards of sand were required to establish road foundation on this half-mile stretch. (3) Loop connection with recently realigned Route 1. (4) At this low pass, a new view spreads before the traveler's eye. (5) Across the road, believe it or not, was one of the borrow sites. Now, smoothed and graded to fit into the surrounding slopes, and seeded with ryegrass, it becomes a part of the natural landscape.

It was a challenge to design the highway. Divides, where subject to erosion, were provided on each side of the highway. Drains were provided on each side of the high passes to reduce the load on the narrow road above. Even though the driver loses a section of the divide through a section, this was more than made up by the better view to the left.

The Planning Manual had specific requirements of the environment that had to be observed during construction. Drains were provided in muddy areas, with ditches lined with tinted air-blown mortar. Distracting markers, signs and guardrails were kept to a minimum. All were placed so as not to mar the aesthetic values of the highway. Divides, where subject to erosion, were provided on each side of the highway. Drains were provided on each side of the high passes to reduce the load on the narrow road above. Even though the driver loses a section of the divide through a section, this was more than made up by the better view to the left.

In addition, in keeping with today’s requirements of environmental preservation, a “built-in” maintenance department was constructed. To give the maintenance men a chance to clean up sand that might trickle down the cut slopes, a six-foot bench at dike level to act as a catchall was provided on each side of the highway. Drains were provided on each side of the high passes to reduce the load on the narrow road above. Even though the driver loses a section of the divide through a section, this was more than made up by the better view to the left.

Today, since dedication of the new expressway on November 2, 1966, a worker from Santa Maria can leave work to 20 minutes later in the morning and still arrive on time for work. The 6.5 miles he doesn’t have to drive, plus the better entry conditions all go to make for a safer drive and a happier and more relaxed traveler.

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ing of security essential for a well-designed highway.

Construction personnel did an excellent job of putting the plans "on the ground" and then adding touches here and there to dress up the countryside so that it is now especially beautiful. Particularly, they were remarkably successful in leaving two borrow sites in a natural-looking condition.

Ground water was encountered in the largest cut. The problem was solved by the use of perforated metal pipe underdrains which still conduct a large quantity of water.

If the reader would like to see some of the finest stately oak groves of California, wildflowers of many colors and forms, and experience a truly pleasurable tour, a drive over this new highway is strongly recommended. As a bonus, it is possible that one may even see a mighty missile rise from the earth and soar grandly down the Pacific range.
The "George S. Bartlett Award," one of engineering's highest, has been awarded to J. C. Womack, State Highway Engineer and Chief of the California Division of Highways. The award is given annually to the person who has made the most outstanding contribution to highway progress.

In presentation ceremonies at the national conference of the American Association of State Highway Officials in Wichita, Kansas, on November 29, A. E. Johnson, executive secretary of AASHO cited Womack's achievements in leading California's highway and freeway program, terming it "the most advanced in the nation."

Johnson pointed to the State Highway Engineer's successful efforts to beautify America's roadways, paying particular attention to Womack's exemplary in promoting highway aesthetics.

The George S. Bartlett Award, named for the individual who first advocated paved roads in the United States, was instituted in 1931. It is presented annually to a member of the American Association of State Highway Officials, the American Road Builders' Association or the Highway Research Board.

Womack is a native of Emmett, Idaho, was educated in Seattle and attended the University of Washington. He served as a second lieutenant of field artillery in World War I. His engineering career began in Oregon and Washington in 1922 on location and construction work for the U.S. Bureau of Public Roads.

Joining the California Division of Highways in 1929, he was assigned to the Marysville office, where he served successively as Resident Engineer, the Division's first Resident Engineer and Assistant District Engineer. In 1939 he was assigned to the Planning Division of Highways, and from 1948 to 1959 he was assigned to the California Division of Highways.

In 1955, Womack was promoted to Assistant State Highway Engineer—Planning, and in October 1959 was advanced to Deputy State Highway Engineer—Engineering. In December 1959, he was appointed State Highway Engineer.

Womack is past president of both the American Association of State Highway Officials and the Western Association of State Highway Officials. He is a member of the American Public Works Association, the American Society of Civil Engineers, the American Concrete Institute, the American Society of Photogrammetry, the Commonwealth Club of San Francisco, and the Elks.

He is currently serving as chairman of the Board of Directors of the American Public Works Association and a member of the Board of Directors of the American Road Builders' Association. Womack is a member of the American Road Builders' Association and the American Association of State Highways and Transportation Officials. He is a member of the American Road Builders' Association and the American Association of State Highways and Transportation Officials. He is also a member of the American Public Works Association and the American Society of Civil Engineers.

For the past 17 years, and especially since his appointment as planning engineer in 1948, Womack has been closely identified with California's long-range highway improvement programs, with emphasis on freeway development. California now has about 2,100 miles of full freeway in operation or under construction, and its adopted routings for freeways come to more than 7,300 miles, or well over half of the state's total mileage. The California Division of Highways has about 18,000 employees, with an annual budget of almost a billion dollars.
In the Governor's Design Awards contest for 1966, the California Division of Highways won three of the four certificates given for "significant design in the field of transportation." One was for a bridge, the Cold Spring Canyon steel arch in Santa Barbara County; another was for the design of the San Diego-Santa Monica Freeway Interchange in Los Angeles; and the third was for the design of the Interstate 80 Freeway over the Sierra Nevada.

The presentations were made by the Governor on December 28 in Pasadena. Nathaniel A. Owings, chairman of the awards jury, acted as master of ceremonies. Other members of the jury were Mrs. Helen Reynolds, president, California Roadside Council; Allan Temko, Center for Planning and Development Research, University of California, Berkeley; Sam T. Hurst, dean, School of Architecture and Fine Arts, University of Southern California; Dr. Harry Ashmore, Center for the Study of Democratic Institutions; Cesar Pelli, director of design, Daniel, Mann, Johnson and Mendenhall; and Professor T. Y. Lin, Department of Civil Engineering, University of California, Berkeley.

Awards were given in the categories of urban buildings; public buildings; educational, cultural and religious buildings; industrial projects; commercial service facilities; planned community; transportation facilities; rehabilitation (of buildings or neighborhoods); conservation; social improvement; landscape; and leadership (environmental).

Attending for the Division of Highways were J. E. McMahon, state bridge engineer, representing J. C. Womack, State Highway Engineer; and Tom Lammers, representing District 7, accompanied by Prescott Reed and Marilyn Reese. District Engineer Robert J. Datel represented District 5, and H. F. Sherwood District 3. Marvin Shulman and George Hood of Headquarters Bridge Department also attended.

Photos, top to bottom: The three certificates. Split section of Interstate 80 in the Sierra Nevada. San Diego-Santa Monica Freeway Interchange, Los Angeles. Cold Spring Canyon Bridge, Santa Barbara County.
Installing a tape-switch indicator for recording speeds and time of day. More than 85,000 recordings were used in compiling data for study.

When the Legislature in April 1965, by House Resolution No. 133, directed the Division of Highways to undertake a study of the value of establishing minimum speed limits for each lane on state freeways, it seemed an interesting project, which might offer considerable benefit to California drivers.

The report on the results of the carefully documented tests at four locations in the state shows that quite the opposite result might be expected. The motorist reacts to such close regimentation, but not in the intended fashion. Where the signs indicating minimum lane speeds were posted, drivers who normally would travel at middle-range speeds in the slower lanes, apparently said to themselves, "Oh boy! I can make better time if I get over in the fast lane," and they would move over but continue to drive at the same middle-range speed. Apparently, just as everyone thinks he is a good driver, so everyone thinks it is the other guy who is holding up traffic. (Actually, traffic engineers say that almost everyone in California is a reasonably good driver, for which they are thankful, but, as also every driver knows, everyone does not like to drive at the same speed.)

Actually, when traffic reaches a certain rate of flow, the midrange drivers are reluctant to move back and forth between the outside lane and the "passing" (left) lane to keep the traffic flowing. In other words, they don't like to "keep right, pass left," since it causes them to change lanes so often. Yet the expressways have done their job so far as they know. The motorist who is driving in the slower lane of a multi-lane expressway, finds the passing lane congested with a slow vehicle. In order to catch up with a slow vehicle in the faster lane, he must overtake the vehicle and the passing lane becomes the outside lane and the motorist is once again in the slower lane of the multi-lane expressway.

At the outset of the tests, the engineers conducting them were interested in exploring the following possibilities, which from a logical viewpoint might have been expected:

1. Variations in speed of vehicles in each lane should be less. In other words, the lane controls would separate the traffic so each driver would be moving at a speed comparable with others in his lane. He would then be able to judge his own progress and be aware of the average speed of the group. The motorist might be expected to drive at a speed which would keep him at the higher speed limit. The opposite result was encountered.

The report on the results of the tests of the expressways throughout California, is a report on the difficulties which are encountered in attempting to control the flow of traffic, by means of signs indicating minimum speeds. The study was undertaken by the Division of Highways to evaluate the effectiveness of such signs, by the method of recording speeds and time of day, in order to determine whether the signs were effective in controlling the following possibilities:

1. They would not be used.
2. They would be ignored.
3. They would be disregarded.
4. They would be interpreted in such a manner as to be ineffective.
5. They would be looked upon as a substitute for the establishment of minimum speed limits by the Legislature.

The results of the study show that the signs were not effective in controlling the flow of traffic, as measured by the average speed of drivers on the expressways. The study also shows that the signs were not effective in controlling the flow of traffic, as measured by the average speed of drivers on the expressways.
content to stay in the lane, rather than change back and forth, a cause of many accidents. There would also be less "tailgating" by drivers discontented with the speed of those ahead of them.

- Traffic should tend to increase in the right lane, and decrease in the left lanes. This would make better use of the right lanes, while leaving the left lanes free for faster moving vehicles, with once again less motivation toward lane changing.
- Passing on the right should be lessened. Although passing on the right is legal where there are adequate lanes to permit it, and allows freer movement of traffic on multilane highways, it does make some drivers nervous to be so passed, and it irritates the fast drivers who have to change lanes in order to get around the slow ones.

Four study sites were selected for the tests: one four-lane, one six-lane, one eight-lane, and one where an eight-lane freeway narrows to six lanes. The latter actually served as two study sites.

The four-lane section was on Interstate 80 (Roseville Freeway) near Roseville. The six-lane section was on Interstate 80 near Dixon. The eight-lane section was on Route 11 (Harbor Freeway) in Los Angeles. The combined section was on Route 101 (Bayshore Freeway) in San Mateo County.

These sites were selected for the following reasons:
- (1) They have nearly straight alignment;
- (2) They have no sustained grades which would significantly affect truck speeds;
- (3) They have no high volume on- or off-ramps which would induce an excessive amount of lane changing, passing on the right, and below-normal speeds, and;
- (4) All study sites had overcrossings on which signs could be mounted.

The first three considerations create an atmosphere for high speeds. This was necessary for the validity of the tests, as design features which affected speeds would introduce an artificial element.

"Before" and "after" data was gathered at each of the study sites, with "after" data taken when the signs had
From an operational point of view, however, the report concludes that imposing minimum speed signs by lane can have many significant disadvantages. Some possible disadvantages include:

1. Increased passing on the right, which can lead to increased the incidence of passing on the right.
2. Increased overtaking by lane, which can lead to increased the incidence of passing on the right.
3. Increased travel time for the leftmost lane, which can lead to increased the incidence of passing on the right.

Also, additional overhead signs would not be consonant with current traffic patterns. The posted minimum speed would be approximately between 55 and 60 mph, which is higher than those tested and probably not the minimum speed. The average speed in the left lane of the two right lanes, for example, was approximately 67 mph for the left lane. But some drivers continued to travel faster than the posted minimum speed, even higher than the maximum speed limit. The minimum speed used were 60 mph for the rightmost lane and 55 mph and 45 mph for the two left lanes. The minimum speeds used were 60 mph for the rightmost lane and 55 mph and 45 mph for the two left lanes.

Furthermore, since the average vehicle is about 60 mph, but who do not realize, or do not admit to themselves, that faster traffic (namely themselves) can cause the so-called "slow drivers," as determined by previous research, to keep left. When they see signs implying that the slower traffic should keep right, they assume that they are "slow drivers." When they realize this, they are more likely to slowdown and reduce their speeds. This reduces the average speed in the left lane, which is about 60 mph for the rightmost lane and 55 mph and 45 mph for the two left lanes.

Finally, costs would be heavy. At a speed on the mainline of a freeway reaches capacity, the construction of many sign bridges would be approximately $2,000 miles of existing freeway and approximately 95 percent of the traffic in the leftmost lane traveled faster than 60 mph. (This could lead to increased the incidence of passing on the right; and increased, instead of reduced, travel time.

However, increasing average speeds due to increased the incidence of passing on the right would not be feasible. As an alternative, average speeds would have to be lower than those tested and probably not the minimum speed. The average speed in the left lane of the two right lanes, for example, was approximately 67 mph for the left lane. But some drivers continued to travel faster than the posted minimum speed, even higher than the maximum speed limit. The minimum speed used were 60 mph for the rightmost lane and 55 mph and 45 mph for the two left lanes. The minimum speeds used were 60 mph for the rightmost lane and 55 mph and 45 mph for the two left lanes.

The lane-changing incidence and increased passing on the right; and increased, instead of reduced, travel time. It was learned early in the study that faster traffic (namely themselves) can cause the so-called "slow drivers," as determined by previous research, to keep left. When they see signs implying that the slower traffic should keep right, they assume that they are "slow drivers." When they realize this, they are more likely to slowdown and reduce their speeds. This reduces the average speed in the left lane, which is about 60 mph for the rightmost lane and 55 mph and 45 mph for the two left lanes.

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It has been said that there are three stages in transportation development. In the first stage the emphasis is on a minimum facility that will somehow permit movement to take place. Roads and bridges are built where it is easiest and cheapest to construct them. Travel time and distance are secondary and human time is cheap.

In the second stage the emphasis is upon acceptable standards of transport service. People are willing to pay for more convenience. There is increased interest in raising the levels of efficiency in the movement of traffic and of comfort and amenity for the traveler. An effort is made to minimize the highway user's total transportation cost.

The third stage of transportation development would reflect the needs of an affluent urban society. In this third stage there is concern about how the highway facility improves or detracts from community values.

In the United States we are still largely in the second stage of highway transportation development, although the third stage may well be near at hand. For the last 10 years or so there has been an increasing concern with the quality of highway service as measured by the driver. Experts in this field are in disagreement about what elements of a highway trip contribute most importantly to "good service." Travel time, consistency of speed, frequency of stops, smoothness of pavement, freedom from distractions, relative safety, simplicity of route and attractiveness of surroundings are some of the many ingredients that go together to form trip quality.

To different drivers and at different times one or another of the ingredients may change in importance. If one must select a single trip element which best characterizes the quality of a commuting trip, however, there is little argument that travel time would be the one chosen. When a commuter describes his trip to work as "good" or "bad" he usually means that he was able to reach his destination more or less quickly than usual.

Even in general discussions of highway transportation we usually describe quality of traffic service in terms of travel time. We say that traffic is "strangling" or that it takes longer to travel from one end of town than it did years ago or that we can "get around better" now that freeway systems are generally available to us. Since vast sums of money are spent each year with the purpose of improving the quality of traffic service, it is important that some periodic measurement be made of this quality so that we can tell whether we are making progress and how much improvement we are getting for our money.

Travel time studies have been conducted in almost every major city in the United States. In the Los Angeles metropolitan area the Automobile Club of Southern California has made such studies since 1927. The usual procedure is to select a downtown starting point and record location and time periodically during a series of typical commuter trips. Studies usually use employees who keep track of their morning and evening commute trips for a period of a week or so. In the Los Angeles area these travel time studies have been helpful in demonstrating the progress brought about by the Los Angeles freeway system and by improvement of major arterial streets.

Measurements of travel time have been instrumental in countering the frequently vague and usually gloomy predictions of imminent traffic stagnation which continue to make popular reading in the daily press. In the Los Angeles area, for instance, it has been possible to measure a 30-percent increase in commuting speed in the years between 1957 and 1965. During the same period urban area population increased from 6 million to 8 million and motor vehicle registrations climbed from 3.3 to 4.3 million. Periodic travel time studies have helped the public and its representatives appreciate the improvements made as the result of a planned program of highway construction.

Two years ago it became apparent that the traditional method of measuring travel times was no longer suitable in an area as large and complex as the Los Angeles basin. The central business district is only one of many important centers for employment. As a matter of fact, only slightly more than 5 percent of the jobs in the Los Angeles metropolitan area are in the
The report pointed out differences in commuting habits and experiences among the various employment centers. Average morning speeds in the central area of Los Angeles, for instance, were 28% greater than slower travel service, however. Differences were also noted in the distance typically traveled by employees in various centers. Workers in the central area of Los Angeles, for instance, who used freeways for part of their trip, lived twice as far from downtown Los Angeles, for instance, who used freeways for part of their trip, lived twice as far from downtown as those who made direct trips, but at the cost of only 9-12 minutes, which is currently the area of greatest traffic congestion. The latter information was collected during a massive study of the Los Angeles basin. This information was valuable to a number of businesses and government offices which have considered the possibility of staggered or shifting their work hours. The latter information was helpful to a number of businesses and government offices, which have considered the possibility of staggered or shifting their work hours.

The breakdown of information relating to 28% of the study participants was conducted during July and August. The survey participants were asked to estimate the distance they typically traveled by automobile commuting experience, showing that the San Fernando Valley, for example, who used freeways for their commuting, averaged 30% less driving time and listed any unusual events which affected their driving. Other events included recent earthquake activity, school closings, and many other factors. The survey results were also organized into form of travel time “contour maps,” showing the distances one can travel in 15-minute increments. These contour maps represent average commuting periods and have higher travel speeds. Workers in the central area of Los Angeles, who were frequent users of freeways, experienced the most benefits, with an average speed of 29% greater than the average speed of workers who did not use freeways at all. The so-called “freeway effect” was also noted in some cases, where drivers living closer to Los Angeles used freeways for all or part of their trip. Where any delays occurred during the morning and afternoon, the information was used to give a picture of relative commuting periods. The latter information was collected during off-peak studies of travel time measurement. To expand the scope of the information, a status study was conducted in various areas of the Los Angeles area, including Santa Ana, Santa Monica, and Golden State Freeways. Some of the study results were made available to the Los Angeles Junior Chamber of Commerce through a local technical project. Los Angeles Junior Chamber of Commerce helped contact many local businesses and commerical interests who are involved with the automobile commuting experience.

The auto club prepared and distributed the forms and provided data processing and computing services for the reduction and analysis of the vast quantities of information collected. The auto club had an interest in the automobile commuting experience, and the federal government of the United States was also interested in the automobile commuting experience. The latter information was collected and provided to businesses and government offices which have considered the possibility of staggered or shifting their work hours. The latter information was helpful to a number of businesses and government offices, which have considered the possibility of staggered or shifting their work hours. The latter information was helpful to a number of businesses and government offices, which have considered the possibility of staggered or shifting their work hours. The latter information was helpful to a number of businesses and government offices, which have considered the possibility of staggered or shifting their work hours. The latter information was helpful to a number of businesses and government offices, which have considered the possibility of staggered or shifting their work hours. The latter information was helpful to a number of businesses and government offices, which have considered the possibility of staggered or shifting their work hours. The latter information was helpful to a number of businesses and government offices, which have considered the possibility of staggered or shifting their work hours.
The 1965 travel time study was a pioneering effort in many respects. It examined the subject of travel time on a new, metropolitan scale. It brought together a number of groups with different skills and melded their efforts in a productive investigation of an important part of our daily lives. It was based on the combined experiences of large numbers of motorists whose help had not previously been used for studies of this kind.

Travel time studies in large metropolitan areas could well imitate the scope of the Los Angeles study. To

The fastest route, from downtown Downey, had an average speed of only 23 mph. Generally, lowest speeds were found in the travel corridor connecting the Los Angeles International Airport and the Vernon-Downey industrial complex. High speeds were always associated with trips making extensive use of freeways. Lowest speeds were found where no freeways were available to motorists.

This part of the study showed some interesting differences in directional speeds and travel times. For example, motorists traveling east from the Los Angeles International Airport to West Covina always traveled more slowly than those driving west.

It was also found that there is a consistent amount of surface street traveled in any off-peak trip. Over three-fourths of the trips that included both freeway and surface street travel showed motorists using surface streets for five miles or less of their total trip, regardless of the length of the total trip. As more freeways are made available typical off-peak trips will include about four to five miles of surface street travel with the rest on freeways, regardless of the length of the trip. This finding conforms to a generally held theory of urban freeway spacing.

Average freeway speed in the metropolitan area during the off-peak hour was 57 mph and on surface streets 24 mph. Travel time between any two points was very consistent. Ninety percent of trip times were within 14% minutes of the average trip times, suggesting that barring an unforeseen event that might severely affect highway capacity, a person can pretty well count on his off-peak trip taking a predictable length of time.

The 1965 metropolitan travel time study in the Los Angeles area clearly points out the need to proceed with the area's planned freeway system without delay. Poor travel service was uniformly associated with those corridors of travel where no freeway routes were available. The study also emphasizes the need to apply well-known traffic engineering techniques to improve the surface street system, which in the Los Angeles area handles about 70 percent of all travel. It is also apparent that there are serious conflicts between the needs of the traveling public and those whose work requires street openings or excavation.
Entire truss span in fog

Merchant vessel carries away Rio Vista
In dense fog late Sunday afternoon, January 15, the Italian freighter *Ilice* missed the open draw on the Rio Vista Bridge across the Sacramento River and carried away an entire truss span. Damage is estimated at more than $500,000.

There were no injuries, although two teenage boys, Mark Ackerman and Jamie Cove, both of Stockton, had parked their car at the barrier and were standing at the open draw to see the ship go through. When the vessel struck behind them, both ended up in the river, but they were quickly rescued.

Bridge tender Clyde Spencer of Rio Vista was at his control station a hundred yards away at the time of the crash, across the open span. He could hear the commotion, but because of the poor visibility was not sure what had happened and had a few anxious moments.

Although the engines of the 10,000-ton vessel were backing at the time of impact, her momentum and weight carried away the roughly 400-ton span as though it were made of matchsticks. *Ilice* was trapped in the wreckage for about four hours until tugs could pull her free, but she suffered only minor damage and proceeded to the Port of Sacramento under her own power to take on a load of rice for Japan.

The break in the bridge interrupted the use of State Route 12 at the river, and the structure was out of service for about three weeks until a temporary span across the gap could be completed. Damage was extensive, in addition to the lost span. Concrete pier pedestals were cracked and broken, an additional 36 feet of the adjacent span must be replaced, and paving for some distance from the point of impact was disturbed. Possible damage to the structure's alignment and underwater construction had to be investigated under tedious and difficult conditions.

Emergency repairs were effected by constructing a steel pile bent and crossing the gap with two 72-foot spans of steel girders from the Division of Highways stock. The temporary structure provides for two lanes of legal loads.

In the meantime, a new truss span is being fabricated in the San Francisco Bay area. When it is completed, it will be floated upriver on the huge barge and crane combination which is intermittently used to place the girders for the new San Mateo Bridge. The crane will then remove the temporary structure, and drop the new span into place. Hopefully, the permanent repairs will be completed about June 15.

Since the bridge was handling about 5,000 cars daily at the time its service to the public was interrupted, there was considerable inconvenience to the local residents. This was complicated by the lack of a suitable bypass route. Immediate water taxi service was furnished by the proprietor of Uncle Bobby's Resort, and by a Sixth Army landing barge which carried school children.

As soon as Department of Public Works lawyers could arrange for liability insurance, a service agreement between the Division of Highways and the Sixth Army was effected, with the Sixth Army operating a landing barge on a regular schedule to handle pedestrians.

State Highway Engineer J. C. Womack praised all agencies involved in working out the prompt arrangement, saying "We were worried more about the movement of people—workers, businessmen and hospital cases—than we were about vehicles. Although an awkward situation, the transportation system in the two affected counties could continue to function during the emergency by pooling vehicles at both ends of the ferry."
FREeway REALTY  Mrs. Valley M. Knudsen (1), founder and chairman of Los Angeles Beautiful, once lived most of her life in southern California. Long prominent in civic and cultural affairs, she has been listed in Who's Who in America since 1947. Honors bestowed on her include the City of Los Angeles Annual Freedom Award in 1951, the California Council on the Arts Governor's Award in 1963, and the California Governor's Award in 1969. She also holds the Order of Oseberg from the Loyal University of California.

Her travels during the past 35 years have taken her all over the world, including four trips to the Soviet Union and satellite areas.

BRIDGE STEEL WELDS  Art German (2), a native of Brooklyn, New York, who received his B.A. degree from Brooklyn College and M.A. from Stanford University. During his career as a journalist before joining the state in 1965, German won Associated Press spot news reporting awards for three consecutive years (1958-60) and was cited by the American Political Science Association in 1960 for distinguished reporting of municipal affairs. He is now information officer for the Division of Bay Toll Crossings.

HIGHWAY TO SPACE BASE  Richard D. Gademan (3), a native of Springville, Utah, and graduate of Utah State University, is now an associate highway engineer with the Division of Highways, San Luis Obispo office. He joined the division 17 years ago. For the past nine years he has been doing design work. This has included large freeway projects in District 5, which contains a large portion of the central coastal area of California.

STORM HAVOC IN DISTRICT 6  Edwin L. Tiedemann (4), administrative officer in the Division of Highways, Fresno office, started work with the division in Los Angeles in 1954. Prior to his transfer to Sacramento in 1956 to do traffic flow research, he was resident engineer on a section of the Pomona Freeway through Monterey Park.

MINIMUM SPEED LIMITS  Norman Winge (5), associate highway engineer, was born near Adelaide, Kansas, and graduated from the University of Illinois in 1948. Prior to his employment by the Division of Highways in 1958 to do traffic flow research, he was resident engineer on a section of the Pomona Freeway.

TRAVEL TIME STUDY  Peter G. Kolkmann (6), traffic engineer for the Western Section of the Institute of Traffic Engineers and has also directed similar traffic studies for the auto club. Before coming to work for the auto club, Kolkmann served as traffic engineer for Fresno County for six years.
### DIVISION OF HIGHWAYS

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
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<tbody>
<tr>
<td>J. C. WOMACK</td>
<td>State Highway Engineer, Chief of Division</td>
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<tr>
<td>J. P. MURPHY</td>
<td>Deputy State Highway Engineer</td>
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<tr>
<td>J. A. LEGARRA</td>
<td>Deputy State Highway Engineer</td>
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<tr>
<td>GEO. LANGSNER</td>
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<tr>
<td>LYMAN R. GILLIS</td>
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<tr>
<td>J. E. McMAHON</td>
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<tr>
<td>FRANK E. BAXTER</td>
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<tr>
<td>GEORGE A. HILL</td>
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<tr>
<td>J. C. BURRILL</td>
<td>Comptroller</td>
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<tr>
<td>NEAL E. ANDERSEN</td>
<td>Equipment Engineer</td>
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<tr>
<td>JOHN L. BEATON</td>
<td>Materials and Research Engineer</td>
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<tr>
<td>C. G. BEER</td>
<td>Urban Planner</td>
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<tr>
<td>A. N. DUNHAM</td>
<td>Computer Systems Engineer</td>
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<tr>
<td>ALVORD C. ESTEP</td>
<td>Engineering of Design</td>
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<td>J. F. JORGENSEN</td>
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<tr>
<td>SCOTT H. LATHROP</td>
<td>Personnel and Public Information</td>
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<tr>
<td>C. T. LEDDEN</td>
<td>City and County Projects Engineer</td>
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<tr>
<td>JACK E. PEDDY</td>
<td>Program and Budget Engineer</td>
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<tr>
<td>DANA G. PENGILLY</td>
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<tr>
<td>R. V. POTTER</td>
<td>Systems Research Engineer</td>
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<tr>
<td>PAUL C. SHERIDAN</td>
<td>Office Engineer</td>
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<tr>
<td>E. L. TINNEY</td>
<td>Maintenance Engineer</td>
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<tr>
<td>DONALD P. VAN RIPER</td>
<td>Principal Landscape Architect</td>
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<tr>
<td>J. E. WILSON</td>
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<tr>
<td>A. L. ELLIOTT</td>
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<td>H. R. HINEMAN</td>
<td>Bridge Engineer—Operations</td>
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<td>R. J. IVY</td>
<td>Bridge Engineer—Administration</td>
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<tr>
<td>DALE DOWNING</td>
<td>Bridge Engineer—Southern Area</td>
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<tr>
<td>RUDOLF HESS</td>
<td>Chief Right of Way Agent</td>
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<tr>
<td>HARRY L. KAGAN</td>
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<tr>
<td>DEXTER D. MacBRIDE</td>
<td>Assistant Chief</td>
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<tr>
<td>R. S. J. PIANETTI</td>
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<tr>
<td>SAM HELWER</td>
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<tr>
<td>H. S. MILES</td>
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<td>W. L. WARREN</td>
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### CALIFORNIA HIGHWAY COMMISSION

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<tr>
<th>Name</th>
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<tbody>
<tr>
<td>GORDON C. LUCE</td>
<td>Chairman and Administrator, Transportation Agency</td>
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<tr>
<td>WILLIAM S. WHITEHURST</td>
<td>Vice Chairman, Fresno</td>
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<tr>
<td>ABRAHAM KOFMAN</td>
<td>Alameda</td>
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<tr>
<td>ALEXANDER H. POPE</td>
<td>Los Angeles</td>
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<tr>
<td>FRED C. JENNINGS</td>
<td>Riverside</td>
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<tr>
<td>MOON LIM LEE</td>
<td>Weaverville</td>
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<tr>
<td>VERNON J. CRISTINA</td>
<td>San Jose</td>
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### DIVISION OF CONTRACTS AND RIGHTS OF WAY

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<th>Name</th>
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<tr>
<td>HARRY S. FENTON</td>
<td>Chief Counsel</td>
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<tr>
<td>EMERSON RHYNER</td>
<td>Deputy Chief (Sacramento)</td>
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<tr>
<td>HOLLOWAY JONES</td>
<td>Deputy Chief (San Francisco)</td>
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<tr>
<td>REGINALD B. PEGRAM</td>
<td>Deputy Chief (Los Angeles)</td>
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### DIVISION OF BAY TOLL CROSSINGS

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<tbody>
<tr>
<td>E. R. FOLEY</td>
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<tr>
<td>J. A. KOZAK</td>
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<tr>
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<td>BEN BALALA</td>
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<td>VERNON J. RICHEY</td>
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### DIVISION OF AERONAUTICS

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<tr>
<td>CLYDE P. BARNETT</td>
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