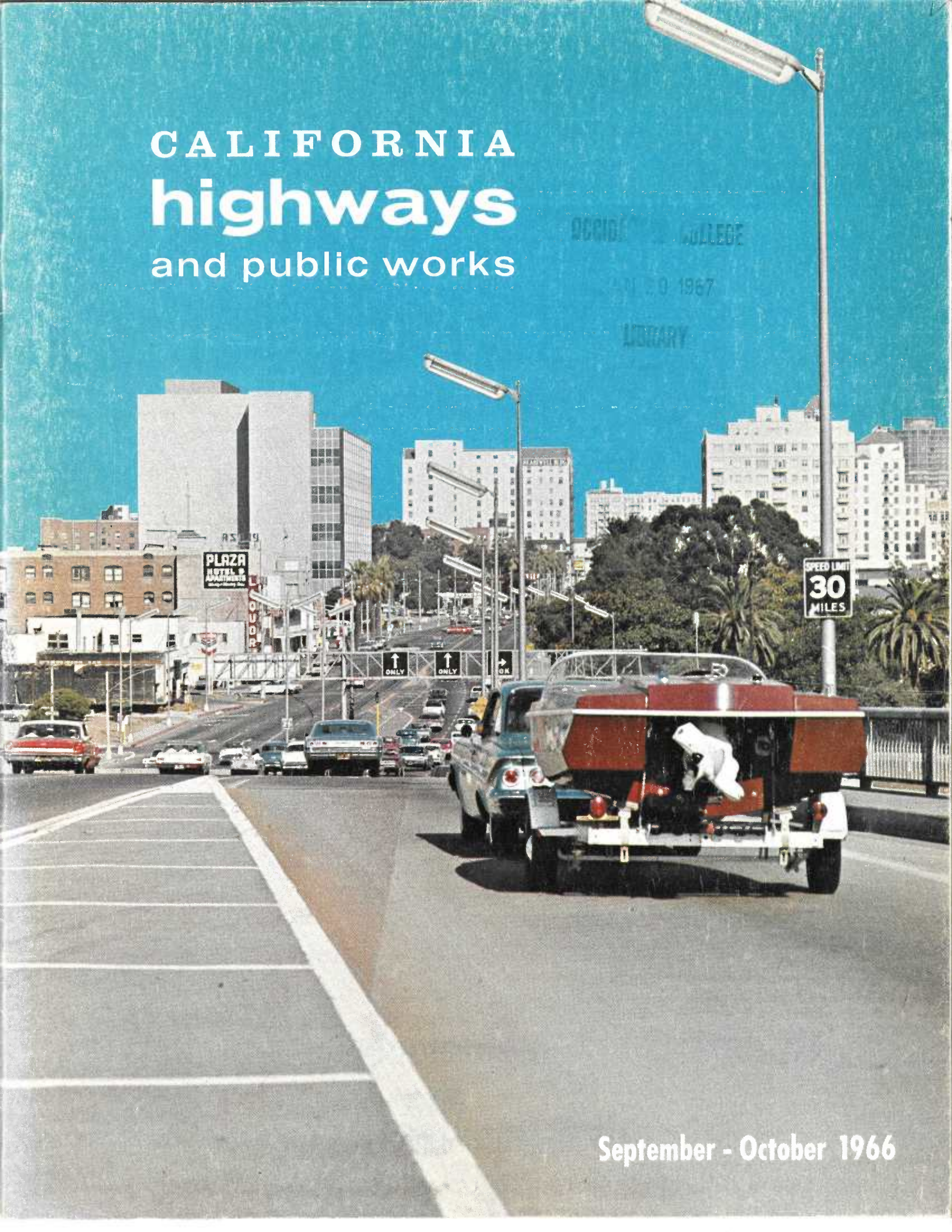
CALIFORNIA
highways
and public works



September - October 1966

COMING NEXT ISSUE

Traditionally, the November–December issue of *California Highways and Public Works* Magazine will be the annual report issue.

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Editors are invited to use information contained herein and to request prints of any black and white photographs.

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"An outstanding network of state highways is essential to the future growth of California's economy"
—*Governor Edmund G. Brown*

Front cover:
Car and boat on trailer on ramp, with city skyline in distance, symbolizes the mixture of recreation and urban development in the city of Long Beach. See story on page 18. Photo by Sam Smith, District 7 Headquarters, Los Angeles.

Back cover:
Scene is view from Highway 395, Conway Summit, just north of Mono Lake, looking toward the High Sierra, through magnificent groves of aspens in this vicinity. Photo by John Meyerpeter, Headquarters Photo Lab.

an engineer looks at aesthetics

Louis G. Kroeck

Fancy phrases will not get the job done! "Yield to the environmental needs of our community soul," or "Understanding the psychology of the fashions of our great society," may be fine for Sunday afternoon reading, but they are of little help to an engineer who works with specifics. Although deeply concerned about the "soul" of a community, he can find little in the way of constructive advice in these phrases that he can apply directly to his projects. He asks, "What specifically can I do to enhance the appearance of my project?"

Engineers have long recognized that public acceptance is the key to success of the highway program. They are also well aware of the popular movement for more beautiful highways. It is difficult, however, for an engineer to rapidly change his approach after so many years of trying to stretch the limited funds in order to keep ahead of the expanding traffic problem. The engineer's approach is a realistic one based on the knowledge of cost and traffic needs. There was a time when the major job was to pave our unimproved road network as rapidly as possible. This phase of our work—"getting out of the mud"—is well behind us. Our newer roads are sophisticated in all respects except perhaps for their appearance. Now that the foundations of a basic highway transportation network have been laid, the public is beginning to expect some amenities from the gas tax dollar. An all-weather surface and adequate traffic interchanges are no longer amenities but something the public expects with each highway project. The engineer is left to grope for some reasonable balance between function, cost, and aesthetics.

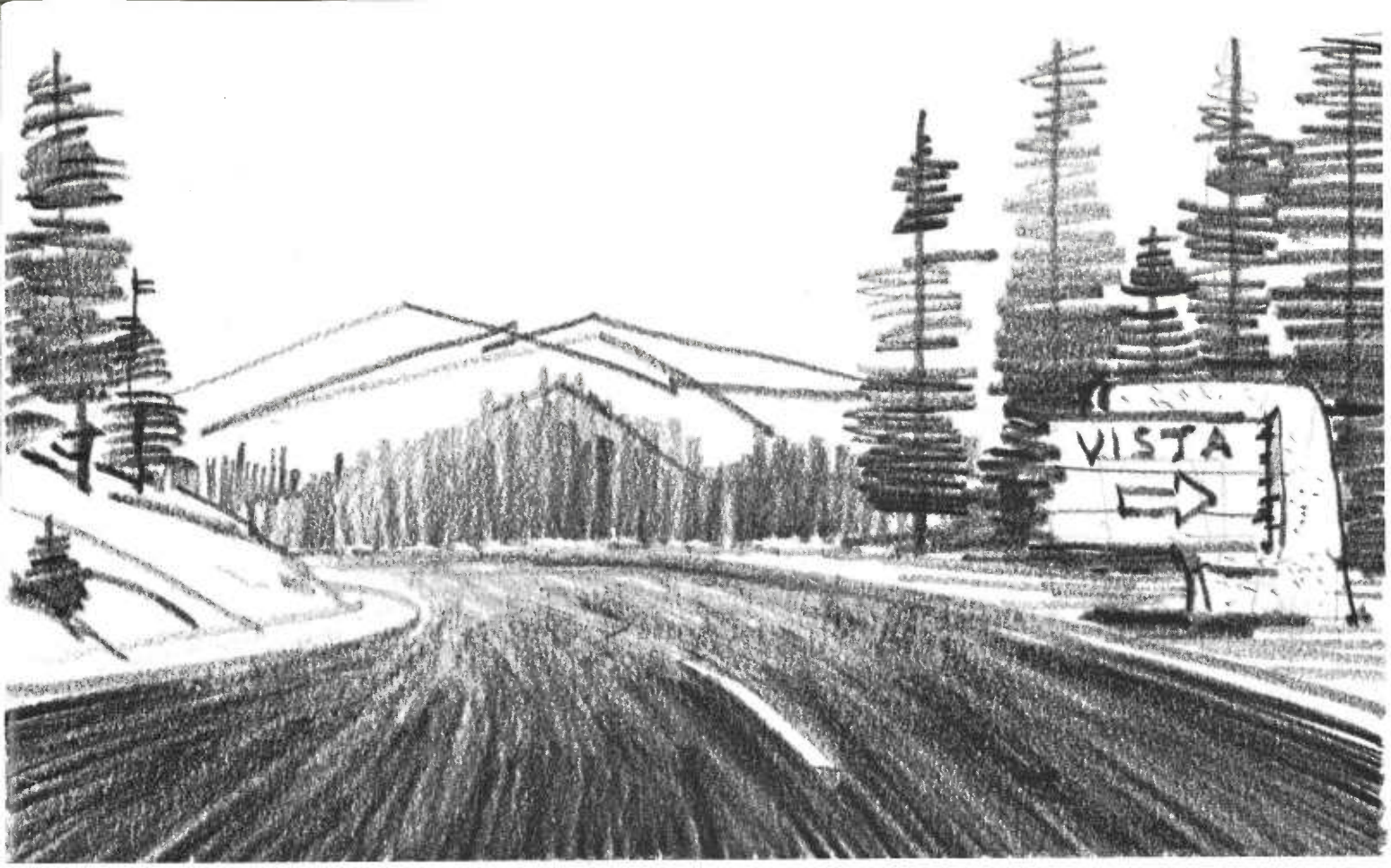
Today the engineer is in an enviable position. He now has the skill and resources to shape a new environment. He must also accept the responsibility of recognizing the qualities that make one environment different from another.

There is no doubt that superb works have been created by engineers. Engineers have also made their mistakes. One of the problems is that engineers have sometimes taken a narrower view of the work than the highway user or viewer.

The highway engineer's primary concern is moving traffic in as safe and economical way as possible. Few people in the past have questioned this noble endeavor. The vast majority in past years have envisioned the highway engineer as a hero in getting traffic onto pavement and across rivers.

Times are changing and engineers must keep up with this change. Hopefully, there will be some additions to the curricula of our engineering schools. Schools of architecture have long required their students to be well versed in structural design as well as aesthetics. Engineering education could well benefit from a focus in the field of balance, form, and texture.

Our engineering schools, being sensitive to the changing needs, can and will meet the challenge. Any change in the academic program, however, will be slow in producing results, due to the inherent time lag of education. An immediate educational program is therefore necessary for the engineers already in the field. The Division of Highways is meeting its share of the problem head-on. A training program is well underway at the time of this writing. This program is only the beginning. Each highway district hopefully will carry on a training program on a continuing basis.



Good highway design includes rounded cuts, attractive signs, and open vistas to add interest for the traveler.

Motivation is not the primary problem. Engineers in Planning, Design, and Construction have always been attentive to the appearance of their projects. However, the majority of highway engineers and technicians need to be told specifically what part they can plan in this beautification movement. The immediate program dealing with specific details reaps quick results in public acceptance. A long-range educational program, however, will be required in building of another dimension to add to function and economy—aesthetics.

District 10 has been quick to recognize the problem and the needs. The first action by the district engineer, J. G. Meyer, was to appoint a "scenic highway committee." The committee was composed of representatives at the senior level from Maintenance, Construction, Traffic, Right of Way, and the Design Departments. The committee was given complete freedom to formulate its own method of operation, responsibilities, and limitations.

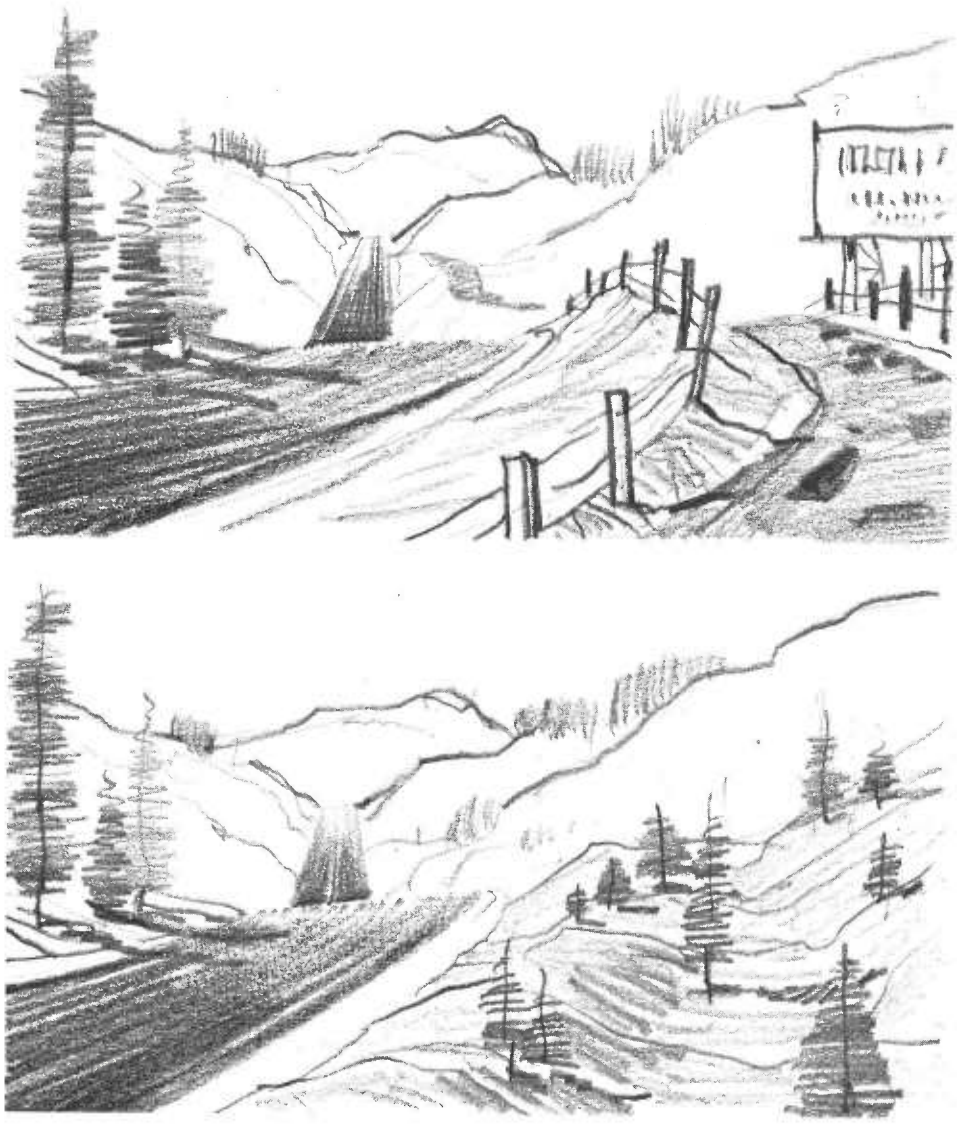
The following general guidelines were formulated after the first meeting of the committee:

1. The committee's activities should not be limited to the scenic highway system but should encompass all highways in the district.
2. On the district level the committee should concern itself initially with details both in design and construction since it appeared that the sum of the details will show results in the shortest possible time.
3. The second phase of our studies should encompass the long-range planning aspects of route selection.
4. The first task was to evaluate our present highways both by observation and by study of available material.
5. Prepare and execute some kind of educational program within the district based on our evaluation of existing highways.
6. Prepare some type of standard and guidelines for all departments.

As a method of operation to evaluate our existing highways, the committee has made a field trip once a month to study, discuss, and photograph both good and poor details. The collection

"WHAT SPECIFICALLY CAN I DO TO ENHANCE THE APPEARANCE OF MY PROJECT?"

ILLUSTRATIONS BY LOU BAKER



On realignment, old paving, unsightly structures, and unnecessary piles of dirt should be cleared away, the ground smoothed, and return of natural growth of trees and shrubs encouraged.

of color slides resulting from these trips is used by the committee for further office study. The slides will have additional use in our proposed educational program within the district. The mere existence of the committee has helped to stimulate others in being more critical of their past work. This has been evident in every department.

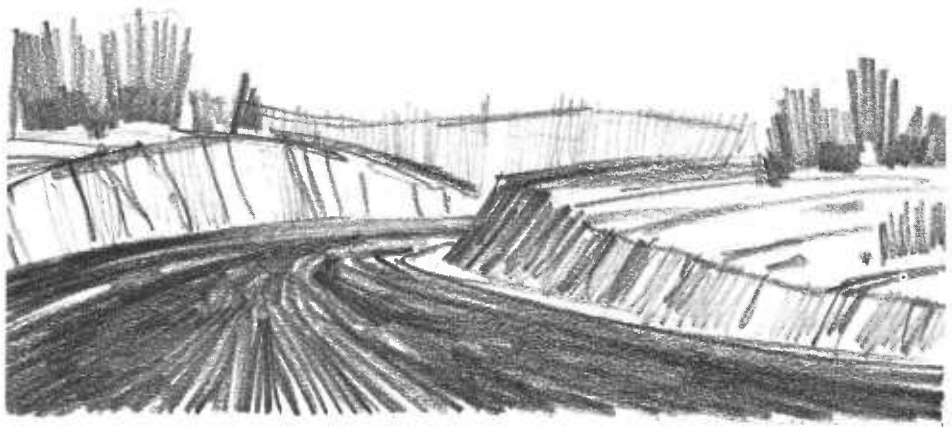
The committee has been in existence for only two years, but the results are already evident. Its first efforts were directed toward projects under construction. Almost everyone was eager to cooperate. Although the changes made during construction on the various projects were within the project fiscal allotment, the end product in some cases was beyond expectation and served to point out that in this field of aesthetics much can be done at small cost.

Let's step back and take a quick look at a few of the details District 10 has considered as a starting point for a long-range program in our attempt to improve our highways from an aesthetic standpoint:

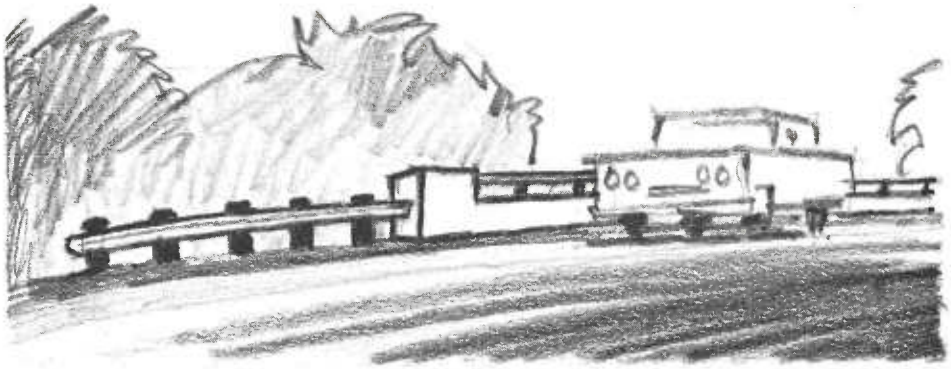
Fit the Environment

In a rural area this means that, regardless of the height of cuts or fills, the natural ground should appear to begin at the edge of the shoulder, not at the right-of-way line. If the highway is built on flat land, the slopes should be flat. Ditches should be nonexistent or at least with very flat slopes. In rolling country the slopes should roll and warp. The cuts and fills should appear as part of the country, not as part of the roadway. In rugged steep terrain the cuts should be rugged and steep.

This philosophy is not without its problems and its conflicts. In a forest area should the cuts be held steep to save trees, or should additional trees be taken to flatten and round the slope?



Instead of sharp cuts, slopes should be rounded to eliminate tunnel effect and to fit slopes into natural contours.



In general, the slopes should be flattened and rounded. The slopes are permanent. The trees will grow anew. The slope, however, can be warped to save a particularly fine specimen or group of trees. This philosophy must vary, of course, with the location, giving full consideration to the type and age of the trees. The U.S. Forest Service has been very helpful in this respect. They are interested in the long-range planning program for the forest areas. Certainly the Forest Service should be brought into the picture in the early stages of a project.

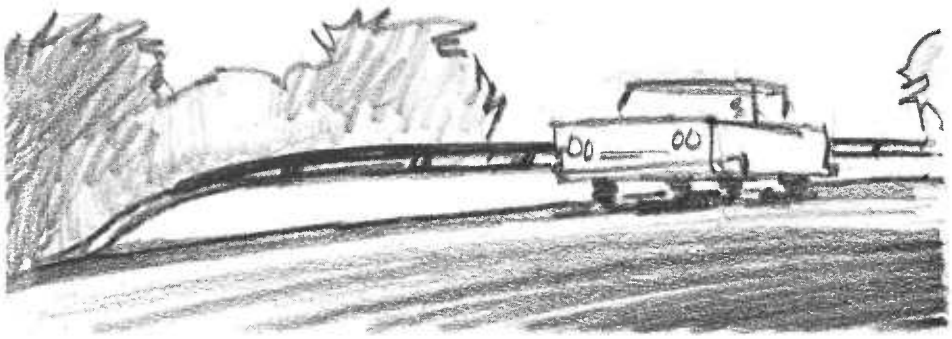
Interception ditches at the top of cut should be held to an absolute minimum since they interrupt the continuity. If a ditch must be lined with concrete, native soil should be broomed in while it is still wet, or asphaltic emulsion should be sprayed on for a camouflage. There is little more disrupting to the scene than a white stripe through the green belt adjacent to a highway.

Remove Old Pavements

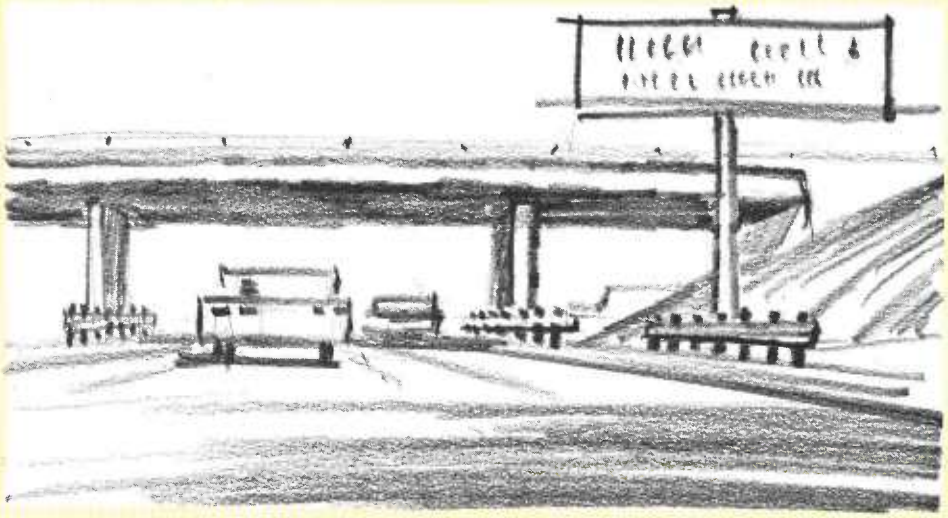
There are many places in this state where not only does the old pavement show, but also the pavement before that. Even the poor pavements of many years ago leave an almost permanent scar on the countryside. Remove the old pavement, remove the old culverts, fences, and signs. Fill the old cuts and remove the old fills. Then seed the entire area. This has been done in District 10, and the cost has been surprisingly small.

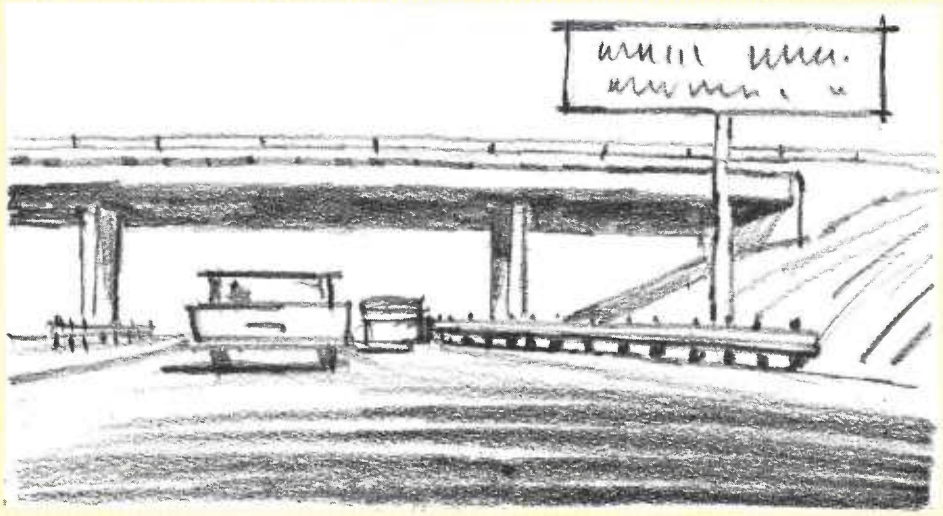
Horizontal and Vertical Curves

Lengthen them! Seldom do short vertical or horizontal curves fit into the landscape. In rolling country the vertical curves should be longer than the tangents between them. This will produce lines that flow rather than jerk. If a curve radius must be short, be sure to lengthen the superelevation transition. This tends to ease the visual abruptness of the curve and prevents the unpleasant, warped appearance so often seen on multilane highways.



End-post extensions on bridge railings can be eliminated and railings faired into the ground.





Rather than several short sections of guard rail which created jagged, interrupted effect visually, use a single, continuous guard rail which costs little more and gives a much smoother effect.

Continuity

The highway, as a continuous, almost never-ending strip, must be held together by its continuity. The higher the speed of travel, the more important this becomes. Changes along the highway and changes in the highway itself should not be abrupt. Not only should visual abruptness be eliminated from the highway alignment, but the visual abruptness should be held to a minimum in all features of a highway. The importance of continuity reaches into every facet of highway design and construction: A smooth-flowing fence rather than one that follows every minor high or low spot on the ground. A right-of-way line that either curves or is on short tangents with small angle points. Edges of pavement that don't jump in and out.

How often do we see multiple short sections of guardrail where one long section could be placed at only a small additional cost. A long piece of guardrail can add continuity. A short piece reduces continuity. Remember, at highway speeds, all lengths become compressed.

Consideration should be given to coordination of the bridge rail and the approach rail. If one type of rail could do for both, the continuity of the facility would be greatly improved. Pavement types is another area where continuity is important. A white bridge deck on a black pavement is an abrupt break in the continuity.

Special Features

Be ever aware of those special points of interest—an exceptional view, an interesting formation, a group of trees or rocks to break the monotony, an interesting historic feature. Take advantage of each of these. Remember, a view of a city's industrial area, to some people, is as interesting as a high Sierra Nevada view.

Cut Benches

Only where absolutely necessary! A widened section at grade will usually serve the purpose. It not only looks better but adds width to the roadway for parking or maneuvering.

Contour Grading of Interchanges

Slopes that warp and flow are far more pleasing to the eye than the precise, straight, geometric slope so often seen on our highways. It is true that a warped slope is more difficult to stake and construct. The results, however, are worth the effort. A curved, fluid surface will fit any environment to a far greater degree than the conventional 2:1.

Drainage Structures

There should be little visual evidence of drainage structures. Bury all downdrains. Substitute culvert end sections for headwalls. Use only grate inlets in the median or where visible. Where flat slopes are used, extend the culvert to intercept the slope line. Don't warp the slope to have a few feet of pipe. The use of flared end sections is far superior to headwalls where slopes are flat. They fit the slope better; they do less damage if hit by a car; they are superior hydraulically; they are easier to maintain; and they are usually more economical.

Dramatic rock formations should be left in place to add interest to the route.

Rock Outcroppings

If a rock outcropping appears on a slope, work around it. It will probably look much more natural to leave it in place than it will to remove it. This is especially true in an area where rock outcroppings already appear in nature.

Daylight Cuts

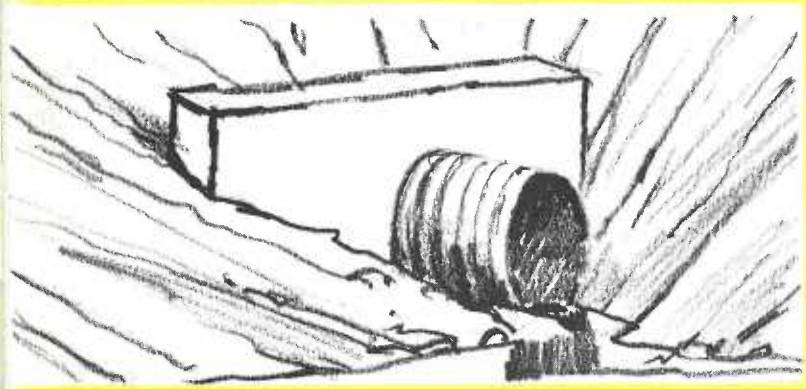
From an aesthetic standpoint, a through cut should be avoided wherever possible. A through cut is not only unpleasant from a visual standpoint, but it leaves much to be desired from an emotional standpoint. While the claustrophobic reaction is usually mild, nevertheless, it is an undesirable play on the emotions of many people. Whenever a cut can be widened, the slopes flattened, or one side daylighted, this undesirable emotional reaction can be eliminated.

Highway Hardware

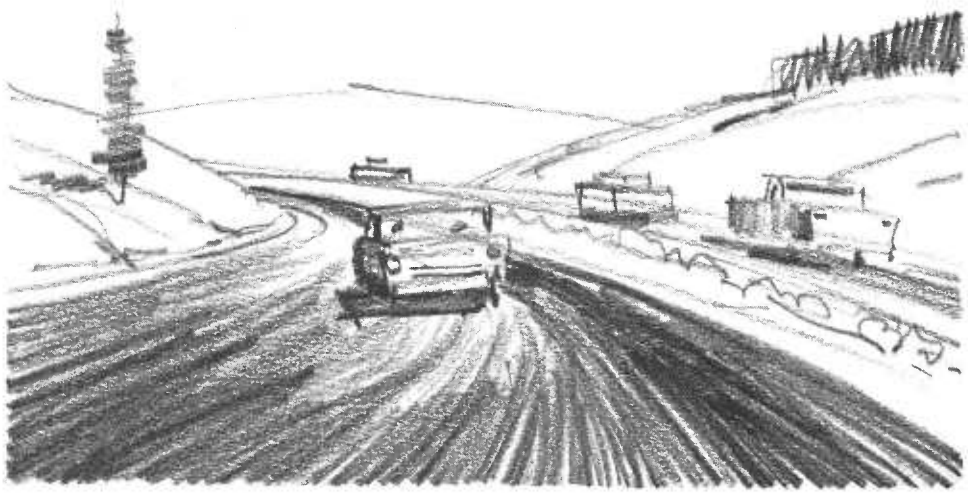
In many cases, the highway engineer is his own worst enemy! There is little beauty in a multiplicity of signs, signals, lighting standards, and guard markers. We should do what we can to subdue or eliminate these facilities. Keep in mind, the fewer the signs, the greater the impact of the remaining signs. In a forest area, a natural wood guide marker may be the answer. The wood post will hold the reflector just as well as a steel post. Maybe the elimination of the white paddle is the answer. The paddle is of little value in the daylight, and the reflector is all that can be seen at night. Also, in a forest or in rural areas unpainted wood posts should be used. They do just as good a job of holding a sign as a painted one. Not only are they less obtrusive, but they are less expensive. Other hardware should be painted a soft color to blend with the background. The backs of all signs should be painted. This renders them less distracting, thereby adding to the safety of the highway. Whenever possible, place signs back to back on the same posts.

Right-of-Way Width

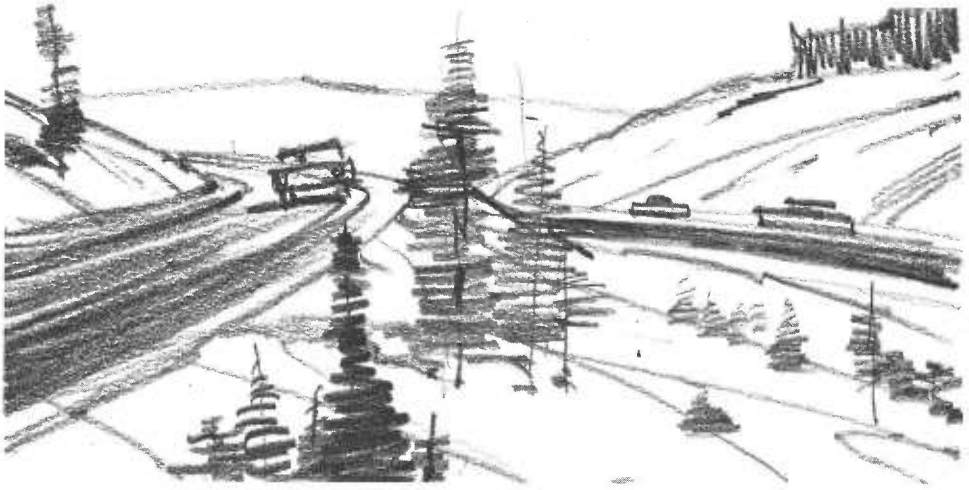
Experience has shown that seldom are our highways situated on an adequate width of right-of-way. What appears to be ample during the design stage seems always too tight after construction. Consideration should always



Structures to protect culvert openings are usually not necessary. Piled rocks will do as well in most cases, and are much less noticeable.



Where terrain permits, a very wide median is much more satisfactory aesthetically. The median can be left virtually undisturbed in its natural state, cuts and fills can be kept on a smaller scale, and both roadbeds fitted into the contours more easily.



be given to future planting—especially to screen planting where necessary. A little additional right-of-way width is often desirable to include a group of trees or a rock outcropping. The area between the top of cut or toe of slope should act as a buffer zone. Often a little extra right-of-way will preserve a view. Always assume that the adjoining property owner will build right to the right-of-way line.

Final Cleanup

This is one of the most important operations on a project, but unfortunately it is often overlooked. This is the frosting on the cake. All areas should be shaped and all debris removed. This includes the removal of all construction stakes.

These are only a few of the details that are being given close examination. They do, however, illustrate what we in District 10 are looking for as a stopgap program. This is only one facet of the total program planned for District 10. It is, however, the portion of the program that will show results in the shortest possible time. It is also the portion of the program most easily understood and most quickly accepted by all concerned.

Future Program

As this initial program takes shape, the district scenic highway committee will be able to devote time and effort to the aesthetics of highway planning. In this area, the guidelines are necessarily general. They must be flexible enough to cover all highway planning situations—urban, rural, mountain, and valley. Opinions are diverse on the application of aesthetic guidelines in relation to the planning of specific projects.

More can be accomplished toward the pleasing appearance of a highway in the relative freedom of the early planning stages than in the design and construction stages which are controlled by what has gone before. Consideration of all the features which will contribute to the aesthetics of a highway, such as wide medians and adequate right-of-way for slope clearances, contour grading, planting, and drainage facilities, may rule out certain locations at the beginning.

Our planning has been attuned to the desires of the local communities. This awareness comes through continuing liaison between Highway Planning personnel and community citizens. Sensitivity to local needs is necessary to arrive at a balance between costs, traffic benefits, and community values. In the final analysis these factors are weighed by the California Highway Commission in each specific instance to arrive at a highway location that provides the optimum combination.

Our planning of routes through a community includes a study of the pat-

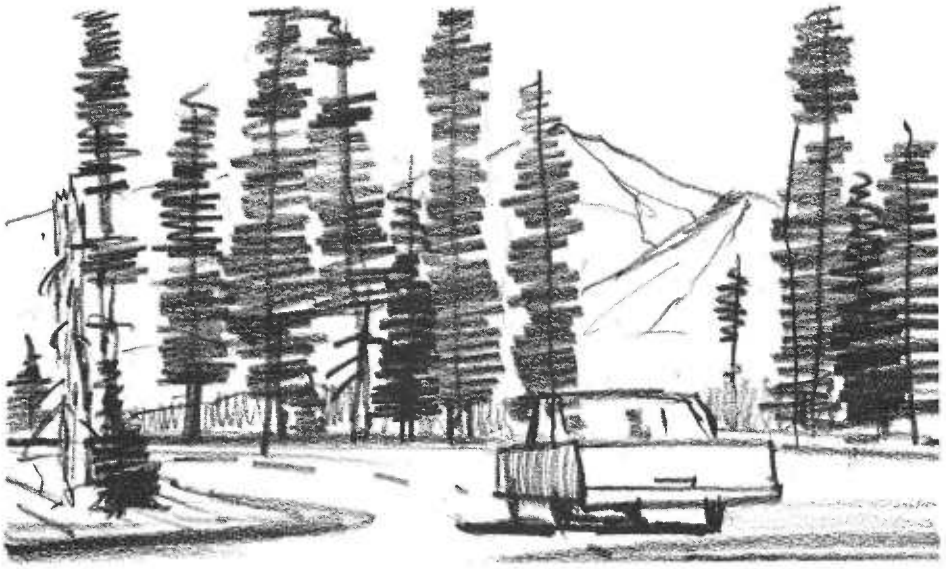
tern of land ownerships to minimize the creation of small odd-shaped parcels that are difficult to use and often detract from the appearance of the surroundings. Among other items that are considered are the boundaries of school districts, locations of public facilities, and zoning. The general plan of the community and outlying unincorporated areas is also an essential source of information in the planning process. Thus, a thorough knowledge is developed of the geography and general makeup of the community so that the highway may be integrated with the local scene rather than forced through it.

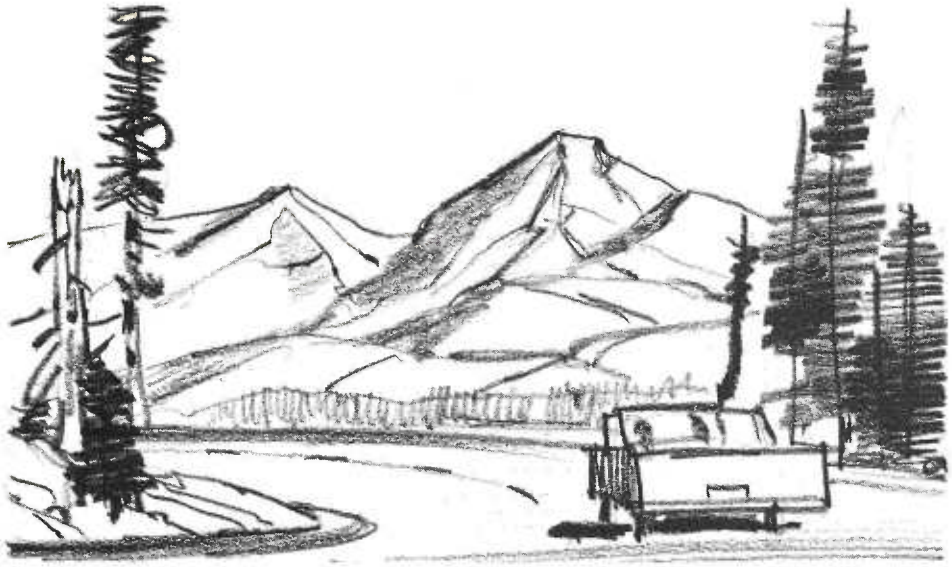
The local community will generally direct attention to sites of historic value early in the planning stage. What may appear to be a pile of junk or even vacant land to a stranger may be a site of some historic event or a last link to a past era dear to the heart of the local community. Although many of us admire the shine and glitter of newness, others prefer the patina of time. This may seem somewhat removed from aesthetics; however, the reactions on one's emotions are just as real, just as strong, as the emotions that come into play when viewing a beautiful scene. In this instance, the emotions are experienced by the community rather than the highway user.

In rural areas, every effort is made to achieve compatibility with the area through which the highway travels. This is of prime importance to both the highway user and the highway viewer. In rolling or mountainous areas, a curving alignment can be used effectively to conserve existing features of the terrain. As the alignment for a new highway is being developed, consideration is given to the view from the roadway itself and possible roadside vista points and rest areas for the enjoyment of the traveling public.

Aesthetic excellence has its birth in the highway planning stage and is often inherent in the highway location. In the following stages of design and construction, close attention to aesthetic details will ensure a completed product in which all contributors can take pride.

District 10 has produced some notable examples of aesthetically pleasing highways in the past. The district scenic highway committee's efforts will contribute to even better results in the future as it reviews and gives advice on each highway project from the start of planning through the completion of construction.





Although it may mean some loss of natural vegetation, the practice of "daylighting" to give travelers an unrestricted view of natural grandeur is highly desirable for adding dramatic values to the highway.

From the desk of R. J. Datel

(Editor's note: This credo on highway aesthetics written by the district engineer of District 5, San Luis Obispo, to his employees in that district's house organ, The ReVue, *is a perfect supplement to the Louis Kroeck article which precedes it. We are fortunate to have it so opportunely to reprint here.)*

We are aware of the natural beauty that abounds in the central coast region of California—of the ever changing coastline that varies from rugged mountains to rolling hills to broad sandy beaches—of the fertile Salinas Valley ringed by mountains carpeted in colors ranging from golden brown in late summer to brilliant green in early spring—of the large unspoiled reaches of San Luis Obispo County and the smaller picturesque ranches of the Santa Ynez Valley—of the charm of the City of Santa Barbara, home of the Queen of the Missions—of the colorful springtime fields of golden poppy and blue lupine of the Nipomo Mesa and of other areas in our district—of the sturdy oaks and stately eucalyptuses that dot our landscape in any direction we look—of the pines, the cypresses, the acacias, *Ceanothus* species, the oaks and the dozens of other inspiring trees and shrubs of the Monterey Peninsula. Yes, we are aware of this natural beauty and of how it enriches our lives, and we are aware of our responsibility—as public employees and as citizens of our state—to do our best at conserving this rich heritage.

We have other responsibilities as employees of the Division of Highways—we must be dedicated to providing a safe, efficient and economical highway transportation system in California. These three characteristics—safety, efficiency and economy—are not incompatible with beauty. A safe highway—one with wide medians, good sight distance, long-radius curves, smooth pavement, wide shoulders—can be a beautiful highway. An efficient highway—one with access control, a freeway—can be a beautiful highway. An economical highway—one stressing the use of widened cut sections, natural plantings and minimum signing—can be a beautiful highway.

It is the proper mixture of the four ingredients—safety, efficiency, economy and beauty—for each particular project that requires the maximum in skill, knowledge and experience. In District 5 we have been aware of this for some time and we have some good examples of aesthetic highways to show for our efforts. A few of these include Highway 101 through San Luis Obispo, north of Buellton, and through Montecito; Highway 1 between Cayucos and Cambria and the Carmel Hill interchange; and Highway 154, the new San Marcos Pass project which opens up some magnificent scenery.

Our critics say that we are interested only in speed and that we always build our highways as short and therefore as straight as possible. I say that user benefits are one of several factors we consider but that we try to build our highways to fit as naturally into the landscape as possible considering our design standards. If a straight line is the most natural, we will build straight lines. If curves are more natural, we will build long-radius curves.

Our critics say that we destroy natural beauty without feeling because we are insensitive to beauty. I say that we are responsible for removing trees, shrubs and natural growth and therefore do "destroy" natural beauty but *not* because we are insensitive to it. Wherever possible we replace the trees and shrubs removed with new ones. I believe we are just as sensitive as anyone about beauty because we also are people. I feel we are *more* aware of the natural assets of California than the average person because we *are* employees of the Division of Highways. No other organization in California, to my knowledge, public or private, plants as many trees, shrubs and ground cover plants each year or has as extensive a landscape maintenance program as we have. One example is our recent planting of 17,000 seedling Monterey pines along Highway 1 through Cambria to replace several hundred mature trees taken out during construction.

Our critics say that we use "scare tactics" in promoting freeways—that we quote statistics on lives lost and injuries sustained in order to scare people into accepting freeways. I say that freeways have proven to be the safest type of highway facility for vehicular traffic and that we can predict with reasonable accuracy how many lives will be saved and how many injuries prevented by building a freeway. I believe strongly that the one factor of the four previously mentioned that should not be compromised is safety. We can grow a Monterey pine, a live oak, a redwood tree, a California poppy—we cannot replace a life. As highway engineers we must in my opinion assign greater importance—where a compromise is necessary—to a person than to a tree.

Our critics say that we should build scenic highways, not freeways. I say that access control—or freeway de-

US 101 through San Luis Obispo, the headquarters of District 5, is one of the most beautifully landscaped sections of freeway in the state.

Right: Scenic view of Carmel Bay and highlands behind Carmel as seen from edge of Highway 1. Informal plantings of Monterey Pine and Cypress were placed by Division of Highways in early 1930's.

State Route 1 along edge of Santa Lucia Mountains in Monterey County, better known as Big Sur Country, is first route to be taken into the state scenic highway system.

sign—is the best friend the scenic highway has. To fulfill the intent of the scenic highway concept what happens outside the right-of-way is equally or more important than what we do inside the right-of-way. Access control provides everyone involved in scenic design with a valuable tool.

Our critics say that we have too much authority and therefore fail to do what the "public" really wants. I say that we must be, and I think that we are, willing to sit down and discuss our designs with anyone and everyone. We must have public acceptance for the highway program. We have a great deal of experience working with advisory groups, and we must always be willing to work with them. We must also realize that *we* are responsible for the design of state highways and be willing to make hard decisions when there is an honest difference of opinion between our advisors and us. We must listen with openness to the advice and council of others and, equally important, accept our responsibility with courage and conviction. Our critics, our detractors or our advisors need not defend our highway designs—it is Mr. Womack and you and I who must defend them. Let's not be in the position of looking at a mistake in design after it's built into a job and say, "We didn't want to do it this way, but the advisory committee wanted it." Rather, let us say under such circumstances, "We are responsible, we will correct it and we will learn by this mistake."

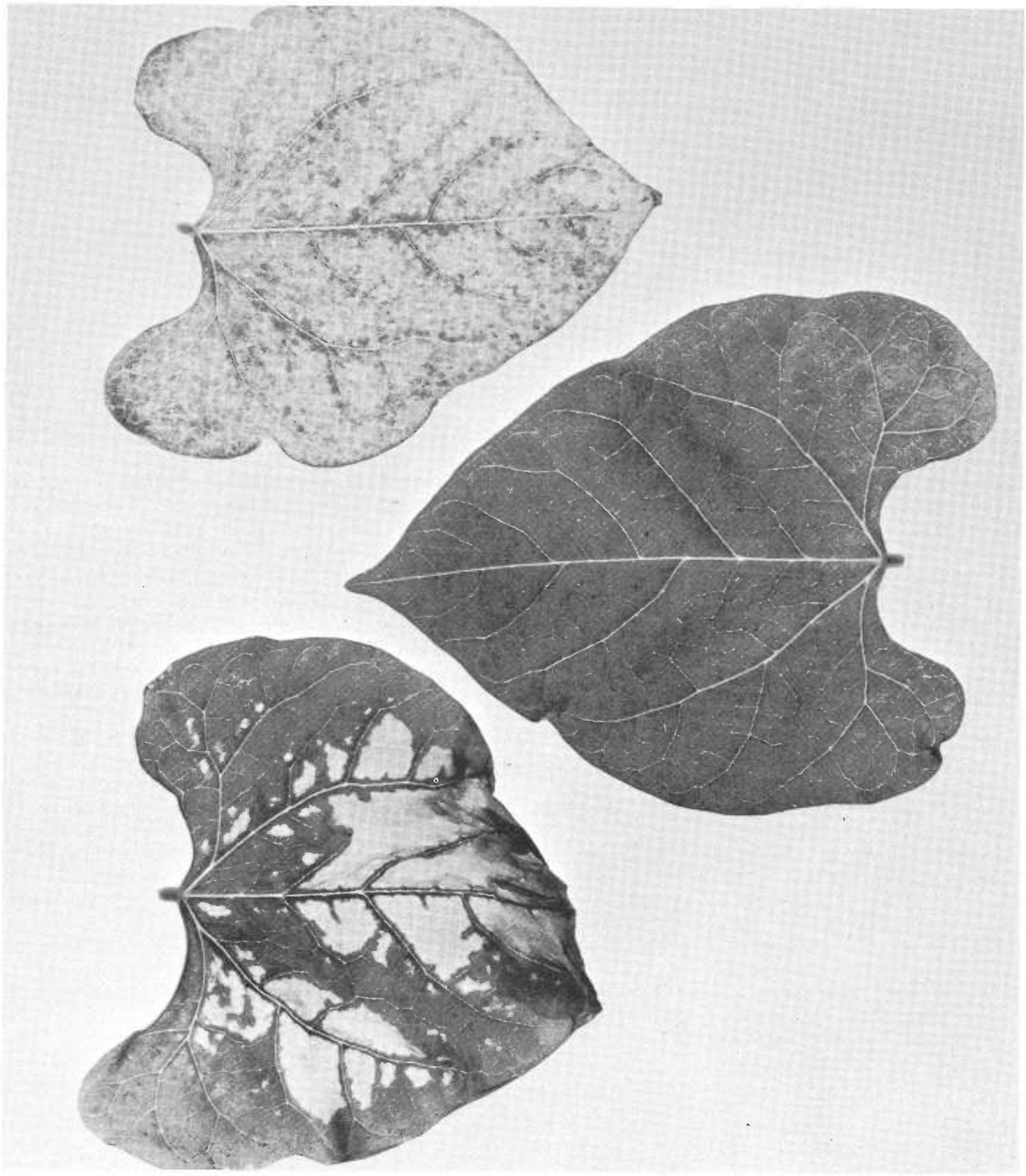
Our critics say that we can do a better job of aesthetic design—and I say we can do a better job. On this point I agree. For example, we can still improve upon our contour grading at interchanges by better handling of open drainage ditches or exposed drainage pipes and junction boxes. We can reduce the number of "things" we stick in the ground and entirely eliminate the orange survey markers that stick out like a sore thumb on scenic highways. We can insist that bridges are designed to eliminate the abutments or piers adjacent to the shoulders for both beauty and safety. We can design wider medians, split-level roadways and wider rights-of-way when appropriate. We can widen cuts and eliminate through cuts. We can strive to get better-than-minimum design standards especially for sight distance. We have done well in District 5—we can do better—and I say we will do better.

The State Highway Engineer sitting in his Sacramento office saying that we will do better will not make it so—but it is an important beginning. The district engineer standing here before you saying that we will do better will not make it so—but it is an essential ingredient. The aesthetic training course you are about to participate in will not make it so—but it is a step in the right direction.

How then can we do a better job? It will be done by you—by the same people who have designed, constructed and maintained the greatest highway system known to man. You will sharpen your technical tools, expand your creative ability, and I hope generate a great deal of enthusiasm for meeting the challenge of more sophisticated highway engineering—highway engineering that provides the best possible blend of safety, efficiency, economy and beauty in every job you turn out.

What's Up - in the Air

By Eric P. Grant



PINTO BEAN leaf damage by smog is visibly demonstrated in these pictures from University of California Air Pollution Research Center, Riverside. Plants on left and right have been attacked by sulfur dioxide and ozone. Center leaf is unaffected. Smog is responsible for $132 million in crop damage and loss every year in California.

Man has finally come to recognize that air is a valuable natural resource.

Either we conserve it or, as one eminent UCLA meteorologist warns, "Civilization as we know it will disappear within 100 years." The amount of air available to sustain life on earth is comparable to one coat of varnish on a child's world globe.

Today 70 percent of all Americans live on less than 10 percent of the land. Almost everything we do, from cooking food to driving an automobile, dirties the air.

Or to put it in more personal terms, not one of us would think of dumping his household trash in the middle of the living room. Yet this is exactly what we are doing to our atmosphere every day when we dump the wastes from home, industry, and transportation into the skies. Then we turn around and breathe this aerial "garbage."

We should really not be surprised that we have polluted our air in California. It would be surprising if we had not. The state grew in the 1930s and 1940s from agricultural economy to a great industrial complex centered in five or six sprawling metropolitan areas.

Take the automobile, for instance. We have 11 million in the state using between 18 and 20 million gallons of gasoline each day. The internal combustion engine which powers our vehicles is relatively inefficient. We lose into the air 10 percent of the total fuel we buy, or nearly 2 million gallons a day.

The irony of the loss is not only its smog potential, but its cost. The loss costs California car owners $666,000 every day of the year. To that must be added the cost of the damage done to humans and crops—a staggering figure.

Getting rid of auto-created pollution is an expensive proposition, but actual savings can be shown when they are related to the cost of installing control systems on motor vehicles.

In California we have an ideal climate in most places—abundant sunshine, mild breezes, moderate temperatures. These are mixed blessings.

It is California's sunshine which chemically converts the automobile exhaust materials and other pollutants of nitric oxide (NO) and unburnt hydrocarbons into organic ozonides which have the characteristic sweetish ozonelike odors of smog—but it is the nitric oxide and the resulting nitric acid which cause the insidious irritation and plant damage.*

Photo of Santa Ana-Hollywood freeways in Los Angeles, made on a clear day, shows large number of vehicles traveling freeways. State now has 11 million registered vehicles, will have 18 million by 1980. California can have more such clear days when control systems go on most cars in urban centers.

A layer of warm air, stretching over the Pacific from the Hawaiian Islands, acts as a lid, trapping the pollution-filled cooler air below. This air cannot disperse until the temperature inversion is broken or it stays at a fairly high altitude.

Let us talk for a moment about smog's effect on health.

We know, of course, about the terrible disasters of Donora, Pennsylvania, in 1948 and London, England, in 1952 and 1962 when thousands were stricken by severe smog and many actually succumbed. Fortunately, such a tragedy has never befallen California. But we know the eye irritation we feel on a smoggy day. And we know the nauseous feeling that comes over us when we drive through smog for any length of time.

The U.S. Public Health Service has confirmed the link between air pollution and increases in respiratory ailments. Emphysema, once an obscure disease, has grown to major proportions. Studies show that women between 18 and 30 living in metropolitan areas have a 400 percent greater inci-

* Smog consists of unburnt and partially burnt hydrocarbons along with nitric oxide (NO) from high-compression engines. This latter constituent is converted by sunlight and air to nitrogen dioxide (NO_2), which in turn reacts with the exhaust or other hydrocarbons forming organic nitrite compounds. These products promptly extract moisture from the air, forming smog, which consists of organic ozonides (having the characteristic ozone odor) and more nitric oxide, which starts its insidious action all over again.

Smog control has a twofold action: (1) to reduce the unburnt hydrocarbons in the air and (2) to eliminate the nitric oxides which cause the bulk of the trouble.

dence of lung cancer than those living in rural areas.

There are still other losses. California agriculture suffers approximately $132 million in crop damage every year because of smog, including destruction of crops, poorer quality, slower growth, and less production. Citrus tree experiments at Upland dramatically illustrate the differences between fruit produced in filtered air and fruit struggling for life in smoggy air.

Smog will peel paint from buildings, rot rubber and corrode metal. How much more frequently does the average housewife have to clean the house, wash linens or windows because of the filth in the air?

The chilling recital could go on and on.

Thus we can see that our polluted air presents a "clear and present danger."

California is not sitting idly by while the problem multiplies. It is the first state to permit strong local air pollution control districts with their own rules and regulations. Nine of these in 14 counties are working hard to stem industrial and domestic waste.

The state, in 1960, took over the unique job of reducing the poisons coming from our more than 11 million motor vehicles.

In 1951 Dr. A. J. Haagen-Smit, professor of biochemistry at Caltech, proved that automobile fumes, in the presence of sunlight, converted to smog. Up until that time, Angelenos had blamed everything else under the sun for the pollution plague.

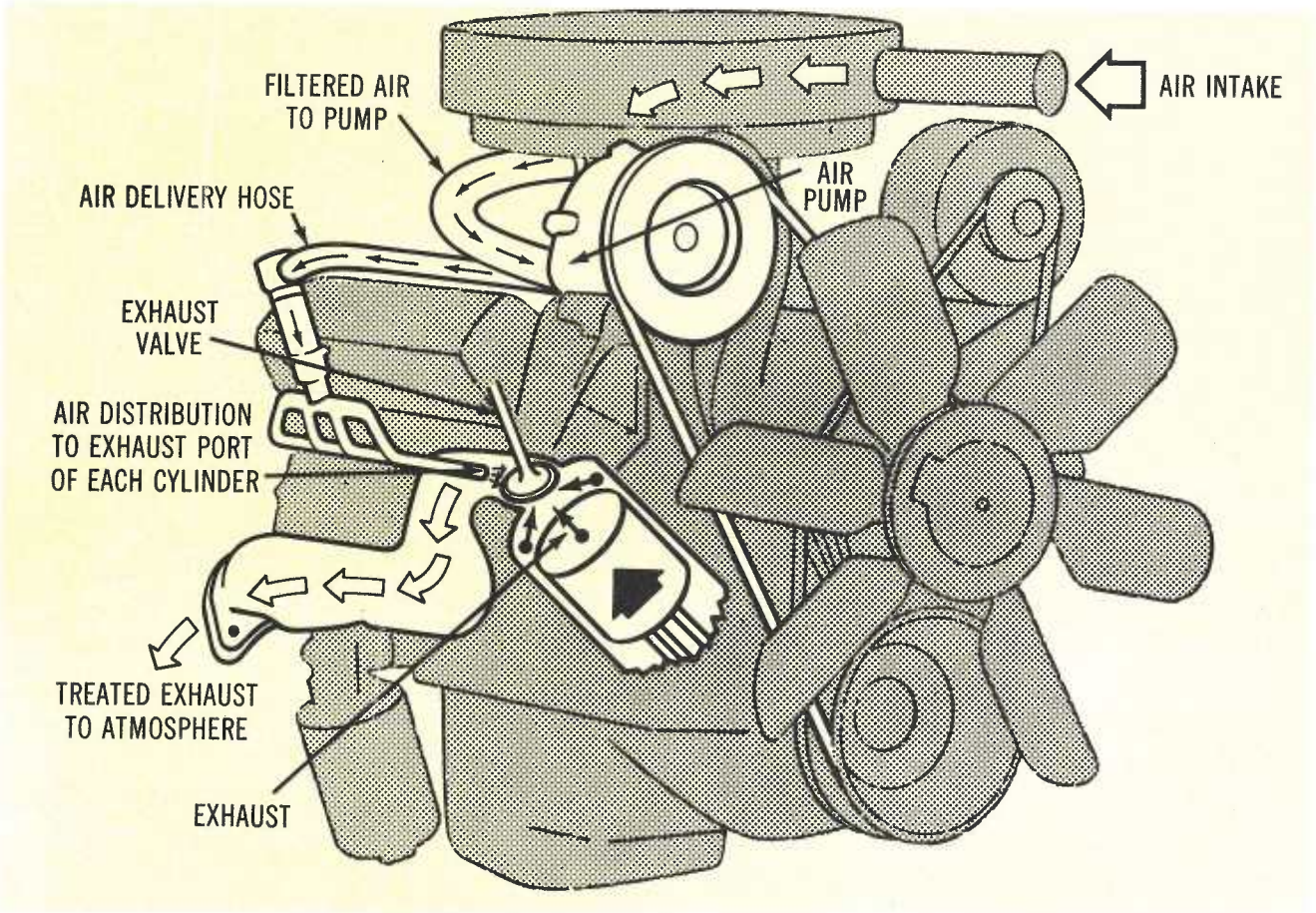
While it is true that almost every human activity contributes to air pollution, not all pollution becomes photochemical smog, except under the proper meteorological conditions, such as those enjoyed in California and other sunny climates.

The menace of auto-created smog becomes more pronounced in California as our car population continues to grow at 5 percent a year. In Los Angeles, the Air Pollution Control District acknowledges that 90 percent of that area's smog is from automobile waste. The San Francisco APCD says 56 percent of the bay area's problem originates with the motor vehicle.

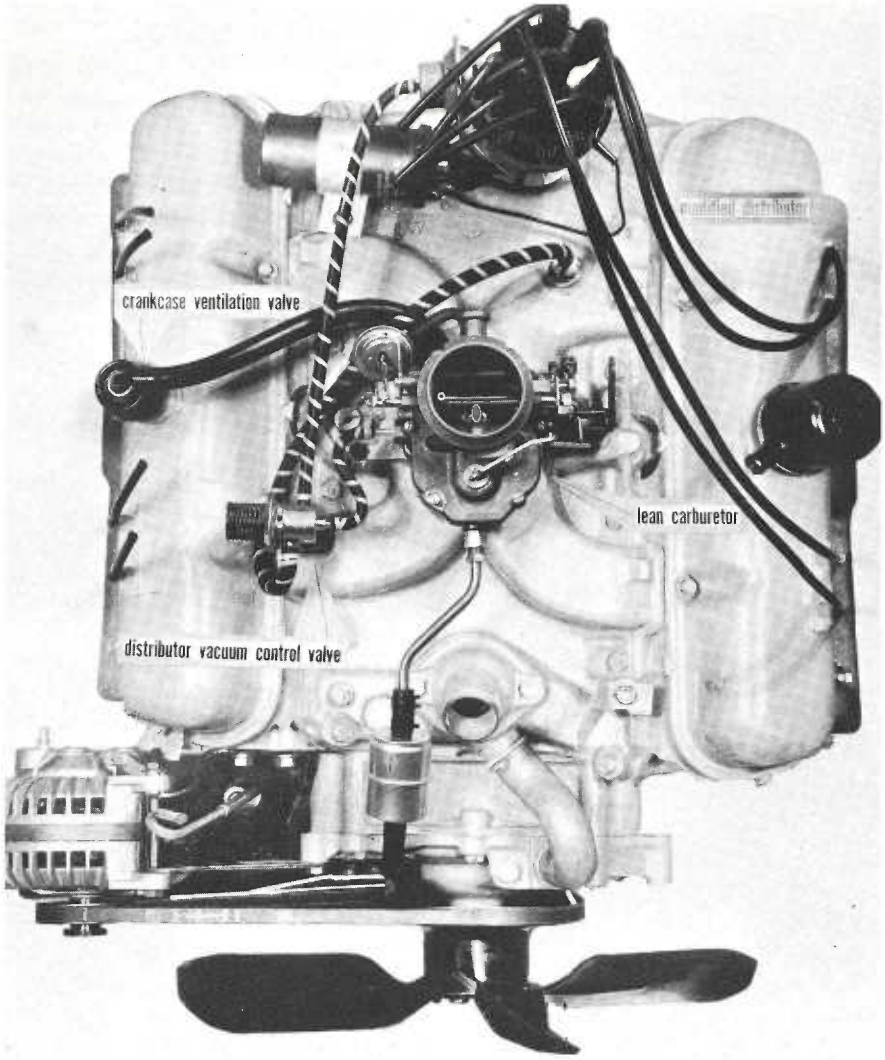
Since the automobile does not observe county boundaries, the problem is statewide. An automobile traveling from San Francisco to Los Angeles, for example, is a little smog "factory," leaving behind its trail of contamination in every county through which it passes.

The State of California became involved with auto smog in 1959 when Governor Edmund G. Brown requested the Legislature to direct standards. The lawmakers followed this action in 1960 by establishing the Motor Vehicle Pollution Control Board to test and certify control systems that would reduce emissions to Health Department standards.

Originally some people believed that if only exhaust gases were controlled this would solve the auto smog problem. Upon further investigation, engineers found that the crankcase was a repository of fumes vented to the air through a small breather tube. These fumes account for 25 percent



This cutaway schematic shows the operating principle of the General Motors air injection reactor system for exhaust emissions control. Heart of the system is a belt-driven pump that sends fresh air to a point near the exhaust valves. Fresh air promotes further oxidation of hydrocarbons and carbon monoxide emerging from the cylinder, changing them to water and carbon dioxide.



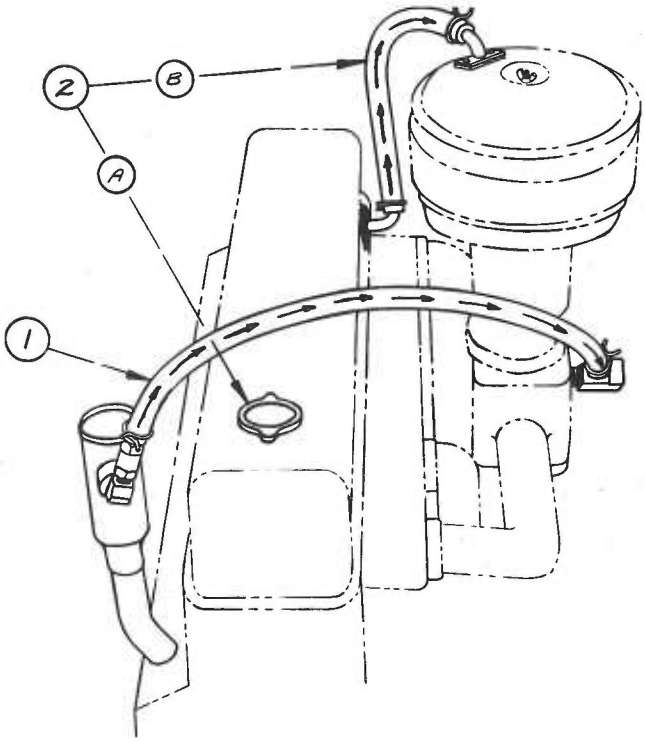
The Chrysler cleaner air package controls carbon monoxide and hydrocarbon emissions by providing optimum burning conditions in the cylinders.

of total unburned hydrocarbons (raw gasoline), while the exhaust contributes 60–65 percent and all of the carbon monoxide. A small amount also comes from fuel tank and carburetor evaporation.

The State MVPCB tackled both the crankcase and exhaust emission problems, but the former offered the greater prospect for simple solution. Automotive men had known for a long time about a breather tube from the crankcase to the air cleaner used by British car manufacturers and the U.S. Army for years to keep dirt and dust from working their way into the engine and to prevent sludge formation in the crankcase. Adaptation of this system for crankcase fume control, therefore, seemed logical.

Approved crankcase devices have been on most new California automobiles since 1961. Many are factory equipped, while thousands of other vehicles have added the devices under state requirements at time of ownership change. Today at least 6 million registered California vehicles are thus equipped, preventing the addition of 300,000 gallons of unburned gasoline from entering the atmosphere every day.

But the main problem still remains exhaust emissions. The 1966 model vehicles now being sold in California are virtually smog-free.



POSITIVE CONTROL—This "closed" positive crankcase ventilation system is approved for installation on both used cars and on new cars. Shown at right is the operation of the system during adverse conditions of high speed or extreme acceleration with a worn engine, when "blowby" tends to exceed the capacity of the original system.

If every one of Los Angeles County's 7 million residents could step into a '66 model tomorrow instead of the polluters they now drive, smog in that area would be trimmed by 70 percent.

The story of exhaust control by the state began in 1961 when the Motor Vehicle Pollution Control Board published its standards and criteria for the operation of the systems. Basically they said that hydrocarbons (raw gasoline) must be reduced to 275 parts per million of air and carbon monoxide to 1.5 percent by volume. This was a high dive into the relatively unknown field of "parts per million" chemistry.

To the everlasting credit of private initiative, dozens of America's largest and most reputable manufacturers decided to enter the race for the exhaust control market in California with the investment of millions of dollars in research and their finest engineering talent.

The problem was one of the toughest technological challenges they ever faced because of the necessity of fitting more than 500 different makes and models, operating under a variety of driving conditions, and in various stages of upkeep. Not only that, the devices had to meet other criteria of safety, heat, noise, efficient operation, longevity and, of course, cost.

The first automobile company system to be certified was the Chrysler Cleaner Air Package, approved in November 1964, and now going on all 1966 Chrysler products sold in the state.

The Chrysler CAP is an engine modification system consisting of a modified carburetor, a slightly altered distributor, and a sensing valve to control spark adjustment during deceleration. The carburetor has lean fuel jets, a modified choke calibration, and the idle set to lean adjustment. The distributor is so arranged to provide spark retard while the car is idling.

"Heart" of the system is a special vacuum-operated valve, mounted between the distributor and the carburetor. The valve senses the change in manifold vacuum when the car decelerates and "instructs" the distributor to provide the maximum spark advance at this time to provide efficient burning and thus reduce hydrocarbon and CO emissions.

The air injection reactor system, now being used by General Motors, Ford, Rambler, Kaiser Jeep, and some International Harvester station wagons, was approved by the MVPCB in July 1965, in time for installation on 1966 models. The system is the result of the greatest crash program ever undertaken by the automobile industry during peacetime.

It works on a different principle from the Chrysler CAP. It consists of a pump which sends a supply of fresh air through distribution tubes to each exhaust port in the cylinder head. There are also modifications to the carburetor and distributor. The fresh air hits the exhaust gases at their hottest point just as they come from the combustion chamber and completes combustion. In some respects, the system is like having an "afterburner" in the exhaust manifold, or, to put it another way, the system is similar to adding air to a smoldering blaze; the oxygen speeds and completes the combustion process.

Both systems do require some minor periodic maintenance, but no more than recommended by the manufacturer in the car owner's handbook to assure proper timing and carburetor adjustment.

Actually, if the car owner follows the manufacturer's recommendation, he will not only be helping to reduce deadly auto fumes but also assuring himself a longer-lasting, smoother-operating automobile.

Today, state-OK'd exhaust systems on '66 models in California are preventing the contamination of the air by 80,000 gallons of hydrocarbons and 1,200 tons of carbon monoxide every day.

The efforts of the California Motor Vehicle Pollution Control Board, and the devices that are going on vehicles, have done and will continue to do an effective job of controlling motor vehicle pollution. Other areas of state activities have also contributed greatly to the elimination of air pollution in the State of California.

There is no peer to the California highway system. Although there are those who will question its efficiency at 5 o'clock on some weekdays, it goes without saying that it is the best

State Senators Stan Pittman, Carl Christensen, and Randolph Collier, grouped in center, along with other members of special committee on vehicle pollution control, inspect emission testing equipment at Detroit automobile plant.

Assemblyman Tom Carrell, left, and State Senator Randolph Collier, chairmen of legislative transportation committees, join Governor Brown as he signs key piece of auto smog legislation. Both legislators have pushed highway and smog control measures.

means of moving masses of vehicles anywhere in the world. This efficient moving of traffic has had its beneficial effects on air pollution:

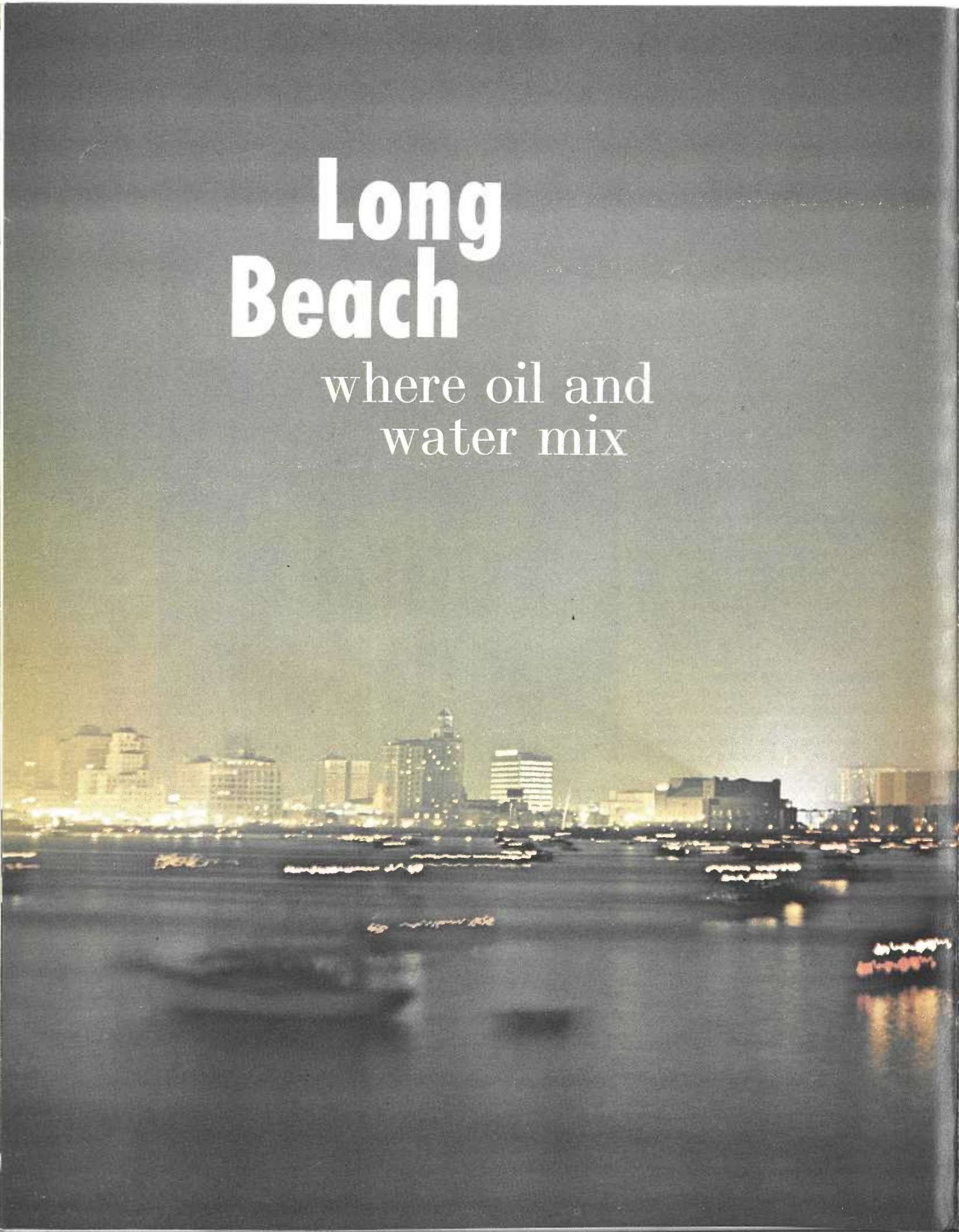
First, the basic premise of freeway construction is to move traffic rapidly at sustained speeds. We know that emissions from a motor vehicle are 20 times higher on deceleration than on cruise. It should be very evident, therefore, that with the increased traffic flow resulting from our excellent freeway system, emissions are substantially reduced.

Second, one of the premises of freeway construction in California is to provide a means for traffic to circumvent metropolitan areas. This prevents motor vehicles from becoming involved in congested metropolitan areas, where smog is most severe. Although it doesn't eliminate pollution, it spreads it out over a wider area and therefore minimizes concentrated impact on the metropolitan center.

Certainly the readers of *California Highways* are well aware of the magnificent job that has been done to provide first-class highways to handle the anticipated increase in vehicle population. State Senator Randolph Collier, Chairman of the Senate Transportation Committee, and Assemblyman Tom Carrell, Chairman of the Assembly Transportation Committee, have been strong supporters of an effective freeway system. They have not, however, neglected to recognize the importance of controlling the motor vehicle. Under their able leadership, key legislation supporting and augmenting the vehicle emission device control program has been passed by the California Legislature. Senator Collier's Senate Bill 317 was the strongest legislation and most effective direction of legislative interest in this program ever passed in the United States.

The strong recognition of the health effects of air pollution and the achievement of control expressed in SB 317 probably, more than any other action by the State of California, awakened the federal government to the necessity for controlling emissions from motor vehicles.

The cooperative effort developed under the administration of Governor Brown, the Legislature, the Motor Vehicle Pollution Control Board, and American industry has resulted in a dynamic program on many fronts to protect an important natural resource, air. Although our problem will not be solved in a year or two, we know that air pollution as it existed yesterday and as it exists today will not be present tomorrow.


Long
Beach
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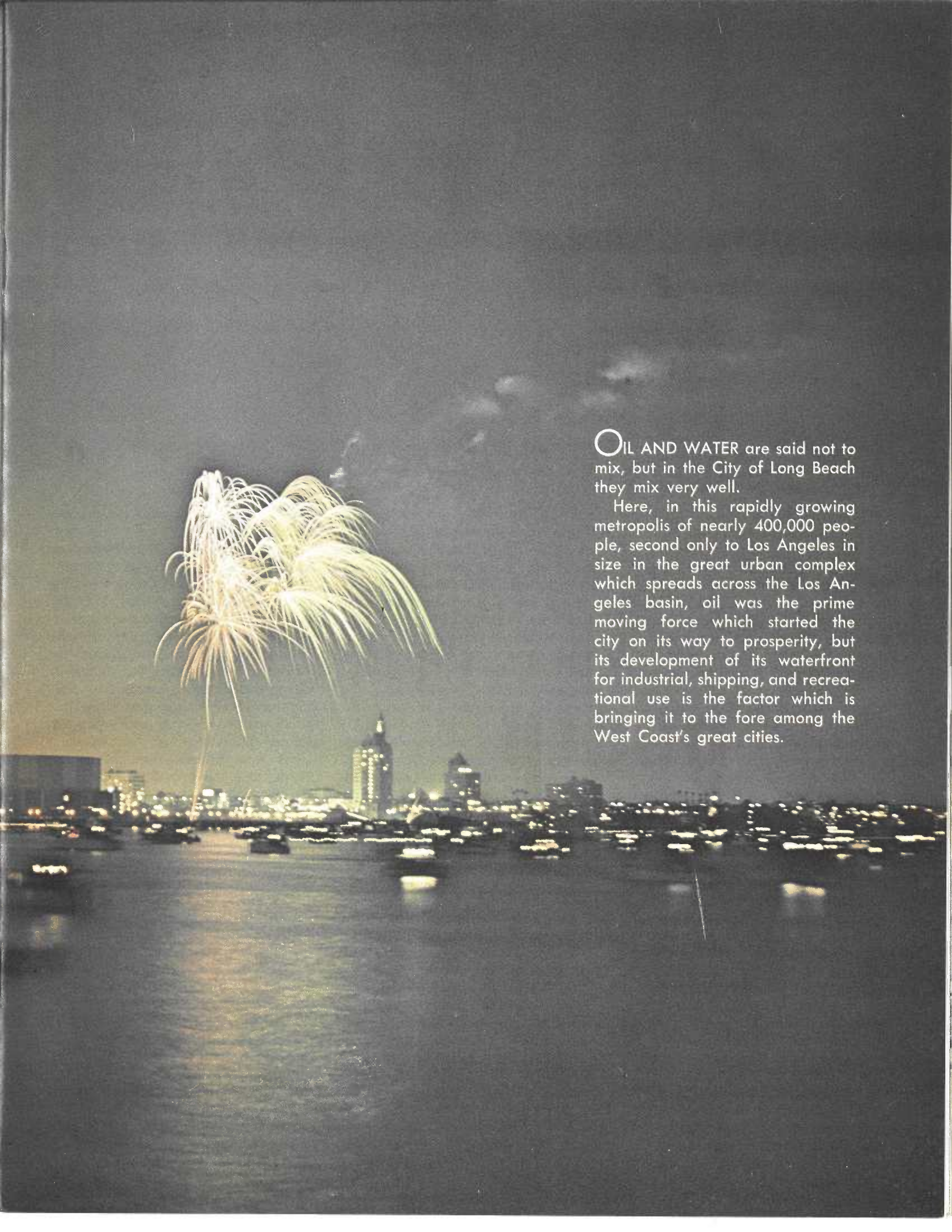


OIL AND WATER are said not to mix, but in the City of Long Beach they mix very well.

Here, in this rapidly growing metropolis of nearly 400,000 people, second only to Los Angeles in size in the great urban complex which spreads across the Los Angeles basin, oil was the prime moving force which started the city on its way to prosperity, but its development of its waterfront for industrial, shipping, and recreational use is the factor which is bringing it to the fore among the West Coast's great cities.

Aerial view of Long Beach shows relationship of city to harbor. New Pier J development in foreground, and Los Angeles River coming diagonally in from far left. Rainbow Pier with its convention center will be incorporated into the shoreline development plan (see next page).

Since Long Beach at one time was a landing place for contraband in the early days of the state's history, the famous Signal Hill got its name as a point from which signals could be shown to tell smugglers' boats when the coast was clear. By the 1880's the slowly growing town was enjoying some attention as a seaside resort, and a number of piers and hotels appeared along the beach.

It was not until the 1920's that Signal Hill was discovered to be a great dome with fabulous riches in oil beneath it, and the development of the modern city started. A little later, the Navy decided to use Long Beach as a base and the city's modern pattern was set —oil, Navy, shipping and recreation. By World War II a fifth element—aviation—was added with the development of the Douglas Aircraft Plant and associated industries.

Long Beach today is California's fifth largest city, geographically a part of but a separate entity in the sprawling Los Angeles urban complex. Its port facilities and its naval shipyard are the most modern in the U.S., but at the same time it has the world's largest municipally owned marina for small pleasure craft, and the world's largest roller coaster.

Scattered all through these facilities are oil wells, for the land has oil in great pools everywhere beneath the surface, in one of the earth's great fields. In the harbor area, groups of as many as a dozen or more pumps can be seen working in a long row, only a few feet apart. Directly adjacent may be a long wharf with ships loading for Japan, Ceylon, and Melbourne.

Along Ocean Avenue a dozen new or still-building high-rise structures punctuate the skyline, for the city is running short of land. Added to its unusual combination of recreation, shipping and industry, is its share in the second largest economic market in the United States.

Possibly today Long Beach's biggest business is its harbor, which has 52 modern deepwater berths, with plans firmed for 28 more soon. Annually, over 2,000 ships call at the port, more than half of them bearing foreign flags. Cargoes through the port approximated 15 million tons last year, roughly valued at an average of $100 a ton, or one and a half billion dollars.

More money has been spent on the Port of Long Beach since World War II than any other in the nation with the exception of New York, but the port's history goes back to the early 1900's. At that time there were no facilities at all. Ships anchored off shore and lightered their cargoes to land.

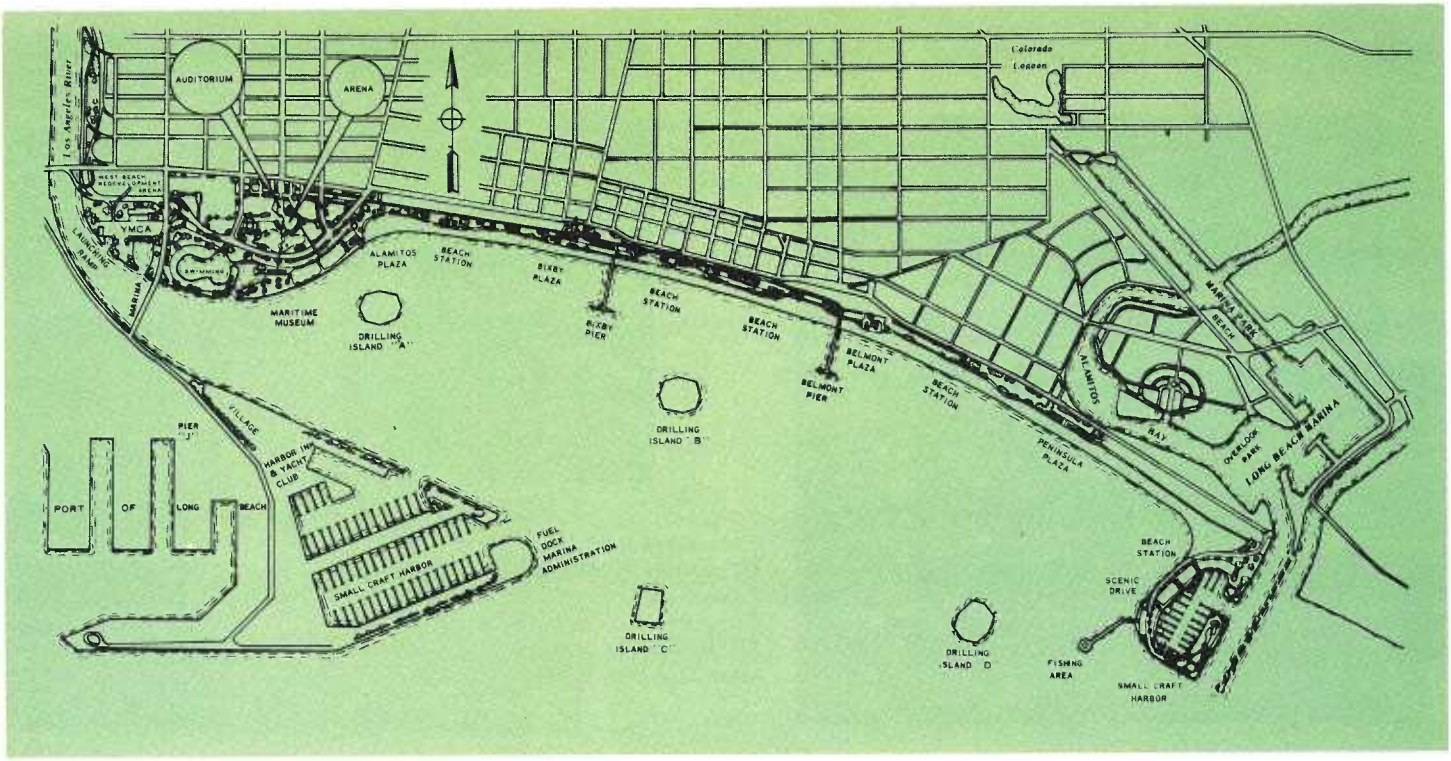
The area encompassed by the joint San Pedro-Wilmington-Long Beach harbor facilities today was then a weary looking expanse of mudflats and shallow estuaries—created through the centuries by the vagaries of the changing channels of the Los Angeles River.

The first contributions came from the federal government, for there was a growing demand for a harbor to serve the Los Angeles basin communities. Then in 1909 the people of Long Beach approved a modest $245,000 bond issue for the city's own harbor, and Pier 1 was constructed. At the dedication a long parade of jubilant citizens marched from downtown to attend the ceremonies at the new pier. Typical of the shipping of the times, the first two vessels to use Pier 1 were lumber schooners.

As time passed, more substantial bond issues were voted, and the mudflats were slowly raised with dredgings from the channels. By 1930 the harbor could berth five large vessels simultaneously. This year also federal funds were made available for construction of a breakwater, creating an outer harbor.

Although Shell Oil had brought in the first well in 1921 at Signal Hill, in 1936 the even richer coastal and offshore Long Beach and Wilmington fields were discovered, and the city owned much of the land lying over them. While military activities during World War II stimulated further harbor development, the oil fields were to prove the city's best source of money for port improvements.

Income from the wells was in the multi-millions, but the wells brought a new problem. As early as 1940 considerable subsidence in certain areas of the harbor complex was being noted,



Map above shows plan for the city's ultimate development of its waterfront through its Pier J and Shoreline Development Plan (city street pattern has been simplified).

and in the ensuing decade the situation rapidly worsened. By 1957 an area of 16 square miles had subsided from 2 to 24 feet. So serious was the situation, the Navy was considering closing its naval shipyard on Terminal Island. Since the yard employed 6,500 people with an annual payroll of $30 million, this would have been a serious blow to the city's economy.

Consulting engineers and geologists called in to study the problem recommended injection of sea water into the subsurface area. In 1953 this plan was adopted, with installation of a pilot waterflood plant on Pier B. Subsidence continued however, and in 1957 the injections were greatly increased. By 1960 a total of 260 million barrels of water had been forced into the ground, and the subsidence was checked.

Nevertheless, the damage was enormous. In addition to the cost of water injection, subsided areas had to be built up again, and when the work was completed, the city found it was out of pocket nearly $60 millions. There was, however, something of a return for this work in that the flooding forced more oil up which would not have been recovered otherwise. This type of operation is now common in the oil fields.

Today the city boasts the largest dry cargo port on the West Coast, with a net operating profit for the port of more than $1 million each year, and revenues are constantly rising. Ports such as Richmond handle greater tonnage, but this is almost exclusively oil, carried through pipelines operated by computers, and is a relatively simple operation.

Great portions of the port have been built with fill dredged from the channels, and places where the ocean waves once rolled in unimpeded are now solid ground and long stretches of piers. Expansion of the harbor by dredging and filling continues, just as the city continues to automate cargo handling facilities, and provide the most modern equipment for moving freight.

In Long Beach Harbor today there are expensive installations for handling all sorts of dry cargo. Among the port's other claims to fame is its shipment of iron ore—greatest in the country—virtually completely automated. One company imports industrial salt which it stores on the pier in great mountains, and moves with big shovels and conveyors. Another has a 24-stories-high elevator exclusively for the movement of grain. The structure holds over 2 million bushels, which it can load into ships at the rate of 1,300 tons per hour. Mile-long freight trains from the Midwest, loaded with milo and wheat, move into position at a hydraulically operated unloader which tilts a car every three minutes and dumps its load on conveyor belts.

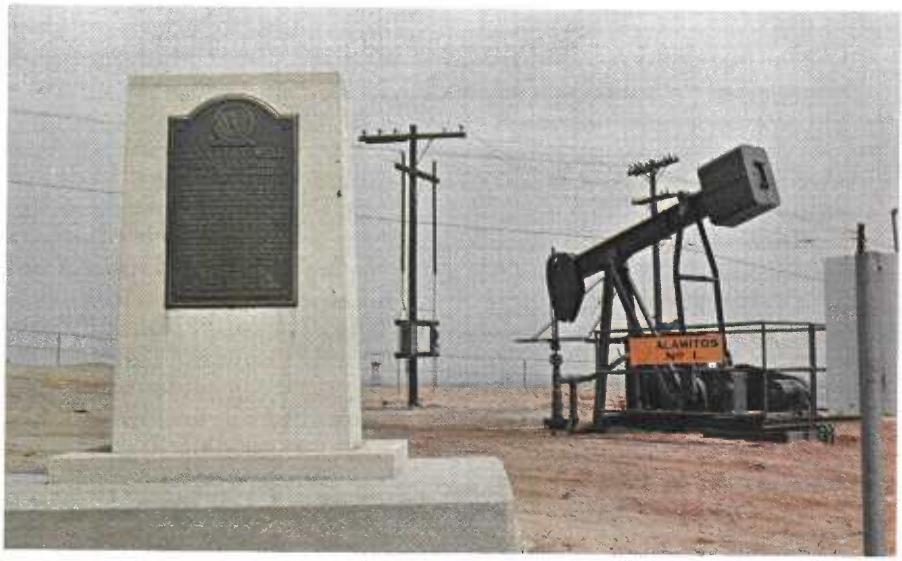
Pier E is fitted for super vessels—one of the few facilities in the world suitable for berthing the huge modern tankers of more than 100,000 tons being built today. Great gantry cranes move up and down Pier D loading cargo where they are needed. At the bulk oil terminal on Pier E, pipelines two feet in diameter can suck up 32,000 barrels of crude oil from the huge tankers and deliver it to storage areas.

A $3 million terminal exclusively for handling bananas is the only one of its kind in the U.S., able to take shipments directly from freighters into its processing shed. Its cranes and conveyor belts can handle 100,000 boxes of bananas per eight-hour shift into storage facilities which will take 200 carloads of fruit. About 160,000 tons of bananas are handled each year through this facility, servicing the entire western third of the U.S. and parts of Canada.

Just to the west of Pier E lies the Long Beach Naval Shipyard and Naval Base, now one of the major U.S. shipyards. One Navy crane in use here can lift 425 tons, and the drydocks can handle the largest ships.

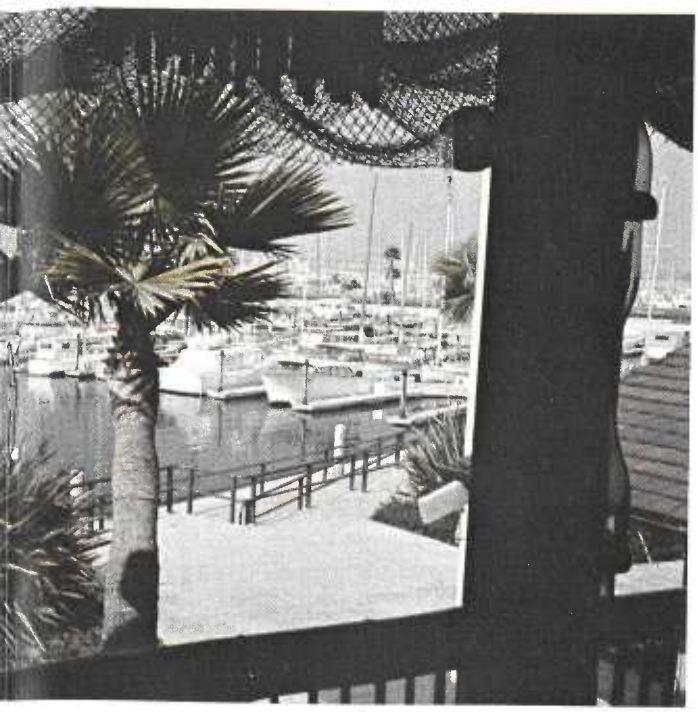
Piggyback shipment of truck trailers to East Coast ports is expanding. One company, moving half a million tons of special cargoes annually, operates a fleet of ships which carry the company's own trailers, designed to fit snugly into the holds and on deck. Frozen foods and perishables requiring refrigeration are picked up at the customer's door, and delivered without further handling on arrival on the East Coast. Trailers have their own refrigeration which can be connected to

Looking east on Ocean Boulevard in vicinity of Atlantic Avenue Intersection, downtown Long Beach. Villa Riviera in distance is old landmark, but other high-rise buildings are new.



Monument has been erected to commemorate Shell Oil Company's Alamitos Number One well, which struck first oil from Signal Hill field June 25, 1921.

Coeds at Long Beach College pose to give scale to one of the pieces of modern sculpture on campus.



One of many small craft berthing facilities in Long Beach area.

Long Beach skyline as seen from harbor area.

Beaches are long and wide, with apartment buildings clustered right behind.

Old photo made in 1923 shows bathing beach, amusement area, and old beach structures. This area has been entirely renovated.

Harbor area as seen from Edison Plant in 1926. Pipes are for dredging operations which even then were creating new land for harbor development. San Pedro and Point Fermin in distance.

the ship's power once the trailer is on board, and constant temperatures maintained.

Included in these loads are frozen citrus concentrates, grapes, prunes, potatoes, melons and shrimp, as well as chemicals, candy, wines, liquors, and other commodities for which the East Coast cities constantly hunger. They arrive in perfect condition, with greatly reduced shipping cost. The company is currently doubling its handling facilities at the port and has plans for larger ships carrying half again as many trailers.

But this is just a minor portion of the truck traffic which operates out of the harbor area. More than 1,000 trucking companies service Long Beach Harbor, and if all the trucks which leave the port each year were lined up bumper to bumper, the line would extend from Long Beach to Chicago. Another 1,300 truck companies serve the city, as well as three railroads, part of the facilities for which are city owned.

The Long Beach Freeway ends at the harbor, handy for truck movements taking ship cargo to further destinations. From this freeway the trucks have access to the state's great highway network. Only a few miles away is the San Diego Freeway, now developing as the major north-south coastal route in southern California. North of Long Beach this route travels through dozens of southern California cities to join the Golden State Freeway at the upper end of the San Fernando Valley. If the driver desires to travel east, he easily reaches the Santa Ana Freeway, which he can take either into downtown Los Angeles, or branch off of it onto other freeways which are part of the Interstate System and go all over the U.S.

Truck travel times have been much facilitated by the freeway system, which in turn is a great help in the rapid movement of materials coming in by ships. By freeway, travel time for trucks from the harbor area to downtown Los Angeles is now less than an hour, only 15 minutes to the Long Beach Airport. Although the San Diego Freeway crosses the northern part of the city close to the airport and Signal Hill, an additional crosstown freeway further downtown is in the planning stage. And as the freeway system is perfected, travel times both to local and distant points are constantly being reduced.

Currently under construction, with tidelands oil money, is the new high-level Gerald Desmond Bridge, which will connect Long Beach and Terminal Island, greatly speeding the movement of traffic through the harbor area, with an interchange at the east end giving direct access to the Long Beach Freeway. Total cost of the project, including construction, movement of disturbed facilities, right-of-way, and similar items, will be close to $20 millions. The new bridge will replace the obsolete and unsatisfactory pontoon bridge which now crosses the harbor entrance channel.

Biggest Long Beach payroll is Douglas Aircraft, with 30,000 employees when operating at full employment. There are dozens of other aircraft and associated industries, as well as numerous plants operated by the big corporation names in America today.

The city's other big industry is tourism, greatly stimulated by Long Beach's own efforts to create as interesting and pleasant an environment for visitors as possible. Developments in this vein include the fine marinas, protection of the city's eight miles of beach, and excellent accommodations.

The city has continued to improve on its image as a sea town. Even the harbor area has been developed as a tourist attraction with its "See-Lane Tour." This is a marked course over

which visitors can drive and see the harbor's main attractions.

One of these is the Pacific Landing complex, with restaurant, boat launching, tackle shop, and sportfishing vessels of all sizes. From these facilities the city claims access to the number one sportfishing area in the world. Here too is an airplane terminal with scheduled flights by seaplane to Catalina Island.

The Long Beach Marina in Alamitos Bay, on the southern edge of the city, is an outstanding achievement with public funds. Here there are berths for more than 2,000 small craft.

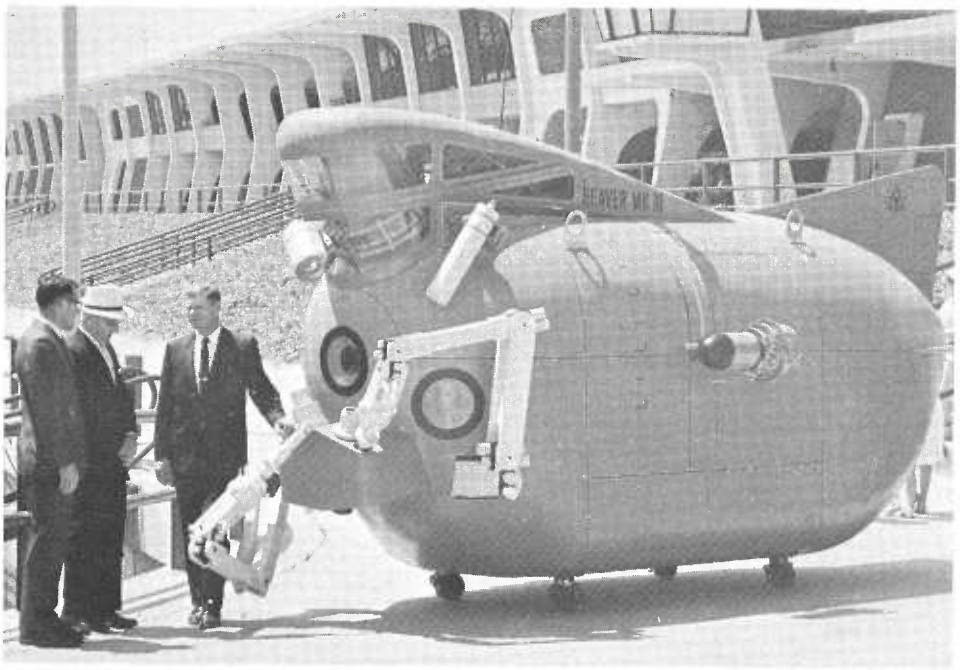
A part of this marina is the Leeway Sailing Club, with over 500 junior boating enthusiasts who make up its membership. Youngsters 7–18 attend daily classes during the summer and learn good sailing techniques, good seamanship, and maintenance of sailing craft. Twice each week there are sailing competitions. In the years since 1932 when the club was founded, it has graduated more than 50,000 youngsters from 31 different nearby cities.

Certainly one of the most ambitious projects among western cities is the Pier J and shoreline development plan. With additional fill on the city's side of the Pier J portion of the harbor, the city will create an entirely new marina double the size of the Alamitos Bay Marina, plus motels, restaurants, and yacht club installations. A new bridge will extend Magnolia Avenue to give access.

The present Rainbow Pier at the Civic Auditorium will be eliminated, with extensive fill and pier construction which will provide parking, swimming, more motels, restaurants, a visitors' marina, and a number of other attractions, all imaginatively landscaped. Heart of this section will be the Civic Auditorium and the Arena seating 17,000 people, with 58,000 square feet of exhibitor space.

Included also in the Pier J plan and its associated features, eventually representing a $250 million investment, will be a shoreline drive, additional pier facilities and beach developments, and several offshore oil drilling islands. These latter will also be attractively landscaped, so that the drilling machinery will be hidden from the view of those on the shore.

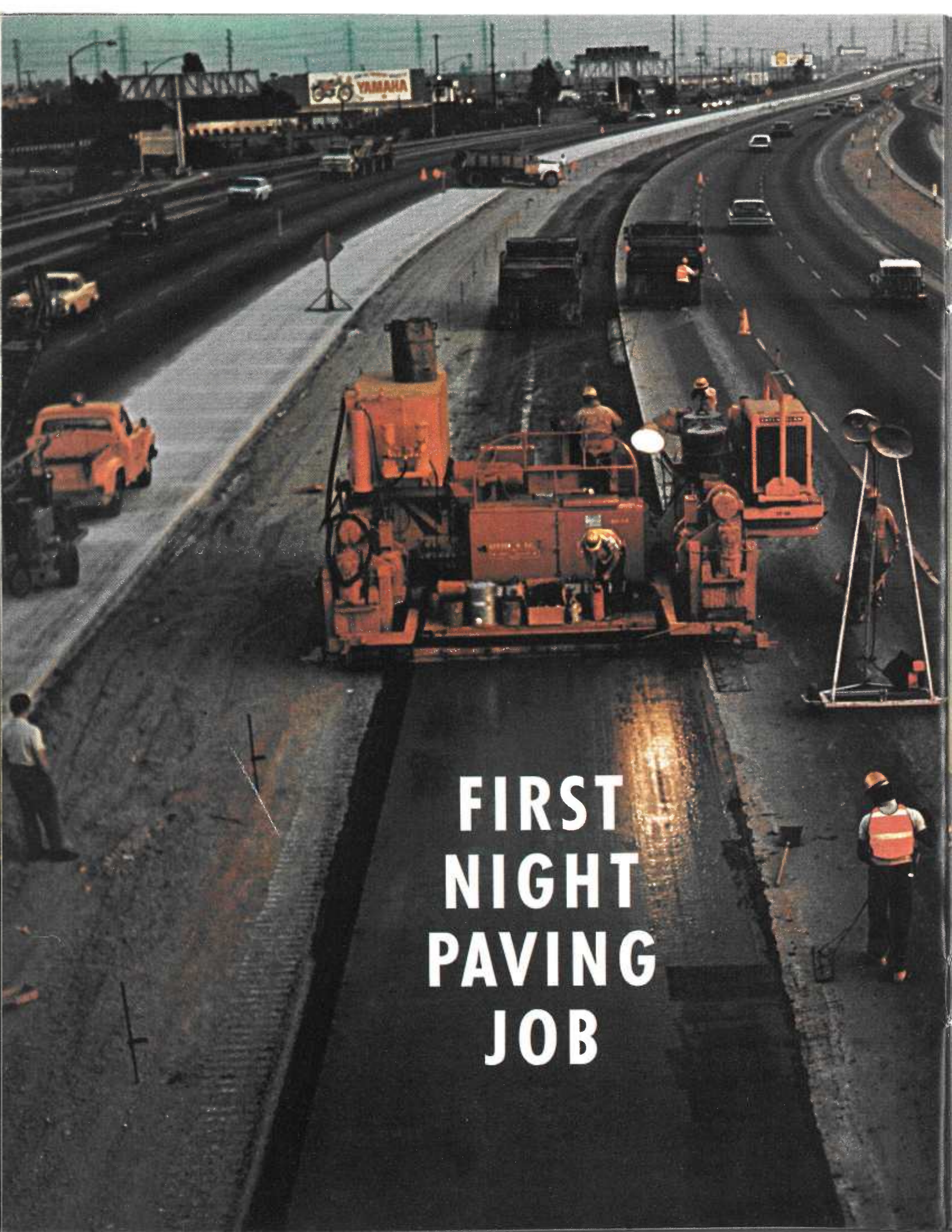
Long Beach today stands on the threshold of becoming one of the West's most imaginative, water oriented cities, rivalling the charm of Italy's Venice and Turkey's Istanbul.



Arrangements have been recently completed for private industry to take over Navy Landing for use as center for oceanography study.

To alleviate parking problem at beaches, city has constructed paved parking lots right on beach.

In canal district of Naples section of Long Beach there are boat berthing facilities directly adjacent to private homes.



FIRST NIGHT PAVING JOB

By Charles F. Gustafson

Twenty-six miles of single-lane concrete poured at a rate of more than 1½ miles a night and completed in 16 working nights was the recent accomplishment on a widening project on the Long Beach Freeway in Los Angeles.

The job was the first nighttime paving ever tried in District 7 and would have taken at least 35 working days to complete because of the heavy traffic using the freeway during the daylight hours.

Working at night not only eliminated interference with heavy daytime traffic but also made it possible to have longer continuous working shifts. Cooler night temperatures slowed down the often too rapid initial drying rate of the freshly laid concrete and contributed to final good paving results.

The Long Beach Freeway, six lanes prior to the widening, carries around 120,000 vehicles on an average day. To handle this growing traffic load, contracts were awarded last December to add two lanes in the median from the San Diego Freeway north to the Santa Ana Freeway interchange—some 13 miles.

However, the problems of paving during the day loomed large.

Since the new lane would be directly against the existing pavement, safety dictated that the inner fast lane of the freeway would have to be closed, funneling traffic down to two lanes in each direction and backing up traffic for the entire length of the job in both directions. Also, with normal 9 a.m. to 3 p.m. working hours (lanes could not be closed during the morning and evening rushes) little paving would be completed in any single working day.

Why not pave at night? the contractors suggested. There would be little or no interference with heavy traffic, longer working shifts and cooler temperatures—thermometers in Los Angeles can hit 95 and higher in June and July.

But night paving was pretty much of an unknown quantity, often considered but never previously adopted in District 7. The difficulties and hazards were apparent. But not overwhelming, said Rich H. Gerald, resident engineer for the state on the project. After discussion and review of signing, lighting and other safety problems, he agreed.

Night paving began June 13. Every week night from 6:30 p.m. to 6 a.m. the lane nearest the median in each direction was closed. Paving operations started about 7 p.m., after the evening traffic peak, and continued to about 3 a.m. They were followed by finishing work and application of curing compound until 6 a.m. The freeway was then opened to its full six lanes for the morning traffic wave.

The paving was laid by two crews, operating two slipform pavers. One crew started work at the south end of the project; the second worked north from about the middle of the job. Completing the new northbound lane, the two crews worked back, paving the new southbound lane.

The two pavers were supplied by a fleet of over 30 dump trucks working out of a centrally located batch plant. The pavers moved forward constantly at 16 feet per minute. The pavers included vibrators, screed and floats so that the continuous slabs 8 inches thick and 12 feet wide were fully completed after the machine passed, except for normal finishing, dragging for texture and the application of curing compound.

Dump truck load is dropped in front of 12-foot slipform paver. Vibrator rods agitate batch, eliminate air pockets in shaking down mix. Finishers, rear, smooth newly poured concrete.

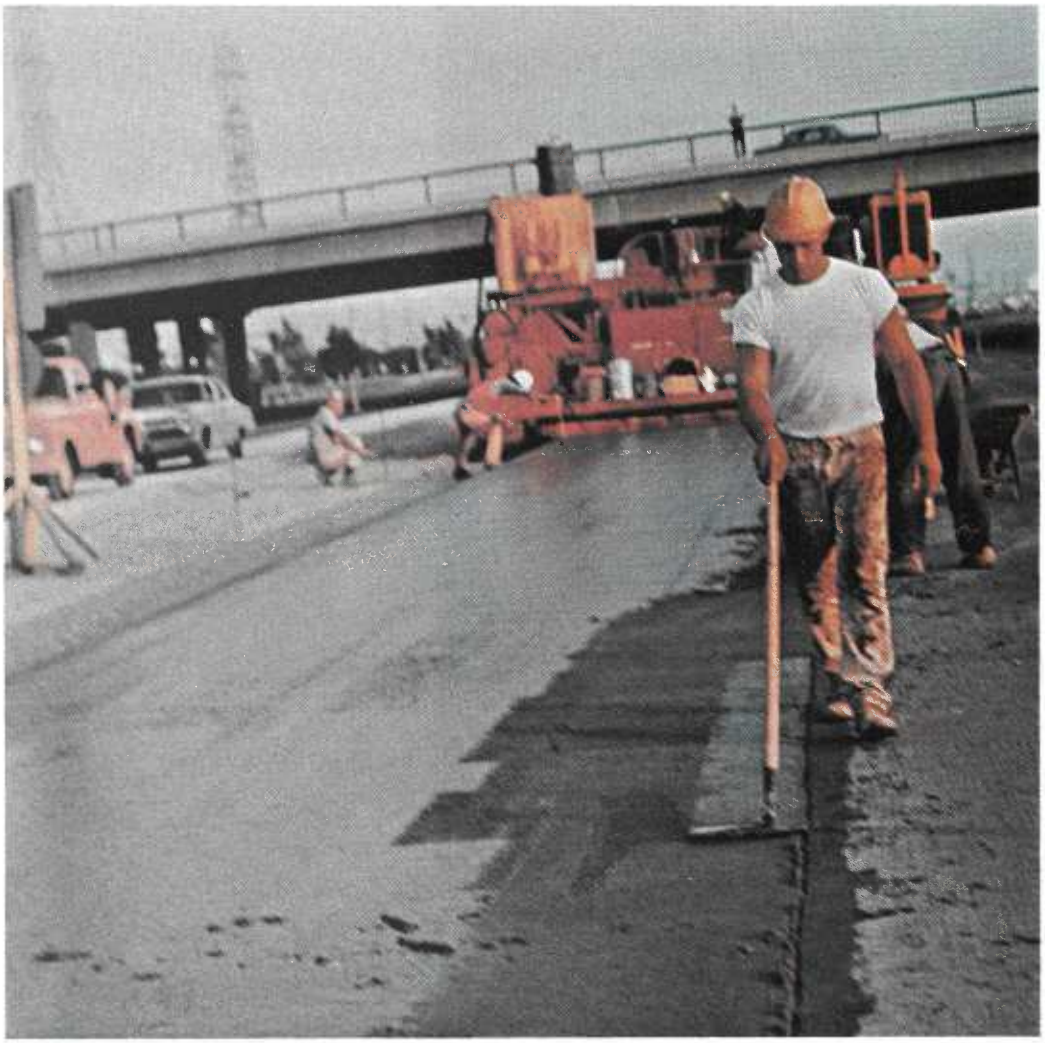
In foreground, finishers follow 12-foot slipform paver. Dump truck backs up to deposit batch. Empty truck en route to batch plant.

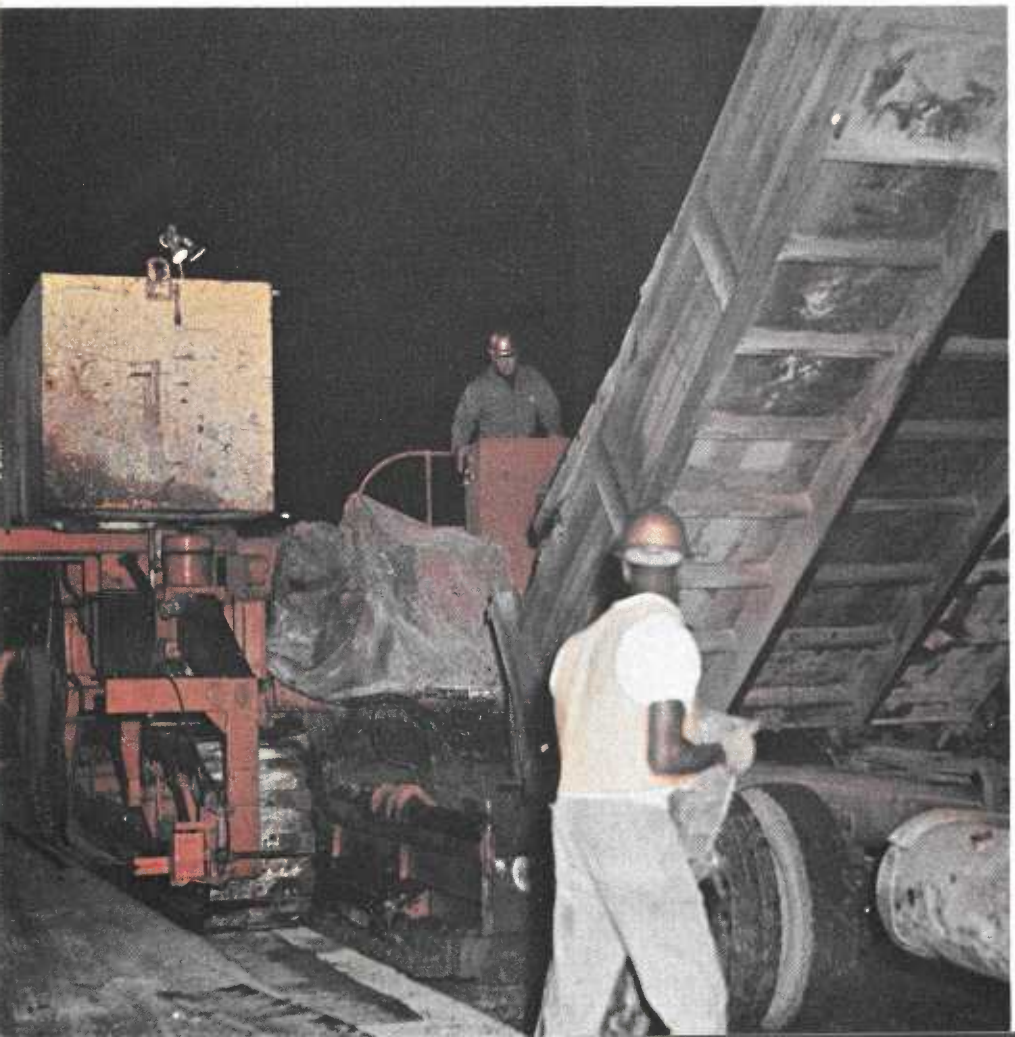
The work of each paver was lighted by a portable unit, diesel-power generated, carrying a bank of six 1,000-watt mercury vapor lights on a 28-foot boom. Finishers' illumination was provided by two 500-watt lights on small rolling stands.

Concern over the quality of the finished night paving proved unfounded. The Long Beach Freeway night job proved that a good paving crew with good equipment attains the same high standards day or night. Profilograph (smoothness) readings on the entire job were well within required limits.

Night paving paid the extra dividend of virtual freedom from random cracking. Pouring in the cool evening temperatures avoided the usual sequence of daytime heat expansion and subsequent contraction.

Another worry had been possible accidents during pouring operations. Rubbernecking drivers, it was feared, might slow down and be rear-ended. However, there were no injuries, no fatalities during the night operation, not even a tire mark on the wet concrete.



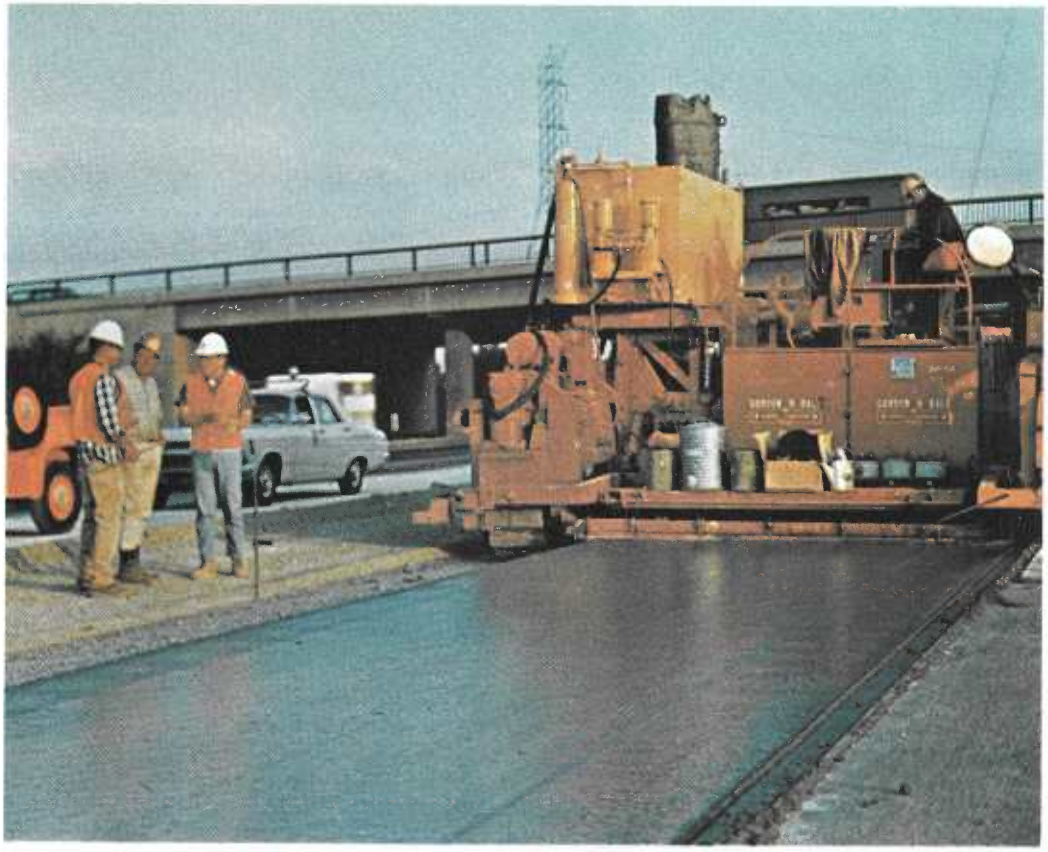


Finishing against existing pavement. Immediately behind paver, inspectors check concrete for grade.

Ten-wheel dump truck deposits load in front of moving slipform paver.

The only major incident directly chargeable to the night job was the blacking out one evening of portions of the Cities of Compton and Long Beach. In moving one of the light towers which illuminated the paving area, the boom snapped an overhead power cable. Freeway traffic was halted only long enough to determine that the broken cable across the lanes was the dead end, rather than the hot line.

The resident engineer and his inspectors were on 6 p.m. to 6 a.m. shifts. One of their most important duties was supervising the placing of warning signs for approaching traffic. Three warning signs, each illuminated by two 500-watt floodlights, were placed at 1,000-foot intervals in advance of the operation. Flares, directional arrows and cones then narrowed traffic to two lanes on the near approach to the actual pouring site.



Above: Paving machine operator checks area just ahead of slipform.
Below: Slab of freshly poured concrete stretches out behind paver in distance. Completed section at left of excavated median.

Widening of the Long Beach Freeway is being done under two contracts. From the San Diego Freeway north to Bandini Boulevard, a 12-mile portion was awarded to Kasler Corporation and Gordon H. Ball Enterprises for $3,659,-283. The second section, about two miles long, from Bandini Boulevard to the Santa Ana Freeway, is under construction by MacDonald & Kruse Inc. on a $2,833,962 award.

In addition to the new lanes, the project requires the changing of all drainage facilities, widening 12 bridges along the route, and installation of a blocked-out metal beam barrier in the median. Adding to safety and driving convenience is a two-foot glare shield atop the barrier to screen off headlights of oncoming cars. Job completion is scheduled for early 1967.

Simi Valley Freeway

By Charles F. Gustafson

Above: Valley beauties smile as they detonate dynamite charge. Below: Chumash Indians in authentic costumes put on dazzling display at celebration.

A century ago the Simi Valley was isolated, remote, almost inaccessible. A rocky trail led to the San Fernando Valley to the east. To the west, north and south were hills, high mountains, sandy stretches of virtual desert.

Once a day, to serve the scattered ranchos, a branch of the famed Butterfield Stage ran from Santa Barbara through the valley and over Santa Susana Pass to a connection with the main line near what is now Pacoima.

Today, in the Simi Valley, the hills, the high mountains and the sandy stretches remain. The trail to the east is a two-lane highway which twists over the pass on an alignment selected in 1915. But the last Butterfield stage ran long ago. There are no successors . . . no passenger trains, no buses, no form of public transportation.

You motorize, if you settle in the Simi now. In 1966, forty thousand people have. And more come all the time.

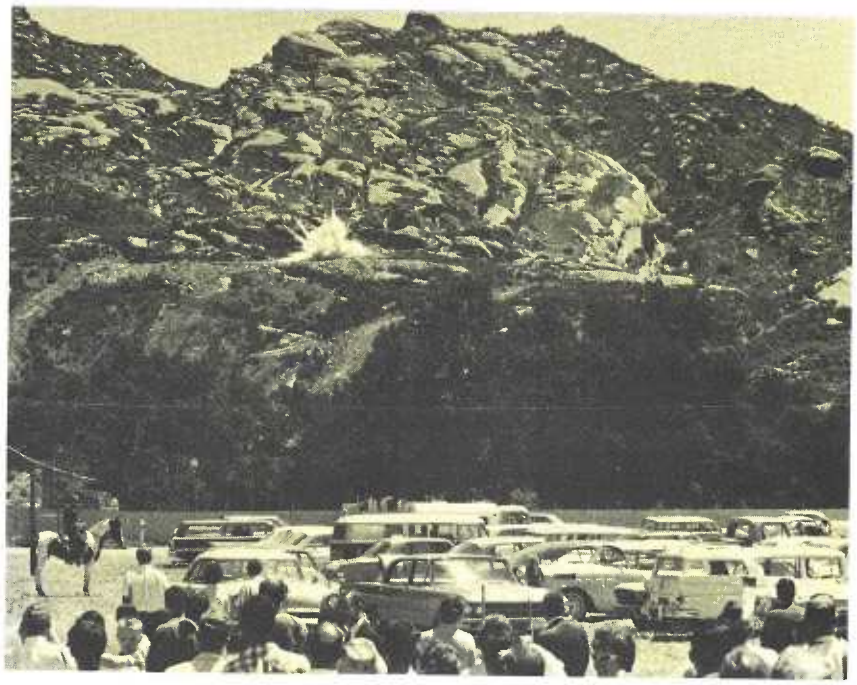
* * *

The word *Simi* is from the Chumash Indian *shimijii*, said to mean fleecy white clouds. The Chumash were hunters and fishermen who also scratched a few crops into the soil and ranged the coast and inland areas south from about present San Luis Obispo. But the valley name of Simi is just about all, aside from a spectacular array of paintings on cave walls high in the mountains, that remains of this gentle tribe which inhabited the area prior to the coming of Spanish soldiers and Franciscan fathers early in the 19th century.

In the 1850's the valley was part of a large Spanish rancho owned by the de la Guerra y Noriega family of Santa Barbara. Then the railroad rate wars of the 1880's brought hundreds of immigrants from the eastern United States. Farmers raised hay and grain, sheep, cattle and blooded horses. Orchard crops included apples, peaches, pears, figs, plums, olives, pomegranates. Great vineyards supplied grapes for locally famous wines.

During and after the rate wars, prospective settlers of Simi Valley land were carried by stage from the rail line at San Fernando. The trip over the pass was described as a hair-raising experience, with the screams of terrified lady passengers echoing from the canyon walls as the stage drivers, cracking blacksnake whips, urged their beasts through the steep and narrow defile.

This tranquil, fertile plain of unspoiled natural beauty, ringed on all sides by its mountain guardians, preserved its rural atmosphere all through the 1940's. Population in 1950 barely exceeded 3,000.



Blast on mountainside signaled beginning of celebration *(see previous page)*

State sign route 118 threaded Santa Susana Pass amid a scenic background familiar to all western movie fans. Los Angeles Avenue ambled through the small settlements of Santa Susana and Simi and west to the coast between walnut and citrus groves, orchards of apricots and peaches, fields of tomatoes and peppers. Sheep and cattle grazed on the green hillsides.

* * *

Then, in the late 1950's, the spillover from the bursting San Fernando Valley swept through the once quiet pass. By 1960, population had reached 8,100. In July, 1962, it had leaped past 15,000; in July, 1963, 24,000. In July, 1964, 33,800. In December of 1965 the population of the Simi Valley was estimated at well over 40,000!

In the years 1960–65, the Simi Valley was rated the fastest growing section of Ventura County, itself one of the nation's leading growth areas. In the 12 months preceding July, 1965, population jumped 24.7 percent—and this was the smallest percentage increase for any single year since 1960. In five years, the Simi Valley showed an overall population increase of about 550 percent, or an average 110 percent per year.

The number of cars on the road soared in pace with population figures. Since the area lacked public facilities, every adult needed personal transportation for work, shopping, recreational and cultural pursuits; in short, for every activity which took him beyond the confines of his own half-acre.

Two-lane Route 118 (Los Angeles Avenue) continued to be the only continuous east-west route through the valley. In 1965 traffic density on this once quiet roadway showed daily traffic counts at such typical intersections as Erringer Road in Simi, 22,900; at Kuehner Drive near Santa Susana, 27,300; on the other side of the pass at the junction with Route 27, 23,500.

But the real bottleneck was the highway through Santa Susana Pass. Improved and widened to provide passing lanes on the upgrade at several points, it followed of necessity the multiple switchback alignment established a half-century earlier. Precipitous terrain permitted only minor improvements in its traffic-handling capacity.

* * *

Of the 18,000 people in the Simi Valley who go to work every day, less than 1,500 are employed in the valley itself. Most travel to jobs in the San Fernando Valley.

As the traffic load built up, the resulting twice-a-day congestion on the highway and through the pass cost time and money and tempered the enticing advantages of the semirural valley. Even between rush hour periods conditions were less than ideal. On weekends, more and more Simi Valley residents tended to stay quietly at home, and found that friends and relatives from "outside" tended less and

Left: Color guard of the Ventura County Independent Riders was also present. Left lower: Honored guests arrived by Conestoga Wagon.

less to make the drive to visit them. Weekday evenings only the hardiest fans traveled from the valley to sports, musical and other entertainment events outside the mountain ring.

There could be no return to the agricultural base of the past. Now, a commuting economy had seemingly peaked. More people on the present roadways threatened total immobility.

To the men whose vision and energies had contributed mightily to the Simi's unparalleled growth, a sound industrial base for the valley was the practical solution. If they could stimulate locally based research and development enterprises, technical product manufacturers, light assembly operations, and similar technological age activities—this would enable the great majority of valley workers to capitalize close to home on their varied skills.

Industrial parcels had been zoned in the west end of the valley—flat, well drained, abundantly served by all utilities. A vigorous campaign was mounted by the Simi Valley Chamber of Commerce to lure industry.

And industry was interested. Plant location teams came to see and learn more. They liked what they found. But few final decisions were made in Simi's favor. Modern industry demands mobility for workers and goods, ready access to markets and manpower.

The Simi was caught in a vicious circle. Until highway congestion was relieved and the area made easily accessible at all times, new industry was not likely to be attracted. Until new industry created new local jobs, roads would be congested with people driving to work outside.

A small but disquieting number of people found traffic intolerable, talked of moving away. It was a situation which could build up to alarming proportions.

* * *

But plans to improve the situation were already well along in the Division of Highways building in Los Angeles. The route of the Simi Valley Freeway, stretching for over 53 miles in Ventura and Los Angeles Counties, had been adopted by the California Highway Commission in a series of actions concluding in December, 1964. Generally paralleling Los Angeles Avenue from Saticoy to the Santa Susana Pass area, the adopted route hugged the foothills of the San Fernando Valley on its way to its eastern terminus at the Foothill (Route 210) Freeway near Sunland.

With its narrow road winding through uptilted terrain and the fantastic rock formations dear to moviemakers since the days of Bronco Billy Anderson, Santa Susana Pass was the key to the entire route. Preliminary design plans for this section had begun in 1961.

The 1965–66 fiscal year highway budget included the initial construction of six lanes of new alignment through the pass. About $9.5 million was allocated, and in January, 1966, the commission provided additional funds for the project. The Division of Highways conducted extensive drilling operations in the pass area to evaluate earlier findings on the geological structure. Clearly, construction would involve extensive blasting and the movement of vast quantities of earth and hard rock.

In late March, 1966, bids were opened on the job, and subsequently the contract was awarded to Kirst Construction Co. of Altadena, which had made the low bid of $14.5 million.

In the Simi, a blue ribbon committee completed plans for a five-day gala celebration, to be climaxed April 23 at groundbreaking ceremonies at the west project limit on Kuehner Drive.

HOORAY!!! SIMI VALLEY FREEWAY UNDER WAY!!!

The triumphant message blazed throughout the Simi days before the actual groundbreaking. Flags, banners, billboards, posters, bumper stickers, lapel pins, blossomed on all sides.

Saturday morning, April 23, was warm and clear. In the lush green meadows alongside Kuehner Drive, hundreds of Simi Valley residents and visitors mingled with colorful groups of Sioux and Blackfoot Indians, Old West gunfighters, horsemen.

The program opened with a gun battle by the Simi Valley Gunfighters worthy of the goriest TV western, a symbol of the valley's link with the Old West. Then the color guard of the Ventura County Independent Riders escorted the dignitaries, arriving in a Conestoga wagon which had in fact carried an early settler's worldly goods into the valley in the 1850's.

John C. Montgomery, Ventura County Supervisor and master of ceremonies, introduced Director of Public Works John Erreca, representing Governor Edmund G. Brown. Erreca reviewed the chain of events which had preceded and now found focus in the morning's events. He recounted the value of the coming freeway in lives preserved and in time and money saved in the years ahead; its economic significance to the people of the valley; and ended with the request that he be invited to the dedication ceremonies in 1968. The invitation was extended, and accepted, on the spot.

Other speakers of the morning included Senator Robert J. Lagomarsino of Ventura County, Senator Alvin Weingand of Santa Barbara County, and Assemblyman Burt Henson of the 37th District.

Edward T. Telford, District Engineer, Division of Highways, added to his brief remarks the tongue-in-cheek suggestion that the present two-lane highway over the pass be preserved for posterity as a historical monument to the fortitude and patience of the valley residents. Immediate loud applause by those who twice daily traveled its twists and turns indicated that his whimsical recommendation may gain a lot more support than he ever intended.

Then all eyes focused intently on the mountains looming high to the east over the festivities. Three Simi Valley beauty queens detonated a blast which, far up the hillside and directly on the centerline of the future freeway, dynamited tons of rock and an immense plume of white smoke into the air.

After the booming report echoed down the lovely valley, war and hunting dances by the Many Trails Club representing 30 Indian tribes continued through the morning. The visiting dignitaries once again seated themselves in the jouncing Conestoga wagon and set off for the invitational luncheon which ended the groundbreaking ceremonies.

But throughout the Simi Valley itself the "Open Door to Opportunity" celebration never faltered for a moment. Carnivals, rodeos, community dances, moonlight trail rides and barbecues; flower shows, hobby and crafts fairs, outdoor art exhibitions—all were part of the tumultuous gala which enthusiastically welcomed the advent of the long-awaited Simi Valley Freeway.

* * *

To achieve present-day standards in its leap across the mountaintops, the Simi Valley Freeway has of necessity abandoned altogether the 1915 alignment through Santa Susana Pass. The result is one of the largest projects the Division of Highways has undertaken in Ventura County. Earthmoving statistics are impressive: Excavation of more than 8.5 million cubic yards of earth for roadway (some rippable, much requiring blasting). Over 34,000 cubic yards for structure excavation. The compacting of 108,200 square yards of original soil.

To withstand the crushing weight of fills ranging up to 220 feet in depth, reinforced concrete drainage structures of special high-arch design are being built. In some areas, the unique rock strata require a 3-to-1 slope. The right-of-way at its widest point is 1,100 feet from top of cut to top of cut.

This initial project to conquer the rugged and picturesque Santa Susana Mountains is on schedule for opening to traffic late in 1968. Immediate construction includes 1½ miles of four-lane highway on Santa Susana Avenue north from Devonshire Street, as an extension of Route 27 (Topanga Canyon Boulevard). This work, to relieve traffic congestion on the existing two-lane roadway, will be completed by the end of 1966, joining the present pass road just south of its "S" curve over the Southern Pacific rail tunnel. Subsequently, this extension will climb an 8-percent grade to an elevation of 1,232 feet at the interchange of Route 27 and the Simi Valley (Route 118) Freeway. Construction also covers grading work for 0.7 mile at the east end of the project to a point north of Variel Avenue to "balance out" the project.

Crossing the mountains, the new freeway marches up a 3.6-percent grade to reach its highest elevation at 1,568 feet virtually on the Ventura-Los Angeles county line. A short distance west, near the point where an access road to existing Los Angeles Avenue soars 30 feet overhead, the six-lane freeway begins its descent on a 5-percent grade to the Keuhner Drive project limit.

In the Ventura County "hard rock" terrain, even the new and powerful single-shank rippers on the job cannot cope with the rock density. So, day after day, the jagged hills which once echoed only to the soft tread and twanging bow of the Chumash hunter now resound to the deafening chatter of 3-inch holes being air-drilled to a depth of 15 feet, followed by overnight blasting.

Near Keuhner Drive, scrapers climb 32-percent grades and descend them again to deposit fill hundreds of feet below the loading area. Dragging their pans down the steep slopes, the huge scrapers are enveloped in clouds of dust and the white smoke of metal biting deep into hard rock.

Building the Simi Valley Freeway's next section west from Kuehner Drive —through level terrain to Tapo Canyon Road in Santa Susana—is expected to be funded in the 1967–68 fiscal year budget. Completion is planned for late 1968 to coincide with the opening to traffic of the initial project through the mountains. The next extension of Route 118 will be to First Street in Simi.

Meanwhile, to relieve valley internal congestion, Los Angeles Avenue is being widened from two to four lanes from Smith Road, near the east ascent of the pass, to Tapo Street in Santa Susana, 3.3 miles. Similar widening of a five-mile stretch between Tapo Street and Tierra Rejada Road is scheduled for completion in mid-1967.

An alternate route from the Simi to the Conejo Valley and Route 101 (Ventura) Freeway will also be open to traffic in the late fall of 1966. This federal aid secondary highway project will extend Olsen Road from the vicinity of Thousand Oaks to the Simi Valley's Madera Road. Traversing presently inaccessible country, Olsen Road's scenic attractions will rival those of the spectacular Santa Susana Pass country.

The Simi Valley Freeway will carry its first traffic through Santa Susana Pass in late 1968. But its impact on the economic future of the communities of Santa Susana and Simi (possibly then united into a single incorporated area) has long been discussed and eagerly anticipated in every circle.

Simi Valley leaders are well prepared to meet the challenges inherent in economic expansion. Time and again in the past decade they have planned and successfully executed the programs which have met the realities of a truly fantastic growth.

A population of 85,000 in 1970, and approaching 200,000 in 1985, is the conservative forecast of demographers speaking from the basis of today's 40,000-plus population. Growth like that means homes for thousands of new young families. New residential developments. New shopping centers. New and expanded educational, cultural, and recreational facilities. And, above all, to make it economically feasible, new industry.

Simi Valley in its remarkable 15-year growth from 3,000 to over 40,000 people has attracted a young population. Currently 70 percent of the residents are under 35. One-third of the population goes to school. Over 30 percent are under 10, only 3 percent over 50. These young families, 4.3 persons per home, average an annual income of $8,100. It is expected that young and growing families like these will make the major contribution to the valley's growth in the next two decades.

All concerned agree that new industry must furnish the sinews to support the Simi's rosy future. What does the

Director of Public Works John Erreca represented Governor Edmund G. Brown at groundbreaking ceremonies.

valley offer? First, close proximity to the Los Angeles-Long Beach metropolitan area, America's No. 2 market. Then, an extensive and eager pool of scientists, engineers, technicians, and similarly skilled personnel. And plant sites 40 miles from Los Angeles, 30 miles from Port Hueneme (the only deep sea port between Los Angeles and San Francisco), 35 miles from Los Angeles International Airport and the quick access it offers to jet-near world markets.

In the western end of the valley, over 400 acres of flat and well-drained land have been zoned for industrial use. The parcels range from 2 to 165 acres, adjacent to the Southern Pacific main line and the Simi Valley Freeway's future junction with First Street and with Madera Road, the connection south to Thousand Oaks and the Ventura (Route 101) Freeway. An additional 90 acres are reserved for later expansion. Several industrial parcels, totaling 75 acres, also well served by rail and truck lines on a daily basis, have been zoned in the Santa Susana area, near the future freeway interchange with Tapo Canyon Road in the east end of the valley.

Investor-owned utility companies have facilities to handle any industrial application requiring electric power and natural gas service. Telephone service includes ultramodern equipment, with almost all installations underground.

Metropolitan water district pipelines carry across the valley an ample supply of good water under gravity flow pressures adequate for all peak demands and for firefighting requirements. Feather River water will supplement and ultimately replace the present Colorado River sources.

By the mid-1980's, research and development laboratories, engineering and technical manufacturing, light assembly operations and similar activities will provide the major sources of employment in the valley. Seeking these bright opportunities will be a steady influx of new residents, eager to share the cool, clear summers, the mild winters.

So educational facilities must expand, too. Here, Simi Valley school leaders are practiced hands. The present modern and efficient public school system serves an enrollment which has increased over 500 percent in the past five years. It includes 16 elementary schools enrolling 10,000 children, three junior high schools enrolling 3,000, a senior high school enrolling 2,000. An excellent and complete adult education program is maintained five evenings each week throughout the school year. The total of 15,000 daytime students is expected to increase to at least 25,000 by 1969. The plans to accommodate them are ready.

A few miles west of Simi, the Moorpark Junior College is scheduled to hold its first classes in September 1967. The second junior college in Ventura County, it is now being erected on a 134-acre site. The initial six buildings, constructed at a cost of about $8,000,000, will serve about 2,000 students. A daytime and evening enrollment of approximately 10,000 students is anticipated by 1970.

Nearby, in Thousand Oaks, is California Lutheran College, a four-year fully accredited institution. Ventura Junior College, in the City of Ventura, is about 35 miles distant.

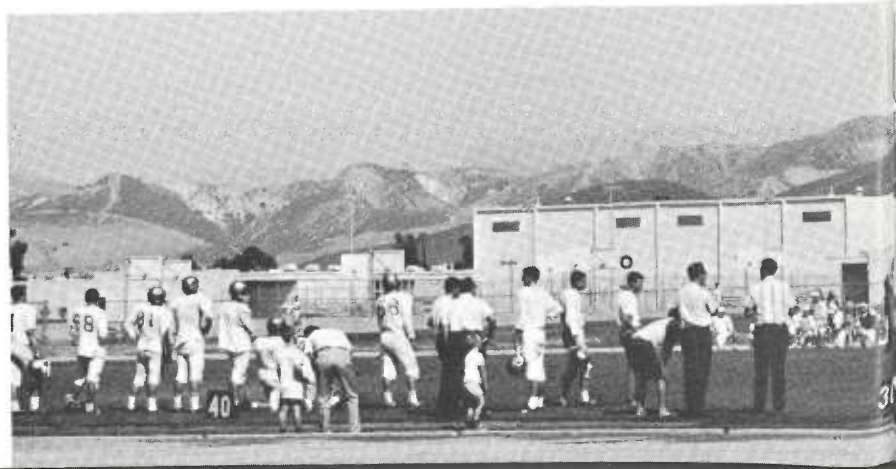
In its residential area development, care has been taken to provide ample recreational facilities. Park land has been set aside by the Simi Valley Park and Recreation District for 13 fully developed parks.

Nearly 100 service clubs, fraternal and social groups, and other organizations are active in the valley. There are about 40 churches, representing all faiths.

The new Simi Valley Community Hospital of 50-bed capacity was recently completed at the north end of the valley. The complete modern facilities, including several operating theaters, are expandable to 150-bed capacity when needed. Medical and dental services in the valley have been excellent for many years.

Perhaps the scope of valley ability to plan for the multiple daily needs of its future residents is best illustrated by its present and proposed shopping centers. Because Santa Susana and Simi were originally about four miles apart and began to expand notably toward each other only in the past five years, there is no single "central" shopping district. Rather, many shopping districts of varying size are scattered throughout the area. Retail and service establishments now total nearly 800.

Plans for additional shopping centers are on the drawing board, scheduled for construction in the early 1970's but ready to be advanced quickly as population and demand arise. A typical development will include department stores, major food markets, other retail



stores, professional and civic administration offices, theaters, motor hotels, restaurants and banking facilities.

Strategically located regional "village centers" on 60- to 100-acre sites will prove major attractions for the combined populations of Simi and Santa Susana, nearby Moorpark, and the Conejo and Santa Clara River Valleys.

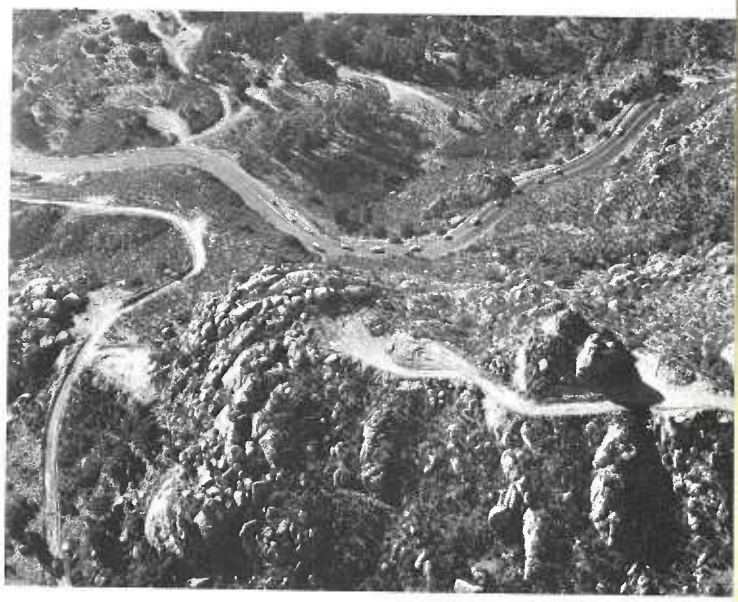
Planned projections of smaller neighborhood centers include drug and specialty shops on two- to five-acre sites, retaining so far as possible the open rural atmosphere which, it is hoped, will continue to be characteristic of the valley.

"When the freeway comes . . . "

The Simi Valley Freeway is an important segment of a nationwide highway system which provides speed, safety, convenience and economic advantage in moving masses of people and goods. But, to the individual citizen, "when the freeway comes" has its own special significance:

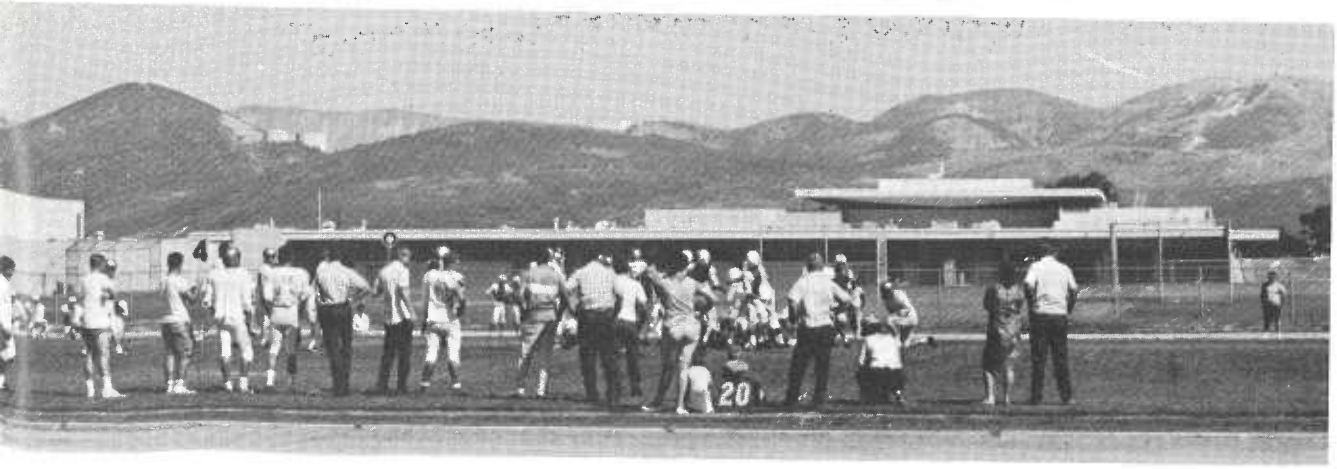
To the mother whose school-age children walk quiet streets freed from fast through traffic; to the worker who finds the job precious minutes nearer; to the shopper who again parks close to favorite neighborhood stores; to the homeowner who sees his property increased in value; these are the benefits which loom large because they are daily, and personal. And perhaps it is in these terms that the meaning of its new freeway to the Simi Valley will best be expressed.

Above: One of the new high schools recently built in the valley. Note housing tract in distance. Left: Aerial view at foot of Tapo Canyon looking north, near west end of Santa Susana, shows transition area between housing and agriculture.



Construction work for new freeway will pass close to old route. Note string of traffic on old road held up by small car laboring up grade.

Football team turns out for fall practice at Simi Valley High School.



Johnny Lupineseed

by Marcia J. Mickelsen

John Brown, Sr., the senior highway superintendent in District 1, Eureka, has been informally dubbed "our own Johnny Appleseed of the north." The only difference is that the roadsides he frequented are sprouting yellow lupine, not apple trees.

Brown has been working at making lupine grow on the sandy, barren stretches of roadside near Eureka for 30 years.

He became interested in using the bushy plant for erosion control when he noted the earlier success of the Hammond Lumber Company (now Georgia-Pacific) in tying down the shifting sand slopes that were located on the right-of-way for the logging railroad that once ran along the beach between Crannell and Samoa.

Yellow lupine had graced the right-of-way here since the late 1800s; it seemed to grow well in the sandy ground without much tending, and it obviously fended off the destructive forces of the ever-blowing staunch sea breeze.

Why, Brown reasoned, couldn't lupine stabilize the highway slopes paralleling the railway to the east? In his spare time, he began experimenting, with many admitted failures. Lupine, like everything else introduced to this sand-without-soil, was not always obliging.

He had precedent in his first failures, however, because John McLaren, noted Superintendent of San Francisco Parks, had the same trouble with the temperamental plant.

McLaren tried to use lupine to tie down the moving mass of sand that formed the western edge of Golden Gate Park. After he and his staff met with no success, they finally held and bound the dunes from drifting by planting bent sea grass imported from France.

In contrast, Brown persisted in his efforts with lupine. The lumber company had demonstrated that it could be done.

In time, Brown did learn how to make the lupine grow. Always involved with maintenance work during his long highways career, he found occasional help in his department. In wet weather, when the regular work was impossible, Brown sent otherwise unoccupied men out to gather lupine seedpods. Later, he sent them back to sow the seeds when conditions were right for germination.

Mr. B. A. Hemenway originally, and later Mr. Frank Coleman (both highway tree maintenance foremen, and both of whom worked under Mr. Brown's supervision), also became intensely interested in the lupine and helped considerably in getting it established.

Brown's hankering to see lupine succeed was entirely personal; he had only tacit approval from his supervisors. Without any money or the spur of official administrative encouragement, Brown managed to establish several "stands" of yellow lupine. The plants, with their identifying yellow spikes of flowers, first appeared on Route 101 in the early thirties after a WPA crew had widened the road's shoulders.

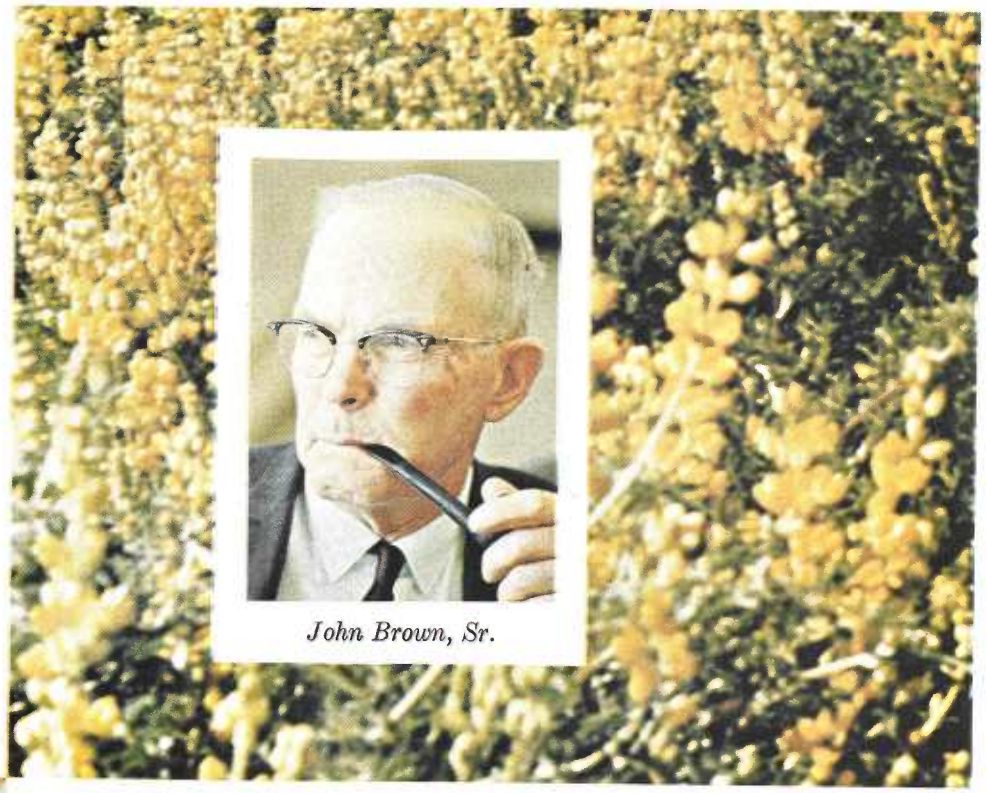
Today, due to Brown's perseverance, about 35 miles of yellow lupine line the roadsides of US 101 in and around Eureka. In the summer, they make an unusually spectacular frame for magnificent Trinidad Head. On Route 1, in Mendocino County, another 10 miles of scattered lupine plantings provide a blaze of color to motorists for almost three months of the year; these, too, are Brown's work.

After all this experience, Brown still terms yellow lupine a "temperamental ornery plant that requires its own type of soil and its own climate. Even with planting at the proper time, it may not grow."

But comment from travelers and others who saw the colorful slopes brought Brown's efforts into the limelight. Three years ago, his lupine planting was recognized by the inclusion of erosion control funds in the maintenance budget to allow for the gathering and planting of these seeds.

The seed collecting and planting operations are not expensive. It costs from four to five dollars to gather a pound of seed, as abundantly supplied by nature. By way of comparison, commercial seed suppliers offer erosion control mixtures at a retail price of $25 to $35 per pound.

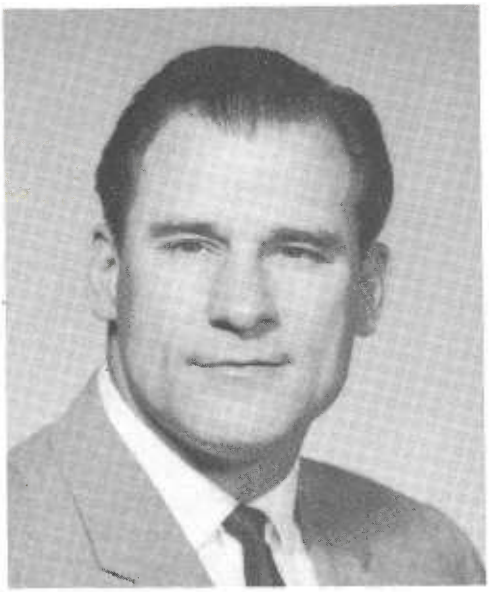
Even when lupine is established, it may have other problems. Aphids sometimes attack and reduce the plants to brown stubble. Although this is far from ideal, there are certain advantages because, as legumes, lupine roots deposit a tremendous amount of nitrogen in the soil. Once the nitrogen is there, it is possible for other plants to grow. After lupine succumbs to foes like aphids or root grub; grasses, native woody plants (*Baccharis* and *Ceanothus*) and even forest cover can adapt to the enhanced soil. The cycle from sandy, barren soil to a cover of fir and pine is a lengthy one, but the addition of nitrogen attracts enough plant life to keep the soil from eroding while the long process takes place.



John Brown, Sr.

Photograph of Johnny Lupineseed is framed by Lupinus arboreus, or yellow tree lupine, botanically described as a shrubby perennial, four to eight feet high. A beautiful plant with rather light green foliage and rich sulfur yellow, fragrant flowers. At left, is photo of Brown's hands holding quantity of seeds. Below is a portion of an eight-mile stretch of US 101 north of Eureka where three-year-old plants provide color throughout the spring and summer.

Bridge Design Awards



Above: W. James Jurkovich, grand prize winner.

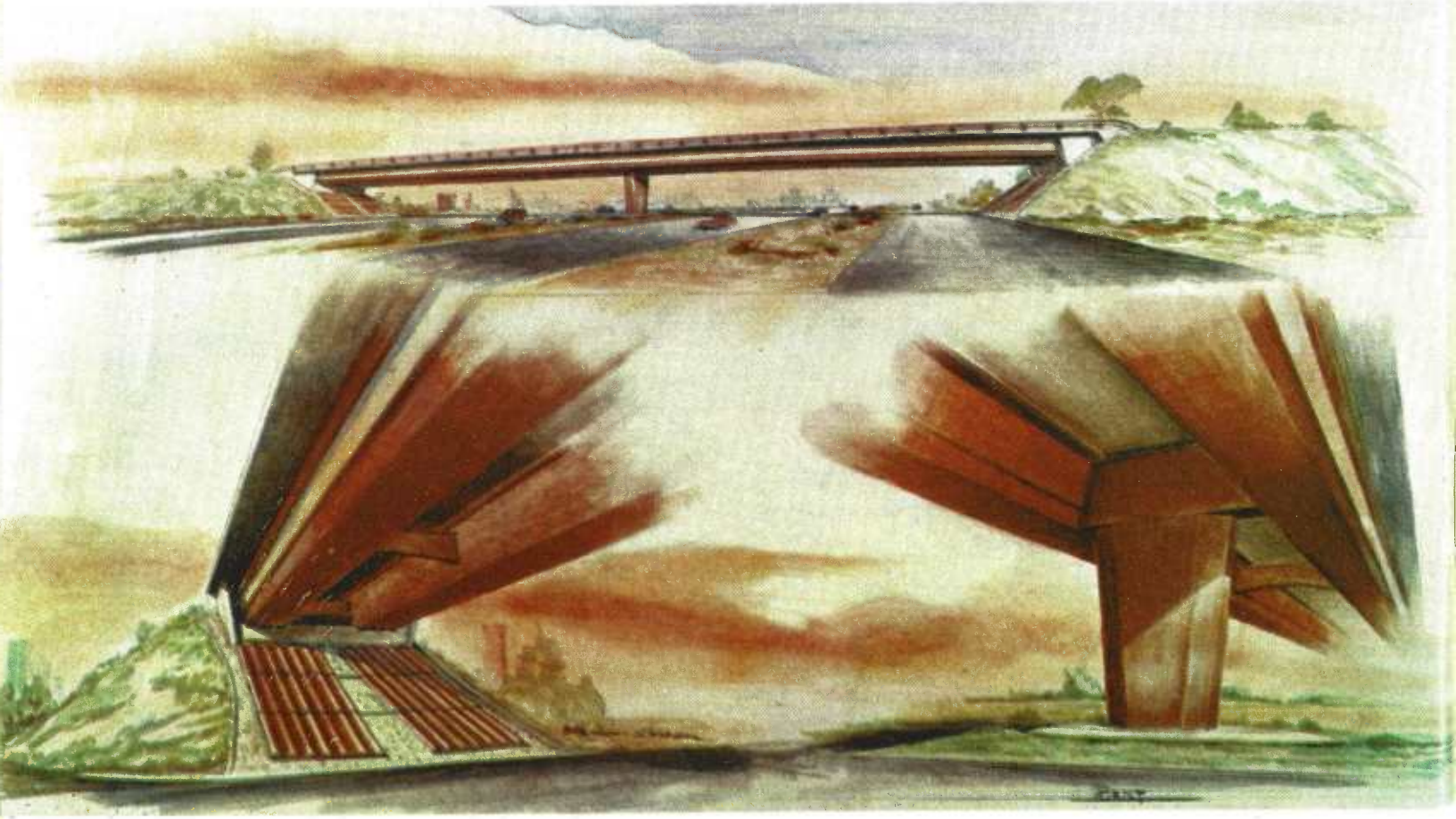
In September a California Division of Highways bridge engineer received the welcome news he had won $15,000 as first prize in the U.S. Steel Corporation 1966 International Bridge Design Contest. The talented winner was W. James Jurkovich, a senior bridge engineer who heads a design section in the division's Sacramento headquarters.

Second prize went to a New Jersey engineer, and third prize to a New York engineer. Of the 10 honorable mention awards, each bearing a $1,000 prize, 5 were also won by employees of the California Division of Highways Bridge Department. All the other honorable mention awards went to engineers in foreign countries.

The aim of the competition was the development of new ideas, design concepts, methods, and different uses of material to benefit design engineers and consultants throughout the world. Entries were judged on originality of design, good utilization of steel, economy in design and fabrication, and esthetic appearance of the total structure.

Each contestant worked on the same problem—design of a two-lane overpass across a four-lane freeway with frontage roads located on level ground. Although the problem was a hypothetical one, drawings for the finished design had to be so complete that a construction crew could build the structure.

Below: Rendering for Jurkovich's design which won first prize of $15,000.



Walter W. White, Rio Linda.

H. L. Payne, Sacramento

O. Bender, Sacramento

A. P. Bezzone, Sacramento

Robert E. Kerswah, Yuba City

Earl R. Latham, Davis

Richard J. LeBeau, Citrus Heights

Photos above are of the seven young Division of Highways engineers who shared in the five $1,000 awards.

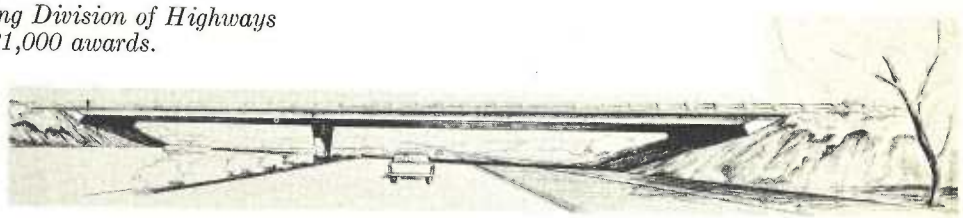
The California honorable mention award winners were:

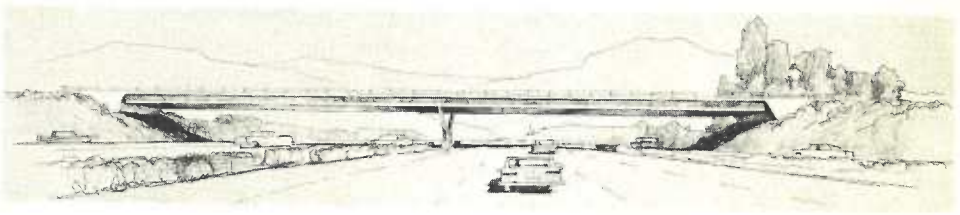
- The team of Robert E. Kershaw, 1255 Rickey Drive, Yuba City, and Richard J. LeBeau, 5422 Sagitarius Way, Citrus Heights.
- Earl R. Latham, Willowbank 10A, Davis.
- The team of O. Bender, 5508 Prim Court, Sacramento, and A. P. Bezzone, 2183 56th Avenue, Sacramento.
- H. L. Payne, 1225 56th Avenue, Sacramento.
- Walter W. White, 7408 16th Street, Rio Linda.

Governor Brown commended the winners and cited their accomplishments as "proof that strong progress is being made in blending safety, beauty and economy in the state's public construction program."

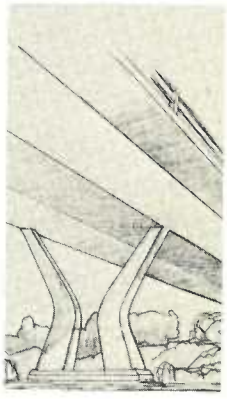
Jurkovich is a native Californian. Born in Fresno, he graduated from high school there and attended the University of California, where he worked his way through school and still found time to letter in football and track.

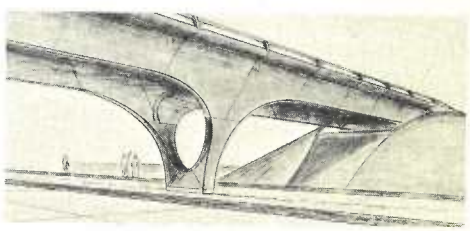
Upon graduation, he spent three years in the Army Engineers before joining the California Division of Highways in 1946.





Drawings are details from some of the winning designs submitted by men shown above



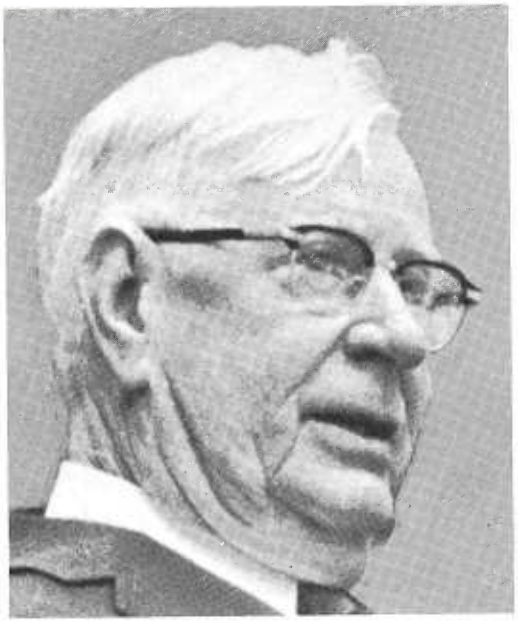


He was promoted to senior bridge engineer in 1952 and heads a design section that specializes in major projects such as the Vincent Thomas Bridge near Los Angeles.

Married, he and his wife and five children reside at 2170 56th Avenue, Sacramento.

Highway Commissioner James A. Guthrie Dies

Served Under Three Governors



James A. Guthrie

James A. Guthrie, member of the California Highway Commission for the past 23 years, died on August 23 in San Bernardino.

Guthrie, a Republican, was reappointed twice by Governor Edmund G. Brown, in 1961 and 1965. His original appointment to the commission was made in 1943 under Governor Earl Warren. He served several terms as vice chairman.

In reappointing Guthrie for the second time in 1965, Governor Brown said: "Jim Guthrie has been a pioneer in highway development through three administrations and has played an integral part in shaping our transportation system. I feel we need his help in planning for the growth of the future."

Guthrie was born in San Bernardino in 1888 and lived there throughout his life. He was editor and president of the San Bernardino *Daily Sun and Telegram* for many years. Guthrie through his newspaper was one of the leaders in the first good roads program for San Bernardino County before the state highway system was so widespread. He pioneered in the development of the roads now known as U.S. Highways 66, 91 and 99. These routes are now part of the Interstate system.

Guthrie was past president of the San Bernardino Chamber of Commerce and a former director of the state chamber. He was a member of the advisory board of the Automobile Club of Southern California, the California Club of Los Angeles and the Sutter Club of Sacramento.

He is survived by his wife and a son, James K., of San Bernardino.

The following statements reflect the feelings of close associates of Guthrie.

Robert B. Bradford, Transportation Agency Administrator and Chairman of the California Highway Commission, said: "Few taxpayers could really know how much over a 23-year period Jim Guthrie contributed to the integrity and quality of the state's highway program."

John Erreca, Director of Public Works, stated: "Every Californian who owns an automobile lost a friend when James A. Guthrie died. Long before his appointment to the California Highway Commission he directed much of his time toward making sure that Californians would have available to them the best possible network of state highways, county roads and city streets. He was remarkably successful in not only this, but in the other varied public service projects he undertook during his many fruitful years."

State Highway Engineer J. C. Womack stated: "California lost a real friend when James A. Guthrie passed away. Much of his adult life was devoted to public service. He was keenly interested in good roads and his constructive efforts were a positive factor in the development of our state highway system. The California Division of Highways will miss him."

And from his fellow commissioners:

Joseph C. Houghteling, Sunnyvale: "It was an honor to serve on the same commission with such a distinguished Californian and newspaper editor as James Guthrie."

Roger S. Woolley, San Diego: "James Guthrie epitomized all that is balanced and progressive in the California scene. He led an envied life that all of us should emulate."

Abraham Kofman, Alameda: "The passing of James Guthrie is a loss not only to me as a member of the commission but to each of the state's residents who is now benefiting from Mr. Guthrie's long years of service."

Alexander H. Pope, Los Angeles: "As the most newly appointed member of the commission, I shall miss the wisdom and experience that James Guthrie's 23 years of service provided to the other commissioners."

William S. Whitehurst, Fresno: "He was a man of such stature that his passing is a loss that California can ill afford."

Alfred Heller ——— *"He was a dedicated public servant, a man I am proud to have known, albeit only briefly."*

Frank B. Durkee ——— *"Above all, Jim Guthrie stood for progress; for what he believed would be beneficial for all the people—whether it be water for San Bernardino or a freeway system for California, subject always to fair treatment for individuals or communities affected. It was an honor to have served with him."*

Franklin S. Payne ——— *"Jim Guthrie was one of the finest and most honorable men I have ever known. He was the most outstanding member the California Highway Commission has ever had."*

Fred W. Speers ——— *"Jim Guthrie was, in my opinion, one of the great men of California who truly matched its mountains."*

C. T. Leigh ——— *"It was a privilege to have known and worked with Jim, and continued a friendship for many years after serving on the commission."*

Robert E. McClure ——— *"Jim Guthrie to his many friends and colleagues—was one of the great twentieth century builders of California and truly a man 'to match our mountains.'"*

H. Stephen Chase ——— *"Of the many privileges coming my way as a result of service on the Highway Commission without a doubt one of the greatest was my association with Jim Guthrie. His wisdom and friendship I shall always remember and cherish."*

Arthur T. Luddy ——— *"The passing of Jim Guthrie has grieved and saddened me. My fondest memory will always be my association with him on the Highway Commission."*

F. Walter Sandelin ——— *"Jim Guthrie, he was a true and loyal crusading Son of California."*

C. M. Max Gillis ——— *"He possessed good qualities in unusual measure—strength, gentleness, integrity, and wisdom—a truly big man."*

John J. Purchio ——— *"The passing of Jim Guthrie takes from all of us in California one of its finest people and most able citizens."*

John O. Bronson ——— *"Jim Guthrie was a credit to the Highway Commission. He was fair and honest and used excellent judgment in his decisions."*

Harrison R. Baker ——— *"He was an outstanding citizen of California, one of the finest of this generation, a powerful and continuing progressive force in his community."*

T. Fred Bagshaw ——— *"He was great in every aspect—to his family—as a friend —as a public servant."*

"Well Done"

In the first such action of consequence since 1951, the Division of Highways in September resumed control of three major state highway contracts on which the contractor was unable to meet his required time schedule. The three projects in El Dorado, Placer and Shasta Counties, totaling an estimated 10 million plus dollars, had all been originally awarded to Norman I. Fadel Construction Company of Marysville.

State Public Works Director John Erreca said he was well pleased with the work done both by the contractors and the Division of Highways personnel in correcting the situation. "Both groups cooperated very well and almost no time was lost in transferring the contracts to new bidders," he said in a letter to State Highway Engineer J. C. Womack.

Because there had been no similar situations in the past 15 years, Division of Highways employees were required to virtually blaze a new trail to expedite letting new bids and get work resumed in the minimum time allowed by law. One time factor was in their favor—the law requires a contractor must be notified five days in advance before he loses a contract for cause.

During these five-day grace periods division engineers spent many extra hours figuring out each item contained in the original contract that had been completed, partially completed, untouched. Then cost factors had to be derived for each item, and finally the overall amount of cash required to finish the project.

Although six weeks usually is required by the state just to advertise a contract, open resultant bids, and make award, in each instance the procedure was cut down to about 10 days. The division normally throws out all bids and starts over if the low bid on any project is 10 percent above the amount considered fair.

In addition, on most contracts, the Federal Bureau of Public Roads must concur on the amount of the contract because federal funds are so often involved. There was some concern within the division as to whether the responding contractors might bid too high because of the limited time allowed them for their calculations.

The bidders had their problems too, but they overcame them. They normally have a one-month minimum in which to figure a contract before submitting a bid but this time they had to complete their calculations in about one-third the usual time.

They responded by assigning their best engineers to the task and staffs worked overtime at home offices in refining physical facts into dollar estimates.

Four firms submitted bids to complete five miles of Interstate 5 near Anderson in Shasta County where approximately 20 percent of the work remained unfinished. Fredrickson and Watson was low at $1,121,894.86. The company was awarded a contract on the same day bids were opened, September 13, and had men and equipment on the job the same day.

They worked a slipform paver around the clock for 336 consecutive hours and by October 10 were well ahead of schedule. Although some finishing touches may be required next spring, the bulk of the work has been done and the freeway will be open to traffic throughout the winter.

Other bidders were Ray Kizer Construction and R. A. Heintz Construction Company (joint venture); Gibbons and Reed Company and Hughes and Ladd (joint venture).

The El Dorado project was a 2.2-mile stretch of US 50 near Bass Lake that was about 65 percent complete. Its original value was $1,571,000.

Granite Construction Company's offer of $727,735.30 was low among six bidders, and work was resumed the day after bids were opened. The job probably will shut down during the bad weather sure to come with the winter, but the new firm will have two lanes of new road paved and open to traffic by that time.

Other bidders were Huntington Brothers; A. Teichert and Son, Inc.; Merrill L. Dubach; American Paving Company and Thomas Construction (joint venture); and Harms Brothers.

Granite Construction Company was the successful bidder, $3,218,706, on the Nevada County job, where 3.4 miles of Route 20 was under construction in Nevada City. The original contract, $5,416,296.22, was about half complete, and the community was disturbed because some overcrossings had not been built and local traffic was handicapped in moving about the city.

For that reason the new contract awarded Granite stipulated the Broad Street overcrossing be completed within 35 working days. The new firm was moving heavy equipment toward the site the same day it was awarded the bid, and a full crew was working on the overpass within three days.

Other bidders were Fredrickson and Watson; Harms Brothers, Gordon Ball Enterprises, Homer J. Olsen, and Huntington Brothers (joint venture); and Parker, Baun and Thomas.

J. C. Womack, State Highway Engineer, congratulated those unknown individuals among the contractors' forces who did such fine work. He also said that although many of the Division of Highways employees could have done as well, he wanted to commend the following members of his own staff who worked on the projects. Included (at the division's Sacramento Headquarters), are Bruce Gentry, construction field representative; M. W. Beckstead, Charles Nassi, Clarence Nevis, specifications; Clarence Peterson, plans and estimates; R. R. Norton, office engineers; Davis Swansen and Stanley Newell, bridge department.

In Redding (District 02 headquarters): H. S. Miles, district engineer; Walter Nett, assistant district engineer; George Bischof, resident engineer; H. C. Holum, reports engineer; and E. C. Engle, construction engineer.

In Marysville (District 03 headquarters): Willard Warren, district engineer; Ed Miller, assistant district engineer; Art Nelson, Barney Hutsinpiler, Ralph Sandler, resident engineer; G. H. Brummond, Richard Peacemaker, reports engineers.

NEW USE OF SPACE

By Howard Smith

Sunnyvale's former Greyhound bus station, housed in a mobilehome, lacked restroom facilities and adequate parking.

New passenger waiting and freight and luggage storage facilities located beneath Mathilda Avenue overhead.

Proof that the space beneath a freeway structure can be used for other purposes is evinced in the new Public Accommodations Building in Sunnyvale. Located under the Mathilda Avenue Overhead on Route 85, the building provides public service as well as earns its cost through lease of a portion of the building to the Greyhound Bus Company.

In a dedication speech when the building was opened for use, Mayor Eugene Conrady said:

"Today we gather to celebrate the opening and dedication of what we believe is a unique public building . . . We believe it is the first project in California that takes this kind of double advantage of . . . areas in our business districts . . . To our knowledge, it is the first use of the airspace *under* a structure required for the efficient movement of automobiles," said Mayor Conrady.

It all came about this way. Back in 1958, the City of Sunnyvale started an urban renewal plan to clear a blighted area of family dwelling units and poor commercial buildings, one of which was the Greyhound Bus Depot. Although many months were spent in a search for a new site, every suitable location was either too expensive or not available.

In desperation, the Greyhound Company rented a large trailer for use as an interim station and placed it on an undersized, unpaved parking lot just outside the downtown business district. The waiting room consisted of two outdoor benches, and the baggage and freight were stacked in the open.

In the meantime, the City of Sunnyvale was building an overhead structure on Mathilda Avenue (Route 85) to carry traffic over the railroad tracks. Funds were provided by the city, state, and Southern Pacific Company for this project, which was opened to traffic on May 10, 1965.

One day, while the overhead structure was under construction, City Manager Thomas H. Sweeney spotted the unused land under the overhead.

"Why not put the bus station there?" he thought.

It was near acres of parking, it was only a short block away from the center of the business district, and it offered ready access to the routes traveled by the bus line. In addition, the property had already been bought and paid for.

Mr. Sweeney, with the services of Architect Byron Lundburg, proposed that the city erect a bright, cheerful building on this rather small, dark site. It would be leased to the Greyhound Bus Company and could also become a center for a number of public purposes. It provides needed restrooms in the downtown area. The building might well be the focal point of a local transportation system in the future.

Best of all, as far as the taxpayers are concerned, Greyhound's monthly rental of the building would completely pay off the $55,000 cost of construction in a number of years.

Currently being installed is a landscaped outdoor patio to provide a park-like area for relaxation.

Since the location of Route 85 along Mathilda Avenue was to be switched a mile to the west along the new "Stevens Creek Freeway," and the area was to be relinquished to the city, an encroachment permit was issued on January 20, 1965, to allow the City of Sunnyvale to build the facility.

Bylines

WHAT'S UP—IN THE AIR? Eric P. Grant (3) was born in Los Angeles, received his law degree from Southwestern University and is now a member of the State Bar. He worked 5½ years in the enforcement division of the Los Angeles County Air Pollution Control District. He was appointed assistant executive officer of the Motor Vehicle Pollution Control Board in 1961 and became its executive officer in April of this year.

JOHNNY LUPINESEED Marcia J. Mickelsen (4) is a native Nebraskan and a graduate of the University of Nebraska who began her career in medical public relations in Omaha. She served on the staff of the *Medical World News* before coming to California in 1961 to become director of public relations of a San Francisco medical center. She joined the Division of Highways as an assistant information officer in 1963.

FROM THE DESK OF R. J. DATEL Robert J. Datel (5) is the youngest district engineer in the Division of Highways. He was appointed to his present post in San Luis Obispo in 1963 when he was 38 years old. A native of Wessington, South Dakota, he received his civil engineering degree from the University of Minnesota and joined the division in 1948. The present article was originally prepared by Datel for the employees in his own district and appeared in the District 5 house organ.

AN ENGINEER LOOKS AT AESTHETICS Louis G. Kroeck (1), who was awarded the 1965 *Parade* magazine national award for the design of the most beautiful highway, is a native of San Jose and a graduate of the University of the Pacific. He came to work for the Division of Highways Stockton office in 1946. Now traffic engineer for the district, Kroeck spent much of his career in design work and was district design engineer at the time he won the *Parade* award. Among his hobbies he includes hiking and camping, watercolors, photography, woodworking, hi-fi, and gardening.

Louis O. Baker (2), who illustrated the article, is an architectural assistant with the Division of Highways Bridge Department in Sacramento and has sold many watercolor paintings. A native Sacramentan, he also attended school there and began his state career with the Division of Forestry in 1948. He worked for the Department of Water Resources before joining highways in 1957.

NEW USE OF SPACE Howard M. Smith (6) is an assistant information officer for the Division of Highways in San Francisco. He was born in Chicago and was an honor graduate in journalism from the University of California at Berkeley. Smith was editor of several U.S. Navy publications and was twice recipient of an armed forces press service award. He was assistant editor for *Western Construction* magazine from 1953 to 1954. He joined state service in 1961.

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