SW/JM

ORIGINAL

Decision No. 80197

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Investigation on the Commission's own motion into the construction of 220 kv La Fresa-La Cienega and La Cienega-El Nido electric transmission lines and related facilities of Southern California Edison Company.	Case No. 9245 (Filed July 13, 1971)

Rollin Woodbury, Harry Sturges and H. Clinton Tinker, by H. Clinton Tinker, Attorney at Law, for respondent.

Overton, Lyman & Prince, by Robert F. Lewis and Donald H. Ford, Attorneys at Law, for City of Torrance, protestant.

Anthony M. Summers and Larry C. King, Deputy Attorneys General, for California Attorney General; Melvin R. Dykman, Attorney at Law, Department of Public Works, Division of Highways; George W. Miley, Attorney at Law, State of California, Department of Public Works; Robert M. Letteau, Attorney at Law, for City of Inglewood; Lincoln A. Sanders, for City of Los Angeles; Brobeck, Phleger & Harrison, by Robert N. Lowry and Gordon E. Davis, Attorneys at Law, for California Manufacturers Association; interested parties.

Vincent MacKenzie, Attorney at Law, and Norman Johnson, for the Commission's staff.

O P I N I O N

In 1970 the Southern California Edison Company (Edison) began construction of two 220 kv overhead transmission lines to connect its La Fresa and El Nido substations to a new substation known as the La Cienega substation. On July 13, 1971, the Commission opened an investigation on its own motion into the construction of the two lines and related facilities to consider their impact upon the air, water, land, and other aesthetic, environmental, and ecological requirements of the public and of its energy needs; to determine whether the Commission should order Edison to reroute the lines or a portion thereof, or to place the lines or a portion thereof underground; to determine the cost and revenue requirement if rerouting or undergrounding is ordered; to determine if the cost or revenue requirement of any alternate route, if ordered, should be recouped by imposing upon all of Edison's customers, or a portion thereof, an increase in rates; to determine if the proposed lines and related facilities are necessary to promote the safety, health, comfort, and convenience of the public; and to determine whether the proposed lines and related facilities are required by the public convenience and necessity.

Fourteen days of public hearing were held between August 17, 1971 and December 22, 1971, in Los Angeles before Examiner Robert Barnett. The matter was submitted subject to the filing of briefs, which have been received.

A diagram showing Edison's proposed routes is set forth as Appendix A to this opinion. The city of Torrance protested the routing of the La Fresa line through Torrance and proposed an alternate route; the city of Inglewood objected to a portion of the El Nido route through Inglewood and proposed an alternate route; the California Attorney General objected to both routes in their entirety and proposed alternates; and the Commission staff objected to portions of both routes and proposed alternates.

I

NEED FOR THE PROPOSED TRANSMISSION LINES

All parties to this proceeding either agreed with, or did not controvert, Edison's evidence on the need for the two proposed transmission lines. The transmission lines will run from a proposed new La Cienega substation located just easterly of Culver City in the Baldwin Hills area of Los Angeles County. The west line of the project will run generally in a southerly direction for a distance of approximately nine miles to Edison's El Nido substation just north of the city of Redondo Beach. The east line runs generally in a southerly direction for a distance of approximately 12 miles to Edison's La Fresa substation located in the northwesterly portion of the city of Torrance. The two lines are required to provide bulk power to the proposed La Cienega substation, to provide additional transmission capability into the service areas of the El Nido and La Cienega substations, and to provide relief to the El Nido substation before its capacity is exceeded.

The proposed La Cienega substation service area consists of approximately 25 square miles, and includes the communities of Beverly Hills, Culver City, Marina Del Rey, Santa Monica, Sawtelle, West Hollywood, and portions of the city of Inglewood. The estimated population in this service area, as of 1970, was 249,000 persons. By 1980, the population is forecast to be 266,000, which is an annual compounded growth rate of one percent for the decade. This compares to an annual compounded growth rate of 3.5 percent from 1960-1970. The lines, themselves, are located within the boundaries of the Los Angeles County areas known as Baldwin Hills and Lennox, and the cities of Los Angeles, Inglewood, Hawthorne, Lawndale, and Torrance.

Due to commercial development, and change in land use in residential areas which will result in the development of high-rise apartments, the electric load within the La Cienega service area has been forecasted to increase from 249 megawatts in 1970 to 380 megawatts in 1980, and 660 megawatts by 1990. This represents an annual compounded growth rate of 4.3 percent for the 1970-1980 period and 5.6 percent for the 1980-1990 period. This compares to 3.6 percent for the 1960-1970 period. As can be seen, although the population growth rate has slowed considerably, the electric load growth rate is expected to increase at an even higher rate than in the past.

The existing load in the La Cienega service area is presently served by eight 66 kv transmission lines whose capability is expected to be exceeded by December 1972. In order to avoid the necessity of building numerous future 66 kv lines from the El Nido substation into the La Cienega service area, Edison decided to develop the La Cienega substation in the Baldwin Hills area. The La Fresa and El Nido transmission lines are necessary to provide transmission service to the La Cienega substation which will serve the existing 66 kv network in that area.

Edison considered the following alternatives to the development of the La Cienega substation:

(1) Serve the La Cienega area from the El Nido substation. This plan would require three additional 66 kv lines, one in 1972, one in 1973, one in 1977, and one approximately every two years thereafter, as well as additional 220 kv line capacity between the La Fresa and El Nido substations. Edison rejected this alternative because the distance from the El Nido substation to the La Cienega service area, as well as the requirement for a large number of 66 kv lines from El Nido was, from the engineering viewpoint, not feasible.

(2) Continue to serve the La Cienega area from El Nido substation until 1979 and then construct La Cienega substation. This plan would require building three additional 66 kv lines to the La Cienega service area, two additional 66 kv lines into the area north of El Nido and an additional 220 kv line from La Fresa to El Nido, none of which lines would be required after the La Cienega substation goes into service. This alternative was considered economically wasteful.

Edison decided to construct the La Cienega substation along with the proposed 220 kv lines because such construction minimizes the number of transmission lines into the La Cienega service area, because by establishing the La Cienega substation a number of 66 kv lines will be released to provide for additional load growth in the El Nido service area, and because the adopted plan has a lower over-all cost.

II

THE AREA TO BE TRAVERSED

The nature of the area through which the two transmission lines will pass is primarily residential. Edison states that the two lines will traverse an area that is about 75 percent residential. The city of Torrance has described a portion of that residential area in its brief as follows: "177th Street and Ainsworth Avenue traverse a residential area, the access to which is somewhat restricted, which fact keeps cross-traffic to a minimum. Many of the homeowners were attracted to the area by reason of their belief that this was and would contribute to be a quiet residential area and a safe place in which to raise their children. There is a Catholic parochial school on the west side of Ainsworth Avenue and north of 177th Street, and easterly of Ainsworth there is a public park maintained by the city of Torrance, known as McMaster Park." Further on, the brief states: "There was clutter on 177th Street and Ainsworth Avenue before Edison came in. There were old black poles -- as stated in Edison's letter to the residents. These old black poles, unfortunately, are in practically every community more than 25 years of age in Southern California. They are part of the landscape. . . ." And, we have the testimony of a Torrance City Councilman

to the effect that 177th Street and Ainsworth Avenue is situated in a "quiet, nicely kept residential area. It is moderate income families. I would say there are two or three children to each family. It is a family neighborhood." There is other testimony in the record of a similar vein regarding Inglewood. In addition, the presiding examiner has taken a number of trips over the routes proposed by Edison and the other parties and has seen the nature of the area through which the transmission lines will traverse. And, of course, the Commission has a general familiarity with the area. For the purposes of this opinion, we find that all of the residential areas along the proposed routes are comparable to those residential areas in Torrance and Inglewood as described by various witnesses. We further find that there is nothing unique in this area: there are no scenes of natural beauty, wilderness areas, large parks, recreational areas other than those usually found in small cities, places of historic or cultural value, archaeological sites, or any other kind of scenes of natural or man-made beauty that would set this area, or any part of it, apart from other areas. What we have here are average communities: quiet, residential areas, with homes of various sizes and values, a few small parks, some commercial establishments, all covered by the usual canopy of electric and telephone lines that can be found in comparable communities throughout the State of California. This finding of averageness is important because what we do concerning these lines in general, or as they traverse Torrance or Inglewood in particular, will affect the future placement of all 220 kv lines within California. There is no reason to single out Torrance or Inglewood for special treatment.

The implication of the averageness of the cities along the routes was not lost upon the parties. The Attorney General states in his brief, "The physical location of the transmission line on city streets immediately adjacent to private dwellings is particularly significant since this is the first attempt by Edison to place a 220 kv line on franchise in a residential area. Indeed, it appears to be the first attempt to place 220 kv lines on residential streets anywhere in Southern California, and possibly the first attempt in the State. Thus, the ruling of the Commission in this case may well determine the extent to which electrical utilities may use city streets for high voltage transmission lines. The question is of great importance to every urban dweller in California. . . . For these reasons it is difficult to overestimate the significance of this case. The scope of the case will far exceed the one transmission line immediately affected; it may set the pattern for the use of residential streets by public utilities for the indefinite future." The California Manufacturers Association takes the same position. In its statement of position, it says: "The Commission must consider the impact of its decision in this case as a precedent for future requests that transmission line additions be placed underground. If the city of Torrance is successful in its efforts to require these facilities to be installed underground, it may be expected that other demands will be made for similar treatment by other communities."

III

PROPOSED ROUTES AND PROPOSED ALTERNATE ROUTES

The two routes proposed by Edison are shown on the diagram, Appendix A; the detail of streets utilized is set forth in Appendix B. Alternate routes considered by Edison and a summary of route changes, starting with Edison's first plans for the routes and culminating in Edison's proposed routes, are also set forth in Appendix B.

The Attorney General takes the position that both transmission lines should be placed underground. If the Commission does not order undergrounding of the entire line, then the Attorney General's position is that we should order undergrounding in residential areas. If no undergrounding is ordered, then the Attorney General would support the use of the present right of way out of the La Fresa substation; and if that is not the Commission order, then the Attorney General supports the recommendations of the Commission staff "as an alternative less desirable than undergrounding or use of right of way, but preferable to Edison's proposal."

Torrance takes the position that the La Fresa line should be constructed westerly of the La Fresa substation over Edison's present right of way to Hawthorne Boulevard, at which point the line should go north on the east side of Hawthorne Boulevard to the intersection of Redondo Beach Boulevard. Torrance believes that no high-powered transmission line should be permitted in residential areas, and in particular, areas of single residential dwellings, and that the present line either be placed underground or placed on Edison's existing right of way. If these positions are rejected by the Commission, the city would support the staff's position. (See diagram Appendix D.)

The staff position is:

1. Within the city of Torrance (La Fresa Line) From La Fresa substation, north along the west side of Yukon Avenue across an Edison-owned lot on the west side of Yukon Avenue and through McMaster Park to Artesia Boulevard. West along the north side of Artesia to the westerly side of the freeway and northwesterly across private property to Prairie and north along the east side of Prairie to the existing line along Redondo Beach Boulevard. (See diagram Appendix D.)
2. Within the city of Inglewood (El Nido Line)
   a. West along the north side of Arbor Vitae from Ash to La Cienega, north on the west side of La Cienega to Florence and east on the north side of Florence to the existing line at Hyde Park Boulevard; or,
   b. Starting at a point approximately 400 feet south of Arbor Vitae, northerly along the east side of the San Diego Freeway to Manchester, thence northerly along the west side of Ash to Florence to connect with the existing line at Hyde Park and Florence. (See diagram Appendix C.)

The staff position of rerouting within Inglewood would place the line behind the Oak Street School rather than in front of it. Inglewood supports either staff proposal.

IV

ENVIRONMENTAL FACTORS

Power poles, which were once looked upon as harbingers of progress, are now considered by many to be pallbearers of ugliness and pollution. This change in viewpoint has created many problems which were not perceived in earlier times. The Attorney General in his brief clearly states the basic problems which must be considered in this case when he says:

> "Within an urban area there are special problems in siting transmission lines, since the absence of vacant land may make acquisition of rights-of-way difficult. Nevertheless, it is precisely in the urban areas with high population densities that electricity will be most needed. Thus the siting of a transmission line in an urban area presents problems which are greater - or at least different - than are involved in the siting of a line in a sparsely settled area. The line under investigation exemplifies the problems which may occur: the line passes through the jurisdictions of numerous local governments; it passes through areas of great population and thus affects many people; it passes through neighborhoods with varying zoning patterns; it traverses streets of varying widths."

We need not set out the testimony concerning aesthetics as all parties concede the obvious. From an aesthetic point of view, and as an abstract proposition, it is better to place 220 kv transmission lines underground rather than on power poles; it is better to place 220 kv transmission lines within existing company-owned rights of way rather than on city streets; it is better to place 220 kv transmission lines in commercial areas rather than in residential areas; and, it is better to place 220 kv transmission lines on wide streets rather than narrow streets. But the determination of which of the

foregoing choices is proper in any particular case can only be made by an evaluation of the cost associated with different alternatives, balanced against the environmental considerations relevant to the area through which the lines pass. Statements on this record, such as the one made by the representative of the Southern California Chapter of the American Institute of Architects, to the effect that overhead utility lines and poles are aesthetically incompatible anywhere are of little or no assistance on the subject of siting transmission lines. Taken at face value, the statement means that all transmission and distribution lines, in place now and to be built in the future, of all electric utilities and telephone companies should be undergrounded. The resulting cost would be so prohibitive that it would effectively deny the use of electricity and telephone service to a large segment of the population.

Governmental agencies have been admonished by the Legislature to: "(b) take all action necessary to provide the people of this state with clean air and water, enjoyment of aesthetic, natural, scenic, and historic and environmental qualities, and freedom from excessive noise. . . . (d) insure that the long-term protection of the environment shall be the guiding criterion in public decisions. . . . (g) . . . consider qualitative factors as well as economic and technical factors and long-term benefits and costs, in addition to short-term benefits and costs, and to consider alternatives to proposed actions affecting the environment." (Public Resources Code Section 21001.) In addition to that general admonition, the Public Utilities Commission has been given a new additional standard by which to judge applications for certificates of public convenience and necessity.

"The commission, as a basis for granting any certificate pursuant to the provisions of this section shall give consideration to the following factors: (a) community values, (b) recreational and park areas, (c) historical and aesthetic values, and (d) influence on environment." (Public Utilities Code Section 1001, effective March 3, 1972.) Further, Public Utilities Code Section 761 provides "Whenever the commission, after a hearing, finds that the . . . equipment (and) . . . facilities . . . of any public utility, or the methods of . . . distribution (and) transmission . . . employed by it, are unjust, unreasonable, unsafe, improper, inadequate, or insufficient, the commission shall determine and, by order or rule, fix the rules, practices, equipment, appliances, facilities, service, or methods to be observed, furnished, constructed, enforced, or employed. . . ." Section 762 provides in part "Whenever the commission, after a hearing, finds that additions, extensions, repairs, or improvements to, or changes in, the existing plant, equipment, apparatus, facilities, or other physical property of any public utility . . . ought reasonably to be made, or that new structures should be erected, to promote the security or convenience of its employees or the public, or in any other way to secure adequate service or facilities, the commission shall make and serve an order directing that such additions, extensions, repairs, improvements, or changes be made or such structures be erected in the manner and within the time specified in the order. <u>If the commission orders the erection of a new structure it may also fix the site thereof</u>. . . ." (Emphasis added.)

The above-quoted Public Utilities Code sections mandate the Commission to consider environmental factors in siting power lines; and, as our decision must be reasonable, they also require us to consider economic factors. We recognize that the consideration of environmental factors in cases such as the one before us may result in changes that would increase the cost of a particular utility project. So the question, as usual, comes down to, "How much?"

A. Placing the Transmission Lines on New Rights of Way

When the La Cienega project was first considered, Edison investigated the possibility of purchasing rights of way upon which to construct the two transmission lines. (These rights of way are not to be confused with Edison's existing right of way between the La Fresa and El Nido substations. That right of way is involved with only a small portion of the La Fresa line and will be discussed below.) As part of its investigation, Edison determined that the area between the new La Cienega substation and the El Nido and La Fresa substations was a densely populated area and that the minimum required right of way width of approximately 40 feet for each right of way would result in disruption of this densely populated area. A preliminary survey showed that it would cost approximately $23.6 million for Edison to secure rights of way for the proposed lines. In Edison's opinion, this made the acquisition of rights of way too expensive a method to provide service. In our opinion it is imprudent to spend $23.6 million to purchase rights of way upon which transmission lines can be constructed when for $19.1 million (see below) the lines can be buried.

B. Undergrounding

Some would argue that from an aesthetic and environmental point of view undergrounding of transmission lines is best. Edison asserts that in this case the cost of undergrounding would be prohibitive, and that, since there is no reason to underground these transmission lines and not underground future transmission lines, the cost of undergrounding transmission lines over the next nine years would put an unnecessarily high burden on Edison, its ratepayers, and the public in general.

The estimated cost of the project as proposed by Edison, which includes undergrounding the communication and distribution system now on the routes and relocating portions of the 66 kv transmission system to other streets, is as follows:

Item	La Fresa	El Nido
Overhead 220 kv	$1,438,000	$1,501,900
Other Work Underground: Distribution, Communication, etc.	4,578,500	2,409,600
Total	$6,016,500	$3,911,500
Project Total	$9,928,000	

The estimated cost of undergrounding the 220 kv lines along routes which would be shorter by approximately 2.4 miles than the overhead routes is as follows:

Item	La Fresa	El Nido
Terminal Facilities	$ 250,000	$ 250,000
Trench and Manholes	1,353,000	984,000
Pipe	1,798,500	1,308,000
Cable	7,639,500	5,556,000
Total	$11,041,000	$8,098,000
Project Total	$19,139,000	

However, the above figures of total cost are not the true difference between overhead and undergrounding. The overhead cost set forth above includes undergrounding the present distribution and communication lines now along the routes. In the first instance, if the choice had been to underground the proposed transmission lines, the distribution and communication lines now in place would not be disturbed. Therefore, the true comparison is between the cost of undergrounding, $19,139,000, and the cost of overhead construction of the two lines, $2,939,900 ($1,438,000 + $1,501,900). The ratio of underground to overhead cost is more than six to one. Costs of rights of way or easements have not been included in the above computations.

Edison's estimate shows that for the nine-year period, 1972 through 1980, if all of Edison's new transmission lines, 66 kv through 220 kv, were constructed underground, the cost would be $1,229,561,000 as compared to $232,000,000 for constructing the same lines overhead.[1/] The additional estimated annual revenue requirement in 1980 would be $179,469,000. The estimated annual effect of undergrounding all transmission line additions on customer groups, for each customer in 1980[2/] is:

Domestic	$ 23	
Lighting & Small Power	118	
Large Power	5,927	
Very Large Power	196,000	(sic)
Off-Peak	1,075,000	(sic)
Agricultural & Pumping	188	
Street Lighting	151	

1/ Although some would argue that we are not discussing all transmission lines but only transmission lines through residential streets, the Commission in other cases has been confronted with arguments that transmission lines through uninhabited countryside should be undergrounded. (See application of San Diego Gas & Electric Company, Application No. 52735.) And in this case there is testimony to the effect that all lines everywhere should be placed underground.

2/ This table reflects 1972 customer distribution and usage at present rates, not 1980 customer projections.

The Attorney General argues that to place the two proposed transmission lines underground would cost the domestic customer of Edison only five cents a month. This five cents does not include cost to other classes of customers. Most significantly, the five cents a month figure is based on an allocation of cost between all domestic customers on Edison's system, that is, 2,230,000 domestic customers. The Attorney General ignores the implication of having all customers on Edison's system pay for undergrounding transmission lines through some cities in Los Angeles County. If we were to make such an order, after a finding that the cities are "average" cities, then in fairness we would have to bury substantially all new transmission lines through residential areas, no matter where on Edison's system, regardless of cost. Further, as there is nothing special about the particular routing involved in this case and there is nothing special about the Edison company, there is no reason why customers of other utilities in other areas of the State should not obtain the same treatment.

We find that the cost of undergrounding the two proposed transmission lines is excessive in relation to the cost of placing the lines overhead; we find that any environmental benefit to be gained by placing the lines underground is outweighed by the economic cost involved; and we find that, if we were to order undergrounding in this case, in fairness to all of the ratepayers in California, we would have to order undergrounding of all new transmission lines proposed through residential areas throughout the State by privately owned public utilities, the cost of which could be prohibitive.[3/]

3/ Our discussion has not even considered the cost of undergrounding transmission lines now in place, nor distribution lines now in place or to be built. We are sure that such consideration would show that the total cost of undergrounding all electric lines is astronomical.

But even if we were to consider the cost of undergrounding these two lines not excessive, we would not order undergrounding in this case because, from an aesthetic point of view, we feel that the money that might be allocated to undergrounding transmission lines would be better spent in undergrounding distribution and telephone lines, as was actually done. If the transmission lines were undergrounded at a cost of $19.1 million, there would be no environmental or aesthetic improvement along the route through which the lines pass. The Attorney General's environmental witness, in response to a question as to whether there had been improvement in putting the 220 kv poles in and taking out the distribution system, stated, "There is a net gain, I would say. . . ." Our own observation of the line confirms this; there is a net gain. If $19.1 million is going to be spent on improving the aesthetics of electric distribution and transmission systems in the Torrance/Inglewood area, we would prefer the money be spent on undergrounding distribution lines because the public gets more for its money. This implements our policy of encouraging undergrounding. (Re Investigation to Establish Rules for Electric and Communication Line Undergrounding (1967) 67 CPUC 490, 512.) The evidence in this record shows that for every mile of transmission line undergrounded, about two and one-half miles of distribution and telephone lines can be undergrounded. But, we must emphasize, we are referring to these proposed lines, in this particular area; other lines in other areas may require different approaches.

C. Aesthetics of the Poles

The poles to be used on the proposed transmission line are single-circuit tubular steel poles with cross-arms which overhang city streets and which do not intrude on private property. The poles are designed to support only one 220 kv circuit. The poles are generally 100 feet in height in order to secure a required minimum conductor-to-ground clearance of 34 feet, and have a maximum ground line diameter of 24 inches. All poles are embedded in concrete footings which are equal to or greater in strength than the poles.

Protestants assert that the poles are so tall that they will be seen from adjacent streets and therefore be an intrusion not only on the streets where they are placed, but also throughout the neighborhood. To the extent that the poles are intrusions this argument is correct, but it must be weighed against the benefits inherent in the project and especially the consideration that to eliminate the intrusion the lines would have to be buried. Placing them on another route merely shifts the problem.

Protestants also claim that the poles are ugly. Not only do we disagree with this characterization -- we think that in regard to power poles they are aesthetically pleasing -- but even if the poles are not things of beauty, they represent the latest advances in the art. Again, to satisfy protestants we would have to either underground the lines or place the ugliness within someone else's line of sight. The facts do not warrant this.

D. Radio and Television Interference

Professor Ellis King, School of Engineering, UCLA, testified that the proposed transmission lines would create radio and television interference. He said that transmission lines of this character would dissipate some energy into the surrounding atmosphere as electro-magnetic radiation. This phenomenon is called corona and can create radio and television interference. Under normal conditions the amount of interference will vary with the weather, the humidity, the curvature of the conductor voltage, and a number of other factors. In tests on the desert he recorded radio signals off his car radio near a 220 kv line. He found noticeable interference with the signals from two radio stations. Some residents along the proposed route testified that they are experiencing some radio and television interference with the lower voltage lines presently installed.

An Associate Utilities Engineer on the Commission's staff testified that he made an investigation of the effects of 220 kv transmission towers and lines on radio and television reception. He made his tests near energized transmission lines in Torrance. He used the following equipment to make the tests: a 16-inch Zenith portable television, a 12-inch Zenith portable television, a 9-inch Sony portable television, a Jerrold television field signal strength meter, and a Sprague radio interference locator. Among other places, he tested at the locations on the north side of 177th Street near Ainsworth, directly beneath two circuits of 220 kv transmission lines, and approximately 40 feet south of a 66 kv transmission line. The results of his investigation showed that radio interference was negligible

except at one location where subsequent investigation revealed that the interference was caused by a 4 kv distribution circuit. Television reception was fair to poor when using the "rabbit ears" type antenna. When a directional antenna was used directly underneath the transmission lines, both audio and video reception were good. Rotating the antenna in a vertical direction so that the antenna was pointing directly to two 220 kv circuits appeared to have little or no effect on reception.

The evidence shows that, depending upon the strength of signal, the quality of the receiver, the quality of antenna, the direction of the antenna, the atmospheric conditions at a particular time, and proximity to power lines, among other variable factors, radio and television interference may be observed. However, the evidence also shows that this interference is not noticeably different in the presence of 220 kv lines as distinguished from distribution lines and transmission lines of lesser voltage. We have also considered that the homes on 177th Street adjoin Edison's right of way, which is built up with a number of transmission lines, including two 220 kv circuits. Yet the Commission has received few, if any, complaints concerning radio and television reception prior to this case. We conclude that the use of 220 kv lines on residential streets has no more effect on radio and television than if the lines were placed in rights of way to which homes adjoin. Further, it appears that a 220 kv transmission line has no more adverse effect than lower voltage transmission lines, and may have less, because it is higher off the ground and further from nearby habitations.

E. Air, Water, and Noise Pollution

An Edison engineer testified concerning the impact of the proposed transmission lines on air pollution, water pollution, and noise pollution. He testified that inherent in an overhead electric transmission line is a dependence on the air or atmosphere to act as an electric insulator to prevent leakage of electricity. The air accomplishes this task with varying efficiency, depending upon altitude and weather. In no case is air a perfect insulator; very small amounts of electricity are lost from the transmission line conductor via ionized air. Electric energy from the transmission line can excite the molecular constituents of air from a few inches, thus permitting such molecules to "ferry" away electric energy. In this exciting or ionizing the various constituents of air, the possibility of forming components of air pollution exists. On a practical basis, in his opinion, this is a negligible pollutant formation. Most air pollutants require high temperature formation in a significant amount and, as such, are linked to combustion processes associated with vehicles, factories, and power plants. Nitrogen oxides are such pollutants and are primarily products of the combustion process. Ozone or tri-atomic oxygen in the atmosphere is for the most part produced by solar energy. Both ozone and nitrogen oxides can be produced by the electric ionization phenomena and have been so produced in the laboratory, but field measurements have failed to detect ozone or nitrogen emissions from transmission lines even at voltage levels in excess of 700 kv. This evidence was not contradicted.

Regarding water pollution the witness stated that he did not know of any measurable water quality effects due to electric transmission line operation. During construction the preparation of steel pole foundations could potentially interfere with a near surface local water table. Investigation by Edison shows that this will not happen with these two lines. The water table is approximately 35 feet below the surface and there are no wells along the path of the lines.

Regarding noise the witness stated that at times, and under varying atmospheric conditions, sound will be emitted from the transmission lines. The sound is the result of molecular interaction and a slight energy release. This sound varies with the density of the air, an altitude variable, and with moisture or water content, a weather variable, and with distance. Many of Edison's existing 220 kv transmission lines are in close proximity to residences. Sound levels at these closest points of permanent occupancy are within the acceptable urban residential evening levels. During daytime hours, the background or ambient sound level is much higher due to vehicular traffic; hence during daytime power line sound is rarely perceptible.

He testified that experiments made by Edison in rural areas show that at a reading taken 35 feet directly under conductors on a 220 kv transmission line sound levels are as high as 45 dB(A). Edison has not made extensive investigation in this field as it has never had any kind of complaints relative to audible transmission noise and has never found it necessary to compile such information. Edison did make sound level readings in the early morning hours along the general routes followed by the proposed transmission lines, which of course, have not been energized, and Edison did not find sound levels less than 45 dB(A); and generally, sound levels were significantly higher than 45 dB(A). These measurements were made in the open with a background of traffic noise; freeways are in the vicinity.

The "Report to the 1971 Legislature on the Subject of Noise Pursuant to Assembly Concurrent Resolution 165, 1970", a report which this Commission has utilized in other cases (see Commission Investigation of the AT&SF Railway Co. Decision No. 79851 dated March 28, 1972 in Case No. 9219), shows that people in urban residential areas prefer a sound level of 35 decibels on the "A" scale at night; for suburban residential the people prefer 30 decibels on the "A" scale. However, urban residents will accept nighttime sound within the range of 35 to 45 decibels; and suburban residents will accept sound levels within the range of 30 to 40 decibels.

Some of the phenomena of sound are: If there is an ambient sound level of 45 dB(A), adding another source of sound of 45 dB(A) will increase the ambient level by 3 dB(A) to 48 dB(A). Sound levels drop approximately 6 dB(A) for every doubling of the distance from the place where the meter was read. So a meter reading of 45 dB(A) at 35 feet from the source of sound will register 39 dB(A) at 70 feet and 33 dB(A) at 140 feet. These measurements are all taken out in the open. In a house with windows open at 35 feet from a source of sound, a meter reading inside the house will be about 10 dB(A) less than outside the house. If the windows are closed, there could be an additional drop of as much as 15 dB(A). In the neighborhood of Ainsworth Avenue and 177th Street the homes are no closer than 50 feet from the conductors.

Based on the evidence in this record, we find that the proposed transmission lines will not create sound that will be audible during daylight hours, except in rare situations. At times during nighttime hours, depending upon atmospheric conditions, sound from the transmission lines will be audible to a slight degree on the streets, but rarely within homes.

V

SAFETY

The design safety factors for the proposed lines exceed the requirements of Commission General Order No. 95 "Rules for Overhead Electric Line Construction". The poles are approximately 100 feet in height and have a maximum ground line diameter of 24 inches. The conductors will maintain a designed ground clearance of at least 34 feet. Safety factors for the conductors are in the order of 10 to 1 based on breaking strength. The insulators and other appendages to the poles have a minimum safety factor of 4.5 to 1. The poles are embedded in concrete footings which are equal to or greater in strength than the pole structures which have a safety factor of 1.5 to 1, or better.

No one disputed that the construction of the proposed lines was well within the safety factors provided for in General Order No. 95. However, protestants presented testimony to the effect that the line as designed would be unsafe. Because of the nature of protestants' testimony, the examiner ordered the staff to investigate the safety of the proposed line and to present testimony on that subject. In addition, there was testimony from Edison's witnesses and from an engineer of the Department of Water & Power of the City of Los Angeles.

Professor King testified that as a result of his investigation he concludes that the proposed lines are unsafe. He pointed out the possibility of physical contact with the line in tree trimming, of the risk of a solid stream of water

from garden hoses coming into contact with the line, and of the danger from flying kites. In addition, he testified that there were hazards such as conductor breaks, insulator failure, aircraft collision, thermal overload, a car fire below a conductor, earthquakes, and lightning, which make the lines unsafe. Supplementing Professor King's testimony, a number of residents along the route of the proposed lines testified that they fear that the lines are unsafe.

The Senior Utilities Engineer in charge of the Electric Branch in the Commission's Los Angeles office testified concerning the safety of the proposed lines. He said that from 1963 to 1968 he was responsible for the administration of General Order No. 95. He conducted an investigation concerning the safety of the proposed lines and his conclusion is that "the overhead construction proposed by Edison exceeds the minimum standards set forth in the Commission's rules for lines in this voltage class. Furthermore, General Order No. 95 contains adequate standards for the safe operation of the 220 kv lines involved in this matter; therefore, I conclude that from the viewpoint of safety the construction and operation of the line should not be prevented because of safety consideration." In response to questions concerning the use of water hoses beneath the line, he answered that tests by other electric utilities concerning water hazard from washing insulators supporting energized conductors show that as the proposed lines will be constructed and operated, no water hazard exists.

The Engineer of Transmission and Distribution Electrical Design for the Department of Water & Power, City of Los Angeles, testified that he directs a section whose primary function is the design of overhead and underground transmission and distribution facilities. In regard to the safety of 220 kv transmission lines, he testified that in his experience with the Department of Water & Power, which extends from 1937, he has never heard of anyone who has been injured by spraying water from a garden hose on electric distribution or transmission lines. With respect to transmission lines, he has never known of an instance where a person flying a kite was injured, although it has happened with distribution lines. He has never heard of any case where a conductor "failed due to wind or anything like that or any other cause other then airplanes flying into them."

We find that the proposed transmission lines comply with General Order No. 95, they are safe, and that the kinds of hazards envisioned by the protestants are either nonexistent, e.g., water hazards, extremely rare, e.g., kite flying, or hazards that are unavoidable due to the nature of the commodity, e.g., earthquakes, airplane accidents, and fire. As to these latter hazards, the siting of transmission lines utilizing fewer poles in place of the more numerous electric distribution poles and conductors and telephone lines reduces the potential for harm.

VI

LAND VALUES

Protestants assert that the proposed transmission lines unreasonably depreciate the market value of homes along the route.

In support of this position three homeowners testified that in their opinion the value of their property has decreased since the construction of the proposed lines. In addition, protestants presented a land planning expert who testified that construction of the proposed lines would cause the residential areas to deteriorate into industrial areas. Opposing this testimony, Edison presented an expert in the field of real estate values who testified that the market value of residences along the route would not depreciate after the proposed lines were constructed. He based his testimony on what he believed to be comparable situations in the cities of Phoenix, Scottsdale, and Mesa, Arizona. He found no area in California which had a 220 kv transmission line on a residential street.

The testimony of protestant's land use expert was not supported by any underlying documentation or examples whatsoever. No residential area was pointed out where, because transmission lines were placed within the area, deterioration occurred. Further, if the presence of power poles caused areas to deteriorate from residential to industrial, there would be few residential areas in Torrance and Inglewood. The evidence does not persuade us that Edison's proposed construction will reduce the market value of residences along the routes in any measurable amount. We are mindful of the fact that people would rather not have power lines on their streets, but we have also considered the fact that in this case communication lines and distribution lines have been placed underground so that there has been a net improvement in the overhead line configuration along the route.[4/]

[4/] The situation on 177th Street in Torrance is different, and is discussed infra.

Edison is not proposing constructing 220 kv transmission lines on residential streets where the construction will not be accompanied by the simultaneous undergrounding of more aesthetically displeasing power and communication lines and poles.[5/]

We base our finding that there has been no loss of property values along the routes of these lines not only on the evidence in this record, but on our observation of the lines in place. One needs only to go to Inglewood and look down a street where the 220 kv lines are in place and then compare the sight of those straight lines with the messy web of overhead distribution and communication lines on adjacent streets to see that there has been improvement over the route by construction of the transmission lines and burying the distribution and communication lines.

We wish to emphasize that market value considerations are relevant only when determining routing of power lines along residential streets in comparison to undergrounding, or routing the lines through industrial areas. In our opinion, market value has no relevance when determining whether to route a power line through residential area "A" or residential area "B". Arguments that power lines will depreciate property values in affluent residential areas and, therefore, power lines should be placed in less affluent residential areas do not impress us. Of course, that argument is never made so blatantly. Its usual form is that the power line will depreciate property values in area "A" and, "please place the line elsewhere." If that 'elsewhere' turns out to be another residential area, the argument fails.

5/ We would point out that if a comparable situation arises in the future and costs are such that utilizing residential areas is the only reasonable method of routing, the transmission line need not necessarily be placed on the street where facilities are undergrounded if a nearby street having no lines is better suited for a transmission line. The net effect in the area would still be an improvement.

VII

PROPOSED ALTERNATE ROUTES THROUGH INGLEWOOD

The staff has proposed two alternate routes through Inglewood (see diagram Appendix C). The first alternate is to construct the transmission line west along the north side of Arbor Vitae from Ash to La Cienega, north on the west side of La Cienega to Florence and east on the north side of Florence to the existing line at Hyde Park Boulevard. The other alternate would start at a point approximately 400 feet south of Arbor Vitae, go northerly along the east side of the San Diego Freeway to Manchester, then northerly along the west side of Ash to Florence to connect with the existing line at Hyde Park and Florence. Inglewood and the Attorney General support either of these routes although Inglewood prefers the route over La Cienega Boulevard.

The staff routes are alternatives to Edison's proposed route which would take the El Nido line down Oak Street in Inglewood for a distance of about 4,500 feet. The staff routes would completely eliminate the need to use Oak Street, a narrow two-lane street going through a single-family residential portion of Inglewood; moderate-priced homes are on both sides of the street. The width of the street is between 30 to 36 feet, curb to curb. La Cienega Boulevard in this area is significantly wider, ranging from a width of 48 feet to 84 feet. In this area La Cienega is zoned commercial, but there are a number of homes, some single-family and some multiple-family, on the street. Only the west side of La Cienega Boulevard has homes; the east side is the common boundary of the west side of the San Diego Freeway and has no improvements on it whatsoever. Ash Street is a residential

street; portions of its west side border the San Diego Freeway. Residences are primarily on the east side of Ash Street; a few are on the west side. The staff Ash Street route would site the line behind the west side residences on Ash Street, between the homes and the freeway. The staff alternatives would place the power poles on the residential side of La Cienega Boulevard, or on the freeway side of Ash Street.

Edison considered and rejected using La Cienega Boulevard as a route because parts of La Cienega Boulevard were outside of Edison's service area and because, at the time Edison investigated these routes, the Federal Aviation Administration's rules on height restrictions for air navigation prohibited the placing of 100-foot utility poles on La Cienega. Edison considered and rejected Ash Street for this portion of the route because in Edison's opinion, it was not feasible to cross the Oak Street School property. As Appendix "C" shows, a transmission line over Ash Street would cross the rear of the Oak Street School property which is used as a playground.

Since this case began we have been informed that the Federal Aviation Administration no longer objects to placing the proposed power poles on La Cienega Boulevard, and that the Inglewood School District does not object to the power line crossing the rear of the Oak Street School. It should be noted that the El Nido route over Oak Street in this vicinity passes within three blocks of the La Fresa route over Eucalyptus Street. This is a heavy concentration of large power poles in a residential area and, from a reliability standpoint, places two 220 kv transmission lines within three short blocks of each other. Under the facts as we know them today, Oak Street is not the best choice.

The cost of placing transmission lines on the three proposed routes in this area, plus the cost of undergrounding distribution and communication lines, is as follows:

Cost of Proposed Routes

Item	Oak Street	Ash Street	La Cienega Boulevard
220 kv Construction	$134,000	$158,000	$138,000
Telephone Undergrounding	91,000	54,000	45,000
Distribution Undergrounding	310,000	190,000	203,000
Easement Cost	-	49,000	6,000
66 kv Relocation	-	-	14,000
Total	$535,000	$451,000	$406,000

On the Oak Street route $401,000 has already been spent in undergrounding distribution and communication lines. No 220 kv poles have been installed along this portion of the route. The cost of completing the Oak Street route is $134,000.

In our opinion, from an environmental viewpoint, the Ash Street route is the preferable route; we will order it used. This route will be primarily on the freeway side of Ash Street, whereas the La Cienega route would be on the residential side of La Cienega Boulevard; it is on a narrower street than La Cienega Boulevard, but there is substantially less traffic; it does not require crossing the San Diego Freeway at two places; and there are significantly fewer people living along the route. In comparison to Oak Street, the Ash Street route traverses an area which has residences primarily on only one side of the street, is partly commercial north of Manchester Boulevard, and borders the freeway, being essentially in the freeway corridor for most of its distance in the disputed area.

General Order No. 131 requires utilities constructing power lines in excess of 200 kv to apply to the Commission for a certificate of public convenience and necessity prior to construction. The General Order went into effect in July 1970 and specifically exempted construction commenced prior to its effective date. Therefore, these proposed lines were not subject to the General Order and we certainly cannot fault Edison for proceeding as it did with the knowledge that it had at the time it began construction. Nor can we ignore what has already been done in constructing the lines; we must consider embedded costs as well as the evidence of changed conditions presented to us at the hearing. Also, we must now consider environmental factors which, in the usual case, require the spending of more money than would be needed if environmental factors were not considered. Clearly, the money spent on Oak Street in undergrounding communication and distribution lines was money well spent; it was a proper expense by Edison. After weighing the effect of already expended costs we feel that shifting the route from Oak Street to Ash Street will significantly improve the environment of the area with a cost that is commensurate with the improvement.

The cost differential for this segment of the route in relation to the amount of footage being rerouted is not to be taken as a formula for future cases of the same nature. All of the factors discussed throughout this opinion went into the conclusion expressed here and if any of those factors are different in a future case, our conclusion might be different.

Our order will be conditioned upon Inglewood submitting clearances from the Division of Highways and an easement from the Inglewood School District permitting construction over the new route.

VIII

PROPOSED ALTERNATE ROUTES THROUGH TORRANCE

Edison proposes to run its La Fresa-La Cienega line from the La Fresa substation westerly on the south side of 177th Street to Ainsworth Avenue, then north on the east side of Ainsworth to Redondo Beach Boulevard, then west on the north side of Redondo Beach Boulevard to its intersection with 172nd Street, then west on 172nd Street across Hawthorne Boulevard. The remainder of the route is immaterial to this phase of the case. Edison has completed the building of the entire La Fresa line except for stringing some conductors. To complete construction, Edison would have to expend only $15,000.

Torrance and the staff have each proposed an alternate route through Torrance (see diagram Appendix D). The La Fresa and El Nido substations are connected by an Edison-owned right of way through Torrance. The right of way is located behind the homes on 177th Street and is approximately five miles long and 150 feet wide, and is fenced. Torrance proposes that Edison use its right of way from La Fresa substation to Hawthorne Boulevard, then go northerly on the east side of Hawthorne Boulevard to its interconnection at Redondo Beach Boulevard. The staff alternate would take the line from La Fresa substation north along the west side of Yukon Avenue across an Edison-owned lot on the west side of Yukon Avenue and through McMaster Park to Artesia Boulevard, then west along the north side of Artesia to the westerly side of the San Diego Freeway, then northwesterly across private property to Prairie Avenue, then north along the east side of Prairie to the existing line at Redondo Beach Boulevard. Torrance supports the staff proposal as its second choice.

We reject Torrance's proposed route because it would utilize Edison's right of way. At present the right of way connects the La Fresa and El Nido substations. On the right of way there is a bridge network which carries eight 66 kv circuits, and, on the north side, there is a line of towers which carries two 220 kv circuits. The bridge network and towers take up all of the right of way except for about 21½ feet on each side. Torrance proposes that the south 21½-foot section be used to site the proposed transmission line. Torrance had no competent engineer support its proposal. Edison's transmission engineer admitted that Torrance's proposal could be physically constructed at a cost of $975,000, but that Edison would not use this method as it is not good engineering practice for related lines and violates Edison's criteria for reliability. The engineer said that if Edison were to use the right of way for the proposed line, it would have to completely rebuild the right of way, which could be done in a way that meets all engineering criteria, for a cost of $1,950,000. In addition, the cost of running the line north on Hawthorne Boulevard from the right of way to Redondo Beach Boulevard would be $178,000, or a total of $2,128,000 to properly engineer Torrance's proposed route.

Torrance's proposal would remove the transmission line from 177th Street, Ainsworth Avenue, and Redondo Beach Boulevard, but Torrance is only concerned with removing the line from 177th Street and Ainsworth Avenue. Redondo Beach Boulevard is otherwise not objectionable. The cost to achieve Torrance's primary purpose is prohibitive in comparison to the benefits to be received. If we were to consider the $350,000 Edison has already spent in undergrounding along 177th Street, Ainsworth Avenue, and Redondo Beach Boulevard, the uneconomic features of Torrance's proposal is even more apparent.

And there are other reasons for rejecting the use of the right of way. The right of way is approximately five miles long and connects the La Fresa and El Nido substations; the distance between La Fresa substation and Hawthorne Boulevard is approximately one mile. To construct the line as proposed by Torrance would utilize only one-fifth of the length of a portion of the right of way and would eliminate the future use of the remaining four-fifths unless there is additional expensive rebuilding. We must also consider the reliability factor. The proposed transmission lines complete a loop from La Fresa to La Cienega to El Nido. If the lines are constructed according to Edison's proposal and if for any reason the circuits on the right of way are taken out of service, power can be delivered to El Nido or La Fresa via La Cienega. If the La Fresa-La Cienega transmission line is on the same narrow corridor as the La Fresa-El Nido line, as Torrance proposes, and the circuits are taken out of service because of an airplane crash or a fire, or some other major catastrophe, there could well be reduced service to La Fresa, La Cienega, and El Nido. For these reasons, it is not good engineering practice to put both lines on one corridor, if that can be avoided.

Finally, to accede to Torrance's request would mean that this Commission would be, in part, redesigning Edison's transmission system. At this time, we see no reason to do that. The situation in Torrance differs from that in Inglewood. In Inglewood all we have done is shift a line from one street to another street, where both streets, from an engineering standpoint, are quite capable of carrying the line, and where no changes are required on any other part of Edison's system.

However, in Torrance, placing the line on the right of way would require a major rebuild of Edison's transmission system. This would not only affect the proposed transmission line, but would affect all transmission lines on the right of way and would change the nature of the service between La Fresa, El Nido, and La Cienega. This distinction, to us, is substantial. We do not feel that we should involve ourselves in redesigning Edison's transmission system on the basis of the evidence in this record. For all of the reasons stated above, we find that the route proposed by Torrance utilizing the Edison right of way between La Fresa substation and El Nido substation is not acceptable.

The staff does not support Torrance's proposal. The staff proposes an alternate which would route the transmission line north on Yukon Avenue for a short distance, then across a lot to be purchased by Edison, then across McMaster Park to Artesia Boulevard, then westerly on Artesia Boulevard across the San Diego Freeway to Prairie, then north on Prairie again across the San Diego Freeway to Redondo Beach Boulevard, then west on Redondo Beach Boulevard, crossing the San Diego Freeway a third time, following Edison's proposed route. This proposal removes the line from 177th Street and Ainsworth Avenue, and is estimated to cost $395,000.

The staff proposal has the drawback that it requires crossing the San Diego Freeway at three places within approximately a quarter of a mile in contrast to Edison's one crossing; this zigzag crossing is aesthetically displeasing. Its benefit is that it places power lines on wider streets in a more commercial area. On balance, the staff proposal in its totality does not appear environmentally superior to Edison's proposal.

However, we must carry the analysis one step further. The situation on 177th Street is bad. Under Edison's proposal, the homeowners on the south side of the street have 220 kv poles to the front of them and 220 kv towers to the rear of them. In our opinion, this configuration will have a substantial adverse effect on the residents and should be avoided. Of equal importance is the question of system reliability. Edison's proposed power line on 177th Street would be approximately 100 feet away from its power lines on its right of way. Just as Edison did not wish to place this proposed line on its 150-foot-wide right of way because of reliability problems, so it should not place it within 100 feet of that right of way because of the same reliability problems. In fact, it appears to us that the likelihood of fire taking out more than one line is greater when one of the lines is on 177th Street because the likelihood of fire in the homes along 177th Street is greater than the likelihood of fire on the right of way itself. For these reasons we feel that the line should be moved off 177th Street and, therefore, we will adopt the staff proposal up to the point where it crosses Artesia Boulevard and Ainsworth Avenue. At that point, we will order Edison to route the transmission line down the east side of Ainsworth Avenue to its interconnection at Redondo Beach Boulevard. We estimate that the cost of the change that we are ordering will be approximately $200,000. Our order will be conditioned upon Torrance granting Edison an easement over McMaster Park.

This differentiation between the portion of the route over 177th Street to Ainsworth to Artesia Boulevard and the portion on Ainsworth between Artesia Boulevard and Redondo Beach Boulevard is crucial to our decision. We have found compelling reasons to move the route off 177th Street; the portion on Ainsworth between 177th Street and Artesia is rerouted by necessity. There is no other feasible way to remove the route from 177th Street. However, we find no compelling reason to reroute the Artesia-Redondo Beach section on Ainsworth. Merely because it is a residential area is not enough; if it were, we would have to reroute almost the entire La Fresa and El Nido lines.

When we viewed the staff proposed route we noted that there were a number of possible sites for power poles as the line leaves the La Fresa substation and crosses McMaster Park. To avoid any possible controversy over pole locations we will reopen this proceeding for the purpose of determining the location of each pole between La Fresa substation and Artesia Boulevard, unless, prior to the reopened hearing, Edison, Torrance, and the staff submit a written stipulation agreeing to pole locations.

IX

OTHER MATTERS

The Attorney General makes a broadside attack on General Order No. 131 on the ground that it does not provide adequate criteria for siting high voltage transmission lines in urban areas. We do not agree with this characterization. The General Order is adequate to give notice to the various governmental bodies along the route of a proposed transmission line and to insure that the views of the governmental bodies are considered. It was not meant to be a substitute for a detailed study of a proposed route which would accompany an application for a certificate of public convenience and necessity. The General Order requires an application to be filed with the Commission, and it provides for publishing notice and for hearing so that protestants may fully develop the record. That is exactly what happened in this case. All parties who objected to Edison's proposal were given every opportunity to be heard, to cross-examine witnesses, and to present evidence.

Torrance asserts that the proposed lines are a nuisance. We do not agree. In our opinion, the proposed lines are reasonable to meet the present and future needs of the public for electric service through the areas to be served. Further, considering environmental impact, economics, and reliability, the proposed lines will be sited in their optimum location. They are not nuisances. Torrance asserts that the proposed transmission lines unreasonably depreciate property values and constitute the taking of property without just compensation. We disagree with the statement that the proposed transmission lines unreasonably depreciate property values. To the extent that the proposed lines constitute the taking of property without just compensation, those persons feeling agrieved have their remedy in the superior court.

Edison asserts that the added cost to relocate the lines from Edison's original proposal should be borne by those persons requesting the relocation. The staff, Torrance, and the Attorney General disagree. The staff asserts that the cost of relocating the transmission lines should be borne by the entire Edison system, but that the cost of undergrounding the distribution and communication lines on the relocated routes should be borne by Edison in accordance with its underground conversion rule on file with this Commission. This would require the adoption of ordinances by the cities of Torrance and Inglewood creating underground districts, and the use of funds allocated through what is known as Case No. 8209 procedures. The estimated amounts to be accounted for under the district method are $190,000 for Ash Street and about $75,000 for the rerouting in Torrance. Torrance and the Attorney General assert that all costs of relocation should be borne by the entire Edison system. We agree with the position of Torrance and the Attorney General. When we order the lines relocated, we have determined that the original routes are not the best. The cost of the new or relocated lines should then be treated in the same manner as any other new line -- it should be recouped through the systemwide rate base. When Edison originally proposed its routes to various city governments, it relocated portions of the routes in response to requests by those city governments. Edison has never asserted that those changes should be paid for by the governments requesting them. Rather, Edison asked that its entire project, which had incorporated all route changes prior to construction, be paid for by all of Edison's ratepayers. Merely because we are ordering Edison to change portions of its routes rather than Edison making those changes at our request should not affect the outcome as to recoupment of costs.

The only real question is whether the cost incurred by Edison for constructing the improperly routed portions of the lines can be classified as a reasonable and prudent expenditure which may be recouped, or whether the company should absorb that cost itself. On the question of whether the cost incurred prior to rerouting the lines is reasonable and prudent, we find that it is. At the time construction began on these lines, there was no requirement that Edison obtain a certificate of public convenience and necessity before construction. And, the reasons for Edison choosing the routes it did choose were valid at the time the choice was made. Edison should not be penalized because subsequent to the time it made its original choice, various obstacles were removed.

In this opinion we have attempted to set forth the criteria that have brought us to the conclusion that Edison should be permitted to site its transmission lines along the routes it proposed, with some modification. We would like to sum up our discussion. We are reluctant to place transmission lines on residential streets, but when the electric needs of an area demand additional power there may be no economically viable alternative. Of course, undergrounding takes care of the problem of the transmission line but, as we have seen, undergrounding is very expensive and the money for undergrounding transmission lines can be placed to more advantageous use, as was done in this case. It seems to us that purchasing new rights of way through urban areas will usually turn out to be more expensive than placing lines underground, as shown in this case. Still, if it were not more expensive, we must consider that the path of a transmission right of way can be considered as a small freeway through an area which divides the area into segments and could thereby trigger a deterioration of the area. Placing transmission lines on existing

rights of way is a reasonable solution to the siting problem; yet even in this instance the new transmission lines add to the clutter in the air space. It appears to us that until the state of the art of undergrounding transmission lines is greatly improved, Edison's resolution of the problem is as good as any proposed by other interested parties. Edison has taken down more poles than it put up, has taken down more conductors than it put up, and has buried all services from the distribution and communication lines to the customers' premises along the routes. It has, to a substantial degree, cleaned up clutter in the air space. Neither burying the transmission lines nor utilizing rights of way would have achieved this result.

Finally, we would like to discuss a point that was not raised by any of the parties: allocation of resources. This case dealt with aesthetics and the environment; in effect, it considered power poles as a possible source of pollution of the environment. As we have seen, the complete solution of this power pole problem, undergrounding to improve the aesthetics and environment of the neighborhoods through which power lines pass, would cost billions of dollars over the next few decades. The question then presents itself whether such an expenditure of money is worthwhile when we consider the other pollution problems that demand attention. We raise this question to give pause to those who demand immediate solutions without regard to cost. A look at the general literature in the field of pollution shows that, at least in California, the major emphasis is on cleaning up air pollution, water pollution, and solid waste disposal. Of lesser emphasis are the problems caused by noise pollution. A visit to the Los Angeles County Law Library will show approximately eight shelves of textbooks devoted to various aspects of all forms of pollution. Yet none

of those books is devoted to the problem of the aesthetics of electric transmission lines. Most of the books that discuss aesthetics at all do not refer to electric transmission lines. Although there are occasional references to transmission lines, the bulk of the material, in our opinion over 95 percent of it, is devoted to aspects of pollution that do not include electric transmission lines.[6/]

6/ The small output of literature on the subject of siting transmission lines is almost entirely published by agencies directly responsible for transmission lines. (See Environmental Criteria For Electric Transmission Systems (1970) U.S. Departments of the Interior and Agriculture (and appended reference list); Environmental Guidelines (1971) Western Systems Coordinating Council; Report on Electric Utility R & D in Areas of Aesthetic & Environmental Improvement (1971) C.P.U.C. staff; Electric Power & the Environment (1970) Office of Science & Technology, Executive Office of the President.) This material does not consider the problem of allocation of resources, or priorities in determining which pollution problems should be remedied. However, the material certainly has cost as a reference point, e.g.:

> "The electric utility industry is encouraged to make environmental costs known to the public so that unreasonable demands and excessive costs can be avoided. In most cases, these costs will be negligible. In some cases the costs will be so high that alternatives will have to be considered, or, it may be determined that no intrusion is tolerable regardless of the costs involved. While no attempt is made to outline cost guidelines, all additional costs should be fully justified. At the same time, management should consider as a part of their construction and their normal maintenance and operating budgets, the costs of these environmental considerations." Environmental Criteria for Electric Transmission Systems (Forward ii).

It is trite, but true, to point out that all money to pay for transmission lines comes from the public, either by way of purchasing stock in the utility, loaning the utility money, or paying the utility rates for electricity. And the funds needed to clean up all other forms of pollution come from the same source. Consequently, it is important for this Commission to determine if it should require the public to pay tens of millions of dollars to correct displeasing aesthetics when that money might be better spent on correcting air pollution, water pollution, noise pollution, or solid waste disposal problems. It appears to us that clean air and clean water are much more pressing problems than an aesthetically pleasing skyline. So we shall be selective, as we think we have been in this case, in ordering changes in routes of electric transmission lines for the purpose of improving the aesthetics of an area.

Findings of Fact

1. Due to commercial development, and change in land use in residential areas which will result in the development of high-rise apartments, the electric load within an area that includes the communities of Beverly Hills, Culver City, Marina Del Rey, Santa Monica, Sawtelle, West Hollywood, and portions of Inglewood, has been forecasted to increase from 249 megawatts in 1970 to 380 megawatts in 1980, and 660 megawatts by 1990. The population of this area as of 1970 was 249,000 persons and by 1980 it is expected to grow to 266,000.

2. In order to serve this load, Edison needs to construct a new substation in the Baldwin Hills area of Los Angeles County. This substation, to be known as the La Cienega substation, will obtain its electricity through two transmission lines. The west line will run generally in a southerly direction for a distance of approximately nine miles to Edison's El Nido substation just north of the city of Redondo Beach. The east line runs generally in a southerly direction for a distance of approximately twelve miles to Edison's La Fresa substation located in the northwesterly portion of the city of Torrance. Not only will these two transmission lines provide bulk power to the proposed La Cienega substation, but they will provide additional transmission capability into the service areas of the El Nido and La Cienega substations, and will provide relief to the El Nido substation before its capacity is exceeded.

3. The nature of the area through which the two transmission lines will pass is primarily residential. All of the residential areas along the proposed routes are comparable to those residential areas in Torrance and Inglewood as described by various witnesses.

4. There is nothing unique in this area; there are no scenes of natural beauty, wilderness areas, large parks, recreational areas other than those usually found in small cities, places of historic or cultural value, archaeological sites, or any other kinds of scenes of natural or man-made beauty that would set this area, or any part of it, apart from other areas.

5. The two transmission lines will traverse average communities: quiet, residential areas, with homes of various sizes and values, a few small parks, some commercial establishments, all covered by the usual canopy of electric and telephone lines that can be found in comparable communities throughout the State of California.

6. It would cost approximately $23.6 million for Edison to secure rights of way for the proposed lines. It would cost approximately $19.1 million for Edison to underground the proposed lines. It is imprudent to spend $23.6 million to purchase rights of way upon which transmission lines can be constructed when for $19.1 million the lines can be buried.

7. It will cost approximately $2,940,000 to construct the two transmission lines overhead. The ratio of underground to overhead cost is more than 6 to 1. Costs of rights of way for easements have not been included in these computations.

8. If all of Edison's new transmission lines, 66 kv through 220 kv, during the years 1972 through 1980, were constructed underground, the cost would be approximately $1.23 billion as compared to $232 million for constructing the same lines overhead. The additional estimated annual revenue requirement in 1980 would be approximately $180 million.

9. The cost of undergrounding the two proposed transmission lines is excessive in relation to the cost of placing the lines overhead; any environmental benefit to be gained by placing the lines underground is outweighed by the economic cost involved; if we were to order undergrounding in this case, in fairness to all of the ratepayers in California, we would have to order undergrounding of all new transmission lines proposed through residential areas throughout the State by privately owned public utilities, the cost of which could be prohibitive.

10. From an aesthetic point of view we feel that the money that might be allocated to undergrounding transmission lines would be better spent in undergrounding distribution and telephone lines. If the transmission lines were undergrounded at a cost of $19.1 million, there would be no environmental or aesthetic improvement along the routes through which the lines pass.

11. In the areas where the distribution and communication lines have already been undergrounded and the transmission line has been erected we find that there has been a net gain in the aesthetics of the area and an improvement in the environment.

12. The power poles to be used on the two transmission lines represent the latest advances in the art. As power poles go, they are aesthetically pleasing.

13. The proposed transmission lines will not create radio and television interference in the home.

14. There will be no air, water or noise pollution. The proposed transmission lines will not create sound that will be audible during daylight hours, except in rare situations. At times during nighttime hours, depending upon atmospheric conditions, sound from the transmission lines will be audible to a slight degree on the streets, but rarely within homes.

15. The design safety factors for the proposed lines exceed the requirements of Commission General Order No. 95, "Rules for Overhead Electric Line Construction". The lines are safe.

16. Except along 177th Street in Torrance, the transmission lines will not reduce the market value of residences along the routes in any measurable amount.

17. Oak Street in Inglewood is a narrow two-lane street going through a single-family residential portion of Inglewood; moderate-priced homes are on both sides of the street. The width of the street is between 30 to 36 feet, curb to curb. Ash Street is a residential street; portions of its west side border the San Diego Freeway. Residences are primarily on the east side of Ash Street; a few are on the west side. The staff Ash Street route would site the transmission line behind any residences on Ash Street, between the home and the freeway.

18. The El Nido route over Oak Street as proposed by Edison in this vicinity passes within three blocks of the proposed La Fresa route over Eucalyptus Street. This is a heavy concentration of large power poles in a residential area and, from a reliability standpoint, places two 220 kv transmission lines within three short blocks of each other. Oak Street is not the best choice for a transmission line.

19. The costs of the proposed routes in the area under discussion are as follows: Oak Street, $535,000; Ash Street, $451,000; La Cienega Boulevard, $406,000. Edison has already expended $401,000 in undergrounding distribution and communication lines on Oak Street. No 220 kv poles have been installed along Oak Street. The cost of completing the Oak Street route is $134,000.

20. From an environmental viewpoint, the Ash Street route is the preferable route; we will order it used. This route will be primarily on the freeway side of Ash Street, whereas the La Cienega route would be on the residential side of La Cienega Boulevard; it is on a narrower street than La Cienega Boulevard, but there is substantially less traffic; it does not require crossing the San Diego Freeway at two places; and there are significantly fewer people living along the route. In comparison to Oak Street, the Ash Street route traverses an area which has residences primarily on only one side of the street, is partly commercial north of Manchester Boulevard, and borders the freeway, being essentially in the freeway corridor for most of its distance in the disputed area.

21. The additional cost of approximately $317,000 to construct the transmission line over Ash Street rather than Oak Street is reasonable in view of the improvements in aesthetics and environment that will be made. The cost is commensurate with the improvement.

22. Edison has a five-mile-long right of way between its La Fresa substation and its El Nido substation. The right of way carries eight 66 kv circuits and two 220 kv circuits. To use a portion of this right of way, without rebuild, for part of the La Fresa-La Cienega transmission line would cost a minimum of $975,000, but the result would violate good engineering criteria for transmission construction. To provide good engineering construction for the La Fresa-La Cienega line the configuration now on the right of way would have to be changed at a cost of $1,950,000. This cost is prohibitive in comparison to the benefits to be received.

23. To construct the line as proposed by Torrance along the right of way would utilize only one-fifth of the length of a portion of the right of way and would eliminate the future use of the remaining four-fifths unless there is additional expensive rebuilding.

24. Placing the La Fresa-La Cienega transmission line on the same narrow corridor as the La Fresa-El Nido transmission line would violate good engineering practices as it lessens the reliability factor of transmitting electricity between the substations. If both circuits were to be taken out of service because of an airplane crash or a fire, or some other major catastrophe, there could be reduced service to the La Fresa, La Cienega, and El Nido substations.

25. If we were to order the transmission line to be placed on the present right of way, in effect we would be redesigning Edison's transmission system. There is no evidence in this record that would compel us to do that.

26. The staff proposal has the drawback that it requires crossing the San Diego Freeway at three places within approximately a quarter of a mile in contrast to Edison's one crossing; this zigzag crossing is aesthetically displeasing. Its benefit is that it places power lines on wider streets in a more commercial area. On balance, the staff proposal in its totality does not appear environmentally superior to Edison's proposal.

27. The environmental situation on 177th Street is bad. Under Edison's proposal, homeowners on the south side of the street have 220 kv poles to the front of them and 220 kv towers to the rear of them. This configuration will have a substantial adverse affect on the residents and should be avoided.

28. Edison's proposed power line on 177th Street would be approximately 100 feet away from its power lines on its right of way. This makes them more likely to be shut down because of a major catastrophe, and therefore the reliability factor is lessened.

29. We will adopt the staff proposal up to the point where it crosses Artesia Boulevard and Ainsworth Avenue. We estimate that the cost of the change that we are ordering will be approximately $200,000.

30. The proposed transmission lines and routes, as modified, are not nuisances. The proposed lines are reasonable to meet the present and future needs of the public for electric service through the areas to be served. Considering environmental impact, economics, and reliability, the proposed lines will be sited in their optimum location.

31. All costs of relocation of the two transmission lines should be borne by the entire Edison system.

32. The costs incurred by Edison for constructing along those portions of the transmission routes which are being ordered relocated were reasonable and prudent.

33. The proposed transmission lines, as modified by this order, when considered in conjunction with the program to underground distribution and communication lines along the routes, will have a beneficial affect upon community values, recreational and park areas, historical and aesthetic values, and the environment, in the areas traversed by the routes.

34. The proposed transmission lines, as modified by this order, are reasonably required to meet area demands for present and future reliable and economic electric service.

35. The proposed transmission lines, as modified by this order, will not produce an unreasonable burden on natural resources, aesthetics of the area in which the proposed facilities are to be located, public health and safety, air and water quality in the vicinity, or parks, recreational and scenic areas, or historic sites and buildings or archaeological sites.

36. Public convenience and necessity require that the proposed transmission lines, as modified by this order, be constructed.

Conclusions of Law

The Commission concludes that the proposed transmission lines shall be constructed in the manner and along the routes proposed by Edison in its application, except:

a. In Inglewood, at a point approximately 400 feet south of Arbor Vitae Street the route shall go northerly along the east side of the San Diego Freeway to Manchester Boulevard, then northerly along the west side of Ash Street to Florence Avenue to connect with the existing line at Hyde Park Boulevard and Florence Avenue. This modification will be conditioned upon Inglewood submitting clearances from the Division of Highways and granting Edison an easement from the Inglewood School District permitting construction over the new route.

b. In Torrance, the route shall leave the La Fresa substation and go northerly along the west side of Yukon Avenue, then across an Edison-owned lot on the west side of Yukon Avenue, then through McMaster Park to Artesia Boulevard, then west along the north side of Artesia Boulevard to Ainsworth Avenue to connect with the existing line. This modification will be conditioned upon Torrance granting Edison an easement over McMaster Park.

O R D E R

IT IS ORDERED that:

1. A certificate of public convenience and necessity is granted to the Southern California Edison Company authorizing it to construct two transmission lines in the manner and along the routes set forth in its application, except:

a. In Inglewood, at a point approximately 400 feet south of Arbor Vitae Street the route shall go northerly along the east side of the San Diego Freeway to Manchester Boulevard, then northerly along the west side of Ash Street to Florence Avenue to connect with the existing line at Hyde Park Boulevard and Florence Avenue. This modification is conditioned upon Inglewood submitting clearances from the Division of Highways and granting Edison an easement from the Inglewood School District permitting construction over the new route.

b. In Torrance, the route shall leave the La Fresa substation and go northerly along the west side of Yukon Avenue, then across an Edison-owned lot on the west side of Yukon Avenue, then through McMaster Park to Artesia Boulevard, then west along the north side of Artesia Boulevard to Ainsworth Avenue to connect with the existing line. This modification is conditioned upon Torrance granting Edison an easement over McMaster Park.

2. Further hearing on this application is set for October 2, 1972, at 10:00 a.m., in the Commission Courtroom in Los Angeles for the purpose of determining the location of each pole between La Fresa substation and Artesia Boulevard, unless, prior to the reopened hearing, Edison, Torrance, and the staff submit a written stipulation agreeing to pole locations.

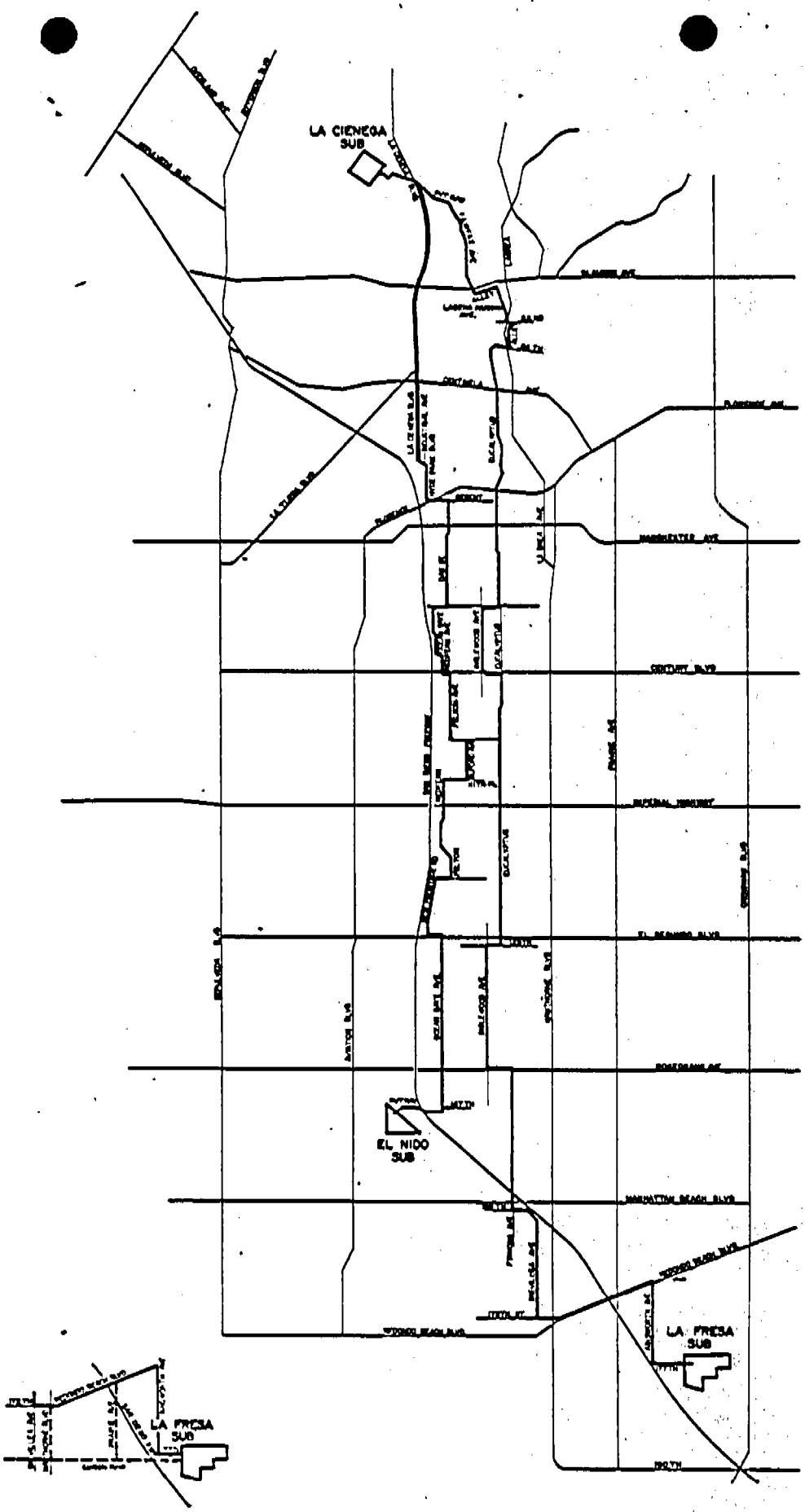
The effective date of this order shall be twenty days after the date hereof.

Dated at San Francisco, California, this 27th day of JUNE, 1972.

Chairman

Commissioners

Commissioner Thomas Moran, being necessarily absent, did not participate in the disposition of this proceeding.



CITY OF TORRANCE
PROPOSED RELOCATION

APPENDIX A

10-22-71

Evolution of Edison's Proposed Routes

This description of changes in the routes of the two lines is a summary of the material to be found on pages 28 through 40 of Exhibit No. 1.

A. La Fresa Route

The first of many proposed east routes originated from El Nido Substation, going east on private property, paralleling the railroad to Inglewood Avenue, thence across private property to Condon Street, north to Rosecrans Boulevard, east to Ramona Avenue, north on Ramona to Arbor Vitae Avenue, west on Arbor Vitae Avenue to Eucalyptus Avenue to 64th Street or Fairfax, north on Fairfax to the Department of Water and Power right of way south of Stocker Street.

This route underwent several alterations:

1. A portion of the line was rerouted to La Brea Avenue. This route was rejected because there were no overhead existing facilities on La Brea to be undergrounded.

2. The next significant route change was to use the alley east of La Brea Avenue. This route was rejected because there were no overhead existing facilities to be undergrounded.

3. Inglewood Avenue and Shoup Avenue were considered in place of Ramona Avenue at the request of the City of Hawthorne. Inglewood Avenue was agreed upon.

4. The use of Redondo Beach Boulevard between the Flood Control Channel and Ainsworth Avenue was rejected because there were no alternate locations for the double circuit 66 kv line presently installed.

5. The use of Artesia Boulevard was considered and rejected because a freeway had been planned for Artesia.

6. A route crossing Alondra Park Golf Course was rejected because an overhead line crossing the park was considered not to be acceptable.

7. A route utilizing Prairie Avenue was considered and rejected because of the necessity of relocating the existing 66 kv double circuit line on Prairie.

8. After further considerations and changes the final route was proposed as follows:

> To begin at the west edge of La Fresa Substation on single-circuit steel poles and proceed westerly along the south side of 177th Street, then northerly along the east side of Ainsworth Avenue, then southwesterly along the north side of Redondo Beach Boulevard, then westerly along the south side of 172nd Street, then northerly along the east side of Grevillea Avenue, then westerly along the north side of 159th Street, then northerly along the west side of Firmona Avenue, then westerly along the north side of Rosecrans Boulevard, then northerly along the east side of Inglewood Avenue, then easterly along the north side of 129th Street, to a point of Eucalyptus Avenue extended, then northerly across private property and the west side of Eucalyptus (Condon Avenue) Avenue to 104th Street then the east side of Eucalyptus Avenue (Condon Avenue), then westerly along the south side of Century Boulevard, then northerly along the west side of Inglewood Avenue, then easterly along the south side of Arbor Vitae Street, then northerly along the east side of Eucalyptus Avenue, to Kelso Street, then the west side of Eucalyptus Avenue with a one span east side jog at the

Southern Pacific Railroad Crossing, then easterly along the north side of 64th Street, then northerly along the west side of the alley (one block east of La Brea Avenue), then westerly on 62nd Street to La Brea Avenue (one span), then northerly along the west side of La Brea Avenue, then northerly along the west side of Ladera Park Avenue to a point just south of Slauson Avenue, then westerly across Ladera Park on easement, then westerly along south side of Alley (one block south of Slauson Avenue) then northerly along the west side of Fairfax Avenue to private R/W just south of Stocker Street, then westerly along private R/W to intersection of La Cienega Boulevard, then westerly on private R/W using double-circuit steel poles (with the El Nido-La Cienega 220 kv circuit) to the proposed La Cienega Substation.

B. El Nido Route

1. The west line route originates from El Nido Substation. The first proposal started at El Nido, going north on Isis Street to 135th Street, east on 135th Street to Oceangate Avenue, north on Oceangate Avenue to El Segundo Boulevard, east on El Segundo to Eucalyptus Avenue, north on Eucalyptus to Century Boulevard, west on Century to Inglewood Avenue, north on Inglewood to 97th Street, west on 97th Street to Cedar Avenue, north on Cedar to Arbor Vitae, west on Arbor Vitae to Osage Avenue, north on Osage Avenue to La Tijera Boulevard to La Cienega Boulevard, north on La Cienega to private right of way north of Stocker Street, west on private property to the proposed La Cienega Substation. After further consideration, it was felt that Transmission should try to establish an alternate route for the west line between Arbor Vitae

Avenue and La Tijera Boulevard. This alternate route would keep the line east of the San Diego Freeway, would remain within Edison's service territory, since the Los Angeles City limits begin west of the San Diego Freeway.

2. An alternate on Cedar Avenue was considered and rejected as it did not give enough line separation.

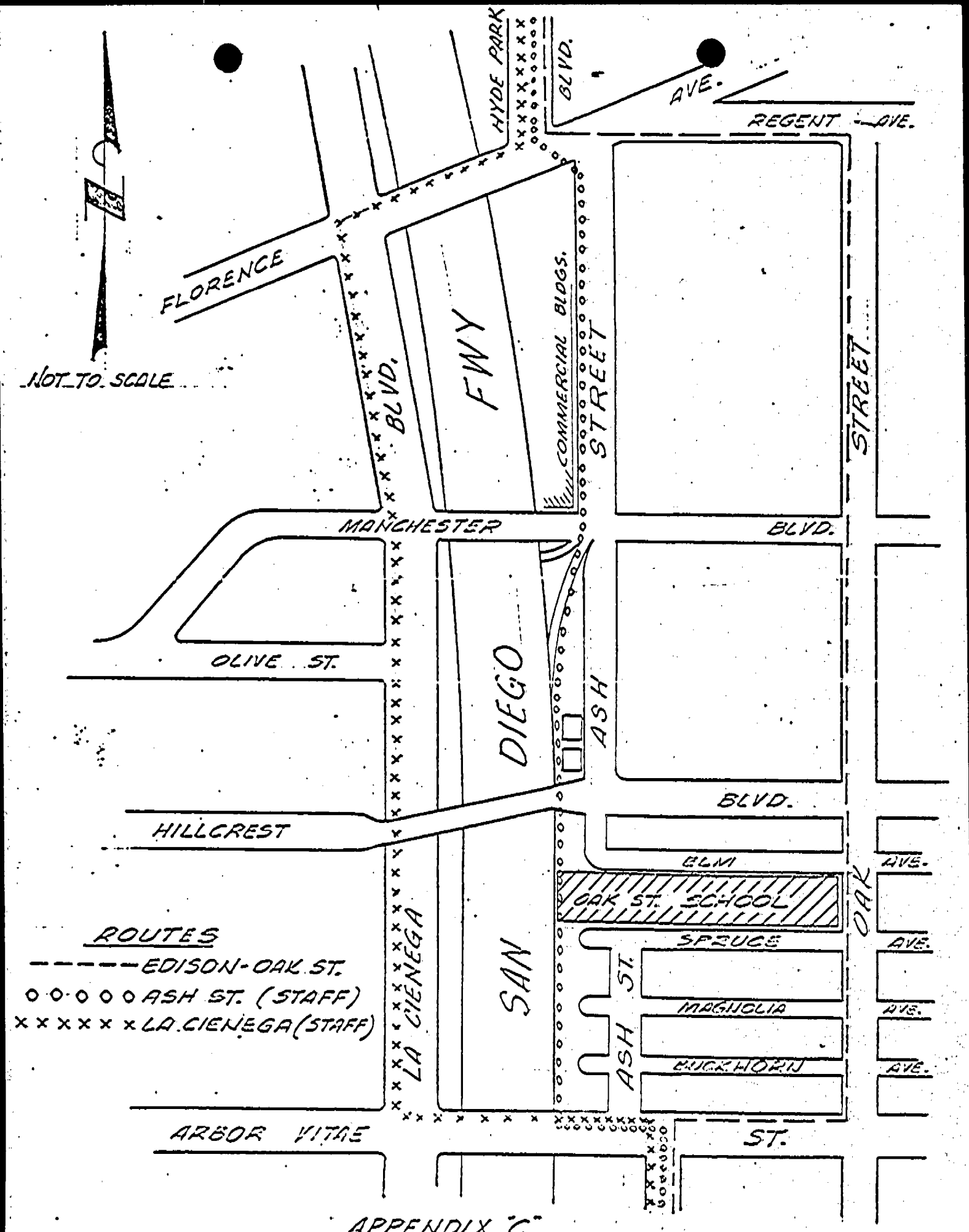
3. A portion of the route adjacent to the San Diego Freeway was incorporated into the final route when the Division of Highways gave approval.

4. At the request of the City of Hawthorne, Edison agreed to utilize Oceangate Avenue south of 135th Street instead of Isis Street.

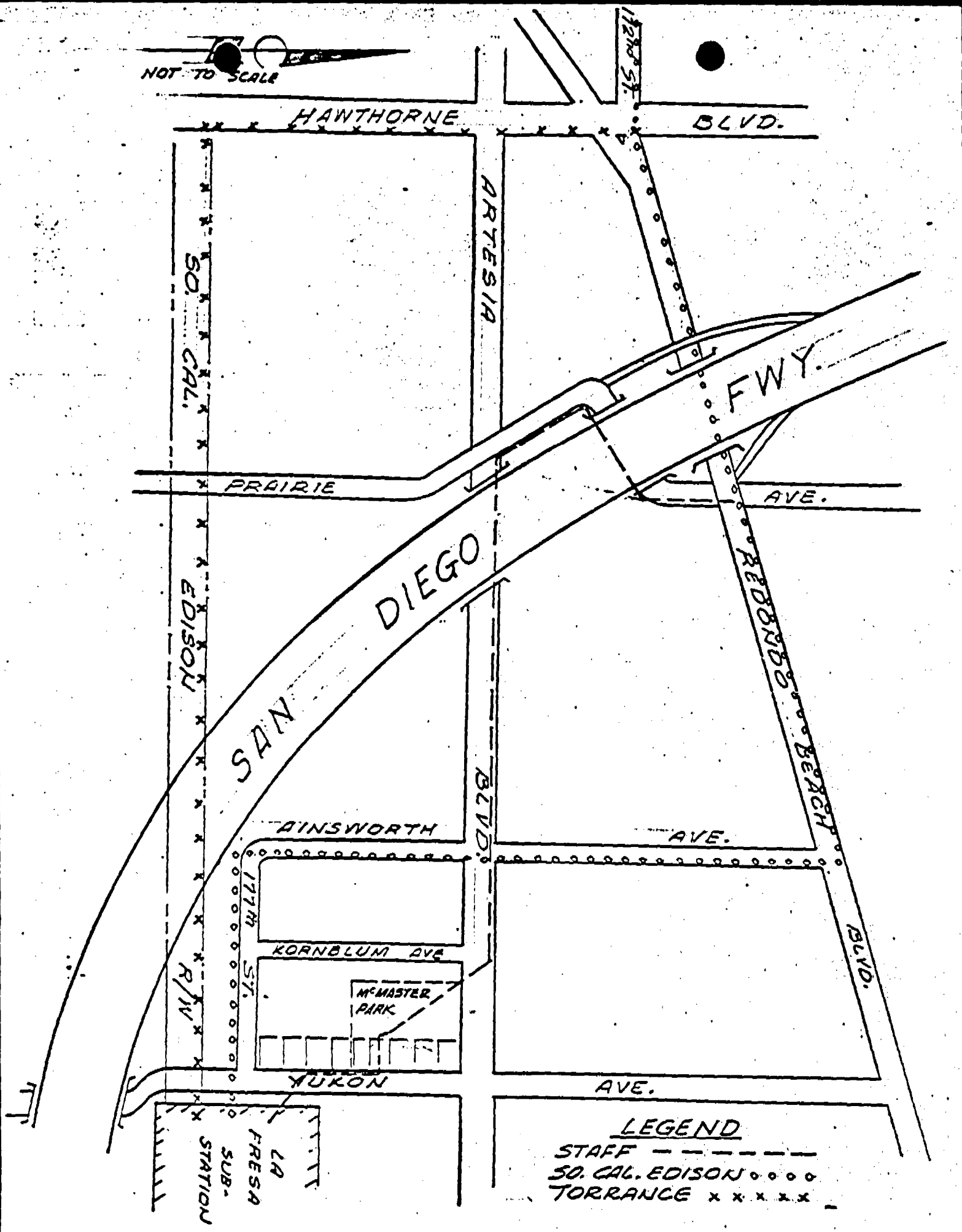
5. After further considerations and changes the final route was proposed as follows:

> To begin at the northerly edge of El Nido Substation on single-circuit steel poles and proceed easterly on private R/W and easement, then northerly along easement and the east side of Oceangate, then westerly along the north side of El Segundo Boulevard, then northerly along California Highway Department easement and future frontage road to be constructed in conjunction with the California Highway Department San Diego Freeway widening project, then easterly along north side of 121st Street, then northerly along west side of Felton to 119th Street, then northerly along proposed San Diego Freeway R/W fence to Imperial Highway, then northerly on east side of Redfern Avenue, then easterly on the north side of 111th Place, then northerly on the west side of Buford Avenue, then westerly on south side of Lennox Boulevard, then northerly on west side of

Felton Avenue, then westerly on south side of Century Boulevard, then northerly on west side of Redfern Avenue, then westerly and northerly along south side and west side of Oceangate and Ash Avenues, then easterly along south side of Arbor Vitae Street, then northerly along west side of Oak Street to Olive Street, then the east side of Oak Street, then westerly along north side of Regent Street, then northerly along the west of Hyde Park Boulevard, then westerly on Industrial Avenue (one span), then northerly along east side of La Cienega Boulevard to Centinela Avenue, then northerly on east side of La Cienega Boulevard on double-circuit steel poles (1 220 kv circuit and 1 existing 66 kv circuit) to the point of intersection of private R/W and La Cienega Boulevard (intersection with the La Fresa-La Cienega 220 kv transmission line). Then westerly on private R/W using double-circuit steel poles (with La Fresa-La Cienega 220 kv circuit) to the proposed La Cienega Substation.


HYDE PARK BLVD.
AVE.
REGENT AVE.
FLORENCE BLVD.
FWY
COMMERCIAL BLDGS.
STREET
STREET
NOT TO SCALE
MANCHESTER BLVD.
OLIVE ST.
DIEGO
ASH
BLVD.
HILLCREST
ELM AVE.
OAK ST. SCHOOL
SPRUCE AVE.
MAGNOLIA AVE.
BUCKTHORN AVE.
OAK
LA CIENEGA
SAN
ASH ST.
ARBOR VITAE
ST.
ROUTES
EDISON-OAK ST.
ASH ST. (STAFF)
LA CIENEGA (STAFF)

APPENDIX "C"


NOT TO SCALE
HAWTHORNE BLVD.
ARTESIA
SO. CAL. EDISON
SAN DIEGO FWY.
PRAIRIE AVE.
REDONDO BEACH BLVD.
AINSWORTH AVE.
KORNBLUM AVE
McMASTER PARK
YUKON AVE.
LA FRESA SUB-STATION
LEGEND
STAFF
SO. CAL. EDISON
TORRANCE

APPENDIX D