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REPORT
on
Railroad Grade Crossing
Elimination
and
Passenger and Freight
Terminals
in
Los Angeles

California Railroad Commission
Engineering Department

RICHARD SACHSE, Chief Engineer

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ADDRESS ALL COMMUNICATIONS TO
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LETTER OF TRANSMITTAL

Subject: Los Angeles Railroad Grade Crossing and
 Terminal Investigation, Cases 970 et seq.

California Railroad Commission,
 San Francisco, California.

Gentlemen:

In December, 1917, the Commission instructed me to arrange for a complete engineering investigation into the Los Angeles railroad grade crossing and freight and passenger terminal situation and to report to the Commission on all of the matters above referred to. This work has now been completed and I am submitting with this letter this department's "Report on Railroad Grade Crossing Elimination and Passenger and Freight Terminals in Los Angeles."

You will find preceding the first chapter a summary and in the body of the report a full discussion of the Los Angeles grade crossing and terminal problem. The report has grown to be larger than was expected. It was necessary, nevertheless, to limit the scope of the investigation and to leave out of consideration a number of matters that were brought before us in the course of our work. Among such matters were the relation of the Los Angeles railroad development to the municipal harbor at San Pedro, more comprehensive plans for the elimination of grade crossings on electric rapid transit lines, the electrification of the steam roads in the Los Angeles district and in Southern California, the location and the plan for a civic center, and other problems of a city planning character. Aside from the fact that each one of these subjects is large enough for a separate and independent investigation and that we had neither the means nor the time to deal adequately with these matters, it was apparent that in their essential features they were outside the jurisdiction of this Commission.

Within the limits it was necessary to recognize, we believe that our report is complete. This statement is made with the fact in mind that there is available in the engineering department a very large amount of detail data that it was impracticable to include in a printed report. The magnitude of the subject can, perhaps, best be illustrated by the fact that estimates were

made for various purposes and plans (many of which had to be rejected) totalling in excess of one hundred million dollars, and that the total estimate for all of our ultimate recommendations amounts to approximately thirty-two million dollars.

It will be convenient to give to the Commission in this letter our conclusions in the three main branches of the investigation (possibility of grade crossing elimination; desirability, location and plan for a union passenger terminal; possibility for improvement in the freight situation) and in the matters related to these three main branches.

Grade Crossing Elimination

This is the most important of the three subjects and is the one that is of most vital importance to the public and to the railroads. It is also the controlling engineering element in the entire report and, to a large extent, governs the solution of the union terminal and freight problems. We believe that all complaints against the unsatisfactory grade crossing conditions in Los Angeles, within the scope of this report, can be satisfied and that a permanent solution of the problem can be had by the adoption of our recommendations. These are:

1. Eliminate all important grade crossings on both banks of the Los Angeles River through the depression of the railroad tracks and the elevation of the streets by means of the improvement of existing, and the construction of new, viaducts across the river and across the tracks adjacent to the river. The streets to be so treated are North Main, Macy, Aliso, East First, East Fourth, East Seventh and East Ninth Streets. The North Spring Street crossing is to be entirely eliminated and Alhambra Avenue crossing is to be protected by an improved interlocking plant. The recommendations should be carried out substantially in the order and according to the plans given in this report.
2. Allow tracks to remain on Alameda Street but eliminate all (except approximately 3 per cent) of the present railroad traffic by diverting to better channels. The remaining traffic (consisting of switching service) is to be handled at night between Macy and Ninth Streets. Eliminate all main line traffic from Alameda Street.
3. Bring about the elimination of 61 streets, 8 electric railway and 2 steam railroad crossings by the adoption of the Santa Fe plan for an improved line between Los Angeles and Pasadena. Bring about the elimination of an additional 28 grade crossings on the Salt Lake Railroad by requiring that road to join in the construction and the use of the proposed Santa Fe line and by the abandonment and removal of its present tracks between the termini of the proposed line.
 - ii. In addition to the existing rapid transit lines, a municipal electric line should be built between Los Angeles and Pasadena, this line should be located on the same right of way (additional width to be acquired) and should be combined for the Santa Fe and the Salt Lake between Los Angeles and Pasadena.
4. Depress Santa Fe Avenue and raise the Butte Street tracks to eliminate the grade crossing at Butte Street and Santa Fe Avenue.

Union Passenger Terminal

After a most exhaustive consideration of all arguments for and against a union passenger station in Los Angeles, we have come to the conclusion that the establishment of such a station is desirable both from the standpoint of the public and from the standpoint of the railroads, that the cost is justified and that the project can be financed. The reasons for this conclusion are given in detail in the body of the report.

We have found three sites adapted to the location of such a station, viz., the Plaza site, the Santa Fe Station site and the Southern Pacific Station site. Detailed plans and estimates have been worked up by us for each of these locations, and the recommendations contained in the report have been fitted to each of the plans. Of the three plans, the Plaza plan is the best and it is our recommendation that the Commission order the establishment of a union passenger station at this site substantially in accordance with the plan we have developed.

Freight

We believe that the matter of proper freight facilities is of even greater importance to the City of Los Angeles than the matter of steam railroad passenger facilities. It is our conclusion that freight traffic conditions are not unsatisfactory and that no far reaching recommendations are necessary to bring about such further improvements as appear to us desirable. Our recommendations in this connection are:

1. Tracks should not be removed from Alameda Street at this time, but all possible traffic should be removed from that street (see recommendation No. 2 above).
2. The so-called "Santa Fe Alley Spur" should be removed north of Butte Street.
3. Dealing with switching service and spur tracks for the future, we recommend that:
 - (a) New permits be not granted for industry tracks longitudinally in the streets.
 - (b) All tracks now longitudinally in the streets be confined to industrial purposes only and be removed as soon as better access to the industries served can be obtained.
 - (c) All spur tracks to be built in general easterly and westerly direction from the river banks and not across east and west streets unless, by such construction, the crossing of important north and south streets is avoided.
4. The establishment of a union freight station for less than carload freight at the Santa Fe freight yard site on Santa Fe Avenue from First to Seventh Streets is recommended. The present Santa Fe freight station is to become a part of this union freight station. This we consider a very important recommendation and one that will be of great and permanent benefit to the railroads and to the shippers in Los Angeles.
5. The establishment of team yards along the east side of Alameda Street is recommended, as outlined in the report.
6. We recommend the construction of new freight yards farther away from the industrial district. A new yard is recommended for the Southern

Pacific, following the plans of this road, along the San Fernando Road, and a new yard for the Santa Fe is recommended on the Fullerton line just east of Hobart, on land already acquired.

Related Recommendations

Related to the foregoing recommendations are certain other matters that are either before the Commission in various applications consolidated with this proceeding or that are important factors in the terminal problem and that fall within the scope of this report.

1. **Union Passenger Station and Electric Interurban Service:** If our recommendation for the establishment of a union passenger station at the Plaza is adopted by the Commission, we recommend also the construction of a subway from the present Pacific Electric station at Sixth and Main Streets northerly along Main Street to and under the passenger station, changing to an elevated railroad along Ramirez Street and meeting the present line at the Aliso Street bridge. This line from here would continue as an elevated railway to Brooklyn Avenue where the present tracks and grade would be met. This subway construction along Main Street should be undertaken within the next five years.

The present elevated Pacific Electric structure in the rear of the Main Street Station should be extended to Alameda Street and thence south to Fourteenth Street.

We realize that this is a far-reaching recommendation but believe it justified and essential in the interest of transportation and city development in Los Angeles, for reasons given in the report.

2. **Continuation of Consolidated Uptown Ticket Office:** This matter is related to our recommendation for a union passenger station. We urge that the existing consolidated uptown ticket office be continued, pending the establishment of a union passenger station, after the railroads return to private control. This recommendation is made because the present arrangement instituted by the United States Railroad Administration has proved satisfactory in every respect to the public and to the railroads.
3. **Application 3346** (Southern Pacific Company and Salt Lake Railroad for approval of agreement covering joint terminal facilities). It follows as a result of the recommendations contained in this report that this application should be dismissed.
4. **Application 2962** (Industrial Terminal Railway to issue stock for the construction of a switching and terminal railway): This application should be dismissed for the same reasons, although it will probably appear that with the adoption of our recommendations, another application of this nature will likely be filed later on in a modified form.
5. **Application 3037** (Los Angeles and Salt Lake Railroad Company for authority to establish 14 grade crossings in order to enable the construction of a freight terminal on Alameda Street): We recommend that this application be denied since our recommendation for a less than carload union freight station at the Santa Fe site will take care of all such freight requirements.
6. **Case 938** (Interlocking at Aliso Street and the Los Angeles River): In this case the Commission made its order directing the installation of an interlocking plant to control the Pacific Electric Railway, the Santa Fe and the Los Angeles and Salt Lake roads at this point. A supplemental order was later issued holding the matter in abeyance pending

the completion of this report. Since our recommendations for the separation of grades and for a union passenger station will eliminate this crossing, the construction of this interlocker will not be necessary. An order should be issued to this effect after the adoption of our recommendations.

7. **Pairing of Southern Pacific and Salt Lake Tracks between Los Angeles and Colton:** The recommendation for such pairing of tracks was made to the Director General jointly by the engineers representing the Federally controlled railroads and by the Commission. Although this recommendation is very clearly to the benefit of the interested railroads and although the improvement can be made with very small expenditure and although an annual saving in the cost of operation was estimated at \$173,025 (and this estimate has in the meantime increased), nothing has been done to carry out this recommendation. We can see no reason and have no explanation for the inaction on the part of the United States Railroad Administration. The recommended plan will work perfectly with our recommendations and we again urge that the proposed pairing of tracks as outlined in the report be put into effect by the action of this Commission as soon as the operating control of the roads is released by the Federal Government.

Cost Estimates

Detailed cost estimates will be found in the summary, in the body of the report and in Chapter XX.—Estimates. I shall here give only our totals for the ultimate plans worked out by us for the foregoing recommendations:

ESTIMATED CAPITAL EXPENDITURES FOR ALL RECOMMENDATIONS (Ultimate Plan)

Grade Crossing Elimination	\$11,488,933
Along Los Angeles River	\$4,596,042
Between Los Angeles and Pasadena	6,700,000
Butte Street Trackage	192,891
Union Passenger Terminal and Coach Yard.....	10,933,202
Union Freight Station	2,575,942
New Freight Yards	2,835,187
Double Track Operation of Southern Pacific and Salt Lake Tracks between Los Angeles and Colton—Pairing of Single Tracks...	136,812
Team Yards	629,021
Additional Trackage, Various Locations.....	710,818
Subway and Elevated Construction—Pacific Electric.....	5,741,566
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Total	\$35,051,481
Release Southern Pacific Station and Coach Yard Sites.....	2,818,036
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Net Total	\$32,233,445

While a capital expenditure of over \$32,000,000 seems large, it should be remembered that this money is to be expended over a term of years. In any event, whether the foregoing recommendations are adopted or not, very large capital expenditures aggregating probably in the neighborhood of the sum estimated by us will become necessary in the near future if the transportation of Los Angeles is to keep pace with the growth and the industrial and business

development of the City. The choice is not between a large expenditure if these recommendations are adopted and a small one if they are not adopted: it is rather between an adequate and carefully planned development without wasteful expenditures and a haphazard growth dictated, in the main, by private interests from the standpoint of each individual road. In either case the burden of capital and operating costs must, in the end, be borne by the public.

It is impossible to estimate in dollars the direct and indirect savings and benefits through the carrying out of these plans that will accrue to the railroads, to the passengers and to the shippers and also to the people and enterprises affected by transportation conditions. We have no hesitation in saying, however, that from the financial standpoint alone, the proposed expenditure is justified. In the larger aspect of city planning, there is no doubt that the City of Los Angeles should use every effort to assist in the carrying out of these recommendations.

It is a pleasure to acknowledge the whole-hearted co-operation of our permanent and temporary engineering staff and of all other Commission employees assigned to this work. I have attached to this letter a statement of personnel, listing all engineers assigned to the investigation, in order that the Commission may know to whom credit and responsibility belong. Much credit and thanks are due to the engineers and representatives of the City and County of Los Angeles and of all the railroads, steam and electric, who were always ready to furnish us with the necessary information and to assist us in every possible way. It would have been impossible, without the assistance of these gentlemen, to complete this report within the time and means at our disposal.

Respectfully,



July 31, 1919.

Chief Engineer.

PERSONNEL

Richard Sachse, Chief Engineer, in charge.

H. G. Weeks, Assistant Engineer, in charge of office and field work in Los Angeles.

Structural Design and Estimates—*G. S. Hill, Assistant Engineer.

E. A. Bender, Draftsman,	H. Schmidt, Draftsman,
*T. F. Chace, "	*O. A. Schyl, "
*H. E. Findlay, "	*H. Y. Smith, "
*G. A. Raab, "	*L. Millsaps, "
*Earl Frary, Architectural Draftsman,	

Land Appraisal—V. C. Dickinson, Assistant Engineer.

R. L. Davis, Assistant Engineer,	F. H. Smith, Assistant Engineer,
Ward Hall, "	R. W. Ure, Clerk,

Historical and Traffic Studies—A. C. Wells, Assistant Engineer.

*C. Fiske, Jr., Assistant Engineer,	*R. N. Taplin, Assistant Engineer,
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Trackage Estimates and Industrial Survey—A. A. Anderson, Assistant Engineer.

J. F. Beaman, Assistant Engineer,	A. N. Johns, Assistant Engineer,
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Building Estimates—*H. D. Johnson, Assistant Engineer.

General—

B. W. Campbell Assistant Engineer,	G. H. Sisson, Assistant Engineer.
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*Temporary employee.

SUMMARY OF REPORT AND OF RECOMMENDATIONS

A short review of the formal proceedings which led to the Los Angeles grade crossing and terminal investigation is necessary to an understanding of the purpose of this report. In July, 1915, several civic organizations of Los Angeles filed complaints asking the Commission to ameliorate the grade crossing situation within the city limits of Los Angeles, to consolidate and unify the tracks of the various roads, to provide for a union passenger station and for better freight facilities and to investigate thoroughly the entire transportation situation.

These complainants were joined in their general and more specific petitions by a number of other civic and commercial organizations and by several municipalities in the immediate neighborhood of Los Angeles, until, in August, 1916, there were before the Commission seven formal proceedings and at least ten informal complaints. Under the provisions of the Public Utilities Law, the Commission began the hearing of these cases and consolidated them into one proceeding.

The question of the Commission's jurisdiction was raised by the railroads and by the City of Los Angeles and the issue was taken before the Supreme Court of the State of California. After the Court had confirmed the Commission's jurisdiction in all essential aspects and had placed the Commission under mandate to proceed with the various cases, the City of Los Angeles, the County of Los Angeles and other interests were made parties to the proceeding and the Commission continued with the investigation.

There are now included in this proceeding all of the steam railroads and electric railways entering into and operating in the City of Los Angeles (the Southern Pacific, the Santa Fe, the Los Angeles and Salt Lake, the Pacific Electric and the Los Angeles Railway); the City of Los Angeles, as represented by the city authorities and by a number of commercial and civic organizations; the Cities of Pasadena, Alhambra, San Gabriel, South Pasadena, San Dimas, El Monte, Pomona, Ontario, Sierra Madre, Colton, San Marino, San Pedro, Whittier, Santa Monica and Venice; and the County of Los Angeles through its county authorities.

Subsequent to the filing of the various proceedings just referred to, applications were made to the Commission by the Los Angeles and Salt Lake Railroad, by the Industrial Terminal Railway Company of Los Angeles, by the Southern Pacific and by the Southern Pacific, the Salt Lake and the Pacific Electric jointly, for permission to undertake certain operating agreements affecting the Los Angeles grade crossing and terminal situation.

With all of these applications the Commission took the position that large capital expenditures and important re-arrangement of existing conditions were unjustified until the larger matters had been thoroughly considered. For this reason all of the applications were held in abeyance.

In December, 1917, public hearings by the Commission were continued until further notice pending the completion of the engineering investigation

which had been undertaken by the Commission and for the purpose of which the City Council of Los Angeles had appropriated \$20,000 to defray part of the cost of the work.

Active work in this investigation began about January, 1918, shortly after the control of the three steam railroads in Los Angeles had been taken over by the United States Railroad Administration, and this work has been pursued ever since, resulting in this report.

With the assumption of the operating control of the railroads by the Federal Government, Hon. Wm. G. McAdoo, the Director General of Railroads, announced as one of his policies the unification of terminal facilities. Los Angeles was one of the cities whose terminals he wished to unify. He made request on this Commission to give him the benefit of its investigation and of its views in the Los Angeles grade crossing and terminal situation. As a result of this request the Commission's Engineering Department made two reports, the first in September, 1918, and the second in January, 1919. Both of these reports contained recommendations which were to be put into effect immediately and during Federal control, which were calculated to improve certain unsatisfactory traffic and grade crossing conditions and which (and this was the main point) were to effect considerable immediate savings in operating costs. While the recommendations in the first report were urged upon the Director General by the Commission alone, the proposals in the second report were the joint recommendations of the Railroad Administration's own engineers and the engineers of this Commission.

It might be stated here that none of the recommendations have at this time been carried into effect by the United States Railroad Administration.

It is the Commission's intention that this report in its present form shall be submitted to all of the interested parties for criticism and suggestions, that thereafter further public hearings shall be held, that after the conclusion of these hearings the recommendations contained in the report shall be revised on the basis of such additional facts as may be established during the hearings, and that finally the Commission shall make its decision and order.

Scope of Work

The scope of the investigation is broad and includes the entire steam and electric railroad situation in Los Angeles and vicinity. Of necessity, however, the report deals particularly with the steam railroads, although the interurban electric transportation problem (Pacific Electric Railway) and the street railway question (Los Angeles Railway) have been given consideration in their relation to the steam carriers.

The engineering inquiry involved the following subjects:

- (a) Grade crossing elimination,
- (b) Union passenger terminal,
- (c) Joint main line and industrial trackage,
- (d) Improvement and possible re-arrangement of freight facilities,
- (e) Electric interurban, street railway and automobile traffic,
- (f) City streets, viaducts and bridges and the relation of the transportation problem to the general subject of city planning.

Again, the engineering investigation distinguishes between:

- (a) Work to be done within the city limits of Los Angeles,
- (b) Work to be done outside the city limits of Los Angeles.

And again, the report recognizes that any comprehensive plan can be carried out only under the "unit system" and that a program must be laid down for:

- (a) Work to be commenced and carried out immediately after a plan has been adopted,
- (b) Work to be carried out later,
- (c) Work for the more distant future,

The recommendations may be considered under three heads, in the order of their importance:

- (a) Elimination of grade crossings,
- (b) Establishment of a union passenger terminal,
- (c) Improvement in the handling of freight.

These three phases of the investigation are interdependent, and a determination of one question cannot be reached without a study of the other two. On the basis of such a study, the following conclusions are reached:

ELIMINATION OF GRADE CROSSINGS

Crossings Adjacent to Los Angeles River

Traffic studies indicate that every year about 65,000,000 people cross the Los Angeles River and the tracks of the Santa Fe and the Salt Lake roads adjacent to the River, divided as follows:

	People per Annum
Over present five grade crossings.....	33,000,000
Over present four viaducts and bridges.....	32,000,000
Total	65,000,000

If we estimate the population of Los Angeles in 1918 at 600,000, this movement would be equivalent to a going back and forth of the River every day of approximately one-third of the population.

The railroad traffic amounts to about 560 train movements each day from 6 A. M. to 8 P. M., or at least 600 movements per twenty-four hours for the five existing grade crossings mentioned above.

Numerous accidents have occurred and the delay to vehicular traffic and, especially, interurban cars, is also serious. On Seventh Street, the crossing gates have been found to be down as much as 19 per cent of the daylight

We recommend that the grade crossings formed by the following streets and the Santa Fe on the west bank and the Salt Lake on the east bank of the River, be eliminated by depression of tracks and elevation of the streets: hours—the period of main traffic.

**Recom-
mend-
ations**

**RECOMMENDED DEPRESSION OF TRACKS AND ELEVATION OF STREETS
FOR ELIMINATION OF GRADE CROSSINGS ALONG
LOS ANGELES RIVER**

Street	Which Work Order in Should Be Done	Santa Fe or		Salt Lake or	
		West Side Depression of Tracks	Raise of Streets	East Side Depression of Tracks	Raise of Streets
North Spring	2nd	1.2 ft.	‡	3.4*ft.	‡
North Main	2nd	2.5 "	22.5 ft.	4.5 "	20.5 ft.
Alhambra	2nd	7.9 "	0.0‡ "	8.0 "	0.0‡ "
Macy	1st	7.9 "	17.1 "	11.3 "	13.7 "
Aliso	1st	8.3 "	16.7‡ "	8.0 "	17.0‡ "
East First	3rd	8.7 "	16.3 "	3.8 "	21.2 "
East Fourth	3rd	3.6 "	21.4 "	6.4 "	18.6 "
East Seventh	3rd	7.0 "	18.0 "	7.3 "	17.7 "
East Ninth	3rd	2.7 "	22.3 "	5.7 "	19.9 "

Raise: †Tracks only, no highway. ‡Remove existing bridge.

The above mentioned Santa Fe tracks at Macy and Aliso Streets are those along the River. We intend to eliminate the crossings of the present main line at these streets by removing the track.

The recommendation above stated as to the order in which the work should be undertaken is here based on the assumption that this grade crossing elimination work **only** is done. If our recommendation for a union passenger station and for certain changes in freight handling are adopted, the order of these grade separations will be changed as will appear later.

At the locations marked "1st" the crossings should be eliminated at once; at those marked "2nd" the crossings should be eliminated within five years; the crossings at the others should be eliminated shortly thereafter, the time depending, to a large extent, upon future development. The cost of the whole work is estimated as follows:

**ESTIMATED COST OF GRADE CROSSING ELIMINATION ALONG LOS
ANGELES RIVER, NORTH BROADWAY TO BUTTE STREET
(CONSTRUCTION IN ONE STEP)**

Construction of Viaducts and New Approaches to North Broadway Viaducts.....	\$3,658,132
Depression of Existing Tracks (Grading for Double Track).....	629,412
Santa Fe.....	\$309,898
Salt Lake.....	244,966
Southern Pacific.....	74,548*

*Includes all interlocking at Mission Tower.

\$4,287,544

These estimates, like all the others, include the costs of additional lands, compensation for existing private structures and damages and include allowance for contingencies, interest during construction, engineering, and legal and general administrative expense. Estimates for the viaducts are based on three-span reinforced concrete arch bridges across the river, on steel construction over the tracks and on filled approaches with concrete retaining walls. Roadways are uniformly 48 feet between curbs, and grades of the street approaches are 4 per cent.

The cost, as estimated, is predicated on the depression of the existing Salt Lake tracks, only such changes being made as are occasioned by the depression. The grading, however, is for a double track road-bed all the way from near North Broadway to south of Ninth Street. On the Santa Fe side, double tracks are estimated all the way, the ends of the freight yard being "planed off" to fit the new grade of the river tracks. Otherwise the yard between First and Sixth Streets is not disturbed.

If a union passenger station is built or if certain changes in the handling of freight are made, these estimates will be increased as shown hereafter. They are here given only for "simple depression" of the existing river tracks.

If the work is done by steps, the cost will again be increased for the reason that, because of temporary grades, the work between certain points will have to be done twice. The estimate for the 1st step is as follows:

FIRST STEP IN GRADE CROSSING ELIMINATION ALONG LOS ANGELES RIVER, ELIMINATION OF GRADE CROSSINGS AT MACY AND ALISO STREETS (WITH SIMPLE DEPRESSION OF SANTA FE AND SALT LAKE TRACKS)

Viaducts (Macy and Aliso Streets).....	.....	\$774,493
Tracks (Alhambra Ave. to 1st St.).....	.....	196,993
Santa Fe .....	.....	\$103,812
Salt Lake .....	.....	93,181
Total .....	.....	\$971,486

No estimates have been made for the second and third steps.

Alameda Street Grade Crossings

Traffic studies indicate that every year approximately 78,000,000 people cross Alameda Street in its most congested part (Spring Street to Ninth Street), divided as follows:

Location	Important Streets	Electric Railways	People per Annum Crossing Tracks
North of Arcade Station.....	9	6	59,000,000
South of Arcade Station.....	4	1	19,000,000
Total	13	7	78,000,000

The railroad traffic is very heavy: the average street north of the Arcade Station is crossed by 157 train movements each day, and the average street south of the station is crossed by 98 train movements. This means that 13 principal streets have an aggregate of 3,315 train movements daily.

Accidents have occurred (though they have not been very numerous on account of the reduced speed of the trains) and there is an important delay to both railroad, vehicular and electric railway traffic. At both Sixth and Seventh Streets the crossing gates are down over 15 per cent of the daylight hours. Both danger and delay will increase as time goes on.

We recommend that the tracks be allowed to remain in Alameda Street but that all except approximately 3 per cent of the present railroad traffic be diverted from this street and that this remaining traffic (switching service) be handled after midnight between 1 and 6 A. M. between Macy and Ninth

Streets. Thus all mainline traffic will be eliminated. This will do away with practically all the grade crossings and will, at the same time, disturb the existing investment in buildings and business as little as possible. It will mean little or no increase in railroad operating costs.

Through Southern Pacific freight trains (about ten daily) between the Southern Pacific yard and Los Angeles Harbor should be rerouted to avoid Alameda Street. They should be handled along the river bank tracks and should reach Alameda Street via Butte Street.

There is at present a traffic of some 45,000 fuel oil (tank) cars per annum on Alameda Street. This movement results in a serious disturbance to both the public and the railroads because of the long, heavy trains running at slow speed. These cars, which comprising about 32 per cent of all freight cars moved on Alameda Street, run between El Segundo and Los Angeles via the Pacific Electric. We recommend that they be rerouted through the city and that they be handled over Salt Lake or Santa Fe tracks along the river between the Southern Pacific yard and near Butte Street, at which point they be transferred to and from the Pacific Electric.

The Southern Pacific now hauls cars for the Pacific Electric between Macy Street and Eighth Street on Alameda Street in order to avoid haul over Pacific Electric tracks further uptown. These cars also should be handled on the tracks along the river, reaching the Salt Lake tracks at Aliso Street and the Pacific Electric tracks at the transfer tracks at Santa Fe Avenue and Butte Street. Nearly 31,000 cars per annum—22 per cent of all freight cars switched on Alameda Street—are involved. Cars transferred between the Southern Pacific and the Pacific Electric amount to 36,000 cars per annum—26 per cent of all freight cars handled along Alameda Street.

These cars, too, should be diverted from Alameda Street to the banks of the Los Angeles River.

This rerouting and diversion is very important in reducing the traffic on Alameda Street, the switching so rerouted amounting to 85 per cent of all freight cars switched along this important thoroughfare.

Grade Crossings between Los Angeles and Pasadena

The Santa Fe has under consideration plans which will eliminate 61 street, 8 electric railway and 2 steam railroad crossings. The railway grade will be reduced, with a shortening of line and a reduction of curvature. There will result a large saving in operation. This work is estimated to cost \$6,700,000. The Santa Fe plans are in a preliminary stage at this time, and we have agreed to hold as confidential the information given us. The plans fit perfectly into all other recommendations made in this report and in all respects meet our views as to the phase of the problem dealing with the main line situation between Los Angeles and Pasadena.

This construction could be divided into two steps: The first step should begin at Los Angeles and extend about 5½ miles. In this distance all of the street crossings (2 in number), all of the electric railway crossings (2 in

number) and all of the steam railway crossings (2 in number) would be eliminated. It is estimated that this work, based on 1916 prices, would cost approximately \$2,083,000, but at the present time the cost would probably be \$3,000,000. It should be pointed out that this first step, while accomplishing the complete elimination of grade crossings, would not reduce the present maximum grade or the amount of curvature. The saving in operation, therefore, would not be proportionate to the expenditure.

We draw attention to the fact that piecemeal elimination of these crossings would probably average \$100,000 per crossing, which is approximately the figure obtained by dividing the estimated costs above by the number of crossings, and that for this expenditure a practically new double track roadbed is gained in addition to the separation of grades. Also, that the history of railroads in the larger cities proves the wisdom of a comprehensive plan of track elevation (or, in some cases, depression) as compared with temporizing and separating the grades of crossings one by one.

There would remain about 28 grade crossings on the **Salt Lake**, the elimination of which is also desirable.

We recommend that the first step in the elimination of grade crossings on the Santa Fe between Los Angeles and Pasadena be undertaken at once, taking into consideration the early completion of the whole project and consequent saving in the cost of operation as well as the public benefits resulting from the elimination of crossings at grade.

We further recommend that the Salt Lake join in the construction, use and operation of these new tracks and abandon and remove its present tracks between the termini of the proposed new line.

The **City of Pasadena** has taken steps toward the construction of its own rapid transit line between **Los Angeles and Pasadena** but the matter seems to be in abeyance at this time. If the project should be revived, it should be combined with the elimination of grade crossings on the **Santa Fe and the Salt Lake** by constructing the tracks on the same, but somewhat wider right of way and roadbed. This would reduce the cost of construction and operation of such a rapid transit line and also reduce the number of bridges and subways in the Cities of Pasadena, South Pasadena and Los Angeles.

We would not recommend the construction of such a rapid transit line through private capital because the revenue from the traffic is apparently insufficient to justify the investment. If the line is a municipal and public enterprise, however, and is partially supported by general taxes, consideration of earnings, expenses and return are no longer of first importance. In any event, and provided that construction of the line is seriously considered, the plan should be carried out in accordance with the above recommendation.

Santa Fe Avenue and Butte Street

If freight switching, through freight and certain transfer freight, is diverted and rerouted according to the plans herein presented, the tracks on Butte Street will become so busy that it will be desirable to avoid a grade crossing at Butte Street and Santa Fe Avenue. The increase of vehicular

traffic along Santa Fe Avenue is another reason for the elimination of a grade crossing at this point.

It is recommended that within five years Santa Fe Avenue be depressed five feet and that Butte Street track be raised to cross over the street. We are satisfied that under any plan this grade crossing elimination should be made.

This improvement would cost, it is estimated, \$47,652 for the subway and bridge and \$50,630 for the elevation and rebuilding of the Butte Street tracks (including a double track line); a total of \$98,282.

ESTABLISHMENT OF UNION PASSENGER TERMINAL

The establishment of a union passenger station is largely a question of its desirability and cost. It is not entirely a railroad matter but is also one of public policy and it may be resolved into a question of whether or not public convenience and necessity, present and future, demand the expenditure.

A union passenger station is desirable for the following reasons:—

- (1) As a gateway to the city, Los Angeles prefers **one** adequate, convenient and beautiful entrance to several separate gateways, one of which can by themselves have all the advantages of a single union depot. This is a matter of civic pride and of city planning for the future. Los Angeles, by reason of its wonderful advantages as a tourist center and as a center of travel, is justified and sound, in our opinion, in making this consideration one of the first importance.
- (2) There will be increased convenience to passengers. Since mail, express and baggage is carried on passenger trains, it is more economical to handle this business at one station. \$10,000 per annum would be saved in the handling of mail if a terminal post office were established. The express business amounts, in tonnage, to about one-fourth of the less than carload freight business of Los Angeles and much would be saved by elimination of the wagon haul between the various depots. This saving cannot readily be estimated in terms of money and is dependent on the location of the main depot. The more central the location, the greater the saving. Baggage is also transferred between the stations and—while of lesser importance in cost—increased convenience would result.
- (3) Grade crossing elimination would be simplified. When it is maintained that there is no necessity for a union station, it must be remembered that the retention of more than one station will necessitate greater expenditure for the elimination of grade crossings, and, pending complete separation, will result in more vehicular movement across tracks at grade.
- (4) Present passenger facilities of the Santa Fe and the Salt Lake stations are inadequate. Large capital expenditures must soon be incurred in any event to satisfy present and future needs. This is true to a lesser extent of the Southern Pacific station also. A union depot will fill these needs better, permanently and at a relatively smaller cost than piecemeal construction by individual roads regardless of the problem as a whole. If the three steam roads now had satisfactory facilities, this argument would be less important. Under existing conditions, it is of prime importance.

- (5) The topographical conditions and location of the railroads in Los Angeles are almost ideal and point definitely towards a union station. These natural conditions are such that a union station can be created with comparatively inexpensive connections between the roads at a relatively small capital expenditure. Long and costly approaches are eliminated and there is no doubt that the first cost will be relatively much smaller than for a similar undertaking in other communities of equal importance in the United States.
- (6) Centralization and consolidation would be particularly desirable from the point of view of unified operation of the railroads, whether under private or government ownership and control.

The principal arguments against the establishment of a union station are:

- (1) Los Angeles is not a through station. Practically all trains entering the city **terminate** there, and it is there that the majority of the passengers reach their destination. Only approximately 15 per cent of the total number of passengers transfer from one station to another.
- (2) The first cost of any adequate union passenger terminal will be high and the saving in operating expenses will not alone warrant the resulting increase in fixed charge.

These are the principal arguments for and against a union station. Other and more detailed reasons are given in the report.

Taking all arguments into consideration, we are convinced that a union station is desirable, provided it may be suitably located.

After a very complete study of the various sites and plans presented and suggested, we have come to the conclusion that there are but three locations worthy of serious consideration and detailed analysis:—

First: The Plaza site.

Second: The Santa Fe site.

Third: The Southern Pacific depot site.

The Hawgood and Storrow plans (submitted at hearings before the Commission) are located on sites which are too short for the construction of the necessary trackage and, locating the station as they do, too great a climb is required by the passengers between the station platforms and the concourse. The distance from Alameda Street to the Los Angeles River and between Macy and Aliso Streets is such that the throat of a properly designed yard would come so close to the River that the approaches would necessarily be by means of curved approaches north and south and crossing the River. This is very undesirable, viewed from the standpoint of train operation. This land should not be used for this purpose. The Storrow Plan also contemplates removal of the tracks from Alhambra Avenue and the construction of new tracks on private right of way adjacent thereto, with the elimination of a grade crossing at Mission Road by depressing the tracks. This would result, in order to obtain a satisfactory grade, in such a large expenditure, that we do not think it commensurate with the results to be obtained.

We recommend that the Commission order the establishment of a union passenger station at the Plaza site, substantially in accordance with the plan we have developed. This site and plan were selected for the following principal reasons, listed in the order of their importance with brief comparisons:

- (1) **Size and shape of site.** The Plaza site is much wider and longer than the Southern Pacific Station site and is equal to the Santa Fe site, which is too large.
- (2) **Greater architectural and aesthetic possibilities.** Civic pride and the advertising value of this feature is of particular significance in a tourist center. At the Plaza, a suitable park to set off the station is possible with least damage to business, and at least cost, and at the intersection of important streets. The Santa Fe freight station interferes at the Santa Fe site, which has the least possibilities in this respect.
- (3) **Ultimate rapid transit.** The Plaza site is on a more probable axis of the ultimate rapid transit system, which would be nearer and more convenient to the station than with either the Southern Pacific or the Santa Fe plans. More interurban passengers would pass the Southern Pacific site than the Santa Fe site.
- (4) Because of the separation of passenger tracks from the future main switching leads along the west bank of the river, there would be less **interference with switching** with the Plaza plan than with the Santa Fe plan, which presents bad operating conditions because of too much traffic in one place. The Plaza plan is nearly equal to the Southern Pacific plan in this respect.
- (5) **Least train, coach equipment and light engine mileage.** The Plaza site is very superior to the other sites largely due to the location at a more northerly point. The Southern Pacific plan is worst in this respect.
- (6) **Union freight station.** The Santa Fe site is particularly suitable for a union freight station, which is possible either with the Plaza or the Southern Pacific plans. The Plaza plan is equal to the Southern Pacific plan and both are better than the Santa Fe plan.
- (7) **Grade crossing separation.** With the Plaza plan, no elevated railway structures are necessary in uptown district or awkward subway and crossings in a very important thoroughfare, as with the Southern Pacific plan. The Plaza plan is nearly equal to the Santa Fe plan.
- (8) **Accessibility by street car lines.** Sixty per cent of the passengers use the street cars. With the Plaza plan more are accommodated without transfer than at the Southern Pacific or the Santa Fe sites. In this respect the Southern Pacific site is more convenient than the Santa Fe site.
- (9) **Distribution and collection of mail and express.** The Plaza site is nearly as good as the Southern Pacific site. The Santa Fe site is further and less accessible than either.
- (10) **Operation of yard and coach yard.** The Plaza site is better than the Santa Fe site because of the proximity of the coach yard, notwithstanding the fact that a through station is possible at the latter site. The Southern Pacific site is worst as the coach yard is distant, a stub station is necessary and the approach is on a steep grade.
- (11) **Property values.** Considering ultimate appreciation and neglecting immediate disturbances, the Plaza plan is far superior and the Southern

Pacific plan is far better than the Santa Fe plan. The ultimate appreciation with the station at the Plaza site and a union freight station at the Santa Fe site is estimated at over \$8,000,000. This is of advantage to the City in the restoration of depreciated property values.

- (12) **Convenient to hotel, business and shopping districts.** The Plaza site is slightly less convenient than the Southern Pacific site, which is much superior to the Santa Fe site.
- (13) **Accessibility by automobiles.** The Plaza site is superior to the Southern Pacific site from all points except the business district, where the inferiority is slight. Both are better than the Santa Fe site.
- (14) **Locomotive service and repair facilities.** This is partly covered in No. 5. Otherwise the Plaza site is first, the Santa Fe second and the Southern Pacific third with respect to use of present facilities and construction of new facilities.
- (15) **Freight draying.** The Plaza site is best inasmuch as passenger and freight vehicle traffic is separated. The Santa Fe site is worst since both classes would be in the same district.
- (16) **Confinement of transportation facilities to natural channel—the banks of the Los Angeles River.** The departure at the Plaza site is not of great importance because of location and improvements. The Santa Fe site is slightly better than the Plaza site and much better than the Southern Pacific site.
- (17) **Release of lands in industrial district.** Arranged in order of benefit, the three plans compare as follows:
 - Plaza: Release Southern Pacific station and coach yard sites.
 - Santa Fe: Release Southern Pacific station site; use coach yard for team tracks.
 - Southern Pacific: Release coach yard site.
- (18) **Segregation of freight and passenger routes.** This is best accomplished by the Southern Pacific plan, but the Plaza plan is not much inferior. The Santa Fe puts both passenger traffic and freight switching along the west bank and is in this way far inferior in this respect.

These arguments are more fully discussed and other arguments are given in other parts of this report.

Attention is drawn to the fact that construction of a union passenger station requires more than the expenditure covering the station itself and more than the addition of a coach yard, not only ultimately, but through the different steps of construction. Committed, as we are, to the separation of grades by the depression of the river tracks, the union passenger station plans hinge upon such separation and certain of this track depression and viaduct construction should be undertaken along with the building of a union station. The Plaza plan will close Alameda Street from Aliso Street to North Main Street and use part of the Southern Pacific freight station site. Therefore the re-location of this facility is imperative and of great importance, as approximately 50 per cent of all Los Angeles less-than-carload freight is handled at this station. Gathering the passenger traffic on the west bank of the river and using the Southern Pacific freight yard for a coach yard, forces extension of the new freight yard of the Southern Pacific along the east bank of the river north of Dayton Avenue. Having in mind

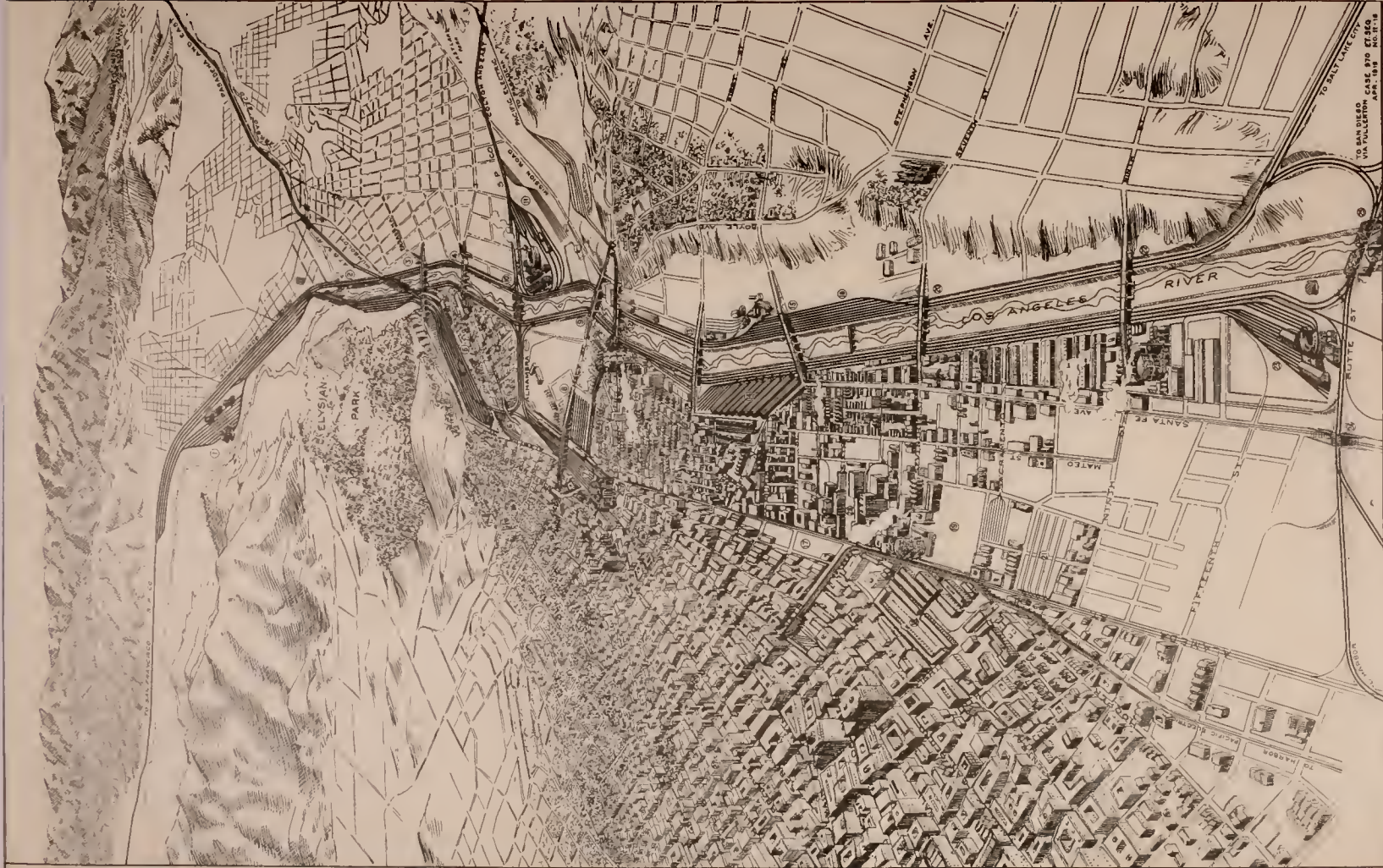
the influence of one factor on another we have, in the following table, presented our estimate of the total new money required for the necessary construction under the proposed plan:

**ESTIMATED NEW MONEY REQUIRED FOR UNION PASSENGER STATION
AT PLAZA AND OTHER PROPOSED IMPROVEMENTS
(IMMEDIATE AND ULTIMATE PLANS)**

Item No.	Item	Immediate	Ultimate*
Steam Roads			
1.	Passenger Terminal, Approaches, etc.	\$8,942,992	\$10,303,492
2.	Union Coach Yard	516,264	629,710
3.	Subtotal, Station Facilities	(1+2) (\$9,459,256)	(\$10,933,202)
4.	Union L. C. L. Freight Station.....	772,333	2,575,942
5.	Viaducts over Los Angeles River.....	774,493	3,658,132
6.	Depression of, and New, Tracks along River.....	290,357	937,910
7.	Main Line Track and Connections, not depressed.....	71,042	.....
8.	New Tracks for Southern Pacific, East Bank of Los Angeles River, North of Humboldt St.....	.....	305,238
9.	Butte Street Trackage and Santa Fe Ave. Subway.....	.....	192,891
10.	New Trackage, River to Hobart and Connections.....	111,570	401,144
11.	New Freight Yards, Southern Pacific and Santa Fe.....	1,198,127	2,835,187
12.	New Freight Terminal, Salt Lake, Alameda St.....	†	†
13.	New Connections, Relief Alameda St. Switching.....	67,209	4,436
14.	Team Yards	148,271	629,021
15.	Total	(1 to 14) \$12,892,658	\$22,473,103
16.	Release Southern Pacific Station Site.....	1,243,654	1,243,654
17.	Release Southern Pacific Coach Yard Site.....	1,574,382	1,574,382
18.	Total Credits	(16+17)\$2,818,036	\$2,818,036
19.	Net Total—Steam Roads	(15-18)\$10,074,622	19,655,067
Electric Roads			
20.	New Line, Pacific Electric Station to Brooklyn Avenue and to 14th Street	5,591,480	5,591,480
21.	New Surface Line to Union Station at Santa Fe.....	†	†
22.	Freight Tracks .....	.....	150,086
23.	Total Electric Roads.....	(20 to 23)\$5,591,480	\$5,741,566
24.	Grand Total—Steam and Electric.....	(19+23)\$15,666,102	25,396,633

*"Ultimate" includes "Immediate." †Not included in this plan.





California Railroad Commission Express File 247

FIG. 1. PROPOSED AREA OF LOS ANGELES HARBOUR WITH VIADUCT IN ACCORDANCE WITH ENGINEERING DEPARTMENTS RECOMMENDATIONS

This shows grade, viaduct, trestle, Union Passenger Station at Plaza, Union Station, Pacific Electric Bldg., Pacific Electric Bldg., and other improvements, finally recommended in this report.

- KEY TO SYMBOLS
- 1 New Southern Pacific Freight Yard
 - 2 New Tanks East of River and near Artillery St.
 - 3 North Main Street Bridge
 - 4 Proposed Union Coach Yard, near Southern Pacific Freight Yard
 - 5 Proposed Union Passenger Terminal
 - 6 Proposed Union Auto Lower River
 - 7 New Street Auto Lower River
 - 8 New Street Auto Upper River
 - 9 New Southern Pacific S. T. Freight Yard
 - 10 Proposed Southern Pacific Bldg.
 - 11 Proposed Union L. P. L. Freight Station
 - 12 New Street Bridge
 - 13 Salt Lake Freight Yard, Station Removed
 - 14 Union Pacific Freight Yard, Station Removed
 - 15 Southern Pacific Freight Yard, Station Removed
 - 16 Proposed Team Yard
 - 17 Proposed Team Yard
 - 18 New Double Truck Bridge
 - 19 New Double Truck Bridge
 - 20 Seventh and Broadway Highest Heavy Values
 - 21 Seventh and Broadway Highest Heavy Values
 - 22 Proposed Team Yard—Los Angeles Market

TO SAN DIEGO
 VIA FULLERTON CASE 910 ET SEQ.
 APR. 1919 H.C. 17-18

The largest single item in these totals is land. Of **privately** owned land, it is necessary to acquire approximately 65 acres, estimated to cost \$3,905,122. Of this, 41 acres are to be used for the union station and would cost \$2,822,831. The other parcels of land are required for connections, widening of existing right of way, new trackage along the east bank of the river north of Humboldt Street, etc.

These latter figures include two blocks bounded by Commercial, Arcadia-Aliso, San Pedro and North Main Streets, which go to make up the largest part of a proposed new plaza in front of the station and which, it is estimated, would cost \$678,186, or 24 per cent of the total cost of the land required for the terminal and immediate approaches, and \$195,010 for land for one end of a viaduct to carry Macy Street over the station yard. They do not include \$9,641 estimated to be the present market value of City of Los Angeles real estate included in the terminal area, or Southern Pacific property also so located and estimated to have a present market value of \$272,679.

These figures indicate the magnitude of the land question.

In this matter of the acquisition of land and other property, and of damages, account should be taken of the litigation that is almost certain to result in connection with certain parcels. The Commission, under Section 43 of the Public Utilities Act, has power to condemn all necessary real estate and other property and to fix the just compensation for such property and for damages. We quote what to us appear the determining portions of this section:

" (c) 1. The commission shall have power in accordance with the procedure provided in this subsection to fix the just compensation to be paid for property or any interest in or to property to be taken or damaged in the separation of grades at any crossing specified in subsection (b) hereof, or for property or any interest in or to property to be taken or damaged in the construction, alteration or relocation, under the order or with the approval of the commission, of elevated tracks or subways for any railroad or street railroad over or under any public road, street, highway or private right of way, or of any public road, street or highway over or under the tracks of any railroad corporation or street railroad corporation; and upon the payment of the just compensation so fixed to make a final order of condemnation as hereinafter provided.

2. Proceedings under subsection (c) hereof may be commenced by order on the commission's own motion or by a petition filed by the state, county, city and county, incorporated city or town, other political subdivision, railroad corporation, or street railroad corporation affected.

6. The finding of the commission on the question of the necessity for the taking and the finding, fixing the just compensation to be paid for any property or interest in or to property under the provisions of this subsection shall be final and shall not be subject to modification, alteration, reversal or review by any court of this state.

8. The legislature hereby declares that subsection (c) hereof is enacted as a germane and cognate part of and as an aid to the jurisdiction of the railroad commission in the supervision and regulation of railroad and street railroad corporations."

In our estimates of land costs we have assumed that such parcels as cannot be acquired in any other way would be secured through just compensation proceedings. The methods of valuation used in such cases by the engineering department are made the basis of such cost estimates.

While we have reached the conclusion that a union passenger depot at the Plaza is superior to any other possible plan, we have also made estimates for union stations at the Santa Fe and Southern Pacific sites. Both of these plans have the advantage of lower first cost over the Plaza plan. A full discussion of these two plans will be found in the body of the report in Chapters XII and XIII.

Continuation of Consolidated Uptown Ticket Office

The establishment of a consolidated uptown ticket office by the United States Railroad Administration in 1918 has evidently proved entirely satisfactory. We recommend, therefore, that this facility be continued, irrespective of whether or not the railroads return to private control.

Application of Southern Pacific Co. and Salt Lake For Approval of Agreement Covering Joint Terminal Facilities—Application No. 3346

In this application, filed November 22, 1917, and consolidated with the seven other formal cases, applicants ask approval of agreement dated July 18, 1917. This agreement covers construction and operation in connection with the joint use, by these two roads, of the Southern Pacific passenger station. Approval of this agreement would give these roads permission to go ahead with their plans to the exclusion of other plans herein recommended.

In recommending a union passenger station at the Plaza we are, in effect, rejecting the Southern Pacific-Salt Lake plan, but final disposition should be made of this application by the Commission.

We recommend, therefore, that Application No. 3346 be dismissed.

Union Passenger Station and Electric Interurban Service, Pacific Electric Railway

As noted before, this report will not deal with the general problem of the elimination of grade crossings in Los Angeles on the lines of the Pacific Electric Railway. We have, however, considered this electric road in the light of its relation to a union passenger station and have given attention to the elimination of grade crossings on Main, San Pedro, Aliso and Seventh Streets, which are the most congested with interurban cars.

If the Commission decides to adopt our recommendations for a union passenger station at the Plaza, we recommend also the construction of a subway from the present Pacific Electric station at Sixth and Main Streets northerly along Main Street to, and under, the union passenger station, changing to an elevated railway along Ramirez Street and meeting the present line at the Aliso Street Bridge. From here this line would continue as an elevated railway to Brooklyn Avenue, where the present tracks and grade would be met. We also recommend that the Pacific Electric continue the

present elevated structure in the rear of its station, elevating the Long Beach line to Fourteenth Street. The subway work along Main Street should be undertaken within the next five years.

This recommendation is made with full knowledge that the proposed improvements cannot, for a number of years to come, earn a return on the estimated cost of this work. It is clear, however, from the testimony given by the Pacific Electric Company in these cases, that the Pacific Electric realizes the necessity and advantages of making radical and permanent changes in its downtown lines in the near future and at a large first cost. We are in agreement with Mr. Paul Shoup that present conditions will not be tolerable much longer. We are also satisfied that if capital expenditures for such purposes are made in excess of, say, \$1,000,000, then the money should be expended in accordance with the recommendation above.

This subway and elevated will eliminate the most important grade crossing of the Pacific Electric in Los Angeles, relieve the present congestion on the streets mentioned, reduce the running time and provide not only a good connection between the steam and electric roads, but also a start on the ultimate rapid system.

Main Street, being centrally located between the hilly section west of Hill Street and the business section between Alameda Street and Main Street, is the most logical location for the main north and south line of the future subway system. The street is also wide and straight and is, we are informed, the most free from sub-surface obstructions of any of the principal north and south streets. These facts lead toward the most economical construction. It is proposed that the immediate permanent construction would commence at Seventh Street and run north to the union passenger station and to Brooklyn Avenue. A single-track subway loop could be constructed in Seventh and Los Angeles Streets and under the Pacific Electric Station, using the latter for a station. Another station should be located midway between the Plaza and Sixth Street.

The construction of a subway in Main Street or an elevated construction in Ramirez or Aliso Streets is apparently impossible under the present charter, Article I, Section 43, which reads in part as follows:

". No franchise for an elevated structure or subway shall be granted in or along any street or way in a longitudinal direction, either above or below the surface thereof."

The charter would, therefore, have to be amended.

The elevated construction in the rear of the Pacific Electric station would also be permanent. It is probable that Sixth Street will be the route of the principal east and west subway, and it is entirely feasible to make the change from this elevated construction to a subway between San Pedro and Wall Streets. San Julian Street only would have to be closed, and since this is not a through street, the objections to closing it should be outweighed by the benefits. One of the principal advantages is the fact that an elevated railway is cheaper, by far, than a subway, and if the change

between the two can be made and, at the same time, can combine immediate construction with the ultimate plan, a large saving can be effected.

The plan proposed by the Pacific Electric provides for elevated construction from the rear of the Pacific Electric station across the Los Angeles River and north along the Salt Lake right of way to Aliso Street, where the present line will be met. Also, it is proposed that elevated construction shall be installed south from the above line on the Long Beach line as far as Fourteenth Street. This locates two main routes of the interurban roads comparatively near the union passenger station, providing for transfer (which is, however, not very convenient) between the two steam and electric roads. The estimated cost is \$2,574,013 against \$1,200,000 as estimated by the Pacific Electric Railway on earlier and lesser unit costs and on a somewhat shorter distance. This is the best and most logical solution if joint use is made of the Southern Pacific Station site.

Under the third possible plan, using the Santa Fe site, we recommend the elevated construction, as under the Southern Pacific plan, except that instead of using the Salt Lake right of way between Sixth and Aliso Streets, the new line would be built on the west side of the river on the Santa Fe right of way, passing the proposed union station and reached by a subway from it. The estimated cost is \$2,557,223. Under this plan, the Pacific Electric would not have access to the station by surface tracks. This is undesirable, not only because this road would undoubtedly wish a direct line and because the public would be best served thereby, but also because the handling of mail and express demands a surface connection. We would, therefore, recommend an extension of the present Pacific Electric line from Sixth Street and Ceres Avenue to the station.

IMPROVEMENT IN THE HANDLING OF FREIGHT

There can be no doubt that the matter of proper freight facilities is of even greater importance to the City of Los Angeles than the matter of steam railroad passenger facilities. It is our conclusion, however, that freight traffic conditions are not by any means unsatisfactory and no far-reaching recommendations will be necessary to bring about such further improvements as appear to us desirable.

Industry Tracks and Switching

Present conditions relative to the handling of carload freight within the City of Los Angeles have generally been found satisfactory. Mr. F. P. Gregson, the representative of the Associated Jobbers of Los Angeles, representing, as he stated, approximately 75 per cent of the shippers, is on record to the effect that conditions in Los Angeles, with respect to carload freight destined to industrial spurs, are almost ideal. With the thought, therefore, that such an almost unique situation should not be disturbed, we see no reasons for making radical recommendations with regard to this class of freight movement. The underlying reason is that in Los Angeles a car entering the city via one road is set on an industry track belonging to

another road without any charge, and vice versa, so that there is already practically consolidation of all industry tracks within the city.

There are about 820 industries located on about 382 industrial spur tracks within the free switching limits, which extend outside the city boundary. The total length of these tracks is 60 miles, with a car capacity of over 4,000 freight cars. We are particularly concerned with the more congested industrial district between Alhambra Avenue and Butte Street because of street and railroad traffic conditions and the large percentage of the shipping. Four hundred and fifty-five industries are located in this district, and to these in 1917 there were set 48,000 loaded freight cars, or 70 per cent of the total number set on industrial tracks. In addition, 20,600 empty cars were set for loading, making a total of 69,200 cars per year, or an average of 230 cars per working day.

From these figures it must be evident that the large investment in buildings, tracks and commercial business connected with spur tracks, and the present large amount of spur trackage, make it inexpedient to make any radical change in the present location of these industrial tracks. At present these spurs branch off from two main stems, the Southern Pacific tracks in Alameda Street and the Santa Fe tracks along the river. Those off the Santa Fe tracks run in a general easterly and westerly direction between the important east and west streets and in this way may be considered as built in conformity with the so-called herring-bone system.

There are 42 spurs branching off from the Southern Pacific main line tracks in Alameda Street between Alhambra Avenue and Butte Street. These tracks have a total length of 24 miles, a car spot capacity of 922 cars, and serve 278 industries, exclusive of 36 industries on the Santa Monica Air line. There were set to these industries in 1917 about 34,000 cars, and to team tracks 14,000 cars.

A few of these industries may be served without the use of the Alameda Street tracks, but the importance of the commercial business and railroad investment is so great that **we do not believe it would be proper or wise to recommend the removal of the tracks from Alameda Street at this time.**

All but 3 per cent of the present traffic in Alameda Street can be removed. In addition, we recommend that the duplication of switching service to industrial spurs be discontinued. This will reduce the number of train movements and the number of grade crossing movements, and benefit both the public and the railroads. We also recommend that the Santa Fe Alley spur be removed north of Butte Street. This track was built in 1907, apparently for competitive reasons, and these reasons no longer exist. It is a spur over a mile long and is located in an alley 15 feet wide. This is insufficient width for safe operation, and as time goes on and business develops, it will undoubtedly be found too long to switch economically. We believe, therefore, that it should be discontinued now, when the resulting disturbance will be relatively small.

For the future we recommend that:

- (1) New permits should not be granted for industrial tracks longitudinally in streets.
- (2) All tracks now longitudinally in streets be confined to use for industrial purposes only and be removed as soon as access to the industries served is otherwise obtained.
- (3) All spur tracks shall be built in a general easterly and westerly direction from the river banks and not across east and west streets, unless, by such construction, the crossing of more important north and south streets is avoided.

Union Freight Station

We have recommended a union passenger station at the Plaza. Recognizing the resulting isolation of the present Southern Pacific freight station by cutting off Alameda Street north of Aliso Street, and further bearing in mind the fundamental principle that freight conditions should be equaled or bettered and certainly not made worse, we propose to take care of the Southern Pacific and in addition to make a general improvement in the less-than-carload freight situation.

We recommend the establishment of a union less-than-carload freight station at the Santa Fe freight yard site on Santa Fe Avenue, from First to Seventh Streets, the present Santa Fe freight station on the west side of Santa Fe Avenue to become a part of this union freight station.

This would locate the station on a very suitable site in a very convenient location. The site is of sufficient area for development to over 125 per cent of present facilities, is of good shape and is centrally located. A union station once established, there would result a desirable stabilization of business and increase of property values. Draying should be cheaper and more satisfactory, and this is a large item.

This recommendation will also hold good if the Southern Pacific station site is chosen for a union passenger station. This proposed freight station is estimated to cost, ultimately, \$2,576,000 in new money for buildings, trackage and driveways, including removal of the present yard and facilities. Not all of this is necessary at present. Sufficient shed space (119,480 sq. ft.) for the Southern Pacific could be constructed (based on Class "A" construction) for approximately \$680,000, including trackage, and the present Santa Fe sheds are ample to take care of the Salt Lake less-than-carload freight business.

This recommendation is in opposition to the arguments before the Commission for several sub-freight stations. Sub-freight stations in the industrial district are, in our opinion, unnecessary and are a detriment in a city like Los Angeles where the district in which the less-than-carload freight is important is confined to a comparatively small area. They cost more to operate and are too much of a source of delay. Shipments are delayed by not reaching a central station in time to catch the train, and by the draymen having too many places to go to, which means light loads and delay.

If branch receiving stations for freight appear desirable in the future, from changed conditions, the haul of L. C. L. freight between these branch stations and the central station, may possibly be made in railroad owned motor trucks, rather than in cars. Up to a certain volume of traffic and excepting certain classes of freight this is entirely feasible and cheaper.

If a union freight station at the Santa Fe site cannot be had and it appears that this contingency would arise only if the cost of a union passenger station was considered too great for the advantages accruing—we must be guided by the same principles of least expenditures. Under these conditions we should recommend the retention of the present Southern Pacific and Santa Fe freight stations, and in justice to the Salt Lake, we should recommend that it be allowed to proceed with its present plans for a freight terminal on its newly acquired site on the east side of Alameda Street between Eighth and Hunter Streets.

Additional Team Tracks

Convenient team tracks tend to restrict the construction of industrial spurs and grade crossings. Small shippers especially, if able to handle their shipments from a convenient team track, will not go to the expense of providing themselves with spur track facilities. We believe this to be true in spite of the fact that the advantage of an industrial track is that it obviates draying and two handlings of the freight.

The more expensive use of team yards, if it results in less demand for private spurs, is a distinct advantage from the standpoint of the grade crossing problem since it cuts down the number of crossings. It should, therefore, be encouraged.

Traffic studies show that in 1917 the movement of loaded cars to and from team tracks was as follows:

Road	Cars Set	Cars Loaded	Total Cars
Southern Pacific	8,732	5,426	14,158
Santa Fe	5,154	683	5,837
Salt Lake	3,651	240	3,891
Pacific Electric	137	1,888	2,025
Total	17,674	8,237	25,911

With this in mind, we are recommending the establishment of team yards along the east side of Alameda Street. They will be located differently, depending upon the location of the union passenger and freight stations on account of the different use proposed for different parcels of land. Team yards should be located as follows:

With Plaza Plan	With S. P. Plan	With Santa Fe Plan
At College and Alameda	At College and Alameda	At College and Alameda
At Macy and Alameda	At Macy and Alameda	At Macy and Alameda
Los Angeles Market	Los Angeles Market	Los Angeles Market
.....	.....	S. P. Coach Yard
Proposed Salt Lake Ter- minal	Proposed Salt Lake Ter- minal	.....

With the union passenger station at the Plaza, as before noted, the Southern Pacific freight station at College and Alameda would be abandoned and consolidated with the other two roads in a union freight station at the Santa Fe site. The land at College and Alameda now occupied by the freight station team tracks should be devoted to team track use. This also holds under the Southern Pacific plan. In the Santa Fe plan the freight station would remain and the present team yard would also remain but would not be enlarged.

Under the Southern Pacific and Santa Fe plans, the present Southern Pacific team yard at Macy Street would be unchanged. Under the Plaza plan, the team yard would be shortened somewhat, but with the addition of more team tracks at College and Alameda Streets we believe that what remains will be sufficient.

The recommendation for a team yard at the Los Angeles Market property at Sixth and Alameda Streets should be qualified. We are of the opinion that this site is valuable for railroad purposes and should either be used for a team yard or should be developed by the construction of warehouses, which would be provided with spur tracks. It may be noted that this property is owned by the Los Angeles Market Company, which is, in turn, controlled by the Pacific Electric Land Company, the Pacific Electric Railway Company and, finally by the Southern Pacific Company.

ASSOCIATED MATTERS HELD IN ABEYANCE

Industrial Terminal Railway—Application 2962

In this application the Industrial Terminal Railway Company asks permission to issue stock for the purposes of acquisition of rights of way for a switching and terminal railroad approximately 2 miles in length, commencing on Alameda Street north of Aliso Street and running in an easterly and northwesterly direction across Ramirez Street, Macy Street, Lyon Street and crossing the tracks of the Santa Fe, across the Los Angeles River and across the tracks of the Salt Lake, terminating on the south side of Alhambra Avenue east of the Los Angeles River.

In Decision No. 4553, the Commission held that this application should neither be granted nor denied until the Commission's investigation into the larger cases had progressed sufficiently to determine whether or not it would be possible to allow applicant to proceed with its plan, and it was ordered that a supplemental order be issued at such time as the Commission was in possession of the necessary information to enable it to determine whether or not, under the circumstances set forth in the accompanying opinion, it was proper for this capital stock to be authorized.

We now believe that it would be unwise for the Commission to allow the construction of the railroad along the route proposed because of the grade crossings involved, and **we recommend that a supplemental order be entered in which this application be dismissed.** When the Commission has made its order in Cases 970 et seq., applicant can then file another application based upon the Commission's decision in the larger problem.

Los Angeles and Salt Lake Railroad Company—Application 3037

In this application the Los Angeles and Salt Lake Railroad Company asks the Commission's authority to cross at grade 9 public streets, 4 railway tracks and 1 double track street railway, as follows:

(a) **Street Crossings at Grade:**

1. Sixteenth Street, to be crossed with 2 tracks.
2. Fourteenth Street, to be crossed with 2 tracks.
3. Eleventh Street, to be crossed with 2 tracks.
4. Tenth Street, to be crossed with 2 tracks.
5. Ninth Street, to be crossed with 2 tracks.
6. Alley between Hunter and Ninth Streets, to be crossed with 2 tracks.
7. Hunter Street, to be crossed with 2 tracks.
8. Lawrence Street, to be crossed with 2 tracks.

(b) **Steam Railroad Crossings:**

1. One track at grade across a one-track spur of the Santa Fe, south of Sixteenth Street.
2. Two tracks at grade across one spur track of the Southern Pacific Company, north of Sixteenth Street.
3. Two tracks at grade across two spur tracks of the Santa Fe, south of Fourteenth Street.
4. Seven tracks at grade, with two additional tracks proposed across spur tracks of the Santa Fe on Lawrence Street.

(c) **Street Railroad Crossings:**

1. Two tracks at grade across the double track line of the Los Angeles Railway on Eleventh Street. (**Note:** The Los Angeles Railway tracks have since been removed.)

As further set forth in the application, the Salt Lake contemplates the construction of a freight terminal in a newly acquired site bounded, roughly, by Alameda Street on the west, Hunter Street on the south, Lemon Street on the east and the Alley south of Hunter Street on the north, and the necessary grade crossings will occur principally on the connection between this proposed terminal and the existing Butte Street track of the Salt Lake between Santa Fe Avenue and Butte Street.

In Decision No. 4552, the Commission held that a decision should be postponed until the investigation into the general transportation situation in Los Angeles (Cases 970 et seq.) had progressed sufficiently to enable a determination to be reached as to whether or not the application should be granted and it was ordered that a supplemental order be issued at such time as the Commission was in possession of the necessary information.

We have already recommended a union freight station at the Santa Fe site. This would accommodate the Salt Lake and would avoid the construction of a freight terminal on the site above mentioned. Under these circumstances, the necessity for the construction of the connecting tracks having been eliminated, we recommend that a supplemental order be issued in which the authority to cross at grade the streets mentioned be denied.

As we also recommend that team tracks be established on this Salt Lake terminal site, provision must be made for reaching them. This we propose

to do either by connection with the Alameda Street tracks of the Southern Pacific or by the Lawrence Street spur track of the Santa Fe. This will not introduce any additional grade crossings and, at the same time, will not prevent the use of the site.

Interlocking at Aliso Street and Los Angeles River—Case 938

Following a serious collision, on May 7, 1915, at the crossing of the Pacific Electric Railway and the Atchison, Topeka and Santa Fe Railway tracks at Aliso Street, Los Angeles, these two roads applied, on January 10, 1916, to the Commission for permission to install an interlocking device. From the plans submitted with this application (No. 2043) it developed that certain of the Commission's requirements regarding interlocking plants were not met, and that the scheme of protection would be incomplete unless the Los Angeles and Salt Lake road was included. Shortly thereafter the Commission instituted Case 938 upon its own motion and a hearing was held in both matters.

In Decision No. 3290, dated April 27, 1916, the Commission made its order directing the installation of a standard interlocking plant, the three parties at interest having, prior to the hearing, agreed between themselves to do this. According to the order, plans were to be submitted within three months and the plant placed in operation within nine months. On July 28, 1916, the Commission issued an "order extending effective date" in Case 938, in which the time within which the plans were to be submitted were extended until further order.

Thus the matter has been held in abeyance. Since we recommend a separation of grades for the crossings of the Pacific Electric and the main line of the Salt Lake and the river tracks of the Santa Fe, and the removal of the crossing of the present main line Santa Fe tracks, the matter of installing an interlocking plant is, if the recommendation be adopted, automatically removed from further consideration. We recommend an order in Case 938 to this effect.

Pairing of Southern Pacific and Salt Lake Tracks Between Los Angeles and Colton

In our two reports dealing with temporary unification of terminal facilities at Los Angeles, we recommended that the Southern Pacific and Salt Lake tracks should be paired between Los Angeles and Colton. This recommendation was also made by the engineers representing the federally controlled railroads at Los Angeles and urged for adoption upon the Director General of Railroads by the Commission. This means that trains would be run in one direction only over each of the two roads, making, in effect, a double track road of these two single track roads. Due to grades, operation was not to consist of routing trains in one direction only over each track between the termini, but to change between the two roads at Ontario. The scheme of operation is then as follows:

Limits	Operate for	
	Westbound Trains	Eastbound Trains
Between Colton & Ontario	Salt Lake track	Southern Pacific track
" Los Angeles & Ontario	Southern Pacific track	Salt Lake track

The estimated cost of the necessary changes, consisting of new connections and additional ballasting on the Salt Lake tracks, was estimated at \$136,812. The annual saving in the cost of operation was estimated at \$173,028 due principally to the larger tonnage ratings of freight locomotives because of more favorable ruling gradients. While this matter is not so intimately connected with grade crossing elimination and terminal unification at Los Angeles, it comes properly within the scope of this report. The financial results are large—for an expenditure of \$136,812, a saving of \$173,028 each year is possible.

We again recommend that the Southern Pacific and Salt Lake tracks between Los Angeles and Colton be paired for double track operation, as given above.

PART I—HISTORICAL MATTERS AND
PRESENT CONDITIONS

Chapter I—History of Proceedings.

Chapter II—General Survey of the Problem.

Chapter III—History and Development of City and of Transportation Facilities.

Chapter IV—Electric Transportation.

CHAPTER I.
OUTLINE

Introduction

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CHAPTER 1
HISTORY OF PROCEEDINGS BEFORE COMMISSION
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INTRODUCTION

For many years the question of grade crossing elimination has been more or less acute in the City of Los Angeles. The matter has been before the City Council and before the people in general in numerous cases such as when the railroads were seeking to build new tracks, when streets crossing railway tracks were opened or closed, or when street grades were established and the handling of passenger and freight traffic along or across streets had to be considered. At various times, also, the City had reports made by its own engineers as well as by engineers engaged for the purpose. In later years, certain associations and individuals began advocating union passenger and freight depots within the city.

With the jurisdiction over common carriers by the Railroad Commission, as defined in the Public Utilities Act, it became apparent that a comprehensive and permanent solution could not be had without action by the Commission.

On July 3, 1916, on the invitation of the City Council of Los Angeles, all the members of the Railroad Commission went to Los Angeles for an informal conference with the City Council with reference to the railroad grade crossing situation and the freight and passenger terminal conditions in Los Angeles. At the conclusion of the conference, the City Council unanimously voted to contribute \$20,000 toward the expense of a complete and thorough investigation to be made by the Railroad Commission.

FORMAL COMPLAINTS

On the same day, complaints were filed by the Municipal League, the Central Development Association and the Civic Center Association. Shortly thereafter, complaints were filed by the cities of Pasadena, Alhambra, San Gabriel and South Pasadena.

The complaint of the Municipal League asks the Commission to eliminate railroad grade crossings, to prevent a further use of streets longitudinally by the railroads, and to compel the erection of a union passenger depot and appropriate freight terminals. The complaints of the Central Development Association and the Civic Center Association present the same issues as the complaint of the Municipal League, except that no relief is asked with reference to a union passenger depot or a freight terminal. The complaints of the cities of Pasadena, South Pasadena, Alhambra and San Gabriel ask relief with reference to the railroad grade crossing situation in Los Angeles and also the elimination of the grade crossing of Mission Road by the Pacific Electric Railway Company. These cities also ask that the Commission's order in Case 938, ordering the installation of an interlocking plant at Aliso Street and the Los Angeles River, be rescinded.

The following table presents briefly the dates of filing, the complainants and the defendants of the seven formal complaints:

Case Number	Date Filed	Complainants	Defendants
970	7-6-16	Municipal League	1. Southern Pacific Company. 2. Atchison, Topeka and Santa Fe Railway Co. 3. Los Angeles and Salt Lake Railroad Co.
971	7-6-17	Central Development Association	1. Southern Pacific Company. 2. Atchison, Topeka and Santa Fe Railway Co. 3. Los Angeles and Salt Lake Railroad Co.
*971	7-24-17	Central Development Association	1. Southern Pacific Company. 2. Atchison, Topeka and Santa Fe Railway Co. 3. Los Angeles and Salt Lake Railroad Co.
972	7-6-16	Civic Center Association	1. Southern Pacific Company. 2. Atchison, Topeka and Santa Fe Railway Co. 3. Los Angeles and Salt Lake Railroad Co.
974	7-15-16	City of Pasadena	1. Southern Pacific Company. 2. Atchison, Topeka and Santa Fe Railway Co. 3. Los Angeles and Salt Lake Railroad Co. 4. Pacific Electric Railway Co. 5. City of Los Angeles.
980	7-26-16	City of Alhambra	1. Southern Pacific Company. 2. Atchison, Topeka and Santa Fe Railway Co. 3. Los Angeles and Salt Lake Railroad Co. 4. Pacific Electric Railway Co. 5. City of Los Angeles.
981	7-27-16	City of San Gabriel	1. Southern Pacific Company. 2. Atchison, Topeka and Santa Fe Railway Co. 3. Los Angeles and Salt Lake Railroad Co. 4. Pacific Electric Railway Co. 5. City of Los Angeles.

*Amendment to Complaint.

- | | | | |
|-----|---------|------------------------|---|
| 983 | 7-28-16 | City of South Pasadena | <ol style="list-style-type: none"> 1. Southern Pacific Company. 2. Atchison, Topeka and Santa Fe Railway Co. 3. Los Angeles and Salt Lake Railroad Co. 4. Pacific Electric Railway Co. 5. City of Los Angeles. |
|-----|---------|------------------------|---|

Following the filing of the above complaint by the City of Pasadena, several smaller cities, i. e., San Dimas, Pomona, Ontario, El Monte and Sierra Madre, filed with the Commission, by letter, their concurrence with all claims contained therein. At some of the hearings petitions circulated by various Los Angeles organizations were submitted to the Commission, as also were numerous letters from individuals. These were all accepted by the Commission with the understanding that they would be filed without being read into the record and that they would be held subject to inspection by any of the interested parties.

Other interested organizations and cities entered representatives as appearances at the hearings. They were:

1. **Cities:** Alhambra, San Gabriel, Santa Monica, Venice and Whittier.
2. **Organizations:** Associated Jobbers of Los Angeles, Business Men's Co-operative Association, Business Stability Association, Los Angeles Chamber of Commerce, Los Angeles City and County Viaduct Committee, Los Angeles Realty Board and the Northwest Association.

Jurisdiction of Commission

The defendants in these proceedings filed answers denying the Railroad Commission's jurisdiction. A public hearing on the question of jurisdiction was thereupon held in Los Angeles on September 15, 1916, and all of the cases were consolidated. At this hearing, all of the parties except the City of Los Angeles urged that the Railroad Commission had exclusive jurisdiction over the issues presented. The City of Los Angeles took the position that jurisdiction over all railroad grade crossings in Los Angeles was in the City and not in the Railroad Commission.

On October 21, 1916, the Railroad Commission rendered its order (Decision No. 3805), dismissing all proceedings. In the opinion preceding the order, the Commission gave its reason for this action. This was, in brief, as follows: While the Commission was of the opinion that it had jurisdiction, the investigation prayed for required the expenditure of so much public money and was of such great importance to the communities and the carriers involved, that, in agreement with all parties, no action should be taken until it was definitely established where jurisdiction rested in the premises.

The question of jurisdiction was then taken to the Supreme Court of the State of California by two writs of mandamus. In the first, the applicants were the same as in Cases 970, 971 and 972, and in the second, the same as in Cases 974, 980, 981 and 983. Taking up the first proceeding (L. A. No. 5028),

the applicants asked, in brief, that the Court order the Commission to proceed with the investigation. The City of Los Angeles conceded that the Railroad Commission had exclusive jurisdiction insofar as a union passenger depot and freight terminals were concerned, but argued to the Supreme Court that, as to grade crossings and all other uses of streets by railroads in Los Angeles, the City had exclusive jurisdiction.

California Supreme Court Decision Ordering Investigation

On June 11, 1917, the Supreme Court made its decision in the first proceedings, upholding the position of the complainants and the Railroad Commission, and decided that the Railroad Commission had exclusive jurisdiction over the construction and operation of railroads on streets in Los Angeles.

We quote from the Supreme Court's decision:

"The effect upon the present case may be stated as follows:

"The City of Los Angeles has the power to open, widen, extend and improve streets and to regulate the ordinary uses thereof. The Railroad Commission, under Section 43 of the Public Utilities Act, has the power to make orders, which are binding upon the railroad companies under its supervision, to abolish grade crossings of the public streets of a city and to order a separation of grades so that the railroad and street shall not be upon the same level and generally to exercise the powers specified in that section. It cannot vacate the street or direct a cessation of the public use thereof. Its orders are to be directed to the railroad company and not to the city, except so far as may be necessary to apportion the expense of construction and maintenance of the particular mode of crossing which shall be required. The city has the power to alter the construction of its streets at such crossings, or any of them, by elevating them upon a viaduct so as to pass over the railroad or by making a subway passing under the railroad. In either case, if the change in the street does not interfere with the operation and use of the railroad at time, the Commission cannot prevent the change and it may be made without the consent of the Commission. But if it does interfere, either at the time or afterward, whether by natural causes or lack of repair of the street as changed, or by reason of changes in the construction or use of the railroad subsequently directed or approved by the Commission, the city must conform to the orders of the Commission so as to avoid such interference.

"It is ordered that the Railroad Commission proceed to consider and determine, upon the merits, the complaints made to it by the plaintiffs herein, and that a writ of mandate be issued to it in accordance herewith."

On the same day, June 11, 1917, the Court made substantially the same decision in the second proceeding (L. A. No. 5029).

The City of Los Angeles thereupon filed a petition for rehearing. On July 10, 1917, the Supreme Court made its order dismissing the petition and the matter of jurisdiction was considered as settled.

Closely associated with these cases were three applications which were filed with the Commission previous to the decision by the Supreme Court. These were applications by the Industrial Terminal Railway Company, by the Los Angeles and Salt Lake Railroad Company and by the Southern Pacific Company and Los Angeles and Salt Lake Railroad Company jointly.

ASSOCIATED FORMAL APPLICATIONS

Application of Industrial Terminal Railway Company. (Application No. 2962.)

The Industrial Terminal Railway Company has made two applications (Nos. 1803 and 2962), both for the issuance of capital stock. The details are given in Decisions Nos. 2832 and 4553, rendered on October 22, 1915, and August 18, 1917, respectively. Only Application No. 2962 and Decision No. 4553 are concerned with these proceedings.

In this application, applicant asks permission to issue stock to acquire, in effect, a right of way for an industrial railroad in Los Angeles and (quoting from Decision No. 4553):

“ . . . proposes to construct in the city of Los Angeles a switching and terminal railroad approximately two miles in length. If the plans of the company are carried out, the line will start at Alameda Street at a point about 200 feet north of Aliso Street, run in an easterly and northeasterly direction across Ramirez Street, Macy Street and Lyon Street, and across the tracks of the Atchison, Topeka and Santa Fe Railway Company; then across the Los Angeles River and across the tracks of the Los Angeles and Salt Lake Railroad, ending on the south side of Alhambra Avenue east of the Los Angeles River. The maps filed with the earlier application (Application No. 1803) do not show the proposed location of tracks and other facilities, but they do show the right of way as the company is securing it.

“In addition to the right of way needed for the main line, these maps show right of way for a short spur, 40 feet wide, at right angles to the main line about 250 feet east of Macy Street.”

In its opinion preceding the order, in the same decision, the Commission states:

“ . . . that this application should not be granted nor should it be denied until the Commission's investigation in the larger cases has progressed sufficiently to determine whether or not it will be possible to let applicant proceed with his plan. . . .”

It was ordered by the Commission that:

“ . . . a supplemental order will be issued at such time as the Commission may be in possession of the necessary information to enable it to determine whether or not, under the circumstances set forth in the foregoing opinion, it is proper for this capital stock to be authorized.”

Application of Los Angeles and Salt Lake Railroad Company. (Application No. 3037.)

This condition also prevails with reference to Application No. 3037 of the Los Angeles and Salt Lake Railroad Company, which applied on July 16, 1917, for permission to construct, in Los Angeles, certain crossings in connection with a proposed new freight terminal at Eighth and Alameda Streets, which would give the Salt Lake Company a freight terminal on the west side of the river and would improve conditions of that carrier in regard to its freight business.

In Decision No. 4552, dated August 18, 1917, the Commission says:

“We recommend that at this time the Commission neither deny nor grant this application but that a decision be postponed until the investigation into the general transportation situation in Los Angeles has progressed

sufficiently to enable the Commission to determine whether or not the application should be granted."

It was ordered that:

" . . . a supplemental order will be issued at such time as the Commission may be in possession of the necessary information to determine whether or not this application should be granted, and the location, construction, installation and protection of the crossings involved in this application."

Application for Joint Terminal Facilities by Southern Pacific and Salt Lake Railroad Company. (Application No. 3346.)

At the hearing held before the Commission on November 22, 1917, the Southern Pacific Company and the Los Angeles and Salt Lake Railroad Company filed an application asking approval of an agreement dated July 18, 1917. This agreement covered the joint use of the existing Southern Pacific Station at Fifth Street and Central Avenue by these two roads and entered fully into the cost and maintenance of existing and additional facilities.

The plan proposed was the same as that submitted to the Commission at the previous hearings. The most important features, in addition to the joint use of the Southern Pacific passenger station, were the joint construction and use of elevated tracks south of Sixth Street between Alameda Street and the east bank of the Los Angeles River, with additional tracks along the river. The Company claimed that the joint use of track would obviate the necessity for operation of passenger and freight traffic over Alameda and certain other streets and would also eliminate many grade crossing movements. The agreement further provided for the possible joint use of certain station facilities by the Pacific Electric Railway and for the construction and use by that company of a double track elevated structure alongside the steam railroad structure.

The application was consolidated with the seven other formal cases for determination and decision.

HEARINGS BEFORE THE COMMISSION

Immediately after the order by the Supreme Court dismissing the petition for rehearing, the Railroad Commission set Cases 970 et seq. for hearing in Los Angeles, and made arrangements for the necessary engineering investigation.

The hearings in these cases were held on the following dates:

September 15, 1916,	November 20, 1917,
July 24, 1917,	November 21, 1917,
July 26, 1917,	November 22, 1917,
August 22, 1917,	December 11, 1917,
August 23, 1917,	December 12, 1917.

At the hearings held on July 24, 1917, the Railroad Commission made the following announcement regarding the conduct of these proceedings:

"As is usual in formal complaints, the complainants will be permitted to introduce their evidence and then the defendants will present their testimony.

"The Railroad Commission proposes to conduct a thorough, comprehensive and impartial investigation into the entire situation. The Commission will instruct its engineering department to make an exhaustive investigation and to prepare a report which will thereafter be introduced as evidence in these proceedings. Until this report has been prepared and introduced, and all the parties have had a fair opportunity to present their evidence and to cross-examine witnesses, no conclusion will be reached."

"One of the matters which will be determined as soon as possible is the time of payment by the City of Los Angeles of the sum of \$20,000.00, which was voted by the City Council to help defray the expense of the investigation which is to be made by the Commission's engineering department. The sooner can the Commission employ the necessary engineers and other assistants.

"I assume that it will be entirely unnecessary to say that the Railroad Commission approaches this case, as every other case, with an absolutely open mind and with an earnest desire to ascertain all the facts, so that a just and constructive solution of the problem may be reached. It is our intention to view this problem in the largest possible aspect and to reach a conclusion which will serve the needs not merely of today, but also of the future. The people of the City of Los Angeles and the surrounding communities and railroads are entitled to an exhaustive and thorough consideration of the problems here presented and such consideration they will receive from the Railroad Commission.

"In this work, which will mean so much to the people of this community and the surrounding communities, as well as the railroads, the Railroad Commission, of course, expects the fullest consideration and cooperation from all parties—the complainants, the railroad companies and the public authorities."

The Commission also ruled that all of the formal complaints, seven in number (Cases 970, 971, 972, 974, 980, 981 and 983), be consolidated for hearing and decision.

At the same hearing, one of the principal complainants, the Central Development Association, filed an amendment to its original complaint to include the requirement of freight and passenger union terminals, in addition to reclaiming Alameda Street, reorganizing the trackage and eliminating grade crossings.

At all of the hearings, beginning July 24, 1917, and subsequent thereto, the complainants and defendants submitted data and evidence in general supporting or refuting the several proposed schemes for a union passenger and freight terminal and the elimination of grade crossings within the City of Los Angeles.

The testimony thus far covers 1477 pages and is supplemented by 53 exhibits filed and assigned numbers as follows:

Business Stability Association	No. 1
Central Development Association	" 1 to 20 inclusive
City of Los Angeles	" 1 " 3 "
City Planning Association	" 1 " 3 "
Southern Pacific Company and Salt Lake Company	" 1 " 25 "

Since the hearings, the Business Stability Association has filed with the Commission a new drawing of its exhibit. This includes a larger area than

the original map. The Central Development Association also filed a drawing supplementing the track plan shown by its original exhibit No. 5. Copies of these supplementary drawings have not been furnished to all parties but are reproduced in this report.

In December, 1917, the Commission opened an engineering department office in Los Angeles and assigned its Chief Engineer and a staff of assistants to study the entire situation. Further hearings were continued until after the completion of the report by the engineering department.

REPORTS UPON TEMPORARY AND IMMEDIATE MEASURES

Report of August, 1918

Shortly after the control of the railroads had been taken over by the United States Government on January 1, 1918, the United States Railroad Administration issued its general order for the unification, as far as possible, of all railroad facilities, including terminals in cities. At the same time, investigations were started and in some cities the terminal facilities were consolidated. In Los Angeles, due to the fact that the California Railroad Commission was at that time making a study of that question, Mr. McAdoo, as Director General of Railroads, on July 22, 1918, addressed the Commission, asking that it make a report giving the Administration the benefit of its knowledge in the investigation under way and to make recommendations for immediate unification. Mr. McAdoo's telegraphic request was as follows:

"Am having investigation made of terminals at Los Angeles with a view of unifying them in line with similar policy through country with view to increasing the public convenience and economizing in cost of operation. I also desire, if possible, to reduce existing traffic on Alameda Street. Shall be glad if the California Commission will look into this situation and give me the benefit of its views on proposed changes. Mr. Sproule will gladly co-operate with you and supply all available information."

The Engineering Department of the Commission on September 7, 1918, submitted to the Commission its report on "Immediate Unification and More Economical Operation of Railroads with Resulting Betterment of Grade Crossing Conditions in Los Angeles and Vicinity." This report was concurred in by the Commission and was submitted on September 16th to Mr. McAdoo.

The seven recommendations made in this report follow:

1. Operate as double track the Salt Lake and Southern Pacific lines as east and westbound tracks between Colton and Los Angeles.
2. Discontinue Salt Lake passenger and freight service to Pasadena.
3. Discontinue Salt Lake passenger and freight service between Los Angeles and Glendale.
4. Discontinue Southern Pacific passenger service between Los Angeles and Anaheim.
5. Santa Fe take over Salt Lake freight business in Los Angeles.
6. Reroute certain freight switching in Los Angeles, relieving Alameda Street and providing for additional transfer facilities at Butte and Alameda Streets.
7. Unify all passenger facilities at the Santa Fe Station.

Copies of the report were furnished to all interested parties: the carriers, the civic organizations, the City of Los Angeles and individuals.

A similar report had been asked by Mr. McAdoo from the engineers of the United States Railroad Administration, and the engineers of the three interested railroad companies submitted to their superior officers a joint report containing certain recommendations for the immediate unification of railroad facilities in Los Angeles. These recommendations varied considerably from the report submitted by the Commission, and, in consequence, the Federal Managers of the Santa Fe, the Southern Pacific and the Salt Lake applied to the Railroad Commission requesting a conference between the engineers of the Commission and of the roads for the purpose of reconciling the differences between the two reports.

Report of January 15, 1919

In consequence, three conferences were held, the first in Los Angeles on November 12 to 14, 1918, and the second and third in San Francisco on December 30 and 31, 1918, and January 14 and 15, 1919, respectively. Through these conferences the differences in the estimates were practically eliminated. The result of the conferences was, on January 15, 1919, submitted to Mr. Walker D. Hines, who had succeeded Mr. McAdoo as Director General of Railroads, by supplemental reports, one by the Engineering Department of the Commission dated January 15, 1919, and the other by the engineers of the carriers of the same date. These reports were combined and they included the estimates as revised and agreed upon, together with an explanation of the recommendations and methods in dispute.

Agreement was reached on the majority of the recommendations made by the Commission in the original report. This is true of original recommendations Nos. 1, 2, 3 and 6, and, with qualifications on the part of the railroad engineers, of recommendation No. 5. It was not possible to reach agreement with respect to recommendation No. 7—Unification of Passenger Facilities.

The Railroad Engineers' report still maintained the advisability of partial unification at the present Southern Pacific station. This plan contemplated the use of this station by the Salt Lake as well as the Southern Pacific, with the resultant increase of railroad traffic on Alameda Street.

In the first report to Mr. McAdoo, the Commission recommended **temporary unification of all passenger facilities** at the Santa Fe station site. In the supplemental report to Mr. Hines, the Commission recommended **temporary partial unification** by the joint use of the Santa Fe passenger station by the Salt Lake and the Santa Fe. This change in recommendations was caused by the changed general conditions that occurred between the dates of the two reports. At the time the supplemental report was made, the period of continued federal control was one of great uncertainty. The curtailment of all expenditures to an absolute minimum, as a war measure,

was no longer imperative. With the cessation of hostilities, it was not considered:

"... necessary, nor in the interest of the railroads, or the City of Los Angeles, to press at this time the matter of **complete temporary unification** of terminal facilities in Los Angeles."

The Commission decided that partial temporary unification at the Santa Fe site, with its minimum cost, was most desirable. Another factor leading to this conclusion was the fact that the investigation of the entire Los Angeles terminal situation was nearing completion and it was possible to consider seriously a permanent solution, which was thought superior to any temporary arrangement.

ATTITUDE OF UNITED STATES RAILROAD ADMINISTRATION

Since this report was submitted, Mr. Hines, during a visit to Los Angeles, expressed himself as being desirous of giving the support of the United States Railroad Administration to the investigation of the Los Angeles terminal situation. At a conference held on April 25, 1919, Mr. Hines stated:

"I shall be glad to facilitate in every way in the power of the Railroad Administration the completion of the Railroad Commission's investigation of the Los Angeles terminal situation and shall give prompt consideration to the method by which I can most effectively aid in this direction."

No action has thus far been taken, however, by the United States Railroad Administration towards the carrying out of any of the Commission's and of the Administration's own engineers' recommendations. This is in spite of the fact that an annual saving of over \$350,000 could have been accomplished with the expenditure of a very small amount of new money (less than \$150,000) and with great benefits to the City of Los Angeles and to the railroads.

On June 3, 1919, the Director General issued instructions to the Regional Director setting forth the policy of the United States Railroad Administration with regard to public improvements and capital and operating expenditures. These instructions will be of importance in this proceeding and we quote in full:

"June 3, 1919.

"Public Improvements

"To the Regional Directors.

"Gentlemen:

"The Railroad Administration is disposed in favor of the resumption or development of public works and improvements. In cases where the only objection thereto is to the present comparative cost of labor and material, no protest will be made on behalf of the Railroad Administration. Even where the burden upon the Railroad Administration in a particular district would be relatively a larger part of the total cost, the mere difference between the cost of work being done now and being done somewhat later is not sufficient to justify an attitude of opposition by the Railroad Administration to a policy of resumption or prosecution of public works.

"The Railroad Administration should not identify itself with opposition to proposals looking to such development or resumption of public works

unless the case is exceptional, and it is clear that the expenditure will be improvident, or that the project is actually in a private interest and involves the public interest only to a slight degree and the private interest involved will not assume the expense of the work. Nothing herein shall be construed to relate to facilities covered by General Order No. 15.

"Representatives of the Railroad Administration should at all times make it clear to the public authorities that responsibility for Capital Expenditures rests upon the Railroad Corporations and not upon the Railroad Administration, and unless specifically authorized by the Division of Law, shall speak only for the Railroad Administration in proceedings before Public Service or State Railroad Commissions, or officials or cities, counties or municipalities.

"The Railroad Administration may use its moral suasion to get the Railroad Corporations to consent to go ahead with public improvements and to finance improvements. However, no Federal Administration officer should take any action or make any commital, the effect of which would be to deprive a corporation of an opportunity to present its objection to the expenditure.

"In view of the fact that the amount of money available for capital expenditures is always limited, if a project will not be beneficial to the public in proportion to the expense, or can better be postponed pending the completion of more important Capital Expenditures, the Railroad Corporation, which will have to supply the capital, should present the conditions to the proper authorities.

"Bond Issues or Special Assessments

"Railroad Administration officials will not take any action for or against any proceeding, the purpose of which is to authorize a bond issue or special assessment, but will as fully as practicable keep the Corporate officer of each interested railroad advised so that if the Corporation desires to take any action, it may do so.

"In cases involving a special assessment chargeable to Capital Account in which the Corporation does not make financial arrangements to pay the assessment, there is no obligation upon the Director General to furnish the money. In such case, the question is one between the public authorities and the Railroad Corporation.

"Projects which Involve Charges to Capital Account That the Corporation Agrees to Assume, but which also Involve Charges to Operation

"If such a project is agreed to between the Corporation and the public body and the financial arrangements have been satisfactorily disposed of, the Railroad Administration will assume, as to Operating Expenses, the amount properly chargeable to it, but this policy should not prevent the Federal officer from presenting the objections, if any, which may develop to the project from an operating standpoint, nor from designating, wherever possible, the most economical method of carrying out any such project whenever there is more than one way of providing the proposed facility, or improving the existing facility, or from designating a better method of reaching the result if there is one available.

"Discussion with, or Proceedings Before, Public Service or State Railroad Commission, or Officials of States, Counties or Municipalities

"The general practices in connection with negotiations with, or before such public authorities preceding the issuance of an order, either formal or informal, should be along the following lines:

"(a) Immediately upon receiving notice that any question affecting Capital Expenditures is to be taken up, notice should be given as information, to the proper officer of the Corporation so that the Corporation may participate in the consideration or hearing before the public authority, and where such projects involve the consideration of existing franchises or charters, unusual care in protecting the rights of the Corporation, to notice should be exercised.

"The United States Railroad Administration representatives should assure themselves that the public authorities have given the Corporation the notice required by law.

"(b) The representatives of the United States Railroad Administration will in such proceedings handle to the best advantage all matters involving maintenance, transportation and other items included under operation, and may be called as witnesses for the public, or the Corporation, as well as for the Railroad Administration.

"(c) It will be entirely proper to respond to any requests from a Municipality, County or State for information in regard to material and labor costs, and to volunteer such data so that all concerned may get the benefit for the information in the hands of the Railroad Administration officials.

"(d) Single complete items involving a charge to Capital Expenditures of \$1,000 or less should be promptly reported to the Corporation to give the Corporation the opportunity of handling the matter with the public authority, but in the discretion of the Federal Manager the work should not be delayed if, and when, in his opinion, a prompt disposition of the matter will be the proper action under all circumstances.

"Compliance with Orders Issued by Public Authorities

"If and when a proceeding before the public authority has resulted in a definite order involving a charge to Capital Expense, the matter should be promptly reported to the Division of Capital Expenditures, with the position of the Corporation officer clearly expressed, together with the recommendation of the Federal Manager and Regional Director.

"Sincerely yours,

"(Signed) Walker D. Hines."

Since the date of this letter, Director General Hines has designated District Director William Sproule as the representative of the Administration. Mr. Sproule in a letter to the Commission of June 18, 1919, states that:

". . . the Director General, while not a party to these hearings, will co-operate in arriving at the facts and their bearing and desires to be represented at the hearing."

CHAPTER II.

OUTLINE

Influences Affecting Terminal Problem

The Steam Railroad Problem

Relation of Electric Interurban Lines to the Problem

CHAPTER II

GENERAL SURVEY OF PROBLEM

INFLUENCES AFFECTING TERMINAL PROBLEM

Mr. Bion J. Arnold has well summarized the influences affecting the Chicago terminal problem. Since the problem at Los Angeles is different only in degree, we shall take the liberty to quote from his report:*

"Influences Affecting Terminal Problem:

- "A broad and unbiased study of this problem calls for consideration of the rights and viewpoints of the many interests concerned, which are briefly set forth here in order to emphasize the impossibility of reaching conclusive decisions until the full facts are available.
- "1. **The Railroad Corporation**—viewing its properties, realty holdings, terminal advantages, operating rights and investment from an individual rather than a community point of view, thus reflecting the attitude of a foreign directorate.
 - "2. **The Municipality**—vitaly interested in the proper physical and aesthetic development of the industrial properties within its borders as well as in the convenience of its citizens.
 - "3. **The Local Taxpayer**—who questions the justice of enormous railroad holdings within his city being assessed at merely a fraction of his own assessment rate while he is required to contribute a proportionally greater share to the support of the municipal government.
 - "4. **The Real Estate Owner**—generally in favor of any plan that benefits his property without considering the best interests of the city as a whole and who as loudly protests against the depreciation of his property values by contiguous railroad properties, and whose views are equally divergent upon the desirability of a railroad or loop terminal location depending upon whether his property is inside the "loop" or outside.
 - "5. **The Commuter**—satisfied with moderate terminal facilities if low fares and reasonable conveniences are available with quick access to the business district.
 - "6. **The Traveler**—favoring that road with the shortest running time, the best equipment, the most imposing terminal architecture and maximum terminal conveniences without so much regard to location, as his lack of knowledge of the city forces the use of taxicabs. Here the advertising value of the expensive terminal is evident.
 - "7. **The Stockholder**—often interested only in a maximum return upon his investment without much regard to methods of operation and often with none at all in the welfare of the community.
 - "8. **The Bondholder**—retaining through the trustees the absolute ownership and control of present property which cannot be disposed of outright without his consent except through long term leases and operating agreements.
 - "9. **The Management**—under continual pressure for maximum dividends, adherence to schedules, better equipment and the demands of the suburbanites for more and faster equipment in the face of increasing operating expenses and competition from long-haul rapid transit lines.

*Report on the Rearrangement and Development of the Steam Railroad Terminals of the City of Chicago—1913.

- "10. **The Financier**—gauging the amount and discount of his loan largely by the record of annual surplus shown on the road's balance sheet.
- "11. **City Shipping**—Desiring freight terminal facilities located as close to point of originating tonnage as possible in order to avoid delay and expense in extra cartage. Obviously too close concentration within congested district defeats the purpose in view.
- "12. **Through Shipper**—interested only in prompt transfer through the Chicago District with the least rehauling, which practically dictates the clearing system now being installed.
- "13. **Lake Shipping**—the success of which practically depends upon cheap and convenient trans-shipment facilities that can only be brought about by the most intimate contact between rail and water, supplemented by interchange clearing and union freight station.

"Analysis of all these extremely conflicting viewpoints reveals the fact that in the main the decision of all parties interested as to the merits or demerits of any terminal plan proposed is practically guided by individual interest and in this respect the municipality is no exception. How, then, may a just balance of interests and equities be found? The method followed in this report is that of disinterested technical analysis.

- "1. Analysis and classification of each proposal.
- "2. Balancing of advantages and disadvantages from the viewpoint of the greatest good to the greatest number.
- "3. Determination of capacity and commercial feasibility.
- "4. Assumption of reasonable co-operation between all interested parties, especially the railroads and the city.

"In the present situation the property values and equities involved are so large and the interests so complicated as the result of long years of development, rearrangement, reorganization, acute competition and lack of adequate municipal supervision, that the question immediately arises:

"Shall expediency and minimum cost govern, or shall permanent development based upon the lessons of the past and the unquestioned needs of the future prevail?"

"Here there are the two extremes: the Corporation hesitates to plunge into a large investment for the distant future, especially during a close money market, and, therefore, follows the line of least resistance and uncertainty in providing only for the immediate future. On the other hand, enthusiastic supporters of the comprehensive City Plan are convinced that piecemeal and disorganized development for the present only will simply intensify the problems of the future. Both are right to a degree and in the analysis the problem is to find the middle ground, if possible, upon which these conflicting interests may unite upon a constructive program of necessity and moderation."

The problems involved at Chicago were very much the same as those presented in this investigation, more particularly the various interests involved. The most important exception lies in the fact that here in California the Railroad Commission has very large powers to make orders affecting service and operation of common carriers. These orders, if reasonable, are binding upon the carriers, and in a measure also upon municipalities and other political subdivisions of the state. The necessity of bringing the various conflicting interests upon the "middle ground" by means of

argument and persuasion, that is, the necessity to compromise, is present, therefore, only if, in the interests of the greatest good to the greatest number, a compromise seems best.

However, a "disinterested technical analysis" is necessary in any case. The conclusions reached in this report are the result altogether of such disinterested analysis as we have been able to give to the problem.

THE STEAM RAILROAD PROBLEM

The main subject of this report is the study of the railroads in the City of Los Angeles and particularly the railroads in the industrial district. Plans have been formulated and recommendations have been made in the main with three objects in view:

1. The elimination of grade crossings,
2. The question of the desirability and location of a union passenger station, and,
3. The possible improvements in the handling of freight.

These three problems are interdependent: the plans of one item have an effect on the other two. It is obvious, for instance, that the matter of crossings is very largely dependent upon the location of a union passenger station. It is necessary, therefore, to determine first which one of the three problems shall be considered as of greatest importance. It has frequently appeared during the hearings in these cases and subsequently that the establishment and the location of a union passenger station is of paramount importance. Even a superficial examination of the factors involved will lead to the conclusion, however, that this is not the case. The matter of first importance, in our opinion, is the elimination of grade crossings. This is true not only because we are dealing with the question of danger to life and limb and property, but also because the continued existence of certain grade crossings in the City of Los Angeles is one of the main handicaps to a healthy and unhindered development of the city. The comparative importance of the grade crossings can be established from another angle:

About 2,750,000 people per year—approximately 7,500 per day—are now using the depots of the three steam railroads in Los Angeles. A union passenger station will probably accommodate for years to come not in excess of 10,000 people per day. Over the various grade crossings adjacent to the Los Angeles River and between North Broadway and East Ninth Street (the crossings chiefly under consideration in this report) there pass about 33,000,000 people per year—90,000 per day. And this number is steadily increasing and will, within another year, average at least 100,000 per day. These facts, in our opinion, demonstrate clearly the overshadowing importance of the grade crossing problem in the City of Los Angeles.

In addition to the three main factors affecting steam railroads, as enumerated above, we have considered only such other steam railroad matters as were clearly included in the cases officially before the Commission (the recommendations, for instance, that were made by the Commission in the

reports to the Director General of Railroads on immediate unification possibilities) and in various other applications awaiting decision by the Commission.

RELATION OF ELECTRIC INTERURBAN LINES TO THE PROBLEM

It is an important fact that the Pacific Electric Railway in 1917 carried about 35,000,000 passengers in and out of Los Angeles—exclusive of five-cent fare passengers—while on the three steam roads combined the passengers numbered only 2,750,000. In other words, the electric interurban passengers are over thirteen times as numerous as the passengers on the steam roads. There were, on December 31, 1917, over 1,400 scheduled passenger trains daily on the Pacific Electric in and out of Los Angeles, exclusive of street or local service, while on the steam roads there were but 94. The proportion of thirteen to one, therefore, holds here also. The routes traversed by these 35,000,000 passengers are shown in Fig. 17 on page 107.

The grade crossings within the city on electric interurban lines also exceed the crossings on steam roads, but an exact ratio is difficult to establish because of the relative importance of the various crossings. Recently the City erected advance grade crossing warning signs in compliance with a state law, and there were about as many steam road crossings designated for signs as there were Pacific Electric crossings, the ratio being 159 to 163. These figures give a very good approximation of the number of crossings of both kinds considered dangerous by the City.

Electric interurban traffic in a city is more dangerous than steam road traffic for the main reason that electric trains accelerate much faster and, in general, operate at much greater speed. With these facts before us, it is necessary to take up the question of the elimination of grade crossings of the electric interurban tracks and its relation to the whole problem.

It should be stated at the outset that from the practical point of view, all matters dealing with electric interurban service within the City of Los Angeles resolve themselves first into questions of jurisdiction. To the extent that the scope of this report includes electric interurban service, we are considering the problem regardless of the power of the Commission to enforce recommendations and from an engineering standpoint only. As matters now stand, jurisdiction is divided between the various municipalities served, the County and the Commission. The ideal condition would be to have these various jurisdictions work together and agree on the best possible plan for future electric railroad development and to permit thereafter nothing to be done that would seriously interfere with the ultimate accomplishment of the adopted plan.

Such a plan, insofar as electric interurban traffic within the City of Los Angeles is concerned should, in our opinion, take account of the main factors indicated.

The so-called **Hill Street subway line** which was discussed at length at the hearing in these proceedings, is a case in point. As long as fourteen years ago the interests then controlling the Pacific Electric planned this line as a subway westerly from the present Pacific Electric Hill Street station to approximately Vermont Avenue and thence either on the surface or as an elevated line to Vineyard.

This plan as developed fourteen years ago remains sound today. There is no doubt that construction of the line and the abandonment of the Hill Street station and the Sixteenth Street line for all but street car traffic would result in far better transportation to the various beach towns and in the elimination of dangerous crossings. In this connection see Fig. 89 on page 246.

A somewhat similar situation exists with regard to the elimination of Pacific Electric grade crossings between Los Angeles and Pasadena. This matter will be further discussed in Chapters IV and IX.

The general problem of the elimination of grade crossings on Pacific Electric tracks in the City of Los Angeles resolves itself into the separation of street levels and railway levels not only where the tracks cross the streets but between these points. This is a problem of city planning rather than one to be taken within the scope of this report.

CHAPTER III.

OUTLINE

Historical Review

Early History of City

Growth of the City

Los Angeles Harbor

Municipal Railroad

Steam Railroads

Los Angeles and San Pedro Railroad Company

Southern Pacific Company

Atchison, Topeka and Santa Fe Railway Company

Los Angeles and Salt Lake Railroad Company

San Gabriel Valley Rapid Transit Railway

Los Angeles and Glendale Railroad Company

Los Angeles, Pasadena and Glendale Railroad Company

Los Angeles and Independence Railroad

Passenger Stations in Los Angeles

Present Conditions

Railroad Entrances

Southern Pacific Routes

Santa Fe Routes

Salt Lake Routes

Railroad Mileage in Los Angeles

Valuation of Steam Railroad Property in Los Angeles

Relation of the Business District to the Topography

CHAPTER III
HISTORY AND DEVELOPMENT OF CITY AND OF TRANSPORTA-
TION FACILITIES

HISTORICAL REVIEW

Early History of City

The Pueblo of Los Angeles was founded under the protection of the Spanish Government on September 4, 1781, shortly before the original site of the city had been laid out in rectangular shape (200 feet by 275 feet) and, according to the records, was approximately a little north and west of that area now between Main, Los Angeles, Marchessault and Plaza Streets, and comprised slightly more territory than is included in the present circular park known as the Plaza. It was at this location that the Mexican colonists gathered and declared this to be the Town of Our Lady the Queen of the Angels ("Pueblo de Nuestra Senora la Reina de Los Angeles").



FIG. 2. THE PLAZA

This circular park marks the center of the original City of Los Angeles at the time of founding, in 1781. The area of the city was but slightly greater than the present plaza.

Los Angeles is, therefore, one of the oldest cities of the Pacific Coast. It was the first colony to be organized independently and separately from a Spanish Mission. Of these there were several and the largest was at San Gabriel, at that time the sponsor to the entire Southern California region.

The population at the time of founding is officially reported as forty-four. Since then, the growth of the city has not been regular, but has fluctuated during different periods. From the date of the foundation to the time of incorporation, in 1851, very little progress can be noted. About

that time the population increased considerably because of the influx of prospectors into California attending the discovery of gold and the subsequent excitement. From about 1800 to about 1885, the growth of the town was fairly steady. In the latter year the last spike was driven in the Cajon Pass line of the Santa Fe, giving Los Angeles a direct and competing railway connection with the East. (The Southern Pacific, as will be discussed later, had come in, in 1873.) This event has been termed the turning point of Los Angeles from the old to the modern city.

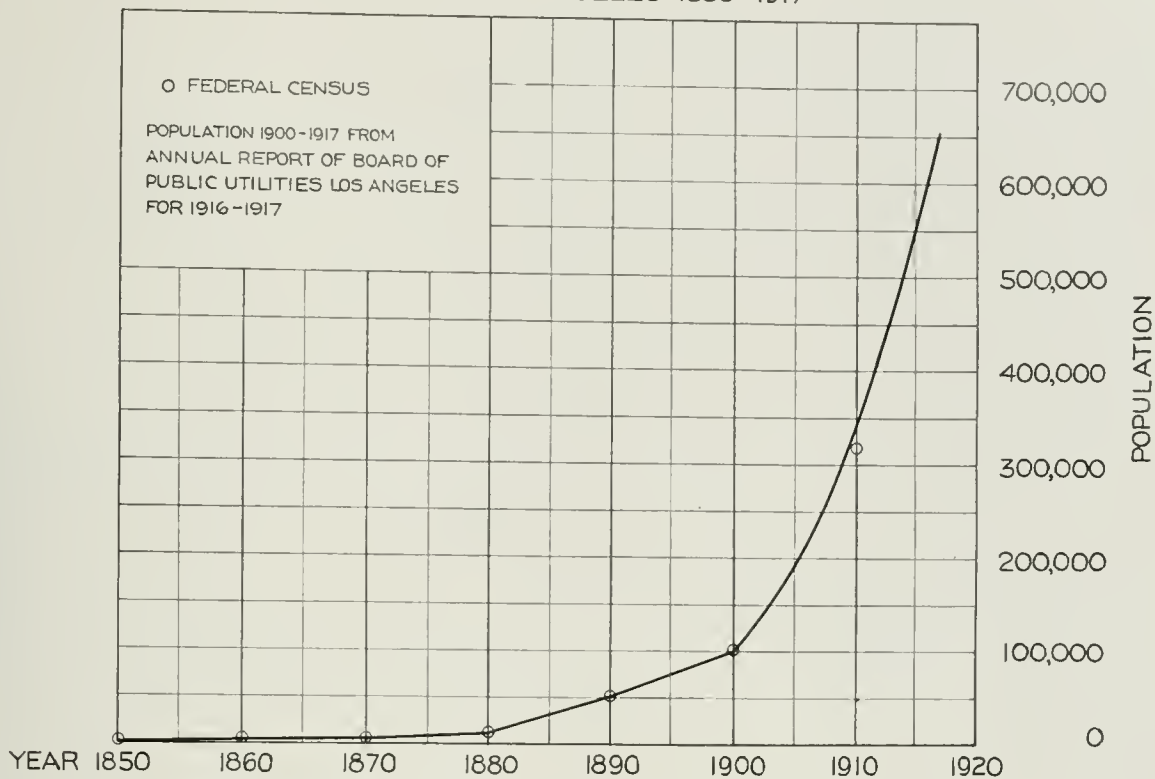
Growth of the City

With the widespread advertising, and special railroad rates offered, traffic developed and there came a sudden flood of people to this part of the Pacific Coast. With this period the remarkable development of Los Angeles and Southern California began. In 1860 the population is reported to have been 3700; in 1870, 5728; in 1880, 11,090; in 1890, 50,395; in 1900, 102,479; in 1910, 310,198, and in 1918 it is estimated at over 600,000. The population of Los Angeles stands first in California, fifth in the United States, and about thirty-fifth among the cities of the world.

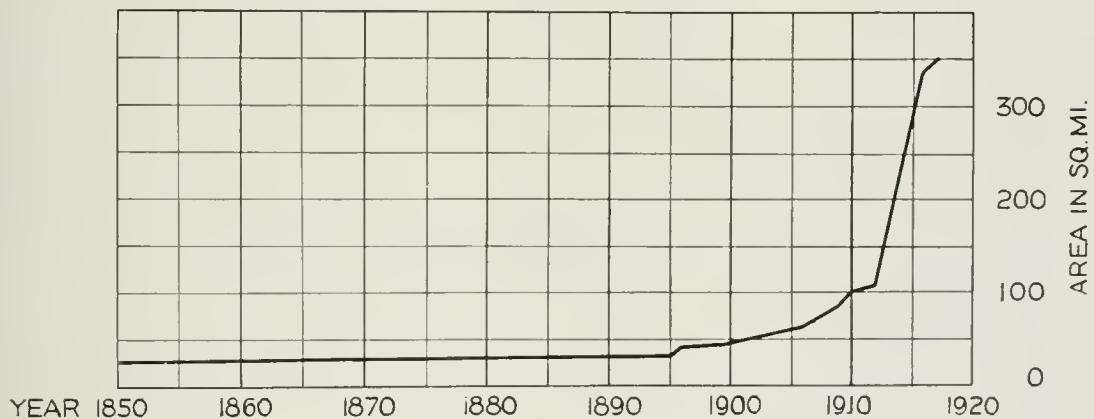
The actual growth in population may be more readily seen from the chart, Fig. 3, page 67.

The greatest rate of increase in any one decade was 350 per cent and occurred between 1880 and 1890 in the so-called "boom period." It has been stated this was caused, to a large extent, by the opening of the Santa Fe railroad from the East with ridiculously low rates. During the rate war between the Southern Pacific and the Santa Fe, in 1886, the fare from Missouri River points to Los Angeles reached as low as one dollar.

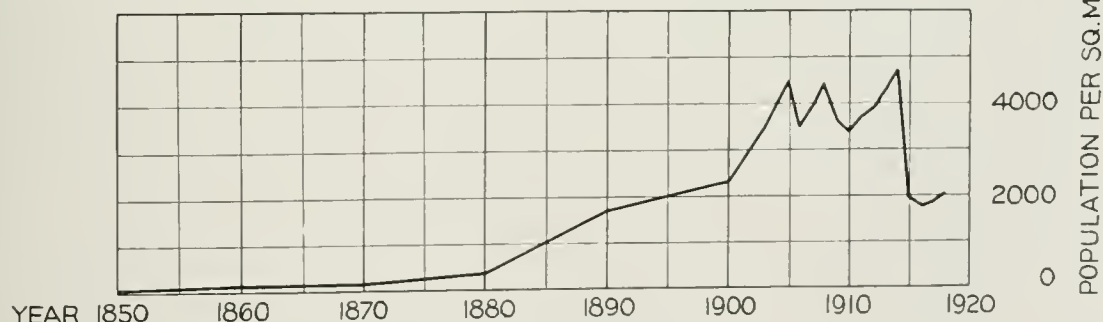
POPULATION LOS ANGELES 1850-1917



AREA LOS ANGELES 1850-1917



POPULATION PER SQ. MI. LOS ANGELES 1850-1917



GROWTH OF LOS ANGELES
POPULATION & AREA

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FIG. 3. GROWTH OF LOS ANGELES IN POPULATION AND AREA

The upper diagram shows the growth in population from 1850 to the present time; the middle diagram shows the growth in area in the same period; and the lower one shows corresponding changes in average density of population. The drop in average density in 1915 is due to the annexation of the San Fernando Valley at that time.

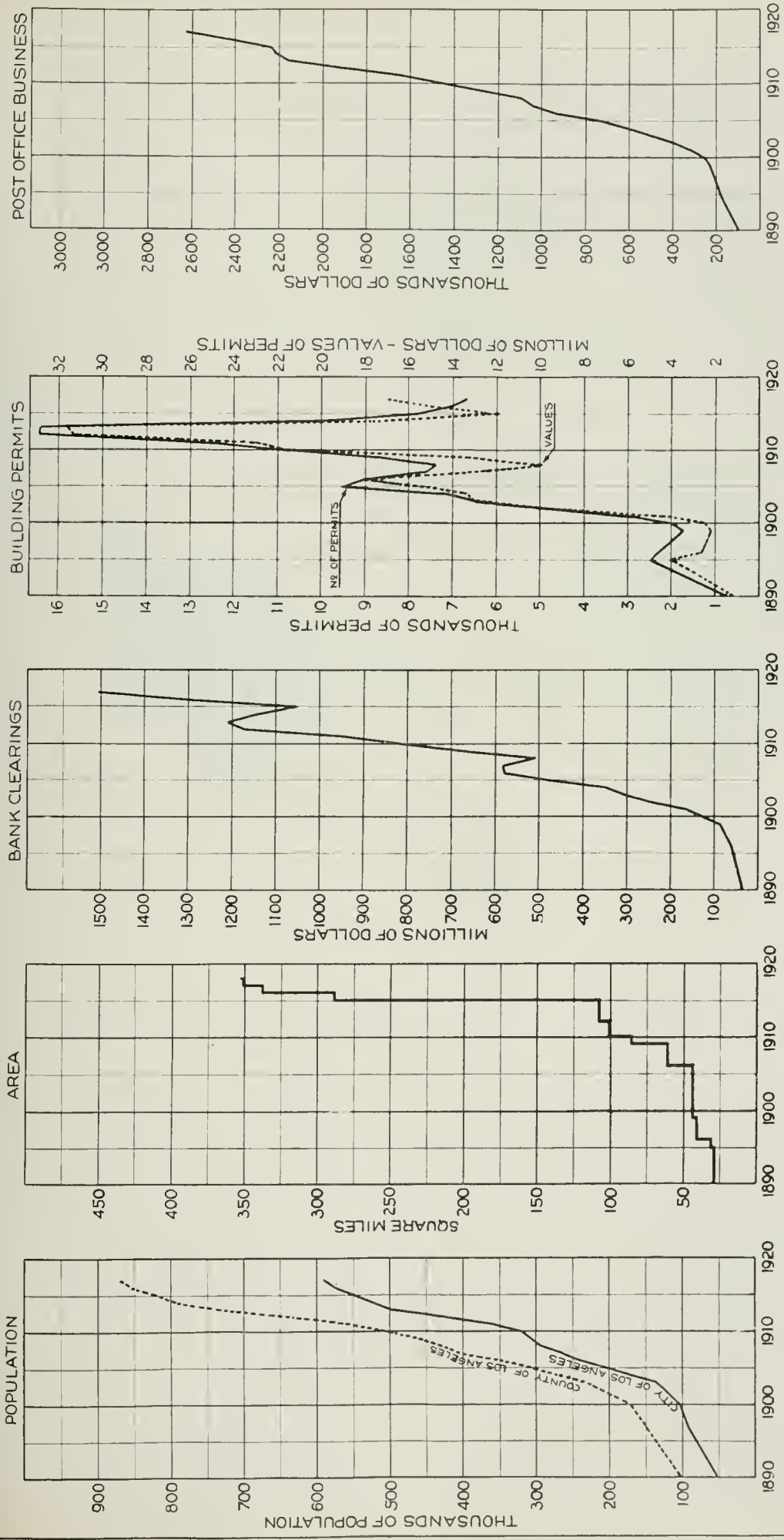
A chart, showing the territorial growth of Los Angeles from 1850 to the present time, is also shown in Fig. 5. In 1851, when the city was incorporated, the total area was 28.01 square miles. During the next fifty-five years the increase in area amounted to only 1.20 square miles. From 1900 to 1910 the area increased 133% and from 1910 to 1918, 261%. This last rate of increase was caused principally by the annexation of the San Fernando Valley. This annexation was made in order to irrigate this valley with water from the newly completed municipal aqueduct, the law providing that such water could not be sold outside the city.

The third graphic chart embraced in Fig. 3 shows the population per square mile of area and the corresponding changes in the density of population. This curve reflects the effect of the acquisition by the city of largely sparsely populated areas, nevertheless the population of the city is constantly growing. With two or three exceptions, the territories consolidating with, or annexing themselves to, the City of Los Angeles have been large in area, but small in population. The San Fernando District or Valley is an agricultural district and embraces approximately 170 square miles, with but 5000 or 6000 people.

The economic factors controlling the growth and prosperity of any community are directly reflected in such statistics as banking, building permits, and post office business. In the chart, Fig. 4, these statistics, for the years 1890 to 1918, together with curves for population and area, are shown as an indication of this growth in Los Angeles.

Fig. 5 shows the present shape and boundaries of the City of Los Angeles. The original townsite or city, as incorporated in 1851, and consisting of 17,924 acres or 28.01 square miles, is shown in black. The subsequent annexations are shown in decades by color, as explained on the drawing. The total length of the city, from the northern limits of the so-called San Fernando district to the most southerly point at San Pedro, is now approximately 45 miles. The present area is approximately 365 square miles. With this area, Los Angeles is the largest city, in point of territory, in the United States.

An idea of the distribution of the population may be obtained from Fig. 6.

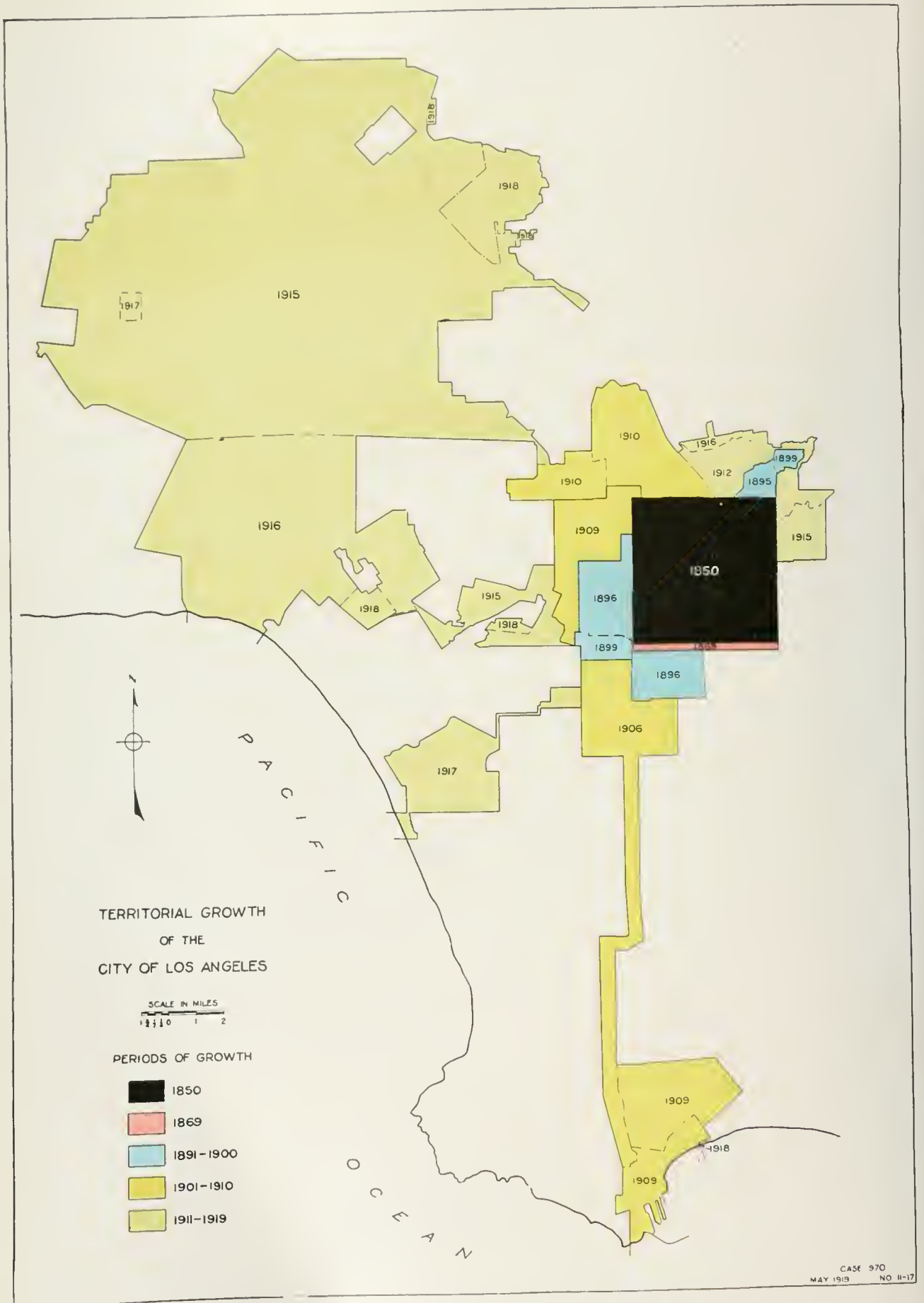


GROWTH OF CITY OF LOS ANGELES
AS SHOWN BY
POPULATION, AREA, BANK CLEARINGS, BUILDING PERMITS AND POST OFFICE BUSINESS
INFORMATION, EXCEPT AREA, FROM LOS ANGELES CHAMBER OF COMMERCE

California Railroad Commission Engineering Dept.

A comparison of growth in population, area, bank clearings, building permits, and post office business from 1890 up to the present time, is shown. The drop in building permits is due to war conditions. The general upward tendency is very pronounced.

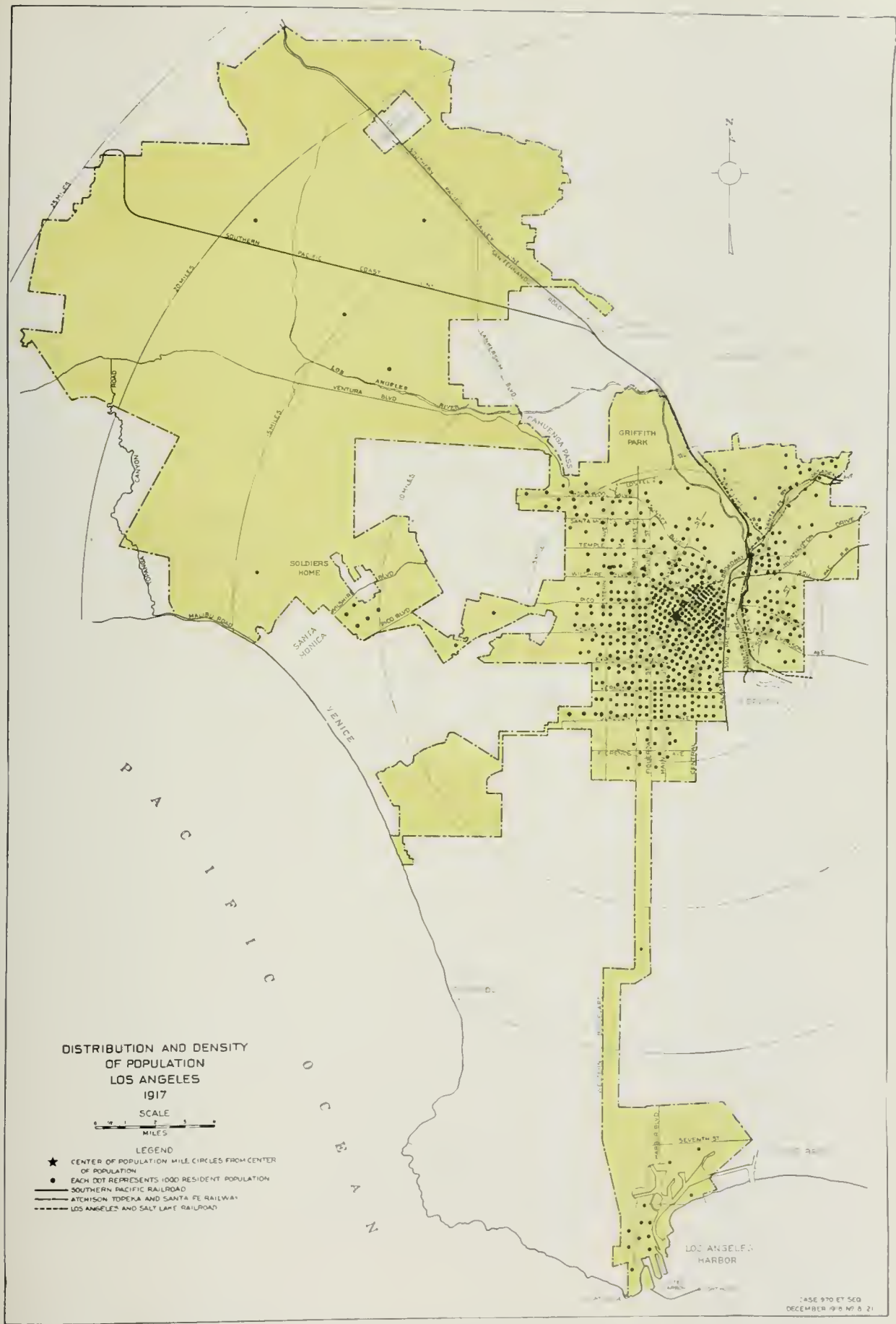
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California Railroad Commission Engineering Dept.

FIG. 5. TERRITORIAL GROWTH OF LOS ANGELES

Except for the first annexation, the periods of growth are by decades. In order that the density of population shall keep pace with the territorial growth, adequate rapid transit facilities are of prime importance.



California Railroad Commission Engineering Dept.

FIG. 6. DISTRIBUTION OF POPULATION IN 1917

Each dot represents 1000 resident population. The star marks the point where a north and south and an east and west line divides the population into two equal parts. This map is based upon the registration of voters.

Each dot on this chart represents 1000 inhabitants, with the center of population shown by the star, at approximately Eleventh and Georgia Streets. About 1911 this center was at Sixth and Main Streets. The star is located at the intersection of north and south and east and west lines equally dividing the resident population.

The first inhabitants located within the original plaza site but, as the town grew, the residential district was developed to the north and south of the Plaza, and occupied the area along Main, Spring, and Broadway (formerly Fort Street), as far south as Sixth and Seventh. From this district, the tendency seems to have been to the west and the south.

Along with the growth and increase in population, there were economic, industrial and manufacturing developments in the city and great agricultural growth and developments in the surrounding country.

Up to about 1880 the business of the city had been practically confined to the immediate vicinity of the old Plaza; then a few small business buildings were built south of First Street; and, ten years later, the center of the business district shifted from around the old Mission Church at the Plaza to First Street. Up to this time the predominating population lived north of the Plaza; but, as the number of inhabitants increased, the trend seemed to be westward. This movement also caused the shifting of the city's business center, which moved south from First Street to between Third and Fourth Streets on Broadway, Spring and Main Streets, where it seemed to hold for several years. Then, within the last few years, it has evidently been moving toward Seventh Street, west of Broadway and Hill Streets, which, thirty years ago, was the southern outskirts of the town, but which is now the acknowledged future business center. Thus, it will be seen that the modern Los Angeles has far outgrown, in every respect, the city before the "boom." It may be of interest here to note the time of the beginning in Los Angeles of a few of the modern conveniences. In 1850 the first United States census was taken and, in the same year, before the city was incorporated, the first post office was opened for business on April 9th. On July 1st, 1850, the first election was held. In 1853 the Wells-Fargo Express Company came in. It was not until October 8, 1860, however, that the first telegraph line was in operation between Los Angeles and San Francisco. The first locomotive operated in Los Angeles was shipped in by water in 1869. Street railway companies began the operation of horse or mule cars on the streets of Los Angeles in 1872. In 1873 the first bridges were built across the Los Angeles River at Downey Avenue, now North Broadway, and Aliso Street. In 1874 the first cable street railroad was built and known as the Sixth and Main Streets line. On December 31, 1882, the city celebrated the occasion of the first electric street lights. In the same year the telephone was introduced. Street paving was started in Los Angeles in 1887, when Main, Spring and Broadway were paved. Oil, which has been one of California's greatest products, was first pro-

duced in Los Angeles in 1892, from a well dug by hand. The first shipment of oranges was made in 1877.

In due time Los Angeles decided that the city must be expanded to reach the coast. Accordingly, an annexation act was passed creating a "pan-handle" or "shoe string" reaching to and including San Pedro, which is now a portion of the corporation of Los Angeles. The city also began to reach out in other directions until, today, it has an area of approximately 365 square miles.

The Aqueduct, to which the present size of the city is largely due and of which Los Angeles is rightfully proud, was made possible by the issuance, in 1907, of a \$25,000,000 bond issue. Actual construction began in 1908 and, in 1913, the waters of the Owens River were brought across 250 miles of desert to the City of Los Angeles at a total cost of \$24,650,000.00. In addition to providing some 184,000,000 gallons, daily, of available water, the city is now building power plants at various points along the Aqueduct, and expects to develop electricity to the amount 185,000 horse power with plants already installed and to be installed.

Los Angeles Harbor

From 1871 to 1897 the question of constructing a breakwater at San Pedro was agitated, and for years there was a conflict between the railroads and certain factions of the citizens of Los Angeles to determine and secure from the government an appropriation for the construction of a harbor at either San Pedro or Santa Monica.

This contest, usually termed the "Los Angeles Harbor Fight," is a well known story in and around Los Angeles and will not be dealt with, in detail, in this report. The principal point is that the matter was one of railroad rivalry primarily; the Santa Fe (or its predecessor) developing a wharf at Redondo to compete with San Pedro, and the Southern Pacific Company, to checkmate this, extended its Santa Monica line three miles up the coast to Los Angeles and there building a wharf nearly a mile in length. Later, when the Southern Pacific Company transferred its plans from further extension of Santa Monica and Port Los Angeles to extensive improvements at San Pedro, the former wharves became practically abandoned. Not long after the transfer of the Southern Pacific interest, the government rendered its final decision in favor of San Pedro and, in 1897, the United States army engineers located Los Angeles Harbor. The present breakwater, 11,152 feet in length, was then built at a cost of \$3,108,300.00. The construction of this breakwater marks the beginning of Los Angeles Harbor as a deep water port.

The first railroad facilities built on the old waterfront are shown in the following picture:



FIG. 7. TERMINUS OF LOS ANGELES AND SAN PEDRO R. R. AT WILMINGTON
This picture was taken about 1869.

In 1906, the City of Los Angeles acquired a strip of land extending southerly from the then city limits to the northern boundaries of Wilmington and known as the "shoe-string" addition. Three years later, in 1909, San Pedro and Wilmington became a part of the City of Los Angeles.

Municipal Railroad

Shortly after the acquisition of this new territory along the waterfront, including Los Angeles Harbor, the city officials believed it to be to the best interests of the city to preserve to the people their rights to deep water frontage and to provide a means of access between the city and deep water for any transcontinental railroad which might build to Los Angeles. Accordingly, a plan was approved, and the road was to be known as the Municipal Railroad.

Shortly after a railway right of way from Los Angeles south to Wilmington and San Pedro was secured, through donations to the city, with no financial outlay whatever. These donations were obtained with the understanding that a railroad was to be constructed and, in many cases, the agreements called for the creation, by the city, of waiting stations, freight platforms, or the construction of a boulevard alongside the right of way, and also numerous other considerations. Later, when the building of the road did not materialize, the parties donating land demanded some action by the city, or the return of the land donated for railroad purposes. As fast

as such applications are made, the city, without any objections whatever, is relinquishing all claims.

The only constructive work done by the City on the Municipal Railroad consisted of a double three-rail electric track from Aliso Street to Ninth Street on San Pedro Street; for this the City paid the following:

Pacific Electric Railway (paid by Harbor bonds).....	\$246,575.00
Engineers' fees	1,032.98
Installing intakes	327.00
Repaving street	421.00
<hr/>	
Total expended	\$248,355.98

The total appropriation by the City amounted to \$250,575.00. After the completion of the track, it was leased to the Pacific Electric Railway Company for the consideration of the interest on the bonds, which amounts to \$11,376.00 annually, or 4½% of the total expenditure. If, at any time, the City terminates the lease, the Pacific Electric Railway Company is to automatically receive the franchise for a track on Los Angeles Street. The franchise covering this was allowed by Ordinance No. 26,874 (N. S.) City Book 4, page 668.

The Los Angeles Railway has also obtained a franchise for the operation of cars over that portion of the municipal tracks between Ninth and Fourth Streets. Several years ago the City attacked the right of the Los Angeles Railway to operate on San Pedro Street and the case was carried through the Supreme Court, proving some of the Los Angeles Railway franchises void and others valid.

Steam Railroads

In the following short history no attempt is made to go into details, such as the corporate names or entities under which various sections of railroads and improvements were constructed or operated; the reorganizations that almost all roads underwent during their life; the changes in motive power and franchises, and other such matters. In all cases the matter has been considered in a general way, and with special attention to the more important developments. To attempt to list the names of all small companies which were organized, in most cases by the larger companies merely to build a certain section, small or large, of a particular road, and which, after completion, were absorbed by the operating company, would necessitate a great amount of searching of records and would not assist in any way our study of the case. This is intended to be merely a sketch of the railroad development of Los Angeles and its surrounding territory. The subject matter is taken from various publications dealing with the history of Southern California and Los Angeles, and from information furnished by old residents of the City. The accuracy of our statements is, therefore, limited to the accuracy of these historians.

There is no doubt in anyone's mind that progress and prosperity anywhere is dependent upon transportation to a greater extent than upon any

other single factor. In the United States especially, as indeed in every "new country," the railroads have played a most important part in the growth of wealth, the increase of material comfort, and the spread of information and knowledge. While this is true of the country, as a whole, it is even more startlingly true in the later development of the Pacific Coast and of the State of California.

Los Angeles is now the first city in point of population in this State, and it is apparent that the railroad history of this city is intimately bound up with the progress of railroading in the entire State. A short review of that progress, in so far as it may be of interest in connection with this report, will, therefore, be in order. There are in California today 57 steam railroads, with a grand total of 12,000 miles of track, of which 8000 are main line. The first railroad in the State, and in fact on the Pacific Coast, was completed in 1855 between Sacramento and Folsom, a distance of 21 miles. The second was built in Oakland in 1862, 4 miles long and to facilitate the transbay traffic, then in a crude and undeveloped condition. The third was between San Francisco and Menlo Park, built in 1863 and extended early the next year to San Jose. The next railway achievement of importance was the construction of the Central Pacific from Sacramento to Ogden, commenced in January, 1863, and completed in May, 1869. During 1869 the Western Pacific Company was constructing a line between San Jose and Sacramento which was completed and merged with the Central Pacific in 1870. Soon after the Alameda and Oakland road, which meanwhile had crept along to Haywards, was purchased by the Central Pacific and extended to Niles. This completed the first great all-rail transcontinental system, with California as its western terminus.

Following this, railroads were built from San Francisco into the San Joaquin Valley and into the Salinas Valley, along the Coast. The high mountain ranges which separate Southern California from the central or San Joaquin Valley were encountered and surmounted, and with a tunnel 6966 feet in length the railroad from San Francisco to Los Angeles was completed.

The construction in 1877 of what is now known as the "Sunset Route," extending from Los Angeles to Yuma, and a few years later through the southern border territory to New Orleans, gave California another transcontinental route.

The railroads of next importance, whose operations were confined entirely to the southern part of the State, were the Atlantic and Pacific and the Southern California, in effect the Pacific ends of the Santa Fe. That portion of the Atlantic and Pacific route between Mojave and The Needles was originally constructed by the Southern Pacific Company in 1882-83 and transferred in 1884 to the Santa Fe, the present owner. At Needles it joined the main portion of the line, then nearly completed between that point and Albuquerque, adding a second transcontinental line to Southern California. Subsequently branches have been constructed into all of the

important territory to the south and a great deal of enterprise displayed in the development of the country.

In 1895 a second railway was started from San Francisco to Los Angeles, practically paralleling the Valley line of the Southern Pacific Company; and in 1900 it had been completed and sold to the Santa Fe, which company has operated it ever since.

A third railroad which may be called a transeontinental line is the present Los Angeles and Salt Lake Railroad, formerly known as the San Pedro, Los Angeles and Salt Lake Railroad. This road has its western terminus at Los Angeles Harbor and its eastern terminus at Salt Lake City where connections with the Union Pacific are maintained. Though several schemes for such a road had been promoted and failed, the San Pedro Company, together with the Los Angeles Terminal Company which had already built from Los Angeles City to San Pedro or Los Angeles Harbor, finally, in 1905, completed its line to Salt Lake City.

The impetus to progress given by railroad construction in the southern part of California seems almost without an equal in the history of the nation. Within a comparatively short space of time Los Angeles had broken all records of growth. From a sleepy, indolent town of 12,000 inhabitants, few attractive features, and no evidence whatever of advancement, it has swelled to a metropolis of 600,000, and the railroad is the chief cause of the metamorphosis.

Los Angeles and San Pedro Railroad Company

The Los Angeles and San Pedro Railroad was the first railroad to be constructed in Los Angeles County or Southern California. Previous to the time when railroads began serving Los Angeles, the connecting link between Los Angeles and the outside world was the port or roadstead of San Pedro. All freight, with little exception, was transported that way, and, by the year 1869, business had grown to such proportions that a railroad from the port to the City was completed.

This road was first agitated in 1860. At that time money for railroad projects was hard to raise, and an appeal was made to the State. An enactment was passed by the legislature allowing counties and cities within the State of California the power to bond themselves and to loan the proceeds of the bonds as subsidies to railroads. The public, however, was more or less skeptical of the success of a railroad and consequently it was not until eight years later (1868) that the City and County approved the issuance of the bonds. By these bonds the County and City made available \$225,000, \$150,000 and \$75,000, respectively, which made possible the building of the first railroad into Los Angeles.

It is a noteworthy fact, therefore, that the first railroad in Los Angeles was built with public and not alone with private funds.

On September 19, 1868, construction was started at Wilmington. By June, 1869, six miles of the road was completed. By August 1st, the road

had been built to within 4 miles of Los Angeles or to about where the City of Compton is now located. By October the construction of eighteen miles was completed and the road brought well within the limits of the present city, but "far from town" as it appeared in 1869 and 1870. On October 20, 1869, the road was opened to the public although the regular schedule was not put into effect until November 1st.

The road into the City was built along what was then called the "Lane" (which in reality was an extension of Alameda Street) to its terminus at Alameda Street and what is now Commercial Street, where a depot and turntable, as shown below, had been constructed. Later this road was acquired by the Southern Pacific Company and is operated as its San Pedro Branch.



FIG. 8. FIRST LOS ANGELES RAILROAD STATION

This station was built in 1869 by the Los Angeles and San Pedro Railroad at Commercial and Alameda Streets.

In 1870 the Los Angeles and San Pedro Railroad Company extended its line from Wilmington to Timms Landing, at San Pedro. This was the real beginning of the city and the harbor of San Pedro.

Southern Pacific Company

The completion of the first continental railroad to San Francisco in 1869 gave an impetus to railroad building in California. To encourage railroad construction throughout the State, the legislature in 1870 enacted a law authorizing any county to bond itself to five per cent of the assessed

value of all property in the county for the purpose of assisting railroads. Previous to this, the legislature had, in 1863, granted Los Angeles County and the City of Los Angeles permission to issue bonds as a subsidy to the Los Angeles and San Pedro Railroad Company.

About 1870 the Texas Pacific Railroad was building a road across Texas and had projected a line through California from Yuma to San Diego. This company had also proposed and offered to build a line extending along the coast to Los Angeles, providing suitable inducements or bonus were given by Los Angeles County and Los Angeles City.

The Southern Pacific, about this time, was building southward from Lathrop, through the San Joaquin Valley, and over the Tehachapi Mountains to Mojave. From this latter point, two separate surveys had been made to the Colorado River: one by way of Soledad Pass, via Los Angeles, through costly tunnels and over heavy grades; the other directly eastward to Needles, over an almost level plain and desert.

Rumors that the latter route would be chosen and Los Angeles sidetracked unless inducements were offered resulted in a committee being sent from Los Angeles in 1872 to San Francisco to confer with the Southern Pacific Company. Maps presented at this conference showed how the railroad could enter the city. When the road was finally built, it followed the lines indicated by those maps.

At the conference in San Francisco, the Southern Pacific Company offered to build fifty miles of its main trunk line through the County of Los Angeles and the City of Los Angeles, leading from San Francisco to Yuma, where connections were to be made with the Texas Pacific. Twenty-five miles of this fifty miles of road were to be built north of the City and a similar amount eastward. In consideration of this, the company demanded a bonus of 5% of the assessed valuation of all land and improvements in the county; sixty acres of land, ten acres suitable for a depot and fifty acres for shops at advantageous locations within the City, with the necessary rights of way for the main trunk lines. In addition, the company demanded the entire stock owned by the City in the Los Angeles and San Pedro Railroad Company.

According to the ordinance adopted in May, 1872, through which this matter was submitted to the vote of the people, the bonus to the railroad company was as follows: 5% of the assessed valuation of taxable property, which, in 1872, was \$10,550,000, making a total of \$527,000. \$15,000 of this sum was to be paid by transfer of the capital stock held by Los Angeles County in the Los Angeles and San Pedro Railroad and \$377,000 in 7% twenty year bonds. In addition, the City granted the lands and rights of way, as also the San Pedro Railroad stock as demanded by the Southern Pacific Company.

There then ensued a three-cornered fight between those who favored the Southern Pacific Company, those who favored the Texas Pacific, and

those who were opposed to the expenditure of public money as a railroad bonus.

At this time, a committee from Anaheim, representing the southeastern portion of the County, which would receive little benefit from the railroad if constructed as indicated above, entered the discussion and to satisfy them and gain their vote the Southern Pacific Company offered to build, within two years, a branch road from Los Angeles City to Anaheim. This branch was constructed and the first train ran from Los Angeles to Anaheim on January 14, 1875.

The contest between the two railroad propositions was quite bitter and at the election held on November 5, 1872, the Southern Pacific won by a large majority.

The total donations to the Southern Pacific Company, exclusive of land and rights of way, amounted to \$602,000. A number of citizens raised by subscription \$75,000 and purchased a tract of land, consisting of fifteen acres, which was presented to the Southern Pacific Company for a passenger and freight depot. This was the southern portion of what was the River Station grounds and at present is part of the freight yards along North Spring Street. There was also deeded as a gift to the company fifty acres of land lying east of the Los Angeles River, to be utilized as shop yards, but the railroad, failing to comply with the conditions of the grant, the land reverted to the grantor. It was then donated to the City for a park and is now known as Eastlake Park.

The Southern Pacific Company immediately started construction from the City north to meet the so-called Valley line, and four years later, on September 6, 1876, when the work of building through the mountains and the Newhall tunnel, 6966 feet in length, had been completed, the first trans-continental railroad was connected with the City of Los Angeles. The first train was operated through the tunnel in June, 1876.

A line along what is now Alhambra Avenue was started in 1873-4, and by April, 1877, it had reached the Colorado River at Yuma. This line was continued to El Paso and completed in 1881. At El Paso it made connections with other eastern roads. Trains over this route began operation in 1883.

In ordinances and resolutions contained in the Revised Charter April 1, 1876, we find the following:

"September 6, 1872, Southern Pacific Railroad Company granted right of way for tracks along Alameda Street. City reserves the right to cross same with new streets or pass under the railroad tracks such canals, ditches, etc., as it may desire.

"September 6, 1872, Southern Pacific Railroad Company is granted right of way on Alameda Street, tracks to be located in center of street, residue of street to be used for vehicles, etc., crossings to be kept in repair.

"July 26, 1873, Southern Pacific Railroad Company is granted right of way over San Fernando and Mission and Alameda Streets."

After the completion of the Southern Pacific Company's line through from San Francisco, the Company took over, as per agreement, the prop-

erties of the Los Angeles and San Pedro Railroad Company, and, having made connections with their track on Alameda Street, operated trains to and from San Pedro. In the first year or two the Southern Pacific Company built repair shops near the newly acquired station of the Los Angeles and San Pedro Railroad, where, until the other shops were constructed at the present location, all the locomotive work was done.

In 1873 the branch line from Los Angeles to Anaheim was started as per agreement made at the time the City and County donated rights of way, land and money to the Southern Pacific Company. The construction of this line consumed practically two years, and the first passenger train from the City of Los Angeles to Anaheim was run on January 14, 1875.

In July, 1877, the holdings of the Los Angeles and Independence Railroad Company were purchased by the Southern Pacific Railroad Company. A few months later, after the City had granted a right of way over the Southern Pacific Railroad Company's land on September 27, 1877, the road was extended to First and Alameda, where connections were made with the Southern Pacific Company's main line and trains were run to the old station of the Los Angeles and San Pedro Railroad. A line was also constructed from Sixteenth and San Pedro to a connection with the Alameda Street line. Later, about 1892 or 1893, this line was removed and a connection made with the tracks at what is now Clement Junction.

After acquiring the Los Angeles and Independence Railroad, the Southern Pacific Company proceeded to remove the wharf at Santa Monica since it interfered with business at San Pedro, which threatened competition was in reality the cause of the purchase of the road.

The opening of the "Coast Line" by the Southern Pacific progressed very slowly. By 1887 the road was constructed to Santa Barbara, but not until 1901 was the road finally completed, and on March 31st of that year the first train passed over the entire length from San Francisco to Los Angeles.

After the Southern Pacific had built a connection from the so-called Santa Monica branch at Sixteenth and San Pedro to Alameda Street at about Fifteenth Street, that portion of the old Los Angeles and Independence Railroad from Sixteenth along San Pedro to Fifth and thence northeasterly to First and Alameda was removed. This was done in about 1889.

By the acquisition of the San Gabriel Valley Rapid Transit Company by the Southern Pacific Company in 1894, the latter company secured a right of way from approximately the station of Shorb, just east of Los Angeles, to Pasadena. The Southern Pacific Company immediately rebuilt the San Gabriel line and operated trains to and from Los Angeles to Pasadena.

Within the City of Los Angeles alone the Southern Pacific single track mileage is 75.07 miles of main line and 148.31 miles of other tracks.

Atchison, Topeka and Santa Fe Railway Company

As a nucleus of the present Atchison, Topeka and Santa Fe Railway Company, a railroad was constructed in 1863 west from Kansas City practically along the old Santa Fe Trail. It was not until October, 1880, that a subsidiary organization of the Santa Fe made its appearance in California, when the California Southern Railroad Company was chartered.

The first actual construction began in January, 1881, when a line was constructed from San Diego Bay to Colton via Temecula. This line was placed in operation in 1882 and the following year was constructed to San Bernardino. That portion of this line running through the Temecula Canyon was washed out in the spring of 1884, and in order to reconstruct and also extend the road from San Bernardino to Barstow arrangements were made with the Santa Fe. In 1885 active construction of the extension from San Bernardino, its then terminal, to Barstow, was undertaken and completed on November 9, 1885, when the last spike was driven in Cajon Pass.

At Barstow connection was made with the Atlantic and Pacific road, then owned jointly by the Santa Fe and the St. Louis and San Francisco Railroad Company. Completion of this line, together with a traffic agreement with the Southern Pacific from Colton to Los Angeles, allowed the Santa Fe to inaugurate through train service from Kansas City to Los Angeles. We find that many historians state that this was the direct cause of the ensuing great development in California. The first Santa Fe train entered Los Angeles on November 29, 1885.

In 1886, through a subsidiary company, the Santa Fe started the construction of a railroad from Los Angeles to Santa Monica. This line was only partially built, its western terminus being between Inglewood and Bellona. In 1892 another company was organized and extended the line into Santa Monica. Part of this line was sold in 1892 to the Los Angeles Pacific Railroad Company, now merged into the present Pacific Electric Railway Company. In 1888 another line was constructed and connected with the Santa Monica road near Inglewood, extending to Redondo Beach. The present Santa Fe still maintains and operates this line from Los Angeles to Redondo Beach.

In order to have its own line into Los Angeles, the Santa Fe, in 1887, constructed a line west from San Bernardino to Lamanda Park, connecting there with the Los Angeles and San Gabriel Valley Railway Company. This company was taken over by the Santa Fe in 1887. This route constitutes the present Santa Fe line between San Bernardino and Los Angeles via Pasadena.

About this time, the Santa Fe, through a subsidiary company, the Riverside, Santa Ana and Los Angeles Railway Company, started the construction of a second line from San Bernardino to Los Angeles. This route ran in a westerly direction from San Bernardino through what is known as the Santa Ana Valley, and entered the City of Los Angeles from the

south by crossing the Los Angeles River just south of Butte Street and paralleling the river on the west bank to First Street, where it connected with the tracks of the Los Angeles and San Gabriel Valley Railroad and where the La Grande station of the Santa Fe is now located.

In 1895 a few San Francisco merchants and capitalists organized a company and started the construction of a railroad from San Francisco Bay through the San Joaquin Valley. This road was built with the express purpose of competing with the line built by the Southern Pacific to Bakersfield. This line was purchased by the Santa Fe in 1900-1901. The road work was completed in 1900 and placed in operation as the Valley Division of the Coast lines of the Santa Fe.

The Atlantic and Pacific Railroad Company, which had built a road from Albuquerque, New Mexico, to Needles, California, and had acquired a lease on the Southern Pacific from Needles to Mojave, went into receivership in 1894. By 1897 the Santa Fe Company had purchased, at foreclosure sale, the properties of the Atlantic and Pacific Company and immediately began reconstruction. Through an exchange in 1911 of a branch line of the Santa Fe running from Nogales to Guaymas, Mexico, with the Southern Pacific, the Santa Fe became owner of the Southern Pacific line between Needles and Mojave, known as the Mojave Division, and at the same time entered into a new agreement with the Southern Pacific Company for joint use of the Southern Pacific Mojave-Bakersfield line over the Tehachapi Pass.

Practically all of the present Santa Fe main line mileage south of the Tehachapi was constructed during the years 1886 and 1887, aside from that of the California Southern, which ran from National City to Barstow. Since that time, however, the Santa Fe has been very active in the construction of service and industrial tracks in Los Angeles and other Southern California cities.

Within the City of Los Angeles alone, the Santa Fe single track mileage is now 14.27 miles of main line and 65.44 miles of other tracks.

Los Angeles and Salt Lake Railroad Company

This company, which at present operates a railroad from the City of Los Angeles to Salt Lake City, Utah, finished the last section of the road early in 1905, the first through train entering Los Angeles April 17, 1905.

This road had acquired the entire properties of the Los Angeles Terminal Railways Company, which had been incorporated in 1891, and which had as its nucleus the consolidation of the old Los Angeles & Glendale Railroad Company and the Los Angeles, Pasadena & Glendale Railroad Company.

These latter companies, as previously related, had constructed from Los Angeles to Glendale, a narrow gauge road, and from Los Angeles to Pasadena and Altadena a broad gauge road. As soon as the property of the Los Angeles & Glendale Railroad Company was acquired, the Terminal Company reconstructed that line as a broad gauge. These two branches are at present operated as branches of the present company.

Soon after the incorporation of the Los Angeles Terminal Railway Company, application was made to the City for a concession of land to be devoted to yard uses and railroad terminal facilities. The City Council approved the application of the Terminal Company and granted them sixty (60) acres of land on the east side of Los Angeles River, being properly a right of way along the river bank through the city. In addition to this grant, the Company purchased some land within the city and along the east bank of the river at a cost of \$60,000. Included in this purchase was 21 acres at First and Meyers Streets, which, with the land donated by the city, is at present occupied by the Salt Lake, where the Company's passenger station, yard, round house, and shops were constructed in 1891. Until the track was completed to the new station near First Street, the company used the old Los Angeles & Glendale Railroad Company's station at Downey Avenue. For some time after the trains began operating to the new station, the old depot was made a stop, but was finally abandoned. At that time trains to Pasadena were run almost hourly.

From First Street, or the new station, the Terminal Company continued building its road to Long Beach, being the first railroad to serve that city, and to East San Pedro, where the Company had acquired what was then called Rattlesnake Island (now known as Terminal Island), comprising approximately 2,000 acres. This branch line was 22 miles in length and connected directly with the Company's wharves and docks on the waterfront at East San Pedro. The value of these waterfront facilities was greatly increased after the United States Government undertook and improved the Los Angeles Harbor and constructed the breakwater.

In March, 1901, the San Pedro, Los Angeles and Salt Lake Railroad Company was incorporated and began the construction of a line from Salt Lake City to Los Angeles. Although such a line had been proposed and agitated many times, it was not until this company was organized that the work was finally carried to completion in 1905. The first passenger train from Salt Lake City via the Salt Lake Route arrived on April 17, 1905, and the road was opened for general railroad traffic May 1, 1905. On August 25, 1916, the San Pedro, Los Angeles and Salt Lake Railroad Company changed its name to the Los Angeles and Salt Lake Railroad Company, under which it is at present operating.

In 1905 and 1906, the Salt Lake constructed a track from a connection with the Southern Pacific Company's track on Alameda Street at Butte Street along the latter street across the Los Angeles River and easterly to the main line from Salt Lake City, a distance of about one and one-half miles. The following year a track was built along what is called "Santa Fe Alley." This is the alleyway one-half a block east of a parallel to Santa Fe Avenue from near Seventh Street to Thirty-seventh Street. Besides these two principal pieces of trackage, the company has constructed quite

a number of spur and industry tracks to serve industries and handle freight and passenger business.

The present single-track mileage within the city limits of Los Angeles of this company amounts to approximately 17.85 miles of main line and 42.04 miles of other trackage.

San Gabriel Valley Rapid Transit Railway

Real estate possibilities were the cause of the promotion of the San Gabriel Valley Rapid Transit Railway, which was constructed from the City of Los Angeles eastward to Monrovia, with a branch line from near the present town of Alhambra to Pasadena. This was a narrow gauge road and was operated almost exclusively for passengers. The road entered the City of Los Angeles over a right of way practically the same as that used at present by the Pacific Electric for its Pasadena Short Line, except that it ran only as far as Anderson and Aliso Streets, on the east side of the Los Angeles River. Here the company constructed a small shed and platform, used as a passenger depot.

The San Gabriel Valley Rapid Transit Railway was leased by the Los Angeles Terminal Railway for the term of one year, beginning June 14, 1892. After the expiration of the lease, the San Gabriel Company operated the road during the following year, when it was sold to the Southern Pacific. That company immediately started the construction of a standard gauge track on the right of way acquired from the San Gabriel Company as its Pasadena branch. The new branch connected with the company's main line at their present station of Shorb and is at present the Southern Pacific's only steam line into Pasadena. The other tracks of the San Gabriel Company were torn up and the remaining portions of the old right of way were later sold to the Pacific Electric, controlled, through stock ownership, by the Southern Pacific.

Los Angeles and Glendale Railroad Company

Shortly after the completion of the Santa Fe into Los Angeles and during the time of the so-called "boom," a railroad was promoted to run from Los Angeles to Glendale. This road was named the Los Angeles and Glendale Railroad and was constructed in 1887, as a narrow gauge line from near old Downey Avenue and the east side of the Los Angeles River to Glendale. At the terminus of the road near Downey Avenue, a frame building was constructed and served as a passenger station and ticket office. This company, about four years after completion of this line, was absorbed by the Los Angeles Terminal Railway Company, and the work of widening the roadbed and track was started immediately.

Los Angeles, Pasadena and Glendale Railroad Company

This company was organized, in 1890, for the purpose of constructing a railroad from Los Angeles to Pasadena. Being fostered by the same interests as the Los Angeles and Glendale Railroad Company, the road

was constructed from the same terminus in the city, the Downey Avenue station to Pasadena and north to Altadena, a distance of about sixteen miles.

This company, with the Los Angeles and Glendale Railroad Company, was consolidated, in 1891, into the Los Angeles Terminal Company.

Los Angeles and Independence Railroad

Through the construction of a wharf at Santa Monica, in 1875, and the development of the city, it was thought Santa Monica would become part of Los Angeles and a great shipping point on the Pacific Coast. At about this time a supposedly great mining district in Inyo County, about 250 miles northeast of Los Angeles, was being developed and a few Los Angeles men decided to build a railroad from Santa Monica to this district. The company, known as the Los Angeles and Independence Railroad, was chartered January 4, 1875, and construction began immediately. By December, of the same year, the tracks had been laid as far as Los Angeles, a distance of approximately sixteen miles, and terminated at San Pedro and Fifth Streets. The line east from Los Angeles was never built.

For about two years this road did a thriving freight and passenger business and, to remove this competition, the Southern Pacific Company, on July 1, 1877, acquired and operated the road until 1880, when it was leased for operation to the Central Pacific Railroad Company for five years. After the purchase, the Southern Pacific Company, having established a terminus at Wilmington, transferred the freight business to that point and practically dismantled the wharf at Santa Monica. In 1889 the Southern Pacific removed the tracks on San Pedro Street, from Fifth to Sixteenth Streets. A portion of the balance of this road is the present Sixteenth Street line of the Pacific Electric.

Passenger Stations in Los Angeles

The first railroad station to be constructed in the City of Los Angeles was built in 1869 by the Los Angeles and San Pedro Railroad Company. This structure, shown in Fig. 8 on page 78 of this report, was located on a lot fronting three hundred feet on Alameda Street and having a depth of one hundred and twenty feet, its situation being such that, after Commercial Street was extended to cross Alameda Street, the depot building occupied the southeast corner of the two streets. This station had very inadequate passenger facilities and was utilized principally for freight business. This depot was the city terminus of the first railroad in Los Angeles. Passenger trains between Los Angeles and San Pedro were at first scheduled for two round-trips a day. The freight train had no schedule, but was running according to business.

The second railroad depot in Los Angeles was built about 1876, by the Southern Pacific Company, on the west side of North Spring Street about opposite Sotello Street. In the following year the company built a com-

bination building, part of which was used as a ticket office, the balance being devoted to hotel purposes. This building was located about a hundred yards south of the first station and was maintained for only a short time. The business of the Southern Pacific Company, after its completion to Los Angeles, increased very rapidly, and it was but a short time before the first small station and ticket office built was moved to the site of the present office building of the main freight house and a larger depot was constructed where the first had been located. This building contained considerably more space than the others, housing practically all offices of the company, and had adequate passenger facilities for that period. After the completion of this building, the so-called "Hotel" was torn down.

By the year 1876, the Southern Pacific Company had constructed its tracks as far south as the location of the Los Angeles and San Pedro Railroad Company's depot at Commercial and Alameda Streets and began using the latter company's station for both passenger and freight business. Even after the Southern Pacific Company had built the Arcade Depot, at Fifth Street and Central Avenue, and up to 1896, all trains stopped at the old Los Angeles and San Pedro depot and at River Station. After 1896, this old "San Pedro Depot" was considered a "flag stop."

The brick building situated on the northwest corner of Sotello and North Spring Streets was purchased by the Southern Pacific Company, in 1885, and given the name of River Station. Since its organization, the company has made two enlargements. The depot, as shown in Fig. 83 on page 241, was operated as the main passenger station in the City of Los Angeles up to the time the old Arcade Station was built, at Fifth Street and Central Avenue, in 1888. After that time all trains, both inbound and outbound, stopped at River Station, although, during the last few years and until 1915, the trains stopped for orders rather than for passengers. In 1895, the frame station, built opposite and across North Spring Street from River Station, was torn down and the main part of the building was rebuilt as a passenger station at Tustin, California.

For the purpose of furnishing adequate passenger facilities, the Southern Pacific Company, in 1888 or 1889, leased a small brick building, about 20 by 30 feet, on the east side of Alameda Street half way between First and Second Streets. This structure was used as a waiting room and ticket office for only a short time.

In acquiring the Los Angeles and Independence Railroad Company, the Southern Pacific Company also obtained possession of a second passenger station within the City of Los Angeles. This was the first station built by the former company and was located a little east of San Pedro Street, about half way between Fourth and Fifth Street, or about opposite Winston Street. This was practically nothing more than a platform and shed used only for passenger purposes. Although this building was maintained as a passenger depot for a comparatively short time after being taken

over by the Southern Pacific Company, it remained in place until about four years ago (1915).

As previously stated, the Southern Pacific Company constructed a track, from the line of the old Los Angeles and Independence Railroad on San Pedro Street, connecting with its main line on Alameda Street near Fifteenth Street. After the completion of this new trackage, and in the year 1889, operation along San Pedro Street was eliminated and the old line, from Sixteenth Street to First and Alameda Streets, was removed and a new passenger station was built at Sixteenth Street and Central Avenue. This building was 18 feet by 40 feet and provided a ticket office, baggage and waiting room. Later, this building was removed to Glamis, on the Southern Pacific Company's line, where it is at present being used as a station. On the old line of the Los Angeles and Independence Railroad the Southern Pacific Company also maintained two other stations, one at Jefferson and Main Streets and the second at Vermont Avenue, known as University Station (built in 1888). The former was operated in a building leased by the company and a regular agent was turned over to the Pacific Electric Railway Company, after the latter began operating trains over this line.

In 1888 the Southern Pacific Company erected a frame building at the intersection of Main and Alameda Streets, where the Alhambra Avenue and Alameda Street lines connect and which is designated by that company as Naud Junction. This building was about 18 feet by 40 feet, and contained an open waiting room, a baggage room and ticket office. This building served as a passenger station for a number of years but was, in June, 1910, removed after the city complained of its occupying a portion of the public streets and declared it a menace and source of danger and accidents at this crossing.

When the site of the present Southern Pacific Company's passenger depot was donated to that company, it was part of the agreement that a passenger station should be erected. This station was to be a structure similar in all respects to the Arcade Depot previously built by the Southern Pacific Company at Sacramento. In 1888, the Southern Pacific Company, under this agreement, constructed the passenger station at Fifth Street and Central Avenue.



FIG. 9. TRAIN SHED—OLD SOUTHERN PACIFIC ARCADE STATION

This station, known as the Arcade Station, was for about twenty-five years the main passenger depot of the Southern Pacific Company in Los Angeles and in addition to furnishing passenger facilities, contained practically all offices then maintained in the city.

After the plans for the two expositions held in California, in 1915, had been made, agitation for a union passenger station, or at least a new and respectable Southern Pacific station, commenced in Los Angeles. The old Arcade Depot, built of wood, was depreciating and, although it was considered a model station at the time of its construction, it lacked the facilities and appearance of a modern railroad station. In 1912, the Southern Pacific Company announced its plans for the construction of a new passenger station to be erected at Fifth Street and Central Avenue on the site of the old Arcade Depot, but with the main portion of the building fronting almost directly on Central Avenue.

The plans for the new depot, particularly the proposed construction of trackage across two of the principal streets of the city and also the arrangement for street car service, had been made without consultation with the city and, when announced, met with much opposition. After the plans had been shown to, and discussed with, the City Council and certain modifications made, an agreement was finally reached. The main contention of the city was the question of the right of the Southern Pacific to build on the stub end of Fifth Street and, also, the proposed scheme of construction of tracks in such a way as to make worse, rather than improve,

the grade crossing conditions. An application was then filed, by the Southern Pacific, with the Railroad Commission, asking permission to abandon the old Arcade Depot and erect a new station. At the hearings held on this case, the opposition to the placing of additional tracks across Fourth and Sixth Streets was vigorously pressed and the Southern Pacific Company filed a stipulation that, if permitted to construct the new station, no objection based upon its construction, would ever be made to the abatement of grade crossings on Alameda Street by track elevation or depression. The present Southern Pacific passenger station, shown in Fig. 76 on page 234, built at a cost of \$345,000 for the building and furnishings, was commenced March 28, 1914, and completed in 1915. The baggage room and ticket office was opened for business on May 2, 1915, and the official opening of the station was held on June 12th of the same year. This station and other passenger depots are discussed further in Chapter X of this report.

The first station, or depot, on the line of what is now the Santa Fe, was built about 1884, by the old Los Angeles and San Gabriel Valley Railroad Company at Downey Avenue, just west of the Los Angeles River. This depot was a small frame building and used almost exclusively for passenger business and accommodated travel between Los Angeles, Pasadena and Lamanda Park, the eastern terminus of this road. In 1887, a track was constructed, by another subsidiary company, connecting the most southerly point of the Los Angeles and San Gabriel Company's line at Alhambra Avenue and the River, and extending to First Street and Santa Fe Avenue. Also to this same point, where a considerable tract of land had been acquired, the Santa Fe had constructed a track along the west bank of the river from the south. Here, in 1887, was built a second depot, located on the east side of Santa Fe Avenue and about half way between First and Fourth Streets. This building was of wooden construction but contained much more space than the little old depot at Downey Avenue and, in addition to serving as a passenger station, it housed all the necessary offices.

In 1893, the Santa Fe built the brick building which, with several alterations and changes during subsequent years, at present serves that company as its Los Angeles passenger station. This is known as the Le Grande Station, shown in Fig. 84 on page 242, and located on the east side of Santa Fe Avenue just south of First Street.

When the Los Angeles and Glendale Railroad Company constructed its track connecting Glendale with the City of Los Angeles, the depot of this road was located on Downey Avenue on the east side of the Los Angeles River. This station, built in 1887, was of frame construction and served all purposes of a railroad station. This same depot building served as a passenger station for the Los Angeles, Pasadena and Glendale Railroad Company for travellers between Los Angeles and Pasadena. The city terminus of the San Gabriel road was on the east side of the Los Angeles

River just north of Aliso Street and east of Anderson Street, and where the Pacific Electric at present maintains several team tracks. Here, the company built the small shed and platform which served the purpose of that company till 1894, when the Southern Pacific Company took over the property of the San Gabriel Company, when the tracks and old depot were removed.

After the Los Angeles Terminal Railway Company had been organized and secured its right of way along the east bank of the Los Angeles River, it constructed a passenger station at First Street, just east of the Los Angeles River. This structure is at present used for the same purpose by the Los Angeles and Salt Lake Railroad Company. Previous to the construction of this station, the business offices of the Los Angeles Terminal Railway Company were maintained in the Burdick Building but, upon completion of the depot, were moved to the new structure. It was not long after the new station was occupied that the old depot at Downey Avenue was abandoned.

In 1905, the Salt Lake erected an umbrella shed and platform at Seventh Street, on the east bank of the Los Angeles River. Only local trains, operating between Los Angeles and San Pedro, stop at this point.



California Railroad Commission Engineering Dept.

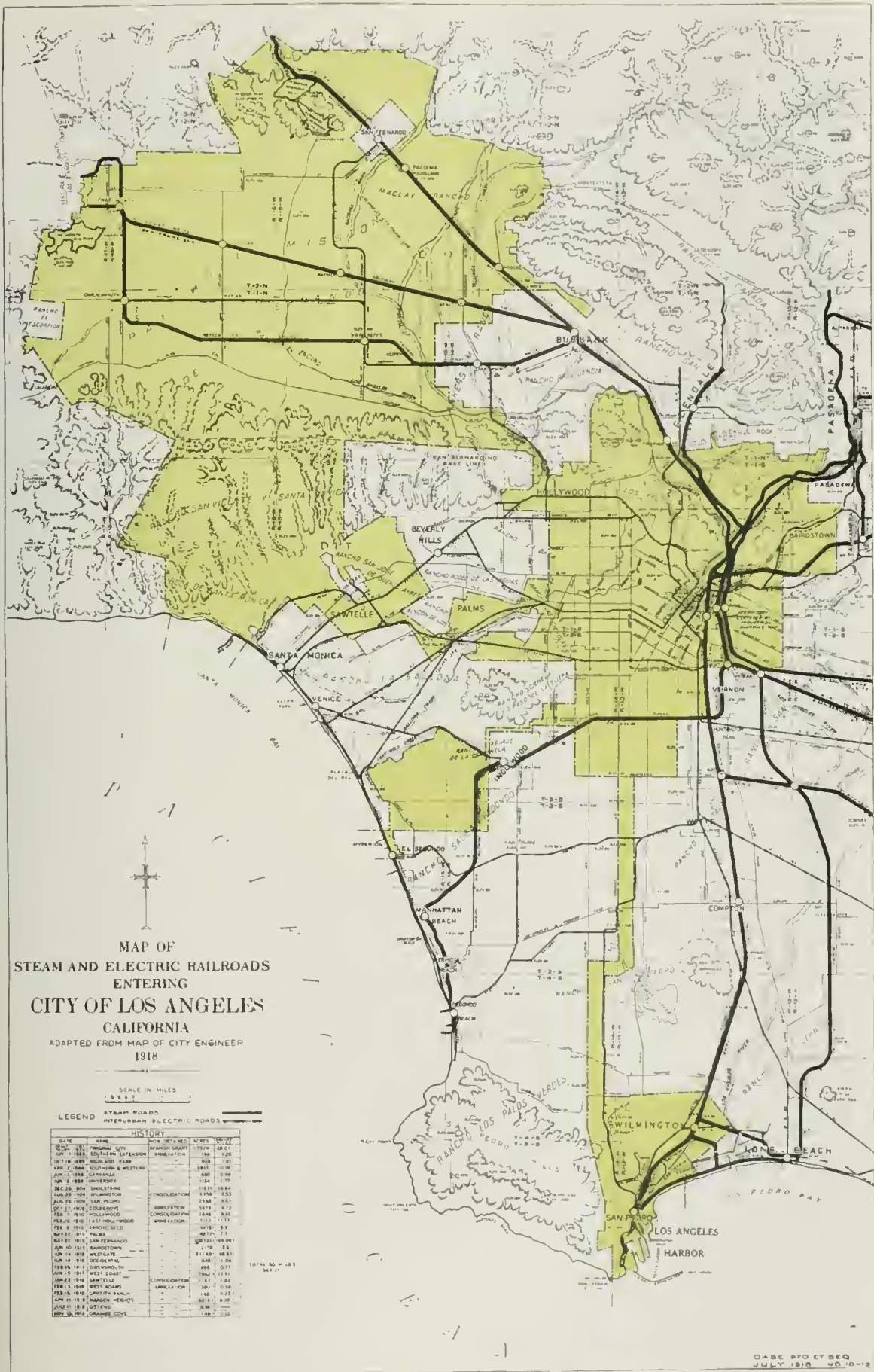
FIG. 10. MAP OF RAIL ENTRANCES AND EXTENT OF FLAT LAND ALONG RIVER

No great change in the rail entrances is possible except at prohibitive cost. The shaded area represents rolling country and is largely residential. Observe that the principal streets are not parallel with the Los Angeles River, but that their general direction is toward Pasadena. Transportation and growth follow the lines of least resistance.

PRESENT CONDITIONS

Railroad Entrances

Fig. 10 shows the extent of the comparatively flat land adjacent to the Los Angeles River and suitable for railroad construction. From this drawing, it is evident that the main lines of the steam roads are obliged to enter the industrial and business district of the city from either the northeast or southeast.



California Railroad Commission Engineering Dept.

Adapted from map by Los Angeles City Engineer

FIG. 11. RAILROAD MAP OF LOS ANGELES DISTRICT

The steam roads enter the city from the north, northeast, and southeast. Notice how parallel lines to Pasadena, in the vicinity of Vernon, and in Los Angeles increase the difficulties of grade crossing elimination.

Southern Pacific Routes

Fig. 11 shows the steam and electric roads in the Los Angeles district. The Coast and Valley Routes of the Southern Pacific connecting Los Angeles with San Francisco and the Sacramento and San Joaquin Valleys, unite at Burbank and follow the left bank of the Los Angeles River to the Arroyo Seco. Here, the line crosses to the right bank, branching out into the freight yards. The passenger line continues under North Broadway Bridge and, leaving the river, proceeds along Spring and Alameda Streets to the passenger station at Fifth Street. The "Sunset" or El Paso Route enters the city along Alhambra Avenue, joining the tracks on Alameda Street. Local lines run south from the station along Alameda Street, terminating, one at San Pedro, and the other at Santa Ana.

Santa Fe Routes

The main line of the Atchison, Topeka & Santa Fe Railway from the east, through Pasadena, follows the Arroyo Seco and reaches the west bank of the Los Angeles River just north of North Broadway Bridge. Passing under this bridge, it proceeds south partly adjacent to the river and then, at some distance away from it, to the Santa Fe station and yard between the river and Santa Fe Avenue and First and Fourth Streets. An alternative route from the east, used principally for freight, because of more favorable grades, from San Bernardino, through Riverside and Fullerton, enters the city from the southeast. The river is crossed near Butte Street and the line follows the west bank to the station. The line from San Diego joins this line at Fullerton. A local line runs to Redondo.

Salt Lake Routes

The main line of the Los Angeles and Salt Lake Railroad enters the city from the southeast, skirting the southerly high ground. It then proceeds up the east bank of the Los Angeles River to the Salt Lake station and yard adjacent to the river between First and Seventh Streets. One local line runs south to Long Beach and San Pedro; another, following the east bank of the river northerly from the station, passes under North Broadway Bridge and follows the Arroyo Seco to Pasadena. A branch of this line crosses the Arroyo Seco and terminates at Glendale.



FIG. 17. REPERTERIO DE LOS PUEBLOS DE COLOMBIA



FIG. 12. RELIEF MAP OF LOS ANGELES COUNTY

Railroad Mileage in Los Angeles

The present equivalent single-track mileage of the railroads within the city limits of Los Angeles may be summarized as follows:

TRACK MILEAGE IN THE CITY OF LOS ANGELES

	Miles—Single Track		
	Main Line	Other Tracks	All Tracks
Steam Roads			
Southern Pacific	75.07	148.31	233.38
Santa Fe	14.27	65.44	79.71
Salt Lake	17.85	42.04	59.89
Total	107.19	255.79	362.98
Electric Roads			
Pacific Electric			
Owned	200.43	28.62	229.05
Leased from S. P.	14.62	9.43	24.05
Leased from City of Los Angeles	6.74	5.98	12.72
Total	221.79	44.03	265.82
Los Angeles Railway	318.95	17.56	336.51
Total	540.74	61.59	602.33
All Roads			
Grand Total	647.93	317.38	965.31

Valuation of Steam Railroad Property in Los Angeles

An appraisal of steam carrier properties definitely allocated within the wide boundaries of Los Angeles would be, in itself, a stupendous task. We will, however, attempt to make an estimate of the railroad investment.

In connection with the nation-wide valuation of carrier properties made by the Interstate Commerce Commission, both the companies and the Interstate Commerce Commission have made estimates of reproduction cost. The estimates are made up by sections, and it so happens that a combination of these sections on the three roads will cover about all carrier property in the industrial district. The total cost so estimated is, approximately, \$40,000,000 for the operative properties, exclusive of rolling stock of the Southern Pacific, Santa Fe and Salt Lake. Pre-war unit costs of material and labor are used in the detail figures making up this total.

This figure of \$40,000,000 is made up partly, of carrier estimates, partly of Interstate Commerce estimates and partly of our own estimate. The detail cannot be made public, as some of the underlying data was submitted confidentially, and all is tentative and subject to review and revision.

Relation of the Business District to the Topography

The business and industrial district of Los Angeles lies in the broad valley of the Los Angeles River, between the bluffs called "Boyle Heights," along the east or left bank, and the ridge immediately west of Hill Street. The four main streets of Los Angeles—Main, Spring, Broadway and Hill—are parallel with this ridge from First Street to Sixth Street. North of First

Street, as far as Sunset Boulevard, the high ground extends east as far as Main Street. Two tunnels have been built connecting Hill Street and Sunset Boulevard and there are traffic tunnels at Third Street and at Broadway. A new traffic tunnel is projected for Second Street. The center of the old town was at the Plaza, near the intersection of Main and Sunset Boulevard. From this point, Sunset Boulevard passes through a gap in the range of hills west of the river valley. From the Plaza, the streets radiate in all directions.

The present business center is at about Fifth and Spring Streets and the highest realty values are at Seventh Street and Broadway, the center of the shopping district. There has been a progressive movement of the business center southwestward. From Main Street, at the Plaza, it has followed the more level ground west of Hill Street to Seventh Street and now seems to be moving westerly, skirting the southerly end of the ridge west of Hill Street. This shifting of the business and shopping district is, however, by no means the result of topographical and other natural conditions alone; factors connected with real estate operations have had an equal or, perhaps, greater effect in determining the direction of the growth of the city.

Particular attention is called to the fact that the direction of the four main streets diverges more than 45° from the direction of the Los Angeles River, south of First Street. This results in the fact that the farther south the main streets are followed, the farther the location from the Los Angeles River and the natural channel of the steam railroads. Main Street, if it were continued straight, would be in line with the Arroyo Seco and would pass through Pasadena. The main travel is north and south. From First Street to Sixth Street, the cross streets are narrow, being only sixty feet wide. Seventh Street is the principal cross street of the city. West of Central Avenue and east of Los Angeles Street, the district is becoming less and less industrial. It has residential and small store occupancy. Alameda Street is the main artery of the industrial district and has replaced Los Angeles Street in this respect.

CHAPTER IV.
OUTLINE

Los Angeles Railway

Present Conditions

Rerouting

Pacific Electric System and Rapid Transit Plans

Present Conditions

Recommendations in Arnold Report

Causes of Lack of Growth

The Ultimate Rapid Transit System

 The First Subways

 Subway West from Hill Street Station

 Connection of Subway West of Hill Street with Main Street
 Station

 Elevated Line Eastward from Main Street Station

 Transportation Between Los Angeles and Pasadena

 Legal Matters

 Recommendations

CHAPTER IV

ELECTRIC TRANSPORTATION

Of the two electric transportation systems operating within the geographical limits of this report, the Pacific Electric is by far the most important for the purposes of this investigation. The Los Angeles Railway operates principally within the city limits and is only slightly affected by our recommendations. For these reasons it will be considered first.

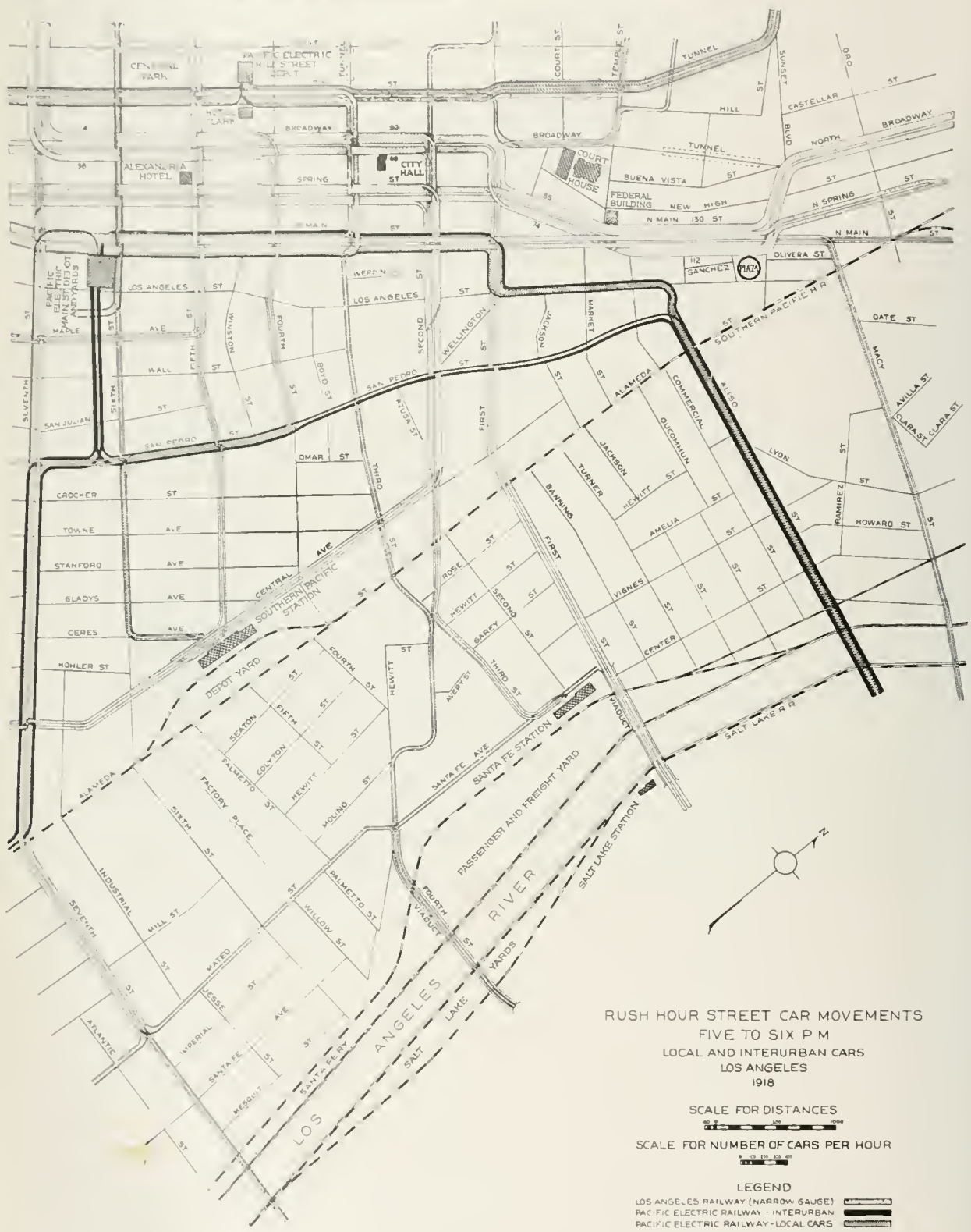
LOS ANGELES RAILWAY

The Los Angeles Railway is a narrow (3 ft. 6 in.) gauge street railway with approximately 390 miles of track and operating about 880 passenger cars. This road is strictly a passenger road and handles no freight. The railway operating revenue for 1918 was \$6,577,638.52, and during that year 130,538,704 regular fare passengers were carried.

Present Conditions

An analysis of the local street railway system of Los Angeles is not within the scope of this report except as to the question of adequate street car service to the several sites proposed for a union station, or to the extent that the plans proposed will alter existing routes. It is obvious that, other things being equal, that site is most desirable which will serve the maximum number of people without a transfer, and that a location convenient to existing lines will not require the construction and maintenance of special or accommodation lines.

The Los Angeles Railway has put into effect the through route principle and universal transfers as applied to its own system but does not exchange transfers with the Pacific Electric Railway, although this would prove of advantage to the city.



California Railroad Commission Engineering Dept.

FIG. 13. STREET CAR FLOW IN BUSINESS DISTRICT DURING EVENING RUSH HOURS

The relative width of lines show the volume of street car traffic from five to six P. M. The numbers indicate the cars per hour. Notice that the main thoroughfare north and south and that the limit of capacity is already reached at the North Main Street "throat" near the Plaza.

CASE 970 ET SEQ
 SEPTEMBER 1918 NS 10-34

Fig. 13 shows the local and interurban street car movements during the rush hour from 5:00 to 6:00 P. M. in the central district. It will be noted that here the main travel of Los Angeles is northeast and southwest, that is, lengthwise of the river valley. Attention is called to the large volume of traffic passing through the "throat" on North Main Street between Temple Street and Sunset Boulevard, and to the large amount which turns at Seventh Street and Broadway.

The use of a lesser headway than 30 seconds would result in such a low schedule speed as to be impracticable, so that 120 cars per hour per track is about the limit of capacity. The maximum number of cars of the Los Angeles Railway Company, per hour, operating on Hill, Broadway, Spring and Main Streets, is as follows:

NUMBER OF CARS IN RUSH HOUR LOS ANGELES RAILWAY

	Northbound	Southbound
Hill Street from Fifth to Seventh.....	34	36
Broadway, from Fourth to Seventh.....	98	114
Spring Street, from Fourth to Seventh.....	107	86
Main Street, from Fourth to Seventh.....	65	68
Main Street, from Temple to Sunset.....	112	131

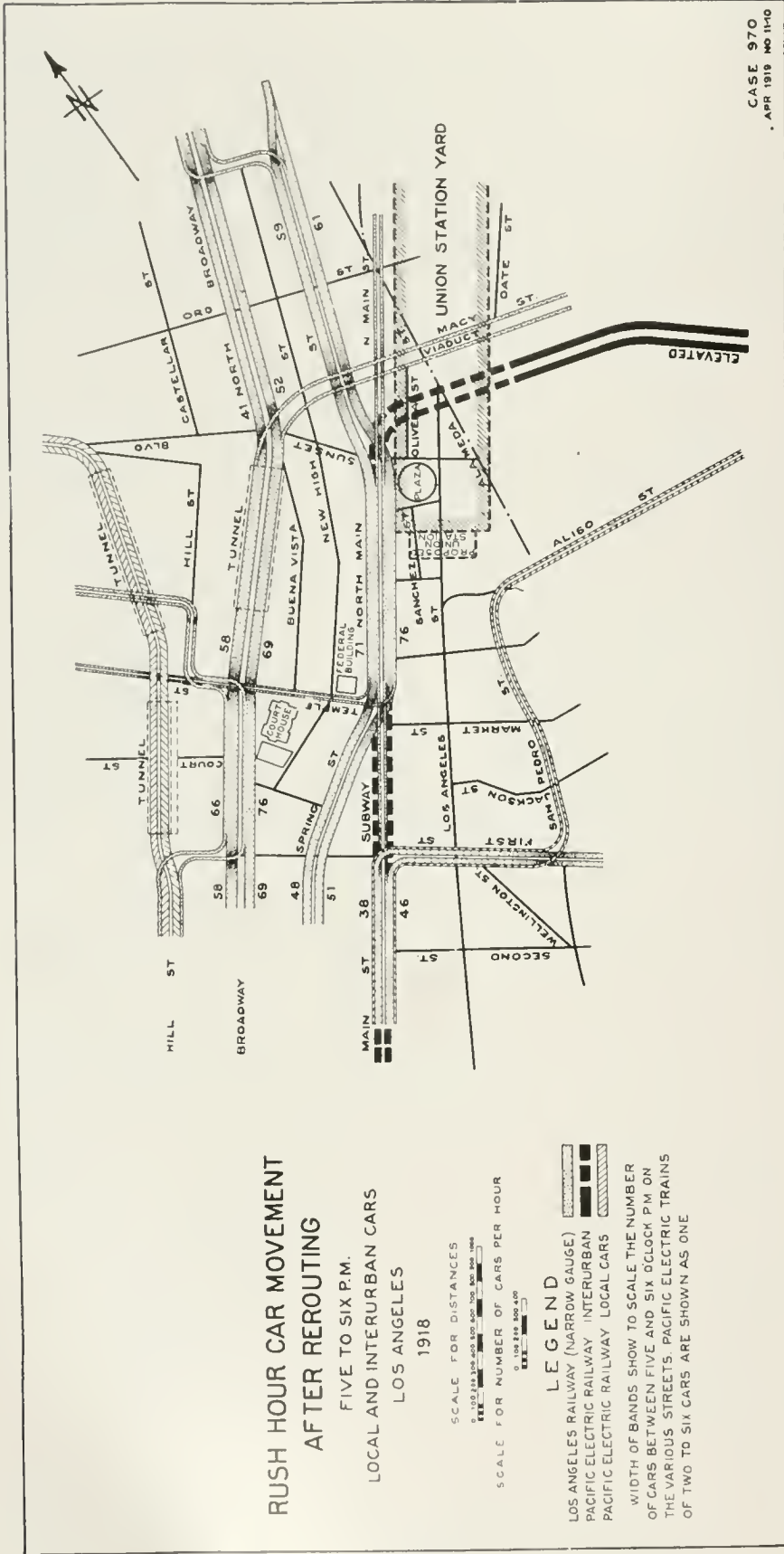
It will be noted that the limit of 120 cars per hour is actually exceeded in one instance, and is nearly reached in three others. It is seen that the number of cars that can be operated upon the streets leading to the North Main Street throat is limited to the capacity of the throat itself.

Rerouting

In connection with plans for a union station at the Plaza, some rearrangement of the car lines is necessary, and it was thought best to extend the study to include a complete rearrangement of the lines at the north end of the business district.

In that part of the Arnold Report relating to local street railways, the following principles are enumerated, and, as far as possible, these have been applied in our plans for rerouting:

1. The chief problem is to do away with present and future congestion in the business district.
2. More cross-town and circuit lines should be built.
3. Congestion is due to loops and curves. A car passing around a curve takes fully 50 per cent more time to clear the crossing than a car passing directly across the street at right angles.
4. The threading of the cars from the traffic of one street into that of another makes impracticable the running of cars in pairs at high speed at street intersections.
5. The interurban cars should be eliminated from Main Street. (This has since been accomplished to a large extent by rerouting to San Pedro Street.)



CASE 970
APR 1919 NO 1140

**RUSH HOUR CAR MOVEMENT
AFTER REROUTING**
FIVE TO SIX P.M.
LOCAL AND INTERURBAN CARS
LOS ANGELES
1918

SCALE FOR DISTANCES
0 100 200 300 400 500 600 700 800 900 1000
SCALE FOR NUMBER OF CARS PER HOUR
0 100 200 300 400

LEGEND
 LOS ANGELES RAILWAY (NARROW GAUGE) [Symbol: Dashed line]
 PACIFIC ELECTRIC RAILWAY INTERURBAN [Symbol: Solid line]
 PACIFIC ELECTRIC RAILWAY LOCAL CARS [Symbol: Line with diagonal hatching]

WIDTH OF BANDS SHOW TO SCALE THE NUMBER OF CARS BETWEEN FIVE AND SIX O'CLOCK P.M. ON THE VARIOUS STREETS. PACIFIC ELECTRIC TRAINS OF TWO TO SIX CARS ARE SHOWN AS ONE

California Railroad Commission Engineering Dept.

FIG. 14. STREET CAR FLOW IN VICINITY OF PLAZA AFTER REROUTING
Notice the direct routing of the Broadway line and the reduction of turns on First Street. The value of an additional outlet to the north is apparent.

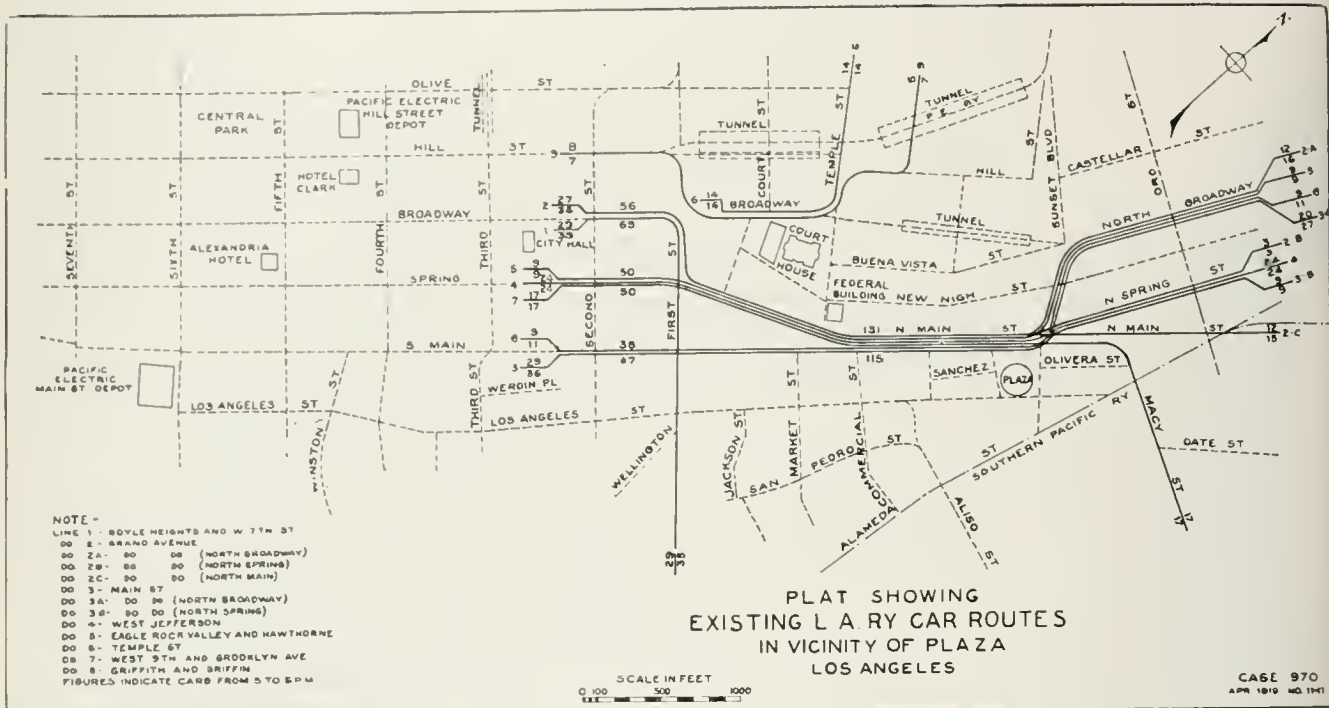
Fig. 14 has been drawn out to show the advantage of building a street car subway below the present Broadway tunnel. This subway, a cross-section of which is shown on Fig 12^o, can be built at considerably less cost than a separate bore and will not disarrange the normal position of street traffic. It will provide two outlets—Broadway and Main Street—to the north instead of one—Main Street—and will permit direct routing of the Broadway cars to North Broadway. As Spring Street and Broadway combine with Main Street at Ninth Street and near Tenth Street respectively, it is relatively immaterial which streets are used between First and Tenth Streets. The volume of traffic on each will be maintained as at present. Incidentally it may be noted that additional outlets to the south will be as necessary as at the north end of the city. One will be provided by the proposed extension of Broadway. By this arrangement, it is seen that practically all of the curves at First Street will be eliminated.

Upon the completion of the projected Second Street tunnel, it is desirable that the car line operated through it should continue as a cross-town line.

Fig. 15 shows the individual routes now in use. Nearly one-half of the cars of the Grand Avenue line now operating on Broadway, return to North Broadway after passing through the North Main Street throat.

Fig. 16 shows how routes have been rearranged so as to give the least car interference and to provide as direct routing as possible. The number of cars at present operating through the throat at North Main Street have been divided equally between the two throats of the new plan. However, additional cars have been added to the North Main Street throat from Temple Street. The reduction in the number of cars on North Main Street makes it possible to extend the Temple Street line to a stub terminal on North Spring Street, thus giving the district served by that line and the Sunset Boulevard district of the Pacific Electric more direct service to the union station, if located at the Plaza. A part of the Grand Avenue line will continue to operate on North Spring and North Main Streets, as at present. The Griffith and Griffin line will remain unchanged, thus giving service from the station to North Broadway. All other lines at present operating on North Broadway will be rerouted to Broadway and through the proposed sub-tunnel. The diversion to Spring Street of those Grand Avenue cars which now operate on North Spring and North Main Street will reduce the number of cars turning at Seventh Street and Broadway.

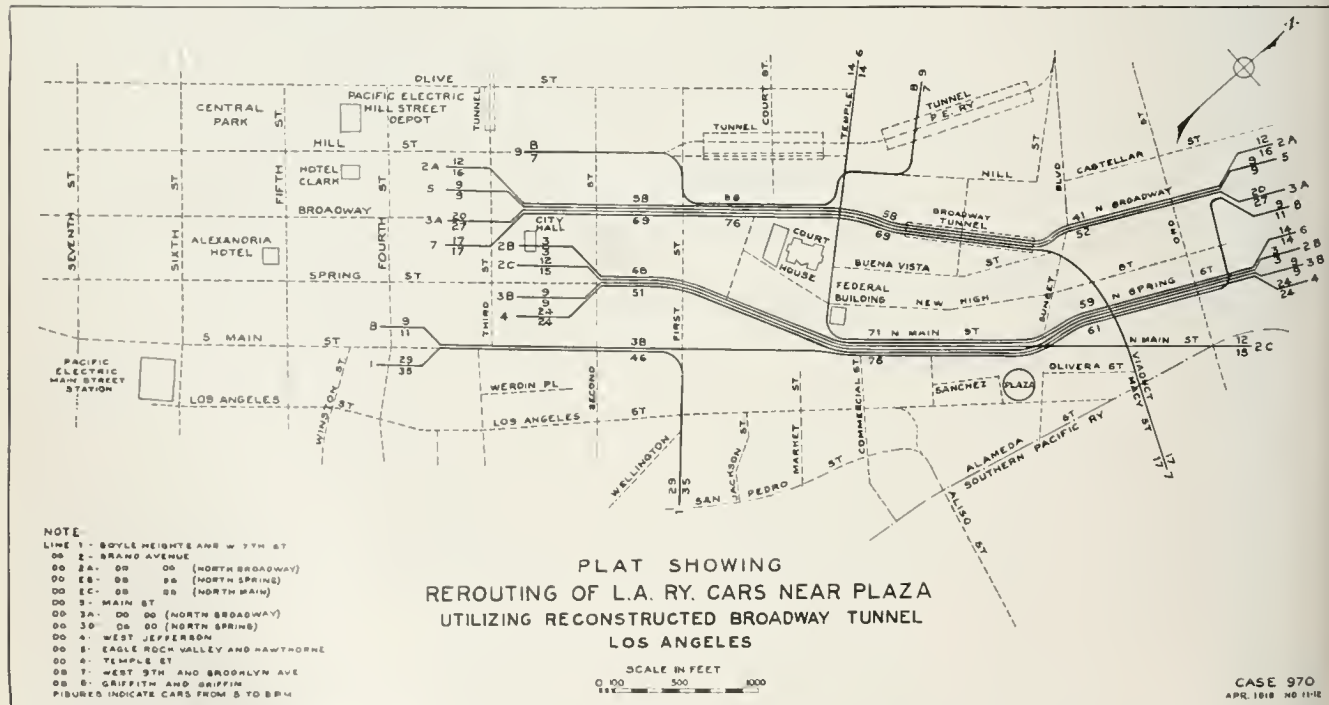
The maximum number of Los Angeles Railway cars north of Second Street and the number resulting from the suggested changes in route are as follows:



California Railroad Commission Engineering Dept.

FIG. 15. EXISTING STREET CAR ROUTES—PLAZA DISTRICT

Notice the turns at First Street and at Sunset Boulevard and how three of the main streets have but one outlet to the north.



California Railroad Commission Engineering Dept.

FIG. 16. REROUTING OF STREET CARS—PLAZA DISTRICT

By means of a subway built under the existing Broadway tunnel it will be possible to rearrange the routes as shown. Notice that the change in volume of traffic on Broadway, Spring and Main Streets, south of First Street, is slight, but that the routes have been simplified. The car interference has been greatly reduced by providing the additional "throat."

**PRESENT AND PROPOSED NUMBER OF LOS ANGELES RAILWAY CARS IN
BROADWAY, SPRING AND MAIN STREETS NORTH OF SECOND ST.**

	Broadway			Spring			Main		
	North	South	Total	North	South	Total	North	South	Total
Present ...	56	69	125	50	50	100	38	47	85
Proposed .	58	69	127	48	51	99	38	46	84

**SUGGESTED ROUTES NORTH FOR LOS ANGELES RAILWAY LINES ON
BROADWAY, SPRING AND MAIN STREETS**

Mark on Plans	Line	No. of Cars		Present Route	New Route
		North- bound	South- bound		
1	Boyle Heights and West Seventh St.	29	35	Broadway to First St.	Main St. to First St.
2A	Grand Avenue and North Broadway..	12	16	Broadway to First, to Spring, to Main, to Sunset, to North Broad- way	Broadway via Subway to North Broad- way
2B	Grand Avenue and North Spring St..	3	3	Broadway to First, to Spring, to Main, to Sunset, to North Spring terminus	Spring to Main, to Sunset, to North Spring terminus
2C	Grand Avenue and North Main St..	12	15	Broadway to First, to Spring, to North Main	Spring to North Main
3A	Main Street and North Broadway..	20	27	Main to Sunset, to North Broadway	Broadway via sub- way to North Broadway
3B	Main Street and North Spring St..	9	9	Main to Sunset, to North Spring terminus	Spring to Main, to Sunset, to North Spring terminus
4	West Jefferson St..	24	24	Spring to Main, to Sunset, to North Spring terminus	Unchanged
5	Eagle Rock Valley & Hawthorne	9	9	Spring to Main, to Sunset, to North Broadway	Broadway via sub- way to North Broadway
6	Temple Street	14	14	Temple to Broad- way terminus	Temple to Main, to Sunset, to North Spring terminus
7	West Ninth and Brooklyn	17	17	Spring to Main, to Macy	Broadway via tun- nel to Macy St. viaduct
8	Griffith and Griffin..	9	11	Main to Sunset, to North Broadway	Main to Sunset, to North Spring, to Alpine, to North Broadway

It should be noted that the entire Los Angeles Railway operating and financial situation is at this time the subject of a special study by this department. Matters are there considered that have no immediate bearing on the subject of this report, but the recommendations here made will be kept in mind when suggestions are made in the other report on the Los Angeles Railway problem.

PACIFIC ELECTRIC SYSTEM AND RAPID TRANSIT PLANS

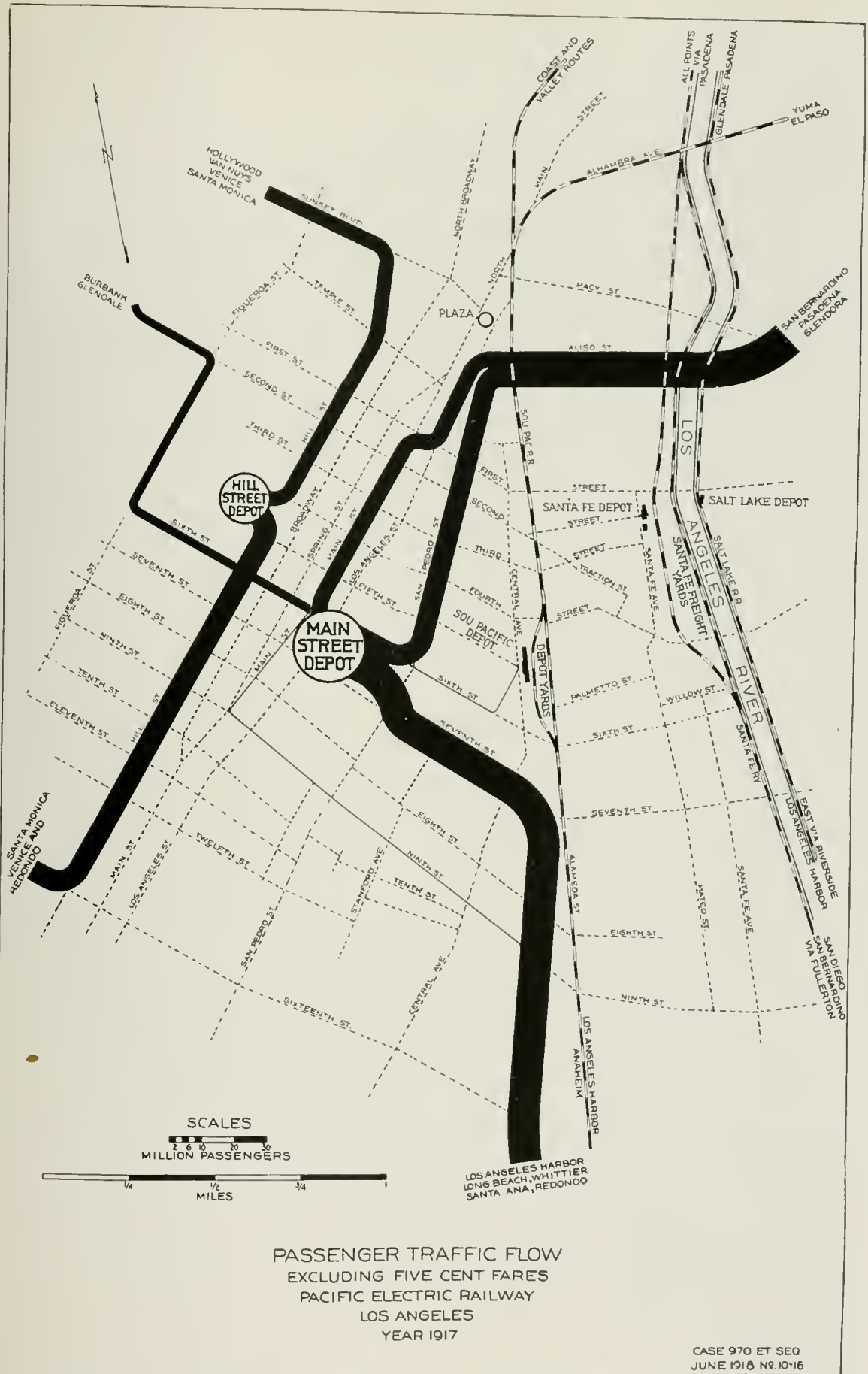
The Pacific Electric Railway is a standard gauge electric road giving both interurban and local passenger service and with a considerable freight traffic. This road operates about 1100 miles of track and is one of the largest—if not the largest—electric railway systems in the world from the point of view of mileage. The company serves a population of about one million in over fifty incorporated cities and towns located in four different counties.

In 1918, about 68,000,000 passengers were carried, divided about equally between interurban and local or five-cent fare passengers. The passenger revenue was \$7,500,000, and the freight revenue \$2,350,000, or roughly one-third of the passenger revenue. The figures are especially noteworthy as indicating the importance of the freight business, both as a source of revenue and as an unusually prominent part of an electric road's business.

The Southern Pacific Company controls, through stock ownership, the Pacific Electric Railway and directs its policies. The Pacific Electric has a considerable interest in the Los Angeles Union Terminal Company, as discussed in another chapter.

Present Conditions

The City of Los Angeles is fortunate in having this system of electric interurban lines which has contributed so largely to its growth and development. A due appreciation of the importance of the Pacific Electric system may be had when it is stated that in 1917 this road carried 65,000,000 passengers, while in the same year the steam roads of the entire State of California carried only 39,000,000.



California Railroad Commission Engineering Dept.

FIG. 17. PASSENGER TRAFFIC FLOW DIAGRAM

The width of band represents the number of interurban passengers carried by the Pacific Electric Railway in both directions during the year 1917. Observe that the combined traffic from the Hill Street station is greater than that of the Long Beach Line, showing the practicability of through routing.

Recommendations in Arnold Report

Mr. Arnold, in his report* to the City of Los Angeles on the local transportation problem, after drawing attention to the broad constructive policy followed by the management producing the network of electric lines which bind together the different communities of the district, draws attention to the important part played by the Pacific Electric in the prosperity of this entire section and advises that the continual growth of this inter-urban system should not be hampered.

He stated that there were promising possibilities in the use of an elevated structure or subway running from the rear of the present terminal building back to and across the river, with a connection in the vicinity of the Southern Pacific Arcade Depot to the four tracks of the southern division running to Long Beach, San Pedro, Santa Ana, etc., and, after crossing the river, the extension should connect with the northern division which serves Pasadena, Alhambra and other foothill communities. This is virtually the same plan as submitted by the Pacific Electric in conjunction with the Southern Pacific-Salt Lake plan for the use of the former's depot as a joint station for the two roads.

Mr. Arnold further advises that the Pacific Electric should be encouraged to work out plans to provide for this permanent way and, at the same time, to make public the plans for the tunnel connection running northwest from the Hill Street station more or less parallel to Sixth Street. He recommends the connection of the Hill Street station with the Main Street station by means of a subway which, however, should be carefully located so as not to interfere with a longitudinal subway which may eventually be located on Broadway, Spring or Main Streets. In this connection it should be noted that Mr. Arnold counseled very generous franchise grants by the City as at least a partial contribution on the City's part compared with the amount of money to be expended by the Pacific Electric. The franchise question is considered under a special heading in this report.

It is important to note that it was decided that ultimately there would be need of an elongated sub-surface terminal along the axis of natural growth with a number of stations for the distribution and collection of passengers. This plan, in general, is one whereby interurban passengers may be deposited or picked up at several points four or five blocks apart in the business district and is, we believe, superior in every respect to the one-station plan whereby passengers leave or board the trains at one point only. The advantage of the former plan over the latter is the fact that the people receive better service, since the station is nearer the point of destination whether it be a place of business, a hotel or more or less definite points in the retail or wholesale district. Congestion under such a plan is reduced if not entirely avoided.

*Preliminary Report upon the Transportation Problem in Los Angeles, by Bion J. Arnold, October, 1911.

If the present cars or lines of the Pacific Electric doing only local business remain on the surface of the streets—and this is the proper place for them—we believe something could be accomplished in the way of through routing for interurban cars. This must go hand in hand with the discard of the terminal idea and the adoption of the "district stop" plan. It so happens that the number of passengers now carried along Main and San Pedro Streets when added to those now carried along Hill Street north of the Hill Street station approximately equals the number of passengers carried out Seventh Street plus those on Hill Street south of the Hill Street station. If the number of passengers is approximately the same, the number of cars should also be about the same, and this is the factor which has probably the greatest effect on the possibility of through routing.

Whether or not this possibility of through routing and the evident approximate balance of the traffic were known to Mr. Arnold, we are not advised, but in any event he has stated as follows:

"Such a terminal (referring to an elongated sub-surface terminal) would collect the electric interurban lines of the west and northwest at a point near the original Plaza and the interurban lines entering the City from the south, the west and the southwest at a center located in the vicinity of Pico and Main Streets."

Causes of Lack of Growth

Normal development of the system has to some extent been retarded by several causes:

1. The increase in interference due to grade crossings.
2. The increase in interference due to street traffic.
3. The increase in automobile competition, public and private.
4. The reduction in capital expenditures and the increase in expenses on account of the war.

The subject of grade crossing elimination is taken up in Part II.

Interference due to street traffic can, of course, be prevented only by taking the high speed lines off the streets. The local, or street, cars can continue to use the present routes.

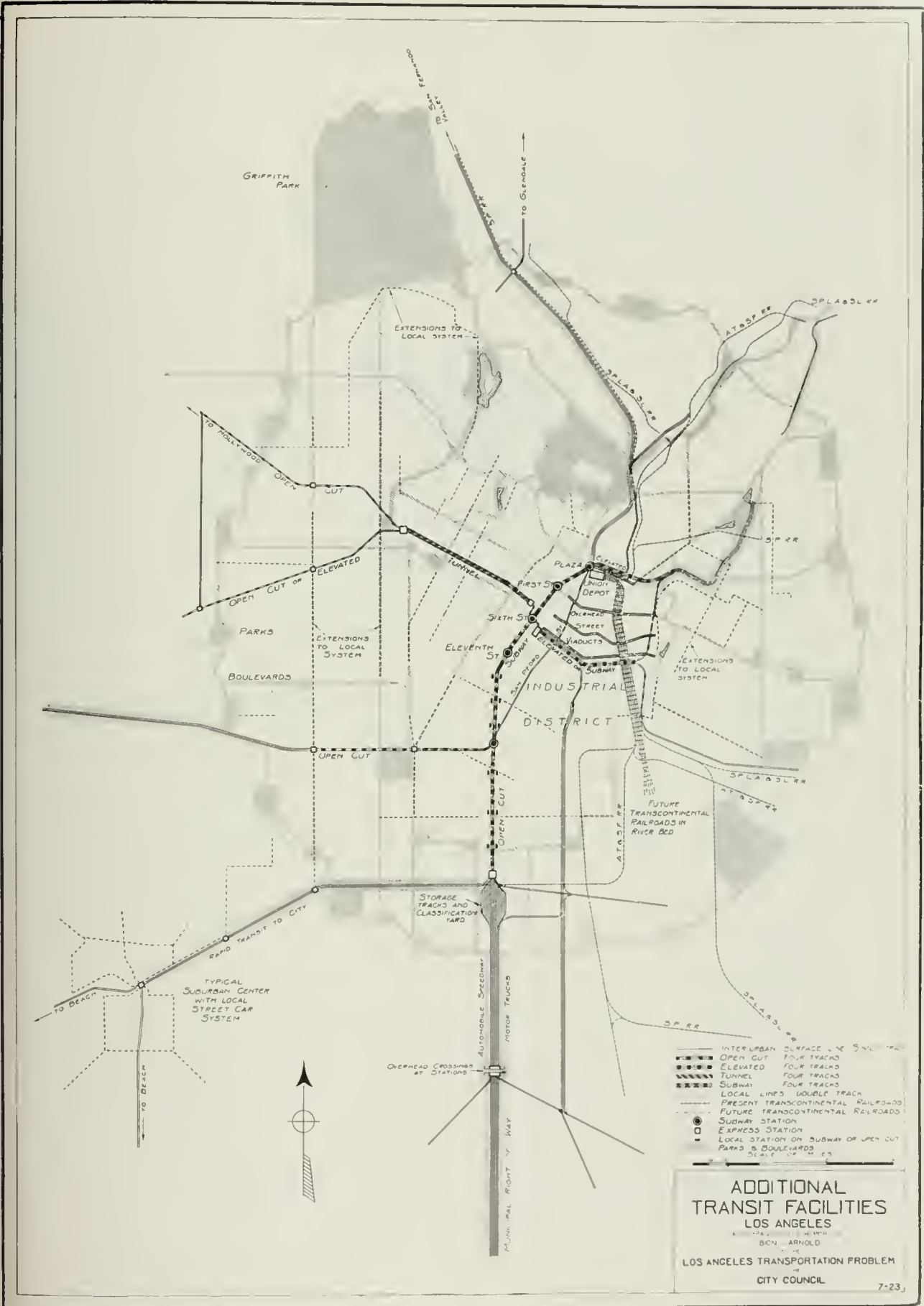
With improvement in equipment and speed and especially in distribution, the electric lines should not suffer in the future to the same extent as they have in the past from automobile competition.

The Ultimate Rapid Transit System

In the development of any plan, the ultimate system must be kept in mind (if it can be foreseen) in order that it will not be necessary to undo later on what is first attempted. The solution of the interurban terminal should come before the transcontinental. In other words, a union passenger terminal should be located to secure the most efficient distribution of passengers.

In the development of a rapid transit system, certain general principles must be applied.

1. For rapid transit lines serving the commuter district, an elongated terminal is better than a stub terminal because passengers are not left at a single point but are distributed. Such a terminal would be especially valuable in Los Angeles because of the long and comparatively narrow business district. For hauls beyond the commuter zone, stub terminals are preferable but they should be adjacent to the distributing lines.
2. Through routes are better than loops for rapid transit lines because they require less time and less car mileage.
3. There should be at least four entrances or trunk lines to the city for the interurban system. The ones opposite should be connected so as to secure through routing.
4. There should be a transfer point where these lines cross.
5. The subway should be for interurban lines only. The subway stations are three or four blocks apart and at these points transfers can be issued to the local cars, which will continue to operate as at present.
6. From an operating standpoint, a balanced traffic is desirable.
7. Coach yards will be required for the long haul lines.
8. There should be no grade crossings in subways, not even at junctions.
9. A universal transfer system is desirable if it tends to bring about:
 - a—elimination of duplicate service,
 - b—better distribution of passengers,
 - c—uniform fares,
 - d—a better satisfied public.
10. Elevated lines are undesirable in commercial, hotel, retail and residence sections on account of noise, unsightliness, extra climb, detours and the shutting off of light. These factors are of less importance in an industrial or wholesale district.
11. The justification for a subway is sometimes based upon the density of population along the route, but there are other factors which are of importance:
 - a. Greater safety.
 - b. Greater speed.
 - c. Greater regularity.
 - d. Greater capacity.
12. Open cut construction is less objectionable than elevated through residential districts, is less expensive than subways and simplifies the separation of grades.
13. In developing plans for a rapid transit system, the possibility of ultimate electrification of the steam lines should be kept in mind. Some of the advantages of such electrification are conservation of fuel oil, reduction of noise and smoke and fire risk, and superior tractive qualities.



From Bion J. Arnold Report of 1911

FIG. 18. ADDITIONAL TRANSIT FACILITIES

This plan is reproduced from the Arnold report issued in 1911 and is the most important exhibit in it. It shows Mr. Arnold's suggestions for improvement in transportation and should be compared with Fig 134.

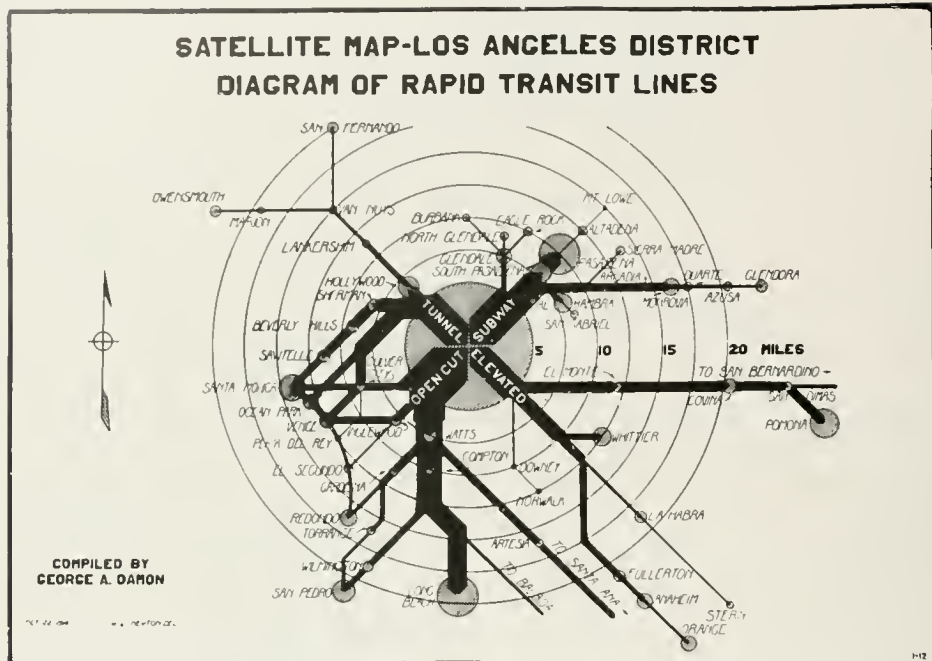


Exhibit No. 2 City Planning Association

FIG. 19. DIAGRAM OF RAPID TRANSIT LINES

This map was presented to show how all subcenters in the Metropolitan area would be reached from two main truck lines with a common transfer point at their intersection. Through routes with a balanced traffic are advocated.

Fig. 18, in which these principles are applied, is reproduced from the Arnold report and is unquestionably the most important exhibit in that work. It merits careful study.

Fig. 19 is Exhibit No. 2 of the City Planning Association. It is diagrammatic and shows how the through route principle can be applied in Los Angeles. The four central rays, as interpreted and applied by us, are the Tunnel west of Hill Street, the Elevated east of Main Street, the Subway in Main Street, and the Open Cut in the territory south of the business center.

The First Subways

Main, Spring, Broadway and Hill Streets are the principal north and south streets in the present business district of Los Angeles. This district is a long and comparatively narrow belt of territory. Therefore, the first subway should be in one of these streets. The principal travel is along them. On the other hand, if the first subway were to be built on the other axis, there would be a tendency for the business district to elongate in that direction and there would be a consequent depreciation of values along the present axis of growth.

For the first subway, Main Street has several advantages over the streets parallel with it:

1. It bisects a broader belt of business territory than would streets west of it, and the distance to Hill Street would be no greater than half the distance between stations.
2. Main Street is a through street.
3. There are fewer underground obstructions in Main Street than in either Spring Street or Broadway.
4. The present Pacific Electric terminal is at Sixth and Main Streets.

Ultimately, the Pacific Electric northern division lines might be continued south on Main Street to connect possibly with the Santa Monica Short Line and the Redondo line electrified. As a first step, however, it might be sufficient to terminate the northern lines at Sixth and Main Streets with a temporary loop.

Subway West from Hill Street Station

"Several years ago a tunnel enterprise was proposed to take care of the traffic to Santa Monica and vicinity, but the financial depression caused a delay in pushing the undertaking. The growth of the Hollywood district, the opening up of the San Fernando Valley and the extension of the electric lines into this district through the Cahuenga Pass would seem to be additional reasons for the construction of this double track outlet through the hills west of the business center." (Quoted from B. J. Arnold report.)

As noted before, the "Hill Street subway" was undertaken some five or six years before the date of the Arnold report. This is a local name for a proposed subway or tunnel west from the Pacific Electric Hill Street Station to Vermont Avenue and thence by elevated or surface railway to Vineyard. The sum of \$1,590,000, exclusive of taxes, engineering and interest, was expended toward the acquisition of right of way and sub-surface rights for this line.

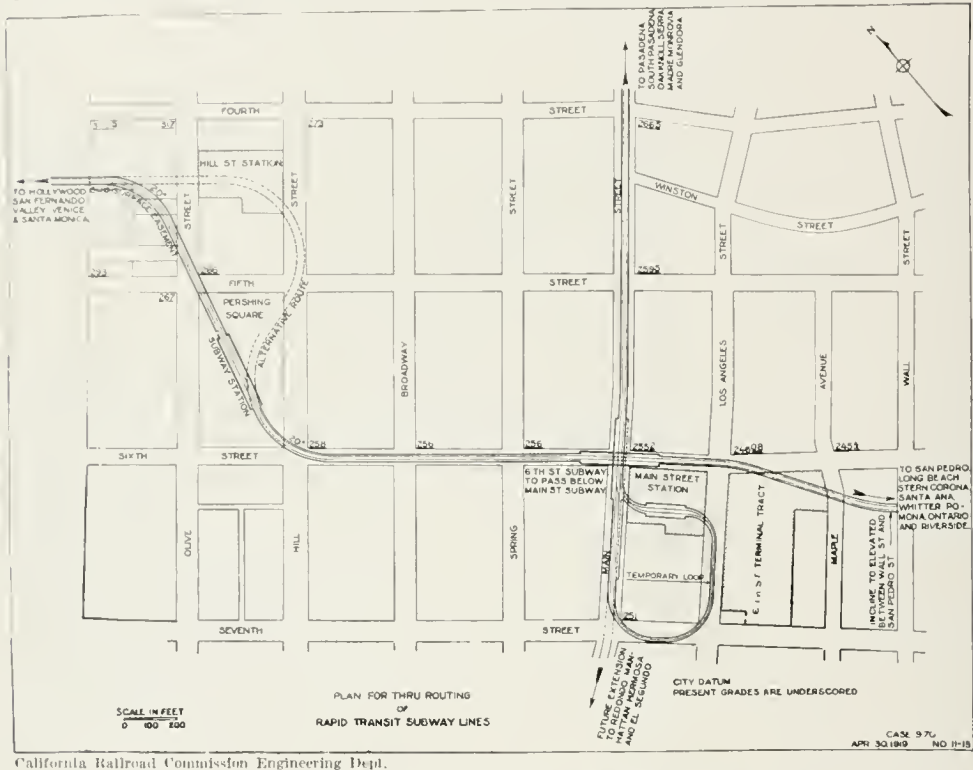
This project is desirable as it will remove the express service from the streets and will result in a saving of both time and distance. Furthermore, it will pave the way for a connection with the station at Sixth and Main Streets.

Connection of Subway West of Hill Street with Main Street Station

This connection is very desirable, in order to secure through-routing. The stub terminals can still be used for the long haul business. It would be impracticable and undesirable to extend the present elevated west of its present terminus, but it could still be used for the stub terminal. As the north and south subway in Main Street would be built first, it would be nearest to the surface, while the east and west subway would be in Sixth Street and would pass beneath the other. There would be an underground transfer station at Sixth and Main Streets where the subway lines would cross.

The subway could continue west to Pershing Square and continue diagonally across the square to Olive Street, where it could enter the hill far enough below private property to entail nominal damages only, and

could join the proposed right of way west of the Hill Street station. The station would be used for the stub terminal business. The damage to the park would be small and temporary.



California Railroad Commission Engineering Dept.

FIG. 20. STUDY SHOWING RAPID TRANSIT SUBWAY ROUTES

The Main Street and Hill Street stations can be combined and through routing obtained by a subway beneath Pershing Square. Temporarily the Main Street line can terminate at the Sixth Street station using the "Loop."

Fig. 20 has been drawn to show the practicability of the alignment and grades. One of the advantages of the plan is that it would not necessitate the acquisition of expensive central property.

Eastward from Main Street station it will be possible to connect the subway with an elevated by means of an incline from under Wall Street up over San Pedro Street. It will be necessary to close San Julian Street and to regrade Wall Street between Sixth and Seventh streets. The resulting damage to property will doubtless be less than the extra cost of extending the subway east to Alameda Street—the first point where the transition to elevated could be made without closing streets. The grade of the incline would be 5 per cent, but this rate is equalled for short inclines in the Boston subways.

The possibility for a balanced traffic for through routes, or the use of "lap" system (in which cars run through the business district before turning back) is indicated on Fig. 17, page 107.

Elevated Line Eastward from Main Street Station

The present Pacific Electric plan in the City of Los Angeles is the "one-station plan." The construction of an elevated roadway easterly from the present Main Street station connecting with the southbound tracks of its southern division and the tracks of its easterly division leading to Pasadena, Alhambra, San Bernardino, etc., is a further development of this plan.

Unfortunately, the construction of this elevated roadway would possibly, and probably, interfere with the development of a plan whereby interurban trains would be run north through the business district with stops approximately four blocks apart.

The northern and eastern divisions would furnish much better distribution by entering the business district at the north. The matter of distribution is of less moment for the long haul lines than for the lines serving the commuter district, but it is to the interest of the merchants of Los Angeles that the commuting radius be increased to the fullest extent. One hour is considered about the limit of commuting. Although the elevated route across the river would cost less than the route utilizing a subway in Main Street, the distance would be eight-tenths of a mile longer, and hence it would shorten the commuting radius by that distance.

The construction of the elevated would probably fill the need for rapid transit to such an extent as to delay the construction of the north and south subway.

Transportation between Los Angeles and Pasadena

Outside the City of Los Angeles the electric interurban traffic question affects this report particularly in relation to **rapid transit between Los Angeles and Pasadena**. A movement has recently assumed large proportions in the City of Pasadena looking towards the early development of a better rapid transit system between that City and Los Angeles. A municipal railway between the two cities was proposed by the Pasadena City Commission. Years ago a bicycle pathway between Los Angeles and Pasadena was proposed, and a considerable portion of a private right of way was acquired. \$5,000 was paid for an option on this right of way and an ordinance was passed calling for an election in Pasadena for the issuance of bonds to acquire all of the necessary right of way. An appraisal of all of the necessary right of way for the entire line with certain portions of the route in alternative shows an estimated cost of \$700,000. Detailed estimates and surveys were not, as far as we know, ever made. But among the plans considered by the City Commission was one under which the City would provide the right of way and roadway complete with tracks and ready for operation and lease this property to an operating company under conditions somewhat similar to the contracts in effect on the later New York subway and elevated lines. During the period of the war and while the Capital

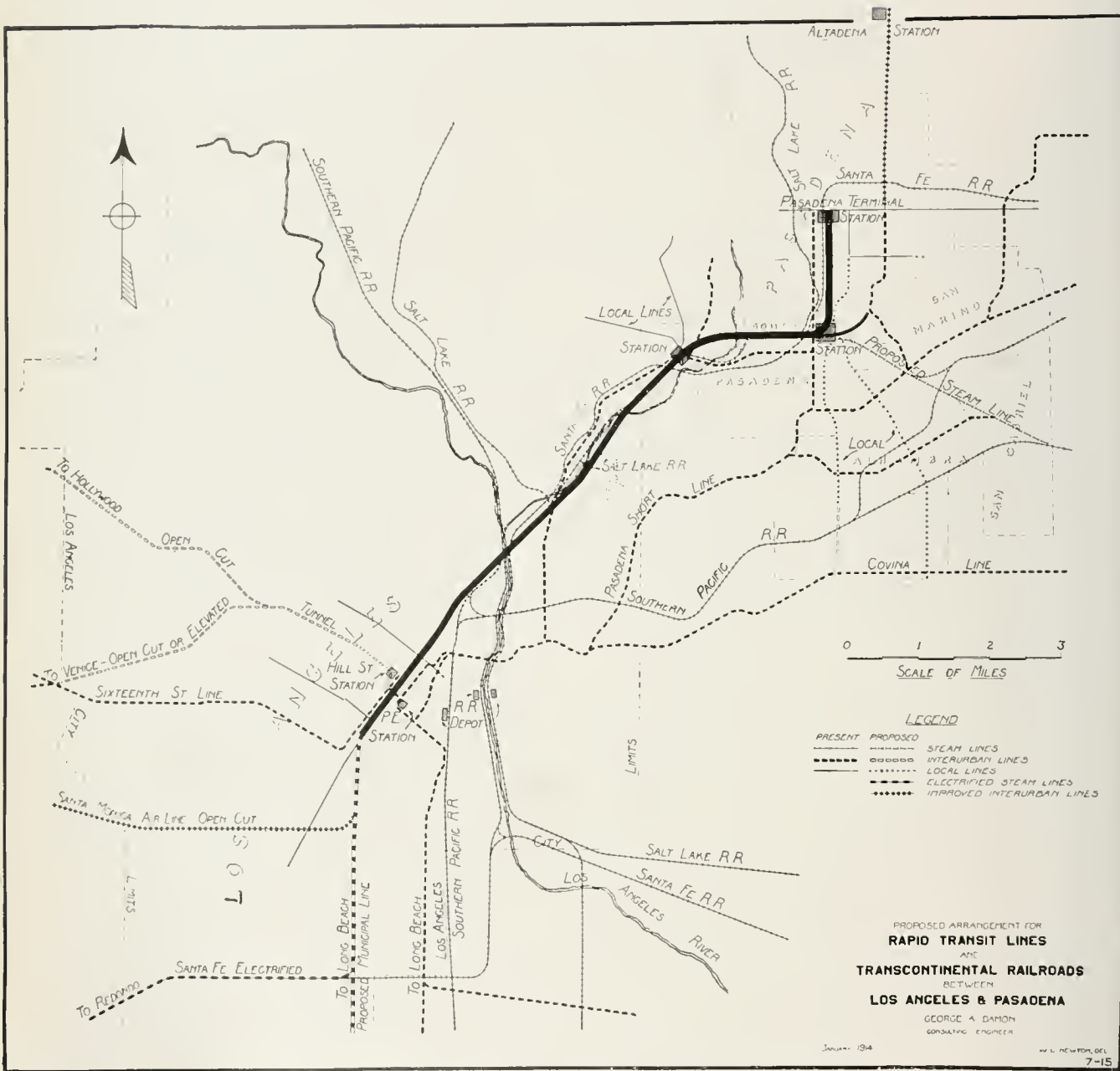


FIG. 21. PROPOSED RAPID TRANSIT LINE TO PASADENA

This is one of the plans for a direct route between Pasadena and Los Angeles by way of the Arroyo Seco. It is about one mile shorter than the Pasadena short line. We have recommended that the proposed right of way of the Santa Fe be used jointly for the steam and electric roads, (Chapter IX).

From George A. Damon

January 1914

W. L. NEWTON, DEL.
7-15

Issues Committee looked with disfavor on any capital expenditures not absolutely necessary, this project was not advanced.

It was not necessary, in this report, to pass on the question of the necessity and desirability of the development of new electric interurban transportation facilities between Los Angeles and Pasadena along the lines suggested for the "Municipal Railway." But it is certain, in our opinion, that the very heavy expenditures for the new rights of way are unreasonable from every point of view if there can be made available existing rights of way giving the same results as far as rapid transit is in question. Such rights of way are now available. The project of the Municipal Railway, if it is revived, should be combined with the question of the elimination of grade crossings on the Santa Fe and the Salt Lake lines and the construction should be such that all tracks for both steam and electric lines are on one right of way and that the roadbed is of sufficient width.

There are at present four lines of railroad between Los Angeles and Pasadena:

1. The Santa Fe, over which no local trains are operated.
2. The Salt Lake, over which, at present, during the period of Federal control four trains are operated daily.
3. The Pasadena shortline of the Pacific Electric, over which ninety trains are operated daily, and
4. The Pasadena Avenue line of the Pacific Electric, over which local service is given.

We believe that the people of Los Angeles and Pasadena will best be served by one high-speed electric line with possibly four tracks (local cars on outside tracks; express trains in inner tracks). Express trains should be through trains and should not make more than, say, one stop between Los Angeles and Pasadena. This line should follow a shorter route than the present shortline on the Pasadena Avenue line and it should be altogether free from grade crossings. It should be constructed along the drainage of the Arroyo Seco since this line furnishes the most direct route over which it is feasible to build an economical road. Then, if it becomes necessary to maintain service between Pasadena and Los Angeles on the steam lines of the Salt Lake and the Santa Fe, even if the steam passenger trains are through trains, these two roads should occupy the same right of way as the electric lines, and there would then result a six-track line. The proposed re-location of the Santa Fe, which will be discussed hereafter (Chapter IX) will provide the possibility for such a right of way.

Legal Matters

It is stated in the charter that "no franchise for an elevated structure or subway shall be granted in or along any street or way in a longitudinal direction." It is not clear that the City could lease its own subways to an operating company as is done in New York. It would seem that the charter restrictions are rather severe in that they will tend to prevent or delay the building of adequate rapid transit terminal facilities and thus retard the

natural growth of the City. For this reason, it is recommended that these restrictions should be modified by a charter amendment.

Recommendations

We recommend that the Los Angeles Railway cars be re-routed to avoid car congestion near the site of the Plaza terminal by the construction of a sub-tunnel under the present Broadway tunnel and the re-routing as suggested above in detail. This recommendation is made with the provision that it will be in harmony and correspond with more far-reaching recommendations that will be proposed in the recommendations in Los Angeles Railway Application (Appl. 4238) decision by the Commission.

With reference to the Pacific Electric, we recommend the construction of a subway from the present Pacific Electric station at Sixth and Main Streets northerly along Main Street to, and under, the Plaza union station, changing to an elevated railway along Ramirez Street and meeting the present line at the Miso Street Bridge. From here, this line would continue as an elevated railway to Brooklyn where the present tracks would be met. We also recommend that the Pacific Electric continue the present elevated structure at the rear of its Main Street station, elevating the Long Beach line to Fourteenth Street. This elevated railway should be so designed that later connection can be made with a subway in Sixth Street. The transit from elevated to subway is to be made from San Pedro to Wall Street.

Further development of the electric interurban rapid transit in the more distant future should follow, generally, the lines laid down in the Arnold report and in this chapter.

Further recommendations for the Pacific Electric Railway in connection with rapid transit and the unification of railways between Los Angeles and Pasadena and the elimination of grade crossings in this district will be found in Chapter IX.

PART II—THE ELIMINATION OF
GRADE CROSSINGS

- Chapter V—Grade Crossing Elimination in General.
Chapter VI—Depression of Tracks for Elimination of Grade
Crossings at the Los Angeles River.
Chapter VII—Present and Proposed Bridges Over the Los Ange-
les River.
Chapter VIII—Alameda Street Grade Crossings.
Chapter IX—Elimination of Other Crossings at Grade.

CHAPTER V.

OUTLINE

Scope of Inquiry
Complaints

District in Which Grade Crossing Elimination Is To Be Considered

Plans Proposed for Grade Crossing Elimination

Necessity and Advisability of Elimination

Street Traffic in General

CHAPTER V
GRADE CROSSING ELIMINATION IN GENERAL
SCOPE OF INQUIRY

Before taking up in detail the various plans presented for the amelioration of the grade crossing situation, it appears advisable to review the formal complaints to the Commission, which led to this investigation, and give consideration to the district in which special studies are necessary.

Complaints of Applicants

In Decision No. 3805, decided October 21, 1916, the Commission reviewed in brief the complaints in these consolidated Cases, Nos. 970, 971, 972, 974, 980, 981 and 983.

Referring to this decision, it will be noted that in Case 970 the Commission is asked:

"...to order relief by reclaiming Alameda Street and other streets, by the improvement and abolition of grade crossings, by the installing of a union terminal and by reorganization of the traffic situation, so that, as far as possible, the operation of the lines of the defendants across the streets of the City of Los Angeles may be eliminated, locating said terminal station in as accessible a location as possible to the main lines of street and interurban electric railroads."

The defendants in this case were the Southern Pacific, the Santa Fe and the Salt Lake; the Pacific Electric was not included.

The complaint itself is general, but in Exhibits "A" and "B" we find specific mention of certain crossings. Exhibit "A" is a report to the Viaduct Committee of the City Council under date of May 12, 1916, by Messrs. Homer Hamlin, F. D. Howell and Samuel Storrow. Exhibit "B" is another report to the Executive Committee of the Municipal League of Los Angeles dated April 7, 1916, and is signed by Samuel Storrow. In Exhibit "A" (incorporated in this report on page 125), "the district" in which it is a "vital necessity to separate the grades of the railroads from those of the streets" is described as "adjacent to the Los Angeles River and extending from North Broadway, south to the south city limits." The streets within this district crossing the Los Angeles River or otherwise involved, are given as follows:

Main Street	First Street
Alhambra Road	Fourth Street
Macy Street	Seventh Street
Aliso Street	Ninth Street

Of these eight, the following six are considered as "necessary arteries for through traffic to be treated for the immediate separation of grades":

Main Street	Fourth Street
Macy Street	Seventh Street
First Street	Ninth Street

Exhibit "B" recommends a much broader course of action: This report, like Exhibit "A", does not mention a union terminal and concerns

itself only with the elimination of grade crossings, except that the treatment suggested involves, to some extent, the relocation of certain tracks.

The recommendations in Exhibit "B" are these:

- (a) All grade crossings now used by passenger trains in regular service must be eliminated.
- (b) All grade crossings used by through freight trains (in distinction from freight cars being run on to a warehouse spur track) must be eliminated.
- (c) The use of all grade crossings which are permitted to remain must be regulated and made as safe as possible.
- (d) The requirement is a comprehensive design which can be available for continuous development so as to cover the grade crossings now to be improved and so as to be continued along similar lines for the improvement of grade crossings hereafter to be improved.
- (e) The most important crossings calling for immediate improvement are those of Alameda Street, Macy Street, Aliso Street, Seventh Street and Ninth Street; all crossing the Santa Fe tracks, the river and the Salt Lake tracks.
- (f) The right of the Southern Pacific to use Alameda Street must be withdrawn excepting insofar as it may prove necessary to use an Alameda Street track for delivering freight cars to adjacent spur tracks.
- (g) It is advised that the Southern Pacific and the Santa Fe occupy an adjacent system of tracks on the west bank of the river bed and that the cars of through freight which are not to be opened and which are for delivery to consignees in Los Angeles, be handled in a system of freight yards outside the city limits.
- (h) The trackage on the east and west banks of the Los Angeles River used for through freight or passenger trains shall be lowered from eight to ten feet below the present grade, and the streets crossing these tracks shall be built up to an increased grade until, reaching the railroad right of way, they enter a viaduct crossing the Southern Pacific, the Santa Fe, the River and the Salt Lake, and again reach an embankment at the east side of the right of way of the Salt Lake.
- (i) The cost of readjusting the railroad grades and rights of way shall be borne by the railroads, and the cost of the remainder of the structures and the damages shall be borne, one-half to one-third by the railroads and the remainder by the City and County, or by an assessment area extending over as much frontage as possible.

In Case 971, the complainant does not mention any crossings specifically. The complaint is similar, in substance, to Case 970, with the exception that the petition for elimination of crossings is accompanied by a petition for a reorganization of railroad traffic. It is asked that as far as possible, the railroads of the defendants along or across the streets be eliminated to the extent that switching facilities would not be impaired.

The complaint in Case 972 is, in effect, similar to that in Case 971.

In Case 974, the City of Pasadena asks the Commission to rescind its order made in Case 938, which order provided for the construction of an interlocking plant at the crossing of the Santa Fe, the Salt Lake and the Pacific Electric Railway at Aliso Street and adjacent to the Los Angeles River. In addition, the City of Pasadena complains in particular of the

crossings of the Pacific Electric Railway and Mission Road (or Huntington Drive).

In Case 980, the City of Alhambra makes complaint almost identical with the complaint in Case 974.

In Case 981, also, the City of San Gabriel makes complaint almost the same as that in Case 974.

In Case 983, the City of South Pasadena also makes a complaint nearly identical with that in Case 974.

DISTRICT IN WHICH GRADE CROSSING ELIMINATION IS TO BE CONSIDERED

It will be noted, therefore, that with the exception of the crossings of Mission Road and the Pacific Electric, all of the crossings referred to lie within the so-called Los Angeles railroad and industrial district. This investigation is confined, then, for reasons given heretofore, to the grade crossings within this district, which, roughly, is bounded on the north by North Broadway, on the south by the south city limits near Twenty-fifth Street, on the east by a line east of and adjacent to the east bank of the Los Angeles River, and on the west by a line west of and adjacent to Alameda Street.

In addition, the grade crossings between Los Angeles and Pasadena have also been studied.

PLANS PROPOSED FOR GRADE CROSSING ELIMINATION

There have, in general, been three remedies proposed for the amelioration of the present grade crossing condition of the steam railroad tracks: two remedies for crossings adjacent to the Los Angeles River and one for Alameda Street.

This subject was touched upon in the "Preliminary Report upon the Transportation of Los Angeles" by Bion J. Arnold, October, 1911. In this report it is stated that there are three kinds of grade crossings that are desirable to eliminate. Of these three kinds, those of the high-speed inter-urban electric trains are deemed the most dangerous; those of steam freight main lines and switching tracks, the most inconvenient; and transcontinental passenger traffic at grade, the least justifiable. The remedy proposed was, in brief, the construction of long viaducts carrying the streets over not only the Santa Fe and the Salt Lake tracks on both sides of the river, but also across a large portion of the industrial district as well. It was suggested that the first viaduct of this character be built on Fourth Street, commencing at Main Street, crossing the municipal railroad tracks on San Pedro Street, going over the present Southern Pacific tracks on and contiguous to Alameda Street, and connecting with the present viaduct over the Santa Fe yards. The existing viaduct crosses the river and is built over the Salt Lake railroad yards. Under this plan it was proposed to collect and deliver goods from the second story of buildings, thus increasing present facilities for

handling the business of industries now located along the viaduct. Adding the advantage of switching carload freight to and from buildings on the lower or present street level, the double-decking of the street was considered a decided advantage which would add to, rather than detract from, the value of all industrial property.

Then, if the Fourth Street viaduct proved its usefulness, the First Street viaduct could be continued in a similar manner. Another connection between the business center and the east part of the city could be provided for by a similar viaduct on Sixth Street, from Main Street to Boyle Avenue.

It appears that Mr. Arnold's idea was to standardize the elimination of grade crossings along the river by carrying the streets over the tracks. In connection with such grade separation, the double-decking of Los Angeles Street, running north and south, parallel to the main line railroad track, was also advocated.

Under date of June 17, 1915, the Board of Public Utilities of the City of Los Angeles published a report of its Chief Engineer, Mr. F. D. Howell, on grade crossing elimination, transportation, congestion, and viaducts across the industrial district. This report advocated the construction of the following viaducts:

Street	From	To
North Main Street.	Clover Street.	Sunset Boulevard.
Macy Street.	Mission Road.	North Main Street.
First Street.	Boyle Avenue.	Near San Pedro Street.
Fourth Street.	Boyle Avenue.	Crocker Street.
Seventh Street.	Near Boyle Avenue.	Near Central Avenue.
Ninth Street.	Soto Street.	McGarry Street.

The cost, including three 100-foot spans across the river, where needed; the removal of the Los Angeles Railway tracks and the replacing of the same on viaducts; the widening of the streets for approaches; engineering; advertising; and 10 per cent additional for contingencies, was estimated at \$4,260,000, or an average of \$120 per foot of viaduct.

It is evident that this plan, in its general aspects, is similar to the Arnold plan.

In his testimony before the Commission, Mr. Howell stated that at the time this report was written, he had in mind the advantages of maintaining the tracks on Alameda Street. If Alameda Street tracks are to be maintained and grade crossings eliminated, a viaduct must be built to go over all territory between the river and Main Street. When the public realized what this meant, "storm was raised against any viaducts of such great length." Following the agitation for the removal of tracks on Alameda Street, a so-called "short viaduct" plan was then presented, this term being used in contra-distinction to the "long viaduct" plans above mentioned.

The City Council of Los Angeles then appointed a Viaduct and Grade Crossing Committee. This Committee on May 3, 1916, addressed Mr. Homer Hamlin, City Engineer, Mr. F. D. Howell, Chief Engineer, Board of Public

Utilities, and Mr. Samuel Storrow, Consulting Engineer, Municipal League of the City of Los Angeles, as follows:

"At the meeting of the Viaduct Committee held at 2:00 P. M., this date, a Committee of Engineers, consisting of Messrs. Homer Hamlin, City Engineer, F. D. Howell, Chief Engineer, Board of Public Utilities, and Samuel Storrow, Consulting Engineer, representing the Municipal League, was appointed to report back to the Viaduct Committee at 2:00 P. M., Monday, May 8, 1916, giving their recommendations after considering the methods heretofore submitted to said Viaduct Committee as to the proper method for separation of grades within the City of Los Angeles and the names of the streets which should be considered in said separation.

Their reply was attached as Exhibit "A" to the Complaint in Case 970, and is here quoted in full:

"Los Angeles, Cal., May 13, 1916.

"To the Viaduct Committee of the City Council, Los Angeles, California.

"Gentlemen:

"The Committee of Engineers appointed by your Honorable Body on Wednesday, May 3, 1916, to report on the practicability of the several methods of eliminating grade crossings heretofore submitted, begs to report to you herewith, as follows:

"**The District** in which it is vitally necessary to separate the grades of the railroads from those of the streets is that adjacent to the Los Angeles River, and extending from North Broadway south to the south city limits.

"**The Streets** within the above district crossing the Los Angeles River, or susceptible of crossings, and calling for immediate study, are as follow:

Main Street, Macy Street, First Street, Seventh Street, Alhambra Road, Aliso Street, Fourth Street, Ninth Street.

"Of these, we are of the opinion that those requiring to be considered as necessary arteries for through traffic to be treated for the immediate separation of grades, are:

"Main Street, Macy Street, First Street, Fourth Street, Seventh Street, Ninth Street.

"Alhambra Road has no highway bridge across the River at present, and is occupied principally by the tracks of the Southern Pacific Sunset Route as well as tracks to the shops. It is close enough to Main Street so that Main Street can act as a main artery, and there is no present necessity of considering Alhambra Road.

"Aliso Street is so close to Macy Street at its eastern terminus that Macy Street can care for all the through traffic now present in this territory. The future development of the Aliso Street crossing should, and can, be on the design proposed for Macy Street.

"The question of the separation of the grades of the Pacific Electric Railway tracks crossing the Salt Lake and the Santa Fe railroads at the river is not one of immediate necessity because the Santa Fe, the Salt Lake and the Pacific Electric Railways have entered into a contract to construct an interlocking plant on these crossings, which interlocking plant is subject to the approval of the Board of Public Utilities of the City of Los Angeles and the California Railroad Commission. This will render these tracks safe for the present, and while an interlocking plant is an obstruction to the free flow of traffic, it is believed that before the separation of grades could all be finished—and if constructed in the order of necessity, before Aliso Street would be reached the probabilities are that the Pacific Electric Railway tracks at grade

on Aliso Street will have been removed and connected up by elevated railroad or other grade separation with the terminal.

"Any design, however, that is applied to Macy or First Streets should be applied in such a manner as not to interfere with the probable separation of grade at Aliso Street at such time as the same shall become necessary.

"Specifications for the Separation of Grades on the streets mentioned relative to railroad tracks, are as follows:

Specifications for the separation of grades on the streets mentioned relative to railroad tracks, are as follows:

1. (A) 1st—All grade crossings other than those of industrial spurs must be removed;
2. 2nd—No industrial tracks permits should hereafter be granted for the use of the streets at grade longitudinally;
3. 3rd—All tracks now longitudinally within any street, to be confined to use for industrial purposes only, and finally removed as soon as access to the industries served can be obtained otherwise;
4. 4th—That eventually all spur tracks shall herring-bone out east and west from leads along the river-bank, and these leads and all other trackage throughout the city be for joint use by all railroads;

NOTE: A. 1, 2, 3, include Alameda Street, which should be handled in the following manner:

5. 1st Step—Eliminate through-freight and restrict the use of these tracks to passenger service and local car deliveries and removals;
6. 2nd Step—Eliminate passenger service;
7. 3d Step—Finally remove tracks altogether.
8. 5th—These requirements of course are susceptible to but one interpretation, namely—that the elimination of grade crossings for other than industrial deliveries and the maintenance of the minimum number of such grade crossings, with joint use of trackage, means a Union Terminal for Los Angeles, both passenger and freight, and it is only on this basis that the congestion and danger of railroad crossings can be avoided and minimized, and the best interests of the City at large and the Railroads themselves can be conserved.

The considerations bearing on the City's use of the streets as affecting the design for the separation of grades, are as follows:

9. (B) 1st—The greatest use to the public;
10. 2nd—The lowest grade percent possible with a maximum grade not to exceed 4 percent.
11. 3d—The least obstruction to possible river floods, thereby avoiding possible damage to other parts of the City, by reason of acting as a dam, or other obstruction to the river, assuming 50,000 second feet as extreme flood condition; and
12. 4th—The least damage to adjacent property.

The consideration governing the readjustment of road grades and alignment, are:

13. 1st New grades for railroad tracks shall not be such as to seriously interfere with the proper operation of the railroad;
14. 2nd Grades as now established for yard purposes shall not be reversed unless the yard can be redesigned;

15. 3d—Access to industry spurs shall not be rendered inoperative.
16. 4th—Through freight or passenger service may be readjusted but must not be crippled.

Predicated upon the above, we find the following methods of separating the grades of streets and railroads:

17. 1st—All tracks can be elevated to full clearance over present street grades. This does not appear to be feasible or practicable, from the fact that it would cut the railroads off absolutely from the industries they are now serving within this district, and force the abandonment of the same as industrial territory.
18. 2nd—All streets can be elevated to full clearance over present railroad grades. This is not justifiable, as it will elevate the streets too high above the present surroundings and make the approaches too long to be reasonable.
19. 3d—All tracks can be depressed to full clearance under present street grades. This is not feasible because it would put the railroad tracks under water in flood time, and would also cut them off from access to the industries in the same manner as if elevated to full clearance above the street.
20. 4th—All streets can be depressed to full clearance under present railroad grades. This is impossible as it places the bridges crossing the river well down below the flood line, and makes them act as a series of dams, which would cause irreparable damage.
21. 5th—All tracks can be elevated part way, and all streets can be depressed part way, yielding full clearance between. This we believe is not feasible in all cases.
22. 6th—All tracks can be depressed part way and all streets can be elevated part way, yielding full clearance between.

This we believe to be the best practicable solution. It will make the minimum approach to the bridges across the tracks and the river, and will fill all the general specifications heretofore mentioned.

The City Engineer in signing this report, reserves the right of reconsidering the design proposed for 7th and 9th Streets.

"The requirements for the establishment of a level to which the railroad tracks can be depressed, will be the gauge as to how high the streets will have to be raised. This will involve a study of the necessary channel of the Los Angeles River and the establishment of a standard cross-section to be based on the grade established for the river bed itself.

"We believe that it is safe to assume that the trackage along the river could be lowered to a line 20 feet above the grade established for the river bottom.

"We attach hereto a tentative profile* made up from such information as we had at hand, showing the present bed of the river, the elevation of the Santa Fe and Salt Lake Railroads on the west and east bank of the same, together with a tentative grade line to which, we believe, the railroads can safely be depressed.

"The solid red grade line shows the grade line proposed to be reached finally and is 20 feet above the river bottom, while the dotted red line shows the proposed deviation from this grade line to meet conditions that cannot immediately be altered. It is not now feasible to lower the railroad bridges

*See Fig. 23, page 139.

crossing the river for the same reason that it is not now feasible to lower the street bridges, so that for the present it is proposed to meet the present grades of the Santa Fe bridge at North Broadway, the Southern Pacific bridge at Aliso Street and the Salt Lake bridge at or near Sixteenth Street, and lower these later when the trackage conditions have been altered to suit the then conditions.

"This would mean that at the various streets under discussion, the railroads would be depressed below their present level, as follows:

Depress	Main	Macy	First	Fourth	Seventh	Ninth
Santa Fe	2.7	7.5	8.5	6.5	10.50	7.0
Salt Lake	3.5	8.5	4.25	9.50	11.25	8.5

Respectfully submitted,

(Signed) HOMER HAMLIN,
City Engineer.

F. D. HOWELL,
Chief Engineer, Board
of Public Utilities.

SAMUEL STORROW,
Consulting Engineer,
Municipal League of
Los Angeles."

NECESSITY AND ADVISABILITY OF ELIMINATION

The necessity for eliminating crossings at grade may be measured by the amount of vehicular traffic, amount of railroad traffic, number of passengers carried over the crossings, the number of accidents and the liabilities therefor, the influence of the delays occurring at the crossing and the cost of elimination.

Once decided that a situation is intolerable, there are several possibilities for improvement: The track may be done away with, the highway may be abandoned, the railroad traffic may be diverted or the vehicles may be rerouted. If one of these schemes does not bring about the desired result, it becomes necessary to make a separation of grades. There are, in general, six methods of separating grades at crossings, as follows:

- (1) All tracks can be elevated to full clearance over present street grades.
- (2) All streets can be elevated to full clearance over present railroad grades.
- (3) All tracks can be depressed to full clearance under present street grades.
- (4) All streets can be depressed to full clearance under present railroad grades.
- (5) All tracks can be elevated part way, and all street grades can be depressed part way to yield full clearance between.
- (6) All tracks can be depressed part way and all streets can be elevated part way to yield full clearance between.

One of these methods must be used in any location, the method to be chosen depending on the topography, the amount of traffic, the relation of the railroad to improvements and the City plan and, lastly, cost.

For example, where a trunk line railroad cuts directly across an important part of a city it is usually found advisable to adopt the first method. This is particularly true in level cities, such as Chicago and, in a measure,

Detroit. The principal disadvantage of this method is that there is a great inconvenience and expense to industries which find it essential to have spur track connections. This method was proposed for Alameda Street in Los Angeles, but, because of the industry track situation, it was not thought feasible.

It may be well to point out at this time that conditions in Los Angeles are peculiarly favorable to the elimination of main line grade crossings, in that two of the three steam railroads are now located on the east and west banks of the Los Angeles River through the industrial parts of the city, and are crossed by very few streets. In the northerly portion of the district, where the Los Angeles River Valley contracts to such an extent that all three railroads are brought together along the banks of the river, it is possible to pass over them with a single structure similar to the North Broadway or Buena Vista Bridge. The southern portion of the industrial district is practically level on the west side of the river, but on the east side, within a comparatively short distance, the ground rises abruptly and there is a well-defined line between the bluffs and the level ground adjacent to the river. These conditions will appear important in the study of the elimination of the grade crossings formed by the Salt Lake tracks on the east bank and the Santa Fe tracks on the west bank of the Los Angeles River.

STREET TRAFFIC IN GENERAL

In the past few years an epochal change has taken place in street traffic: the horse and bicycle have been very largely displaced by the automobile (pleasure cars and commercial vehicles) and the motorcycle. Liability of accident has been enormously increased, due to the greater speed at which the modern vehicle moves, and the accompanying increase in the minimum distance in which a stop can be made.

In Chicago, between 1907 and 1913, it has been recorded, teams increased 11.8 per cent in number, while motor vehicles increased 832 per cent, with an increase in the number of all vehicles of but 19.1 per cent (Report on the Rearrangement and Development of the Steam Railroad Terminals of the City of Chicago, by Bion J. Arnold, 1913). From other studies in Chicago, the following increases are shown (Journal W. S. E., February, 1918):

CHANGES IN CHARACTER OF VEHICLES—CHICAGO

Year	Kind of Vehicle					
	Self Propelled		Trucks		Horse Drawn	
	No.	%	No.	%	No.	%
1916	45 409		9 898		46 187	
1910 .....	...		799		...	
1908	5 475				53 678	
Gain	39 934	729%	9 099	1 138%	* 7 491	14%

*Loss.

In our state the number of automobiles has increased very rapidly, as will be seen from the following:

GROWTH IN NUMBER OF AUTOMOBILES

Years.	—Automobile Registrations—			
	State		Los Angeles County	
	No.	Increase	No.	Increase
1914	123,516	....	43,099	....
1915	163,795	33%	55,217	28%
1916	232,440	42%	74,709	35%
1917	306,916	24%	93,654	25%
1918	364,800	19%	107,232	14%

Of the 107,232 automobiles registered in Los Angeles County, approximately 63,000 are registered in the City of Los Angeles, and of these about 9,000 are trucks.

With reference to the present relative numbers of the different kinds of vehicles, we can, from our counts, including different locations of grade crossings of steam carriers, and covering over 500 hours' traffic and about 140,000 vehicles, show the following result:

Relative Numbers of Different Classes of Vehicles	
Automobiles	57%
Trucks	31%
Wagons	8%
Motorcycles	3%
	100%

Very comprehensive studies in Chicago (Jour. W. S. E., Feb., 1918) showed that two-thirds of the number of vehicles counted in and out of the central business district were used for business and that 85 per cent of all movements of vehicles were made by these business vehicles. This is inserted to draw attention to the fact that in Chicago the traffic problem is intimately associated with business progress—and in Los Angeles the same general relation must hold, although the percentage of business vehicles to total vehicles is probably somewhat less.

It seems of particular importance to note the large number of motor vehicles in Los Angeles County and the surrounding territory. Table I, Appendix, shows that 107,232 automobiles were registered from Los Angeles County in 1918. This is 29 per cent of all the automobiles registered in California, and shows the relatively large number as compared with other locations, particularly when combined with the three contiguous counties. In this territory, there is a total of 128,767 automobiles. In Southern California (as this term is commonly used), there are 159,528 cars, or nearly one-half the total number in the state.

This relatively high proportion of local automobiles and the large percentage of high speed vehicles, are important factors in connection with elimination of grade crossings. Our studies take account of this fact. Traffic studies dealing with the vehicular and railroad traffic in different

localities are grouped with the discussion of the necessity and advisability of the elimination of grade crossings at these various places.

It is interesting to note a comparison of the vehicular traffic at Seventh Street and Broadway with some other points more particularly concerned in this report. At Seventh Street and Broadway most people are familiar with the congestion and are more or less impressed by it. While this is the most congested point in the city, the greatest vehicular movement is elsewhere. In the following table consideration should be given to the difference between an intersection where two streets are involved, such as at Seventh Street and Broadway, and a crossing, such as at the bridges over the Los Angeles River, where but one street is involved.

RUSH HOUR VEHICLE TRAFFIC AT SEVERAL OF THE MORE CONGESTED POINTS LOS ANGELES

Location	Date	Hours	No. of Vehicles and Cars			
			East & West		North & South	
			Vehicles	Cars	Vehicles	Cars
7th & Broadway	6-6-19	5-6 PM	669	87	692	107
N. Broadway Bridge..	4-9-18	5-6 PM	...	...	1174	104
Macy St. Bridge	1-9-18	5-6 PM	647	31*	...	...
7th St. Bridge	5-9-18	5-6 PM	499	29	...	...
6th & Alameda	2-4-18	7-8 AM	667	0	...	...
7th & Alameda	5-8-18	4-5 PM	523	64	...	...
Sunset Blvd. near Main St.	3-21-18	5-6 PM	861	181	..	...
Los Angeles St. at Plaza	3-21-18	5-6 PM	..	...	672	..
Marchessault St. at Plaza	3-21-18	5-6 PM	558	0	...	...
Alameda St. south of Macy	3-1-18	4-5 PM	...	....	640	...

*On separate bridge.

CHAPTER VI.

OUTLINE

Los Angeles River Crossings

Traffic Studies

Vehicular Traffic Over Crossings

Railroad Traffic Across the Streets at the River

Grade Crossings at Los Angeles River a Menace and Nuisance

Plans for Elimination of Crossings

Short Viaduct Plan Preferable and Practical

Tracks Adjacent to River Should Be Depressed

Amount of Depression Recommended at Various Streets

Difference in Depression from Hamlin-Howell-Storrow Report

Estimates on the Santa Fe or West Side of Los Angeles River

Simple Depression of the Santa Fe Tracks

Depression Based Upon Union Passenger Station at the Plaza, and
Union Freight Station at the Santa Fe Site

Depression Based Upon Union Passenger Station at the Santa Fe Site

Depression Based Upon Union Passenger Station at Southern Pacific
Site and Union Freight Station at Santa Fe Site

Estimates on the Salt Lake or East Side of Los Angeles River

Simple Depression of Salt Lake Tracks

Depression Based Upon Union Passenger Station at Either the Plaza
Site or the Santa Fe Site

Depression Based Upon Union Passenger Station at Southern Pacific Site

Adaptability of Southern Pacific-Salt Lake Plan to Proposed River Track
Depression

Excavation Quantities

Order in Which the Work Should Be Done

Simple Depression—No Union Passenger or Freight Station

Union Station at the Plaza

Union Station at the Santa Fe Site

Union Station at the Southern Pacific Site

CHAPTER VI
DEPRESSION OF TRACKS AND ELIMINATION OF GRADE
CROSSINGS AT THE LOS ANGELES RIVER

LOS ANGELES RIVER CROSSINGS

It is our belief that the crossings which should be first considered are those where the various streets cross the Los Angeles River. The tracks of the two carriers on the east and west banks of the river will probably remain there, since this seems to be the logical location for north and south trackage, and the railroads will probably retain this location for all time. The elimination of these crossings can be undertaken regardless of the proposed location of a union passenger terminal for the reason that the establishment of this facility has no effect upon them other than to modify certain of the crossings. Neither is the separation of these river crossings dependent upon the recommendations for the improvement in the handling of freight.

TRAFFIC STUDIES

Certain traffic studies have been made in order to have the facts regarding traffic at the crossings of various streets and the Los Angeles River and the tracks of the Atchison, Topeka and Santa Fe Railway and the Los Angeles and Salt Lake Railroad adjacent to the river. The resulting data indicate, to a large extent, whether public convenience and safety require the elimination of these crossings and also the relative importance of elimination at different points.

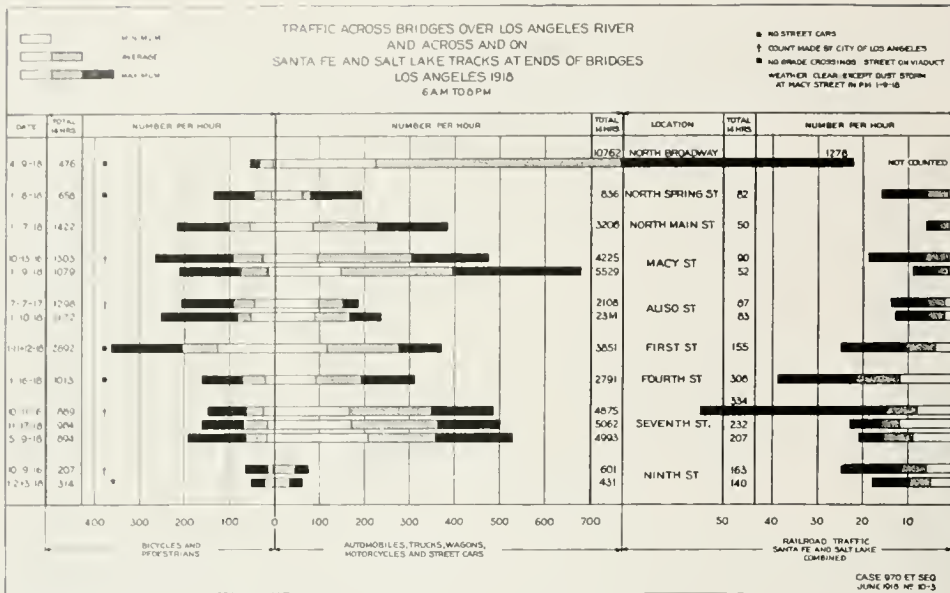
To determine certain characteristics of the traffic across the grade crossings adjacent to all the bridges across the Los Angeles River, we have counted the traffic for a day of fourteen hours (6 A.M. to 8 P.M.) at all the bridges. An average week day was chosen for the counts, and no check was made on holidays, Sundays, rainy days or on days on which showers or rain was predicted. Supplementing our efforts, several counts were made by the Board of Public Utilities of Los Angeles. Our counts were made principally in January, 1918, while those of the City were of November, 1916, and July, 1917. The difference in results lies principally in that in each case we found a more extensive use of the bridges by the public and a less extensive use of the adjacent tracks by the trains than was shown by the counts of the City.

The following segregations were made, all independent of direction, the figures including movement in both directions:

Motive Power	Railway Traffic	Human
Street Traffic		
Automobiles	Passenger Trains	Pedestrians
Trucks*	Freight Trains	Bicycles
Wagons	(separate or together,	
Motorcycles	Switch Engines and cars	
Street Cars**	counted as one)	
	Light Engines	

*A truck is defined as a vehicle with body arranged for freight, packages, etc.

**At Aliso Street two or three car trains of the Pacific Electric were counted as one.



California Railroad Commission Engineering Dept.

FIG. 22. STREET AND RAILWAY TRAFFIC AT THE LOS ANGELES RIVER BRIDGES

This diagram shows the results of traffic counts at those bridges on the date given in the first column. The traffic is divided into three groups for each crossing: pedestrian, vehicle and railroad.

Fig. 22 shows some of the results of the counts of the traffic across bridges over the river and on the tracks on each side of the river. We have the average number of times the crossings are used and the maximum number per hour. The chart does not show, however, at what time of day these conditions occur at the various bridges. (This information may be obtained from other charts not reproduced in this report.) It appears that the maximum traffic is between 4 P. M. and 5 P. M., although the maximum automobile traffic is between 5 P. M. and 6 P. M. The observers report, however, that the maximum vehicular traffic is really between 4:30 P. M. and 5:30 P. M. The vehicular travel, at all bridges taken together, shows a fairly even distribution throughout the day, as will be noted in the following tabulation:

PERCENTAGE OF TRAVEL EACH HOUR—6 A. M. TO 8 P. M.

(Automobiles, Trucks, Wagons and Motorcycles)

A. M.	P. M.
6 to 7..... 2.6%	12 to 1..... 7.2%
7 to 8..... 6.4%	1 to 2..... 7.3%
8 to 9..... 7.6%	2 to 3..... 8.2%
9 to 10..... 7.7%	3 to 4..... 8.2%
10 to 11..... 8.5%	4 to 5..... 10.1%
11 to 12..... 8.1%	5 to 6..... 9.9%
6 to 12..... 40.9%	6 to 7..... 4.5%
	7 to 8..... 3.7%
	12 to 8..... 59.1%

This data is important in consideration of the facilities provided at the rush hours, or of the present crowding at certain bridges and the delays at certain crossings.

Figures giving average daily or yearly traffic movements are, as a rule, derived from one or more days count, which is assumed as an average day; yearly figures are simply 365 times as large. This method of computation can be made subject to refinement but is thought sufficiently accurate.

Vehicular Traffic over Crossings

It appeared necessary to make some study of the use of these crossings and with this in view, the number of people passing over the bridges across the river and over the Santa Fe and the Salt Lake tracks (which are on opposite sides of the river), was studied with the following result, which is found in more detail in Table II, Appendix.

	People Per Year
Over present five grade crossings.....	33,000,000
Over present four viaducts and bridges.....	32,000,000
	<hr/>
Total	65,000,000
Average per day	178,000

This figure is equivalent to having the entire population of Los Angeles crossing the river approximately every third day.

The people passing over the present grade crossings were, with respect to mode of conveyance, as follows:

	Number Per Year	Ratio
People in vehicles.....	11,291,600	34%
Pedestrians and bicycles	2,222,100	7%
People in cars	19,744,300	59%
	<hr/>	<hr/>
Total	33,258,000	100%

The vehicles, too, may be subdivided, the figures representing as above, the number per year using the present grade crossings:

	Average Day	Year	Ratio
Automobiles	10,113	3,691,245	63%
Trucks	3,612	1,318,380	22%
Wagons	2,038	743,870	12%
Motorcycles	551	201,115	3%
	<hr/>	<hr/>	<hr/>
Total	16,314	5,954,610	100%

It may be well to contrast some of our findings with the data in the testimony, in order that the latter may not stand unchallenged. Witnesses Koenig and James presented traffic counts at Fourth Street and the river which compare as follows with our findings:

Item Number of	Date Hours—6 A. M.-8 P. M.	James	Engr. Dept.
		7-21-17	1-16-18
Vehicles		2,940	2,679
Pedestrians		472	865
Street Cars		254	260
Passengers on Cars		5,757	6,601*

*4-1-18, for 24 hours.

It is seen that our figures are not very far from those of Mr. James and are within the limits of change between the dates.

Witness Koenig presented evidence covering traffic at East Seventh Street bridge, which compares with our data as follows:

Item Number of	Hours Dates	Koenig		Engineering Department	
		6 A.M.-8 P.M. 7-21-17	1-17-18	6 A.M.-8 P.M. -----	5-9-18
Vehicles		5,080	4,892	....	4,779
Passengers in Vehicles		30,480	....	*9,323	....
Pedestrians		870	....	749	....
Street Cars		361	383	....	361
Passengers in Street Cars		7,201	....	†10,203	....
Total Persons		38,551	....	†20,275	....

* Two dates averaged.

† 24 hours, April 1, 1918

We believe that Mr. Koenig's total figure is about twice what it should be on account of an error in the number of passengers per vehicle.

Railroad Traffic across the Streets at the River.

The railroad traffic on the Santa Fe and the Salt Lake on both sides of the river and across the five east and west streets with grade crossings, may be briefly set forth as follows: (see Fig. 22, page 134).

Street	—6 A.M. to 8 P.M.—					
	Santa Fe			Salt Lake		
	Trains Pass.	Frts.	Pass.&Frts.	Trains Pass.	Frts.	Pass.&Frts.
North Main	8	3	24	7	1	7
Macy	8	2	11	12	0	19
Aliso	10	2	34	7	1	29
Seventh—May, 1918*	18	4	105	14	2	64
Seventh—Jan., 1918	19	7	118	11	4	73
Ninth	19	10	91	12	2	6
Totals	64	24	278	49	8	134
Total movements per road..		366			191	
Total movements 14 hours..			557			

* Excluded in totals.

The delays to traffic at Seventh Street on the west (Santa Fe) side were two hours and two minutes out of the fourteen hours counted, or, to put it differently, the gates were down 14 per cent of the time. On the east (Salt Lake) side, the gates were down one hour and thirty-nine minutes, or 12 per cent of the time. The Board of Public Utilities of the City of Los Angeles found, on October 11, 1916, that the percentage of time the gates were down was 18.5 per cent for the Salt Lake gates and 19 per cent for the Santa Fe gates.

Grade Crossings at Los Angeles River a Menace and Nuisance

With these 557 movements per day (6 A. M. to 8 P. M.) of trains across these five crossings, and with 16,314 vehicles and 2,042 street and interurban cars—a total of 18,356 vehicles moving across the tracks, practically all at four crossings—it will be obvious that there is a large menace in the form of liability of accident. With the gates down such a large per cent of the time (up to 19 per cent), the crossings are a prolific source of delay to traffic and those at grade should be eliminated.

PLANS FOR ELIMINATION OF CROSSINGS

Short Viaduct Plan Preferable and Practical

We have before us two general plans for the elimination of crossings at grade of the streets across the river: the "long viaduct" plan, as proposed by Mr. Arnold and later by Mr. Howell, and the "short viaduct" plan as proposed by Messrs. Hamlin, Howell and Storrow.

After considerable study, we have reached the conclusion that the "short viaduct" plan will, in general, give the best solution to the problem of elimination of crossings of various streets and of tracks adjacent to the river, for the following principal reasons:

- (1) The industrial district adjacent to the river is at grade and is thus better served by short viaducts.
- (2) Public opinion is against viaducts of great length in this industrial district.
- (3) Lower cost and less property damage is incurred.
- (4) Future extension of approaches, if advisable, is not prevented.
- (5) Transition from subway to elevated railway is more easily accomplished.

This means that the tracks along the river should be depressed part way and that the streets should be elevated part way, so that the necessary clearance of twenty-two feet over the tracks is obtained.

The question of how high the streets would have to be raised depends upon the establishment of how far the railroad tracks can be depressed, and this latter involves a study of the channel of the Los Angeles River. The Hamlin-Howell-Storrow report states that the authors believe it safe to assume that the trackage along the river could be lowered to an elevation of twenty feet above the grade established for the river bottom. It is a demonstrable fact that the bottom of the river is now much lower than it

was on account of the straightening of the river, which has increased the velocity and, consequently, the scouring power of the water, and also on account of the removal of the sand and gravel of the river bed for building operations within the city. Extensive studies dealing with this subject have been made by the Engineering Department of the City of Los Angeles.

We know that the authors of this report have made very comprehensive studies of flood conditions in the Los Angeles River and have also had a good deal of actual experience with this river. We believe, therefore, that their estimates of the lowest safe elevation to which the tracks along the river can be depressed are entirely sound.

We have discussed the tentative profile attached to the report of the three engineers, which shows the grade line to which the railroad tracks could be safely depressed, with the Chief Engineer of the Salt Lake Railroad and have ascertained that he does not entertain any serious engineering objection to this depression. We understand that he agrees that the depression of the Salt Lake tracks to the tentative grade line would be safe. We are advised by the Santa Fe that the depression to the proposed grade line is practicable but expensive.



Diagram of the geological structure.

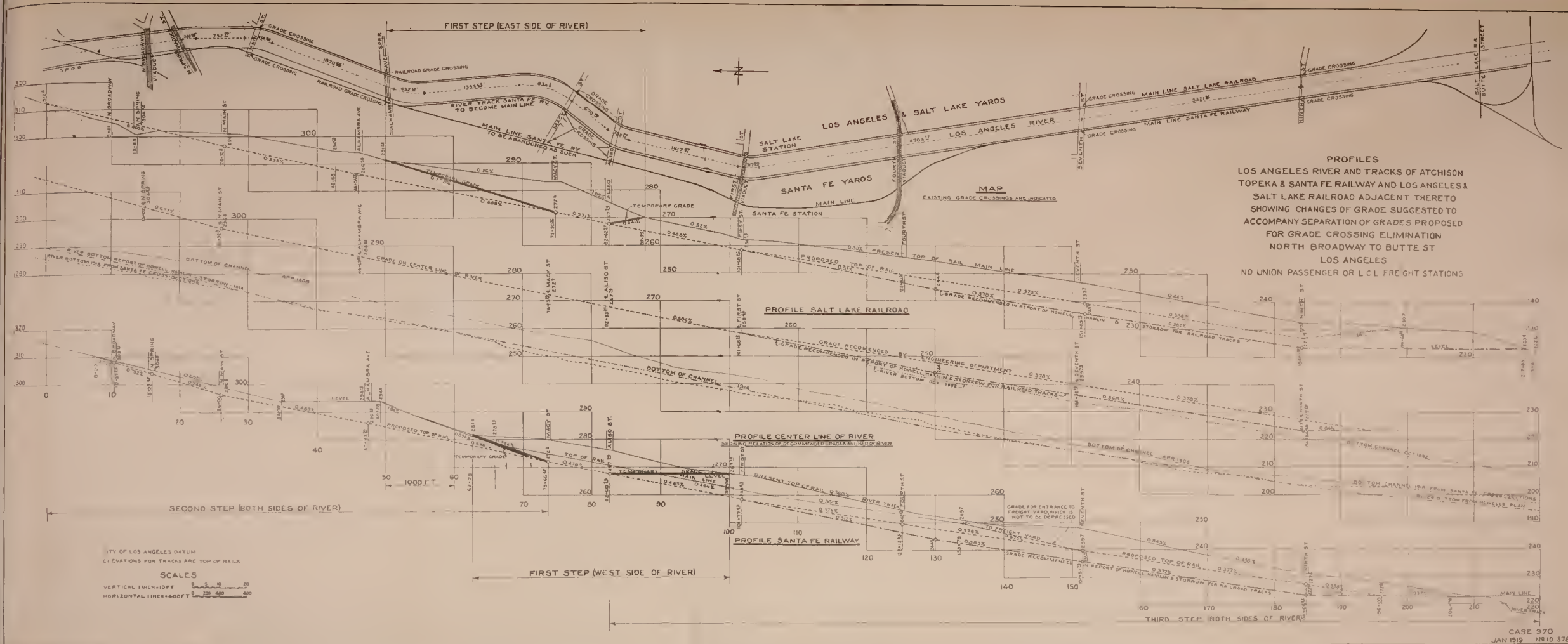


FIG. 24. PROFILES OF RIVER BANK TRACKS

This is a study made by the Engineering Department to show the relation between the existing grades and those which would result under track changes at the terminals at the yard, but the plan was used as the basis for the three plates which follow. Departures from the recommendations of the 'T' & 'R' are shown.

Tracks Adjacent to River Should be Depressed

With this information before us we are of the opinion that the Salt Lake and Santa Fe tracks along the river should be depressed to the grade line shown in the above profile, Fig. 23, which profile is substantially the same as that submitted to the Commission as Exhibit No. 1 by the City of Los Angeles. The difference between these two profiles arises in this way:

The profile submitted as an exhibit shows a final grade line for the tracks on both sides of the river, but the grade line and station shown are those on the center line of the official bed of the Los Angeles River. Our profile, (Fig. 23), shows three grade lines: one on the center of the river and one each for the Santa Fe and the Salt Lake tracks. It will be noted that these two latter grade lines show, at the points where various streets cross the river, the same elevations for the proposed final grade for the Salt Lake tracks, the center line of the river and the Santa Fe tracks. Between these streets, the rates of grade and elevations are slightly different, this difference being introduced by the difference in distance along the tracks on account of the curvature of the river and tracks.

Amount of Depression Recommended at Various Streets

The major difference, however, between the profile showing the grades recommended in the three engineers' report (City of Los Angeles Exhibit No. 1) is shown in the following tabulation which gives the amount to which the tracks of the Salt Lake and the Santa Fe are recommended to be depressed at the various streets now carried across the river by means of bridges and viaducts:

RECOMMENDED DEPRESSION OF TRACKS ALONG LOS ANGELES RIVER

	Street									
	**Spring	**Alham-				**Aliso	1st	4th	7th	9th
Santa Fe	Ft.	Main	bra	Macy	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
City Ex. 1	1.5	2.7	7.5	7.5	7.8	8.5	6.5	†10.2	7.0	
Engr. Dept.	1.2	2.5	7.9	7.9	8.3	8.7	3.6	7.0	2.7	
	0.3	0.2	0.4	0.4	0.5	0.2	2.9	3.2	4.3	
Salt Lake										
City Ex. 1	3.0*	3.5	7.2	8.5	6.6	4.25	‡9.2	11.25	8.75	
Engr. Dept.	3.4*	4.5	8.0	11.3	8.0	3.8	6.4	7.3	5.1	
	0.4	1.0	0.8	2.8	1.4	0.45	2.8	3.95	3.65	

* Raise (fill).

** Depression at Spring, Alhambra and Aliso Streets not listed in report of Messrs. Howell, Hamlin and Storrow, but shown on profile attached to Exhibit.

† 10.2 from the profile; 10.5 in above report.

‡ 9.2 from the profile; 9.5 in above report.

Difference in Depression from Hamlin-Howell-Storrow Report

The principal differences, it will be noted are at Fourth, Seventh and

Ninth Streets, where the amount of depression we have recommended is considerably less than that recommended in the report of the three engineers. At the other streets the differences are probably due to the fact that our data is more accurate, for we have made no attempt to depart from the proposed elevations.

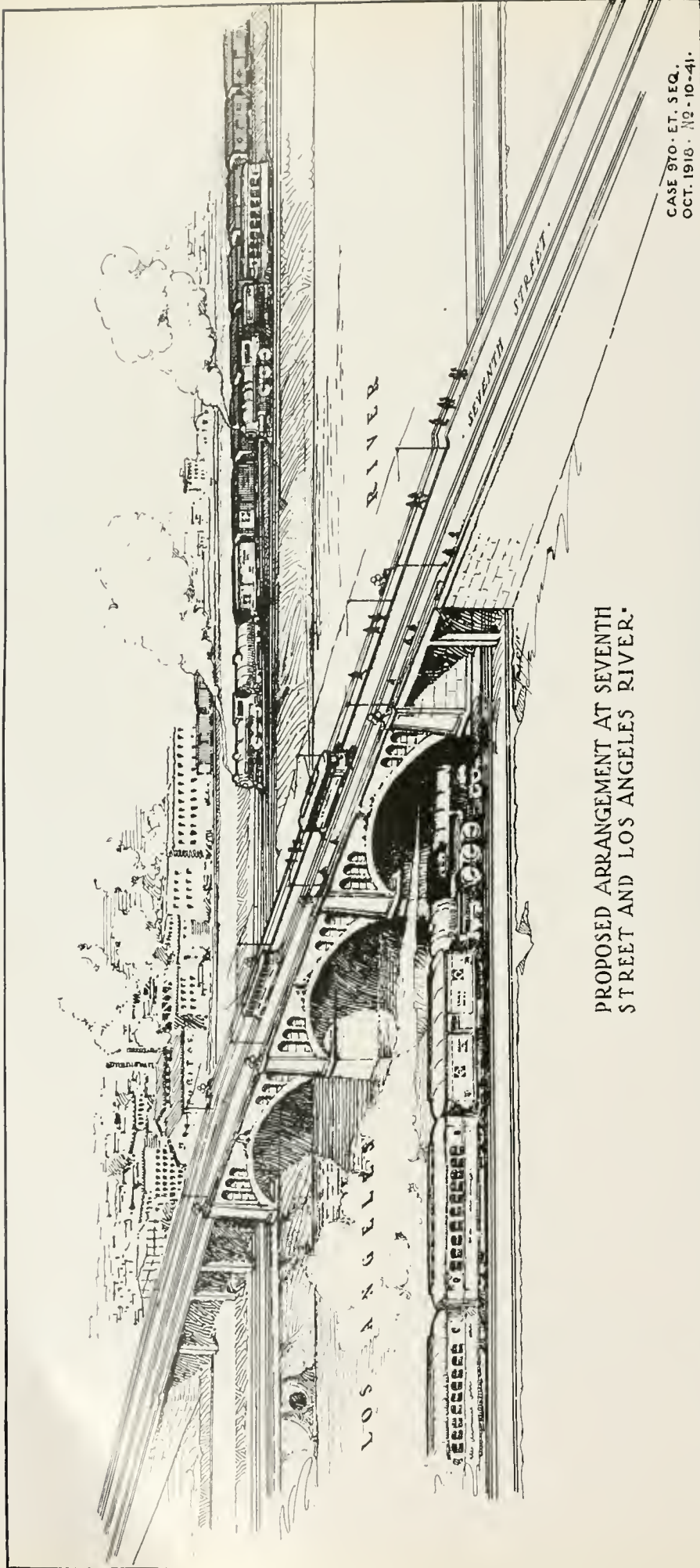
It was at first thought that the grades recommended by the three engineers would be entirely satisfactory, but a detailed study has led us to believe that the modifications as shown in the last tabulation should be made. The following line of reasoning was responsible for this change:

It was assumed that if a union passenger terminal is recommended or established in the vicinity of the Plaza or at the Arcade depot site, the Santa Fe should not be forced to regrade the entire area of about sixty acres covered by its freight yards between First and Seventh Streets; or if a union station, passenger or freight is recommended or established at the Santa Fe site, the grading should be reduced as far as possible. In short, this whole yard area should not be required to be depressed unless some advantage consistent with the cost obtains. The cost does not wholly lie in the excavation: removing and replacing tracks under operation is a large factor.

If the Santa Fe is to use this yard for freight alone, we would have a union passenger station elsewhere. If it be at the Plaza, then two main line passenger tracks would be required along the river and south of Fourth Street, and good practice would indicate that through freight trains and switching would require separate tracks. If the grade proposed by the three engineers' report at Seventh Street (elevation 235.7—City datum) be adopted, and also the plans for a viaduct similar to that shown in Fig. 56 on page 185 with four adjacent tracks along the river, the problem arises as to how to get the heavy freight trains into the yard on practicable gradients.

Any studies relative to grades between Seventh Street and the throat of the yard should take into consideration the ruling grades on the Santa Fe freight district over which Santa Fe trains entering this yard must run. The present ruling grade westward—San Bernardino to Los Angeles—on the Santa Fe, via Fullerton, is 0.7 per cent, and to introduce any grade heavier than this at this point would reduce the freight engine tonnage ratings. This is highly objectionable since it reduces the number of cars in every train which is filled up to the tonnage limit of the locomotive.

Opposite Willow Street which is about the southerly throat of the present freight yard, the present main line tracks of the Santa Fe are at an elevation of 250 feet. It is proposed, by constructing two tracks which for convenience we will call M and N, parallel to the two tracks adjacent to the river the nearer nineteen feet west of them and descending southerly, to pass under a proposed viaduct on Seventh Street and then to connect both M and N with the tracks adjacent to the river, and also, by a single track ascending southerly to connect M and N with the coach yard tracks, etc., near the location of the present Pullman building. This situation we have attempted to show graphically in the accompanying drawing.



CASE 970-ET. SEQ.
OCT. 1918. No. 10-41.

PROPOSED ARRANGEMENT AT SEVENTH STREET AND LOS ANGELES RIVER.

FIG. 24. PERSPECTIVE OF BRIDGE OVER THE LOS ANGELES RIVER AT SEVENTH STREET

This sketch shows the general design of bridges proposed in this report. Bridge here shown is proposed for Seventh Street and contemplates simple depression of tracks on both banks of river.

With the tracks at Seventh Street at elevation 235.7, as proposed in City's Exhibit No. 1, a grade in excess of 0.8 per cent on tracks M and N is necessary, and this is too steep. If this elevation is changed from 235.7 to 239.7, a 0.57 per cent grade can be obtained, which appears to be practicable since the grade at this point should be equal to somewhat less than the ruling grade on the district, on account of slow movement, virtual profile, etc. Raising the elevation of the proposed grade at this point 4.0 feet does not appear to introduce any objectionable features; the toes of slope of the viaduct approach are simply moved about 100 feet further away from the river, and on the west, to the east side of Santa Fe Avenue. It will also be possible—and this is important—to run the switching leads (which are about 160 feet from the river) under the viaduct, although the grades of these leads will not be the best.

On the north side of Seventh Street, at Santa Fe Avenue, the ground floor of an existing building is about three feet above present grade. Little damage, therefore, will result. A fire house is located on the opposite side of Seventh Street, at the corner of Santa Fe Avenue, and appears to be the only building affected by this change of grade. The effect on this structure is simply to raise the street at the doorway from five to seven inches. On the whole, there is little difference in property damage between having the depressed tracks at elevation 235.7 and 239.7.

At Ninth Street the grade recommended by the three engineers is at elevation 223.4. It seems that at this point, too, it would be highly desirable, from the viewpoint of facility of operation, to have the Santa Fe main switching leads, which are here also about 160 feet west of the river, carried across Ninth Street instead of cutting them off at the street line. This is just as desirable as at Seventh Street.

At Ninth Street the property is not well developed. Nor is it particularly expensive, and there is a long block from the river to Santa Fe Avenue. At present the main switching leads are at elevation 227.5, and upon examination and study we can see no good reason why they should not remain at this elevation and why the tracks along the river should not be depressed to the same elevation. This change does not increase the cost of the structures out of proportion to the reduction in excavation for the tracks and to the operating advantages gained.

It was found that a grade line connecting these new proposed elevations at Seventh and Ninth Streets would intersect the grade line proposed by the three engineers approximately at Station 101 plus 77, the point of change of grade at First Street, and we have, therefore, shown a grade line straight from Station 101 plus 77 to approximately Station 184 plus 66, the center line of Ninth Street, as will be noted on the profile. The rate of grade is 0.377 per cent.

The cost of the depression of the Santa Fe and Salt Lake tracks depends upon the location of a union passenger depot and a union less than carload

freight terminal, and also upon the location of various main line freight and passenger tracks running north and south through the City, since the quantities involved in excavation, track changes, etc., depend upon the number of tracks and their arrangement.

We have, however, made estimates of the cost of depressing the tracks under various conditions. The bases for these estimates follow, and, while there might be slight changes introduced, the figures would not be sensibly altered by the introduction of minor departures from the major plans.

ESTIMATES ON THE SANTA FE OR WEST SIDE OF LOS ANGELES RIVER

(a) Simple Depression of the Santa Fe Tracks

This estimate is based on depression to the proposed grades of the Santa Fe tracks as they now exist, except that certain changes are introduced which prevent literal adherence to this statement. The present main line between, approximately, First Street and Alhambra Avenue is to be abandoned as the main track and two new tracks, constructed adjacent to the river on the depressed grade, will become the main line. Between First Street and, approximately, Fourth Street, it is proposed to construct a double track line adjacent to the river, in addition to the present tracks. On the present main line, between First Street and Alhambra Avenue, it is proposed to remove entirely the tracks in Aliso and Macy Streets but not to interfere with the use of this track as a lead for the industry tracks branching off from it. Our estimate is then based upon a double track roadbed and tracks along the river all the way from North Broadway to Butte Street and the reconstruction of both ends of the yard between First and Fourth Streets to meet the proposed new tracks along the river. Estimates are made with Alhambra Avenue depressed and also with that Avenue not depressed. All grading for necessary changes in industry tracks is included.

(b) Depression based upon Union Passenger Station at the Plaza and Union Freight Station at the Santa Fe Site

This scheme is the same as in (a), except between Aliso Street and Seventh Streets, where the excavation is estimated as that necessary for a union freight station. The old main line tracks, approximately 160 feet from the river bank, are proposed to pass under the proposed Seventh Street viaduct at an elevation of four feet below that of the depressed river tracks, and the excavation includes the yardage necessary to make this depression. It is this arrangement that is embodied in our final recommendations.

(c) Depression Based Upon Union Passenger Station at the Santa Fe Site

This estimate is the same as in (b) except that the excavation between Aliso and Seventh Streets is that estimated as necessary for the passenger station yard. This scheme also contemplates depression of the old main line tracks to pass under the Seventh Street viaduct.

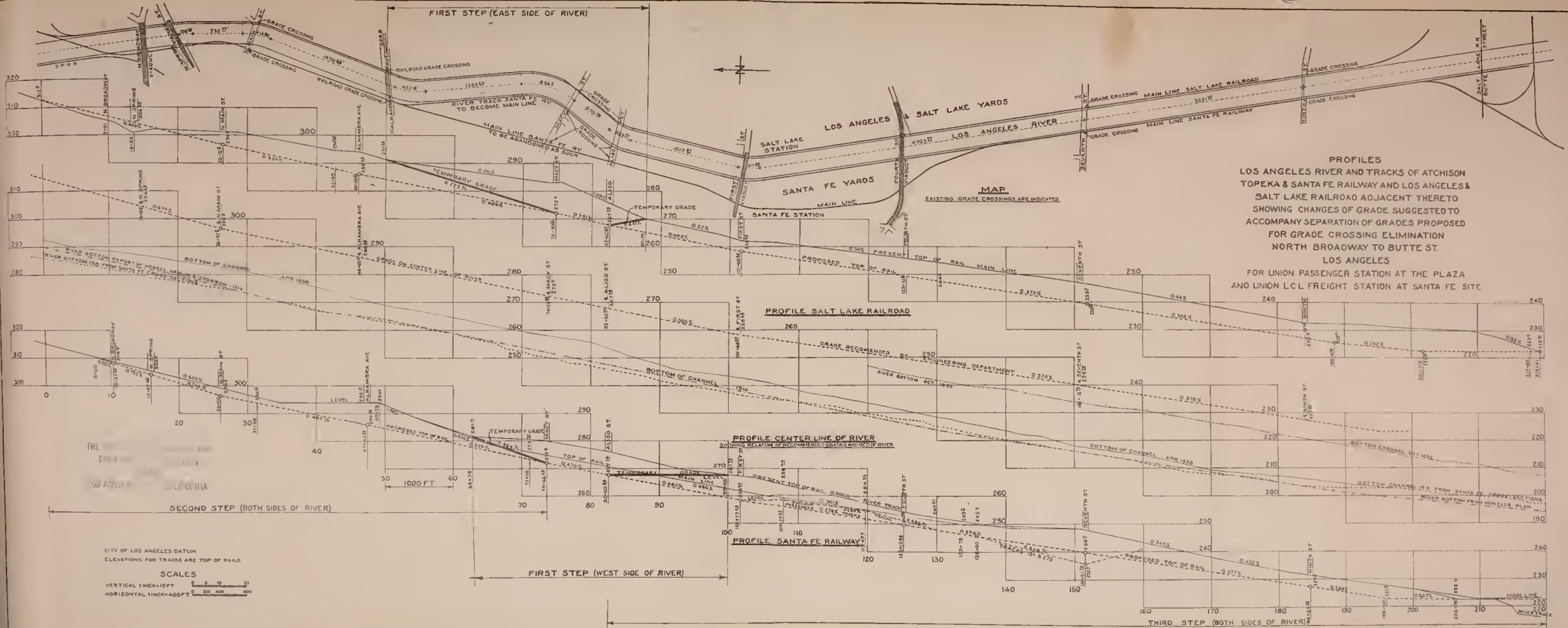
FIRST STEP EAST SIDE OF RIVER



PROFILE LINE

PROPOSED GRADE

FIRST STEP WEST SIDE OF RIVER



PROFILES
 LOS ANGELES RIVER AND TRACKS OF ATCHISON
 TOPEKA & SANTA FE RAILWAY AND LOS ANGELES &
 SALT LAKE RAILROAD ADJACENT THERETO
 SHOWING CHANGES OF GRADE SUGGESTED TO
 ACCOMPANY SEPARATION OF GRADES PROPOSED
 FOR GRADE CROSSING ELIMINATION
 NORTH BROADWAY TO BUTTE ST.
 LOS ANGELES
 FOR UNION PASSENGER STATION AT THE PLAZA
 AND UNION L.C.L. FREIGHT STATION AT SANTA FE SITE

MAP
 EXISTING GRADE CROSSINGS ARE INDICATED.

PROFILE SALT LAKE RAILROAD

PROFILE CENTER LINE OF RIVER

PROFILE SANTA FE RAILWAY

CITY OF LOS ANGELES DATUM
 ELEVATIONS FOR TRACKS ARE TOP OF RAILS

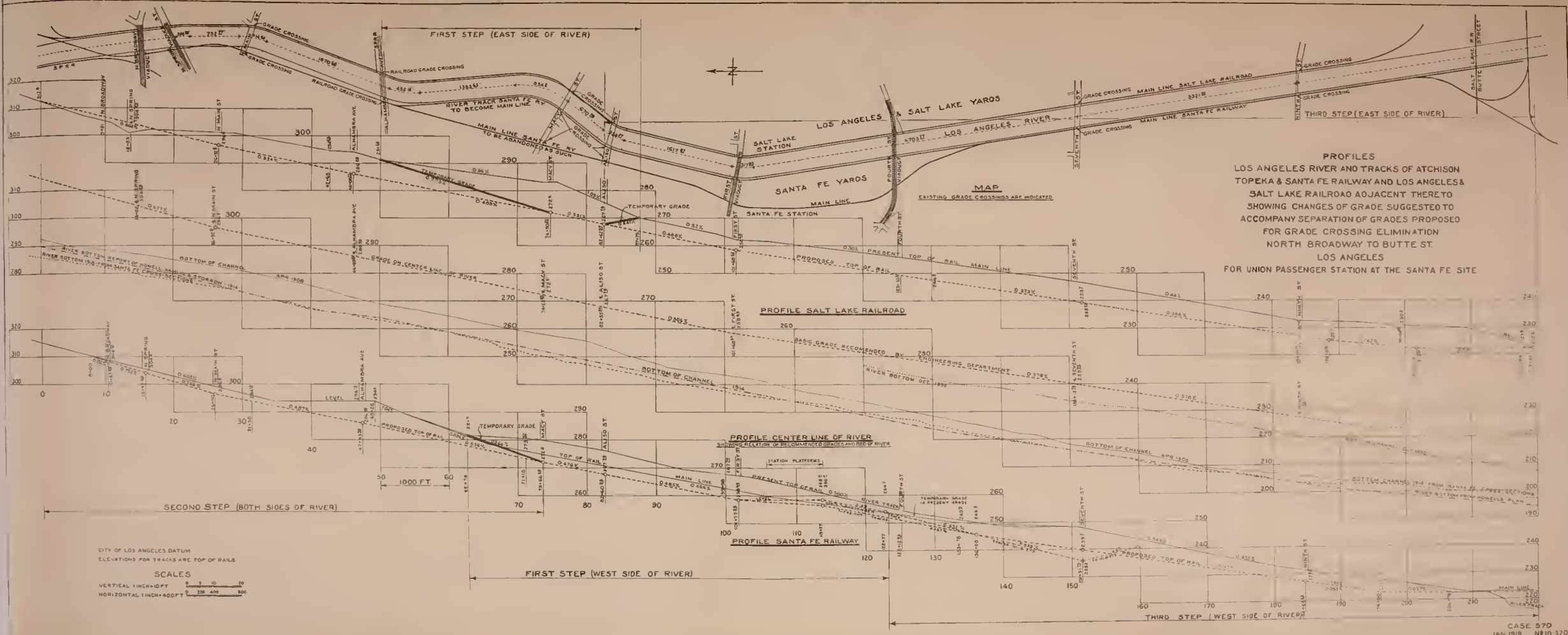
SCALES
 VERTICAL 1 INCH=10 FT
 HORIZONTAL 1 INCH=400 FT

FIG. 25. PROFILES OF RIVER BANK TRACKS ACCOMPANYING THE PLAN RECOMMENDED FOR A LAND STATION AT THE PLAZA
 Because of the importance of eliminating the grade crossings at Main and Alameda Streets, the first step in track depression includes these grade crossing eliminations

SECTION TO THE WEST



SECTION TO THE WEST



PROFILES
 LOS ANGELES RIVER AND TRACKS OF ATCHISON
 TOPEKA & SANTA FE RAILWAY AND LOS ANGELES &
 SALT LAKE RAILROAD ADJACENT THERETO
 SHOWING CHANGES OF GRADE SUGGESTED TO
 ACCOMPANY SEPARATION OF GRADES PROPOSED
 FOR GRADE CROSSING ELIMINATION
 NORTH BROADWAY TO BUTTE ST.
 LOS ANGELES
 FOR UNION PASSENGER STATION AT THE SANTA FE SITE

CITY OF LOS ANGELES DATUM
 ELEVATIONS FOR TRACKS ARE TOP OF RAILS

SCALES
 VERTICAL 1 INCH = 10 FT
 HORIZONTAL 1 INCH = 400 FT

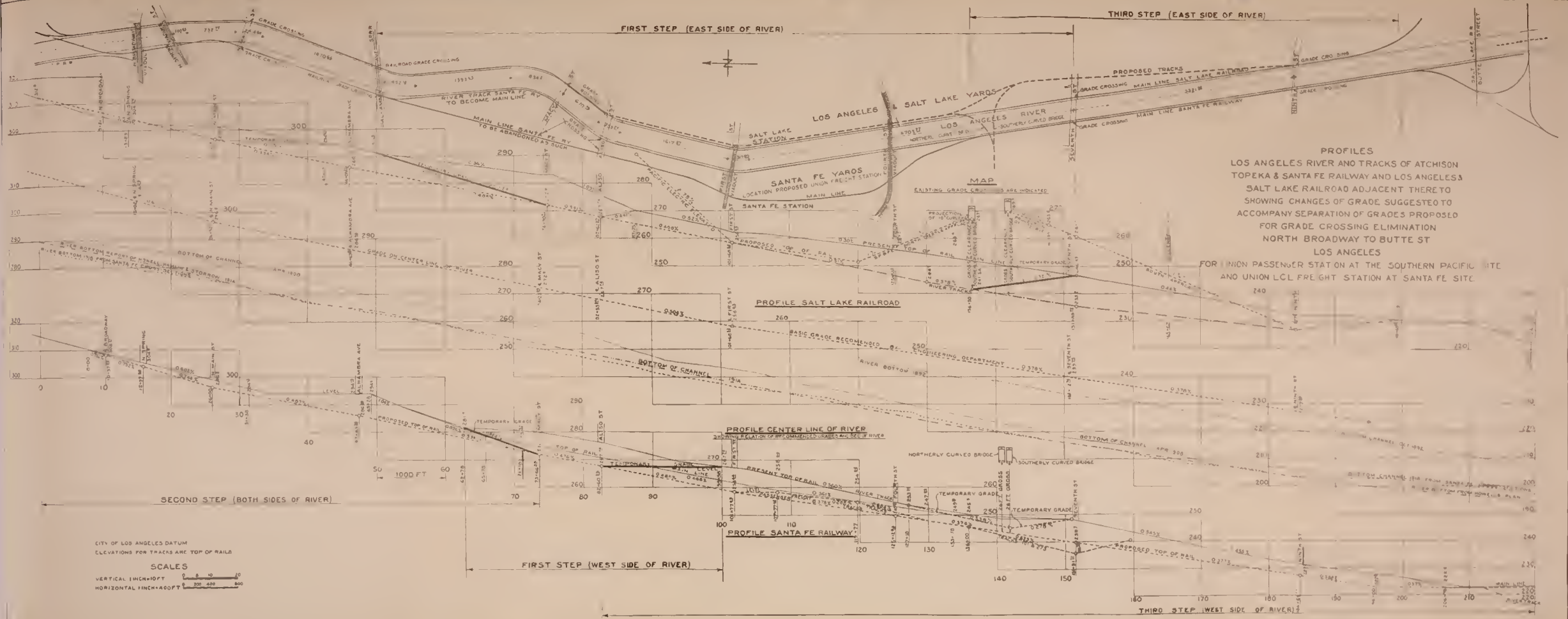
FIG. 20. PROFILES OF RIVER BANK TRACKS ACCOMPANYING PLAN FOR UNION STATION AT THE SANTA FE STATION SITE.
 This is a study made by the Engineering Department to show how this project would affect the general plan for depressing the tracks along the river. This is not the plan recommended.

CASE 570
 JAN 1919 NR10370

FIRST STEP WEST SIDE OF RIVER



FIRST STEP WEST SIDE OF RIVER



PROFILES
 LOS ANGELES RIVER AND TRACKS OF ATCHISON
 TOPEKA & SANTA FE RAILWAY AND LOS ANGELES
 SALT LAKE RAILROAD ADJACENT THERE TO
 SHOWING CHANGES OF GRADE SUGGESTED TO
 ACCOMPANY SEPARATION OF GRADES PROPOSED
 FOR GRADE CROSSING ELIMINATION
 NORTH BROADWAY TO BUTTE ST
 LOS ANGELES
 FOR UNION PASSENGER STATION AT THE SOUTHERN PACIFIC SITE
 AND UNION LCL FREIGHT STATION AT SANTA FE SITE

CITY OF LOS ANGELES DATUM
 ELEVATIONS FOR TRACKS ARE TOP OF RAILS

SCALES
 VERTICAL 1 INCH = 10 FT
 HORIZONTAL 1 INCH = 100 FT

CASE 970
 JAN 1919 NR 10-374

FIG. 27. PROFILES OF RIVER BANK TRACKS ACCOMPANYING PLAN FOR UNION STATION AT THE SOUTHERN PACIFIC STATION SITE
 This is a study made by the Engineering Department to show how the proposed work fits into the general plan of track depression. The profile is based upon the recommended town by the dotted lines in the map. The arrangement is not recommended.

(d) **Depression Based Upon Union Passenger Station at the Southern Pacific Site and a Union Freight Station at the Santa Fe Site**

In this scheme the grading is the same as under (b) above.

**ESTIMATES ON THE SALT LAKE OR EAST SIDE
OF THE LOS ANGELES RIVER**

(a) **Simple Depression of the Salt Lake Tracks**

This estimate is based upon the depression of the present Salt Lake tracks, which would not be altered in any other way, except where it is necessary to change connections of secondary tracks, such as yard tracks or industry spurs. The excavation for the roadbed, however, is predicated upon sufficient width for future double-track along the river. The alignment is changed at Macy Street to bring the tracks outside of the official bank of the river.

(b) **Depression Based Upon Union Passenger Station at Either the Plaza Site or the Santa Fe Site**

This estimate is the same as in (a) except that double-track with heavy rail is substituted for the present Salt Lake tracks, and that the depression, instead of stopping just south of Ninth Street, is continued around the long curve in order to provide a satisfactory grade on the proposed connections between the Salt Lake tracks and the Santa Fe tracks near Soto and Lugo Streets.

(c) **Depression Based Upon Union Passenger Station at Southern Pacific Site**

In the following notes, the proposed profile, Fig. 27, on page 147, for the depressed tracks along the river is for convenience referred to as "E. D. (Engineering Department) Profile". North of Aliso Street and south of Ninth Street, the excavation is the same as in A above. Between Aliso and First Street, additional excavation is required by the six tracks (two along the river, two Pacific Electric tracks—these are, however, on a trestle for part of the distance,—and two through steam passenger tracks). Between First and Seventh Streets the river tracks follow the proposed profile in City of Los Angeles Exhibit No. 1, as it is necessary to pass under Seventh Street about four feet lower than the grade proposed on "E. D. Profile", because of a lower approach for Seventh Street viaduct so that the passenger tracks may pass over the street near Anderson Street. From Seventh to Ninth Streets the river tracks are on a grade to meet the grade proposed on "E. D. Profile" at Ninth Street. Between First Street and the foot of the approach to the northerly curved bridge, excavation is necessary for the steam passenger and Pacific Electric tracks, which are on the "E. D. Profile" grade. Between Seventh and Ninth Streets the approach to the southerly curved bridge is proposed as a fill and the grading included.

Adaptability of Southern Pacific-Salt Lake Plan to Proposed River Track Depression

The approaches and viaducts of the Southern Pacific-Salt Lake plan can be adapted to the plan of depression of the river tracks. It seems

necessary, however, to discuss in some detail the grade adjustments necessary if this plan is given further consideration:

To explain in detail: At the point where the proposed northerly curved bridge crosses the Santa Fe present main line track, just south of Sixth Street, the proposed grade (after depression) of the Santa Fe top of rail is elev. 243.84. (All elevations herein are referred to City datum.) It is estimated that the gross headroom required would be twenty-six feet at this point—twenty-two feet for lawful clearance and four feet for the floor thickness of the structure. If this northerly curved bridge be on a ten degree curve and on a 1 per cent descending grade compensated 0.04 feet per degree of curve and since it is 700 feet from the Santa Fe tracks to the end of curve, the top of rail on the elevated structure at this point (end of curve) would be at elev. 265.6. From the end of curve to Fourth Street is approximately 850 feet and if the elevated structure descends to Fourth Street on a 1 per cent grade, the top of rail at Fourth Street would be at elev. 257.1. The present Salt Lake top of rail is elev. 256.0. The proposed elevation of the depressed tracks is 246.2, according to City Exhibit No. 1 and 249.6 as we have revised the grades shown in this exhibit. The bottom of the Los Angeles Railway bridge at this point is at elev. 276.8, and subtracting from this the proposed elevation for top of rail of 257.1, we note that the clearance would be 19.7 feet. Either this structure would have to be raised 2.3 feet or the clearance would be impaired by this amount. Though it does not appear to be very difficult to raise the frame trestles carrying the Los Angeles Railway and the highway, a "bump" of 2.3 feet in the bridge would be objectionable. The ultimate Fourth Street viaduct would give full clearance, and since the impairment is on a passenger line on a non-permanent structure, we have decided that the Southern Pacific-Salt Lake scheme can be adapted to the depressed grades along the river, as far as the northerly curved bridge and its approach are concerned.

If the tangent through the Los Angeles market property (and approaching the southerly curve across the river from the west) be extended, it will cross the Santa Fe tracks (after depression of the later) where the top of rail is at elev. 253.4. Adding on twenty-six feet for gross headroom, as before, gives the elevation of the top of rail on the elevated structure as 269.4. Also, if the south approach to the southerly curved bridge crosses Seventh Street approximately twenty-five feet west of the west line of Anderson Street, it will cross Seventh Street (as shown on Fig. — at elev. 252.3, this being the proposed grade. Seventeen feet gross headroom being required here, the top of rail on the elevated structure would have to be at least 269.3 or approximately the same as where the curved bridge southerly crosses the Santa Fe tracks. In other words, the southerly curved bridge and its approach, as far south as Seventh Street, would have to be level or approximately so. The proposed elevation of top of rail, if the tracks are depressed, at Ninth Street is 227.2 or there would be a drop of forty-two feet (269.3—227.2) between Seventh and Ninth Streets.

As the distance is approximately 3300 feet, the rate of grade would consequently be 1.3 per cent. This rate of grade is too great, as it should not exceed 1 per cent, and, therefore, the Southern Pacific-Salt Lake plan cannot be adapted to the present plan of depression of the tracks along the river, that is, the plan which proposes the grade of depressed tracks at Seventh Street at elev. 239.7 with a 4 per cent approach grade, as shown on Fig. 56, page 185.

If, however, we depart from the adopted maximum of 4 per cent for the approach grades and use 5 per cent and commence the descent at this rate from the east abutment, neglect the plateau at Anderson Street and depress the Salt Lake tracks adjacent to the river about 5 feet more (that is to elev. 235), we would have an elevation on Seventh Street just west of Anderson Street of 244. Adding 17 feet for gross headroom would give the elevation of the top of rail on the elevated approach to the southern curved bridge of 261, which is 33.8 feet above the proposed grade at Ninth Street. As the distance is just over 3,300 feet, the rate of grade would very slightly exceed 1 per cent, and, therefore, this scheme appears to be practicable. If it were thought desirable not to exceed a 1 per cent grade, the proposed bridge at Ninth Street could be raised about 1 foot on the east side without detracting from its appearance.

The Southern Pacific-Salt Lake have proposed three schemes for getting around the difficulty of grades at Seventh and Fourth Streets, all shown on their Exhibit No. 15 (Fig. 28). The scheme shown in green, according to testimony, is the one which was best thought of. This scheme requires the east end of the Seventh Street bridge across the Los Angeles River to be about 6 feet lower than the west end, and the Salt Lake tracks to be depressed about 18 feet below the present level. We should say that a concrete bridge at this point, which is of more or less monumental construction and visible some distance in almost every direction, should be level as far as the channel spans are concerned. We think this is sufficient ground for the rejection of these plans.

EXCAVATION QUANTITIES

The excavation quantities for depression of the Santa Fe and Salt Lake tracks along the Los Angeles River, as estimated for the various combinations of stations and routes, are as follows:

EARTHWORK QUANTITIES—TRACK DEPRESSION ALONG LOS ANGELES RIVER

Depression of Trackage Along River as Influenced by Various Plans for Union Stations	Side of Los Angeles River		Total Cu. Yds.
	Santa Fe or West Side Cu. Yds.	Salt Lake or East Side Cu. Yds.	
Alhambra Avenue Depressed			
Depression of Existing* Trackage			
1 No Union Passenger or Freight Station	279,372	208,918	488,290

*Based on completion of double tracks on Santa Fe.

Depression and Double Tracking

2.	Union Passenger Station at Plaza	544,926	235,561	790,487
	Union Freight Station at Santa Fe Site			
3.	Union Passenger Station at Santa Fe Site	556,620	235,561	792,190
	No Union Freight Station			
4.	Union Passenger Station at Southern Pacific Site	554,926	237,911	792,837
	Union Freight Station at Santa Fe Site			

Alhambra Avenue not Depressed**Depression of Existing* Trackage**

1.	No Union Passenger or Freight Station	243,107	184,645	427,752
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It will be noted that the excavation required for the depression of these tracks along both sides of the river is considerably increased (about 300,000 cu. yds. or over 60 per cent) by the grading necessary to establish either a union passenger or freight station at the Santa Fe site, and also that the total excavation is not materially different between the various plans for the union stations. It may be possible to somewhat reduce the yardage to be moved from the Santa Fe site.

The amount of earthwork is not large for the comprehensive changes which are involved.

ORDER IN WHICH THE WORK SHOULD BE DONE

Simple Depression—No Union Passenger or Freight Station: If no union passenger or freight station is built, but if the grade crossings along the Los Angeles River are eliminated and the tracks along the river are depressed, the first step should be construction of Macy Street and Aliso Street viaducts, which would require depression between Alhambra Avenue and First Street. These two streets are selected as the first on which the grade crossings should be eliminated because of the fact that at Macy Street the vehicular traffic is heavier than at any other existing crossing and because there are three steam railroad tracks involved. Depression of the tracks along the river at Macy Street will require depression at Aliso Street because of the short distance between them. Regardless of this, the heavy Pacific Electric traffic on Aliso Street justifies a separation of the grades. On the Salt Lake side of the river, the tracks would simply be depressed, although the roadbed would be made wide enough for two tracks at least. On the Santa Fe side, now practically all double-tracked, we have estimated complete double-tracking. The different steps in depression are shown in Fig. 23, page 139.

Depression at Macy and Aliso Streets requires two temporary grades. On the Salt Lake side one would be on a 0.441 per cent grade ascending southerly from Aliso Street to Station 87 plus 75, (Fig. 23 on page 139),

near First Street and another on a grade of 0.773 per cent ascending northerly from Macy Street to Station 50, near Alhambra Avenue. On the Santa Fe side a temporary grade, level, would be installed south from Aliso Street to Station 99 plus 98, near First Street, and another temporary grade north from Station 71 plus 18, just north of Macy Street to Station 53 plus 00, near Alhambra Avenue, the rate of grade being 0.969 per cent ascending northerly.

Union Station at the Plaza: Under this plan, steps in the depression of the tracks along both sides of the river would be the same as in (a) above—depression of existing trackage. South of First Street double tracks would be constructed adjacent to the river on the present grade to the existing main line double tracks at Sixth Street.

Union Station at the Santa Fe Site: The depression of tracks along the river at Macy and Aliso Streets and the establishment of the terminal requires a complete regrade on the west side of the river from Macy Street to approximately Sixth Street. Temporary grades connecting the depressed and existing grades would extend from Macy Street to Alhambra Avenue and from Sixth to Seventh Streets. The existing First Street viaduct, being higher than the proposed new viaduct, need not be replaced because of the union station at the Santa Fe site.

On the west side of the river, the depression would be the same as for the union station at the Plaza.

Union Station at Southern Pacific Site: The second step would consist of depression of the tracks between Alhambra Avenue and North Broadway on both sides of the river, and the third step from Aliso Street to Station 199 plus 68 on the Salt Lake side of the river and Station 210 plus 00 on the Santa Fe side. A union station at the Southern Pacific site would affect the depression of the tracks along the Los Angeles River as follows:

In order that sufficient trackage be provided, the Salt Lake tracks should be double tracked north of Fourth Street before the union station is put into operation. Since the elevated approach to the Southern Pacific station from the Los Angeles River could only be built to a permanent grade, and as this permanent and ultimate grade requires depression of the Santa Fe and Salt Lake tracks in order to pass under the elevated tracks just south of Sixth Street, and further, in as much as the northerly approach should pass under the Fourth Street viaduct and the southerly approach over Seventh Street and under Ninth Street, the Salt Lake tracks should be depressed from Macy Street to the southerly curved bridge proposed over the Los Angeles River. Temporary grades would bring the tracks to the existing grade at Alhambra Avenue on the north, and Seventh Street on the south. The Santa Fe tracks would be depressed as in the heading (b) above. In addition, they would have to be depressed to pass under the proposed elevated approach to the Southern Pacific Station. This would occur just south of Sixth Street, the existing grades being regained at Seventh Street and about Willow Street.

CHAPTER VII.

OUTLINE

General Elements of Design

- Bridge Roadway
- Approach Grades
- Cost Estimates

Present and Proposed Bridges

- Humboldt Street—Santa Fe Bridge
- North Broadway Bridge
- North Spring Street Bridge
- North Main Street Bridge
- Alhambra Avenue—Southern Pacific Bridge
- Macy Street Bridge
- Aliso Street Bridge
- First Street Bridge
- Fourth Street Bridge
- Seventh Street Bridge
- Ninth Street Bridge
- Butte Street—Salt Lake Bridge
- New Double Track Railroad Bridge South of Butte Street
- Santa Fe Railway Bridge—South of Butte Street
- Twenty-Sixth Street Bridge

CHAPTER VII

PRESENT AND PROPOSED BRIDGES OVER THE LOS ANGELES RIVER

In a plan for the elimination of grade crossings adjacent to the Los Angeles River by the depression of the Santa Fe and the Salt Lake tracks along the river and by the elevation of the streets, the element of cost is one of the controlling factors.

We have, therefore, drawn plans and made estimates for structures to carry the following streets over the tracks and the river:

North Spring Street	First Street,
North Main Street,	Fourth Street,
Macy Street,	Seventh Street,
Aliso Street,	Ninth Street.

At North Spring Street, it is proposed to remove the present structure, but at all of the other streets it is proposed that, ultimately, new bridges shall be built.

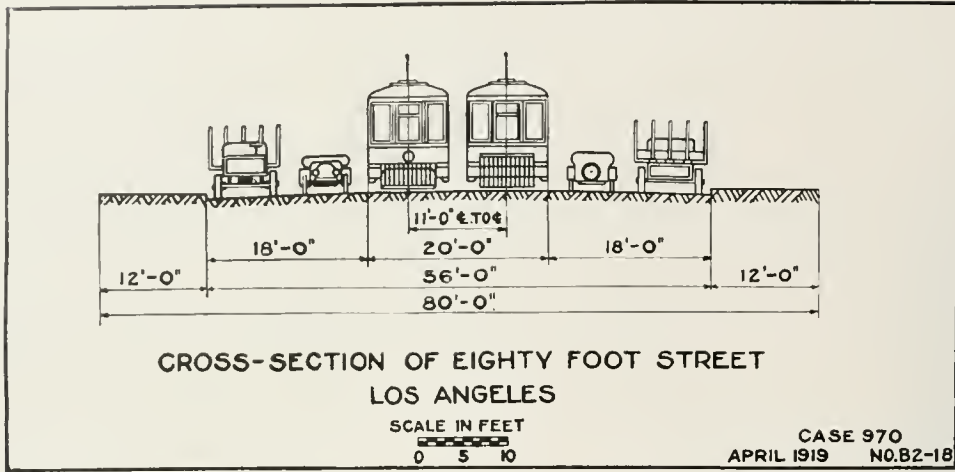
GENERAL ELEMENTS OF DESIGN

A survey of the plans we present will show that we have endeavored to maintain a general standard of construction and have adopted a type of bridge which, we believe, will make the best appearance at a low first cost and which will be the most economical to maintain.

Arch bridges are, without question, the most desirable from the aesthetic standpoint, and when constructed of reinforced concrete, there is practically no maintenance expense outside of that of maintaining the roadway. Our designs for all these bridges show reinforced concrete arch structures of three spans. It is well recognized architecturally that there should be an uneven number of arches for the most pleasing effect, and since it also appears more economical to use three spans across the 300 foot channel of the river, our designs for all these bridges show three spans of 100 feet each.

Bridge Roadway

The majority of the streets leading to the river are 80 feet wide, with a 50 foot roadway and 12 foot sidewalks. The most recent bridges, at North Broadway, North Main and Seventh Streets, adhere to this width of roadway, which provides for two lines of cars and four lines of vehicles, including operating clearances. As the number of pedestrians, as revealed by traffic counts, does not indicate that a sidewalk over 6 feet in width is necessary, two walks of this width have been used in the design. The sketch below shows the cross section of an 80 foot street where ample room is provided by a 50 foot roadway.



California Railroad Commission Engineering Dept.

FIG. 29. CROSS-SECTION OF EIGHTY FOOT STREET

North Main, Macy, First, Fourth, Seventh and Ninth Streets are 80 feet wide at the Los Angeles River. This section is drawn to show the space allotted to cars, vehicles and pedestrians in the normal arrangement. It is important that this arrangement be maintained at bridges and tunnel portals with the faster traffic toward the center. Nine feet is the standard width for one line of vehicles including clearance.

The approaches to the bridges really consist of two parts: The structure which carries the street over the tracks adjacent to the river, and the approaches descending from these spans to the street level. The spans over the tracks have been designed in steel in order to provide a minimum floor thickness, and therefore a minimum elevation for the roadway on the viaduct, and a minimum length of approach grade. While this form of construction is, ordinarily, undesirable on account of the corrosion resulting from the locomotive gases, this objectionable feature may be overcome by cement gun treatment and by a reinforced concrete suspended ceiling under the bridge. The girders would support reinforced concrete floor slabs on which the pavement would be laid.

Approach Grades

A study of the approach grades has led us to the conclusion that 4 per cent is the maximum which should be used. We believe it will be readily conceded that anything over 5 per cent is too steep, and as the difference in cost between 4 per cent and 5 per cent grades is not particularly large, we have endeavored to keep the approach grades down to 4 per cent. However, in one or two cases, this has been increased slightly on account of large property damages which would result from absolute adherence to this rate. The present grades of 7 per cent on North Spring Street and 7½ per cent on First Street are admittedly too steep.

For the sloping approaches, an earth fill, or retaining walls and fill, is the most economical form of construction. In some locations, the simple fill is possible; in others, on account of abutting property, it would be

necessary to construct reinforced concrete retaining walls along the property lines.

In presenting these designs, it will be understood that they are but preliminary: they are necessary for a secure foundation upon which estimates can be made but do not preclude any changes which may prove desirable. In fact, it is expected that changes will be made, but the drawings are adapted for use as a basis for detailed working drawings.

In general we have shown spans over three tracks along both the river banks, and the estimates are based on this assumption. Union passenger station plans, or other plans, have considerable influence on the trackage, and as all plans could not be provided for in one drawing, we have used this basis of three tracks, subject to change for final plans.

Cost Estimates

The estimates of cost for the various viaducts, as given in connection with each bridge, cover the total cost of changing from the present structure and include, in addition to the structural costs, the estimates covering additional land where necessary, changes in pole and pipe lines, street railway tracks, building changes, temporary structures and damages for the full length of bridge, including approaches. The figures do not include any changes in the steam railroad tracks, these alterations having been covered in the estimates for the depression of these tracks.

PRESENT AND PROPOSED BRIDGES

Humboldt Street-Santa Fe Bridge

Humboldt Street-Santa Fe Bridge carries the main line of the Santa Fe between Los Angeles and San Bernardino, via Pasadena. This single track through skew truss steel structure, located north of North Broadway Bridge, is beyond (north of) those parts of the Los Angeles River banks which are involved in the elimination of grade crossings adjacent to the river, and in this report no reconstruction of this bridge is contemplated.

North Broadway Bridge

North Broadway Bridge (also known as Buena Vista Street Bridge) is a reinforced concrete structure of 7 spans, carrying North Broadway across one end of the Southern Pacific freight yard, Santa Fe tracks, the Los Angeles River, and the Salt Lake tracks. This bridge, approximately 900 feet long, was completed about 1913. On the west, North Broadway is cut into the hill, so that no filled approach is necessary. The east end branches into Pasadena Avenue and North Broadway, the approaches to these streets being on earth fill with a street grade of approximately 5 per cent. The erection of this structure is notable in that it is really the first satisfactory solution of the grade crossing problem, the bridge crossing over 24 steam railroad tracks. It is a monumental structure and thoroughly modern, and no one interested in the problem of eliminating grade crossings on the Santa

Fe and Salt Lake tracks along the river has considered it necessary to change this structure or to alter the present grades of the tracks which run beneath it. This bridge carries two tracks of the Los Angeles Railway and has a roadway 50 feet wide and two sidewalks of 8 feet.

We recommend an inclined approach to this viaduct from Baker Street, as will be noted later. This will serve the traffic now taken care of by the unsightly Spring Street Bridge, the ultimate removal of which is recommended.



FIG. 30. SANTA FE BRIDGE ACROSS THE LOS ANGELES RIVER

This single track steel structure carries the main line of the Santa Fe via Pasadena across the River. It is located near Humboldt Street. Nothing is contemplated in this report which would require changes in this bridge.



FIG. 31. NORTH BROADWAY BRIDGE

This reinforced concrete structure, built in 1913, carried North Broadway over the Southern Pacific and Santa Fe tracks, the Los Angeles River and the Salt Lake line to Pasadena, and marks the first comprehensive step of the City in the permanent elimination of grade crossings. About 17,000,000 people per year use this viaduct.



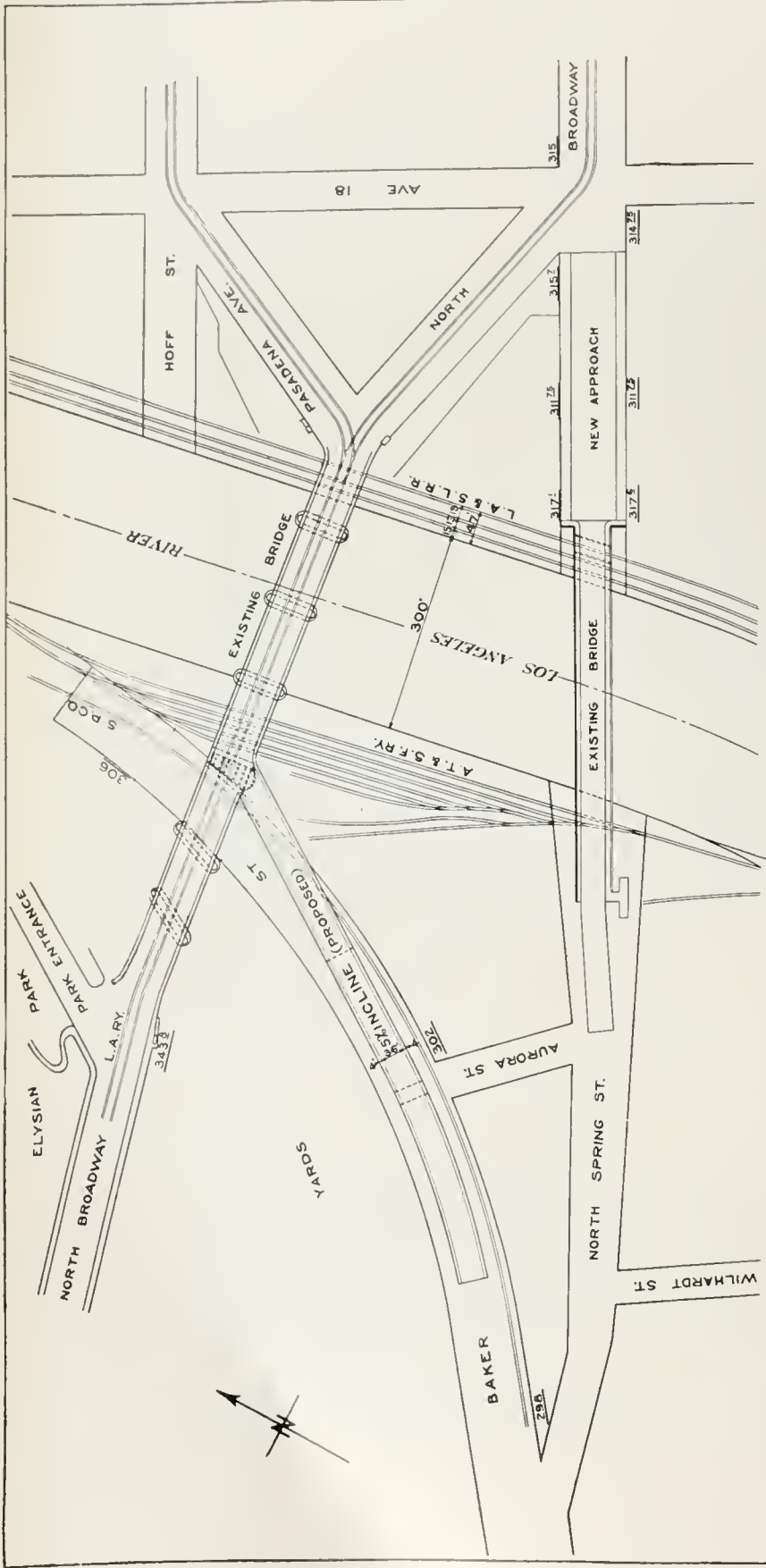
FIG. 32. NORTH SPRING STREET BRIDGE CROSSING THE TRACKS OF THE SANTA FE, THE LOS ANGELES RIVER AND THE TRACKS OF THE SALT LAKE

This steel deck structure, built before 1890, is in fair condition and will undoubtedly be fit for some ten years. While the approach grades are approximately seven per cent, the traffic is not very heavy. A street car line which crossed this bridge was removed in 1918. As noted elsewhere, the floor on the right main span can be raised level with the top chord, and a new approach built to correspond therewith.

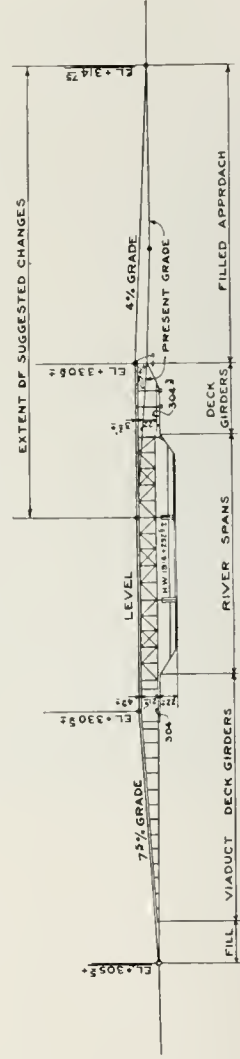
North Spring Street Bridge

North Spring Street is carried over the river on a steel deck truss bridge with approaches consisting of a plank floor supported by steel stringers on steel bents. The total length of the bridge is 742 feet; the width is 56 feet, which is used for a 30 foot roadway, and a sidewalk on either side. This 30 foot roadway was partly occupied by the tracks of the Los Angeles Railway, which were spaced 11 feet centers, but these tracks were removed in 1918. The grade of approach on the west side of the river is $7\frac{1}{2}$ per cent and on the east side is 7 per cent. The clearance over the Santa Fe tracks is 20.45 feet or 1.55 feet less than lawful clearance, and on the Salt Lake side the clearance is 17 feet 8 inches on the main line and 19 feet 9 inches on the siding, or 4 feet 4 inches and 2 feet 3 inches respectively less than the lawful clearance of 22 feet. The river spans are 100 feet, three in number, and are supported on 50-inch steel cylinder piers.

This structure is a very old one and we have been able to derive very little information regarding its history. It might be interesting to note that the yokes used for a cable railway are still in view from beneath the bridge, which is, in itself, indicative of the use of this bridge as far back as 1890. At the present time, the bridge is well painted and is probably satisfactory for the small amount of traffic which it carries, except that



PLAN



ELEVATION

CITY DATA
 VERTICAL SCALE 1" = 10'
 HORIZONTAL SCALE 1" = 100'
 PRESENT GRADES UNDERLINED.

CASE 57017 510
 NORTH SPRING STREET
 DEC 1910

FIG. 34. PLAN AND ELEVATION OF EXISTING BRIDGE AT NORTH SPRING STREET
 The plan view is shown to illustrate the grade of the trucks along the east bank of the river, and to provide additional information as to the location of the bridge. The elevation view shows the grade of the trucks along the east bank of the river, and to provide additional information as to the location of the bridge.



FIG. 33. NORTH END OF NORTH SPRING STREET BRIDGE

It is possible to raise the floor, which now slopes, so that it will be level and at the same elevation as the top chord of the truss, construct new steel approach spans over the Salt Lake tracks, and extend the filled approach toward Pasadena Avenue. The present clearance over the Salt Lake tracks, which are dipped under the bridge, is approximately 6 feet less than lawful clearance. It is recommended that this structure be removed entirely in the future, in accordance with plans.

there is excess vibration under heavy trucks. The use of this bridge was almost entirely discontinued after the construction of the so-called Buena Vista Viaduct, which carries North Broadway over the river.

The present grade of the Salt Lake track on the east bank of the river between the North Spring Street bridge and the North Broadway bridge is 1.4 per cent. The elevation of top of rail at North Spring Street is 300.89. By improving the grade, as shown in Fig. 23 on page 139, the elevation at North Spring Street will become 304.29.

This change, together with the addition of one or two tracks, would require reconstruction of the east approach to the North Spring Street bridge approximately as shown in Fig. 34. It would be necessary to raise the floor beams on the easternmost river span and to use new steel construction over the tracks. It is estimated that these alterations would cost \$72,450.

An alternate plan is to build an incline from the wide pier of the present North Broadway bridge down to grade on Baker Street, as shown on Fig. 129. This plan has several advantages: As the North Spring Street bridge is about 30 years old, it would have to be rebuilt soon under the first scheme. As it is only about 400 feet from the North Broadway bridge and 1200 feet from the North Main Street bridge, the renewal would hardly seem justified. The west approach has a grade



FIG. 35. LARGE PIER—NORTH BROADWAY BRIDGE

This view shows the large pier where the viaduct recommended in Baker Street would connect with North Broadway Bridge.

of $7\frac{1}{2}$ per cent. The only excuse for its continued existence seems to be the fact that it serves the lower territory west of the river and south of North Broadway. This territory will be made accessible from North Broadway by this incline in Baker Street.

The Baker Street incline will cost more than the North Spring Street incline, our estimate being \$111,051; and rather than expend \$72,450 for a temporary approach to Spring Street viaduct, it is preferable to construct the Baker Street approach and to demolish the Spring Street bridge as soon as reconstruction of the Salt Lake tracks—which pass under it—makes this necessary.



FIG. 36. NORTH MAIN STREET BRIDGE, CROSSING THE SANTA FE AND SALT LAKE TRACKS AND THE LOS ANGELES RIVER

This modern structure was built in 1908-1909, has a roadway 56 feet wide and two 6-foot sidewalks. The viaducts recommended in this report are similar to this structure, if it were at elevation great enough to cross over the tracks at both ends of it. It is proposed that this structure, except the piers, be raised, and a new viaduct built on the existing piers.

North Main Street Bridge

Main Street is carried across the river on a 3-hinged arch concrete structure of 87 feet clear spans supported on skewed concrete piers. This bridge was built in 1908-1909, part of the cost being contributed by the Los Angeles Railway. This bridge is 68 feet in clear width, 56 feet being used for the roadway and 12 feet for the two sidewalks. The approaches are slightly elevated above Main Street, the grade being 2 per cent on the west side and 4 per cent on the east side. This is a thoroughly modern structure in every respect and is in excellent condition.

The depression of the river tracks at Main Street being considerably less than at the other crossings, the approaches are necessarily much longer, the depression of the tracks recommended at this point being as follows:

Santa Fe Tracks.....	2.5 feet
Salt Lake Tracks.....	4.5 feet

For the west approach, enough property should be acquired to make an easy curve at the turn, and access to Chavez Street should be provided by a driveway at the present grade alongside the approach. The sidewalk on the side of the viaduct may extend over this driveway, supported by brackets from the retaining wall.

On the east side of the river, Darwin, Mozart and North Main Streets converge but do not intersect. Darwin Street, although 80 feet wide, stops at Douillard Street, and Mozart Street reaches within 40 feet of Main Street.

It would seem logical to extend these streets to an intersection. Lamar Street must connect with the viaduct because of the Los Angeles Railway tracks and the heavy traffic thereover to the Southern Pacific shops. Albion and Gibbon Streets, although unimportant, are shown connected by a subway.

The new viaduct, it is estimated, would cost \$543,084.



FIG. 38. SOUTHERN PACIFIC BRIDGE ACROSS THE LOS ANGELES RIVER AT ALHAMBRA AVENUE

This is a through double-track riveted truss bridge, built in 1903. In this report it is proposed to leave it as it is for the present. Ultimately, when the Santa Fe and Salt Lake tracks are depressed, this bridge should be lowered to correspond.

Alhambra Avenue-Southern Pacific Bridge

Alhambra Avenue Bridge carries the double tracks of the Southern Pacific across the Los Angeles River, these tracks crossing at grade the Santa Fe tracks on the west bank and the Salt Lake tracks on the east bank. These crossings are protected by interlocking. This modern steel structure was built in 1903 and is in good condition.

As discussed elsewhere in this report, with both Macy Street and North Main Street available, it will not be necessary for many years to use Alhambra Avenue for highway purposes. The City granted the Southern Pacific a perpetual right of way over this street, and since it is well used as a principal railroad entrance and because of its directness, we have not thought it advisable to recommend any changes in the present bridge across the Los Angeles River at Alhambra Avenue.

We are, however, presenting estimates for the depression of the tracks along the river, both with Alhambra Avenue depressed and with that street as it is; and in the former case the estimate includes the cost of lowering the Alhambra Avenue bridge and the necessary changes in grade on the Southern Pacific tracks which will accompany the lowering of the bridge.

Macy and Aliso Streets should be considered together. From the evidence presented, there was some question as to whether one or two bridges should be built, and if one, on which street. Macy Street has several advantages over Aliso Street:

1. It has a shorter approach on the east side of the river.
2. The crossing of the river is more nearly a right angle, and, therefore, a more economical bridge is possible.
3. Macy Street connects two very important main thoroughfares—Sunset Boulevard and Mission Road.
4. Lyon, Howard and Center Streets lead from Macy Street into Aliso Street diagonally; thus a bridge on Macy Street would serve both streets.
5. Macy Street and Brooklyn Avenue already have an existing car route of the Los Angeles Railway.

Aliso Street has some points in its favor:

1. It is wider than Macy Street, having a width of 90 feet, while Macy Street is but 80 feet wide.
2. It is somewhat more direct. However, it is practically the same distance from Mission Road and Macy Street to Lyon and Aliso Streets via Lyon and Macy Streets and via Aliso Street.

The district east of the river and between Macy and First Streets is conveniently served either by First Street or by Macy Street. Aliso Street, east of the river, is unimportant and it finally intersects Macy Street, which is known as Brooklyn Avenue on the east side of the river.

Mr. H. C. Nutt, General Manager of the Los Angeles and Salt Lake Railroad, in his testimony before the Commission, favored but one bridge for the two sites, and that one at Macy Street (Trans. p. 1092). We agree with Mr. Nutt.

It will be well to bear in mind that it is best to build adequate bridges, even if fewer are constructed.



FIG. 39. BRIDGES ACROSS LOS ANGELES RIVER AT MACY STREET

The nearer bridge is that of the Los Angeles Railway; the farther, the highway bridge. The river bed has been considerably filled up at this point by the dumping of refuse into it, with a resulting contraction of the waterway. If tracks along the river are to be depressed, such dumping should be prohibited, as contraction of the channel at one point backs the water up to a higher level.

Macy Street Bridge

Where Macy Street crosses the river, there are at present two bridges: one a single track 2-span through timber Howe truss carrying a single track of the Los Angeles Railway; the other, which carries the vehicular traffic, is a 3-span through wood Howe truss having a roadway 18.3 feet wide and one sidewalk about 6 feet wide. The railway bridge was built about 1903 and is not in very good condition on account of obsolescence. The 153 foot span sways badly (laterally) under the cars and it has been necessary to place a false bent in the center of it with suitable attachments to prevent this sway. The spans of this bridge are 153 and 129 feet long.

The highway bridge was also built about 1903 and at the present time has about reached the end of its life, both from the standpoint of natural deterioration and of obsolescence. The bridge has three 100-foot spans and is supported on steel cylinder piers, which, in turn, are supported on concrete piers. The concrete piers were added as underpinning as the bed of the river was lowered. This condition also exists at North Spring Street bridge, and, in fact, at all the bridges across the river.

Neither the railway nor the highway bridge has elevated approaches, the grade on both sides of the river practically meeting the grade of the street. On the west side, the grade of approach is 1.5 per cent; the east approach is 3.5 per cent.



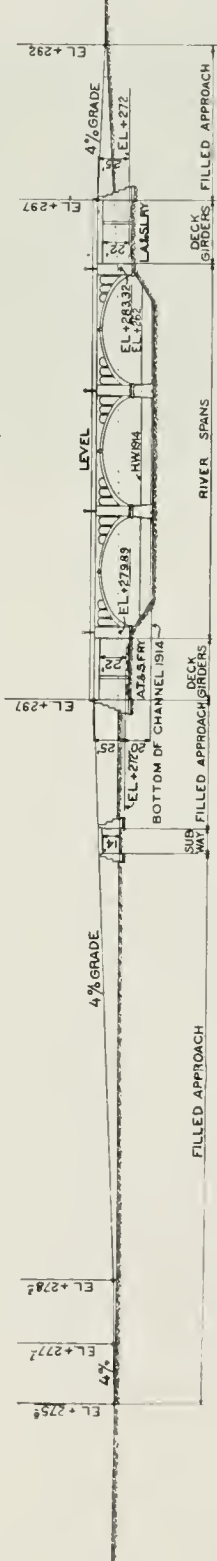
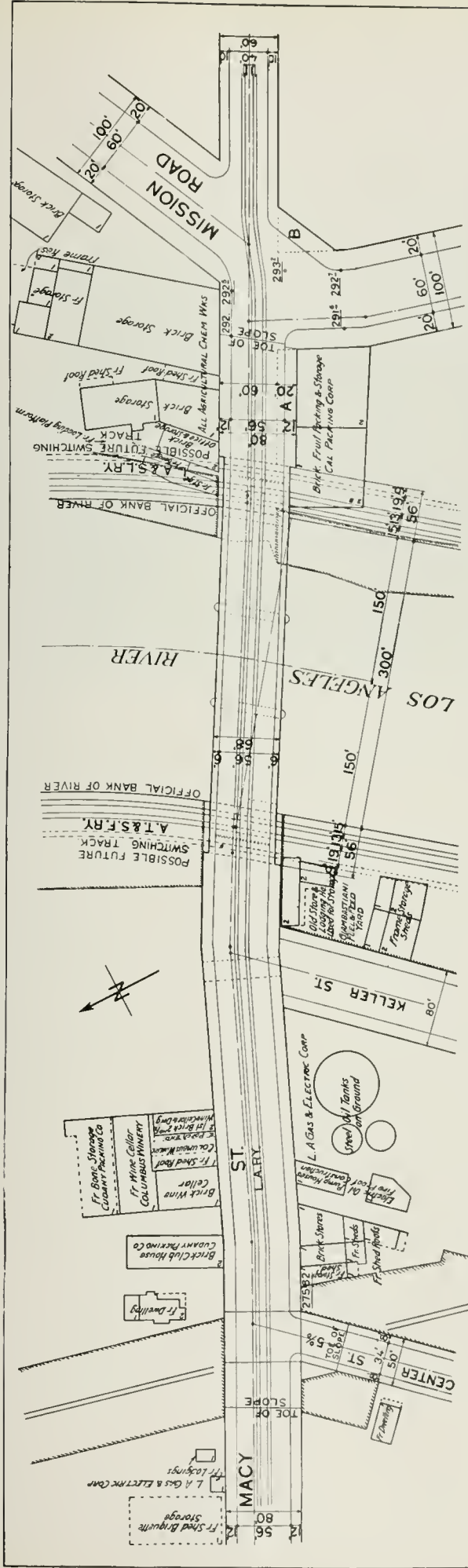
FIG. 49. ALONG MACY STREET BRIDGES

At the left is the Los Angeles Railway bridge; at the right the highway bridge. Because of the obscured view this crossing is particularly dangerous.

Reference to the plans presented for a bridge at Macy Street will show that the existing street lines have been adhered to west of the river. East of the river the street is, at present, only 60 feet wide, but it should be widened to 80 feet, the widening to take place on the south side to reduce the amount of skew for the river crossing. Macy Street is not straight, but the departure from the straight line is so slight that in our opinion the additional expense for property would not warrant a straightening. During the construction of a new bridge, First Street can be used, except for the Los Angeles Railway traffic. This traffic can be taken care of by a temporary foot bridge and a "walking transfer," or possibly by temporary transfer arrangements with the Pacific Electric. On the east side of the river it will be necessary to acquire additional property for street widening. The situation is shown on the plan.

Since the Santa Fe main line is some distance from the river where it crosses Macy Street, this bridge can be constructed with practically no interference with railroad traffic on the west side. The short approach on the east side, together with alterations on account of street widening, would shorten the period of construction and interference with the operation on the Salt Lake.

This bridge, it is estimated, would cost \$357,557.



ELEVATION

CITY DATUM
 VERTICAL SCALE IS
 SAME AS HORIZONTAL
 PRESENT GRADES UNDERSCORED

0 20 40 60 80 100
 SCALE IN FEET

FIG. 41. PLAN AND ELEVATION FOR A BRIDGE OVER THE LOS ANGELES RIVER AT MACY STREET

At this point the tracks along the river are shown depressed at 20 feet above the riverbed. This will result in a material saving in the length of the approaches, which are virtually regrades, and the abutting property will be served at the upper level. Macy Street has a slight slope away from the river on the west side.



FIG. 42. ALISO STREET BRIDGE ACROSS THE LOS ANGELES RIVER

This through plate girder structure, built in 1904-1905, carries the tracks of the Pacific Electric Railway and two driveways, as is shown in another picture. This bridge is in good condition. On account of three grade crossings adjacent to its ends and as many as 95 train movements per hour, this structure is of great importance in the elimination of grade crossings.

Aliso Street Bridge

Aliso Street Bridge was built in 1904-1905 jointly by the City of Los Angeles and the Pacific Electric Railway. The total cost was \$61,195.80 and the Pacific Electric paid \$27,336.20, or 44.7 per cent. This is a steel through girder bridge with a roadway 78 feet wide, the center 27 feet of which is used for the double track of the Pacific Electric Railway. Outside of this there are two 20 foot driveways and outside of these two 5 foot, 7 inch sidewalks, cantilever supported. This bridge has four 75 foot spans, supported on concrete piers, and at the present time is in excellent condition. On the west side of the river the grade approach is 2.2 per cent; on the east side 1 per cent. Neither of the approaches is elevated.

All plans dealing with the elimination of these grade crossings at Macy and Aliso Streets provide for the continuance of the Pacific Electric along Aliso Street, at least for local service. One adequate highway bridge at Aliso Street should meet all the requirements, particularly as these two crossings are only 800 feet apart. This will also have a tendency to maintain the parallelism of the vehicle and railroad traffic in that they will not cross after they have left the industrial portion of the city.

In connection with several different schemes, we have prepared different plans for bridges across the river at Aliso Street.



FIG. 33. VIEW LOOKING ALONG ALISO STREET BRIDGE ACROSS THE LOS ANGELES RIVER

The Pacific Electric tracks occupy the center of the structure between two lines of girders. There is a roadway and sidewalk on either side, the roadways being but 18 feet wide.

The strength of the present Aliso Street bridge has been investigated to determine if it can be modified to use as a four track interurban railway bridge. Using the Southern Pacific specification 1006, the present part, including stringers, floorbeams, and girders, was found to be strong enough for the Southern Pacific oil car wheel loads or Pacific Electric cars of any kind.

It will be necessary to provide new stringers, floorbeams and laterals to replace the present highway construction. They should be of the type now used for the railway part. The present outer girders are also sufficient for railway use. It will be necessary to retain the present spacing of girders because of the substructure. Although no extended study has been made, the existing piers seem adequate. In separating the grades, the bridge will be raised about 17 feet and it may be best to use steel bents on top of the present piers, framing the girders into the columns. This method will add less weight to the footings than if the piers are extended. The existing piers are somewhat narrow to be given additional height.

The total new steel required for the change would be about 658,000 pounds, not including approaches.

The life of the bridge should be about 25 years, after which it should be replaced by a concrete structure.

Fig. 44, which accompanies the Engineering Department plan for a union station at the Plaza, shows full use of the existing bridge, which will be raised while the present highway portion will be strengthened so that the structure will carry four tracks. The local cars will continue along Aliso Street as at present. The express line, as shown, is part of an ultimate project in that it is designed to connect with a future subway in Main Street. This express line will leave Aliso Street bridge, continue as an elevated road across the property of the Los Angeles Gas and Electric Corporation, and along Ramirez Street. Near the end of this street it will descend to the ground level, where the freight and express connection can be made on the surface; still further west, the line will descend into a subway, and turning to the south, connect with a subway in Main Street. While the possible damages to the Los Angeles Gas and Electric Corporation, because of the result of reconstruction and rearrangement necessary in its plant, may seem large, the average cost per foot is the criterion whereby a project of this kind should be judged, and the right of way and property damages west of Center Street will be comparatively small. The cost per foot for the whole distance between the river and Cain Street is therefore reduced to a reasonable figure.

On the west side of the river, provision is made for four tracks to Covina Junction, passing under the Gallardo Street bridge. Elevated construction in Aliso Street gives team access to abutting property, and should not be objectionable as little use would be made of Aliso Street west of Mission Road.

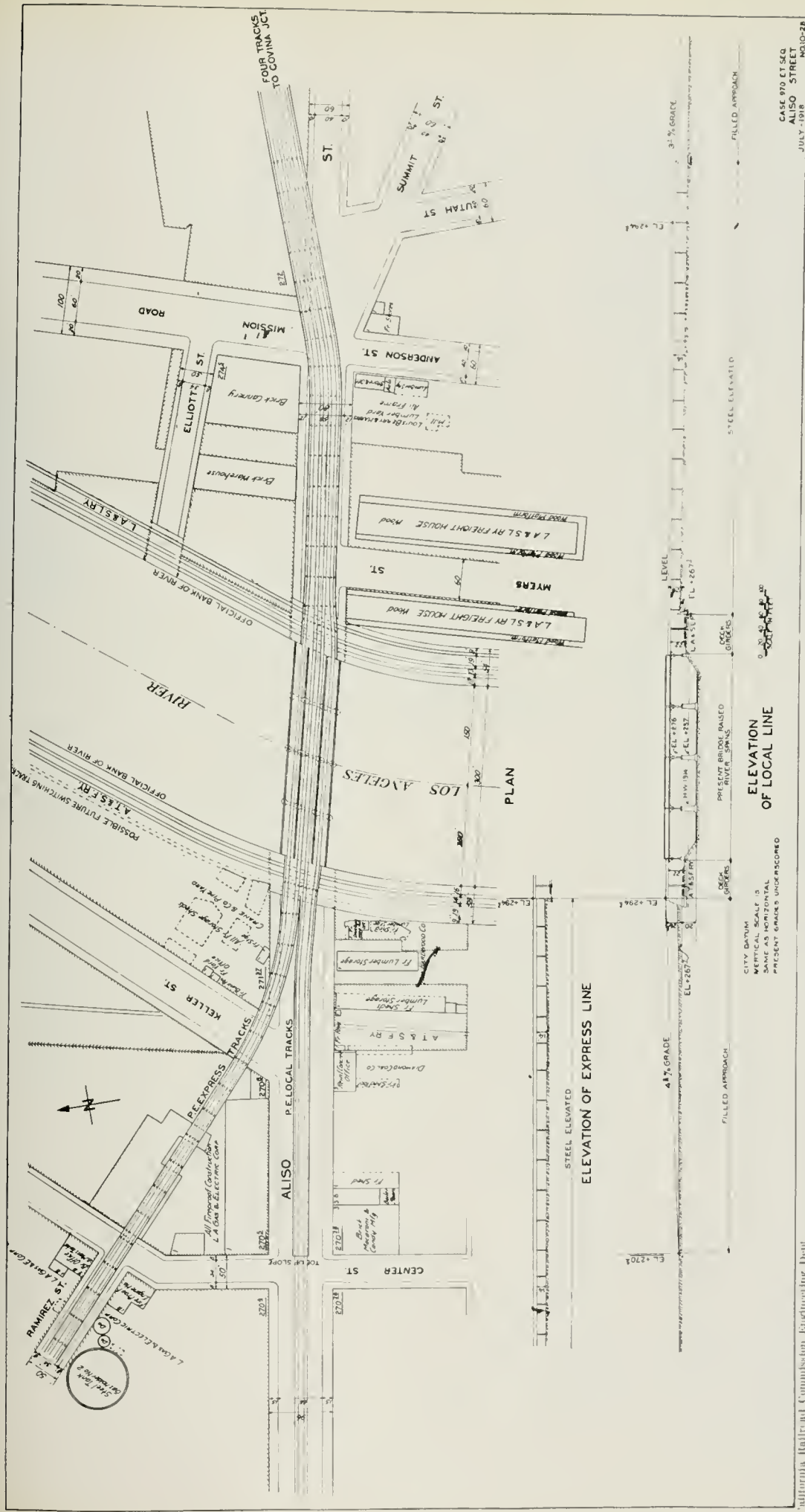
As an alternative, new and higher piers could be built north of the present Aliso Street bridge, and sufficient property could be acquired on the north side of Aliso Street so that the four tracks would lie just north of the street somewhat similar to the arrangement shown on Fig. 45.

A double track bridge, with double track approaches, is estimated to cost \$416,936, based on use of the existing structure.

Fig. 45 shows an arrangement which may be used in case a union passenger terminal is located at the Santa Fe site. As in all plans for a bridge at this site, no highway is provided, and the existing girders are used. They are shown erected on new piers north of, and along side the old ones.

For the express tracks, a reinforced concrete bridge is shown. Because of a bend in the river at this point, the piers can be turned somewhat to reduce the amount of skew of the spans, and, as the cross-section of the river is reduced by only one pier at a time, more and shorter spans can be used than would be practicable for a right-angle crossing.

Fig. 46 was made to show the connections in case the Southern Pacific site should be adopted for a union passenger station, with connections as proposed by the Southern Pacific and the Salt Lake. For

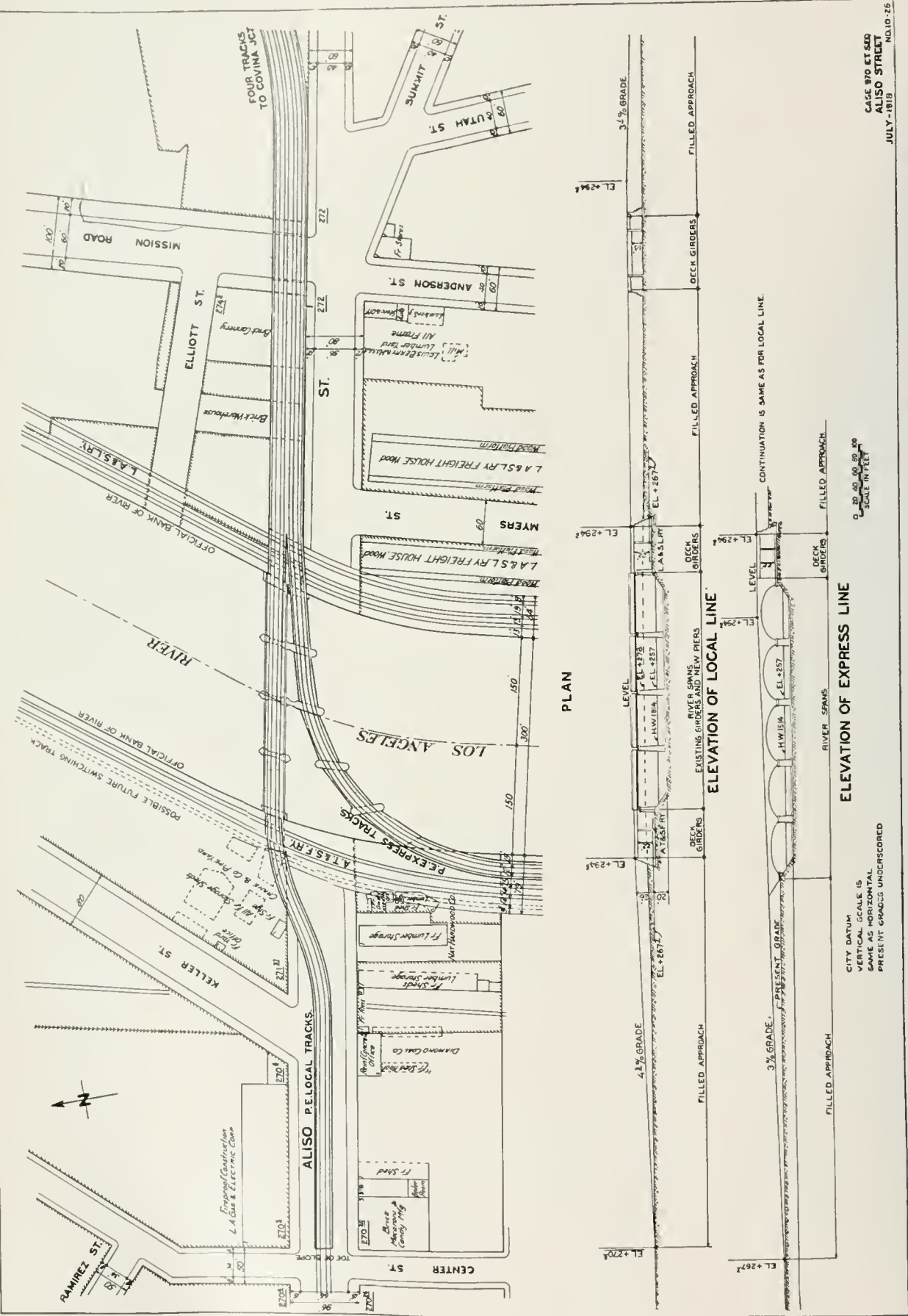


CASE 970 ET SEQ
 ALISO STREET
 JULY 1911

ELEVATION OF LOCAL LINE

CITY DATUM
 SAME AS HORIZONTAL
 PRESENT GRADES UNDISCORDED

FIG. 44. PLAN AND ELEVATION FOR AN INTERURBAN ELECTRIC RAILWAY BRIDGE ACROSS THE RIVER AT ALISO STREET
 This plan shows the existing bridge raised and converted into a four-track structure for railway purposes only. This arrangement is recommended with the Union Station at the Plaza.



CASE 870 ET 600
ALISO STREET
JULY-1919

CITY DATUM
VERTICAL SCALE IS
SAME AS HORIZONTAL
PRESENT GRADES UNDERSCORED

0 20 40 60 80
SCALE IN FEET

California Railroad Commission Engineering Dept.
FIG. 45. PLAN AND ELEVATION FOR AN INTERURBAN ELECTRIC RAILWAY BRIDGE ACROSS THE LOS ANGELES RIVER AT ALISO STREET
 This plan shows the arrangement, if the Union Station is located at the Santa Fe Site. The east approach is shown upon private property as an alternative to placing elevated construction upon Aliso Street as in Fig. 44. This plan is not recommended.

the local tracks, the present bridge is raised, using existing girders and piers, the express tracks passing over the Salt Lake tracks, along the river, and proceeding down to grade along the river bank. Steel construction is employed, except for the approach along the river, and the approach is designed as a ballast deck frame trestle. The express route to Sixth and Main Streets is well over half a mile longer than the local route, but because of the absence of grade crossings, would be shorter in point of time. Mr. Paul Shoup, President of the Pacific Electric Railway, testified that the reduction in time to Echandia Junction would be 8 or 9 minutes, but as during part of the day but 10 minutes are consumed for the present trip to Mission Road, this figure is excessive, except possibly during rush hours. Even then the difference is due more to stops for passengers than any other feature.

First Street Bridge

First Street is carried over the tracks of the Santa Fe, the river and the tracks of the Salt Lake by a viaduct, the total length of which is approximately 1400 feet. This viaduct consists of three steel deck truss spans over the river with approaches consisting of a plank floor on steel beams supported by steel bents. The west approach is 478 feet long with a maximum grade of 7 per cent, while the east approach is 90 feet long with a maximum grade of 6 per cent, both of these distances being the length of the steel structure and exclusive of the fills on either end.

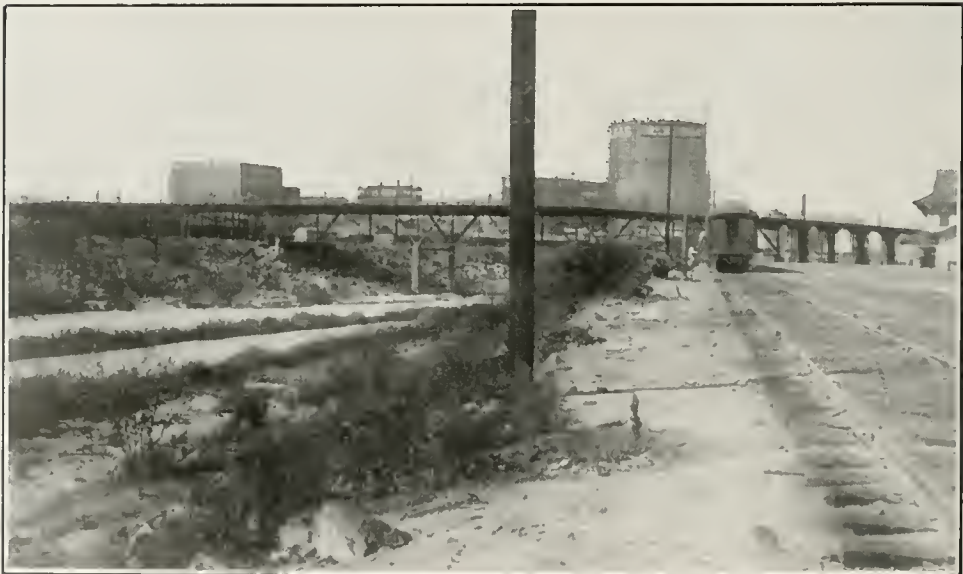


FIG. 17. FIRST STREET VIADUCT, ACROSS LOS ANGELES RIVER

This is a steel structure with a wooden floor, built prior to 1890, now in a very bad state of repair, and it has been condemned by the City Engineering Department. The approaches carry the street over the Santa Fe and Salt Lake tracks.

This bridge is also a very old structure, built, probably, prior to 1890, as we have been advised that in 1886 a car line was constructed across it and the yokes used for cable railways remain in the bridge. The roadway is 55 feet wide, 39 feet of which is used for the street cars (which are on one side of the bridge) and vehicles, the remaining 16 feet being used for two 8-foot sidewalks. The trusses across the river are supported on steel



FIG. 48. WEST END OF FIRST STREET BRIDGE

This view shows the steepness of the approach and how it occupies part of First Street.

cylinder piers. This bridge at present is in bad condition and we have been informed by the City's engineers who are in charge of bridge work, that the structure should be condemned as it is probably overloaded and certain parts of it are very badly corroded.

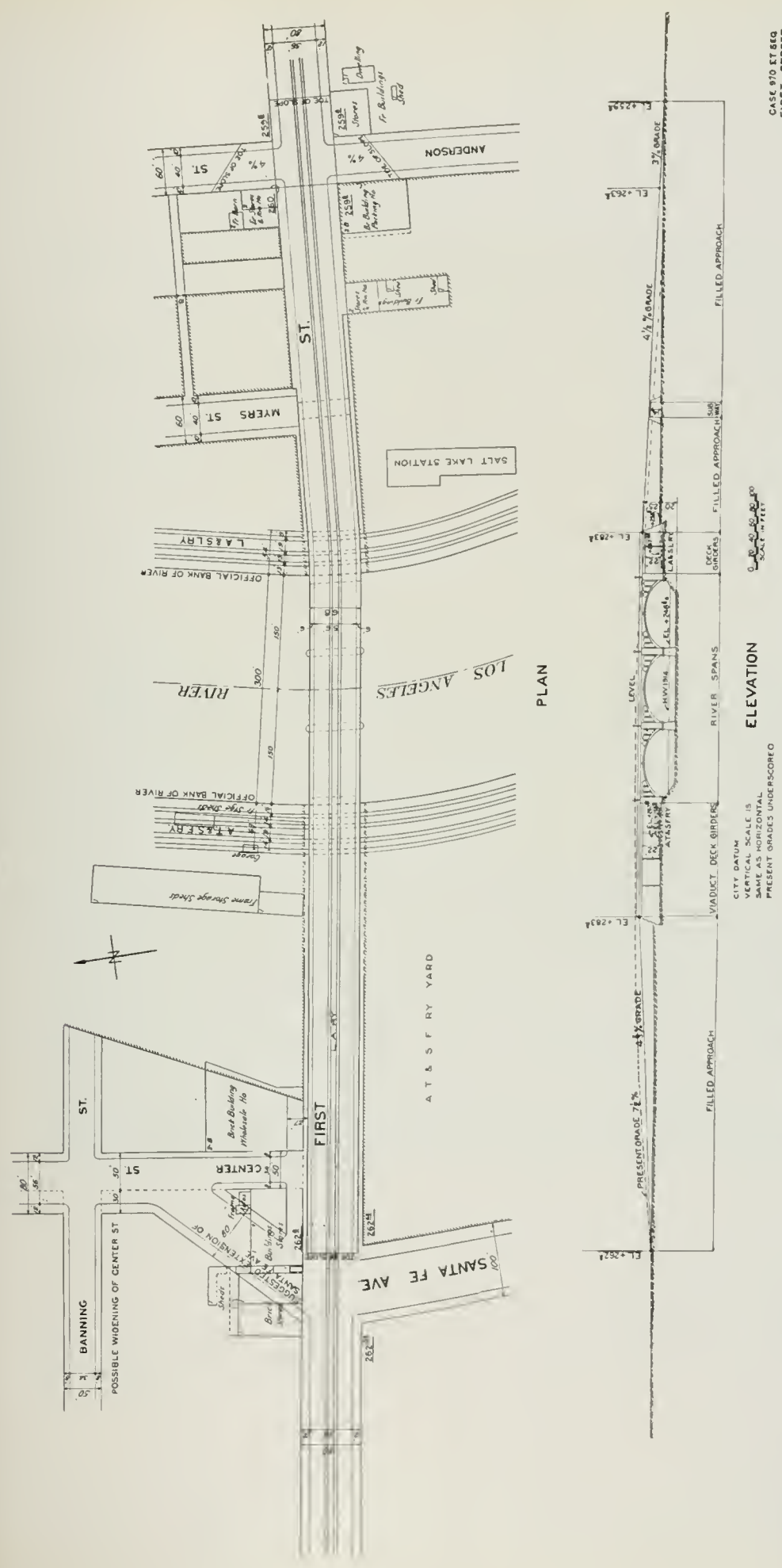


FIG. 49. WEST APPROACH TO FIRST STREET VIADUCT
View of understructure, showing insufficient support.

This viaduct is inadequate:

1. As noted heretofore, the west approach is $7\frac{1}{2}$ per cent and is considered too steep.
2. It is short of the lawful clearance over the Santa Fe tracks.
3. Its strength is insufficient for modern loads.
4. It is of an obsolete type and does not conform to the standard set by the City as to appearance.
5. It is physically in very poor condition.

For all these reasons, this bridge should be abandoned and a new structure should be built at this point.



CASE #10 ET 660
 FIRST STREET
 JULY 1918
 RD 10-18

California Railroad Commission Engineering Dept

FIG. 56. PLAN AND ELEVATION FOR A BRIDGE OVER THE LOS ANGELES RIVER AT FIRST STREET

This plan shows the kind of structure which should replace the existing bridge at First Street at the time the tracks along the river are depressed. Santa Fe Avenue has been shown extended to Center Street.

By the depression of the tracks along the river in accordance with the general plan, this bridge can be made of the same type as proposed for Main, Macy, Seventh and Ninth Streets.

On the west approach it is necessary to have sufficient length of viaduct to provide for throat and ladder tracks serving the Santa Fe yard, but it seems inadvisable to extend this approach beyond Santa Fe Avenue, which is the principal north and south street near the river, and which should have direct access to the viaduct. These conditions result in an approach grade of 4.66 per cent. If, however, a union less-than-carload freight station is established, as recommended, at the Santa Fe site, a grade of 4.0 per cent is possible.

In this connection it seems proper to here state that it is suggested that Santa Fe Avenue be extended, connected and widened where necessary from Seventh to Macy Streets. This will form a connecting link between the ends of the proposed viaducts and serve as a thoroughfare for the distribution and equalization of traffic in that part of the industrial district immediately west of the river. No estimate is made of such widening since this suggestion belongs more properly in a general scheme of city planning.

This bridge, it is estimated, would cost \$390,209.



FIG. 51. FOURTH STREET BRIDGES AND THE LOS ANGELES RIVER BED

This view is taken from the north and shows the deck construction across the Los Angeles River, the through bridge across Santa Fe yards on the right and trestle approach across Salt Lake yard on the left. The character of the river bed is also well shown, although there was an unusually large amount of water in the river. The heavy rip-rap along the banks is necessary to prevent erosion in times of flood.

Fourth Street Bridge

At Fourth Street there are two composite structures each about 2,100 feet long, one carrying the street and the other the Los Angeles Railway

across the freight yard of the Santa Fe, the river and the freight yard of the Salt Lake. For the vehicle bridge, commencing at the west end, there are 100 feet of filled approach, then approximately 300 feet of frame bents and a wooden floor, then five combination through Howe truss spans of lengths from 100 to 114 feet, then three deck combination Howe spans carrying the structure across the river and then wood floor and frame bents and ending with a filled approach about 135 feet long.

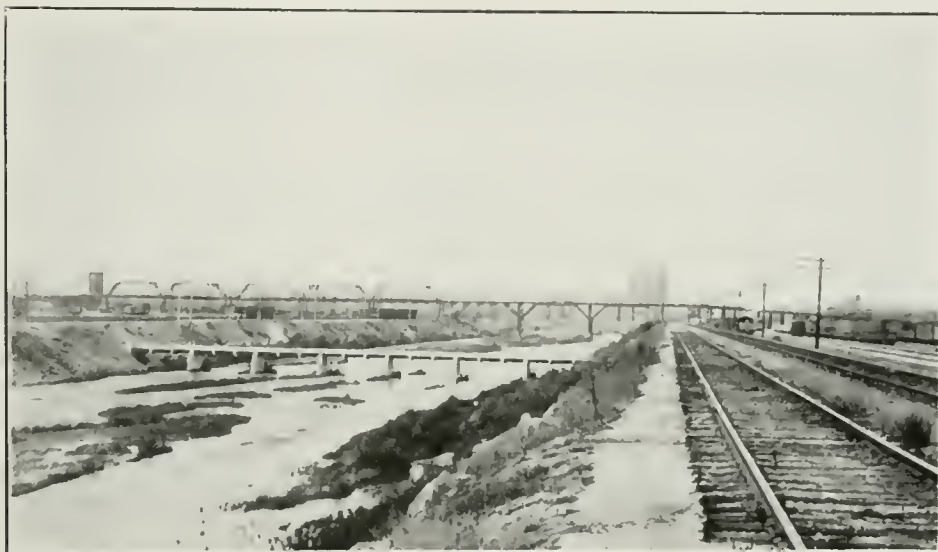


FIG. 52. LOS ANGELES RAILWAY BRIDGE ACROSS THE LOS ANGELES RIVER
FOURTH STREET

There are two bridges shown. The nearer is the railway bridge; the other the highway bridge. The five through spans at the left cross the Santa Fe main line and freight yard; the deck spans at the right cross the Los Angeles River. The approach at right crosses the Salt Lake main line and freight yards. Both approaches are timber trestles.

The Los Angeles Railway Bridge is practically the same as the vehicle bridge except that tracks are carried across the Santa Fe yard on five steel through truss spans. The vehicle bridge was built about 1903 and that of the Los Angeles Railway about 1898. The wooden portion of the structure has been renewed since, a large portion of this renewal having been done in 1913. The vehicle bridge has a roadway 19 feet 6 inches wide and a 5-foot sidewalk supported on brackets.

The Los Angeles Railway bridge is double track. On the west side of the river the approach is curved, with a grade of 7.8 per cent, while the east side has a grade of 5.2 per cent. Clearance over the Salt Lake tracks is 21 feet or 1 foot less than lawful clearance. On the Santa Fe or west side, the clearances vary for the different tracks ranging from 16.8 feet to the lawful clearance of 22 feet. Under the trussed portion of the bridge, the clearance is lawful.

The present bridges at Fourth Street are in good condition and will probably be satisfactory for several years, especially since grade separation has already been accomplished here. We are, however, showing plans for a new bridge at this point. It will be noted that this structure presents a better alignment than the old bridges, being straight, except for one curve. Some rearrangement of the Santa Fe industrial tracks will be necessary, but on the whole both the Santa Fe and the Salt Lake would have more room for tracks than they have at present.

It is suggested that in the future an approach could be built connecting with Santa Fe Avenue at Sixth Street.

The cost of this structure, exclusive of the approach to Santa Fe Avenue at Sixth Street, is estimated at \$856,285, including land and damages. This is larger than the bridges at the other streets because of the greater length of the proposed structure.

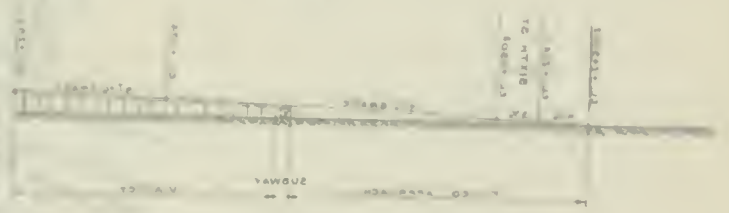
Seventh Street Bridge

Seventh Street bridge is a reinforced concrete arch bridge of three 80-foot clear spans constructed in 1908-1910 and toward the cost of which (about \$115,000, excluding track work and track paving) the Los Angeles Railway contributed \$38,480. The roadway on this bridge is 56 feet wide and carries the double track of the Los Angeles Railway. There are two sidewalks 5.8 feet wide. The approaches are slightly raised above the level of the adjacent ground, the grade on the west side being 4 per cent and that on the east side 1.5 per cent, while the grade of Seventh Street, easterly from the bridge and up to Boyle Heights, is approximately 6 per cent. This bridge is a thoroughly modern structure, in excellent condition and cost approximately \$115,000, the contract having been let in 1908.

Seventh Street is the principal crosstown street in Los Angeles, both to the east and the west of the business center. The rush-hour vehicle traffic across the bridge and adjacent tracks is nearly equal to the traffic crossing Broadway at Seventh Street.

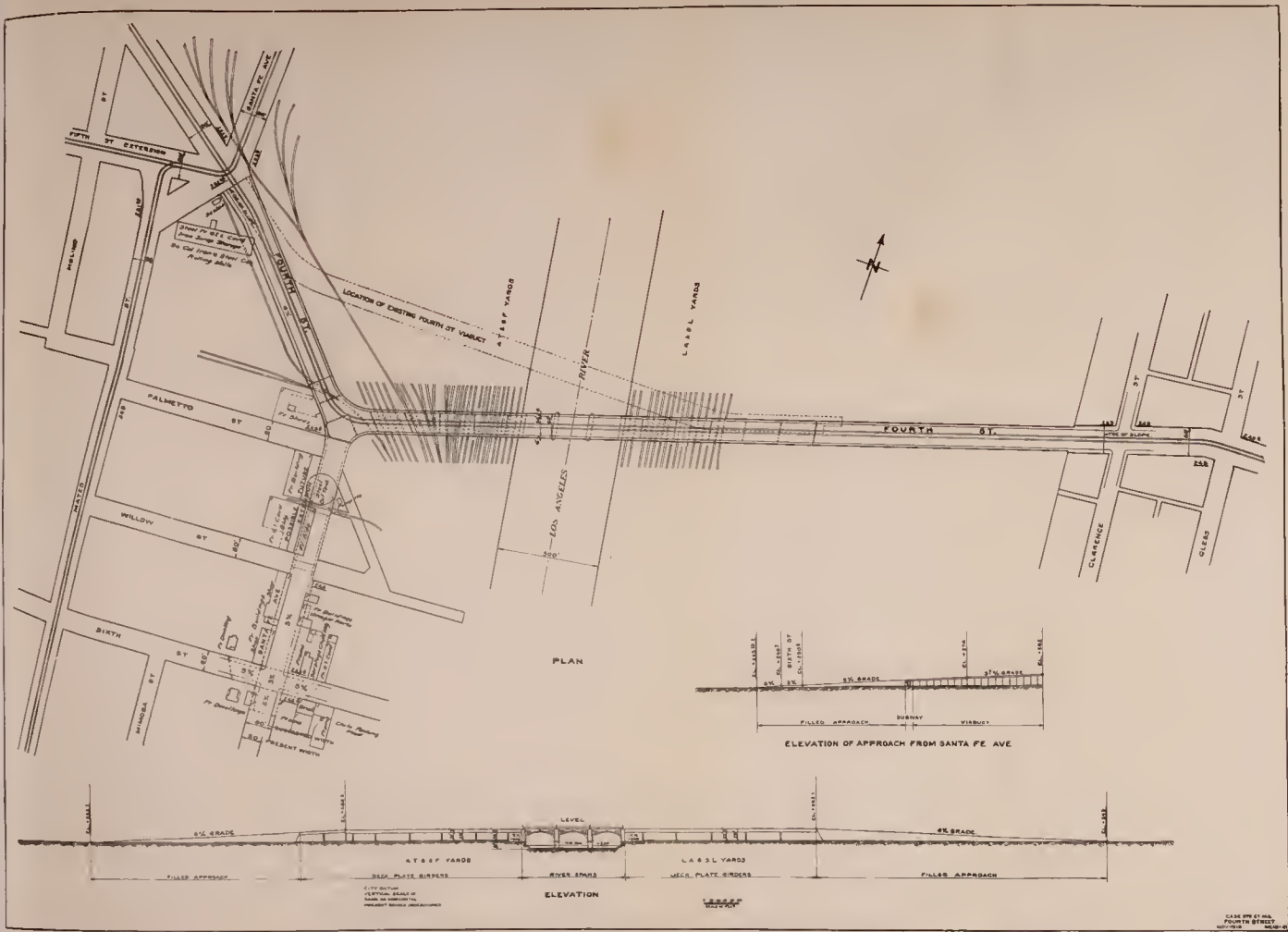


ELEVATION OF APPROACH FROM SANTA FE AVE



4-10-02
L. H. B. CASE 3711 EARD

FOR ENGINEER'S USE ONLY - NOT TO BE USED FOR CONSTRUCTION PURPOSES



California Railroad Construction Engineering Dept.

FIG. 53. PLAN AND ELEVATION FOR A BRIDGE OVER THE LOS ANGELES RIVER AT FOURTH STREET

Although the grades are now separated at Fourth Street and the river, the existing bridge is not of a modern or permanent type. This plan is for a structure with improved grades and alignment. A possible future approach from Santa Fe Avenue would also serve as an extension of that street, and give Sixth Street access to the viaduct without a detour. The existing bridge is shown in dotted lines.

SCALE OF HORIZONTAL DISTANCE
FOURTH STREET BRIDGE



FIG. 54. SEVENTH STREET BRIDGE ACROSS LOS ANGELES RIVER

This reinforced concrete structure, built in 1909-1910, is the last bridge built by the City of Los Angeles across the river, in which no attempt was made to separate the grades of the street and the railroads on the river bank. This bridge carries a roadway 56 feet wide and two 6-foot sidewalks. Except for the fact that they are higher, the viaducts proposed in this report would have very much the same appearance as this bridge.



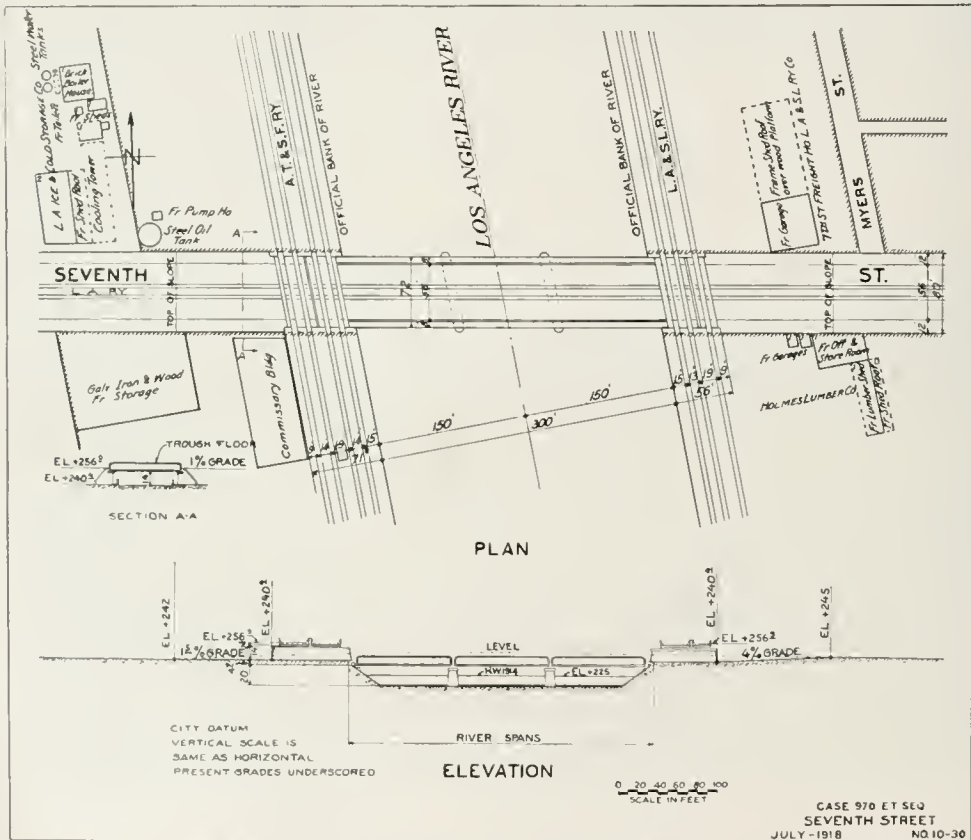
FIG. 55. ANOTHER VIEW OF SEVENTH STREET BRIDGE ACROSS LOS ANGELES RIVER

Santa Fe main line is in the foreground and the Salt Lake tracks are between the striped crossing gates in the background. One of these Salt Lake tracks is the switching lead at the entrance to the freight yard over which practically all freight cars entering the yard move several times during classification. Santa Fe and Salt Lake crossings at either end of this bridge are among the most important in Los Angeles, Seventh Street being one of the busiest streets.

At this point we have considered two plans, one by which Seventh Street is carried over the depressed tracks and the other where the tracks are carried over Seventh Street. Fig. 56 shows a bridge similar to the existing one but with the grades separated, Seventh Street being raised and the Santa Fe tracks depressed. For the west approach, the grade slightly exceeds 4 per cent, because it is not thought advisable to extend the slope beyond Santa Fe Avenue. The westerly two tracks of the Santa Fe are depressed as well as the main line tracks along the river bank.

Extension of the viaduct to Boyle Heights, as has been suggested by certain witnesses, would not seem justified at present, but this plan will not prevent such an extension when warranted in the future. Between the river and Boyle Heights there is considerable lowland suitable for industrial purposes, which would be damaged by a viaduct in Seventh Street across its frontage. This, perhaps, is one of the best reasons for descending to the present grade on the east side of the river.

This bridge, it is estimated, would cost \$567,591.



California Railroad Commission Engineering Dept.
FIG. 57. PLAN AND ELEVATION FOR A BRIDGE ACROSS THE LOS ANGELES RIVER AT SEVENTH STREET

This plan has been drawn to show a low, level structure across the river with the river banks tracks raised. Although there is some economy in first cost, the arrangement is convenient for spur track connections along the river. As this plan does not conform to the general scheme of track depression, it is not recommended.

The arrangement in Fig. 57 in which the railroad tracks are raised to pass over Seventh Street was urged from several quarters, but we are unable to recommend this construction. The plan was drawn for purposes of analysis and shows resulting grades and clearances. Independent of the effect upon the railways paralleling the river, it is obviously of lower first cost than the plan by which the tracks are depressed and the street raised as no approaches and little regrading are required. This advantage is, however, offset by the disadvantages. The most serious objections are as follows:

1. Excessive grade for railway lines south of the bridge are introduced.
2. In a case of exceptional flood, the bridge will act as a dam.
3. An attractive design is not possible and the bridge would be far less pleasing in type than the structures proposed at other points because of limited clearances.
4. The plan is not in accordance with the general plan of the depression of tracks along the river.
5. After including cost of the track elevation, spur track connections and steel railway bridges, whatever economy there is in first cost is offset by the disadvantages.

This arrangement would cost, it is estimated, \$202,826, against \$567,591 for the plan recommended.

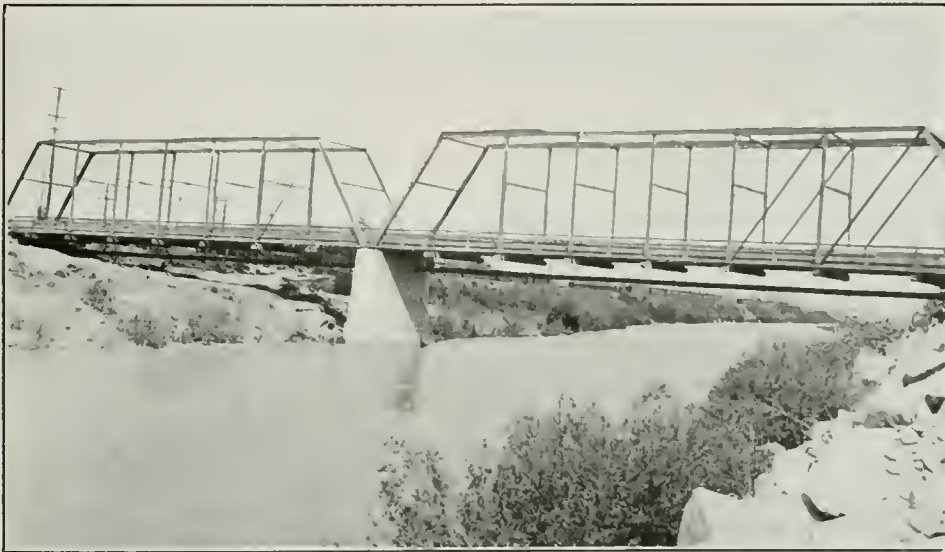
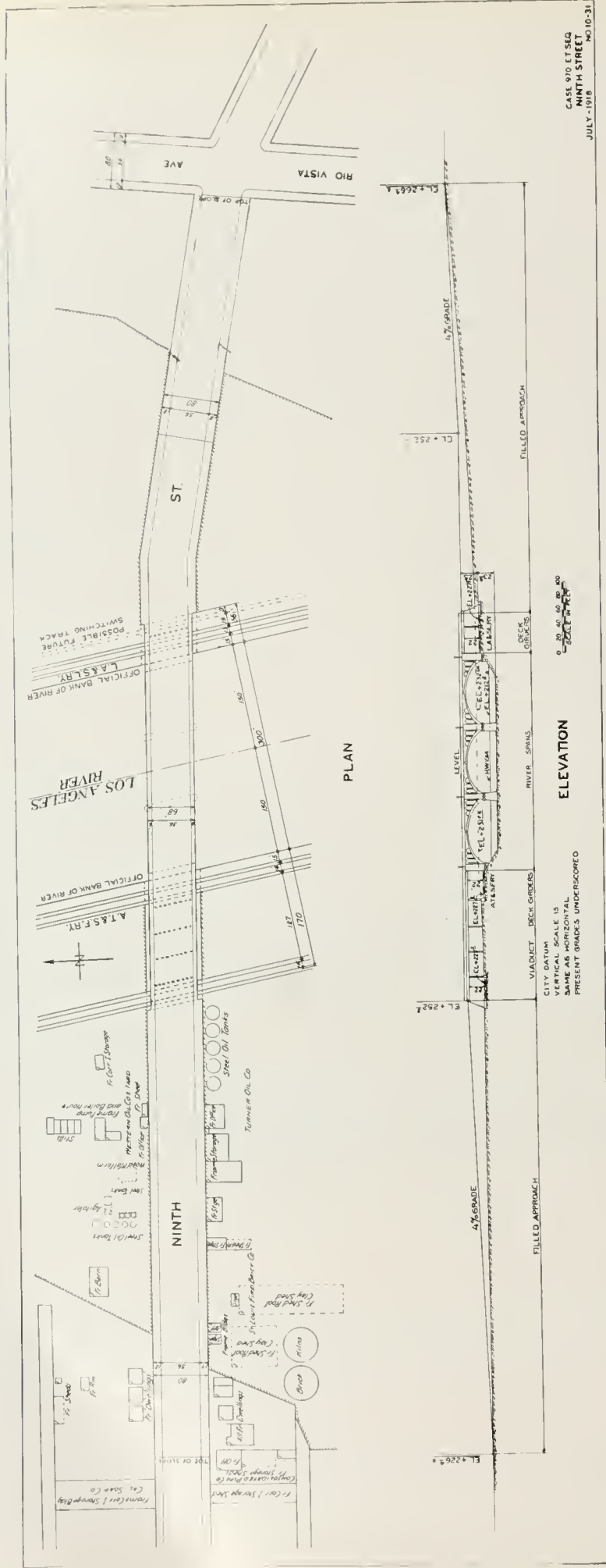


FIG. 58. NINTH STREET BRIDGE ACROSS THE LOS ANGELES RIVER

This 2-span combination steel and wood Pratt truss structure is, at this time (1918), in poor condition, and if subject to anything but lightest traffic, would probably require replacement very shortly. The roadway is but 18 feet wide. Note how the channel is obstructed under the span at the left.

Ninth Street Bridge

The present bridge at Ninth Street is a through wood Pratt truss bridge of two spans (each 158 feet) which carries vehicular traffic across the river, no street cars using this bridge. The roadway is 18.4 feet wide.



CASE 910 ET 550
 NINTH STREET
 JULY - 1918
 NO. 10-31

California Railroad Commission Engineering Dept.
FIG. 59. PLAN AND ELEVATION FOR A BRIDGE ACROSS THE LOS ANGELES RIVER AT NINTH STREET
 This plan has been made with provision for a possible street railway extension. The bridge is of the same general type as that proposed for the other highway bridges across the river.

and there are no sidewalks. On the west side of the river there are some 200 feet of elevated approach partly on a 2 per cent grade and partly on a 7 per cent grade, while on the east side the approach is not elevated but the grade of Ninth Street, as it extends easterly up the hill, has a grade of about 6 per cent at present. This bridge at the present time is only in fair condition and it appears as if the renewal of some, if not all, of the timber will be necessary before very long.

The new bridge suggested is of the same general type as that proposed for Seventh Street and should be built strong enough for street car loads. The approaches cross no streets. On the east side of the river the bluff is so near to the river bank that the approach could be carried horizontally until it intersects a 4 per cent grade to Rio Vista Avenue.

Ninth Street is so little used that the separation of grades here could very well be deferred. When, however, a thoroughfare to the southeast by way of Ninth Street is developed, with more favorable grades and alignment than those which exist on the present Seventh Street route to the state highway and other points in this direction, the construction of this bridge will become necessary. This bridge would cost \$415,419 and is included in our estimates for future work.

The plan shows the arrangement recommended in case the union station is located at the Plaza. If the Santa Fe shop grounds are modified so as to be used as a coach yard in connection with a union station at the Santa Fe site, it will be necessary to add about 100 feet to the length of the viaduct on the west approach. The cost would then be \$436,255.

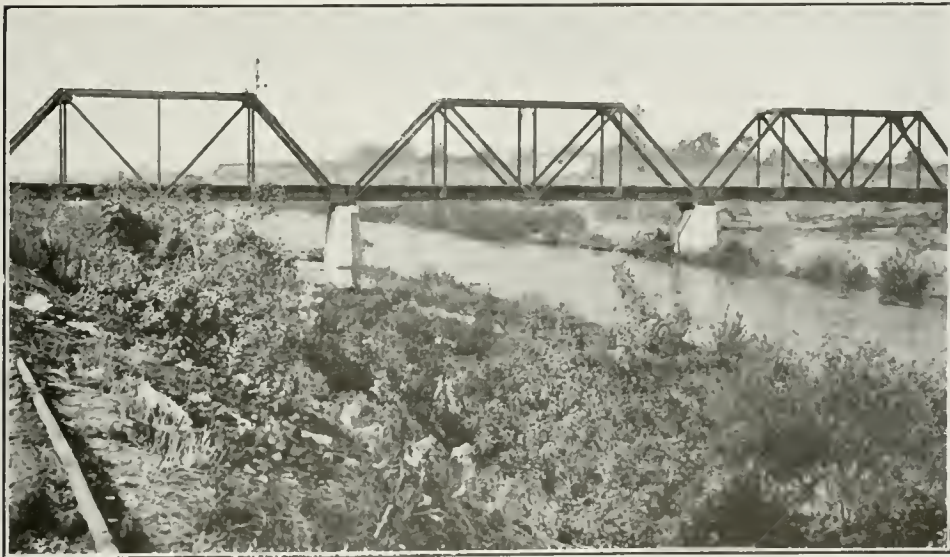


FIG. 60. SALT LAKE BRIDGE ACROSS LOS ANGELES RIVER AT RUTTE STREET

This bridge was built by the Salt Lake about 1907 as part of the plan to reach the district west of the Los Angeles River.

Butte Street-Salt Lake Bridge

The Salt Lake Bridge at Butte Street is a single track bridge and it is not affected by depression of the tracks along the river. It would, however, be affected by rerouting, as noted immediately hereafter.



FIG. 61. SANTA FE BRIDGE ACROSS LOS ANGELES RIVER SOUTH OF BUTTE STREET
This is a single track, steel structure, built in 1897, and carries the Santa Fe's main line to San Diego and San Bernardino, via Fullerton.

Santa Fe Railway Bridge South of Butte Street

The Santa Fe Bridge south of Butte Street and the Salt Lake Bridge at Butte Street should, ultimately, be replaced by one double track structure if the plan is adopted for a union terminal at any one of the three sites considered. For the present, in order to provide double tracks between Los Angeles and Hobart, it would be satisfactory to gauntlet the tracks across the Santa Fe bridge. The installation of a double track bridge is not essential at this time and the structure is included in the ultimate but not in the immediate estimates. The present bridge, although built in 1897, is of excellent design and would, no doubt, be found useful on some other part of the Santa Fe system ultimately. This structure, as will be noted from the picture, consists of two through pin connected single track spans of approximately 150 feet each. When it becomes necessary to construct a double track bridge, it is evident that the location should be changed and, while there are various possibilities for bringing the various tracks together at this point, the best plan seems to locate the bridge on the Santa Fe tangent which runs through Hobart, and is produced westerly. Our estimates, which include the cost of this bridge, are based on this assumption. The location is shown on Fig. 126, and provides connection along the

river on the west side and east side of the river and the Santa Fe tracks to Hobart. Such a bridge is estimated to cost \$161,865. An alternative scheme would be to construct the wye between the proposed track and the present Salt Lake tracks.

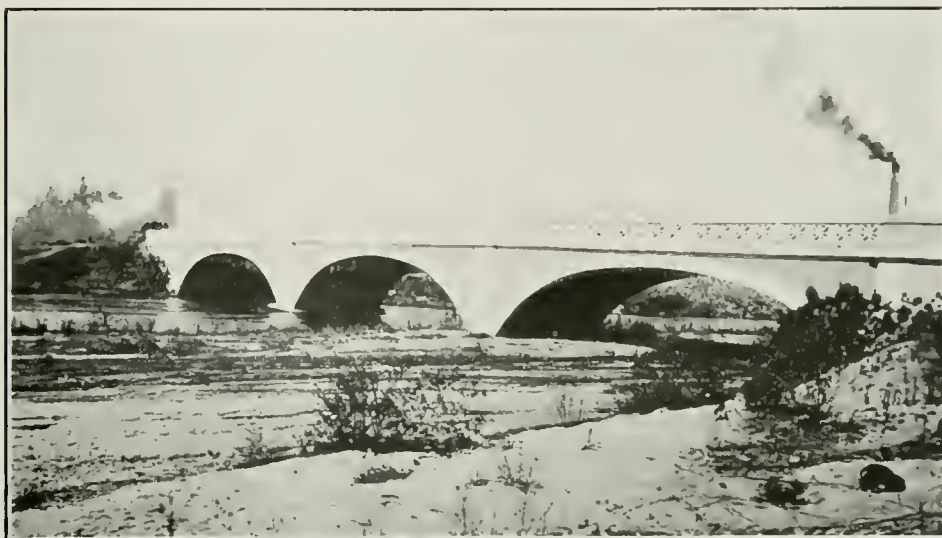


FIG. 62. TWENTY-SIXTH STREET BRIDGE OF THE LOS ANGELES RIVER

This bridge is beyond the southerly limit of proposed track depression and changes and is not affected by any of our recommendations.

CHAPTER VIII.

OUTLINE

Traffic Studies

Traffic Across Alameda Street

Vehicular Travel on Alameda Street

Railroad Traffic Along Alameda Street

Menace of Alameda Street Grade Crossings

Methods of Elimination of Grade Crossings Along Alameda Street

Elevated Tracks on Alameda Street and "Long Viaduct" Plan

Recommendations of Hamlin-Howell-Storrow Report

Plan for Reduction of Freight Switching

Analysis of Present Conditions

Recommendations for Reduction of Freight Switching

Cars Hauled Through City by Southern Pacific for Pacific Electric

Cars Transferred Between Southern Pacific and Pacific Electric

Oil Cars on Alameda Street

Rerouting of Industrial Switching—Switching of Cars to Industry and
Team Tracks

Recommendations For Reduction of Freight Switching

CHAPTER VIII

ALAMEDA STREET GRADE CROSSINGS

At the hearings held before the Commission, much stress was laid on the elimination of the grade crossings formed where the principal east and west streets intersect Alameda Street. Several plans have been proposed for the amelioration of the conditions existing at these crossings and considerable evidence was introduced with regard to their menace and inconvenience. Before taking up these plans and other studies on the same subject, we believed it was essential to ascertain the actual conditions on Alameda Street.

TRAFFIC STUDIES

Traffic Across Alameda Street

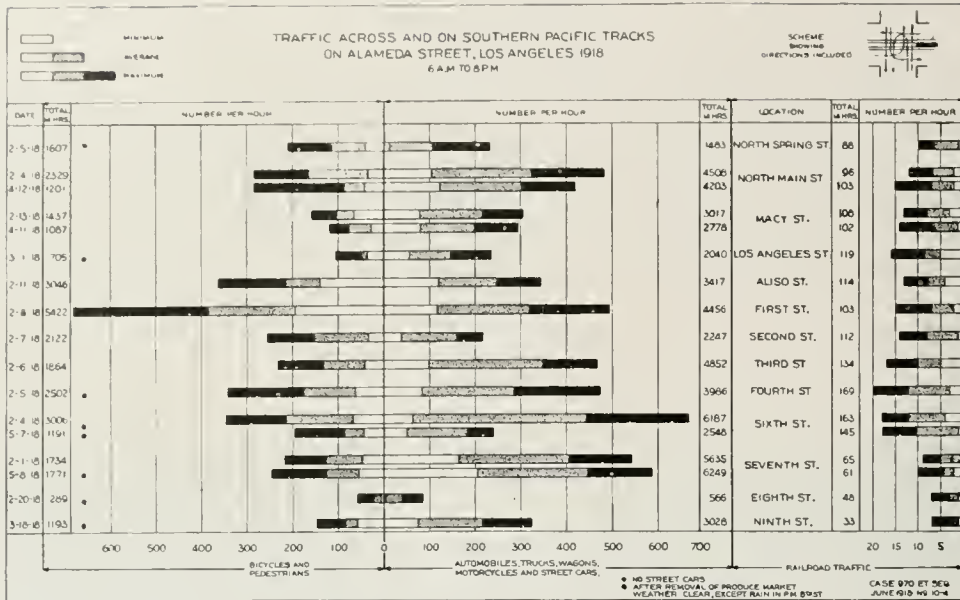


FIG. 63. TRAFFIC CONGESTION AT SEVENTH AND ALAMEDA STREETS

The Los Angeles Railway Traffic and vehicular traffic is holding up the Pacific Electric car on the left, which turns to the right before reaching Alameda Street.

As in the case of the grade crossings of the Santa Fe and Salt Lake adjacent to the Los Angeles River, it seemed advisable to collect certain definite information regarding the traffic which crosses Alameda Street. In so doing, only the principal east and west streets were considered, the streets for which no studies were made being relatively unimportant. Traffic studies were made for:

North Spring Street	East Fourth Street
North Main Street	East Fifth Street
Macy Street	East Sixth Street
Los Angeles Street	East Seventh Street
East First Street	East Eighth Street
East Second Street	East Ninth Street
East Third Street	



California Railroad Commission Engineering Dept.

FIG. 64. STREET AND RAILROAD TRAFFIC ACROSS AND ON ALAMEDA STREET

This diagram shows the results of traffic counts at the principal cross streets on the dates given. The traffic is divided into three groups: pedestrian, vehicle and railroad.

Counts of traffic were made in the same manner as at the Los Angeles River crossings described before. We draw attention to the scheme showing the directions counted, which appears in the upper right-hand corner of the chart, Fig. 64 above. This chart shows the amount of traffic at each intersection, including the railroad traffic on Alameda Street, and is self-explanatory. Attention is called to the difference in traffic on Sixth Street between February 4th and June 7th, the so-called produce market having moved from Sixth and Alameda Streets to the new Los Angeles Union Terminal Company market along Central Avenue during the interim with an apparent reduction of traffic on Sixth Street, and also, particularly, to the fact that in July, 1918, the vehicular movement was heavier than ever before.



FIG. 65. VEHICLES AND TRAIN AT SIXTH AND ALAMEDA STREETS

This crossing at the southern end of the Southern Pacific passenger station is one of the busiest in Los Angeles.

This chart Fig. 66 shows the comparative average hourly traffic as segregated between the different kinds of vehicles and different kinds of trains. Both this chart and Fig. 64 bring out the effect of passenger switching across Sixth Street and also at Fourth and Seventh Streets.

Fig. 67 shows the relation directly between the street traffic, the trains and the delays to traffic. It will be noted that at the crossing at Sixth Street the worst conditions prevail, the number of vehicles and trains and the delays to traffic combined being the maximum at this point, not only before the removal of the produce market, but even after. On June 26, 1918, there were 247 train movements and 6,861 vehicle movements at Sixth and Alameda—which is very heavy traffic. Street traffic, as shown on this chart, includes automobiles, trucks, wagons, motorcycles and street cars.

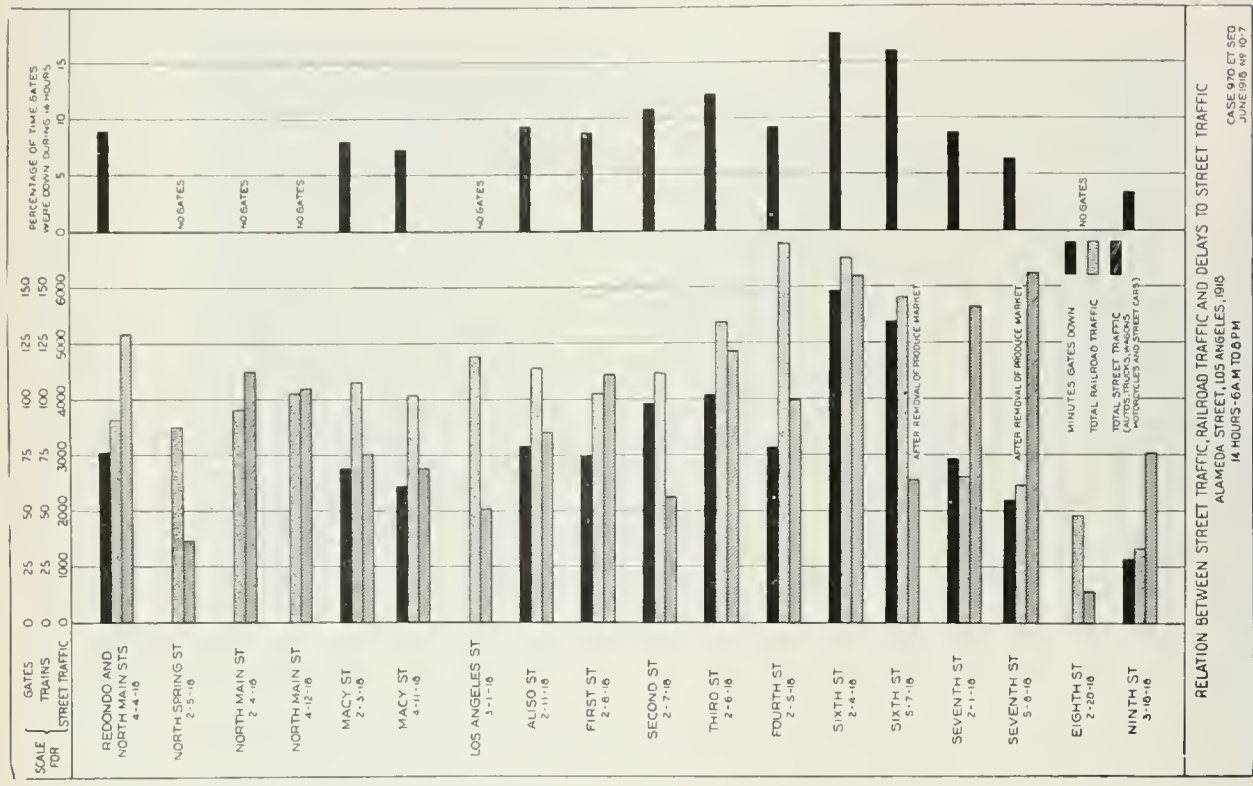


FIG. 67. RELATION BETWEEN STREET TRAFFIC AND RAILROAD TRAFFIC AND DELAYS TO STREET TRAFFIC ON ALAMEDA STREET
 This diagram shows for each important cross street the amount of traffic for 14 hours and the total delay to street traffic in the same length of time. The right hand part of the diagram shows the percentage of time the crossing gates were down. Sixth Street was closed to traffic approximately one-sixth of the time.

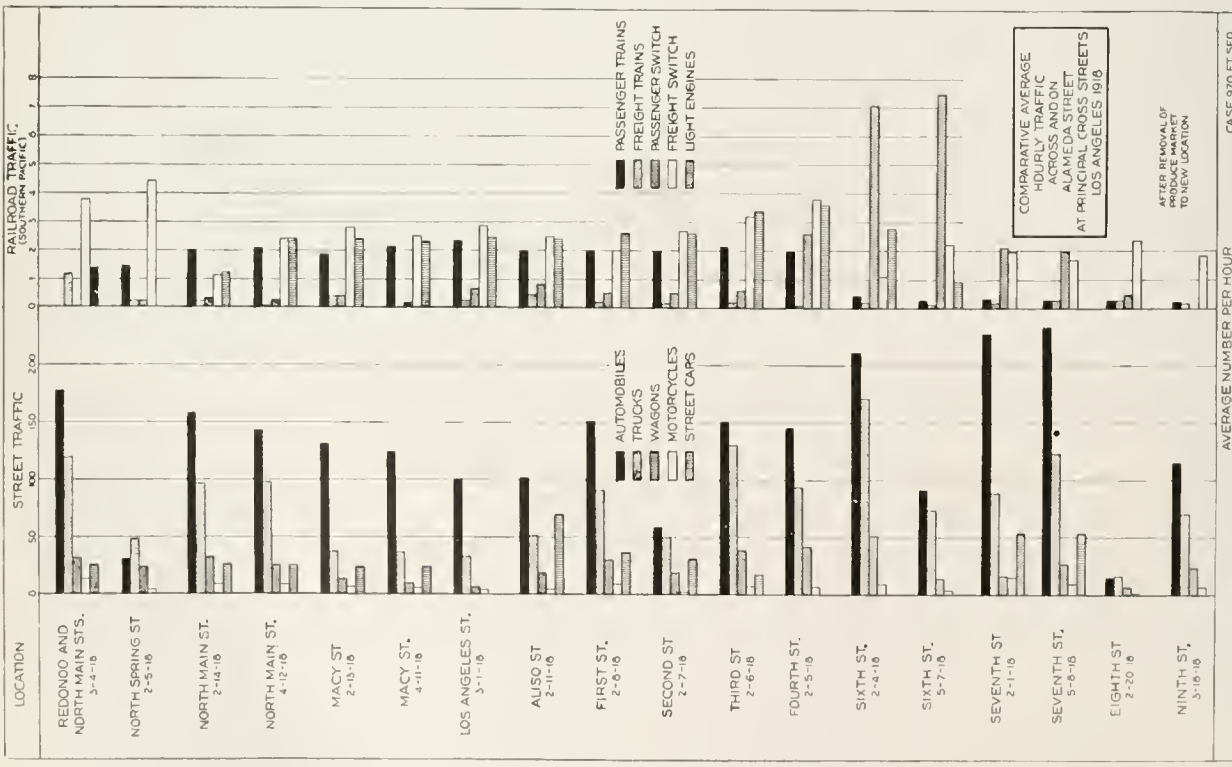


FIG. 68. AVERAGE HOURLY TRAFFIC ACROSS AND ON ALAMEDA STREET AT THE PRINCIPAL CROSS STREETS
 This diagram shows both the railroad and street traffic and the segregation of the traffic into groups.



FIG. 68. TRAFFIC CONGESTION AT SIXTH AND ALAMEDA STREETS

The present use of the Alameda Street crossings, divided between traffic north and south of the Southern Pacific Arcade depot, was found to be about as follows:

USE OF ALAMEDA STREET GRADE CROSSINGS

Crossings	People Per Year Across Tracks
North of Arcade Depot (A)	59,000,000 (Aprox.)
South of Arcade Depot (B)	19,000,000
Total	78,000,000

A — 9 street, 5 street railway and 1 interurban railway crossings.

B — 4 street, 1 street railway and 0 interurban railway crossings.

As would be expected, these figures are considerably in excess of similar figures covering the crossings of the Santa Fe and Salt Lake tracks adjacent to the Los Angeles River, both because there are thirteen crossings included in the above and but five for the river crossings, and because of the large amount of travel between the business portion of the city and locations between Alameda Street and the river.

With respect to mode of conveyance, the following figures are submitted:

TRAVEL OVER ALAMEDA STREET GRADE CROSSINGS

Mode of Conveyance—	Arcade Depot		
	North of	South of	Total
People in Vehicles	20,465,000	9,214,000	29,679,000
Pedestrians and Bicycles.....	8,453,000	1,815,000	10,268,000
People on Cars	30,263,000	7,841,000	38,104,000
Total	59,181,000	18,870,000	78,051,000
Per Average Day.....	162,000	52,000	214,000
Ratios	76%	24%	100%

With regard to vehicular use of this crossing, the following figures show the relative numbers of each class of vehicle:

VEHICULAR MOVEMENT—ALAMEDA STREET GRADE CROSSINGS			
Per Average Day			
Arcade Depot			
	North of	South of	Total
Automobiles	16,514	7,708	24,222
Trucks	9,589	4,238	13,827
Wagons	3,407	1,121	4,528
Motorcycles	755	302	1,057
<hr/>			
Vehicles—Total	30,265	13,369	43,634
Street Cars and Interurban Trains.....	3,458	949	4,407
<hr/>			
Vehicles and Cars—Total.....	33,723	14,318	48,041
Average per Crossing			
Vehicles not including Cars.....	3,363	3,342	3,356

Vehicular Travel on Alameda Street

The attention of the Commission has been drawn many times to the travel across Alameda Street, as discussed above, but we are unaware of any information which has been submitted with regard to vehicular traffic along Alameda Street. This traffic is of equal importance to an understanding of conditions. The following tabulation shows the result of some data obtained for this purpose:

COMPARISON OF VEHICULAR MOVEMENT ACROSS AND ALONG ALAMEDA STREET

Location	Automobiles		Trucks		Hours Counted	Date
	Across	Along	Across	Along		
Alameda Street at		Alameda St.	Alameda St.			
Main St.	2,022*	816*	1,371*	794*	14	April 12
Macy St.	1,734	2,458	517	1,974	14	April 11
Los Angeles St.	1,418	2,553	470	1,668	14	March 1
Fourth St.	1,317	1,342	1,000	1,821	10	March 18
Sixth St.	1,282	1,698	1,034	1,885	14	May 7
Seventh St.	3,263	1,726	1,726	1,372	14	May 8
<hr/>						
Totals	11,036	10,313	6,118	9,514	80	

*Across Alhambra Avenue tracks counted as across Alameda Street.

While this information is for six east and west streets only, we believe it is important to realize that the automobile traffic **along** Alameda Street is just about as heavy as it is **across**, and that the truck traffic—as might be expected, Alameda Street being the thoroughfare for the use of vehicles having business at the Southern Pacific freight depot—is about 50 per cent greater along Alameda Street than it is across. It should be noted that at North Main Street the traffic counts across Alameda Street include all vehicles crossing the tracks at that point, both the tracks which lead out Alhambra Avenue and those extending northerly along Alameda Street. As a re-

sult of this method of counting, the figures for Alameda Street do not indicate the amount of travel actually along Alameda Street, being less than the actual number, and the figures for North Main Street should be reduced by a similar amount. The extremely large figures for along Alameda Street at Macy and Los Angeles Streets include the large amount of traffic which, north bound, turns from Alameda into Macy Street, and, south bound, from Alameda into Los Angeles Street.

Railroad Traffic Along Alameda Street

Figs. 64 and 66 on pages 194 and 196 show the relative amount of railroad traffic at the different streets crossing Alameda Street. Additional data on this subject is presented in the table in second half of report, which shows the railroad traffic, **except switching**, during the year 1917. This table brings out the relation of time and kind of traffic.

TRAIN MOVEMENTS, EXCEPT SWITCHING, NORTH AND SOUTH OF ARCADE STATION Average 24 Hours Traffic

Kind of Movement	Arcade Depot			
	North of		South of	
	Av. Trains Per Day	Ratio	Av. Trains Per Day	Ratio
Passenger Train	38	40%	4	29%
Through Freight Train.....	10	11%	10	71%
Light Road Engine*.....	47	49%	0	0%
Total	95	100%	14	100%
Ratio	8.7%		13%	

*Distinguished from switch engine without cars.

TIME OF DAY OF RAILROAD TRAFFIC ON ALAMEDA STREET Average 24 Hours Traffic (Switching not Included)

	Arcade Depot			
	North of		South of	
	Av. Trains Per Day	Ratio	Av. Trains Per Day	Ratio
Midnight to 6 A.M.....	5	6%	4	27%
6 A.M. to Noon.....	35	38%	4	27%
Noon to 6 P.M.....	22	24%	4	27%
6 P.M. to Midnight.....	30	32%	3	19%
Total	92	100%	15	100%

The next tabulation shows the results of traffic counts along Alameda Street. A division has been made north and south of the Southern Pacific Arcade Depot, both because this is a natural point of division, and because this data was necessary in considering the Southern Pacific-Salt Lake project, as per Application No. 3346:

RAILROAD TRAFFIC ON ALAMEDA STREET FROM TRAFFIC COUNTS

At	Number of Movements						Date of Check
	Trains		Switches		Light Road	Engines Total	
	Pass.	Frt.	Pass.	Frt.	Engines		
North of Arcade Depot							
6 A.M. to 8 P.M.—14 Hrs.							
North Spring Street	21	3	3	61	0	88	2- 5-18
North Main Street	29	3	4	29	31	96	2- 4-18
North Main Street	*(30)	(1)	(4)	(34)	(34)	(103)	4- 2-18
Macy Street	*(20)	(5)	(5)	(39)	(53)	(108)	2-13-18
Macy Street	30	0	5	35	32	102	4-11-18
Los Angeles Street	33	3	9	40	34	119	3- 1-18
Aliso Street	29	6	11	35	33	114	2-11-18
East First Street	28	3	7	28	37	103	2- 8-18
East Second Street	28	2	7	38	37	112	2- 7-18
East Third Street	33	3	8	45	48	134	2- 6-18
East Fourth Street	29	1	36	53	50	169	2- 5-18
East Fourth Street	†*(19)	(2)	(21)	(26)	(40)	(108)	3-18-18
<hr/>							
Total North of Arcade							
Depot	257	24	90	364	302	1,037	
Average per Crossing	28.5	2.7	10	40.5	33.5	115	
South of Arcade Depot							
6 A.M. to 8 P.M.—14 Hours							
East Sixth Street	6	3	99	16	39	163	2- 4-18
East Sixth Street	*(4)	(2)	(105)	(31)	(13)	(155)	5- 7-18
East Sixth Street	*					(189)	7-26-18
East Seventh Street	5	3	30	27	0	65	2- 1-18
East Seventh Street	*(4)	(4)	(29)	(24)	0	(61)	2- 8-18
East Eighth Street	4	4	7	33	0	48	2-20-18
East Ninth Street	4	3	0	26	0	33	3-18-18
<hr/>							
Total South of Arcade							
Depot	19	13	136	102	39	309	
Average per Crossing	5	3	34	25	10	77	
*Excluded in Totals.							
†10 Hour Count.							
8 P.M. to 6 A.M.—10 Hours							
Night Train Movements							
East Sixth Street	7	6	0	27	7	47	4-17-18
East Sixth Street						58	7-26-18
East Seventh Street	0	4	12	21	0	37	4-16-18
24 Hours							
East Sixth Street						247	7-26-18
Macy Street	37	6	5	62	39	149	4-11-18
East Seventh Street	5	7	42	48	0	102	4-17-18

This data for the first time includes switching. The number of switching movements counted at different points shows varying results. Freight switching, as might be expected, is heavier north of the Arcade Depot, and

passenger switching is heaviest on Sixth and Seventh Streets.

In the next tabulation, the relative amounts of the various kinds of train movements during the day are shown:

CLASSIFICATION OF TRAINS ON ALAMEDA STREET

Fourteen Hours (Daytime) Traffic

6 A.M. to 8 P.M.

	North of Arcade Depot		South of Arcade Depot	
	No.	Ratio	No.	Ratio
Passenger Trains	28.6	25%	5	6%
Freight Trains	2.7	2%	3	4%
Passenger Switch	10.0	9%	34	44%
Freight Switch	40.5	35%	25	33%
Light Road Engine	33.5	29%	10	13%
Total	115.3	100%	77	100%
Ratios North and South	60%		40%	

From this table it is evident that the removal of through passenger and freight trains from Alameda Street will remove 65 per cent of the railroad movements north of the Arcade Depot and 67 per cent south of the depot, provided the coach yards are moved from their present site. If they remain, but 25 per cent of the traffic will be removed south of the depot.

Since approximately 78 per cent of freight switching is performed from 6 A.M. to 8 P.M., a table has been constructed similar to the above, but on a 24-hour basis:

CLASSIFICATION OF TRAINS ON ALAMEDA STREET

Twenty-four Hours Traffic

February and March, 1918

Average 24 Hours Traffic

	North of		South of		Ratios	
	Arcade Depot		Arcade Depot		North South	
	No.	Ratio	No.	Ratio	of Depot	
Passenger Trains	38	24%	4	4%	90%	10%
Freight Trains	10	7%	10	10%	60%	50%
Passenger Switch	10	6%	42	43%	19%	81%
Freight Switch	52	33%	32	33%	62%	58%
Light Road Engine	47	30%	10	10%	82%	18%
Total	157	100%	98	100%	61%	39%

This table shows that in the 24 hours the elimination of through passenger and freight train movements on Alameda Street would remove 67 per cent of the traffic both north and south of the Arcade depot and that the present coach yard location is responsible for about 43 per cent of the traffic south of the depot. The figure of 52 freight switch movements per day (or over two per hour average) is also interesting from the standpoint of night switching, as will be discussed later, with regard to the possibility of handling this traffic within certain night hours.

On June 2, 1918, new time tables became effective on all the steam roads in Los Angeles, these time tables showing a large reduction in the number of passenger trains. The number was reduced from 94 to 72, or 24 per cent. So far, we have presented figures based on traffic counts made principally in February and March, 1918, but this subject should not be passed without some consideration of the number of trains under war conditions and Federal control. The next table shows the number of various kinds of trains and the relation which each class bears to the whole, for July, 1918. As conditions in the future are more apt to be similar to those of February than those in July, the data for February should, in our opinion, be given preference.

**CLASSIFICATION OF TRAINS ON ALAMEDA STREET AFTER
REDUCED SCHEDULE OF JULY 2, 1918**

Twenty-four Hour Traffic

Class of Train Movement	July, 1918					
	Average 24 Hours Traffic				Ratios	
	North of Arcade Depot		South of Arcade Depot		North	South
	No.	Ratio	No.	Ratio	of Depot	
Passenger Trains	27	20%	4	4%	87%	13%
Freight Trains	10	8%	10	10%	50%	50%
Passenger Switch	10	7%	42	43%	19%	81%
Freight Switch	52	39%	32	33%	62%	38%
Light Road Engine.....	36	26%	10	10%	78%	22%
Total	135	100%	98	100%	58%	42%

Menace of Alameda Street Grade Crossings

To substantiate the contention that the grade crossings along Alameda Street are dangerous and undesirable, we believe it will only be necessary to call attention to the figures below:

**SUMMARY OF USE OF IMPORTANT ALAMEDA STREET
GRADE CROSSINGS**

Average 13 Crossings of Important Streets	Per Average Day Per Average Crossings	
	North of Arcade Depot	South of Arcade Depot
People across	18,000	5,800
Vehicular movements	3,363	3,342
Railroad movements	157	98

**METHODS OF ELIMINATION OF GRADE CROSSINGS ALONG
ALAMEDA STREET**

This showing so obviously proves the possibility of accident and the delay to traffic that the desirability and necessity of elimination of as much railroad traffic as possible from Alameda Street cannot be questioned. Several plans have been proposed to accomplish this result.

Elevated Tracks on Alameda Street and "Long Viaduct" Plan:

At the time of the Daum Case (Case 467) the elevation of the tracks along Alameda Street was proposed, and these elevated tracks were to be used for through passenger and freight movements. Later, as noted before, the so-called "long viaduct" plan was submitted. This plan, in brief, proposed viaducts crossing Alameda Street and the tracks adjacent to the Los Angeles River, and extending from points west of Alameda Street to points east of the river.

Recommendation of Hamlin-Howell-Storrow Report

Still later, in the Hamlin-Howell-Storrow report, it is recommended that the railroad traffic on Alameda Street be treated as follows:

"1st Step—Eliminate through-freight and restrict the use of these tracks to passenger service and local car deliveries and removals;

"2nd Step—Eliminate passenger service;

"3rd Step—Finally remove tracks altogether."

Such study as we have made of the elevated track and the long viaduct plans convince us that both proposals should be rejected. This is principally because the construction of elevated tracks would make almost impossible industrial switching along Alameda Street, except at prohibitive cost. Furthermore, not only would there be no relief from the existing switching nuisance, but steadily aggravating conditions would become permanently fixed in the future. The long viaduct plan is against the best interests of the city, as has already been pointed out in Chapter VI.

Our traffic investigations have convinced us, however, that the recommendations in the Hamlin-Howell-Storrow report are, generally, sound, and we join in their recommendations with such exceptions as are noted hereunder. Of all the traffic, it is apparent that the **through freight train** movement along this street is the least justifiable. Fortunately this is the easiest to eliminate. Leaving out of consideration for the time being the location of a union station, all that is necessary to accomplish this result is:

(1) Arrangement for the use by the Southern Pacific of the Santa Fe tracks along the river from North Broadway Bridge to a connection with the Salt Lake tracks along Butte Street, including the construction of this connection.

(2) A similar arrangement for the use of the Salt Lake tracks on Butte Street from about Harriet Street to Alameda Street.

(2) A similar arrangement for the use of the Salt Lake tracks on Butte Street from about Harriet Street to Alameda Street.

(3) Construction of an interlocking plant near North Broadway Bridge, where the Santa Fe and Southern Pacific main lines are closer than at any other point.

The ultimate arrangement, if a union passenger depot on any of the three possible sites is built, should be as follows:

(1) Arrangement for use of Salt Lake tracks from Humboldt Street to Alameda Street, including the construction of a connecting curve between Alostá Street and Butte Street on the east side of the river.

(2) Construction of a track along the east bank of the river from Humboldt Street to the new Southern Pacific Classification yard, on the east side of the Los Angeles River.

(3) The construction of an interlocking plant at the Santa Fe Humboldt Street bridge on the east side of the river. This plan corresponds to a portion of the Southern Pacific-Salt Lake project as presented to the Commission in Application 3346.

(4) The construction of a connecting track from the Salt Lake Butte Street track southerly to the Southern Pacific track on Alameda Street. This connecting curve would be necessary either for the use of the Santa Fe or Salt Lake track and is also a part of the Southern Pacific-Salt Lake scheme.

Following along the lines of the Hamlin-Howell-Storrow Report, the second step recommended was the elimination of passenger service along Alameda Street. We also agree that this class of service is, after the through freight traffic, the least justifiable and should be done away with. All the plans submitted to the Commission for a union passenger terminal in Los Angeles provide for the elimination of passenger service on Alameda Street, and this matter can be disposed of in accordance with the decision as to the location of a union passenger depot. Under the Plaza plan, as recommended in this report, the diversion of passenger service from Alameda Street is accomplished automatically.

There is before the Commission but one plan contemplating the continuation of separate passenger depots. This is the one proposed in the Southern Pacific-Salt Lake project (Application 3346). Consideration of the arguments for and against the construction of the elevated tracks proposed in this scheme will be taken up elsewhere under the discussion of a union passenger terminal (Chapters XII, XIII and XIV). It should be here noted that along with passenger service, light road engine movements are included.

The three engineers' report also recommends that finally all tracks be removed from Alameda Street. The accomplishment of this, as recommended by them, is to be obtained in "that eventually all spur tracks shall herringbone out east and west from leads along the river bank, and these leads and all other trackage through the city be for joint use by all railroads", and "all tracks now longitudinally within any street to be confined to use for industrial purposes only and finally removed as soon as access to the industries can be obtained otherwise". This introduces the problem of freight switching.

PLAN FOR REDUCTION OF FREIGHT SWITCHING

Analysis of Present Conditions

The question of the physical possibility of switching the freight cars appears to be the first study essential to the consideration of these recommendations, and with this in view, we have prepared statistics showing the

total number of cars per year moving along Alameda Street and set out to industries, team tracks and transfer tracks. This information is presented in Table XX (in Appendix), and shows from one important street to another, the number of industries and the number of cars set out. Fig. 69 on page 210 shows graphically the total number of cars passing each section, and since all traffic moves south from the Southern Pacific freight yards, the section farthest north would have passing through it all of the cars destined to the different sections lying south of it. It should be noted that this chart presents the number of loaded and empty cars set in, and that to get the number of movements along the street the figures should be double as each car set to an industry or team track must, of necessity, be taken out. The number of cars set in on transfer tracks, while not necessarily equal to the number of cars taken off from transfer tracks, may also be doubled without serious error.

The number of freight cars switched along Alameda Street, divided with respect to the Arcade Depot, is approximately as follows:

NUMBER OF FREIGHT CARS MOVED ALONG ALAMEDA STREET

	Cars Moved	
	1917	Ratios
North of Arcade Depot.....	155,000	70%
South of Arcade Depot.....	65,000	30%
	<hr/>	<hr/>
Total	220,000	100%

Further study of the table shows that the destination of the cars set is about as follows:

DESTINATION OF FREIGHT CARS SWITCHED ALONG ALAMEDA STREET

Destination	Cars Set Year 1917	Ratios
Industries	33,931	31%
Team Tracks	14,241	13%
Pacific Electric Transfer Tracks.....	61,745	56%
	<hr/>	<hr/>
Total	109,917	100%

Now, if it were possible to avoid moving along Alameda Street, cars destined for Pacific Electric Transfer tracks, 56 per cent of the number of cars passing along Alameda Street could be removed, and if we consider only what portion of Alameda Street north of Seventh Street, which is the district in which are located the most important crossings, another tabulation may be prepared showing the destination of cars which pass Seventh Street.

**FREIGHT CARS SWITCHED SOUTH OF SEVENTH STREET ON
ALAMEDA STREET**

Destination	Cars Set Year 1917	Ratios
Industries	21,825	27%
Team Tracks	0	
Pacific Electric Transfer Tracks.....	55,594	73%
	77,419	100%

It is apparent, then, that if the cars destined for Pacific Electric transfer tracks are rerouted, over 70 per cent of the number of cars switched along Alameda Street will be eliminated north of Seventh Street.

With the establishment of a through freight route we see no reason why Alameda Street cannot be relieved of this traffic. The transfer may then take place on Butte Street just west of Santa Fe Avenue, and for the northern portion of the City the transfer located at Aliso and Lyons Streets may be done away with and the interchange made either with the Santa Fe tracks at Aliso Street, or, better, with the Salt Lake tracks at the "Anderson" transfer, which is located near the junction of Elliott Street and the river. This accomplished, the switching along Alameda Street, with the exceptions of the crossings north of Aliso Street, will amount to but about one-third of the present number of freight cars handled along this thoroughfare.

The elimination of the industrial switching movement longitudinally along Alameda Street remains to be accomplished. In order to obtain detailed first-hand information on the various phases of industrial switching in this district an industry-to-industry canvass was made, including industries on the Santa Monica Air Line. Only such industries are included, the cars for which are hauled along Alameda Street. The following tabulation presents the results of the study:

INDUSTRIAL SWITCHING USING ALAMEDA STREET

Number of Industries, exclusive of Air Line.....	278		
on Air Line.....	36	314	
Nature of Freight:			
Ordinary (Number of Industries).....	235		
Perishable (Number of Industries).....	38		
Semi-perishable (Number of Industries).....	10		
Mixed or Various (Number of Industries).....	31	314	
Number of Cars Set:			
	Year 1917	Av.* No. Per Industry	Per Av. Day
Loads	27,905	89	76
Empties	6,026	19	17
	33,931	108	93

*Average per industry based on all industries, including 111 which received no cars.

Time Switched:		
Morning (Number of Industries).....	71	
Afternoon (Number of Industries).....	81	
Night (Number of Industries).....	160	312
Average Time Cars Held, according to information received		
from shippers		14.8 hours
Length of Industrial Tracks:		
Gross	128,512 feet or	24.3 miles
Net	58,621 feet or	11.1 miles
Car Capacity of Industrial Tracks:		
Gross		1,956 cars
Spot		922 cars
Southern Pacific Switching Districts:		
"Red Ball" (Number of Industries).....	97	
"Green Ball" (Number of Industries).....	71	
"Green Ball" (Number of Industries) (Including 36 on Santa Monica Air Line).....	146	314
Shippers Reporting Cars Switched to Another Industry:		
Reported Habitually (Number of Industries).....	35	
Reported Occasionally (Number of Industries).....	30	61
Number of Cars Reported Switched to Other Industries....		1078
Shippers' Opinions as to Night Switching:		
Preferable (Number of Shippers).....	166	
Immaterial (Number of Shippers).....	89	
Impossible (Number of Shippers).....	5	200
Number of Shippers Reporting Present Service Satisfactory		72%
Ration of Cars Set Per Day to Spot Capacity.....		12.3%
Spur Tracks not used:		
Number of		17
Gross Length (Percentage of Total Length), 14,484 feet or		3.0 miles
Car Capacity		302 cars

The results of this study show, in brief, that:

1. The present service is satisfactory.
2. Less than 1 per cent of the shippers have any objections to night switching.
3. All industries except one could be served by night switching. The number of cars necessary to be set on some days on this one track exceeds the number of cars which this track can hold.

The first fact is, to us, of very great importance since the condition of finding shippers satisfied with their switching service is almost unique. We hesitate, on this account, to make any very serious changes in such a situation. The present freight business is the backbone of Los Angeles commerce and upon it depend, to a very large extent, the growth and prosperity of the City. It has been stated positively by the representatives of the railroads that the time available for switching at night is not sufficient to handle the business presented. Statements to this effect by these representatives are presented in the Seventh Annual Report of the Los Angeles Board of Public Utilities and were made in response to an order of that Board to show

cause why freight and switching movements in this district (Macy Street to Seventh Street) should not be restricted to the hours between 12 midnight and 6 A.M. in order to provide greater convenience and safety to the traveling public. The Superintendent of the Southern Pacific Company stated that it was impossible to handle the volume of business allotted to the present industrial district within the sixteen-hour period and that eighteen hours were consumed in satisfactorily handling the business. He made the further point that the shippers, as at present located, could not be so served with the limited spur track facilities with which they had provided themselves.

We considered it desirable to make a careful investigation of the first contention. Our traffic figures have led us to the conclusion that the present volume of business, and also the volume likely to be handled for a considerable number of years in the future, can readily be handled at night. We would suggest that it would be a simple matter to lengthen the switching period from the six hours proposed by the City authorities to seven or eight hours if such expansion proves necessary.

The second contention is, we believe, without merit. We are satisfied that the industries on the Southern Pacific tracks have provided themselves with sufficient facilities, a conclusion that is borne out by the fact that the ratio of cars set to spot capacity is only 12 per cent.

It was stated by Southern Pacific officials that there were about seventy-five industries in the proposed restricted territory requiring almost constant service throughout the twenty-four hour period (an average of 200 cars per day being handled) and that many of the shipments consisted of perishable freight demanding prompt handling. We have found but thirty-three industries in this district which handle perishable freight, and only one industry where the trackage was not sufficient to accommodate the number of cars necessary to be set in one day, barring occasional unusual demands.

It should be here stated that in general night switching requires that a car remain on spot at the industry probably on an average of twenty-four hours, i. e., from midnight of one day until midnight of the next day, and that any study with regard to the possibility of night switching should take into consideration the fundamental necessity that these cars should be released as soon as possible after they are set.

Traffic studies by the Demurrage Bureau during January, 1918, showed that during the week ending January 12 an average of 77 per cent of the cars were released on the day they were set, while during the following week when a drive was made for prompt unloading, only 74 per cent were released. These figures are taken from the following table, the "total" column being ours:

RELEASE OF FREIGHT CARS UNLOADED ON INDUSTRIAL TRACKS

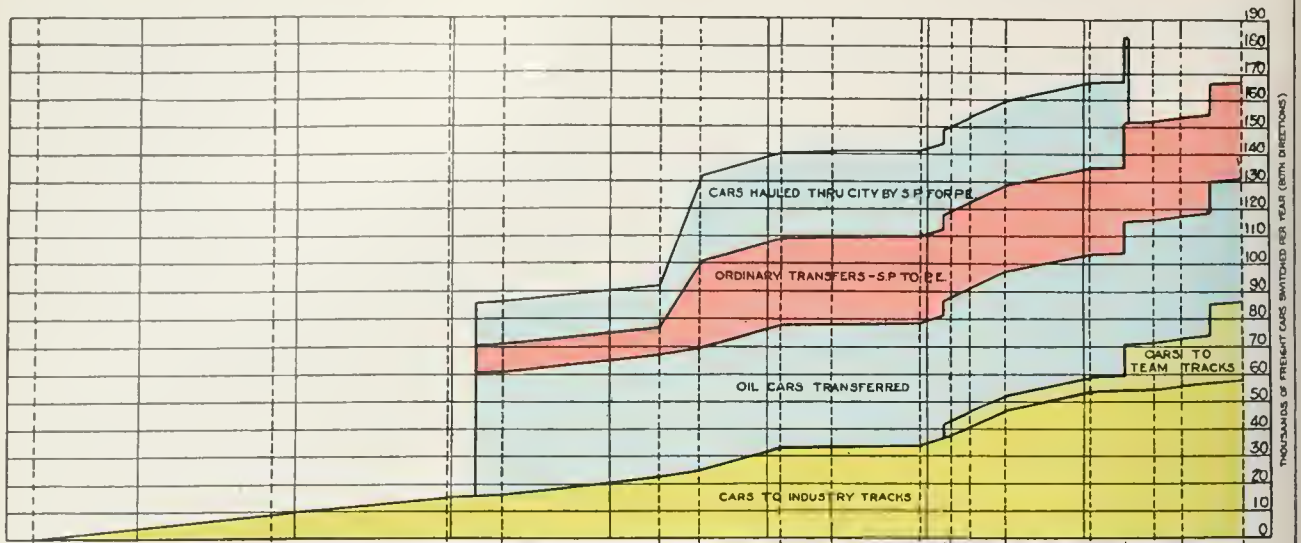
"Cars on Spot and Released Total for All Los Angeles' Lines"

Freight Moving Week—January 14-19							
	Mon. 14th	Tues. 15th	Wed. 16th	Thur. 17th	Fri. 18th	Sat. 19th	Total
Placed	785	628	510	553	566	614	3656
Released	574	499	458	429	427	438	2825
% Released	73%	79%	89%	77%	75%	71%	77%
Previous Week—January 7-12							
	7th	8th	9th	10th	11th	12th	Total
Placed	727	682	537	598	573	615	3732
Released	516	509	438	440	409	456	2768
% Released	71%	74%	81%	74%	71%	74%	74%

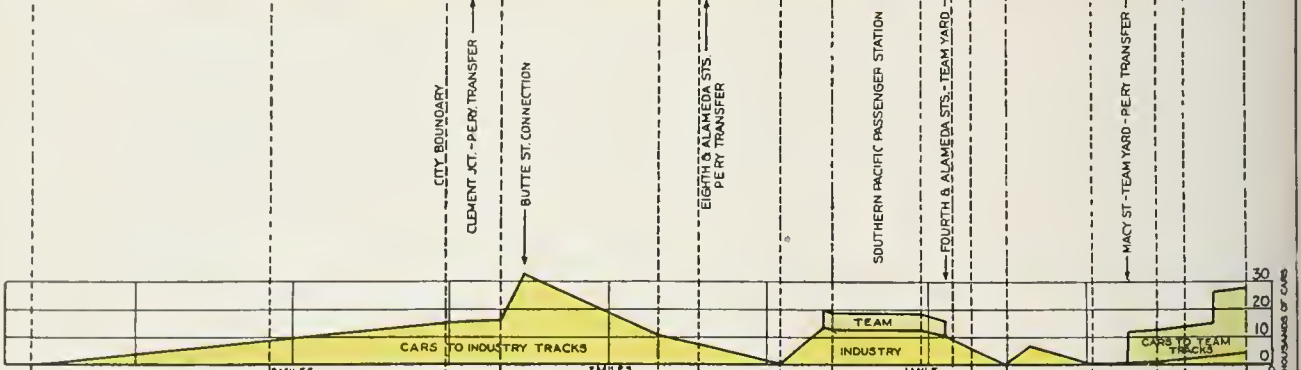
It must be remembered that the foregoing figures cover the war period when more than ordinary efforts were made by shippers and railroads alike to expedite work in car movement. It is our opinion, nevertheless, that even in normal times it is possible to handle all freight switching in the congested portion of Alameda Street from Macy Street to Ninth Street during the night.

Recommendations for Reduction of Freight Switching:

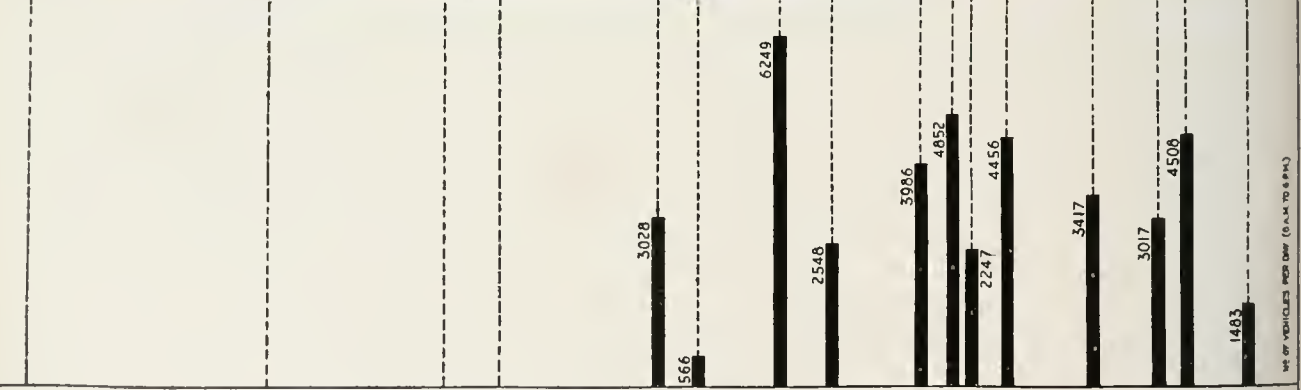
It has been developed that freight switching makes up 33 per cent of the total number of train movements on Alameda Street, both north and south of the Southern Pacific Station. Expressed in other units, for the average crossing there are 52 switches per day north of the Southern Pacific Station and 32 switches south of the station. We are of the opinion that this can be reduced to a point where it is no longer objectionable.



PRESENT CONDITIONS



PROPOSED CONDITIONS



RELATIVE VEHICULAR TRAFFIC ACROSS ALAMEDA STREET

**FREIGHT SWITCHING ON ALAMEDA STREET
LOS ANGELES**

PRESENT TRAFFIC AND CONDITION AFTER PROPOSED CHANGES AND
RELATIVE MOVEMENT OF VEHICLES AT IMPORTANT GRADE CROSSINGS

CASE 970 ET SEQ
FEBRUARY 1919, NO 10-47

FIG. 69. FREIGHT SWITCHING ON ALAMEDA STREET

The upper diagram shows the amount of freight traffic upon Alameda Street under existing conditions. Contrast the present and proposed conditions by comparing the colored areas. Cars represented in the upper three areas are to be diverted to the river and industrial switching rerouted, to avoid important streets. Practically all of the danger and delay at these grade crossings is eliminated without resort to viaducts.

Cars Hauled Through the City by Southern Pacific for the Pacific Electric

Fig. 69 shows, by differently colored areas, the present switching business along Alameda Street divided as to several classes according to destination and routes. The number of cars covers those set and those removed. The upper area on this chart shows the volume of traffic switched by the Southern Pacific for the Pacific Electric, this service being paid for at so much an hour for the use of the engine and crew and being performed in order to keep the freight cars off the uptown Pacific Electric tracks on San Pedro or Main Streets.

This traffic consists of about 15,000 cars per year transferred to the Southern Pacific by the Pacific Electric at Macy Street and hauled along Alameda Street by the Southern Pacific to Eighth Street where they are set on the Pacific Electric transfer track, and about the same number picked up at Clement Junction transfer and set out at Macy Street transfer, all these cars being handled along Alameda Street by the Southern Pacific. These cars, amounting to 31,800 per year, are about 22 per cent of the average total number of freight cars hauled along Alameda Street between Aliso and Eighth Streets.

We recommended that the Pacific Electric deliver these cars to the Salt Lake at Anderson transfer (located on the east side of the Los Angeles River, at Elliott Street), and that they be hauled by the Salt Lake to the existing Pacific Electric transfer just west of Santa Fe Avenue at Butte Street. The cost of operation will be approximately the same as under present arrangements, but even a small extra expense is more than justified by the resulting amelioration of grade crossing hazards on Alameda Street.

Under private operation and control, this rerouting will cause a diversion of revenue from the Southern Pacific to the Salt Lake, and, while we hesitate to recommend any changes resulting in such a diversion, there is no doubt that our proposal embodies the best method of handling these cars.

We have considered that ultimately the use of Anderson transfer, as recommended above, will create an undesirable traffic across Mission Road at Elliott Street. To avoid this we recommend the future construction of a freight connection between the Salt Lake tracks at Macy Street and the Pacific Electric tracks in the Echandia yard. This new track would be built north of and approximately parallel to Mission Road and would pass under this street near the Pacific Electric yard.

Cars Transferred Between Southern Pacific and Pacific Electric

The next lower section of the chart shows the volume of Southern Pacific-Electric carload transfer business. These cars are being transferred between these two roads between Eighth and Alameda Streets, Clement Junction and Macy Street team yard, and pass along Alameda Street.

Cars transferred in this way number approximately 36,000 per year and amount to about 26 per cent of all freight cars hauled between Macy and

Eighth Streets along Alameda Street. We recommend that this class of switching also be rerouted to avoid Alameda Street. This can be done in at least two ways:

First: If a union passenger station is established at the Plaza and the new classification yard of the Southern Pacific along the San Fernando Road is completed and the new trackage constructed along the east side of the river from the San Fernando Road to Humboldt Street, then these cars from the Southern Pacific to the Pacific Electric can be moved from the new classification yard via the Salt Lake along the east side of the river and Butte Street to the Pacific Electric transfer, just west of Santa Fe Avenue. Cars destined east from Los Angeles can be transferred to the Pacific Electric at Anderson transfer.

Second: These cars might also be hauled over the Santa Fe tracks from North Broadway to the Pacific Electric transfer at Butte Street and Santa Fe Avenue with a somewhat shorter haul. Inasmuch as it would seem desirable, under the conditions proposed, to keep the freight traffic on the east side of the river, we believe the plan for using the Salt Lake tracks to be preferable.

Oil Cars on Alameda Street

Considerable fuel oil, in tank cars, is shipped through Los Angeles from El Segundo, about 20 miles from Los Angeles, on the ocean. The Pacific Electric takes these cars from the refinery and hauls them to Los Angeles via Hawthorne. It is transferred here to various roads. About 90 per cent goes to the Southern Pacific at Clement Junction where the cars are set on the long track extending southerly from Twenty-fifth Street. These cars are picked up by the Southern Pacific and hauled to the Southern Pacific yards along Alameda Street, sometimes in 50-car trains. About 20 per cent is for use of the Southern Pacific and the balance for industrial uses, largely for mines and smelters in Arizona.

We are interested in this oil traffic because these long trains are a nuisance, both to the public and to the railroad and as the transfer tracks at Clement Junction require considerable switching and back-up movements, this handling is not efficient. Based on traffic during the latter part of 1917 and the first six months of 1918, this traffic amounts to approximately 45,000 cars per year both ways, or about 32 per cent of the average total number of cars handled on Alameda Street between Macy and Aliso Streets.

We are satisfied that this traffic should be diverted from Alameda Street and there are several methods of accomplishing this end. The Santa Fe has a line between El Segundo and Los Angeles and it is possible to move this oil traffic over Santa Fe trackage all the way. We would recommend this plan only if the revenue question between the Southern Pacific and Pacific Electric and Santa Fe can be satisfactorily adjusted. That this can be done seems doubtful, but from the operating point of view, as also from the point of view of the interests of the city, this plan is best.

The Pacific Electric made a very considerable investment to participate in this traffic and has an annual gross revenue of approximately \$360,000 from this source. Obviously the loss of revenue would be very serious to this road.

With a union passenger station established at the Plaza and the new classification yard of the Southern Pacific along the San Fernando Road completed and the new trackage constructed along the east side of the river between the San Fernando Road and Humboldt Street, these oil cars can be moved from the Pacific Electric transfer at Butte Street and Santa Fe Avenue to the Southern Pacific yard over the Salt Lake tracks on Butte Street and on the east bank of the Los Angeles River. It is our recommendation that this be done.

Rerouting of Industrial Switching. Switching of Cars to Industry and Team Tracks

As noted before, the principal grade crossing hazard and inconvenience on Alameda Street occurs at the crossings of the principal east and west streets. It is true that the switching of spur tracks off the longitudinal tracks in Alameda Street is also a source of delay and inconvenience, but since the train is always within good view, there is less possibility of collision and accident.

A very large sum of money has been invested in Los Angeles in warehouses and other industrial property. The value of this property is considerably influenced by the existence or the possibility of a spur track. Aside from the investment, the cost of doing business is also largely dependent upon the existence of track facilities. We have concluded that it would be unwise to materially disturb the present spur track facilities with which shippers have provided themselves. Over a considerable period of time it may be possible to readjust the trackage, but this must be the result of slow and gradual change or growth and cannot be accomplished at once. We are confronted, then, with the necessity for a comprehensive plan toward which all effort in the future may be directed. At the same time, we are of the opinion that a great deal can be accomplished at present by reducing the switching movement across the principal east and west streets.

Regardless of the establishment of a union station, the switching of traffic may be reduced by dividing Alameda Street into two sections. On account of the heavy traffic on Seventh Street, these sections should lie north and south of this street. Cars destined to points south of Seventh Street should be switched to the Alameda Street tracks via the tracks of either the Santa Fe or the Salt Lake along the river and via the track of the latter along Butte Street and not pass along Alameda Street at any point north of Seventh Street. This would reduce the number of cars crossing Seventh Street and every street north thereof by about 15,000 cars per year.

The section north of Seventh Street may be divided into smaller sections. Aliso Street, because of the heavy interurban traffic movement, seems another natural division. Cars north of this point could be switched as at present. Between Aliso and First Streets, where approximately 3,400 cars per year are switched to Southern Pacific industries, the Santa Fe could handle this, using the Southern Pacific spur on Jackson Street which is not in use at present, and the Santa Fe tracks along the river. This would afford access to this district between Aliso and First Streets from the river by means of a track that is not now used.

Inasmuch as cars destined to Los Angeles industries are delivered without extra charge no matter on whose rails cars enter Los Angeles or on whose rails they are delivered, it would seem as if this interchange of service could be extended beyond the present limits to the point where the cars would be delivered by the road whose tracks involve the fewest number of grade crossings.

Between First and Seventh Streets, where about 6,700 cars per year are set to industries located on Southern Pacific rails and where about 2,800 cars are set in the Southern Pacific team yard at Fourth and Alameda Streets, the Santa Fe could also handle this business. This would require merely the construction of a short connecting track between the Santa Fe's tracks between Sixth and Seventh Streets and the Alameda Street tracks. The same result can be accomplished by the use of the present Southern Pacific spur track near the Los Angeles market property. Traffic conditions, as they would exist were these recommendations carried out, are shown on the lower part of Fig. 69 on page 210.

There remains a consideration of the proposed **herringbone system of spur tracks** as submitted to the Commission. Messrs. Hamlin, Howell, Storrow and others suggest the elimination of the longitudinal tracks of Alameda Street and the substitution therefor of east and west switching limits on private rights of way with suitable connections with existing industrial tracks.

We are unable to join in this recommendation. From the point of view of safety and convenience to street traffic, we believe that a longitudinal track on a street is less dangerous than a series of tracks crossing a street. The situation that would result on Alameda Street would be particularly disadvantageous because these herringbone tracks would emerge from what would be practically narrow alleys, giving a poor view of trains about to cross the street, and because further with the elimination of railway traffic as proposed in other recommendations vehicular traffic on this street undoubtedly will show a very material increase. The relative importance of this herringbone system is also to be considered. This matter will be taken up elsewhere in this report.

The Southern Pacific also appears to have a perpetual franchise on Alameda Street, and this is a legal factor that should not be overlooked.

Recommendation For Reduction of Freight Switching

We believe, therefore, that the best solution lies in a reduction to the lowest point of the amount of railway traffic on Alameda Street rather than in the entire elimination of the tracks. In fact, we are of the opinion at this time that the maintenance of longitudinal tracks on Alameda Street is a necessity, and that a removal would be against the best interests of the City. The effect of the plan proposed by us is indicated in the following table which shows the possibility of an elimination of not less than 87 per cent of the number of freight cars switched at present along Alameda Street.

**PROPOSED REDUCTION OF FREIGHT SWITCHING ON ALAMEDA
STREET ACROSS PRINCIPAL EAST AND WEST STREETS
THROUGH REROUTING OF PACIFIC ELECTRIC-SOUTHERN
PACIFIC JOINT AND TRANSFER BUSINESS AND RE-
ROUTING SOUTHERN PACIFIC INDUSTRIAL
SWITCHING OVER SANTA FE TRACKS ALONG
RIVER AND EAST AND WEST LEADS**

Street	No. of Frt. Cars Swtd. per Year		Reduction	
	Present	Proposed	Number	Ratio
Macy	152,000	12,000	140,000	92%
Aliso	166,000	0	166,000	100%
First	170,000	0	160,000	100%
Second	153,000	6,000	147,000	96%
Third	150,000	10,000	140,000	93%
Fourth	141,000	19,000	122,000	87%
Sixth	141,000	19,000	122,000	87%
Seventh	140,000	0	140,000	100%
Eighth	132,000	8,000	124,000	84%
Ninth	92,000	10,000	82,000	89%

Summarizing further and taking into account the reduction in freight switching of 90 per cent (which is conservative) we have a reduction of all train movements, which may be tabulated as follows:

**ESTIMATED RESULTS OF PROPOSED ELIMINATION OF
RAILROAD TRAFFIC ON ALAMEDA STREET**

Class of Train Movement	Proposed Reduction	
	North of S. P. Station	South of S. P. Station
Passenger Trains	24%	4%
Freight Trains	7%	10%
Passenger Switching	6%	43%
Freight Switching	30%	30%
Light Road Engines.....	30%	10%
Total Proposed Reduction.....	97%	97%

The 3 per cent of remaining traffic consists of freight switching only. We are satisfied that a reduction of the railroad traffic on Alameda Street to 3 per cent of what it has been will prove satisfactory to everybody concerned for many years.

CHAPTER IX.

OUTLINE

Grade Crossings Between Los Angeles and Pasadena
Proposed Pasadena Municipal Line

Crossing of Pacific Electric and Huntington Drive in Rose Hill District

Crossing of Mission Road and Alhambra Avenue

Crossing of Butte Street and Santa Fe Avenue

Crossings Introduced by Engineering Department Plan for Union Passenger
Station at the Plaza

Macy Street and Station Yard

North Main Street and Redondo Street

Crossing at Mission Road and Elliott Street

CHAPTER IX

ELIMINATION OF OTHER CROSSINGS AT GRADE

GRADE CROSSINGS BETWEEN LOS ANGELES AND PASADENA

There are many grade crossings on the lines of the Santa Fe, the Salt Lake and the Pacific Electric between Los Angeles and Pasadena. In this discussion we will consider only the Pasadena Avenue line of the Pacific Electric (as distinguished from the so-called Pasadena Short Line). These crossings are situated in the Cities of Los Angeles, South Pasadena and Pasadena. They may be enumerated approximately as follows, the approximation arising from the fact that there is some leeway in the classification of crossings:

STEAM ROAD GRADE CROSSINGS BETWEEN LOS ANGELES AND PASADENA

City	Number of Street Grade Crossings	
	Santa Fe	Salt Lake
Los Angeles*	25	21
South Pasadena	10	7
Pasadena	30	35
	—	—
Totals	65	63
Total of Both	128	

*East of Los Angeles River only.

At the same time, the Santa Fe crosses the Salt Lake twice at grade and crosses the Pacific Electric Railway and the Los Angeles Railway a total of seven times. The Salt Lake crosses these two electric roads nine times.

Of the thirty-five Salt Lake crossings in Pasadena, eighteen are on the line between the Los Angeles River and the Salt Lake-Pasadena Station at Colorado Street. The other seventeen are beyond Colorado Street on a freight track used for freight switching service only. All of the Santa Fe crossings enumerated are on the main line.

The Pacific Electric operated a local line only, on the Pasadena Avenue route between Los Angeles and Pasadena. This route follows along Pasadena Avenue for the largest part of the distance but has an even greater number of grade crossings than either the Santa Fe or the Salt Lake. The character of service is, however, quite different from that of the steam railroads, inasmuch as but one-car trains are operated and the service is really not different from ordinary street car service on city streets.

The operating conditions on the steam roads are not of the best and their improvement is desirable. The Salt Lake has a maximum grade of a 2.44 per cent uncompensated between the Los Angeles River and the Salt Lake Pasadena Station. The Santa Fe maximum grade eastbound is 2.16 per cent and westbound is 1.4 per cent. The Salt Lake grade is very

steep for steam railroad operation even when the lightness of the Salt of its main transcontinental line and the maximum grade is so steep that no freight trains are operated eastbound, and it is heavy enough to seriously interfere with the passenger train operation. For a considerable part of the distance between Los Angeles and Pasadena, both of these roads have a narrow right of way. The Santa Fe right of way is especially narrow in the heart of Pasadena, as it is only twenty feet in places.

The district through which the Salt Lake and the Santa Fe lines run is now, on the whole, very well built up. The grade crossings are nearly all over streets which have considerable use and many of them are over very important streets. Pasadena Avenue, for example, is crossed several times. This street carries a very heavy vehicular traffic, estimated at 7,000 vehicles per day, 85 per cent of which are automobiles. This estimate is based on knowledge of the number of vehicular movements across North Broadway Bridge, which carries practically all of the Pasadena Avenue traffic. Colorado Street, the main street of Pasadena, also is crossed by both roads, as is California Street, another important street of Pasadena.

The Commission's records show that many accidents occur on these grade crossings, and our observation has been to the effect that they are, in many cases, a serious source of delay to traffic as well as a menace to the travel on the highways. These crossings should be eliminated. There is such a large number, however, and the topography of the country is of such a character that elimination can be had only through a quite comprehensive plan in which all the interested roads should participate. The communities affected would unquestionably derive so large a benefit from such elimination that, in fairness, they should assume a portion of the cost. It is a fortunate fact that such a plan does not seem beyond accomplishment.

The Santa Fe, having in view the elimination of grade crossings, the reduction in the rate of grade eastbound and the shortening of its line, has developed a very comprehensive plan for itself. We are satisfied that this plan can be made the basis for an even more comprehensive undertaking which will include the Salt Lake and the Pacific Electric. Though the Santa Fe has asked the Commission to keep this plan confidential at this time, permission has been given to include in this report the following essential data:

1. The number of grade crossings with streets is reduced from 61 to 0.
2. The number of grade crossings with electric railways is reduced from 8 to 0.
3. The number of grade crossings with steam railroads is reduced from 2 to 0.
4. The maximum curvature is reduced from 10 degrees to 6 degrees.
5. The total curvature is reduced 210 degrees.
6. The maximum grade eastbound is reduced from 2.16 per cent to 1.4 per cent, the westbound remaining at 1.4 per cent maximum.

7. The distance is reduced 1.4 miles.
8. The rise, or elevation which the line attains, is 113 feet less.

It is estimated that this improvement, based upon double track all the way and upon 1919 prices, would cost \$6,700,000. This is at the rate of approximately \$100,000 per crossing if elimination of grade crossings by separation of grades at crossings were the only factor considered. We wish to draw attention to the fact that while this figure involves practically an entire new double track roadbed and is not a proper charge to the crossings alone, \$100,000 per crossing is approximately the cost of simply eliminating the crossings if this were done one at a time and if the streets were left with as good grades and widths as now exist.

Looking ahead some years, during which probably nearly all of the crossings would be considered for separation of grades, the wisdom of complete elimination under a comprehensive plan is apparent, particularly when all the other advantages are gained over the plan of piecemeal elimination are considered. It is apparent that a very large saving in annual operating expenses will result from this improvement. Without a close analysis of operating costs it is impossible, however, to estimate exact or approximate figures.

It is desirable to say here that our own studies, prior to our becoming acquainted with the Santa Fe plan, had led us to the same general conclusions as those that are embodied in that plan. The improvement as contemplated by the railroad is in every respect in harmony with our recommendations on the entire terminal problem and fits in perfectly with such recommendations as we have made on the subjects of grade crossings, betterment of operating service and a union passenger depot. We believe that the carrying out of the Santa Fe plan will prove not only a paying investment from the outset for the railroad company, but also a large benefit to all of the communities served and to all of the territory affected. These communities and the Commission should, we feel strongly, render every possible encouragement and give every possible aid towards the early accomplishment of this plan.

This plan contemplates the elimination of grade crossings in cities other than Los Angeles, Pasadena, and South Pasadena. We do not, however, feel at liberty to state the names of these cities or to give the termini of the improvement. That part of the Santa Fe line parallel to, and east of, Fair Oaks Avenue would remain for freight service, and would be operated as a spur track. The crossings would remain as at present but as this is unsatisfactory, the Colorado Street crossing should be eliminated. This could be done by the abandonment of this part of the line and by switching from the main line.

So large an expenditure for improvements on the Santa Fe should be made to accomplish even more. There is practically no business along the Salt Lake line between Los Angeles and Pasadena, and the Salt Lake should, therefore, be compelled to run over the new Santa Fe tracks and

to assume a proper share of the cost. This would result in the elimination of six more grade crossings of streets, two of steam railroads and four of electric railways. Under this plan, it is contemplated to retain the Salt Lake tracks in Pasadena for freight service, operating them as spur tracks. The crossings on this line would not be included with those to be eliminated.



FIG. 70. ARROYO SECO FROM ELYSIAN PARK

The Valley of the Arroyo Seco furnishes the shortest route between Los Angeles and Pasadena. Avenue 20 Bridge appears in the right foreground. The Santa Fe and Salt Lake are in the right foreground, crossing to the left in the distance.

Proposed Pasadena Municipal Line

The City of Pasadena is extremely anxious to secure improved rapid transit facilities between Los Angeles and Pasadena. As mentioned in Chapter IV, an option was taken by the City on certain lands to be used as a right of way for a municipal railroad between the two cities, and during the war the City took the necessary steps toward putting before the people the question of a municipal bond issue to cover the expense of such an undertaking. It is our understanding that the Capital Issues Committee indicated that it would not approve such an expenditure during the war, and that consequently the matter was dropped.

While the City's plans were not entirely definite, it was contemplated, according to our information, to run this rapid transit line from a point near the corner of Fair Oaks Avenue and Colorado Street, in Pasadena, south and parallel to Fair Oaks Avenue, and then turn to the west, following the Arroyo Seco to its junction with the Los Angeles River. From this point the line entered a long tunnel to its proposed terminus at First and Hill Streets. This line was to have no grade crossings and was to be built for very high speed—to make the trip in twelve minutes.

No information is available as to the details of cost, construction and operation. We do not know whether the City contemplated building the line and then leasing it to the Pacific Electric for operation or whether the enterprise was to be a municipal one throughout. We do not believe that there is sufficient business now, nor will there be for a considerable time to come, to justify a private corporation in constructing and operating another electric line to Pasadena in competition with the Pacific Electric.

With a strictly municipal enterprise, however, the factors of first cost and return on investment are not of the same magnitude that they are in private undertakings, and it is quite possible that Pasadena would gain indirectly much more than it would lose through the unprofitable operation of a municipal railway.

We also realize that other matters, such as franchises, status of railway outside of municipal limits, jurisdiction over construction, operation and rates, etc., must be given weight in a consideration of such a project. With these matters, we are not here concerned.

The relation of the project to the grade crossing problem is, however, of importance. If a municipal rapid transit line is built and it is possible to use in whole or in part existing rights of way already assigned to transportation purposes, a strong effort should be made to avoid duplication of facilities and to avoid new crossings at grade or otherwise.

If further steps are taken by the interested municipalities towards a consummation of the project, we suggest that the Santa Fe, the Salt Lake and the Pacific Electric, the City of Pasadena and other municipalities be brought together on the common ground of the elimination of grade crossings. A solution of the problem can be had, we think, and at less total expense than would be incurred if the City and the railroads acted independently.

The Commission should, we believe, order the elimination of the existing grade crossings, but if a new rapid transit line enters into the problem, the new line construction and the elimination should be combined into one plan in the interests of the cities and of the railroads.

The new Santa Fe line need not be built in its entirety at once; it is possible to divide construction into two steps. The first step would commence at the Los Angeles River and would extend about $5\frac{1}{2}$ miles to near South Pasadena. This first step would eliminate all the street crossings (34 in number), all the electric railway crossings (2 in number) and all the steam road crossings (2 in number). Included in these is the objectionable crossing at Pasadena Avenue and Avenue Sixty-one in Los Angeles.

In 1916, an estimate was made of the cost of this step and was found to be \$2,083,000. At the present time, however, we believe this estimate would have to be increased to \$3,000,000.

The Salt Lake and the rapid transit line, as noted above, may be combined with this first step on the Santa Fe, and it is recommended that

this first step be commenced as soon as possible. The Salt Lake should use the new roadbed and abandon its own line. Should the City of Pasadena elect to go ahead with its rapid transit plans, this line also should be located on the same roadbed.

CROSSING OF PACIFIC ELECTRIC AND HUNTINGTON DRIVE IN ROSE HILL DISTRICT

In Cases 974, 980, 981 and 983, the cities of Pasadena, Alhambra, San Gabriel and South Pasadena, respectively, complained of the grade crossing of Huntington Drive and the Pacific Electric Railway, just south of Tourmaline Street, in Los Angeles. The cities of San Dimas, Pomona, Ontario, El Monte and Sierra Madre, by letter, concurred in these complaints.

Subsequent to the filing, in August, 1916, of the formal complaints of these four cities, an agreement was reached between the City of Los Angeles and the Pacific Electric Railway, whereby, through the construction of a new road, nearly all of the present traffic over this crossing would be diverted, and it was proposed that this crossing be excluded from the general investigation, as will be noted from the following quotation (trans. p. 132):

“Mr. Karr: . . . with reference to the Rose Hill situation and the Mission Road situation, I think they should be excluded from consideration in connection with the other cases, because I think a conclusion in that matter,—it will probably be necessary to reach a conclusion in that matter far in advance of the others. We have entered into a contract with the city whereby a new highway is to be constructed along the west side of the railroad between the Mission Road and the Rose Hill crossing which will make it unnecessary for 99 per cent of the travel that passes that vicinity to take an unsafe place except by choice.”

“Commissioner Thelen: I think that could be very well handled, even if this disposition that I have suggested were made. In other words, when we have sufficient evidence bearing on that particular situation, we could then make what we might term an interlocutory order disposing of it.”

“Mr. Karr: That is satisfactory then?”

Subsequently, on August 7, 1917, the contract referred to by Mr. Karr was filed with the Commission. This is City of Los Angeles Exhibit No. 2 in Case 970, et seq. Since in this agreement no grade crossings are either to be opened or closed, the Commission is not legally concerned.

In view of these facts, we have not made any studies with reference to this crossing. We wish to note, however, that up to this time the proposed new road has not been built and that no relief has been afforded.

We recommend that the Pacific Electric Railway and the City of Los Angeles be urged to carry out at once the agreement reached between them so that conditions at this dangerous crossing may be improved.

CROSSING OF MISSION ROAD AND ALHAMBRA AVENUE

The elimination of this grade crossing was made a part of the Storrow plan for a union passenger terminal and its approaches. Mr. Storrow proposed to remove the Southern Pacific tracks in Alhambra Avenue from

Alameda Street to and just beyond the Mission Road and to rebuild them just south of Mission Road at an elevation considerably lower than the present tracks. This elevation would be low enough to enable a separation of grades to take place on all the streets crossed, including Mission Road. As discussed elsewhere, we believe this proposition is too expensive an undertaking at the present time in comparison with the results obtained. The expense to the Southern Pacific, particularly east of Mission Road, to obtain a satisfactory rate of grade is prohibitive.



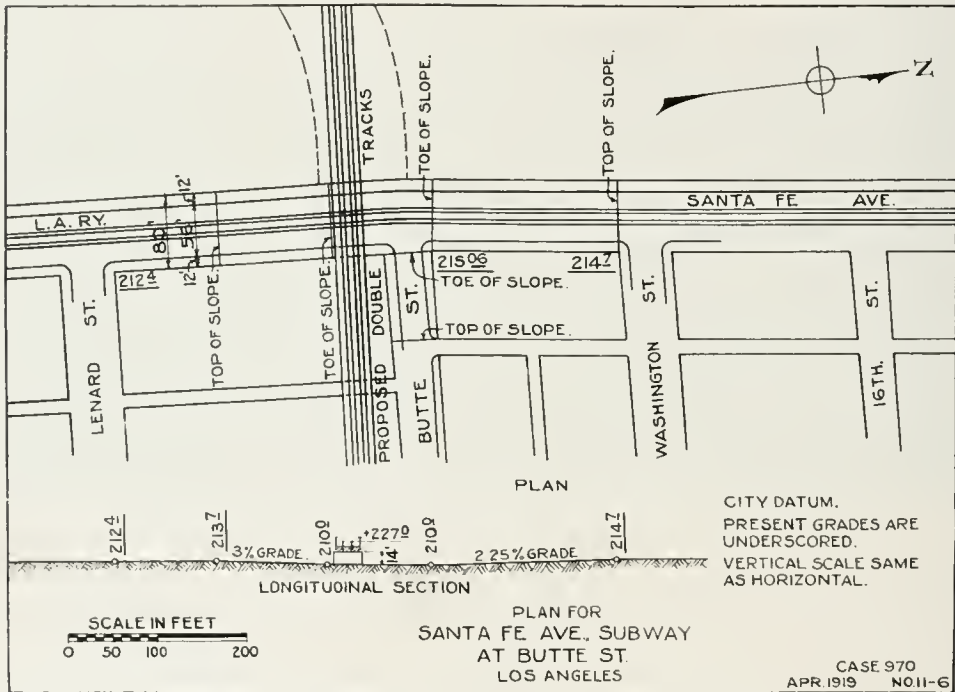
FIG. 71. INTERSECTION OF MISSION ROAD AT ALHAMBRA ROAD

Southern Pacific tracks on Alhambra Avenue crossing Mission Road at this point just before the latter branches into Valley Boulevard, leading to Pomona and San Bernardino, and Huntington Drive, leading to Pasadena.

At present, the crossing of Mission Road and Alhambra Avenue is not exceptionally dangerous. This is due, principally, to the fact that there are many paved streets intersecting at or near this point, as shown in the photograph above. A driver of a vehicle, therefore, can swerve into one of these streets instead of trying to stop if he should be in danger of being struck by a train. Also, the view of the tracks from Mission Road is very good. We do not recommend that any improvement of these crossings be undertaken at present. Some time in the future, however, the traffic on Mission Road will probably be heavy enough to require the separation of grades, and such separation can be accomplished by several means. The matter should be left for future study. Whatever method of separation is adopted must take into account the situation with reference to streets further west. The matter is further discussed in Chapter XII in connection with the union passenger terminal problem.

CROSSING OF BUTTE STREET AND SANTA FE AVENUE

Our plans for rerouting the Southern Pacific through freight, Southern Pacific switching and Southern Pacific-Pacific Electric, Salt Lake-Pacific Electric and Santa Fe-Pacific Electric interchange increases very materially the traffic on Butte Street and crosses Santa Fe Avenue. Santa Fe Avenue is now a very busy street and, in view of the growth of the City of Vernon as an industrial center, we expect a rapid increase of vehicular traffic along Santa Fe Avenue. We have, therefore, come to the conclusion that this increase of railroad traffic on Butte Street and of vehicular traffic on Santa Fe Avenue requires the separation of railroad and street grades at this point.



California Railroad Commission Engineering Dept.

FIG. 72. PLAN AND ELEVATION FOR SANTA FE AVENUE SUBWAY AT BUTTE STREET

The elimination of this grade crossing is required because of the importance of Santa Fe Avenue as a thoroughfare and because of the plan to divert the freight traffic from Alameda Street to the river tracks via Butte Street.

The land is generally level in the immediate vicinity of this crossing, with a gentle slope to the south. Santa Fe Avenue is at present very little above the bed of the Los Angeles River at Butte Street, as the river bed at this point is somewhat higher than it was a few years ago. It is, therefore, desirable to depress Santa Fe Avenue as little as possible.

It is proposed to depress Santa Fe Avenue about 5.0 feet. The approach inclines will extend from Washington Street to about 120 feet north of Leonard Street. The present storm drainage is on the surface of this street, and this depression will not interfere with this scheme for

disposal of flood waters, as the street surface water can be carried **around** the subways. The local rainfall can easily be drained. The present Salt Lake track descends from Redondo Junction to Santa Fe Avenue on a grade of 0.57 per cent, and would be raised 12 feet higher than the present grade at Santa Fe Avenue. With this arrangement, the grade will become +0.66 per cent, and between Santa Fe Avenue and Alameda Street, —0.49 per cent. These grades are satisfactory for the service which would be operated over this line. The only service which would be materially affected by grades along this street are the through Southern Pacific freight trains to and from Los Angeles Harbor and the Anaheim Branch. It is estimated that this improvement would cost \$37,860.

CROSSINGS INTRODUCED BY ENGINEERING DEPARTMENT PLAN FOR UNION PASSENGER STATION AT THE PLAZA

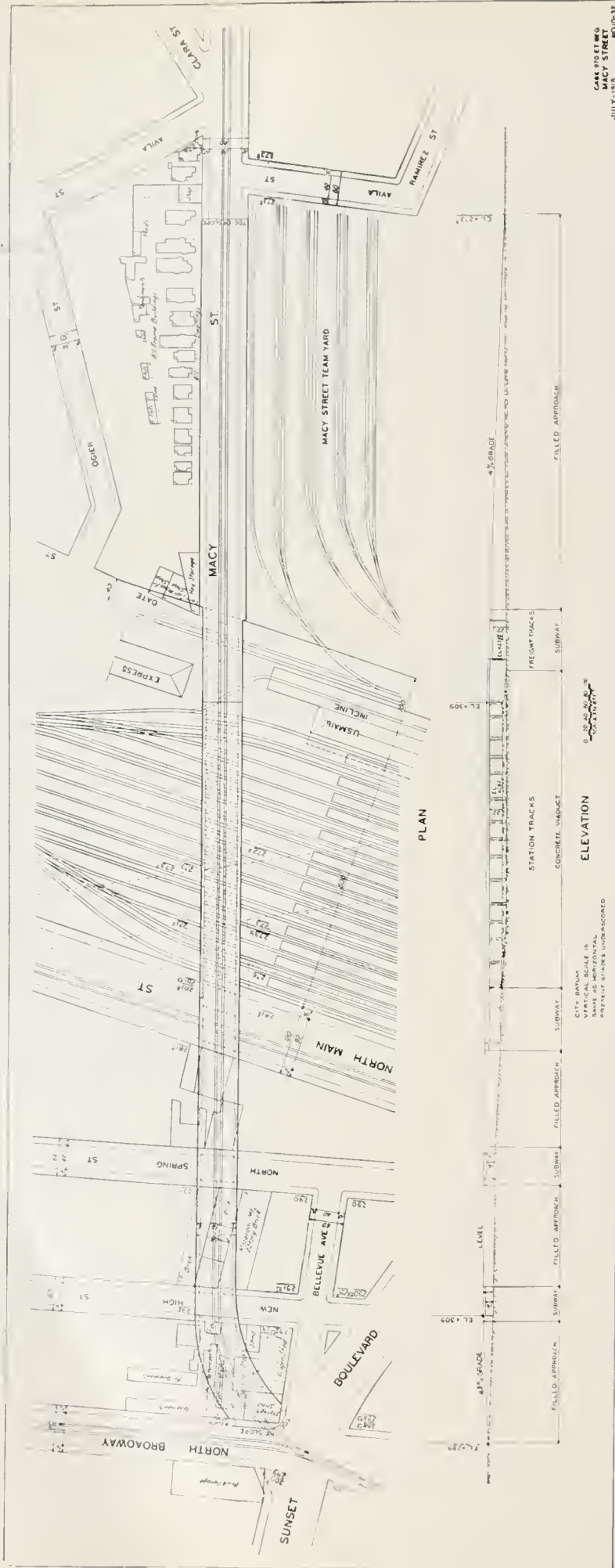
There are no crossings at grade in our plan for a union passenger station at the Plaza, with the exception of North Spring Street, which has been replaced by North Broadway as a main thoroughfare.

Macy Street and Station Yard

As noted elsewhere, it is proposed that no highway bridge be provided at Aliso Street and the Los Angeles River, and that Macy Street be the entrance for the Mission Road traffic into Los Angeles. At Macy and Lyon Streets, this traffic will divide: Broadway and Hollywood traffic will continue along Macy and the other traffic will turn into Lyon Street. It will be necessary to construct a viaduct to carry Macy Street across the proposed station yard to the intersection of Broadway and Sunset Boulevard. At present Macy Street ends at North Main Street. The plan provides for continuing the viaduct over North Main, North Spring and New High Streets, and down to grade at North Broadway.

The plan also provides for rerouting the Brooklyn Avenue line through a street railway tunnel in Broadway, as discussed in detail in Chapter IV.

The construction of this viaduct will enable this traffic to reach the business portion of the city on a direct route entirely free from grade crossings of either steam or interurban railroads and would provide a direct route between Sunset Boulevard and Mission Road, between which streets there is already a rather heavy vehicular traffic. This viaduct is estimated to cost \$730,901, exclusive of lands.



CAR STREET W
MACY STREET W
JULY 1915
M.O. 23

California Railroad Commission Engineering Dept.

FIG. 73. PLAN AND ELEVATION FOR THE MACY STREET VIADUCT OVER UNION STATION TRACKS AT THE PLAZA

This viaduct, together with the proposed bridge across the river at Macy Street, will connect Sunset Boulevard and North Broadway with the Mission Road by a route entirely free from grade crossings.

The approaches are of the same general type as proposed for the bridges across the river. The viaduct across the station tracks can be built of concrete without materially affecting cost of the approaches.

North Main Street and Redondo Street

The use of the present Southern Pacific freight yard as a coach yard is proposed, the connection between the coach yard and the station yard being made just east of the east line of Redondo Street, at Main Street. The constant switching of passenger equipment between these two yards will make it necessary to eliminate the grade crossing at this point. We have, therefore, made plans and estimates for a viaduct to carry Main Street over the tracks.

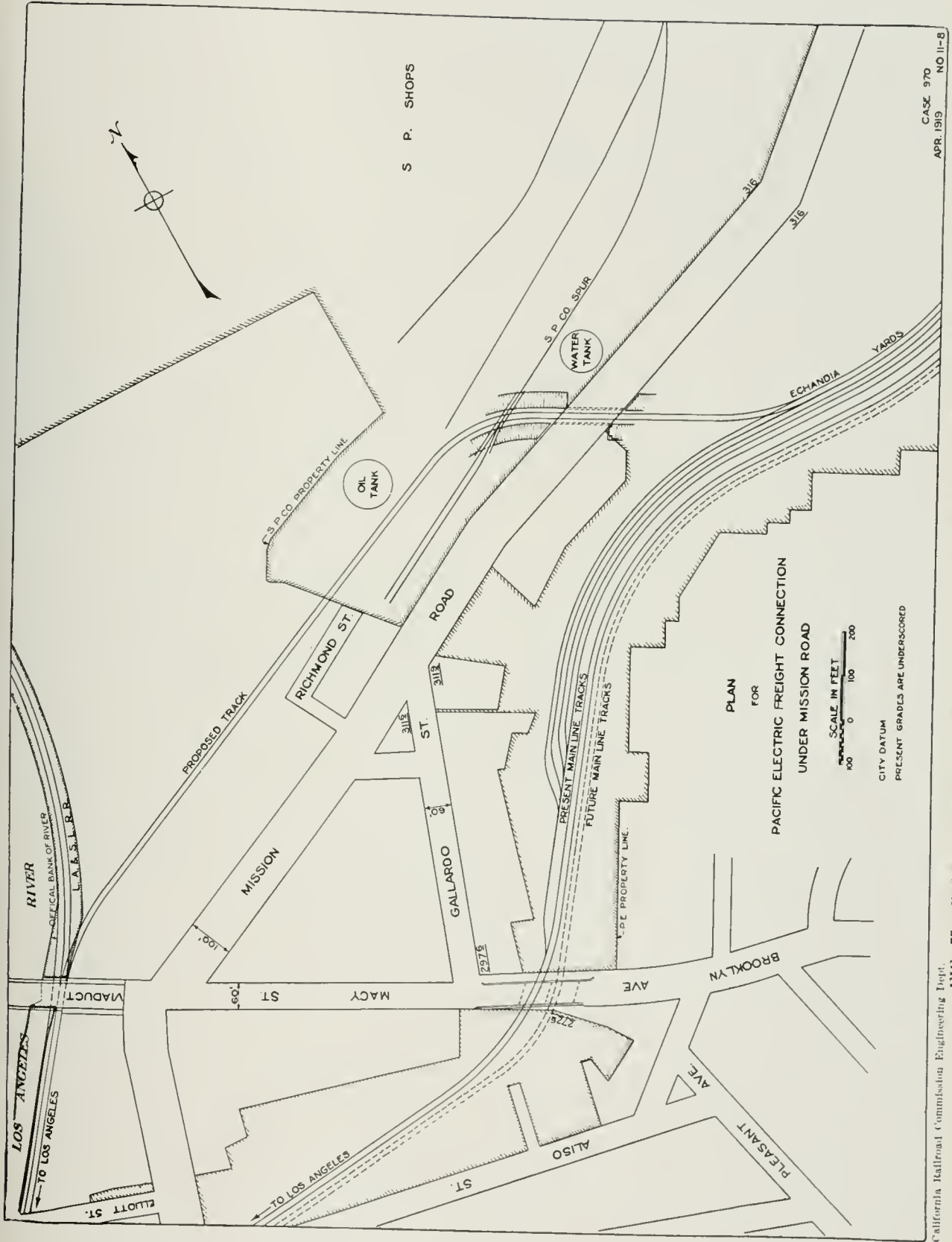
In this plan the tracks are depressed approximately 7 feet below their present elevation and the street is raised about 18 feet. The tracks are removed from Redondo Street and placed just south of the street, in order to keep the foot of the northerly approach as far south as possible, to the end that property damages may be kept at a minimum. The rate of grade on the viaduct has been limited to 4 per cent, as is the case with all street viaducts considered in this report. The construction of this viaduct and of a viaduct carrying Main Street across the tracks at the Los Angeles River will provide a direct route on a wide street, with no grade crossings of either steam or electric interurban roads. This viaduct, it is estimated, will cost approximately \$359,536. It should be built at the same time as the union station.

Crossing at Mission Road and Elliott Street

Pacific Electric freight cars from points east of the Los Angeles River are now delivered to the Southern Pacific at Macy Street transfer (Aliso and Lyon Streets), are hauled by the latter road along Alameda Street and are delivered to the Pacific Electric at either Eighth and Alameda Streets or Clement Junction (Twenty-second and Alameda Streets). Both directions considered, about 35,000 cars per year are so moved. Other cars are transferred directly to the Salt Lake at Anderson transfer (Elliott Street and Mission Road). These amount to about 1,200 per year. Still other cars are transferred to the Santa Fe at Aliso Street on the west bank of the river, about 1,500 per year in number.

If these cars are rerouted, as is necessary if the recommended subway is constructed in Main Street, using the Salt Lake tracks between Elliott Street and the Pacific Electric tracks at Santa Fe Avenue and Butte Street, there would be about 40,000 cars crossing Mission Road at Elliott Street each year. This would be undesirable as a permanent arrangement and should not be permitted.

If an elevated road were built from the Pacific Electric station to Brooklyn Avenue and to Fourteenth Street, it would be possible to run freight cars on this elevated route by a curve or by switching back to the junction near Sixth and Alameda Streets. This plan has the advantage that



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California Railroad Commission Engineering Dept.
FIG. 75. PLAN OF PACIFIC ELECTRIC FREIGHT CONNECTION UNDER MISSION ROAD
 This plan shows a method of eliminating the grading crossing at Elliott Street and Mission Road.

the cars would remain on Pacific Electric rails all the way. On the other hand, the grades and curves would be such that freight could be moved only at certain times, probably at night, because of interference with passenger trains. For the present, switching back at the junction would probably be satisfactory.

Ultimately, however, these freight movements would become too great a handicap on the increased passenger business and would become a nuisance on the lines at grade south of the elevated tracks. Under these circumstances we have, as above stated, proposed rerouting over the Salt Lake tracks. To avoid the freight movement across the Mission Road at Elliott Street we have proposed a new route, leaving the east bank of river tracks just north of Macy Street, turning to the northwest and paralleling Mission Road, then crossing under this important street near the present oil tank in the Southern Pacific shop yards. Connection with the Pacific Electric Echandia yards on the east side of Mission Road would then be made.

The cost, including transfer tracks and based on rather incomplete data, is estimated at \$141,392.

As noted in the early chapters of this report, the question of the elimination of grade crossings of the Pacific Electric Railway system transcends in importance that of the steam lines. The system is so far reaching in extent that to provide for complete elimination would require capital far beyond the financing capacity of the company. At least a beginning should be made, however, in order to reduce the number of accidents, without sacrificing speed of operation.

The damages from a single accident may wipe out the profits of a line for a considerable period of time.

The logical place to make a beginning in the elimination of crossings at grade is at the business center and from that point outward, and improvements in rapid transit proposed in Chapter IV will not only reduce congestion by through routing, but they will tend to remove these high speed lines from the streets. The step of first importance is the subway in Main Street, which has been recommended for immediate construction.

PART III—UNION PASSENGER TERMINAL

- Chapter X—Desirability and Requirements of a Union Passenger Terminal.
- Chapter XI—The Site for a Union Passenger Terminal.
- Chapter XII—Plans Presented for Union Terminal.
- Chapter XIII—Plan for Union Passenger Terminal at Santa Fe Site.
- Chapter XIV—Plan for Union Terminal at the Plaza.

CHAPTER X

OUTLINE

Present Passenger Stations

 Southern Pacific Stations

 Santa Fe Station

 Salt Lake Station

 Pacific Electric Stations

Desirability of a Union Passenger Terminal

Steam Railroad Traffic Studies

 Passenger Traffic

 Passengers Using Street Cars

 Growth of Passenger Business

 Automobile Stage Passengers

 Passengers Transferred Between Depots

 Electric and Steam Road Passengers

 Passenger Trains

 Baggage, Mail and Express

 Baggage

 Express

 Mail

Requirements for Union Passenger Terminal

 General Requirements of Site

 Physical Requirements of Site

 Size of Site

 Mail Facilities

 Baggage Facilities

 Coach Yard

 Engine Terminal

Time Required to Reach Different Sites

Distance of Site From Business District

CHAPTER X.

DESIRABILITY AND REQUIREMENTS OF A UNION PASSENGER TERMINAL

PRESENT PASSENGER STATIONS

At present there are six passenger stations in Los Angeles:

Steam Roads.

Southern Pacific:

- | | Location |
|--------------------|---------------------------------------|
| 1. Arcade Station. | East Fifth Street and Central Avenue. |
| 2. River Station. | North Spring and Ann Streets. |

Santa Fe:

- | | |
|-----------------------|---|
| 3. La Grande Station. | Santa Fe Avenue between East First and Third Streets. |
|-----------------------|---|

Salt Lake:

- | | |
|-----------------------|--|
| 4. Passenger Station. | East First Street and Los Angeles River. |
|-----------------------|--|

Electric Interurban.

Pacific Electric:

- | | |
|-------------------------|---------------------------------------|
| 5. Main Street Station. | East Sixth and South Main Streets. |
| 6. Hill Street Station. | South Hill Street near Fourth Street. |

Southern Pacific Stations

The Southern Pacific Arcade Depot has been in service since 1914. Authorization for its construction was requested of the Commission in Application No. 793 and was granted in Decision No. 1019, dated November 25, 1913. By this decision the Commission authorized the Southern Pacific Company to tear down its then passenger station and to erect the present depot in lieu thereof, and also to take up and rearrange trackage as much as necessary. The station which preceded the Arcade Depot was built in 1884 at a location slightly to the east of the present station. Ground for the new depot was broken on March 28, 1914. The ticket office and the baggage room were opened on May 2, 1915, and the structure was officially completed on June 12, 1915.

Prior to the filing of the above application by the Southern Pacific Company, Mr. W. H. Daum entered a complaint with the Commission, alleging, in substance, that the Southern Pacific was operating its steam line railroad into the city over Alameda Street and in so doing was crossing at grade several important streets between Main Street and Ninth Street; that the operation of trains along Alameda Street was a serious inconvenience and danger to the public using the cross streets; and that the building of the depot would result in the prevention or delay of grade separation at these crossings.

The complaint of Mr. Daum was heard first, and immediately afterward a hearing was set in the application of the Southern Pacific Company for approval of its plans for the new depot. It was agreed by all parties that any relevant evidence introduced at either hearing might be considered as applying to both hearings.



FIG. 76. SOUTHERN PACIFIC STATION

At these two hearings Mr. Daum appeared and made objection to the approval of the depot plans insofar as such approval would interfere with or delay the separation of grades at the crossings complained of. The City of Los Angeles appeared and consented to the approval of the plans for the depot, provided that such approval would not delay or prevent the separation of grades at dangerous and objectionable crossings. The engineer and the architect for the Southern Pacific Company testified that with an expenditure of \$10,000 the new depot could be adapted to separation of grades if the tracks of the Southern Pacific were elevated or depressed.

The following stipulation was filed (Case 467, trans. p. 229):

"Agreement: For the purpose of settling the controversy which has arisen in connection with the erection of a new passenger station on the site of the old Arcade Depot in the City of Los Angeles, California, the Southern Pacific Company and the Southern Pacific Railway Company, by their duly authorized officials, hereby stipulate and agree with the City of Los Angeles that, in consideration of the withdrawal of all objections to the erection of said passenger station, in accordance with the plans and specifications heretofore submitted, modified and agreed upon, and the passage by the city council of the City of Los Angeles of the necessary ordinances to permit the erection of said depot, they will not urge any objection to the consideration of or the abatement of grade crossings on Alameda Street, by the depression or elevation of the railroad tracks belonging to the aforesaid company, by reason of the erection of said passenger station in accordance with the plans and specifications hereinabove mentioned, or any modifications, or either of them, incident thereto. Dated at Los Angeles, California. "

Taking cognizance of the facts that at that time Los Angeles was urgently demanding this new depot, that considerable time would be required to build it and that, as was agreed from the evidence and the stipulations above mentioned, the erection of the depot would in nowise delay or prevent the separation of dangerous and objectionable grade crossings in the City of Los Angeles, it was recommended that the application be granted. The Commission thereupon authorized the construction of the new depot in accordance with plans and specifications filed, provided that this decision "should never be used as a defense against the separation of grade crossings in the State of California."

The principal physical data regarding the present Arcade Depot will be found in the Appendix. The central or concourse part of the building is class "A" reinforced concrete construction, while the wings at both ends are class "C" frame construction with brick walls.

The present station is well designed and is adequate and suitable for its purpose. Since it is built as close to Central Avenue as possible, there is only a short walk not under cover to the Los Angeles Railway cars, which stop alongside the curb. The Pacific Electric cars, however, stop across Central Avenue on Ceres Street. Passengers travelling by automobile are protected from the weather by a marquis.



FIG. 77. CERES AND CENTRAL AVENUES FROM SOUTHERN PACIFIC STATION

The Pacific Electric Railway has access to this station via Ceres Avenue, at the right where two cars are standing. The automobiles backed up against the curb are for rent and take the place, in Los Angeles, of organized taxicab fleets usually found in other cities. A Los Angeles Railway car is along the curb at the left.



FIG. 78. PASSENGER SUBWAY—SOUTHERN PACIFIC STATION

This subway extends transversely under all station tracks. At each station platform there are two inclines, one on each side, leading up from this subway to the station platforms, which are on the same level as the tracks. This subway system is one of the best features of the Southern Pacific layout, as passengers never cross the tracks at grade. Incoming and outgoing passengers are separated by the iron fence. Artificial lights is necessary during the day.

The waiting room, which occupies the central portion of the building, is of good size and is well arranged with respect to the other parts of the building. Rest rooms and toilets are of ample size and are convenient with the exception of the men's toilets, which are in the basement. The baggage room and the parcel room are off the line of travel, as is also the restaurant. Incoming and outgoing passengers are separated, the former passing through the building without interference.

This subway system, by means of which passengers reach the trains without crossing the tracks, is of special interest. On leaving the waiting room, passengers pass through gates, where tickets are inspected. They then descend a ramp to the main transverse subway, which extends across and under the station tracks. This subway is approximately 36 feet in width.

This system of routing the passengers to and from the tracks is the best



FIG. 79. PLATFORMS AND SIDE SUBWAYS AT SOUTHERN PACIFIC STATION

These subways lead from each platform, between tracks, down to a larger subway which lies transverse to the station tracks. They are 7 feet wide in the clear and have a grade of 15 per cent.

plan for a station located at the side of the tracks, for there is less climbing than in any other scheme where the passengers are restrained from crossing the station tracks.

The track level is reached by side subways from each platform, requiring a climb of ten feet. Ramps are used here also, there being no stairways for the use of passengers. Platforms are of asphalt, with concrete curbs. They are slightly above the level of the top of the rails and are connected at several points for trucking of baggage, mail and express.



FIG. 80. SOUTHERN PACIFIC STATION YARD FROM FOURTH STREET

This view, taken from the north end of the yard, shows the concrete umbrella sheds, station platforms and trains. The depot building is on the right.

The platforms are covered by concrete "butterfly" sheds 720 feet long, the platforms being somewhat longer. Since the side subways branch both ways from the main subway, it is possible to open the subway nearest to the rear end of the train where the passengers ride. In this way, the north side subways are used for incoming trains from the north and the south side subways are opened for trains leaving for the north. By the use of different tracks, it is possible to keep the incoming and outgoing streams of passengers separate.

This also provides a means of separating the passengers from the handling and trucking of the baggage, mail and express, the interference of which is to be avoided, both for safety and convenience.



FIG. 81. EXIT SUBWAY AT SOUTHERN PACIFIC STATION

Passengers leave the subway level beneath the station tracks and rise to the level of the main floor on this incline. The iron fence at the left separates incoming from outgoing passengers, passage for the latter being at the left of the fence.

Baggage is handled in the north wing: a second-floor baggage room has been provided but is not at present used. The third floor of this wing is used for division offices. The restaurant is located in the south wing and has a high ceiling, extending up to what, in the north wing, is the third floor.



FIG. 82. SOUTHERN PACIFIC STATION YARD—SOUTH END

This is another view of the concrete umbrella sheds and station tracks. By some, these are termed "butterfly" sheds, "umbrella" being applied to those where the roof slopes down from the middle. Tracks slope down toward the reader from the end of the sheds.

Above the restaurant is office space, vacant at present, which has been provided for the Salt Lake when, as contemplated in the Southern Pacific-Salt Lake Plan, this road shall use the station.

The main Los Angeles express station is located at Fourth Street and Central Avenue. The facilities at this station are even now considered inadequate and will have to be added to. There is no mail building, a small corner of the baggage room being assigned to this use. This room merely houses mail to be transferred from one train to another; no sorting whatever is done at the station. The largest part of the mail is hauled to the main postoffice near the Plaza, although some is taken direct to Station "C" on Los Angeles Street, near Fifth Street.

The Southern Pacific Company has furnished us the following data with reference to the cost of present depot and appurtenances, excluding land.

**AUDITOR'S RECORD OF COST OF ARCADE STATION AND
FACILITIES**

Station building and furnishings.....	\$345,026.24
Umbrella sheds	30,112.66
Subway	54,939.65
Sewer, lights and water.....	42,837.74
Trackage	117,138.84
Paving	28,779.97
Steam plant	15,325.76
Incidentals, including telephones, etc.....	12,267.54
	<hr/>
Total—Excluding Coach Yard Structures.....	\$646,428.40

In this statement we are advised that interest charges are included in the various items. No further detail is available, except that the furnishings cost about \$18,000, included in the first figure above.



FIG. 83. SOUTHERN PACIFIC RIVER STATION

This structure was purchased and put into use as a passenger station about 1884. At this time it is largely devoted to freight yard offices, although a waiting room is maintained and some of the local trains make this stop. It is located at the corner of Sotello and North Spring Streets.

The present **River Station** of the Southern Pacific Company was at one time this road's principal station in Los Angeles. It is now used chiefly as a freight yard headquarters, although a small waiting room is maintained and some of the local trains stop at this point.

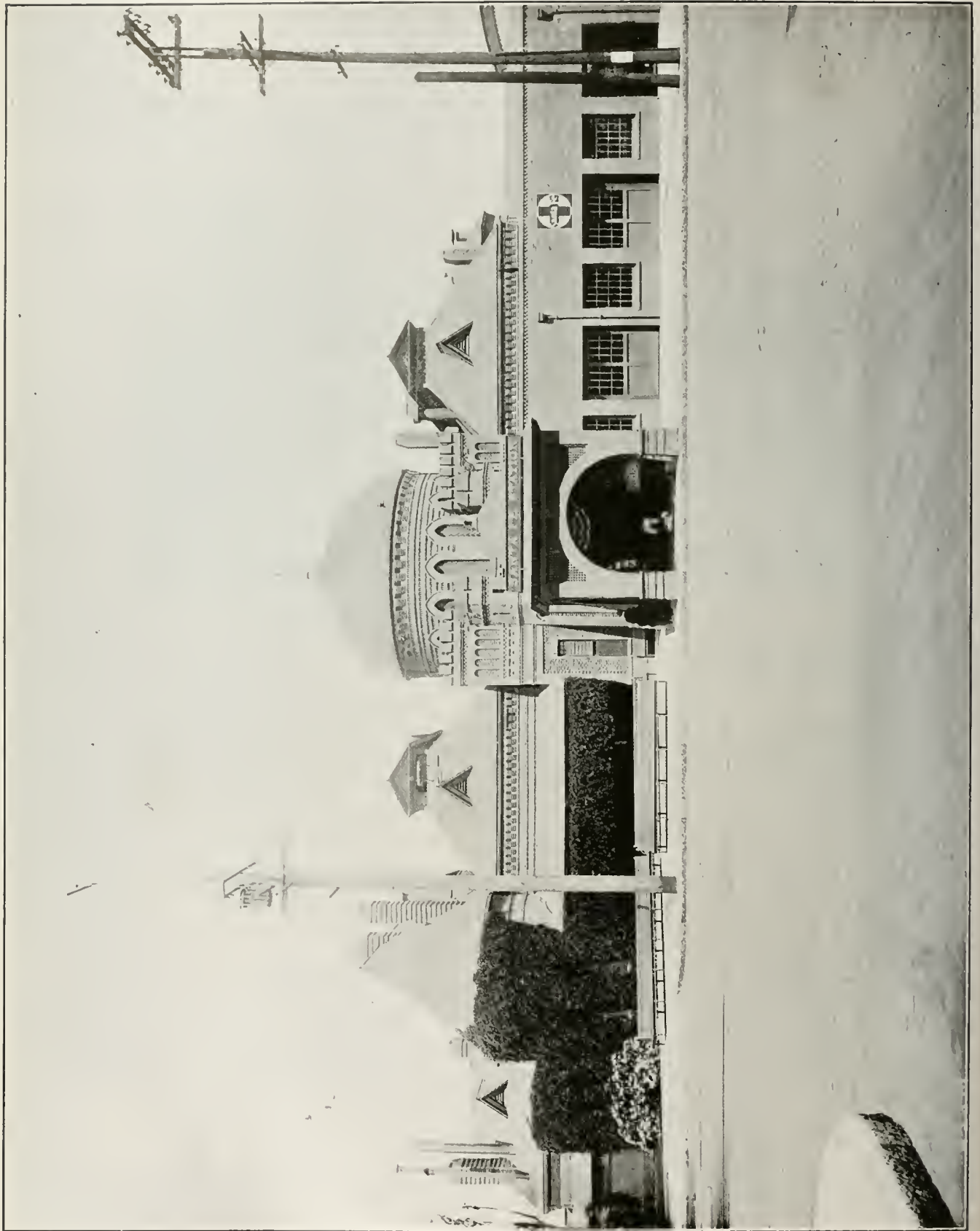


FIG. 84. SANTA FE STATION

Santa Fe Station

The Santa Fe La Grande Depot on Santa Fe Avenue at Second Street is a brick building (Class "C"), built in 1893 but enlarged at various times since. It will be noted from the statement of its principal characteristics in the Appendix that this depot provides scant facilities for the use of passengers. The cost of the building is unknown, but an estimate of the cost of reproduction under normal conditions is \$45,000 for the building, exclusive of furniture, and \$5,000 for the various surroundings such as ornamental fence, paving, parking, furniture, etc., a total of \$50,000. We consider this structure inadequate for present needs.



FIG. 85. SANTA FE STATION—REAR VIEW

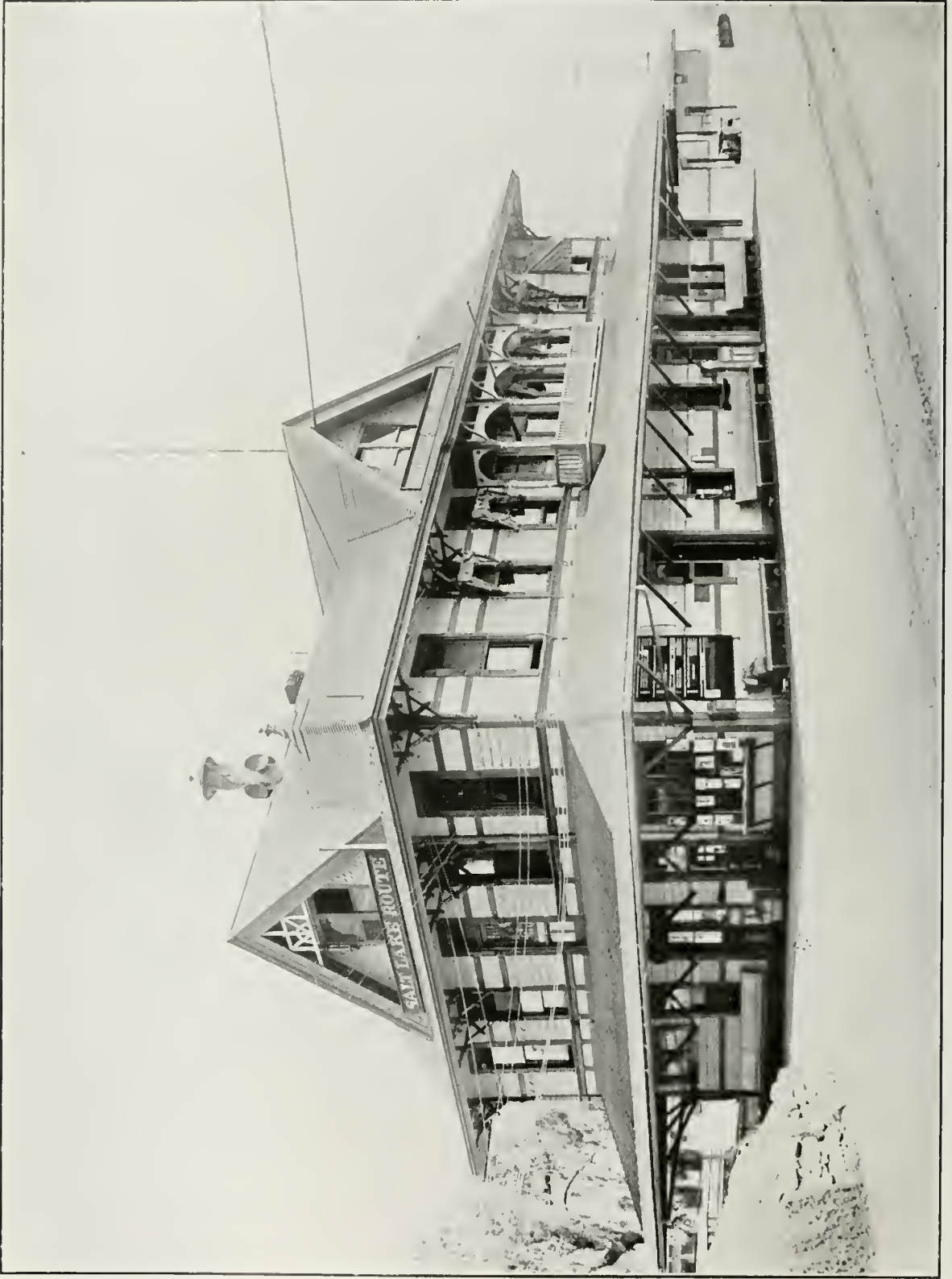


FIG. 86. SALT LAKE STATION

Salt Lake Station

The Salt Lake passenger station was built in 1891 and was added to subsequently. Its cost is unknown, but it is estimated that under normal conditions it could be built for \$10,000. This depot is a frame building, given over, principally, to division offices, and furnishes very poor facilities to passengers. The physical characteristics of this depot will be described in the Appendix.

The Salt Lake Railroad also maintains at Seventh Street and the Los Angeles River a shelter station at which local trains stop. This may be seen in a photograph of the Seventh Street bridge on page



FIG. 87. PACIFIC ELECTRIC BUILDING—REAR VIEW

This eight-story structure, located at Sixth and Main Streets is the Pacific Electric's principal station. The view also shows platforms and umbrella sheds east of Los Angeles Street, the tracks at this point being elevated some 16 feet above the level of the street. This improvement was made in 1916.

Pacific Electric Stations

The main depot of the Pacific Electric Railway is located at Sixth and Main Streets in an eight story building fronting on Sixth Street and extending from Main to Los Angeles Streets. This building, known as the Pacific Electric Building, is given over to offices and stores except for the basement, which is used as a garage, and a large part of the first floor, which is used as a waiting room. Extending east of this building, the tracks are located upon an elevated structure built of steel and concrete, which provides for six tracks at the station, and a two-track extension to San Pedro Street, which it meets at grade. The building was completed in 1906, but the elevated tracks were not built until 1916.



FIG. 88. PACIFIC ELECTRIC YARD AT MAIN STREET STATION

The elevated structure in the rear does not provide sufficient track room to eliminate all train movements from the streets. Several of the lines terminate in this yard, which is also used to store the extra equipment used during the rush hours. The waiting room is in the Pacific Electric Building (the high building at the left) at the same elevation as the elevated tracks.



FIG. 89. PACIFIC ELECTRIC HILL STREET STATION

For many years the cars have turned from Hill Street into this yard. Improvement in this situation was planned about 1904, when a high speed line was projected from this station toward the west, running in a tunnel under the hill in the background and beyond. Approximately \$2,000,000 has been spent out of a total estimated cost of \$10,000,000.

The Hill Street Station of the Pacific Electric Railway is located at practically the same elevation as Hill Street, upon which it fronts. There are no large buildings in this neighborhood, and construction is of an economical character as will pass the fire ordinance.

DESIRABILITY OF A UNION PASSENGER TERMINAL

A railroad passenger terminal is essentially a city matter; it is the main entrance to, and the main exit from, every important city. City pride and what might be called the advertising aspect of a fitting city entrance are, therefore, essential factors in the consideration of any important passenger terminal.

In not a single instance of monumental passenger terminal construction in recent years can it be said that the cost of the station, considered from the railroad operating view point alone, is justifiable as a sustaining investment. This fact in itself shows that the cost of such terminals is not necessarily determining and that other considerations do, as a rule, govern.

It is not to be concluded, of course, that cost should be discredited. After it is agreed that a fitting entrance gate is necessary and desirable, the plan to be adopted, out of several possible ones, should be the most economical one—other things being equal. The best interests of a growing and prosperous city demand a fitting entrance gate, and niggardliness in location, design and construction is poor economy and a detriment and handicap to the city.

This very fact, however, carries with it the implication that not only the railroad but even more so the city should deal with the question of constructing a union passenger terminal in a liberal and broad-minded manner. The city can well afford to grant the railroad every reasonable franchise and privilege for such purposes. It is bound to be a paying investment in every sense of the word to the city if the city bears in one form or another its fair share of the cost and the carrying charges of such an improvement. Whether the contribution of the city be in the form of money or land or the vacation or crossings of streets or a combination of several or all of these, must be determined by the special circumstances in each case.

We believe that in the City of Los Angeles, more than in almost any other city, a fine union passenger terminal is not only very desirable but almost essential. Los Angeles is primarily a city of tourists and of visitors. It is the center of what is already, and bids fair to become more so as the years go by, one of the most desirable playgrounds of the United States. Any reasonable expenditure that Los Angeles may incur to make itself more attractive, more beautiful and more desirable, is bound to redound to the benefit of the City. And a union passenger terminal station in keeping with the present City is perhaps the first requirement in this respect.

The principal arguments in favor of the establishment of a union passenger terminal in the City of Los Angeles we believe, are these:

1. **The present location of the three steam railroads with respect to one another is such that they could easily be brought into one depot; that is to**

say, at one or more points, the roads are close enough together that to connect them would require only the construction of short connecting tracks. This is in contradistinction to the situation in many other cities, where the roads enter from different points of the compass and where the main lines cannot be tied together without the construction of connecting tracks, either of a considerable length or through expensive property or by surmounting topographical difficulties.

2. **The Salt Lake road is under the necessity of making extensive improvements;** its present passenger facilities are admittedly inadequate, and some relief must be obtained. The entrance of this road to a union depot is desirable from every view point.

3. **The Santa Fe, also, must make extensive improvements and would probably gain by the abandonment of its passenger station in favor of a better located union station.** While this road is not so inadequately provided for as the Salt Lake, it uses, at present, facilities designed some fifteen years ago and not in keeping with good railroad practice in a city of the size and importance of Los Angeles.

4. **We believe that it is established that the City of Los Angeles in the great majority of its population and as indicated by its official representatives, is desirous of having the three steam railroads locate their passenger facilities at one point.** We believe this to be a weighty argument in favor of the desirability of a union passenger station. The wishes of the city must have considerable weight in the matter. Los Angeles, with all its problems before it, is now planning for the future along expected and measurable lines of growth and development. We believe that in such planning there is no single factor of such importance as that of transportation, and the union passenger station is one of the major items in the transportation chapter of the city plan.

5. **The desirability of a union passenger terminal may also be measured by the increased convenience to passengers who must, of necessity, transfer from one depot to another.** In Los Angeles, due largely to the fact that the city is a train terminal in contradistinction to a city where many trains run through with no, or little, change in their makeup, the number of passengers who transfer from one road to another amounts to approximately ten per cent of the total number of passengers entering and leaving the city. This is about 275,000 per annum—an average of 750 per day. Passengers' baggage, together with express matter and mail carried on passenger trains, must be segregated at one place for the different roads, requiring another handling and haul.

6. **Certain operating expenses of the steam railroads concerned will be reduced by the establishment of common passenger facilities.** The interest charges on the cost of new construction, while not a part of operating expenses, must, of course, be considered also in order to obtain a true comparison in costs of operating three separate depots and one single station. We have already said that such a combination of figures will not result in show-

ing a profitable investment and that the offset to that condition can be found in more or less indirect benefits.

7. **The establishment of a union station will very greatly simplify the highly important matter of grade separation now and in the future.** This simplification will result in a very large gain of money. While the Southern Pacific interests have maintained that there is no necessity for a union station in Los Angeles, it is at once apparent that the retention of the present Southern Pacific and Santa Fe stations will necessitate far greater expenditure for the elimination of grade crossings than if a union station is established at a point where the elimination is reduced to a minimum. Furthermore, there will be a saving in the elimination of duplication of transit lines to the several stations and in the elimination of duplicate post offices, express and baggage facilities and also restaurants and ticket offices.

8. Where there is free scope in the choice of the best possible location, irrespective of local or personal interest, **there is opportunity to locate the station efficiently with reference to local rapid transit lines, the main streets and the business center, and economically close to the coach yard and mechanical facilities.** This opportunity has been taken full advantage of in this report.

9. Los Angeles is recognized as a tourist city, and it is eminently fitting that there should be a union station in keeping with the importance and peculiar character of the City of Los Angeles. This is not only a matter of local pride, but is a question of definite advertising value because of the impressions given travellers entering and leaving the city. The importance of this feature is well illustrated by an article on French Finance by Stoddard Dewey in the *Atlantic Monthly* (1908), in which it is stated that

".....a reasonable estimate for the year 1907 of gold imported into France by travelers to be spent for hotels, transportation, amusements and purchases is \$600,000,000. One-fifth of this sum may safely be set down as the share of the Americans."

In the "Plan of Chicago," published by the Chicago Commercial Club, the work of Mr. D. H. Burnham, it is stated that the work in civic improvement accomplished by Haussmann for Paris cost \$265,000,000. A recently completed union station at Kansas City cost \$40,000,000, of which \$11,000,000 was spent on the station itself. The Grand Central Terminal in New York probably cost approximately \$200,000,000, and the Pennsylvania Terminal on Manhattan cost approximately \$115,000,000. Although civic improvements on a large scale have generally been applied to capital cities, it may be said that the need for scientific arrangement, particularly of railroad facilities, has been keenly felt in nearly all the larger cities. **The solution of the transportation problem in the city must necessarily precede** other developments in the city plan.

The valid arguments against a union depot are few. In Los Angeles there are only two that appear to us of merit.

1. **Local and private interests may be adversely affected by a change from present conditions to a union terminal.** There are bound to be objec-

tions to any change where property and business values may be disturbed, and such objections are entirely legitimate: A change is justifiable only if benefits to the many outweigh the disadvantages to the few. In Los Angeles, the disturbance in values of property other than railroad property will be practically negligible, and there is not the slightest doubt that the benefits will be far greater than the losses. As to railroad property: any terminal scheme should, in its financial aspect, be so worked out that no carrier is the loser. The existing peculiar advantages of each road should be recognized and allowed for in the adjustment of debits and credits, of capital and operation. In Los Angeles, we believe, this can be accomplished.

2. **The cost of establishing such a facility is the main objection.** This subject has already been touched upon. We may repeat that if the test were the profitableness—direct—of the investment, no union terminal and no other large passenger station should be built. But cost cannot alone be controlling, and the matter resolves itself into a question of policy rather than of engineering. It remains true, however, that a final recommendation can be made only if the cost is estimated. If the required expenditure is excessive, the arguments for the terminal must be overruled. The cost depends upon the location and upon the plan. This matter will be considered further.

Leaving aside, for the moment, the item of cost, but taking all other aspects into consideration, it is our conclusion that the argument may be reduced to the statement that **in Los Angeles, public necessity and convenience require the establishment of a union passenger station.**

STEAM ROAD TRAFFIC STUDIES

The passenger train traffic has an important bearing on the establishment of a union passenger terminal. The term "traffic" as here used, includes passenger trains and baggage and the express and mail handled on passenger trains.

Passenger Traffic

Taking up the subject of passenger traffic, we have had two questions in mind: the number of passengers handled periodically by the steam railroads, and the relation which this number bears to the number of passengers handled by the electric interurban road—the Pacific Electric Railway.

In order to determine the number of passengers handled each year by the steam carriers, several lines of investigation were followed:

First, the ticket sales on the three roads were ascertained. This data gave the number of tickets sold by the three roads at their uptown and depot offices for each month of the year, segregated between local and interline tickets. The revenue derived therefrom was ascertained also. Table VI in the Appendix gives this information in tabular form. This table shows that at least 696,882 passengers purchased tickets in Los Angeles and that the revenue was approximately \$6,000,000. The table has several shortcomings, however:

1. The figures do not include tickets sold for a trip originating at Los Angeles if the ticket is sold by some road other than the three whose rails enter the city.
2. The figures do not include the return portion of round trip tickets to Los Angeles. These must be many—probably in the neighborhood of a million—for Los Angeles is famous as a wintering spot, and practically all this travel is on round trip tickets.
3. The figures do not include passengers entering the city and making use of a stopover before departing.
4. The figures do not include passengers who do not pay fare.
5. The figures do not, of course, include passengers entering Los Angeles. These are in excess of those leaving the city.

We next inquired of the carriers the number of passengers carried into and out of Los Angeles. This brought no definite information; the substance of the replies was to the effect that no records were available since this data was not kept in the ordinary course of operation. This was the reply of the Southern Pacific, which submitted, however, some monthly figures that were not in such form that they could be used. The Santa Fe advised that its passenger department estimated from 80,000 to 100,000 passengers per month who passed through its Los Angeles station, or 960,000 to 1,200,000 passengers per annum. The Salt Lake furnished no estimate.

Since this data was unsatisfactory, the carriers were requested to make two counts for eight days. This was done, and the results appear in Tables IV. and V. in the Appendix.

One of these counts was made in April, 1918, and the other in September of the same year. To have these counts represent yearly figures and take into consideration the number of Sundays and holidays in the year, eight days with but one Sunday were selected. The number of passengers per annum as derived from these figures direct, are presented as follows:

STEAM RAILROAD PASSENGERS AT LOS ANGELES

April, 1918

Road	Passengers Arriving and Leaving			Totals per Year	Percent- ages
	Totals 8-day Count	Aver- age	Max- imum		
Southern Pacific	30,086	3,761	4,098	1,372,765	52.4%
Santa Fe	21,432	2,679	3,268	977,835	37.3%
Salt Lake	5,896	737	859	269,005	10.3%
Total	57,414	7,177	8,056	2,619,605	100.0%
Leaving	30,504	3,813	4,213	1,391,745	53.1%
Arriving	26,910	3,364	4,005	1,227,860	46.9%
Difference	3,594	449	208	163,885	6.2%

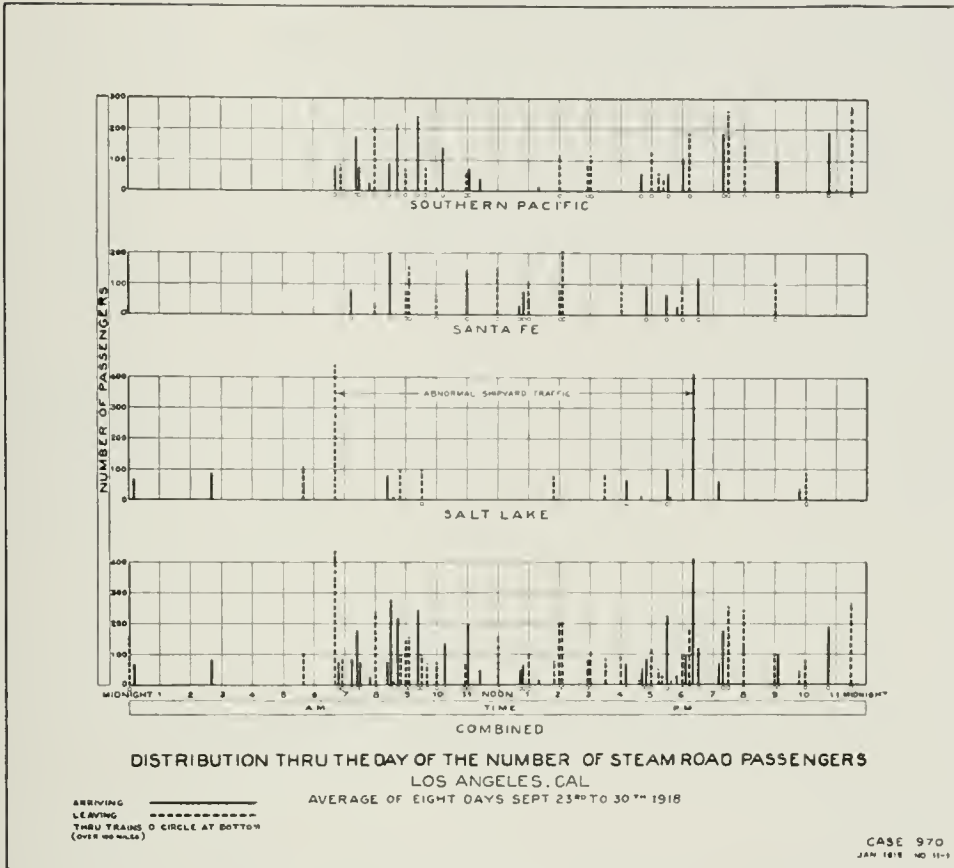
		September, 1918			
Southern Pacific	30,212	3,776	4,094	1,378,422	50.8%
Santa Fe	15,794	1,975	2,258	720,875	25.7%
Salt Lake	15,398	1,925	2,072	702,625	25.0%
Total	61,529	7,692	8,234	2,807,580	100.0%
Leaving	32,033	4,005	4,249	1,461,825	52.1%
Arriving	29,496	3,687	4,163	1,345,755	47.9%
Difference	2,537	318	86	116,070	4.2%
		Average—April and September Combined			
Southern Pacific	30,212	3,776	4,094	1,378,422	50.8%
Santa Fe	18,613	2,327	2,763	849,355	31.5%
Salt Lake	10,647	1,331	1,466	485,815	17.7%
Total	59,472	7,434	8,145	2,713,592	100.0%
Leaving	31,268	3,909	4,231	1,426,785	52.6%
Arriving	28,203	3,526	4,084	1,286,807	47.4%
Difference	3,065	383	147	139,978	5.2%

Inasmuch as these figures compare directly with those given by Witness Titcomb (trans. p. 927) a comparison follows:

COMPARISON OF ESTIMATES OF NUMBER OF STEAM ROAD PASSENGERS

	Passengers per Annum			
	Estimate by	Difference in		
	Titcomb	Engr. Dept.	Number	Per Cent
Southern Pacific	1,575,000	1,373,000	202,000	15%
Santa Fe	1,080,000	977,000	103,000	11%
Salt Lake	341,000	269,000	72,000	27%
Total	2,996,000	2,619,000	377,000	14%

Whatever impression the above comparison may make, we wish to state that the exact number cannot be ascertained without a count through the year. The use of any of the above figures would lead to no serious error, however, though it should be noted that in September "shipyard trains" of the Salt Lake were heavily patronized and account for the large number of passengers handled by this road in that count. The relative percentage for the Salt Lake in April—10.3 per cent—is more nearly indicative of the normal travel on this road than the percentage for September—24 per cent—which resulted from shipyard passengers. We may average Mr. Titcomb's and our own figures and say that in 1918 the number of steam railroad passengers coming into and leaving Los Angeles was approximately 2,750,000.



California Railroad Commission Engineering Dept

FIG. 90. DISTRIBUTION THROUGH THE DAY OF THE NUMBER OF STEAM ROAD PASSENGERS

The usual morning and evening peaks are evident. The traffic on the Salt Lake local trains is regarded as abnormal, due to war conditions.

The counts during the periods taken shows a maximum of slightly over 8,000 passengers daily. There are days, such as special holidays, however, when this figure is exceeded. We have no data bearing on this subject, but may estimate that this figure is doubled to 16,000 on such days.

Passengers Using Street Cars

Some study was made of the number of steam road passengers making use of street cars as a means of transportation to and from the depots. The result of this study were, on the whole, unsatisfactory, but we will give them for what they are worth.

A count made of passengers leaving the trains at the Southern Pacific Depot shows that 33 per cent of them immediately boarded Los Angeles Railway cars; 8 per cent boarded Pacific Electric cars, and 17 per cent passed into the station. This accounts for 58 per cent of the number of passengers leaving the train. The remaining 42 per cent either walked, rode by auto-

mobile—private or taxicab—or took one of the hotel busses. On the same day, 61 per cent of the passengers at the Santa Fe Depot boarded Los Angeles Railway cars.

On another date, 33 per cent of the passengers at the Southern Pacific Station boarded the Los Angeles Railway cars; 11 per cent boarded Pacific Electric cars; and 12 per cent passed into the station—a total of 53 per cent of the number of people who left the train. On the same day, 53 per cent of the number of passengers at the Santa Fe Station boarded Los Angeles Railway cars.

Probably a much higher percentage of the steam road passengers (those who remained around the depot for a time, telephoning, securing baggage, dining or in quest of information of some kind) eventually boarded the cars. We have come to the conclusion that from 60 to 70 per cent of the steam road passengers make use of the street cars—an average of about 6,000 people daily. This is of importance in planning street railway facilities to and at a union station.

The following tabulation compares the number of passengers carried on Friday, June 7, 1918, to and from the three steam road depots by the Los Angeles Railway only, with the number of passengers arriving and leaving on trains on Friday, April 12, 1918. It will be noted that the same day of the week was taken, although we did not get the information from both sources on the same date or even the same month. In this connection, however, it may be said that steam road business during these two months was apparently not very different. June business was only slightly less than that of April.

STREET CAR AND STEAM RAILROAD PASSENGERS

	Passengers Carried to and from Sta- tion by Street Cars June 7, 1918, Friday		Passengers Arriving and Leaving on Trains on April 12, 1918, Friday		Differ- ence	Ratio of Railroad to Street Car Pas- sengers
	No.	Ratio	No.	Ratio		
Southern Pacific	5,753	60%	3,532	53%	2,221	61%
Santa Fe	2,868	30%	2,426	36%	442	86%
Salt Lake	930	10%	738	11%	192	79%
Combined	9,551	100%	6,696	100%	2,855	70%

On Friday, September 27, 1918, a count of passengers showed the following results with regard to the number of passengers to and from Fifth Street and Central Avenue, the location of the Southern Pacific Station:

**STREET CAR AND STEAM ROAD PASSENGERS—SOUTHERN
PACIFIC STATION ONE DAY COUNT**

Passengers by Los Angeles Railway.....	5,170	
Passengers by Pacific Electric Railway	1,313	6,483
Passengers by Southern Pacific		3,792
		<hr/>
Excess by electric roads over steam road.....		2,691
Excess by electric roads over steam road		72%

It is obvious that a great many more people go to and from the station than ride on the trains. These consist largely of persons employed in the vicinity, friends going to the station with travellers, and employees of the Southern Pacific Company who make their headquarters at the Arcade Station

Similarly, for the average of eight days ending September 30, 1918, we may compare the passengers in the same way:

**STREET CAR AND STEAM RAILROAD PASSENGERS—SOUTHERN
PACIFIC STATION EIGHT DAY COUNT—SEGREGATED
BY DIRECTION**

Direction—Away from Los Angeles

To the station by electric cars		
Los Angeles Railway	2,535	
Pacific Electric Railway	646	3,181
From the station by Southern Pacific		1,880
Difference		1,301 or 69%

Direction—Into Los Angeles

From the station by electric cars		
Los Angeles Railway	1,980	
Pacific Electric Railway	614	2,594
To the station by Southern Pacific		1,917
		<hr/>
Difference		682 or 36%

As a result of these studies we conclude that the street cars carry to and from the depots a great many more people than actually become steam road passengers—this is particularly true of the present Arcade Depot of the Southern Pacific—and that about 60 per cent of the steam road passengers use the street cars in going to or from the station.

Growth of Passenger Business

As an indication of the growth in the number of passengers, the following data on Southern Pacific passengers is offered:

**SOUTHERN PACIFIC PASSENGERS IN OCTOBER FOR THREE
YEARS**

Time	Approximate number of passengers to and from Los Angeles		
	To	From	Total
October, 1913	49,503	53,344	102,847
1914	37,365	40,669	78,034
1915	42,096	40,767	82,863
Average	42,988	44,927	87,915
	Actual number of passengers		
April, 1918 (based on 8-day count).....	52,890	59,940	112,830

This study does not indicate any growth in the number of passengers carried in the three years for which the figures are given, but apparently shows growth to 1918. This, we believe, is more seeming than real, for the data for the three years was submitted as approximate and was known not to include all passengers (passengers on through transportation and passengers traveling on transportation other than pay tickets were not counted). Moreover, the traffic in April is particularly heavy on account of returning tourists.

The only conclusions we have drawn is that apparently there has been little growth, if any, in the number of passengers handled by the Southern Pacific. This may be borne out by the general statistics covering the state:

**REVENUE PASSENGERS CARRIED IN THE STATE OF CALIFOR-
NIA BY THE SOUTHERN PACIFIC, THE SALT LAKE AND
THE SANTA FE, 1912 TO 1917**

Year Ending	Millions of Passengers			
	Southern Pacific	Santa Fe	Salt Lake	Total
June 30, 1912.....	32.0	3.0	...	35.0
" " 1913.....	33.2	3.2	...	36.4
" " 1914.....	33.6	3.1	0.7	37.4
" " 1915.....	34.0	2.7	0.6	37.3
" " 1916.....	35.6	2.6	0.6	38.8
Dec. 31, 1916.....	33.4	2.0	0.5	35.9
" " 1917.....	36.1	2.1	0.4	38.6

Figures given for the Southern Pacific for the calendar year 1916 (33,444,510) include 21,131,983 passengers carried in the San Francisco transbay traffic. This is 63 per cent of the total number of passengers reported. With this large percentage, it should be borne in mind that the fluctuations in this transbay traffic have a large effect on the above figures, which are reported for passengers carried within the State.

**REGULAR FARE PASSENGERS CARRIED BY PACIFIC ELECTRIC
RAILWAY AND LOS ANGELES RAILWAY, 1912 TO 1918**

Year Ending	Pacific Electric	Road	
		Los Angeles Railway	Total
June 30, 1912.....	60,841,521	122,702,682	183,544,203
" " 1913.....	68,686,203	135,784,507	204,470,710
" " 1914.....	70,678,719	169,872,064	240,550,783
" " 1915.....	64,719,754	125,939,865	190,659,619
" " 1916.....	63,350,501	121,574,028	184,924,529
Dec. 31, 1916.....	61,861,184	117,336,924	179,198,108
" " 1917.....	65,028,315	123,074,300	188,102,615
" " 1918.....	67,915,099	130,358,704	198,273,803

It will be noted that the year ending June 30, 1914, shows the largest number of passengers carried by both roads. The decrease which followed, as explained later, was no doubt the result of automobiles, both privately owned and those publicly operated. The latter class includes jitneys which were particularly effective in reducing the number of passengers carried on the Los Angeles Railway and which came into existence about the end of 1914 and reached the height of their career in 1916.

It was stated that "in other communities, records show for local transportation and interurban transportation the demands increase as the square of the population." The statistics above indicate that for the five years 1912 to 1916 there was an increase of 6 per cent in the number of passengers carried by the Southern Pacific, which for the ratio stated, would correspond to an increase of 2.45 per cent in the population. It has been stated on competent authority that an analysis of the records of passenger traffic indicate that for the entire United States the traffic has been increasing approximately as the cube of the population (neglecting the depression of 1893 to 1895). With the local situation, however, it appears that neither of the above general statements, one with regard to the local and interurban transportation and the other with regard to the relation of population to passengers in the United States, are applicable to the local steam road transportation problem.

Automobile Stage Passengers

The reason for the apparent departure from the usual rate of growth in the number of passengers is found, we believe, in the large number of privately owned automobiles within the Los Angeles district and in the large amount of passenger traffic carried by the automobile stage lines. Figures recently furnished indicate that there are regularly employed about 140 automobiles in stage service in and out of Los Angeles, which carried during 1918 from 1,500,000 to 2,000,000 passengers, or approximately from 60 to 80 per cent of passengers carried by steam roads.

Practically all of these stage passengers are carried across several grade crossings, and from 1,200,000 to 1,600,000 of them are carried across Alameda Street and over the tracks of the Salt Lake and the Santa Fe which lie adjacent to the Los Angeles River.

Passengers Transferred Between Depots

Passengers transferred from one depot to another (changed by us from a monthly to a yearly basis) were estimated by witness Titcomb as follows:

Southern Pacific to Santa Fe.....	13,584
Southern Pacific to Salt Lake	2,208
Salt Lake to Southern Pacific	1,080
Salt Lake to Santa Fe	2,904
Santa Fe to Southern Pacific	14,400
Santa Fe to Salt Lake	7,200
Total	41,376

Based on an eight-day count, the number of passengers transferred on through tickets was found to be:

From Southern Pacific	45,000	per Annum
From Santa Fe	31,000	" "
From Salt Lake	2,000	" "
Total	78,000	" "

Another tabulation shows the relative number of passengers transferred as compared with the number of passengers arriving:

Road	Passengers Per Annum		
	Arriving	Transferred	% Transferred
Southern Pacific	697,880	44,895	6.4
Santa Fe	297,840	31,025	10.4
Salt Lake	350,035	1,825	0.5
Total	1,345,755	77,745	5.8

As these figures were taken under unusual conditions (shipyard travel on the Salt Lake was unusually high and general travel was discouraged) it was thought that the percentage transferred was abnormally low at that time (October, 1918).

Furthermore, since these figures do not include passengers who go from one depot to the other and at the latter purchase a through ticket, which figures we could not obtain, and since these must be considerable, it was thought that further inquiry would result in no additional useful information. We estimate that normally about 10 per cent of all passengers transfer from one station to another.

Electric and Steam Road Passengers

As it appeared advisable to consider the relative number of passengers traveling over the steam roads and the electric interurban line (Pacific Electric Railway), we ascertained this latter information for the year 1917. We endeavored to estimate the number of passengers entering and leaving Los Angeles and to exclude the passengers who paid a fare of five cents, but found that the underlying data was not susceptible of exact analysis except at the expense of more labor than was thought justified.

The number was estimated by the Pacific Electric Railway by deducting five per cent from the total number of passengers carried but is modified by using a ratio based on exact segregation for one day for two of the lines which did most of the five cent business. The following tabulation gives a comparison of the steam and electric railway passengers during 1917, with the limitation above noted:

**STEAM AND ELECTRIC RAILROAD PASSENGERS
LOS ANGELES, 1917**

	Number of Passengers	Ratios
Pacific Electric Railway	35,000,000	92.7%
Steam Roads	2,750,000	7.3%
	-----	-----
Difference	32,250,000	85.4%
	-----	-----
Total	37,750,000	100%

With these figures before us, the conclusion was evident that the electric interurban passengers should have as much, if not more, consideration than the steam road passengers. It may be argued that the electric road passengers are practically all commuters and that they are therefore not entitled to as much consideration as the man who pays more for his ticket. Against this, we may say that the average ticket sold in Los Angeles appears to produce to the selling line about \$8.50, which is considerably less than the average commuter pays per half year; and we estimate that a large percentage of the Los Angeles passengers on steam trains ride not oftener than twice a year.

Passenger Trains

The number of passenger trains is essential in studies of plans for a union passenger depot and is also important in traffic studies at grade crossings. With these objects in view, a study was made of passenger trains on the three steam roads entering Los Angeles, together with a study of the equipment used and the length of trains.

The time tables effective on December 31, 1917, and June 2, 1918, were used as a basis for the following tabulations. Further detail appears in Tables IV and VII in the Appendix.

**NUMBER AND DIRECTION OF SCHEDULED PASSENGER TRAINS
LOS ANGELES, 1917 AND 1918**

Directions	Southern Pacific		Santa Fe		Salt Lake		Combined	
	1917*	1918*	1917*	1918*	1917*	1918*	1917*	1918*
Outbound								
North ..	18 (6NE)	15 (6NE)	7	4	4	2	29 (6NE)	21 (6NE)
South ..	2	2	9	7	6	6	17	15
	—	—	—	—	—	—	—	—
Total ..	20	17	16	11	10	8	46	36

Inbound								
North ..	18 (6NE)	15 (6NE)	5	3	5	2	28 (6NE)	20 (6NE)
South ..	2	2	11	8	7	6	20	16
	—	—	—	—	—	—	—	—
Total ..	20	17	16	11	12	8	48	36
Total								
North ..	36 (12NE)	30 (12NE)	12	7	9	4	57 (12NE)	41 (12NE)
South ..	4	4	20	15	13	12	47	31
	—	—	—	—	—	—	—	—
Total ..	40	34	32	22	22	16	94	72

*1917—December 31, 1917; 1918—June 2, 1918.

In the above table, and, in fact, in all discussions of passenger trains, mixed trains, Sunday or Saturday only, weekly or other trains which do not run six or seven days per week are not included. North or south means the direction toward which the train starts or from which it arrives, in the immediate vicinity of depot. For example, a Southern Pacific train to either Burbank or Pomona is **north**, while one to Santa Ana is **south**; a Santa Fe train to San Bernardino via Pasadena is **north**, though one via Fullerton is **south**; a Salt Lake train to Pasadena is **north** and one to Riverside is **south**. The figures (6NE) indicate that of the eighteen (or fifteen, according to the date) trains shown, six go out via Alhambra Avenue and the other twelve (or nine) go out via Burbank.

Further study has been made into the history of the number of trains. For this purpose it has proved advisable to segregate passenger trains into through and local trains, a through train being one with a run of over 100 miles and a local train being one with less. The reason for this developed after a preliminary inquiry, which showed that 1917 compared with 1907 as follows:

In 1917 **more through** passenger trains existed than in 1907.

In 1917 **fewer local** passenger trains existed than in 1907.

In 1917 **fewer passenger** trains existed than in 1907.

After this inquiry a detailed study was made, the results of which are shown graphically in the above chart Fig. 91. The following may be extracted from this chart, "Local Trains" being taken as those with a run of less than 100 miles:

GROWTH AND NUMBER OF PASSENGER TRAINS

Class of Train	Road and Number of Trains			
	Southern Pacific	Santa Fe	Salt Lake	Combined
Through 1917	34	22	6	32
Through 1907	22	10	4	36
	—	—	—	—
Gain	12 55%	12 120%	2 50%	26 62%
Local	32	16	19	67
Local	6	10	16	32
	—	—	—	—
Loss	26 81%	6 38%	3 16%	35 52%

Through and Local 1907.....	54		26		23		103
Through and Local 1917.....	40		32		22		94
	—		—		—		—
Loss	14	26%	*6	*18%	1	4%	9 9%

*Gain.

The reasons for these differences are apparent when it is recalled that the increase in population would require an increase in the number of trains and that the extension of lines by the Pacific Electric, influenced in great part, no doubt, by the assumption of control of this road by the Southern Pacific, has diverted the local business to the electric road. The automobile stage and private automobile, in turn, have taken some of the local traffic of both the steam and electric interurban roads.

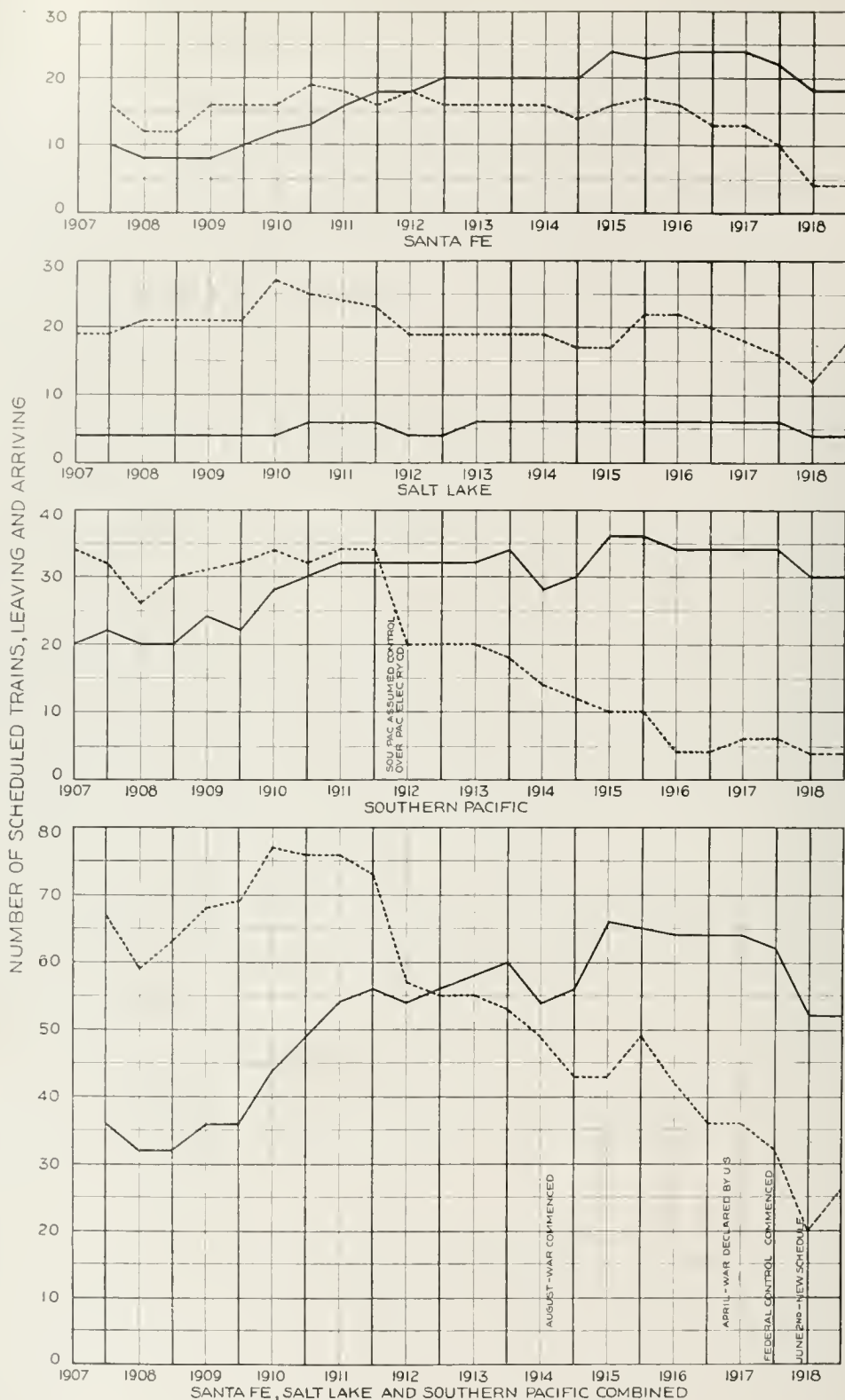
The number of passenger trains per day in the future is necessary for the determination of the number of tracks necessary, not only of station tracks but also of approach tracks. In the above drawing, the period 1907 to 1918 is a record of actual growth and corresponds with the period in Fig. 91 on page 262. The line is apparently so irregular that it cannot readily be used, except roughly, as a basis for mathematical analysis to forecast the future from the past.

For the through trains we have, therefore, drawn three straight lines to a point twenty years hence. The upper line gives what may be called the maximum number of through trains in 1937, the middle one represents our idea of probable growth, and the lowest one gives the least that can be expected.

This method of forecast gives, then, the following results:

Maximum number of through trains in 1937—	185
Probable " " " " " "	—140
Minimum " " " " " "	— 83

Looking at the question from another angle: if the population of Los Angeles in 1917 was 600,000, the population per through train would be 9,700; in 1907, if the population was 200,000 and the number of through trains was 36, the population per through train would be 6,100. In Chicago in 1913 there were 593 through trains, which, combined as above, with a population of approximately 2,500,000, results in the figure of approximately 4,200 per through train. As the passenger business in Chicago must consist largely, or to a considerable extent, of passengers who pass through the city using it as a junction point for the lines east and the lines west, however, it is not thought



TREND OF NUMBER OF PASSENGER TRAINS
AT
LOS ANGELES

SCHEDULED TRAINS BASED ON EMPLOYEES TIME TABLES,
EXCLUDING MIXED TRAINS AND OTHERS
SCHEDULED LESS THAN SIX DAYS PER WEEK

— THROUGH TRAINS - RUN OVER 100 MILES
- - - LOCAL TRAINS - RUN UNDER 100 MILES

CASE 970 ET SEQ
JUNE 1918 NO 10-6

California Railroad Commission Engineering Dept.

FIG. 91. RECORD OF NUMBER OF PASSENGER TRAINS AT LOS ANGELES FROM 1907 TO 1918
The diagram shows the number of through and local trains on each of the through steam roads and the three combined. The local business is largely being taken over by the electric lines and by automobiles.

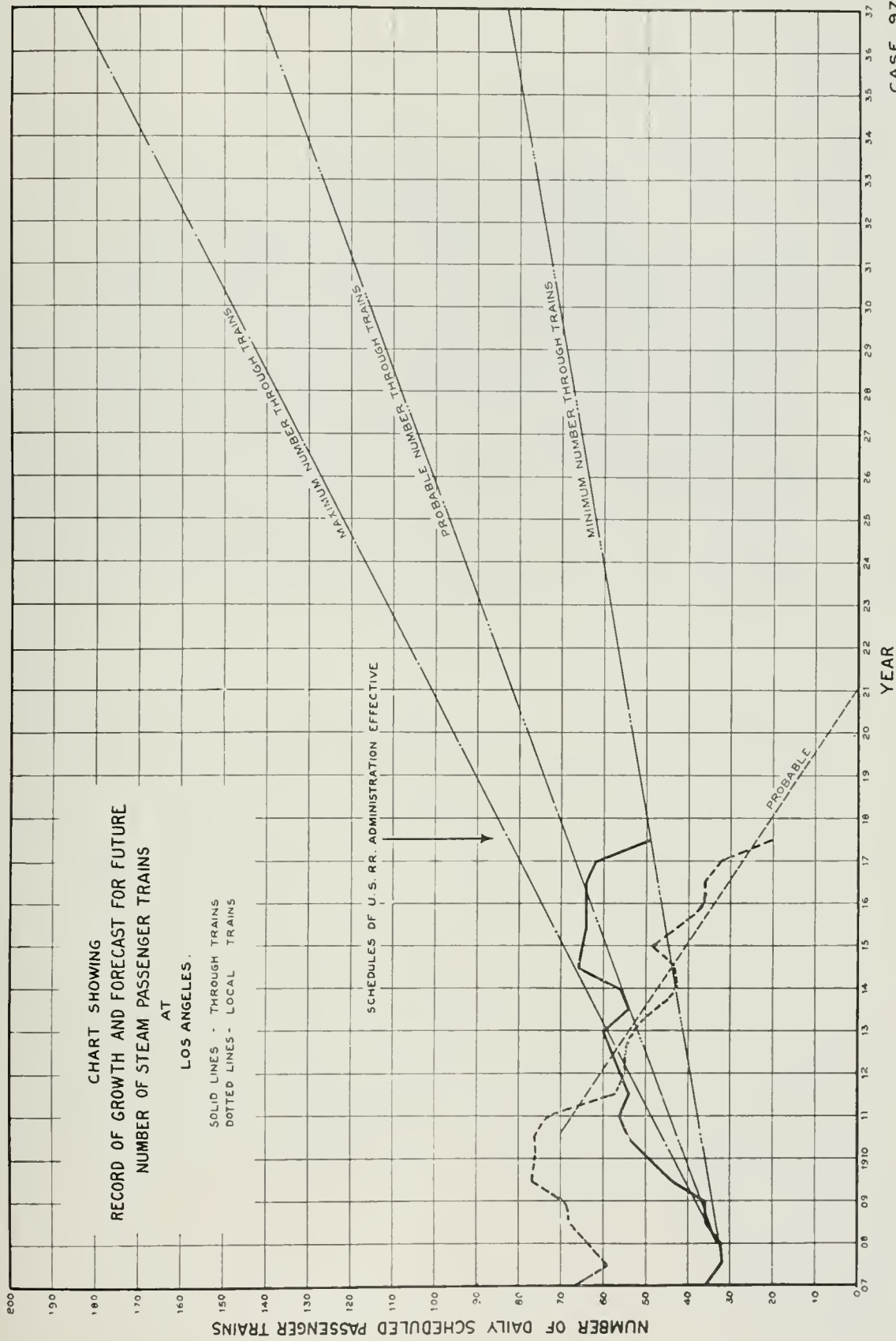


FIG. 92. FORECAST FOR STEAM PASSENGER TRAINS

The record of growth is the same as shown on Fig. 91. It shows that the number of trains is considerably affected by war conditions and that a more definite forecast will not be possible until normal conditions are again reached. Comparison should be made with the other curves of growth shown in Fig. 1.

that the experience of Chicago should be considered as a criterion of Los Angeles conditions.

It is a well known fact that a large part of the passengers on through trains into and out of Los Angeles consists of tourists, especially in the winter and in the spring. It is apparent, therefore, that the study of the relation of the number of through trains to the population can have no definite bearing on the number of through passenger trains that can be expected in the future. For this reason, this line of study does not appear to be productive of useful results.

Returning to the discussion of Fig. 91 on page 262. We believe that it may be said that the increase in the number of through trains in the past decade has been due, in a measure, to competition of service. But whatever the reasons, the increase was evidently stopped by the economy practiced throughout the country since the commencement of the European war. Since the assumption of control of the railroads by the Federal government, this is even more marked as will be noted by the reduction in the number of trains in the first six months of 1918.

Whether the old conditions will return or not is an open question, but we believe that a measure of competitive service will return regardless of whether the railroads go back to private ownership, as before the war, or continue under some form of Federal control.

We believe that the local trains (i. e. trains that run less than 100 miles) will probably disappear in the next ten or twenty years. This is particularly evident from Fig. 130.

Electrification, we are confident, will play a large part in future railroad-ing in the vicinity of Los Angeles. The railroads running over heavy grades, which control the tonnage of trains, on all through lines out of Los Angeles, will probably be electrified on account of shortage and cost of fuel oil and on account of the disinclination to return to coal, and the more economical electrical operation will probably require that this measure be adopted. This will include all switching service in Los Angeles. This prospect also has an important bearing on freight traffic.

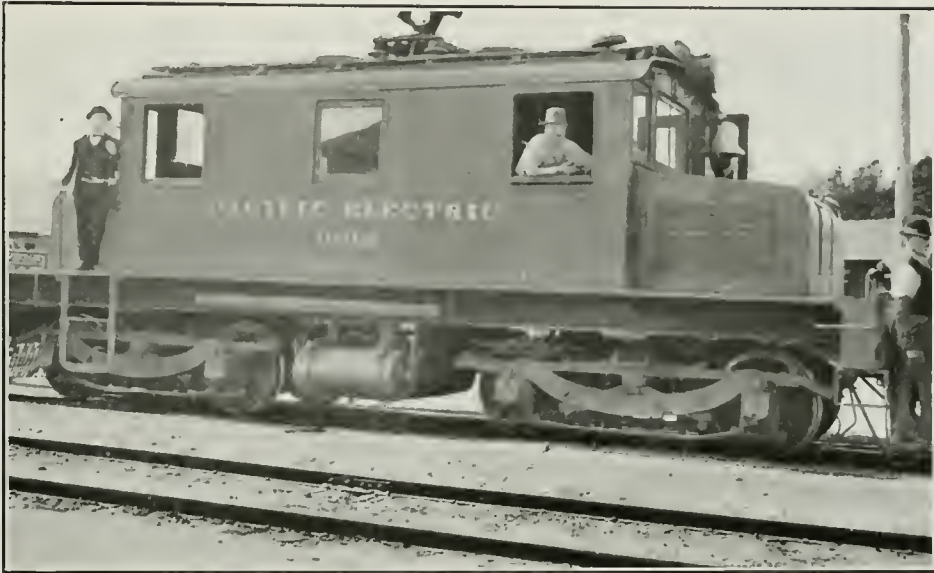


FIG. 33. ELECTRIC LOCOMOTIVE

One type of locomotive used by the Pacific Electric. This form of power has many advantages over the steam locomotive and some day will probably be used exclusively for switching in Los Angeles.

With all these conditions before us, we are led to believe that the next ten years will probably see 105 daily through trains; the number of through trains at the end of the second decade will be about 140 and the local trains will disappear. In the making of any plans, therefore, facilities should be provided capable of an ultimate development in the handling of trains to at least 140 trains per day.

The number of cars in a passenger train on December 31, 1917, varied from 2 cars in some of the local trains to 12 or 13 cars in the through trains, the average being about 5.4 cars per train. In Chicago, in 1913, through trains averaged 6.5 cars per train; suburban trains, 4.3 cars; and the average 5.4 cars, as in Los Angeles. An estimate for the end of twenty years should, we believe, be based on 6.6 cars per train, or a daily movement of approximately 1,000 passenger train cars.

Baggage, Mail and Express



FIG. 94. BAGGAGE BUILDING AT SANTA FE DEPOT

This is Class "C" structure of brick. The front or lower portion was built in 1914 to care for the extraordinarily large traffic created by the two expositions in 1915.

Baggage

Studies of baggage traffic were made in order to ascertain what relation this class of traffic bore to the other classes and to provide, in any plans we might make for a union station, adequate space and convenient arrangement.

The steam road baggage business at Los Angeles may be listed as follows, "handling" being defined as the number of pieces into and out of Los Angeles:

BAGGAGE HANDLED—1917

	Number of Pieces Handled		
	Year 1917	Av. Day	Ratio
Southern Pacific	690,684	1,892	58%
Santa Fe	343,595	941	29%
Salt Lake	159,201	436	13%
Total	1,193,480	3,270	100%

Based on an eight-day count in September, 1918, annual figures for 1918 may be approximated as follows:

BAGGAGE HANDLED—1918

ESTIMATED

	Handled		Transferred to Other Steam Roads		Ratio Transferred to Handled
Southern Pacific	823,075	66%	35,770	57%	4.3%
Santa Fe	326,675	26%	25,185	40%	7.7%
Salt Lake	103,360	8%	1,825	3%	1.8%
Total	1,253,410	100%	62,780	100%	5.8%
Average Day	3,434		172		

If the baggage transfers follow the same ratio as the passengers who are transferred (at least 10 per cent), then the baggage transferred amounts to 125,341 pieces per annum—about 340 per day. This is considerably in excess of the figures in the last tabulation. This does not follow, however, as many passengers do not check baggage.

The above information does not include the baggage transferred between the Southern Pacific and the Pacific Electric. The latter does practically all the local baggage business in the cities in the vicinity of Los Angeles. The next tabulation shows the extent of baggage transferred between these two roads based on an eight-day count in September, 1918:



FIG. 85. WELLS FARGO AND COMPANY EXPRESS STATION AT
FOURTH STREET AND CENTRAL AVENUE

This structure, built in 1912, is located upon land part of which is owned by the Southern Pacific Company and part by the Wells Fargo Company. At the time the picture was taken this express company formed part of the American Railway Express Company.

**TRANSFER OF BAGGAGE BETWEEN SOUTHERN PACIFIC AND
PACIFIC ELECTRIC YEAR 1918—ESTIMATED**

	Pieces of Baggage	
	Year	Av. Day
Received by Southern Pacific, all sources.....	396,299	1,086
Transferred to Pacific Electric from Southern Pacific...	31,710	85
		7.7%
Forwarded by Southern Pacific, all sources.....	426,685	1,169
Transferred from Pacific Electric to Southern Pacific...	32,530	90
		7.7%



FIG. 96. EXPRESS UNDER COVER—SOUTHERN PACIFIC STATION

During the summer, when deciduous fruit shipments are heavy, this canvas is erected.

Express

The more salient features of the express traffic in Los Angeles appear in Table X in the Appendix. For quick reference the following figures relative to the volume, may be given.

EXPRESS TRAFFIC—1917

	Wells Fargo and Company Express		American- Express		Combined
At Southern Pacific Station	54,673	73%	....		54,673
At Santa Fe Station.....	19,854	27%	....		19,854
At Salt Lake Station .....	.....		5,188		5,188
	74,527	100%	5,188		79,715
	93%		7%		100%



FIG. 97. WELLS FARGO EXPRESS BUILDING—SANTA FE DEPOT



FIG. 98. AMERICAN EXPRESS COMPANY—SALT LAKE STATION

This is a view of the American Express Company's only Los Angeles express depot, located at the Salt Lake station on the east side of the Los Angeles River near First Street.

A similar table based on an eight-day count in September, 1918, shows a considerable difference; the volume is greater, and due to the closer combination of the express business under the American Railway Express Company,

more business was apparently concentrated at the Santa Fe Station. (The American Railway Express Company is a voluntary combination of the various express companies organized since the war and has since been taken over by the United States Railroad Administration.)

EXPRESS TRAFFIC—1918

ESTIMATED

	Tons of Express Handled per Year		
	Wells Fargo and Company Express		American- Express
			Combined
Southern Pacific Station	70,513	70%	70,513
Santa Fe Station	31,238	30%	31,238
Salt Lake Station .....	.....	.....	2,464
	<hr/>	<hr/>	<hr/>
	101,751	100%	104,215
	97%	3%	100%

The extent of this traffic may be judged from the fact that it is approximately, by weight, 23 per cent of all Los Angeles less-than-carload freight business of the three steam roads.

For the year 1917, the express transferred between the three stations of the steam railroads was approximately as shown in the next table:

TONS OF EXPRESS TRANSFERRED—YEAR 1917

Express Com- panies' Depots To	From			Total Salt Lake	Total All Depots
	Wells Fargo & Company Southern Pacific	Santa Fe	Total		
Southern Pacific .....	.....	2,880	2,880	516	7,716
Santa Fe	4,320	.....	4,320	...	.....
Salt Lake	360	48	408	...	408
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	4,680	2,928	7,608	516	8,124
Ratio Wells Fargo ...	60%	40%	100%		
Ratio All Companies..	58%	36%	94%	5%	100%

The 8,124 tons so transferred were approximately 10 per cent of the total movement of 79,715 tons into and out of the City and were handled by wagon from one depot to another.

Turning again to 1918 based on an eight-day count made in September, 1918, more data is available:

TRANSFER OF EXPRESS—1918

ESTIMATED

	Tons per Year
1. Received at Southern Pacific Station from Southern Pacific trains	28,447
2. Received at Southern Pacific Station from Pacific Electric cars...	9,809
3. Transferred at Southern Pacific Station from Southern Pacific trains to Pacific Electric cars	3,490
4. Transferred at Southern Pacific Station from one Southern Pacific train to another	1,916
5. Received at Santa Fe Station from Santa Fe trains.....	17,338

6. Transferred from one Santa Fe train to another.....	1,519
7. Received at Salt Lake Station from Salt Lake trains.....	525
8. Transferred from one Salt Lake train to another.....	160
9. Forwarded from Southern Pacific Station.....	42,066
10. Forwarded from Southern Pacific Station but received from Pacific Electric	2,464
11. Forwarded from Santa Fe Station.....	13,938
12. Forwarded from Salt Lake Station.....	1,939

This data brings out the importance of the Pacific Electric in the Los Angeles express traffic and indicates the desirability and necessity of having the tracks of this road connected with the express facilities at any union passenger station.



FIG. 99. PACIFIC ELECTRIC EXPRESS CARS AT MAIN EXPRESS DEPOT

The Pacific Electric handles practically all of the express business in the Los Angeles suburban territory, and its cars run directly to the main Wells Fargo Express depot at the Southern Pacific station at Fourth Street and Central Avenue.

It will be seen that the express received at the main Wells Fargo Express depot from the Pacific Electric is 35 per cent of that brought in on Southern Pacific trains and that the Pacific Electric cars, outbound, carry to the Southern Pacific trains 6 per cent of the express carried out of the City.

The Pacific Electric also transports to and from the main Wells Fargo and Company Express station express which is not handled on Southern Pacific trains but is taken to and from the depot in wagons, either from Santa Fe or Salt Lake trains or from shippers. Our data indicates that the total extent of the Pacific Electric express business to and from the main express depot at Fourth Street and Central Avenue, is about 20,000 tons—approximately 165 per cent of the express transferred between Pacific Electric cars and Southern Pacific trains (slightly over 12,000 tons).



FIG. 100. MAIL BUILDING AT SANTA FE DEPOT

This Class C brick structure was erected in 1915 by the Santa Fe and is leased to the Federal Government.

Mail

The extent and importance of the United States mail service in Los Angeles steam road transportation was also made the subject of some study. Data were rather difficult to obtain, and complete statistics covering this class of traffic were not made available to us. We have, however, the following yearly figures based on thirty-five days weighing from March 27, 1917, to April 30, 1917:

MAIL HANDLED ON TRAINS—1917

	Tons Forwarded	Tons Received	Tons Total
Southern Pacific	8,683.89	5,709.87	14,393.76
Salt Lake	227.00	317.00	544.00
Total	8,910.89	6,026.87	14,937.76
Per day Aver.	24.	17.	41.
Ratios	59%	41%	100%

Similar statistics for the Santa Fe were not to be had, but since it has been stated by the Superintendent of Mails that from 60 to 65 per cent of the mail goes to the Southern Pacific, the total tonnage movement per day for all roads, including the Pacific, may be computed as about 65 tons forwarded and received.

REQUIREMENTS FOR UNION PASSENGER TERMINAL**General Requirements of Site**

The desirability of a location for a union passenger terminal may be determined from a set of specifications drawn up for this purpose, with requirements arranged, approximately, in the order of their importance. Others may not agree with this order, but there will without doubt be agreement that some of the requirements are of greater moment than others.

The finding of a location that satisfies the more important requirements will, therefore, be the first and most important step in the union terminal plan.

The location should be such that:

1. It is susceptible to enlargement for expected growth in the future,
2. Interurban lines may be built to the depot,
3. Approaches may be made fireproof without excessive cost,
4. No grade crossings of streets are introduced,
5. Coach yard may be near enough for economical switching and for greater capacity per station track,
6. Street congestion will not result,
7. Easy access by carlines may be had,
8. Easy access by automobiles may be had (this requires that several routes be made available.)
9. A future subway may run into the site,
10. Profile of approach can be as flat as possible and can have easy grades,
11. Station tracks can be practically level,
12. As few train miles as possible will be necessary,
13. No grade crossings of railway lines will be introduced,
14. Business, hotel and shopping districts (in the order named) will be near,
15. A through terminal may be built rather than a stub terminal,
16. There will be space for express business,
17. There will be space for mail business,
18. Mail will require a short wagon haul,
19. There will be space for hotel busses,
20. There will be space for taxicabs,
21. Passengers will not be obliged to pass through the industrial district before reaching station,
22. The cost will be consistent with the advantages (this factor is put last because its importance may vary from 100 to 10 per cent).

The depot should be such that:

1. It is adequate for present traffic,
2. It is susceptible of enlargement for the future,
3. It will not be liable to be filled with smoke,
4. Passengers, after showing tickets to gatemen, will be reasonably certain of boarding their proper trains,
5. There will be no stairways for passengers,
6. Ticket offices will be aside from the main stream of passengers,
7. There will be space for dispatchers and other necessary officers,
8. Passengers on and off trains may be kept separate,
9. There will be sufficient baggage space,
10. Baggage room will be off stream of travel but adjacent thereto,

11. Restaurant facilities will be adequate,
12. Passenger route will have minimum rise and fall,
13. The cost is not unreasonable (see 22 above).

These specifications point toward a consideration of the physical requirements, which indicate the area of the site and the proportionate length and breadth of this area. The site should also be such that the station tracks may be level, or nearly so, and that the grades of approach tracks may not be excessive.

Physical Requirements of Site

It will be necessary to have clearly before us the amount of space required. This will include the number of tracks necessary and their length, spacing, etc., the area of the waiting room and other parts of the main building, the area of baggage rooms, mail rooms and express buildings, and the requirements of a coach yard as to the number of tracks, and their length and arrangement.

The number of tracks for a passenger station yard depends, of course, upon the number of trains and the intervals at which they leave and arrive, and also upon the number of approach tracks. This latter number will vary according to the design of the station as a through or a stub terminal. The width of the station yard depends upon the spacing of the tracks and upon the arrangement of the baggage and express facilities.

We have estimated that in twenty years there will be at least 140 trains into and out of Los Angeles per day. Witness for the Southern Pacific, in the discussion of the requirements of a union station, mentioned several times that at least 120 trains should be provided for. Basing our studies on this data, we reach the conclusion that in a stub terminal 18 tracks would be sufficient provided that the throat of the yard is fast and that the coach yard and mechanical facilities are not too far away, and provided further that the throat is arranged in such a way that full use may be had of any and all of the tracks. These 18 tracks are for passenger trains only: the tracks devoted to express purposes are not included in this number. If the terminal is to be a through terminal with free use of both ends, 14 tracks will be sufficient. The number of "headend" tracks, upon which baggage, mail and express are handled, depends largely upon the shape of the site and on the location of the buildings devoted to this traffic. In addition to the 18 or 14 tracks for trains, at least 2 tracks should be provided for "headend" tracks.

We now come to the question of the necessary width of the station yard. The station tracks should, in general, be arranged in pairs, with platforms between each pair. Modern practice seems to indicate that 40 to 42 feet would be required for each pair of tracks. At the present Southern Pacific Station the spacing is $12\frac{1}{2}$ feet for the adjacent tracks and $28\frac{1}{2}$ feet between tracks where the platforms are located, or 41 feet per pair of tracks. At the Washington Union Station, where large crowds must be handled at certain times (such as the inauguration of the President) tracks are spaced 13 and 30

feet apart, or 43 feet per pair. In a plan by the American Railway Engineering Association for a typical layout for a station, 41 feet for a pair of tracks is shown, the tracks alongside one another being 13 feet apart.

We have used 41½ feet per pair of tracks in our studies for a station layout. The tracks are to be located with 12½ and 29 foot centers. We believe that this design may be easily justified by an examination of the principal modern stations in this country, with due consideration for Los Angeles conditions. Perhaps the most important local factor is the favorable climatic condition, resulting, for instance, in the absence of snow, which considerably decreases the problem of handling crowds.

Size of Site

Twenty tracks will require 415 feet net for trackage in a stub terminal; sixteen tracks in a through terminal will require 332 feet. The necessary buildings for baggage and express alongside the yard and tracks to serve these facilities will require further space. This will make a total of 500 feet required for the width of a stub terminal and 420 feet for a through station.

Since the grades on through lines of the steam railroads out of Los Angeles, coupled with the operating requirements, indicate that a passenger train of thirteen cars is about the maximum under ordinary conditions, and inasmuch as a modern car is about 70 feet long and the engine 90 feet long, it is evident that all station tracks should be 1,000 feet long in the clear. Under certain conditions, such as during troop movements, when twenty cars of 60 feet are sometimes moved in one train, it is desirable that some of the tracks should be long enough to accommodate a train of this length.

In connection with the track spacing, the method of handling the baggage and express must be considered. Unless this is handled under the train floor, some of the tracks in a stub terminal should be designed as baggage tracks, that is, single tracks with platforms on each side, the platforms on one side of the tracks to be used for unloading baggage from incoming trains, and the platforms on the other sides for unloading passengers. Thus both may be unloaded simultaneously without interference.

Good practice requires that frogs not sharper than No. 8 should be used. This is very important in determining the length necessary for the station yard. No. 9 frogs are preferable and should be used, if possible, in preference to No. 8 frogs. Good practice also indicates that no curves sharper than 10° should be used, and on the approach tracks and in the switches, curves not sharper than those which accompany a No. 8 slip switch on tangent should be installed. Station tracks should be tangent, and if curves are necessary, they should be limited to 6° where cars are to be coupled.

Without going into any of the details of building design, we will say that a station yard 500 feet wide for a stub terminal will provide sufficient frontage for a passenger station at the end of the yard without excessive depth of building.

Mail Facilities

The Postmaster's office at Los Angeles has advised that :

- a. It is highly desirable to have the sorting station at a union station. This would do away with the present sorting station in the Federal Building.
- b. The whole sorting station should preferably be on one floor.
- c. It would be preferable to have a building of such shape that one side is about twice the size of the other.
- d. Provision should be made for about 40,000 square feet for a mail building.
- e. Space should be provided for loading postal cars direct from the building.
- f. The building should be convenient to Pacific Electric tracks.
- g. About 150 feet of team front will be necessary.
- h. A Class "A" structure will be essential.
- i. It is not necessary to isolate the building.

The Postmaster's office also advised that without doubt the present post office in the Federal Building at Main and Temple Streets would be discontinued as far as the handling of mail is concerned, although, perhaps, the financial department would remain.

Express Facilities

Officials of the American Railway Express Company advise that there should be a large express building at the union passenger station. They believe that a width of 60 feet for the building is preferable, the length depending upon requirements. There should also be a covered platform on the track side, 30 feet in width. Surface trucking in their opinion will also be preferable to trucking subways and elevators, even if the distance is greater. Through head-end tracks for express cars are more desirable than stub tracks. No advice was received as to the proper area of express building, but we have estimated this at about 40,000 square feet of first floor building area. This estimate was made by the addition of 50 per cent to the present facilities, bearing in mind the conditions under which the following areas were acquired and are now used:

EXPRESS SPACE—LOS ANGELES STATIONS

Express Building, Southern Pacific	16,400 sq. ft.
" " Santa Fe	8,000 " "
" " Salt Lake	3,042 " "
Total	<u>27,442</u> " "

In addition, office space should be provided on an upper floor.

Baggage Facilities

At present there are 25,000 square feet of baggage space at the Los Angeles stations, with an additional 11,000 feet of unused second floor space at the Southern Pacific Station. This may be tabulated as follows:

BAGGAGE ROOM SPACE—LOS ANGELES STATIONS

	Used	Not Used
Southern Pacific	13,674 sq. ft.	11,487 sq. ft.
Santa Fe	7,985 " "	
Salt Lake	2,954 " "	
	<hr/>	<hr/>
	24,613 " "	11,487 " "

We have estimated that about 60 per cent increase should be provided for at a union station, or a total of approximately 40,000 square feet.

Coach Yard

A coach yard for cleaning, restocking and making light repairs to passenger coaches and Pullman cars is a part of any union passenger terminal. It is proposed to provide a union coach yard wherein the cars of all roads and Pullmans will be handled. In such a yard it is proposed that cleaning, common supplies and light repairs be pooled, subject to individual inspection. Heavy repairs would be made at the individual road's own shops. Pullman cars would be handled by their owner, the Pullman Company.

The present Los Angeles coach yards have a capacity of about 517 seventy-foot cars, with a total length of track of 10.8 miles, the car capacity being estimated for only such tracks as cars could occupy, that is, the lead tracks and fouling distances at switches are excluded in computing the car capacity.

We have concluded that a capacity of 1,000 cars is the proper size of the ultimate coach yard. For the immediate construction about 500 car capacity should be ample and our estimates are predicated on this figure.

In considering the other requirements for a coach yard, there are many other items of expense. Buildings, service piping, machinery and equipment are necessary. We have estimated new buildings and piping, but contemplate moving the present equipment, machinery and tools of the three roads to the new yard. This would include air compressors, wheel lathes, water treating plant, battery charging outfits and other similar large items of equipment and all tools. The present Pintsch gas plant at the Southern Pacific coach yard would also be moved, and if the Southern Pacific station is abandoned, the boilers and air compressor in the basement of the present station would be available. If not, there would have to be a power plant provided.

In ascertaining the area required, we have spaced each pair of service tracks at 40 foot centers, to be divided as may be thought best. To provide for the necessary number of cars, about 10 miles of track are necessary for the immediate requirements and 6 miles more for the ultimate plan, the former figure including the approaches and leads.

Engine Terminal

It does not appear essential to analyze the engine terminal situation, for, if engine terminals are provided at the new freight yards necessary under all

ultimate plans, there will be sufficient space released in a satisfactory location to care for passenger road engines. It should be noted that it will probably be desirable that light and turning repairs, cleaning, boiler washing, etc., of passenger road locomotives be pooled and handled at a common roundhouse, subject to individual inspection.

TIME REQUIRED TO REACH DIFFERENT SITES

As already developed, approximately 60 per cent of steam road passengers are using street cars to reach the depots. The actual time required, under the present routing, was ascertained by riding on the cars of the Los Angeles Railway during the hours when the largest part of this travel takes place. The results follow:

TIME REQUIRED TO REACH UNION STATION SITES BY STREET CARS

From	Minutes to		
	Plaza	Southern Pacific	Santa Fe
Fifth and Spring	6.2	4.9	11.5
Seventh and Broadway	11.5	8.5	10.0
Seventh and Figueroa	14.5	18.5	14.5

Since certain rerouting would doubtless accompany the establishment of a union passenger station, the figures above are subject to modification and should not be given too much weight. They would probably be somewhat reduced.

As perhaps from 20 to 25 per cent of the steam road passengers travel to and from the station by automobile, we have also considered the time required to go from several points to these locations. The following tabulation is based on actual test in private automobile:

TIME REQUIRED TO REACH UNION STATION SITES BY AUTOMOBILE

From	Minutes to					
	Plaza		Southern Pacific		Santa Fe	
	Operator	Fast Slow	Operator	Fast Slow	Operator	Fast Slow
Fifth and Spring	4.0	5.5	3.2	4.5	5.3	8
Seventh and Broadway	6.1	8.5	4.5	5.0	7.5	11
Seventh and Figueroa	8.8	15.0	8.2	10.0	10.2	13

This data is introduced chiefly to show that the time element is not important: the differences are very small, and since so much depends on the driver of the automobile, the variations because of distance become almost negligible. The figures for the faster driver are the average of eight trips to each station during the busy hours and those for the slower driver for two to three trips all through the day.

DISTANCE OF SITE FROM BUSINESS DISTRICT

Since the distance to the various sites from some prominent points in the business district have been made an argument for or against different plans, it seems desirable to present this information. These distances, along,

from and to the center lines of the nearest streets are as follows:

DISTANCE TO UNION STATION SITES	
From Fifth and Spring Streets:	Distance
To Southern Pacific Depot (5th and Central).....	0.689 miles
To Santa Fe Depot (2nd and Santa Fe)	1.229 "
To Plaza (Main, at Plaza)	0.894 "
To Plaza Station, Engineering Department Plan.....	0.803 "

The distance to the various depots were argued in these cases during the hearings before the Commission. We believe our figures are reliable. The routes selected are the shortest, although not necessarily the most travelled. Attention is directed to the fact that for vehicular traffic the route selected is not necessarily the shortest in point of distance. In general, that route which is most direct, which has the fewest grades and number of turns to be made and which is the most free from congestion, is the one that is most used by vehicles.

CHAPTER XI.

OUTLINE

- Site Considered Apart From Detailed Plan
- Site Suggested for Union Passenger Terminal
- Comparison of Sites
 - Southern Pacific Site
 - Advantages
 - Disadvantages
 - Santa Fe Site
 - Advantages
 - Disadvantages
 - Plaza Site
 - Advantages
 - Disadvantages

CHAPTER XI

THE SITE FOR A UNION PASSENGER TERMINAL

SITE CONSIDERED APART FROM DETAILED PLAN

With several plans proposed, several of which contemplate the same site, and with still other sites suggested, it is evident that in order to proceed logically to a plan for a union passenger station the site may be considered aside from the detailed plans. A comparison of the different general locations, irrespective of yard or other details except where such items are so intimately related that disassociation would destroy the effectiveness of the argument, will, therefore, first be made.

SITES SUGGESTED FOR UNION PASSENGER TERMINAL

There have been suggested to the Commission practically four sites for the location of a union passenger terminal, as follows:

1. Southern Pacific Arcade Site,
2. Plaza Site,
3. Santa Fe Site,
4. Washington Street Site.

Mr. D. A. Hamburger, a witness for the Business Men's Association, stated that the depot should be moved "further toward Washington Street and in the direction south rather than in the direction north" (these directions are taken from the site of the present Southern Pacific station). No exact location and no further details were mentioned, and this is all that has been said about any location south of the present Southern Pacific station.

Since a station located in the vicinity of Washington Street and anywhere east of Santa Fe Avenue is too far from the business center, this location may be dismissed without further consideration. If located between Alameda Street and Santa Fe Avenue, it is still too far from the business center. Again, if it is located west of Alameda Street, the same objections obtain. In addition, at this general location the train mileage would be so much more than at any of the other sites that we have concluded that the Washington Street site could not be considered to the extent of making detailed plans and estimates. We have decided, therefore, that it is inadvisable to pursue the study for a union passenger station at this location.

Mr. R. W. Kelly, appearing as a witness for the Brooklyn Avenue and Malabar Improvement Association, stated that a union depot should be constructed between Mission Road and North Broadway. Since these highways are approximately one mile apart, it is evident that the location is quite indefinite. Since, however, the recommendations might be construed to include locations in the vicinity of the Plaza, Mr. Kelly's suggestion will be considered in connection with other sites in that vicinity.

Four more or less detailed plans for a union passenger terminal have been presented to the Commission:

1. Hawgood Plan,
2. Barnard Plan,
3. Storrow Plan,
4. Southern Pacific-Salt Lake Plan.

The first three of these plans propose a union station in the vicinity of the Plaza.

The Hawgood and the Storrow Plans were presented by witnesses for the Central Development Association.

The Barnard Plan was presented by the Business Stability Association.

The Santa Fe site was also suggested, but no plans or estimates were presented and the adoption of this site was not supported by argument or evidence. The suggestion for this site was made by Mr. E. W. Camp, General Counsel for the Santa Fe Coast Lines in a general statement to the Commission during the hearings in this proceeding (trans. p. 1080):

“Mr. Camp: Now I may as well, if I may, having been asked several times what the Santa Fe’s position in all this is, I may say a little further, the Santa Fe recognizes the truth of what Mr. Workman has said, that the important thing before this Commission is the separation of grades in Los Angeles. The other thing is not of comparatively any importance whatsoever.”

“Now, as far as the Santa Fe is concerned, with reference to the proposed Southern Pacific-Salt Lake electric station, it has been suggested that the Santa Fe get in. Well, it might. I suppose, if the gods so ordered, there is no particular reason why the Santa Fe should not get in there. If we need a depot and new facilities, where we are we have more ground right where we are, more ground available for passenger tracks, than the whole space devoted to—proposed to be devoted to the passenger tracks of the union terminal. We have got plenty of space there, and there is no reason to go anywhere else. As a matter of fact, we have more ground available for a union terminal right there than is proposed to be used by the union terminal here.

“Commissioner Thelen: Do I understand you, Mr. Camp, to mean that the Santa Fe invites these other carriers to join in a union terminal there?

“Mr. Camp: Oh, we would be perfectly willing. I am not making any invitation, but if your engineers thought that was the best location right down there by the river, without blocking any street, for the union terminal, there would be no difficulty in arranging it with the Santa Fe.

“Commissioner Thelen: That is specifically why I asked the question.”

The Southern Pacific-Salt Lake Plan was presented by these roads, which, together with the Pacific Electric Railway, a subsidiary of the Southern Pacific, have formulated a larger plan of concentrating their terminal facilities in the district (roughly) along Alameda Street between Fourth and Eighth Street. This larger plan is evidenced by the location of the Los Angeles Union Terminal Company (or wholesale produce market) partly on Pacific Electric property along Central Avenue between

Seventh and Eighth Streets and by the location of the proposed Salt Lake freight terminal (land for which is already purchased) on Alameda Street near Eighth Street. It is also evidenced by the Southern Pacific-Salt Lake-Pacific Electric project for the use of the Southern Pacific depot for the two steam roads and for the joint use of lands and joint construction of approaches with the Pacific Electric.

We have really, then, but three locations:

1. The Southern Pacific Site,
2. The Santa Fe Site, and
3. The Plaza Site,

which we feel justify a detailed analysis and study. These will be taken up in order and their principal advantages and disadvantages will be compared with the idea of selecting the most favorable. Later, if for such sites detailed plans for their development may have been presented, these plans will be analyzed.

In the discussion of various sites and plans, criticism of unimportant details which may be satisfactorily altered and improved will be avoided, and only matters of comparative importance will be dealt with.

COMPARISON OF SITES

Southern Pacific Site

The following discussion of this site is predicated upon its use with an approach by means of an elevated structure extending from Sixth and Alameda Streets just south of Sixth Street to and across the Los Angeles River, thence turning both north and south and coming to grade on the Salt Lake right of way near Fourth and Ninth Streets, respectively.

This elevated structure includes depression of the intersection of Sixth and Alameda Streets by 5 feet and the construction of a vehicular subway under the proposed elevated tracks. This is more clearly brought out in Fig. 118 on page 333.

The Southern Pacific site is bounded by Central Avenue, Alameda Street, Fourth Street and Sixth Street. At the present time, however, not all of this property is in railroad ownership, the frontage along Central Avenue near Sixth Street and one or two lots along Central Avenue but near Fourth Street, being in private ownership.

A further adjunct to this plan contemplates the use of the present Salt Lake freight yard on the east side of the river for a coach yard whenever necessary. For the present it is proposed to continue to use the Southern Pacific coach yard located along Alameda Street just south of Seventh Street, the Salt Lake passenger equipment to be handled along with Southern Pacific equipment.

No plans have been submitted showing how it is proposed to bring the Santa Fe into this station except for the statement that it would join the Southern Pacific tracks at Humboldt Avenue on the east bank of the river.

It may be added, however, that this appears practicable and also that it is feasible to bring the Santa Fe trains from the south into the station by using the Salt Lake tracks from Hobart to the station.

Advantages

The principal advantages of the site of the present Southern Pacific station for a union terminal are these:

1. It is possible to provide a union L. C. L. freight station at the Santa Fe site, which is the best site available for this purpose.
2. It is possible to segregate passengers and freight on different sides of the river.
3. It is convenient to business, hotel and shopping districts.
4. Use is made of present facilities, cost of which is already paid.
5. Elimination of all grade crossings on Seventh, San Pedro and Aliso Streets for through Pacific Electric trains is provided for.
6. Pacific Electric traffic south of Los Angeles is given access to the union station.
7. Loss of property values is small, if there is any.
8. Passengers are not obliged to pass through industrial district but are carried over it.

The Southern Pacific site has a number of advantages, of which possibly the most important is the fact that it makes use of existing facilities whose cost is already paid for. The station facilities, including the building, trackage, subways, umbrella sheds and minor structures cost approximately \$593,000. The cost to the Southern Pacific of the land used (14.85 acres) was approximately \$347,298. This figure represents the cost of the land purchased (2.59 acres) and the land acquired free through ordinance (0.23 acres).

Practically all of the site (12.03 acres) was donated to the Southern Pacific by gift deed about the year 1889. This deed carried the proviso that if the site were not used for a passenger station, the land would revert to the grantor or his heirs. The deed also provided that a restaurant must be maintained. The value of the land, however, is quite another matter. Our estimate of the present market value of the land is approximately \$1,310,348 and of all Southern Pacific holdings in this block, \$2,101,128

Following is a **valuation** of the Arcade Station facilities:

VALUATION—ARCADE STATION FACILITIES

Land—Present Market Value—

	Acres	
Southern Pacific		
Wolfskill deed portion	12.03	\$1,310,348
Purchased portions	2.59	720,780
Acquired through ordinance	0.23	70,000
	14.85	\$2,101,128
Wells Fargo and Company .....	.23	70,000
	15.08	\$2,171,128
Total		

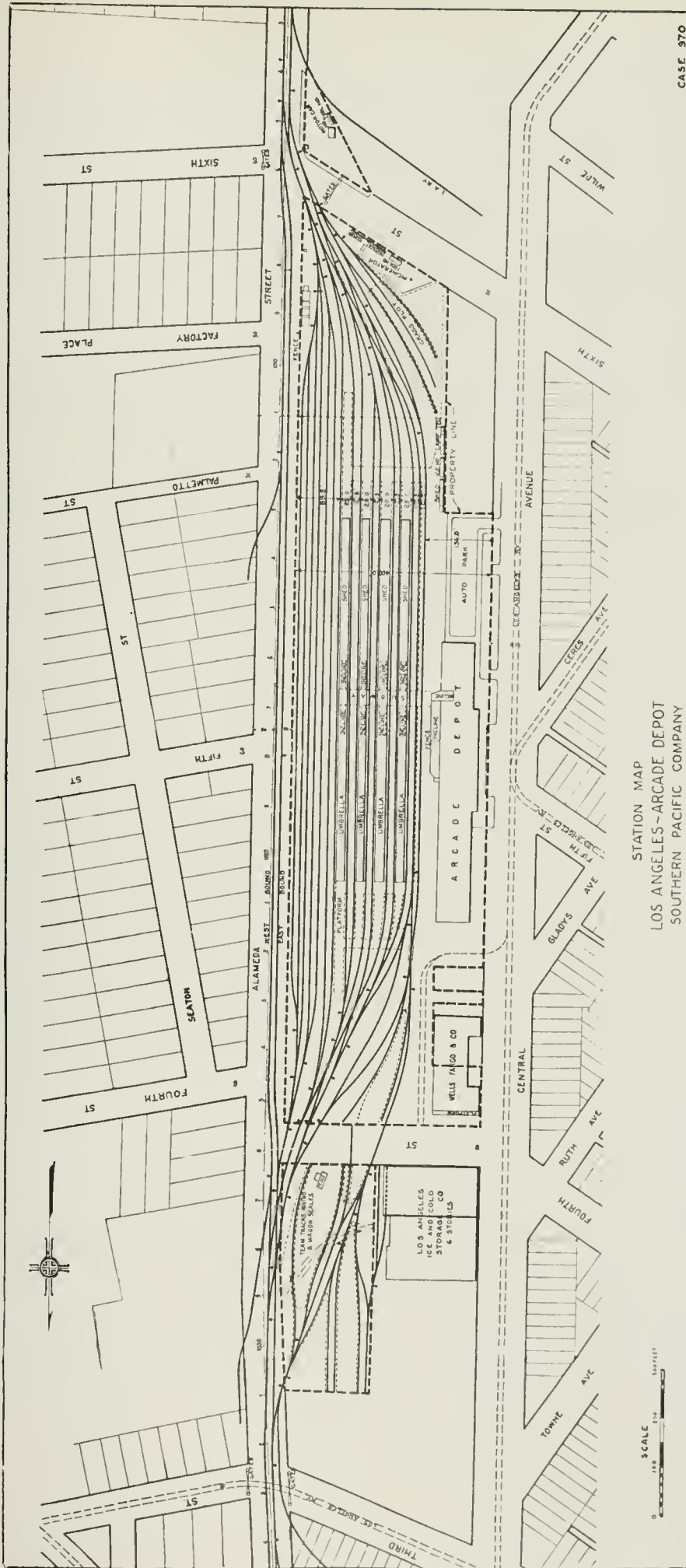


FIG. 101. MAP SHOWING SOUTHERN PACIFIC STATION GROUNDS AND TRACKAGE

This shows the present arrangement at the "Arcade Depot" site, with grade crossings at Third, Fourth and Sixth Streets and with Fifth Street closed.

California Railroad Commission Engineering Dept. (Drawn from map furnished by Southern Pacific Co.)

Facilities—Approximate Cost—		
Southern Pacific	693,000	
Wells Fargo and Company.....	45,000	738,000
Total		<u>\$2,909,128</u>

The cost of the land was very much less, being \$347,298 for Southern Pacific lands and \$83,550 for Wells Fargo and Company Express lands, a total of \$430,848. This is \$1,740,280 less than the estimated present market value.

Probably the next most important advantage in the use of this site lies in the complete segregation of passenger and freight movements in the industrial district. This is of particular importance when it is considered that the passenger trains are diverted to the east bank of the river, leaving the west bank free to act as a main lead or stem from which the industrial tracks may branch off, and on which freight traffic and switching may be carried on without any disturbance whatever by passenger train movements of any kind.

The use of the Southern Pacific site as a union passenger station makes it possible to locate the union less than-carload freight station on a very suitable site—the present Santa Fe freight yard site.

Including with this plan the project of the Pacific Electric to do away with surface operation on San Pedro and Aliso Streets, it is possible to eliminate 23,000 grade crossing movements per day. This number was found by taking the number of trains per day multiplied by the number of streets crossed. Bringing the Pacific Electric trains from points south of the city over elevated tracks from Seventh and Alameda Streets would eliminate the interurban car movement on San Pedro Street. These amount to approximately 425 per day. The total reduction of grade crossing movements would, then, be equal to 4,250 per day.

Since very little additional new land is necessary (1.14 acres, estimated to cost \$569,994) and since two of the steam roads in Los Angeles are in favor of a union station at this site, it would be possible to effect the consummation of the Southern Pacific-Salt Lake plan with little or no litigation.

The elevated approach makes it possible to bring all steam road passengers across the industrial district instead of through it, the station being approximately on the western edge of the district.

There would be very little disturbance of property values if the Southern Pacific site were continued in use for a passenger station since the property values are now built up on the basis of this facility in this location.

The Southern Pacific station is easy of access to the hotel, shopping and business districts, both to the retail and the wholesale districts. At present it is served by both the Los Angeles Railway and the Pacific Electric Railway cross-town lines: the passengers board either of these lines and

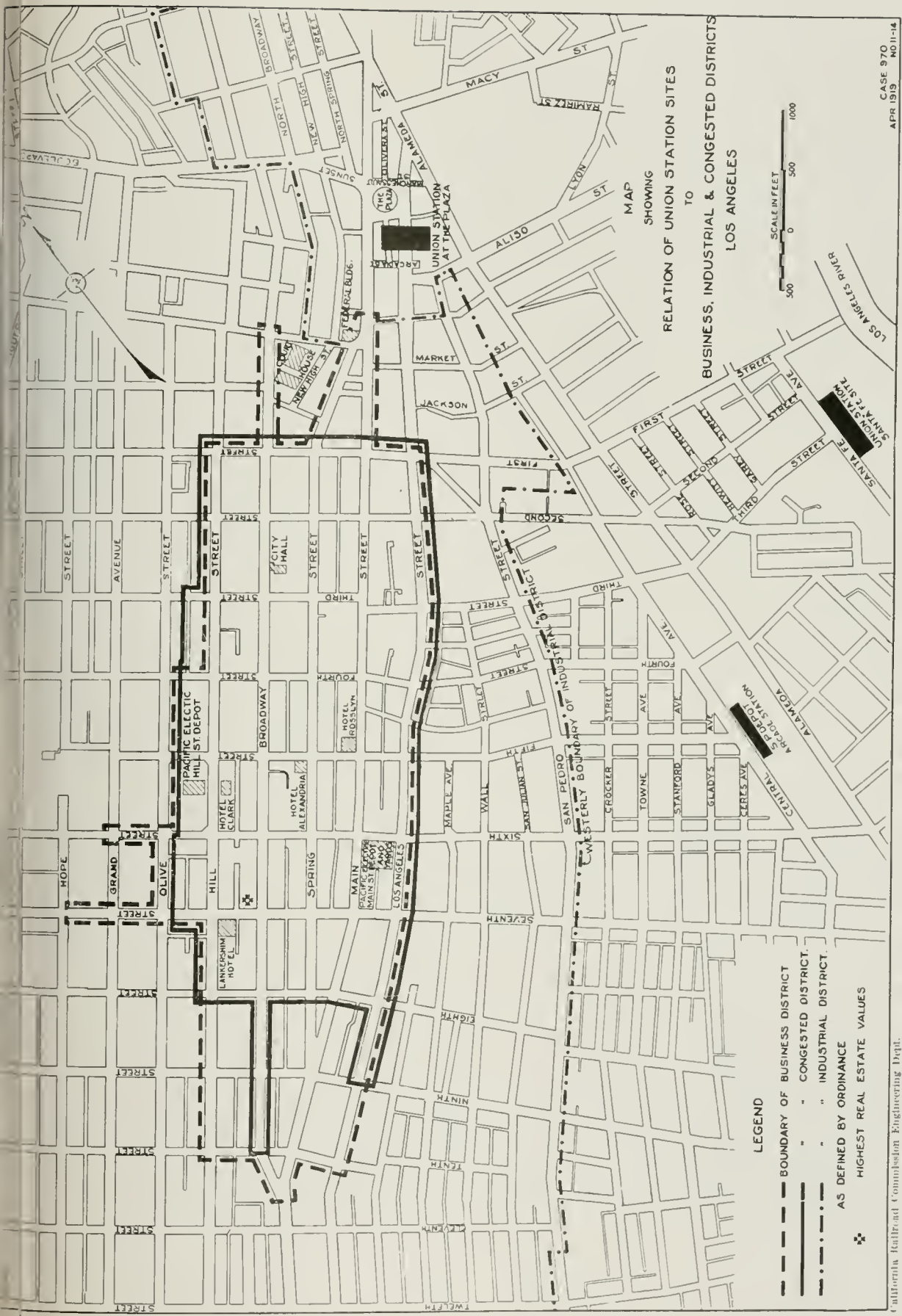


FIG. 102. MAP SHOWING RELATION OF UNION STATION SITES TO BUSINESS AND INDUSTRIAL DISTRICTS

Observe that the Business District as defined by city ordinance is long and comparatively narrow. The Congested District, pertaining chiefly to traffic regulations, is perhaps the best index of the central area. The present business center is at about Fifth and Spring Streets and the highest real estate values at Seventh and Broadway. The Plaza Site is near the end of the principal streets of the Business District and probable rapid transit routes, while the Southern Pacific site is slightly nearer the business center. The Santa Fe site is not as well situated as either of the other two and is in the heart of the industrial district.

California Railroad Commission Engineering Dept.

are carried across the city from east to west and can reach their destinations with usually not more than one transfer.

The location compares not unfavorably with other locations when viewed from the aesthetic standpoint. The station is at the end of one of the main streets, and while there is no plaza or park providing a setting for the building, the construction of such a plaza is not impossible. The buildings in this vicinity present, perhaps, a little better appearance than those in the vicinity of either the Santa Fe or the Plaza sites.

Disadvantages

The principal disadvantages of the present Southern Pacific site are these:

1. The site is not large enough for an adequate and permanent union station such as, in our opinion, is appropriate for the City of Los Angeles. Not only does it appear that the site may be too narrow for the required number of station tracks, but there seems to be insufficient room for proper mail and express facilities and also for baggage.
2. The site cannot be made larger without closing or deflecting Alameda Street and closing or moving Fourth Street or Sixth Street.
3. The plan as proposed introduces an awkward situation at Sixth and Alameda Streets—a perpetual disadvantage which the City could not look upon with favor.
4. The project would include a four-track elevated approach and curved bridges over the Los Angeles River—expensive to build and expensive to maintain. The fire risk of approaches built through a district in which frame construction predominates, would be large unless the approaches are made fireproof, which would be expensive.
5. The project would involve the crossing of important thoroughfares. It would virtually close Fourth Street, actually close Fifth Street and depress Sixth Street.
6. The station would either be a stub terminal or would perpetuate a busy grade crossing at Fourth Street. This might be obviated by an expensive subway for Fourth Street.
7. The location would require more train mileage to station, coach yards and shops than other sites. The continued use of the present Southern Pacific coach yard would be impossible.
8. Little land would be released from railroad use.
9. The site acts as a dam between parts of the retail and the industrial districts.
10. The curvature and grades of the station approach and ladder tracks present a distinct operating disadvantage.
11. The site is not well situated with reference to future rapid transit lines, since it is 1000 feet distant from the proposed elevated near Sixth Street.

The most important question of the Southern Pacific site as the location for a union station refers to the adequacy of space available. A witness for the Southern Pacific stated (trans. p. 592) that the Southern Pacific plan contemplates "improvement or enlargement of facilities in the future to take care of all possible needs of this community," and that "the business that would come into this town 'on the present three transcontinental lines' can

be adequately served on the property and trackage that it is possible to provide in that depot location of the Southern Pacific." This statement must be given consideration and weight in view of the fact that it was made by a responsible official of the principal railroad involved.

The maximum number of train tracks that can be built at the Southern Pacific station is twelve. It is impossible to increase this number except by encroaching on Central Avenue or Alameda Street, or, as suggested by a witness for the Southern Pacific, by establishing other tracks on the east side of Alameda Street, to be reached by means of a tunnel under this street from the present station. We have already said that at the end of twenty years 140 trains per day might be expected, basing this statement on a study of increases in the past. Twelve tracks, with proper approach tracks, will, in our opinion, handle this number of trains, although eighteen would be preferable.

The site may be criticised as being too small for adequate baggage, mail and express facilities. It may be possible to increase the size of the present baggage room and to construct buildings of adequate size for the needs of the post office and express business. It does not, however, seem possible to locate these three facilities, with their trackage, so that mail, baggage and express can be handled economically at grade. This objection may be overcome by a change in the plan; it may be possible to have the station tracks elevated and the baggage, mail and express buildings and accessories located at the present grade.

While the next argument against the Southern Pacific site is apparently one of the more or less distant future, it is, nevertheless, of very great importance. It has been contended that the site is not susceptible to subway connections running north and south through the business district and that such an important artery of traffic should pass near enough the union station of the steam roads to enable passengers to transfer from one road to the other. The elimination of local traffic on the steam roads makes, and will make, the possibility of such a transfer very desirable for the convenience of the public. This statement is predicated on the assumption that the first, and probably most important, subway will be built in a northerly and southerly direction somewhere between Main and Hill Streets.

It is also argued that the money spent by the Pacific Electric for its part of the plan would be thrown away. To a certain extent this is true for that part of the line crossing the river. Although there is considerable saving in the first cost of an elevated as compared with a subway, it should be borne in mind that the subway in Main Street will doubtless soon become a necessity in any event, since it would effect a system of distribution lengthwise of the business district, instead of at right angles to it. The Main Street route also has the advantage of being 0.8 of a mile shorter. This subway

should be large enough to handle any equipment. In Boston, the mistake was made of making the first subway too small.

The direct effect of building the elevated line across the river would be to delay the construction of the subway by partially filling the need for one.

The establishment of a union station at the Southern Pacific site virtually closes Fourth Street, actually closes Fifth Street and introduces a subway in Sixth Street. This has the effect of making the site a dam between the business district and part of the industrial district. Such a condition has been found very detrimental in other cities and should be avoided.

It will not be possible to release any land from transportation purposes except the Southern Pacific coach yard. Instead, as time goes on and it becomes necessary to enlarge the station, it will be necessary to acquire more land. We believe it will be to the best interest of the public and of the railroads to hold as little land as possible for transportation purposes.

The train mileage at this site is high as compared with the mileage at other locations, not only for passenger trains but for light passenger engines and passenger equipment switching. The cost of operation of passenger trains (including coach yard and light engine movements) if based on mileage alone, would amount to about \$14,600 a year more than at the Santa Fe site, and \$81,000 more than at the Plaza site. Both these figures are based on the number of trains in 1917 and should be increased up to 40 per cent for the future. These figures do not take into consideration the fact that the elevated approach would be particularly expensive to maintain, the costs per train mile used not including this additional cost.

The best alignment and grades that can be obtained on the necessary curved and sloping approach at Sixth and Alameda Streets are too severe for approved operating conditions. A 10° curve is the maximum possible curve, and with proper compensation therefor (to allow for curve resistance), the whole approach must be on a 1 per cent grade. This includes the throat of the yard and all tracks south of the umbrella sheds.

This curvature and steep grade are a distinct operating disadvantage. Operation on such approach tracks is possible but is far less favorable than on level and straight approaches.

The Santa Fe Site

The present site of the Santa Fe station and freight yards on the west bank of the river between First and Sixth Streets also appeared to offer a suitable location for a union passenger terminal, and we have made studies to show what is possible in this location. As noted before, this location was not suggested to the Commission at any of the hearings in these consolidated cases, except that the General Counsel of the Santa Fe stated that his road had a large tract of land which was not cut by streets and which was suitable for a union station.

Before listing the advantages and disadvantages of this site, it is necessary to give some description of what it is proposed to do: It is possible to construct a through terminal at this point with the station along Santa Fe Avenue and centering on Third Street. As a part of this plan, the Pacific Electric can be brought from the Main Street depot to the Los Angeles River in the same manner as outlined for the Southern Pacific-Salt Lake scheme. Instead of crossing the river, however, it is proposed to descend to grade, continue north along the edge of the station, rise south of Aliso Street and cross over the river and the tracks on the east bank. The local line now on Aliso Street would be retained for street car service, joining the high-speed line on Aliso Street at the east side of the river. A continuation of the local lines on Sixth Street from Ceres Avenue to Mateo Street and the construction of a three-rail track on Mateo Street to the station is also contemplated.

With this plan, it is proposed to construct trackage along the east bank of the river between the Southern Pacific tracks, along San Fernando Road to Humboldt Street, and to use the east bank of the river for freight service. The coach yard would be established at the present site of the Santa Fe shop yards. The present freight yard, which would be displaced, would be re-located at Hobart, a tract of 100 acres for this purpose having already been acquired by the Santa Fe.

Advantages

The principal advantages of the Santa Fe site may be listed as follows:

1. Adequate space is provided for station tracks.
2. Economical operation is possible.
3. Connection to Pacific Electric lines to the east is possible. These are lines of heaviest traffic.
4. There is less train mileage than at the Southern Pacific site.
5. No grade crossings of railroads are introduced.
6. No changes in streets are necessary.
7. A through terminal is provided.
8. Least expense for viaducts and trackage is required.
9. Least new capital is required.
10. Loss of property values is small.
11. Least amount of land is required for railroad purposes.
12. Lands now held for railroad use could be released.
13. Open door is made for future roads entering Los Angeles.
14. Passenger train operation on Alameda Street would be eliminated.
15. Railroads would be confined to natural channel, the banks of the Los Angeles River.
16. This station site would automatically do away with all passenger operation on Alameda Street.

A union station at the Santa Fe site would be economical to operate on account of the fact that a through terminal could be established, which would make it possible to provide only a relatively small number of tracks for the regular traffic and still to handle abnormal traffic such as that of

exposition years. With this trackage arrangement and with an adequate number of approach tracks, temporarily heavy traffic could be handled by additional switch engines. This plan, then, necessitates less maintenance expense because of the fewer tracks, and less operating expense because of the fewer switch engines required to handle the switching.

There is adequate room at the Santa Fe site to provide baggage, mail and express facilities designed for the most convenient and most economical operation. It is possible to construct a mail building of the area and in the shape that is considered most desirable; and it is also possible to establish an express station of a long and narrow shape which is best suited for the express business and which at most points cannot be done. Adequate head-end trackage is possible.

All of the project is on the ground, as far as the steam roads are concerned. The approaches are on good grades with little or no curvature and with maintenance less than for elevated structures. No streets are crossed at grade by main line tracks.

A factor of considerable importance is the number of train miles at this location, which would be considerably less than at the Southern Pacific Station. This item, for 140 passenger trains per day, amounts to \$20,000 per annum saving in operating expenses. This is an advantage for this site over the Southern Pacific site in this regard, other things being equal.

Being located along the river, this site would require small expense for viaducts and trackage as no viaducts would be necessary except those across the river. These viaducts are really part of the cost of depressing the tracks and raising the streets and of eliminating grades along the river and would occur with any plan.

There are practically no approach tracks leading from the trunk lines along the river to the station yard. The length of approach tracks is a minimum, therefore, at this site.

Disadvantages

The chief disadvantages of the Santa Fe site are these:

1. The combination of freight switching with passenger station would introduce serious operating disadvantages.
2. The establishment of a union less than carload freight station would be impracticable.
3. The location is rather poor from an aesthetic standpoint.
4. The location is difficult of access on account of the few and narrow streets through the industrial district and crossed by spur tracks.
5. The Santa Fe freight yard would have to be moved at once.
6. The site is not well located with reference to future rapid transit lines. The proposed Pacific Electric express route is 0.8 miles longer from Aliso Street at the river to the Sixth Street station than the proposed subway route in Main Street, which accompanies the Plaza plan.
7. The site is further from retail business, shopping and hotel districts.

Perhaps the most serious objection to the Santa Fe site arises from a combination of freight and passenger business along the west bank of the

river. There is no doubt that the west bank should be the location of the main switching leads for the transport of freight cars to and from industry tracks (at present there are 140 of these tracks), these industry tracks to branch off the main leads and to run east and west between the important east and west streets. Between Alameda Street and the river the streets in these directions are, in general, more important than the north and south streets. Since spur tracks must cross streets at grade, the lesser evil is to cross the north and south streets.

The switching now so handled is to be increased by feeding Alameda Street from several points. With future growth, these main tracks along the river will, therefore, be a very important factor in the freight situation. To add to this the effect of traffic created by a union passenger station, with the train, light engine and coach equipment movements, would be to create a situation bound to breed interference, delays and expense. Since passenger trains must not be delayed, the freight trains will be delayed although the latter traffic is, in fact, the more important. This is not only because a few minutes of time lost a great many times a year becomes of much value, but also because there is necessity of additional switch engines to handle the traffic in a satisfactory manner. This interference would occur especially in the vicinity of the station, where switching leads would have to cross important main line passenger tracks.

Another important objection is the fact that the site is inconvenient in regard to routes for suburban rapid transit lines. This is true especially if it is conceded—as we think it must be—that the future of Los Angeles rapid transit lies in a subway system, with the principal north and south subway constructed between Main and Hill Streets and the principal east and west subway east of Main Street constructed between Sixth and Seventh Streets.

This system would make through routing and district stops possible—something which has been found very desirable for suburban transportation in all large cities.

The fact that a large portion of the Pacific Electric traffic is not suburban traffic should not be lost sight of, however. Suburban business is usually confined to a zone in which the length of the longest trip does not exceed one hour, which corresponds to a distance of approximately 20 to 25 miles from the business district. The Pacific Electric business outside of this suburban zone would, in all probability, be better handled at a terminal station such as the present station at Sixth and Main Streets, where the cars stop and unload all passengers at one point. With this in view, the arrangement proposed for the Pacific Electric is not so bad as it would be if all the Pacific Electric traffic were strictly suburban.

The Santa Fe site is far from the retail shopping and hotel districts. This is a disadvantage in two ways: first, the passenger requires more time to reach the station, and second, the cost of hauling the express matter is

somewhat greater. Here we may call attention to the fact that the new terminal in Kansas City, constructed at a cost of some \$40,000,000, is not located close to the business district. The St. Louis union terminal, also, is not so located. In fact, these large stations, built after the business district of the city was fairly well established, have usually been built for competitive and advertising reasons. The most conspicuous example is the Pennsylvania station in New York.

The question of convenience to the public is, after all, only relative. It must be borne in mind that it may be a mistake to locate a station at a point convenient for the users of the steam railroads if, at the same time, the far greater number of those who do not use the station find this location inconvenient by reason of traffic congestion, grade crossings or lack of street car transportation.

At present the Santa Fe site is somewhat difficult of access on account of the comparatively few streets that lead to it directly: First, Second, Third and Fourth Streets are the only east and west streets to reach this site. Second Street is narrow, but First, Third and Fourth Streets are as wide as practically any of the streets in the business district.

If this site were adopted and the Southern Pacific site were released from transportation purposes, it would be possible to cut Fifth Street through and thus provide another route to the station. Hewitt Street could also be cut through to Alameda Street. These streets leading to the station are crossed at many points by industry spurs, introducing a source of delay and some danger to the travel to and from the station.

The site makes no particular appeal when considered from the aesthetic standpoint, since it does not appear possible to obtain a very imposing setting for such a large station building as would be necessary. Moreover, the location does not harmonize with the general principle that passengers should not be obliged to pass through the industrial district in going to and from the station. This is a matter not so much of time as of the impression on the traveler, which is of particular importance in Los Angeles because of the extremely large number of tourists visiting the city.

Under this plan it does not appear possible to segregate through passenger and freight lines to the two banks of the Los Angeles River. In the Southern Pacific plan, through freight and passenger business is diverted to the east bank and the west bank is reserved and left free for a trunk line serving freight stations, team tracks and industry tracks. With the passenger station at the Santa Fe site, it is still possible to divert all through freight to the east bank, although the west bank would have to accommodate the trunk freight line to serve the Santa Fe freight station and industry tracks as well as provide a location for all through passenger lines.

The establishment of a station at this site would necessitate the moving of the Santa Fe freight yard. This road has already purchased a tract, 100

acres in extent, just east of Hobart Junction, where the Santa Fe and Salt Lake cross.

The disadvantage of having to move the freight yard lies in the fact that the new money for the construction of the new yard would somehow have to be provided. It should be noted, however, that it is considered necessary to move this yard at some time in the near future, as evidenced by the purchase of the land.

The establishment of a union passenger station at the Santa Fe site would necessitate the abandonment of the present Southern Pacific facilities, not only the station and trackage but also the coach yard. But it should here be noted that the Southern Pacific plan also contemplates the ultimate abandonment of its present coach yard along Alameda Street just south of Seventh Street.

In justice to this and other sites, it should be said that we have not estimated the cost of establishing a plaza or park for this station. In order to make the estimates really comparable, therefore, the figure for the cost of facilities at this point would have to be increased by the amount of the cost for the proper setting for the station. The reason that the plaza is not included in this plan is found in the underlying idea that in our opinion a union passenger station at the Santa Fe site can be considered from a utilitarian point of view only, and is, therefore, less expensive than a more aesthetic terminal embodying the conception of the monumental gateway to the city.

We have thought it desirable and necessary to prepare detailed plans showing the possibilities of this location and to make estimates of the cost of a union station at this point. These will be considered later and will be compared with similar plans and estimates for the other sites.

The Plaza Site

This site differs from the Santa Fe and Southern Pacific sites in that it includes virtually no railroad property. Because the project would be entirely new, several plans have been presented for this point, differing in the location of the station and in the connections between the station yard and the main line tracks near the river. The advantages and disadvantages of the various plans are taken up later, the present discussion being confined to the general location.

Advantages

These are the chief advantages of the Plaza Site:

1. A union freight station is possible at the best site (the Santa Fe site).
2. The site is at the converging point of many streets and is near the end of the principal business streets of Los Angeles.
3. The site is near the present Pacific Electric lines to the east.
4. The site is near a point which will probably be the northerly end of the first subway to be built in Los Angeles. This subway would be the best means of serving commuters as it would distribute passengers through the business district instead of unloading them at one depot from which they would be obliged to walk or take a street car.

5. This station site would automatically do away with all passenger operation on Alameda Street.
6. Less train mileage is required.
7. This site would distribute the maximum number of passengers without a transfer.
8. The site is convenient to coach yards and shop yards.
9. The entire project is on the ground.
10. An open door for future roads entering Los Angeles is provided.
11. The elimination of grade crossings may be economically effected.
12. It is convenient to establish locomotive service and repair facilities.
13. It would tend to stabilize values in the down-town district.

Probably the most important argument in favor of the Plaza site is the fact that it is adjacent to the future north and south subway. As stated before, we believe that it will be conceded that a union passenger station should be located near the principal rapid transit lines. We also believe that such a subway would lie between Main and Hill Streets on account of the topography of this part of the city and that it would pass under Main Street directly west of the Plaza.

With the growing tendency to electrify the local steam lines, the importance of having the union passenger station near the electric lines will be considerably increased.

The Plaza, as has been stated many times, is the diverging point of many important streets: Sunset Boulevard, which carries very large vehicular traffic (as shown in Fig. 103 on page 300) to and from Hollywood; North Broadway, which carries an equally heavy volume of traffic between Los Angeles and Pasadena; Macy Street, which is used as the entrance of the Valley Boulevard to the city; Los Angeles Street, which carries a large automobile traffic to and from the business district, since it has no car line; and Alameda Street, which is the main artery of the industrial district. All these streets converge at this point, making it possible to reach this location without having to pass through the business district or through the industrial district and thus avoiding the congestion in those districts.

The street car service is heavier at the Plaza than anywhere else in the city, and more lines reach this location than at any other point.

It is true that the establishment of a union passenger terminal at this point would improve property values in the vicinity, which are now run down. This improvement would be of advantage to the city on account of the taxes and the increase in its income. This increase, however, would not be offset by an appreciable impairment of established values elsewhere, and it is quite certain that the gain would far outweigh the impairment.

One of the principal advantages of this site lies in its convenience. It is convenient for the public and convenient for the railroads. It is near to all of the railroad entrances to Los Angeles, northern and eastern, which are used by 60 per cent of the trains and fully 70 per cent of the passengers.

This particular site, as shown on some of the plans, appears to be very desirable from an architectural and civic point of view on account of the fact that a monumental station of imposing appearance and fronted by an attractive plaza can be constructed. This plaza would be of use in acting as a large "traffic button" serving to segregate into streams and keep clear from congestion the very large vehicular traffic which passes this vicinity. It would also enable one to gain a view of the whole front of the structure—something that would be impossible if the view of the station is limited to the width of a street in front of it.

A station yard at this location will be made of sufficient size to take care of the steam road business for 20 or 30 years to come, beyond which time it is probably unwise to plan.

Under some of the particular plans for a station at this site, it is possible to make use of the present Southern Pacific main freight yard as a coach yard. This is very desirable for the reason that in the broader plan including the treatment of the freight problem it is proposed to establish the Southern Pacific freight yard along the San Fernando Road. This would result in throwing the present yard into the status of carrier land owned but not necessary for operative purposes. The present main freight yard, while very desirable as railroad land because of its large size uncut by streets, would not be particularly desirable for any other purpose because it would have frontage on but one street—North Spring—and would not have access to North Broadway since that street is so much higher than the general level of the yard that it would not be possible to reach the one from the other.

There is some sentimental value attached to the Plaza site: The Plaza is the center of the original boundary of the City of Los Angeles, and the fact that the railroad gateway would be located at this point appeals to many people and seems particularly appropriate.

Under the plans, the entire project is on the ground and requires no elevated or depressed approaches. The train mileage is a minimum with a station at the Plaza. This applies not only to passenger trains but also to passenger equipment switching movements, and is a source of saving which occurs every year. Like the Southern Pacific and Santa Fe sites, all plans at this site would do away with all passenger train operation on Alameda Street.

Disadvantages

1. The cost would be large.
2. It is not probable that passenger and freight traffic could be segregated to the different sides of the river.
3. Two more viaducts than at the Santa Fe site are required.
4. Until subway is built, there is no benefit to present commutation service of Pacific Electric.
5. Pacific Electric passengers from the south must transfer.
6. This site has heretofore been opposed by the railroads. Litigation might delay consummation.

7. This would be a stub-end depot.
8. Several streets would have to be crossed on separated grades.
9. Considerable "new money"—\$10,000,000 would be required.

The most important argument against the union passenger station near the Plaza site is the cost. This is due to the fact that practically all land would have to be acquired from private owners, necessitating the expenditure of approximately \$3,500,000 more than the amount necessary for a station at either the Santa Fe or the Southern Pacific sites. The question of whether this is worth while or not is not entirely an engineering matter but depends more on public policy and city planning, including, perhaps, the idea of a civic center in Los Angeles. This feature is also largely influenced by the future of the railroads, that is, whether they are to return to private control, are to be purchased by the Government or are to be operated on some plan intermediate between these two extremes. If the Federal Government could purchase the roads, we would have no hesitancy in stating that the cost would be well worth while under the circumstances, and there would be no doubt that the Southern Pacific site would be salvaged and would go a long way toward paying for the cost of a new station. Unification of the Los Angeles district as a whole would take place, freight as well as passenger business being consolidated and a union freight station being established. There would then be no real excuse for the retention of the Southern Pacific site for railroad purposes.

If the roads return to their private owners, the cost assumes a more important aspect since in that case the burden would be placed upon particular carriers instead of upon the railroads as a whole. The providing of the necessary new money is still more difficult.

This location has been criticised as a plan of private interests to gain through real estate operations. It goes without saying that arguments of this sort carry no weight in this report.

With the station at this site, it is not probable that passenger and freight traffic could be segregated on the different sides of the Los Angeles River. This is the same situation as obtains with the Santa Fe and is a disadvantage as compared with the Southern Pacific site. This site requires more street viaducts than the Santa Fe site but this disadvantage is reflected in the cost of establishing the station and in that way has already been considered.

Until a rapid transit subway is built, a station at this site is of no benefit to present commutation service on the Pacific Electric lines since this road would continue to use the same route as at present. This site offers no particular advantages to the Pacific Electric passengers from the south, who would probably be forced to transfer under any plan.

The location is rather distant from what will probably be the shopping district on Seventh and Eighth Streets, west of Broadway. Thus it would require a rather long trip through the business district. This we consider a minor disadvantage, however, since as a rule steam road passengers do

not wish to reach this district immediately on arriving in the city. It is somewhat doubtful whether the establishment of a station would cause congestion of heavy vehicular traffic now passing the Plaza. This traffic, while heavy, does not congest because the streets are wide, free from cars, and relatively high speeds can be maintained on account of the absence of necessary stops.

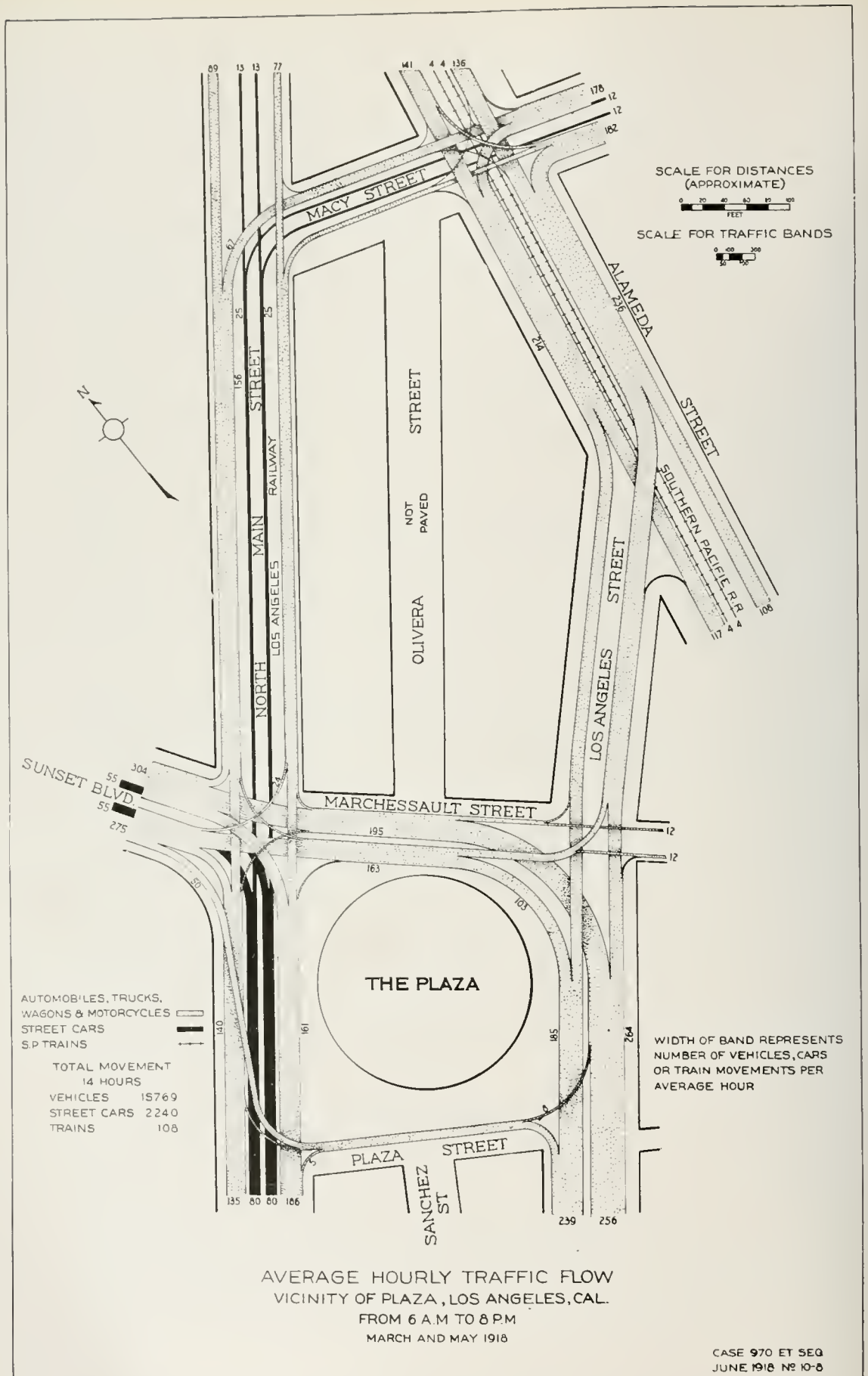
While it is of advantage to place the station at the neck of the bottle, it should not be forgotten that the neck must be large enough to pass the contents quickly, lest congestion result. Only careful planning can prevent this congestion.

This plan also requires the abandonment of the present Southern Pacific facilities. With regard to this, it should be noted that there is a difference of opinion as to the legal question whether the present Southern Pacific site could be sold and the money thus received placed as credit to the plan, or whether the site would revert to the grantor under the terms of the deed by virtue of which the Southern Pacific now controls the property.

The Plaza site offers so many advantages that we have decided to consider all of the detailed plans presented to the Commission for a union passenger terminal in this general location, analyzing them with respect to the desirable and undesirable features. This will be taken up later in another chapter.

It should be noted that the Barnard Plan for a union station at the Plaza site contemplates the closing of Alameda Street from Aliso Street to North Spring Street, the station yard running across this street. This has a very important effect on the present Southern Pacific freight station at North Spring and Alameda Streets, since by cutting Alameda Street this station would be practically isolated from the industrial district. There remains no satisfactory routing for travel between the industrial district and the freight station. Were this or a similar plan adopted, it would be necessary to move the Southern Pacific freight station to some other location. In the event that it is found possible and practicable to locate the Southern Pacific satisfactorily elsewhere, this necessity of removing could not be considered a disadvantage to the Barnard plan for the Plaza site. On the other hand, if it is not possible to find a satisfactory location for the Southern Pacific freight station, this is an argument against the Barnard plan.

The Hawgood and Storrow Plans for the Plaza site contemplate a station on the west side of Alameda Street between Ferguson, Aliso and Macy Streets, with the concourse on the east side of Alameda Street. The floor of the station and the concourse would be 17 feet above Alameda Street if the tracks in Alameda Street are to be eliminated, or 25 feet if the tracks



**AVERAGE HOURLY TRAFFIC FLOW
VICINITY OF PLAZA, LOS ANGELES, CAL.
FROM 6 A.M. TO 8 P.M.
MARCH AND MAY 1918**

CASE 970 ET SEQ
JUNE 1918 No 10-8

California Railroad Commission Engineering Dept.

FIG. 103. TRAFFIC IN VICINITY OF THE PLAZA

This diagram illustrates the complexity of street traffic and the volume to be provided for in case of changes in the street plan. Note the relatively large volume on Los Angeles Street and on Sunset Boulevard due to Hollywood traffic, and that on Alameda Street made up of traffic of the Southern Pacific Freight Houses and of Macy Street.

are allowed to remain in Alameda Street. Forcing the passengers to ascend this 17 or 25 feet is not desirable, and if either of these plans are under consideration, this difficulty in elevation and the necessity of long ramps or stairs must be regarded as arguments against the Plaza site.

With either the Hawgood or Storrow plans it will be necessary to cut through the property and plant of the Los Angeles Gas and Electric Corporation located along both sides of Center Street, in order to provide sufficient length for the station yard; and the consequent cost of removal of this plan may run up to approximately \$500,000. This is another argument against the adoption of either of these plans for a union station in the vicinity of the Plaza.

CHAPTER XII.

OUTLINE

Earlier Plans

- The Report of Charles Mulford Robinson
- The Report of Bion J. Arnold

Plans Presented Before the Commission

Central Development Association Plans

- Hawgood Plan
- Storrow Plan
- Reasons for Rejection of Hawgood and Storrow Plans
- Lands Required for Hawgood and Storrow Plans

Business Stability Association Plan

Southern Pacific-Salt Lake Plan for Joint Station

- Proposed Steam Road Construction
- Detailed Description of Proposed Construction
- Proposed Pacific Electric Construction

Southern Pacific Plan Revised for Union Passenger Terminal

- Track Changes at Station
- Site and Building Changes
- Method of Operation
- Coach Yard
- Locomotive Facilities

Immediate Construction Necessary

CHAPTER XII
PLANS PRESENTED FOR UNION PASSENGER TERMINAL
EARLIER PLANS

The Report of Charles Mulford Robinson

The first report which has come to our attention, advocating the establishment of a union passenger station in Los Angeles, is that of Mr. Charles Mulford Robinson, which was made in the latter part of 1907. This report was rendered to the Municipal Art Commission, which, in 1909, rendered a report to the City Council, of which Mr. Robinson's was made a part.

The following quotations are taken from the report of Mr. Robinson:

"It is obvious that there ought to be a Union Station. In locating this and planning approaches to it, we have to seek the maximum of effect at the minimum of expense, and must do this by making use of all which is good in the present situation. The location of the Arcade Station is good, if it be suitably developed; the tracks on Alameda Street are bad and, if possible, must be given up; the location of the tracks of the Santa Fe and the Salt Lake Roads is, perhaps, as little objectionable as possible. We have, then, a basis on which to work; and it must be recognized that there must be both give and take, as between the railroads themselves and as between the city and railroads, to obtain a result that will be to the advantage of all.

"My recommendation is that the Union Station be located on the land now occupied by the Arcade Depot and its surroundings, that the Southern Pacific abandon the use of Alameda Street by through trains, thenceforth collecting and delivering freight, to such plants as are reached by the sidings from that track, in cars propelled by electricity; and that in return for this relinquishment of Alameda Street, the Southern Pacific be given a right of way directly east from the present Arcade Depot to the present freight yards of the Santa Fe. From that point the roads can be depended upon to work out their own trackage arrangements. The Santa Fe and Salt Lake should be allowed trackage facilities over the new right of way, and the trains of the Southern Pacific should then enter and leave the city along the line of the river. As the Salt Lake Road now does this, and is allied with the Southern Pacific, and as the latter would still have, near the Buena Vista Street bridge, convenient access to the extensive yards, this plan would seem to involve no serious difficulties in view of the advantages to be derived. For it is to be remembered that in economy of administration, in convenience to its passengers, and in the transfer of baggage and mails, a Union Station is of advantage to the railroads, as well as to the public; and that in the present instance there is practically no local competition in passenger traffic between these roads. The short strip through which it is proposed that the city give right of way, in return for the restoration of Alameda Street, now consists of vacant lots, of frame cottages and shacks, and of unimproved streets. The city could well afford to make such a change."

It was Mr. Robinson's idea that the station building be placed on the axis of Fifth Street, centering on it, so as to give a fine effect and "closing the vista of the street." Fifth Street was to be widened to 192.5 feet, from Gladys Avenue to Los Angeles Street, and straightened so that it would lead straight away "from the broad plaza planned in front of the station

to the heart of the business district." So far as we know, nothing was done about the establishment of a union station at that time.

The Report of Bion J. Arnold

In October, 1911, Mr. Bion J. Arnold rendered a preliminary report upon the transportation problem of Los Angeles, which dealt not only with a union passenger station but with a municipal railroad, grade crossings, freight handling, local street and interurban railways, immediate relief of congestion on Main Street, city and district planning and a comprehensive and constructive transit plan.

In the following quotation from this report it will be noted Mr. Arnold favored the establishment of a union station at the Plaza, although not without qualification, as discussed later. No plans were presented, however, showing any of the details of such a proposed station, nor even its exact location, but on one of the maps, which were a part of the report, a union depot is shown approximately south of Aliso Street and east of San Pedro Street, with the station yard tracks parallel to Aliso Street. This is in a very similar location to that proposed by the Hawgood and Storrow plans.

"PASSENGER STATIONS"

"Each of the three transcontinental lines entering Los Angeles—the Atchison, Topeka and Santa Fe Railroad, the Southern Pacific Railroad, and the San Pedro, Los Angeles and Salt Lake Railroad, have their own independent passenger terminal and depot. The Arcade Depot of the Southern Pacific is located nearest to the center of the city, but it is old, unsightly, inadequate and hardly a credit to either the city or the company. The Santa Fe Station is more modern and sufficient, and although not quite as favorably located, it will probably be considered by its owners as equal to the demands of their business for a number of years and considerable advantage would have to be demonstrated to get them interested in a Union Depot project. The Salt Lake, being affiliated with the Southern Pacific, would probably be glad to abandon their frame depot on the opposite side of the river and join the latter under an equitable arrangement in any proposed station and terminal improvements.

"Any plans which are made for a new depot for the Southern Pacific and Salt Lake roads would naturally include some convenient transfer arrangement between these transcontinental steam lines and the network of interurban electric lines, and in considering possible sites this intimate connection must be kept in mind.

"There would appear to be two sites for such a station—one that of the present Arcade Depot, and the other contiguous to the present Pacific Electric terminal building at Sixth and Main Streets. A station plan, if worked out in connection with the proposed elevated or subway extension for the interurban lines running back to, and across the river, could be made convenient and adequate for either location.

"It would be a mistake, in my opinion, not to encourage the railroads to develop and submit plans for a terminal station of this character. If these plans could be worked out so as also to accommodate the Santa Fe and other future transcontinental roads, which no doubt in time will reach this city either over new or present tracks, the arrangement would be all the more attractive.

"In the course of time the bed of the Los Angeles River may be used for additional tracks carrying transcontinental traffic, but my study of the river-bed has led me to the conclusion that considerable expense will be entailed in protecting any track structure from possible washouts, and that this expense will not be justified until an entrance into the city becomes very valuable and difficult to secure. If the flood waters which now go to waste are ultimately stored, it will be possible to take care of the excess runoff by means of a covered conduit in such a manner that a right of way at least 100 feet in width will be available, and this at such an elevation that subway branches could be taken off from the river-bed tracks in the southern part of the city. As the river does not run in the direction that makes it useful for taking care of immediate interurban demands and as the present steam lines are now taken care of along the protected levees or river banks, the development of the river-bed itself as a railroad right of way is a future possibility which need not seriously affect present plans. Any elevated structure reaching the river, however, should be so designed that a sub-surface or lower track terminal could be built so as to parallel and double the upper track capacity at some time in the distant future.

"If the Arcade Depot site should be favored by the railroads and a Union Station arrangement can be agreed upon, then the city should adopt the plan so admirably worked out several years ago by the Municipal Art Commission and Mr. Charles Mulford Robinson for a beautiful and effective approach to be secured by widening and straightening Fifth Street from Los Angeles Street to Central Avenue. If a Union Station is not possible, then it would appear better to encourage the Southern Pacific and Salt Lake roads to combine with the Pacific Electric in a splendid station adjoining and becoming part of the present Pacific Electric terminal building.

"UNION DEPOT AT THE PLAZA."

"If all of the competing transcontinental steam roads can be brought to consider a Union Depot, independent of the Arcade site, then the most natural thought in regard to this combined railroad entrance to the city is to have one grand monumental portal with an appropriate setting of open spaces, parkways and surrounding buildings.

"This gateway to the city should be convenient to the business district with plenty of main arteries leading to and from it; it should be easy of access from the street railway system, and particularly in the case of Los Angeles it should be a mixing chamber or clearing house between transcontinental and interurban passenger traffic.

"It does not take a lengthy study of the plan of the city and its transportation requirements to discover that there is one site which is adapted to fulfill the requirements of a grand central depot and transfer station and this location is in the immediate vicinity of the Plaza.

"The Plaza was the exact center of the original Spanish grant to the Mission Padres of one league each way from this central point, and this original area of twenty-eight square miles constituted the city limits of Los Angeles up to the year 1869 and was not materially extended until the year 1896. The Plaza was the starting point of all roads which lead in various directions, following in their meanderings the natural topography of the country. Then the street plan of the central part of the city was the outcome of efforts to parallel these original main highways. The result is that there is no one site in the entire city which can be reached so easily from so many different directions as this original Plaza, and as modern transportation naturally follows and accentuates primitive pathways, it would be

but natural to have this original center of the older town come into its own as the permanent portal of the newer city which has grown up about it. But there are many other reasons for favoring this location for a Union Station. Here is already the beginning of a splendid civic and administration center—with the Court House, Hall of Records, Post Office and Custom House forming an imposing group of monumental buildings and a crystallized sentiment that in this part of the city should be located the new City Hall. Furthermore, the business section, in seeking unobstructed sites for modern buildings, has been growing away from this original center. If values of property in this vicinity are not maintained by means of public improvements of this character, this part of the city will suffer from slow paralysis and Los Angeles is too young and active a city to afford such a contingency in any of its parts.

"The natural lay of the land at this point allows for a double-deck station with the trains on the lower level, while the broad streets and possible open spaces will allow for sub-surface subway stations and storage tracks at a minimum expense.

"The greatest opportunity exists here for the planning of a center of civic beauty and usefulness, which would hardly have an equal in all the efforts being made by the cities throughout the country to surround their public buildings with imposing settings.

"This report is not intended to be a city planning program, but as transportation is the fundamental of the city useful, it should also become the foundation for the city beautiful. It is pleasing to find this splendid opening for a portal which will allow the city to display at its gates the evidence of its growth, its prosperity, its progress in government, and its possibilities in art.

"The first impression which would be created in the minds of the visitor would include a glimpse of the original Plaza and the Old Mission directly back of it. A new Plaza, a central park and open courts should take the place of the old buildings between the old Plaza and the Post Office, and this breathing space would act as a foreground to the new City Hall and to the Post Office, which buildings would naturally be located with an open space between them to allow for their future growth. Back of these buildings would rise the Hill Side Park with terraced gardens furnishing a frame of green and color. Have city builders ever had a more inspiring opportunity?

"I recognize the fact that an enterprise of this character takes form very slowly and only if it has in it the elements which will attract to it a consensus of favorable opinion can it be carried out. I do not advance the idea as an absolute necessity, as I have already pointed out other sites for railroad stations which will answer all the commercial purposes, but if the city is really desirous of putting its front yard in order, and of creating such a favorable impression on the visitor within its gates that his stay may be all the longer, I cannot but point out that in the development of this Plaza center will be found a great opportunity."

This analysis of the situation, we believe, is sound today and the City of Los Angeles should not lightly pass by so splendid an opportunity for a great and permanent improvement of the community.

After Mr. Arnold's report was submitted to the City of Los Angeles, little was done toward the establishment of a union station. In 1914, however, the Southern Pacific came forward with a plan for replacing the old

Arcade Station, which was quite severely criticised in Mr. Arnold's report, with a new station. This plan was carried through, resulting in the construction of the present Southern Pacific station at Fifth Street and Central Avenue.

At the hearings held by the Commission, several detailed plans for a station were presented.

PLANS PRESENTED BEFORE COMMISSION

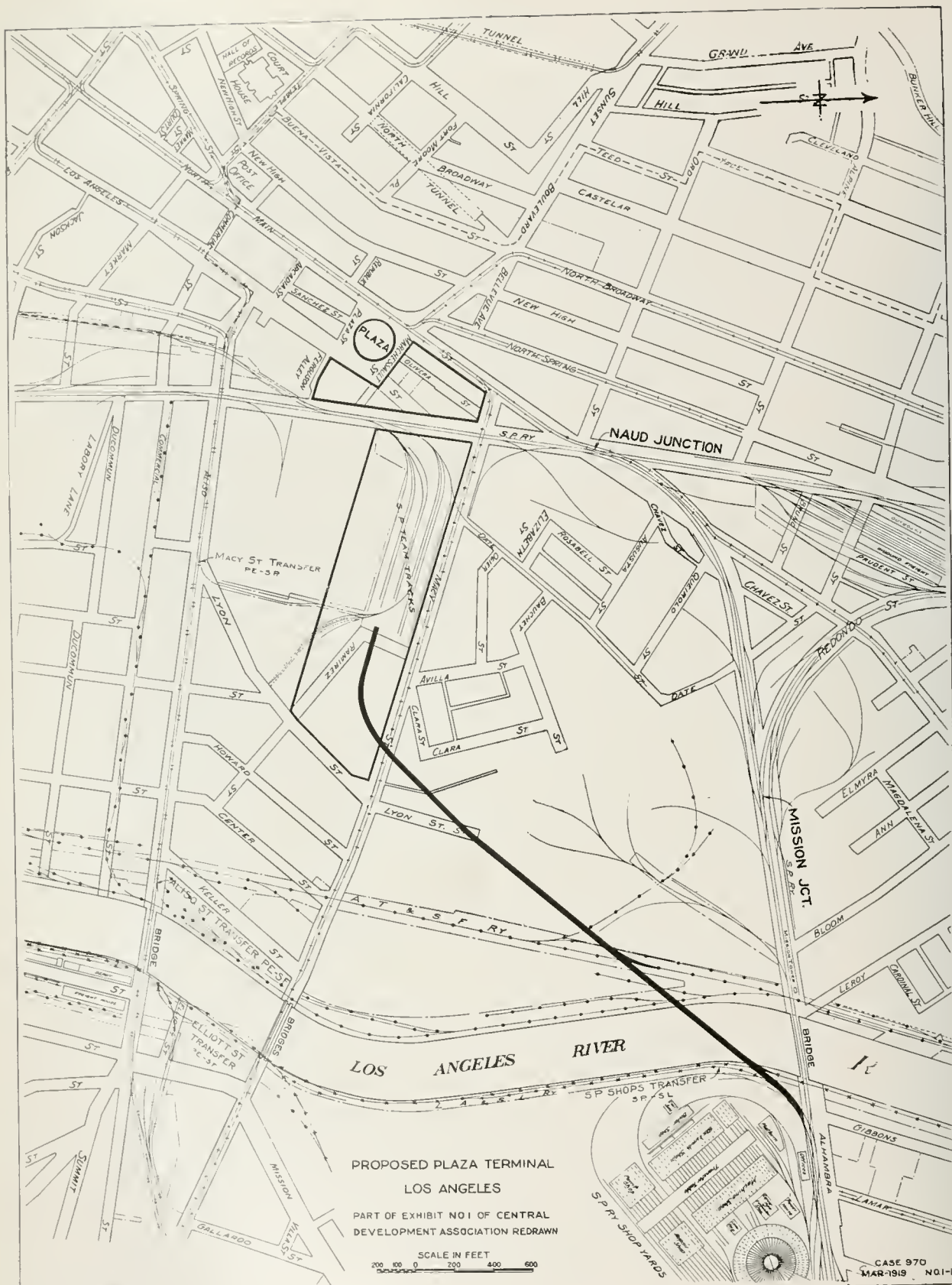
Central Development Association Plan

The first plan submitted to the Commission was that of the Central Development Association, as shown on its Exhibit No. 1, and as described by Mr. Samuel Storrow, one of its engineers. This plan suggests a union terminal located near the Plaza. The station building would be located west of and over Alameda Street and the depot yard east of Alameda Street, between Aliso and Macy Streets, rather short in length. Passengers going from the depot to the trains would cross over Alameda Street and thence down to the station platforms by means of either stairs or ramps, the vertical drop being about seventeen feet, the tracks on Alameda Street to be removed.

The connections between the depot tracks and the present lines of the steam railroads were only shown in the rough on Central Development Association Exhibit No. 1, but it might be here stated that the route shown corresponds very closely to the route of the proposed Industrial Terminal Railway Company and makes use, to a large extent, of its lands and those of the Industrial Development Company, corporations controlled by Mr. L. E. Hanchett. The Industrial Terminal Railway Company, in Application No. 2962, asked the Commission to authorize the issue of stock for the purpose of constructing an industrial railroad, this switching and terminal railroad to be approximately two miles in length. No maps were filed with this application, but maps were filed with Application No. 1803, an earlier application. These maps do not show the proposed location of tracks and other facilities, but they do show the right of way as the company was securing it.

Starting at Alameda Street at a point about 200 feet north of Aliso Street, it was planned to secure a strip of right of way 165 feet from Alameda Street east to Ramirez Street. From Ramirez Street the width was to be 40 feet to Macy Street, which was crossed about 280 feet west of its junction with Lyon Street; from here it continues 40 feet in width and north on a tangent to the main line tracks of the Santa Fe. A 60-foot strip was shown from this point to the river tracks of the Santa Fe. On the east bank of the river it was proposed to acquire a small triangular tract, the project ending on the west side of Alhambra Avenue.

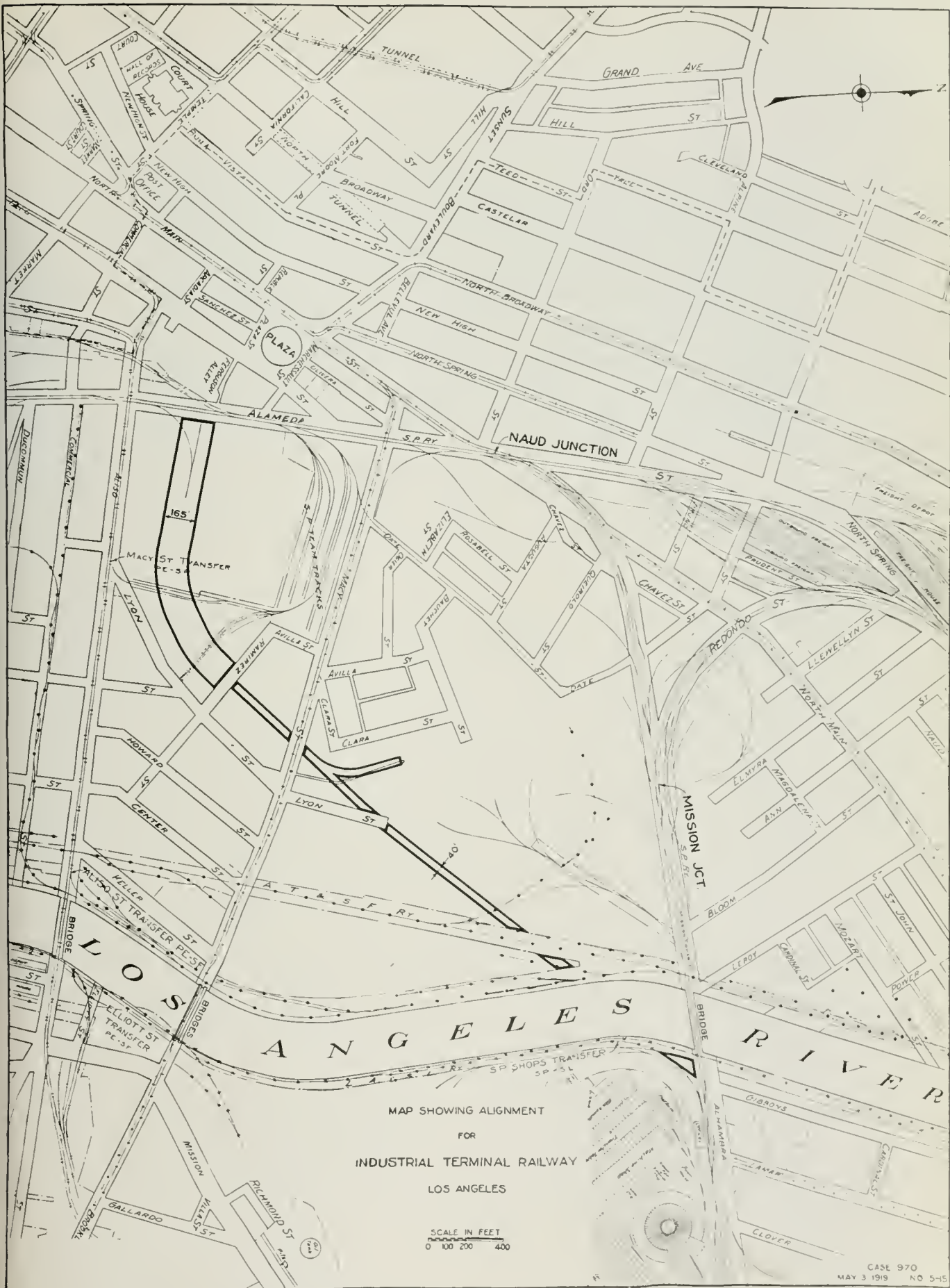
This route crosses about eleven tracks of other railroads and the Commission, in Decision No. 4553, dated August 18, 1917, decided that it would



Part of Exhibit No. 1 of Central Development Association (Redrawn)

FIG. 104. PRELIMINARY PLAN OF CENTRAL DEVELOPMENT ASSOCIATION

This shows one of the locations suggested for the Union Passenger Terminal at the Plaza with connections to existing trackage. This plan is not recommended.



From Industrial Terminal Railway Co.

FIG. 105. MAP SHOWING ROUTE OF INDUSTRIAL TERMINAL RAILWAY COMPANY

This is the plan proposed in Application 2962. The alignment is practically identical with that shown in exhibit No. 1, the Central Development Association. Dismissal of the application is recommended.

not authorize the issuance of this stock when it had pending an investigation into terminal facilities and the grade crossing situation in the locality where this construction was proposed to be made, and the matter is now in abeyance pending the Commission's decision in Cases 970, et seq.

Hawgood Plan

Exhibit No. 2 of the Central Development Association is an architectural drawing showing, first, the elevation of an imposing depot and, second, a rough track plan to accompany it. As the connection between the depot track and the lines of the steam railroads, as shown on Exhibit No. 1 and No. 3, were later thought impractical, as we understand, further detail of the track layout and connections were submitted as Exhibit No. 4 of the Central Development Association, this plan being the first submitted by Mr. H. Hawgood, one of its engineers.

Exhibit No. 4 was submitted as a study map—not as a finished product—and shows fifteen pairs of tracks ranging from 900 to about 1400 feet long in the depot yard. These yard tracks are connected by curved tracks southerly to the Santa Fe tracks adjacent to the river, northerly to the present main line Santa Fe tracks some 900 feet away from the river and north of Macy Street, and to the Salt Lake tracks south of Aliso Street, by means of a bridge across the river and a curved connection (which nearly reaches Anderson Street) through the present Salt Lake freight yards. At Alhambra Avenue the Southern Pacific El Paso Line is reached by means of a curved bridge across the river, and the Salt Lake Pasadena Line by a curved connection north of Alhambra Avenue on the east side of the river.

Central Development Association Exhibit No. 5 is a still more detailed study of the yard tracks, buildings, platforms, etc. The connections to the Santa Fe, Salt Lake and Southern Pacific tracks, which are not shown, we would assume to be the same as proposed in Exhibit No. 4, except for modifications resulting from a change in the design of the throat of the yard.

It will be noted that these plans simply connect the proposed depot yard with the present lines of the Santa Fe and Salt Lake, no combinations of steam railroads on one right of way being proposed, except the combination of the Southern Pacific and the Santa Fe north of Macy Street,



Exhibit No. 2 Central Development Association

FIG. 106. PERSPECTIVE OF UNION TERMINAL AT THE PLAZA

This is an artist's conception of the possibilities of the site. The track plan at the right was used as the basis for the perspective but was not presented as being ideal from an engineering standpoint

arising through the proposed elimination of Southern Pacific passenger service on Alameda Street. This exhibit shows fourteen passenger tracks for the present, arranged in pairs, with platforms between, the platforms to be reached from the concourse by means of ramps on a 10 per cent slope. Future extensions would be made to the south. These plans were severely criticized by a witness for the Southern Pacific and, as a result of this criticism, a detailed plan on a scale of fifty feet to the inch was made and transmitted to us in February, 1918.

This plan was submitted with the following comments:

"This map, entitled TRACK PLAN FOR PROPOSED PLAZA STATION, scale 50 feet to one inch, is a compilation of sundry large scale detail studies, upon which Exhibit No. 5 was based. It is of the nature of a preliminary plan, and will probably admit of changes and additions that without changing the general layout would make for increased efficiency.

"The plan differs from Exhibit No. 5 in three respects:

"First: The Salt Lake tracks are shown connected with the wye at the east end of yard, beyond the throat. This permits of the trains of all three roads being turned close in without loss of mileage in running to a distant wye. An additional track is shown paralleling the north main line at the north end of the wye for the purpose of giving standing room clear of main lines for trains waiting to turn.

"Second: The cross-over, connecting with slips the outbound Santa Fe

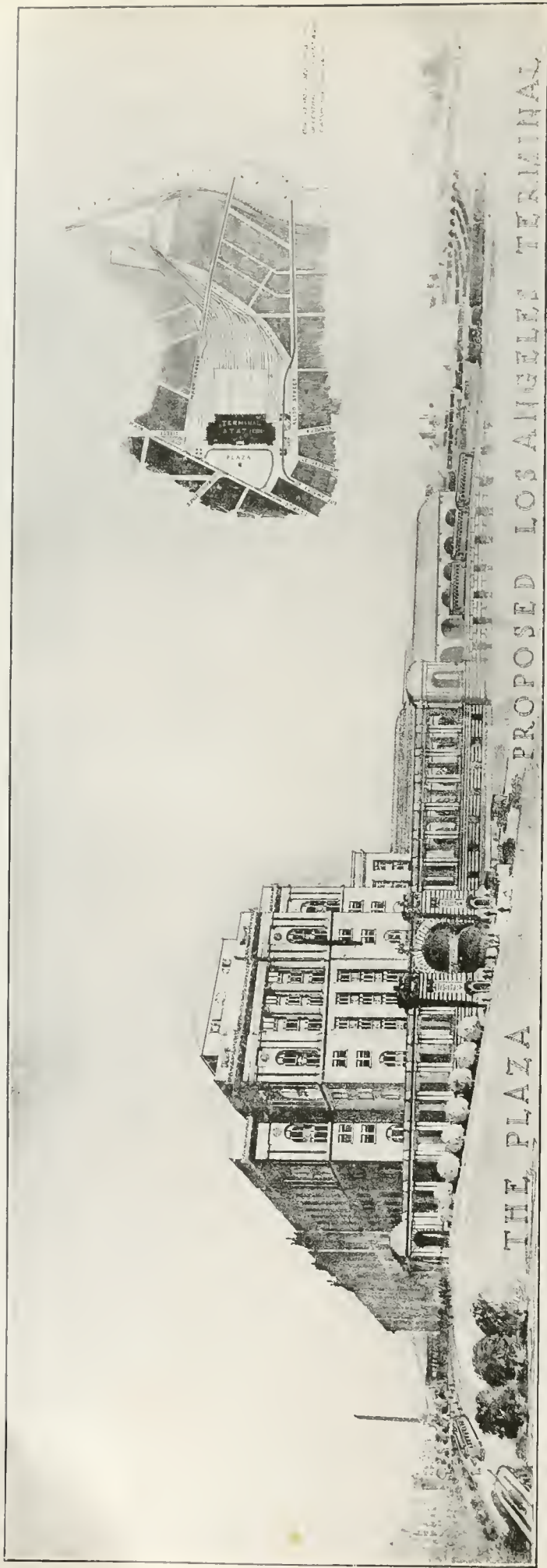
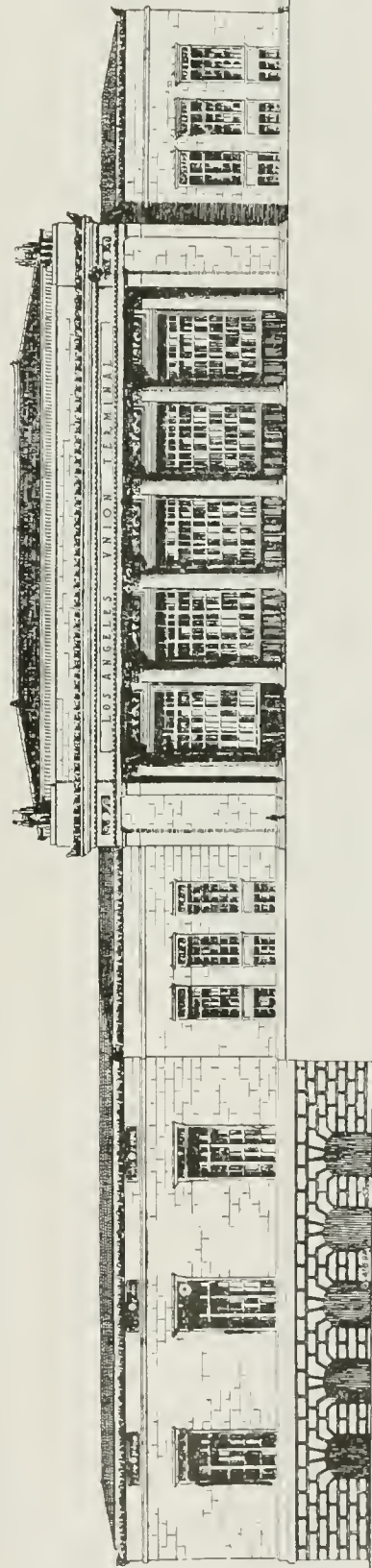


Exhibit No. 3 Central Development Association

FIG. 107. PERSPECTIVE OF UNION TERMINAL AT THE PLAZA

This Exhibit is similar in character to the preceding one. The value of a symmetrical arrangement is shown, but this would be enhanced if it included the site as well as the building. Instead of facing the high ground west of Main Street, the building would be given a more effective approach if it were placed upon the axis of an important street.



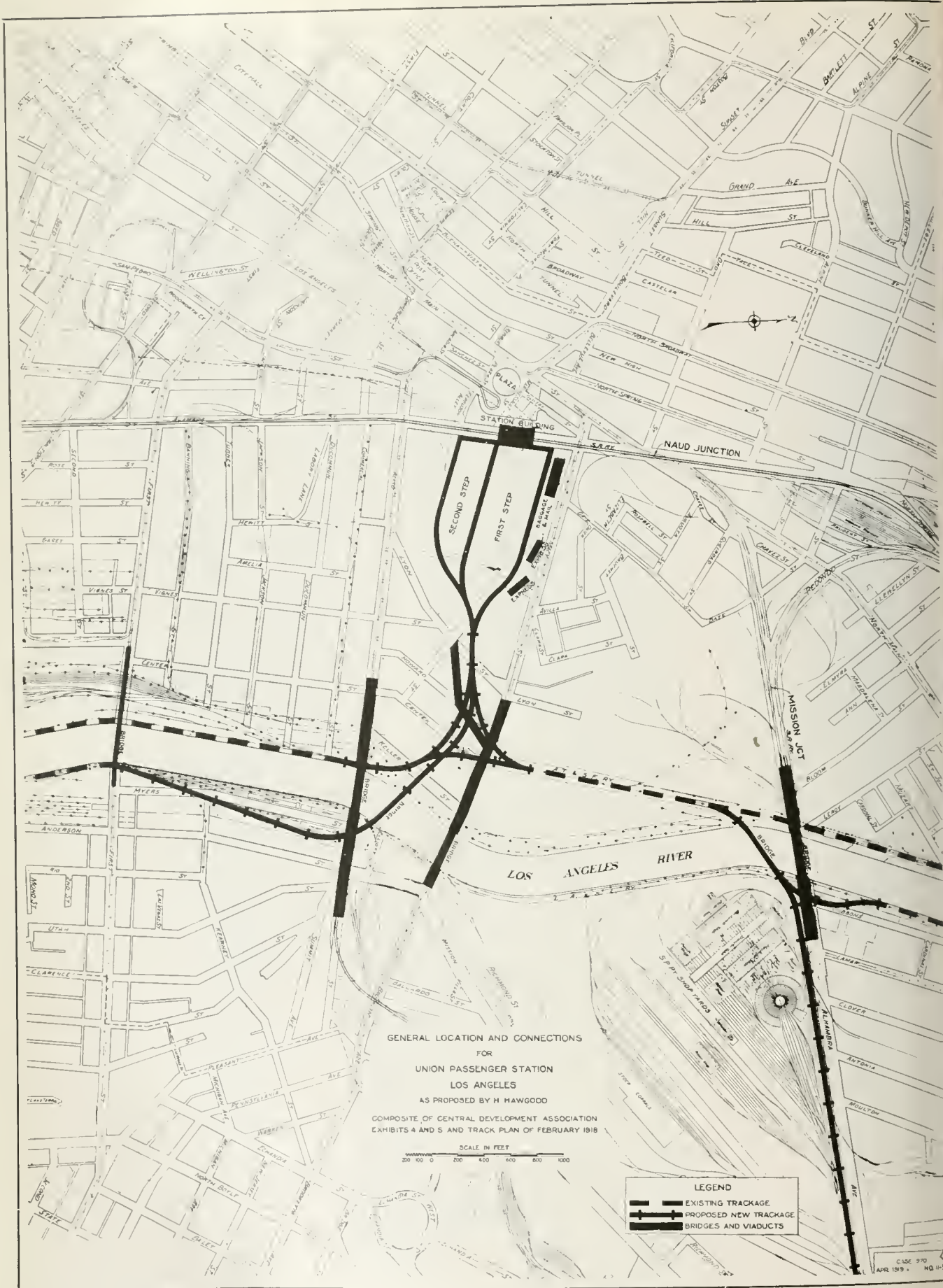
FRONT ELEVATION OF THE PLAZA UNION TERMINAL
EXHIBIT NO 9 OF CENTRAL DEVELOPMENT ASSOCIATION

SCALE
1" = 10' 0" 1" = 20' 0" 1" = 40' 0" FEET

CASE 970
APR 1935 NO 219

California Railroad Commission Engineering Dept.

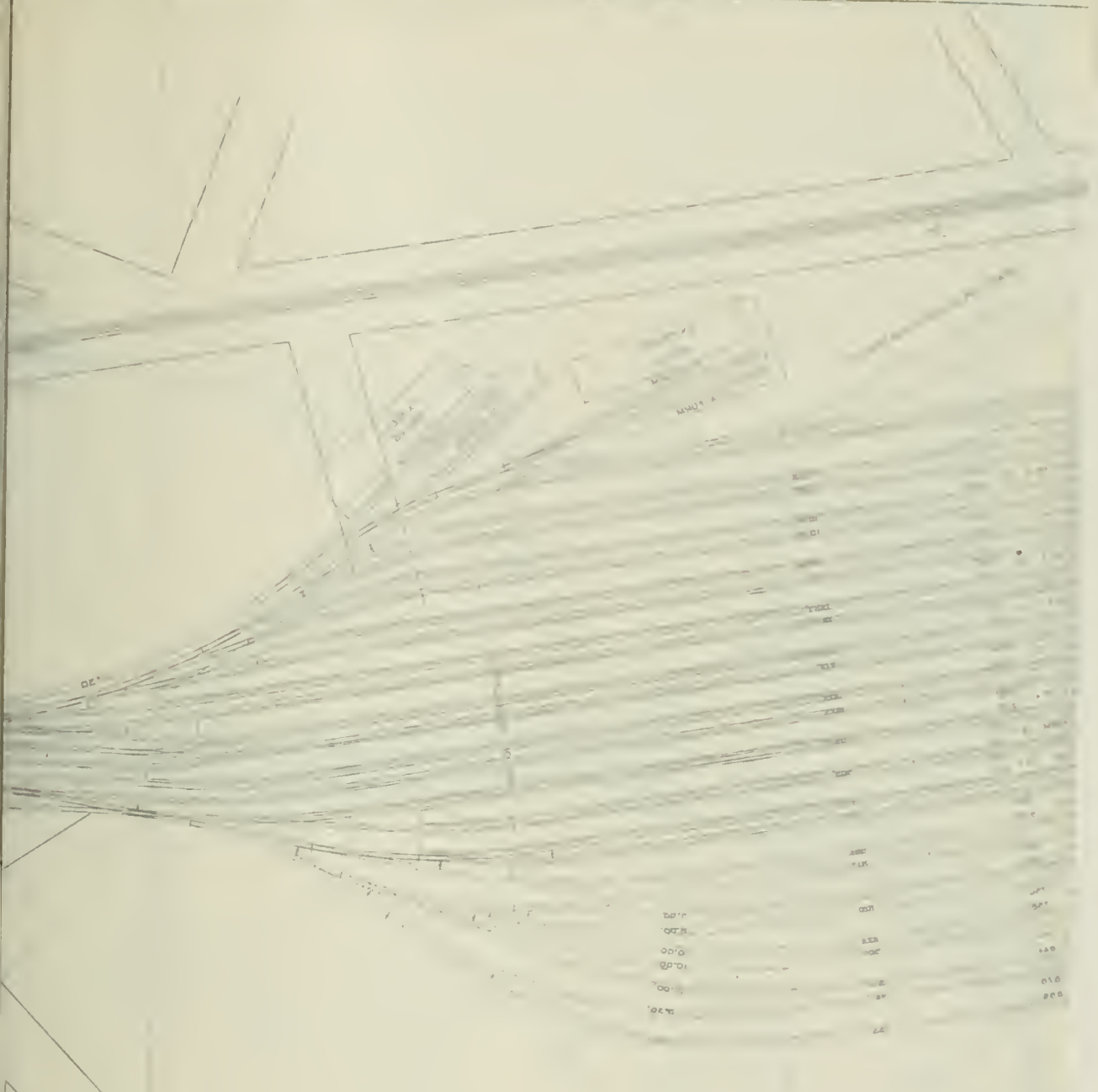
FIG. 108. FRONT ELEVATION OF PLAZA UNION TERMINAL.
This is a preliminary drawing made by Architect A. E. Curlett to show the size and character of building which could be produced for about \$700,000 in 1917.



California Railroad Commission Engineering Dept.

FIG. 109. THE HAWGOOD PLAN

The principal objection to this plan is that the distance between Alameda Street and the Santa Fe line is too short for the development of the station yard and throat tracks, according to the best practice. There is also too much interference with freight movements at the river. The plan is not recommended.



ACK PLAN
 FOR
 ION AT THE PLAZA
 S ANGELES
 ED BY H. HAWGOOD

ALE IN FEET
 0 50 100

0 25' 50' 75' 100'
 11.48' 11.48' 11.48' 11.48' 11.48'

LYON

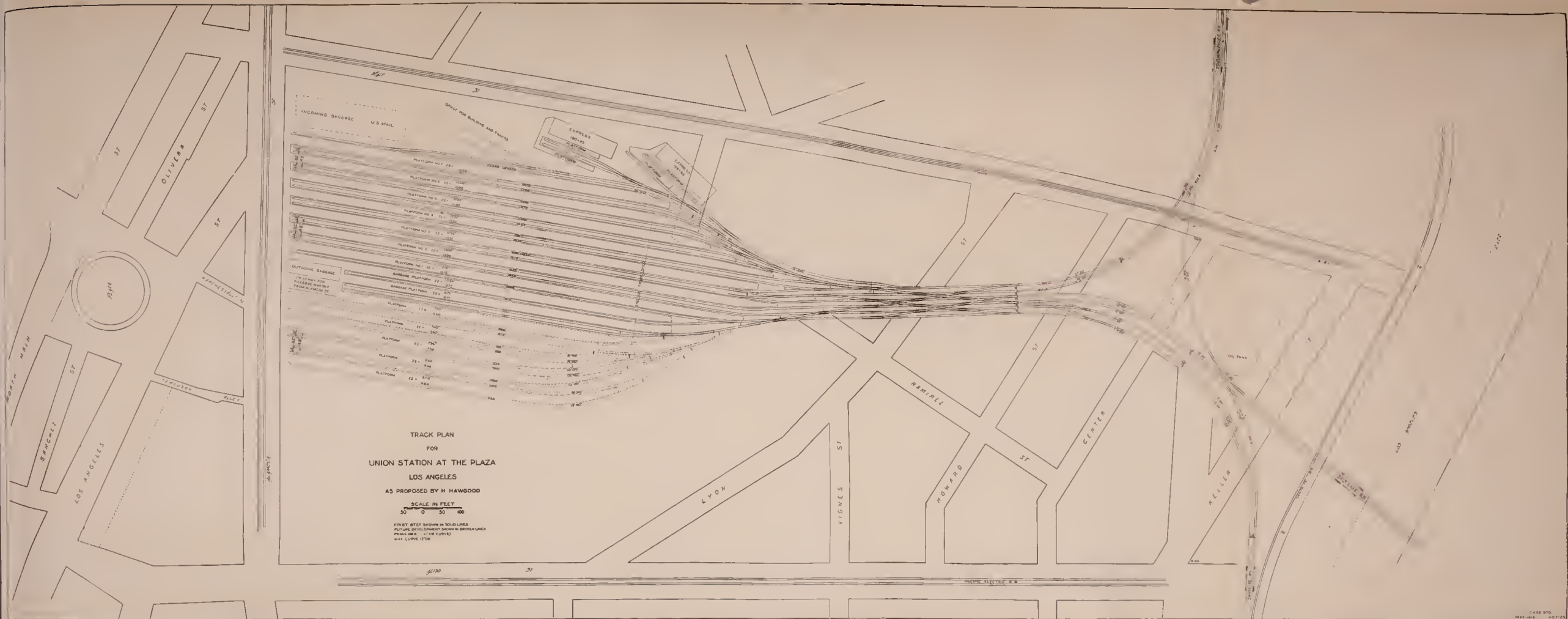


FIG. 110. TRACKAGE MAP FOR UNION STATION AT THE PLAZA AS PROPOSED BY H. HAWGOOD
 The spacing and arrangement of tracks are shown with details of curvature, switches and connections. Detail of general plan, Fig. 109

track to all the other tracks, as contemplated in Exhibit No. 5, has been changed to a cross-over which runs through the inbound Santa Fe track without slips, with separate connection between inbound Santa Fe and outbound Salt Lake. All as shown on the map. Distance is saved by this method.

"Third: Exhibit No. 5 indicates a single structure to accommodate two express companies, the present plan presents as an alternative separate tracks and separate houses for each of two companies and space for a third unit. The buildings are shown each as 185 x 50, giving a floor space of 9,250 square feet, which is liberal in the light of space used for similar purposes in important stations."

This 50 foot scale plan and Central Development Association Exhibit Numbers 4 and 5 may be called the Hawgood Plan. They are shown combined in Fig. 109 on page 314.

It will be noted that the Hawgood Plan does not present any proposed location for coach yards. We have learned from him, however, that he intended to leave this feature to the judgment of the Commission's engineers.

Storrow Plan

The Storrow Plan (Central Development Association Exhibit Nos. 18 and 19) was presented as an alternative arrangement also making use of the tract of land lying between Aliso, Macy and Alameda Streets and the Los Angeles River, and locating the depot on the west side of Alameda Street at the Plaza. The plan differs from the Hawgood plan principally in the arrangement of connections, or approaches to the Southern Pacific, Santa Fe and Salt Lake tracks and in the proposal to bring the Pacific Electric tracks practically into the station. On the less detailed plan, it will be noted, Mr. Storrow proposes to have the Southern Pacific tracks moved from Alhambra Avenue, this to be accomplished by building new tracks adjacent to, south of, and parallel to the present tracks on Alhambra Avenue from a point opposite Eastlake Park to a point near Daly Street, thence the passenger traffic will take the route along tracks to be constructed along the southerly edge of the Southern Pacific shop property and across the river on a bridge between Aliso and Macy Streets. A connection with the Salt Lake tracks would be made similar to that in the Hawgood plan; no use, however, would be made of the Santa Fe tracks for through passenger traffic, both the Santa Fe and the Southern Pacific to

UNION TERMINAL
STATION PROJECT 123
LOS ANGELES CALIF



123

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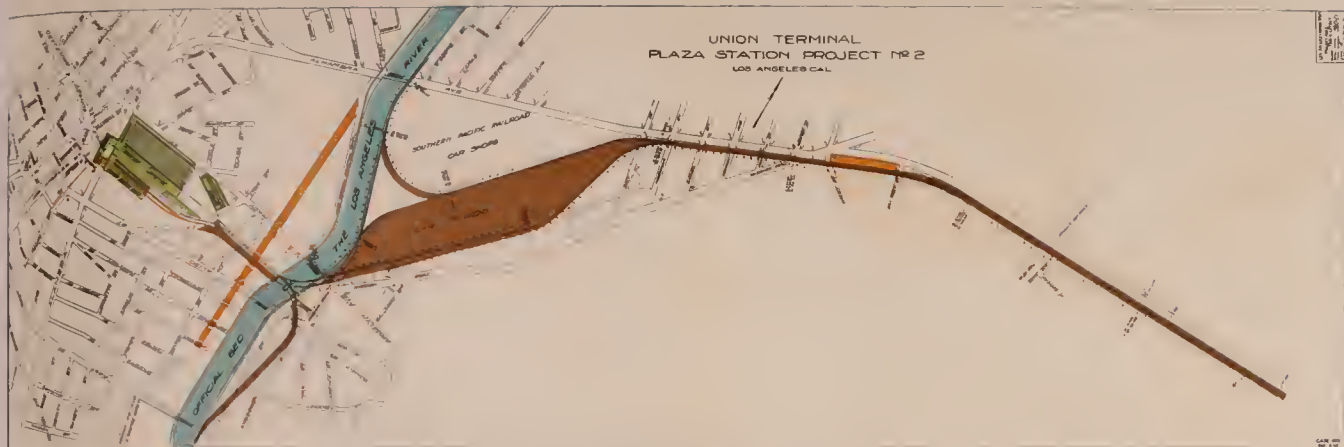


FIG. 111. THE STORROW PLAN

This plan is similar to the Hawgood Plan, and it is subject to the same objections. The curved bridges crossing the river tracks at grade will not fit in well with the general plan of track depression. The plan is, therefore, not recommended.

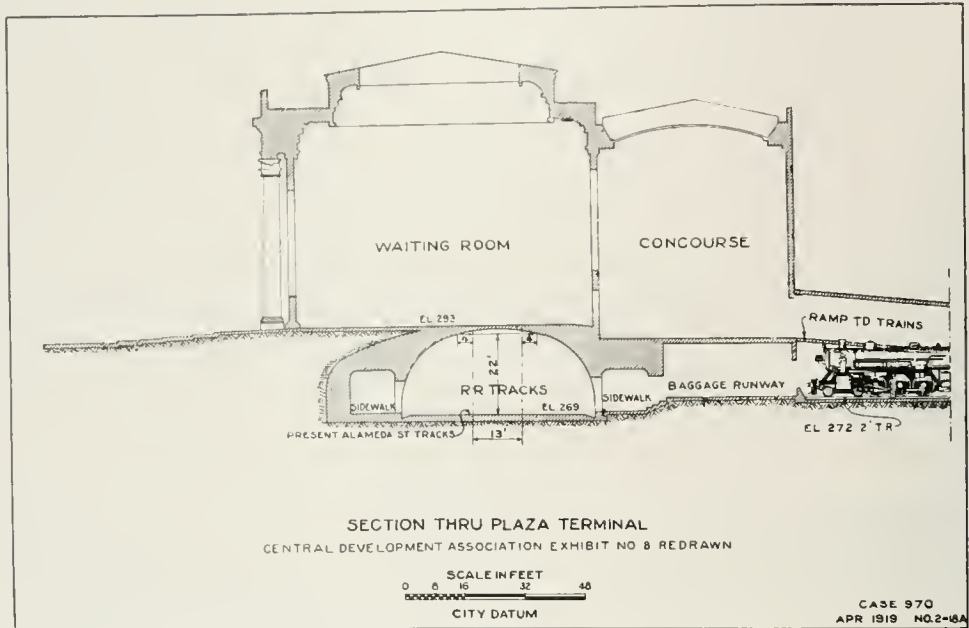


Exhibit No. 8 Central Development Association (Revised and redrawn)

FIG. 113. SECTION THROUGH PLAZA TERMINAL

This is a section through the building shown in Exhibit No. 9 (Fig. 108). Much of the advantage of the stub station is lost by requiring passengers to climb from the level of the station platforms up to the level of the waiting room, a rise of about 21 feet. The street below the station building, will add to the difficulties of construction.

use tracks on the east bank of the river for their northern exits. It is proposed to bring the Pacific Electric across the river by a high-level third bridge, crossing over the steam roads, and thence into a depot on the east side of Alameda Street and south of the proposed union depot for the steam roads.

All steam railroad crossings are to be at grade. Mr. Storrow proposed that a union coach yard be located partly within the present Southern Pacific shop grounds along Alhambra Avenue and east of the river, and partly on land to be acquired between the shop grounds and the river, a tract commonly known as the Stern Tract.

The ultimate elimination of the present Southern Pacific tracks on Alameda Street was dwelt upon as a very desirable part of this plan. The establishment of a union belt line or system for handling freight was also recommended.

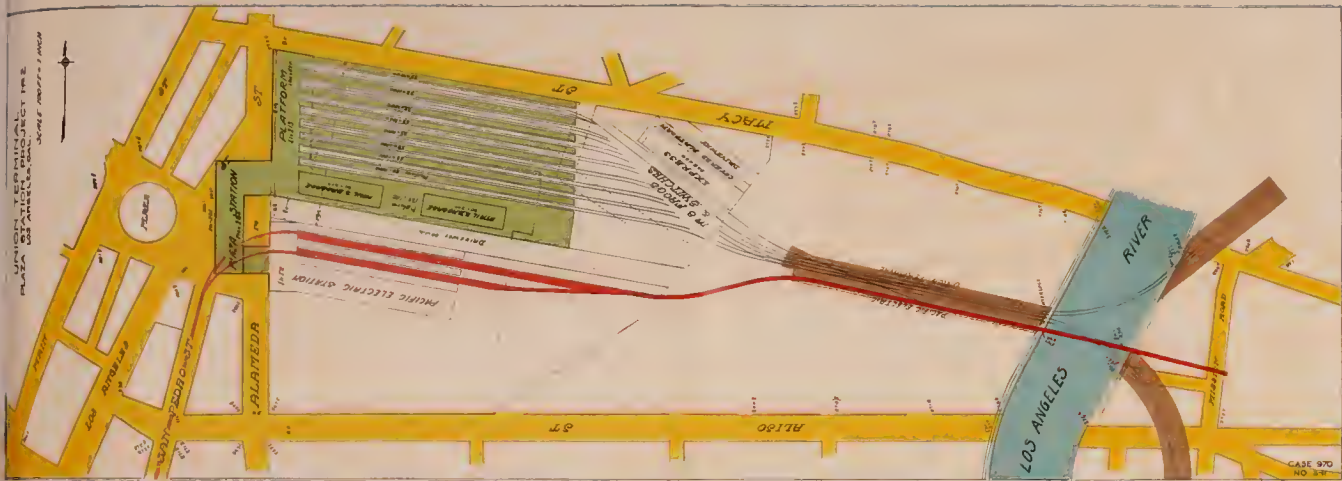
Reasons for Rejection of Hawgood and Storrow Plans

Since both the Hawgood and Storrow plans make use of the same



Handwritten notes or a signature in the bottom left corner of the map area.

THE TOWN OF ...
 A map showing the layout of the town, including streets and buildings. The map is oriented with North at the top. The streets are shown in yellow, and the buildings are shown in blue. The red line represents a boundary or a specific feature. The map is labeled with 'W 20 A' and '5775'.



By the Civil Engineers' Association

FIG. 112. TRACK ARRANGEMENT FOR STATION PLAN

Particular attention is called to the figures denoting elevations. Alameda Street is seen to be lower than the river bank. The platforms, as shown, would be 21 feet below the main floor of the station and approximately 15 feet below the level of the Plaza. The arrangement is not recommended.

site for a union passenger station building and yard, they may be properly considered together.

It should be noted that no criticism is directed against details which are subject to change and which, as we think, do not affect the plan as a whole. Such criticism is unwarranted and leads to no useful end. The effort to improve, rather than enlarge upon, these defects in detail is more helpful.

The Hawgood plan, like the Storrow plan, proposes a site approximately parallel to Macy Street and east of Alameda Street. This is, perhaps, one of the worst features of these two plans. The site proposed for the station building and its setting is so shaped that it is impossible to obtain the symmetrical arrangement necessary from an architectural standpoint. Alameda Street would form the easterly boundary and Main Street the westerly. The north and south boundaries could be made parallel, but the angle between Main Street and Alameda Street is such that a rectangular area is not feasible. The area in front of the proposed station is not only of poor shape, but is too small for such a station building as would be appropriate in Los Angeles. See also Fig. 107 on page 312.

The next bad feature lies in the fact that the concourse and station would be 20 feet above the station platforms. Central Development Association Exhibit No. 6 shows the station floor at elevation 293, and the station platforms at elevation 273, Alameda Street being lowered about 3 feet to elevation 269 and the difference of 20 feet (293-273) being what the passenger would be required to climb, by means of a ramp, in leaving the station. While this distance is equalled at other stations in this country, it is not good practice and should be avoided, if possible. Fixing the station platforms at elevation 273 also prohibits any separation of grades at the river, based on the assumption that the throat of the yard would extend that far, as taken up later. This is due to the location of the crossings of the approach tracks and the river tracks with respect to the proposed grades along the river and the crossings of Macy and Aliso Streets.

The Storrow plan, advocating the removal of the Alameda Street tracks, reduces the climb from the station platforms to the station floor to 13 feet, the station being proposed at elevation 286, Alameda Street remaining, as at present, at elevation 270 and the station platforms at elevation 273, the same as in the Hawgood Plan, these being given in the Central Development Association Exhibit No. 19. This difference arises from the fact that with the tracks in Alameda Street the required overhead clearance is 22 feet but, with the tracks removed, the required clearance is but 14 feet. A climb of 13 feet is not excessive, but, as we do not recommend the removal of the Alameda Street tracks, it is impossible to consider that 13 feet is obtainable. This plan also contemplates the station platforms at elevation 273 and it is equally impossible to obtain a separation of grades of the station approach tracks and the tracks along the river. Referring again to Central Development Association's Exhibit No. 19, we wish to

call attention to the fact that we consider the layout shown at the crossing of the northerly curve, approach and tracks on the east bank of the river to present impossible operating conditions. While this may appear to be criticism of a detail, it does not appear possible to provide a satisfactory solution of the difficulty imposed by this crossing.

A third point which is not in favor of this site is that, in order to provide adequate throat room in the passenger depot yard, it will be necessary to construct through curved bridges across the Los Angeles River, and the cost of these bridges and the necessary connections, when added to the cost of the land, makes a total amount for which we think better facilities may be purchased or provided.

Referring to Fig. 119 (page 315) "Track Plans for Proposed Plaza Union Station, Scale 30'=1 inch," dated February, 1918, which is the last plan presented by Mr. Hawgood and the one toward which criticism should be turned, we note that the distance from the ends of station tracks to the curves of the wye is too short to admit of fulfillment of the general principle—that all station tracks must be fairly accessible from the approach tracks. Seventeen tracks shown by solid lines are fairly accessible, but the nine tracks in dotted lines are not, and cannot be made so.

This is sufficient reason to reject the plan as it is, but we have attempted to do justice to this general plan by redrawing it so that this feature be eliminated and have concluded, as noted before, that the only way in which this can be accomplished is to have the throat of the yard so near the river that connections must be made to the tracks on the east side of the river and these must be made by means of curved bridges across the river.

While these curved bridges are objectionable, from the view of cost, they are not impracticable and are not in themselves sufficient reason for rejection of this plan.

This arrangement would necessitate the placing of the Santa Fe passenger trains on the east and this is rather desirable, as it leaves the west bank free for freight. The situation that would result from the adoption of this plan has, however, one extremely bad feature: The throat of the yard would be crossed at grade by the tracks to be used for freight on the west bank of the river. The introduction of such a grade crossing would ultimately result in such congestion that operation would be very difficult. As such a grade crossing apparently cannot be avoided, there is introduced a very serious objection to these plans.

With the throat of the yard near the river, it would be necessary to run through the gas plant of the Los Angeles Gas and Electric Company, resulting in a large cost, due to damages—another argument against these plans.

As noted before, the coach yard was not discussed by Mr. Hawgood and his testimony does not disclose his plans with regard to this im-

portant feature of any terminal. It appears that the best location to fit this plan is the present Salt Lake freight yard where a union coach yard is possible. Some storage should, however, be provided for at the depot yard.

It will also be seen that in the Hawgood Plan it is intended to use the right of way of the main line of the Santa Fe north of Macy Street for Southern Pacific trains. How these trains are to cross the river and proceed along Alhambra Avenue is not disclosed in this plan, and we must assume it to be the same in this respect as on Central Development Association Exhibit No. 4, namely, a curved bridge south of Southern Pacific bridge across the Los Angeles River at Alhambra Avenue. The connection to the Salt Lake tracks is also indicated on this exhibit, the Pasadena line to be reached by a curved connection from the above mentioned curved bridge and the main line running south along the Los Angeles River by a bridge between Macy and Aliso Streets and thence by a curve which would be adjacent to Anderson Street between Aliso and Kearny Streets, and connecting with the present main line about at First Street. The yard connects with the Santa Fe tracks approximately at their intersection with Aliso Street. These connections would be expensive, and we believe would present unfavorable operating conditions, on account of the excessive curvature that is unfavorable when compared to something else which is better. However, we do not wish to criticise this plan for such details as may be re-arranged, and attention is only drawn to these points to bring out the fact that the plan is more or less incomplete, and what really is presented is a passenger station yard along Aliso Street and west of Alameda Street. It should be noted that, in order to fit this plan in with the depression of the tracks along the river, the curved bridges should necessarily be of through construction, as there would be insufficient clearance for deck structures.

As in the Hawgood Plan, the Storrow Plan provides for a passenger station and concourses about 17 feet above the level of the tracks and the station yard. This plan proposes the elimination of the tracks on Alameda Street. The vertical drop from the station to the yard would be only that required for clearance over a street without tracks, and which is about 17 feet, and not that which might be required under the Hawgood Plan. The latter is silent as to the removal of the tracks on Alameda Street and a 25 foot drop is required if these tracks are allowed to remain.

The fact that the passengers would be compelled to ascend or descend such long ramps—stairs are out of the question—is another one of the principal objections to either of these plans.

Mr. Storrow's approaches to the station yard are quite different from those of the Hawgood Plan. The Storrow Plan is based upon the removal of the Southern Pacific tracks from Alhambra Avenue. These tracks would be moved to a new right of way to be acquired just south of this street, and to be depressed where they cross Mission Road, thus eliminating a

grade crossing at this point and providing in Alhambra Avenue a direct entrance to the city. This removal was strongly advocated.

Mission Road, where it crosses the Southern Pacific tracks, is at present at elevation 328 (Southern Pacific Railroad datum—sub-grade). For 25 foot clearance the railroad, if depressed, would have to be at elevation 303 (sub-grade). Now, as the Southern Pacific ascends from Mission Road toward the east for some distance, it appears that, in order not to exceed a one per cent grade—and this is of paramount importance—it would be necessary to lower these tracks for some two and one-half miles, through Aurant Station and ending approximately at Meyer's Spur. We believe that the expense to the Southern Pacific Company of such reconstruction is too great to be ordered under the circumstances. (The elimination of this crossing is presented in Chapter IX.)

Under the Storrow Plan the Southern Pacific main line tracks to the station would be relocated along the southerly edge of the Southern Pacific shop property, with a coach yard to occupy approximately one-half the area of this tract. After considerable investigation, we are convinced that it would be unwise to deprive the Southern Pacific of this shop property for shop uses, and that the establishment of a coach yard over so large an area of this shop property should not be made.

At the Los Angeles River, the Storrow Plan proposes two curved bridges to carry the tracks across the river. As for the Hawgood Plan, these would necessarily be through structures, very expensive, and also as in the Hawgood Plan, the cost of these bridges, plus the cost of the land, is not very different from the cost of better facilities which can be provided for the same money elsewhere.

It seems necessary to add that Mr. Storrow's plan also provides for the Pacific Electric. From a proposed station just south of the station yard proposed for the steam roads, the Pacific Electric would rise on an elevated structure up to the Los Angeles River, which it would cross at an elevation great enough to carry it over the steam road tracks, and connect with the present tracks east of Mission Road.

Another feature of the Storrow Plan is the abandonment of the Santa Fe present main line right of way between Alhambra Avenue and Jackson Street. How industries located along this line are to be served has not been indicated, except that they would be provided for under the general re-arrangement of spur tracks which were mentioned several times as the "herring-bone system."

Since we believe that better facilities can be provided for the same money as contemplated by the Storrow Plan, and that the Southern Pacific shop property should not be used for a coach yard, that such grade crossings of railroads would be introduced as to render proper operation very doubtful and since other coach yard facilities within reasonable distance cannot be acquired, we have decided that the Storrow Plan cannot be recommended.

Lands Required for Hawgood and Storrow Plans

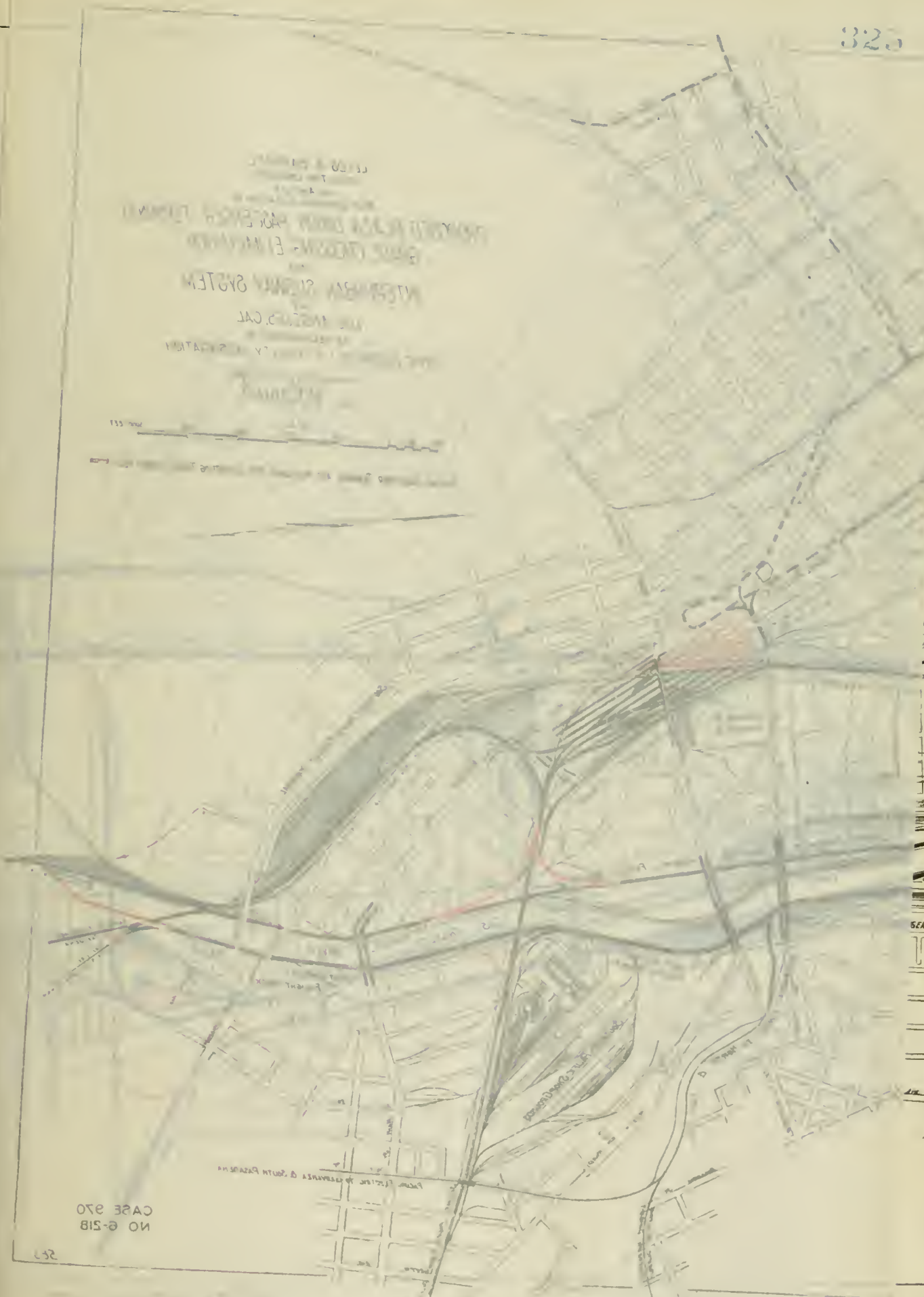
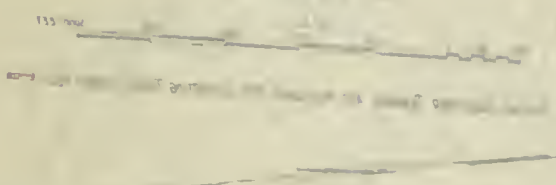
Exclusive of a coach yard, it is estimated that approximately 34.3 acres would be required for the union station site and approaches under the Hawgood Plan and that this land would cost \$2,060,039 exclusive of damages and the present value of the buildings which would be destroyed; the improvements are estimated at \$302,420, making a grand total of \$2,362,459. Of this 34.2 acres, 21.7 acres are now in private ownership and would cost, it is estimated, \$1,302,307. The balance is in carrier ownership, with the exception of one acre now owned by the City of Los Angeles and estimated to cost \$89,422. These figures refer to the plan as proposed by Mr. Hawgood and would be increased if the station yard were made longer, which would be necessary in order to obtain a satisfactory layout.

Under the Storrow Plan, 121 acres would be required and would cost, exclusive of damages and compensation for the present value of the buildings thereon, \$3,588,127. Improvements are estimated at \$461,896. Of the total land to be acquired, 52 acres are in private ownership and would cost, it is estimated, \$1,935,787. The property of the City of Los Angeles is included, the same as in the Hawgood Plan. Sixty-one and four-tenths acres to be used are now Southern Pacific property and valued at \$1,112,917. In the figure \$3,588,127, we have included \$1,287,530 as the cost of acquiring these 61.4 acres.

Business Stability Association Plan

The Barnard Plan (Business Stability Association Exhibit No. 1) presented by Mr. W. K. Barnard, as witness for this body, while locating the terminal at the Plaza, is quite different from the Hawgood or Storrow plans. Mr. Barnard has selected a depot site lying along and east of Main Street, running northerly from approximately Arcadia Street to Alhambra Avenue, and extending approximately from Main Street easterly to Date Street. As Exhibit No. 1 was evidently prepared in a hurry, we asked Mr. Barnard if he would prefer to re-draw it, or have us photograph the original. He chose to re-draw the map, as this plan now appears before us, it consists of two drawings, one showing the depot and the other showing proposed connections with a proposed subway system. An explanatory statement supplementing his oral testimony was also submitted by Mr. Barnard.

THE UNIVERSITY OF CALIFORNIA
 DEPARTMENT OF CIVIL ENGINEERING
 AND
 WATER RESOURCES CENTER
 UNIVERSITY OF CALIFORNIA
 BERKELEY, CALIFORNIA



CASE 870
 NO. 8-518



LEEDS & BARNARD
 CONSULTING ENGINEERS
 LOS ANGELES
 MAP SHOWING LOCATION OF
PROPOSED PLAZA UNION PASSENGER TERMINAL
GRADE CROSSING ELIMINATION
 AND
INTERURBAN SUBWAY SYSTEM
 AT
 LOS ANGELES, CAL.
 AS RECOMMENDED BY
 THE BUSINESS STABILITY ASSOCIATION
 APPROVED MAY 20, 1908
 BY W. H. BARNARD

SCALE 1" = 100 FEET

PARTIAL PASSENGER TERMINAL AND NECESSARY NEW CONNECTING TRACKS SHOWN RED

CASE 970
 NO. 6-218

FIG. 111. BARNARD PLAN FOR UNION PASSENGER TERMINAL AT THE PLAZA
 This is the plan recommended by the Business Stability Association. This plan and the recommended Engineering Department plan makes use of the same site. Proposed immediate construction is shown in red

It will be noted that the map of "Track Arrangement and Connections" shows thirty-two tracks arranged in pairs with a rather comprehensive, if not complicated, throat arrangement. No details are presented as to the possible details of the building or the location of the baggage, express and mail facilities. The site of a coach yard, or the arrangement of the necessary facilities therein, were not brought up, except that space for some car storage was shown.

In the explanatory statement submitted by Mr. Barnard, the following, with regard to the general object of the plan, is found:

"In addition to the foregoing general considerations, it is desired particularly to draw your attention to the following advantages which inhere to the proposed plan for the location of the passenger terminal at the Plaza:

"First: The plan provides easy access and ample facilities for all railroads now entering Los Angeles and for such as may reasonably be expected to enter the city in the next twenty or thirty years.

"Second: The plan provides for the progressive development of the work as need shall arise for facilities.

"Third: Requires least amount of disturbance of existing track arrangements.

"Fourth: Offers best and most approved method for handling baggage and express without interference with passenger movement on platforms and concourse.

"Fifth: The plan provides for trains heading or hacking in, as circumstances might dictate.

"Sixth: The plan best conforms to the physical, topographical and geographical conditions at the Plaza and as related to urban, interurban and subway carriers.

"Seventh: The plan provides for the rapid handling of United States mails between the terminal and the main post in the federal building.

"Eighth: The plan provides means for having all general offices of the railroads, express companies and allied facilities housed conveniently and economically under one roof at the terminal.

"Ninth: The plan conforms to the essential requirements given for passenger terminal stations in the manual of the American Railway Engineering Association representing the best recommended engineering practice in the United States.

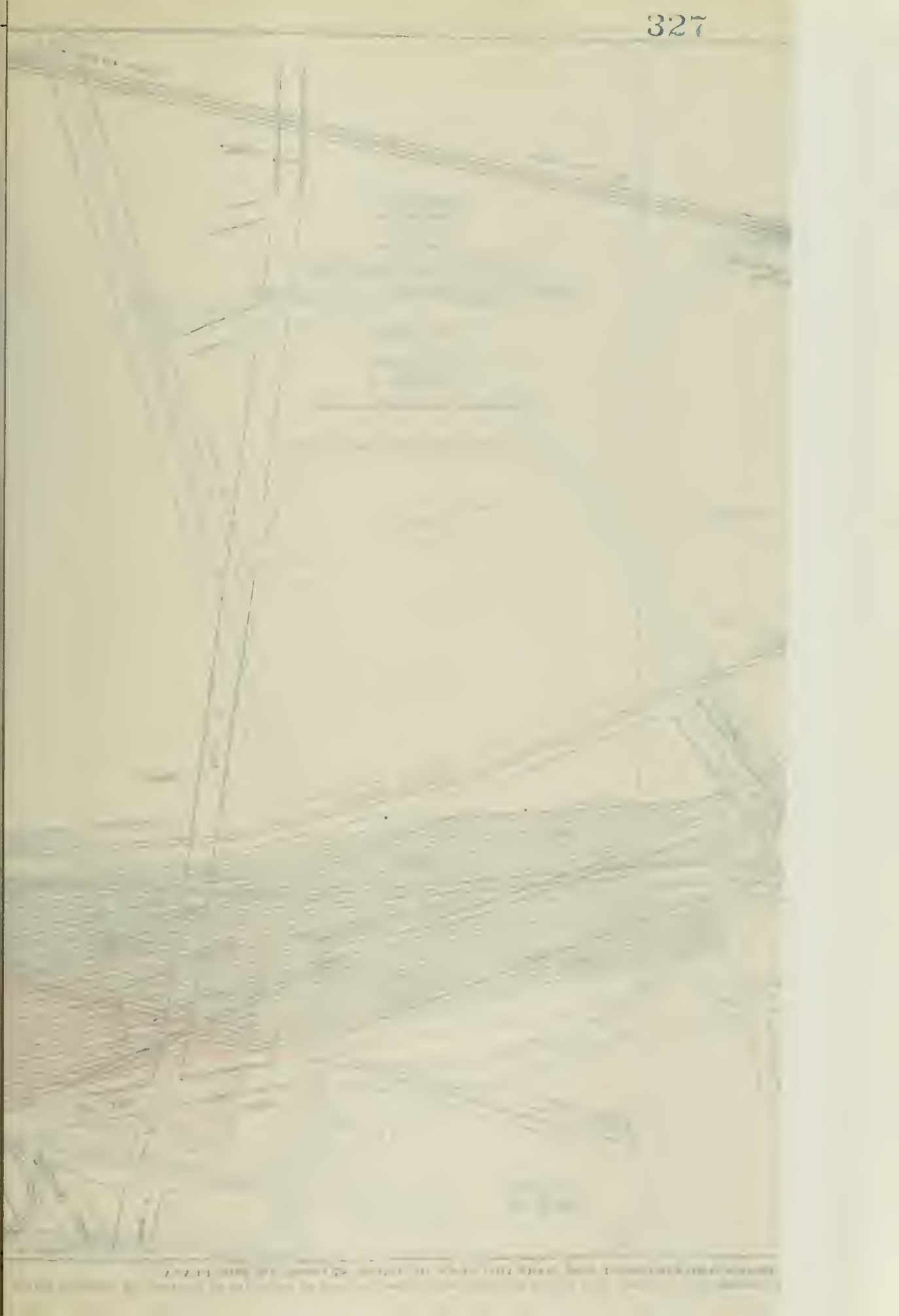
"Tenth: The plan provides for a location of the terminal at the exact end of the municipal railroad track on San Pedro Street.

"Eleventh: The plan provides for the most complete and effective elimination of grade crossings of main thoroughfares and railroads.

"Twelfth: The plan provides for the joint use by the several railroad companies of the various freight terminal facilities and engine terminals."

These different advantages are discussed in detail, but we believe that attention should be drawn to the fact that Mr. Barnard's plan is probably the most comprehensive, in that he has considered rapid transit in subways in the city, as well as the establishment of a passenger station.

The site proposed in the Barnard Plan has been used as a basis for our plan for a union passenger terminal at the Plaza, and will be discussed further in the chapter devoted to our plan.





LEEDS & BARNARD
 CONSULTING ENGINEERS
 LOS ANGELES
 MAP SHOWING
 TRACK ARRANGEMENT & CONNECTIONS
 PROPOSED PLAZA UNION PASSENGER TERMINAL
 AT
 LOS ANGELES, CAL.

APPROVED MAY 20 1915
 BY W. S. BULLARD
 CHIEF ENGINEER
 SCALE: 1" = 100'

PARTIAL DEVELOPMENT OF PASSENGER TERMINAL, JOHN BID

CASE 370
 NO 6-228

FIG. 116. TRACK ARRANGEMENT FOR BARNARD PLAN OF FAIR STATION AT THE PLAZA
 The ultimate plan is shown and consists of 11 tracks. The tracks are depressed below the level of the Plaza to the level of Alameda Street

Edwin S. Smith (Redrawn by Mr. Barnard)

Southern Pacific-Salt Lake Plan for Joint Station

Proposed Steam Road Construction

The general features of the plan have already been described and arguments for and against the use of this site given, with the conclusion that

This plan was submitted to the Commission in Application No. 3346, filed November 22, 1917, although it has been described and advocated at hearings commencing July 24th, 1917, six days after the date of an agreement between the two roads.

This application was consolidated for hearing and decision with Case 970, et seq. As this application now stands before the Commission, applicants ask approval of the above agreement, which appears as a printed pamphlet of forty-three pages, covering fully all phases of construction and operation under the plan.

The preamble of the agreement states, in part, as follows:

"WHEREAS, The Southern Pacific Company desires to procure new and additional lines through parts of said City of Los Angeles, from a point on its existing lines near the foot of Dayton Avenue, in the vicinity of its present bridge across the Los Angeles River; thence taking a course across the Arroyo Seco on the east side of the Los Angeles River and beyond, and over and along the tracks and property of the Salt Lake Company to Butte Street; thence westerly along the Butte Street line of the Salt Lake Company to a connection with the existing tracks of the Pacific Electric Railway Company on Butte Street, and/or of the Southern Company on Alameda Street, together with elevated track connections commencing at points in the vicinity of Sixth and Alameda Streets, running easterly to the Los Angeles River and by bridges across said river to connections with the tracks of the Salt Lake Company; also a proposed joint passenger train car yard to be located on property of the Salt Lake Company; and

"WHEREAS, The Salt Lake Company desires to use in common with the Southern Company, the passenger station and appurtenances of the Southern Company located in the vicinity of Fifth Streets and Central Avenue, in said City of Los Angeles, together with such tracks and other facilities as may be necessary for the operation of engines and passenger train cars of the Salt Lake Company to and from said passenger station; and

"WHEREAS, The parties hereto contemplate the ultimate establishment of a joint interchange yard upon the property of the Southern Company situate between Dayton Avenue and Alice Street; and

"WHEREAS, in order to provide for the common use, as aforesaid, of the respective facilities mentioned, and the reciprocal exchanges of privileges, it will be necessary to purchase and acquire additional real property, to procure franchises and easements, construct additional tracks, bridges, elevated viaducts, subways, interlocking devices, signal system, telegraph and telephone lines, and all appurtenances:"

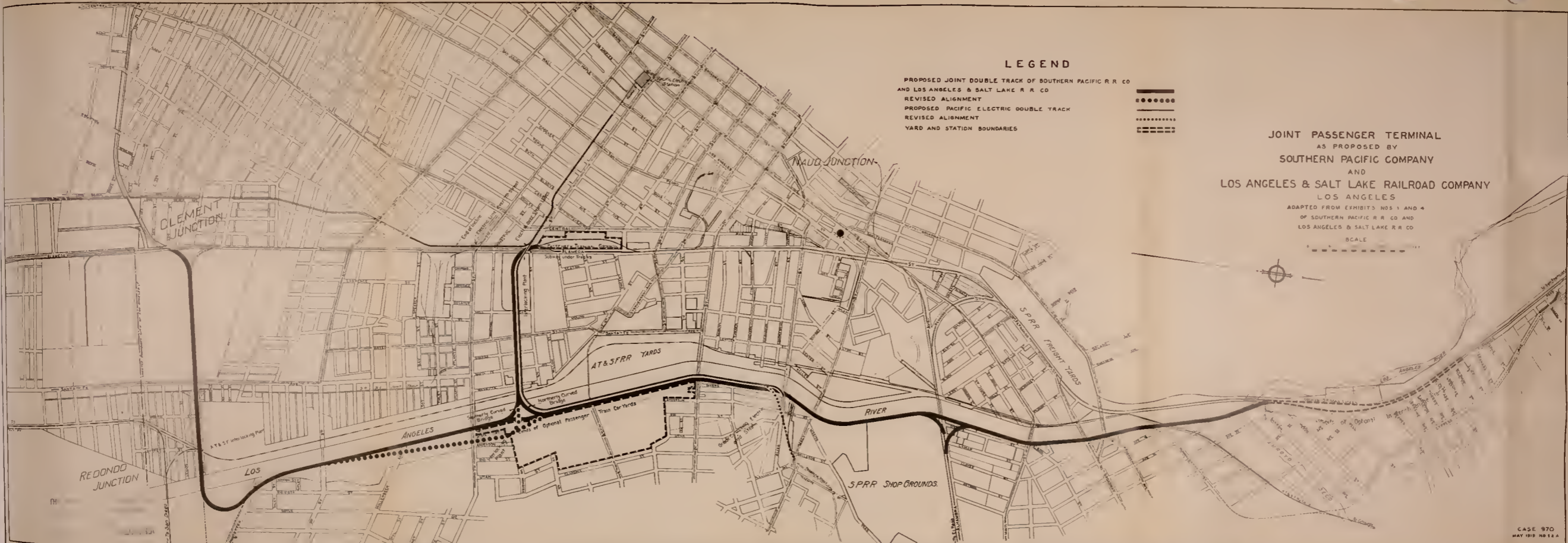
Construction is divided into several units, and for Unit One the Salt Lake agrees:

A—To double-track its tracks from south of Alhambra Avenue to Ninth Street.



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and

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LEGEND

- PROPOSED JOINT DOUBLE TRACK OF SOUTHERN PACIFIC R R CO AND LOS ANGELES & SALT LAKE R R CO
- REVISED ALIGNMENT
- PROPOSED PACIFIC ELECTRIC DOUBLE TRACK
- REVISED ALIGNMENT
- YARD AND STATION BOUNDARIES



**JOINT PASSENGER TERMINAL
AS PROPOSED BY
SOUTHERN PACIFIC COMPANY
AND
LOS ANGELES & SALT LAKE RAILROAD COMPANY
LOS ANGELES**

ADAPTED FROM EXHIBITS NOS 1 AND 4
OF SOUTHERN PACIFIC R R CO AND
LOS ANGELES & SALT LAKE R R CO

SCALE



FIG. 110. JOINT PASSENGER TERMINAL AS PROPOSED BY THE SOUTHERN PACIFIC COMPANY AND LOS ANGELES AND SALT LAKE RAILROAD COMPANY

This is adapted from Exhibit Nos 1 and 4 of the two roads, and shows the routes to be used jointly. The approach to the Southern Pacific Station is to be elevated from east of the river from its present end near Wall Street, including a connection for the Long Beach Line. This is the plan contemplated in Application 114. We recommend that this application be disallowed. The alignment for the Pacific Electric Railway is shown with open circles.

B—To construct and double-track elevated bridge and tracks across the Los Angeles River between Sixth and Seventh Streets (this is the southerly curved bridge, as shown on the plan).

C—To construct part of connection with the Southern Pacific south of Alhambra Avenue.

D To construct interlocking plant between northerly and southerly curved bridges between Sixth and Seventh Streets.

The Southern Pacific agrees:

A—To construct double-track elevated structure and tracks from the east line of the Los Angeles River between Sixth and Seventh Streets westerly to a location near Sixth and Alameda Streets.

B—To re-arrange its passenger facilities and connect the station tracks with "A" above.

C—Construct interlocking plant for "B" above.

All of the above construction is to be jointly used.

After the completion of Unit One, Unit Two follows. This covers construction by the Salt Lake of minor trackage near Alhambra Avenue and the river by the Southern Pacific, construction of a new track from the Santa Fe right of way at Humboldt Street and the Southern Pacific right of way near Dayton Avenue, along the east bank of the Los Angeles River.

Unit Three covers construction by the Salt Lake of—

A—A single track curved connection between the main line at Hostetter Street (Alosta St.) and Butte Street.

B—Part of new connection curving southerly from Butte Street into Alameda Street.

Within five years from the effective date of the agreement, the Southern Pacific may elect to join with the Salt Lake in a joint passenger train car yard, to be located upon not to exceed 30 acres of the Salt Lake property along the east bank of the Los Angeles River between First and Seventh Streets, and the Salt Lake may elect to join the Southern Pacific in an interchange yard upon Southern Pacific property between Dayton Avenue and Alice Street.

The passenger train yard is to be constructed by the Salt Lake and the interchange yard by the Southern Pacific. Both companies reserve the right to admit one or more additional railroads to these new yards, but the agreement does not bear any reference to the use of the Southern Pacific Station facilities by any additional road other than the Pacific Electric, which may be admitted at the election of the Southern Pacific.

The Salt Lake also grants to the Southern Pacific for the sole use of the Pacific Electric without rental therefor, an easement during the life of the agreement, for a right of way of sufficient width, not exceeding 50 feet, for the construction, maintenance and operation of a double-track electric railway along the Salt Lake right of way on the east bank of the river from Aliso Street to the northerly curved bridge, as mentioned in the agreement. The agreement further provides for the division of the cost of certain additions and betterments and the costs of operation.

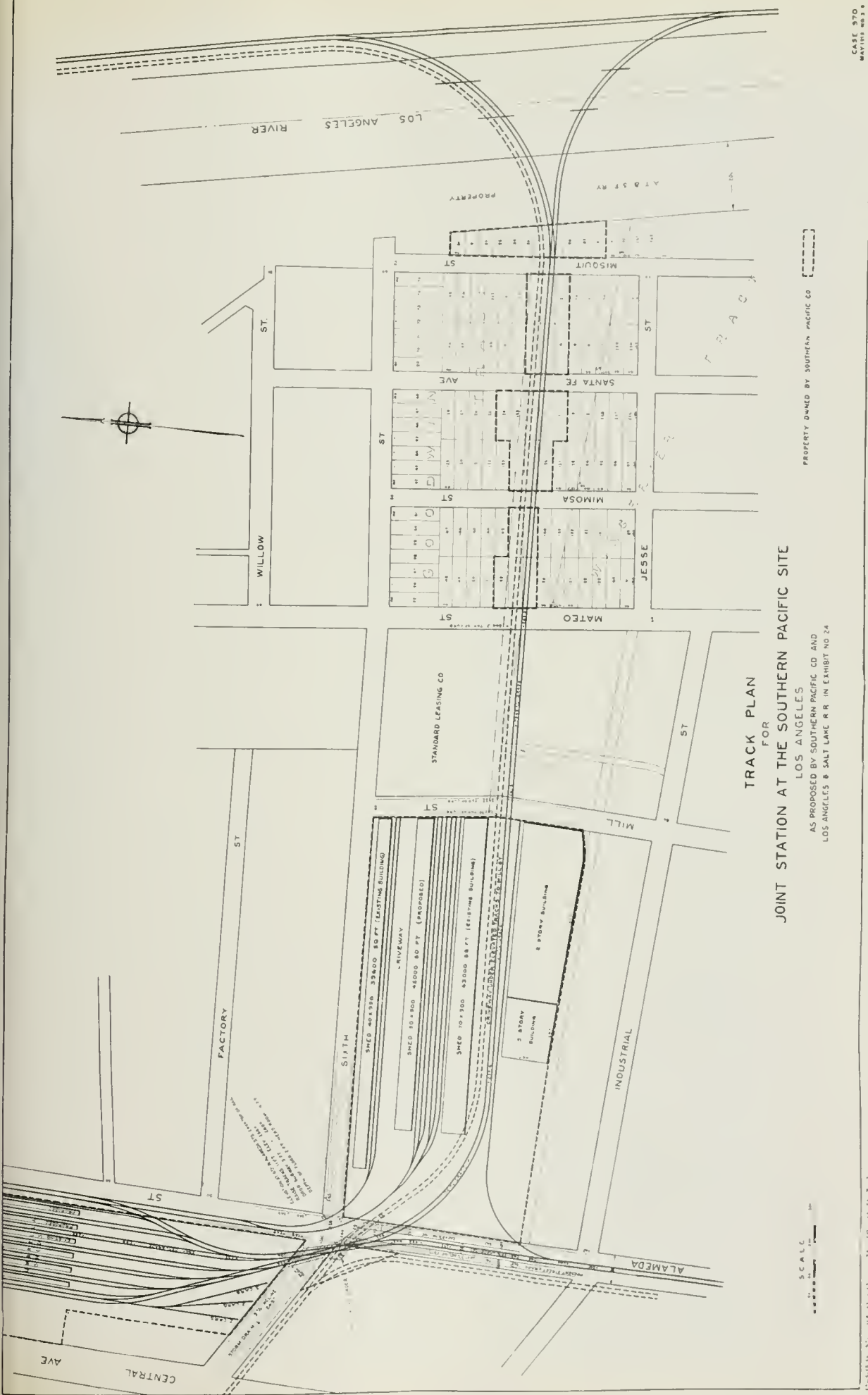


FIG. 117. TRACK PLAN FOR UNION STATION AT THE SOUTHERN PACIFIC SITE

This shows the alignment of the proposed elevated approach from east of the river to the station. The width from Central Avenue to Alameda Street is 400 feet and the capacity is limited to 14 station tracks. In maintaining the freight tracks on Alameda Street and in providing connection to the coach yard now in use, it is difficult to eliminate the grade crossings at 6th and Alameda Streets without causing an awkward situation.

Detailed Description of Proposed Construction

Beginning at the southerly end of the present umbrella sheds at the present Southern Pacific station, it is proposed that the tracks rise, curve to the east and cross over Sixth Street and Alameda Street on a 0.6 per cent ascending grade. It may be noted that the curvature is 10° and that the rate of grade is a one per cent compensated grade.

The intersection of Sixth and Alameda Streets is to be depressed 5 feet and the tracks carried over both of these streets. At Sixth Street the full width of the street would be available, but at Alameda Street, due to a proposed connection to allow train movements from the station site into Alameda Street south thereof, the width of the street is contracted from 68 to 40 feet (41%).

This plan of street depression and subway produces an extremely awkward situation at Sixth and Alameda Streets, which we do not believe the city would look upon with favor. Alameda Street should not be contracted in width, because of the large amount of traffic it now carries and must carry in the future. This objectionable feature may be partly overcome, however, by doing away with the proposed connection to the tracks in Alameda Street south of the station and by increasing the width of the roadway. The proposed track connection is apparently for the use of the coach equipment movements between the station and the present coach yard but we believe that train movements of this kind should not be allowed, because of the present grade crossing conditions at Seventh and Alameda Streets. Instead of waiting five years for the proposed joint passenger train yard, it should be constructed at once if this plan is approved.

With regard to the width of Alameda Street, this elimination of the track connections will avoid the contraction of the street. The 3% grades proposed in the subway are not prohibitive but should be made less, if possible, to avoid adjustment in the tonnage carried on drays and trucks, since all the streets used for draying in this vicinity have grades of considerably less than one per cent. The point has been made that this subway would occasionally be filled up with water, but, since it is possible to successfully drain it directly into an underlying storm sewer, this cannot be regarded as an argument against the plan.

We have already noted that the maximum number of station tracks possible at the Southern Pacific site is twelve, this limitation being imposed by the width of the site. There are now eight station tracks and it is possible to build four more without encroachment on Alameda Street.

The number of approach tracks proposed was two, as shown by Fig. 118.

From Alameda Street, the proposed elevated approach continues to rise, running easterly approximately parallel to, and from 300 feet to 400 feet southerly of Sixth Street, to the west bank of the Los Angeles River, crossing over Mill, Mateo, Imperial, Santa Fe and Mesquit Streets.

LOS ANGELES, CAL.

Southern Pacific Co.-Salt Lake & Los Angeles Ry. Co.-Pacific Electric Ry. Co.

SIXTH and ALAMEDA STS.

PROPOSED GRADE CROSSING ELIMINATION.



Exhibit No 18 Southern Pacific Salt Lake

This shows the complexity of the problem of eliminating grade crossings at this point. The upper level represents the Pacific Electric elevated line, the middle level shows the arrangement of the steam trackage and approaches, and the lower level shows Alameda Street depressed, and divided into two lines of traffic south of Sixth Street. By discontinuing the use of the existing Southern Pacific Coach yard, the steam line south of Alameda Street would become unnecessary.

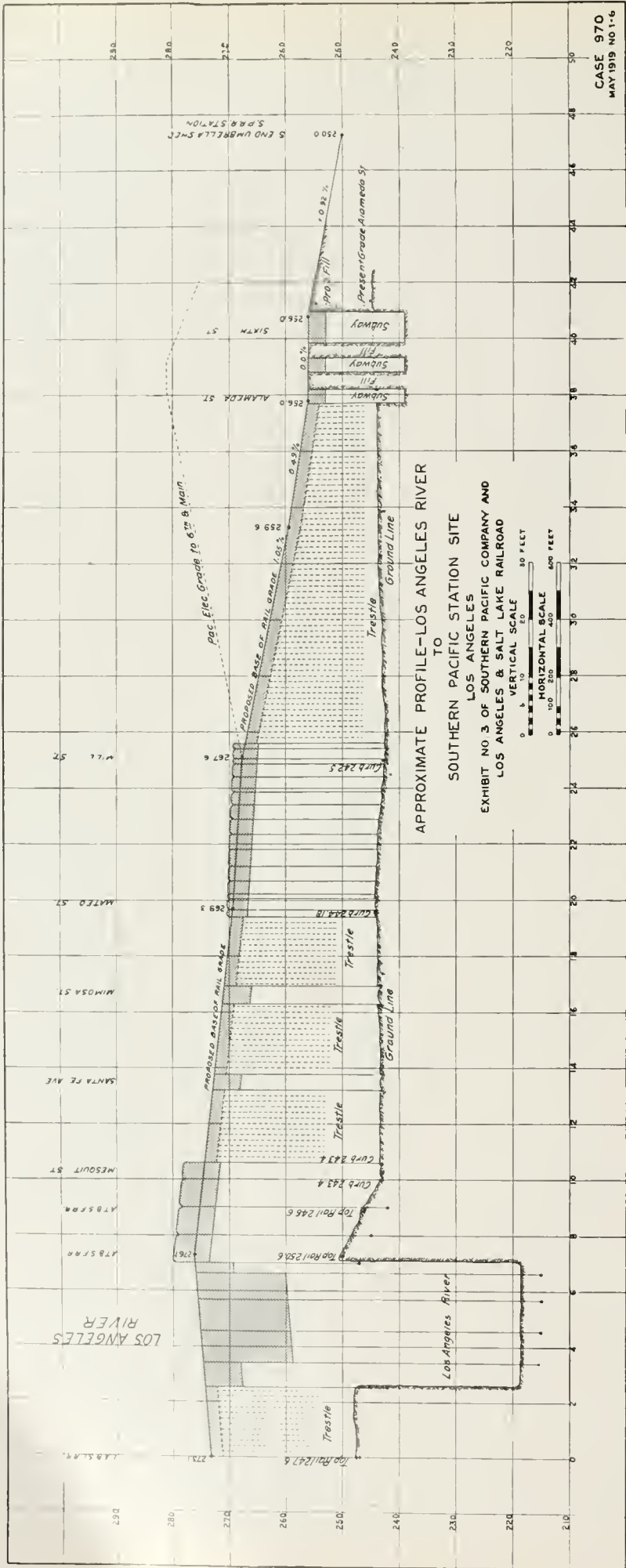
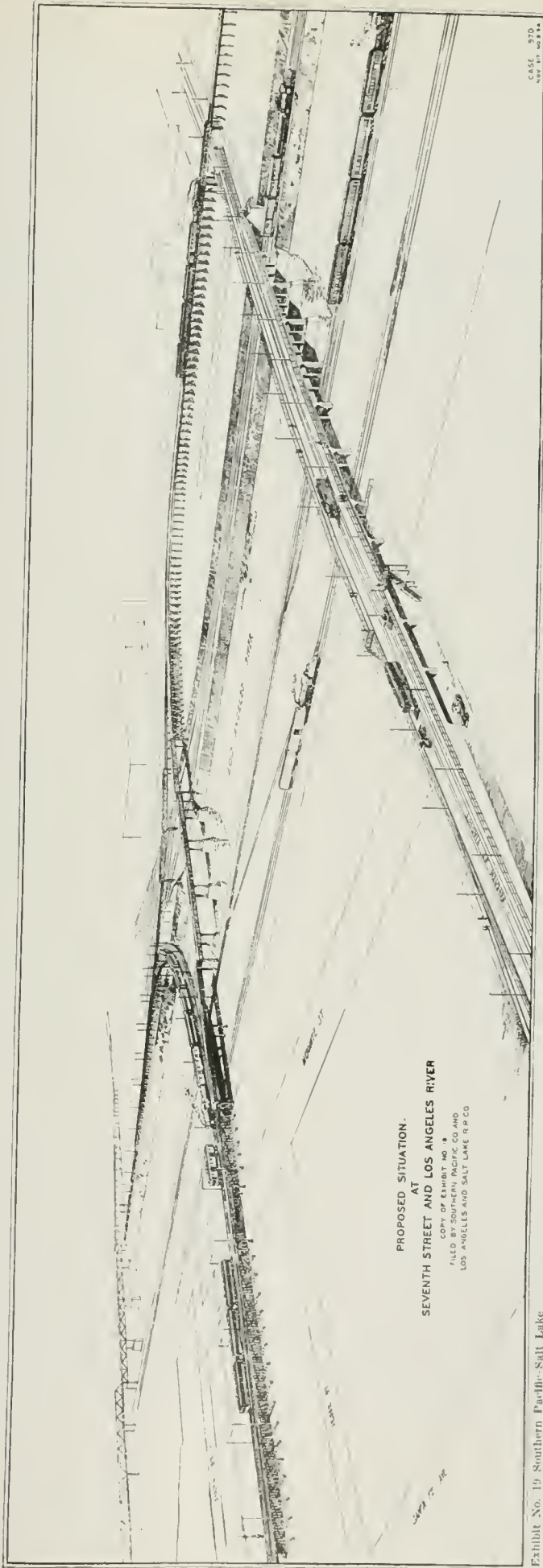


FIG. 119. PROFILE OF ELEVATED APPROACH TO SOUTHERN PACIFIC STATION to the east side of the river. The proposed grades for the Pacific Electric line are also shown.



PROPOSED SITUATION.
 AT
 SEVENTH STREET AND LOS ANGELES RIVER
 COPY OF EXHIBIT NO. 9
 FILED IN SOUTHERN PACIFIC CO AND
 LOS ANGELES AND SALT LAKE R.P. CO

Exhibit No. 19 Southern Pacific-Salt Lake

FIG. 120. PERSPECTIVE OF SEVENTH STREET VIADUCT AND ELEVATED APPROACH IN SOUTHERN PACIFIC STATION PROJECT

This shows the curved bridges and depressed trackage at the river and the relation of the railway lines to the street viaducts.

The profile of this elevated approach is given in Southern Pacific-Salt Lake Exhibit No. 3. This profile shows wooden trestle construction from Alameda Street to Mill Street, steel elevated construction from Mill Street to Mateo Street, and wooden trestle construction from Mateo Street to Mesquit Street, with steel bridges over Mimosa (now Imperial) Street and Santa Fe Avenue. All of these streets are to be crossed with a net clearance of 22 feet, which will allow the construction and operation of tracks beneath, over which standard freight cars may be moved without impaired clearance. From the end of the curve at Sixth and Alameda Streets, the rate of grade is 0.63% ascending; from Mill Street to Mateo Street, 0.31%, and from Mateo Street to the west bank of the river, 0.55%, both of these grades also ascending. The proposed base of rail where these elevated tracks cross the Santa Fe main line tracks at the west bank of the river is 276.1 (City Datum). If the Santa Fe tracks are depressed, as herein recommended, their elevation would be 243.84, and allowing 26 feet gross clearance, the top of rail on the elevated structure would be 269.84, which would permit a level grade on the elevated tracks on the west bank of the river to Mateo Street.

Beginning at the west bank of the river, two curved bridges were proposed—one curving to the north and one to the south, both on ten-degree curves. The rate of grade on the northerly curved bridge was proposed at 0.41%. The curves on this bridge bring the elevated tracks, after crossing over the Salt Lake tracks, parallel to the east bank of the river, and, continuing to descend, the tracks pass under the Fourth Street Bridge, which, by the way, it was stated would have to be raised about 8 feet to accommodate this scheme, and come to grade just north of this bridge.

It was first planned to start the curve on the southerly curved bridge at such point on the west bank of the river that the elevated tracks on the east side would be adjacent to the east bank of the river, but this having developed difficulty in the separation of grades at Seventh Street, it was later proposed to move the curve easterly, so that the elevated tracks would cross over Seventh Street, just west of Anderson Street. From Seventh Street, the elevated tracks descend, coming to grade at Ninth Street.

Full discussion of the adaptability of the Southern Pacific-Salt Lake plan on the east side of the river to the proposed depressed grades of the river tracks and the proposed viaducts has already been given in Chapter VI, with the conclusion that it was feasible to provide a satisfactory rate of grade for the railroad and make the necessary grade crossing elimination at Fourth, Seventh and Ninth Streets.

The plan of having but two tracks at the throat of the yard was quite severely criticised at the hearings held before the Commission, it being alleged that this number was sufficient for satisfactory operation. We agree that two tracks are not enough but see no reason why four tracks could not

be built. They would be desirable even at first, but it would not be necessary to build them all the way from Alameda Street across the river until the traffic has increased considerably above the present train movements.

Following will be found a table showing the relation between the number of trains, station tracks and approach tracks at several of the Chicago stations and similar data estimated for the Southern Pacific Station. This information has been supplemented by data for a proposed union station at the Southern Pacific site, and comparison between this station and the Chicago station may be made. Based on Chicago experience, the twelve tracks at the Southern Pacific station will be sufficient for the 140 trains expected in the future.

COMPOSITE RUSH HOUR TRAIN TRAFFIC*
CHICAGO PASSENGER TERMINALS

Station	—Tracks—			—Trains—		Trains Per Day		Trains Per Busy Hour	
	Sta- tion	Ap- proach	Ratio	Per Day	Per Hour	Per Sta- Track	Per Ap- proach Track	Per Sta- Track	Per Ap- proach Track
C. & N. W.	16	6	2.67	319	46	19.7	53.2	2.88	7.67
Union	12	4	3.0	278	37	23.2	66.3	3.08	9.25
La Salle	11	4	2.75	196	22	17.8	49.0	2.00	5.5
B. & O.	6	2	3.0	31	4	5.2	15.5	.67	2.00
Dearborn	9	2	4.5	154	19	17.1	11.0	2.11	9.50
I. C. (12th St.)	7	2	3.50	89	9	12.7	44.5	1.28	4.50
Total	61	20	3.05	1067	137	17.46	53.3	2.25	5.85
I. C. Suburban (Randolph St.)	6	2	3.0	284	34	42.7	128	5.1	15.5
Grand Total	67	22	3.05	1351	171	20.15	61.4	2.55	7.77

NOTE: Records compiled from station train sheets. Busy hours of each individual station taken without reference to other stations. These periods overlap in some cases. The total represents the maximum station business for a complete rush or busy hour.

*From 'Report on Railroad Terminals, City of Chicago, by Bion J. Arnold.'

PROPOSED SOUTHERN PACIFIC UNION STATION

Arcade	12	4	3.00	140	.	11.7	35	...	...
	12	2	6.00	...	..	.	70	...	...

Proposed Pacific Electric Construction

The Pacific Electric is also a party to this plan. It is proposed to continue the present elevated structure from San Pedro Street easterly and approximately parallel to Sixth Street, along a private right of way to Alameda Street, where the Pacific Electric tracks would cross over the curved bridge to the yard and also over Alameda Street, which, in turn, would cross over Alameda Street, involving what might be called a "two-story" crossing

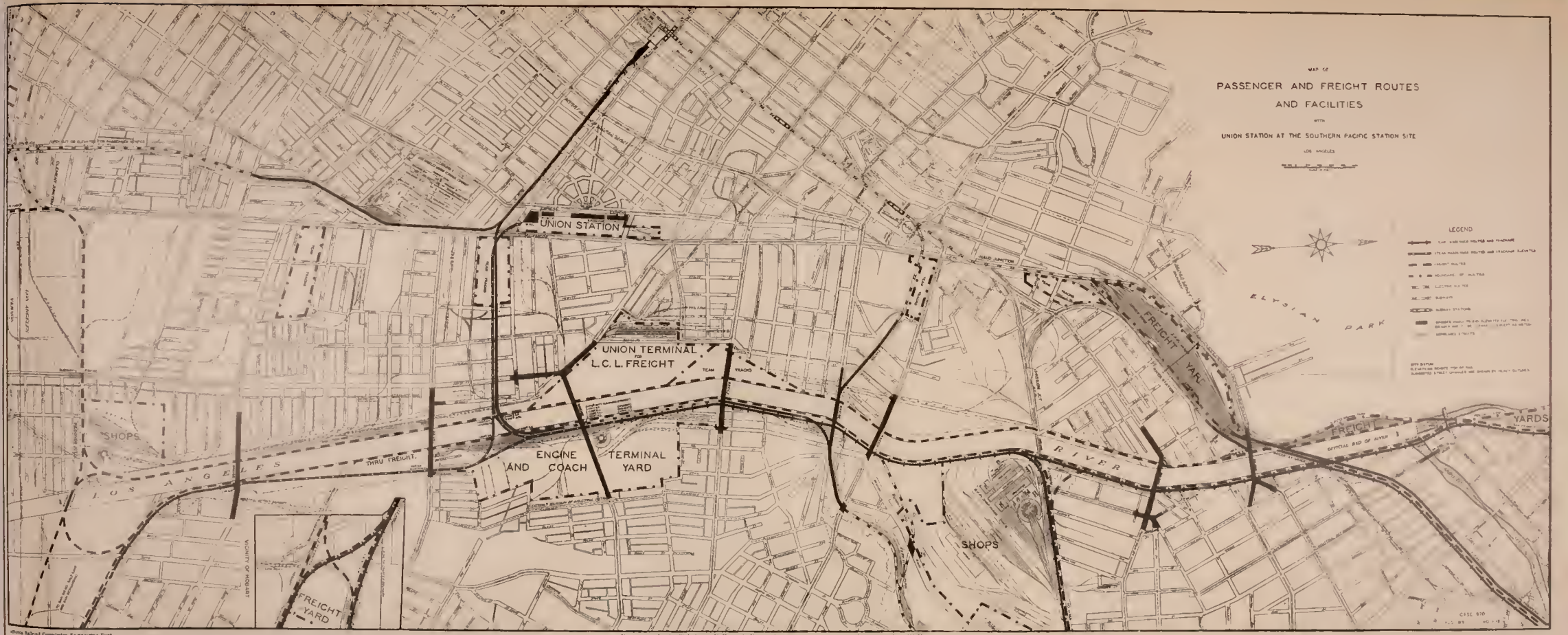
at this point. See Fig. 118 (see page 333). The Pacific Electric tracks would then be at an elevation of 37 feet above the present grade of Alameda Street and 42 feet above the bottom of the proposed subway. West of Alameda Street the Pacific Electric tracks would become parallel and adjacent to the Southern Pacific tracks and follow them to and across the river and northerly along the east bank coming to grade at the same point. They would then continue at grade, passing under First Street to a point just south of Aliso Street, where they would turn to the east, either crossing at grade or crossing over the steam railroad tracks and connecting with the present main line just east of Mission Road. The first scheme was to make this crossing at grade, but this was later revised so that the Pacific Electric would start to rise just north of First Street and south of Aliso Street, would cross over the steam railroad tracks, then over Aliso Street and Mission Road and come to grade at Brooklyn Avenue.

Just before the Pacific Electric reached Alameda Street, it was also planned to have an elevated line turn south and pass over Industrial Street along the right of way on the westerly side of Alameda Street. They would then cross over Seventh, Eighth and Ninth Streets and reach the present Southern Division main line at grade at Fourteenth Street, although this construction might be progressive to reach Ninth Street at present, later to extend to Fourteenth Street or even toward Vernon or Slauson Avenues.

Figs. 117 and 118 (see pages 331 and 333) show a connection from the throat of the yard southerly into Alameda Street on a 2.3 per cent grade and, as heretofore mentioned, apparently for the use of the coach equipment movements between the station and the present coach yard and for the continuance of industrial switching in Alameda Street. Under this plan there is no reduction of the passenger traffic south of Seventh Street and across the very busy crossing of Seventh and Alameda Streets. The passenger traffic now consists of only two train movements each way per day and is unimportant, but the combination of passenger and freight switching is responsible for entirely too much congestion at the Seventh Street crossing. There is no necessity of building this connection. These passenger trains, operating over the Anaheim Branch only, could be rerouted, using the Salt Lake tracks to Cudahy, where they could transfer to the Anaheim Branch. This would require a new connection at Cudahy. The passenger car switching across Seventh Street would be eliminated by construction of the proposed passenger car yard on the Salt Lake right of way between First and Seventh Streets, and the freight switching by the plan proposed for the amelioration of Alameda Street grade crossing situation through elimination of the traffic, in which it was recalled that all freight cars destined for points on Alameda Street south of Seventh Street would reach Alameda Street via Butte Street and not by a haul along Alameda Street north of Seventh Street.



THE PLAN OF THE RAILROAD STATION AND YARD



© 1911, Southern Railway System. Engineering Dept.

FIG. 121. ROUTE MAP WITH UNION STATION AT THE SOUTHERN PACIFIC SITE.

This plan has been made by the Engineering Department to show the location of passenger and freight routes and facilities, viaducts, etc., with the Union Station at the Arcade site, and should be compared with similar plans for the other two sites considered, (see Plans 122 and 123). Note the impossibility of expanding the station site without deflecting or bridging Alameda Street. Also note the inconvenience of the site with reference to rapid transit lines. The plan is not recommended.

SOUTHERN PACIFIC PLAN REVISED FOR UNION PASSENGER TERMINAL

This name may be applied to the Southern Pacific-Salt Lake plan as we have modified it for a union passenger terminal at the Southern Pacific site, by certain changes and elimination of certain objectionable features.

Track Changes at the Station

Four approach tracks of a train length have been substituted for the two proposed, resulting in a different arrangement of the south ladder tracks. The approach from Alameda Street from the south is eliminated, resulting in a somewhat different alignment of the curved approach at Sixth and Alameda Streets. This change in alignment permits depressing Alameda Street 4 feet, instead of 5 feet, while Sixth Street is depressed 5 feet only under the railway bridge.

Two more station platforms and umbrella sheds and four station tracks are added, as in the original plan. South of the sheds the station tracks are continued parallel and straight and stubbed, but provided with a cross-over at an appropriate distance from the end. This provides tracks of sufficient length and at the same time provides for the prompt release of road engines and gives some switching facilities which stub stations cannot enjoy. One track only is carried across Fourth Street to provide for unloading of carload express shipments on Fourth and Alameda Streets team tracks.

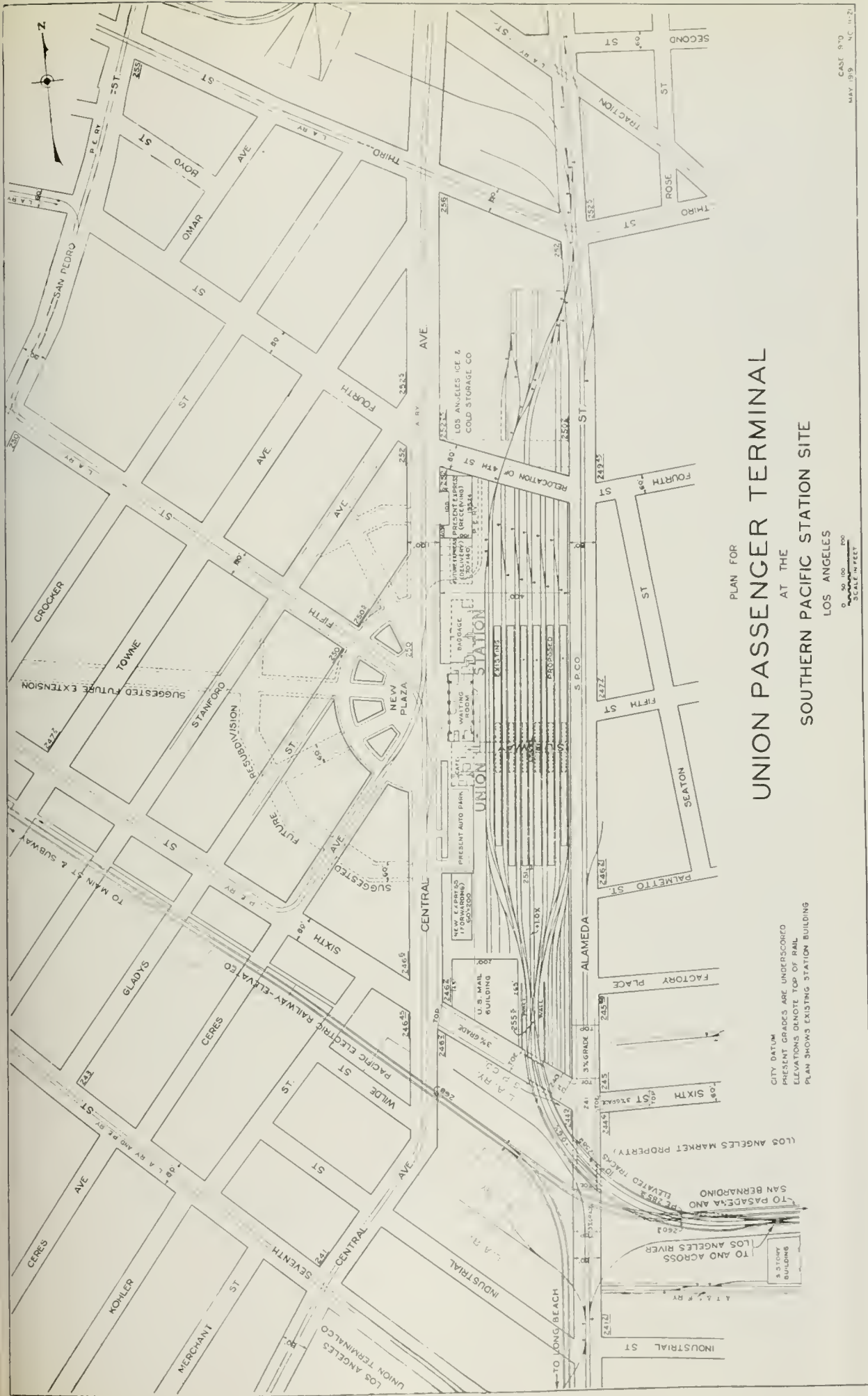
Site and Building Changes

In order to straighten Fourth Street we propose that it be relocated to avoid the jog at Alameda Street. This increases the Fourth Street team yard and decreases the station site by the same amount, which does not seem to present any objectionable features.

The present station and baggage building in the revised plan needs no important changes at this time.

The present express facilities are inadequate, about 9,000 square feet more of ground floor space being needed at present, preferably in a building 50 feet wide. Two methods of providing this facility have been considered. The station tracks north of the umbrella sheds are long and such a building may be constructed along Fourth Street and at the ends of the station tracks.

There is a distinct line of demarcation between the forwarding and delivery departments, and we see no reason why they should not be separately housed, provided the length of trucking haul may be in this way reduced. Since the inbound trains have their express cars on the north end, the space north of the sheds may be used for unloading and the present express building, nearby, for a delivery house. It also has adequate second-floor office space.



PLAN FOR
UNION PASSENGER TERMINAL
 AT THE
SOUTHERN PACIFIC STATION SITE
 LOS ANGELES

SCALE IN FEET
 0 50 100 200

MAY 1919
 C.S.T. 970

FIG. 122. PLAN FOR UNION PASSENGER TERMINAL AT THE SOUTHERN PACIFIC SITE
 This plan has been made by the Engineering Department and is similar to the joint terminal plan submitted by the Southern Pacific Company and the Salt Lake Railroad Company (See Fig. 116) but modified to be used as a union terminal. For just comparison with the plan recommended (See Fig. 120) a plaza has been added. The difficulty and expense of creating a radiating system of streets for adding to the convenience of the site, instead of taking advantage of an existing fan-like arrangement, should be noted.

A terminal postoffice being desirable, this and the forwarding building may be located on land to be acquired, now privately owned and south of the "auto park."

The present express building has 10,250 square feet of ground floor. A new forwarding building should have 10,000 square feet, which is given by a building 50 feet by 200 feet. Further increment may be made by extending the present building south and the proposed forwarding building somewhat to the south and to the north into the "auto park." In this way at least 40,000 square feet may be found.

The requirement of a terminal postoffice for ten years is taken at 40,000 square feet, preferably in the shape of the width about half the length. This may be located at the southeast corner of Sixth and Alameda Streets, although a rectangular shape is not provided.

Method of Operation

In order to compare, analyze, or prepare plans showing different facilities used in handling passenger trains, it is necessary to have before us the proposed method of operation. Our plans for a union station and coach yard are predicated upon joint operation, division of the cost to be made on some equitable basis to be determined later. It is also contemplated that a union engine terminal be used for passenger train locomotives, light and turning repairs and boiler washing to be pooled. This, however, is not absolutely necessary and its adoption depends, to a large extent, upon the relative location of the station and roundhouses. Inspection should be made by the individual roads in either event. Passenger switch engines are to be handled the same as road engines, as far as light repairs and supplies are concerned. Under private operation of the roads, the switch engines might be rented to the organization controlling the operation of the terminal. Passenger train cars should, however, be cleaned in one union coach yard, and it is contemplated that this work would be pooled between the different roads, as would all light repairs, light shop work, Pintsch gas manufacture and train charging, air-brake work and disinfection. The stock of all light repair parts and coach supplies would also be pooled. It is probable that commissary plants would have to be individual, the employees and supplies being under the control of the individual roads, but there seems to be no reason why the commissary plants cannot be housed in the same building, the space assigned being based upon the requirements. Certain parts of this service should be pooled, such as refrigeration, fuel and steam for diners, cooking and sterilization.

Coach Yard

It is proposed to establish a union coach yard on the property of the Salt Lake on the east bank of the Los Angeles River between First and

Fourth Streets. No plans have been drawn for this facility. There is, however, sufficient area. Our estimate for the cost of a coach yard is taken to be the same as that for a coach yard at the site of the present Southern Pacific freight yard, as proposed under the Plaza scheme, as there is no reason why the facility should not cost about the same in either location.

Locomotive Facilities

The present Southern Pacific roundhouse at the Alhambra Avenue shops is too small to absorb all of the roundhouse work of a union passenger station, unless the freight engines are provided for elsewhere. Under this plan, it is proposed ultimately to construct roundhouses at the new freight yard of the Southern Pacific but, even if this were done, we do not believe it would be advisable to have all roads use the present Southern Pacific roundhouse, because of its distance from the passenger station. The Santa Fe roundhouse is even more inaccessible. The Salt Lake roundhouse is also not large enough at present. Under this plan, therefore, we propose to construct a new roundhouse at the site of the Salt Lake freight yard. The first step would involve 30 stalls.

IMMEDIATE CONSTRUCTION NECESSARY

The very fact that this plan contemplates elevated approaches, necessitates the completion of a relatively large portion of the ultimate construction in the initial step.

Passenger trains would follow, at once, their routes as previously outlined for the ultimate scheme.

With freight, no such radical change is immediately necessary. The three roads could continue the use of their present freight yards and station, except that we would recommend transfer of the Salt Lake less-than-carload business to the Santa Fe freight station, which is ample to accommodate this business. Freight trains, then, would use their present routes, except that through Southern Pacific freight trains should be taken off Alameda Street and, in this plan, would leave Alameda Street, turning into Butte Street, which would be followed to the east bank of the Los Angeles River. Here, by means of a new connection to the north, they would reach the Salt Lake tracks, and run north along the river to the new classification yard along the San Fernando Road.

Macy Street viaduct should be built at once. This is at present the busiest grade crossing adjacent to the river. Three tracks are involved and the present bridge is inadequate, being only 18 feet wide. The construction of Aliso Street viaduct is also required, not only because of the short distance between Macy and Aliso Streets and the poor grades for the steam roads between these streets, but because of the extremely heavy interurban car traffic and grade crossings at Aliso Street. These viaducts, in turn,

necessitate the depression of the tracks along both sides of the river from Macy Street to Aliso Street and temporary grade lines connecting the old and new grade lines. North of Macy Street temporary grades would extend on both sides of the river from Macy Street to Alhambra Avenue. South of Macy Street, on the Santa Fe side, the temporary grade would extend to First Street. Temporary grades would also be installed to allow the Santa Fe tracks to pass under the elevated approach to the union station, which crosses the Santa Fe tracks approximately 1000 feet north of Seventh Street. On the Salt Lake side, however, it would be expedient to depress the tracks to the ultimate grade line from Aliso Street to the foot of the approach to the northerly curved bridge across the Los Angeles River. There would then be six tracks for this distance, as follows:

Two ultimate freight.....	15 ft. and 28 ft. from official bank
Two Pacific Electric.....	46 ft. and 59 ft. from official bank
Two steam passenger.....	77 ft. and 90 ft. from official bank

The last four would commence to rise just north of Fourth Street on ultimate grade and turn to the west on the northerly curved bridge. The first two would continue on ultimate grade until they passed under the last four, where they would rise on a temporary grade, meeting the present grade at Seventh Street. The southerly approach to the southerly curved bridge would meet the present grade, instead of the ultimate grade just north of Ninth Street.

At the station the amount of immediate work is relatively small. The tracks would be rearranged at both ends of the present umbrella sheds. At the north end they would be continued parallel and straight and stubbed, while at the south end they would be gathered into the throat.

The present station building is large enough for some time to come. The baggage room is also sufficient. The express building will do for a "delivery" building, but a new "forwarding" building should be built, with 10,000 square feet of floor area, south of the present auto park. All of the terminal postoffice should be installed.

The present coach yard should be discontinued at once and a new union coach yard installed on the Salt Lake freight yard site, including a 30 stall roundhouse.

In addition to these major features, the following connections and additions are required on the approach routes:

1. Connection single-track, southerly, between Butte Street tracks of the Salt Lake and the Alameda Street tracks of the Southern Pacific.
2. Connection, single-track, northerly between the Butte Street track and the main line of the Salt Lake, between the Los Angeles River and Soto Street.
3. Connection, single-track, between the Santa Fe main line east of Hobart and the San Pedro branch of the Salt Lake.

4. Connection, single-track, northerly between the Jackson Street spur of the Southern Pacific and the Santa Fe yard.
5. Connection, double-track, northerly, between the Southern Pacific tracks on Alhambra Avenue from near Clover Street and the Salt Lake tracks along the Los Angeles River.
6. Double-tracking of the Salt Lake from Alhambra Avenue (South of Alhambra Avenue to Fourth Street this is included in the estimate of track depression) to Humboldt Street.
7. Connection, single-track, Humboldt Street between the new double tracks just mentioned and the Santa Fe and Salt Lake tracks.
8. Extension of the east approach of Los Feliz Road bridge over the Los Angeles River.
9. Removal of Spring Street Bridge over the Los Angeles River.

More detailed description and estimates will be found in the chapter devoted to estimates.

CHAPTER XIII.

OUTLINE.

- Principal Factors and Requirements
 - Approach Routes
 - Station Building
 - Station Tracks, and Platforms
 - Baggage, Mail and Express Facilities
 - Baggage Facilities
 - Mail Facilities
 - Express Facilities
 - "Headend" Tracks
 - Locomotive Terminal
 - Coach Yards
 - Elevation and Grades
 - Track Arrangement
 - Extension of Santa Fe Freight Station
- Immediate Construction Necessary

CHAPTER XIII

PLAN FOR UNION PASSENGER TERMINAL AT SANTA FE SITE

Several studies for a union passenger terminal at the Santa Fe site have been made, but only the one thought best is discussed in this report. These plans were made for the purpose of assuring ourselves that the site would admit of a reasonable design and of furnishing a basis for estimates of cost. If a station should be established here, a more detailed analysis will probably be desirable.

PRINCIPAL FACTORS AND REQUIREMENTS

It has become apparent that the site of the Santa Fe property along the river from about Jackson Street to Seventh Street is larger than necessary for a passenger station yard but that it is not large enough for such a yard and a coach yard. A coach yard should be a unit in itself and should not be dispersed. Since this land is too valuable for such a purpose alone unless an ideal layout can be obtained, and also since it seems impracticable to locate a wye for turning trains anywhere north of Butte Street, all attempts at locating the coach yard at the Santa Fe site were abandoned. We came to this conclusion although we realized that proximity tends toward economical operation and that it might prove advisable to locate passenger equipment storage tracks, and possibly team tracks too, on the area shown as being devoted to the extension of the Santa Fe freight station.

We had also in mind the growth of the Santa Fe freight station. This led to the conclusion that the Santa Fe site is ample for a passenger terminal and for the growth of the freight station, and the plan submitted provides for these two things. Estimates, however, do not include the extension of the freight station.

The fact that the electric interurban lines should reach the station is another controlling factor. Provision is made for the interurban line, for a local line and for the large express and mail traffic handled by the Pacific Electric.

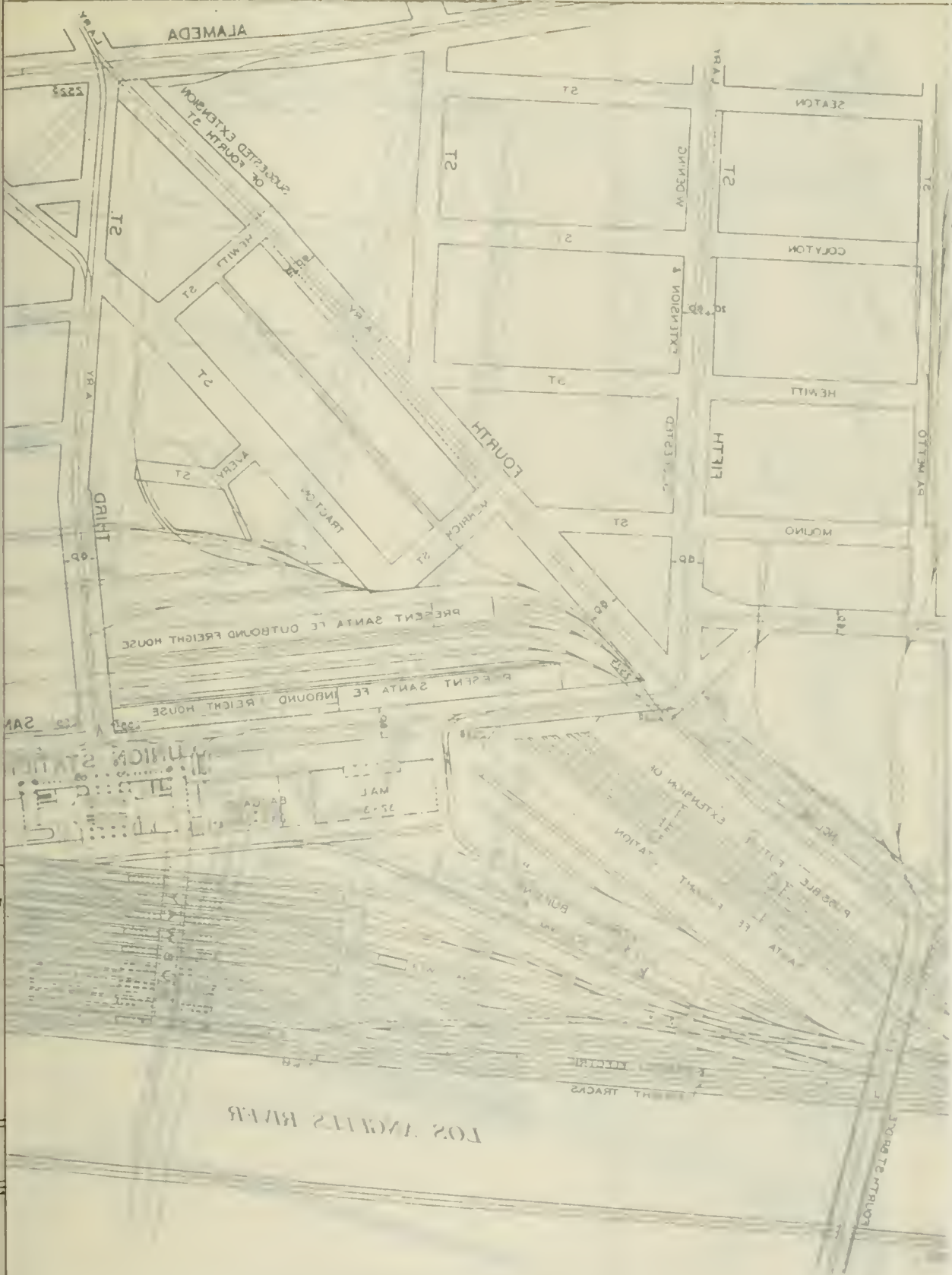
Approach Routes

Southern Pacific passenger trains from the Coast or Valley Routes entering the city via Burbank and Glendale would run as at present along the easterly side of the Midway yard to North Broadway, where they would connect with the Santa Fe tracks along the bank of the river and proceed along these tracks to the station yard. Southern Pacific trains from Colton would enter the city on Alhambra Avenue as at present, cross the Los Angeles River on the present bridge and then, by means of a new connection, turn south and reach the tracks on the river bank just north of Macy Street. If Alhambra Avenue is not depressed, it is possible to build this connection with a maximum grade of 1 per cent compensated and curves of not over 10 degrees. If the tracks on Alhambra Avenue are depressed, this grade can be reduced to approximately 0.66 per cent, compensated. Southern Pacific trains entering the city from the south via Florence would proceed along Alameda Street to a point just south of Butte Street, where a connecting track with the Butte Street track of the Salt Lake would be installed. They would then proceed easterly along Butte Street, crossing over Santa Fe Avenue on a new fill and bridge, and at the west banks of the river would turn into the Santa Fe tracks, following these tracks to the station.

The Santa Fe trains would use the same routes as at present except that at Redondo Junction it is proposed to construct a new bridge. (Inasmuch as this bridge is a part of all plans presented, the reasons for building it will not be here given. The matter has already been discussed in Chapter VI.)

Salt Lake trains from Pasadena would reach the Santa Fe tracks on the east bank of the river near Humboldt Street by means of an easily constructed connection. From this point they would follow the Santa Fe tracks to the station yard. Salt Lake trains from the south and the east via Riverside would reach the Santa Fe tracks by means of a new connection to be built at Hobart Junction. The Santa Fe tracks would then be followed to the station.

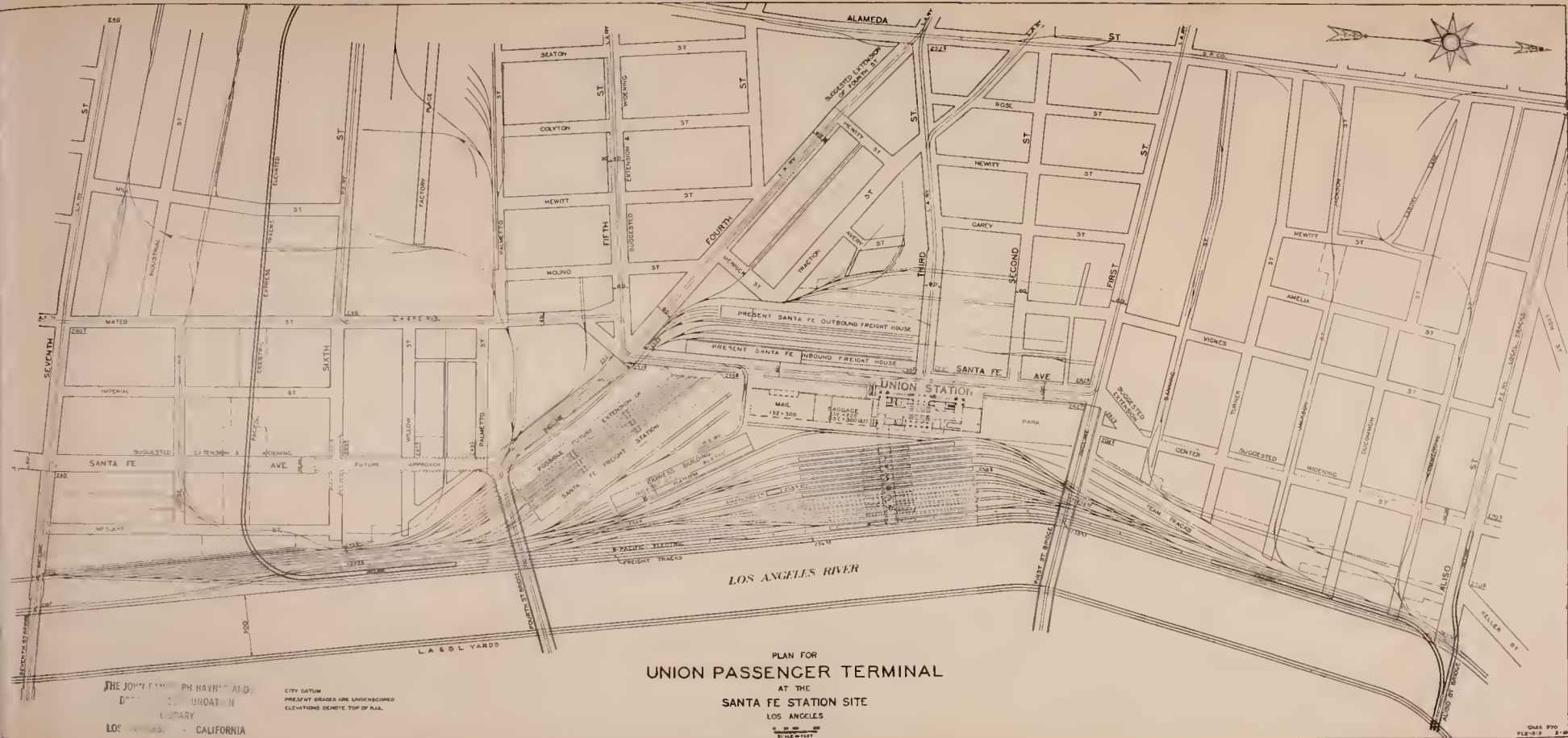
With a union station at this site, it appears possible to bring the Pacific Electric into the station at Sixth and Main Streets via a route very similar to the one proposed in the Southern Pacific-Salt Lake-Pacific Electric plan. That plan provides that a line should be followed from Aliso Street south along the east bank of the river, thence turning west along a line just south of Sixth Street and crossing the river on a curved bridge and passing over the tracks on the west bank. We now propose to bring the Pacific Electric over the tracks on the east bank of the river at Aliso Street and to cross the river on a new curved bridge, at the same time turning to the south and crossing over the proposed two freight tracks adjacent to the west bank



PLAN FOR
 UNION PASSENGER TERMINAL
 AT THE
 SANTA FE STATION SITE
 LOS ANGELES

0 20 40 80
 FEET
 1" = 20'

THIS PLAN IS FOR THE UNION PASSENGER TERMINAL AT THE SANTA FE STATION SITE. THE EXISTING FREIGHT HOUSES AND TRACKS ARE SHOWN FOR REFERENCE. THE PROPOSED TERMINAL AND TRACKS ARE SHOWN IN SOLID LINES. THE PROPOSED EXTENSION OF SANTA FE AVENUE IS SHOWN IN DASHED LINES. THE PROPOSED EXTENSION OF THE TRACKS IS SHOWN IN DOTTED LINES. THE PROPOSED EXTENSION OF THE TRACKS IS SHOWN IN DOTTED LINES. THE PROPOSED EXTENSION OF THE TRACKS IS SHOWN IN DOTTED LINES.



PLAN FOR
UNION PASSENGER TERMINAL
 AT THE
SANTA FE STATION SITE
 LOS ANGELES

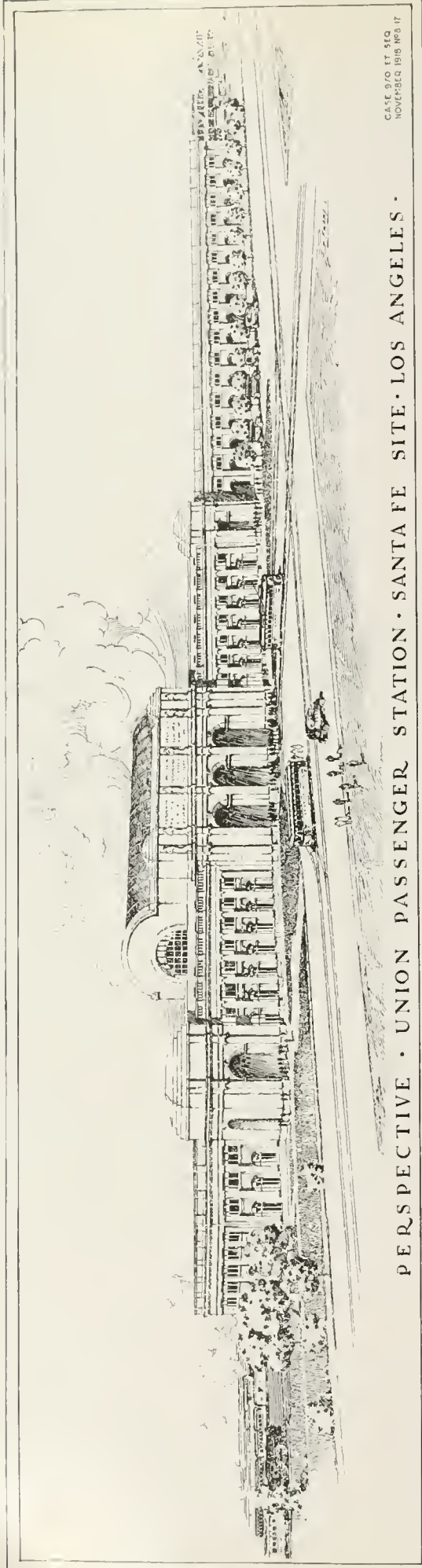
THE JOHN C. HAYWARD & COMPANY
 ENGINEERS
 105 S. WILSON ST.
 LOS ANGELES, CALIFORNIA

CITY DATUM
 PRESENT GRADES ARE UNCHANGED
 ELEVATIONS GIVEN TOP OF ALL

SCALE 1" = 100'

FIG. 123. PLAN FOR UNION PASSENGER TERMINAL AT THE SANTA FE SITE. Although the site is favorable to the separation of grades, its location in the heart of the industrial district is unsuitable. The Santa Fe property between Santa Fe Avenue and the river is of ample size for such a terminal, but is of inconvenient shape. The station is not well situated with reference to rapid transit lines.

DATE 1910
 FILE 113 81-10



PERSPECTIVE · UNION PASSENGER STATION · SANTA FE SITE · LOS ANGELES ·

California Railroad Commission Engineering Dept.

FIG. 125. PERSPECTIVE OF UNION PASSENGER STATION AT SANTA FE STATION SITE

This view is based upon the plan of Fig. 124 and shows the general effect of a station similar to that at Washington, placed upon the Santa Fe Station property.

CASE 970 ET SEQ.
NOVEMBER 1918 WP. 47



THE L. E. ROYAL MAP WITH STATION

Copyright 1910 by L. E. Royal, New York, N. Y.



FIG. 124. HOIKE MAP WITH UNION STATION AT THE SANTA FE STATION SITE

This plan has been made by the Engineering Department to show the location of passenger and freight routes and for other students and rapid transit routes with a Union Station at the Santa Fe site. Although the plan limits itself to the economical elimination of grade crossings, the site should be used to much better advantage as a Union terminal for less than railroad freight.

of the river. The track would then descend to grade, pass through the station yard at grade, using station platforms similar to those for the steam roads, and, after going under the Fourth Street viaduct, would rise again. Thence, turning to the west, the track would cross over all of the yard tracks and would proceed to the Pacific Electric station on an all-elevated structure. This route would be used for rapid transit only. Near Alameda Street a branch elevated structure to the south would carry the Pacific Electric tracks over Seventh Street. Between Ninth and Fourteenth Streets the tracks would descend to the present grade. Ultimately, some other disposition of the tracks south of Tenth Street might be made, either by open cut or elevated construction.

It is also proposed to extend the Pacific Electric from Sixth Street and Ceres Avenue down Sixth Street to Mateo Street, thence along Mateo Street to the station. This would be a local route over which street car service only would be given, although baggage, mail and express could also reach the station over this route.

Station Building

As shown on the plan, the station building is located along Santa Fe Avenue, centering on Third Street, with the main entrance opposite the end of this street.

The building, as planned, is 500 feet by 160 feet and is set back 27 feet from the property line of Santa Fe Avenue, although the entrance is set back but 19 feet. The front portico would be accessible for automobiles. Street cars, both Los Angeles Railway and Pacific Electric Railway, could berth immediately south of the exit. Inasmuch as some 60 per cent of the passengers reach the station by cars, it seems proper to afford this convenience. At the rear is shown a marquis 40 feet wide cantilevered on posts. The exit is on the south end, entirely away from outbound passengers.

No plaza or park is provided for as a setting for the station. As noted elsewhere, a plaza is not recommended in the plan. This feature could, however, be incorporated: in the event that it was thought desirable, probably the block bounded by Second, Third, Santa Fe and Vignes Streets extended south, could be acquired. The station should then be moved north to center on this park.

No plans for a station have been prepared, as in the case of the plan for a terminal at the Plaza. It was simply developed that probably about 60,000 square feet of ground floor area is required, and the ground floor of the union station at Washington, D. C., was redrawn to fit the reduced size. As shown, the area of the station is about 72,000 square feet. This excess over the 60,000 square feet (which is used in the plan for the station at the Plaza) gives a little better arrangement, which is desirable where space is available. Also, this building has no concourse which the public may use. This is because such a concourse would not fit well into the plan for a pedestrian subway.

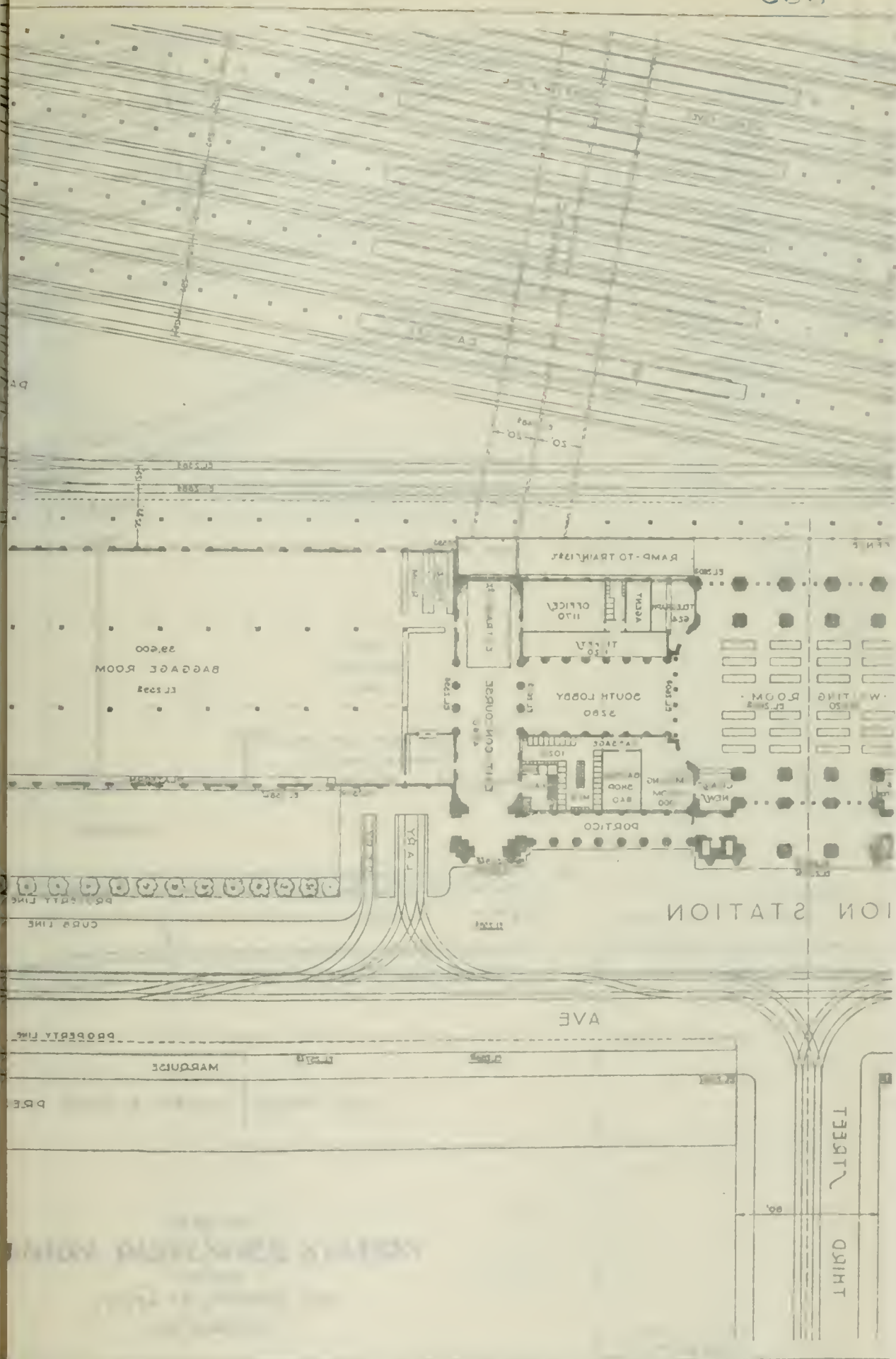
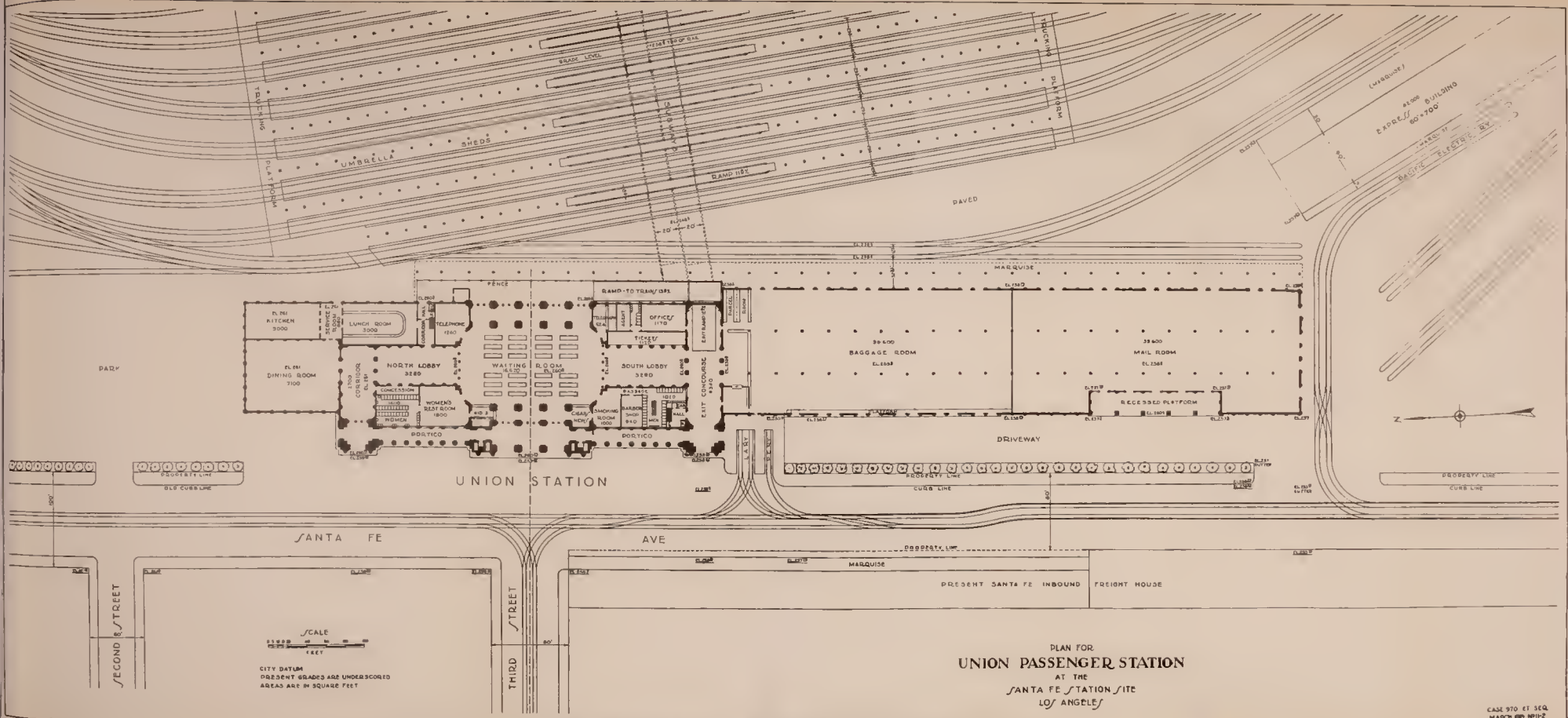


FIG. 120. ENGINEERING DEPARTMENT PLAN FOR STATION PASSENGER STATION AT THE STATION. THE



CITY DATUM
 PRESENT GRADES ARE UNDERSCORED
 AREAS ARE IN SQUARE FEET

PLAN FOR
UNION PASSENGER STATION
 AT THE
 SANTA FE STATION SITE
 LOS ANGELES

CASE 910 ET SEQ.
 MARCH, 1909

FIG. 126. ENGINEERING DEPARTMENT PLAN FOR UNION PASSENGER STATION AT THE SANTA FE STATION SITE.
 The station plan may be compared with that of Fig. 131. Special local car lines would be at the far end of the pedestrian subway. The station tracks as shown are parallel with the river.

The station building would be at approximately the same level as Santa Fe Avenue. Since the tracks are limited to about the same elevation, it was decided to show the subway system of reaching the passenger platforms—the same scheme as is used at the present Southern Pacific station. This effectually does away with the necessity of having the passengers cross the tracks and provides the possibility of separating the streams of incoming and outgoing passengers. As shown, the plan contemplates surface trucking. For the present, this would be satisfactory, but in the future when the railroad traffic becomes too congested, a trucking subway, or subways, might have to be added. These are, however, undesirable and would probably be unnecessary for a considerable period to come on account of the large head-end trackage provided.

Station Tracks and Platforms

Spacing the tracks alternately 12.5 feet and 29.5 feet gives room for 16 passenger train tracks, 3 head-end tracks, 2 Pacific Electric tracks and 2 freight tracks. It may be noted that the Pennsylvania Station in New York has only 21 tracks devoted to the use of through trains (as distinguished from the electric suburban service of the Long Island Railroad), and that about three years ago these through trains amounted to 124 per day. This station is a through terminal, as would be the case with the Los Angeles union station at this site.

The freight tracks at the Santa Fe site by-pass such freight business as must pass the site. The 29.5 foot spacing is for the platforms and shelter, the former slightly above top of rail and made of asphalt, and the latter unit-built reinforced concrete "butterfly" sheds similar to the sheds at the present Southern Pacific station. The sheds, as shown, are nine in number, seven of 800 feet and two of 600 feet in length.

The platforms would be reached from the main transverse subway by side subways 85 feet long, on 11.8 per cent grades.

The main subway also would reach the tracks of the Pacific Electric Railway, alongside of which are platforms 700 feet long with shelter, as along the steam road tracks.

Baggage, Mail and Express Facilities

Baggage Facilities

South of and adjacent to the passenger station is the baggage building, reached by a doorway from the depot. This building, 132 feet by 300 feet (39,000 square feet), has but one story although it would be possible to provide more stories for office space or future additional baggage space. The building has the length of its sides in about the proportion of 2 to 1, which is usually the most convenient shape for baggage or mail use. It is set back 68 feet from the property line of Santa Fe Avenue and has a 60-foot driveway in front, behind an 8-foot parking strip where trees should

be planted in order to screen this building and make the station more prominent. The back of this building is provided with a 30-foot marquis, adjacent to which are two tracks.

Mail Facilities

We have attempted to comply with the postoffice requirements of 40,000 square feet by having one side twice the end in length in the building shown, which is very like the baggage building just described. It is also one story high and is 132 feet by 300 feet (39,600 square feet).

Express Facilities

The express building shown is 60 feet by 700 feet (42,000 square feet). This width is based on advice from the officials operating the Western Department of the American Railway Express Company. The length, however, is an estimate. This building has a marquis and a covered platform on all sides, 30 feet wide on the track side.

Express team tracks are shown with a capacity of forty-two 70-foot cars adjacent to the express building. Tracks for nineteen more cars may be installed at First Street and Santa Fe Avenue. About eight Pacific Electric express cars may reach the station under the arrangement shown, but this also is subject to such rearrangement as may prove necessary.

“Head-End” Tracks

“Head-end tracks” may be defined as tracks upon which the cars on the head-end of the train (baggage, express and mail cars) are loaded and unloaded. In addition to having cars devoted solely to one of these three uses, there are various combinations of two or three uses for one car. This makes it necessary to group the buildings for these purposes so that the trucking may be reduced to a minimum.

There are two general methods of arranging head-end tracks, which, as defined, do not include team tracks for carload express shipments unloaded direct into wagons or trucks. The underlying principle of both is the least disturbance to loading and unloading and the fewest car movements when a car is set in or taken out. There may be provided:

1. Several stub tracks holding two or three cars.
2. A long track on which the cars are set in the order of departure, the whole string being moved along as trains depart.

In this plan we have used the second method. Three long tracks are grouped about an open space, accessible to wagons, if necessary, and two stub tracks for mail cars will hold in the aggregate 60 cars each 70 feet long. All may be switched from a lead accessible to any station track by minimum switching, that is, no switching will be required beyond the yard entrance cross-overs.

As noted before, the Santa Fe will, no doubt, find it necessary in the

future to extend its present freight station. We have indicated how this might be done on the portion of the site unnecessary for passenger use. If this is not thought desirable, this space may be used for freight team tracks or coach and Pullman storage tracks.

Locomotive Terminal

Under this plan, a new freight yard is proposed at Hobart. An engine terminal for freight engines should be located and constructed at this yard. This would leave the present Santa Fe engine terminal at Butte Street free for use as a union passenger road engine and switch engine terminal, if desired. The roundhouse now has 25 stalls. The present car repair tracks are contemplated for passenger car repairs, as a part of the coach yard and for some heavy freight car repairs. Light freight car repairs are to be made at the Hobart yard. There is no necessity, however, for drawing rigid lines in this respect.

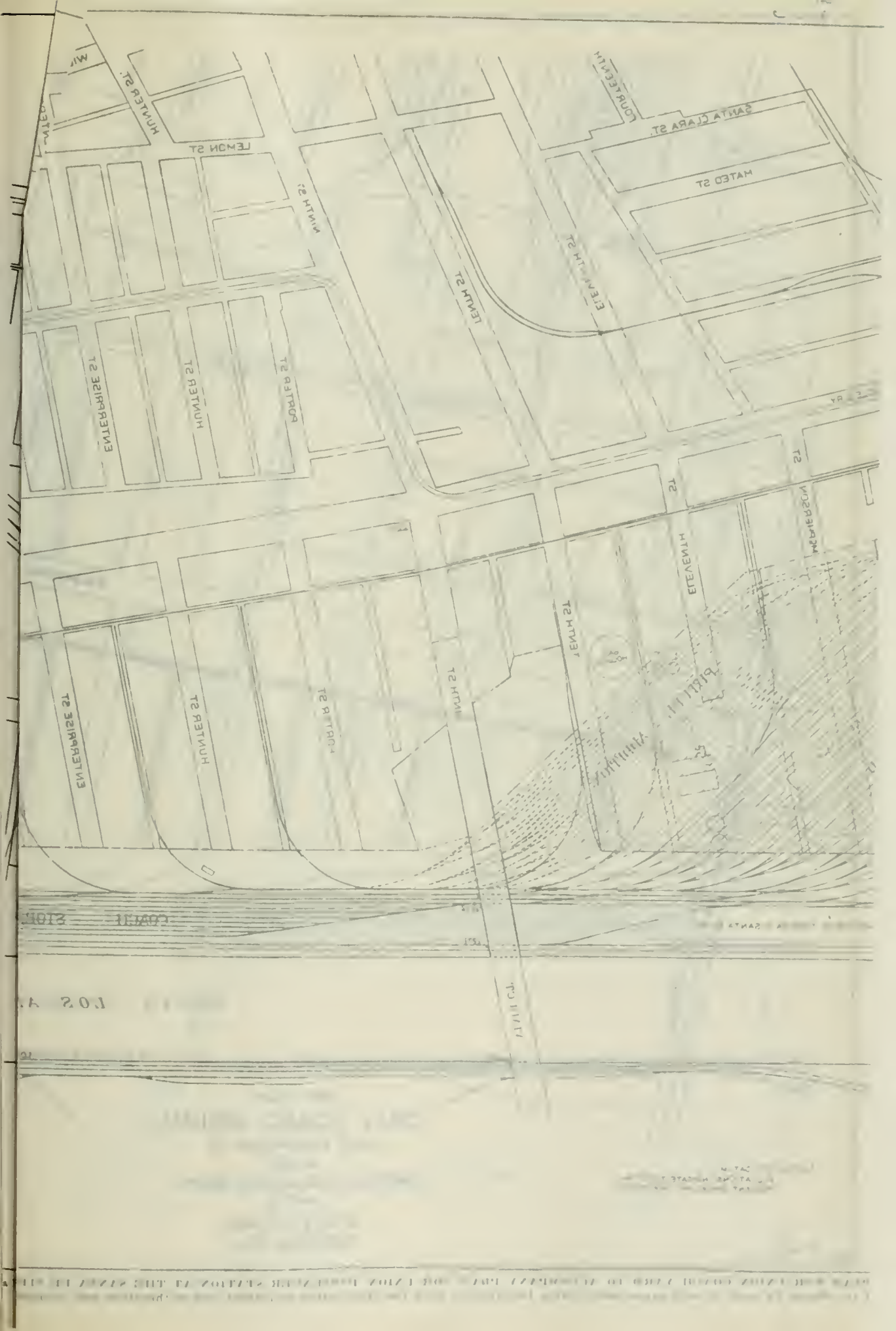
Coach Yards

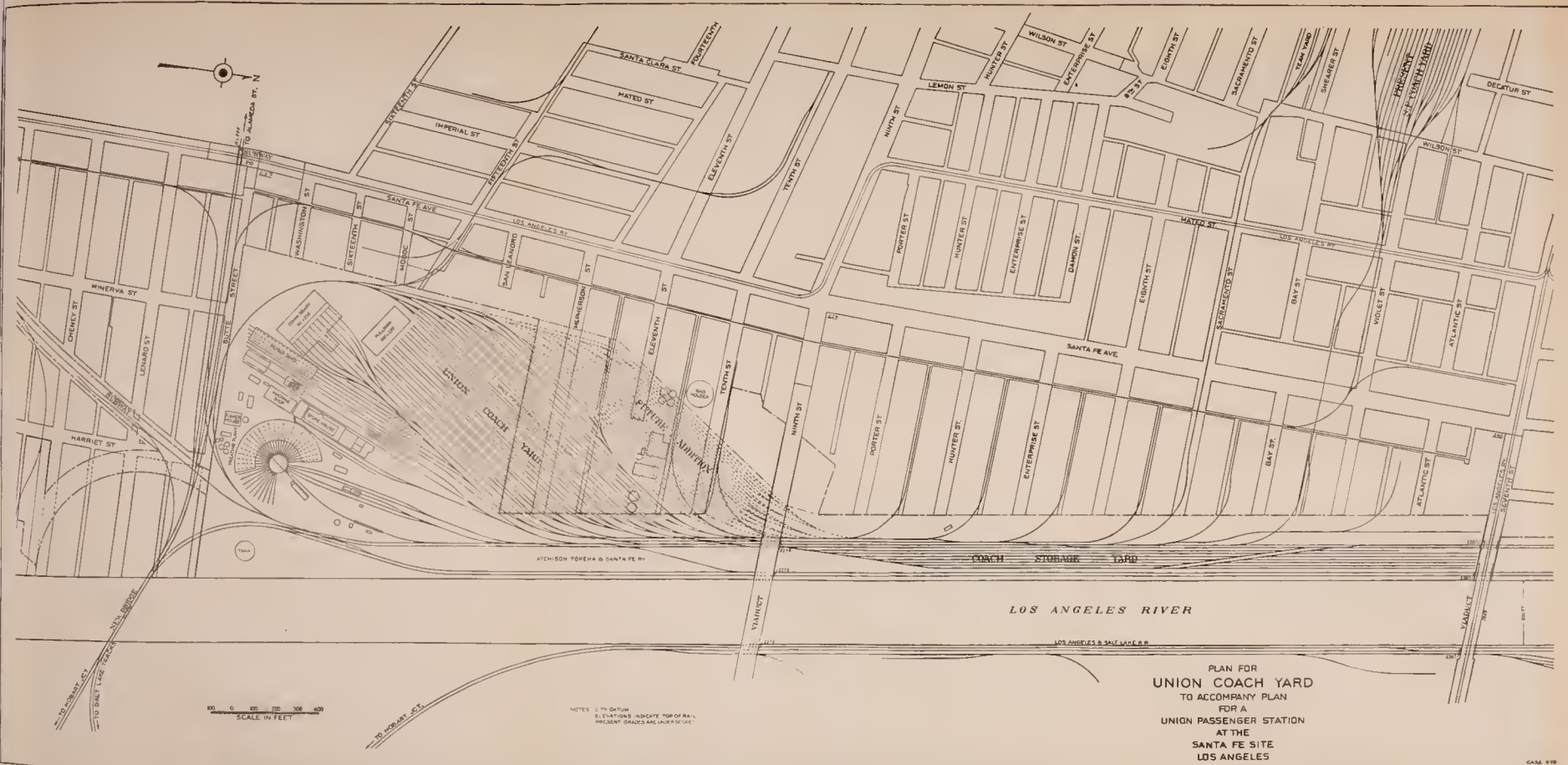
It is proposed to locate coach yards either at the present Southern Pacific freight yard or at the Santa Fe shop yard site which lies along the Los Angeles River just north of Butte Street. This latter site would have to be considerably enlarged for the purpose. In order to turn the cars, it is proposed to build a "balloon" or loop track around the roundhouse and light repair yard, which will enable a train to be turned and run into the yard without stopping and changing direction. As shown, this loop is on an 11 degree curve.

The coach yard may be divided into two parts: one, of 17 stub-end tracks butting up against a coach and Pullman service building and holding 300 cars (70 feet), and the other of 13 tracks, accessible from either end, holding 185 cars. These 30 tracks have a capacity of about 485 70-foot cars. The tracks are spaced alternately 16 and 24 feet or 40 feet per pair, the same as in the Sunnyside Yard of the Pennsylvania Railroad on Long Island, which handles the New York traffic, this spacing having been decided upon there after considerable attention by all departments.

Future extension of this coach yard, as shown, will provide double-end tracks with a capacity of about 270 cars, making a total future capacity of 750 cars. This number may be still further increased by the use of the present Santa Fe coach yard's new coach tracks south of Seventh Street, parallel to the river, or new additional coach tracks at the station site.

The future extension shown does not interfere with the gas holder of the Southern California Gas Company, but the gas generators of the Southern California Gas Company are in the way of future expansion. These should be relocated as it becomes necessary to replace them. There are two oil tanks of 300,000 gallons capacity, which should be moved though this is not necessary at once. The land required for the coach yard includes





PLAN FOR
 UNION COACH YARD
 TO ACCOMPANY PLAN
 FOR A
 UNION PASSENGER STATION
 AT THE
 SANTA FE SITE
 LOS ANGELES

FIG. 127. PLAN FOR UNION COACH YARD TO ACCOMPANY PLAN FOR UNION PASSENGER STATION AT THE SANTA FE SITE
 Although this is the most available site for the coach yard of the Santa Fe plan, it will cause considerable interference with the distribution of freight and is therefore not recommended. The Southern Pacific freight yard site is better.

lands of the gas company, and while some arrangement for purchase should be made if this plan is adopted, the establishment of the coach yard need not interfere particularly with the gas property since the structures may be rebuilt and moved as necessary. In the meantime a rental for the land can be arranged.

The 17 stub-end tracks butt up against a service building, accessible by teams from Santa Fe Avenue. Each track will hold the longest regular train, even if the train is cut and spaces left between cars.

Ten tracks are provided for diners and are spaced at 25-foot centers butting up against a commissary building. There should be a platform between each track for the reason that diners are stocked through the kitchen windows. A shed covering the cars and platforms is also shown. The building, two stories high, is accessible for teams for delivery of food and other supplies.

The Pullman and coach service building is shown as located across the ends of the stub-end tracks, available for teams. A space for a battery building, etc., is left in the middle of the yard.

It is contemplated that repairs would be made on the present repair tracks near the roundhouse.

The plan, as shown, while principally for the purpose of assuring the possibility of, and furnishing a foundation for, estimates, is, of course, subject to further change. Even as presented, it appears to furnish many desirable features. Free switching, especially, has been considered, not only of the coach yards but of the industrial tracks and the freight station.

On the other hand this location of a coach yard has one particularly undesirable feature. The yard itself encroaches on industrial development, especially in the future. The site of the yard is in one of the best parts of the industrial district, lying between the river tracks and Santa Fe Avenue, and a district in which spur trackage can be installed at minimum expense and without the introduction of grade crossings of streets.

Not only would the yard intrude, but the switching between the coach yard and the station would interfere with freight switching to and from industry tracks.

In the ultimate analysis it may develop that these factors point decisively to a coach yard location elsewhere. The present Southern Pacific freight yard site, proposed as a coach yard site under the Plaza plan, is but very little farther from the Santa Fe Station site than the coach yard site at the Santa Fe site. Aside from this disadvantage, the Southern Pacific freight yard site is in our opinion as well suited for a coach yard site as the one which we recommend or perhaps better, and this may be considered an alternate recommendation. The cost would be little different.

Elevations and Grades

The Santa Fe site is generally level. The ground slopes down from the river to Santa Fe Avenue with an approximate slope of 0.3 per cent across the yard. In the other direction, Sixth Street is about 17 feet lower than First Street, and the average rate of grade is approximately 0.5 per cent. With these conditions, there is every opportunity for free choice in the location of tracks and other facilities.

There is, however, one limiting feature introduced by the plan for the depression of tracks along the river: The distance available for tracks under the viaduct is limited to 210 feet from the official bank of the river, which necessitates a more curved approach to the station yard than is desirable and which results in an impaired clearance over some of the approach tracks. (See drawing showing proposed viaduct over First Street, Fig. 50 on page 179.) Further analysis may improve this situation. At various places on the tentative station plan the proposed elevations are shown, the grade lines being straight between these points. At First Street all tracks are at the same elevation, 258.44 (city datum), and at the elevation proposed for track depression. The station tracks are level to the southerly end of the umbrella sheds, then descend on a 0.49 per cent grade for 900 feet, and then for 1300 feet on a 0.55 per cent grade meeting the grade line proposed for track depression about opposite Sixth Street, following this grade to Seventh Street. The freight tracks descend from First Street to the south end of the umbrella sheds on a 0.2 per cent grade. This design is chosen to avoid a retaining wall between the freight and Pacific Electric tracks. The freight tracks then descend on a 0.49 per cent grade for 2200 feet, and we find them opposite Sixth Street at the same elevation as the passenger tracks. From Sixth Street south, the freight tracks, which are about 163 feet from the river, descend on a 0.64 per cent grade to Seventh Street, where they pass under at elevation 235.7, or 4 feet lower than the passenger tracks adjacent to the river. It will be seen that the rates of grade are very favorable.

A close analysis would probably reduce the amount of grading required, now estimated at about 390,000 cubic yards between Aliso and Seventh Streets.

Track Arrangement

The yard as drawn by us is designed with No. 9 frogs and double slip switches. Curves, for passenger tracks, are limited to 10 degrees. Both of these features appear to coincide with the best practice.

Station tracks are tangent for the full length of the train, except for the very longest trains. These can be accommodated by two tracks. This plan also provides for easy coupling of cars and straight sheds. The throat arrangement permits of alternate routes and great flexibility in operation.

While a seemingly large number of slip switches are shown, the effort has been made to reduce these to a minimum in the ultimate plan.

Since this is a through station, we have estimated that one interlocking plant would handle both ends of the yard.

Extension of Santa Fe Freight Station

Extension of the Santa Fe less-than-carload freight station is shown at Santa Fe Avenue and Fourth Street. It consists of a layout very similar to that of the present station and is for the more distant future. This will add 120,000 square feet of shed and 2,900 square feet of transfer platform to the present facilities, which amounts are approximately equal to the present facilities. No estimates are presented for this freight station. This need will come in the somewhat distant future, and since such a facility will then have to be provided in any event, it is not properly chargeable against a station plan.

Until this extension is necessary, the space may be used for coach tracks or team tracks or may possibly be leased to industries not requiring permanent buildings.

IMMEDIATE CONSTRUCTION NECESSARY

Passenger trains could be routed to a union station at the Santa Fe site as follows: Those routes are selected that require the least immediate construction commensurate with satisfactory operation.

Southern Pacific passenger trains from the Coast and Valley routes would transfer to the Santa Fe tracks just north of North Broadway Bridge. Trains entering the city via Alhambra Avenue would cross the river and turn south on a new curved connection, reaching the Santa Fe tracks just north of Macy Street. Trains from the Anaheim Branch could either turn into Butte Street from Alameda Street, follow this street east to the river and reach the Santa Fe tracks by means of a new connection, or could transfer to the San Pedro Branch of the Salt Lake at Cudahy, following the route of the Salt Lake trains from that point to the station.

Santa Fe passenger trains would follow their present routes.

Salt Lake passenger trains from Pasadena would transfer to the Santa Fe tracks at the east end of its Humboldt Street Bridge. Trains from Riverside and from Los Angeles Harbor would transfer to the Santa Fe tracks at Hobart, using new connections.

Freight trains of all roads would run as at present, except that Southern Pacific trains from Los Angeles Harbor would use the Butte Street track of the Salt Lake from Alameda Street to the Santa Fe tracks at Redondo Junction and thence northerly along the Santa Fe tracks on the west bank of the Los Angeles River, as proposed for the Anaheim branch passenger trains.

Since the proposed union passenger station would occupy the site of the present Santa Fe freight yard, it is proposed that sufficient trackage be installed in the new freight yard site of the Santa Fe east of Hobart. No changes would be necessary in the Southern Pacific or Salt Lake freight yards. Also, since under this plan it is proposed to continue in the three freight stations of the three roads, no changes would be required in the freight stations.

As in all plans for initial construction, the depression of the Salt Lake and Santa Fe tracks is contemplated from Alhambra Avenue to First Street, in order to pass under proposed viaducts carrying Macy and Aliso Streets across the Los Angeles River and adjacent tracks. With the union station at the Santa Fe site, the general level of the station demands that the ultimate excavation for the station yard be undertaken and completed at once between First Street and Station 122 plus 77, Fig. 26 (see page 146). Between the latter point and Seventh Street the present grade may be used since Seventh Street is not to be depressed at once. It follows that the tracks between Aliso Street and First Street should be depressed to their ultimate grade. The level of the present First Street viaduct will permit passing under it with standard clearance.

It is realized that the Seventh Street crossing of the Santa Fe tracks will be considerably busier. Some criticism may possibly be justified as conditions at this crossing are not improved but aggravated. We have not included the construction of a new viaduct at Seventh Street in the first step because the present bridge is of adequate width and cost a large sum of money only ten years ago, and the city should obtain a longer service. We do, however, recommend that this bridge be replaced by the proposed viaduct over the tracks and river at the end of five years.

The first step at the union station would contemplate construction of the station building complete and all the trackage. All the tracks are not necessary now, but since their cost is relatively small and since the main transverse subway would have to be built complete to reach and serve the Pacific Electric tracks, the installation of all the trackage seems justified, particularly as operation of the yard might be made somewhat less expensive.

The following areas of buildings will be sufficient for the present:

Express building	24,000 square feet
Baggage building	24,000 " "
Mail building	40,000 " "

At the coach yard it will not be necessary to install all the trackage, and at the site of the present coach yard, rearrangement is not now necessary. The site of the proposed future extension, or addition, to the freight station may, if desirable, be temporarily devoted to passenger car yard uses.

Aside from the station, freight yard track depression and grade crossing elimination, the following construction is necessary on the approach routes:

1. Connection, single-track, Butte Street track of the Salt Lake into Alameda Street southerly.
2. Double-tracking of Santa Fe from each bank of Los Angeles River to new freight yard at Hobart.
3. Connection, single-track, between Butte Street and main line tracks of Salt Lake east of the Los Angeles River.
4. Connection, single-track, between industrial spur of Santa Fe north of Industrial Street with tracks in Alameda Street.
5. Connection, single-track, of Jackson Street spur with Santa Fe tracks.
6. Removal of present main line crossings of Macy Street and Aliso Street Bridge.
7. Connection, double-track, at Mission Tower of tracks in Alhambra Avenue and Santa Fe tracks along the river.
8. Connection, single-track, between Salt Lake and Santa Fe tracks at east end of Humboldt Street bridge of Santa Fe.
9. Connection, double-track of Southern Pacific and Santa Fe tracks near North Broadway.
10. Double-tracking of the Santa Fe from Alhambra Avenue to connection with Southern Pacific tracks mentioned in No. 9 above.

The First Street Bridge is in bad physical condition and, if possible, should be replaced as soon as money is available. This would require further depression on the Salt Lake side, but the Santa Fe side will, under this plan, be ready.

CHAPTER XIV.

OUTLINE

- Principal Factors and Requirements
- Comparison with Barnard Plan
- Principal Advantages of Site
 - Convenience for the Railroads
 - Convenience for the Public
 - Architectural and Aesthetic Effect
- Features of the Plan
 - Site
 - General Approach Routes
 - Station Building
 - Station Tracks and Platforms
 - Ultimate and Immediate Construction of Approach Routes
 - Baggage, Mail and Express Facilities
 - Baggage Building
 - Mail Building
 - Express Facilities
 - Station Yard
 - Coach Yard
 - Relocation of Southern Pacific Freight Station
 - Locomotive Facilities
- Immediate Construction Necessary
- Selection of Plaza for Final Recommendations
 - Advantage of Plaza Plan Over Other Plans
 - Cost Estimates
 - Final Recommendations

CHAPTER XIV
PLAN FOR UNION TERMINAL AT THE PLAZA
PRINCIPAL FACTORS AND REQUIREMENTS

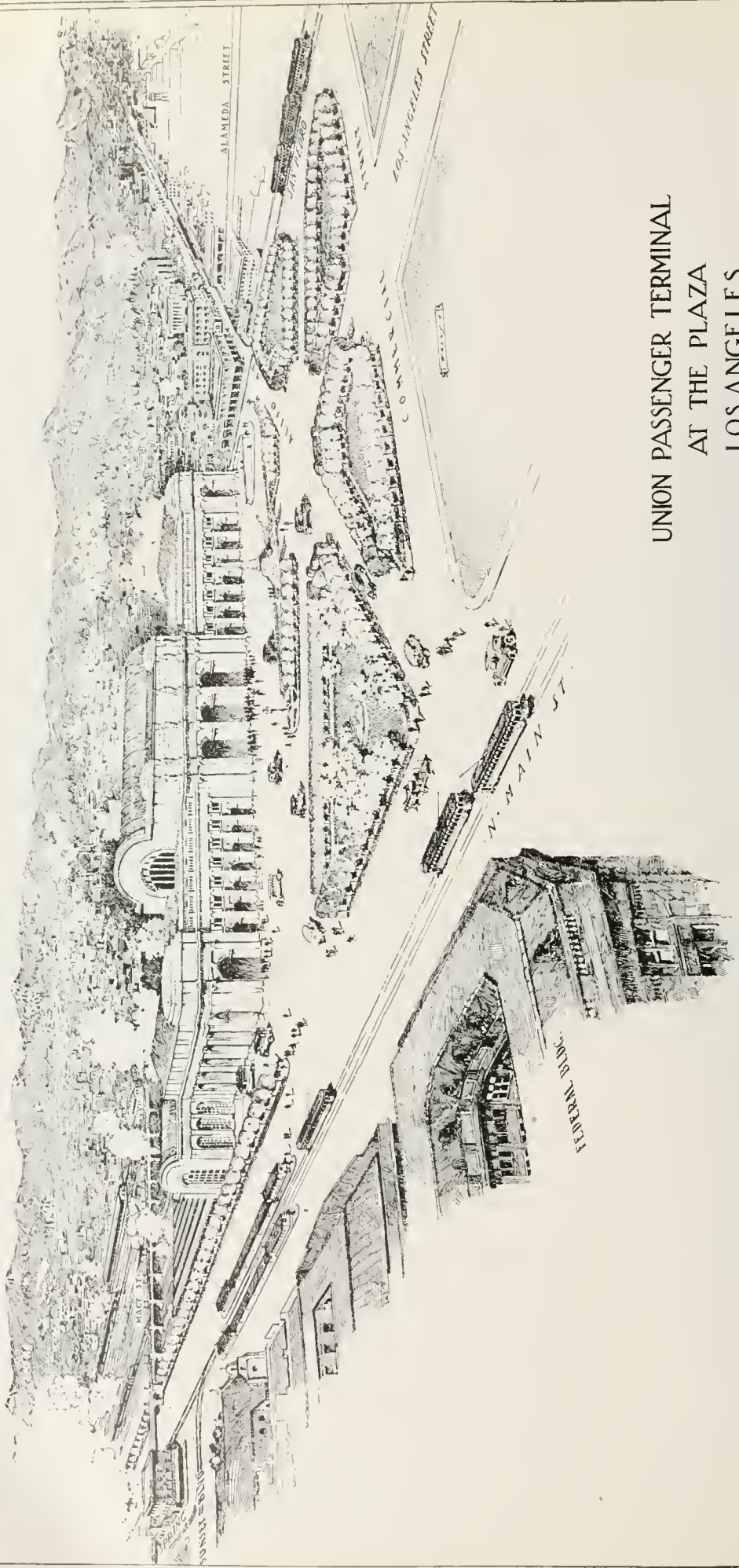
This plan was made after a comparison of the merits and demerits of all the plans presented and after a study of plans for similar projects in other cities. Many possible positions of the station and trackage were considered before the present plan was developed.

The Washington union station may, we believe, be considered as typical of the best practice in station design in the country today. The circumstances surrounding its location and design are worthy of careful study (see volume LXXXI of Transactions of American Society of Civil Engineers). In 1901, Congress passed acts relating to reconstruction of terminals and elimination of grade crossings. Later Mr. Daniel H. Burnham and Mr. Charles F. McKim, foremost among American architects; Mr. Frederick Law Olmstead, foremost in landscape architecture; and Mr. Augustus St. Gaudens, first among American sculptors; were appointed as a commission for the civic development of Washington. The Commission visited Rome, Venice, Vienna, Paris, Budapest and London. The site for the union station was selected only after considerable thought and labor on the part of the architects and the officers of the railroad companies involved—the Baltimore and Ohio and the Pennsylvania Railroads. These companies may be held to represent the best in American Railroad practice. The station stands pre-eminent, therefore, because it is certain that every important factor of location and construction was not only given careful consideration, but entered into its proper place in the final design. The terminal was completed in 1907, six years after the enabling act of Congress.

COMPARISON WITH BARNARD PLAN

In the Washington station, the architectural and aesthetic as well as the engineering requirements have been met.

1. A plaza has been created in front of the station.
2. The streets radiate from this plaza.
3. The head house is located on the axis of an important street.



UNION PASSENGER TERMINAL AT THE PLAZA LOS ANGELES

FIG. 12. UNION PASSENGER TERMINAL AT THE PLAZA, LOS ANGELES

California Railroad Commission Engineering Dept.

This perspective shows the general appearance of a station as recommended in the Commission plan for this site. The station faces on Los Angeles Street and is adapted as a preliminary study from the Union Station at Washington, D. C. Also Street is shown extended to Main Street to the Federal Building in the foreground. The New Plaza is necessary for the proper distribution of traffic and proper setting for the buildings.

It is our belief that the Barnard plan makes possible the realization of all three of these requirements in the most effective manner. Just as Mr. Barnard has stated that his plan is "a combination of some of the ideas which have been presented" (Trans., page 721), and that "the plan is not supposed to be an original plan in a great many respects" (Trans., page 837), so we believe that we have but carried his plan further in its logical development.

The principal changes made by us in the Barnard plan are these:

1. A Plaza has been added in front of the station.
2. The tracks, instead of remaining at the level of Alameda Street, have been raised practically to the level of Main Street and are at the same level as the station floor.
3. The Southern Pacific freight yard is used as a coach yard.
4. There are fewer tracks.
5. San Pedro Street is extended.
6. Macy Street is extended through to Broadway by a viaduct.
7. The rapid transit subway arrangement is different.
8. Alameda Street has been extended by a subway under the throat of the yard.
9. Station facilities, baggage, mail and express buildings and coach yard facilities have been provided.

We have prepared a plan showing a possible arrangement of the necessary facilities. This plan is in sufficient detail to satisfy us that it will be possible to fill the requirements for a terminal at this site in a thoroughly practical manner (see Fig. 129 on page 369). This plan, however, should be considered as preliminary and subject to the changes which usually accompany a still more detailed analysis when working drawings are prepared. The architectural design of the building is not considered as being within the scope of the report. The station at Washington, D. C., has, therefore, been shown in the plans as typical of the best practice. Fig. 128 on page 366.

PRINCIPAL ADVANTAGES OF SITE

The principal advantages of this site are its convenience, its general desirability architecturally and from a civic standpoint, and the fact that there is the most ample provision for all possible future railway transportation development.

Convenience for the Railroads

This site will be convenient for the railroads as well as for the public. It is near two of the three principal railroad entrances to Los Angeles—the northern and the eastern. Sixty per cent of the trains and 70 per cent of the passengers use these two routes. The route south would extend along the west bank of the river and would use the Santa Fe right of way. The route east would pass along Alhambra Avenue (or parallel with it, if, at some future time the tracks are removed from this street). The route north would use the Santa Fe right of way on the west bank of the river. The present Southern Pacific freight yard will make an adequate and convenient coach yard site. The Southern Pacific shops, also, are conveniently located and are capable of being enlarged when necessary. The wye connection along Redondo Street will permit a train to be turned. Operating requirements demand this facility of operation. Passenger trains between two terminals are commonly run both ways with the same cars and these trains often include cars which usually run one way only (such as combination baggage, buffet or observation cars). It is found desirable to keep the train intact while being cleaned at the coach yards. A place, preferably near the yard, should be provided for turning trains as a whole. It may be found advisable to back trains into the station to facilitate the handling of baggage, etc. The wye also makes this possible. With the exception of an unimportant crossing on the coach yard lead, the terminal area will be free from grade crossings.

Convenience for the Public

From the standpoint of the public this site is especially convenient. It is accessible for the main lines of street and interurban railroads. In fact, more people will be served without transfers from this point than from any other point in Los Angeles. Five times as many electric railway passengers are served without a transfer from this point than from the Arcade.

The advantage of locating the station close to a rapid transit route is apparent when we consider the running time from the proposed subway station between Arcadia and Republic Street to various points along Main Streets. The time from this station to Second Street would be $1\frac{1}{4}$ minutes and from this station to Sixth Street, $2\frac{1}{2}$ minutes (based upon a schedule speed of 20 miles per hour). These figures show the convenience of this location with reference to the business, hotel and shopping districts (see Fig. 102 on page 287).

Until such time as a subway is built, the Pacific Electric trains can use San Pedro Street; the cars now using Los Angeles Street can turn at First Street to Main Street. This will leave Los Angeles Street entirely free for vehicles. The Pacific Electric rights in Los Angeles Street extend for about nine years, but possibly this route can be vacated sooner by agreement.



SECTION 36, TOWNSHIP 10 N., RANGE 10 W., 1883
CITY OF ST. LOUIS, MISSOURI



SHOP GROUNDS

FIG. 12. ENGINEERING DEPARTMENT PLAN FOR A LINES PASSENGER TERMINAL AT THE PLANT. The plan shows the location of the terminal in relation to the existing streets and the river. The terminal is shown as a large rectangular structure with a central platform and several tracks extending to the river. The plan also shows the location of the existing passenger terminal and the proposed extension of the street grid.



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FIG. 129. ENGINEERING DEPARTMENT PLAN FOR A UNION PASSENGER TERMINAL AT THE PLAZA. This plan as it would be developed twenty or thirty years hence is shown. Note the convenient relation of the station to the coach yard and shop grounds, the strategic location of the station building near the end of the built up business district, and the accessibility and general convenience of the site.

After the subway is built, the local cars can continue to use the present routes. A more direct route to Pasadena up the Arroyo Seco has been suggested and would, doubtless, result in a considerable saving in time and distance. This point is discussed in Chapters IV and IX.

The majority of people will continue to be carried by the street and interurban lines, notwithstanding the increased use of the automobile, provided that up-to-date service and equipment are supplied. However, the site will also prove a very convenient one for the 40 per cent of steam road passengers using automobiles.

The streets radiate fan-like from the new plaza in front of the station, making the site accessible from all directions. Los Angeles Street is already a wide street—especially at its northern end—and will provide a route free from car lines, direct to the station from the business center. Sunset Boulevard will provide a convenient route to Pasadena, Hollywood and the district behind the ridge paralleling Hill Street. In fact, it may be more convenient for vehicles from the vicinity of Seventh and Figueroa Streets to use Figueroa Street and Sunset Boulevard in reaching the station instead of passing through the business district. Aliso Street and its connection to Macy Street, via Lyon Street, will serve the heavy traffic which uses Mission Road as the entrance to the city.

At the present time the streets in the vicinity of the Plaza are by no means congested. Although the streets converge and their traffic is extremely heavy, they are wide enough to permit constant high-speed movement and are free from traffic blockades. Only two of the streets are occupied by car lines. The addition of a union station at this site will not materially affect the conditions which now exist if adequate street facilities are provided to take the place of the present street arrangement. It is very important, however, that this be accomplished.

In the plan proposed by us, although Los Angeles Street will end at the station, San Pedro Street will be extended to Alameda Street and Main Street will be widened past the station from 90 to 120 feet. With this widening the sidewalks can be maintained at a width of 14 feet and the resulting roadway will accommodate 8 lines of vehicles abreast (or 6 lines and 2 street cars). Proper police regulation of parking can keep this street free from congestion.

The building of the Second Street tunnel and the improvement of First Street west of Figueroa will provide a new outlet for traffic to Hollywood. In the plan, the proposed viaduct on Macy Street connecting with North Broadway and Sunset Boulevard will still further reduce the vehicular and street car traffic through the "throat" at Main Street near the Plaza. This traffic is very heavy. In connection with this viaduct, a subway below the present Broadway tunnel for the Los Angeles Railway cars will make possible a rerouting of certain lines, as described in Chapter IV.

The station floor is designed to be at the same level as the station tracks, and a mezzanine gallery below Main Street with access up to surface safety stations for the Los Angeles Railway and down to subway station platforms for the suburban lines will result in a maximum of convenience and safety for the public. (See Fig. 132 on page 377.)

Architectural and Aesthetic Effect

We believe that the location of a union passenger station on a site unsuitable architecturally would be a mistake. The main portal of the City of Los Angeles—a community of 600,000 inhabitants—should be dignified by giving it the proper setting.

The plaza in front of the station should be considered an essential and integral part of the project. It will give a setting to the Federal Building as well as to the station and will include the extension of Aliso Street through to Main Street. This extension, which will afford a view of the Federal Building, was advocated by Charles Mulford Robinson, the city planning expert, in his report on the City of Los Angeles. Attention is called to his recommendation for side hill improvements west of Main Street.

A symmetrical arrangement is shown for this New Plaza. The planting and general arrangement should be as formal as the location will permit in order to harmonize with the proposed classical architecture of the station building. A screen of trees might be used to conceal the buildings fronting on Commercial Street. The axis of the station building is parallel with Main Street, and the central facade is at the end of Los Angeles Street. The station will be visible from Third and Los Angeles Streets, Jackson and San Pedro Streets and First and Spring Streets. The historic Mission Church will be visible to all travelers.

The straightening and widening of Los Angeles Street into a mall, as suggested by Robinson for Fifth Street is a possible development.

The proposed location will permit future roads to enter without prohibitive expenditures.

FEATURES OF THE PLAN

Site

The station proposed in this plan is a tract of approximately 60 acres, in general shape, a rectangle 700 feet wide and about 3800 feet long. The westerly long side of the rectangle lies along the east side of North Main Street; the easterly, a line 500 feet therefrom and partly along Date Street. The southerly short side is along Commercial Street, and the northerly end along Redondo Street. These 60 acres do not include the present site of the Southern Pacific freight yard proposed to be used as a union coach yard. Additional strips of right of way extend along Alhambra Avenue for ap-

proach tracks, along Redondo Street for coach yard connection tracks and along Ramirez Street for possible Pacific Electric interurban elevated tracks.

The property is held as follows:

Privately Owned	61	per	cent	of	area
Carrier Owned	7	"	"	"	"
Street Areas	32	"	"	"	"
	<hr/>				
Total	100	"	"	"	"

The site is now occupied, to a large extent, by old buildings—once among the best in the city but now run down. There is, however, a considerable portion devoted to industrial use.

It is estimated that the cost of the site would be as follows:

ESTIMATED COST OF ACQUISITION OF SITE

Property	Land	Improvements	Total
Privately Owned	\$2,937,828	\$807,545	\$3,745,373
Carrier Owned	360,805	.....	360,805
	<hr/>		<hr/>
Total	\$3,298,633	\$807,545	\$4,106,178
Street Areas	0	.....	0
	<hr/>		<hr/>
Grand Total	\$3,298,633	\$807,545	\$4,106,178

The figures above, exclude the site of the present Southern Pacific freight yard between North Broadway and North Spring Streets, and north of College Street, proposed as the site of the union coach yard. This parcel contains 48.46 acres and is valued at \$1,477,672.

Further details will be found in Chapters XVIII (Real Estate Studies) and Chapter XX (Estimates).

General Approach Routes

Southern Pacific trains from the Coast or Valley routes would follow the present tracks to about Roseview Avenue although the tracks would be raised for some distance. New tracks would then be built over the throat of the new Classification Yard, and along the west side of the freight tracks as far as Alhambra Avenue, where they would reach the northerly end of the station yard. For the time being, the present tracks could be used down to the North Broadway Bridge, where connections would be made with the Santa Fe tracks. Southern Pacific trains from the East via Colton, would reach the station yard direct via Alhambra Avenue.

Santa Fe trains from Pasadena and beyond, would reach the new tracks along the river under the North Broadway bridge, cross over the freight leads at grade (protected by interlocking) and then follow the same route as described for the Southern Pacific trains to the station. Santa Fe trains from the south would cross the river by means of a new bridge near Redondo



FIG. 130. HOW THE MAP WITH LION ST. ...
 Dr. DeL. ...
 of the ...
 new ...



FIG. 130 ROUTE MAP WITH UNION STATION AT THE PLAZA
This plan has been made by the Engineering Department to show the location of passenger and freight routes and facilities as recommended. The passenger routes from the north and from Pasadena will pass to the west of the freight yards and trackage. Those from the east will reach the station directly along Alhambra Avenue, and those from the south will run adjacent to the river on a new double track bridge. Through freight will use the east bank of the river.

Junction and would then proceed northerly, adjacent to the west bank of the river to Alhambra Avenue where they would connect with the station yard by means of a new connecting track.

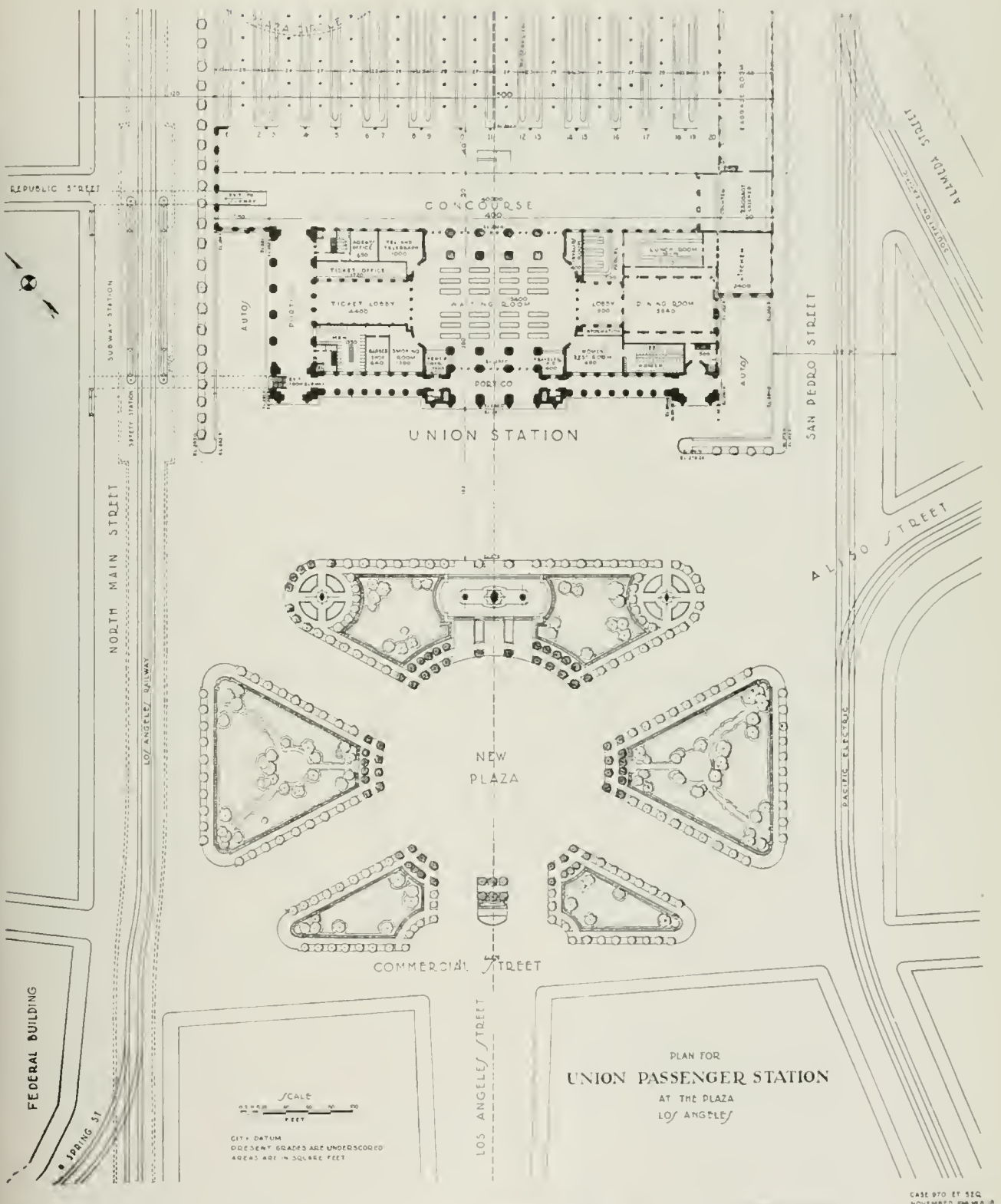
Salt Lake trains from Pasadena would use the Santa Fe tracks on the east side of the river (as recommended in Chapter IX) and to the station. Salt Lake trains from the south and east via Riverside would connect with the Santa Fe tracks by means of a new connection at Hobart Junction and would use the Santa Fe tracks from that point to the station.

Pacific Electric local cars would enter the City over the Aliso Street Bridge raised and proceed along Aliso Street to San Pedro Street as at present. The existing Pacific Electric tracks in Los Angeles Street and in Aliso Street, west of San Pedro, would be removed and the Los Angeles Railway track on First Street, between Los Angeles and San Pedro Streets would be rebuilt as a three-rail track. Rapid transit could be afforded by means of the subway in Main Street. Almost opposite Sunset Boulevard this subway would turn to the east and would follow along the south side of the present Macy Street team yard, emerging to the surface, and would then follow along the south side of Ramirez Street, ascending and passing over Lyons Street. It would then continue as an elevated line to the river, which would be crossed on the same bridge as the local line.

In the event that, sometime in the future, it becomes possible to construct a new line for the Pacific Electric along a more direct and quicker route between Los Angeles and Pasadena, this line can be brought to the west side of the river just north of the North Broadway Bridge. It would then skirt the westerly side of the proposed coach yard, descending until it reaches Alameda Street as a subway. It would then proceed until it met the above mentioned subway in Main Street, opposite Sunset Boulevard.

An important element of this routing of both steam and electric lines lies in the fact that there is a complete segregation of freight and passenger routes, with the exception of unimportant crossings. This is accomplished by placing the passenger tracks west of the freight tracks north of Alhambra Avenue and east of the freight tracks south of Alhambra Avenue.

Associated with this plan, as well as with other terminal plans, is the idea of eliminating all movements of Southern Pacific through freight in the district on the west side of the river, north of Butte Street. To accomplish this, the scheme is to construct new tracks along the east bank from San Fernando Road to Humboldt Street, and to use the Salt Lake tracks from Humboldt Street to Butte Street. Eastbound freight would turn into Alhambra Avenue by means of a new connection just north of the street and southbound Southern Pacific freight would turn to the west on a new connection just north of Butte Street. It would then proceed westerly on Butte Street, crossing over Santa Fe Avenue and turning south on Alameda Street. There is no movement of freight through the industrial district on either the Santa Fe or the Salt Lake, so it is not necessary



California Railroad Commission Engineering Dept.

FIG. 131. PLAN FOR UNION PASSENGER STATION AT THE PLAZA

The floor plan shows approximately the space and facilities required. Main Street is shown widened to 120 feet. The future subway station and surface loading platforms will give direct access to and from the station building without crossing lines of traffic. A formal arrangement for the New Plaza is recommended.

to plan for the elimination of through freight movement on these roads. Santa Fe freight from Pasadena and beyond would turn into the Salt Lake tracks at Humboldt Street and would follow these tracks to Butte Street along the east bank of the river, turning at Butte Street into the Santa Fe tracks, which would be followed to Hobart.

Station Building

It should be noted that, with the exception of a preliminary plan for the first floor, no architectural plans for a station building are herein presented. This work is without the scope of this report and should not be undertaken until the final decision has been made in this case. Plans should then be made by architects of recognized ability and nation-wide experience in station design. Awarding the work by competitions is not recommended, as many of the best men refuse to participate in them.

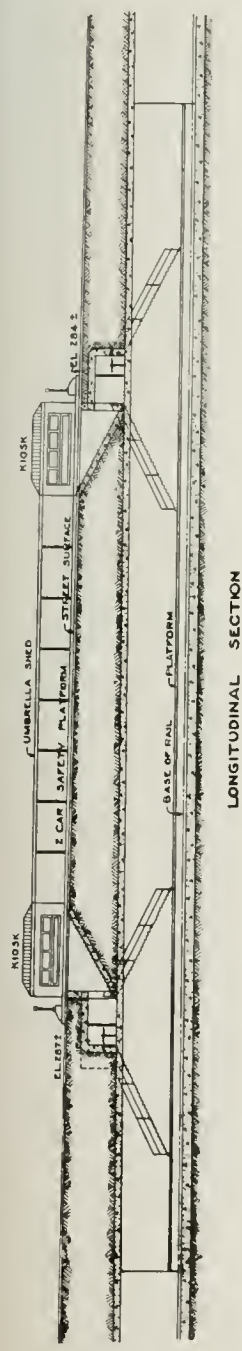
For preliminary purposes it will be sufficient to ascertain, approximately, what floor area is needed and to determine if this space, in the proper shape, can be found at this site. After study of the principal station buildings in this country—and taking into consideration Los Angeles conditions—we are convinced that approximately 60,000 square feet of floor space should be provided for in the building.

The Washington Station has been used as a model, but the length has been reduced from 626 feet to 400 feet. Taking into consideration the changed location of proposed exits, the baggage facilities, etc., some re-arrangement of the parts became necessary. Such re-arrangement resulted in a depth of about 160 feet for the main building, with a concourse 50 feet wide and a head platform 40 feet wide.

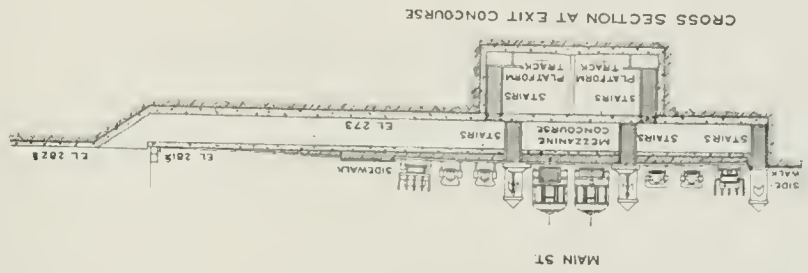
In the plan Fig. 131 on page 375 the building is (neglecting corners, etc.) 158 by 400 feet, or 63,200 square feet, which is divided as follows:

FLOOR AREAS—PROPOSED PLAZA STATION

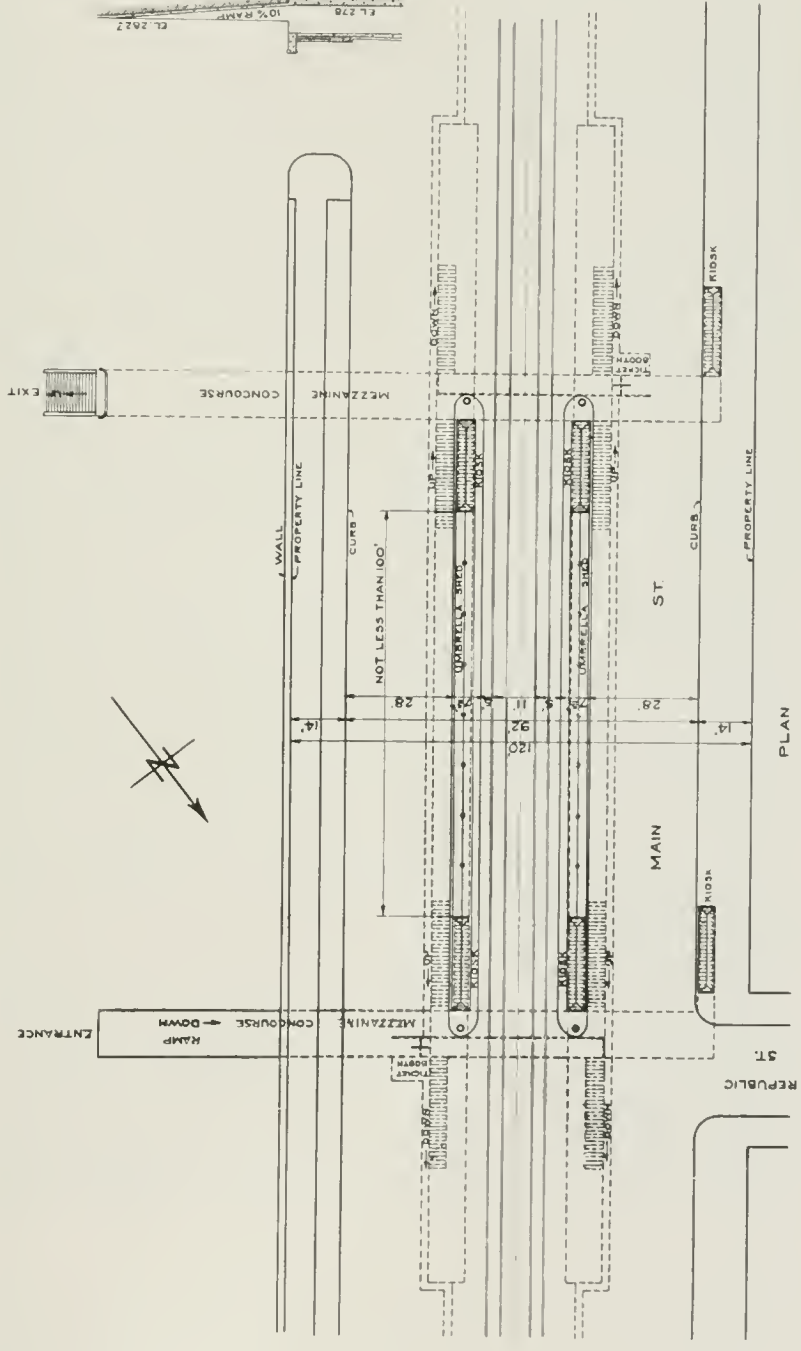
	Square Feet
Waiting room	15,400
Ticket lobby	4,400
Restaurant lobby	1,900
	<hr/>
Public space in building.....	21,700
Concourse (additional)—40,000	
Ticket office	2,370
Telephone and Telegraph	1,000
Men's smoking room	1,200
Barber shop	640
Men's toilets	1,330
	<hr/>
	3,170
Women's rest room	1,650
Women's toilets	1,380
	<hr/>
	3,030



LONGITUDINAL SECTION



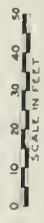
CROSS SECTION AT ENTRANCE RAMP



PLAN

CITY DATUM

PLAN FOR SUBWAY STATION IN MAIN STREET NEAR PLAZA



CASE 970 ET SEQ.
JUNE 1918 NP 10-46

California Railroad Commission Engineering Dept.

FIG. 132. PLAN AND SECTION FOR A SUBWAY STATION AT MAIN AND REPUBLIC STREETS, ACCOMPANYING PLAN FOR A UNION STATION AT THE PLAZA

As the general level of the Union Terminal will be several feet below the level of Main Street, mezzanine concourses or galleries are provided. These will make it possible to reach all cars operating on Main Street without crossing lines of traffic, and will serve as entrance and exit to a future subway in Main Street. These features are best illustrated by the cross-section, which also shows the street arrangement recommended. Eight lines of traffic (cars and vehicles) are provided for. The sidewalks should not be wider than shown.

Restaurant	5,840
Lunch room	2,100
Kitchen (main floor only).....	2,400
	10,340
Cigar and News Stand, etc.....	400
Parcel check room	1,500
Invalids' room	400
Travelers' aid office	400
Porticos, halls, walls, stairways, etc.....	18,890
	63,200
Total	63,200

Because of the heavy vehicle traffic expected in Main Street, it was thought desirable to suggest a two-car safety station at each side of the street railway tracks, to be reached by two pedestrian subways from the union station. These will also be used to reach the rapid transit subway recommended for Main Street.

Because of the difference in elevation of Main Street and Alameda Street, considerable attention was paid to the question of setting the station building on satisfactory grades. The grades proposed are shown on Fig. 131 (see page 375). The station platforms will be at practically the same level as the New Plaza.

Separation of incoming and outgoing passengers would be accomplished by releasing the latter at the westerly end of the concourse, where they could conveniently reach street cars or the auto space at the west end of the station. The ticket lobby is off the stream of travel. The floor area for the kitchen, as shown, is insufficient: additional space should be provided on a lower floor.

Upper floors may be provided on which offices for the participating railroads, or for general rental, could be located. The question of space is a matter of negotiation and has not been considered in the plans. We believe a satisfactory building can be provided for one million dollars and use this figure in all estimates. This amount covers the building complete, ready for occupancy, excluding a heating plant. Heat would be received from a power house serving the station yard and coach yard.

The floor of the main waiting room is proposed at elevation 283.0 (City datum), or one foot above the station tracks.

Station Tracks and Platforms

The plan shows 20 station tracks, 18 of which are for trains and 2 for solid postal and baggage cars. There are also 2 additional tracks providing for from 4 to 6 more cars of this kind. The tracks are planned as level, the top of rail being at elevation 282.0 and extending for the full length of the yard.

Of the 18 station tracks, 10 are paired at 12.5 foot centers, 2 are single with platforms on one side, and 6 are single with platforms on both sides.

Tracks separated by platforms are 27 and 29 feet apart, the platforms themselves being about 10 feet narrower and slightly above top of rail elevation. These widths correspond very closely with those used at the principal stations in this country.

The single tracks are for incoming trains, provided it is thought necessary to head the trains into the station. With this arrangement, the rush baggage, mail and express could be handled on one side of the train while the passengers alight from the other side. This avoids all interference, delay and possibility of accident. At first, the seven westerly tracks may be omitted.

The concourse and head-platform would be roofed, and "butterfly" sheds would extend along the platforms with construction similar to that at the present Southern Pacific Station.

Ultimate and Immediate Construction on Approach Routes

The station yard contracts at the throat at the northern end, the four principal tracks turning to the east in Alhambra Avenue. In the future, the tracks from Alhambra Avenue can be removed if necessary. We do not recommend this removal under present conditions for reasons shown in the discussion, in Chapter IX of the crossing of Mission Road and Alhambra Avenue.

At the river, two tracks turn north to serve the Southern Pacific Coast and Valley Routes and the Santa Fe line to Pasadena. This line crosses the river just north of North Broadway, at the present Santa Fe Bridge. Passenger tracks are placed some distance back of the river bank to allow space for freight tracks to be constructed. Additional land is necessary between Alhambra Avenue and North Broadway in order to carry out the ultimate scheme. The extra land should be acquired immediately, although the necessary tracks between North Broadway and Alhambra Avenue can be provided by completing the Santa Fe double track.

From the four-track approach on Alhambra Avenue, two tracks will turn to the **south**, crossing at grade the above mentioned ultimate freight tracks, and reaching the west bank of the river. This is recommended to avoid the congestion which would probably occur ultimately at points south if the freight tracks were to remain east of the passenger tracks. The passenger tracks will remain adjacent to the bank to Butte Street, where they will cross to the east side of the river, on a new double track bridge and reach the present Santa Fe right of way just east of Soto Street. These tracks will be used by the Santa Fe and the Salt Lake to Hobart, where the Salt Lake will separate from the Santa Fe. The new bridge mentioned is also to be used for transfer freight and industrial switching.

The two present Southern Pacific tracks crossing the Southern Pacific Bridge at Alhambra Avenue will serve as the approach for Southern Pacific trains on the El Paso Route.

There is no change contemplated in the Southern Pacific tracks east of the river except ultimate depression for some distance to meet the grade of the depressed river tracks. The tracks along the river, both north and south of Alhambra Avenue will be depressed according to the recommendations hereinbefore given for the elimination of grade crossings adjacent to the Los Angeles River.

Baggage, Mail and Express Facilities

Baggage Building

The baggage building should be located adjacent to the station building, if possible, chiefly in order that passengers may get their hand-baggage quickly upon calling for it and in order to necessitate the least trucking. We have shown the baggage building along the east side of the station yard and adjacent to the station building. It seems necessary here to state that Alameda Street along the baggage building is at elevation 270.3, about 12 feet below the elevation of the station platforms. This difference in elevation makes possible baggage and mail buildings of two stories; one story at the elevation of the station tracks and the other at the elevation of Alameda Street. The baggage and mail may be trucked on either level and may be transferred from one level to another, either in the building or by means of elevators at the station platforms. These platform elevators may be reached by a trucking subway transverse to the station tracks, with the floor at the same as Alameda Street. The speed of loading and unloading the cars is limited by the capacity of the elevators. Surface trucking is possible at the upper level.

The baggage building, as shown, provides approximately 46,000 square feet. On account of the long and narrow shape of the building, we have shown about 14 per cent greater area than if the building were in the preferred shape in which one side is twice the length of the other. About one-half of this area is necessary at present. This building is served directly by one head-end track (No. 19), which may seem insufficient, but since there are very few solid baggage cars which it is necessary to bring to the baggage building, we are of the opinion that the proposed arrangement will be satisfactory. It will also be possible to use, occasionally, track No. 18 for this purpose.

Mail Building

The requirements for a mail building, as set forth by the Post Office Department, have already been given under the description of the mail building in the plan for a union station at the Santa Fe site. These requirements are fulfilled in this plan. The shape of the building, however, is not two to one and the space is not all on one floor. It is proposed to have the upper floor 48 feet in width and the lower floor 68 feet in width,

extending under track No. 20. These widths, with a length of 350 feet, provide 40,600 square feet. It might also be noted that suitable arrangements can be made for handling mail direct from postal cars on track No. 20 into the Post Office space below this track.

Express Facilities

A one-story express building 700 feet long and 60 feet wide (42,000 square feet) is shown north of Macy Street. The floor is at the same elevation as the station tracks. The adjacent driveway, 50 feet wide, is reached by means of an incline from Alameda Street. Express from combination express-baggage or express-mail baggage cars can be trucked to and from the express station, but since the express matter is much greater in bulk than either the baggage or the mail matter, the latter can be first unloaded from mixed cars and the express can then be taken to the express station and there unloaded. For steam road express cars, we have shown 6 stub-tracks, with a capacity of 5 cars each, or a total of 30 cars.

The platforms and trackage are also arranged to give the Pacific Electric express cars access to the express station. Express team tracks for car-load shipments are provided north of the station with a capacity of 66 seventy-foot cars.

Station Yard

Since it is possible to obtain a symmetrical layout at this site, it follows that the proportion of straight track is relatively large and the maintenance relatively small. Station tracks are of a minimum length of 900 feet and range from this to 1,600 feet. As the longest trains except those used in troop movements consist of 13 cars, all of the station tracks can accommodate these trains. This feature provides for the complete interchangeability of tracks, which is very desirable. A double set of cross-over tracks provides alternate routes. The connections in Alhambra Avenue were designed to afford choice of routes in any direction. Trains from the south may cross to the Redondo Street side of the wye, proceed into North Spring Street and then back into the station. Freight switching from Alameda Street may cross to the northerly connecting track on the west bank of the river, and drags from the coach yard may also cross the main tracks and turn on the third track to the north, for tail room. The final analysis may require a somewhat different arrangement, but there is sufficient room for tracks for any possible operating requirement.

The cross-over tracks at the north end of the station yard are based on the use of No. 8 frogs and slip switches. No curves over 10° are contemplated.

One of the most important features is the wye at the north end of the yard, providing a place close to the station where trains can be turned.

Coach Yard

A coach yard close to a passenger station reduces the car mileage to a minimum and also reduces the number of engines necessary to perform the switching service. Close proximity, furthermore, facilitates changes in the make-up of trains which sometimes occur shortly before the scheduled time of departure. With Pullman cars it often happens that the actual requirements are different from the estimated ones. For example, it may occur that where a sixteen-section car, with no drawing rooms, was provided, a ten-section car with four drawing rooms may have to be substituted, and it is highly desirable that such changes can be made conveniently and with a minimum loss of time. Coaches may have to be added to accommodate unexpected travel.

The establishment of a union passenger station at this site will probably necessitate re-location of the present Southern Pacific freight station now at College Avenue and Alameda Street.

The present Southern Pacific yard will be rendered less useful for freight purposes but, as it seems to offer an excellent location for a union coach yard, we recommend that the site be used for that purpose and that enough of the new Southern Pacific classification yard along San Fernando Road to meet present requirements be now installed.

The present Los Angeles coach yards have a combined capacity of approximately 500 cars. This yard will have a capacity of approximately 900 cars. The storage yard would hold about 55 per cent and the wash and service tracks about 45 per cent of this number. It will be unnecessary to provide all of this capacity at present, and it is proposed that some of the present freight tracks be used for the storage yard. With this arrangement, the capacity is 889 cars, 445 on the new trackage and 444 on the old. Inasmuch as the wash and service tracks, with all their attendant piping, cannot very well be installed without considerable moving of the present freight tracks, which are at various centers, they should be installed at once. The estimate is predicated on the plan of leaving the present freight tracks as they are, as far as possible.

Relocation of Southern Pacific Freight Station

Alameda Street is the artery along which practically all teaming to the Southern Pacific freight station now takes place. Since the station yard cuts across Alameda Street and virtually cuts it off at Aliso Street, the freight station will have to be re-established at another point. Furthermore, the switching leads from the northern end of this yard will be cut by the tracks to the coach yard so that it would be practically impossible to operate it. Discussion of the re-location of this freight station is taken up in Chapter XVII.



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FIRST STEP
 IN
 PLAN FOR
UNION PASSENGER TERMINAL
 AT THE PLAZA
 LOS ANGELES

NOTES
 PROPERTY OWNERS AND INTERESTED PARTIES
 TO BE ADVISED BY THE ENGINEERING DEPARTMENT
 OF THE U.S. RAILROAD ADMINISTRATION

SHOP GROUNDS

FIG. 125. FIRST STEP IN ENGINEERING DEPARTMENT PLAN FOR A PASSENGER TERMINAL AT THE PLAZA

Locomotive Facilities

The construction of the new classification yard of the Southern Pacific along the San Fernando Road will necessitate the construction at once of a roundhouse to care for freight locomotives. The present Southern Pacific roundhouse at Alhambra shops will then be relieved and light and turning repairs of all passenger locomotives using the union passenger station can be made at this point.

Ultimately the heavy repairs to Southern Pacific engines will require all of the present roundhouse and a new one for passenger engines and joint use will become necessary. This can be built on the Southern Pacific shop grounds.

IMMEDIATE CONSTRUCTION NECESSARY

Thus far, we have discussed only the ultimate plan. It will not be necessary, however, to provide all the ultimate facilities at once; for the present, temporary routes and temporary and less elaborate connections may be used, with fewer tracks. Passenger trains can be routed as follows: Southern Pacific trains from the Coast and Valley Routes can transfer to the Santa Fe river tracks at North Broadway; Alhambra Avenue trains can run direct to the station; and Anaheim trains can enter the city via Florence and Alameda Streets, as at present, crossing over Butte Street to the river and using the Santa Fe tracks north to the new station.

Santa Fe passenger trains from Pasadena or Fullerton can enter the station directly at Alhambra Avenue.

Salt Lake passenger trains from Pasadena can transfer to the Santa Fe tracks at Humboldt Street. Trains from Riverside or San Pedro can transfer to the Santa Fe tracks at Hobart.

Since the present Southern Pacific freight yard is to be used as a coach yard, it will be necessary to enlarge the new classification yard sufficiently to handle the present business. Southern Pacific freight trains from the Coast and Valley Routes can then run directly into this yard. Freight trains from the Los Angeles Harbor can use the Butte Street track of the Salt Lake between Alameda Street and the river, and then use Santa Fe tracks along the river as far north as North Broadway. Freight trains from Alhambra Avenue can cross the Los Angeles River on the present bridge and can use the new coach yard connection approximately parallel to and just south of Redondo Street to reach the present main line tracks in North Spring Street. These tracks can remain and be used for freight service until the freight line is built on the east side of the river between Humboldt

Street and San Fernando Road.

In determining this matter, we have considered the relative advantage of running the Southern Pacific freight trains from Alhambra Avenue to

the new freight yard (1) via Redondo Street, or (2) via the new trackage to be built along the river north of Humboldt Street. We believe that while considerable train mileage would be saved by the new trackage, the temporary approach on the easterly side of the North Spring Street, the Arroyo Seco Bridge and new trackage, can be well deferred until the second step, particularly if Main Street is not to be depressed under the first step.

The Santa Fe can continue to use its present freight yards until a union less-than-carload freight station is built. As noted elsewhere, the present Santa Fe freight station is large enough to take care of the Salt Lake less-than-carload freight, and it will not be necessary to construct at once any more of the union freight station than that required to accommodate the Southern Pacific, which must move from its present location as soon as construction of the union station is actually commenced.

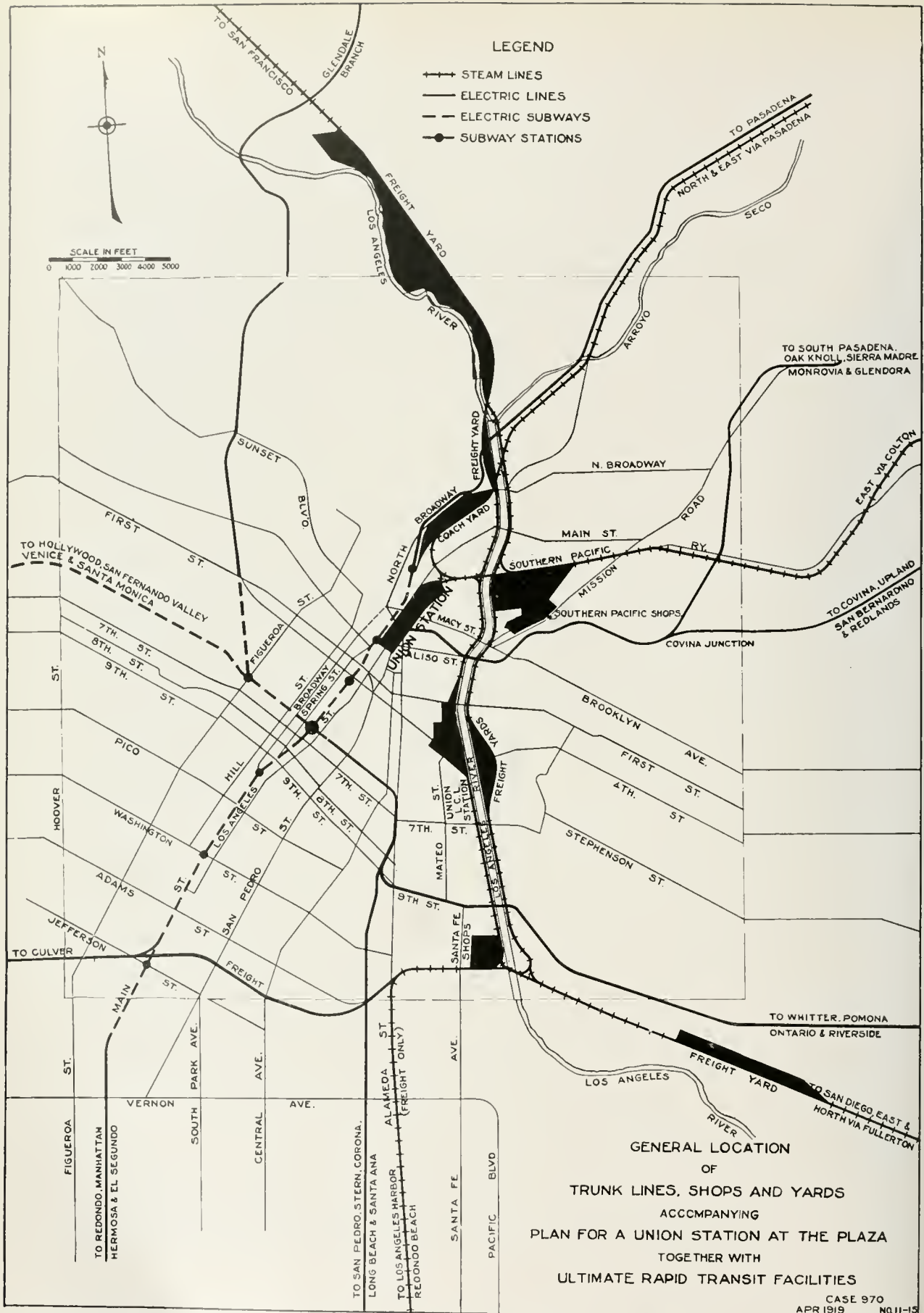
No changes will be necessary in the Salt Lake freight yard.

We have already set forth the first step in track depression to accompany the union station at the Plaza. This, in brief, contemplates the construction of viaducts at Macy and Aliso Streets and the depression of the tracks on both sides of the river from Alhambra Avenue to First Street. The additional right of way necessary both for future trackage and to move the tracks out of the official bed of the river, should be acquired.

Since the existing North Main Street Bridge is of comparatively recent construction and since, because of the small amount of track depression contemplated under our plans, the viaduct approaches are long and expensive, its removal should be deferred for at least five years.

The first step at the union station contemplates the construction of the station building, as in the ultimate plan, together with the Plaza in front of the station and all necessary changes in the surrounding streets. All of the right of way should be acquired at once, but in some instances the improvements can remain upon the land for a term of years (such as along North Main Street between the Plaza and Alhambra Avenue) and, in this way, offset the interest charges. This is possible, since the westerly seven station tracks will not be required for approximately ten years. Construction of the subway under the throat of the yard can also be delayed until some time in the future. The viaducts to carry Macy Street across the station yard and North Main Street across Redondo Street should be constructed at once in order to provide better vehicular traffic routes.

It is not necessary at this time to provide all of the space necessary in the ultimate baggage and express buildings. For the baggage building, a length of 300 feet will provide 28,800 square feet. The express building will have a length of 400 feet, providing 24,000 square feet for present purposes. The length of 350 feet for the mail building will provide 40,600 square feet.



California Railroad Commission Engineering Dept.

FIG. 131. GENERAL STUDY SHOWING RELATION OF UNION STATION AT THE PLAZA TO SHOPS, YARDS, TRUNK LINES, AND PRESENT AND POSSIBLE FUTURE RAPID TRANSIT FACILITIES

Note the proximity of the station to coach yard and shops, and its relation to the principal rail entrances. Distribution by the rapid transit lines and radiating streets are important factors in the location. This study shows existing and non-existing main steam and electric lines and is intended especially to convey an idea of the possibilities of electric interurban transit and its relation to the recommendations made in this report. The assignment of certain steam lines to electric interurban service, as shown in the study, is a possibility of the future and is not included in our recommendations. This plan should be compared with Fig. 18.

SELECTION OF PLAZA FOR FINAL RECOMMENDATION

Advantages of Plaza Plan Over Other Plans

To the extent that the union passenger terminal problem enters into this report, it is our purpose to reach conclusions on these questions:

1. Are the present passenger station facilities inadequate?
2. Can improvement in these facilities be best accomplished by the establishment of a union passenger terminal?
3. Which one of the several possible plans should be recommended?

The first and second questions have already been discussed in this report and have both been answered in the affirmative, that is, the present facilities, taken collectively, are inadequate. Taken individually, it is apparent that the passenger station of the Salt Lake is altogether inconvenient and inadequate and therefore needs immediate improvement; that the Santa Fe passenger station facilities are outgrown and need radical improvement in the very near future; and that of the three roads, the Southern Pacific alone has at this time ample facilities for its own passenger business.

Conditions in the City of Los Angeles are especially favorable for the construction and operation of a union station. Not only from the railroad point of view but also from the standpoint of the City of Los Angeles, the erection of such a station must be considered as a very desirable and wise, if not absolutely necessary, enterprise.

Three different sites are available and lend themselves to the establishment of a union passenger terminal. It has been our purpose carefully to study and analyze the advantages and disadvantages of each of the three possible locations and the three corresponding plans. The best possible site must be our final recommendation to the Commission.

We realize that it is necessary for us to show definitely why we consider the Plaza plan superior to the other plans. It would be possible to take up the various features of each plan and to make a comparison of the advantages and disadvantages and to give in detail our reasons for each conclusion. Such a method, however, is likely to lead to endless discussion and would leave us without a definite standard of judgment. We have decided, therefore, to present a more concrete comparison and one that has the advantage of brevity. The following table was prepared after complete plans for all three locations were available. What we consider the more important factors are listed in the table in the order of their importance. Numbers have been assigned to each one of these items, indicating the comparative and relative weight of each factor.

COMPARISON OF SITES AND PLANS FOR PROPOSED UNION PASSENGER
STATION BY WEIGHING OF IMPORTANT FACTORS

(a)	Important Factors (b)	Relative Weight of Factors (c)	Plaza		Site and Rating Southern Pacific		Santa Fe	
			Rat- ing (d)	Weighted Rate (e)=(cd)	Rat- ing (f)	Weighted Rate (g)=(cf)	Rat- ing (h)	Weighted Rate (i)=(ch)
1.	Site of proper area and shape	20	10	200	5	100	8	160
2.	Monumental gateway—esthetic and architectural possibilities	15	10	150	4	60	4	60
3.	Adaptability to ultimate rapid transit	8	10	80	6	48	2	16
4.	Non-interference with switching in industrial district	8	8	64	10	80	1	8
5.	Train, engine and coach equipment mileage	8	10	80	5	40	7	56
6.	Unification of freight station on suitable site.....	7	10	70	10	70	1	7
7.	Adaptability to, and economy of, grade crossing elimination	7	8	56	5	35	10	70
8.	Accessibility by surface lines	6	10	60	8	48	3	18
9.	Adaptability to baggage, mail and express collection and distribution	6	8	48	10	60	5	30
10.	Operation of yard and coach yard	6	10	60	4	24	8	48
11.	Ultimate appreciation of property values	6	10	60	4	24	3	18
12.	Convenient to hotel and business district	6	8	48	10	60	5	30
13.	Accessibility by automobiles	5	10	50	5	25	4	20
14.	Locomotive service and repair facilities	4	10	40	5	20	8	32
15.	Results to freight draying.	4	10	40	7	28	5	20
16.	Confinement of transportation facilities to natural channel-banks of Los Angeles river	4	5	20	3	12	10	40
17.	Released transportation lands in industrial district.	3	10	30	3	9	7	21
18.	Segregation of freight and passenger routes in city...	2	8	16	10	20	4	8
19.	Immediate improvement in rapid transit	2	0	0	10	20	9	18

20. Continued use of land especially suitable for transportation purposes	2	10	20	4	8	4	8
21. Ability to locate at grade.	1	8	8	2	2	10	10
Totals	130	183	1200	130	793	118	698
Ratios			100%		66%		58%

Each of the three plans has been rated for each factor and the weighting of each factor for each plan has been made on a percentage basis. We believe this method of determining the relative desirability of each plan is superior to any other. Each advantage and disadvantage automatically finds itself in a definite place in the discussion and a very complete comparison is possible at a glance. Whether or not there is agreement on the relative place of the various factors listed is not of great importance. No matter what the order of the listing, any fair comparison would approximately result in the same totals and would show marked superiority of the better over the less desirable plans. Also, if additional factors were added to the table (and there are, of course, a number of others of lesser importance), the result would remain materially unchanged.

It is necessary to say that the important factor of cost is purposely left out of consideration in this table. This is true for the reason that the final question to be answered must be this: is the superiority of the best plan over the less desirable plans worth its additional cost?

The table shows that if the Plaza plan be rated at 100% this plan is superior by 34 per cent over the Southern Pacific plan and 42 per cent over the Santa Fe plan. In other words, the Southern Pacific plan is only two-thirds as good as the Plaza plan, while the Santa Fe plan is still lower in the scale.

Among all the factors, the most important is, no doubt, the adequacy of the site. This factor takes into consideration the area and shape. We are convinced that a new union passenger terminal designed to care for railroad needs in Los Angeles for many years in the future should be monumental in character. This is a matter of civic pride and city planning. Los Angeles, because of the heavy tourist travel, would be justified, in our opinion, in making this consideration one of the first importance. A suitable passenger station should be given a suitable setting. The station building should not stand alongside, or close to, a street, but should have fronting it a plaza or park and should face, if possible, one of the principal thoroughfares. These requirements are met in the Plaza Plan. The building can have a frontage of from 400 to 500 feet and will be located advantageously with reference to existing streets and traffic routes. In our plan, the station stands squarely opposite what will be the terminus of Los Angeles Street.

It is equally necessary that the station yard be of adequate size. The yard should be long enough to permit of the design of proper track layout

with tracks of the required length and completely interchangeable as to use. The yard should be straight and should be wide enough for a sufficient number of tracks to permit of easy and economical operation. All these conditions are met in the Plaza Plan.

At the Santa Fe site there is sufficient ground. The site, however, is larger than necessary for a passenger terminal and is not quite large enough for the addition of a union coach yard on the same land. This site is, however, in the center of the industrial district, and an important and expensive freight station is now established across Santa Fe Avenue. The site also is faced by large warehouses and other industrial development. It does not seem possible to provide here a satisfactory setting for the station. It is true that the station building can be designed to face Second or Third Street or even both streets, but compared with Los Angeles Street, these streets are narrow and far less important.

The Southern Pacific site is narrow. It is not possible to build upon this site the station we have proposed for either the Plaza or Santa Fe sites. The building would have to be adjacent to Central Avenue. The streets intersecting Central Avenue in this section do not meet it squarely and a building could not be placed squarely opposite the end of an important street. The width of the yard is such that only 12 train tracks could be installed. While this number might be sufficient for some time to come, the 12 tracks will continue to serve only at the expense of additional elevated approach tracks. Since both the Southern Pacific and Santa Fe plans are based upon economical construction, rather than on the provision of a monumental terminal, the Southern Pacific site is preferable to the Santa Fe site. This is due to the fact that, in the Santa Fe plan locating the station, as it does, in the heart of the industrial district, there would be too much interference with freight switching, while in the Southern Pacific plan, all trains are carried across this district and cause, therefore, no such interference.

The Plaza site is more adaptable to ultimate rapid transit. We believe that the main trunk lines of an ultimate rapid transit system in Los Angeles should consist of a subway on Main Street and a combined elevated and subway line on Sixth Street. Main Street has and will have the heavier travel. The subway would directly pass the union passenger station and would afford a convenient and essential connection between the steam railroads and the electric lines. This is especially important in the absence of local steam train service in the Los Angeles district, as practically all passengers must reach their destinations by means of one of the electric lines.

The Southern Pacific site lies along the Sixth Street axis, and a rapid transit station is possible about 1000 feet from the Southern Pacific station. The Santa Fe site does not lie on either of these axes and, while it is possible

to build a rapid transit electric line to this site, this line would carry and serve fewer passengers than either of the main trunk lines above referred to.

As a fourth factor in the location of a union station, non-interference with switching in the industrial district may, at first, appear unimportant. We believe, however, that this is one of the most important factors. This interference occurs whenever passenger movements take place in the switching territory and a crossing of the two streams of traffic is made. In this respect, the Southern Pacific station site appears best, as all passenger movements on the west side of the river are above grade and there is no interference whatever with industrial switching. The Plaza plan, however, is practically equally advantageous. The only interference would occur at Alhambra Avenue and the river, and a possible remedy is at hand even here although the necessary separation of grades would be rather expensive. The Santa Fe plan, locating the passenger station and tracks on the west bank of the river, which is or should be the main stem for all industrial switching, is by far the worst with regard to interference. With this plan it would be necessary to cross the passenger main line and coach yard with light engine movements and switching movements. This would, in our opinion, result in additional operating expense and in great inconvenience.

The mileage run by passenger trains, light engines and coach equipment is reflected in the cost of operation. Our studies of this cost, based on the train movement of December, 1917, show the following comparison of estimated cost of operation of these three classes of movement:

Plaza Plan	100 per cent.
Santa Fe Plan	123 " "
Southern Pacific Plan	128 " "

This cost in 1917 would have been \$81,000 less per year at the Plaza site than at the Southern Pacific site and \$66,000 less than at the Santa Fe site. Since then all railroad operating costs have been steadily mounting. The discrepancy between the three plans is, therefore, much greater now than in 1917.

We consider the unification of freight stations at a suitable site important, and this is related to the passenger station. With a passenger station at either the Plaza or the Southern Pacific site, it is possible to locate a freight station at the Santa Fe site, which is particularly suitable for this purpose, because of its central location in the industrial district. The Santa Fe plan obviously stands last in this respect.

Because of shorter and fewer viaducts, the Santa Fe site is more adaptable to economical grade crossing elimination. The Plaza plan is, in this respect, better than the Southern Pacific plan because of the long elevated approaches necessary in the latter.

The Plaza site is more accessible by surface electric lines. It is possible here to serve more people without a transfer since more car lines pass

this station. We consider the Southern Pacific site only slightly inferior to the Plaza site in this respect. The Santa Fe site, in this item, is by far the least desirable on account of its distance from the business district.

The Southern Pacific site stands first with regard to the collection and distribution of baggage, mail and express. This is because the origin and destination of the express matter, (by far the largest item among these three), lies in a district closer to the Southern Pacific station. As this factor depends largely upon the relation of the location of the points to which the express matter is delivered and from which it is collected, the Plaza and Santa Fe sites rate about the same, with a slight advantage in favor of the Plaza site.

It is possible to locate a coach yard very close to the proposed Plaza union station. In this respect this site has a very distinct advantage over the other two. We estimate that it would cost more to move the trains between a station and a coach yard at the Santa Fe site than at the Southern Pacific site on account of the interference with the movement of freight switching and industrial development. We are of the opinion, however, that there is very little choice between the Southern Pacific and the Santa Fe sites in this respect.

The ultimate appreciation of property values is also an important factor. This question will be dealt with more fully in Chapter XVIII. It will suffice to say here that the Plaza plan will ultimately bring about a greater net gain in property values than either the Southern Pacific or the Santa Fe plans.

The Southern Pacific site is a little more convenient to the hotel and to the present and probable future business district. The advantage over the Plaza plan is, however, slight. Compared with the Santa Fe plan, the Plaza plan is first in this respect. This is largely because the passengers would be obliged to pass through the industrial district if the union station were located at the Santa Fe site instead of being brought to the edge of it as in either of the other two plans.

Because it is located at the intersection of several important thoroughfares, the Plaza site is far more accessible to automobiles. The Southern Pacific site is but slightly superior to the Santa Fe site, as with automobile travel it is more a matter of street congestion than of distance.

The Plaza site is best located with respect to locomotive service and repair facilities. The construction of a new freight yard along the San Fernando Road would make it possible to care for the passenger engines of all roads at the present Southern Pacific roundhouse on the east side of the river at Alhambra Avenue. Better use of existing mechanical facilities would be made with the station at the Santa Fe site than at the Southern Pacific site.

With a union passenger station at the Plaza and a union freight station at the Santa Fe site, there would be less interference with freight draying than with a union passenger station at the Southern Pacific site. The Santa Fe site is worse than either because of the introduction of a crossline of passenger travel through the freight draying district.

At the Santa Fe site, transportation facilities are more nearly confined to the natural channel—the banks of the Los Angeles River. The departure from this natural channel with the Plaza plan is not, however, very great. At the Southern Pacific site a great deal of railroad property is located at some distance from the river.

In this connection, the release of land used for transportation purposes in the industrial district becomes of importance. With the station at the Plaza site, it is possible to release both the Southern Pacific coach yard and station sites. With the station at the Southern Pacific site, only the Southern Pacific coach yard can be released. With the Santa Fe site, we believe that it would be advisable to release only the Southern Pacific station site.

The Southern Pacific plan provides a complete segregation of the passenger and freight routes in the city. Such a segregation can be had nearly as well with the station at the Plaza site. With the Santa Fe plan, however, this condition would be very unfavorable.

Although the immediate improvement in rapid transit is far less important than a suitable future arrangement, this factor should, nevertheless, be considered. There is but little choice between the three sites in this respect. Improvement would be accomplished at less cost at the Southern Pacific site and with but slightly increased cost at the Santa Fe site. At the Plaza site, however, the expenditure necessary for immediate improvement would be large but, at the same time, would include the ultimate recommendations.

The selection of either the Southern Pacific or the Santa Fe site will ultimately throw upon the market the present Southern Pacific freight yard site. This land is especially suited for transportation purposes and considerable loss would result from its transfer from this use. The Plaza plan contemplates permanent use of this land as a coach yard.

Lastly, both the Plaza site and the Santa Fe site may be located practically at grade. The Southern Pacific site, however, requires the construction of long and expensive elevated approaches.

Cost Estimates

Detailed cost estimates for all union passenger terminal plans are given in the Appendix to this report. For purposes of comparison, however, there are here inserted two tables, the first showing the estimated money required for a union passenger station and other proposed improvements for

all three plans (Plaza, Southern Pacific and Santa Fe) under our proposals and recommendations for an **immediate plan**, and the other showing similar estimates under recommendations and proposals for our **ultimate plan**. It is understood that these two estimates are to be considered separately and that they are **not** to be added together but that the ultimate plan includes the estimates for the immediate plan.

**ESTIMATED NEW MONEY REQUIRED FOR UNION PASSENGER STATION
AND OTHER PROPOSED IMPROVEMENTS
IMMEDIATE PLAN**

Item	Site of Passenger Station		
	Plaza	Southern Pacific	Santa Fe
Steam Roads:			
1. Passenger Terminal, Approaches, etc.	\$8,942,992	\$2,733,161	\$2,577,040
2. Union Coach Yard	516,264	919,662	1,005,673
3. Subtotal, Station Facilities (1+2)	(9,459,256)	(3,652,823)	3,582,713
4. Union L. C. L. Freight Station.....	772,333	.....	.....
5. Viaducts over Los Angeles River	774,493	774,493	774,493
6. Depression of, And New, Tracks Along River...	290,357	463,219	217,356
7. Main Line Tracks and Connections, not depressed	71,042	117,441	201,698
8. New Tracks for Southern Pacific east bank of Los Angeles River, North of Humboldt Street.....	.....	306,367	.....
9. Butte Street Trackage and Santa Fe Avenue Subway .....	.....	.....	.....
10. New Trackage, River to Hobart & Connections.	111,570	66,729	111,570
11. New Freight Yards, Southern Pacific and Santa Fe	1,198,127	.....	579,127
12. New Freight Terminal, Salt Lake, Alameda St...	*	*	.....
13. New Connections, Relief Alameda Street switching	67,209	59,858	67,209
14. Team Yards	148,271	.....	.....
15. Total	(1 to 14) 12,892,658	5,440,930	5,534,166
16. Release Southern Pacific Station Site.....	1,243,654	.....	1,243,654
17. Release Southern Pacific Coach Yard Site.....	1,574,382	1,574,382	.....
18. Total Credits	(16+17) 2,818,036	1,574,382	1,243,654
19. Net Total—Steam Roads..... (15-18)	10,074,622	3,866,548	4,290,512
Electric Roads:			
20. New Line, Pacific Electric Station to Brooklyn Ave. and to 14th Street.....	5,591,480	2,574,013	2,557,223
21. New Surface Line to Union Station at Santa Fe..	*	*	238,944
22. Freight Tracks .....	.....	.....	.....
23. Total Electric Roads	(20 to 23) 5,591,480	2,574,013	2,796,167
24. Grand Total—Steam and Electric (19+23)	\$15,666,102	\$6,440,561	\$7,086,679

*Not included in this Plan.

**ESTIMATED NEW MONEY REQUIRED FOR UNION PASSENGER STATION
AND OTHER PROPOSED IMPROVEMENTS
ULTIMATE PLAN**

Item	Site of Passenger Station		
	Plaza	Southern Pacific	Santa Fe
Steam Roads:			
1. Passenger Terminal, Approaches, etc.....	\$10,303,492	\$2,966,268	\$3,637,191
2. Union Coach Yard	629,710	1,099,475	1,166,277
3. Subtotal, Station Facilities	(1+2)10,933,202	(4,065,743)	(4,803,468)
4. Union L. C. L. Freight Station.....	2,575,942	2,575,942	.....
5. Viaducts over Los Angeles River.....	3,658,132	3,658,132	3,678,968
6. Depression of, And New, Tracks Along River....	937,910	1,003,518	1,042,052
7. Main Line Tracks and Connections, not depressed .....	.....	.....	.....
8. New Tracks for Southern Pacific, east bank of Los Angeles River, North of Humboldt Street....	305,238	305,238	305,238
9. Butte Street Trackage and Santa Fe Avenue Subway	192,891	192,891	192,891
10. New Trackage, River to Hobart & Connections..	401,144	388,853	401,144
11. New Freight Yards, Southern Pacific and Santa Fe	2,835,187	2,835,187	2,835,187
12. New Freight Terminal, Salt Lake, Alameda St...	*	*	286,564
13. New Connections, Relief Alameda St. Switching	4,436	4,436	4,436
14. Team Yards	629,021	629,021	704,897
15. Total	(1 to 14) 22,473,103	15,658,961	14,254,845
16. Release Southern Pacific Station Site.....	1,243,654	.....	1,243,654
17. Release Southern Pacific Coach Yard Site.....	1,574,382	1,574,382	.....
18. Total Credits	(16+17) 2,818,036	1,574,382	1,243,654
19. Net Total—Steam Roads.....	(15-18) 19,655,067	14,084,579	13,011,191
Electric Roads:			
20. New Line, Pacific Electric Station to Brooklyn Ave. and to 14th Street.....	5,591,480	2,574,013	2,557,223
21. New Surface Line to Union Station at Santa Fe.	*	*	238,944
22. Freight Tracks	150,086	150,086	150,086
23. Total—Electric Roads	(20 to 23) 5,741,566	2,724,099	2,946,253
24. Grand Total—Steam and Electric.....	(19+23) 25,396,633	16,808,678	15,957,444

*Not included in this Plan.

In the matter of cost, fair and sound conclusions can be reached only after the totals for the various estimates in the **ultimate plan** are compared. It will be noted that the Plaza plan is the most expensive, with the Southern Pacific plan second and the Santa Fe plan third. The Plaza plan will cost approximately \$25,400,000, the Southern Pacific plan \$16,800,000 and the Santa Fe plan approximately \$16,000,000. In other words, the Southern Pacific plan compared with the Plaza plan will be 34 per cent more economical

and the Santa Fe plan will be 37 per cent more economical. It is a coincidence and not a result of any design that the difference in the table of comparison of plans by weighting of important factors places the Plaza site at an advantage of approximately 34 per cent over the Southern Pacific plan and 42 per cent over the Santa Fe plan.

Final Recommendations

It is apparent that the question asked earlier in this chapter (Is the superiority of the best plan over the less desirable plans worth the additional cost?) cannot be answered from the engineering and railroad standpoint alone.

If it were possible to make a reliable estimate of operating expenses properly chargeable to the union passenger terminal under each of the three plans and under both the immediate and the ultimate layouts, and if these various estimates were then compared, and if, further, the actual and corresponding figures under the present passenger operation in Los Angeles could be obtained and compared with each of the various estimates, then the relative merits of the different plans as operating propositions could be fairly well established. Even if such figures were obtainable however, and possessed a fair degree of accuracy, a comparison would not be conclusive. This is true for the reason, among others, that each ultimate or immediate plan is intended to provide for the more or less distant future (with the Plaza plan making the most complete and satisfactory provision for all possible contingencies). It would obviously be improper to charge up to the first few years of operation all of the cost incurred for the benefit of the future and compare the results, with no allowance for this factor, with present operating costs.

But aside from these and other obvious and insurmountable difficulties, it is apparent to us that reliable estimates of operating costs for any of the three immediate or ultimate plans cannot be obtained. It will be remembered in this connection at the time we made our reports to the Director General of Railroads on immediate terminal unification in Los Angeles, the attempt was made to make comparisons of operating costs. The figures finally agreed upon by the railroad engineers and the Commission's engineer were obtained only after long and exhaustive investigation by a large force of railroad engineers and by our own engineers. And then it was agreed on all sides that at best it could be considered only as an approximation. Yet, no far-reaching or radical changes from existing conditions were proposed in those reports. In the meantime railroad operating expenses of all classes have steadily mounted—and the end is not yet.

We are satisfied, therefore, that any attempt to justify one plan over another by estimates of resulting operating costs alone would not be fair

and would be misleading rather than helpful. We are, however, satisfied, from our general understanding and analysis of the problem, that these will be the operating results:

First: The total operating costs properly chargeable to a union terminal under any of the three plans will, in the first few years (probably not longer than five) be larger than the continued operation in separate passenger stations as at present. After a comparatively short period of time, however, the reverse will be true and union terminal operation will be carried on at a lesser expense than operation at independent terminals. The principal reason for this condition will be found in the fact that neither the Santa Fe nor the Salt Lake can continue for any length of time to operate with present facilities. These facilities must be enlarged and such an enlargement will carry with it increase in operating expenses. This is referring to railroad operating expenses alone and does not take account of operating expenses of other interests dealing with the terminal such as the public, express service, street railway service, interurban service, freight service insofar as it is affected by the terminal location, results to the City, etc.

Second: The relation of the railroad operating expenses under the three plans are difficult of determination. However, because considerably less train, coach yard and light engine mileage is involved in the Plaza plan, we believe that the cost of operation with the terminal at this site will be less than at either the Southern Pacific or Santa Fe sites. Train mileage appears to be by far the most important factor, as other operating expenses do not vary so widely between different locations.

As between the Southern Pacific and Santa Fe plans, the difference in the train mileage is not so large that it might not be offset by other factors, such as interference with freight switching. We are of the opinion that the operating costs for the Santa Fe plan will be less than those which accompany the Southern Pacific plan.

Third: While this discussion deals with the union passenger terminal only, it is impossible in this subject of operating costs to separate the effects of the other recommendations contained in this report from the results of passenger terminal operation. This is particularly true with reference to recommendations made as to grade crossing elimination, freight station unification and pairing of tracks between Colton and Los Angeles and with reference to the elimination of facilities between Los Angeles and certain outlying points.

One of the principal advantages of the adoption of the Plaza plan, as has been pointed out repeatedly in this report, is to be found in the advantages and benefits to the City. It will not be necessary here to enlarge the arguments on that score. They belong more properly in the field of city planning and civic enterprise. We are satisfied that the direct and

indirect benefits to the City that will ensue from locating the union passenger terminal at the Plaza will almost alone justify the necessary expenditure. We are convinced, therefore, that Los Angeles can well afford to contribute in one form or another such share of this expense as may fairly be assessed against the City. We are also satisfied that such an expenditure by the City, in whatever form it may take, will begin to pay immediate and substantial returns and will be a permanent and safe investment.

After a careful study and analysis of all possible plans, it is our conclusion that a union terminal at the Plaza offers the best solution of the terminal problem. We strongly recommend to the Commission, to the City of Los Angeles and to the railroads that a union passenger station be established at the Plaza substantially in accordance with the plan outlined in this chapter.

An incident in the creation of a union passenger terminal at the Plaza will be the establishment of a union ticket office in the station building. About the middle of 1918, the Federal Railroad Administration established an uptown consolidated ticket office, at present located on Broadway between Second and Third Streets. This has proved successful from the point of view of reduced expenses to the carriers and has evidently satisfactorily filled the needs of the public. Irrespective of whether or not the railroads return to private operating control, this joint facility should be maintained. After a union passenger station is established at the Plaza, it will not be necessary to maintain another joint uptown ticket office within five blocks of the union passenger station. Such an office might, however, be established further south in the business district, say, in the neighborhood of Seventh and Hill Streets. It is our recommendation that in the meantime the existing joint uptown ticket office be maintained.

PART IV—FREIGHT

- Chapter XV—Present Freight Traffic and Facilities.
- Chapter XVI—Industrial Spur Tracks—Plan and Service.
- Chapter XVII—Proposed Improvements in Freight Handling.

CHAPTER XV.

OUTLINE

Freight Traffic

- Car Movements
- Carload Freight
- Cars Transferred Between Roads
- Cars Set on Industry Tracks
- Less-Than-Carload Freight

Freight Facilities

Freight Yards

- Location of Yards
- Operation of Yards
 - Southern Pacific Yard Operation
 - Santa Fe Yard Operation
 - Salt Lake Yard Operation
 - Pacific Electric Yard Operation

Recommendations

Freight Stations

- Southern Pacific Freight Depot
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- Recommendations

Team Yards

Los Angeles Union Terminal Company

CHAPTER XV

PRESENT FREIGHT TRAFFIC AND FACILITIES

FREIGHT TRAFFIC

The handling of freight, both as a subject by itself and in its relation to the elimination of grade crossings and the establishment of a union passenger station, is the third general subject of this report.

A careful study of present freight conditions was made with the purpose in view to better the present situation, if possible, and in any event, not to make it worse. During the hearings in these cases, the statement was repeatedly made that freight handling in Los Angeles was, on the whole, satisfactory.

It should be here noted that discussion of freight traffic and facilities involves the following roads, all standard gauge:

Steam Roads:

Southern Pacific
Atchison, Topeka and Santa Fe
Los Angeles and Salt Lake

Electric Interurban:

Pacific Electric Railway

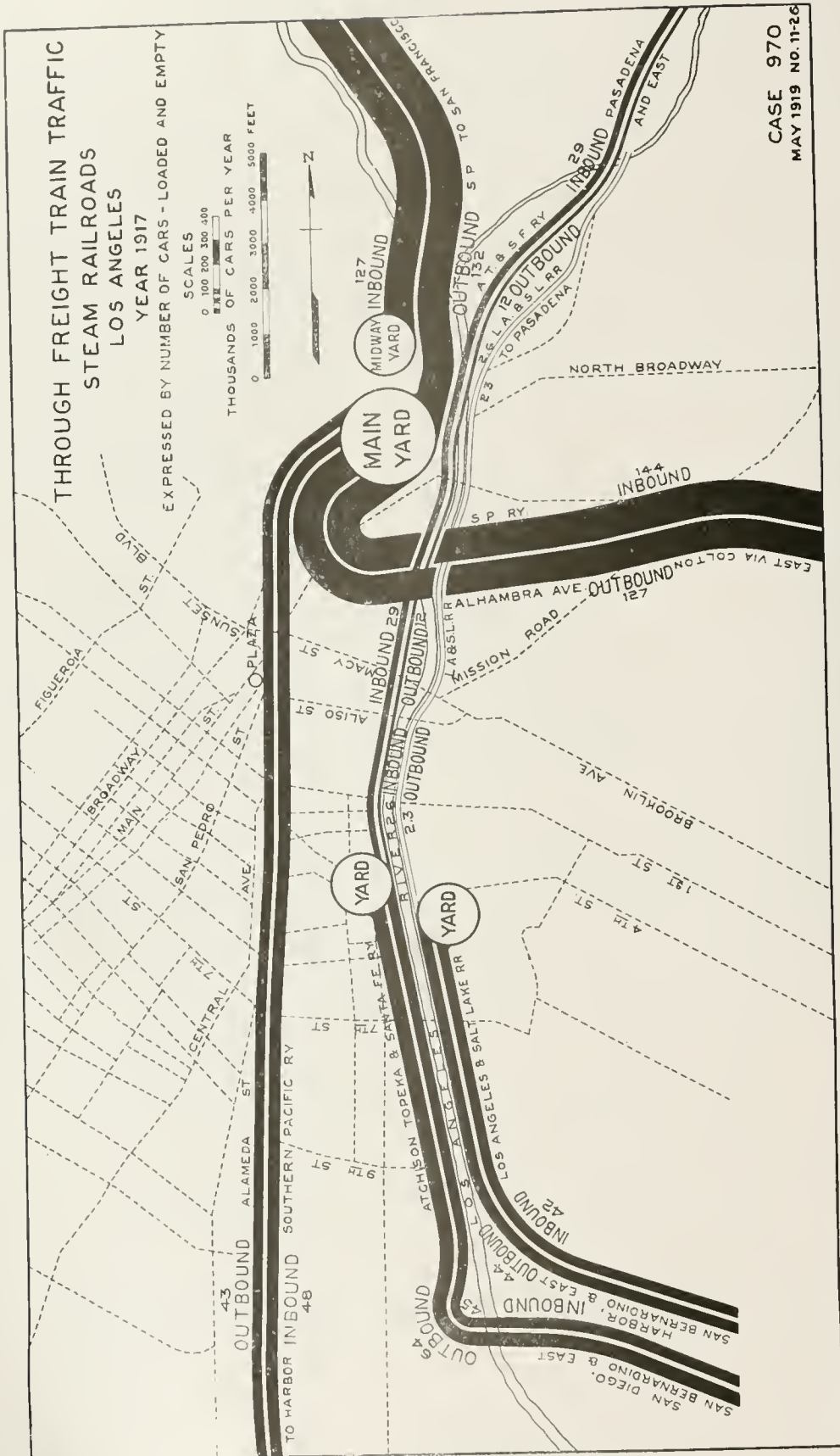
The Los Angeles Railway, a narrow gauge system, does not enter into this phase of our investigation.

Car Movements

Table XXI gives the number of freight cars handled in and out of Los Angeles by the steam railroads during the year 1917, figures for both loaded and empty cars being given. In this table segregations are made according to the general direction of line haul referred to the approximate center of the industrial district; three divisions being made:

1. **Northwest:** This division included only cars handled to and from the Coast and Valley Routes of the Southern Pacific, which enter and leave Los Angeles by the main line, which runs along the San Fernando Road.
2. **Northeast:** This division includes the main line east via Shorb on the Southern Pacific, Glendale, and Pasadena lines of the Salt Lake and the San Bernardino line via Pasadena of the Santa Fe.
3. **South:** In this division are included the San Bernardino and Los Angeles Harbor lines of the Salt Lake; the Redondo, San Diego and San Bernardino, via Fullerton, lines of the Santa Fe and Los Angeles Harbor line of the Southern Pacific.

This segregation by directions was made in order to enable us to form an idea of the relative balance of the traffic and it should be noted that the number of cars handled in the three different directions is approximately equal.

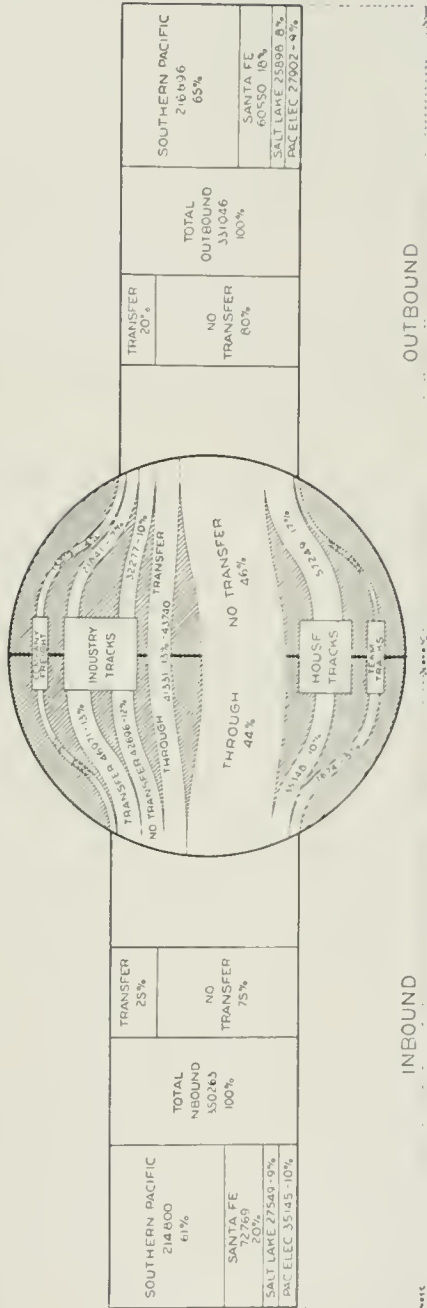


California Railroad Commission Engineering Dept.

FIG. 135. THROUGH FREIGHT TRAFFIC

Routes and volume of through freight under present conditions are shown. Observe that the volume of in and outbound freight is about the same.

LOS ANGELES SWITCHING LIMITS



WIDTH OF BANDS ARE PROPORTIONAL TO NUMBER OF CARLOAD CARS
EMPTY CARS ARE NOT HEREIN CONSIDERED
TRANSFERS INDICATE TRANSFER OF CARS FROM ONE ROAD TO ANOTHER WITHIN SWITCHING LIMITS

CARLOAD FREIGHT MOVEMENT
LOS ANGELES
YEAR 1917



CASE 070 ET SEQ
JUNE 10 1918 NP 10 17

California Railroad Commission Engineering Dept.

FIG. 136. CARLOAD FREIGHT MOVEMENT IN LOS ANGELES

Total volume of inbound carload freight is but slightly larger than outbound. The relatively large volume of through freight should be noted. This shows the total and relative volume handled in and out of the city by the steam roads, the volume transferred and the origin and destination in the city.

During the year over 864,000 freight cars were handled by the steam railroads in and out of Los Angeles; an average of about 2400 per day. Of these, two-thirds were loaded cars and one-third empties. If we use the same ratio of loads and empties for the Pacific Electric it will be seen that including this electric line, there are handled in and out of Los Angeles, approximately 1,000,000 freight cars per year, or about 2,850 per day. As a matter of comparison, we note that in 1912 the twenty-one operating railroads at Chicago received and forwarded approximately 15,000,000 cars or about fifteen times as many as are handled at Los Angeles.

Carload Freight

Figure 136 shows graphically the movement of carload freight in and out of Los Angeles, showing at the same time the destination or origin classified under several different headings. This chart is an exposition of the figures in Table No. XVI. The principal information may be briefly presented as follows:

ORIGIN AND DESTINATION OF CARLOAD FREIGHT

	Loaded Cars—1917	
	Number of Cars	Ratio
I. Inbound at Los Angeles		
Set on Industry Tracks.....	89,667	25%
Set on Team and House Tracks.....	54,189	15%
Transferred to Other Roads for Line Haul...	41,331	12%
Through or Passing Freight.....	154,823	44%
Company Freight	10,253	4%
	<hr/>	<hr/>
Total inbound	350,263	100%
II. Outbound at Los Angeles		
Received from Industry Tracks.....	54,118	16%
Received from House and Team Tracks.....	65,486	20%
Received from Foreign Line Haul.....	43,740	13%
Through or Passing Freight.....	154,283	47%
Company Freight	13,419	4%
	<hr/>	<hr/>
Total outbound	331,046	100%
III. Total Inbound and Outbound at Los Angeles	681,309	200%

It is necessary to state that the figures which make up this table were obtained with the greatest difficulty, and only after a great amount of effort were we able to obtain figures which check as closely as they do in the above table. No useful purpose would be served, we believe, by further refinement. In addition to the cars included above, there were handled during the year, approximately 10,000 cars having their origin and destination in Los Angeles, this number being included in the number of cars given above as transferred between the different roads. It is also important to draw out the percentages of total cars handled by the different roads, as follows:

FREIGHT CARS HANDLED BY DIFFERENT ROADS

Road	Loaded Cars—1917	
	Number of Cars	Ratio
Southern Pacific	431,496	63%
Santa Fe	133,319	20%
Salt Lake	53,447	8%
Pacific Electric	63,047	9%
Total	681,309	100%

Cars Transferred Between Roads

Fig. 136 also indicates that twenty-five per cent of all the loaded cars handled at Los Angeles are transferred from one road to another. This transfer is made within the city at eleven different points. These points and the number of cars transferred at each point are shown in Table No. XV. The table is based upon information received from the Chief Joint Inspector under whose direction all cars are inspected for defects in equipment and loading at the point of transfer, this service being paid for jointly by the different railroads interested. According to this table 291,407 cars were transferred from one road to another during 1917, an average of about 800 per day.

It will at once be apparent that while the totals in the various tables above do not run into the millions, the figures nevertheless, assume such proportions as to necessitate caution in proposing any plan which might upset the smooth working of the present system.

Cars Set on Industry Tracks

Inasmuch as the industry tracks and the traffic carried over them are an important factor in these proceedings, attention is directed to a peculiar situation which exists in Los Angeles with regard to industrial switching. The Los Angeles shippers are very anxious to retain the benefits of the present arrangement and we agree that nothing should be done to disturb existing advantages in this respect. The situation in brief is this; a car destined to an industry track is switched to that track without charge, no matter on whose rails the industry is located, or on whose rails the car was brought into Los Angeles.

The representative of the Associated Jobbers of Los Angeles, representing as he stated, seventy-five per cent of all wholesalers and manufacturers served by carriers, stated before the Commission that this present arrangement is almost ideal, that as above noted, all transcontinental roads have absolute and unrestricted access to all industry tracks, and that the association which he represented would be strongly opposed to any plan which would interfere with these conditions.

The number of industries in Los Angeles, within the free switching limits (including quite a few industries outside the city boundaries) is, of course, constantly changing and was, at the time of this investigation (April, 1918) about as follows:

INDUSTRIAL SWITCHING OF DIFFERENT ROADS

	Industries		Cars Set
	No.	Ratio	1917
On Southern Pacific Rails.....	340	40%	38,515 Loads
On Santa Fe Rails	371	45%	40,869 "
On Salt Lake Rails.....	109	12%	8,879 "
Total, Steam Roads	820	97%	88,263 "
On Pacific Electric Rails.....	25	3%	1,584 "
Total—All Roads	845	100%	89,847 "

Of the 340 industries on Southern Pacific rails, 278 are so located that the cars destined for them are hauled along Alameda Street.

Table No. XX shows the number of loaded and empty cars set at these various industries and also gives the same information for team tracks and the three Pacific Electric transfer tracks, also reached via Alameda Street.

Less Than Carload Freight

The following information is taken from Table XVII and shows the extent of this class of traffic, expressed in its common measure, the short ton of 2000 pounds.

LESS THAN CARLOAD FREIGHT TRAFFIC

Road	Inbound	Tons—1917		Ratios
		Outbound	Total	
Southern Pacific	55,432	164,258	219,690	46%
Santa Fe	67,670	111,147	178,817	31%
Salt Lake	34,107	24,629	58,736	7%
Total—Steam Roads	157,209	300,034	457,243	84%
Pacific Electric	34,968	59,274	94,242	16%
Total—All Roads	192,177	359,308	551,485	100%
Average day	624	1,166	1,790	
Ratios	35%	65%	100%	
Ton Per Car, Av.	5.26	6.27	5.23	

It will be observed that the importance of Los Angeles as a jobbing center is well brought out, the package freight outbound being nearly double in tonnage the inbound, the wholesale merchants receiving freight by the carload and distributing it in smaller lots. Of course, freight originating in Los Angeles is also responsible for some of this excess of outbound freight.

The importance of the Pacific Electric in the Los Angeles freight field is also well brought out. Its more important package freight business lies in handling this class of freight between the boats at Los Angeles Harbor and the City, the Pacific Electric having access to the more important wharves, which are municipally owned.

FREIGHT FACILITIES

Freight Yards

Freight, in entering a distributing center by railroad, is first handled in unbroken carloads at the yards. Here those cars, which are to be passed through without unloading, are segregated from those destined to the district served by a particular yard. The cars to be unloaded are then segregated into three general classes:

1. Carloads to be unloaded on team tracks.
2. Carloads to be unloaded on industry tracks.
3. Carloads of package freight to be unloaded at freight depots.

There are other classifications, but these are the principal ones.

The yard is, probably, the most crucial point in the handling of freight—the proper relation of its parts and its location with respect to the distributing tracks being the controlling factor with regard to delays, prompt and economical service and congestion.

Knowledge of present conditions, regarding the handling of freight cars in the Los Angeles yards of the various railroads, is essential to a study of any changes made necessary by a general plan for the elimination of grade crossings, by the establishment of a union passenger terminal, or for any changes toward an improvement in the handling of freight, with this in view, a brief description of the present location of freight yards and the general methods of operation is given.

Location of Yards

The Southern Pacific yard, which handles about 63 per cent of the number of cars entering and leaving Los Angeles, is located principally on the west side of the Los Angeles River, near North Broadway, but partly on the east side of the river, and north of Dayton Avenue. This latter location is the site of the future classification yard, the progressive construction of which is little more than started. The Santa Fe yard, handling 20 per cent of the cars, is located on the west bank of the Los Angeles River between First and Sixth Streets; the Salt Lake freight yard, handling 8 per cent of the cars, is located on the east bank of the river between First and Seventh Streets, and the Pacific Electric freight yard, handling 9% of the cars, is located along the west side of Alameda Street, between Seventh and Eighth Streets, and is commonly known as the "Eighth and Hemlock" yard.

Southern Pacific Yard Operation

For the purpose of handling freight trains, the Southern Pacific yards may be divided into four sections:

1. The "New Classification Yard" lying on the east bank of the Los Angeles River.

3. The "Upper Yard" includes that part of the yard along North Broadway which lies easterly from the lead which extends diagonally across the yard.
4. The "Lower Yard" which is that part of the same yard lying to the west of this lead.
2. The "Midway Yard" lying between the new classification yard and just north of the North Broadway bridge across the river.



FIG. 137. NEW CLASSIFICATION YARD—SOUTHERN PACIFIC

This new yard lies between the left bank of the Los Angeles River and the San Fernando Road. The southerly end is roughly outlined by the cars and tracks at the right center of the picture.



FIG. 138. SOUTHERN PACIFIC UPPER YARD

This view is taken from the overhead foot bridge across the yard near Ann Street, looking north toward North Broadway bridge, which appears in the background. The track on the left is one of the main line tracks in North Spring Street.



FIG. 139. SOUTHERN PACIFIC LOWER YARD

View taken from the overhead foot bridge across the yard near Ann Street. Redondo Street is immediately in back of the first telegraph pole on the left.

The Southern Pacific Company handles in and out of these yards approximately 620,000 cars per year and as high as 2,200 cars per day, and

this figure, which is the number of cars in and out on the main line, will be increased to about 3,000 cars per day, if all movements in and out of the yard, including cars originating and delivered at Los Angeles are taken into consideration. The size of the yards is indicated in the following tabulation:

SOUTHERN PACIFIC YARDS—TRACKAGE AND CAR CAPACITY

Yard	Miles of Track	Standing Car Capacity
New Classification	18	1609
Midway	4	320
Main Yard (Upper and Lower Yards).....	25	2214
Total	47	4143

At the present time there are needed and constantly employed, approximately 58 switching crews with about 35 switch engines. These numbers vary considerably, depending upon the volume of business and also upon the supply of equipment.



FIG. 140. SOUTHERN PACIFIC MIDWAY YARD, LYING ALONG THE WEST BANK OF THE LOS ANGELES RIVER AND NORTH OF BROADWAY.

The hills on the left of the picture prevent any further expansion of this yard, which adjoins, at its south end, the Main Yard and, at its north end, the Classification Yard. The main line tracks are those on the right. The main line of the Santa Fe to San Bernardino, via Pasadena, is seen in the right foreground.

Trains from the North—Coast and Valley Routes—pull into the "Midway Yard" where the road engine is cut off and proceeds to the roundhouse at the shops on the east bank of the river. The conductor of the train rides the engine up to River Station, at North Spring and Sotello Streets, which is the yard headquarters. Here he leaves the waybills which give the yard authorities, in practically all cases the first information as to where the loaded cars in his train are to go. There are certain exceptions to this rule, notably in case of stock trains, where this information is telegraphed ahead of the train, and for a few other forms of special shipments, among which, at this time, are included certain classes of government freight.

In this yard the train is broken up into cuts for the following points, the information necessary to make this classification having been sent by wire ahead of the train:

1. Points on the Galveston, Harrisburg and San Antonio Railroad.
2. Points on the Texas-Pacific.
3. Points on the Rock Island.
4. El Paso and East.
5. Imperial Valley.
6. Upper Yard.

The cuts for the Upper Yard are then moved to this yard for further classification. It might be noted that the grade is approximately 1 per cent down from the New Classification Yard to the Lower Yard, so that movements in this (southerly) direction are down hill.

Following the arrival of the waybills in the yard office, tags showing the destination of the cars are made and tacked on each car by a boy from the yard office, who also gives the yardmaster of that section of the yard a copy of the switch list. The Upper Yard has 24 tracks, which are put to the following uses:

- 8 for receiving tracks for trains from the south and east.
- 1 each for the following destinations: empty oil cars, San Joaquin Valley, new classification yard, freight houses, San Joaquin Valley local cars, shops, locals east, cabooses, eastbound, Santa Ana Branch, Salt Lake transfer, Coast Division short hauls, short hauls east, cars to be weighed, Santa Fe transfer, lower yard.

As noted above, cuts from the Midway Yard are broken up into these divisions in the Upper Yard.

Trains from the East pull directly into the Upper Yard and are handled in a manner similar to that described for the Midway Yard.

Trains from the South are supposed to be reduced to approximately 25 cars in the vicinity of Forty-seventh Street before being pulled along Alameda Street through the city. This reduction of the train appears to be the result of what might be called a "gentlemen's agreement" with the City, and is not compulsory through ordinance or franchise, and we may add that our observation has indicated that this reduction is not always made—though possibly omitted at this time as a war measure.

These trains pull directly into the Lower Yard. It will be noted that among the tracks in the Upper Yard is one on which cars for the Lower Yard are placed.

In the lower yard a further segregation of cars is made. The usual classes observed being as follows:

1. "Yellow-ball District, running from the Yard east to Myers Station, which is usually switched during the day.
2. "Green-ball" District, which is south of 8th Street.
3. "Red-ball" District, which is north of 4th Street.
4. "Central" District, extending from 4th to 8th Streets.
5. Macy Street Team Tracks.
6. Pacific Electric Transfer. These cars are transferred to the Pacific Electric either at Aliso Street near Alameda, at 8th and Alameda, or at Clement Junction (at Alameda Street near 25th Street).
7. Santa Fe Transfer, which is under North Broadway Bridge.
8. Salt Lake Transfer, which is at the Los Angeles River and Alhambra Avenue.
9. San Pedro Branch.
10. Santa Ana Branch.
11. Duarte Branch.
The cars for these branches are further segregated to district and station order.
12. Bad order cars.

Santa Fe Yard Operations

FIG. 141. SANTA FE YARDS NORTH OF FOURTH STREET BRIDGE

The passenger yard and station are in the left background; freight yard on the right.



FIG. 142. SOUTHERN END OF SANTA FE FREIGHT YARD

Taken from Fourth Street viaduct, this view shows the southern end of the yard with the main line tracks along the river. The coach yard is just beyond Seventh Street in the distance. The Los Angeles Ice and Cold Storage Company's plant is the largest single industry in Los Angeles from the standpoint of the number of freight cars received and delivered. These amount to approximately 7,000 per year.

This freight yard has about 19 miles of track and will stand 1276 freight cars on the yard tracks proper.

Trains may enter the Santa Fe yards from either the north or south and are just as liable to come one way as another. All freight trains, excepting one, are operated as extras, the exception being train No. 35, which handles green perishables and is routed into Los Angeles via Pasadena.

On arrival in Los Angeles, the train is broken up, as far as Los Angeles business is concerned, into cuts for the following points:

"Canal" (This cut includes cars for the freight houses and the neighboring industries and extends from First to Fifth Streets)

"North Industrial District" (Industries from First Street to North Main Street)

"South Industrial District" (Including industries, roughly between Sacramento Street and Slauson Avenue; also including industries located between Redondo Junction and Hohart Junction)

"Patch" (Including industries between Fifth and Sacramento Streets and the "Market" on Alameda Street.)

"North of Main Street" (Including industries between North Main Street and Avenue 22)

"Southern Pacific Transfer"

"Salt Lake Transfer"

"Pacific Electric Transfer," of which there are two, one at Butte and one at Aliso Streets, the use of which depends upon the destination of the cars.

Practically all freight trains **leaving** Los Angeles leave the Santa Fe yard headed south—down grade at the start—as cars for the east are hauled to San Bernardino via Fullerton on account of the heavier grades via Pasadena.

At the present time the yard switching requires approximately 1170 engine hours per week, which, stated in another way, is a daily requirement of about 20 crews and 11 switch engines.

It seems important to note that the Santa Fe is able to switch the industries in the district between First and Ninth Streets and have all cars set within approximately three hours after the arrival of the train without the use of any longitudinal drill tracks, such as those on Alameda Street.

This yard has about 9 miles of track and a capacity of 795 standing cars. About 90 per cent of the Salt Lake freight traffic approaches or leaves the

Salt Lake Yard Operation

FIG. 113. SALT LAKE FREIGHT YARD NORTH OF FOURTH STREET

On the left is the Los Angeles River. The two tracks adjacent to the river are the main line tracks and all those to the right are yard tracks. In the center distance may be seen the coach yard.



FIG. 114. SALT LAKE YARD SOUTH OF FOURTH STREET

On the right is the Los Angeles River, next to which are the main line tracks, which are considerably higher than the yard tracks on the left of the line of telegraph poles. Seventh Street bridge across the river may be seen.

Salt Lake yard from the south, the business on the Pasadena and Glendale lines being, by comparison, very small with the Eastern and Los Angeles Harbor traffic. The operation of the yard is comparatively simple and needs little description, the freight trains simply pulling into the yard and being broken up according to the different classifications necessary.

With regard to cars destined to Los Angeles industries, it may be said that the territory within the Salt Lake switching limits is divided into two districts; the north district including all territory north of First Street, the principal business in this district being that of the canneries between Aliso and First Streets; the house and team tracks are also within this district. The south district includes all territory south of First Street, including the Santa Fe Alley track. This latter lies parallel to, east of, and about 150 feet distant from Santa Fe Avenue, and is joint property of the Southern Pacific-Salt Lake, and, previous to May 13, 1918, was switched during the last six months of the year by the Salt Lake and during the first six months by the Southern Pacific. Since this date, in order to reduce the amount of industrial switching on Alameda Street, the Salt Lake is switching this track the entire year.

At present (May, 1918) there are about nine switch crews and five switch engines employed in Salt Lake freight switching at Los Angeles. One engine and two crews are used in the north district, one engine and three crews in the yard and the balance is used in switching the south industrial district. Passenger trains require one crew and one engine.

This yard appears to be sufficient for present business and is satisfactory from the standpoint of operation, except that the classification must be handled across Seventh Street, which seriously delays the street car and vehicular traffic at this point, it being necessary, at times, to keep the gates down for two or three minutes at a time. North of Seventh Street the ladder track descends on rather a steep grade for four or five hundred feet, which is a very objectionable feature because of the amount of damage done to cars by too heavy collision when switching them on this steep grade.

The Salt Lake also has a small yard south of the City near Hobart, commonly called East Yard, which is at present used only for storage.

This yard has about 3 miles of track and will hold 186 freight cars. Cars reach the Pacific Electric yard in two ways: (1) those cars originating on the lines south and west of the City are hauled directly into the yard by Pacific Electric power; (2) cars originating on the eastern lines are delivered to the Southern Pacific at the Macy Street transfer; are hauled along Alameda Street and set on one of the Pacific Electric transfers usually at Eighth and Alameda Streets. Cars destined for points on the east lines are

Pacific Electric Yard Operation

FIG. 145. PACIFIC ELECTRIC FREIGHT YARD

White rows of paper are standing at the end of the freight sled on the left. The large brick buildings in the background are shop buildings; in back of these are the concrete buildings of the Los Angeles Union Terminal. Eighth Street is in the foreground.

transferred to the Southern Pacific at Clement Junction, hauled by it along Alameda Street to Macy Street transfer and thence to their destination over Pacific Electric rails.

Switching business in Los Angeles is handled by three day crews and three night crews; a day and a night crew, which may be classed as an outside crew, working south of Amoca Tower as far out as Fruitland, on the Whittier line, and as far as Slauson Avenue on the Long Beach line and two inside crews, which work north of the Amoca Tower (Amoca Tower is approximately at Long Beach Avenue and Twenty-sixth Street).

Recommendations

These recommendations are a direct result of other recommendations in this report. The existing freight yards in Los Angeles have not been the source of any complaint and our studies have indicated no criticism of their operation or location, except as the latter is affected by the general relocation of transportation facilities.

We have previously recommended that the present Southern Pacific freight yard be used as a union coach yard. We recommend, therefore, that a new freight yard for the Southern Pacific be established along the San Fernando Road, substantially as already planned by this road. (Southern

Pacific-Los Angeles Division—M. of W.—Drawing S-1794). All freight trains will then run directly into this yard, which will take the place of the present small development at this yard, the Midway Yard and the upper and lower yards between Spring Street and Broadway. The Midway Yard will probably be found useful as a transfer yard between the Southern Pacific and the Santa Fe. While it is at present larger than necessary for this purpose, the future business will justify this use. In our opinion, these changes will result in much improved operating conditions, both as to smoothness of operation and economy.

We recommend, as will be noted in a later chapter, a union freight station at the site of the present Santa Fe yard. This yard must, then, be moved to another location. We recommend, therefore, that the Santa Fe construct a new freight yard on the land already acquired just east of Hobart. All Santa Fe freight trains would then run directly into this new yard. Ultimately, the trains running via Pasadena would not cross the Los Angeles River at all, using the trackage on the east bank between Humboldt Street and Butte Street.

No changes are recommended in the use or location of the Salt Lake freight yard along the Los Angeles River between Fourth and Seventh Streets.

We recommend that the Pacific Electric join the three steam roads in a union freight station at the Santa Fe site and are also recommending elimination of transfer tracks between the Southern Pacific and Pacific Electric at the Pacific Electric freight yard. With these two things accomplished, the Pacific Electric will find it no longer necessary to maintain its present yard along Alameda Street between Seventh and Eighth Streets. In this connection, we may note that the land is well suited for industrial development, such as future extension of the Los Angeles Union Terminal, in which the Pacific Electric is financially interested (see Fig. 157 on page 428).

We have not, in our estimates, taken any credit for the release of this property from transportation use. All of our plans contemplate an elevated railway for the Pacific Electric along the easterly edge and across the southeast corner of this tract. The remainder, to the west, is the part that could be released from transportation use. This remainder, 803,000 square feet (18 acres approximately) in area, it is estimated, has a salvage value of \$1,364,100.



FIG. 146. SOUTHERN PACIFIC FREIGHT SHEDS AND TEAM YARD

On the left the tracks curve from Alameda Street into North Spring Street. Shed "A" is in the left background. In the left center are freight cars standing on the house tracks, the outbound shed "B" being on the left and the inbound shed "C" on the right. Farther to the right and in the foreground is the team yard.

Freight Station

Southern Pacific Freight Depot

The Southern Pacific less than carload freight station is located at Alameda and North Spring Streets, where, in addition to the freight sheds, a team yard is maintained. This station is located near the freight yard, a point of some advantage, as a minimum of time is lost in transferring cars between the yard and the station.

It may be well to point out that less than carload freight sheds are open for business about 308 days per year, being closed on Sundays and some holidays (perishable shipments are, however, handled 365 days per year). In all of our tables, wherein an average daily figure is shown, the calculations are based on 308 days. Cars are usually spotted for unloading alongside the inbound house during the early morning hours and, after being unloaded, are transferred to tracks nearer the outbound house and, in our tabulations covering the movement of cars in and out of less than carload freight stations, it will be understood that the total cars in and out includes in the outbound cars practically all of those reported inbound.

The Southern Pacific has three freight sheds, the principal characteristics of which follow:

PRINCIPAL CHARACTERISTICS—SOUTHERN PACIFIC FREIGHT STATION

	Square feet	Outbound		Inbound	
		Shed B	Shed A	Shed A	Shed C
Area, House	24,000	28,320	21,384		
Platform	9,720	18,466	12,200		
Platform and Shed	3,108	4,800			
Total	36,828	51,586	33,584		
Grand Total		121,998			
Cars handled, average day	83	50			
Cars, spot capacity	96	102			
Tons handled, average day	533	180			
Area per ton per average day, sq. ft.	68	473			
Team front per ton per average day, feet	1.59	8.0			

Shed "B" is exclusively outbound and Sheds "A" and "C" exclusively inbound. Shed "A" is used for automobiles and inbound Los Angeles freight exclusively, and Shed "C" for inbound and transfer freight. The freight offices are located in the two-story portion of Shed "A."



FIG. 147. SOUTHERN PACIFIC FREIGHT DEPOT

This is part of Shed "A", extending along the west side of North Spring Street and North of Alameda Street. The offices are located in this building, which is of frame construction.

The Southern Pacific freight station is now rather poorly located. Many jobbers have moved south, away from it, but since the Southern Pacific serves so many points exclusively, shippers have, of necessity, had to ship there. The station is also inadequate, principally because Shed "B" is too small, not having been designed for the present business. The facilities

have been left behind in the march of events toward the more economical operation of freight stations, due to better design and the introduction of mechanical labor saving devices.



FIG. 148. SOUTHERN PACIFIC OUTHOUD FREIGHT SHED

This view gives some idea of the congestion during the busy period of the day. At the time this picture was taken, 116 vehicles were either at the shed or waiting their turn. This view emphasizes the necessity of the enlargement of these facilities within the near future, although closing time congestion seems almost impossible of elimination.

Shed "B" is 40 feet wide and 600 feet long. The loading length for teams is inadequate and the system of handling the freight from the teams to the cars is open to improvement, although this cannot be accomplished with the present design. While it is well known that the teams are thickest just before the time of closing the sheds for receipt of less than carload freight (at 4 o'clock P. M. in Los Angeles) and that this congestion occurs at all large freight stations, they are evidently detained too long at this shed. The figure of 1.59 feet of wagon frontage per ton shipped per average day is indicative of the inadequacy of team frontage.

The buildings are of frame construction, built at various times, as the traffic grew and not intended for the purpose for which they are now used. Freight is handled from the drays to the cars on hand trucks, the house trucks being placed alongside one another, without platforms.

The Santa Fe freight station, handling 32 per cent of Los Angeles less than carload freight, is located along Santa Fe Avenue, between Third and Fourth Streets, and consists of two very modern reinforced concrete sheds, the present inbound shed, 1080 feet long, half being 60 feet wide and half 40 feet in width, having been built in 1907, and the inbound shed, 950 feet long and 60 feet wide, in 1915.



FIG. 149. ANOTHER VIEW OF SOUTHERN PACIFIC OUTBOUND FREIGHT SHEDS

In the busy time of day, just before the sheds are closed for shipments, teams must often wait for a considerable time in order to unload. This lost time, in the aggregate, probably amounts to more than the time consumed in going to and from the freight house.



FIG. 150. SANTA FE INBOUND FREIGHT SHED

Located along west side of Santa Fe Avenue, between Third and Fourth Streets, this modern reinforced concrete and steel structure is probably one of the best facilities of its kind in the West. The outbound shed, shown in part in another picture, is of similar construction and size. Offices are located in the two-story portion in the foreground.

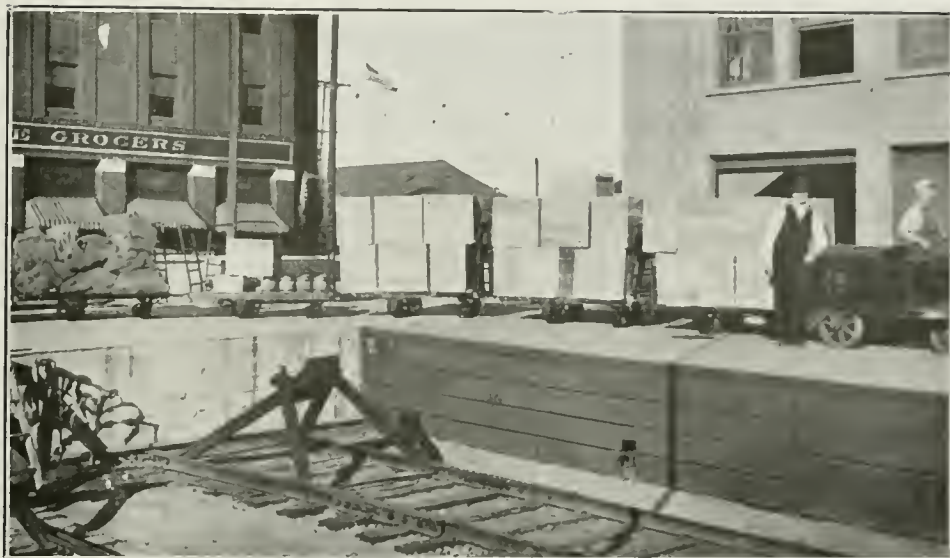


FIG. 151. MODERN PACKAGE FREIGHT HANDLING AT THE SANTA FE FREIGHT HOUSE

These electric tractors and special trucks are used to convey freight between the freight house and cars. This is the only modern equipment of its kind in the West. The tractor is hauling 8000 pounds of freight; a man with a hand truck usually finds his limit 500 pounds.



FIG. 152. SANTA FE STATION YARD

The passenger station is immediately in front of the large gas holder in the background. This view also shows the cars alongside the inbound freight house, with the island platforms between the lines of cars. Third Street is just this side of the grocery warehouse on the left.

These sheds are the most modern in the West. Structurally they are very similar. The outbound shed is completely equipped with dial scales, the quickest type for weighing freight. Between the sheds are platforms reached by electrically operated lift bridges from the sheds, these lift bridges being raised to admit the movement of cars.

One of the most noteworthy items is the use of electric tractors and specially built trucks for handling outbound and transfer freight between the scales and cars. This shed was designed for this method of operation, being 60 feet in width. Hand trucks are used for inbound freight, this method being more economical for the class of freight and width of shed.

The principal characteristics follow:

PRINCIPAL CHARACTERISTICS—SANTA FE FREIGHT STATION		Outbound	Inbound
Area, house	square feet	48,000	54,000
“ platform	“ “	1,885	1,885
“ shed and platform	“ “	8,994	6,936
“ transfer platform	“ “	14,998	15,878
Total		73,877	78,699
Grand Total		152,576	
Cars handled, average day	No.	62	37
Cars, spot capacity	No.	94	76
Tons handled, average day	tons	361	220
Area per ton per average day	sq. ft.	205	353
Team front per ton per average day.....	feet	2.63	5.70



FIG. 153. SANTA FE OUTBOUND FREIGHT SHED

This view was taken about closing time and shows the concentration of business at this time of day. Crane for unloading heavy freight appears at the left.

It will be noted that these sheds offer more room for the business done than the Southern Pacific, and our observation has been that there is less congestion, especially congestion of teams. This is, however, also due in part to the fact that during the war, considerable business was diverted to the other roads and the fact that "steamer day" loading tends towards less congestion at closing time. "Steamer day" (or "sailing day") loading means that less than carload freight is dispatched for less important points at intervals of several days rather than daily, and that freight for such destinations will be received at the freight houses only on these certain days. The frequency depends upon the volume of business.

Salt Lake Freight Depot



FIG. 154. SALT LAKE FREIGHT STATION

These are the freight sheds at Aliso and Myer Streets. With the exception of a small concrete section, these buildings are of frame construction.

The Salt Lake less than carload freight station, at which 11 per cent of this class of Los Angeles freight is handled, is located along Myers Street, just south of Aliso Street. The buildings are of frame construction, except a part of Shed "B" which is concrete and brick. An extension of Shed "C" built in 1913 (on the east side of Myers Street), is of reinforced concrete, but as this building is leased as a warehouse, it is not included in the following data. Shed "A," inbound, was built in 1901 and 1902. Shed "B," outbound (and nearer to Aliso Street on the west side of Myers Street), was built in 1905, and Shed "C," in 1907.



FIG. 155. SALT LAKE AUTOMOBILE FREIGHT STATION

The main Salt Lake freight station is located at Aliso Street and too far from the center of the automobile industry. It was found necessary to locate this structure at Seventh Street. It lies just east of the Los Angeles River.

Pacific Electric Freight Depot

The Salt Lake also has an "automobile dock" on Seventh Street, just east of the river, which was built in order to provide facilities for handling this class of freight in a location fairly accessible to the automobile district, practically all of which is south of Seventh Street. This structure is of frame construction.

With the realization that the site of the present station was such that business would no longer care to go to the extra distance involved, the Salt Lake in recent years acquired a site for a freight terminal on Alameda Street, between Eighth and Hunter Streets. As discussed elsewhere, permission to install the necessary track crossings to enable the construction of tracks to the site was asked of the Commission, in Application 3037, and the matter is now held in abeyance pending the Commission's decision in these consolidated cases.

The Pacific Electric freight station is located along Eighth Street, from Hemlock to Naomi Streets. The sheds, part of which are two-story, accommodating the offices, are all of frame construction. This station was established about 1905. Seventeen per cent of all Los Angeles less than carload freight traffic is handled at this station. The inbound freight originates, to a large extent, at the wharves at the harbor while the outbound is destined to the many points in the large territory surrounding Los Angeles and served by this road.



FIG. 156. PACIFIC ELECTRIC FREIGHT STATION

This frame structure is located on Eighth Street near Hemlock Street and is the only less than carload freight station of the Pacific Electric in Los Angeles.

The essential data regarding this station follows:

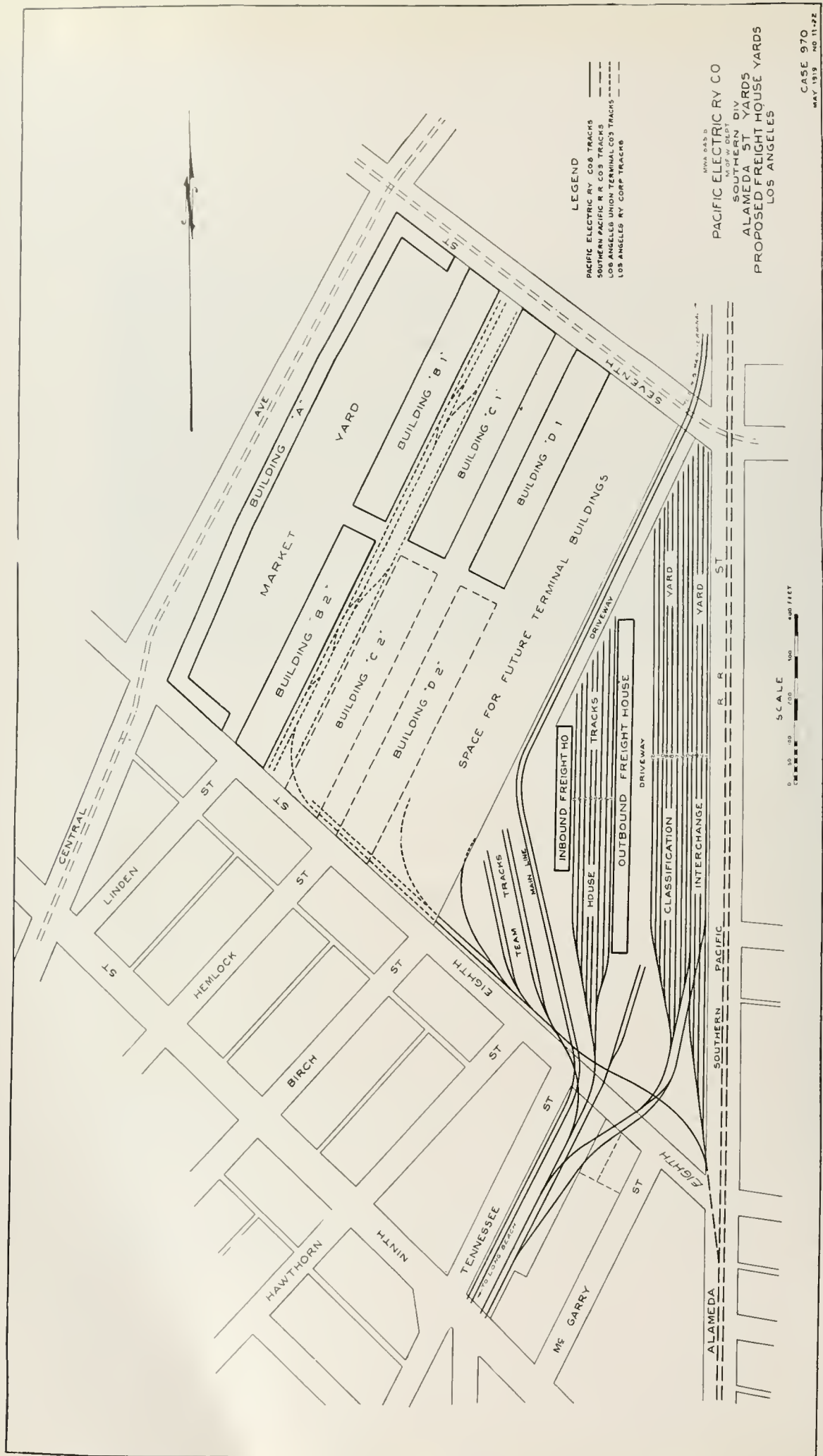
PRINCIPAL CHARACTERISTICS—PACIFIC ELECTRIC FREIGHT STATION

	Outbound	Inbound
Area, house	15,616	17,520
" platform	2,032	4,412
" shed and platform	11,928	3,600
Total	29,576	25,532
Grand Total	55,108	
Cars handled, average day	No. 21	13
Car spot capacity	No. 53	14
Tons handled, average day	tons 192	113
Area per ton, average day	sq. ft. 154	226
Team front per ton, average day	feet 3.07	3.12

It will be noted that these facilities are fairly adequate for the amount of present business. It may also be stated that the Pacific Electric has plans for changing the location of this station, the new site being on ground now owned and occupied by shop buildings. This improvement is intended to include the whole arrangement of the team tracks and, in fact, the whole yard.

Recommendations

We recommend that the Southern Pacific, Santa Fe and Pacific Electric join in the construction and operation of a consolidated freight station at the



LEGEND
 PACIFIC ELECTRIC RY CO'S TRACKS
 SOUTHERN PACIFIC RY CO'S TRACKS
 LOS ANGELES UNION TERMINAL CO'S TRACKS
 LOS ANGELES RY CORP TRACKS

PACIFIC ELECTRIC RY CO
 SOUTHERN DIV
 ALAMEDA ST YARDS
 PROPOSED FREIGHT HOUSE YARDS
 LOS ANGELES

SCALE
 0 50 100 200 400 FEET

CASE 970
 MAY 1919 NO 11-72

California Railroad Commission Engineering Dept. (from map by Pacific Electric Railway)

FIG. 157. PROPOSED PACIFIC ELECTRIC FREIGHT HOUSE YARDS

This shows the industrial development of the Los Angeles Union Terminal Company. In the future this development may be extended to include the site of the proposed freight yard. A better conception of the extent and character of the market buildings can be obtained from the photographs (see Fig. 166).

Santa Fe site, the existing Santa Fe freight station to become a part thereof. This is discussed more in detail later.

Under these conditions, the present Southern Pacific freight station site will be used as a team yard, the existing Salt Lake freight station site will be cleared and used in part as a team yard (it may be here noted that the recommended depression and expansion of the tracks along the east bank interferes to some extent with this freight station), and the Pacific Electric freight station will be abandoned.

Team Yards

Certain classes of freight, principally carloads, destined for consignees without spur track facilities, and large and heavy packages, such as machinery, are commonly unloaded, or loaded, directly from cars to drays, without being handled in the freight station, at team tracks alongside good driveways, although at one or more points a crane is provided. It is advantageous to have at least one yard adjacent to the freight station.



FIG. 158. MACY STREET TEAM YARDS

Located at Alameda and Macy Streets, this property would be devoted to a station yard according to the Hawgood and Storrow plans for the establishment of a union passenger station.

The Southern Pacific team tracks are located at the site of the freight station at North Spring and Alameda Streets, at the corner of Macy and Alameda Streets and at the corner of Fourth and Alameda Streets.



FIG. 159. SOUTHERN PACIFIC TEAM TRACKS—FOURTH AND ALAMEDA STREETS

This team yard is largely devoted to a carload express business, which consists principally of perishable commodities. These cars are handled on passenger trains, and such a yard is necessarily near the passenger station.

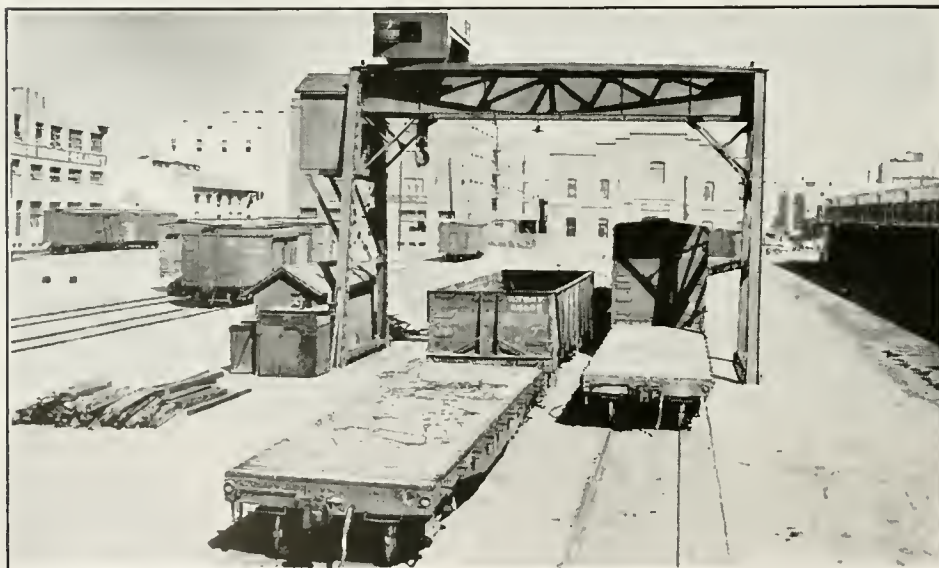


FIG. 160. SANTA FE TEAM YARD BETWEEN THIRD AND FOURTH STREETS

This is one of the Santa Fe Team Yards. Driveways are paved with granite block. A crane for unloading heavy shipments is shown.

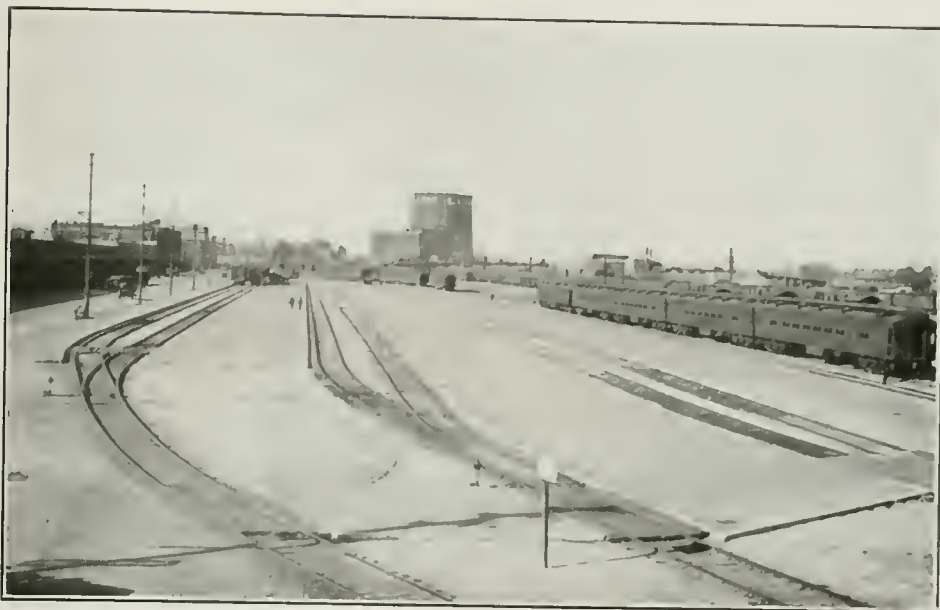


FIG. 161. SANTA FE TEAM TRACKS

These seven tracks are located along the east side of Santa Fe Avenue, between Third and Fourth Streets. The paving is granite block.



FIG. 162. SANTA FE TEAM YARD AT BAY AND LAWRENCE STREETS

These team tracks were constructed in 1914, but are used very little. Perhaps the most important point in this connection is the evident attempt of the Santa Fe to procure team tracks adjacent to Alameda Street. These are one block to the east.

Santa Fe team tracks are located along Santa Fe Avenue between Third and Fourth Streets, and also west of the Santa Fe freight station, between Third and Fourth Streets. The teamways in these yards are granite blocks on a concrete base and are, perhaps, the best paved of any in Los Angeles. The Santa Fe also has a team yard on Shearer Street, between Wilson and Lawrence Streets, which is also paved with granite blocks. This yard was installed in 1914 and represents an attempt of the Santa Fe to gain a location adjacent to Alameda Street south of Seventh Street.



FIG. 163. TEAM TRACKS AT SALT LAKE FREIGHT STATION

The first track on the left and the tracks on the right, in the foreground, are team tracks where carload shipments are transferred to vehicles.

Salt Lake team tracks are located at the site of the freight station along Myers Street, although some tracks in the yard north of Seventh Street are occasionally used for that purpose.

Pacific Electric team tracks are located at the site of the freight station and also at the corner of Anderson and Aliso Streets.

The principal physical characteristics of the Los Angeles team tracks are given in the following summary:



FIG. 164. PACIFIC ELECTRIC TEAM YARD AND TRANSFER YARD

In this view there are shown the Pacific Electric team yard at Anderson and Aliso Streets, and Pacific Electric-Salt Lake transfer on Elliott Street, known as Anderson Transfer. Elliott Street is just to the right of the center of the picture. Mission Road is just this side of the building on which "Ben Hur" appears.

TEAM YARDS—LOS ANGELES

Road	Area (Sq. ft.)	Trackage (feet)	Car Capacity (spot)
Southern Pacific	593,605	17,619	353
Santa Fe	391,800	13,661	280
Salt Lake	95,100	3,342	67
Total Steam Roads	1,080,505	34,622	700
Pacific Electric	48,300	1,765	36
Total	1,128,805	36,387	736
(Alternate Units)	(26 acres)	(6.9 miles)	

It may be noted that cars are frequently set for unloading at various other points not in the team yards above mentioned.

LOS ANGELES UNION TERMINAL COMPANY

The Los Angeles Terminal Company has recently completed a large part of its proposed terminal facilities between Seventh and Eighth Streets and along Central Avenue. The opening took place about May, 1918. This recent development houses practically all of the produce business in Los Angeles. In addition, warehouses are leased, principally for wholesale groceries and allied trades. Fig. 157 (see page 428) shows the location and extent of the buildings and, also, in solid lines, those already built.



FIG. 166. MARKET COUCHET—LOS ANGELES UNION TERMINAL.
An early morning view soon after the opening date.



FIG. 165. WAREHOUSES AND CARS—LOS ANGELES UNION TERMINAL

This view shows the concrete warehouses and manufacturing buildings and the freight cars on tracks along Buildings B-1 and B-2 (See Fig. 157). The Pacific Electric is the only road serving this terminal.

The property was acquired largely from the Pacific Electric Railway Company and this road is financially interested in the project. It is the only road having direct track connections.

CHAPTER XVI.

OUTLINE

Relation to Terminal Problem

Industry Spurs

Types of Spur Tracks

The Herringbone System of Spur Tracks

Recommendations Relative to Industry Tracks

CHAPTER XVI
INDUSTRIAL SPUR TRACKS—PLAN AND SERVICE

RELATION TO TERMINAL PROBLEM

In the terminal problem, spur tracks are important in their relation to grade crossings and in relation to the receipt and the delivery of carload freight. The elimination of such tracks or plans for their relocation can be considered only after a study of the business conditions surrounding their location and use has been made.

Before taking up any suggested or other plans for the spur track system, it is essential to know the extent of this business, the number of industries and tracks, the extent of the trackage and the number of cars which it is possible to set on these tracks.

INDUSTRIAL TRACKAGE AND CAR CAPACITY LOS ANGELES
SWITCHING LIMITS, 1918

Road	Number of Industries	Apprx. No. of Tracks	Miles of Track	Car Capacity
Southern Pacific	340	166	25.61	1,626
Santa Fe	371	169	26.37	1,741
Salt Lake	109	47	7.92	657
Total Steam Roads	820	382	59.90	4,024
Pacific Electric	25	...	....	....
Grand Total	845			

(Industries on Southern Pacific east of Alhambra Shops and on Santa Monica Air Line are not included.)

These figures change almost every day and for this reason only approximate figures can be given. Attention is drawn to the fact that 60 miles of track is required and that over 800 industries are served. This is indicative of the amount of capital invested in this phase of transportation in Los Angeles and its commercial importance.

We are more concerned, however, with the congested industrial district between Alhambra Avenue and Butte Street because of street and railroad traffic conditions and the large percentage of the shipping. Of the 820 industries above, 455 are located in this district. To these, in 1917, there were set 48,600 loaded freight cars, or 70 per cent of the total number set on industrial tracks. In addition, 20,600 empty cars were set for loading, a total of 69,200 per year, or an average of 230 cars per working day (300 days in a year), or 1 every 6 minutes. Eighteen of the 25 industries on Pacific Electric tracks are also between Seventh and Butte Streets. To these are set about 1,500 cars per annum. More detailed figures follow:

**INDUSTRIES, SPUR TRACKS AND TRAFFIC INDUSTRIAL DISTRICT
LOS ANGELES—YEAR 1917—STEAM CARRIERS ONLY**

Section Street Limits		Number of Active Industries	Approx. Number of Tracks	Number of Cars Set (Empty Incl.)
From	To			
College-Main	Alpine-Alhambra ..	‡9	6	3,878
Alpine-Alhambra	Macy	6	9	9,089
Macy	Aliso	17	12	1,057
Aliso	First	33	29	8,974
First	Fourth	*105	32	13,519
Fourth	Sixth	34	19	3,413
Sixth	Seventh	101	22	11,223
Seventh	Eighth	89	22	7,334
Eighth	Ninth	17	11	1,800
Ninth	Butte	44	27	8,923
Totals		455	189	69,210
Total, Southern Pacific & Salt Lake.		234	77	23,903
Total, Santa Fe		221	112	45,307
Total, Loaded Cars for Unloading...				48,569
Total Additional Empty Cars for Load- ing				20,641

‡Omits Southern Pacific Spurs in Alhambra Avenue.

*Excluding Los Angeles Ice and Cold Storage Company at Seventh Street and River.

INDUSTRY SPURS

The name "Industry Spur" as usually understood means a spur track alongside the warehouse or business establishment of some shipper or located in part of his property, to which he has practically exclusive use. Cars are unloaded at his place of business and draying is obviated. This is, perhaps, the most important feature from the shippers' standpoint for, if the cost of obtaining this facility has not been excessive, all draying charges or equivalents are done away with. There is also less handling, and this is of importance with certain classes of freight.

These tracks are commonly built under an "Industry Track Agreement," of which there are two general forms:

1. The industry pays for all labor and perishable material (ties) and the carrier pays for the balance and bears the cost of maintenance.
2. The industry pays for both the labor and material, where the track is on its property, and the carrier assumes the cost of the balance. Maintenance costs are paid by the owners of such portions.

There are various ramifications of these two general propositions, dependent, as much as any other one thing, upon the business the carrier expects or ultimately receives from the industry. These tracks are located in the streets as well as being located in part on private property. The lat-



REGIONAL DISTRIBUTION OF FREIGHT CARS
 SET ON INDUSTRY TRACKS
 AND
 INTERCHANGE OF FREIGHT CARS
 LOS ANGELES. YEAR 1917.

FIGURES INCLUDE LOADED AND EMPTY CARS.
 LETTERS AND FIGURES IN SQUARES REFER TO INTERCHANGE

S. P. - SOUTHERN PACIFIC
 S. F. - SANTA FE
 S. L. - SALT LAKE
 P. E. - PACIFIC ELECTRIC



LEGEND

- TRACK
 SOUTHERN PACIFIC CO.
 STOWEN, TOROJA & SANTA FE RY.
 LOS ANGELES RY. CO. RY.
 PACIFIC ELECTRIC RY.
 LOS ANGELES RT.
 P. AND LARRY'S
 JOINT S. P. CO. AND L.A.A. S. L. RY.
 JOINT S. P. CO., S. L. RY. AND S. F. RY.



FIG. 107. REGIONAL DISTRIBUTION OF FREIGHT CARS SET ON INDUSTRY TRACKS, AND INTERCHANGE OF FREIGHT CARS.

The interchanges shown in squares on this map indicate the number of cars with each district by the various railroads is shown. The location and name of a carrier given in interchanges are not intended to imply any preference for that carrier.

ter is the usual case, however, in Los Angeles where, in the industrial district, the spur track privilege has a considerable effect on the value of land. In fact, the County Assessor's office recognizes this feature in making assessments for taxes.

TYPES OF SPUR TRACKS

These tracks are built to serve industries in different ways. Some are objectionable and should not be sanctioned, while others, having the same characteristics but differently located, cannot be regarded as objectionable. Still others have evidently been designed to accord, as far as possible, with the best practice of the time. It will be well to review the general methods in which these spurs are constructed in order to understand clearly the conditions which surround any plans for proposed changes.



FIG. 168. INDUSTRY SPUR IN ARCADE

This view shows an industry track constructed in an Arcade, under one side of a warehouse, leaving the sidewalk free for pedestrians. A freight train in Alameda Street is at the right.

Location of a spur track in an arcade leaves the sidewalk free for its normal purpose and does not block the street. This type of spur must be designed for a building at the time of its construction. The track is not susceptible to being changed, except at the expense of altering the building and, in the case shown by the photograph above, this would be prohibitive in cost to the owners. This type of spur is limited to one or two.



FIG. 169. SANTA FE ALLEY, NEAR VIOLET STREET

On the left it will be noted that the building is constructed so that a track is located in such a way that cars may run alongside the loading platform, while the upper stories of the building are not interfered with. The track on the right in the main lead in Santa Fe Alley and is owned jointly by the Southern Pacific and the Salt Lake.



FIG. 170. SPUR TRACK PLACED BEHIND SIDEWALK

This view shows one method of serving a warehouse with a spur track. By placing the track behind the sidewalk, no street traffic whatever is interfered with. Passenger train in Alameda Street appears at the left.



FIG. 171. WAREHOUSE WITH SPUR TRACK INSIDE

With this arrangement, the spur track turns from the main tracks in the street and enters the warehouse at an angle.



FIG. 172. SPUR TRACK ON ALAMEDA STREET NEAR FIRST STREET

There is not sufficient room for a vehicle between cars on the spur track and a train on the nearer main line track. Spur tracks in such locations on important thoroughfares should not be permitted. Note also the elevated sidewalk used for unloading platform.

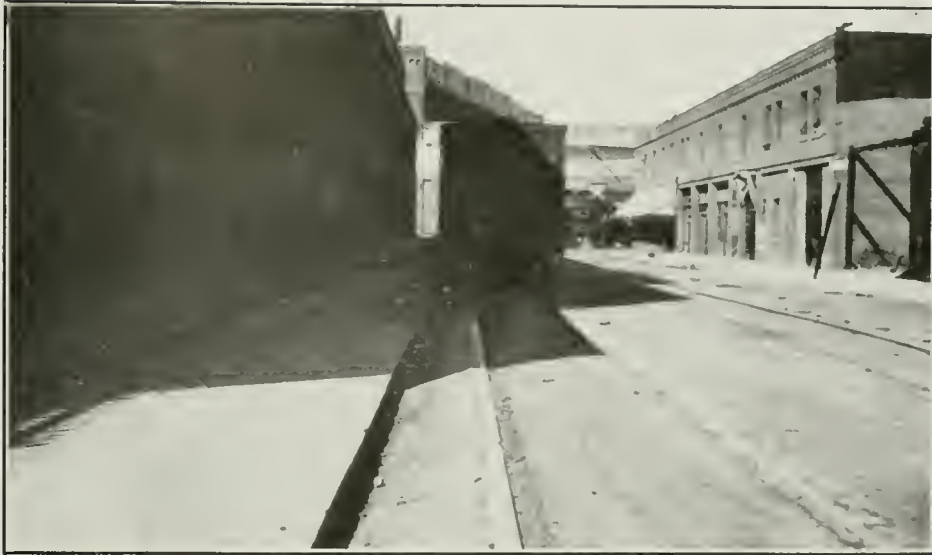


FIG. 173. SIDEWALK USED FOR UNLOADING PLATFORM

This view, taken in Banning Street, shows how the sidewalk has been elevated to approximately the level of the car floor and used as an unloading platform. It also shows that the car is standing in the street. This practice in unimportant streets does not appear to be particularly objectionable.

The spur track may be placed behind the sidewalk and the car frontage also used for team frontage. This is an excellent arrangement under some conditions, particularly when the cost of the land is not excessive for this use. Night switching is usually preferable to industries so located, so that switching will not interfere with teaming. This form of construction is also, in general, difficult to change to correspond to new switching leads. There are but few of this type of spur tracks in Los Angeles.

A few Los Angeles spur tracks turn off the lead tracks in the street and enter the shippers' warehouses on a curve. This arrangement is usually difficult of changing to another system of leads as it is dependent upon the track longitudinally in the street. There are many examples of this general type.

There are one or two spur tracks in the streets where freight is unloaded on the sidewalk, which is elevated. This has few objectionable features on a sidewalk but should not be tolerated on important streets such as Alameda Street. Neither should such construction be allowed where there is not room for a vehicle to pass between a car on the spur and a train on the main tracks. The general plan, having the future in mind, is not a good one since it demands tracks longitudinally on streets.



FIG. 174. FREIGHT CARS IN COMMERCIAL STREET

These cars stand on tracks located on one side of the street and are usually unloaded in the warehouse by means of hang-planks across the sidewalk. Note that there is no switching lead in this street and that to move any car it is necessary to disturb all of the cars behind it.

There are many instances where there is a spur track along the sidewalk, and gangplanks are placed across the sidewalk for unloading the cars. In some localities, this is objectionable; in others, the practice may be tolerated.

By far the largest class of spurs are those located upon private or carrier property or located alongside of warehouse or shipping platform within a city block. These spurs would require no change to improve grade crossing conditions, but practically all groups would need alteration because of a different approach. As at present these main leads turn off a track longitudinally in a street, they are difficult to change on account of the vast amount of work necessitated by the elimination of the main tracks in the street.

THE HERRINGBONE SYSTEM OF SPUR TRACKS

This system, which was referred to many times at the hearings before the Commission, was first mentioned by Mr. Samuel Storrow, a witness for the Central Development Association, in his testimony, from which the following quotation is taken:

"A. Our project does not include the removal of any industries from Alameda Street.

"Q. Then will you kindly state what you mean by the ultimate, if it isn't intended to remove those industries?

"A. The proposal is that all the tracks on Alameda Street—by that we mean tracks that run longitudinally on the streets—not the cross tracks but all tracks which now run longitudinally on Alameda Street—shall be taken up from the south city limits to the north end of Alameda Street.

"Q. Then how will the industries located upon Alameda at the present time be served?

"A. The suggestion is that, pending that removal, which, of course, would take time, because this thing has to go on somewhat slowly, it is a very large job,—during that time a system of freight tracks would be built out in a **herring-bone** fashion from the river bank, roughly speaking, perpendicular to the river bank, and that those tracks should be so arranged, adjusted, located and planned that they would reach not only every industry now on Alameda Street, or west of it, but many others which we hope will come. I admit it is an intricate problem which we are handing to the Railroad Commission. We have confidence in the Railroad Commission and its engineers." (trans. p. 373)

The "herringbone" system in Los Angeles has come to mean a system of industrial tracks turning to the west from the Santa Fe tracks along the river and running east and west on private rights of way between the principal east and west streets. From these main industrial tracks other and shorter tracks would be built within the city blocks to reach various industries. Under this system the east and west streets would be free from grade crossings, but the number of crossings on the north and south streets would be increased.

Another fundamental point in the "herringbone" plan, as noted by Mr. Storrow, is the proposal that all the tracks on Alameda Street should ultimately be taken up from the south city limits to the north end of the street. It was suggested to Mr. Storrow that the "herringbone" system would not reduce the number of crossings and, while he appears to have admitted this point, he contended that the advantage lay in the fact that the danger and delay to vehicular traffic would be materially less because these "herringbone" tracks, serving only a few industries, would not be used by the long trains which now operate along Alameda Street. That is, the traffic between the freight yards in the northern part of the city and the industries in the southern part would be hauled along the river instead of along Alameda Street and, so the witness stated, the traffic on the "herringbone" tracks would be only one or two car trains, under better control than the longer trains; and the danger and delay to the public would be correspondingly decreased.

There are, at present, few industrial tracks which cross the east and west streets. The Santa Fe Alley line crosses many streets, but Ninth Street and Twenty-sixth Street are the only ones of any importance because of present traffic conditions. The Santa Fe crosses Sixth Street near Mill Street and Third Street near Santa Fe Avenue, but neither is now of great importance. The Southern Pacific crosses Second Street near San Pedro

Street, which is a rather busy street. The principal east and west streets are, then, now not crossed to any appreciable extent, except by Alameda Street.

A study of the trackage (Fig. 179 on page 481) will show that the present industrial tracks are, to a large extent, already built along the "herringbone" plan, the most important exception being the Southern Pacific spurs off Alameda Street. But here the departure from the "herringbone" plan is the result of the tracks in Alameda Street. Another exception is the fact that many of the tracks are in the streets instead of on private rights of way.

RECOMMENDATIONS RELATIVE TO INDUSTRY TRACKS

The report of Messrs. Hamlin, Howell and Storrow, referred to before, contained the following recommendations with respect to the spur tracks:

- "1st: All grade crossings other than those of industrial spurs must be removed;
- "2nd: No industrial track permits should hereafter be granted for the use of the streets at grade longitudinally;
- 3rd: All tracks now longitudinally within any streets, to be confined to use for industrial purposes only, and finally removed as soon as access to the industries served can be obtained otherwise.
- "4th: That eventually all spur tracks shall herring-bone out east and west from leads along the river bank, and these leads and all other trackage throughout the city be for joint use by all railroads;
- "Note: A 1, 2, 3, includes Alameda Street, which should be handled in the following manner:
 - "1st Step: Eliminate through-freight and restrict the use of these tracks to passenger service and local car deliveries and removals.
 - "2nd Step: Eliminate passenger service.
 - "3rd Step: Finally remove tracks altogether.
- "5th: These requirements, of course, are susceptible to but one interpretation, namely: that the elimination of grade crossings for other than industrial deliveries and the maintenance of the minimum number of such grade crossings, with joint use of trackage, means a Union Terminal for Los Angeles, both passenger and freight, and it is only on this basis that the congestion and danger of railroad crossings can be avoided and minimized, and the best interests of the city at large and the railroads themselves can be conserved."

The industrial district is so nearly level as to make impossible any improvement in conditions by any separation of grades and the question resolves itself into how to plan for the least number of tracks and least traffic.

The construction of team tracks along the east side of Alameda Street would have a tendency to reduce the number of industrial tracks, for a shipper would forego, in many instances, the costly luxury of his own spur and use a convenient team track. This, however, would not offer sufficient relief.

We have given considerable study to the problem of general rearrangement of spur tracks and have come to the following fundamental conclusions:

(1) The large investment in buildings, tracks and commercial business connected with spur tracks, and the present large amount of spur trackage make it inexpedient to make any radical change in spur track locations at this time or in the near future.

(2) The shippers have reason to be satisfied with present conditions, which should be interfered with as little as possible. This is discussed in greater detail in the next chapter.

We agree with the 'Three Engineers' Report in the general propositions that:

"(1) All grade crossings other than those of industrial spurs must be removed.

"(2) No industrial track permits should hereafter be granted for the use of the streets at grade longitudinally.

"(3) All tracks now longitudinally within any streets should be confined to use for industrial purposes only and should finally be removed as soon as access to the industries served can be obtained otherwise."

With the fourth recommendation we can concur only in part. This recommendation was that:

"Eventually all spur tracks shall herring-bone out east and west from leads along the river bank and these leads and all other trackage throughout the city shall be for joint use by all railroads."

The general proposition that all spur tracks herring-bone out east and west from leads along the river is the best solution of the problem, but we would add that it is better to cross an unimportant east and west street than an important north and south street, such as Alameda Street or Santa Fe Avenue. We would modify this recommendation to that extent.

The question of joint use of all trackage throughout the city by all railroads is very broad. The principle of joint use is sound and we are not here concerned with the matter of property rights and exclusive benefits to owners. We are concerned, however, with the reduction of the railroad traffic in and across city streets to the absolute minimum in order to improve, as far as possible, the grade crossing situation. And when unrestricted joint use leads to an aggravation of direct and indirect crossing evils, it must be condemned.

In the chapter devoted to the Alameda Street grade crossings, we have taken up the diversion of freight switching by rerouting and have called attention to the fact that at present any car hauled into Los Angeles over any road may be set on an industry track of any other road without charge. Bearing this in mind, and taking cognizance of the large amount of capital invested in land, buildings and business largely dependent upon spur track facilities and track mileage involved, we make the following recommendations for immediate improvement:

A.—Duplication of Switching Service to Industrial Spurs should be Discontinued.

Such discontinuance was put into effect as a war measure and should be retained and made more rigid. This will reduce the number of train movements and will benefit both the public and the railroads.

B.—Santa Fe Alley Spur should be Removed North of Butte Street.

This spur, which is over a mile long, is owned jointly by the Southern Pacific and the Salt Lake, except for about 350 feet near Bay Street, where the Santa Fe owns 50 per cent and the other two roads 25 per cent each. It was built about 1907, apparently to cut off the Santa Fe from extending its spurs to the west, and, if such was the case, with the present free switching, it has outgrown the competitive conditions under which it was built. Santa Fe Alley is but 15 feet wide, allowing only standard clearance if there are no projections into the alley. There are such projections (poles, for example), and at present the clearance is impaired in several cases. If the spur is continued in use, it will, in time, become too long to switch. For the present, the portion north of Bay Street could remain until some other way is found to serve three large industries at Atlantic Street. To take care of the other industries served by this track in Santa Fe Alley, in four or five cases spurs from the Santa Fe tracks can be built in accordance with the general scheme of east and west spurs. In several other cases the Santa Fe spurs now serve the industries. For the remainder, the industries do not appear to be sufficiently heavy shippers to justify the retention of the spur to serve them.

C.—Macy Street Transfer should be Removed

If the rerouting of Southern Pacific-Pacific Electric transfer cars is accomplished, this will no longer be necessary. At present, the right of way is but 14 feet wide—too narrow to allow standard side clearance for cars.

D.—The Southern Pacific Spur Track in Alameda Street on the West Side of the Main Line Tracks from First to Jackson Streets should be Moved or Removed.

With a freight car standing on this track there is not room for a vehicle to pass between it and a train on the main line tracks. We are advised that this has been the cause of several accidents and the condition is too dangerous to continue.

For future plans, we concur, as stated, with the greater portion of the recommendations of Messrs. Hamlin, Howell and Storrow.

CHAPTER XVII.

OUTLINE

Present Conditions Generally Satisfactory

Effect of Elimination of Grade Crossings Adjacent to the Los Angeles River

Effect of Establishment of Union Passenger Terminal

Union Passenger Terminal at the Plaza

Union Passenger Terminal at the Santa Fe Site

Union Passenger Terminal at the Southern Pacific Site

Establishment of Union Less-Than-Carload Freight Station

Branch Freight Stations Not Recommended

Union Freight Station with Union Passenger Station at the Plaza

Union Freight Station with Union Passenger Station at Southern Pacific Site

Union Freight Station at Santa Fe Site

Union Freight Station Not Recommended, With Union Passenger Station at Santa Fe Site

Pairing of Southern Pacific and Salt Lake Tracks Between Los Angeles and Colton

CHAPTER XVII

PROPOSED IMPROVEMENT IN FREIGHT HANDLING

PRESENT CONDITION GENERALLY SATISFACTORY

It has been noted that the present conditions surrounding the handling of freight in Los Angeles are generally satisfactory to shippers. This fact was brought out in the testimony before the Commission of Mr. F. P. Gregson, the representative of the Associated Jobbers of Los Angeles, representing, as he stated, approximately 75 per cent of the shippers. Mr. Gregson was practically the only witness who touched upon this subject from the shippers' side.

It will be well to quote some of his testimony since it deals with one of the most important subjects of this report:

"...In receiving of cars we have possibly an ideal condition and we have also an ideal situation. I know of no other city so ideally situated as Los Angeles, from a track situation. First you must understand that all transcontinental roads today have absolute access, unrestricted and untrammelled access to each other's side tracks. That is, a merchant located upon the Southern Pacific tracks upon Alameda, and I might say that when I say Alameda Street I refer to Central Avenue and San Pedro Street—no reference is made to those streets in the fish bone, or near it—simply to Alameda. Now, if the Santa Fe transports a car from Chicago consigned to a merchant on the Southern Pacific road at Los Angeles, that merchant has this car delivered to him upon the Southern Pacific tracks under the same conditions as he would if it was located on the Santa Fe, and that obtains also with the Southern Pacific and the Salt Lake, as well as the Santa Fe."—(Trans. p. 419)

"Commissioner Gordon: Are you opposed to any change of traffic conditions in Los Angeles, so far as the freight end of it is concerned?

"A. Freight end is concerned?

"Commissioner Gordon: Do you want everything left as it is now?

"A. No, we don't—

"Commissioner Thelen: Mr. Gregson, you want some more tracks do you, for freight?

"A. Yes, we would like to ask Mr. Sachse to take into consideration the suggestions to be made, always looking toward the economic handling of freight to the city, to the depots, and the interchange that we now have."—(trans. p. 423)

".....I want this Commission to understand our commercial proposition, that we don't want to be squeezed on Alameda Street between any two rival real estate propositions or between any two institutions in Los Angeles. We want a free and untrammelled right, as we have now, and we don't want the situation disturbed, only to make it better for us by the elimination of the trains on Alameda Street."—(trans. p. 424)

With particular reference to Alameda Street Mr. Gregson said further:

"Along Alameda Street we have large jobbing houses and manufacturers immediately located upon the street, and others served from Alameda Street upon laterals both east and west. You might say that Alameda Street is

the very heart artery of the industrial section of Los Angeles. Now, the industrial section, briefly speaking, of Los Angeles is east of Los Angeles Street, inclusive of that street, and west of the bluff, what is known as the Boyle Heights Bluff. There we are confined within that district—I am not speaking altogether of a jobbing proposition, but as to industries of certain kinds—we are forbidden to go beyond those lines and the history of the jobbing center and jobbing street of Los Angeles is briefly this: In the early days we were located upon what is known as Los Angeles Street. Los Angeles Street served our purpose for years and years, but we were practically driven off of Los Angeles Street on account of the congestion created by the advent of the Pacific Electric from Aliso Street travelling up Los Angeles Street. When that railroad appeared upon Los Angeles Street, when we would back up our trucks to our door and we had only one way to get our freight out, and that was through the front entrance of the door, and we were rather crudely erected in those days. That created a congestion there that was unbearable. We then set up a more economic handling of our business and we went to Alameda Street, thinking we were fully protected by the ordinances that had been passed by the city. We have constructed on Alameda Street, at a cost of millions of dollars, large houses, concrete houses, and we have now constructed them with a number of objects, first, the object of relieving the congestion upon the streets, that is to say, that we may load and unload our teams from some point not upon the street as we did upon Los Angeles Street, so a great many of our houses now have provided themselves with arcades and sidings, places where the teams back in and load without any obstruction upon the street, leaving the street entirely clear to the pedestrians and railroads. As far as side tracks are concerned, we have—we are doing that today and have been for some time—have our tracks upon private property and in an arcade or within an arcade. So there we have our business located so that we are not a nuisance and so that we don't intrude upon anybody.

"While Mr. Storrow and Mr. Howell have pointed out to you possible nuisances and the necessity of reconstruction of railroads, they have left out a most important part that goes with a reconstruction, and that is relief of the congestion upon the streets of Los Angeles, and the best manner of handling that business from your wholesale houses and your retail houses. Upon Alameda Street you will see it is a very important artery. We can reach out in all directions from the wholesale houses and from the manufacturing places with our auto trucks going upon the streets that are not constructed in the jobbing district, utilizing convenient points in the city and making economical deliveries to consignees.....Now, in the early days, we might say in less than half a decade, the wholesale jobbing business, or 60 per cent of it, was located north of First Street, upon First and north of First Street. Now, that situation has been entirely reversed. It is upon First and going south. So you see that Alameda Street is an extremely important street to us. Now, we contend this, that either plan, may it be the north or the south end, that as one of its objects it must have the elimination of the train service upon that street, will satisfy everybody who are now complaining, and for this reason: We are perfectly willing to submit to our delivery upon the street either at night or any hours the Commission may so designate, but we want the Commission to bear in mind this, and when I say this particular thing, it is an entire objection to Mr. Howell's scheme or Mr. Storrow's scheme as to a freight proposition. That any scheme that is thought of—and I am now speaking especially of our friends here, the engineers—that any scheme that is thought of must be

that of an economic reception of cars and the forwarding of cars. Bear in mind at this time that we are here making drives to load and unload cars within a reasonable hour. Under our present situation our merchants are unloading cars within 15 minutes and ready to give them back to the carriers. That would not be possible and could not be under a belt line. That could not be possible under this fish bone proposition that we have before us and it could not be possible under any system of union terminal. Belt Line railroads are one of the curses of the country when it comes to the economic handling and the quick dispatch of cars."—(trans. p. 417)

The adoption of recommendations in this report for the elimination of grade crossings and the establishment of a union passenger terminal will somewhat disturb these satisfactory conditions and it is our purpose to substitute at least equally satisfactory facilities, and perhaps better ones. The main items we have to deal with refer to carload switching, to industrial tracks and to the location of the less than carload freight stations.

The subject of rerouting of freight has already been discussed in connection with Alameda Street grade crossings. (Chapter VIII.)

Effect of Elimination of Grade Crossings Adjacent to the Los Angeles River

The depression of the Santa Fe and Salt Lake tracks along the Los Angeles River from North Broadway to Butte Street, and the construction of viaducts carrying these streets across these tracks and across the Los Angeles River have very little effect on the handling of freight in Los Angeles provided that present passenger and freight depots are not interfered with and remain as they are. Recommendations, of course, are made by us, changing both freight and passenger facilities, but in order to maintain the general system of this report, the recommendations on the union passenger station and joint freight station will be ignored for the moment and the effect of grade crossing elimination **alone** will be dealt with.

As far as the Southern Pacific is concerned, there will not be any effect whatever on freight handling caused by this track depression, that is, simple depression of existing tracks uncomplicated by a union passenger or freight station, or both.

The Santa Fe freight business will, however, be affected to some extent. Some of the industry tracks which branch out from the river tracks will have to be rebuilt for short distances in order to provide satisfactory rates of grade. The freight yard along the river between First and Seventh Streets would have to be regraded at both ends, but the grades which could be established would not affect the haulage of freight. The Santa Fe-Pacific Electric transfer track, located at Aliso Street on the River, would have to be done away with, as the tracks of the two roads would be different in elevation by some 25 feet at this point. This transfer facility would either have to be provided for by the construction of a track along the southerly side of Aliso Street easterly from Keller Street and connected by a curve with the present Santa Fe line just south of Aliso Street; or the Salt Lake,

as outlined elsewhere, could handle Pacific Electric cars from the eastern division from Elliott Street to Butte Street and Santa Fe Avenue, where they could be exchanged with the Santa Fe.

Switching in the Salt Lake yard will be improved by the depression of the river tracks. The ladder tracks used in switching in the yard now descend sharply from Seventh Street to the north, causing considerable damage to cars when they are switched, by reason of too great velocity acquired. With the depressed tracks, this switching lead can be installed on a better grade.

The Pacific Electric freight business will not be affected by the depression of the river tracks, except as noted with regard to the Santa Fe-Pacific Electric transfer track at Aliso Street.

Effect of the Establishment of a Union Passenger Terminal

Union Passenger Terminal at the Plaza

The establishment of a union passenger terminal as recommended by us will be serious in its effect on the Southern Pacific. The site of the depot yard cutting across Alameda Street, as it does, isolates the present less-than-carload freight station, and the establishment of a coach yard at the site of the present Southern Pacific main freight yard will force the construction of a new yard.

This new yard would, in all probability, be built at the site of the present Southern Pacific new classification yard along the San Fernando Road (this is our recommendation). Sufficient land has already been acquired for this purpose and plans have already been drawn. The construction of a connecting track between the depot yard of the union passenger station and the proposed site of the coach yard will make it impossible to handle the cars in and out of the freight station and will necessitate moving the freight station elsewhere. This facility is now almost inadequate.

The Southern Pacific holds several pieces of land which might, at first thought, be used for a freight station. The Macy Street team yard site, at Macy and Alameda Streets, is too small. The site of the present Arcade Station, while large enough, is out of the question because of the increase in traffic on Alameda Street brought about by switching in and out of the freight station. The Los Angeles Public Market Company property along Sixth and Alameda Streets is large enough and might possibly be used for this purpose. The principal objection to this site is that grade crossings would result on approach tracks at Mateo Street and Santa Fe Avenue, and also at Mill, Imperial and Mesquit Streets. The present Southern Pacific coach yard is also large enough, the principal objection to the use of this location being the same as those for the Los Angeles Public Market Com-

pany property, except that in this case there is more travel on the streets to be crossed. Lastly, if a union less than carload freight terminal is established at the Santa Fe site, the Southern Pacific will find relief in the use of such a station.

With a passenger terminal at the Plaza, the west bank of the river will be left free for freight switching and the possible construction of trackage branching out from the Santa Fe will make it possible to switch such industries between Macy and Seventh Streets without using the present tracks on Alameda Street, except between the principal cross streets.

Union Passenger Terminal at the Santa Fe Site

If such a facility should be established, the principal effect on the handling of freight would be the necessity of the construction of a freight yard for the Santa Fe and the elimination of switching from Alameda Street. The Santa Fe has, however, acquired a site of 100 acres near Hobart, which could be used for a freight yard and, in fact, was acquired for that purpose. If all of the Los Angeles passenger traffic were handled along the west bank of the river, there is the possibility of interference with the freight business which has developed on trackage extending westerly. The passenger train and light engine movements would be so frequent that the number of switch engines required to handle the industrial switching would have to be increased. This would increase the operating cost—an increase which would go on year after year.

It will be noted that in the plan for the union passenger terminal at the Santa Fe site, provision has been made for the enlargement of the Santa Fe less than carload freight station at some time in the future, and it may be noted in passing that this arrangement would give the Santa Fe ample room for the future expansion of its less than carload freight station.

The Southern Pacific could continue to use its present freight station at College and Alameda Streets and would have more yard available for switching if the new classification yard along the San Fernando Road were constructed.

The Salt Lake could establish its proposed freight terminal along Alameda Street near Eighth Street, as contemplated in Application 3037.

The Pacific Electric freight business would not be affected by the Santa Fe plan and would continue to use its present facilities, modified, of course, by future necessities.

Union Passenger Terminal at the Southern Pacific Site

With this plan, the new freight yard along the San Fernando Road would ultimately be constructed, as is also recommended by us for the Plaza plan. The present freight yard could be used until such time as the

completion of the new yard proves advisable. The Southern Pacific would not be forced to discontinue its freight station, but since it is inadequate, we are recommending that it be abandoned. The Southern Pacific would use the union freight station, which, as part of the Southern Pacific (as well as of the Plaza plan), we are recommending at the Santa Fe site. Under these conditions the site of the present Southern Pacific freight station would be used for a team yard.

The effect on the handling of freight on the Santa Fe with a union passenger station at the Southern Pacific site would be the same as if the Santa Fe tracks along the river were simply depressed if we did not recommend, as part of the Southern Pacific plan, a union freight station at the Santa Fe site. Under this condition the effect on Santa Fe freight handling would be the same as under the Plaza plan discussed above. This consists of a new freight yard for the Santa Fe east of Hobart.

Under the Southern Pacific plan the Salt Lake freight yard would require remodelling to take care of the new passenger tracks and coach yard. It would, however, be continued in its present use. The Salt Lake freight station would be abandoned, this road also to use the joint freight station at the Santa Fe site.

The Southern Pacific plan has no particular effect on the Pacific Electric freight business, except, as part of the plan we would recommend that the latter road transfer its less than carload freight business to the proposed union freight station at the Santa Fe site along with that of the three steam roads.

ESTABLISHMENT OF UNION LESS THAN CARLOAD FREIGHT STATION

Branch Freight Stations Not Recommended

During the hearings in these consolidated cases held before the Commission, the establishment of several less than carload freight stations throughout the city was advocated, particularly by Chief Engineer Howell of the Board of Public Utilities of the City of Los Angeles and by Mr. Samuel Storrow, witness for the Central Development Association. This plan proposes that branch freight stations be established in different parts of the city so that the wagon haul of the shipper would be reduced and shippers would use the station nearest to their places of business.

We are not in favor of this plan. The principal objection to it is the loss of time and we are of the opinion that this is of more importance to the majority of Los Angeles shippers than the length of haul. The loss of time comes about in this way: If there were four such package freight stations, consignments for one point might be made at all of them. These shipments would be placed in cars at the four stations and taken to one

central station, where they would have to be unloaded, transferred around the sheds until the car or cars for destination were reached. The freight houses now close for the receipt of freight at 4 P. M., but the cars are not ready to be removed from the station until at least two hours later, and, under normal conditions, these trains leave the city before midnight. Transferring this freight picked up at the branch stations, would consume several hours more, and since it is absolutely necessary to afford the shipper prompt service, the adoption of this plan would probably result in many delays of twenty-four hours in the delivery of less than carload freight, since trains could not be held for all of the cars from the sub-stations. Of course, it is possible that solid cars for different points would at times be accumulated at these branch stations, but this would not be the rule. The principal less than carload outbound freight is destined for points in Southern California and in the northern part of the San Joaquin Valley. With the former, time competition with auto trucks must be met and in the case of the latter territory, Los Angeles competes with San Francisco and an early delivery is essential. It is also possible to expedite the handling of cars from the sub-stations, but as this is expensive, too much reliance cannot be placed in such performance.

The district in which the majority of such shipments originates is only approximately 4 miles north and south, and the average haul, therefore, cannot be over 2 miles.

Furthermore, this district will in all probability remain about the same size and in the same location, particularly if a union less than carload freight station is established at the Santa Fe site. This would tend to stabilize the jobbing district and there is plenty of room for development, due to the present vacant areas and the areas now used for lower classes of occupation. This stabilization is a good thing for the shipper as well as for the railroads: Property values are established and become of greater value as a credit asset, haul is reduced and the concentration of one class of business in one district is a great convenience to the many people who are concerned with this phase of industry.

At present the trucking and drayage companies in Los Angeles make the same charge for drayage to the Southern Pacific, the Santa Fe and the Salt Lake freight stations, although the haul to the Southern Pacific is considerably further since the station is located at one end of the jobbing district and the haul is all one way. We are advised by the draymen that the cost of drayage depends not so much upon the distance as upon the time consumed in loading and unloading and that the establishment of a union freight station would reduce the drayage charges, other things being equal. This, of course, is very important. A large part of the draying is done by two-horse teams and large low trucks. This method is holding its own over the motor truck for the reason that, in spite of the high price

of feed, it is more economical. This is because the investment is far less than in the case of a large-capacity motor vehicle which, in order to be economical, cannot stand idle. It would seem, then, that the controlling feature in the cost of handling less-than-carload freight at Los Angeles from the shippers' warehouse to the freight station is not the distance but the promptness with which the shipments may be loaded and unloaded. Distance, within reasonable limits, is a secondary factor.

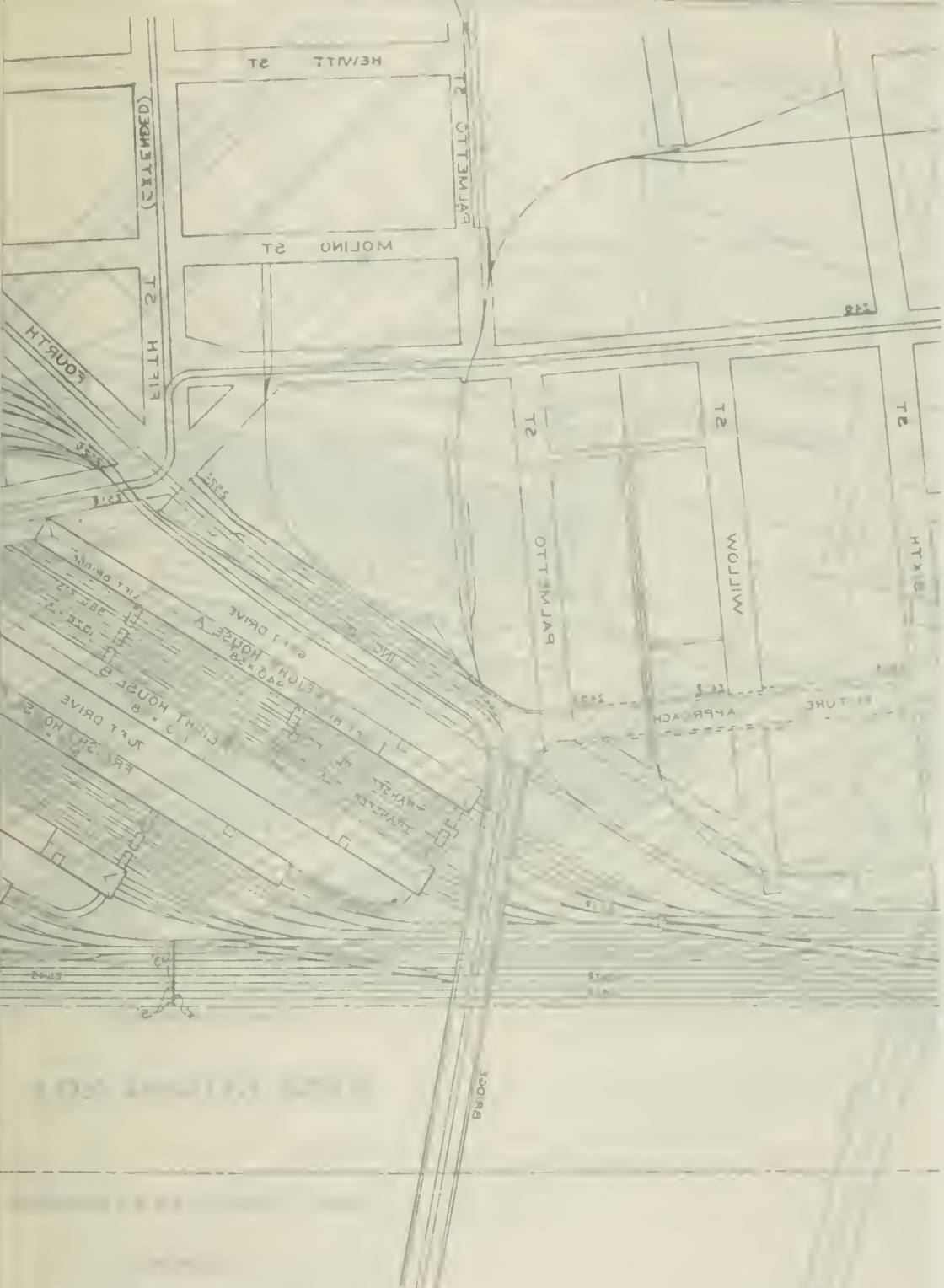
There is another reason against the establishment of branch freight stations. There would be considerable confusion with regard to **inbound freight** if this class of freight is handled at branch stations. If all inbound freight must be called for at one station, one of the objects of the branch depots is defeated, and if inbound freight may be called for at several stations, the possibility of confusion in proper shipping directions is present. More important, again, is the question of loss of time. These inbound shipments would have to be split up at some central station, handled about the freight house and loaded on the cars to be switched to branch stations. Of course, the outbound less than carload freight is approximately double the inbound freight in tonnage and these points are, therefore, of less importance.

Union Freight Station with Union Passenger Station at Plaza

Rather than establish branch freight stations, it would seem preferable to establish one union less-than-carload freight station to be used by all roads, including the Pacific Electric. If a union passenger terminal is established at the Plaza as recommended by us, the Southern Pacific will probably find it necessary to establish a new freight station considerably further south than the location of the present one at College and Alameda Streets. The Salt Lake admittedly has for some time been anxious to improve the location of its facilities along Myers Street on the east bank of the river. We believe that both these purposes may be accomplished and that shippers will be greatly benefited by the establishment of a union less-than-carload freight station at the Santa Fe site, together with the construction of two classification yards to serve Los Angeles, one north of the city on the property of the Southern Pacific along the San Fernando Road and one south of Los Angeles, near Hobart, where the land for such a yard has already been acquired by the Santa Fe.

Union Freight Station with Union Passenger Station at Southern Pacific Site

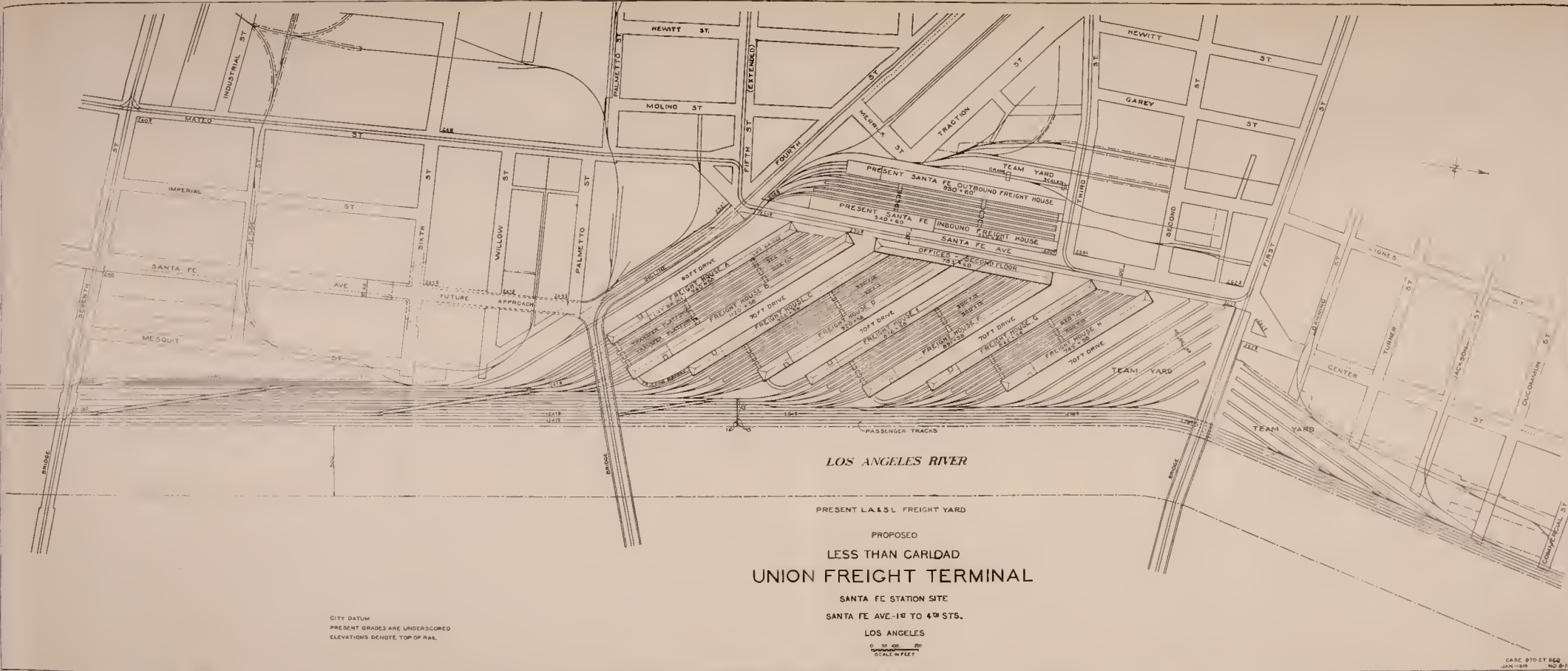
The arguments that apply in favor of a union freight station at the Santa Fe site with a union passenger station at the Plaza, apply equally if the passenger depot is located at the Southern Pacific "Arcade" site. Operating conditions at the freight station and its approaches would be even better, for the west bank of the river would be entirely free from passenger traffic, this latter to be handled on the east bank and carried over all tracks on the west bank.



LANEWAY & BRANCH

RECORDED
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THESE PLANS HAVE BEEN EXAMINED AND FOUND TO BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE ACT OF 1908 AND THE REGULATIONS THEREUNDER. THE LOCAL AUTHORITY IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION CONTAINED HEREIN.



LOS ANGELES RIVER
 PRESENT LA&SL FREIGHT YARD
 PROPOSED
LESS THAN CARLOAD
UNION FREIGHT TERMINAL
 SANTA FE STATION SITE
 SANTA FE AVE. 1ST TO 4TH STS.
 LOS ANGELES

CITY DATUM
 PRESENT GRADES ARE UNDISCORDED
 ELEVATIONS DENOTE TOP OF R.R.

0 50 100 200
 FEET
 SCALE = 1" = 100'

CARL BTD CT REG
 JAN-1918 NO B-15

FIG. 175. PROPOSED UNION TERMINAL FOR LESS THAN CARLOAD FREIGHT
 This proposed terminal effectively uses the space now occupied by the Santa Fe station and freight yards. This land is too valuable to be used as a classification yard but its strategic position opposite the business center and along the river makes it peculiarly adapted for the purpose of a great distributing center for less than carload freight.

Union Freight Station at Santa Fe Site

With these facts in mind, we have made a study of the possibilities of the Santa Fe site for a union freight station and this study finds expression in Fig. 175 (see page 459). The plan provides for the ultimate construction of eight freight sheds, with their trackage, and the establishment of a team yard at the same location. Based on this plan, it is possible to provide sufficient floor area, team frontage and car spot capacity for many years in the future, considering also that the present Santa Fe freight station would become a part of the union terminal. The driveways, as shown, are 70 feet in width; they should be 100 feet. Sufficient space is available for this standard dimension.

This plan, it will be noted, follows very closely the plan of the present Santa Fe freight station. The width of the houses is about the same; the arrangement of the trackage, with transfer platforms between, is also along the same lines. Similarly the use of electric tractors and special trailing trucks is contemplated as is also the construction of lift bridges crossing the trackage between the adjacent houses and raised trackways crossing the southwesterly ends of the driveways. The use of tractors and trailers reduces what has always been considered an extremely objectionable feature of a large freight terminal, i. e., the difficulty of transferring freight between sheds which are not adjacent. The use of lift bridges across the tracks between sheds and truckways at the far end of the driveways will allow a tractor to transfer freight from any one shed to any other one and would do away with the use of transfer cars, which are always necessary at the larger freight stations and which are necessary in Los Angeles between the stations of the above roads.

Whether the railroads ultimately are to be owned by the government or whether they remain in private control, there is little, we believe, that can be said against the establishment of such a station. It seems desirable here to go somewhat into the proposed operation of the sheds. It is proposed that a dray, loaded with different shipments for different places, will deposit its load at one place. Here it will be weighed and the shipments will be segregated to destinations and placed on trucks which, at short intervals, will be gathered into truck-trains by the tractors and taken to the cars. This would indicate the possibility of too long a tractor haul. This can be overcome by more or less regional assignment of the sheds.

If the railroads return to private control, the assignment of space can be made on the basis of requirement. While this would require a drayman to unload at different points, it surely would be an improvement over the practice of taking part loads to several widely separated locations. Transfer of all freight destined to a point on another carrier's line could be made between the various sheds without the use of cars, the freight being hauled

across the lift bridges and truckways at the southerly end of the sheds. As shown in Fig. 175 (see page 459), the areas and capacity for cars and teams provided in the plan are as follows:

**PROPOSED UNION LESS THAN CARLOAD FREIGHT FACILITIES
SANTA FE SITE**

Item	Area—square feet		Car	Team
	Freight House	Transfer *Platforms	Capacity Car—43'	Frontage Lin. Ft.
Freight Houses A & B (Dwg. 8-20)	115,080	37,765	149	2,040
" " C & D "	113,344	29,700	153	1,860
" " E & F "	104,917	27,000	139	1,750
" " G & H "	83,626	26,035	127	1,587
Total New	416,967	120,500	568	7,237
Present Santa Fe	102,000	30,876	170	2,203
Total Ultimate	518,967	151,376	738	9,440
Present Southern Pacific and Salt Lake	215,941	30,876	324	4,337
Increase	303,026	120,500	414	5,103
Increase	140%	390%	128%	118%

*First floor of sheds only; uncovered platforms not included.

This plan will provide for 140 per cent increase over the present area of sheds and 118 per cent over the present area of sheds and platforms of all kinds, except transfer platforms.

While undoubtedly objection will be directed against the establishment of such a station (for competitive reasons, principally) we are satisfied that the plan is sound and that while it may be improved in detail, there is no valid objection which should prevent the consummation of the scheme as a whole.

Having in mind the congestion which occurs at closing time, we have paid particular attention to the frontage available for teams. Our plan will certainly create conditions as satisfactory as any that can be obtained and far better than those that exist at present at the Southern Pacific station. The car capacity has also been studied and the arrangement of tracks is designed to give sufficient trackage for all the cars necessary.

Another feature not to be overlooked is the facility with which the house tracks may be switched. With this in view, the trackage, as shown, provides sufficient length of drill track so that an engine can pull all cars along one track at any of the yards without fouling switching operations going on at another yard. The southern portion of the buildings are shown as open sheds, and against the end of these sheds several tracks have been brought for the unloading of automobiles and other freight in end-opening cars.

It is further assumed that the operation of this station would begin with the transfer of cars from the classification yards north and south of the city to the yard. This movement is in the nature of transfer service to be performed by heavy switch engines, and the trackage proposed has been laid out with this in mind.

Table No. XIX shows the estimated cost of the buildings as shown in Fig. 175 (see page 459). It will be noted that this table is arranged and subdivided for different steps of construction. The first step includes the construction of buildings A and B. At present the Southern Pacific and Salt Lake have 238,131 square feet without transfer platforms, or 269,774 square feet with transfer platforms, which should be ample for the present. While this latter figure is smaller than that of the combined area of the present Southern Pacific and Salt Lake sheds, we call attention to the fact that the Salt Lake has at present more room than is necessary and the space at the Southern Pacific is not well arranged. It is estimated that these four buildings, including the two-story front office portion, the transfer platforms between the buildings and the lift bridges, would cost as follows:

**ESTIMATED COST OF BUILDINGS AND DRIVEWAYS
PROPOSED UNION L. C. L. FREIGHT STATION
AT SANTA FE SITE**

	Area Sheds Only	Fireproof Roof Class A	Wood Roof Class C
Step 1, Sheds A & B.....	119,480 sq. ft.	\$496,443	\$471,568
" 2 " C & D.....	109,388 " "	422,242	399,511
" 3 " E & F.....	102,486 " "	657,340	621,003
" 4 " G & H.....	92,046 " "	352,481	333,275
Totals	423,400 " "	\$1,928,506	\$1,825,357
Difference		\$103,149	

The buildings, as estimated, are of the same construction, except the roofs, and all are 60 feet in width, but of varying lengths, and follow closely the design and appointments of the present Santa Fe outbound freight yard.

The cost of removing the present trackage, buildings and facilities and compensation for carrier and private facilities abandoned is also a part of the cost of establishing the station. The total cost is estimated as follows:

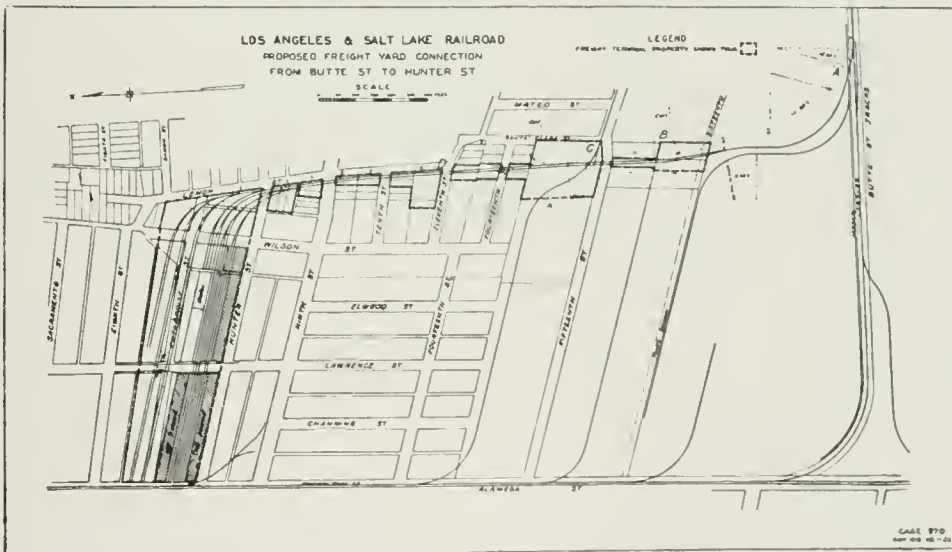
**ESTIMATED COST OF UNION L. C. L. FREIGHT STATION
SANTA FE SITE**

(Including Allowance for Contingencies, Engineering, Interest, Legal and General)	
Grading, etc.	\$ 171,124
Trackage	179,134
Buildings (Class A) and driveways.....	1,926,193
Paving, team tracks	98,128

Compensation for Santa Fe facilities abandoned.....	\$142,334	
Compensation for private facilities abandoned.....	37,053	179,387
Moving equipment, etc.		21,976
Total		<u>\$2,575,942</u>

Union Freight Station Not Recommended with Union Passenger Station at Santa Fe Site

With the establishment of a union passenger station at the Santa Fe site, we have not recommended the construction of a union freight station. There are several reasons for this. The Santa Fe Union Passenger Plan is proposed along lines of economy of capital expenditure, and the cost of such freight station is about \$2,000,000 for buildings alone. A good site is not available and would cost about \$1,000,000 more, and the use of present carrier-owned land for such a purpose would introduce exactly the grade crossing situation that this report seeks to ameliorate. The Los Angeles Public Market Company's site is hardly large enough and the approach tracks would cross too many streets where it is not feasible to separate the grades. The present Southern Pacific coach yard cannot be recommended, although it would, in this case, be possible to construct a station and, by closing Wilson Street, depressing Mateo Street 9 feet and Santa Fe Avenue 5 feet, and by elevating the tracks, to avoid any grade crossings on the approaches. It does not appear possible, however, to find



From Los Angeles and Salt Lake R.R.

FIG. 176. PROPOSED FREIGHT YARD AND CONNECTION FROM BUTTE STREET TO HUNTER STREET

This map shows the L. C. L. freight terminal site on Alameda Street between Eighth and Hunter Streets, acquired in recent years by the Los Angeles & Salt Lak Railroad, and the proposed connection with the Butte Street tracks. Permission to make this connection was asked of the Commission on Application 3027. We recommend that the application be denied and the site be used for a team yard.

here enough space. The operating conditions, moreover, on the approaches—particularly with a union passenger station at the Santa Fe site—would be so bad that we cannot recommend this location.

The site purchased by the Salt Lake along Alameda Street between Hunter and Eighth Streets, has possibilities. The approach tracks would cross but one important street—Ninth Street—and nearly all of the land necessary is already railroad owned and is vacant. After some study we have decided that while the Salt Lake traffic alone could be handled across Ninth Street at grade, the combined traffic of the four roads would be too heavy even at this time, to say nothing of the future. It is also not feasible to separate the grades of Ninth Street and the approach tracks.

PAIRING OF SOUTHERN PACIFIC AND SALT LAKE TRACKS BETWEEN LOS ANGELES AND COLTON

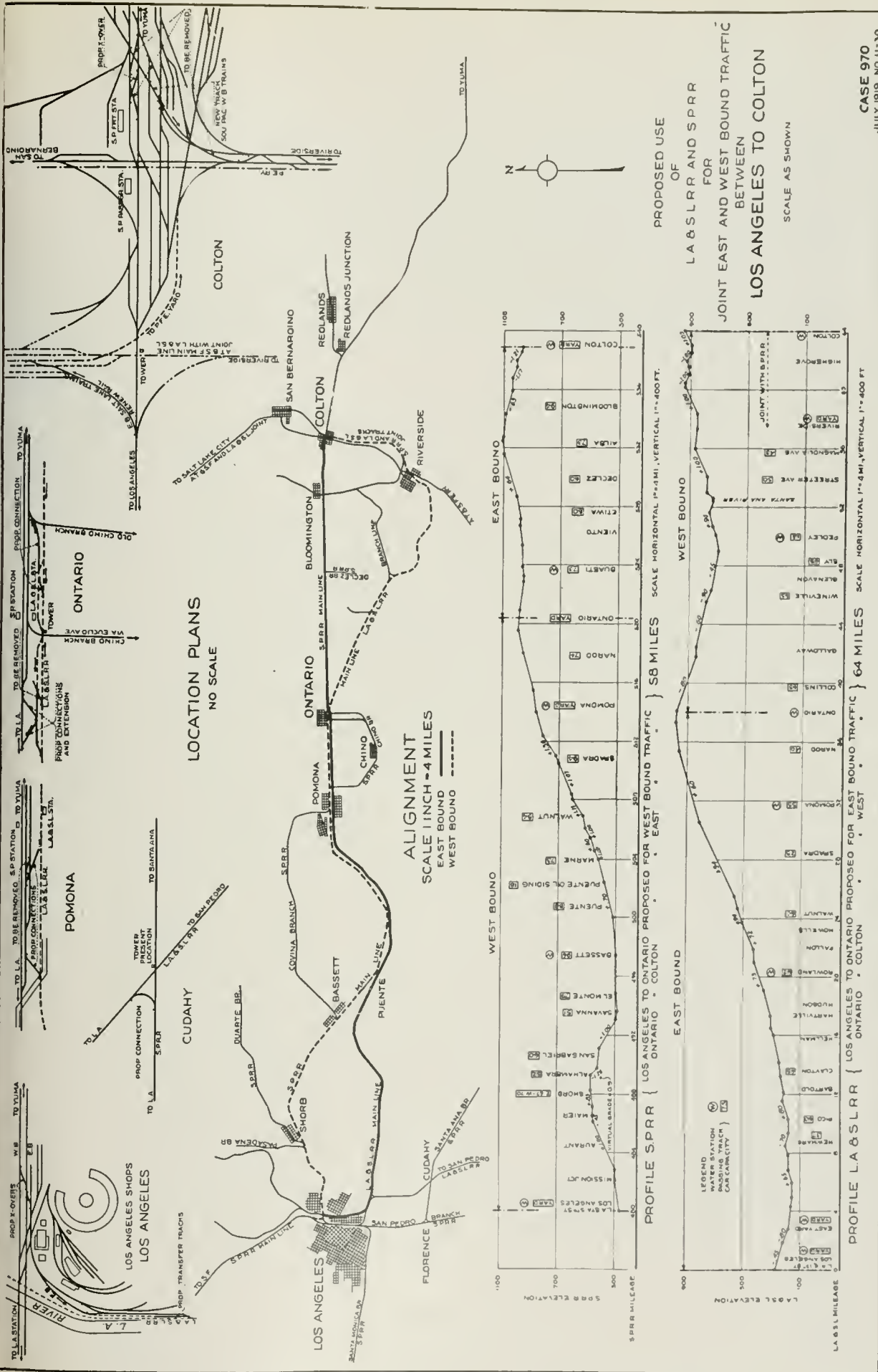
In our "Report on Immediate Unification and More Economical Operation of Railroads with Resulting Betterment of Grade Crossing Conditions in Los Angeles and Vicinity," dated August, 1918, the following recommendation was made:

"It is agreed by the engineers of the Southern Pacific and the Salt Lake and of the Commission that all traffic on Southern Pacific and Salt Lake tracks between Colton and Los Angeles can best be handled as an east and west double-track proposition. Their recommendation is to make **eastbound track** the Salt Lake Line from Los Angeles to Ontario and the Southern Pacific from Ontario to Colton; and to make **westbound track** the Salt Lake from Colton to Ontario and the Southern Pacific from Ontario to Los Angeles. This will bring all Salt Lake and Southern Pacific westbound passenger and freight trains into Los Angeles over the Southern Pacific Alhambra Avenue line, and will take out of the city all eastbound business of both lines over the Salt Lake line east of the river via Hobart. The map on page 107 shows profiles, proposed routing and connections.

"This arrangement will be an essential factor in the economic operation of any union passenger terminal in Los Angeles. The estimated costs and savings of this plan, according to an estimate made by the engineers of the Southern Pacific and the Salt Lake and checked by us, are as follows:

"Estimated Capital Expenditures

Pomona	
New Crossover	\$ 2,142
Ontario	
Connecting Tracks and Interlocking	21,527
Colton	
Track Changes	14,082
Los Angeles (Alhambra Avenue and East Bank of Los Angeles River)	
Relay Connecting Track and Replace Transfer Facilities.....	23,061
Cudahy	
Connecting Track	12,000
	\$72,812
Total	



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FIG. 177. PROPOSED JOINT USE OF THE SALT LAKE AND THE SOUTHERN PACIFIC TRACKS BETWEEN LOS ANGELES AND COLTON

It is recommended that the Salt Lake and the Southern Pacific lines be operated jointly as a double track between these two points. The Salt Lake would be used for east bound traffic as far as Ontario, whence the Southern Pacific would be used to Colton. Westbound traffic from Colton would use the Salt Lake to Ontario and the Southern Pacific the rest of the distance.

"Estimated Saving in Operating Expenses

Saving	Per Month	
Due to increased train loading.....	\$9,284	
Due to shorter running time.....	4,449	
Due to fewer relief crews.....	1,000	
Due to fewer station forces.....	2,000	
Due to fewer dispatchers.....	370	\$17,103
<hr/>		
Increases		
Due to additional switch engine.....	1,800	
Interest on new money expended.....	365	
Maintenance of additional connection.....	200	2,365
<hr/>		
Net Saving		\$14,738
Net Saving per year		\$176,856

"This simple arrangement, if continued in the future (and I can see no reason why it should not be continued under Federal or private operation), will be equal to a capitalized saving, at 5 per cent of over three and one half (3½) million dollars. This sum is far greater than the total capital outlay required for the immediate terminal unification in Los Angeles.

"It should be here noted that this plan contemplates quite an important change in the handling of Southern Pacific through freight between Los Angeles and Los Angeles Harbor. It is proposed that all freight trains in leaving Los Angeles will leave the Upper Yard; back around the curve on Redondo Street with a switch engine on the rear end, and proceed along Alhambra Avenue to and beyond the Los Angeles River. The train would then transfer to the Salt Lake tracks by means of the present connection at this point; use the Salt Lake tracks on the east bank of the river to Hobart and transfer to the San Pedro branch of the Salt Lake which would be followed to Cudahy. At this point a connecting track with the Southern Pacific Anaheim branch would be constructed. These trains would then pass around this connecting track, proceed to Florence, and then turn south to the harbor. Movements in the opposite direction would simply be a reverse of the above. This will be taken up later under a discussion of the freight situation."

In the supplemental report on the same subject, dated January 15, 1919, this recommendation was repeated. The report dated January 15, 1919, of the engineers representing the federally controlled railroads entering Los Angeles and made a part of our supplemental report, also recommended the pairing of tracks between Los Angeles and Colton, as outlined above, but the estimate of capital expenditure necessary was changed to \$136,812 instead of \$72,812, as previously estimated, and the net saving per year was estimated at \$173,028 instead of \$176,856. Their recommendation was made with the proviso that "satisfactory arrangements are first made to take care of Salt Lake passenger traffic on the west side of the Los Angeles River." This demand is now met, it will be noted, if the recommendations in the present report are adopted.

The plan of operation as proposed for temporary unification was somewhat different from the plan which accompanies our recommendations for

terminal improvements in connection with a union passenger station at the Plaza site. For immediate and temporary unification, it was proposed that all east bound Southern Pacific freight trains leaving Los Angeles would be made up in reverse order in the Upper Yard, back around the curve on Redondo Street and proceed along Alhambra Avenue, east of the river, then, reversing the direction, the train would transfer to the Salt Lake tracks by means of the reconstructed present connection and proceed south along the river.

For the immediate future, the plan of operation would be the same as proposed for temporary unification except that the new classification yard along the San Fernando Road would take the place of the present Upper Yard, the latter being proposed as part of a union coach yard.

This operation is greatly simplified, however, under the ultimate arrangement now proposed. Southern Pacific eastbound freight trains would leave the new classification yard along the San Fernando Road and proceed south along the east bank of the river by means of new trackage to be constructed between Humboldt Street and the new classification yard. Westbound Southern Pacific trains would change from the Southern Pacific tracks in Alhambra Avenue to the river tracks at the Los Angeles River. Southern Pacific trains from Los Angeles Harbor would leave Alameda Street at Butte Street, use Butte Street tracks to the east bank of the river and follow the east bank to the new classification yard. Trains to the Harbor would reverse this movement.

Southern Pacific and Salt Lake passenger trains to the east would turn south from Alhambra Avenue, follow the proposed tracks on the west bank of the river, turn east just south of Butte Street and reach the Salt Lake tracks by means of a new connection at Hobart. Southern Pacific trains for the Anaheim Branch would follow the last mentioned route and transfer to the Southern Pacific Anaheim Branch at Cudahy, also by means of a new connection.

While this pairing of tracks between Los Angeles and Colton is an improvement in the handling of freight and does not affect particularly the freight situation in the City of Los Angeles, the recommendation may properly be considered as part of a freight terminal plan. The estimates show, further, such a large saving that we are convinced that the recommendation should be put into effect. For an investment of \$137,000, \$173,000 a year may be saved, that is, the expenditure will be returned in less than a year. The saving results, for the most part, in a conservation of resources and is largely due to the fact that the more favorable grades allow more tonnage to be handled at less expense. The saving in fuel oil, now an important item in railway operating expenses, is considerable.

We recommend that the Southern Pacific and Salt Lake tracks between Los Angeles and Colton be paired for operation, as follows:

Limits	Operate for	
	Westbound Trains	Eastbound Trains
Between Colton & Ontario	Salt Lake track	Southern Pacific track
" Los Angeles & "	Southern Pacific track	Salt Lake track

The construction of the necessary connecting tracks and other details as given above are included in this recommendation.

PART V—REAL ESTATE, FRANCHISES,
FINANCIAL MATTERS AND
ESTIMATES

Chapter XVIII—Real Estate Studies.

Chapter XIX—Franchise, Legal and Financial Matters.

Chapter XX—Estimates.

CHAPTER XVIII.

OUTLINE

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Historical Discussion

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 Business Development

 Industrial Development

 Residential Development

 Character of Industrial District Lands

 Industrial Development East of River

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CHAPTER XVIII
REAL ESTATE STUDIES

CHARACTER AND METHODS OF STUDIES

It was the purpose of the real estate studies to establish values and probable costs of private lands proposed to be acquired, values for all lands in present railroad use and estimates of the probable value of land which might be deemed unnecessary for railroad use. The several plans under investigation also proposed to acquire a considerable amount of land in present private ownership. As an outgrowth of this original project came a study of the entire industrial district, and later a study of the probable effect upon development and land values as the result of the adoption of any of the three principal plans.

These cost estimates are based upon information pertaining to similar and adjoining lands. Our "total estimated cost" was based upon the present market value of the property, which value is developed after an analysis of the various factors affecting value. In addition to the market value, there has been estimated for privately owned lands an "estimated additional cost to acquire," varying in amount according to the particular property to which it is applied, and based upon facts gathered through extensive analysis of real estate purchases by railroads in different parts of the state.

The purpose of all estimates is to find, as nearly as may be, first, the amount of new money required for each project, and, second, the cost, or value, of all facilities—both new and existing property—included in each project. All lands now in carrier ownership, as also all lands now owned by the public (City or County), are therefore included in our estimates at their actual present normal market value, without the addition of any multiples or any estimated costs of acquisition. It is not assumed that it can be the purpose of either the carriers or the City to make a profit out of the transfers of lands now devoted to public use to some similar or other public use such as would be the case if lands occupied by freight trackage, for instance, should become necessary for passenger station use, or if lands owned by the City should be devoted to park purposes.

From the standpoint of equity and in view of the fact that the recommendations in this report are bound to benefit all interested parties, especially the City of Los Angeles, the railroads and the private property owners, it would seem altogether fair if all of the lands needed for the recommended projects should be acquired and paid for at their actual fair market value without any additions for multiples or other artificial costs of condemnation.

It is to be hoped that the City, the railroads and the Commission will unite and use all power vested in them and all influence they may possess to acquire the necessary real estate for the strictly beneficial public purposes contemplated in this report, at the lowest possible figure. In the case

of city-owned lands, as has been indicated elsewhere in this report, it is our opinion that Los Angeles can well afford to donate such lands for purposes of street improvement, grade separation and union terminal use. We are also of the opinion that with a tactful and efficient handling of the matter, and with the benefits that will accrue to private property properly understood by private owners, it will be possible to secure a considerable portion, if not all, of the private lands required in the form of donations, properly safeguarded and removed from private speculation.

When the present railroad situation, under strict regulation, as we find it, and indeed devoted almost exclusively to the service of the public, is compared with the conditions of by-gone days such as have been sketched in Chapter III of this report, it must be evident to all fair-minded people that an arrangement such as the one suggested is just and to the ultimate interests of all concerned.

The real estate investigation comprised a more or less general appraisal of the entire industrial district of the City, with particular study of railroad lands and private lands which might become necessary in any of the plans under consideration. Real estate totaling upwards of \$75,000,000 was appraised during this investigation, aggregating a total area of 100,000,000 square feet (2300 acres).

The large extent of this work would not permit us to pursue our usual method of obtaining the opinion of various reliable informants, and it was necessary to take very material short-cuts in compiling our information in order to arrive at reliable results with the expenditure of the least amount of time.

Use was made of all possible sources of information. Among the more important data available to us was the entire appraisal of the Joint Bureau of Appraisal made in 1915. We used this appraisal to very good advantage. We were also furnished by the railroads appraisals covering their lands in the district, together with an amount of underlying data making up their appraisals. We also had access to certain appraisals of railroad lands made by this department and by others. Much of this data is in controversy before the Interstate Commerce Commission and we were asked to consider such information as executive and confidential.

We have also on file a very considerable amount of information pertaining to the Los Angeles industrial district which has been accumulated through the valuation of the properties of the Los Angeles Gas and Electric Corporation and of the Los Angeles Railway Corporation.

All this information, together with the information that it was possible to obtain without making public the trend of our final recommendations, furnished sufficient data for a fair, reliable and well balanced appraisal of all lands involved.

HISTORICAL DISCUSSION

Trend of City Development

The development of the City of Los Angeles has been at such a remarkable pace during recent years that there has been a rapid shifting of business, industrial and residence districts. The result of the sudden expansion has been the creation of a number of prospective permanent locations, with the owners of properties in each of these sections jealously watching any development which may in any way influence the desirability of their particular district. The result is that the down-town district is divided into several active and antagonistic factions. As a matter of fact, the growth of the City is so certain, and its development will necessarily be so extensive, that all factions will be taken care of if they are only satisfied to abide by the natural and normal development.

Business Development

The business development of the City of Los Angeles has seen some rather remarkable changes. This business development has progressed from the original center at First Street at the intersections of Broadway, Spring and Main, to its present location at Seventh Street between Spring and Grand.

In early days, the Plaza formed the axis around which the business of Los Angeles radiated. From this point, development spread south upon Los Angeles, Main and Spring Streets, and as time passed, the improvements originally erected in this vicinity became out of date or inadequate in size and made necessary the erection of more modern buildings. As the district in the immediate vicinity of the Plaza was already occupied, other locations were promoted and this expansion naturally extended south along Main, Spring and Broadway. This was due to the fact that expansion north of the Plaza encountered natural obstacles. The territory immediately north of the Plaza was in the early days a portion of the old bed of the Los Angeles River and was undesirable on account of lowness and the possibility of flooding. It will be noted that at the present time the boundary of the old original river-bed follows the high ground. This is very apparent between Main and Los Angeles Streets. The high ground formed the original westerly boundary of the river.

Another difficulty of the location of early business development was the narrowness of the streets. The obsolescence of the improvements was only one cause of the shifting of the business center.

The increase of business and of vehicular and pedestrian traffic also invited a change to streets where traffic interference would be as slight as possible.

Extension of development along Spring and Broadway in a southerly direction was further accentuated by the hills that rise immediately west of the Plaza. Development gradually grew around the base of these hills and extended over on to Broadway and Hill Street. The natural trend of the City has always been in a southerly direction, principally on account of the two topographical basic reasons.

Industrial Development

The industrial development of the City has kept pace with its business development. A very rapid increase in the values of lands in the industrial district lying east of Alameda Street, together with the remarkable rate at which these lands have been put to industrial use, has forced industrial concerns requiring any considerable area to seek cheaper locations than can be found in the principal industrial district of Los Angeles. About 1910 this movement first became apparent and from that date to the present time a very steady development has taken place in the cheaper industrial lands in the vicinity of Vernon. As there is practically an unlimited amount of this acreage property which furnishes desirable locations to industries requiring a considerable area, it is reasonable to predict that the present cheap prices will pertain to these properties for a considerable time in the future. The fact that these cheap lands are available and desirable will tend to create a more intensified industrial district east of the business center of Los Angeles due to the gradual elimination of large holdings and the cutting up of these properties into smaller parcels.

The territory immediately east of the business district will remain permanently desirable to the smaller class of industrial concerns which require spur track facilities and a location close to the center of the city. The natural growth of the city will probably require the occupancy of all satisfactory lands in that portion of the industrial district close to the business center.

Residential Development

The residential development of the City of Los Angeles has been very markedly in a southwesterly direction. The present high class residential section of the city lies in the Wilshire district along Wilshire Boulevard with the better class of smaller homes bordering on this high class district on both the north and south. Great development has also taken place in the City of Pasadena and in a number of outlying sections within commuting distance. Considerable development of homes of a smaller and less expensive character has occurred in the southerly portion of the city but the permanent and manifest direction of residential development will continue toward the southwest.

Residential development east of the Los Angeles River appears at this time practically at a stand-still. Only normal progress residentially will

probably take place east of the river. Elimination of grade crossings will, no doubt, render this property more desirable, but it cannot compete as a permanent residence section with the new territory coming into existence to the south and west. The section east of the river, however, may become very desirable as a district of homes for people employed in the various industries along the river as its location will be in close proximity to the point of employment.

Character of Industrial District Lands

The principal industrial district of Los Angeles being that portion of the city lying between Main Street on the west and the bluff on the east side of the river on the east and south of North Broadway, comprises the low level lands adjoining to and bisected by the Los Angeles River. This large level section is what was formerly the old river-bed of the Los Angeles River, subject to all its irregularities and occasional seasonal floods. The river has been confined to a permanent channel, thereby reclaiming all of these at one time annually flooded lands. As the overflowed area was naturally of a level character, it rendered itself immediately adaptable to industrial development. Owing to its flatness and lowness, it was not desirable for residential purposes and its natural use was that of an industrial character. The old original river-bed is very apparent even at the present time. It follows the high ground at the intersection of North Broadway and the river and extends along the west side, following the high ground along Alameda and Main Streets until this high ground disappears south of Tenth Street. On the east, the bluff is a physical handicap, as in portions of the undeveloped sections it rises to a considerable height above the lower land and has in the past offered considerable detriment to development upon the east side of the river, rendering the grades rather steep and generally detracting from the desirability of the the district.

Industrial Development West of the River

Industrial development west of the river is extensive and permanent. The district bounded by North Broadway, Ninth Street, Alameda Street and the river, makes up the principal industrial district of the city. In this territory are located practically all of the business concerns requiring railroad connections and varying in character from small shops occupying one-story buildings to the larger industries such as the Moreland Truck Company and the Oil Well Supply Company. This is the permanent industrial district of the city and will become more intensely occupied through the gradual development of the future.

Industrial Development East of the River

The industrial district east of the river is practically undeveloped. A very considerable percentage of the adaptable land is held by the Salt Lake

Railroad for its own development and is therefore not now available for private enterprise. The chief objection to this district, however, is the fact that its location is on the opposite side of the river from the center of the city. Access is further interfered with now by the great number of grade crossings which exist in the district west of the river.

PRESENT CONDITION OF OCCUPANCY OF INDUSTRIAL DISTRICT

The principal section of the industrial lands of Los Angeles lies within the district bounded by North Broadway, Ninth Street, Alameda Street and the Los Angeles River. There is embraced therein a total of 869 acres. Investigation was made as to the ownership of this property and it was found that of this total area, 605 acres, or 70 per cent, are privately owned and 264 acres, or 30 per cent, are railroad owned.

A study was made of this district with the object in view of ascertaining the amount of property not now absorbed for industrial purposes; in other words, property not actually occupied at this time by a permanent industrial concern. It was found advisable to segregate this district into the following classifications:

- (a) Permanently Occupied,
- (b) Temporarily Occupied,
- (c) Unoccupied (Vacant).

Permanent occupancy means that the area referred to is being put to actual use by an industrial concern of a more or less permanent character. Railroads are considered permanent occupants of the land they possess since there is no large amount of non-operative railroad property in this district. Also, active operating industrial concerns are considered as permanent occupants whether all of the property owned by them is really in use or is being held for future development. For example, the lands of Wilson & Company, meat packers, are not entirely covered by improvements, but though entirely used only a portion of the time, it is considered that the absorption of this amount of land is complete.

Permanent occupancy, however, refers to its present condition and does not mean that it will always be so occupied, for it is very probable, in fact it is a practical certainty, that a considerable amount of this at present fully occupied land will at some future date be released for more intensive use: large parts are devoted to uses that fundamentally desire and require cheap land and in time lands within this district will become of a greater value than can consistently be devoted to uses for which cheaper lands are satisfactory. Occupants of this class will in time seek other locations where cheap lands are available. This situation exists today and has been a constant phase of past development and will continually recur until the

district reaches its full development. The release of land now held in parcels of considerable area will not necessarily throw it out of the permanent industrial classification for it will gradually be absorbed and devoted to a more intensive and higher priced use.

By **temporary occupancy** is meant occupancy of lands that are not entirely vacant but which are occupied for purposes other than industrial. A very considerable amount of real estate within this district is held for prospective industrial development and is occupied at the present time by cheap and quite dilapidated shacks which are rented largely to Mexican laboring people. This old district before the encroachment of industrial enterprise formed the residence section of a large per cent of the foreign labor population of Los Angeles on account of cheap ground and ready accessibility to the industries of the city. As the district developed to one of an industrial character, property became too valuable to be considered as residential and it has been practically all bought up for speculative purposes. Where it has been improved, it has been rented for whatever amount it would bring. On account of its low rental value and the ever present possibility of sale, none of these buildings have been maintained and are all in a very poor condition. Many of them, in reality, are nothing but shacks.

The phrase "temporary occupancy" is intended to convey the idea that the property referred to is not of an improved or permanent nature and that whatever improvements exist of an industrial or residential character are temporarily attached to the property. In other words, it is generally considered that this class of land has not reached its highest use and that it will in all probability at some time in the future be actually occupied by substantial industries through the general development of the district.

As a result of the study we find that of this total area, 449 acres, or 52 per cent, are permanently occupied; 282 acres, or 32 per cent, are temporarily occupied; and 138 acres, or 16 per cent, are entirely vacant. In other words, only one-half of this large and permanent industrial section is entirely developed today and the balance is either immediately available or available within a short period in the future for permanent development.

This large area has been broken up into nine smaller sections, using as boundaries the principal streets transversing the district. Following is a table showing the result of our occupancy study of this district. Following this table is a map allocating the result of our findings. Referring to the map, Fig. 179, it will be noted that the highest percentage of permanency exists in Section 1, Section 4 and Section 7. Section 1 is the district embracing the River Station Yards of the Southern Pacific Company and is 100 per cent permanent. Section 7 is the district in which lies the station and yards of the Santa Fe and is the next highest, being 65 per cent permanent. It is interesting to note that the percentage of per-

manency is uniformly below 40 per cent throughout the entire district, with the exception of the three above mentioned sections.

Improvements

Fig. 178 shows the location and class of buildings in that portion of the industrial district in which we were more particularly interested. It also shows the occupancy of the various buildings as determined from field survey, segregated to several general classes. This map gives graphically an idea of the unoccupied areas (see also remarks in Chapter XX).



THE LOS ANGELES INDUSTRIAL DISTRICT AND CLASS OF BUILDINGS
 PREPARED BY THE ARCHITECTURAL DEPARTMENT OF THE CITY OF LOS ANGELES
 1917



FIG. 178. LOCATION AND CLASS OF BUILDINGS IN THE INDUSTRIAL DISTRICT
 Note the substantial character of the industrial development, and the fact that the small dwellings are gradually being displaced throughout the district.

OWN

OF PRINCIP

W. BROAD

PRIVATE

RAILRO

PERMA

TEMP

VACAN



OWNERSHIP AND OCCUPANCY OF PRINCIPAL INDUSTRIAL LANDS OF LOS ANGELES

DISTRICT BOUNDED BY

N. BROADWAY NINTH. ALAMEDA STS. L.A. RIVER.

TOTAL AREA 869.01 ACRES

PRIVATELY OWNED	604.72 ACRES OR 69.6%
RAILROAD OWNED	264.29 ACRES OR 30.4%
PERMANENTLY OCCUPIED	449.36 ACRES OR 51.7%
TEMPORARILY OCCUPIED	281.89 ACRES OR 32.4%
VACANT	137.76 ACRES OR 15.9%



CASE 970
JULY 1919 NO 11-31

FIG. 17B. OWNERSHIP AND OCCUPANCY OF PRINCIPAL INDUSTRIAL LANDS OF LOS ANGELES

Note the large percentage of railroad owned lands. Note also that a large part of the land in the central and northern portions of the district is occupied by business of a permanent character.

MAGNITUDE OF RAILROAD HOLDINGS

There is shown upon the Land Index Map, Fig. 180 (see page 487), approximately 6,000 acres of land. Of this amount, 1284 acres (21 per cent) are in public utility ownership and 1134 acres (19 per cent) are railroad owned and controlled.

The various holdings with the appraised values by this department are shown below:

PUBLIC UTILITY LANDS IN INDUSTRIAL DISTRICT

Company	Area in Acres	Value by Engineering Department
Southern Pacific	555.6	\$11,405,490
Santa Fe	199.9	9,218,510
Salt Lake	271.4	4,315,003
Pacific Electric	106.6	6,574,349
Total	1,133.5	\$31,513,352
L. A. Ry. (Incl. H. L. & I. Co.).....	124.7	
L. A. Gas & Elec. Corp.....	17.9	
So. Cal. Gas Co.....	8.2	
Grand Total	1,284.3	

It should be understood that wherever general land appraisal figures (made by this department) are shown, the valuation was made by methods discussed in the first portion of this chapter. Such figures are included in the report as a general index of the magnitude of interests involved rather than a determination or expression of opinion of the actual present day market value of such holdings.

This is true of general land valuation figures. In cases where we have made estimates of costs or values of lands actually required in any of our different plans, it is our opinion that the real estate estimates, as other classes of estimates, represent actual and fair costs and values.

Following are four tables showing the areas and values by the engineering department of the holdings of the three transcontinental steam roads together with tentative figures for the properties of the Pacific Electric:

AREAS AND VALUES

BY ENGINEERING DEPARTMENT

SOUTHERN PACIFIC COMPANY LAND HOLDINGS IN INDUSTRIAL DISTRICT, LOS ANGELES

AS SHOWN ON "LAND INDEX MAP"

Index Map, Parcel No.	Location of Section	Area, Square Feet	Present Value (1918)	
			Unit	Total
S. P. 1	New North Yards—Station 883+60 to East Bank Los Angeles River	12,249,595	3,370*	\$947,040
S. P. 2	Midway Yards	30,300	20	6,060
S. P. 3	River Station Yards	310,561	25	77,640
S. P. 4	Freight Yard Site	2,110,960	70	1,477,672
S. P. 5	R. W.—River and Alhambra Avenue	328,572	913	299,809
S. P. 6	Non-carrier—Gibbons Street and Alhambra	55,714	50	27,857
S. P. 7	Shop Yards	53,578	40	21,503
S. P. 8	Macy Street Team Yards	5,473,664	30	1,642,099
S. P. 9	R. W.—Macy Team Yard to Lyon Street	340,813	1 20	408,976
S. P. 10	" Jackson Street Spur	14,462	90	13,016
S. P. 11	" Corner Alameda and Jackson	21,258	1 00	21,258
S. P. 12	" Ferguson Alley to First Street	4,312	2 00	8,624
S. P. 13	" Alameda to Los Angeles	120,705	2 27	273,906
S. P. 14	Arcade Team Yard	87,992	3 66	322,498
S. P. 15	Arcade Depot Grounds	85,508	2 50	213,770
S. P. 16	Corner Alameda and Sixth	646,951	3 25	2,101,128
S. P. 17	Los Angeles Public Market Site	11,369	3 00	34,107
S. P. 18	New R. W.—Mateo to River	656,044	2 00	1,312,088
S. P. 19	Coach Yard—Alameda to Wilson	144,024	1 12	162,185 cost
S. P. 20	" Wilson to Mateo	943,578	1 75	1,651,262
S. P. 21	" Santa Fe Avenue to Santa Fe R. W.	54,562	1 00	54,562
S. P. 22	" Alameda to Long Beach Avenue at 25th Street	96,568	1 02	99,943
S. P. 23	" Alameda to Long Beach Avenue at 25th Street	174,032	34	59,295
S. P. 24	W. S.—Alameda at 25th Street (S. of P. E. R. W.)	52,310	50	26,155
	Grand Total...	24,199,969	47	\$11,105,490

*Per acre

AREAS AND VALUES

BY ENGINEERING DEPARTMENT

ATCHISON, TOPEKA AND SANTA FE RAILWAY LAND HOLDINGS IN
INDUSTRIAL DISTRICT, LOS ANGELES

AS SHOWN ON "LAND INDEX MAP"

Index Map, Parcel No.	Location of Section	Area, Square Feet	Present Value (1918)	
			Unit	Total
S. F. 1	R. W.—Ave. 33 to San Fernando Blvd. Ave 20) . . .	151,369	.29	\$43,461
S. F. 2	" San Fernando Blvd. to Los Angeles River . . .	55,063	.38	20,909
S. F. 3	" Across Los Angeles River	34,300	.075	2,572
S. F. 4	" Los Angeles River to North Spring	107,672	.53	56,696
S. F. 5	" North Spring to North Main Sts.	32,854	.76	24,934
S. F. 6	" North Main to Alhambra Ave.	128,150	.58	74,576
S. F. 7	" West Bank River, Alhambra to Macy St.	222,523	.56	125,459
S. F. 8	" Main Line, Alhambra to Macy St.	246,740	.64	158,863
S. F. 9	" West Bank River, Macy to Aliso Sts.	135,246	1.00	135,972
S. F. 10	" Main Line, Macy to Aliso Sts.	78,971	.92	72,487
S. F. 11	Yards—Aliso to First Sts.	464,615	1.12	519,696
S. F. 12	Leased Lands—First, Second, Santa Fe Ave.	225,686	2.57	579,798
S. F. 13	Freight Depo—Third, Fourth and Santa Fe Ave.	466,145	2.18	1,015,647
S. F. 14	Station and Yards—First to Seventh Sts.	2,555,838	1.67	4,257,741
S. F. 15	Corner Willow and Santa Fe Ave.	40,243	1.50	60,364
S. F. 16	Corner Jesse and Mesquit	25,628	1.25	32,035
S. F. 17	R. W.—Along Palmetto, Molino to Seaton	26,147	1.26	32,922
S. F. 18	" Between Factory Pl. and 6th, East of Alameda	44,004	1.50	66,006
S. F. 19	" Between Mateo, Mill, 6th, Industrial	24,852	1.50	37,278
S. F. 20	" Mill to Alameda between 6th and Industrial	35,400	1.75	61,950
S. F. 21	" Mill to Alameda between Industrial and Seventh	50,783	2.00	101,566
S. F. 22	" Mateo to Mill between Industrial and Seventh	24,830	1.75	43,452
S. F. 23	" Corner Industrial and Mill	3,049	1.50	4,574
S. F. 24	New Freight Yards—Shearer near Alameda	96,268	1.25	120,335
S. F. 25	R. W. and Coach Yards—Seventh to Ninth Sts	1,029,869	.74	764,285
S. F. 26	R. W. and Shop Yards—Ninth to Butte Sts.	2,402,042	.34	804,932
	Total	8,708,287	1.06	\$9,218,510

AREAS AND VALUES

BY ENGINEERING DEPARTMENT

PACIFIC ELECTRIC RAILWAY LANDS IN INDUSTRIAL DISTRICT,
LOS ANGELES

AS SHOWN ON "LAND INDEX MAP"

Land Index, Parcel No.	Location of Section	Area in Square Feet	Tentative Value (1918)	
			Unit	Total
P. E. 1	P. E. Station, Sixth and Main	69,488	22 59	\$1,563,480
P. E. 2	Passenger Yards	143,053	7 50	1,072,897
P. E. 3	R. W. for Elevated—Maple to San Pedro	81,310	3 73	303,270
P. E. 4	Proposed R. W.—San Pedro to Central	91,023	2 38	223,983
P. E. 5	" " Central Ave. to Alameda St.	83,664	2 50	209,160
P. E. 6	Shop Site—Seventh, Eighth and Alameda	961,000	2 39	2,296,500
P. E. 7	Yards—Eighth to Ninth Sts.	59,082	1 25	73,852
P. E. 8	" Ninth to Fourteenth Sts.	121,095	75	90,821
P. E. 9	R. W.—Fourteenth to Sixteenth Sts.	97,010	50	48,505
P. E. 10	Yards—Sixteenth to Washington...	218,790	50	109,395
P. E. 11	" Washington to Twentieth	291,331	40	116,531
P. E. 12	R. W.—Twentieth to Twenty-fifth Sts.	71,400	25	18,600
P. E. 13	" Twenty-fifth to Jefferson (Thirty-sixth).	111,900	25	27,975
P. E. 14	" Jefferson to Thirty-eighth	36,600	20	7,320
P. E. 15	" Thirty-eighth to Vernon...	117,730	21	24,723
P. E. 16	" Transfer Track—L. B. Ave. to Alameda St	38,250	25	9,563
P. E. 17	" Transfer Track—Alameda St. to Santa Fe Ave	241,640	224	51,127
P. E. 18	Northwest corner Broadway and Sunset Blvd.	58,400	1 76	102,736
P. E. 19	Fronting Aliso and Elliott, East of River.	33,305	60	19,983
P. E. 20	Yards—Aliso and Mission Rd. to Macy St.	262,899	25	65,725
P. E. 21	Echandia Yards...	1,450,265	093	135,200
	Total...	4,645,238	1 41	\$6,574,349

AREAS AND VALUES

BY ENGINEERING DEPARTMENT

LOS ANGELES AND SALT LAKE LAND HOLDINGS IN INDUSTRIAL DISTRICT, LOS ANGELES

AS SHOWN ON "LAND INDEX MAP"

Index Map, Parcel No.	Location of Section	Area, Square Feet	Present Value (1918)	
			Unit	Total
S. L. 1	Arroyo Seco Gravel Pit	1,139,796	.075	\$85,484
S. L. 2	R. W.—Artesea to Hoff Sts.	144,613	.39	56,608
S. L. 3	" Hoff St. to Downey Ave. (North Spring).	8,738	.40	3,495
S. L. 4	" North Spring (Downey Ave.) to North Main	210,066	.40	84,373
S. L. 5	" North Main to Alhambra Ave	110,992	.41	45,621
S. L. 6	" Alhambra Ave. to Macy St.	165,588	.31	51,452
S. L. 7	" Macy to Aliso Sts.	35,208	.52	18,223
S. L. 8	Yards—Aliso to First Sts.	460,171	.57	261,459
S. L. 9	" and Shop Site—First to Fourth Sts.	2,076,331	.46	949,503
S. L. 10	" Fourth to Seventh Sts.	2,521,889	.50	1,255,095
S. L. 11	" (Future) Seventh to Hollenbeck	613,828	.516	316,796
S. L. 12	" (Future) Hollenbeck to Ninth Sts.	984,280	.27	263,997
S. L. 13	" (Future) Ninth to Alostia Sts.	234,724	.16	38,094
S. L. 14	" (Future) Alostia, River, Soto St.	1,033,678	.057	59,325
S. L. 15	" (Future) South of Alostia and East of Soto St.	720,439	.046	33,078
S. L. 16	R. W.—Across Los Angeles River	15,945	.05	797
S. L. 17	" Along Butte St.—River to Harriet St.	60,340	.175	10,559
S. L. 18	" " " Harriet to Minerva	90,454	.225	20,352
S. L. 19	" " " Minerva to Santa Fe Ave.	114,376	.33	38,038
S. L. 20	" (Butte St. extended) Santa Fe to Alameda St.	162,043	.20	32,550
S. L. 21	New R. W.—Sixteenth to Fifteenth Sts.	49,600	.30	14,880
S. L. 22	" " Fifteenth to Fourteenth Sts.	143,800	.29	42,260
S. L. 23	" " Fourteenth to Eleventh Sts.	20,000	.20	4,000
S. L. 24	" " Eleventh to Tenth Sts.	38,837	.25	9,709
S. L. 25	" " Tenth to Ninth Sts.	10,200	.55	5,485
S. L. 26	" " Ninth to Hunter St.	27,771	.54	15,147
S. L. 27	" " Hunter to Enterprise Sts.	61,223	.75	45,917
S. L. 28	" " Enterprise to Damon Sts.	25,881	.75	19,410
S. L. 29	Proposed Hunter St. Terminal—Alameda, Wilson, Hunter, Alley	542,048	.98	533,296
Total		11,822,859	.365	\$4,315,003

RECENT LARGE DEVELOPMENTS

There has been a very considerable development in recent years which has resulted in the absorption of a very large amount of the city's industrial land. Since 1911 a total of 6,500,000 square feet of land has been purchased by railroad companies to provide for contemplated development.

In 1911, the **Southern Pacific Company** purchased 2,000,000 square feet of land, completing the acquisition of their New North Yards in the lower end of the San Fernando Valley, north of the Pigeon Farm. The company now owns a total of 280 acres of land comprising these yards which were purchased in two periods, from 1906 to 1908 and from 1911 to 1913.

Between 1912 and 1918 the **Hanchett interests**, including the Industrial Terminal Railway, acquired upward of 1,500,000 square feet in the district lying east of Alameda and north of Aliso Streets. This property comprises in part the old Chinese section of the city and is being held for prospective development. The property is either occupied by temporary improvements or is entirely vacant. No advancement has taken place since the first purchase was made.

In 1913, the **Salt Lake Railroad Company**, to provide for future requirements, purchased over 700,000 square feet of undeveloped land upon the east side of the Los Angeles River south of Seventh Street. This property remains in its original state today as it has not yet come into use.

The **Santa Fe Railway**, in order to provide additional freight yard facilities, in 1913 purchased 100,000 square feet of land upon Shearer Street one block east of Alameda. This property now has railroad connection and will be put to immediate use.

The **Pacific Electric Railway**, seeing the necessity for the extension of its elevated tracks from San Pedro to Alameda Street, purchased lands between these streets for right of way use, aggregating 175,000 square feet. These purchases were made in two periods, the larger per cent being purchased in 1906-1907, and the more recent purchases occurring in 1913. There are still some of the required properties that have not yet been acquired.

The largest, most costly and most extensive development that has taken place recently was the acquisition by the **Los Angeles Union Terminal Company** of all private properties in the O. J. Mairs Tract at Eighth and Central Avenue. A total of 413,534 square feet was purchased from private individuals in 1915 and 1916. In addition to these private purchases, the Terminal Company acquired, through exchange with the Pacific Electric Railway, the former's car-barn site at Seventh Street and Central Avenue. This area amounted to 293,000 square feet, giving the Terminal Company a present area of 800,000 square feet of land. Extensive development has

occurred upon this property by the construction of modern two and three-story concrete buildings in which has been located a large part of the wholesale produce business of the city.

The most recent large purchase of industrial lands occurred when the Salt Lake Railroad in 1917 made its purchases for the proposed Hunter Street Terminal, located on Hunter Street east of and fronting on Alameda Street. These purchases provided for a large terminal area approximately 425 feet in width extending from Alameda Street to Lemon Street, with a right of way extending from the east end of the property to connection with existing Salt Lake tracks at Butte Street.

No development has yet taken place on this property outside of the clearing of the land.

PROBABLE FUTURE DEVELOPMENT

Business

The growth of the city has been sketched in Chapter III of this report. It may be well, however, even at the risk of repetition to deal with this subject once more from the point of view of our real estate studies.

The original center of the City of Los Angeles was around the old plaza. Expansion has gradually forced this center south and west. From the plaza, there was a move to First and Spring; from there to Fifth and Spring; and from there to Seventh and Broadway. This is the present shopping center of the city. Around this center a large area of flat land is adaptable to business purposes. This fact creates the opportunity for the widening of the business belt, so that at the present time this district is undergoing an expansion in a westerly as well as a southerly direction.

The center of the financial district at first coincided with the center of the shopping district. Later, when the latter district moved south on Broadway, the financial district remained on Spring Street. At the present time its center is at Sixth and Spring Streets.

The development of the main business district of Los Angeles within the course of a normal life will probably be confined to the territory bounded by Main, Pico, Figueroa, Sixth, Hill and First Streets.

Industrial

The main industrial development of Los Angeles will likely be in a southerly direction and will be confined to the territory east of Alameda Street from North Broadway to Seventh Street and continuing southerly into the large area of flat lands adaptable to development in the vicinity of Vernon.

All of the industries requiring a large amount of land will probably be ultimately located south of the present city limits in the City of Vernon.

The character of these lands renders them immediately desirable to industries requiring large areas, since they are in close proximity to a residential section particularly adapted to less expensive homes.

Among the chief advantages of this section are the adequate transportation facilities now available and the large flat areas uncut by streets and ready for the immediate establishment of all classes of large industrial concerns.

The present industrial district has a tendency to parallel the Los Angeles River. The main business streets of Los Angeles deviate from the general direction of the river, and therefore from the industrial district at approximately an angle of 45 degrees. Therefore, the further south the industrial district extends, the further away it will be from the business center.

This fact makes it apparent that in order to serve the business district adequately, industries must at some future date locate west of Alameda Street. At the present time, Alameda Street practically forms the western boundary of spur tracks. This is very satisfactory in the present condition of the city in that the distance between the business district and the industrial district is not so great as to cause inconvenience. But, as mentioned above, the entire business district is moving southward and through this movement a general divergence takes place between these two districts. We believe, therefore, that one of the developments of the future will be the changing of the western boundary of the industrial district from Alameda Street to Central Avenue. We also believe that there will be a demand for spur track facilities south of Sixth Street between Alameda Street and Central Avenue.

Residential

The future development of residential property will probably continue at a normal rate of growth in its present direction.

Effect of Recommendations

Our recommendations will affect the future business and industrial development of the city and, to a lesser extent, the residential development. Speaking of the "business district," a distinction should be made between what might be termed the "shopping district," the "financial district" and the "general business district" (office buildings, hotels, etc.). The shopping district will not be materially affected in its normal expansion as suggested heretofore. The location of a union terminal at the Plaza will tend to stabilize the financial, office and hotel area in the downtown district and there will be a further effect towards such stabilization by the elimination of grade crossings and the construction of viaducts across the river and

across the railroad trackage adjacent to the river as proposed in our recommendations. Stabilization will be even more affected by the carrying out of our recommendations with reference to electric rapid transit facilities, especially the construction of a subway on Main Street and the elevated railway near Sixth Street and east of Main Street.

While we are satisfied that the carrying out of these recommendations will have such an effect towards stabilization, the continued expansion and growth of the entire downtown business area will not be interfered with and the benefits that we expect will come largely from a stabilization of land and business values in areas that are already within the business district.

The industrial district, of course, will be very vitally affected by all of our recommendations, particularly by the ones dealing with the elimination of grade crossings, with Alameda Street and with the spur track situation. It is not necessary to repeat here what these effects in their entirety will be since they have already been discussed at length. Nor will it be necessary to repeat the benefits to all of the interests involved, especially to industrial and business districts. The residential development will be affected principally on the east side of the Los Angeles River through grade crossing elimination and in a more or less indirect manner in outlying and suburban districts and communities by all of our recommendations affecting rapid transit interurban service.

LAND ESTIMATES FOR VARIOUS PLANS

The total estimates for all plans considered in the reports and for all recommendations fall under three general heads:

- (1) Estimates dealing with union passenger stations.
- (2) Estimates dealing with improvements in freight handling.
- (3) Estimates dealing with grade crossing elimination.

Into the cost of the plans there enters the question of cost and value of lands. In all of our estimates, lands have been included and treated in the following manner: our estimates of cost include the amount of new money required and this includes the estimated cost of the acquisition of the necessary lands. As stated heretofore, the cost of acquisition includes in the case of private lands, a certain amount of money over and above the market value of the land, while in the case of railroad and city lands, the market value alone is taken into the estimates. The detailed data on all of these land estimates are available but, as in the case of other estimates, are not reproduced in this report.

The item of land estimated is not of controlling importance in connection with estimates made for grade crossing elimination and for improvement in the handling of freight. Costs of lands are of very great importance, however, and may possibly become the controlling factor in

connection with the plans for a union passenger terminal. It is for this reason that there is given in this chapter considerable detail on the real estate entering into the various passenger terminal plans.

Special land studies were made for each of the following union passenger terminal plans: (a) Southern Pacific plan, (b) Barnard plan, (c) Santa Fe plan, (d) Hawgood plan and (e) Storrow plan. In addition, there is the engineering department's Plaza plan, making six plans in all for which real estate estimates were made. For the Barnard, Hawgood and Storrow plans, the estimates cover only the station site and immediate approaches. For the other plans, the estimates include not only this land but also real estate necessary for connecting tracks, additional rights of way and parking or plaza areas. All of the details are available in the engineering department, and it is to be understood that the area assigned to the various plans and the estimated figures are not comparable until proper allowances for this differing treatment of the different plans have been made.

Southern Pacific Plan

The Southern Pacific plan provides for the location of the union passenger station at the present Arcade Depot.

By far the largest per cent of real estate necessary is in present railroad ownership.

Fig. 181 (see page 493) shows, within the limits of the map, the lands which would be in railroad use if the Southern Pacific plan were adopted. This map covers, generally stated, the industrial and railroad district in Los Angeles. The following figures with reference to the lands involved in this plan cover only such lands as are shown on the map. (Similar Maps Fig. 182 (see page 497) and Fig. 183 (see page 499) are presented later for the Santa Fe and Plaza plans and in each case the gross area of the map is the same, so that the figures given under the three plans are comparable.

There is involved in the Southern Pacific plan a total of 49,529,872 square feet of land which will be used by the various railroads if the plan is adopted. This includes lands in present railroad ownership and lands in present private ownership which are necessary to provide adequate area. Lands which we recommend should not be continued in transportation use, mainly the Southern Pacific Coach Yard site, are not included in the figures. These lands have a total cost and value of \$31,179,943.

This total is comprised of properties held in the following ownership:





FIG. 10. LAND MAP FOR PLAN NO. 1—LANDS STATIONS AT THE SOUTHERN PACIFIC STATION ARE

This map of the Los Angeles River and its tributaries is to be used and that will be shown in the plan. It also shows the new land which would be required for the electric and the steam lines.

LANDS IN RAILROAD USE—SOUTHERN PACIFIC PLAN

Owner	Area Square Feet	Cost and Value
Southern Pacific	23,256,391	\$9,754,228
Santa Fe	8,708,287	9,218,510
Salt Lake	11,532,651	4,223,522
Pacific Electric	4,645,238	6,574,349
Total Railroad	48,142,567	\$29,770,609
City of Los Angeles.....	105,790	29,415
Private	1,281,515	1,379,919
Grand Total	49,529,872	\$31,179,943

The adoption of the proposed Southern Pacific plan would make necessary the acquisition of certain lands in present private ownership. By far the largest percentage of the area making up the total is already in the possession of the Southern Pacific Company. The private lands, outside of those existing in the depot block itself, are made up entirely of small parcels necessary for rights of way and approaches. Of the total area of land involved, 1,281,515 square feet are in present private ownership. For this area, we estimate a total cost of \$1,379,919. The largest single area comprising this total is made up of certain private lands east of the Los Angeles River and south of Alosta Street. The most valuable single parcel is in the Arcade Depot block. Aside from the private lands needed to fill out the proposed depot site, all other new lands included in the plan are made up of parcels of varying sizes needed for right of way purposes.

Almost 50 per cent of the cost of the new lands required for the operation of this plan is comprised of private lands lying within the present Arcade Depot block. The intrinsic value of these properties is not particularly high, but the owners attach a certain strategic importance to them on account of the generally accepted fact that the Southern Pacific Company will ultimately require these parcels. The past purchases by this company in this block have been made at very high figures, and the effect of these purchases is reflected in the attitude of the owners.

To complete the area required for the station site itself, in this proposed plan, it will be necessary to acquire property in the block bounded by Fourth, Sixth, Central and Alameda Streets at present privately owned, aggregating 49,994 square feet, for which we estimate the sum of \$569,994 as being the probable cost to acquire.

The balance of this block is owned by the Southern Pacific Company and Wells Fargo and Company, as follows:

	Area in Square Feet	Present Value by Eng. Dept.
Southern Pacific Company	646,951	\$2,101,128
Wells Fargo and Company.....	10,000	70,000
Total	656,951	\$2,171,128

As the Plaza plan provides an artistic plaza in front of the depot structure, it would be necessary, in order to make a fair comparison, to provide for a similar plaza in front of the present Arcade depot. The value of this location from a civic standpoint is not nearly so great as the Plaza location, and there is less opportunity for beautification or any development along the lines of city planning. Also there would be no sentimental value attached to any plaza at the Arcade site. To put the two plans upon a comparable basis, it has been necessary to estimate a probable cost for the creation of a plaza at the Arcade. The consummation of this idea can, however, be accomplished only at very great, if not prohibitive, expense. The property immediately adjoining the Arcade depot is of a valuable business character. Further, due to past activities, the speculative aspect is very apparent and enters very materially into any scheme which provides for the acquisition of additional land in that vicinity.

The development of Fifth Street is quite substantial and while it is not of a first class business character, the retail value of property along that street is considerable. An estimate covering the smallest amount of land that it would be possible to develop into a plaza would require a cost of \$739,251 for the land alone, exclusive of improvements estimated at \$243,000. This cost creates a plaza by no means equal to the one developed by us for the Plaza plan, allowing only 65,871 square feet of new private land for the Southern Pacific plan as against 161,202 square feet of the Plaza plan. We have not included the Southern Pacific plaza in any of our estimates.

The adoption of the Southern Pacific plan would cause the least readjustment of realty values of any of the plans. Practically no decreases in real estate values would result. On the other hand, no great gains would follow: Those that would come about would be limited to the very small area of business in the vicinity of the depot, together with the business district existing on Fifth Street. Also, property values on Third, Fourth and Sixth Streets would be slightly increased. The district in the vicinity of the Plaza would not be particularly affected. Rapid decrease has taken place in this district within recent years and the location of the Union Passenger Depot at the Southern Pacific site would not materially accelerate decrease in this territory. The Southern Pacific plan would not materially affect values in the vicinity of the Santa Fe station either by increasing or by decreasing them.

Santa Fe Plan

The Santa Fe plan provides for the location of the union passenger depot at the present site of La Grande Depot at First Street and Santa Fe Avenue. Practically all of the real estate involved in this plan is in present railroad ownership, by far the larger part of the railroad property involved belonging to the Santa Fe.

There is involved (within the limits considered) in the Santa Fe plan a total of 50,473,231 square feet of real estate which would be used by the several railroads in the operation of the plan. Fig. 182 (see page 497) shows these lands. Of this total area, 1,733,547 square feet represent new (private) lands, and 105,790 square feet are lands owned by the city. Land which we recommend be no longer continued in railroad use—the Southern Pacific Arcade site—is not included in the figures.

This total area of land aggregates a total estimated cost and value of \$9,900,108.

These real estate properties involved comprise lands in the following ownerships:

LANDS IN RAILROAD USE—SANTA FE PLAN

Owner	Square Feet	Cost and Value
Southern Pacific	23,457,510	\$9,685,572
Santa Fe	8,708,287	9,218,510
Salt Lake	11,822,859	4,315,003
Pacific Electric	4,645,238	6,574,349
	<hr/>	<hr/>
Total Railroad	48,633,894	\$29,793,434
City of Los Angeles	105,790	\$ 29,415
Private	1,733,547	1,227,662
	<hr/>	<hr/>
Grand Total	50,473,231	\$31,050,511

As shown in the total above, the private lands involved in this plan amount to 1,733,547 square feet. These lands have been appraised at an estimated present value of \$821,499, to which we have added an estimated additional cost to acquire of \$406,163, giving a total estimated cost of \$1,227,662.

The chief item of new lands pertaining to this plan is represented by additional lands required for the proposed coach yard site to be located at the present site of the Santa Fe shops at Butte Street. These new lands, aggregating a total area of 534,545 square feet, are appraised at a present value of \$250,360, to which has been added an estimated additional cost to acquire amounting to \$160,537, giving a total estimated cost of \$410,897. The balance of the new lands required for this plan is represented by parcels of various sizes necessary for right of way purposes.

The location of the union passenger depot on the proposed Santa Fe site would result in material decrease of properties in the vicinity of the Southern Pacific station. This decrease will not only result in a considerable loss upon the Southern Pacific station site itself, but would be further reflected in the business district in the vicinity of the Southern Pacific station along Fifth Street and also, to some extent, along Fourth and Sixth Streets.





FIG. 100. LAND MAP FOR PLAN 10-MILE RAIL STATION AT THE SANTA FE STATION SITE.
 THE MAP SHOWS THE LAND OFFERED UNDER THE PLAN AND IS SIMILAR TO THE LAND MAPS FOR THE OTHER TWO PLAN.

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Industrial values in the vicinity of the Santa Fe site would probably show material increase, but as this district is already permanent, the development would not be as marked as in the case of the Plaza plan.

By the opening of Fifth Street through the Southern Pacific station site (as in Plaza plan), another through and convenient street would exist to furnish quick access to the business district. The opening of this street would develop quite extensively the property east of the Arcade depot site and would tend to alleviate decrease in business values on Fifth Street.

Plaza Plan

There is involved (within the limits considered) in the Plaza plan a total of 50,415,983 square feet of land which will be used by the various rail lines if the plan is adopted. This includes lands in present railroad ownership and lands in present private ownership, which are necessary to provide adequate area. These lands have a total cost and value of \$32,100,225 and are shown on Fig. 183 (see page 499). Lands which we recommend be discontinued from transportation use—the Southern Pacific Arcade station site and the Southern Pacific coach yard site—are not included in these figures.

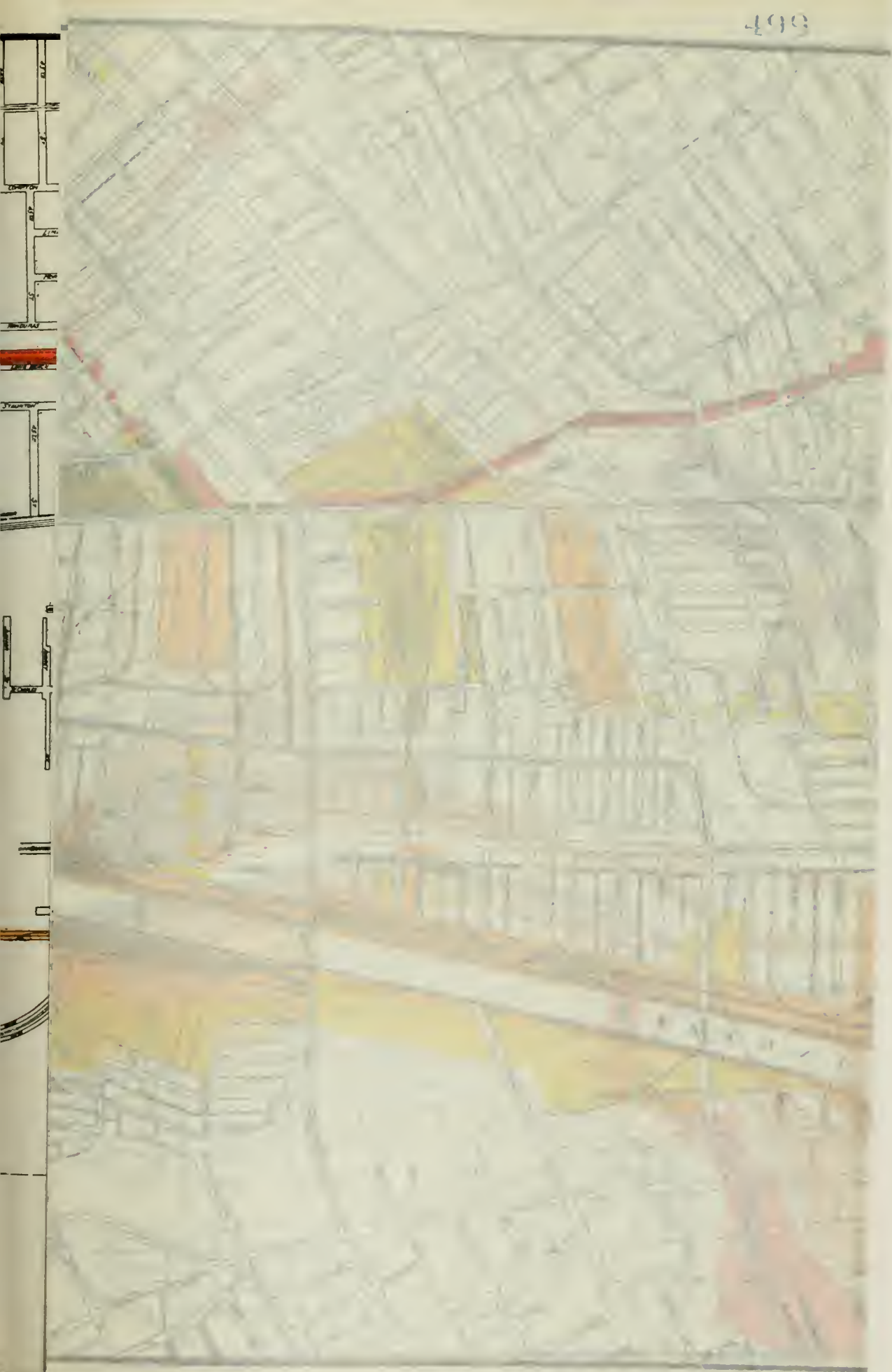
This total is comprised of properties held in the following ownerships:

LANDS IN RAILROAD USE—PLAZA PLAN

Owner	Square Feet	Cost and Value
Southern Pacific	22,513,932	\$8,034,310
Santa Fe	8,708,287	9,218,510
Salt Lake	11,532,651	4,223,522
Pacific Electric	4,645,238	6,574,349
		<hr/>
Total Railroad	47,400,108	\$28,050,691
City of Los Angeles	162,141	144,412
Private	2,853,734	3,905,122
		<hr/>
Grand Total	50,415,983	\$32,100,225

Involved in the Plaza plan are some 2,853,734 square feet of private (new) lands, which have been appraised at an estimated present value of \$2,938,196, to which we have added an additional cost to acquire of \$996,926, giving a total estimated cost of \$3,905,122.

For the construction of the proposed Plaza union station as outlined in the Plaza plan, it is necessary to acquire a considerable amount of lands at present privately owned lying east of and adjoining North Main Street, with a depth of 500 feet easterly therefrom and extending from Commercial Street northeasterly to Redondo Street. For the proposed station site itself, it will be necessary to obtain possession of 1,782,858 square feet of land held in fee and bounded by North Main, Redondo, Date (approximately extended south) and Commercial Streets. This property will have to be purchased





LEGEND

SOUTHERN PACIFIC CO
 ATTORNEY TORRES &
 SOUTH PL PL
 LOS ANGELES RY
 PACIFIC ELECTRIC RY
 LOS ANGELES RY
 R. LAND LOTS
 JOHN J. COOK AND L.A.A.
 JOHN J. COOK AND L.A.A.
 JOHN J. COOK AND L.A.A.

LANDS PERMANENTLY IN R.R. USE
 LANDS WHICH MAY BECOME UNNECESSARY FOR R.R. USE
 NEW LANDS REQUIRED - STEAM
 NEW LANDS REQUIRED - ELECTRIC
 PACIFIC ELECTRIC RY LANDS

LAND MAP FOR PLAZA PLAN
 SHOWING
 USE OF RAILROAD OWNED LANDS
 AND
 PRIVATELY OWNED LANDS TO BE ACQUIRED

1000 500 0 1000 2000
 SCALE IN FEET

FOR PRESENT OWNERSHIP OF RAILROAD LANDS-SEE LAND INDEX MAP
 CASE 970
 AUGUST 1918 NO. 11-25

FIG. 105. LAND MAP AND PLAN OF UNION STATION AT THE PLAZA
 The map showing the land which will be required is referred to the plan as the land map.

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outright in its entirety and is all at present privately owned, with the exception of the small holdings of the Southern Pacific and the City lying within those boundaries. The probable cost of these private holdings we estimate at \$2,822,831.

The proposed Plaza station site bounded by Commercial, Redondo and North Main Streets and a line extending parallel thereto and distant 500 feet westerly therefrom, is comprised of the following lands:

OWNERSHIP OF LAND—PROPOSED PLAZA UNION STATION SITE

Areas	Square Feet	Per Cent
Area in Railroad Ownership.....	178,958	6.8
Area in City Ownership.....	56,351	2.1
Area in Private Ownership.....	1,547,549	59.1
Total Area held in Fee.....	1,782,858	68.0
Area in Existing Streets.....	840,590	32.0
Total Area Proposed Site.....	2,623,448	100.0

The estimated cost and value of the property is as follows:

OWNERSHIP AND COST AND VALUE OF LANDS PLAZA UNION STATION SITE

Ownership	Estimated Cost and Value
Railroad	\$ 282,249
Private	2,822,831
City	114,997
Streets	None
Total	\$3,220,077

The above tabulations are very important. It should be noted that of the total area comprising the proposed station site aggregating 2,623,448 square feet, 840,590 square feet, or 32 per cent, is represented by present street areas which will be absorbed in the plan. In other words, a station site comprising over 2,000,000 square feet can be obtained by the purchase of only 1,782,000 square feet of land held in fee by private individuals. By the purchase outright of 68 per cent of the total area required, 32 per cent additional can be obtained by the closing of existing streets, a net gain without cost.

As adequate means have been taken for the handling of all traffic, both present and prospective, through the rearrangement of streets in the vicinity of the proposed station site, the street areas above mentioned should be acquired without cost through proper action by the City. In view of the great civic improvement resulting from the adoption of this plan, it would be to the City's best interest to permit the closing of these streets.

The larger proportion of the cost attached to the proposed acquisitions pertains to property lying within the triangle formed by Commercial, North Main and Alameda Streets. The lands lying within this triangle amount to



FIG. 184. MAIN STREET NORTH FROM MARKET STREET

Under the plan recommended, all buildings to the right of Main Street and beyond the white faced building in the exact center of the picture (which is the northeast corner of North Main and Commercial Streets) would be demolished. This corner would be the closest point to the business district. The station site would extend from this corner out Main Street to its point of disappearance in the background, taking in all lands of a width of three blocks to the right of Main Street.



FIG. 185. MAIN STREET BETWEEN COMMERCIAL STREET AND THE PLAZA

This picture shows a close-up view of buildings on the east side of the street.

THE JOHN RANDOLPH HAYNES AND
DORA HAYNES FOUNDATION
LIBRARY
LOS ANGELES, - - CALIFORNIA



FIG. 186. MAIN STREET NORTH FROM THE PLAZA

This view is looking north. All buildings in the immediate foreground lie within the proposed station site.



FIG. 187. MAIN STREET BETWEEN MARCHESSAULT AND MACY STREETS

This picture gives a close-up view of the buildings on the east side of Main Street, north of the Plaza.



FIG. 188. PLAZA STREET BETWEEN MAIN AND LOS ANGELES STREETS

This view shows existing buildings on this street between Main and Los Angeles Streets; also those on the east side of Los Angeles Street.

a total area of 582,426 square feet having a present value of \$1,393,843, for which has been estimated a total cost of \$1,827,479. The property contained in this triangle is of a business character and though it is located in a district that has depreciated very materially and very rapidly in recent years, the business value of the land adds greatly to the cost of the plan.

This cost, however, is offset by the many favorable features connected with the location, such as its ready accessibility and its adaptability to attractive development. Practically all of the lands contained within this triangle are improved properties. The improvements vary from two to three story buildings of an obsolete character (but of still good construction), used for retail business, to one story brick and frame shops carrying on a small manufacturing business.

The retail business is confined almost exclusively to the Main Street frontage, which is occupied by small retail stores catering mainly to Mexican trade. The business on Los Angeles Street is more of a wholesale nature. Between Los Angeles Street and Alameda Street the property at present comprises a section of Chinatown, being partially occupied by two-story brick buildings leased to Chinese.



FIG. 189. LOS ANGELES STREET BETWEEN COMERCIAL AND ARCADIA STREETS

This picture shows the character of improvements existing on the west side of the street.



FIG. 190. LOS ANGELES STREET FROM ARCADIA STREET TO PLAZA STREET

The character of existing improvements on the west side of the street is shown. The Plaza can be located by the tree in the right center of the picture.



FIG. 191. LOS ANGELES STREET FROM THE PLAZA TOWARD COMMERCIAL STREET

The buildings shown are the same as in Figs. 187 and 188 but looking north instead of south. This picture was taken from the Plaza and shows the west side of Los Angeles Street from the Plaza almost to Commercial Street.



FIG. 192. LOS ANGELES STREET SOUTH FROM ALISO STREET

All buildings on both sides of street up to the first cross street (opposite the street car) in the foreground will be demolished.



FIG. 193. LOS ANGELES STREET AND "NEGRO ALLEY"

This picture shows the class of buildings on the Los Angeles Street frontage of the block bounded by Los Angeles, Aliso, Alameda and Ferguson Alley.



FIG. 194. FRONTAGE ON THE WEST SIDE OF THE INTERSECTION OF LOS ANGELES AND ALAMEDA STREETS

All buildings shown will be demolished. The large three-story brick building is the Plaza Substation of the Los Angeles Railway.



FIG. 195. INTERSECTION OF LOS ANGELES AND ALAMEDA STREETS

All buildings with the exception of that at the immediate left will be demolished.



FIG. 196. IMPROVEMENTS UPON THE PROPERTY OF THE OIL WELL SUPPLY COMPANY



FIG. 197. LOOKING EAST ACROSS ALHAMBRA AVENUE AT ALAMEDA STREET

This view shows the pipe yard of the Oil Well Supply Company with the plant of the Fulton Engine Works at the extreme left

The balance of the proposed station site, other than this triangle, is made up of excellent industrial property, either used for that purpose at the present time or held for future development of that character. Alameda Street furnishes the valuable features of the location, as it is the main artery of travel through the industrial district. In this territory are three large industrial concerns that have been substantially located for a considerable period of time. There are, however, several large parcels of property of an industrial nature that await development. They are held for prospective sale and are vacant and practically without use at present.

In addition to the streets in this district, over which the City has control, it also owns outright fee to 56,351 square feet of land within this triangle, comprising a fire-house site upon Aliso Street, the parcel used by the Water Department upon Los Angeles Street, and the old Plaza. The value of these parcels is included.

The railroad lands contained in the estimates pertaining to this plan comprise all of the railroad holdings which will be used in conjunction with the operation of the various roads. It is assumed that no new money will be expended to accomplish the transfer from one railroad's use to another of these various railroad properties and that the only new money necessary will be for the purpose of acquiring lands at present privately owned.

A very large percentage of the costs of new lands pertaining to the Plaza plan is the result of the inclusion of a plaza in front of the new union station building. This is not necessary from a railroad operating standpoint, and traffic could probably be handled without this additional space. But from a civic standpoint it would not seem advisable to construct a new depot without giving it the proper setting. The Plaza will provide an attractive entrance to the station and will furnish additional parking space and more convenient access for the traveling public. From the standpoint of civic pride and public interest, the sentimental value of a new plaza, even though it carries a very material additional expense, is something that should be given weight.

Of the station site itself, 276,250 square feet are devoted to Plaza purposes, and of this area, 161,202 square feet will have to be purchased at an estimated cost of \$678,186.

Effect on Land and Business Values

The establishment of a union passenger station at the Plaza, in our opinion, will result in a marked increase in the desirability of the business district upon Main Street, from Sixth to Commercial Street; upon Spring Street, from Fifth to Temple Street; and upon Broadway, from Fifth to First Street. We also expect an increase in industrial values in the district lying north of First Street, between Alameda Street and the river, and also on

property on Los Angeles Street between Sixth and Commercial Streets. By the suggested opening of Fifth Street through the present Southern Pacific Station site, a material enhancement in values would take place in the industrial lands east of Alameda Street between Third and Sixth Streets. Values in the vicinity of the Santa Fe Station would not be subject to material changes, but whatever change takes place will be an increase. Some immediate, but temporary, decrease in values in the business district in the vicinity of the Southern Pacific Station may result and, if this station be abandoned, the station site itself may suffer a loss of value. The value of properties on Third and Fourth Streets would probably be unaffected.

Summing up the three plans: The Southern Pacific plan would result in the least unsettlement; the Plaza plan would make necessary the greatest adjustment; and the Santa Fe plan would fall midway between these two. The adjustment following the operation of the Plaza plan, while not particularly desirable to certain of the property owners in Los Angeles, would result in a very material net gain through the considerable increase of values throughout a large area.

In view of the very great immediate benefits and of the tremendous ultimate benefits resulting from the adoption of this plan, through which considerable profit will be directed toward owners of real estate in the general vicinity of the proposed station, we believe that the cost of these new lands, nearly \$3,000,000, can be greatly reduced, if not entirely covered, through private subscription of, or assessment upon, the owners of lands who will be materially benefited.

It is entirely logical to assume that persons deriving benefit from the location of the station at this site should bear a portion of the cost of such location, and it seems eminently fair to ask these beneficiaries to provide the necessary land.

This could be accomplished through voluntary action either by the formation of local associations to handle the problem or through legislative action by the City. This is a matter somewhat outside the scope of this report, but it should, in our opinion, be given special attention by the Commission and by the City authorities.

DAMAGES CAUSED BY PROPOSED VIADUCTS

As a result of the construction of the proposed new viaducts across the Los Angeles River, there would be certain damages to the lands fronting upon these viaducts due to the obstruction or loss of the frontage of these properties.

Estimates have been made of these damages, and it is found that they total \$530,516 for the several viaducts.

Due to the nature of the subject, no particular discussion can be engaged in without entering into the detail of each estimate, and for that

reason, reference here will be limited. The subject of viaduct land damages furnished a rather intangible situation in that it was necessary to view the viaduct as actually constructed and the property affected in its resultant condition after this construction. It was the object of our investigation to consider probable conditions resulting from the construction of these viaducts which would in any way influence the value of the properties fronting thereon. Individual ownership was considered as a basic standard and damage was regulated by the extent of the individual ownership involved.

The character of the property, such as its size and location within the limits of the viaducts, means of other access and its present physical condition, formed the basis of our estimates. Allowance and difference were made for the degree of obstruction or total loss, varying with the probable condition of the property after the construction of the viaducts.

We find that a total of 26,524 front feet of real estate is affected by the proposed construction.

Below is a tabulation of our estimates by viaducts:

**ESTIMATED DAMAGE RESULTING FROM PROPOSED
VIADUCT CONSTRUCTION**

Viaduct	Front Feet Involved	Property Damages Estimated Amount of Damages
North Main over River	3,441	\$92,056
North Main over Redondo Street.....	1,902	67,310
Macy Street over River.....	1,545	30,495
Macy Street over Depot.....	1,324	31,951
Aliso Street over River.....	6,069	69,151
First Street over River.....	2,188	15,650
Fourth Street over River.....	4,063	36,632
Seventh Street over River.....	2,915	141,316
Ninth Street over River.....	3,077	45,955
Butte Street over Santa Fe Ave.....	.....	None
Baker Street .....	.....	None
Total	26,524	\$530,516

**LANDS THAT MAY BECOME UNNECESSARY FOR RAILROAD
USE (NON-OPERATIVE LANDS)**

Through the operation of either of the three principal plans, a great amount of real estate at present either used for railroad purposes or held for future development will, in our opinion, become unnecessary for railroad use and can be added to the total area of industrial lands susceptible of private development.

This does not mean that the railroad companies must necessarily dispose of a portion of their holdings, but in view of the fact that these lands will not be needed for railroad operation and the companies can voluntarily dispose of them or hold such areas as non-operative property, it was thought advisable to estimate their probable value in case they were so disposed of or salvaged.

The salvage value fixed in the estimates shown below, covering the salvage value of the lands which may become unnecessary for railroad use, make up the value which will probably pertain to these lands should they become non-operative.

In considering the possible release of these various parcels of railroad lands, it has not been assumed that a condition of forced sale will exist and the figures fixed do not represent a sacrifice condition. The figures placed upon these salvage parcels represent their probable value under normal conditions of absorption and with no restrictions placed upon their disposal. In other words, it is assumed that the carrier, if it should be desired to sell these lands, will be at liberty to carry the property for whatever period is deemed fit and that no specified date will be fixed at which all of these parcels will be disposed of.

This is a very important factor in the problem for, if it were assumed that upon the operation of any of the plans involved the carrier must necessarily throw upon the market all parcels possible of salvage, the figure obtained would undoubtedly be considered less than that placed upon the property, as it would not be possible to force the sale of so great an amount of land without a sacrifice.

The greatest differences existing between salvage value and present value pertain to the Southern Pacific station site. This is accounted for by the fact that the existence of the depot at this location today has created a certain desirability for the property in that locality which will be immediately destroyed should the station be abandoned at that point. A small business center has grown up around this depot and values for this business property exceed very materially the values which would prevail at the time of the abandonment.

The removal of the railroad facilities from this property would immediately place this vicinity in the same condition as other property along Central Avenue and Alameda Street, and the higher value, due to its special features, would be destroyed.

It is to be understood that the following list of possible non-operative properties has not been made use of in our estimates of the cost of the various plans. The list is an expression of opinion, merely, of what lands will not necessarily be operative after our plans will take care of all needs in Los Angeles for the near future. In our estimates there is credit taken for land salvaged only as follows:

LANDS CREDITED IN ESTIMATES OF COST OF PLANS

Lands	Southern Pacific Plan	Santa Fe Plan	Plaza Plan
Southern Pacific Coach Yard.....	\$1,651,262	.....	\$1,651,262
Southern Pacific Station Site .....	.....	\$1,719,918	1,719,918
Salt Lake New Right of Way—Ninth to Sixteenth Sts.	91,481	.....	91,481
Total	\$1,742,743	\$1,719,918	\$3,462,661

Following are tabulations showing, by plans, the property which may become unnecessary to railroad operation by the adoption of the respective plans:

TABLE SHOWING
SALVAGE VALUE OF LANDS
WHICH MAY BECOME UNNECESSARY FOR RAILROAD USE

SOUTHERN PACIFIC PLAN

Location and Description of Parcels Proposed to be Salvaged	Area, Square Feet	Present Value 1918, by Engineering Department		Estimated Salvage Value by Engineering Department		Loss	
		Unit	Total	Unit	Total	Per Cent	Amount
LOS ANGELES & SALT LAKE							
Arroyo Seco Gravel Pit.	1,029,869	075	\$72,884	075	\$72,884	None	
Between North Spring and West Albion—Non-carrier Parcel.	116,425	38	44,191	38	44,191	None	
At First and Myers Sts.—Non-carrier Parcels (3)	83,000	65	54,175	65	54,175	None	
Yards—Between Seventh and Hollenbeck—Non-carrier Portion	100,766	42	42,029	27	27,130	35	14,899
Yards—Between Hollenbeck and Ninth—Non-carrier Portion	698,126	27	187,338	26	180,258	4	7,080
Yards—Between Ninth and Alosta—Non-carrier Portion...	123,201	21	25,907	21	25,907	None	
Between Alosta, Soto and River—Non-carrier Portion...	802,534	057	49,164	057	49,164	None	
Bridge Across Los Angeles River.	15,945	05	797			100	797
East of Soto and South of Alosta—Non-carrier Portion...	547,800	046	25,199	016	25,199	None	
New R. W.—Hunter to Ninth Sts	27,771	54	15,147	54	15,147	None	
" " Ninth to Tenth Sts...	10,200	55	5,485	55	5,485	None	
" " Tenth to Eleventh Sts	38,837	25	9,709	25	9,709	None	
" " Eleventh to Fourteenth Sts	20,000	20	4,000	20	4,000	None	
" " Fourteenth to Fifteenth Sts	143,800	29	42,260	29	42,260	None	
" " Fifteenth to Sixteenth Sts.	49,000	30	11,880	30	11,880	None	
On Santa Fe Ave. near 26th St., Zone 48 C-N. C.	40,728	40	16,291	40	16,291	None	
Total..	3,908,602	16	\$609,456	15	\$586,680	4	\$22,776
SOUTHERN PACIFIC							
Coach Yard...	943,578	1 75	\$1,651,262	1 75	\$1,651,262	None	
Northwest corner Violet and Santa Fe R. W.	35,804	1 00	35,804	75	26,853	25	8,951
Fronting Alameda and Long Beach Aves. at Twenty-fifth St.	100,469	25	25,118	20	20,094	20	5,024
North Spring between Sotello and Mesnager	10,716	50	5,358	50	5,358	None	
Southeast corner North Spring and Sotello (Old River Station)...	8,581	60	5,149	60	5,149	None	
Total..	1,099,148	1 57	\$1,722,691	1 55	\$1,708,716	8	\$13,975
SANTA FE							
Shearer St. Freight Yard	96,268	1 25	\$120,335	1 25	\$120,335	None	
North side Ninth—Adjoining Santa Fe R. W.	49,871	75	37,403	70	34,910	7	\$2,493
South side Ninth—Adjoining Santa Fe R. W.	145,324	60	87,609	58	84,620	3	2,989
R. W. south of Butte St.—Harriett to Soto	236,000	12	28,686	058	13,642	52	15,044
Total..	527,643	52	\$274,033	48	\$253,507	8	\$20,526
PACIFIC ELECTRIC							
East side Santa Fe Ave., between Eighth and Enterprise...	5,600	90	\$5,040	90	\$5,040	None	
Northwest corner Broadway and Sunset Blvd	58,400	1 76	102,736	1 76	102,736	None	
Corner Lyons and Aliso	1,750	1 00	1,750	75	1,312	25	\$438
South side Eighth—Betwen San Julian and Wall	8,150	1 94	15,800	1 94	15,800	None	
Por. Shop Site (excl. proposed R. W.)	803,800	2 42	1,942,050	1 70	1,364,100	30	577,950
Total..	877,700	2 36	\$2,067,376	1 70	\$1,488,988	27	\$578,388
WELLS FARGO & CO.							
Express Building Site in Arcade Depot Block	10,000	7 00	\$70,000	4 00	\$40,000	43	\$30,000
Grand Total ..	6,422,913	74	\$4,743,556	64	\$4,077,891	14	\$665,665

**TABLE SHOWING
SALVAGE VALUE OF LANDS
WHICH MAY BECOME UNNECESSARY FOR RAILROAD USE**

PLAZA PLAN

Location and Description of Parcels Proposed to be Salvaged	Area, Square Feet	Present Value (1918) by Engineering Department		Estimated Salvage Value by Engineering Department		Loss	
		Unit	Total	Unit	Total	Per Cent	Amount
LOS ANGELES & SALT LAKE							
Arroyo Seco Gravel Pit	1,029,869	075	\$72,884	075	\$72,884	None	
Between North Spring and West Albion—Non-carrier Parcel	116,425	38	44,191	38	44,191	None	
At First and Myers Sts.—Non-carrier Parcels (3)	83,000	65	54,175	65	54,175	None	
Shop Site—Between First and Fourth—Non-carrier Portion	784,691	41	321,185	36	285,849	11	\$35,336
Yards—Between Fourth and Seventh—Non-carrier Portion	1,174,054	46	539,528	46	539,528	None	
Yards—Between Seventh and Hollenbeck—Non-carrier Portion	520,019	52	268,687	48	257,646	4	11,041
Yards—Between Hollenbeck and Ninth—Non-carrier Portion	847,171	27	229,018	27	225,246	1 6	3,772
Yards—Between Ninth and Alosta—Non-carrier Portion	123,201	21	25,907	21	25,907	None	
Between Alosta, Soto and River—Non-carrier Portion	862,534	057	49,164	057	49,164	None	
Bridge R. W. across Los Angeles River	15,945	05	797			100	797
East of Soto and South of Alosta—Non-carrier Portion	547,800	046	25,199	046	25,199	None	
New R. W.—Hunter to Ninth Sts	27,771	54	15,147	54	15,147	None	
" " Ninth to Tenth Sts	10,200	55	5,485	55	5,485	None	
" " Tenth to Eleventh Sts	38,837	25	9,709	25	9,709	None	
" " Eleventh to Fourteenth Sts	20,000	20	4,000	20	4,000	None	
" " Fourteenth to Fifteenth Sts	143,800	29	42,260	29	42,260	None	
" " Fifteenth to Sixteenth Sts	49,600	30	14,880	30	14,880	None	
On Santa Fe Ave. near 26th	40,728	40	16,291	40	16,291	None	
Total	6,435,645	27	\$1,738,507	26	\$1,687,561	3	\$50,946
SOUTHERN PACIFIC							
Coach Yard	943,578	1 75	\$1,651,262	1 75	\$1,651,262	None	
Arcade Team Yard	85,508	2 50	213,770	2 00	171,016	20	42,754
Arcade Depot Site	646,951	3 25	2,101,128	2 33	1,508,902	28	592,226
New R. W.—Mateo to River, between Sixth and Jesse	144,024	1 12	162,185	88	126,830	22	35,355
Northwest corner Violet and Santa Fe R. W	35,804	1 00	35,804	75	26,853	25	8,951
Southwest corner Sixth and Alameda	11,369	3 00	34,107	2 50	28,422	17	5,685
Fronting Alameda and Long Beach Aves at Twenty-fifth St	100,469	25	25,118	20	20,094	20	5,024
North Spring between Sotello and Mesnager	10,716	50	5,358	50	5,358	None	
Southeast corner North Spring and Sotello (Old River Station)	8,581	60	5,149	60	5,149	None	
Total	1,987,000	2 13	\$4,233,881	1 78	\$3,543,886	16	\$689,995
SANTA FE							
Shearer St Freight Yard	96,268	1 25	\$120,335	1 25	\$120,335	None	
North side Ninth St.—Adjoining Santa Fe R. W.	49,871	75	37,403	70	34,910	7	2,493
South side Ninth St.—Adjoining Santa Fe R. W.	145,324	60	87,609	58	84,620	3	2,989
R. W. South of Butte St.—Harriett to Soto St	236,000	12	28,686	058	13,642	52	15,044
Total	527,463	52	\$274,033	48	\$253,507	7 5	\$20,526
PACIFIC ELECTRIC							
East side Santa Fe Ave., between Eighth and Enterprise	5,600	90	\$5,040	90	\$5,040	None	
Northwest corner Broadway and Sunset Blvd	58,400	1 76	102,736	1 76	102,736	None	
Corner Lyon and Aliso	1,750	1 00	1,750	75	1,312	25	438
South side 8th, between San Julian and Wall Sts.	8,150	1 94	15,800	1 94	15,800		
Por. Shop Site (excl. proposed R. W.)	803,800	2 42	1,942,050	1 70	1,364,100		577,950
Total	877,700	2 36	\$2,067,376	1 70	\$1,488,988	28	\$578,388
WELLS FARGO & CO.							
Express Building Site in Arcade Depot Block	10,000	7 00	\$70,000	4 00	\$40,000	43	\$30,000
Grand Total	9,837,808	85	\$8,383,797	71	\$7,013,942	16 3	\$1,369,855

TABLE SHOWING
SALVAGE VALUE OF LANDS
WHICH MAY BECOME UNNECESSARY FOR RAILROAD USE

SANTA FE PLAN

Location and Description of Parcels Proposed to be Salvaged	Area, Square Feet	Present Value (1918) by Engineering Department		Estimated Salvage Value by Engineering Department		Loss	
		Unit	Total	Unit	Total	Per Cent	Amount
LOS ANGELES & SALT LAKE							
Arroyo Seco Gravel Pit	1,029,869	075	\$72,884	075	\$72,884	None	
Between North Spring and West Albion—Non-carrier Parcel	116,425	38	44,191	38	44,191	None	
At First and Myers Sts.—Non-carrier Parcel (3)	83,000	65	54,175	65	54,175	None	
Shop Site between First and Fourth—Non-carrier Portion	784,691	41	324,185	36	285,849	11	\$35,336
Yards—Between Fourth and Seventh—Non-carrier Portion	1,174,054	46	539,528	46	539,528	None	
Yards—Between Seventh and Hollenbeck—Non-carrier Portion	520,019	52	268,687	48	257,646	4	11,041
Yards—Between Hollenbeck and Ninth—Non-carrier Portion	847,171	27	229,018	27	225,246	1 65	3,772
Yards—Between Ninth and Alosta Sts.—Non-carrier Portion	123,201	21	25,907	21	25,907	None	
Yards—Between Alosta, Soto and River—Non-carrier Portion	862,594	057	49,164	057	49,164	None	
Bridge R. W. across Los Angeles River	15,945	05	797			100	797
East of Soto and South of Alosta—Non-carrier Portion	547,800	046	25,199	046	25,199	None	
On Santa Fe Ave., near 26th St., Zone 48 C-N. C.	40,728	40	16,291	40	16,291	None	
Total	6,145,437	27	\$1,647,026	26	\$1,596,080	3	\$50,946
SOUTHERN PACIFIC							
Arcade Team Yard	85,708	2 50	\$213,770	2 00	\$171,016	20	\$42,754
Arcade Depot Site	646,951	3 25	2,101,128	2 33	1,508,902	28	592,226
Southwest corner Sixth and Alameda	11,369	3 00	34,107	2 50	28,422	17	5,685
Northwest corner Violet and Santa Fe R. W.	35,804	1 00	35,804	75	26,853	25	8,951
Fronting Alameda and Long Beach Ave. at Twenty-fifth St	100,469	25	25,118	20	20,094	20	5,024
North Spring between Sotello and Mesnager	10,716	50	5,358	50	5,358	None	
Southeast corner North Spring and Sotello (Old River Station)	8,581	60	5,149	60	5,149	None	
Total	899,398	2 70	\$2,420,434	1 97	\$1,765,794	27	\$654,640
SANTA FE							
Shearer St. Freight Yard	96,268	1 25	\$120,335	1 25	\$120,335	None	
North side Ninth—Adjoining Santa Fe R. W.	40,848	75	30,636	70	28,594	7	\$2,042
South side Ninth—Adjoining Santa Fe R. W.	68,274	62	42,000	61	40,427	3 7	1,573
R. W. south of Butte—Harriett to Soto	236,000	12	28,686	058	13,642	52	15,044
Total	441,390	50	\$221,657	46	\$202,998	8 5	\$18,659
PACIFIC ELECTRIC							
East side Santa Fe Ave., between Eighth and Enterprise (Lot 181)	5,600	90	\$5,040	90	\$5,040	None	
Northwest corner Broadway and Sunset Blvd	58,400	1 76	102,736	1 76	102,736	None	
Corner Lyons and Aliso (70x50 apx)	1,750	1 00	1,750	75	1,312	25	438
South side Eighth, between Wall and San Julian (79x100)	8,150	1 94	15,800	1 94	15,800	None	
Por. Shop Site (excl. proposed R. W.)	803,800	2 42	1,942,050	1 70	1,364,100		\$577,950
Total	877,700	2 36	\$2,067,376	1 69	\$1,488,988	28	\$578,388
WELLS FARGO & CO.							
Express Building Site—Arcade Depot Block	10,000	7 00	\$70,000	4 00	\$40,000	43	\$30,000
Grand Total	8,373,925	77	\$6,426,493	61	\$5,093,860	21	\$1,332,633

LAND SUMMARY FOR ADOPTED FINAL RECOMMENDATIONS

The total estimated cost of lands involved in the Plaza plan (**immediate** recommendations) amount to a net figure of \$467,559, to which has been added interest during construction at varying rates and periods, amounting to \$610,819, giving a net total estimated cost of \$1,078,378.

For the Plaza plan (**ultimate** recommendations) the estimated cost of real estate involved aggregates a net figure of \$661,571, to which has been added interest during construction, amounting to \$629,921, giving a net total estimated cost of \$1,291,492.

By net totals, as mentioned above, is meant totals after deduction has been made of the credits due to the proposed release from transportation use of the Salt Lake right of way from Sixteenth Street to the New Hunter Street Terminal, amounting to \$91,481; salvage of Southern Pacific Arcade Station site, amounting to \$1,719,918; and salvage of the Southern Pacific Coach Yard site, amounting to \$1,651,262.

Following are two tables which are summaries of lands required for final adopted recommendations for the Plaza plan-immediate, and the Plaza plan-ultimate:

TABLE SHOWING
SUMMARY OF LANDS REQUIRED FOR PLAZA PLAN

IMMEDIATE PLAN

Est. Sec. Key	Group	Item	Estimated Cost	Const'n Period (Months)	Interest		Total Estimated Cost
					Rate %	Amount	
STEAM ROADS							
	1	Passenger, Terminal, Approaches, etc.:					
CC		Viaduct on Main St. over Redondo St.	\$195,010	24	12	\$23,401	\$218,411
CE		Viaduct on Macy St. over Terminal Yard	84,539	6	3	2,536	87,075
MCB		Connections at Mission Tower—Modified	2,949,812	36	18	530,966	3,480,778
MCF		Passenger Station and Facilities—Modified					
		Total	\$3,229,361			\$556,903	\$3,786,264
MCA	2	Union Coach Yard	\$19,135	14	7	\$1,339	\$20,474
MCJ	4	Union L. C. L. Freight Station: Union Terminal at Santa Fe Site—Modified					
M	5	Viaducts over Los Angeles River:					
T		Viaduct at Macy St.	\$5,210	18	9	\$469	\$5,679
		Viaduct at Aliso St.					
		Total	\$5,210			\$469	\$5,679
N	6	Depression of and New Tracks along River:					
M2		Removal Santa Fe Crossings—Macy and Aliso Sts.					
M3		Depression Santa Fe Tracks—Aliso to Alhambra	\$26,256	12	6	\$1,575	\$27,831
		Depression Salt Lake Tracks—Aliso to Alhambra					
		Total	\$26,256			\$1,575	\$27,831
E	7	Main Line Tracks and Connections Not Depressed:					
M-1		Connection S. P. and Santa Fe at North Broadway					
MD2		Connection S. L. and Santa Fe at Redondo Junction	\$11,250	2	1	\$113	\$11,363
		Connection S. L. and Santa Fe at Humboldt St.					
		Total	\$11,250			\$113	\$11,363
AC	10	New Trackage, River to Hobart and Connections:					
AD		Second Track, Santa Fe, Soto St. to Hobart					
M4		Connection S. L. and Santa Fe at Hobart					
		Second Track, Santa Fe, Soto St. to Redondo Junction.					
		Total					
MA	11	New Freight Yards, Southern Pacific and Santa Fe: Yard for S. P. along San Fernando Rd.—Modified.					
P	13	New Connections, Relief of Alameda St. Switching:					
M5		Connection Jackson St. and Santa Fe Tracks.					
M6		Connection Alameda St. and S. F. near Industrial St.					
MV		Connection S. L. Main Line and Butte St. Track.	\$18,329	2	1	\$183	\$18,512
		Connection Alameda St. and Butte St. Track					
		Total	\$18,329			\$183	\$18,512
CD	14	Team Yards: Team Yard nt S. P. Freight Station Site					
S	16	Release Southern Pacific Station Site.	\$1,719,918				\$1,719,918
V	17	Release Southern Pacific Coach Yard Site	\$1,651,262				\$1,651,262
ELECTRIC ROAD							
CK	20	New Line—P. E. Station to Brooklyn Ave. and to Fourteenth St.:					
CM		Abandon Pacific Electric in Los Angeles St., etc.	\$86,969	24	12	\$10,436	\$97,405
DR		Subway and Elevated—P. E. Station to Brooklyn Ave.	442,229	18	9	39,801	482,030
		Elevated—Pacific Electric Station to Fourteenth St.					
		Total	\$529,198			\$50,237	\$579,435
		Grand Total	\$467,559			\$810,819	\$1,078,378

*Credit.

**TABLE SHOWING
SUMMARY OF LANDS REQUIRED FOR PLAZA PLAN
ULTIMATE PLAN**

Est. Sec Key	Group	Item	Estimated Cost	Const'n Period (Months)	Interest		Total Estimated Cost
					Rate %	Amount	
STEAM RAILROADS							
	1	Union Passenger Terminal and Appurtenances:					
CB		Depression of S. P. Tracks in Alhambra Ave.	\$84,539	6	2	\$2,536	\$87,075
CC		New Viaduct on North Main St.		24	12	23,401	218,411
CE		New Viaduct on Macy St.	195,010	36	18	530,966	3,480,778
CF		New Passenger Station at the Plaza	2,949,812				
CG		Sub-tunnel for Street Cars in Broadway Tunnel					
		Total	\$3,229,361			\$556,903	\$3,786,264
CA	2	Coach Yard	\$19,135	18	9	\$1,722	\$20,857
CJ	4	Union Freight Station					
	5	Viaducts over Los Angeles River:					
F		Baker St. Approach to North Broadway Bridge					
G		Removal of North Spring St. Bridge					
H		New Viaduct at Main St.	\$15,742	18	9	\$1,417	\$17,159
M		New Viaduct at Macy St.	5,210	18	9	469	5,679
R		New Viaduct at Fourth St.	42,262	20	10	4,226	46,488
Q		New Viaduct at First St.					
T		New Viaduct at Aliso St.					
U		New Viaduct at Seventh St.					
CN		New Viaduct at Ninth St.					
		Total	\$63,214			\$6,112	\$69,326
	6	Depression of and Additional Tracks Along River:					
D		Connections at East End of Humboldt St. Bridge	\$11,250	2	1	\$113	\$11,363
E		Connections at West End of Humboldt St. Bridge					
I		Depression of Alhambra Ave. East of and at River					
K		Depression and Double-tracking S. L. Tracks Along River	26,256	24	12	3,151	29,407
N		Removal of Santa Fe Crossings—Macy and Aliso Sts.					
W		Depression of Santa Fe Track South of Ninth St.					
CH		Depression of Santa Fe Track—Broadway to Aliso	92,646	12	6	5,559	98,205
CL		Depression of Santa Fe Track—Seventh to Ninth St.					
		Total	\$130,152			\$8,823	\$138,975
	7	New Trackage—East Bank—Humboldt St. to Dayton:					
B		New Approach—Los Feliz Road Bridge					
C		New Tracks—Humboldt St. to Dayton St.—East Bank	29,228	14	7	\$2,046	\$31,274
J		New Connection—S. P. and S. L. at Alhambra and River	18,374	4	2	367	18,741
		Total	\$47,602			\$2,413	\$50,015
	8	Butte St. Trackage and Santa Fe Ave. Subway:					
X		Tracks—Butte St.—Alameda St. to River	\$3,506	12	6	\$210	\$3,716
Y		New Connections—Alameda St. to Butte St.	18,329	3	1.5	275	18,604
AA		Santa Fe Subway					
		Total	\$21,835			\$485	\$22,320
	9	New Trackage—River to Hobart and Connections:					
Z		New Bridge and Wye East of River	\$47,505	8	4	\$1,900	\$49,405
AC		Second Track North of Present Santa Fe Main Line					
AD		Connection at Hobart between Santa Fe and S. L.	6,186	4	2	124	6,310
		Total	\$53,691			\$2,024	\$55,715
	10	New Freight Yards—Southern Pacific and Santa Fe:					
A		New S. P. Yard—San Fernando Rd					
O		New Santa Fe Yard—East of Hobart					
	11	New Freight Terminal—Salt Lake					
P		New Connections—Relief Alameda St. Switching					
	13	Team Yard:					
AO		New Yard—S. L. Terminal—Alameda and Hunter Sts.	*91,481				*91,481
AT		New Yard—L. A. Market Property					
CD		New Yard—S. P. Freight Station Site					
		Total	*91,481				*91,481
S	15	Release S. P. Station Site	11,719,918				11,719,919
V	16	Release S. P. Coach Yard Site	11,651,262				11,651,262
ELECTRIC RAILROAD							
	19	New Line—P. E. Station to Brooklyn Ave. and to Fourteenth St.:					
CK		Removal and Reconstruction of P. E.—Los Angeles St. and First St.					
CM		Double Track Subway in Main St.	\$86,969	24	12	\$10,436	\$97,405
DR		Double Track Elevated for P. E.	442,229	18	9	39,801	482,030
		Total	\$529,198			\$50,237	\$579,435
	20	New Surface Line to Proposed Union Station					
	21	Freight Tracks:					
L		Macy St. and River to Ehandia Yard	\$30,044	8	4	\$1,202	\$31,246
AB		Raise Transfer Tracks—Santa Fe Ave. and Butte St.					
		Total	\$30,044			\$1,202	\$31,246
		Grand Total	\$661,571			\$629,921	\$1,291,492

* Credit,

EFFECT OF RECOMMENDATIONS UPON DEVELOPMENT AND LAND VALUES

The adoption of the recommendations set forth in this report will have a great and far-reaching beneficial effect on the development of the city, with a simultaneous benefit applying to real estate values.

The chief benefits following the adoption of these recommendations, which will be reflected directly in improved real estate conditions, are cited below:

Immediate Benefits

1. Great increase in the values of realty fronting upon the proposed station site and in its immediate vicinity.
2. Increase in the value of properties upon Los Angeles Street from Commercial Street to Third Street.
3. Material increase in values upon San Pedro Street between Commercial and Third Street.
4. Immediate acceleration in the desirability of industrial property north of First Street.
5. Immediate increase in the desirability of business property upon Main, Spring and Broadway, between Temple Street and Third Street.

Ultimate Benefits

1. Recuperation and stabilization of values now rapidly deteriorating in the business district north of Fifth Street on Main, Spring, Broadway and Hill Streets.
2. Increase in values upon Los Angeles and San Pedro Streets (especially Los Angeles Street) due to improvement and change in character of business conducted upon them.
3. Main Street Subway—Will eliminate congestion of traffic through removal of Pacific Electric trains which will reclaim, to a large extent, former business values upon Main Street north of Sixth Street.
4. Material improvement in the convenience and desirability of the industrial district east of Alameda Street and north of Ninth Street, with resulting increase in values.
5. Increase in values of both the industrial and residential property lying east of the River, due to more convenient and quicker access.
6. Improvement of commutation conditions, both train and vehicular, between Los Angeles and outlying cities, with equivalent increase in the desirability of these districts for homes.
7. Increased safety of vehicular traffic between Los Angeles and Pasadena and material saving of time, reflected in increased values.
8. Inestimable benefit resulting from increased safety and elimination of delay to traffic of all classes while traversing industrial district.

CHAPTER XIX

OUTLINE

Franchise and Legal Matters

Financial Matters

 Financing of Expenditures Directly Connected with a Union Terminal
 Financial Plans of New York and Chicago

Tentative Plan for Division of First Cost

Tentative Plan for Division of Operating and Maintenance Cost

Pacific Electric Railway and Rapid Transit

CHAPTER XIX

FRANCHISE, LEGAL AND FINANCIAL MATTERS

FRANCHISE AND LEGAL MATTERS

Although this report is primarily of an engineering nature, it seems necessary to call attention to a few of the legal points that have been encountered in the course of the work, since the determination of legal matters must necessarily precede construction.

In Chapter IV, several points relating to subways and elevated lines have already been enumerated.

The main line franchises of the Southern Pacific Company dealing principally with Alameda Street and Alhambra Avenue are in our possession and have been considered. One reason why, in our opinion, it will be difficult to remove Southern Pacific tracks from Alameda Street without the railroad's consent is found in what appears to be a perpetual franchise (see franchise passed by Los Angeles Common Council on September 5, 1872). We quote from this franchise:

"Sec. I. That the right of way for the railroad track of the Southern Pacific Railroad Company in and out of the City of Los Angeles, for the distance said Company may wish to use same, be, and the same is hereby granted to said Company, its successor and assigns, over and upon the street and its extension, commonly called Alameda Street. . . ."

This franchise apparently does not contain any reversion or time clause whatever. The franchise situation has not, however, been with us one of the controlling factors for our recommendations that tracks be permitted to remain on Alameda Street. We believe that these tracks are necessary for the proper service to the Los Angeles industries.

On July 24, 1873, the Common Council of Los Angeles granted the Southern Pacific Company another franchise dealing not only with Alameda Street but also with certain other streets. We quote in full:

"An ordinance providing a free right of way for the Southern Pacific Railroad through the City of Los Angeles.

"WHEREAS, by a certain ordinance, passed October 24, 1872, the Mayor and Common Council of the City of Los Angeles obligated said city to give the Southern Pacific Railroad Company a free right of way for its road through said city, and said obligation having received the endorsement of a majority of the qualified voters of said city under the provisions of said above-mentioned ordinance; and,

"WHEREAS, The proper agents of said railroad company have selected as the lines for entering and leaving said city, and the necessary connections therewith, the grounds occupied by and embraced in the recently opened streets, named, respectively, San Fernando and Mission Streets, and a portion of Alameda Street, as recently enlarged, now, therefore:

"The Mayor and Common Council of the City of Los Angeles do ordain as follows:

"Section 1.—That all of San Fernando and Mission Streets, from their initial to their terminal points, together with that portion of Alameda Street between the present depot of the Los Angeles and San Pedro Railroad Company; subject to the provisos, resolutions and conditions hereinafter contained, be and the same is hereby set apart from the public highways of the City of Los Angeles to the unreserved and unrestricted use of the Southern Pacific Railroad Company, and the right of way over and along the same, subject as aforesaid, is hereby granted to said company for the building, maintaining and operating of its railroad thereupon by and through the track or tracks which said company shall deem it necessary to build along and over the same, and with the privilege to said company of making such embankments and excavations upon said streets as shall be found necessary by company's engineers to the proper construction of said railroad and its connections within the said city.

"PROVIDED, that the use of said Alameda Street, as hereinbefore provided for shall not at any time nor in any manner interfere with, nor preclude the city or the public from the right to use and enjoy as a public street of said City that portion of said street not actually occupied by the tracks of said company; and provided that neither the construction nor operation of said railroad over or upon the streets herein granted shall at any time interfere with any of the present and existing zanjas, water courses or ditches, nor preclude said city from any time making or constructing in, upon or along said streets crossings for new streets or for the extension of old ones; from making or constructing sewers, zanjas, water ditches and acequias or from laying down water pipes and gas pipes therein, or in either of them. Such crossings, constructions and improvements not to interfere with the grade and the efficiency of said road or its operation; and provided further, that whenever said company shall build its road across any road, street, water witch or zanja now open and in use, good and proper crossings shall then be built and maintained by said company, and all waterways shall be left in as good condition to pass water through the same as before such crossing of said railroad was made; and provided further, that if said railroad company shall fail or neglect to construct its road over and along said streets, or if when constructed said railroad company should at any time abandon or relinquish that portion of said road so constructed along said streets, then the rights hereby granted shall cease, determine and be void, and the lands embraced in and occupied by said streets shall revert to and again become vested in said City in the same manner and estate as if this ordinance had never been passed.

"Section 2. This Ordinance shall take effect and be in force from and after its passage, approval and publication.

"Passed—Session July 24, 1873.

"Approved:—July 26, 1873.

J. R. Toberman, Mayor."

This franchise makes a distinction between Alameda Street and other streets mentioned in the franchise, namely, San Fernando (now North Spring) and Mission (now Alhambra). It appears that the railroad's rights on Alameda Street are restricted and that the City expressly retains the right "to use and enjoy as a public street of said city that portion of said

street not actually occupied by the tracks of said company." No such restriction on San Fernando Street (now North Spring) or Mission Street (now Alhambra) were provided.

None of our recommendations, we believe, interfere with the Company's rights on either North Spring Street or Alhambra Avenue.

Another question of considerable importance to the Southern Pacific is the legal status of the so-called Wolkskill land now forming part of the Southern Pacific Arcade station site. One provision of this deed was to the effect that if the railroad company did not maintain a passenger station and a restaurant on the property deeded, then this property would revert to the grantor. Whether or not this clause, if we have correctly interpreted it, is of force when change in the location of railroad facilities is made by Government authorities rather than by the choice of the railroad company, is a legal question which will have to be considered.

FINANCIAL MATTERS

This report would be incomplete if it did not include a general discussion of a financial program to accompany the plans which we have presented. Such a program should take into account not only the financing of the actual construction, but also the operation of the properties as planned. In fact, after a set of definite recommendations has been adopted, the financial program must be worked out immediately.

We realize that the financial program must be a special and detailed study and consider it within our province only to point out various possibilities based on experience elsewhere and certain special features connected with the Los Angeles problem.

Detailed study of the financial program should not be undertaken until a rather definite set of plans dealing with all three branches of our investigation (the grade crossing elimination, the union passenger terminal and the freight situation) have been decided on.

It is eminently desirable to secure the interest and co-operation of the railroads in carrying out a plan. In our recommendations it has been our endeavor to make them practical. The fullest use has been made of existing railway properties in order to reduce the amount of new capital necessary, although this need not necessarily be the ruling consideration in determining which plan is best. From the standpoint of the roads, not only the first cost must be considered, but the general efficiency under operation. From the standpoint of the public, not only the general effect on values but the general convenience and the saving of time must be taken into account. The charge has been brought against the railroads, in the past, that the civic viewpoint has been too often neglected, and this is easily understood when it is remembered that the people who control and own the roads do not always have an adequate conception of local needs.

Referring to the financing of the union passenger terminal, and possibly to the union freight station, also, and excluding from consideration all expenditures clearly to be borne by individual roads or by the public, we find several methods for financing such a terminal:

(1) Financing by the **individual railroads with the formation of a union terminal company** and with the participation by the City or other public bodies. The independent terminal company may either be an altogether private corporation financed independently and in the open money market, or may be a "close corporation" and be participated in mainly by the interested carriers. This company would issue its own securities, guaranteed, if the second alternative were chosen, by the railroads. After the construction of the terminal, the income would be secured from the lease of its facilities to individual roads and other users of the property (express, mail, advertising, offices, stores and restaurants). This method is superior to the first but is not, in our opinion, the best for the Los Angeles situation for the reason that more complete co-operation on the part of the public is desirable.

(2) The financing could be by the **individual railroads without the formation of a union terminal company** and without participation by the City or other public bodies. This method, in our opinion, would not be the best in Los Angeles for a number of reasons. The most important objection to this plan lies in the fact that the cost would be higher than under any other scheme. Under such a method it would not be likely that the project would receive the co-operation of the public and the benefit of public lands and other grants as might be secured under a better plan.

(3) The financing could be by a **union terminal company with a participation** by not only the railroads but also by such **public bodies** as may benefit by the consummation of the project (the City of Los Angeles and possibly the County of Los Angeles). This would necessitate either the creation of a bond issue by the City or arrangements for the purchase of the bonds of the Terminal Company in the proper amount by the City. In addition to the participation in the project of the City as a whole, there might be a participation by an assessment district including such territory as will particularly benefit by appreciation of realty values and by other causes.

This method of financing the terminal project appears to us the best. The capitalization of such a terminal company with participation of the railroad, the City, a special terminal district, and possibly private individuals, should be equal to the total cost and value of the property devoted to terminal use. In other words, credit should be given in the form of securities or otherwise to the lands and other property contributed for joint use by the present individual owners on the basis of an agreed and fair valuation. All, or a portion of the new money to be raised should be con-

tributed in proportion to the uses made of the terminal by the individual carriers and by other users, and, in the case of the City or other public bodies, in proportion to the interest in the project. Under such a plan there should be a joint guarantee of the investment by the railroads and by the City. There would consequently be available for financing the combined credit of the carriers and of the public. The result will be the possibility of a very economic financing by a large proportion of bonds and a small proportion of stock. To the extent that the issuance of stock is associated with the idea of speculation, it would seem desirable to eliminate as far as possible all speculative features and to consider the project from a high grade investment standpoint rather than from a speculative standpoint.

We proceed on the assumption that the railroads will return to private control and that Government ownership is not a possibility of the immediate future. As long as Government control continues as at present, of course, it is clear that the railroad corporations can make no engagements for the assumption of capital expenditures, or, to a much greater degree, for future operating expenditures, without the approval of the United States Railroad Administration. It is true that the railroad corporations are free to finance such capital improvements as may seem to them desirable, but the practical effect of the situation is that no important financing of any nature will be undertaken until operating control again reverts to the railroads.

Financing of Expenditures Directly Connected with a Union Terminal

By whatever method the union terminal project is to be financed, it will be necessary to distinguish between expenditures for the terminal and expenditures for work not a part of the union terminal such as grade separations, bridges across the Los Angeles River, subway and tunnel construction, expenditures for the modification of street railway systems, etc.

To the extent that such expenditures should be borne jointly by the carriers and by the public, it will be necessary to segregate the money to be furnished by the roads from the money to be furnished by the City of Los Angeles, by the County, by the State and, perhaps, by other public bodies.

In the following chapter (Chapter XX) there are given detailed estimates of the amounts of new money required for the various plans. Considering only the estimates for our final recommendations, there is required for the immediate plan \$15,666,102 and for the ultimate plan \$25,396,633.

The ultimate plan is for a construction program of from twenty to thirty years. The immediate plan is intended to take care not only of essential construction consistent with our effort to include sufficient improvement in our estimates to secure the relief desired by the City and necessary to the railroads, but to fix the ultimate development definitely along the lines of our recommendations. It is possible, of course, to increase the program for the immediate future, and in view of the general conditions obtaining in the country today and in line with the general policy urged by the Federal and State governments in regard to all public works, it may be

desirable to shorten considerably the period for the ultimate program. To make a great portion of the recommended improvements in the near future would not only give greater employment to labor but would also secure greater benefits in a shorter time to the City and all interested parties.

It may be useful to consider the financial plans in similar cases elsewhere:

Financial Plans of New York and Chicago

The transportation of New York is being financed by co-operation between the railroads and the city. Half of the money is being furnished by the city by a bond issue, upon which the railroads pay interest and sinking fund charges.

In Chicago an entirely different state of affairs existed in 1907, at the time of the expiration of the cable railway franchises. Although the city had, by the ballot, declared itself in favor of "immediate municipal ownership," it found itself without the funds to rebuild new lines. The money could not be raised by bond issue without exceeding the charter limit. The old cable line had been obsolete for many years and it was necessary to install electric lines and in this dilemma, the city evolved what has since been known as the "Chicago Plan." The city granted the company an indeterminate franchise under a profit sharing agreement. After paying operating expenses, the city and company were each allowed 5 per cent of the gross earnings and the surplus was divided, 60 per cent to the company and 40 per cent to the city. The city reserved the right to acquire the property at such a time as the purchase could be financed. The resettlement plan included a definite price based upon the condition in 1907, with provision for additions and betterments subsequently. The effect of unification was obtained by a Traction Board in which the city was represented and the 60 per cent the company was allowed under the terms furnished the competitive element or the incentive. The city participates as a silent partner and is relieved of the direct responsibilities of operation.

Tentative Plan for Division of First Cost

For the highway bridges across the Los Angeles River, the railroads should pay the difference between the cost of elevated viaducts, as planned, and the cost of installing similar bridges at grade. By this arrangement the roads would pay for all track depression, the approaches and that part of the main span due to increased height.

Street railways using the highway bridges should pay the difference between the cost of simple highway bridges and the cost of bridges as designed, with extra width and loading due to use by these lines. The lines should pay whatever proportion of the street paving it is customary for them to pay under the provisions of their franchises.

The state and county should pay their proper portion of the cost of all bridges on the state and county highway systems.

For the union passenger terminal, the natural lines of divisions of cost

are less marked than in the case of grade separation. With the station located at the Plaza, there will be a large enhancement in realty and business values. It would be but fair to expect that those chiefly benefited would be willing to form an assessment district to share a portion of the first cost of the station building and new land required. An acceptable station, we estimate, can be built for \$1,000,000 (contract cost). It is suggested that the City might increase this sum in case a more elaborate building is desired, and might furnish the Plaza in front of the station as was done in Washington, D. C. As the Federal Building also will face this Plaza, it may be possible to secure a government appropriation to cover a portion of the cost. The remainder of the terminal cost, except express facilities, should be borne by the railroads. The mail facilities can be leased to the Federal Government.

A union less than carload station and other facilities should be furnished by the railroads.

Tentative Plan for Division of Operating and Maintenance Cost

The bridges and viaducts should be maintained by the city, except that the railroads should protect and maintain all steel work over their tracks. The state and county should maintain the paving on the bridges which are part of the state and county highway systems. The union passenger station should be operated by a terminal company as suggested above.

The union coach yard should be under the jurisdiction and operating control of the operating union terminal company.

Leasing charges and rentals should be proportional to use and sufficient only to cover operating expenses, sinking fund requirements and fixed charges.

The union less than carload freight station may or may not be included in the property and the operations of the union terminal company. It is desirable, however, to have this facility under the exclusive operating control of the railroads. Cost of maintenance should be proportional to the tonnage handled.

Repair shops and mechanical facilities should be pooled for such work as can be done jointly to the best advantage.

Pacific Electric Railway and Rapid Transit

We recommend a subway in Main Street from Seventh to Sunset Boulevard. This subway can be built by the City and leased to the operating company as is done in New York. In this case the City would receive a rental and would in addition have the use of this subway for conduits, pipes, etc. The very costly and constant tearing up of main business thoroughfares as it is now going on would be avoided and the City would be provided with a facility in which to place future water pipes or electric conduits for municipal power.

As pointed out heretofore, Charter amendments may be necessary to enable the City to enter into such arrangements.

CHAPTER XX

OUTLINE

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With Union Passenger Station at Plaza Site

With Union Passenger Station at Santa Fe Station Site

CHAPTER XX

ESTIMATES

SOURCES OF DATA

It goes without saying that a very large amount of data was required for the purposes of this report. A considerable portion of the time and expense of the entire investigation is chargeable to the accumulation, verification and assembly of the necessary underlying information. Without the co-operation of the carriers, and of the city authorities, we should have been unable to complete the report in the time consumed and much valuable data could not have been obtained at all.

Information regarding carriers' statistics and physical characteristics was requested from the railroads. Much of this information was a matter of record; some was furnished at a minimum expenditure of time and some required a month or more to analyze and record. Other information was not a matter of record and required surveys, or such work as counting passengers; certain information was submitted as confidential, particularly costs of lands, or passengers carried to and from certain points, and we have agreed to regard such data as executive. Generally, all railroad data was satisfactory and only in a few cases was it necessary to make corrections.

We wish to say that our requests were cheerfully met, in an evident spirit of co-operation, and the data furnished as rapidly as was possible under existing conditions. These conditions, arising from the lack of clerical and other help, caused by the war and the federal control of railroads, were fully realized by us and we have been careful to request only such data as was deemed essential, and not to press the carriers in the matter of time.

In addition to information received from the carriers, the City of Los Angeles, through its City Engineer and the Chief Engineer of the Board of Public Utilities, the Board of Education and the Registrar, furnished us with considerable data, always most courteously and promptly. The County of Los Angeles, particularly through the Assessor's office, has also furnished a large amount of data, and here, too, we have received the earnest co-operation of the officials with whom we took up our questions.

General information has been supplied by certain quasi-public bodies, notably the Chamber of Commerce.

MAPS AND PROFILES

Our first task, almost, was to construct a "base map" to be used as a basis for future studies. The City of Los Angeles Exhibit No. 3- "Railroad and Industrial Map of the City of Los Angeles," Drawing No. 515, Scale 1 inch to 200 feet, was found to be, after some investigation, best suited for this purpose. After tracing this map, it was found in some cases the street

names did not agree with those on the ground, that certain streets were shown which appeared to be vacated, and that there were several other questions which required some verification for our purposes. This is in no manner a reflection on this Exhibit, but is simply drawing attention to the fact that the map only purported to be correct up to September 11, 1917, and that certain changes had taken place in the interim. Furthermore, the original map was made for a purpose different from ours and had to be adapted to our needs. Accordingly, we obtained from the City of Los Angeles prints of the so-called "District Map" which is on a larger scale, and which is, as we understand, kept up to date as far as street names, new streets, and vacated streets are concerned, and endeavored to have our "Base Map" agree with this "District Map." As we decided to make our tracing somewhat larger than the Board of Public Utilities' map, Mr. F. D. Howell, the Chief Engineer of the Board, kindly consented to plot for us the land and street names in part of the district, which were outside of the boundary of the map prepared by the Board.

It also developed that there were a few minor discrepancies between the spur tracks, as shown on the City's Exhibit, and as they actually existed upon the ground, some of which were due to the construction or rearrangement of these spur tracks subsequent to the date of the City of Los Angeles Exhibit No. 3. These have been corrected, as far as was possible, within the limits covered by our "Base Map." This map is on file with the Commission and is the original from which the photo-reproductions appearing in this report were prepared. The original is too large to be made a part of any report, being about 18 feet long.

As the lands owned by the carriers appeared to be of primary importance, we early attempted to secure the limits of such lands, whether owned, leased, or owned and leased to others. This information was obtained by sending a copy of City of Los Angeles Exhibit No. 3 to the Southern Pacific Company, the Atchison, Topeka and Santa Fe Railway Company-Coast Lines, Los Angeles and Salt Lake Railway Company, and the Los Angeles Railway Corporation, with the request that they show this information for their properties in color. After having received these maps, the ownership of the lands involved was verified at the County Assessor's office and all discrepancies ironed out and the necessary corrections made. This map is the basis of the small maps in this report showing carrier lands.

In connection with the elimination of grade crossings adjacent to the Los Angeles River it was necessary to secure profiles of the river and of the adjacent tracks of the Santa Fe and Salt Lake Railways and of the various streets crossing the river. The City of Los Angeles Exhibit No. 1 appeared to present part of the information desired, but since the Chief Engineer of the Board of Public Utilities verbally advised that the profile was made up from such information as was at hand, and since the report of Messrs. Ham-

lin, Howell and Storrow (which was attached to the Application in Case 970 and marked Exhibit "A") also states that this profile was made up from information available at the time, it was thought advisable to verify the grade lines of the two carriers whose tracks are adjacent to the railroad. The Salt Lake advised that the grade of its track was correct. The Santa Fe, however, submitted a profile of its track which differs slightly from map shown by City of Los Angeles Exhibit No. 2.

The Southern Pacific and Salt Lake, in response to our request, made surveys to determine the profiles of the various streets crossing the river, and these have been used as a basis for the studies of possible viaducts across the river and for the street grades of the approaches.

For a study of the excavation required for the depression of the Santa Fe and Salt Lake tracks along the Los Angeles River, we used cross-sections which were obtained from these two roads. The Salt Lake had, we found, rather recently taken cross-sections of its roadbed at 200 feet intervals, which were available. The Santa Fe found it necessary to cross-section its roadbed, which was also done at 200 feet intervals, and prepare a profile. These cross-sections are of special value because, among other information, they present a profile of the bed of the river right up to date. This is in general below the grade of previous records, showing the constant lowering of the river bottom, except south of Ninth Street, where there was evidently a raise between 1914 and 1918.

With these changes, City of Los Angeles Exhibit No. 1 was made a basis for the study of the elimination of grade crossings adjacent to the river, the present elevation of tracks and river bed being shown on the four profiles found in Chapter VI. On all drawings elevations have been referred, as far as possible, to the official city datum plane, the surveys made by the carriers having been made with this datum as a basis.

There are, of course, very many other maps, profiles, etc., which have been used in this work, but those mentioned are the most important.

OCCUPANCY SURVEY

With a view of ascertaining the occupancy in the industrial district an "occupancy survey" was made. This survey was made to show the:

1. Location of all buildings.
2. Kind of building (whether frame, brick, concrete, etc.), and number of stories.
3. Location of vacant land.
4. Nature of business carried on in each structure.

This data has been mapped and now, at a glance, it is possible to form a reasonably accurate opinion as to whether a street or spur track can be located or a change of grade made without excessive damage to improvements.

Near the proposed sites of union passenger terminals, and in the vicinity of approaches to possible bridges across the Los Angeles River, this data was supplemented by an appraisal of the buildings, this appraisal of buildings being made to obtain two elements of value:

1. Cost—an estimate of original cost,
2. Present value—an estimate of present "sound value."

The appraisal was made by a man of long experience in Los Angeles and, in the cost estimates, it was attempted to use unit costs which approximate those prevalent in the period in which the structure was evidently constructed.

For present value, an estimate of depreciation and "sound value" was made, this latter figure being the amount which an owner could reasonably expect to obtain from an insurance company if his building were to burn down, provided sufficient insurance be in force.

As a check against our valuation the figures developed in 1915 by the Los Angeles City and County Bureau of Appraisal were obtained. As a matter of fact, the latter figures were first obtained and an attempt made to verify them, but considerable discrepancy was found in various buildings and our appraisal was then started. On the whole, the figures from the two sources agree very closely for a large area, but vary widely in individual buildings.

CONTENTS OF ESTIMATES

What the Estimates Include

We are at first concerned with the cost of the proposed facilities, regardless of how the cost should be divided between the interested parties. That matter must be equitably adjusted after a decision is reached as to what is to be done and at what time. With this in view, it must be apparent that the estimates should cover the new money to be raised, rather than the value of existing facilities. Although one road may compensate another for rights acquired (because of proposed joint use of facilities), no new money—money not previously invested in transportation facilities—is required as far as the use of existing railroad property is concerned. On the other hand, private property to be acquired, or new construction, or reconstruction and rearrangement clearly require new money. The estimates cover only the new money required.

It might be here noted that inasmuch as different use is made of several of the larger carrier tracts, there are a number of carrier buildings which would be destroyed. Manifestly these buildings are of value to the carrier and it is only fair that the carrier should be paid the present value of the building, either directly, or by crediting the proper amount against its proportion of the cost of the entire construction. To do otherwise would,

in our opinion, be confiscation without just compensation. We have, therefore, included in our estimates "compensation for facilities displaced" to cover such cases and also include the estimated cost of moving, to some other location, the contents of the buildings, such as machinery, records, furniture, etc. If the facility displaced is not to be destroyed, as a track scale, the estimates include moving the scale and setting it up on a new foundation.

In general, the salvage value of buildings, either privately or carrier owned, is considered equal to the cost of removal, and neither item of cost appears in the estimates.

The cost of the establishment of the various facilities herein considered and set forth are made up of many items, which fall into the following general classes:

1. **Physical Construction.**—This item covers construction of new facilities, or, as in the case of rearrangement of tracks, the estimated cost of making the change, including credits for material left over, if any, and moving carrier facilities from one location to another.
2. **Overhead Expenditures.**—This item, as explained later, covers the cost of engineering, administration and interest during construction, and is added as a percentage to Class 1, above.
3. **Compensation for Facilities Displaced.**—This item covers the payment to be made to the owner of property which would otherwise be confiscated without compensation. Included is the estimated value of existing buildings on private property to be acquired for transportation purposes, or buildings on carrier property which would be destroyed in the course of the proposed changes, alterations on private buildings where it is not necessary to destroy them, and moving of carrier equipment in these buildings. Equipment in private buildings is not included, as the estimate of land cost purports to be sufficient to pass the fee. "Overhead Expenditures," except interest during construction, are not applied to items in this class.
4. **Lands.**—This item covers not only the estimated market value of non-carrier lands which it is proposed to acquire, but the estimated cost of acquisition through condemnation and interest during construction on the total cost. No other overhead expenditures are applied to this item. Credits for lands released from transportation use are deducted. (The land and real estate studies form an important part of this report and are separately discussed in Chapter XVIII.)
5. **Damages.**—This item is found only in the estimates for viaducts and covers the estimated damages to real property occasioned by the change in grade of the street. No overhead expenditures are applied to this item, nor is interest estimated thereon.

Unit Costs in Estimates

Construction costs were first estimated with unit prices approximately as of 1916. During the time this report was in course of preparation, the labor and material markets were in a most chaotic condition. This was due to the war and, with conditions so unsettled, and changing from day to day,

it was thought advisable to use 1916 prices and, if necessary, bring them up to any date by the addition of a percentage applicable to a later date. Since the close of the war, unit prices have been revised and the present estimates show figures of costs of what, in our opinion, may reasonably be expected during the next five years.

Take rails, for example: For about sixteen years the price was \$28.00 (per gross ton) f. o. b. eastern points, with about \$11.00 freight, or \$39.00 f. o. b. Pacific Coast. During practically all of 1918 the price was \$55.00 east with about \$26.00 freight, or \$81.00 Pacific Coast, this being a government price and freight rate. We have assumed a price of \$60.00 Pacific Coast, based on the assumption that there will be some reduction, but that the price will not reach the old low level. Other track material prices have been treated in a similar manner. It should be stated that the price of \$55.00 was simply the settling price between the Railroad Administration and the mills, and while not good evidence of a market price, it is the only indication available as practically no rails were rolled since the first of 1917.

This does not apply to lands. Estimates of costs of lands to be acquired are intended to represent, as nearly as may be, our opinion of this cost if the lands are acquired during the next few years. This matter has been fully discussed in Chapter XVIII.

Schedules of unit costs used in our estimates are available in the Commission's office. As arranged, these apply principally to standard railroad construction, no effort being made to set forth the many various unit costs for building estimates, etc., because of the large number of items involved. We have used as a basis for track estimates a composite track practically equal to that of either of the three steam roads entering Los Angeles. This avoids three different sets of figures and makes no material difference in the end. Four different classes of tee rail track are assumed; main line, passenger station yard, freight yard and industry, decreasing in cost in the order given.

Overhead Expenditures

This term includes expenditures ordinarily charged to the following accounts (Interstate Commerce Commission Classification of Expenditures), but which, due to the method of estimate, are provided for by the addition of a percentage to the estimate of physical construction:

- Account No. 1—Engineering,
- “ “ 71—Organization expenses,
- “ “ 72—General officers and clerks,
- “ “ 73—Law,
- “ “ 74—Stationery and printing,
- “ “ 75—Taxes,
- “ “ 76—Interest during construction,
- “ “ 77—Other expenditures—General.

The percentages applied to cover the above expenditures are not applied to land, to credits for materials, nor to amounts estimated as compensation to the owners for buildings to be abandoned, except Account 76, interest as applied to expenditures for land.

Engineering is estimated at 4½ per cent of the total for construction.

Accounts 71 to 75 (inclusive), and 77, are grouped together and estimated at 1½ per cent of the total for physical construction.

Account 76—Interest During Construction—is based upon a rate of 6 per cent per annum. For physical construction it is applied on the theory that half the total of the estimate is the average amount upon which interest during construction should be paid, using the full period of construction. The period of construction is estimated separately for each section, as shown in the following tabulation:

ESTIMATED CONSTRUCTION PERIODS OF CONSTRUCTION UNITS

Estimate Section Key	Construction Period Months	Estimate Section Key	Construction Period Months	Estimate Section Key	Construction Period Months
A	24	V	4	CE	24
B	6	W	10	CF	36
C	14	X	12	CG	24
D	2	Y	3	CH	12
E	2	Z	8	CJ	30
F	6	AA	10	CK	6
G	..	AB	4	CL	6
H	18	AC	4	CM	24
I	6	AD	4	CN	18
J	4	AG	4	DB	6
K	24	AK	12	DH	12
L	8	AL	12	DJ	30
M	18	AM	18	DK	6
N	1	AN	18	DL	8
O	24	AO	6	DM	18
P	1	AS	8	DN	18
Q	18	AT	8	DO	14
R	20	CA	18	DP	18
S	8	CB	6	DQ	4
T	18	CC	16	DR	18
U	18	CD	8	DV	10

For land, the rate of interest is applied on the entire construction period and to the total estimated cost of acquiring the land, on the theory that land must be purchased before construction begins and interest will accrue until operation commences. This will probably not be strictly the case in all instances and a slight reduction in this item may be expected.

Contingencies

Ten per cent is added to estimates of physical construction to cover unforeseen expenditures, small items not separately estimated, changes in plan

and contingencies in the prices of materials and the cost of labor. This is applied to the same totals used for the calculation of overhead expenditures, including the allowance for contingencies.

Construction Estimate Summaries

In order to take into consideration all of the various influences of the interdependent matters of grade crossing elimination, union passenger station and freight handling, we have made estimates which are called the Plaza Plan (Plan C), the Southern Pacific-Salt Lake Plan (Plan A), and the Santa Fe Plan (Plan D), and which cover not only the union passenger terminal, but the proposed grade separations and improvements in the handling of freight which accompany the location of the passenger station on the three different sites.

The summaries are made by combining estimates for a number of various sections. Some of these sections are common to the three plans, some to two and others to one plan only. Where the ultimate plan (and this happens in a few estimates) must remain somewhat indefinite as to the ultimate number of tracks, we have, in such sections, estimated on the immediate improvements only. We should here say, however, that in these sections the difference is of small consequence. All estimates include all the land necessary for the ultimate plan.

In general, a single-letter section applies to all three plans; the first letter of two-letter section indicates the plan to which the section is peculiar, but there are several exceptions to this system of nomenclature.

In order to present clearly the location and limits of the estimate sections, we are including 3 maps (Figs. 198, 199 and 200) upon which this information is shown. These show graphically the relation of the different sections to the plan and to one another.

KEY TO UNIT ESTIMATES

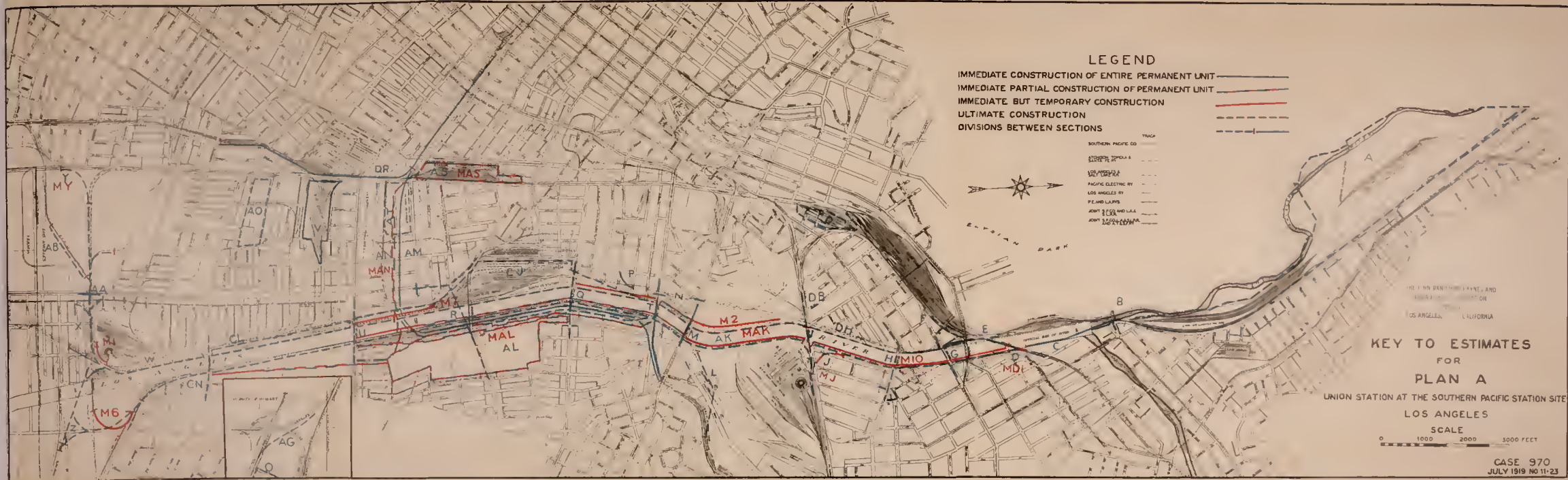
"A" Plan—Union passenger station at Southern Pacific site.

"C" Plan—Union passenger station at the Plaza.

"D" Plan—Union passenger station at Santa Fe site.

The following list indicates the sections comprising the various items entering each or all of the plans. The estimate for each section is complete in itself and includes lands, buildings, reconstruction of tracks and streets, etc., and the so-called overhead percentages, such as cost of acquisition of land and engineering, legal and general expenses incidental to construction. In all cases the existing facilities have been used as far as possible and all abandoned material possible to salvage has been credited. The estimates cover "new money" only, except where otherwise noted. The grand total of any one plan is obtained by adding the totals of various sections in that plan, as noted later.





LEGEND

- IMMEDIATE CONSTRUCTION OF ENTIRE PERMANENT UNIT
- IMMEDIATE PARTIAL CONSTRUCTION OF PERMANENT UNIT
- IMMEDIATE BUT TEMPORARY CONSTRUCTION
- ULTIMATE CONSTRUCTION
- DIVISIONS BETWEEN SECTIONS

- SOUTHERN PACIFIC CO. TRACK
- SOUTHERN PACIFIC CO. TRACK
- PACIFIC ELECTRIC RY. LOS ANGELES DIV.
- PACIFIC ELECTRIC RY. LOS ANGELES DIV.
- JOINT S.P. & P.E. TRACK
- JOINT S.P. & P.E. TRACK



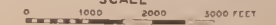
THE I. M. DENYER, FAYNE, AND
 ASSOCIATES, ARCHITECTS
 LOS ANGELES, CALIFORNIA

**KEY TO ESTIMATES
 FOR
 PLAN A**

UNION STATION AT THE SOUTHERN PACIFIC STATION SITE

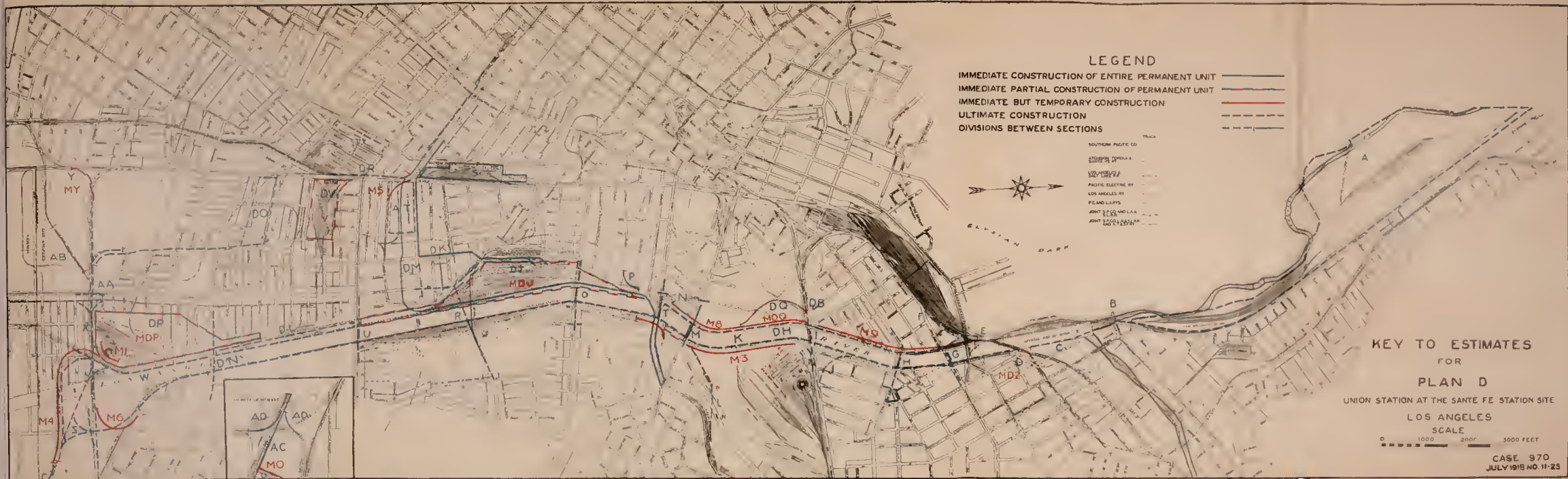
LOS ANGELES

SCALE



CASE 970
 JULY 1919 NO 11-23





LEGEND

- IMMEDIATE CONSTRUCTION OF ENTIRE PERMANENT UNIT
- IMMEDIATE PARTIAL CONSTRUCTION OF PERMANENT UNIT
- IMMEDIATE BUT TEMPORARY CONSTRUCTION
- ULTIMATE CONSTRUCTION
- DIVISIONS BETWEEN SECTIONS

- TRACK
- SOUTHERN PACIFIC CO.
- ATLANTIC PACIFIC R.
- PACIFIC ELECTRIC RY.
- LOS ANGELES RY.
- P.E. AND L.R.P.S.
- JOINT R.F.C. AND L.A.A.
- JOINT R.F.C. AND L.A.A.

KEY TO ESTIMATES

FOR

PLAN D

UNION STATION AT THE SANTA FE STATION SITE

LOS ANGELES

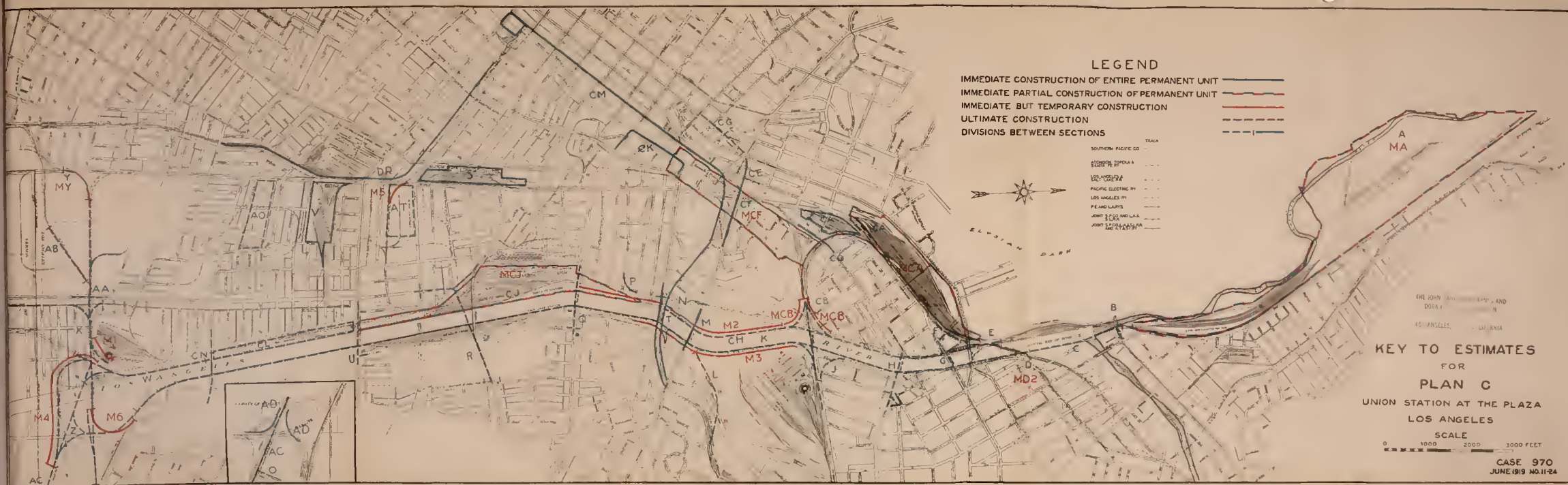
SCALE



CASE 970
JULY 1915 NO. 11-25

FIG. 100. MAP AND ESTIMATES FOR SANTA FE PLAN





LEGEND

- IMMEDIATE CONSTRUCTION OF ENTIRE PERMANENT UNIT ————
- IMMEDIATE PARTIAL CONSTRUCTION OF PERMANENT UNIT ————
- IMMEDIATE BUT TEMPORARY CONSTRUCTION ————
- ULTIMATE CONSTRUCTION - - - - -
- DIVISIONS BETWEEN SECTIONS ————

- TRACAS
- SOUTHERN PACIFIC CO. ————
 - STREET RAILWAY CO. ————
 - LOS ANGELES RY. CO. ————
 - PACIFIC ELECTRIC RY. ————
 - LOS ANGELES RY. ————
 - P. AND L.A.R.Y.S. ————
 - JOINT S.P. CO. AND L.A.R.Y. ————
 - JOINT S.P. CO. AND L.A.R.Y. ————



KEY TO ESTIMATES
 FOR
PLAN C
 UNION STATION AT THE PLAZA
 LOS ANGELES

SCALE
 0 1000 2000 3000 FEET

CASE 970
 JUNE 1919 NO. 11-24

FIG. 206. KEY MAP FOR ESTIMATES FOR PLAZA PLAN

ESTIMATES FOR ULTIMATE CONSTRUCTION BY UNITS

Sections Common to all Plans	Estimated Cost
A—New classification yard—Southern Pacific Company—along San Fernando Road from a point approximately 500 feet north of Los Feliz Road to the northerly limit of the proposed yard. This estimate covers the items additional to the work already done. No new land is required.....	\$1,878,157
B—New bridge carrying Los Feliz Road across the Los Angeles River, presents Southern Pacific tracks and the new trackage mentioned under C, following. No new land required..	67,272
C—New double track along east bank of the river from Santa Fe tracks at Humboldt Street to Southern Pacific tracks at Pigeon Farm, or Section A. Includes interlocking at junction with Section A, and bridge across Arroyo Seco.....	173,464
D—New double track connection at east end of Santa Fe Bridge at Humboldt Street, between Salt Lake tracks and Section C and rearrangement of present connection between Santa Fe and Salt Lake. Small amount of land required.....	59,841
E—New connection between Southern Pacific and Santa Fe tracks at the south end of the Santa Fe Bridge on west side of river opposite Humboldt Street. The southerly limit of this section is the northerly end of the changes introduced by the depression of tracks along the west bank of the river. No new land required.....	23,479
F—New approach in Baker Street to North Broadway viaduct. New land required	111,051
G—Removal of North Spring Street Bridge.....	0
H—New viaduct on North Main Street across the river and adjacent tracks. No new land required.....	543,084
I—Depression of Southern Pacific tracks in Alhambra Avenue from the west bank of the river to a point 1440 feet east of the east bank, where the new grade intersects the old, including lowering of Southern Pacific Bridge, and part of a southerly connection between Salt Lake and Southern Pacific tracks. No new land required.....	45,983
J—New double track connection between the Salt Lake tracks along the river, approximately opposite Cardinal Street, and Southern Pacific tracks in Alhambra Avenue. Land partly acquired	64,502
L—Trackage for Pacific Electric freight between the river and the Pacific Electric main line, and includes new single-track from just north of Macy Street to the main line, including a tunnel under Mission Road near water tank in Southern Pacific shop grounds; three 1000 ft. transfer tracks are included. New land is necessary.....	141,392
M—New viaduct across the river and adjacent tracks at Macy Street, including widening of street east of river. New land for street widening, necessary	357,558
N—Removal of present Santa Fe main line tracks and crossings from Macy and Aliso Streets. Lands not affected.....	1,047

O—New freight yard for Santa Fe at Hobart. Land already acquired	957,030
P—Connection of Jackson Street spur with Santa Fe tracks east of Center Street	4,436
Q—New viaduct across the river and adjacent tracks at First Street. No new land required.....	390,209
R—New viaduct in new location across the river and adjacent tracks at 4th Street, including widening of street west of river. Some new land required.....	856,285
T—New viaduct at Aliso Street for electric railway only—no highway. Reconstruction of present structure into 2-track viaduct by raising present bridge and using inside girders. Approaches with two tracks only, east approach extending to Brooklyn Avenue. No new land required.....	416,936
U—New viaduct across the river and adjacent tracks at Seventh Street. No new land required.....	567,591
W—Depression of Santa Fe main line track from center line of Ninth Street to westerly end of bridge proposed across the river south of Butte Street, double track all the way. Includes reconstruction of Redondo Branch north of Lenard Street, as may be necessary, and abandonment and removal of bridge and present main line from Redondo Junction to the point east of Soto Street where new Section Z begins. No new land required, some right of way abandoned.....	201,272
X—Reconstruction and double-tracking of Salt Lake tracks from westerly end of new bridge south of Butte Street to beginning of curve, about 600 ft. east of Alameda Street, including grading for grade separation at Santa Fe Avenue and reconstruction of spur track to L. W. Blinn and removal of Salt Lake Butte Street Bridge and track east of river to Salt Lake present main line. Small additional right of way.	97,258
Y—New double-track connection through Hammond Lumber Company from Section X to Southern Pacific tracks in Alameda Street. Additional interlocking at Clement Junction Tower included. New right of way is necessary.....	57,773
Z—New bridge across Los Angeles river south of Butte Street on a line with the tangent of Santa Fe track through Hobart produced westerly, including connection to Salt Lake tracks near Boyle Avenue and Alosta Street and third side of wye across Soto and Lugo Streets. New right of way is necessary	322,124
AA—Subway in Santa Fe Avenue at Butte Street including bridge carrying trackage from Section X across Santa Fe Avenue. No new land required.....	37,860
AB—Reconstruction of easterly end of Pacific Electric transfer tracks west of Santa Fe Avenue to meet elevated tracks covered in Section X. No new land required	8,694
AT—New team yard tracks at the present site of the Los Angeles Market, at Sixth and Alameda Streets, with a surface connection with freight tracks in Alameda Street. No new land required	176,694

DR--New double-track elevated construction for Pacific Electric from San Pedro Street, paralleling Sixth Street to Alameda, thence south along private right of way and coming to grade on present line between Ninth and Fourteenth Streets, including reconstruction of present elevated from Wall Street to San Pedro Street. New land is necessary..... 1,671,590

Sections included in Southern Pacific Plan Only--Plan "A"

AG--New connection from Salt Lake San Pedro Branch to Santa Fe tracks east of Hobart at Hobart Junction. New land is necessary 66,729

AK--Depression of Salt Lake tracks along east bank of the river from Humboldt Street (Section D) to a point south of Ninth Street. This covers a double-track alongside the river all the way and new double-track from north foot of the proposed elevated near Fourth Street into the double-track alongside the river at Aliso Street, also includes necessary industry track changes. New land necessary near Macy Street to move tracks outside official river bed..... 398,249

AL--Reconstruction of the present Salt Lake freight yard and shop grounds between 1st and 7th on the east bank of the river into a union coach yard and engine terminal, including a connection from the yard to the elevated track. No new land necessary 1,099,475

AM--New double track elevated construction for the Pacific Electric from a point on Section DR west of Alameda Street, parallel to Section AN, across Los Angeles River, and north to the present main line at Brooklyn Avenue. These tracks will come to the depressed grade just north of Fourth Street and rise again at First Street to cross over steam road tracks adjacent on the east side and continue as elevated across Aliso Street and Mission Road, meeting present grade at Brooklyn Avenue. On same land as AN..... 902,423

AN--New double-track elevated construction for steam roads entering proposed union terminal at present Southern Pacific Station site and extending from near Sixth and Alameda along private right of way about 350 ft. south of and parallel to 6th Street, crossing the Los Angeles River with two curved bridges turning north and south. The southerly leg (fill south of Hollenbeck Avenue) comes to grade at Ninth Street; the northerly leg just north of Fourth Street, passing under Fourth Street viaduct. The elevated wye will connect the northerly and southerly legs just east of the river. This section will include the interlocking plant to control movements at the junction of the bridges. Land already acquired, except that proposed to be leased..... 1,545,322

AS--Reconstruction of the present Southern Pacific passenger station facilities, together with the express buildings and land, into a union terminal. This will include the present S. P. team yard north of Fourth Street. New land is necessary.. 1,420,946

Sections included in Plaza Plan Only—Plan "C"

CA—Reconstruction of present Southern Pacific freight yard between North Broadway and North Spring Street into union coach yard, including double track connection with proposed union station as far as center line of North Main Street. Small right of way necessary.....	629,710
CB—Depression of Southern Pacific tracks in Alhambra Avenue from west side of Los Angeles river to a point 800 feet west, including double track connections north and south to depressed Santa Fe river tracks. New land is necessary.....	165,902
CC—New viaduct on North Main Street across Redondo Street. No new land necessary.....	359,536
CE—New viaduct on Macy Street connecting with Sunset Boulevard and Broadway, across proposed union passenger terminal (Section CF). New lands are necessary.....	730,901
CF—New passenger terminal at the Plaza connecting with Section CA at North Main Street and Section CB 800 feet west of the west bank of the river. Includes new plaza. Practically all land to be acquired.....	8,665,233
CG—Sub-tunnel for street cars in Broadway tunnel between Sunset Boulevard and California Street. No new land required.....	381,920
CH—Depression and double-tracking of Santa Fe tracks along the river from point of change of grade near North Broadway (Section E) to center line of Aliso Street, including tracks from Broadway to Main Street on new right of way out of river, industry spur changes and Keller Street connection. Intermediate step; three tracks along river. New land is necessary.....	206,459
CK—Removing present Pacific Electric double tracks on Los Angeles Street from First Street to Aliso and San Pedro, and reconstruction of present double track to a double three-rail track on First Street from Los Angeles Street to San Pedro Street, including special work at First Street and San Pedro Street. No new land necessary.....	39,074
CM—Double track subway in Main Street from Seventh Street to and under proposed union passenger station at the Plaza, changing to elevated railway along Ramirez Street and continuing as elevated to present Pacific Electric main line at Brooklyn Avenue via and including two-track bridge over Los Angeles River at Aliso Street. Includes single-track loop in Seventh and Los Angeles Streets and under Pacific Electric Building and stations at Pacific Electric Main Street Station, Second Street and union passenger station. Some new land required.....	3,880,816

Sections included in Santa Fe Plan Only—Plan "D"

DJ—New union passenger terminal at the present Santa Fe passenger site, including all changes between the center lines of Aliso and Seventh Streets. No new land required.....	3,513
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DK—New double-track surface line of the Pacific Electric from Sixth and Ceres Avenue, via Sixth and Mateo Streets, to proposed union station (Section DJ), including terminal tracks at station. No new land required.....	238,944
DL—Depression of Santa Fe main line tracks along the river between center lines of Seventh and Ninth Streets, including reconstruction of old main line and coach yard. No new land required	129,408
DM—New double-track elevated construction for Pacific Electric from a point on Section DR west of Alameda Street to near Fourth Street viaduct and from opposite Turner Street across the Los Angeles River at Aliso Street to the present main line at Brooklyn Avenue via private right of way 350 feet south of and parallel to Sixth Street and also new trackage through union station yard. Includes interlocking at junction of Section DR. Land practically all in carrier ownership	885,633
DN—New viaduct across the river at Ninth Street, including crossing of proposed new coach yard. No new land required....	436,255
DO—New Salt Lake freight terminal between Eighth and Hunter Streets, including double-track connection to Butte Street (Section N). No new land necessary.....	286,564
DP—New union coach yard at Santa Fe shop site, including that part of the coach yard tracks north of Ninth Street. New land is necessary	1,166,277
DQ—New double-track connection between Santa Fe tracks along the river north of Macy Street and Southern Pacific tracks in Alhambra Avenue. New land is necessary.....	123,650
DV—New team yard at present site of Southern Pacific coach yard, including connection with freight tracks in Alameda Street and cost of removal of present facilities. No new land necessary	528,203

Sections Common to Southern Pacific and Plaza Plans

V—Abandonment of all Southern Pacific facilities at their present coach yard at Shearer and Alameda Streets with all cost of removal. Lands released from transportation use.. (Credit)	1,574,382
AO—Team track at proposed Salt Lake freight terminal site between Eighth and Hunter Streets, including a connection to tracks in Alameda Street. No new land necessary.....	304,056
CD—Reconstruction of Southern Pacific L. C. L. freight facilities east of Alameda and North Spring Streets and between Llewellyn and Alpine Streets, into a team yard, and including removal of present freight houses. No new land required	148,271
CJ—New L. C. L. station at Santa Fe site, including all changes between center lines of Aliso and Seventh Streets. No new land required	2,575,942
CL—Depression and double-tracking of Santa Fe tracks along the river between the center lines of Seventh and Ninth Streets, including depression of old main line, and south of Seventh	

Street, to pass under Seventh Street viaduct and connection between coach yard and new tracks along the river. No new land required	46,227
CN—New viaduct across the river at Ninth Street. No new land required	415,419

Sections Common to Southern Pacific and Santa Fe Plans

DB—Depression of Southern Pacific tracks in Alhambra Avenue from the west bank of the river to a point 1145 feet west. No new land required.....	12,122
DH—Depression and double-tracking of Santa Fe tracks (on new right of way between Spring and Main Streets, removing tracks from the official bed of river), from point of change of grade near North Broadway (Section E) to center line of Aliso Street, including spur changes and Keller Street connections. New land is necessary.....	215,298

Sections Common to Plaza and Santa Fe Plans

K—Depression and double-tracking of Salt Lake tracks along the river from approximately Humboldt Street (Section D) to the point where the new connecting tracks mentioned under Z. meet the present tracks near Alosta Street and Boyle Avenue. Includes necessary industry track and yard changes and connection with Pacific Electric transfer at Elliott Street and part of connection between Salt Lake and Southern Pacific at Alhambra Avenue. New land necessary near Macy Street	353,602
S—Abandonment of all Southern Pacific and Wells-Fargo facilities at the present site of the Southern Pacific passenger station, with all costs of removal. Lands released from transportation purposes	(credit) 1,243,654
AC—Second track on northerly side of present Santa Fe main line from Section Z to connection with track No. 1 of new Santa Fe yard east of Hobart. No new land necessary.....	31,510
AD—Single track connection between Santa Fe and Salt Lake at Hobart. New land is necessary.....	47,510

ESTIMATES FOR IMMEDIATE CONSTRUCTION UNITS

The foregoing sections are used in estimating the total cost of the ultimate plans. It will not, however, be necessary to provide all of the ultimate facilities at once. The following list indicates the sections for such construction as is deemed necessary at once (M = Modification):

Sections for Southern Pacific Plan—Plan "A."

B—Same as ultimate plan.....	\$ 67,272
C— do do	173,464
G— do do .....	.....
M— do do	357,557

N—	do	do	1,047
P—	do	do	4,436
T—	do	do	416,936
V—	do	do	1,574,382 (Credit)
AM—	do	do	902,423
DR—	do	do	1,671,590
M-1—	Single-track connection with Salt Lake tracks on Butte Street and Santa Fe tracks at Redondo Junction. No new land is required		9,116
M-2—	Depression of Santa Fe tracks along the river, between First Street and Alhambra Avenue, including double-tracking and the abandonment of the present main line. No new land is required		126,828
M-6—	Temporary single-track connection between Butte Street line of the Salt Lake and the main line of the Salt Lake, between the Los Angeles River and Soto Street. No new land necessary		5,715
M-7—	Depression on the Santa Fe tracks to pass under the proposed Southern Pacific elevated tracks just south of Sixth Street. A temporary grade would be run from Station 127 to Station 133 plus 38 and from Station 142 to Station 151 plus 52 (Fig. 27, page 147). No new land is required		24,826
M-10—	Double-tracking of Salt Lake from Alhambra Avenue to Humboldt Street (Section MD) on present grade. No new land is required		48,290
MJ—	Same as ultimate plan, except for grading. In the immediate plan Alhambra Avenue is not to be depressed		65,631
MY—	A single-track connection instead of a double track, as proposed in the ultimate plan. Same land required as for ultimate plan. New land is necessary		49,707
MAK—	Construction of new steam passenger double tracks from foot of elevated north of Fourth Street to Alhambra Avenue on depressed grade and depression and double-tracking of the Salt Lake tracks from Alhambra Avenue to Seventh Street, to pass under the proposed bridges at Macy and Aliso Streets. Under this plan the main line passenger tracks' center lines would be built 77 ft. and 90 ft. from the official river bank between First and Aliso Streets and 15 ft. and 28 ft. from the official river bank between Alhambra Avenue and Aliso Street. A temporary grade would be constructed from Station 50 (Fig. 27, page 147) just south of Alhambra Avenue, to Station 74 plus 90—Macy Street. Between Macy Street and First Street the tracks would be on their ultimate grade. South of First Street the estimate for immediate construction is based on construction of two freight tracks 15 and 28 feet from the official bank of the river, two main line steam passenger tracks at 77 ft. and 90 ft., respectively, from the official bank of the river, and two Pacific Electric tracks 46 ft. and 59 ft. from the official bank of the river. These last four tracks would join Section AN at the foot of the trestle approach to the proposed curved bridges across the Los Angeles River north of Seventh Street. For all six tracks the ultimate grade would be fol-		

lowed from First Street to the foot of the trestle. The two tracks to be built adjacent to the river (15 feet and 28 feet centers) would be constructed on their ultimate grade from Aliso Street to the northerly curved bridge (Station 136 plus 50) and on a temporary grade from this point to Seventh Street, rising in this distance from the ultimate depressed grade to the present grade at Seventh Street. New land is required the same as in Section AK..... 310,518

MAL—Same as ultimate Section AL, except less trackage..... 919,662

MAN—Same as ultimate plan, except grading. The southerly 4000 feet of the south approach will be on a different grade, to connect with present tracks at present elevation at Ninth Street 1,555,749

MAS—Same as ultimate plan, with the exception of smaller buildings for express 1,177,412

MD-1—Connections between new double tracks along east bank of river and Santa Fe and Salt Lake tracks at Humboldt Street, including interlocking 60,035

Sections for Plaza Plan—Plan "C"

E—Same as ultimate plan.....	\$ 23,479
M— do do	357,557
N— do do	1,047
P— do do	4,436
S— do do	(Credit) 1,243,654
T— do do	416,936
V— do do	(Credit) 1,574,382
AC— do do	31,510
AD— do do	47,510
CC— do do	359,536
CD— do do	148,271
CE— do do	730,901
CK— do do	39,074
CM— do do	388,081
DR— do do	167,159
M-1—Same as M-1 in "A" Plan	9,110
M-2—Depression and double-tracking of the Santa Fe tracks between First Street and Alhambra Avenue, to pass under proposed viaducts at Macy and Aliso Streets. No new land is required	126,828
M-3—Depression of the Salt Lake tracks between First Street and Alhambra Avenue to pass under Macy Street and Aliso Street viaducts. Grading for double track. New land is required to remove tracks from official bed of river.....	162,482
M-4—Same as M-4 in "D" Plan	32,550
M-5—Single-track connections between Santa Fe tracks on private right of way between Industrial and Sixth Streets and Southern Pacific tracks on Alameda Street. No new land is required	\$ 7,351
M-6—Same as in "A" Plan	5,715
MA—Enlargement of the classification yard along the San Fernando Road sufficient to replace the trackage diverted from freight	

	use by the use of the present freight yard as a coach yard..	1,198,127
MY—	Same as MY for "A" Plan	49,707
MCA—	Same as ultimate plan, except westerly half of yard is allowed to remain as at present.....	516,264
MCB—	Same as ultimate plan, with the exception of additional grading, the ultimate plan being predicated on the depression of Alhambra Avenue	155,835
MCF—	Same as ultimate plan, with the exception of fewer tracks and smaller buildings for baggage and express.....	7,696,720
MCJ—	Construction of Sheds A and B and necessary house tracks, re-arrangement of yard and double tracks along river from First Street to 1215 feet north of Seventh Street to 1215 feet north of Seventh Street. No new land required.....	772,333
MD-2—	Single-track connection on ultimate alignment between Santa Fe tracks at east end of Humboldt Bridge and Salt Lake tracks in Humboldt Street. New land is required, same as in Section D	38,447

Sections for Santa Fe Plan—Plan "D"

E—	Same as ultimate plan.....	23,479
M—	do do	357,557
N—	do do	1,047
P—	do do	4,436
S—	do do	(Credit) 1,243,654
T—	do do	416,936
V—	do do	(Credit) 1,574,382
AC—	do do	31,510
AD—	do do	47,510
DK—	do do	238,944
DM—	do do	885,633
DR—	do do	1,671,590
M-1—	Same as M-1 in "A" Plan	9,116
M-3—	Same as in "C" Plan	162,482
M-4—	Double-tracking of the Santa Fe main line from Redondo Junction to east end of first curve east of Los Angeles River, to join Section AC. No new land is required.....	32,550
M-5—	Same as in "C" Plan.....	7,351
M-6—	do do	5,715
M-8—	Same as Section M-2 in "C" Plan, with the exception of extending from Aliso Street to Alhambra Avenue instead of from First Street to Alhambra Avenue. No new land is required	53,827
M-9—	Double-tracking of Santa Fe tracks, Alhambra Avenue to Section E by conversion of present passing tracks into second track main line. On present alignment, no new land is required	9,086
MO—	Construction of sufficient trackage at new Santa Fe yard at Hohart, to take the place of the freight yard used as a union passenger station site under this plan. Land already acquired	579,127
MY—	Same as in Plan "A"	49,707
MD-2—	Same as MD-2 in Plaza Plan	38,447
MDJ—	Union Passenger Station. Same as ultimate plan, except smaller buildings and facilities. Includes depression between	

Aliso Street and Station 122 plus 77 (Fig. 26) with temporary use of present grade between Station 122 plus 77 and Seventh Street	2,577,040
MDP—Same as ultimate plan, except that "future tracks" are omitted	1,005,673
MDQ—Same as ultimate plan, with the exception of grading, the grading for the temporary plan being based on Alhambra Avenue not being depressed	121,570

The following tabulations show for the A, C and D Plans, both ultimate and immediate:

KEYS TO ASSEMBLY OF UNIT ESTIMATES FOR COMPLETE PLANS

ULTIMATE PLAN

PLANS IN WHICH ESTIMATE SECTIONS OCCUR

	Plans					
ALL	A	C	D	A and C	A and D	C and D
A P	AG	CA	DJ	V	DB	K
B Q	AK	CB	DK*	AO	DH	S
C R	AL	CC	DL	CD		AC
D T	AM*	CE	DM*	CJ		AD
E U	AN	CF	DN	CL		
F W	AS	CG	DO	CN		
G X		CH	DP			
H Y		CK*	DQ			
I Z		CM*	DV			
J AA						
L* AB*						
M AT						
N DR*						
O						
27	6	9	9	6	2	4=63

SECTION IN EACH PLAN

A			C			D		
A	P	AL	A	Q	CA	A	O	AD
B	Q	AM*	B	R	CB	B	P	AT
C	R	AN	C	S	CC	C	Q	DB
D	T	AO	D	T	CD	D	R	DB
E	U	AS	E	U	CE	E	S	DJ
F	V	AT	F	V	CF	F	T	DK*
G	W	CD	G	W	CG	G	U	DL
H	X	CJ	H	X	CH	H	W	DM*
I	Y	CL	I	Y	CJ	I	X	DN
J	Z	CN	J	Z	CK*	J	Y	DO
L*	AA	DB	K	AA	CL	K	Z	DP
M	AB*	DH	L*	AB*	CM*	L*	AA	DQ
N	AG	DR*	M	AC	CN	M	AB*	DR*
O	AK		N	AD	DR*	N	AC	DV
			O	AO				
			P	AT				
41			46			42		

* Sections for Pacific Electric Railway, not involving steam roads.

IMMEDIATE CONSTRUCTION
PLANS IN WHICH ESTIMATE SECTIONS OCCUR

Plans					
ALL	A	C	D	A and C	C and D
M	B	CC	DK*	V	E
N	C	CD	DM*	M-2	S
P	G	CE	M-8		AC
T	AG	CK*	M-9		AD
DR*	AM*	CM*	MO		M-3
M-1	M-7	MA	MDJ		M-4
M-6	M-10	MCA	MDP		M-5
MY	MJ	MCB	MDQ		MD-2
	MAK	MCF			
	MAL	MCJ			
	MAN				
	MAS				
	MD-1				
8	13	10	8	2	8=49

SECTIONS IN EACH PLAN

A Plan			C Plan			D Plan		
B	AG	MJ	E	CD	M-6	E	DK	M-9
C	AM*	MY	M	CE	MA	M	DM*	MO
G	DR*	MAK	N	CK*	MY	N	DR*	MY
M	M-1	MAL	P	CM*	MCA	P	M-1	MD-2
N	M-2	MAN	S	DR*	MCB	S	M-3	MDJ
P	M-6	MAS	T	M-1	MCF	T	M-4	MDP
T	M-7	MD-1	V	M-2	MCJ	AC	M-5	MDQ
V	M-10		AC	M-3	MD-2	AD	M-6	
			AD	M-4			M-8	
			CC	M-5				
23			28			24		

* Sections for Pacific Electric Railway not involving steam roads.

The next tabulation gives an alphabetical list of estimate sections, the plans in which they are used and the estimate for each section.

**ALPHABETICAL LIST OF ESTIMATE SECTIONS AND PLANS
IN WHICH THEY OCCUR**

Section	Plan	Amount	Section	Plan	Amount	Section	Plan	Amount
A	A, C, D	\$1,878,157	AK	A	\$398,219	DV	D	\$528,203
B	A, C, D	67,272	AL	A	1,099,475			
C	A, C, D	173,461	AM	A	902,423			
D	A, C, D	59,841	AN	A	1,545,322	MA	C	1,198,127
E	A, C, D	23,479	AO	A, C	304,056	MAK	A	310,518
F	A, C, D	111,051	AS	A	1,120,946	MAL	A	919,662
G	A, C, D	0	AT	A, C, D	176,694	MAN	A	1,555,749
H	A, C, D	543,081	CA	C	629,710	MAS	A	1,177,412
I	A, C, D	45,983	CB	C	165,902	MCA	C	516,264
J	A, C, D	64,502	CC	C	359,536	MCB	C	155,835
K	C, D	353,602	CD	A, C	148,271	MCF	C	7,696,720
L	A, C, D	141,392	CE	C	730,901	MCJ	C	772,333
M	A, C, D	357,557	CF	C	8,665,233	MD1	A	60,035
N	A, C, D	1,017	CG	C	381,920	MD2	C, D	38,447
O	A, C, D	957,030	CH	C	206,459	MDJ	D	2,577,040
P	A, C, D	4,436	CJ	A, C	2,575,942	MDP	D	1,005,673
Q	A, C, D	390,209	CK	C	39,074	MDQ	D	121,570
R	A, C, D	856,285	CL	A, C	46,227	MI	A	65,631
S	C, D	1,243,654*	CM	C	3,880,816	MO	D	579,127
T	A, C, D	416,936	CN	A, C	415,419	MY	A, C, D	49,707
U	A, C, D	567,591	DB	A, D	12,122	M1	A, C, D	9,116
V	A, C	1,574,382*	DH	A, D	215,298	M2	A, C	126,828
W	A, C, D	201,272	DJ	D	3,513,541	M3	C, D	162,482
X	A, C, D	97,258	DK	D	238,941	M4	C, D	32,550
Y	A, C, D	57,773	DL	D	129,408	M5	C, D	7,351
Z	A, C, D	322,124	DM	D	885,633	M6	A, C, D	5,715
AA	A, C, D	37,860	DN	D	436,255	M7	A	24,826
AB	A, C, D	8,691	DO	D	286,564	M8	D	53,827
AC	C, D	31,510	DP	D	1,166,277	M9	D	9,086
AD	C, D	47,510	DQ	D	123,650	M10	A	
AG	A	66,729	DR	A, C, D	1,671,590			48,290

* Credit.

The total of the amounts in the above table is \$57,645,593. This figure gives some idea of the large amount of estimating which was done and the quantity of detail work necessary. In addition, many other estimates were made, the grand total approximating \$100,000,000.

Assembly of Unit Estimates for Complete Plans

The following six tables (Tables A-1, C-1, D-1, A-2, C-2 and D-2) show the assembly, or grouping of the estimate sections into primary groups. This was done in order to reduce the number of divisions into which the whole plan is divided and to bring the sections together under brief headings which are more descriptive of the different phases of work necessary than the titles of the estimate sections.

The two tables in Chapter XIV (pages 394 and 395), which are a final summary of each complete plan and comparisons of the three plans, are the result of the assembly and grouping shown in the six tables above referred to.

The following tabulations show for the A, C and D Plans, both ultimate and immediate,—

- (1) In which plans the various sections occur.
- (2) The sections to be assembled for each of the three plans.
- (3) Distinguishment between steam road and Pacific Electric construction.

TABLE A-1
ASSEMBLY OF ESTIMATE SECTIONS INTO PRIMARY GROUPS
PLAN "A"
ULTIMATE PLAN

Est. Sec. Key Group	Item	Physical Construction	Acquisition of Property			Total
			Land	Improvements	Property Damage	
UNION PASSENGER STATION AT SOUTHERN PACIFIC STATION SITE						
STEAM ROADS						
AN	1 Passenger Terminal, Approaches, etc.: Elevated Approach from East side Los Angeles River					
AS	Station Facilities	\$1,514,052	\$31,270			\$1,545,322
	Total	585,765	665,594	\$169,587		1,420,946
AL	2 Union Coach Yard	\$2,099,817				\$2,099,268
CJ	4 Union Freight Station	\$1,011,295	\$696,864	\$169,587	\$88,180	\$1,009,471
	5 Viaducts over Los Angeles River:	\$2,394,404		\$181,538		\$2,575,942
F	Baker St. Approach to North Broadway Bridge	\$111,051				\$111,055
G	Removal of North Spring St. Bridge					
H	New Viaduct at Main St.	433,869	\$17,159		\$92,056	543,084
M	New Viaduct at Macy St.	321,383	5,679		30,495	357,557
R	New Viaduct at Fourth St.	773,165	46,488		36,632	856,285
Q	New Viaduct at First St.	374,559			15,650	390,209
T	New Viaduct at Aliso St.	347,785			69,151	416,936
U	New Viaduct at Seventh St.	426,275			141,316	567,591
CN	New Viaduct at Ninth St.	369,464			45,955	415,419
	Total	\$3,157,551	\$69,326		\$431,255	\$3,658,132
	6 Depression of, and New, Tracks along River:					
D	Connections East end Humboldt St. Bridge	\$41,256	\$11,363	\$7,222		\$59,841
E	Connections West end Humboldt St. Bridge	23,470				23,470
I	Depression Alhambra Ave. East of and at River	45,983				45,983
N	Removal Macy and Aliso Santa Fe Crossings	1,047				1,047
W	Depression Santa Fe South of Ninth St.	201,272				201,272
AK	Depression Salt Lake—Humboldt to Alosta	287,765	28,619	\$1,865		398,249
CL	Depression Santa Fe—Seventh to Ninth	46,227				46,227
DH	Depression Santa Fe—Broadway to Aliso	101,622	98,205	15,471		215,298
DB	Depression Alhambra West of River	12,122				12,122
	Total	\$760,773	\$138,187	\$104,558		\$1,003,518
	8 New Tracks for Southern Pacific, East Bank of River, North of Humboldt St.:					
B	New Approach—Los Feliz Road Bridge	\$67,272				\$67,272
C	New Tracks—Humboldt to Dayton, East Bank	138,070	\$31,274	\$1,120		173,464
J	New Connection—Southern Pacific and Salt Lake at Alhambra and River	39,895	18,741	5,866		64,502
	Total	\$245,237	\$50,015	\$9,986		\$305,238
	9 Butte St. Trackage and Santa Fe Subway:					
X	Tracks—Butte St., Alameda St. to River	\$90,186	\$3,716	\$3,356		\$97,258
Y	New Connection—Alameda St. to Butte St., S. E.	29,712	18,604	9,457		57,773
AA	Santa Fe Ave. Subway	37,860				37,860
	Total	\$157,758	\$22,320	\$12,813		\$192,891
	10 New Trackage—River to Hobart and Connections:					
Z	New Bridge and Wye East of River	\$269,218	\$49,405	\$3,501		\$322,124
AG	New Connection—Salt Lake Br. to Santa Fe	61,640	5,089			66,729
	Total	\$330,858	\$54,494	\$3,501		\$388,853
	11 New Freight Yards—Southern Pacific and Santa Fe:					
A	New Southern Pacific Yard—San Fernando Rd.	\$1,878,157				\$1,878,157
O	New Santa Fe Yard—East of Hobart	957,030				957,030
	Total	\$2,835,187				\$2,835,187
	12 New Freight Terminal—Salt Lake				None—Use Union Freight Station Item 4	
P	13 New Connections Relief of Alameda St. Switching	\$4,346				\$4,336
	14 Team Yards:					
AO	New Yard—Salt Lake Terminal, Alameda and Hunter Sts.	\$395,537	*\$91,481			\$304,056
AT	New Yard—Los Angeles Market Property	176,694				176,694
CD	New Yard—Southern Pacific Freight Station Site	50,155		\$98,116		148,271
	Total	\$622,386	*\$91,481	\$98,116		\$629,021
V	16 Release Southern Pacific Station Site				Not released	
	17 Release Southern Pacific Coach Yard Site	*\$41,964	*\$1,651,262	\$121,844		*\$1,574,382
ELECTRIC ROAD						
	20 New Line—Pacific Electric Station to Brooklyn Ave. and to Fourteenth St.:					
AM	Elevated—Sixth and Alameda to Brooklyn Ave. via Salt Lake	\$902,423				\$902,423
DR	Elevated—Wall St. near Sixth to Fourteenth St.	1,092,114	\$482,030	\$97,446		1,671,590
	Total	\$1,994,537	\$482,030	\$97,446		\$2,574,013
	21 New Surface Line to Proposed Union Station	None				
	22 Freight Tracks:					
L	Macy St. and River to Echandia Yard	\$110,146	\$31,246			\$141,392
AB	Raise Transfer Tracks—Santa Fe Ave. and Butte St.	8,694				8,694
	Total	\$118,840	\$31,246			\$150,086
	Grand Total	\$15,688,115	*\$198,261	\$887,569	\$431,255	\$16,808,678

* Credit.

TABLE C-1
ASSEMBLY OF ESTIMATE SECTIONS INTO PRIMARY GROUPS

PLAN "C"
ULTIMATE PLAN
UNION PASSENGER STATION AT PLAZA SITE

Est. Sec Key Group	Item	Acquisition of Property				Total
		Physical Construction	Land	Improvements	Property Damage	
STEAM ROADS						
1 Passenger Terminal, Approaches, etc.:						
CB	Depression of Southern Pacific tracks in Alhambra Ave.	\$71,279	\$87,075	\$7,548		\$165,902
CC	New Viaduct on North Main St.	292,226			\$67,310	359,536
CE	New Viaduct on Macy St.	490,070	218,411	80,469	31,951	730,901
CF	New Passenger Terminal at the Plaza	4,136,261	3,480,778	1,048,194		8,665,233
CG	Sub-tunnel for street cars in Broadway tunnel	381,920				381,920
	Total	\$5,281,756	\$3,786,264	\$1,136,211	\$99,261	\$10,303,492
CA	2 Union Coach Yard	\$543,760	\$20,857	\$65,093		\$629,710
CJ	4 Union Freight Station	\$2,394,404		\$181,538		\$2,575,942
5 Viaducts over Los Angeles River:						
F	Baker St. approach to North Broadway Bridge	\$111,051				\$111,051
G	Removal of North Spring St. Bridge					
H	New Viaduct at Main St.	433,869	\$17,159		\$92,056	543,084
M	New Viaduct at Macy St.	321,383	5,679		30,495	357,557
R	New Viaduct at Fourth St.	773,165	46,488		36,632	856,285
Q	New Viaduct at First St.	374,559			15,650	390,209
T	New Viaduct at Aliso St.	347,785			69,151	416,936
U	New Viaduct at Seventh St.	426,275			141,316	567,591
CN	New Viaduct at Ninth St.	369,464			45,955	415,419
	Total	\$3,157,551	\$69,326		\$431,255	\$3,658,132
6 Depression of and New Tracks Along River:						
D	Connections at East end of Humboldt St. Bridge.	\$41,256	\$11,363	\$7,222		\$59,841
E	Connections at West end of Humboldt St. Bridge	23,479				23,479
I	Depression of Alhambra Ave. East of and at River	45,983				45,983
K	Depression and Double-tracking Salt Lake Tracks Along River	271,389	29,407	27,806	\$25,000	353,602
N	Removal of Santa Fe Crossings, Macy and Aliso Sts.	1,047				1,047
W	Depression of Santa Fe Track South of Ninth St.	201,272	Salvage negligible			201,272
CH	Depression of Santa Fe Track, Broadway to Aliso St.	92,783	98,205	15,471		206,459
CL	Depression of Santa Fe Track, Seventh to Ninth Sts.	46,227				46,227
	Total	\$723,436	\$138,975	\$50,499	\$25,000	\$937,910
8 New Tracks for Southern Pacific, East Bank of River, North of Humboldt St.:						
B	New Approach—Los Feliz Road Bridge	\$67,272				\$67,272
C	New Tracks—Humboldt to Dayton, East Bank	138,070	\$31,274	\$4,120		173,464
J	New Connection—Southern Pacific and Salt Lake at Alhambra and River	39,895	18,741	5,856		64,502
	Total	\$245,237	\$50,015	\$9,986		\$305,238
9 Butte St. Trackage and Santa Fe Ave. Subway:						
X	Tracks—Butte St., Alameda St. to River	\$90,186	\$3,716	\$3,356		\$97,258
Y	New Connection—Alameda St. to Butte St.	29,712	18,604	9,457		57,773
AA	Santa Fe Ave. Subway	37,860				37,860
	Total	\$157,758	\$22,320	\$12,813		\$192,891
10 New Trackage—River to Hobart and Connections:						
Z	New Bridge and Wye, East of River	\$269,218	\$49,405	\$3,501		\$322,124
AC	Second Track North of present Santa Fe Main Line	31,510				31,510
AD	Connection at Hobart between Santa Fe and Salt Lake	41,200	6,310			47,510
	Total	\$341,928	\$55,715	\$3,501		\$401,144
11 New Freight Yards—Southern Pacific and Santa Fe:						
A	New Southern Pacific Yard—San Fernando Rd.	\$1,878,157				\$1,878,157
O	New Santa Fe Yard—East of Hobart.	957,030				957,030
	Total	\$2,835,187				\$2,835,187
P	12 New Freight Terminal—Salt Lake					
	13 New Connections—Relief of Alameda St. Switching	\$4,436				\$4,436
14 Team Yards:						
AO	New Yard—Salt Lake Terminal, Alameda and Hunter St.	\$395,537	*\$91,481			\$304,056
AT	New Yard—Los Angeles Market Property	176,694				176,694
CD	New Yard—Southern Pacific Freight Station Site	50,155		\$98,116		148,271
	Total	\$622,386	*\$91,481	\$98,116		\$629,021
S	16 Release Southern Pacific Station Site	*\$96,840	*\$1,719,918	\$573,104		*\$1,243,654
V	17 Release Southern Pacific Coach Yard Site	*\$44,064	*\$1,651,262	\$121,844		*\$1,574,382
ELECTRIC ROAD						
20 New Line—Pacific Electric Station to Brooklyn Ave. and to Fourteenth St.:						
CK	Removal and Reconstruction of Pacific Electric—Los Angeles St. and First St.	\$39,074				\$39,074
CM	Double Track Subway in Main St.	3,757,251	897,405	\$26,160		3,880,816
DR	Double Track Elevated for Pacific Electric	1,092,114	482,030	97,446		1,671,590
	Total	\$4,888,439	\$579,435	\$123,606		\$5,591,480
21 New Surface Line to Proposed Union Station						
22 Freight Tracks:						
L	Macy St. and River to Echandia Yard	\$110,146	\$31,246			\$141,392
AB	Raise Transfer Tracks—Santa Fe Ave. and Butte St.	8,694				8,694
	Total	\$118,840	\$31,246			\$150,086
	Grand Total	\$21,173,314	\$1,291,492	\$2,376,311	\$555,516	\$25,396,633

NOTE: * Designates credit

TABLE D-1
ASSEMBLY OF ESTIMATE SECTIONS INTO PRIMARY GROUPS

		PLAN "D"				
		ULTIMATE PLAN				
		UNION PASSENGER STATION AT SANTA FE STATION SITE				
Est. Sec. Key Group	Item	Physical Construction	Acquisition of Property			Total
			Land	Improvements	Property Damage	
STEAM ROADS						
	1 Passenger Terminal, Approaches, etc.:					
DJ	New Union Passenger Terminal at Santa Fe Site	\$3,333,278		\$180,263		\$3,513,541
DQ	Connection between Southern Pacific and Santa Fe Along River	47,318	\$71,725	1,607		123,650
	Total	\$3,380,596	\$71,725	\$181,870		\$3,634,191
DP	2 Union Coach Yard	\$643,952	\$160,421	\$61,901		\$1,106,274
	4 Union Freight Station					
	5 Viaducts over Los Angeles River:					
F	Baker St. Approach to North Broadway Bridge	\$111,051				\$111,051
G	Removal of North Spring St. Bridge					
H	New Viaduct at Main St.	433,809	\$17,159		\$92,056	543,024
M	New Viaduct at Macy St.	321,383	5,679		36,682	357,744
R	New Viaduct at Fourth St.	773,165	46,488		15,650	835,303
Q	New Viaduct at First St.	374,559			89,151	463,710
T	New Viaduct at Aliso St.	347,785			141,316	489,101
U	New Viaduct at Seventh St.	126,275			45,955	172,230
DN	New Viaduct at Ninth St.	390,300				390,300
	Total	\$3,478,387	\$69,326		\$131,255	\$3,678,968
	6 Depression of and New Tracks Along River:					
D	Connections at East end of Humboldt St. Bridge	\$41,256	\$11,363	\$7,222		\$59,841
E	Connections at West end of Humboldt St. Bridge	23,479				23,479
I	Depression of Alhambra Ave. East of and at River	15,983				15,983
K	Depression and Double-tracking Salt Lake Tracks along River	271,389	29,407	27,806	\$25,000	353,602
N	Removal of Santa Fe Crossings—Macy and Aliso Sts.	1,047				1,047
W	Depression of Santa Fe Track South of Ninth St.	201,272				201,272
DB	Depression of Southern Pacific Track in Alhambra Ave.	12,122				12,122
DH	Depression of Santa Fe Track between Spring and Main	191,622	98,205	15,471		299,298
DI	Depression of Santa Fe Track, Main Line, along River	70,473		58,935		129,408
	Total	\$768,643	\$138,975	\$109,434	\$25,000	\$1,042,052
	8 New Tracks for Southern Pacific, East Bank of River, North of Humboldt St.:					
B	New Approach—Los Feliz Road Bridge	\$67,272				\$67,272
C	New Tracks—Humboldt to Dayton, East Bank	138,070	\$41,274	\$4,120		179,464
J	New Connection—Southern Pacific and Salt Lake at Alhambra and River	39,895	18,741	5,866		64,502
	Total	\$245,237	\$61,015	\$9,986		\$316,238
	9 Butte St. Trackage and Santa Fe Ave. Subway:					
X	Tracks—Butte St., Alameda St. to River	\$91,186	\$3,716	\$3,356		\$97,258
Y	New Connection—Alameda St. to Butte St.	29,712	18,604	9,457		57,773
AA	Santa Fe Subway	37,863				37,863
	Total	\$158,761	\$22,320	\$12,813		\$193,894
	10 New Trackage—River to Hobart and Connections:					
Z	New Bridge and Weir, East of River	\$269,218	\$49,405	\$3,501		\$322,124
AC	Second Track North of present Santa Fe Main Line	31,510				31,510
AD	Connection at Hobart between Santa Fe and Salt Lake	41,200	6,310			47,510
	Total	\$341,928	\$55,715	\$3,501		\$399,144
	11 New Freight Yards—Southern Pacific and Santa Fe:					
A	New Southern Pacific Yard—San Fernando Rd.	\$1,878,157				\$1,878,157
O	New Santa Fe Yard—East of Hobart	957,030				957,030
	Total	\$2,835,187				\$2,835,187
DO	12 New Freight Terminal—Salt Lake	\$286,564				\$286,564
P	13 New Connections—Relief of Alameda St. Switching	\$4,436				\$4,436
	14 Team Yards:					
AT	New Yard—Los Angeles Market Property	\$176,694				\$176,694
DV	New Yard at present Southern Pacific Coach Yard Site	492,922		\$125,281		618,203
	Total	\$579,616		\$125,281		\$704,897
S	16 Release Southern Pacific Station Site	*\$96,849	*\$1,719,918	\$573,194		*\$2,390,961
	17 Release Southern Pacific Coach Yard Site					
ELECTRIC ROADS						
	20 New Line—Pacific Electric Station to Brooklyn Ave. and to Fourteenth St.:					
DM	New Double-track Elevated for Pacific Electric	\$854,363	\$41,270			\$895,633
DR	New Double-track Elevated for Pacific Electric	1,092,114	482,030	\$97,446		1,671,590
	Total	\$1,946,477	\$523,300	\$97,446		\$2,567,223
DK	21 New Surface Line to Proposed Union Station	\$28,944				\$28,944
	22 Freight Tracks:					
L	Macy St. and River to Echandia Yard.	\$110,146	\$91,246			\$201,392
AB	Raise Transfer Tracks—Santa Fe Ave. and Butte St.	8,004				8,004
	Total	\$118,150	\$91,246			\$209,396
	Grand Total	\$14,629,725	*\$906,872	\$1,178,336	\$456,255	\$15,957,444

* Credit.

TABLE A-2

ASSEMBLY OF ESTIMATE SECTIONS INTO PRIMARY GROUPS

PLAN "A"

IMMEDIATE PLAN

UNION PASSENGER STATION AT SOUTHERN PACIFIC STATION SITE

Est. Sec. Key Group	Item	Physical Construc- tion	Acquisition of Property			Total
			Land	Improvements	Property Damage	
STEAM ROADS						
	1 Passenger Terminal, Approaches, etc.:					
MAN	Elevated Tracks into Union Terminal at Southern Pacific Site	\$1,524,479	\$31,270			\$1,555,749
MAS	Reconstruction of Southern Pacific Station into Union Terminal	503,350	665,594	\$8,468		1,177,412
	Total	\$2,027,829	\$696,864	\$8,468		\$2,733,161
MAL	2 Union Coach Yard	\$836,182		\$83,480		\$919,662
	4 Union L. C. L. Freight Station					
	5 Viaducts Over Los Angeles River:					
G	Removal of North Spring St. Bridge					
M	New Viaduct of Macy St.	\$321,383	\$5,679		\$30,495	\$357,557
T	New Viaduct of Aliso St.	347,785			69,151	416,936
	Total	\$669,168	\$5,679		\$99,646	\$774,493
	6 Depression of and New Tracks Along River:					
N	Removal of Santa Fe Crossings—Macy and Aliso St	\$1,047				\$1,047
M2	Depression of Santa Fe Tracks—Aliso to Alhambra	126,828				126,828
M7	Depression of Santa Fe Tracks under Southern Pacific Elevated	24,826				24,826
MAK	New Steam Passenger Double Tracks	198,252	\$27,569	\$84,697		310,518
	Total	\$350,953	\$27,569	\$84,697		\$463,219
	7 Main Line Tracks and Connections, Not Depressed:					
MI	New Connection—Salt Lake and Santa Fe at Redondo Junction	\$9,116				\$9,116
M10	Double Tracking Salt Lake—Alhambra to Humboldt	48,290				48,290
MDI	Connection between Double Tracks along River and Santa Fe and Salt Lake Tracks	48,672	\$11,363			60,035
	Total	\$106,078	\$11,363			\$117,441
	8 New Tracks for Southern Pacific—East Bank of River, North of Humboldt St.:					
B	New Approach—Los Feliz Road Bridge	\$67,272				\$67,272
C	New Tracks—Humboldt to Dayton, East Bank	138,070	\$31,274	\$4,120		173,464
MJ	New Double Track Connection between Salt Lake and Southern Pacific	41,144	18,650	5,837		65,631
	Total	\$246,486	\$49,924	\$9,957		\$306,367
AG	10 New Trackage—River to Hobart and Connections	\$61,640	\$5,089			\$66,729
	11 New Freight Yards, Southern Pacific and Santa Fe					
	13 New Connections—Relief of Alameda St. Switching:					
P	Connection—Jackson St. Spur and Santa Fe Tracks	\$4,436				\$4,436
M6	Connection—Salt Lake Main Line and Butte St. Track	5,715				5,715
MY	Connection—Alameda St. Track and Butte St. Track	21,785	\$18,512	\$9,410		49,707
	Total	\$31,936	\$18,512	\$9,410		\$59,858
	14 Team Yards					
	16 Release Southern Pacific Station Site					
	17 Release Southern Pacific Coach Yard Site	*\$44,964	*\$1,651,262	\$121,844		*\$1,818,070
ELECTRIC ROAD						
	20 Elevated—Pacific Electric Station to Brooklyn Ave. and to Fourteenth St.:					
AM	Elevated—Sixth and Alameda to Brooklyn Ave. via Salt Lake	\$902,423				\$902,423
DR	Elevated—Pacific Electric Station to Fourteenth St.	1,092,114	\$482,030	\$97,446		1,671,590
	Total	\$1,994,537	\$482,030	\$97,446		\$2,574,013
	Grand Total	\$6,279,845	*\$354,232	\$415,302	\$99,646	\$6,440,561

NOTE: * Designates credit.

TABLE C-2
ASSEMBLY OF ESTIMATE SECTIONS INTO PRIMARY GROUPS

PLAN "C"

IMMEDIATE PLAN

UNION PASSENGER STATION AT PLAZA SITE

Est Sec. Key Group	Item	Physical Construc- tion	Acquisition of Property			Total
			Land	Improve- ments	Property Damage	
STEAM ROADS						
CC	1 Passenger Terminal, Approaches, etc.:					
CE	Viaduct on Main St. over Redondo St.	\$292,226				\$359,536
MCB	Viaduct on Macy St. over Terminal Yard	400,070	\$218,411	\$80,460	\$67,310	730,901
MCF	Connections at Mission Tower—Modified	61,212	87,075	7,548		155,835
	Passenger Station and Facilities—Modified	3,167,748	3,480,778	1,048,194		7,696,720
	Total	\$3,921,256	\$3,786,264	\$1,136,211	\$99,261	\$8,942,992
MCA	2 Union Coach Yard	\$453,090	\$20,474	\$42,700		\$516,264
MCJ	4 Union L. C. L. Freight Station:					
	Union Terminal at Santa Fe Site—Modified	\$677,316		\$95,017		\$772,333
	5 Viaducts Over Los Angeles River:					
M	Viaduct at Macy St.	\$321,383	\$5,679		\$30,495	\$357,557
T	Viaduct at Aliso St.	347,785			69,151	416,936
	Total	\$669,168	\$5,679		\$99,646	\$774,493
N	6 Depression of and New Tracks Along River:					
	Removal Santa Fe Crossings—Macy and Aliso					
	Sts.	\$1,047				\$1,047
M-2	Depression Santa Fe Tracks—Aliso to Al-	126,828				126,828
M-3	Depression Salt Lake Tracks—Aliso to Al-					
	hambra	49,186	\$27,831	\$85,465		162,482
	Total	\$177,061	\$27,831	\$85,465		\$290,357
	7 Main Line Tracks and Connections, Not De-					
	pressed:					
E	Connection—Southern Pacific and Santa Fe					
	at North Broadway	\$23,479				\$23,479
M-1	Connection—Salt Lake and Santa Fe at Red-	9,116				9,116
	ondo Junction					
MD-2	Connection—Salt Lake and Santa Fe at Hum-	19,862	\$11,363	\$7,222		38,447
	boldt St.	\$52,157	\$11,363	\$7,222		\$71,042
	Total	\$95,454	\$22,726	\$14,444		\$132,624
	10 New Trackage—River to Hobart and Connections:					
AC	Second Track—Santa Fe, Soto St. to Hobart	\$31,510				\$31,510
AD	Connection Salt Lake and Santa Fe at Hobart	41,200	\$6,310			47,510
M 4	Second Track—Santa Fe, Soto St. to Redondo	32,550				32,550
	Junction					
	Total	\$105,260	\$6,310			\$111,570
	11 New Freight Yards—Southern Pacific and					
	Santa Fe:					
MA	Yard for Southern Pacific along San Fernando	\$1,198,127				\$1,198,127
	Road—Modified.					
	13 New Connections—Relief of Alameda St. Switching:					
P	Connection—Jackson St. and Santa Fe Tracks	\$4,436				\$4,436
M-5	Connection—Alameda St. and Santa Fe near	7,351				7,351
	Industrial St.					
M-6	Connection—Salt Lake Main Line and Butte	5,715				5,715
	St. Track					
MY	Connection—Alameda St. and Butte St. Track	21,785	\$18,512	\$9,410		49,707
	Total	\$39,287	\$18,512	\$9,410		\$67,209
	14 Team Yards:					
CD	Team Yard at Southern Pacific Freight Station	\$50,155		\$98,116		\$148,271
	Site					
S	16 Release Southern Pacific Station Site	\$96,840	\$1,719,918	\$573,104		\$1,243,654
V	17 Release Southern Pacific Coach Yard Site	\$14,964	\$1,651,262	\$121,844		\$1,574,382
ELECTRIC ROAD						
	20 New Line—Pacific Electric Station to Brooklyn					
	Ave. and to Fourteenth St.:					
SK	Abandon Pacific Electric in Los Angeles St.,	\$39,074				\$39,074
	etc.					
CM	Subway and Elevated—Pacific Electric Station	3,757,251	\$97,405	\$26,160		3,880,816
	to Brooklyn Ave.					
DR	Elevated—Pacific Electric Station to Four-	1,092,114	482,030	97,446		1,671,590
	teenth St.					
	Total	\$4,888,439	\$579,435	\$123,606		\$5,591,480
	Grand Total	\$12,189,812	\$1,084,688	\$2,292,665	\$198,967	\$15,666,132

* Credit.

TABLE D-2
ASSEMBLY OF ESTIMATE SECTIONS INTO PRIMARY GROUPS

PLAN "D"

IMMEDIATE PLAN

UNION PASSENGER STATION AT SANTA FE STATION SITE

Est. Sec. Key Group	Item	Physical Construc- tion	Acquisition of Property			Total
			Land	Improve- ments	Property Damage	
STEAM ROADS						
MDJ	1 Passenger Terminal, Approaches, etc.	\$2,396,777		\$180,263		\$2,577,040
MDP	2 Union Coach Yard	\$544,067	\$451,975	\$9,631		\$1,005,673
	4 Union Freight Terminal					
	5 Viaducts Over Los Angeles River:					
M	New Viaduct at Macy St.	\$321,383	\$5,679		\$30,495	\$357,557
T	New Viaduct at Aliso St.	347,785			69,151	416,936
	Total	\$669,168	\$5,679		\$99,646	\$774,493
	6 Depression of and New Tracks Along River:					
N	Removal of Santa Fe Crossings—Macy and Aliso Sts.	\$1,047				\$1,047
M-3	Depression of Salt Lake Tracks—Aliso to Alhambra	49,186	\$27,831	\$85,465		162,482
M-8	Depression of Santa Fe Tracks—First St. to Alhambra	53,827				53,827
	Total	\$104,060	\$27,831	\$85,465		\$217,356
	7 Main Line Tracks and Connections, Not Depressed:					
	Connections at West end of Humboldt St. Bridge.	\$23,479				\$23,479
M-1	Connection—Salt Lake and Santa Fe at Redondo Junction	9,116				9,116
M-9	Double-tracking Santa Fe Tracks	9,086				9,086
MD-2	Connection of Salt Lake and Santa Fe at Humboldt St.	19,862	\$11,363	\$7,222		38,447
MDQ	Double-track Connection between Santa Fe and Southern Pacific	45,238	71,725	4,607		121,570
	Total	\$106,781	\$83,088	\$11,829		\$201,698
	10 New Trackage—River to Hobart and Connections:					
AC	Second Track—Santa Fe, Soto St. to Hobart	\$31,510				\$31,510
AD	Connection—Salt Lake and Santa Fe at Hobart	41,200	\$6,310			47,510
M-4	Double-tracking Santa Fe Main Line at Redondo Junction	32,550				32,550
	Total	\$105,260	\$ 6,310			\$111,570
	11 New Freight Yards—Southern Pacific and Santa Fe:					
MO	New Trackage—Santa Fe Yard at Hobart	\$579,127				\$579,127
	13 New Connections—Relief of Alameda St. Switching:					
P	Connection—Jackson St. Spur and Santa Fe Tracks	\$4,436				\$4,436
M-5	Connection—Alameda St. and Santa Fe, near Industrial St.	7,351				7,351
M-6	Connection—Salt Lake Main Line and Butte St. Track	5,715				5,715
MY	Connection—Alameda St. Track and Butte St. Track	21,785	\$18,512	\$9,410		49,707
	Total	\$39,287	\$18,512	\$9,410		\$67,209
	14 Team Yards					
S	16 Release Southern Pacific Station Site	*\$96,840	*\$1,719,918	\$573,104		*\$1,243,654
V	17 Release Southern Pacific Coach Yard Site					
ELECTRIC ROAD						
	20 Elevated—Pacific Electric Station to Brooklyn Ave. and to Fourteenth St.:					
DM	Elevated—Pacific Electric Double Track	\$854,363	\$31,270			\$885,633
DR	Elevated—Pacific Electric Station to Fourteenth St.	1,092,114	482,030	\$97,446		1,671,590
	Total	\$1,946,477	\$513,300	\$97,446		\$2,557,223
	Grand Total	\$6,394,164	*\$613,223	\$967,148	\$99,646	\$6,847,735

* Credit.

Appendix

TABLE I

GROWTH IN AUTOMOBILE REGISTRATION

Political Subdivision	Registrations in Year ending December 31											
	1914		1915		1916		1917		1918		1918	
	Auto- mobiles	Motor- cycles	Auto- mobiles	Motor- cycles	Auto- mobiles	Motor- cycles	Auto- mobiles	Motor- cycles	Auto- mobiles	Motor- cycles	Auto- mobiles	Motor- cycles
Los Angeles County	43,090	7,685	55,217	8,088	74,700	9,724	93,654	9,590	107,232	8,797	128,767	10,824
Orange County	3,761	801	4,913	932	6,140	1,092	8,132	1,095	9,130	917	10,342	1,112
San Bernardino County	3,198	977	4,404	1,051	6,249	1,307	7,737	1,211	8,342	938	9,312	1,112
Ventura County	1,410	186	1,797	190	2,540	213	3,307	196	3,763	142	4,113	329
Sub Total "A"	51,468	9,649	66,331	10,261	89,938	12,336	112,830	12,104	128,767	10,824	148,973	16,173
Imperial County	1,515	111	1,785	116	3,022	449	4,416	462	6,001	91	7,417	802
San Diego County	5,065	1,000	7,232	1,069	9,271	1,480	10,983	1,457	12,743	908	14,651	1,816
Riverside County	2,128	760	2,814	832	3,934	832	5,108	744	6,344	630	7,574	860
Santa Barbara County	1,796	304	2,469	320	3,885	388	5,293	358	6,413	329	7,746	758
Sub Total "B"	62,572	11,833	80,661	12,598	110,050	14,885	138,660	14,522	159,528	12,782	172,000	18,955
Balance of State	60,944	12,876	83,134	13,803	122,390	16,100	168,256	15,895	205,272	13,191	258,463	22,148
Total State	123,546	24,700	163,795	26,401	232,440	30,494	306,946	30,417	364,800	25,973	427,433	39,123
Percentage of Total Registrations in												
Los Angeles County	35	31	33	31	32	31	34	32	34	32	34	34
Sub Total "A"	42	39	40	39	38	40	37	40	35	35	32	35
Sub Total "B"	51	48	49	48	47	48	45	48	41	41	41	49

Compiled from Records of State Motor Vehicle Department

TABLE II

TRAVEL OVER BRIDGES ACROSS LOS ANGELES RIVER
YEARLY TOTALS BASED ON AVAILABLE INFORMATION

	People in Vehicles		Pedestrians and Bicycles		People on Street Cars		Total	
	Number	%	Number	%	Number	%	Number	%
Bridge at Street								
At Grade Crossings								
North Main.....	2,176,600	(9)	636,600	(14)	2,326,100	(6)	5,139,300	(8)
Macy.....	4,296,100	(18)	481,400	(11)	2,432,400	(6)	7,209,900	(11)
Aliso.....	816,200	(3)	527,400	(12)	11,291,700	(31)	12,605,300	(19)
Seventh.....	3,776,400	(15)	435,100	(10)	3,724,100	(10)	7,935,600	(12)
Ninth.....	226,300	(1)	141,600	(3)	.....	.....	367,900	(.5)
Total.....	11,291,600	46)	2,222,100	(50)	19,744,300	(53)	33,258,000	(50.5)
At Bridges Over Tracks								
North Broadway.....	8,236,400	(34)	207,300	(4)	8,316,900	(23)	16,760,600	(26)
North Spring.....	559,300	(2)	295,600	(7)	96,000	(2)	950,900	(1.5)
First.....	2,490,900	(10)	1,305,600	(29)	5,851,300	(16)	9,647,800	(15)
Fourth.....	2,003,500	(8)	452,300	(10)	2,409,400	(6)	4,865,200	(7)
Total.....	13,290,100	(54)	2,260,800	(50)	16,673,600	(47)	32,224,500	(49.5)
Grand Total and Bridges.....	24,581,700	(100)	4,482,900	(100)	36,417,900	(100)	65,482,500	(100)
AVERAGE DAY.....	67,350	37	12,280	7	99,780	56	179,400	100

TABLE III

STATEMENT SHOWING PASSENGER TRAINS, FREIGHT TRAINS AND LIGHT ENGINE MOVEMENTS
ALONG ALAMEDA ST., LOS ANGELES, FOR THE YEAR ENDING DECEMBER 31st, 1917

SWITCHING NOT INCLUDED

Month	Passenger Train Direction from Arcade Depot				Through Freight Train North and South of Arcade Depot				Light Road Engines North of Arcade Depot			
	Mid. 6 A.M.	6 A.M. Noon	Noon 6 P.M.	6 P.M. Mid.	Mid. 6 A.M.	6 A.M. Noon	Noon 6 P.M.	6 P.M. Mid.	Mid. 6 A.M.	6 A.M. Noon	Noon 6 P.M.	6 P.M. Mid.
January	8	471	246	384	131	81	67	114	8	533	328	384
February	9	429	248	351	112	67	60	125	9	485	304	351
March	14	490	289	384	128	53	56	123	14	552	351	384
April	20	481	291	404	127	59	47	108	20	541	351	404
May	6	470	269	417	147	48	30	113	6	532	331	417
June	3	456	248	392	135	44	38	131	3	516	308	392
July	5	472	256	405	133	59	52	147	5	534	318	405
August	23	480	285	399	166	66	59	146	23	542	347	399
September	30	472	272	361	153	71	58	141	30	534	334	361
October	26	474	277	388	158	78	76	137	26	536	339	388
November	35	471	265	380	126	52	46	135	35	531	325	380
December	45	498	309	362	128	61	56	132	45	560	371	362
Total	224	5661	3275	4630	1641	739	645	1582	224	6396	4007	4630
Average Day	61	15.5	9.0	12.7	1.5	2.0	1.8	4.3	57	17.5	11.0	12.7
Kind of Movement			Year	Year			Time of Movement			Year	Average	%
Passenger Movements			15 257	15 257			Midnight to 6 A.M.			2 092	6	6
Through Freight Movements			4 610	4 610			6 A.M. to Noon			13 531	37	38
Light Engine Movement			15 257	15 257			Noon to 6 P.M.			8 659	24	25
Movements			35 124	35 124			6 P.M. to Midnight			10 842	29	31
			96	96						35 124	96	100

Compiled from information furnished by Southern Pacific Company.

TABLE IV

PASSENGERS HANDLED BY STEAM RAILROADS AT LOS ANGELES
BASED UPON EIGHT DAY COUNT IN APRIL, 1918

ROAD AND NUMBER OF PASSENGERS

Date	Day of Week	Southern Pacific			Santa Fe			Salt Lake			Combined		
		Arrive	Depart	Total	Arrive	Depart	Total	Arrive	Depart	Total	Arrive	Depart	Total
10	Wednesday...	1,688	2,116	3,804	1,177	1,243	2,420	297	444	741	3,162	3,803	6,965
11	Thursday...	1,690	1,767	3,457	1,070	1,339	2,409	276	415	691	3,036	3,521	6,557
12	Friday.....	1,622	1,910	3,532	1,277	1,149	2,426	319	419	738	3,218	3,478	6,696
13	Saturday....	1,908	1,990	3,898	1,792	1,476	3,268	305	368	673	4,005	3,834	7,839
14	Sunday.....	2,096	2,002	4,098	1,417	1,839	3,256	330	372	702	3,843	4,213	8,056
15	Monday.....	1,578	2,257	3,835	1,389	1,371	2,760	306	553	859	3,273	4,181	7,454
16	Tuesday....	1,836	2,038	3,874	1,152	1,286	2,438	361	441	802	3,349	3,765	7,114
17	Wednesday..	1,683	1,905	3,588	1,077	1,378	2,455	264	426	690	3,024	3,709	6,733
Total, 8 days		14,101	15,985	30,086	10,351	11,081	21,432	2,458	3,438	5,896	26,910	30,504	57,414
Average, 1 day.....		1,763	1,998	3,761	1,294	1,385	2,679	307	430	737	3,364	3,813	7,177
Maximum of days.....		2,096	2,257	4,098	1,792	1,839	3,268	361	553	859	4,005	4,213	8,056
Total per year, based on above....		643,495	729,270	1,372,765	472,310	505,525	977,835	112,055	156,950	269,005	1,227,860	1,391,745	2,619,605
Proportions.....		.....	.....	52.4%	.....	.....	37.3%	.....	.....	10.3%	.....	.....	100%

Above figures based on actual count made by carriers on days shown. Troop trains are excluded, otherwise all persons riding on trains are included, regardless of form of transportation.

TABLE V

**PASSENGERS HANDLED BY STEAM RAILROADS AT LOS ANGELES
BASED ON ACTUAL COUNT OF SEPTEMBER, 1918**

RAILROAD AND NUMBER OF PASSENGERS CARRIED

Date	Item	Southern Pacific			Santa Fe			Salt Lake			Combined		
		Arrive	Depart	Total	Arrive	Depart	Total	Arrive	Depart	Total	Arrive	Depart	Total
23	Monday	1,725	1,813	3,538	753	1,328	2,081	976	974	1,950	3,451	4,115	7,569
24	Tuesday	1,835	1,840	3,675	700	1,173	1,873	1,028	948	1,976	3,563	3,961	7,524
25	Wednesday	1,879	1,782	3,661	693	1,013	1,706	996	984	1,980	3,568	3,779	7,347
26	Thursday	1,917	1,910	3,827	802	1,002	1,804	924	1,011	1,938	3,673	3,956	7,629
27	Friday	1,863	1,955	3,818	819	1,112	1,931	1,010	951	1,961	3,692	4,021	7,713
28	Saturday	2,069	1,841	3,910	1,079	1,179	2,258	1,015	1,051	2,066	3,163	4,071	8,234
29	Sunday	2,085	2,004	4,089	874	1,156	2,030	731	721	1,452	3,690	3,881	7,571
30	Monday	1,895	1,864	3,759	805	1,306	2,111	993	1,079	2,072	3,693	4,249	7,942
Total, 8 days		15,298	15,639	30,937	6,525	9,269	15,794	7,673	7,725	15,398	29,496	32,033	61,529
Average, 1 day		1,912	1,880	3,792	816	1,159	1,975	959	966	1,925	3,687	4,005	7,692
Maximum of days		2,085	2,004	4,089	1,079	1,328	2,258	1,028	1,079	2,072	3,163	4,249	8,234
Total per year, based on above Proportions		697,880	686,200	1,384,080	297,810	423,035	720,845	350,035	352,590	702,625	1,345,755	1,461,825	2,807,580
		24 9%	24 1%	49 3%	10 6%	15 1%	25 7%	12 1%	12 6%	25 0%	47 9%	52 1%	100%

* Tuesday - October 1, 1918.

† Wednesday - October 2, 1918.

TABLE VI

TICKET SALES AT LOS ANGELES IN YEAR 1917
SOUTHERN PACIFIC, SANTA FE AND SALT LAKE RAILWAYS

	Class of Ticket					
	Local		Interline		Total	
	No. of Tickets Sold	Revenue	No. of Tickets Sold	Revenue to Originating Road	No. of Tickets Sold	Revenue
Road and Office						
Southern Pacific						
Arcade Depot.	255,787	\$1,411,127.00	16,568	\$275,935.00	272,355	\$1,687,062.00
River Depot . . .	4,844	7,944.00	6	132.00	4,850	8,076.00
*Pacific Elec. Depot.	1,950	16,876.00	372	6,232.00	2,322	23,108.00
Uptown Office . . .	76,239	687,486.00	35,462	656,653.00	111,701	1,344,139.00
Total.	<u>338,820</u>	<u>\$2,123,433.00</u>	<u>52,408</u>	<u>\$938,952.00</u>	<u>391,228</u>	<u>\$3,062,385.00</u>
Santa Fe						
Depot Office.	148,330	\$588,864.23	15,451	\$288,465.40	163,781	\$877,329.63
Uptown Office. . .	21,777	144,417.75	36,901	1,153,862.00	58,678	1,298,279.75
Total.	<u>170,107</u>	<u>\$733,281.98</u>	<u>52,352</u>	<u>\$1,442,327.40</u>	<u>222,459</u>	<u>\$2,175,609.38</u>
Salt Lake						
Depot Office.	52,883	\$121,970.67	5,010	\$59,021.27	57,893	\$180,991.94
Uptown Office. . .	8,796	89,000.32	16,506	364,158.36	25,302	453,158.68
Total.	<u>61,679</u>	<u>\$210,970.99</u>	<u>21,516</u>	<u>\$423,179.63</u>	<u>83,195</u>	<u>\$634,150.62</u>
Combined						
Depot Offices. . .	463,794	\$2,146,781.90	37,407	\$629,785.67	501,201	\$2,776,567.57
Uptown Offices. . .	106,812	920,904.07	88,869	2,174,673.36	195,681	3,095,577.43
Total.	<u>570,606</u>	<u>\$3,067,685.97</u>	<u>126,276</u>	<u>\$2,804,459.03</u>	<u>696,882</u>	<u>\$5,872,145.00</u>
Comparisons						
Depot Offices.	81.3%	70%	29.6%	22.5%	71.9%	47.3%
Uptown Offices.	18.7%	30%	70.4%	77.5%	28.1%	52.7%
Local and Interline. . .	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>
	82%	52%	18%	48%	100%	100%
Averages						
Revenue per ticket:						
Depot Offices.		\$1.63		\$16.84		\$5.54
Uptown Offices.		8.62		24.47		15.82
Totals.		5.38		22.21		8.43

"Interline" does not include tickets sold by other roads and "Interline Revenue" is proportion which accrues to the three roads shown from the tickets they sell direct.

* Five months only.

Compiled from statistics furnished by carriers.

TABLE VII
 SCHEDULED PASSENGER TRAINS AT LOS ANGELES AS OF
 DECEMBER 31, 1917

(Compiled from Employees' Timetables)

Train No.	Leaving Time			Train No.	Arriving Time		
	Southern Pacific	Santa Fe	Salt Lake		Southern Pacific	Santa Fe	Salt Lake
30	A.M.		6:35N	79	A.M.		6:00S
55		6:50N		37		6:45NE	
8			7:45S	9			7:10N
107		7:50N		1		7:15NE	
77		8:00N		8		7:30N	
102		8:30NE		102		7:45N	
42			8:30N	121		7:50S	
23				22			8:10S
20			8:45S	50		8:10N	
2			9:00S	65			8:20S
72			9:00S	1			8:20S
21		9:00N		1			8:30S
122		10:00S		105		8:30NE	
52			10:15S	31			8:35N
4		11:45NE		17			8:45S
4	P.M.		1:10N	15			8:45N
74			1:15S	26		8:50N	
8				76		9:45N	
18			2:00N	41			10:15N
36				51			11:00S
79		2:55N	2:40N	56		11:25N	
76				22		11:30N	
2		3:00NE		24	P.M.		12:15S
106		3:05NE		71			12:50S
110		3:30NE		33			12:55N
54			4:00S	110		1:40N	
38				123		2:20S	
25			4:35N	3		2:30NE	
17		5:00N	4:40S	19			2:30S
16			5:00N	7			2:40N
57		5:15N		3			
124		5:20S		35			3:55N
66			5:25S	7			4:30S
12				11			4:45S
25		6:00N	5:30S	73			4:50S
22			6:10N	53			5:00S
40				80		6:00N	
49		7:30N	7:20N	75			6:30S
75		8:00N		58		6:35N	
2			8:00S	108		7:00N	
10			8:30N	37			7:00N
56			8:30S	26			7:10S
101		10:15N		21			7:50S
109		11:30N		15			7:55N
38		11:30NE		39			8:35N
78			11:59S	109		8:55NE	
				101		9:30NE	
				78		9:59N	
46		20	16	10		48	20
23N		12N	7N	4N		22N	12N
6NE		6NE				6NE	5N
17S		2S	9S	6S		20S	2S
							11S
							7S

NOTE: Mixed trains, or trains running less than 6 days per week are not included. Directions entering or leaving: N, North; NE, North via Alhambra Ave.; S, South.

TABLE VIII

**SCHEDULED PASSENGER TRAINS AT LOS ANGELES
AS OF JUNE 2, 1918**

(Compiled from Employees' Timetables)

Train No.	Leaving Time			Train No.	Arriving Time			
	Southern Pacific	Santa Fe	Salt Lake		Southern Pacific	Santa Fe	Salt Lake	
21	A.M.		5:40S	37	A.M.	6:45NE		
23			6:50S	79		7:15S		
107		6:55N		8		7:25N		
30			7:45N	101		7:30NE		
77		8:00N		121		7:50S		
52			8:00S	26		8:30N		
4		9:00NE		17			8:30N	
2			9:00N	1			8:30S	
72			9:05S	110		8:45N		
2				31			9:05N	
25			9:30S	22			9:10S	
36		9:40NE		50		9:25N		
122		10:00S		76		10:15N		
4			10:00N	1		11:00NE		
102		11:00NE		9			11:00N	
8	P.M.		1:00S	51			11:00S	
2		2:00NE		56		11:25N		
18			2:00N	24	P.M.		12:15S	
74			2:05S	7			12:45S	
79		2:55N		71			12:50S	
110		3:00NE		123		1:20S		
54			4:00S	3			4:15S	
27				35		4:40NE		
25		5:00N		73			4:50S	
57		5:15N		3		5:30NE		
124		5:20S		3			5:30N	
34			5:35N	1			5:30S	
76			6:00S	53			5:50S	
17		6:15N		80		6:00N		
49		7:30N		26			6:10S	
75		8:00N		75			6:30S	
10			9:00N	35			7:00N	
4				28			7:10S	
109		11:30N		108		7:20N		
38		11:30NE		109		9:05NE		
78			11:50S	78		10:45N		
36		17	11	8	36	17	11	8
15N		9N	4N	2N	14N	9N	3N	2N
6NE		6NE			6NE	6NE		
15S		2S	7S	6S	16S	2S	8S	6S

NOTE: Mixed trains, or trains running less than 6 days per week are not included. Direction entering or leaving: N, North; NE, North via Alhambra Ave.; S, South.

TABLE IX

BAGGAGE RECEIVED AT AND FORWARDED FROM LOS ANGELES, YEAR 1917

Month	Road and Number of Pieces													
	Southern Pacific				Santa Fe				Salt Lake				Combined	
	Rec'd	For'd	Total	Rec'd	For'd	Total	Rec'd	For'd	Total	Rec'd	For'd	Total	Rec'd	For'd	Total
January	26,225	26,063	52,298	14,697	11,823	26,520	6,073	5,645	11,718	16,995	13,471	30,466	43,471	90,466
February	10,181	25,467	35,648	14,268	11,821	26,089	5,928	3,950	9,878	30,377	41,408	71,785	41,408	71,785
March	27,803	32,780	60,583	15,636	16,067	31,703	8,855	4,851	13,706	52,291	53,701	105,995	53,701	105,995
April	27,408	31,212	58,620	12,733	16,789	29,522	11,117	5,181	16,298	50,988	53,182	104,170	53,182	104,170
May	27,303	28,718	56,021	14,606	13,912	28,518	9,950	5,338	15,288	51,839	18,028	99,887	18,028	99,887
June	27,873	27,800	55,673	14,356	15,084	29,440	10,511	5,716	16,227	52,710	18,630	101,370	18,630	101,370
July	30,938	30,171	61,109	13,815	11,624	25,439	8,417	5,138	13,555	53,170	46,933	100,103	46,933	100,103
August	32,134	31,171	63,305	14,614	14,303	28,917	9,095	5,017	14,112	56,875	53,524	110,397	53,524	110,397
September	31,940	32,839	64,779	13,899	15,720	29,619	8,408	5,539	13,947	54,217	51,098	105,315	51,098	105,315
October	31,274	30,378	61,652	14,492	14,199	28,691	7,281	5,701	12,982	53,017	50,281	103,298	50,281	103,298
November	29,820	26,631	56,451	15,998	12,601	28,599	6,278	5,355	11,633	52,096	44,587	96,683	44,587	96,683
December	33,945	27,767	61,712	16,838	13,610	30,448	4,990	4,471	9,461	55,773	15,878	101,651	15,878	101,651
Total	336,541	351,140	687,681	175,982	167,613	343,595	96,933	62,268	159,201	609,459	581,021	1,190,480	581,021	1,190,480
Average Day	922	970	1,892	482	159	911	266	170	436	1,670	1,600	3,270	1,600	3,270

Compiled from information furnished by carriers.

TABLE X

EXPRESS RECEIVED AT AND FORWARDED FROM LOS ANGELES DURING 1917 BY WELLS FARGO AND COMPANY EXPRESS, AT SOUTHERN PACIFIC AND SANTA FE STATIONS AND BY AMERICAN EXPRESS COMPANY AT SALT LAKE STATION YEAR 1917

	Tons of Express												
	Wells Fargo and Company						American Express Co.						
	Southern Pacific		Santa Fe		Total		Salt Lake		Combined		Total		
Rec'd	Del'd	Rec'd	Del'd	Total	Rec'd	Del'd	Total	Rec'd	Del'd	Total	Rec'd	Del'd	Total
Total:													
Received...	29,964		9,898		39,862				2,451		42,313		
Delivered...	24,709		9,956		34,665				2,737		37,402		
Total...		54,673		19,854	74,527					5,188			79,715
Average Day...	99	33	82	33	115	182	248	8	9	17	108	158	266
Per Cent of:													
Each Total	55	45	49	51	100	53	47	100	47	53	100	53	47
W. F. Total	73				27		100				7		100
Grand Total	68				25		93				7		100

Tons of Express Transferred

	Wells Fargo and Company From						American Exp. Co. From					
	Southern Pacific		Santa Fe		Total		Salt Lake		Combined		Total	
	Tons	%	Tons	%	Tons	%	Tons	%	Tons	%	Tons	%
To Southern Pacific	4,320	92	2,880	98	2,880	38	516		7,716	95		
Santa Fe	360	8	48	2	408	6		408	5			
Salt Lake							516		8,124	100		
Total	4,680	100	2,928	100	7,608	100	2		27			
Average Day	15		10		25							
Per Cent of Wells Fargo to Total	60		40		100							
Grand Total	58		36				6		100			

Information furnished by Express Companies.

TABLE XI

TRACKAGE AND CAR CAPACITY OF PASSENGER STATION AND COACH YARDS, LOS ANGELES, 1918

Class of Track	Salt Lake		Santa Fe		Southern Pacific		Combined Total	
	Total Length, Feet	Car Capacity, Cars	Total Length, Feet	Car Capacity, Cars	Total Length, Feet	Car Capacity, Cars	Total Length, Feet	Car Capacity, Cars
Passenger Depot . .	3,108	34	22,025	210	32,367	284	57,500	528
Coach Yard	10,446	106	14,915	141	31,751	270	57,112	517
Total	13,554	140	36,940	351	64,118	554	114,612	1,045

Car capacity estimates based on 70 feet per car and extended only for such tracks as cars may stand upon without interference to operation on other tracks.

TABLE XII

TRACKAGE AND CAR CAPACITY OF STEAM RAILROAD TRACKAGE, LOS ANGELES, 1918

(Passenger Station and Coach Yards Excluded)

Class of Track	Salt Lake		Santa Fe		Southern Pacific		Combined Total	
	Total Length, Feet	Car Capacity, Cars	Total Length, Feet	Car Capacity, Cars	Total Length, Feet	Car Capacity, Cars	Total Length, Feet	Car Capacity, Cars
Freight Yard	45,501	795	101,805	1,276	250,066	4,143	397,372	6,214
Freight House . . .	4,802	81	10,694	176	10,138	129	25,694	386
Team	4,206	82	16,227	304	18,627	252	39,150	638
Transfer	13,007	72	1,368	60	2,145	18	19,520	150
Shop and Engine . .	23,201	301	28,139	412	113,468	1,680	164,808	2,123
Industrial	11,830	657	139,236	1,741	135,238	1,626	316,304	4,021
Total	132,637	1,988	300,469	3,999	529,982	7,818	963,088	13,835

Car capacity based on 13 feet per car and estimated only for such tracks as cars may stand upon without interference to operation on other tracks (25.4 Miles) (56.9 Miles) (100.4 Miles) (182.4 Miles)

TABLE XIII
**STATEMENT SHOWING FREIGHT CARS HANDLED IN AND OUT OF LOS ANGELES YARD,
 YEAR 1917, BY SOUTHERN PACIFIC COMPANY**

Direction	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
East via Shorb:													
Received: Loads	5,345	5,305	6,332	6,988	7,148	7,189	6,266	5,850	5,383	5,468	5,152	4,869	71,295
Empty	6,886	7,399	6,517	7,922	5,333	4,395	5,631	6,378	6,159	5,628	4,800	5,621	72,669
Forwarded: Loads	10,402	8,821	9,744	8,013	8,334	8,171	8,845	8,788	8,454	9,957	9,075	10,346	108,950
Empty	1,529	1,322	2,320	1,961	1,641	1,660	1,250	1,155	1,327	1,641	1,440	947	18,196
South (Florence):													
Received: Loads	3,799	2,664	4,055	4,506	3,381	4,958	3,413	4,195	3,016	2,982	2,585	1,876	41,430
Empty	666	423	658	481	551	327	380	720	579	813	826	600	7,084
Forwarded: Loads	1,507	1,237	1,347	1,325	1,271	1,319	1,388	1,450	1,515	1,460	1,108	1,106	16,045
Empty	2,874	2,192	2,136	2,741	2,431	2,609	2,885	2,851	1,847	1,327	1,679	1,784	27,662
Coast:													
Received: Loads	4,126	2,775	3,796	2,778	2,828	2,645	3,088	3,087	4,009	4,385	3,754	3,981	41,255
Empty	1,067	966	1,151	1,222	1,329	1,440	1,136	1,100	945	946	1,090	689	13,081
Forwarded: Loads	2,821	2,830	3,348	3,817	3,518	3,150	3,076	2,889	3,011	3,083	3,001	2,664	37,211
Empty	1,599	1,613	952	1,543	1,202	980	957	1,192	1,952	1,724	1,442	1,761	17,236
Valley:													
Received: Loads	6,341	5,529	5,561	4,557	4,608	4,349	5,975	5,623	4,983	5,548	4,796	5,871	63,724
Empty	1,122	440	1,306	713	1,400	1,079	734	592	394	522	702	453	9,457
Forwarded: Loads	2,347	2,162	2,634	3,257	3,513	3,670	3,125	3,026	2,382	2,584	2,730	1,889	33,319
Empty	4,965	4,495	4,756	3,994	4,019	2,358	3,968	4,175	3,171	2,936	2,336	2,622	11,311
Totals:													
Received: Loads	19,614	16,273	19,744	18,809	17,965	19,141	18,742	18,755	17,391	18,383	16,287	16,600	217,701
Empty	9,741	9,228	9,632	10,538	8,613	7,241	7,881	8,790	8,477	7,909	7,418	7,423	102,291
Forwarded: Loads	17,077	15,050	17,073	16,412	16,639	16,310	16,434	16,162	15,362	17,084	15,917	16,005	195,525
Empty	10,907	9,622	10,464	10,245	9,296	7,626	9,060	10,249	8,297	7,628	6,897	7,114	107,405
Totals...	57,339	50,173	56,913	55,804	52,513	50,318	52,117	53,956	49,127	51,004	46,519	47,142	622,925
Maximum Day	2,206	1,952	2,167	2,103	1,907	1,891	1,822	1,962	1,911	1,807	1,830	1,741	
Summary:													
Received per year:							Per average day...						Total
Forwarded per year:							Per average day...						
Total:							Per average day.....						1,706

From information furnished by Southern Pacific Company, Los Angeles, March 29, 1918.

TABLE XIV

FREIGHT CARS HANDLED IN AND OUT OF LOS ANGELES BY STEAM RAILROADS DURING YEAR 1917

General Direction of Line Haul from Center of Industrial District

	Northwest			Northeast			South			Total		
	Loads	Empties	Total	Loads	Empties	Total	Loads	Empties	Total	Loads	Empties	Total
Inbound												
Southern Pacific	104,979	22,538	127,517	71,295	72,669	143,964	41,430	7,081	48,514	217,704	102,291	319,995
Santa Fe				22,009	6,786	28,795	30,052	14,972	45,024	52,061	21,758	73,819
Salt Lake				1,252	1,096	2,348	32,452	9,778	42,230	33,701	10,874	44,578
Total Year	104,979	22,538	127,517	94,556	80,551	175,107	103,934	31,834	135,768	303,469	134,923	438,392
Average Day	287	62	349	259	221	480	285	87	372	832	369	1,201
Ratio, Loads, Empties,	82%	18%	100%	54%	16%	100%	77%	23%	100%	69%	31%	100%
Ratio, Roads			29%			40%			31%			100%
Outbound												
Southern Pacific	70,530	61,517	132,047	108,950	18,196	127,146	16,045	27,662	43,707	195,525	107,405	302,930
Santa Fe				8,882	3,568	12,450	15,538	18,338	63,876	51,420	21,906	76,326
Salt Lake				2,426	161	2,587	22,695	21,676	44,371	25,121	21,840	46,961
Total Year	70,530	61,517	132,047	120,258	21,928	142,186	84,278	67,676	151,954	275,066	151,151	426,217
Average Day	193	169	362	329	61	390	231	185	416	751	411	1,168
Ratio, Loads, Empties,	53%	17%	100%	81%	16%	100%	56%	14%	100%	65%	35%	100%
Ratio, Roads			31%			33%			36%			100%
Inbound Plus Outbound												
Southern Pacific	175,509	84,055	259,564	180,245	90,865	271,110	57,475	34,746	92,221	413,229	209,696	622,925
Santa Fe				30,891	10,351	41,242	75,590	33,310	108,900	106,481	43,661	150,145
Salt Lake				3,678	1,257	4,935	55,447	31,451	86,601	58,825	32,711	91,536
Total Year	175,509	84,055	259,564	214,814	102,479	317,293	188,212	99,510	287,722	578,535	286,074	864,609
Average Day	481	230	711	588	281	869	515	273	788	1,585	783	2,368
Ratio, Loads, Empties,	68%	32%	100%	67%	33%	100%	65%	35%	100%	67%	33%	100%
Ratio, Roads			30%			37%			35%			100%

Northwest: Coast and Valley Routes of Southern Pacific

Northeast: Pasadena Line of Santa Fe, Glendale and Pasadena Lines of Salt Lake and East via Shorb on Southern Pacific.

South: South along Los Angeles River or Alameda St.

Information furnished by carriers.

TABLE XV

CARS INTERCHANGED AT LOS ANGELES DURING YEAR 1917

Name	Location	Item	Transfer Points										Grand Total				
			Downey	Shops	8th and Alameda	Clement	Macy	Water	Hobart	Aliso	Andersen	Butte		Freight Cars	Passenger Cars	Total Cars	
Southern Pacific:	Road	Received:	33,050	16,734	20,408	24,926	18,432								113,550	922	114,472
		Passenger	737	152	19	14											
Santa Fe:	Road	Received:	35,289	17,120	37,116	9,837	27,249								119,591	816	120,407
		Passenger	601	169	23	23											
Salt Lake:	Road	Received:	33,050	17,120	20,408	24,926	18,432								233,141	1,738	234,879
		Passenger	737	152	19	14											
Pacific Electric:	Road	Received:	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23											
Cars Actually Handled:	All Roads:	Received:	68,319	33,854	57,524	34,763	38,681								113,471	1,730	115,201
		Passenger	1,338	921	42	37											
		Delivered:	69,657	34,175	57,566	34,800	38,681								113,471	1,730	115,201
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	17,120	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601	169	23	23									852	852	59,079
		Freight	33,050	16,734	20,408	24,926	18,432								113,471	878	114,349
		Passenger	737	152	19	14									1,730	878	114,349
		Freight	35,289	17,120	37,116	9,837	27,249								58,227	852	59,079
		Passenger	601														

TABLE XVI
**CARLOAD FREIGHT, INBOUND AND OUTBOUND, AT LOS ANGELES
 DURING 1917**

Carload Freight	No. of Cars, Railroad and Ratios				
	Southern Pacific Co.	Santa Fe	Salt Lake	Pacific Electric Ry.	Combined %
I—Inbound at Los Angeles and:					
A—Set on Industry Tracks from:					
1. Company Line Haul	24,312	11,074	3,774	536	42,696
2. Other Roads Line Haul	14,203	26,615	5,105	1,048	46,971
	38,515	10,689	8,879	1,584	89,667
B—Set on:	43%	45%	10%	2%	100%
1. Team Tracks	8,732	5,454	3,651	137	17,674
2. House Tracks	15,490	11,478	5,662	3,885	36,515
	24,222	16,632	9,313	4,022	54,189
C—Transferred to Other Roads for:	45%	31%	17%	7%	100%
1. Line Haul	11,456	6,479	4,874	18,525	41,334
2. Los Angeles Delivery	17,579	5,907	9,947	9,837	43,270
	29,035	12,386	14,818	28,362	84,601
D—Company Freight	31%	15%	18%	33%	100%
	7,171	912	1,227	940	10,250
E—Through or Passing Freight	71%	8%	12%	9%	100%
	133,433	8,057	3,259	10,074	154,823
F—Total Not Transferred (A1, B, D, E)...	87%	5%	2%	6%	100%
	189,441	39,675	17,573	15,572	261,961
G—Total Transferred, A2, C1	74%	15%	6%	5%	100%
	25,659	33,094	9,976	19,573	88,302
	29%	38%	11%	22%	100%
Grand Total—Inbound	214,800	72,769	27,549	35,145	350,263
	61%	20%	9%	10%	100%
II—Outbound at Los Angeles and:					
A—Received from Industry Tracks for:					
1. Company Line Haul	*17,931	12,969	903	474	32,277
2. Other Roads Line Haul	7,300	9,472	3,185	1,884	21,841
	25,231	22,441	4,088	2,358	54,118
B—Received from:	46%	41%	8%	5%	100%
1. Team Tracks	5,426	683	210	1,888	8,237
2. House Tracks	25,386	19,078	6,199	6,586	57,249
	30,812	19,761	6,409	8,474	65,486
C—Received from Foreign:	46%	30%	10%	14%	100%
1. Line Haul	21,471	8,833	7,824	5,912	43,740
2. Los Angeles Industries	8,401	3,020	3,348	3,113	18,182
	29,872	11,853	11,172	9,325	61,922
	47%	19%	18%	16%	100%
D—Company Freight	6,554	1,493	1,288	1,084	13,419
	48%	11%	33%	8%	100%
E—Through or Passing Freight	132,928	8,022	3,259	10,074	154,283
	87%	5%	2%	6%	100%
F—Total Not Transferred (A1, B, D, E)....	188,225	42,245	14,889	20,406	265,465
	71%	16%	6%	7%	100%
G—Total Transferred, A2, C1	28,471	18,305	11,009	7,896	65,581
	43%	28%	17%	12%	100%
Grand Total—Outbound	216,696	60,550	25,898	27,902	331,046
	65%	18%	8%	9%	100%
III—Total Inbound and Outbound..	431,496	133,319	53,447	63,047	681,309
	63%	20%	8%	9%	100%
IV—Origin and Destination in Los Angeles					
	3,038	4,361	341	1,905	9,645
					100

Note.—Error in both Inbound and Outbound between Items A2 and C2 is neglected in favor of Item A2.

* Proportions estimated by Southern Pacific Co.

TABLE XVII

**LESS THAN CARLOAD FREIGHT TRAFFIC
LOS ANGELES, YEAR 1917**

Item	Tons (2,000 Lbs.)					Ratios
	Southern Pacific	Santa Fe	Salt Lake	Pacific Electric	All Roads	
Inbound:						
Tons:						
Received at Freight House	50,144	54,132	31,725	26,750	162,751	
Through—Santa Fe Points..		10,669			10,669	
Delivered Connecting Lines..	5,288	2,869	2,382	8,218	18,757	
Total Received, Year...	55,432	67,670	34,107	34,968	192,177	35%
Total Received, Average Day (308 Days)...	180	220	111	113	624	
Ratios..	29%	35%	18%	18%	100%	
Cars:						
Number Set on House Tracks	15,490	11,478	5,662	3,885	36,515	
Tons per Car	3.58	5.89	6.05	9.00	5.26	
Outbound:						
Tons:						
Original Freight House	157,226	97,051	23,236	52,962	330,475	
Through—Santa Fe		10,669			10,669	
From Connecting Lines..	7,032	3,427	1,393	6,312	18,164	
Total Forwarded, Year..	164,258	111,147	24,629	59,274	359,308	65%
Total Forwarded, Average Day	533	361	80	192	1,166	
Ratios..	46%	31%	7%	16%	100%	
Cars:						
Number from House Tracks	25,386	19,078	6,199	6,586	57,249	
Tons per Car	6.46	5.84	3.94	9.00	6.27	
Inbound and Outbound: (Neglecting duplications in transfers)						
Tons:						
To and from Freight House..	*207,370	172,521	54,961	79,712	514,564	
To and from Connecting Lines	12,320	6,296	3,775	14,530	36,921	
Total..	219,690	178,817	58,736	94,242	551,485	100%
Total, Average Day..	713	581	191	305	1,790	
Ratios..	40%	32%	11%	17%	100%	
Cars:						
To and from House Tracks...	40,876	30,556	11,861	10,471	93,764	
Tons per Car	5.37	5.85	4.95	9.00	5.23	

* Including through Santa Fe points.
Information furnished by carriers. Year at 308 days.

TABLE XVIII
CARS INTERCHANGED AT LOS ANGELES DURING YEAR 1917

Company	Location	Traffic	Areas—Square Feet			Total	*Feet Load Length	Car Capacity	Con- struction	
			Freight House	Platform	Shed and Platform					Transfer Platform
Southern Pacific...	Alameda and North Spring St	Inbound	A 28,320 C 21,384	18,466 12,206	4,800	51,586 33,584	874 560	102 45	Frame "	
		Outbound	B 19,704	30,666	4,800	85,170	1,434	147	"	
	Total		24,000	9,720	3,108	36,828	848	51	"	
	Total Southern Pacific.		73,704	40,386	7,908	124,998	2,282	198		
Santa Fe	Santa Fe Ave. between Third and Fourth Sts	Inbound	54,000	1,885	6,936	15,878	78,699	1,253	76 Reinforced	
		Outbound	18,000	1,885	8,994	14,998	73,877	950	94 Concrete	
	Total Santa Fe.		102,000	3,770	15,930	30,876	152,576	2,203	170	
Salt Lake	Aliso and Myers Sts	Inbound	C 15,939	6,603		22,542	340	11	Frame	
		Outbound	A 11,338 B 12,960	6,284 7,901		17,619 20,861	342 431	27 18	" "	
	Total		24,298	14,185		38,483	773	45		
	Total Salt Lake		40,237	20,788		61,025	1,113	59		
Pacific Electric	Eighth and Alameda Sts	Inbound	245,944	64,944	23,838	30,876	335,599	5,598	427	
		Outbound	17,520 15,616	4,412 2,632	3,000 11,928	15,878 14,998	25,532 29,576	352 590	14 53	Frame "
	Total—Electric Road		33,436	6,444	15,528	55,108	942	67		
	Grand Total		437,463 111,911	13,566 27,822	15,336 24,030	15,878 14,998	211,943 178,761	3,379 3,161	251 243	
	Inbound and Outbound		249,077	71,388	39,366	30,876	330,707	6,540	494	

* Frontage available for wagons and trucks.

TABLE XIX

**ESTIMATE OF COST, BY STEPS, OF BUILDINGS AND DRIVEWAYS
FOR PROPOSED UNION L.C.L. FREIGHT STATION**

	Areas Square Feet	Estimated Cost		
		Class A	Class C	
1st Step:				
Shed A . . .	54,520	178,278	166,919	
Shed B . . .	64,960	209,099	195,583	
Platforms A-B	37,760	28,316	28,316	
Platform B to C	3,750	3,000	3,000	
Lift Bridges A-B . .		10,500	10,500	
Driveway A	54,000	27,000	27,000	
Driveway B-C	80,500	40,250	40,250	
Total	*160,990	496,443	471,568	
2nd Step:				
Shed C	56,028	181,926	170,285	
Shed D	53,360	174,656	163,566	
Platforms C-D	27,900	23,760	23,760	
Platform D to E . . .	3,000	1,650	1,650	
Lift Bridges C-D . . .		7,000	7,000	
Driveway D-E	66,500	33,250	33,250	
Total	*140,288	422,242	399,511	
3rd Step:				
Shed E	50,808	166,291	155,729	
Shed F	51,678	170,517	159,776	
Platforms E-F	27,000	21,600	21,600	
Platform F to G	4,050	3,240	3,240	
Lift Bridge E-F		7,000	7,000	
Driveway F-G	70,000	35,000	35,000	
2-Story Office Section	93,960	253,692	238,658	
Total	*133,536	657,340	621,003	
4th Step:				
Shed G	48,836	164,358	154,174	
Shed H	43,210	145,051	136,029	
Platforms G-H	31,885	23,612	23,612	
Lift Bridges G-H		7,000	7,000	
Driveway H	62,300	12,460	12,460	
Total	*123,931	352,481	333,275	
Summary—				
	Sheds Only.			
1st Step	119,480 square feet	160,990	496,443	471,568
2nd Step	109,388 square feet	140,288	422,242	399,511
3rd Step	102,486 square feet	133,536	657,340	621,003
4th Step	92,046 square feet	123,931	352,481	333,275
Grand Totals	423,400 square feet	*558,745	1,928,506	1,825,357

* Area of sheds and transfer platforms only.

TABLE XX

**NUMBER OF FREIGHT CARS HAULED, AND SET OUT AT VARIOUS POINTS, ALONG ALAMEDA STREET
BETWEEN ALHAMBRA AVENUE AND SOUTH SWITCHING LIMITS (NEAR SLAUSON AVENUE)
BY SOUTHERN PACIFIC COMPANY, YEAR 1917**

Sec.	Location		No. of Incl.	Destination and Number of Cars Set											
	From Street	To Street		Industries			Team Tracks			Pacific Electric Transfers			Totals		
				Load	Empty	Total	Load	Empty	Total	Load	Empty	Total	Load	Empty	Total
A	College	Ord	6	952	86	1,038	1,519	1,108	5,717				5,501	1,254	6,755
B	Ord	Macy	2	596	138	734	4,514	1,173	5,717				596	138	734
C	Macy	Aliso	12	128	238	366									26,332
D	1st	2nd	53	3,103	310	3,413							3,102	310	3,413
E	1st	3rd	6	2,870	117	3,017							2,870	117	3,017
F	2nd	10h	6	1,724	139	1,883							1,721	139	1,883
G	3rd	10h	9	1,217	328	1,545	2,588	219	2,807				3,805	547	4,352
H	10h	6th	2	110	0	110							110	0	110
I	6th	7th	31	1,754	888	2,642							1,754	888	2,642
J	7th	8th	70	3,461	865	4,329							3,461	865	4,329
K	8th	9th	10	1,143	47	1,190									37,116
L	9th	20th	21	2,832	215	3,077							2,832	215	3,077
M	20th	25th	1	301	81	382									9,837
N	25th	Doddsworth	13	5,210	2,356	7,566							5,210	2,356	7,566
			278	25,404	5,888	31,292	11,681	2,560	14,241				67,202		112,735

Air Line included in Pacific Electric Transfer, Sec. M): No. of Industries, 86; Loads, 2,501; Empty, 138; Total, 2,639.

Pacific Electric Transfer in Sec. M includes oil cars for Noxon Lumber and Picou Lumber (beginning of this traffic) and industries on Air Line.

Pacific Electric Transfer in Sec. C includes 15,575 cars hauled through city for Pacific Electric by Southern Pacific (Sec. M to Sec. K)

Pacific Electric Transfer in Sec. K includes 15,495 cars hauled through city for Pacific Electric by Southern Pacific (Sec. C to Sec. K)

NOTE: An industry is allocated to a district by location of spur point of switch in Alameda Street, rather than by location of its quarters. From information furnished by Carriers, except cars set on transfer tracks, from Chief Joint Inspector.

TABLE XXI

DATA ON SOUTHERN PACIFIC ARCADE STATION, LOS ANGELES

DATES

Ground broken for depot . . .	March 28, 1914
Use of depot commenced . . .	May 2, 1915
Official opening	June 12, 1915

FLOOR AREAS

(From S. P. Drwg. L. A. Div., M. of W., F6096, dated 12-22-18—File A2-1)

Item	Division and Use	No. of Square Feet and Floor				Total
		Basement	First	Second	Third	
1	Baggage, Used		11,421			11,421
2	Baggage, Vacant			8,832		8,832
3	Concourse		9,521			9,521
4	Dining Room		3,456			3,456
5	Exit from Trains		3,150			3,150
6	Engine and Boiler Rooms	3,278				3,278
7	Elevators		340	340	340	1,020
8	Halls and Stairs		1,717	1,186	3,808	6,711
9	Information, Telephone and Telegraph		994			994
10	Kitchen and Store		1,991			1,991
11	Ladies' Room and Lounge (Lounge on Mezzanine)		877	*2,417		3,294
12	Mail Room		701			701
13	Men's Lounge			*2,417		2,417
14	News Stand		189			189
15	Offices, Used		320		11,198	11,518
16	Offices, Vacant				6,877	6,877
17	Offices, Temporary			4,355		4,355
18	Parcel Room		994			994
19	Smoking Room		877			877
20	Ticket Office		1,050			1,050
21	Toilets	3,046	1,145		785	4,976
22	Totals	6,324	38,746	19,547	23,008	87,625
23			1,717	1,186	3,808	6,711
24	Net Totals	6,324	37,029	18,361	19,200	80,914

* Mezzanine.

Possible Future Seating Capacity:	Present	Possible Future
Concourse, Main Floor	240	240
Mezzanine, Men's End	40	140
Mezzanine, Women's End	27	54
Total	307	434
Dining Room:		
Number of Seats (approximate)	76	100
Number of Meals Served	400-500	1,000
Ticket Windows	10	...

TABLE XXII

**PHYSICAL CHARACTERISTICS OF PASSENGER STATIONS,
LOS ANGELES**

Item	Passenger Stations											
	Southern Pacific, 5th and Central		Santa Fe, 2nd and Santa Fe		Salt Lake, 1100 East 1st Street		Pacific Electric,				Combined	
	Floor Space		Floor Space		Floor Space		6th and Main		Hill Street		Floor Space	
	Sq. Ft.	Total	Sq. Ft.	Total	Sq. Ft.	Total	Sq. Ft.	Total	Sq. Ft.	Total	Sq. Ft.	Total
Station Building												
1. Public Facilities:												
Concourse:												
Open Waiting Room				2,226					2,148			4,374
Enclosed Waiting Room	8,676		1,750		1,024		22,420		3,381		37,251	
Exits	3,120	11,796	700	2,450			7,140	29,560			10,960	48,211
Halls and Stairs		1,426		36				713				2,176
Ticket Office		960		378		248		560		210		2,356
2. Public Service:												
Information	404		Included in		News Stand		648		At Parcel Room		1,052	
Telephone and Telegraph	466		95		36		400		36		1,033	
News Stand, etc	238		650	745	189	225	1,508		480		3,065	
Parcel Room	860	1,968	Included in		News Stand		360	2,916	108	624	1,328	6,478
3. Public Retiring Rooms:												
Ladies' Rest Room	2,909		733				320		96		4,058	
Men's Rest Room	2,168										2,168	
Smoking Room	701										701	
Toilets:												
Ladies	858		125		99		630		313		2,026	
Men	1,908	8,544	125	983	75	174	2,373	3,323	493	903	4,974	13,927
4. Catering Department:												
Dining Room	3,424		1,225		Included in		2,000		255		6,904	
Kitchen and Larder	1,972	5,396	1,220	2,454	News Stand		440	2,440	108	363	3,740	10,653
Total:												
Passenger Space		30,090		9,272		1,671		39,513		7,629		88,175
5. Office Space:												
General Offices:												
Used	14,604		1,870		4,160						20,634	
Vacant	4,579										4,579	
Temporary	3,258	22,441									3,258	28,471
Total:		52,531		11,142		5,831		39,513		7,629		116,646
Equipment												
6. Ticket Office:												
No. Windows		9		8		3		8		3		39
Counters, Lin. Ft.		31		30		16		60		12		141
7. Waiting Room:												
Seats Installed		307		166		100		246		117		936
Possible Increase		127										127
8. Dining Room:												
Seats Installed		76		48		6		84		19		233
Seats Increase		45										45
Meals served per diem		500		500 light lunches				400 light lunches				1,400

Data from maps and field inspection, Los Angeles, June, 1918

TABLE XXIII

PHYSICAL CHARACTERISTICS OF BAGGAGE FACILITIES AT PASSENGER STATIONS, LOS ANGELES

Item		Passenger Stations					Combined
		Southern Pacific	Santa Fe	Salt Lake	Pacific Electric		
					Main St.	Hill St.	
Baggage Facilities:							
Floor Area:							
Used	Sq. Ft.	13,674	7,985	2,954	5,681	Handled by Wells Fargo at Arcade Station	30,294
*Vacant	Sq. Ft.	11,487					11,487
Total		25,161	7,985	2,954	5,681		41,781
Frontage:							
Team	Lin. Ft.	96	180	97	54		427
Team	No.	12	22	12	6		52
Car	Lin. Ft.	272	103	97	120		592
Car	No.	4	2	2	2		10

* Portion of second floor, 3,258 square feet designed for baggage space is now being used as temporary offices, and so listed.

Data from maps and field inspection, Los Angeles, June, 1918.

TABLE XXIV

PHYSICAL CHARACTERISTICS OF EXPRESS FACILITIES AT PASSENGER STATIONS, LOS ANGELES

Item		Passenger Stations					Combined
		Southern Pacific	Santa Fe	Salt Lake	Pacific Electric		
					Main St.	Hill St.	
Express Building:							
Floor Area:							
Express Offices	Sq. Ft.	16,400	8,000	3,042	Handled at Arcade Depot	Handled at Arcade Depot	27,442
	Sq. Ft.	7,642					7,642
Total	Sq. Ft.	24,042	8,000	3,042			35,084
Frontage:							
Team	Lin. Ft.	200	210	100			510
Team	No.	25	26	12			63
Car	Lin. Ft.	194	160	100			454
Car	No.	3	2	2			7

Data from maps and field inspection, Los Angeles, June, 1918.

TABLE XXV

PHYSICAL CHARACTERISTICS OF MAIL FACILITIES AT PASSENGER STATIONS, LOS ANGELES

Item		Passenger Stations					Combined
		Southern Pacific	Santa Fe	Salt Lake	Pacific Electric		
					Main St.	Hill St.	
Mail Facilities:							
Floor Area:							
	Sq. Ft.	726	3,247	Handled Direct from Cars to Wagons	1,105	Handled at Main St. Station	5,078
Frontage:							
Team	Lin. Ft.	16	52		17		85
Team	No.	2	6		2		10
Car	Lin. Ft.	24	52		*		76
Car	No.	1	1				2

* Handled by elevator from elevated track to Mail Room.

Data from maps and field inspection, Los Angeles, June, 1918.

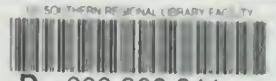
TABLE XXVI
 PHYSICAL CHARACTERISTICS OF PASSENGER STATIONS AT LOS ANGELES INCLUDING BAGGAGE, EXPRESS AND MAIL FACILITIES

Station Building	Passenger Stations					
	Southern Pacific	Santa Fe	Salt Lake	Pacific Electric		
				Main Street	Hill Street	Cross Street
1. Public Facilities:						
Concourse:	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.
Open		2,226			2,148	4,374
Enclosed	11,796	2,450	1,024	29,562	3,381	48,211
Hall and Stairs	1,426	36		714		2,176
Ticket Office	960	378	248	560	210	2,356
2. Public Service:						
Information, Telephone, etc.	1,968	745	225	2,906	624	6,478
3. Public Retiring Rooms	8,544	983	174	3,323	903	13,927
4. Catering Department:						
Dining Room	5,396	2,454		2,440	363	10,653
Total Passenger Space	30,090	9,272	1,671	39,513	7,629	88,175
5. Office Space:						
Used	17,862	1,870	4,160			23,892
Vacant	4,579					4,579
Total	52,531	11,142	5,831	39,513	7,629	116,606
6. Baggage Space:						
Used—Sq. Ft.	13,674	7,985	2,951	5,681		30,291
Vacant—Sq. Ft.	11,487					11,487
7. Express Space:						
Express—Sq. Ft.	16,490	8,000	3,042			27,532
Office—Sq. Ft.	7,642					7,642
8. Mail Space—Sq. Ft.	726	3,247		1,105		5,078
Total	49,929	19,232	5,996	6,786		81,943
Grand Total	102,460	303,714	11,827	46,299	7,629	198,589
9. Ticket Office:						
Windows	9	8	3	8	3	31
Counters—Lin. Ft.	31	30	16	60	12	149
10. Waiting Room:						
Seats Installed	307	166	100	246	117	936
Possible Increase	127					127
11. Dining Room:						
Seats Installed	76	48	6	84	19	233
Possible Increase	45					45
Number of Meals Served	500	500		400		1,400
	Frontage	Frontage	Frontage	Frontage	Frontage	Frontage
	Lin. Ft. No.	Lin. Ft. No.	Lin. Ft. No.	Lin. Ft. No.	Lin. Ft. No.	Lin. Ft. No.
12. Team Space:						
Baggage	96 12	180 22	97 12	54 6		427 52
Express	200 25	210 26	100 12			510 63
Mail	16 2	52 6		17 2		85 10
Total	312 39	442 54	197 24	71 8		1,022 125
13. Car Space:						
Baggage	272 4	103 2	97 2	120 2		592 10
Express	194 3	160 2	100 2			454 7
Mail	24 1	52 1				76 2
Total	490 8	315 5	197 4	120 2		1,122 19

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