CHAPTER VIII.

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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.

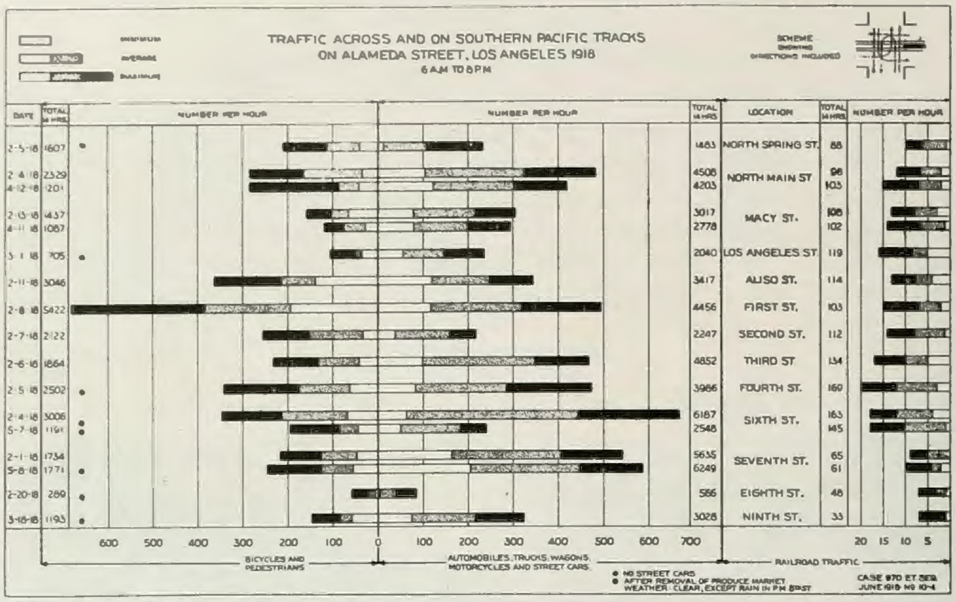
TRAFFIC STUDIES

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
North Main Street
Macy Street
Los Angeles Street
East First Street
East Second Street
East Third Street
East Fourth Street
East Fifth Street
East Sixth Street
East Seventh Street
East Eighth Street
East Ninth 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.

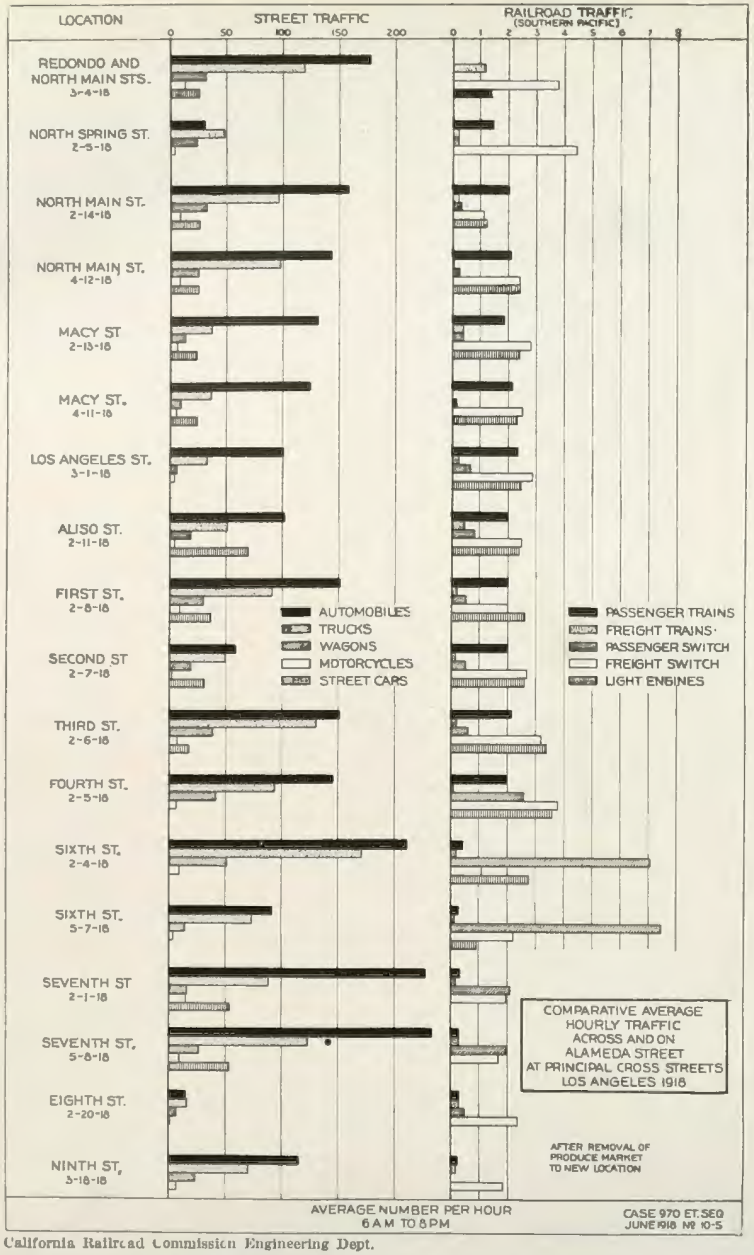


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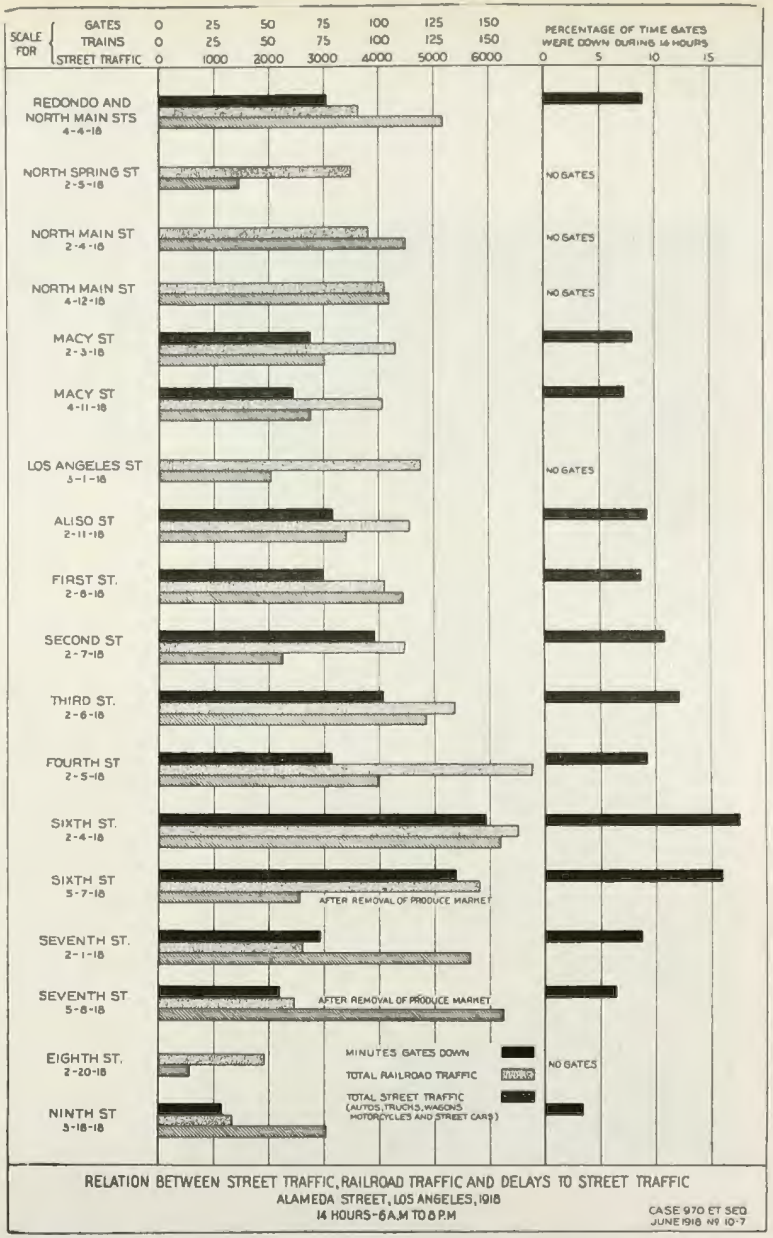
FIG. 66. AVERAGE HOURLY TRAFFIC ACROSS AND ON ALAMEDA STREET AT THE PRINCIPAL CROSS STREETS

This diagram shows both the railroad and street traffic and the segregation of the traffic into groups.



California Railroad Commission Engineering Dept.

FIG. 67. RELATION BETWEEN STREET 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. 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	Arcade Depot 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
Vehicles—Total	30,265	13,369	43,634
Street Cars and Interurban Trains	3,458	949	4,407
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 Alameda Street at	Automobiles Across Alameda St.	Automobiles Along Alameda St.	Trucks Across Alameda St.	Trucks Along Alameda St.	Hours Counted	Date 1918
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
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

	Arcade Depot			
	North of		South of	
Kind of Movement	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: Trains Pass.	Trains Frt.	Switches Pass.	Switches Frt.	Light Road Engines	Total	Date of Check
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 .....*(26)		(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	30	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
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
Total South of Arcade Depot	19	13	136	102	39	309	
Average per Crossing..	5	3	34	25	10	77	
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

*Excluded in Totals.
†10 Hour Count.

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 Arcade Depot		South of Arcade Depot		Ratios	
	No.	Ratio	No.	Ratio	North of Depot	South
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 North of Arcade Depot No.	Ratio	South of Arcade Depot No.	Ratio	Ratios North of Depot	South 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 Alosta 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%
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%
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%
Total	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
Total	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)	36	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	260
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 capaciy 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"

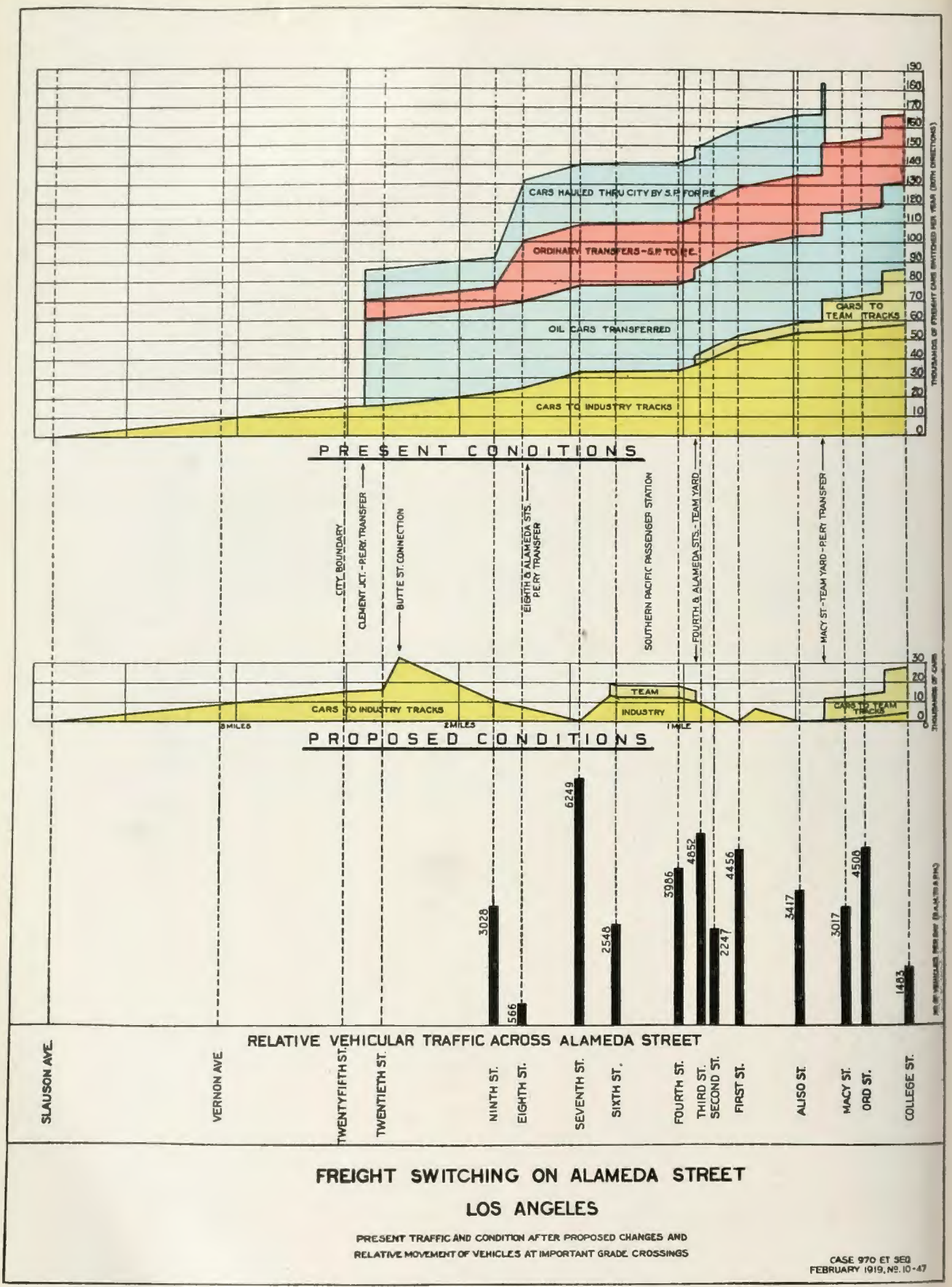
Freight Moving Week—January 14-19

	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.



California Railroad Commission Engineering Dept.

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 REROUTING SOUTHERN PACIFIC INDUSTRIAL SWITCHING OVER SANTA FE TRACKS ALONG RIVER AND EAST AND WEST LEADS

Street	No. of Frt. Cars Swtchd. 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	Proposed Reduction 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 5½ 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.

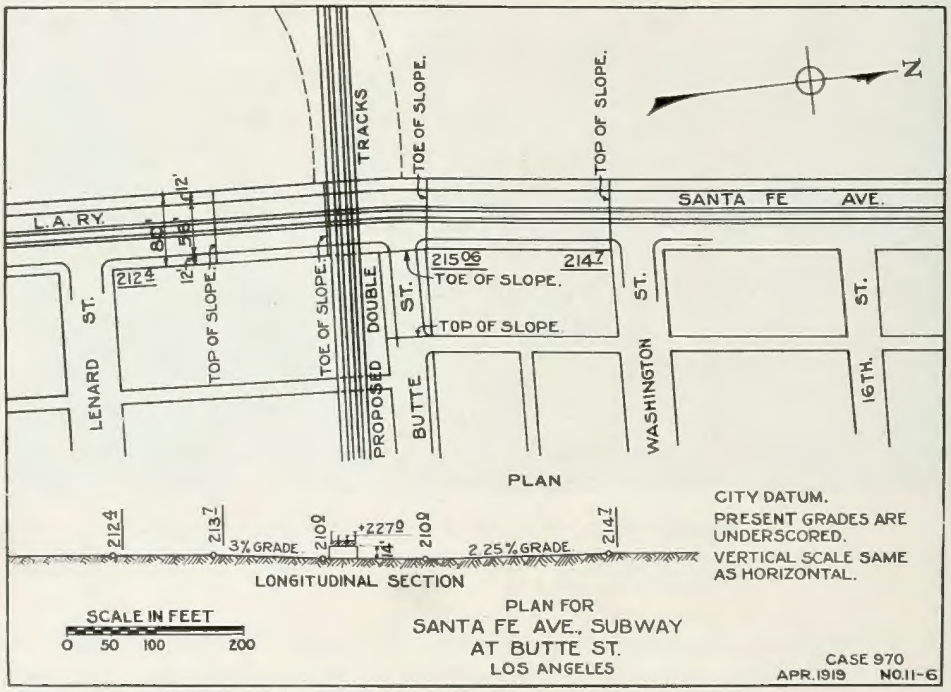
FIG. 71. INTERSECTION OF MISSION ROAD AT ALHAMBRA ROAD

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

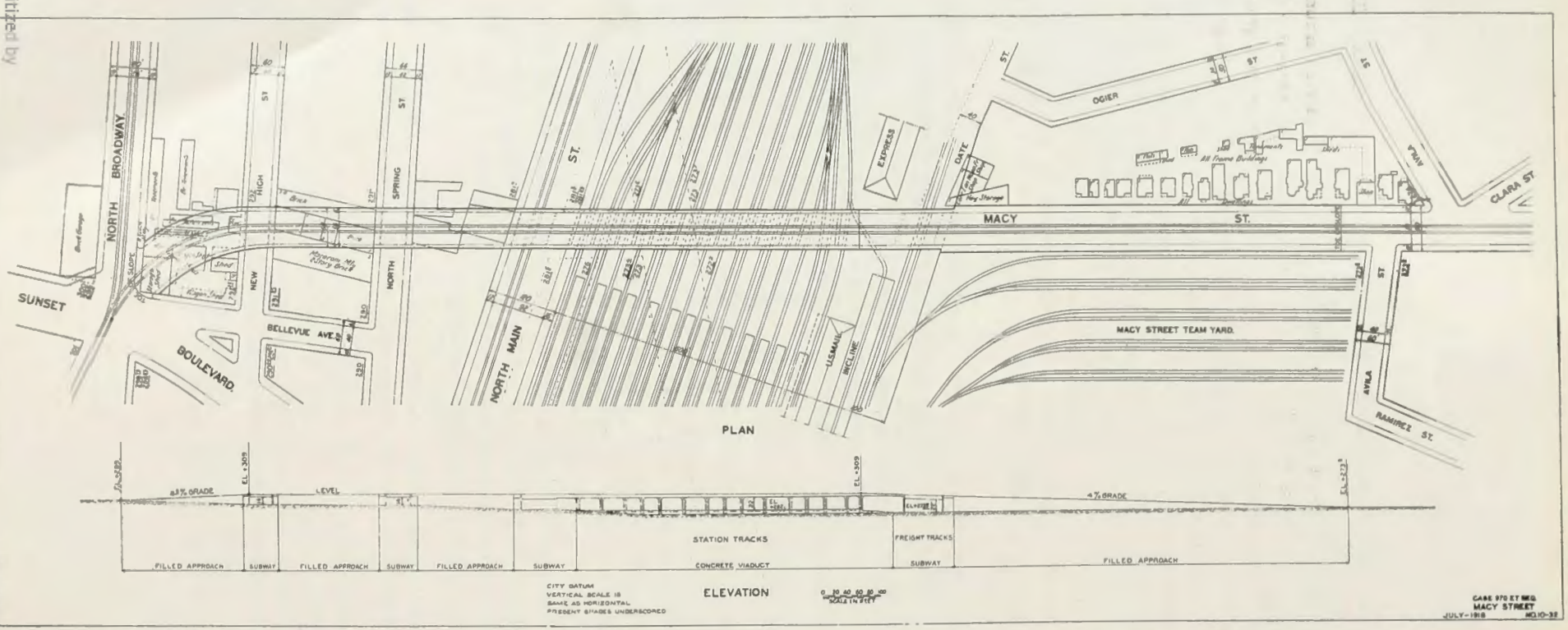
There are no crossings at grade in our plan for a union passenger station at the Plaza, with the exception of North Spring Street, which has been replaced by North Broadway as a main thoroughfare.

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.

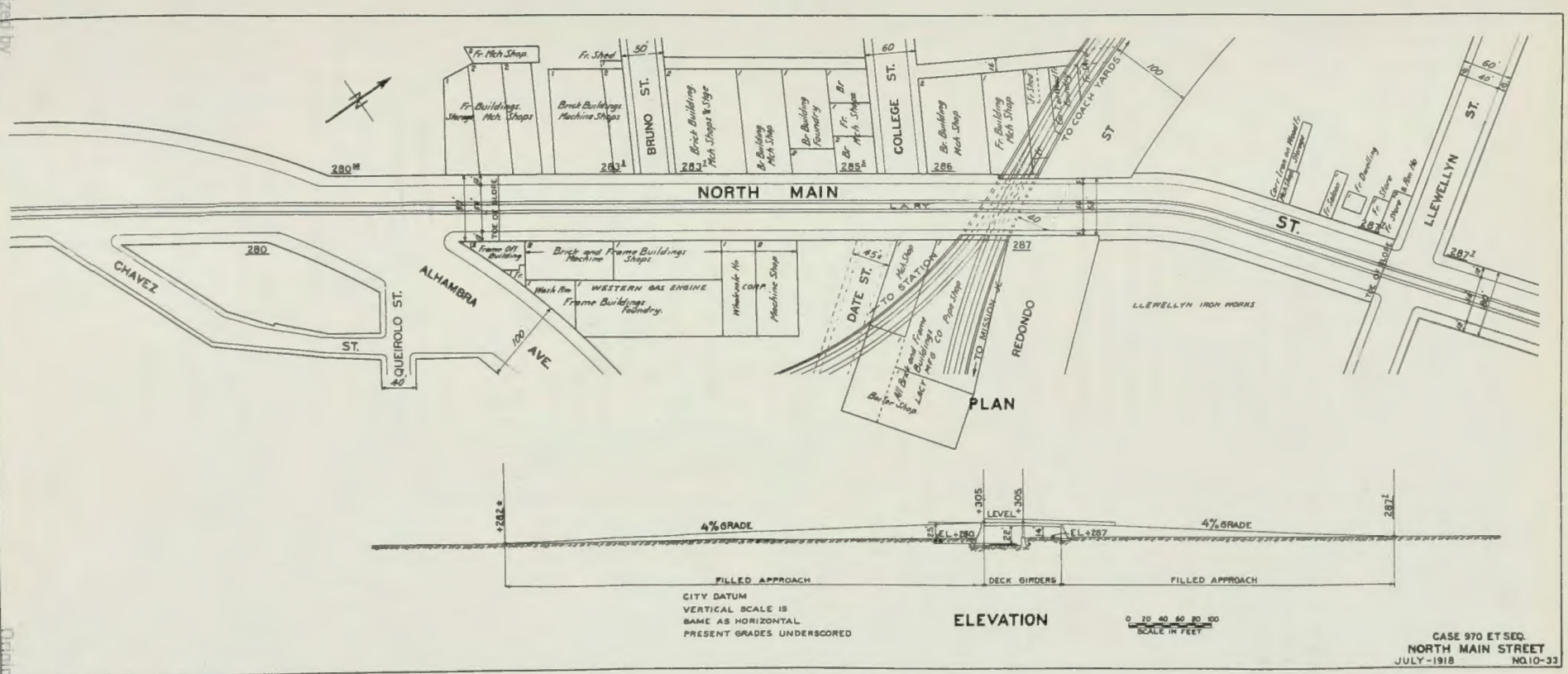
The construction of this viaduct will enable this traffic to reach the business portion of the city on a direct route entirely free from grade crossings of either steam or interurban railroads and would provide a direct route between Sunset Boulevard and Mission Road, between which streets there is already a rather heavy vehicular traffic. This viaduct is estimated to cost $730,901, exclusive of lands.



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.



California Railroad Commission Engineering Dept.

FIG. 74. PLAN AND ELEVATION FOR THE NORTH MAIN STREET VIADUCT AT REDONDO STREET

This viaduct will carry the North Main Street traffic over the tracks connecting the proposed union station at the Plaza with the coach yard.

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.

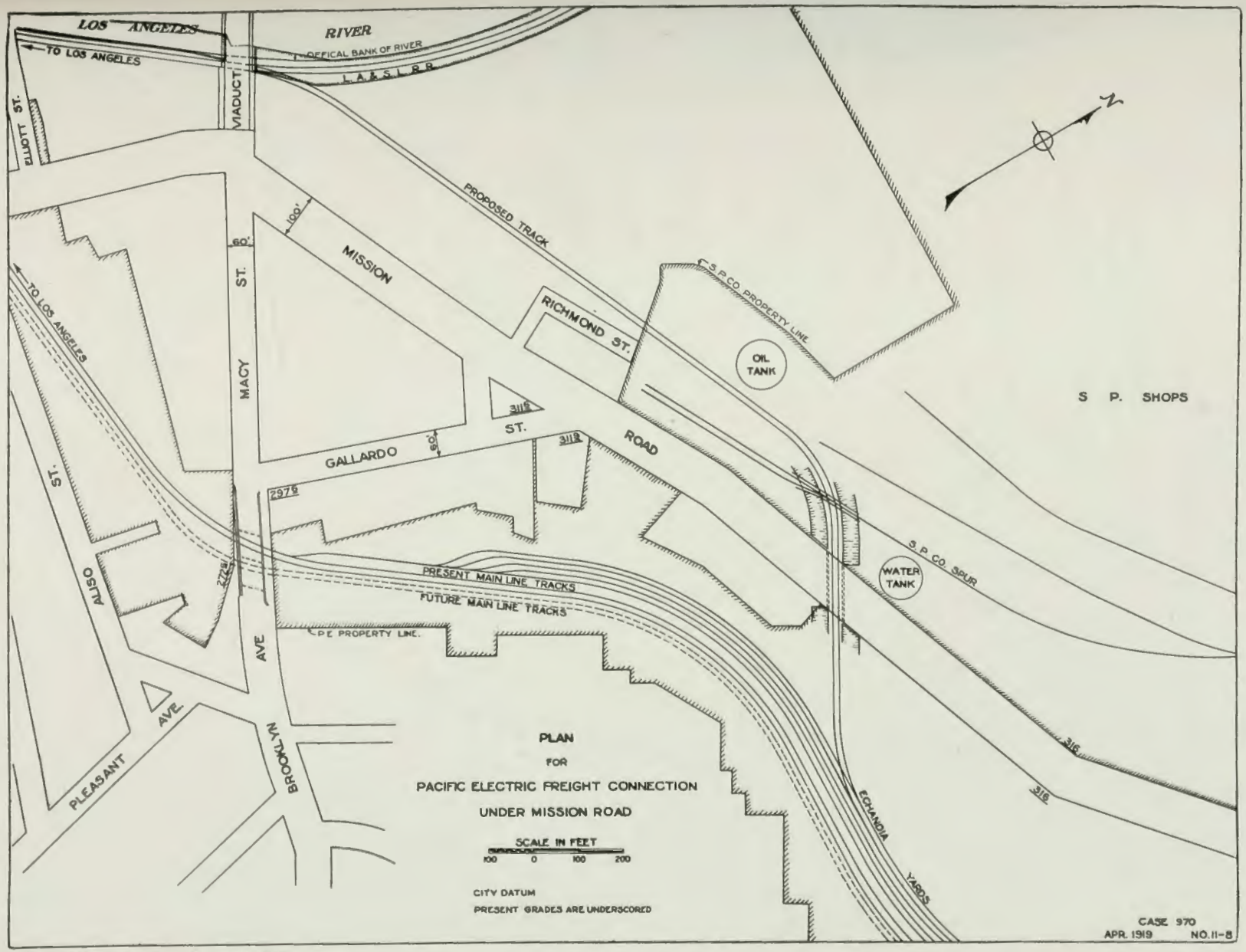
In this plan the tracks are depressed approximately 7 feet below their present elevation and the street is raised about 18 feet. The tracks are removed from Redondo Street and placed just south of the street, in order to keep the foot of the northerly approach as far south as possible, to the end that 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



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 for 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

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  - 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
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CHAPTER X.

DESIRABILITY AND REQUIREMENTS OF A UNION PASSENGER TERMINAL

PRESENT PASSENGER STATIONS

At present there are six passenger stations in Los Angeles:

	Location
Steam Roads.	
Southern Pacific:	
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. 70. 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
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 in 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 SaltLake 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 as economical a character as will pass the fire ordinance.

DESIRABLILITY 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

Passengers Arriving and Leaving

Road	Totals 8-day Count	Average	Maximum	Totals per Year	Percentages
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.

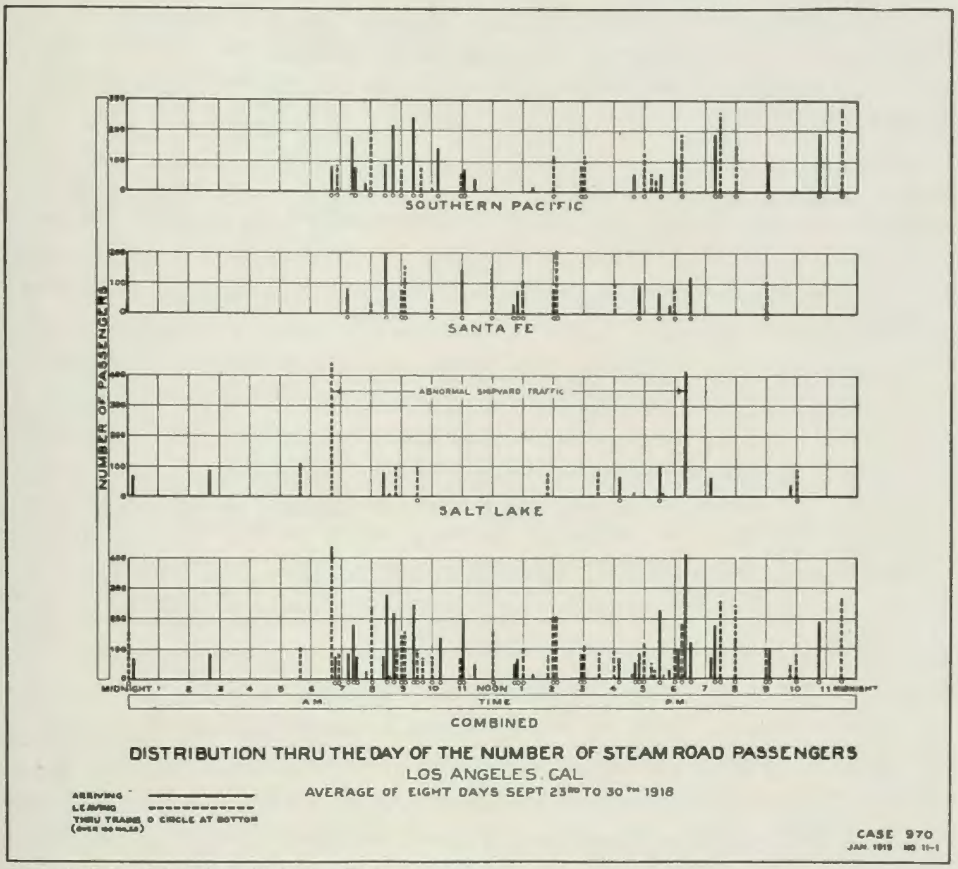

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FIG. 90. DISTRIBUTION THROUGH THE DAY OF THE NUMBER OF STEAM ROAD PASSENGERS

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 Station by Street Cars June 7, 1918, Friday		Passengers Arriving and Leaving on Trains on April 12, 1918, Friday		Difference	Ratio of Railroad to Street Car Passengers
	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
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
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 CALIFORNIA BY THE SOUTHERN PACIFIC, THE SALT LAKE AND THE SANTA FE, 1912 TO 1917

Year Ending	Millions of Passengers — Roads — 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

	Road		
Year Ending	Pacific Electric	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 tranportation 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:

	Passengers Per Annum		
Road	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	
Outbound	1917*	1918*	1917*	1918*	1917*	1918*	1917*	1918*
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

	Road and Number of Trains							
Class of Train	**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

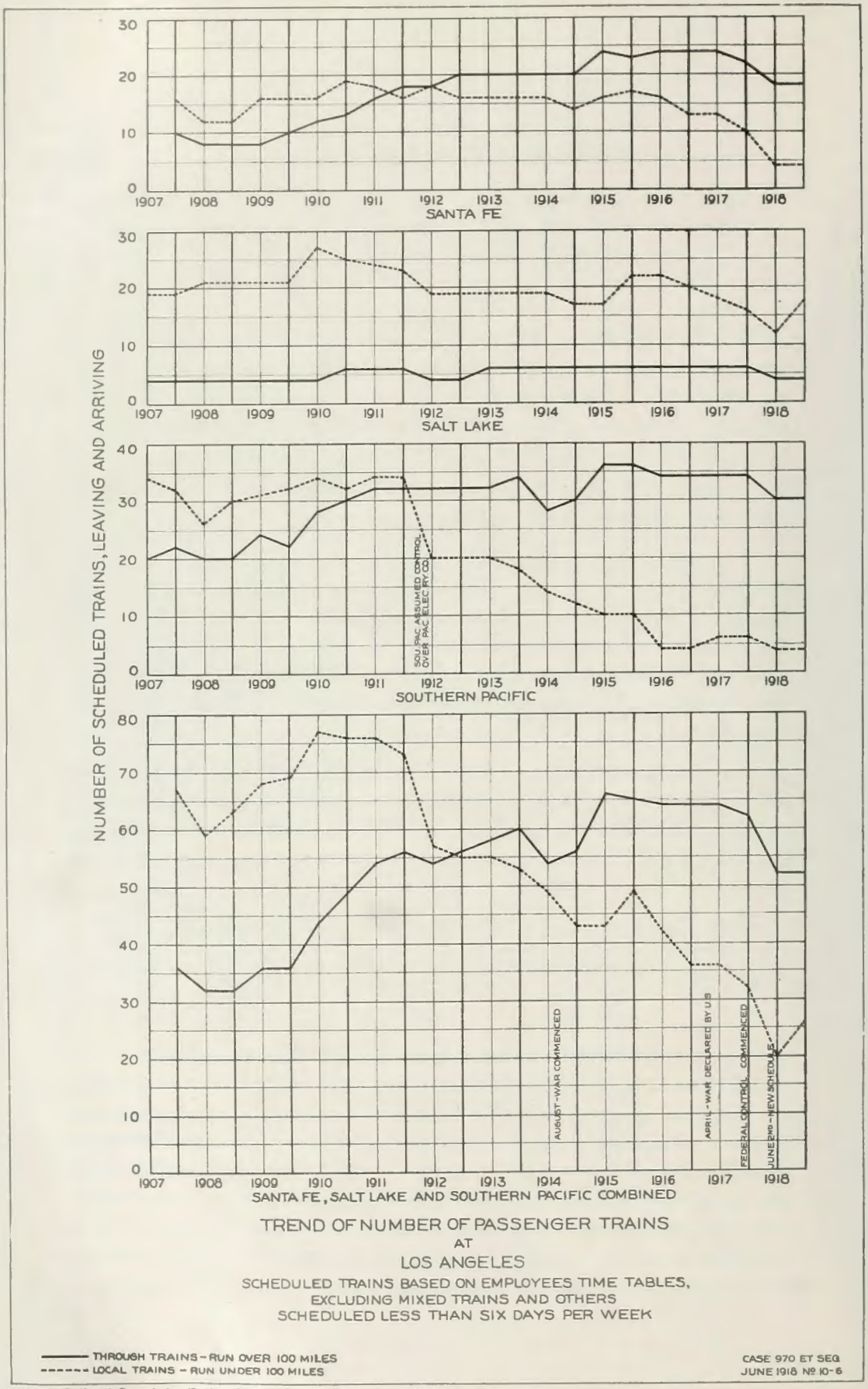

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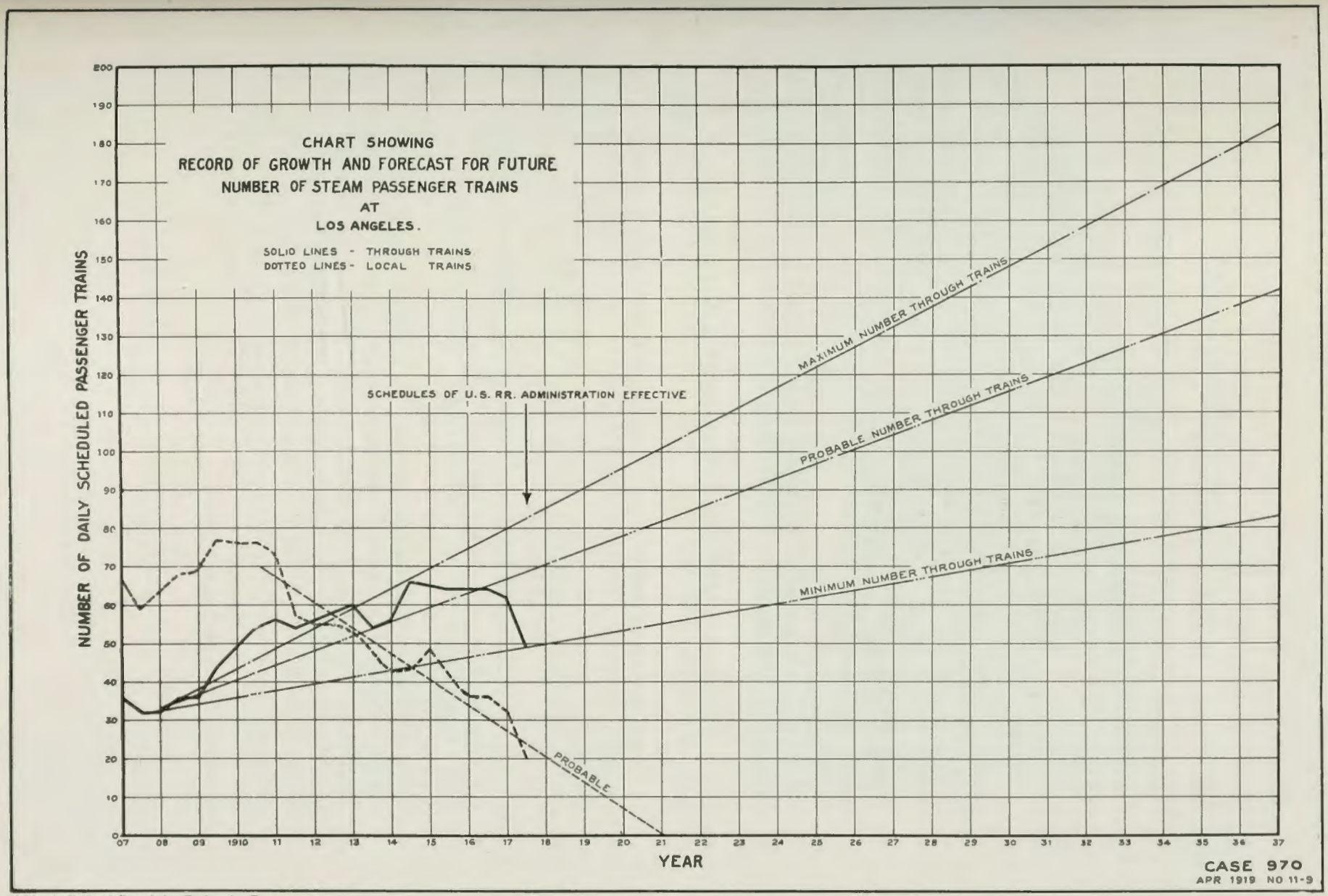
FIG. 91. RECORD OF NUMBER OF PASSENGER TRAINS AT LOS ANGELES FROM 1907 TO 1919

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.



California Railroad Commission Engineering Dept.

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. 4.

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 railroading 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.

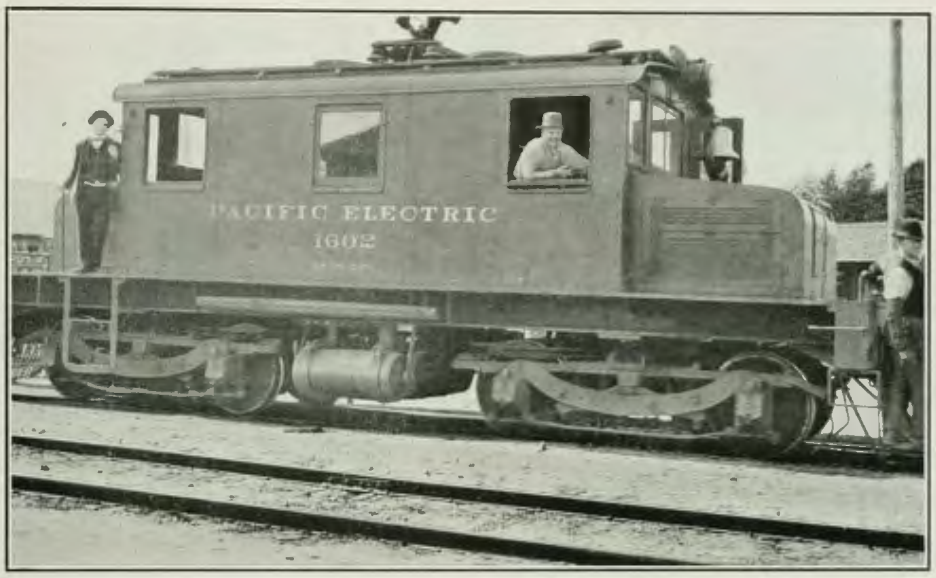


FIG. 93. ELECTRIC LOCOMOTIVE

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. 95. 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
Per cent transferred to Pacific Electric		7.7%
Forwarded by Southern Pacific, all sources	426,685	1,169
Transferred from Pacific Electric to Southern Pacific	32,530	90
Per cent received from Pacific Electric		7.7%

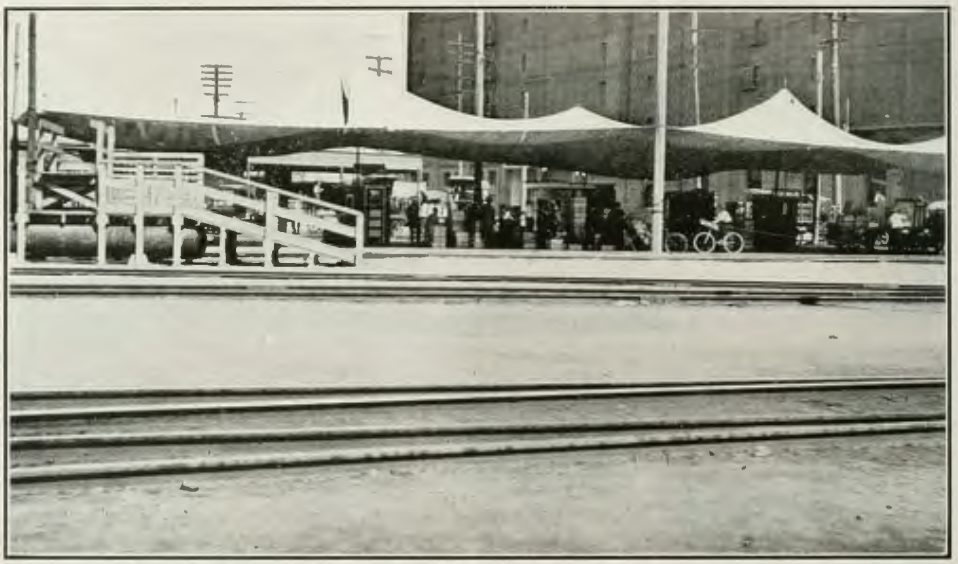


FIG. 96. EXPRESS UNDER COVER—SOUTHERN PACIFIC STATION
During the summer, when deciduous fruit shipments are heavy, this canvas is erected.

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	2,464
	101,751	100%	2,464	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 Companies' Depots	From Wells Fargo & Company			From American	Total All
To	Southern Pacific	Santa Fe	Total	Salt Lake	Depots
Southern Pacific	....	2,880	2,880	516	7,716
Santa Fe	4,320	....	4,320	...	....
Salt Lake	360	48	408	...	408
	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 12½ feet for the adjacent tracks and 28½ 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	27,442	" "

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 " "	
	" "	
	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 Operator Fast	Plaza Operator Slow	Southern Pacific Operator Fast	Southern Pacific Operator Slow	Santa Fe Operator Fast	Santa Fe Operator 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.

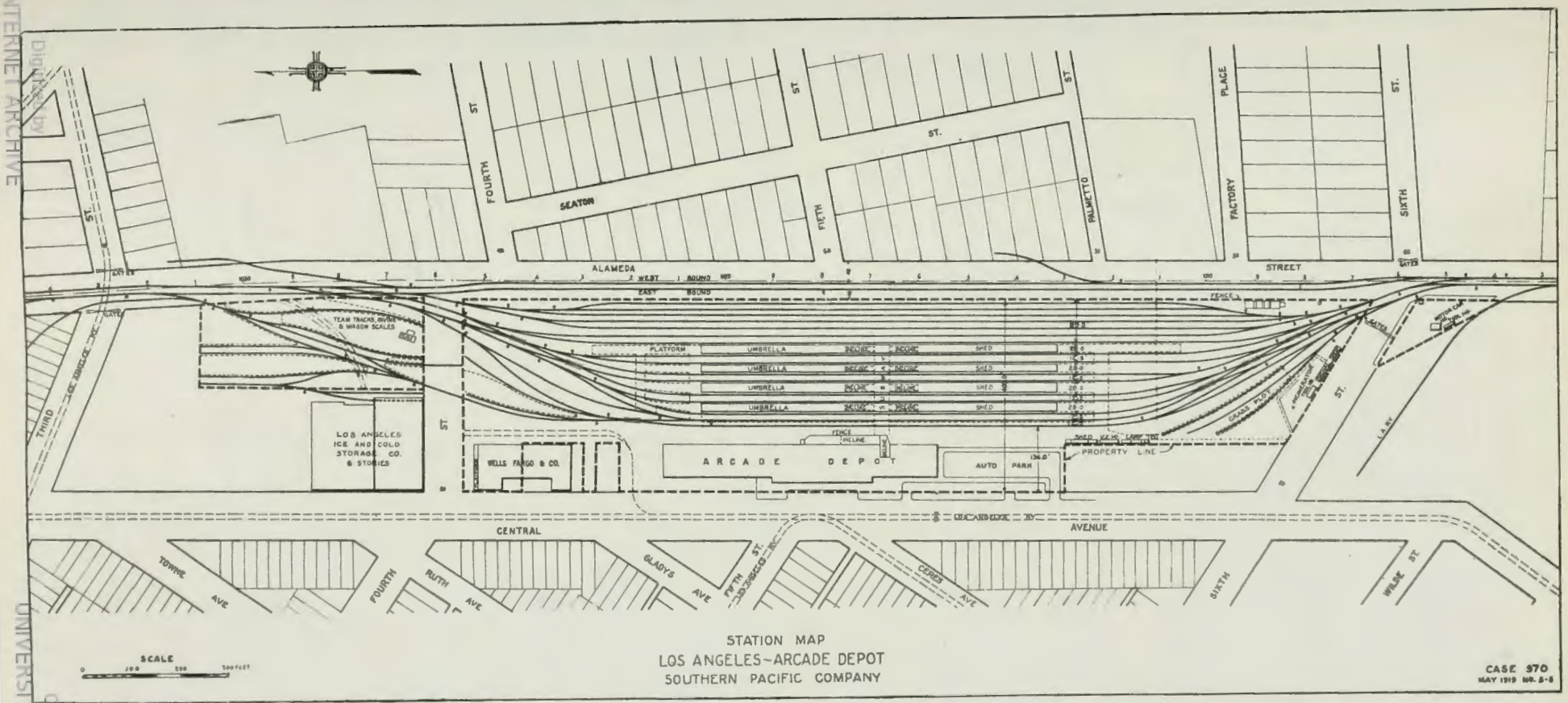
The Southern Pacific site has a number of advantages, of which possibly the most important is the fact that it makes use of existing facilities whose cost is already paid for. The station facilities, including the building, trackage, subways, umbrella sheds and minor structures cost approximately $593,000. 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

	Acres		
Land—Present Market Value—			
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
Total	15.08		$2,171,128



California Railroad Commission Engineering Dept. (Redrawn from map furnished by Southern Pacific Co.)

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.

Facilities—Approximate Cost—		
Southern Pacific	693,000	
Wells Fargo and Company	45,000	738,000
Total		$2,909,128

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.

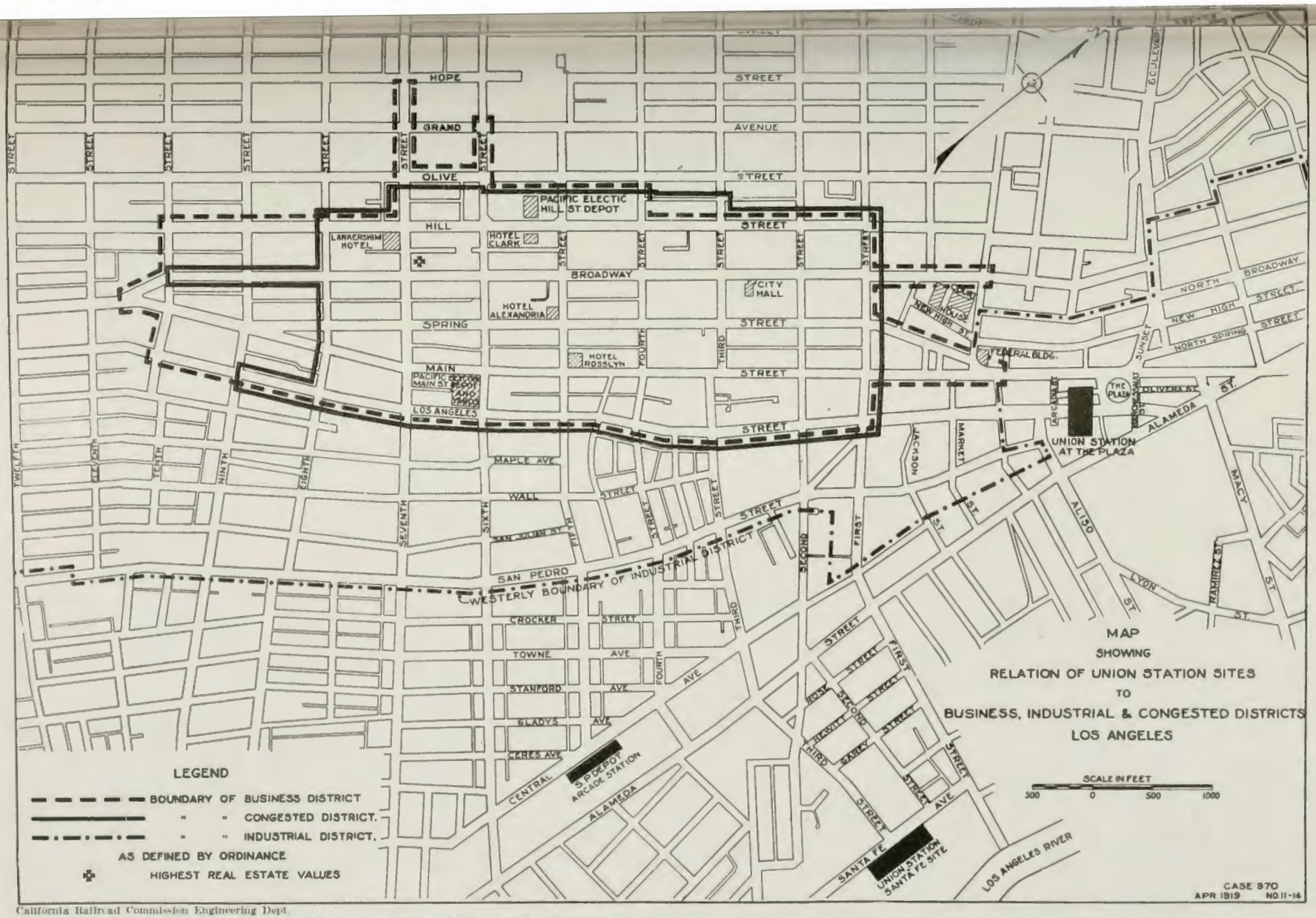
Including with this plan the project of the Pacific Electric to do away with surface operation on San Pedro and Aliso Streets, it is possible to eliminate 23,000 grade crossing movements per day. This number was found by taking the number of trains per day multiplied by the number of streets crossed. 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



California Railroad Commission Engineering Dept.

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 realty 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.

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 site 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 facilites.
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 betweeen 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.

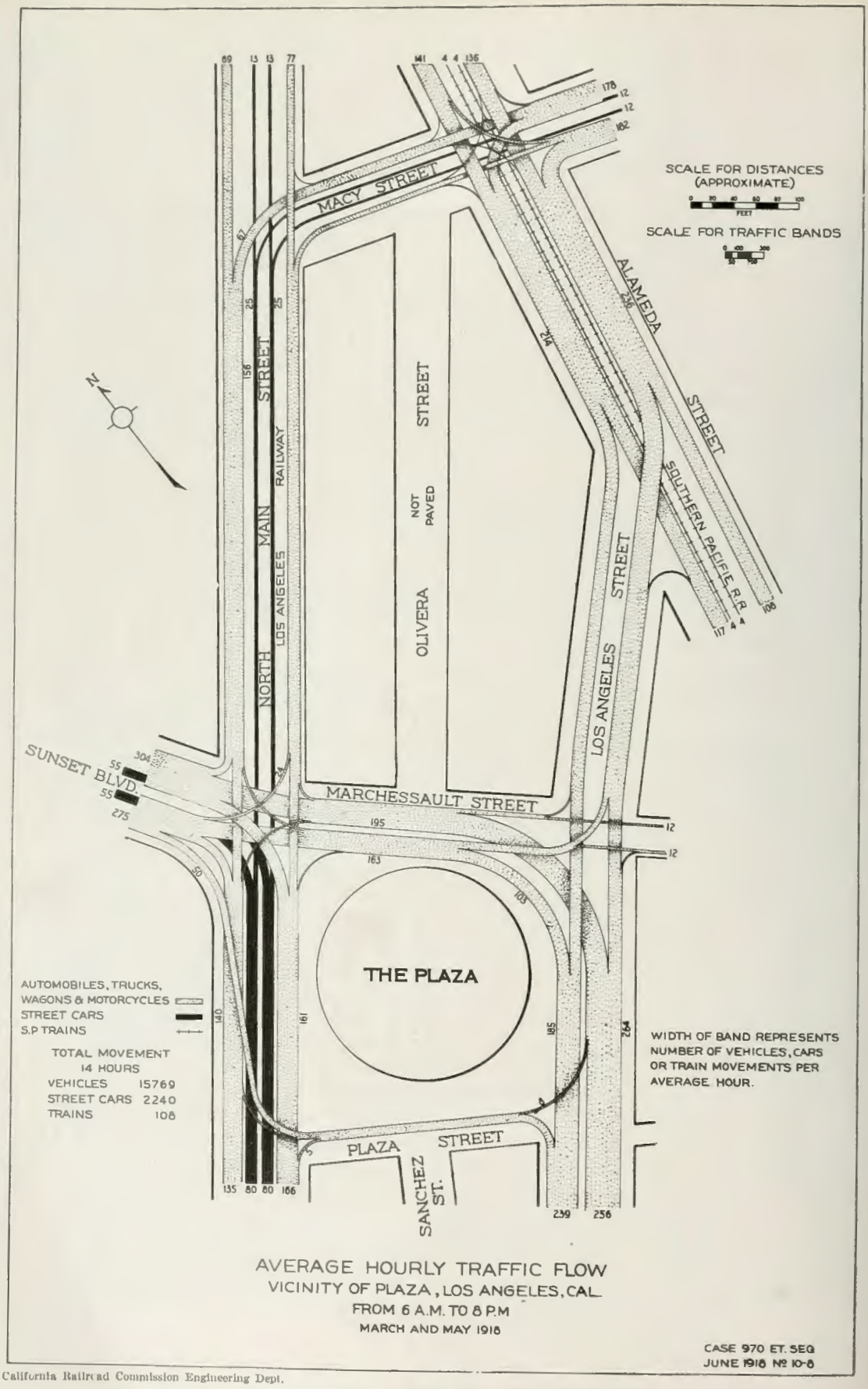
While it is of advantage to place the station at the neck of the bottle, it should not be forgotten that the neck must be large enough to pass the contents quickly, lest congestion result. Only careful planning can prevent this congestion.

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



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

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  - The Report of Charles Mulford Robinson
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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 mantained by means of publc 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

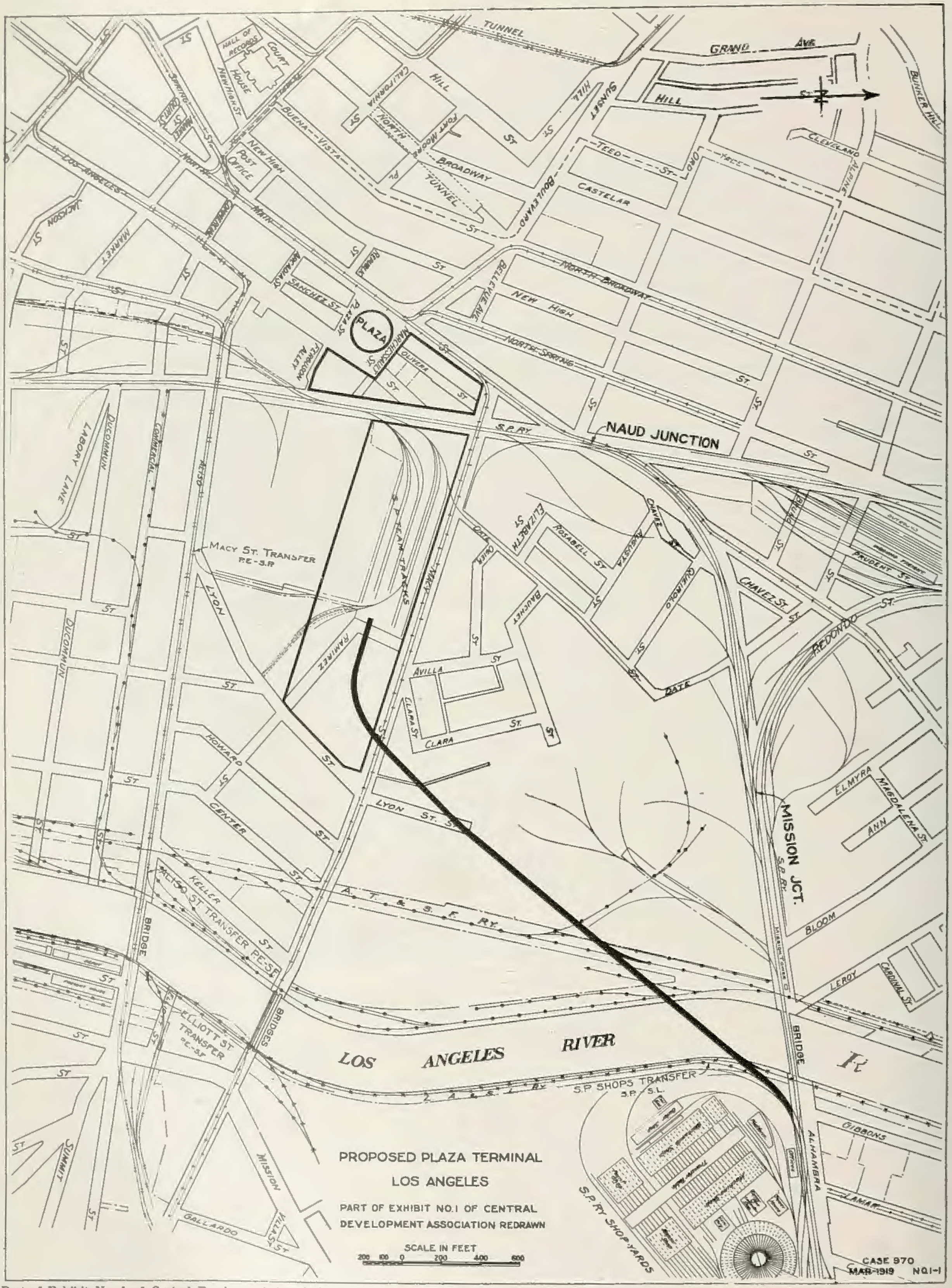
Central Development Association Plan

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 critisized 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:

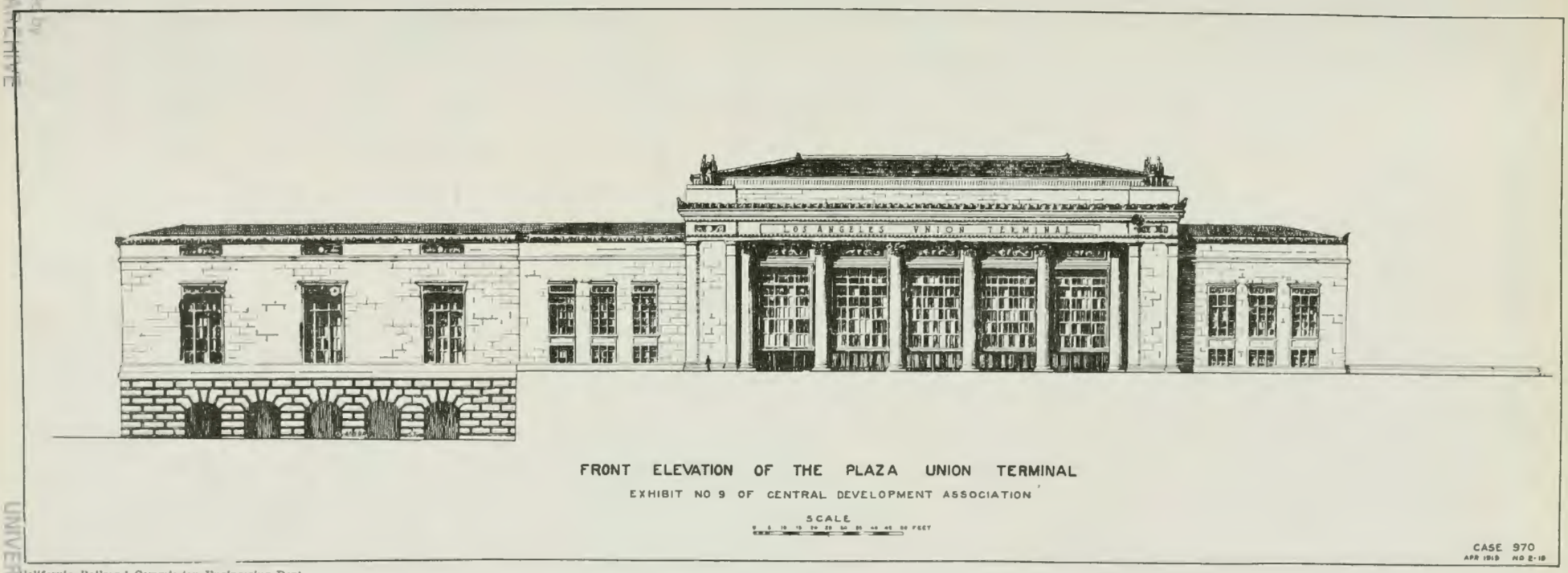
"First: The Salt Lake tracks are shown connected with the wye at the east end of yard, beyond the throat. This permits of the trains of all three roads being turned close in without loss of mileage in running to a distant wye. An additional track is shown paralleling the north main line at the north 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

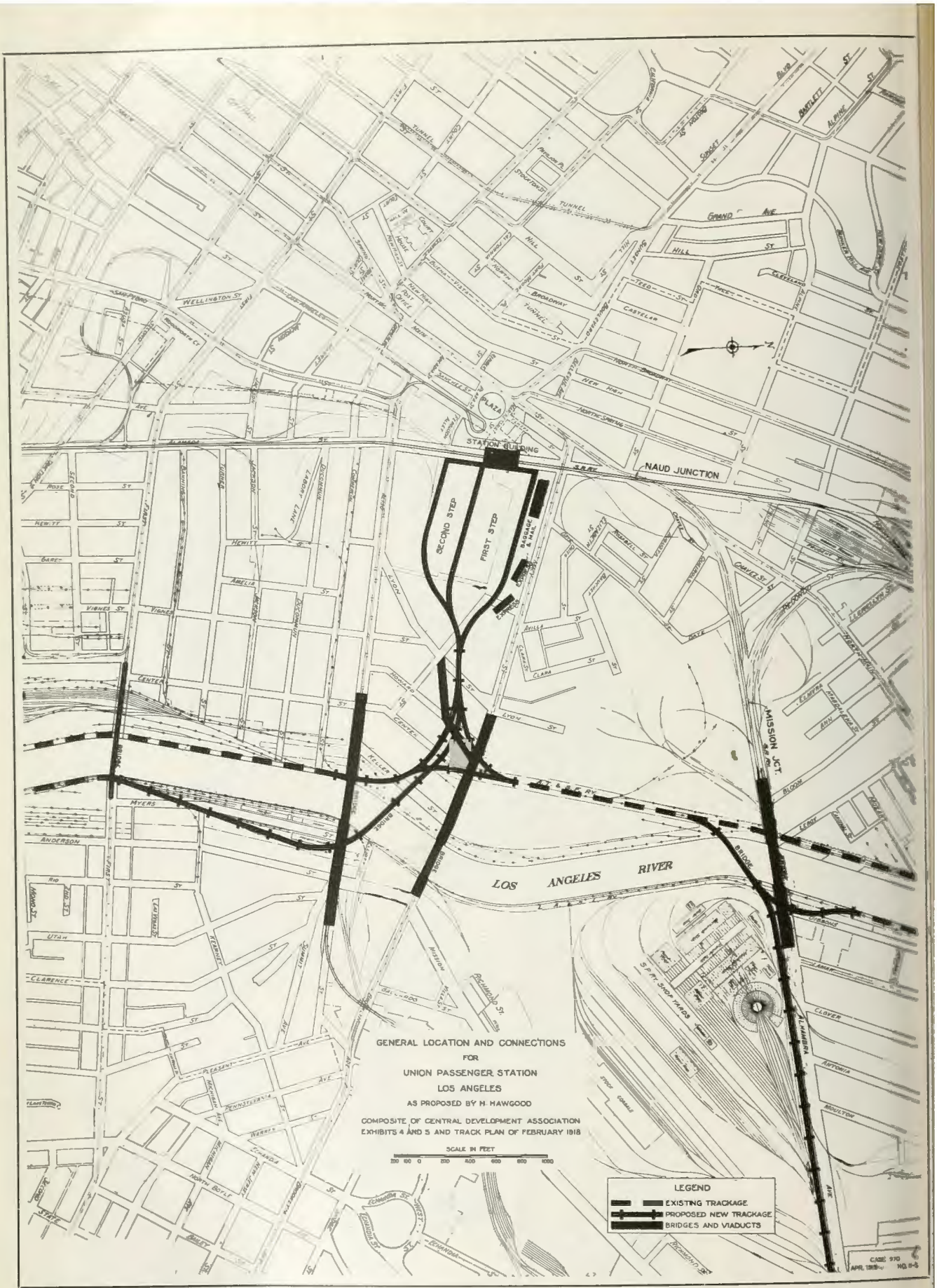
This Exhibit is similar in character to the preceding one. The value of a symmetrical arrangement is shown, but this would be enhanced if it included the site as well as the building. Instead of facing the high ground west of Main Street, the building would be given a more effective approach if it were placed upon the axis of an important street.



California Railroad Commission Engineering Dept.

FIG. 108. FRONT ELEVATION OF PLAZA UNION TERMINAL

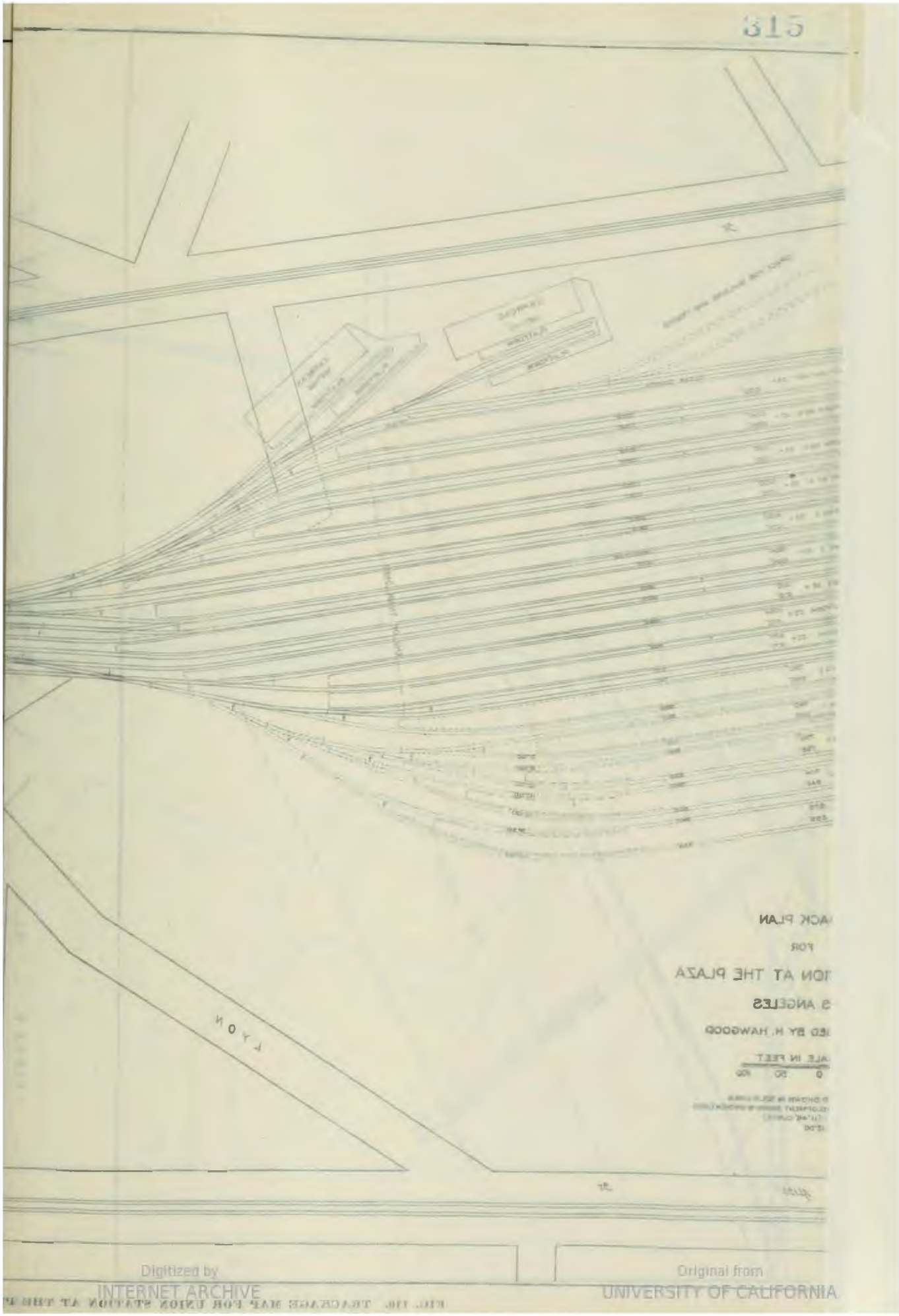
This is a preliminary drawing made by Architect A. E. Curlett to show the size and character of building which could be produced for about $700,000 in 1917.



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.



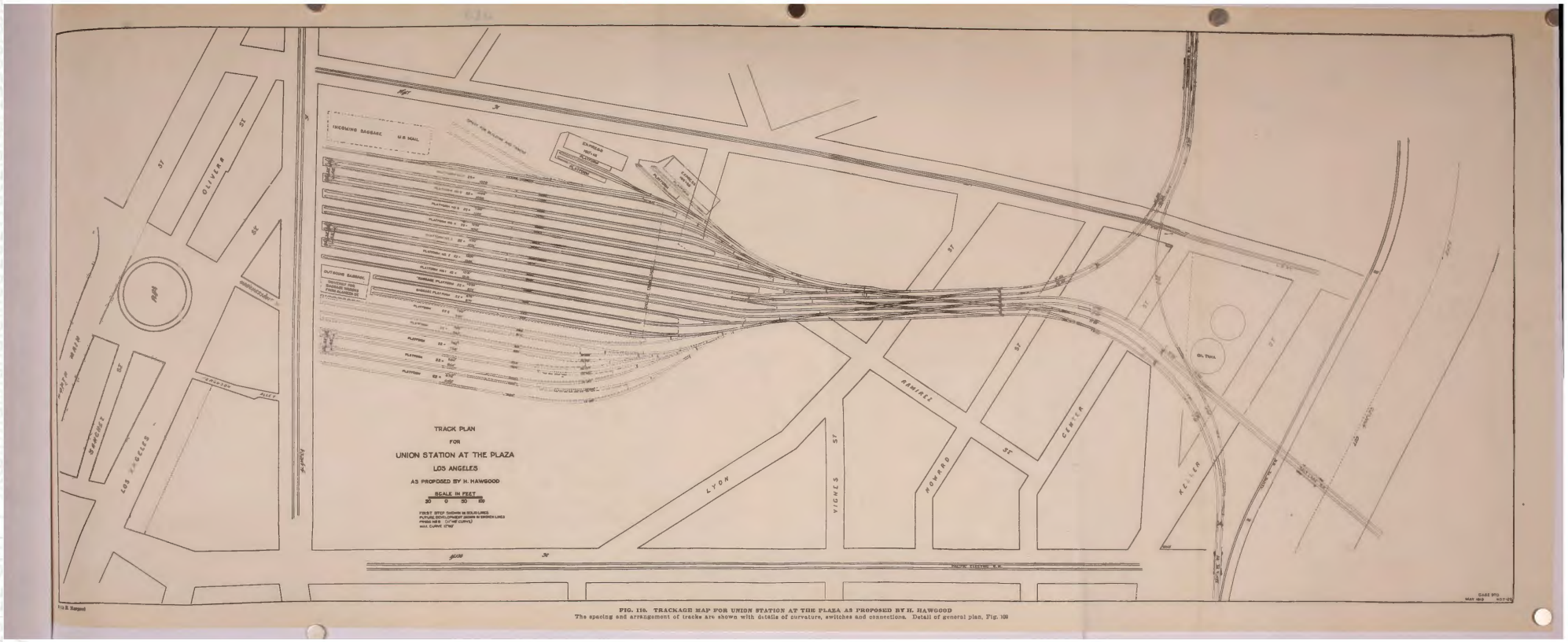


FIG. 116. TRACKAGE MAP FOR UNION STATION AT THE PLAZA AS PROPOSED BY H. HAWGOOD
The spacing and arrangement of tracks are shown with details of curvature, switches and connections. Detail of general plan, Fig. 108

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

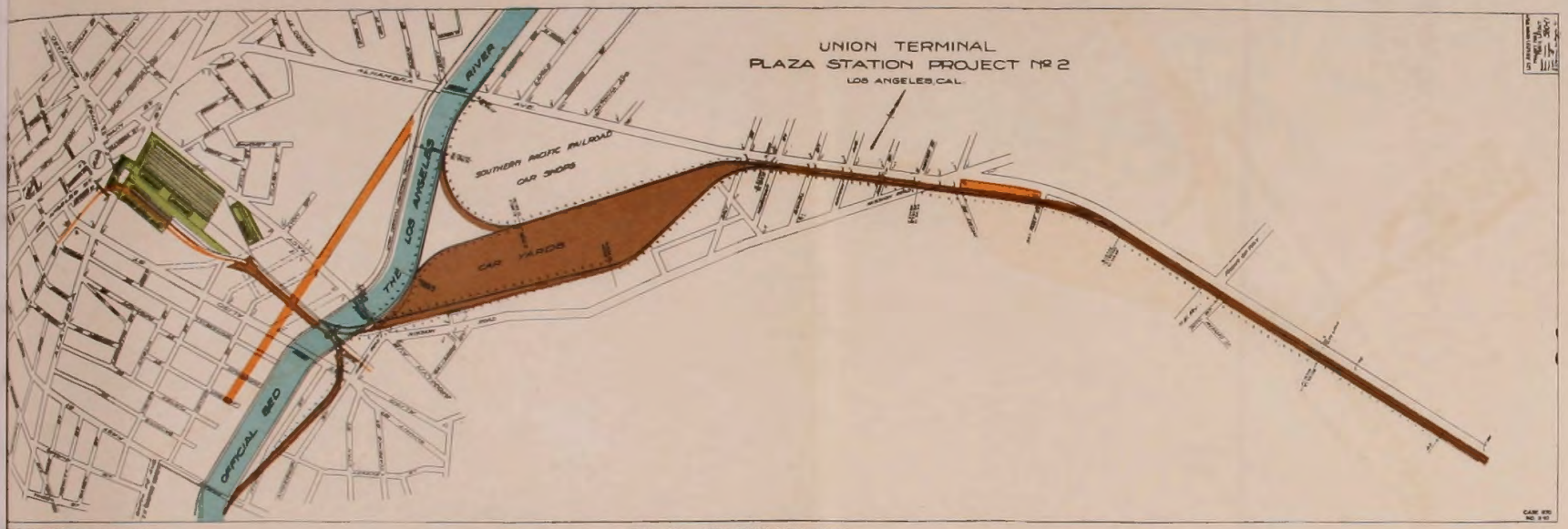


FIG. 111. THE STORROW PLAN

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.

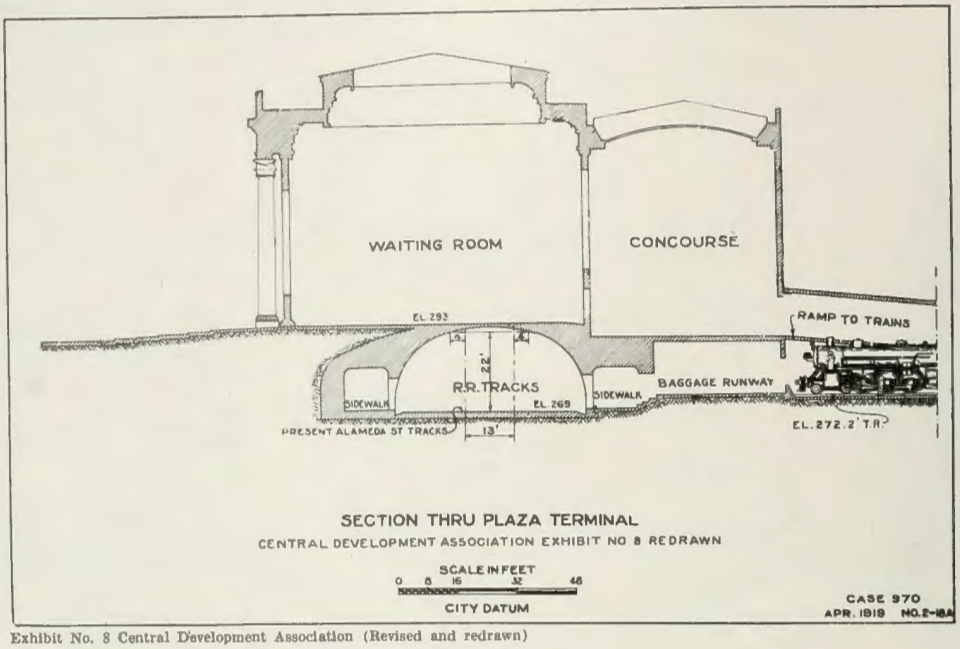


Exhibit No. 8 Central Development Association (Revised and redrawn)

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.

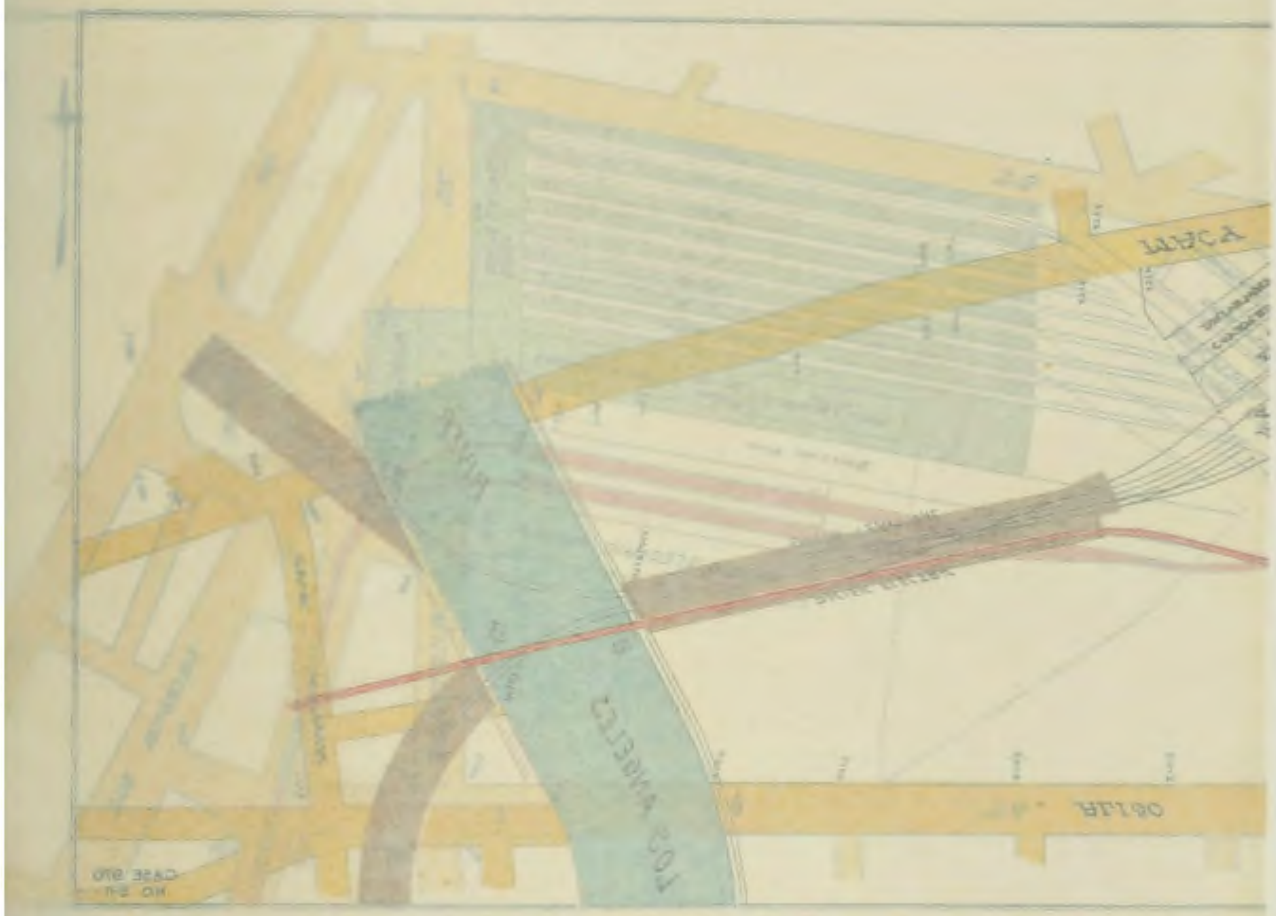
use tracks on the east bank of the river for their northern exits. It is proposed to bring the Pacific Electric across the river by a high-level third bridge, crossing over the steam roads, and thence into a depot on the east side of Alameda Street and south of the proposed union depot for the steam 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



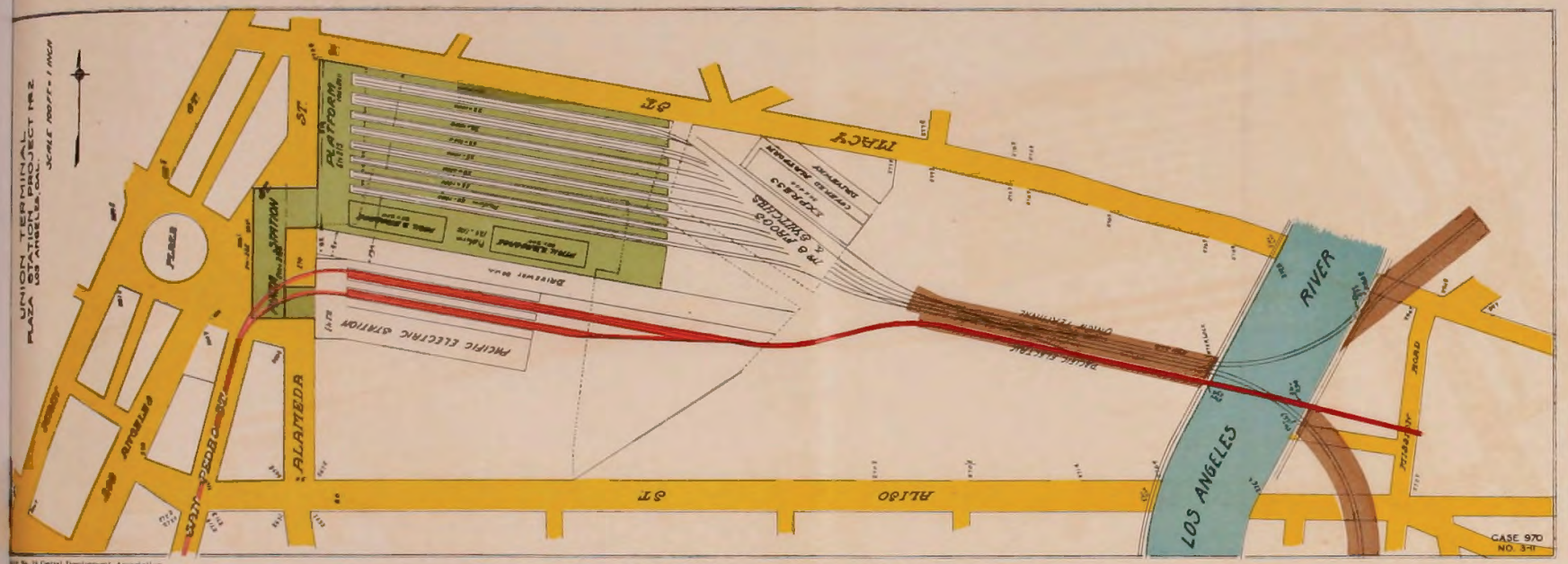


FIG. 112. TRACK ARRANGEMENT FOR STORROW PLAN

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 23 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. 110 (page 315) "Track Plans for Proposed Plaza Union Station, Scale 50=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.

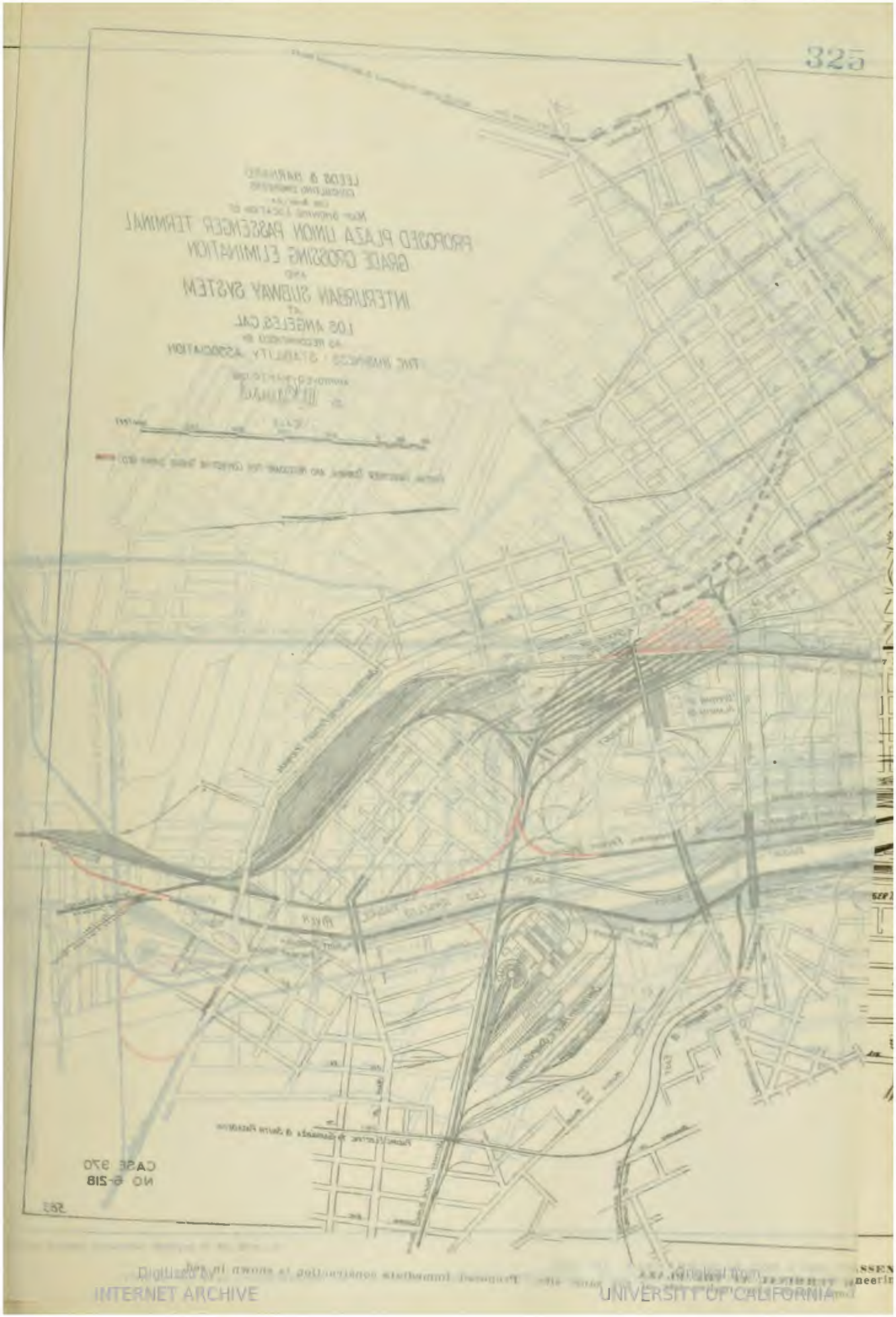
Lands Required for Hawgood and Storrow Plans

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.



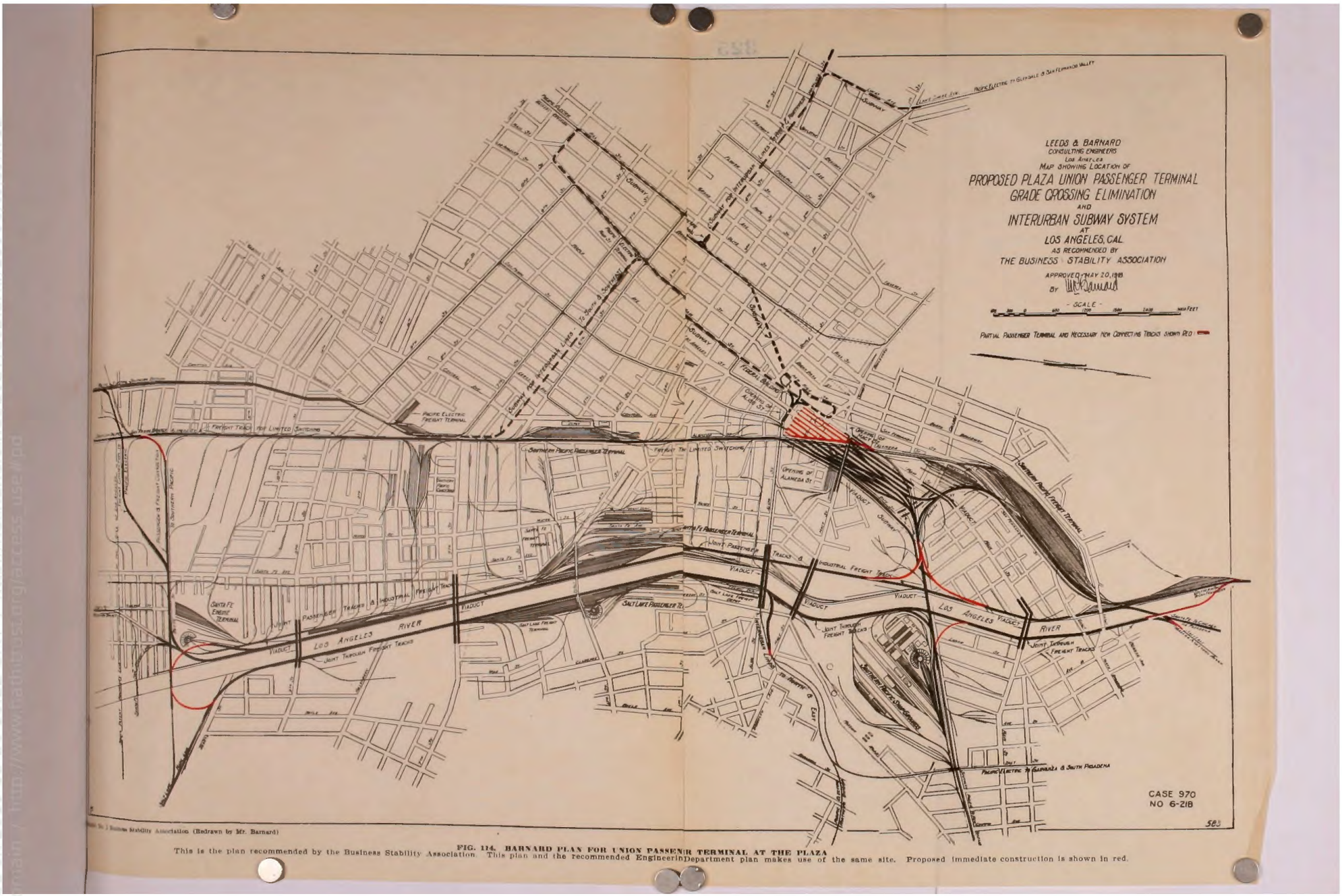


FIG. 114. BARNARD PLAN FOR UNION PASSENIR TERMINAL AT THE PLAZA

This is the plan recommended by the Business Stability Association. This plan and the recommended Engineerin Department plan makes use of the same site. Proposed immediate construction is shown in red.

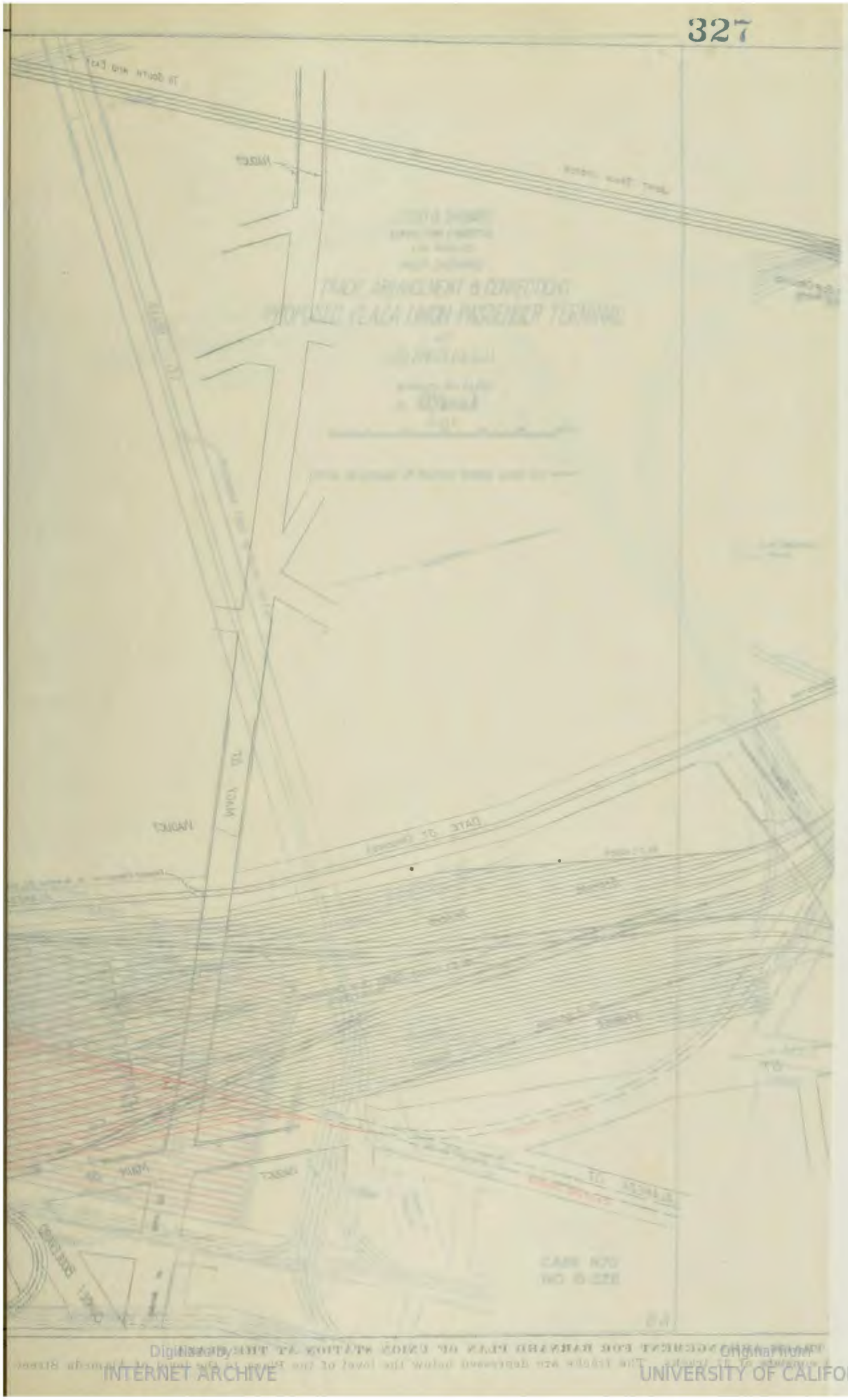
It will be noted that the map of "Track Arrangement and Connections" shows thirty-two tracks arranged in pairs with a rather comprehensive, if not complicated, throat arrangement. No details are presented as to the possible details of the building or the location of the baggage, express and mail facilities. 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 backing 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.



(Redrawn by Mr Barnard)

FIG. 115. TRACK ARRANGEMENT FOR BARNARD PLAN OF UNION STATION AT THE PLAZA

The ultimate plan is shown and consists of 32 tracks. The tracks are depressed below the level of the Plaza to the level of Alameda Street.

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 additonal 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.

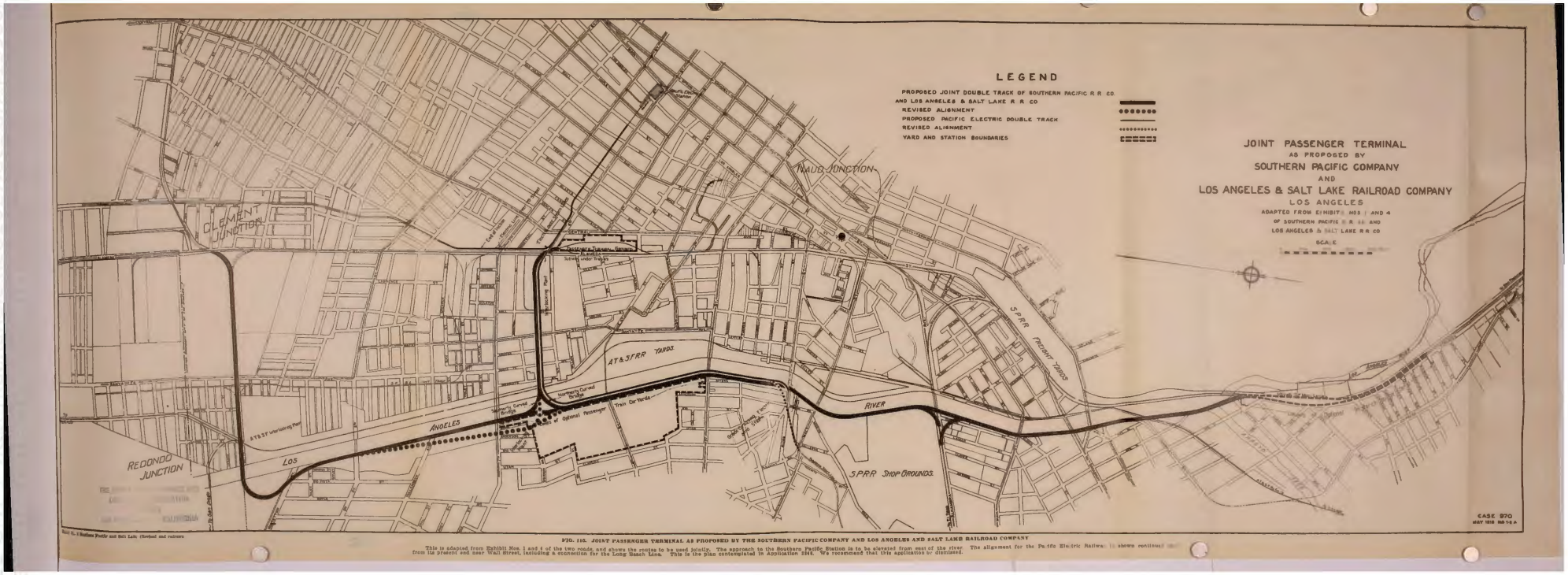


FIG. 116. JOINT PASSENGER TERMINAL AS PROPOSED BY THE SOUTHERN PACIFIC COMPANY AND LOS ANGELES AND SALT LAKE RAILROAD COMPANY

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 1246. We recommend that the application be dismissed.

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.

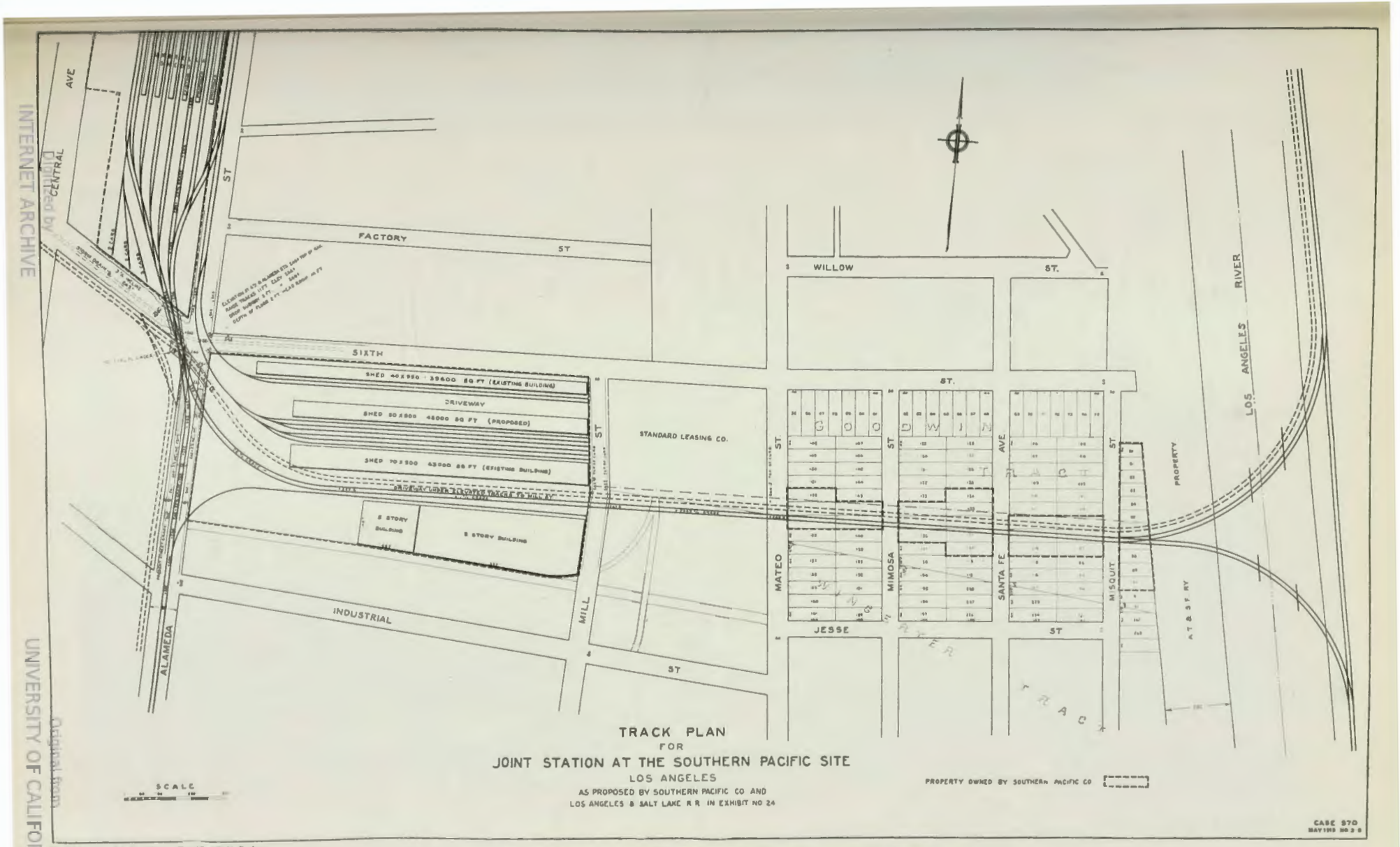


Exhibit No. 24 Southern Pacific-Salt Lake

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.

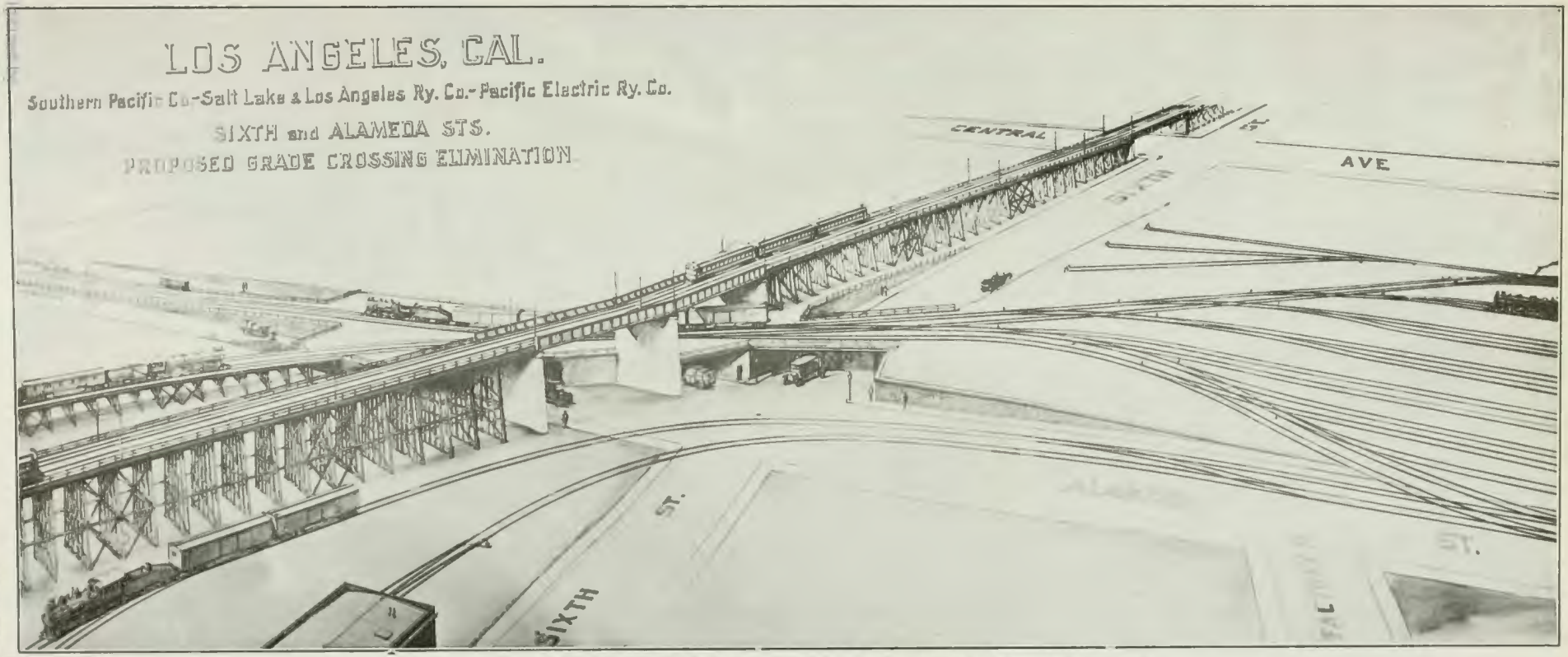


Exhibit No. 18 Southern Pacific Salt Lake

FIG. 118. GRADE CROSSING ELIMINATION AT SIXTH AND ALAMEDA STREETS

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 on Alameda Street would become unnecessary.

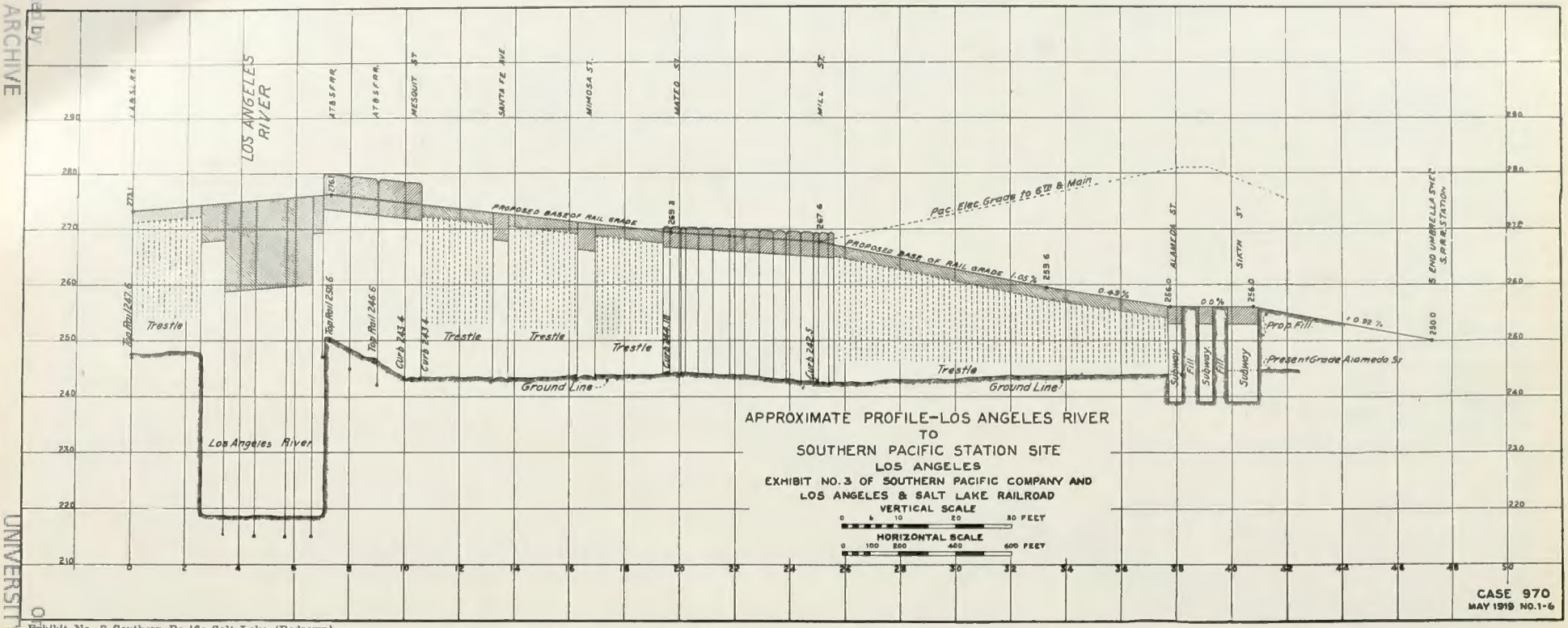


Exhibit No. 3 Southern Pacific-Salt Lake (Redrawn)

FIG. 119. PROFILE OF ELEVATED APPROACH TO SOUTHERN PACIFIC STATION

This shows the proposed grades and construction from the Southern Pacific station to the east side of the river. The proposed grades for the Pacific Electric line are also shown.

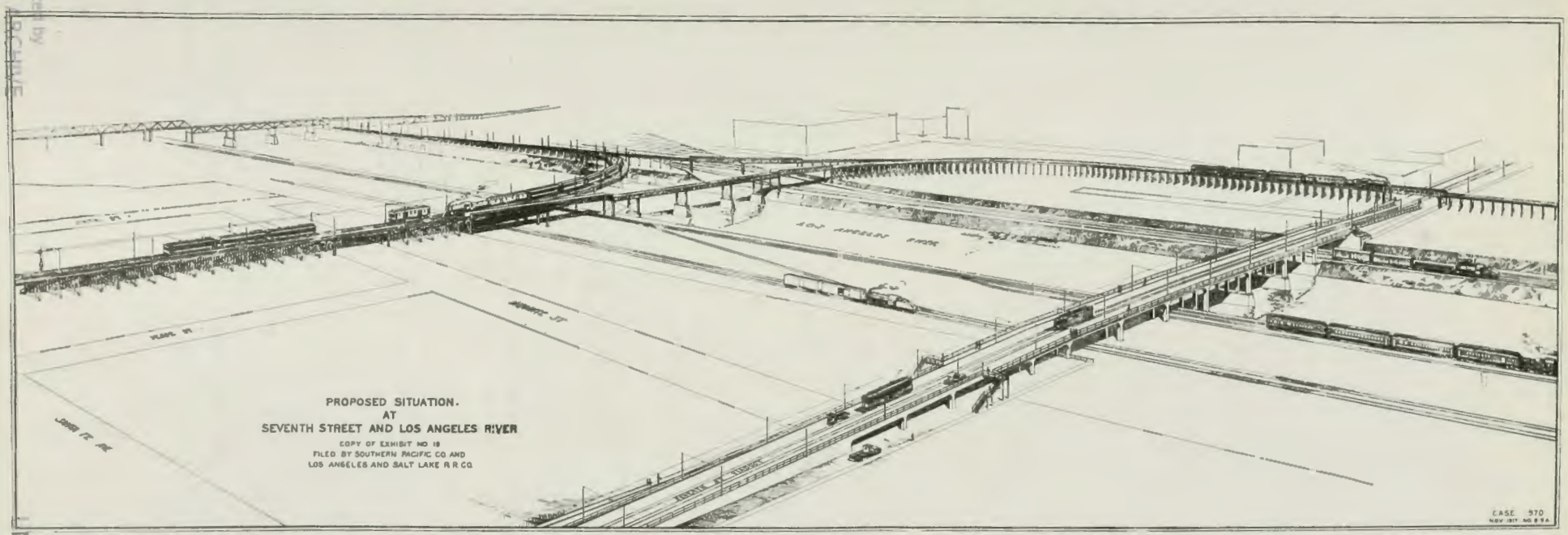


Exhibit No. 19 Southern Pacific-Salt Lake

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 it 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 brings 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 viaucts 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

	—Tracks—			—Trains—		Trains Per Day		Trains Per Busy Hour	
Station	Station	Approach	Ratio	Per Day	Per Busy Hour	Per Station Track	Per Approach. Track	Per Station Track	Per Approach 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 Nonth 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.

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 Figs. 124 and 130.) 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.

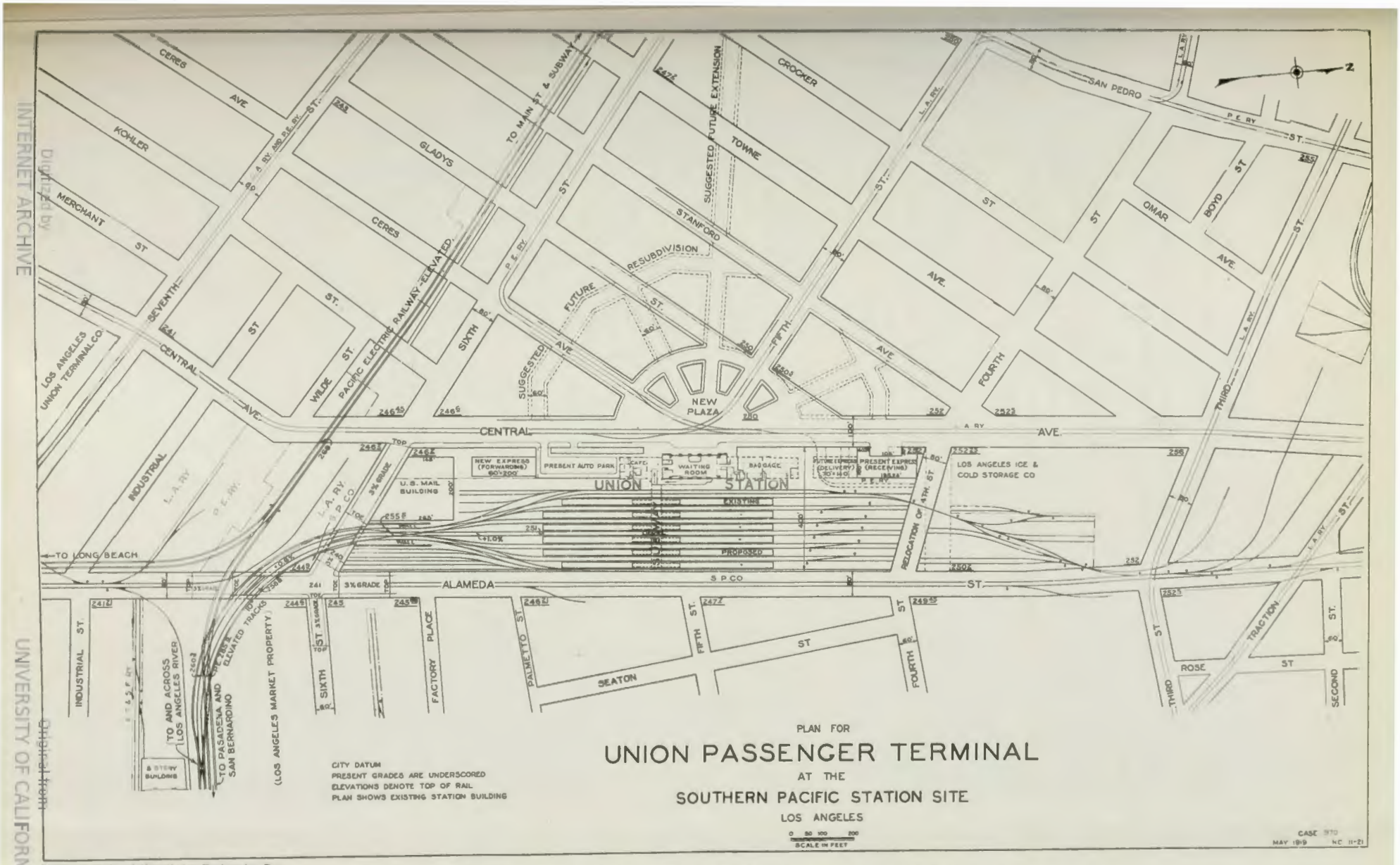
Site and Building Changes

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.



California Railroad Commission Engineering Dept

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. 129) 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

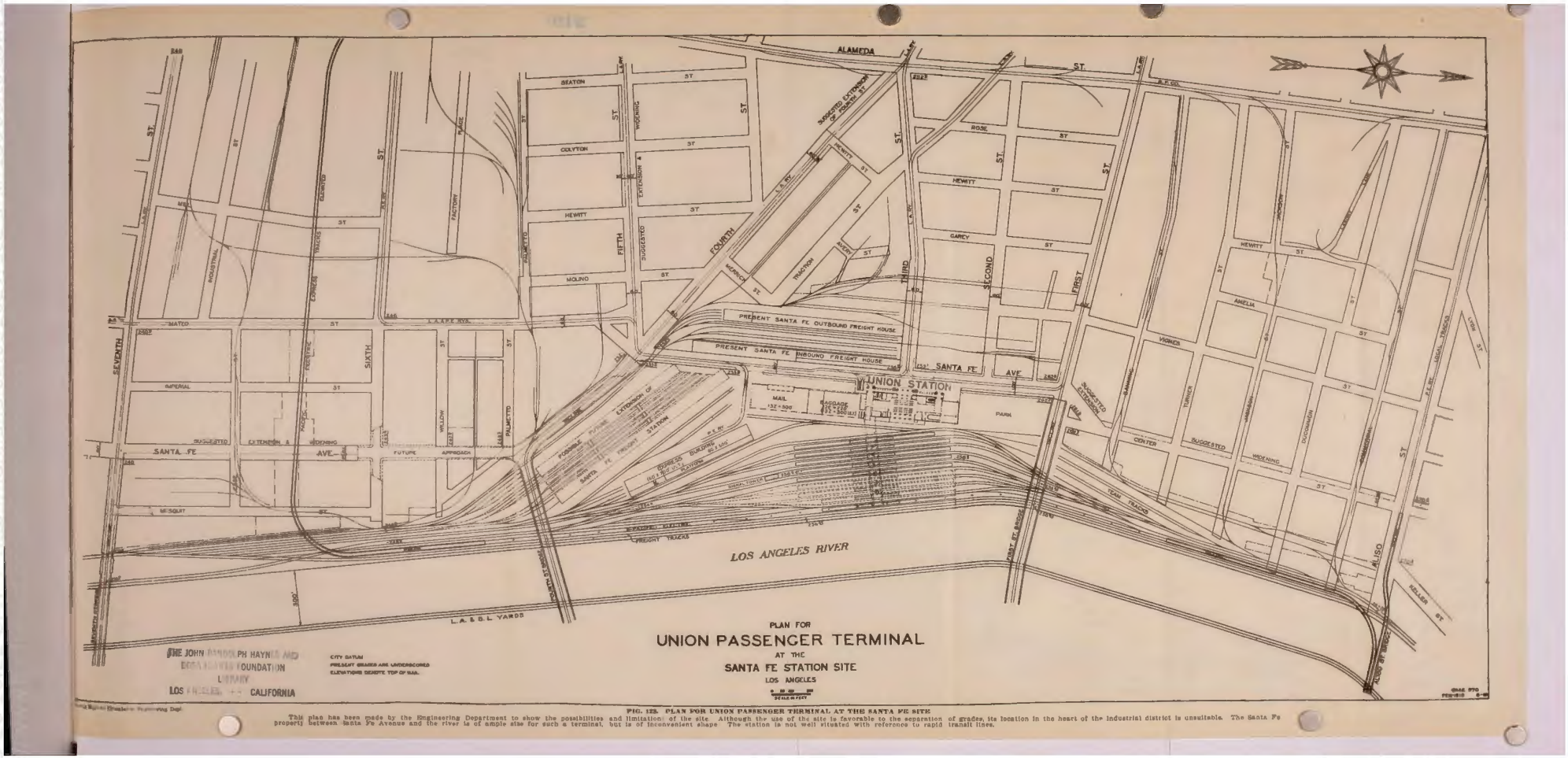
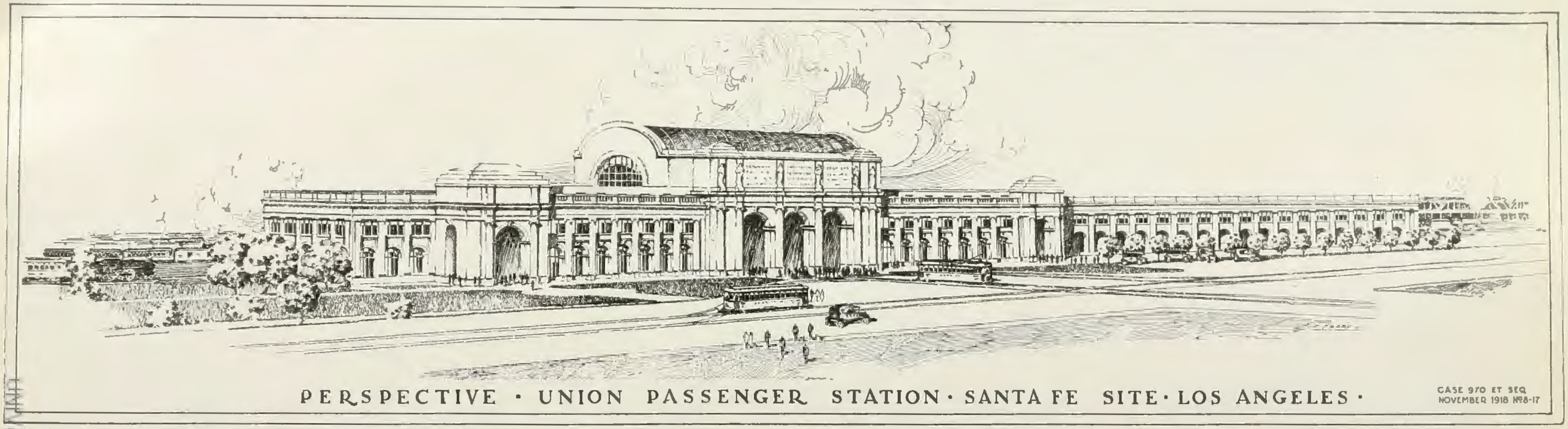


FIG. 123. PLAN FOR UNION PASSENGER TERMINAL AT THE SANTA FE SITE

This plan has been made by the Engineering Department to show the possibilities and limitations of the site. Although the use of 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.



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. 126 and shows the general effect of a station similar to that at Washington, placed upon the Santa Fe Station property.

FIG. 134. SOUTH MAP WITH UNION STATION AT THE SANTA FE STATION SITE

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.

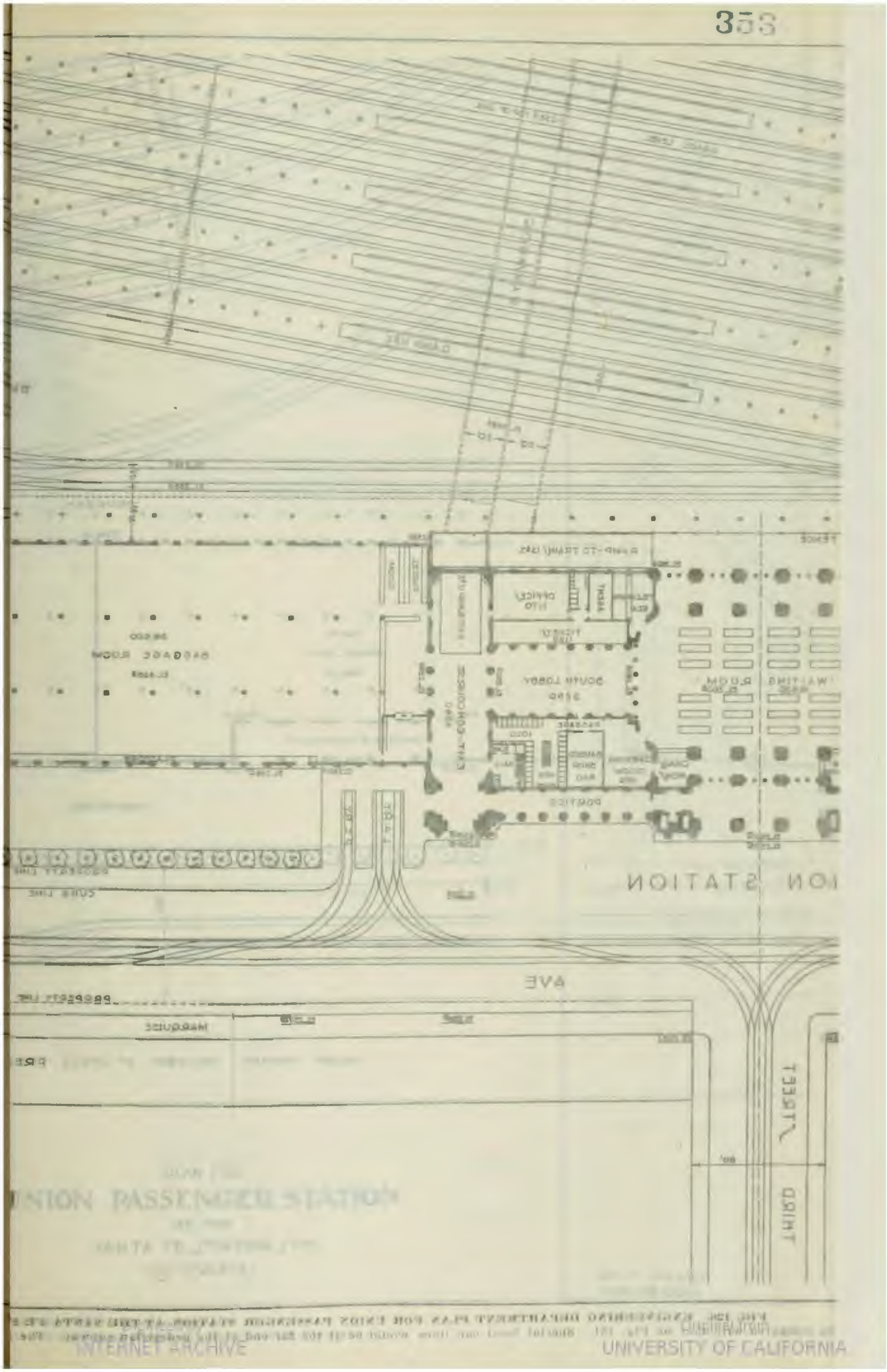
Station Building

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.



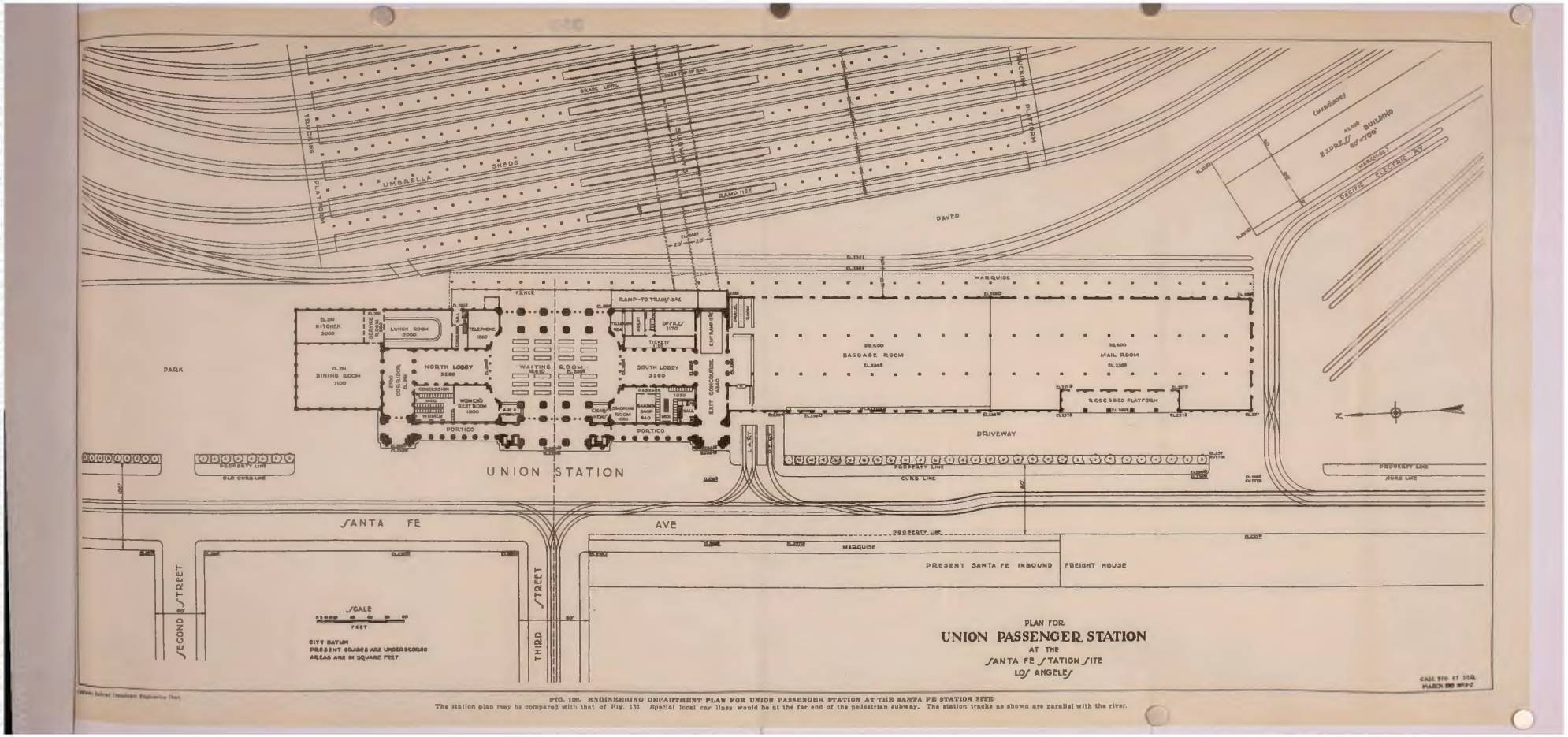


FIG. 136. ENGINEERING DEPARTMENT PLAN FOR UNION PASSENGER STATION AT THE SANTA FE STATION SITE

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 (39,000 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.

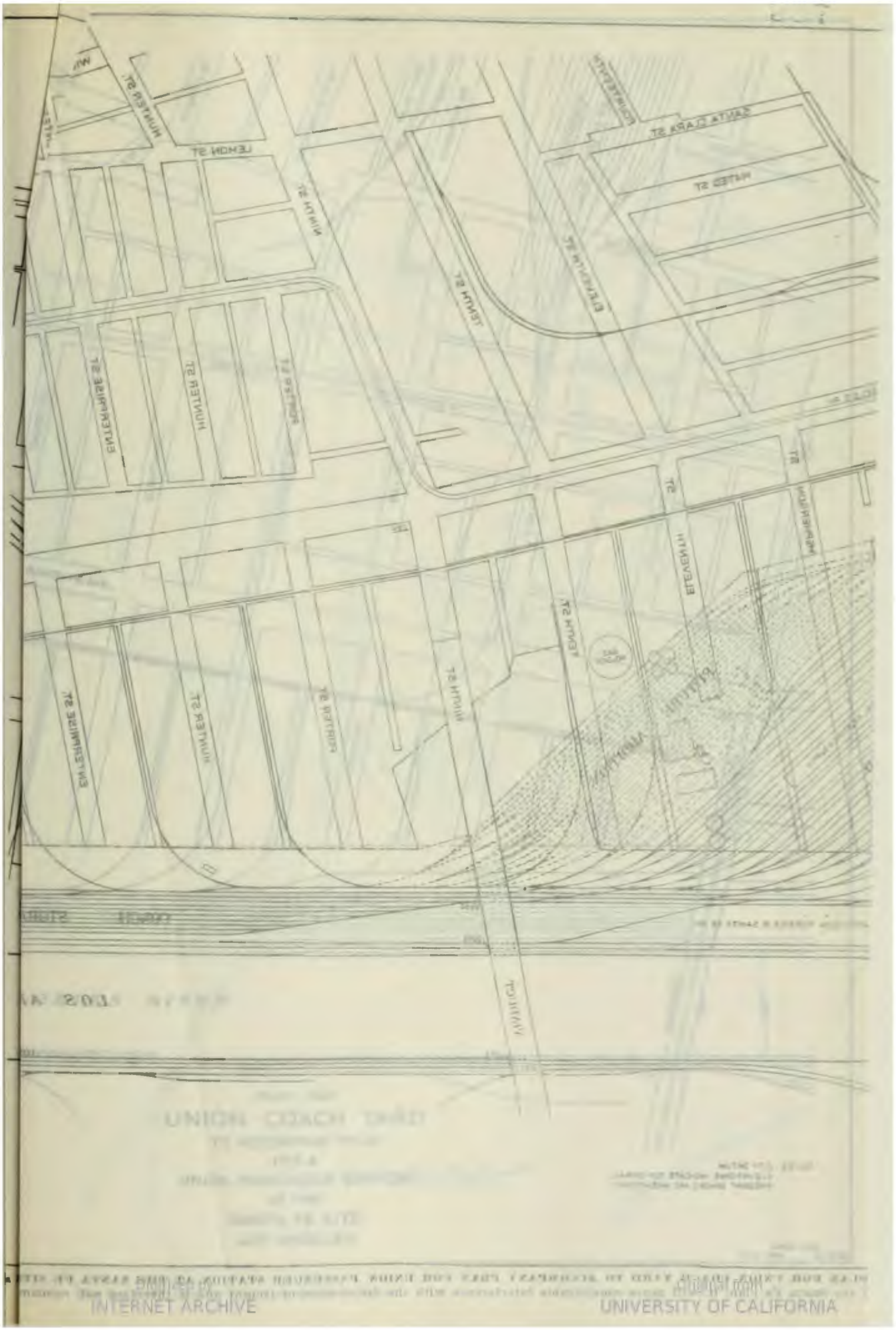
Coach Yards

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



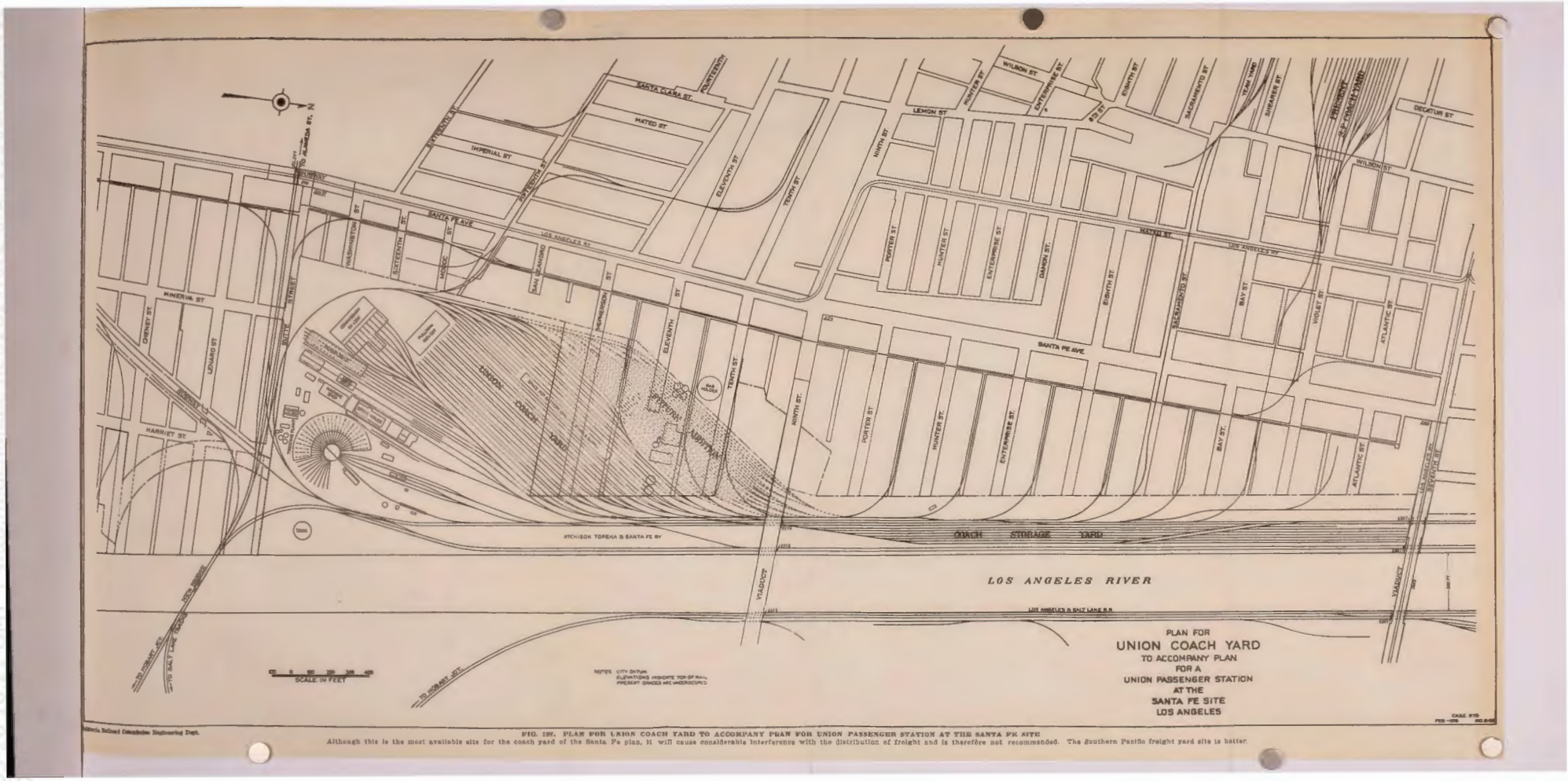


FIG. 137. PLAN FOR UNION COACH YARD TO ACCOMPANY PLAN FOR UNION PASSENGER STATION AT THE SANTA FE SITE

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

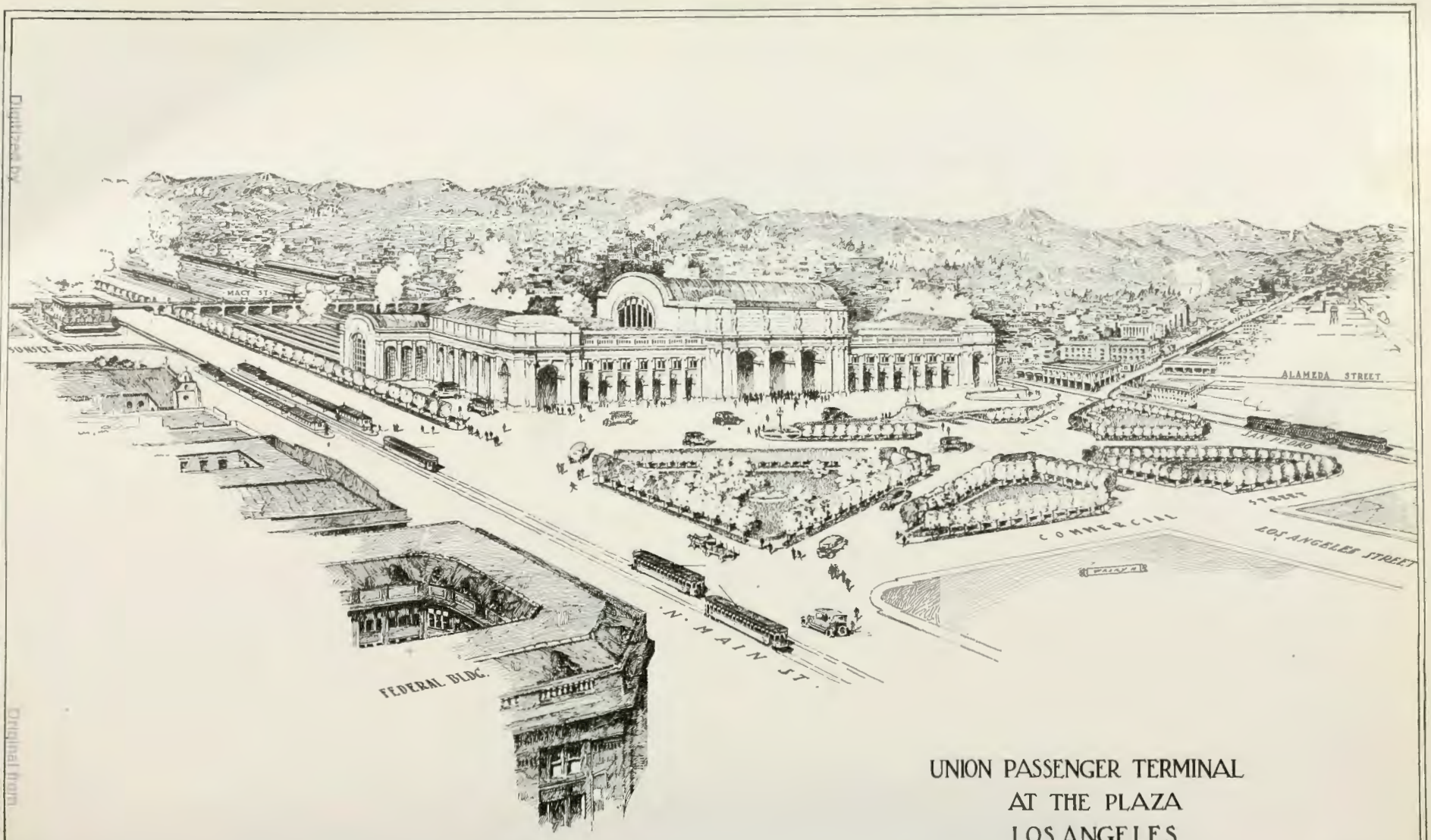
This plan was made after a comparison of the merits and demerits of all the plans presented and after a study of plans for similar projects in other cities. Many possible positions of the station and trackage were considered before the present plan was developed.

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.



California Railroad Commission Engineering Dept.

FIG. 128. UNION PASSENGER TERMINAL AT THE PLAZA, LOS ANGELES

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. Aliso 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 1¼ minutes and from this station to Sixth Street, 2½ 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.

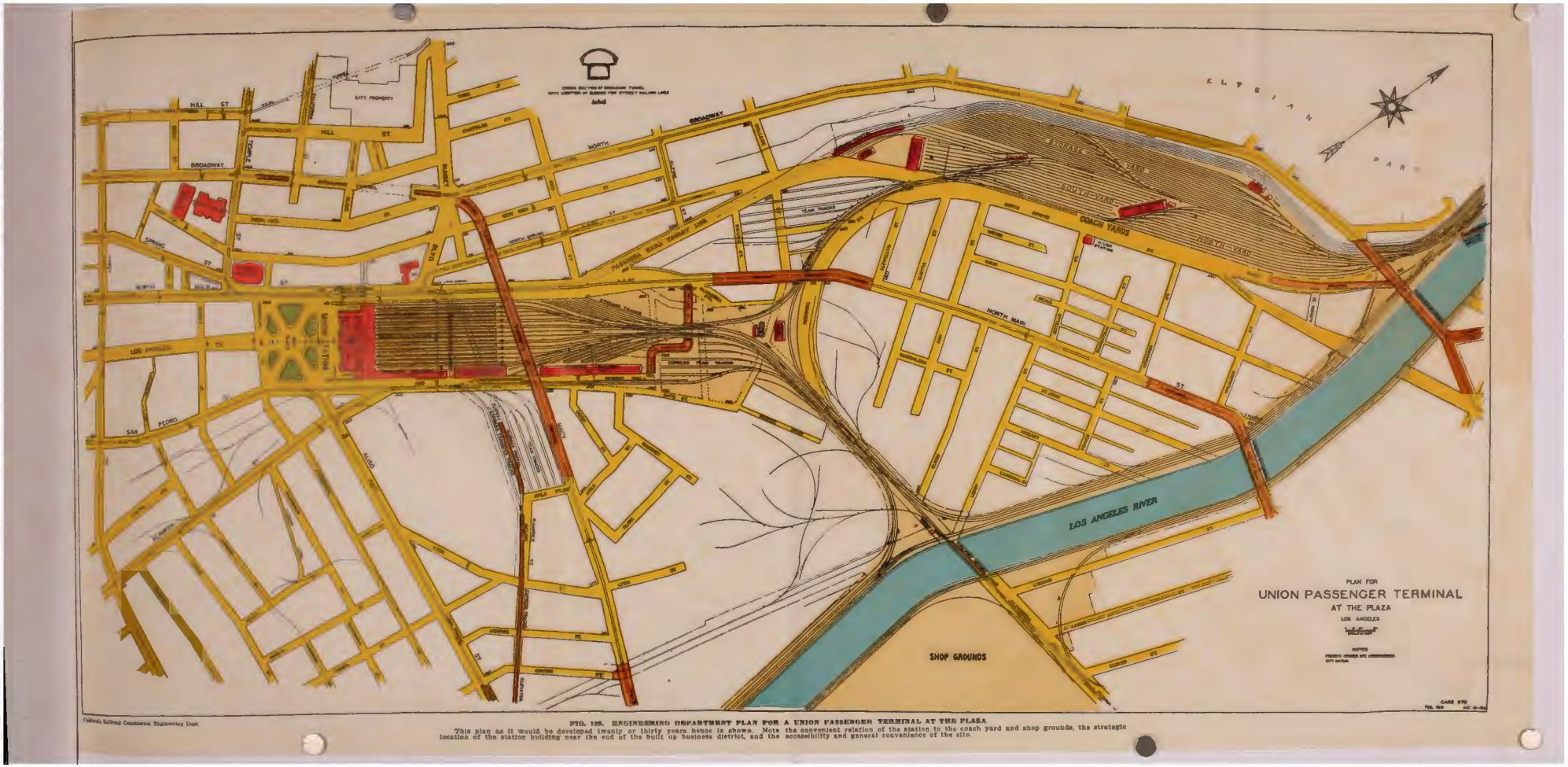


FIG. 128. ENGINEERING DEPARTMENT PLAN FOR A UNION PASSENGER TERMINAL AT THE PLAZA

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 provide 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 with 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. Aditional 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	"	"	"	"
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
Total	$3,298,633	$807,545	$4,106,178
Street Areas	0	.....	0
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

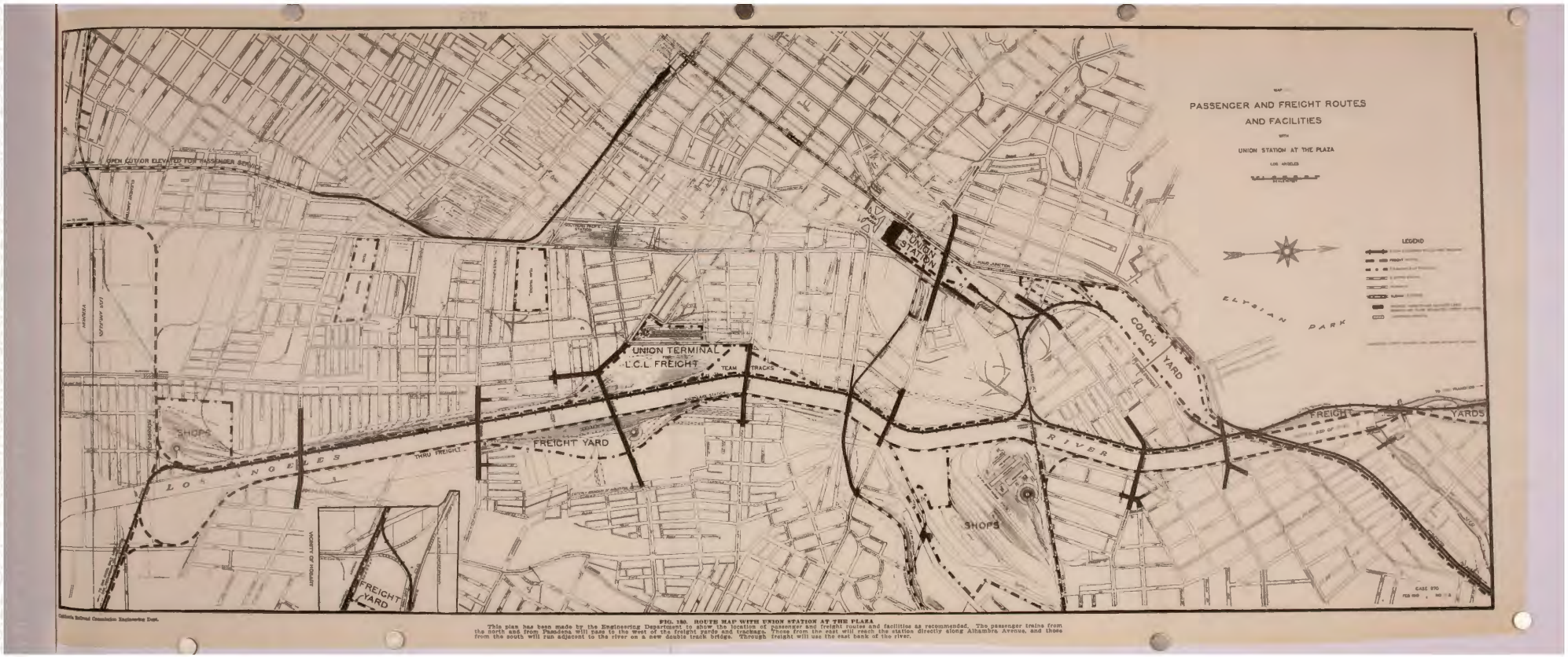


FIG. 130. ROUTE MAP WITH UNION STATION AT THE PLAZA

This plan has been made by the Engineering Department to show the location of passenger and freight routes and facilities as recommended. The passenger trains 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

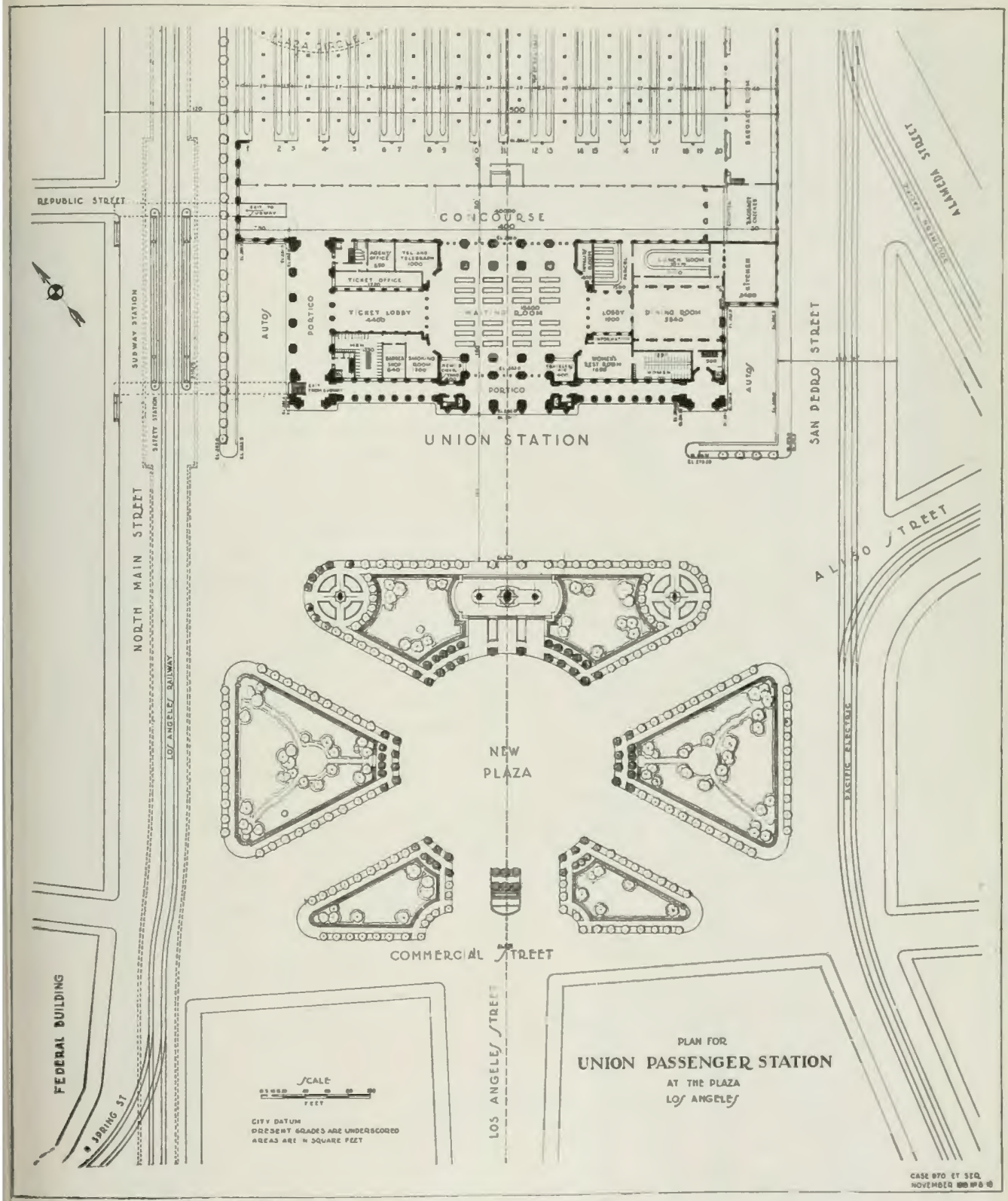


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FIG. 131. PLAN FOR UNION PASSENGER STATION AT THE PLAZA

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	
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	
		3,170
Women's rest room	1,650	
Women's toilets	1,380	
		3,030

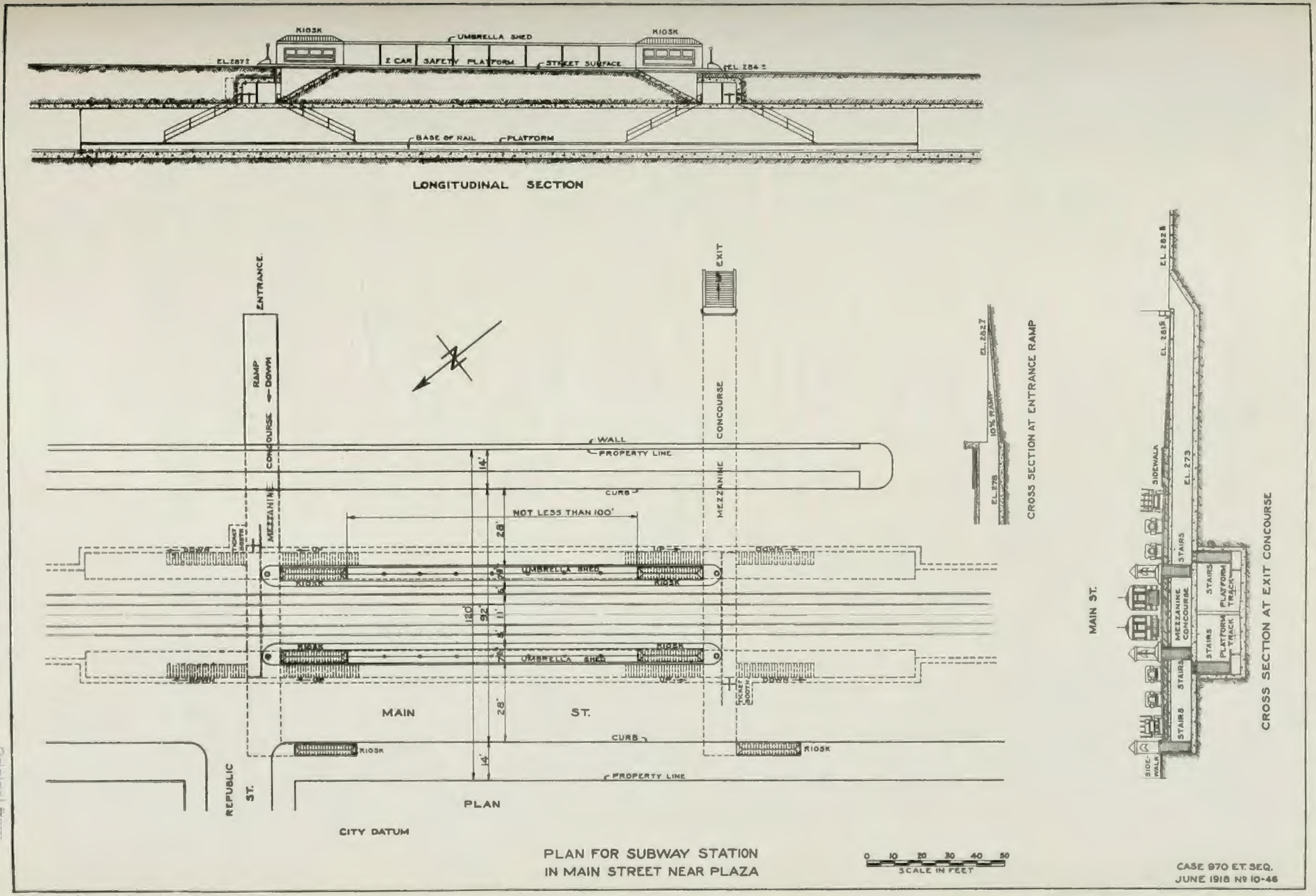

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FIG. 132. PLAN AND SECTION FOR A SUBWAY STATION AT MAIN AND REPUBLIC STREETS, ACCOMPANYING PLAN FOR A UNION STATION AT THE PLAZA

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
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 carload 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.

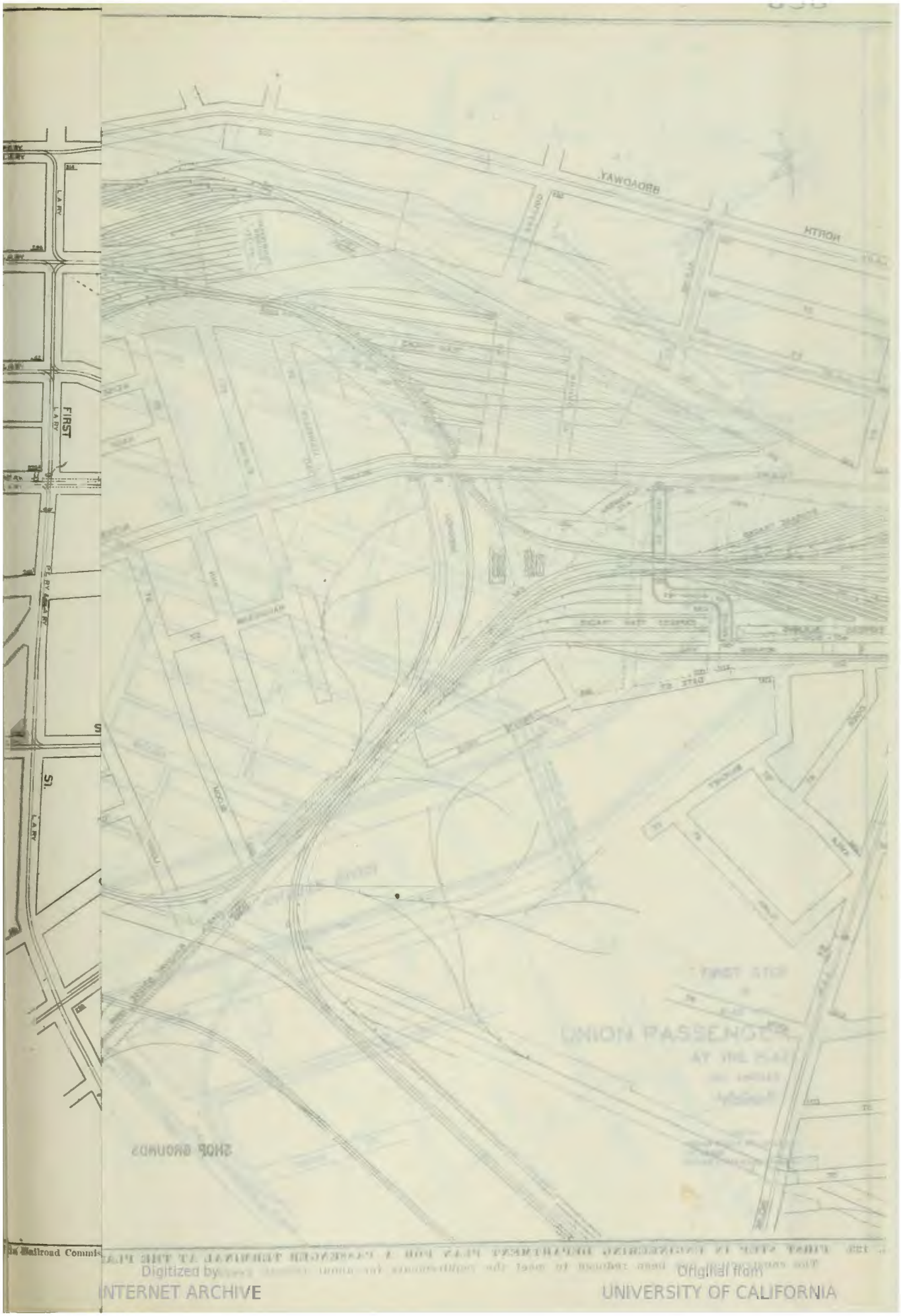
The establishment of a union passenger station at this site will probably necessitate re-location of the present Southern Pacific freight station now at College Avenue and Alameda Street.

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.



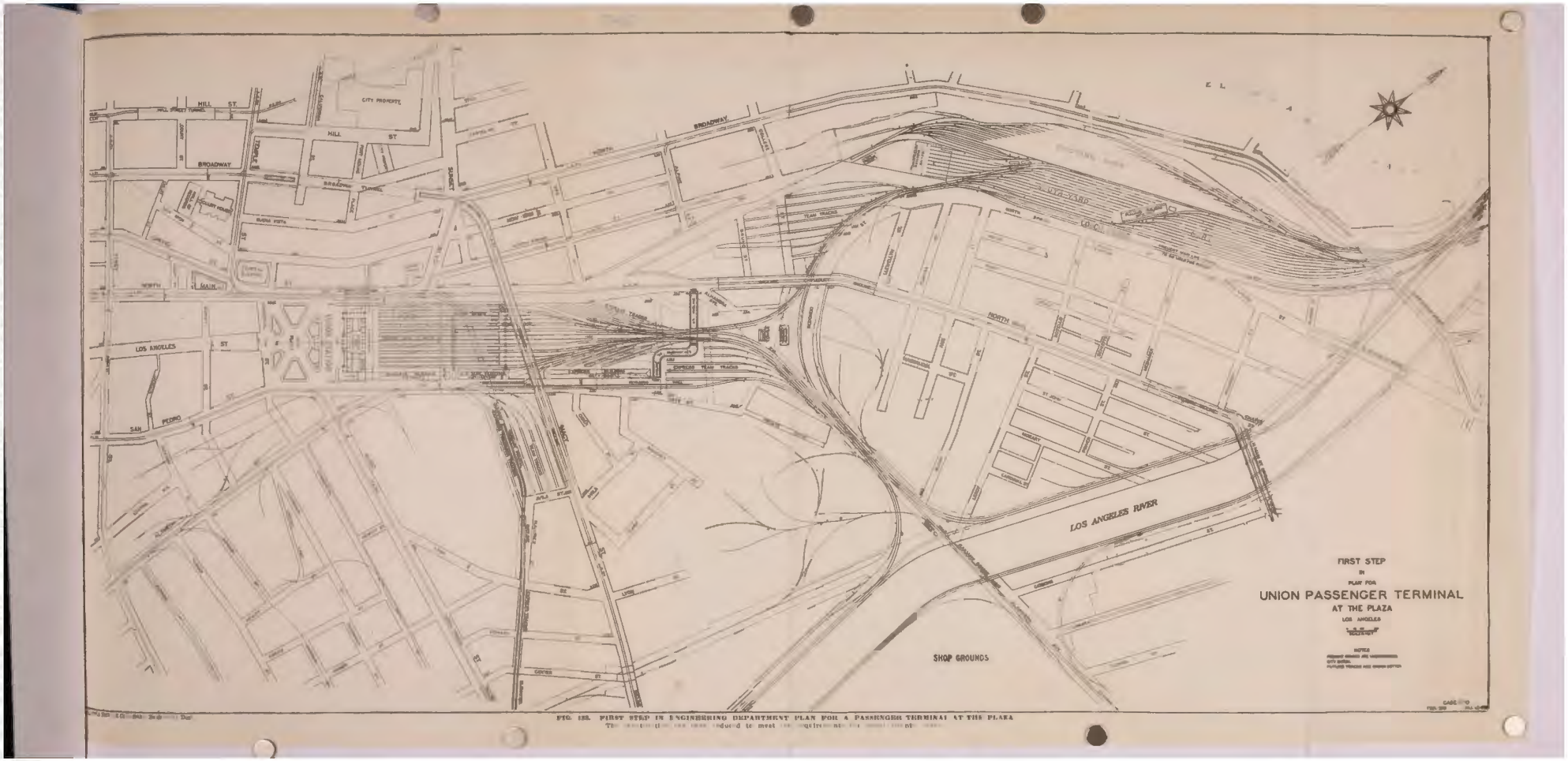


FIG. 139. FIRST STEP IN ENGINEERING DEPARTMENT PLAN FOR A PASSENGER TERMINAL AT THE PLAZA

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.

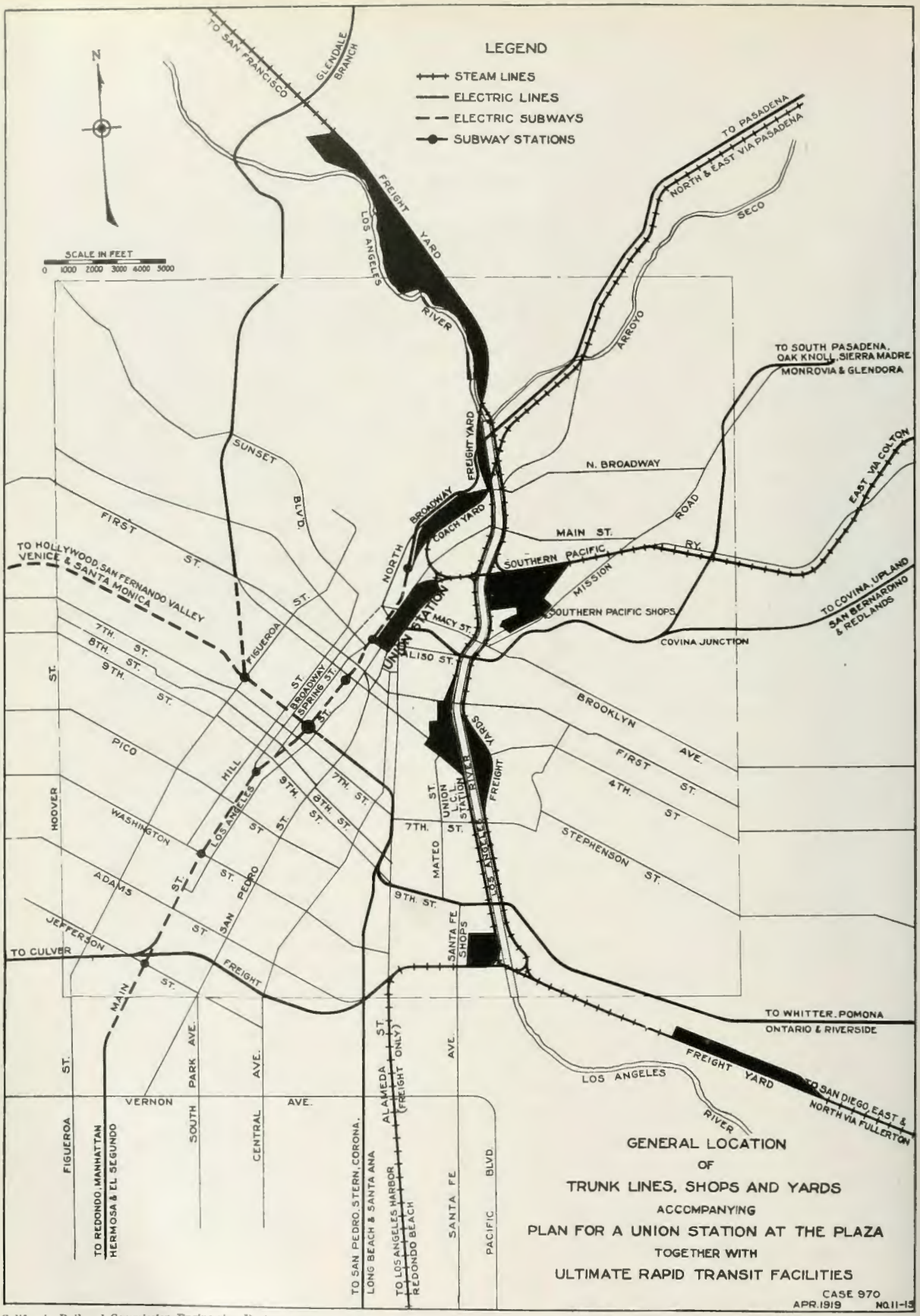


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FIG. 134. GENERAL STUDY SHOWING RELATION OF UNION STATION AT THE PLAZA TO SHOPS, YARDS, TRUNK LINES, AND PRESENT AND POSSIBLE FUTURE RAPID TRANSIT FACILITIES

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

			Site and Rating					
			Plaza		Southern Pacific		Santa Fe	
	Important Factors	Relative Weight of Factors	Rating	Weighted Rate	Rating	Weighted Rate	Rating	Weighted Rate
(a)	(b)	(c)	(d)	(e)=(cd)	(f)	(g)=(cf)	(h)	(i)=(ch)
1.	Site of proper area and shape	20	10	200	5	100	8	160
2.	Monumental gateway—aesthetic 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 ulimate plan includes the estimates for the immediate plan.

ESTIMATED NEW MONEY REQUIRED FOR UNION PASSENGER STATION AND OTHER PROPROSED 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 PROPROSED 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.