

THESIS

Suggested Layouts for a Union Terminal and Car
House for Pasadena, California

by

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SUGGESTED LAYOUTS FOR A UNION TERMINAL AND CAR
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The consideration of a Union Terminal and Car House for Pasadena is not a simple problem but involves all the larger metropolitan problems; not is it only Pasadena that must be considered, but also the outlying cities in the metropolitan district around Pasadena. This district embracing South Pasadena, Alhambra, San Gabriel, Lamanda Park, etc. is intimately concerned in the common civic problems such as drainage, and flood control, sewage and garbage disposal, and transportation service, and any attempt to solve any of these problems with regard to a small part of this district alone must fail of the ultimate desirable solution. Whether or not these cities ever unite to form a single municipality they must inevitably get together on the solution of the larger problems.

Transportation is probably the first of these problems in importance, since without an adequate transportation system the growth and development of a community is impossible. It is beyond the scope of this study to consider any of the larger problems besides transportation and the problems of transportation as they present themselves will now be briefly considered.

The Santa Fe Railroad has for a number of years operated

its main line through the heart of the city, making some thirty grade crossings within the city limits. The railroad is on a 2.5% grade which causes a high cost of maintenance and operation but cannot be changed on account of the established street grades. Furthermore, the line is a single track, and while the traffic of the road would justify double tracking, the city will not permit it. This road is a decided blight to property values near it in addition to being a menace to life, and it is useless to attempt to make a plan for Pasadena until some provision is made to remove the railway from its present location.

The situation concerning the interurban electric lines will also admit of considerable improvement. Two-car trains operating under a 15 to 20 minute headway traverse the main streets and the slow speed thus made necessary, together with the many stops, increases very materially the running time between Pasadena and Los Angeles. The ultimate plan for Pasadena should provide a way for these trains to come into the station at high speed and without grade crossings.

One of the problems of a most urgent nature at the present time, is that of arranging adequate storage facilities for the rolling stock of the electric lines. At the present time it is necessary to store 100 cars each night in Pasadena and the existing car houses have a capacity of only 75 or 80 cars and are widely separated from each other. This means that 20 or 25 cars

must be left out of doors each night. It costs the Pacific Electric Company 12 ¢ per car mile to operate an electric car exclusive of wages to the crew, and the time and money thus wasted moving the cars to and from distant barns could be saved by having the car house near a central station from which all the cars operated. This consideration will be taken up later.

Before passing on to a study of plans designed to offer a solution to the problem above outlined, a brief glance into the future should be made, and some estimate made of the possible growth of the city. Pasadena has been incorporated less than 30 years, yet had a population of 30,000 by the U. S. Census of 1910, and a city directory in 1914 claimed 41,000. This rate of increase will probably fall off somewhat from now on, but should a high speed line be built which would put Pasadena 15 or 18 minutes from Los Angeles, the rate of growth would be much greater than under the present conditions - that is, if the experience of other similarly situated cities can be taken as a criterion. No plan should be adopted which does not have ample provision made for expansion as the city grows.

Several plans have been offered as a solution for the problem. The first ones to be considered must be those providing for the removal of the Santa Fe from the center of town. It has been suggested that the steam lines be routed from Los Angeles on a 4 track right of way, up the Arroyo Seco to Garvanza, thence east on Grevellia Street to a point south of Raymond hill, thence

southeast to the present Southern Pacific Monrovia branch, from which the various roads would branch off to their separate lines. South of Raymond Hill would be placed a Union Station which would be connected with Pasadena, South Pasadena, Alhambra, etc. by high speed electric lines. Two tracks of the 4 track right of way would be for the use of a high speed electric line stopping only at Garvanza, the Union Station, and Pasadena.

This arrangement would leave the city in a position to be improved along the lines of a city beautiful. Among the suggestions offered along this line, the best one probably would be one including a provision for the cutting through of a few radial streets, as this system conforms to the best engineering practice in city planning. The best location for the intersection of these radials is probably on Colorado Street between Raymond and Marengo, both because this is about the center of business and because the present system of streets would lend itself most advantageously to the cutting through of radials intersection at this point.

On account of the location of the city near the much larger business center of Los Angeles there will always be a large amount of interurban traffic to that point. Hence it is essential that the terminal be located as near as possible to the center of the city to best serve the common interest. The present Southern Pacific Station would be an excellent location for such a terminal because of its situation near the intersection of the proposed radials and because the high speed lines could enter it from Los

Angeles and the Union Station of the Steam lines without crossing any of the main thoroughfares.

The car house should be located as near as possible to the station for economy of operation.

Having noted these fundamental considerations concerning the problems in Pasadena, some layouts for a terminal and car-house which will conform to the requirements above laid down will be taken up and discussed. The growth of an ideal city plan must necessarily be a slow one on account of the immense cost involved and hence the problem is not only to suggest a layout which will fit in with the ultimate ideal plan, but one of which the details are capable of execution in part, at a reasonable expense, in the immediate future, with a possibility of being expanded along the unit principle as the need requires, and which, when completed, will fit in with an ideal plan for the entire community.

Hereinafter will be discussed five possible plans, and by means of diagrams it will be shown how these would work out as the city grows.

I. Assuming that the present Southern Pacific Station is the ultimate desirable location for a terminal, as is suggested above, a car house could be built behind it extending across Green Street, to a point 400 ft. south of Green Street, as shown on page 6. This would all be on property owned by the Southern Pacific Company and at the present time has no improvements upon it. Enough space to the west of this house and as far south as Green

COLORADO ST.

E1.833.2

Sta

Shed
Cap20

Car
House
Cap24

E1.846.5

GREEN ST.

E1.823.6

Viaduct

Transfer Table

Car
House
Cap84

S.P. Fr. Sta

S.P. Property Line

BROADWAY

MARENGO AVE

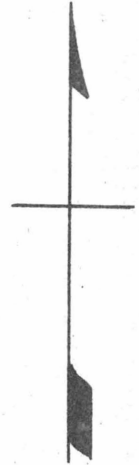
RAYMOND AVE

A.T. & S.F. R.R.

E1.805.2

CENTER ST.

E1.803.7

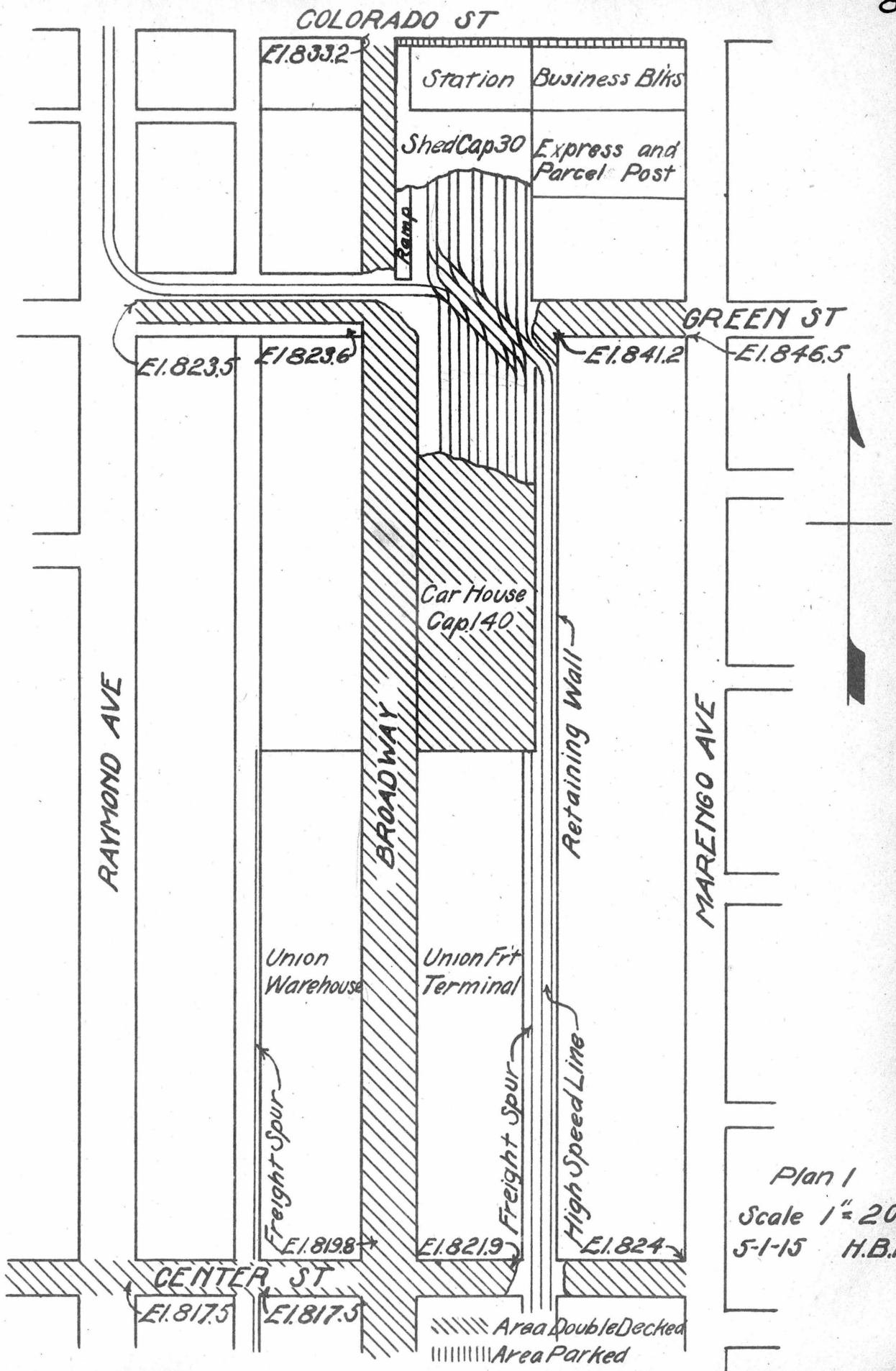


Plan 1
Scale 1" = 200'
5-1-15 H.B.H

would be left for a 4 track loading shed for the present use. The interurban cars would be routed up Broadway from Raymond Hill instead of up Fair Oaks, a change which would only necessitate a short cut off on Railroad Street and the laying of one more track on Broadway as there is at present a single track on that street owned by the Southern Pacific and for which there is a franchise which does not expire till Jan. 29, 1945. The house would be entered by a transfer table on the present site of Green Street, and the local cars would reach the house from Green via Raymond. Reinforced concrete construction could be used to advantage in a building of this type. A roof of the beam and floor slab type could be built heavy enough to be used during the day as a municipal market or a parking space for automobiles. It could be reached by a viaduct over Green Street from Marengo. This would necessitate the ending of Green Street at Broadway for the present, but this would not be of serious inconvenience as Green Street does not extend east from Marengo, and the portion from Broadway to Marengo is little used.

The property which would be covered had an assessed valuation of \$110,000 in 1914 against \$60,000 on the property now used as storage. At a figure of \$20 per cu. yd. of concrete laid, or a figure of 15¢ per cu. ft. volume the car house would cost in the neighborhood of \$40,000 exclusive of trackage or \$450 per car stored.

As the city grows and the need arises for increased facilities, this building could be fitted into a plan for a large terminal and industrial district, as shown on page 8. The district



Plan 1
 Scale 1" = 200'
 5-1-15 H.B.H

lying between Raymond Avenue and the rear property line of lots facing east on Marengo, and between Green Street and Railroad Street, has grown in the development of the city to be a center for industries such as lumber yards, power plants, and manufactories, and as it is desirable in an ideal city to confine such industries to a restricted district, the present location is the most natural one. These industries could face on Broadway which would be used for heavy trucking and could be served on the rear by two freight spurs, the one of the west side of the district operating on the present Santa Fe right of way, and the one on the east operating on a right of way half way between Marengo and Broadway. This right of way would be in an open cut on the level of Broadway with a retaining wall on the east side to restrain the bank. The interurban line would be removed from Broadway and operated in this open cut from the cut off on Railroad Street, and would enter the station as shown on page 8. The portion of the car house north of Green Street could be used as a loading shed when the need required and the rest of the car house could be expanded east and south as far as necessary. As soon as the Santa Fe was removed Green Street could be opened up again by a viaduct starting at Raymond. Another viaduct starting at Colorado and Broadway could rise to the level of the Green Street viaduct and from here South Broadway could be double decked, allowing for trucking on two levels thus facilitating the moving of freight, etc. This would afford easy access to the top of the car house which could

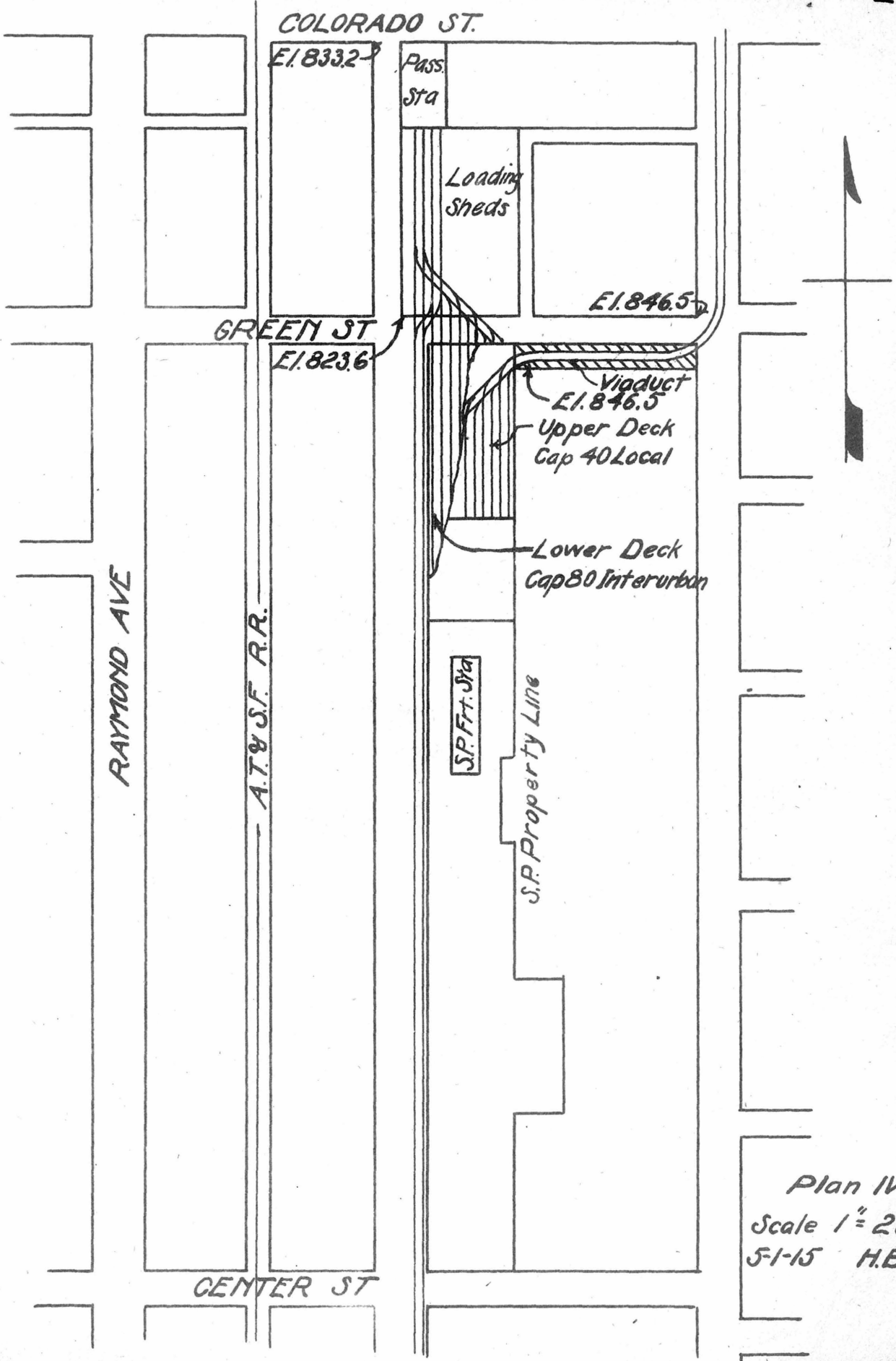
be used for parking space. A viaduct over Center Street from Fair Oaks to Marengo would allow light traffic to cross the industrial district without grade crossings, and one on California Street would answer a similar purpose. These viaducts could be made of reinforced concrete and need not be ugly or unsightly.

II. The necessary changing from a transfer table entrance to the car house to a ladder track and the alteration in the building necessary to bring the high speed line in from the open cut to the station on an easy curve, might be a serious objection to the plan just mentioned. In this case it would be just as possible to build the same type and size of car house extending south from Green Street and thus avoiding the shutting off of that street. The only hindrance to this plan would be the necessity of moving the present Southern Pacific freight depot a short distance south. This however would not entail a large cost as it is only a light frame building. The ultimate layout would be the same as that in Plan No. 1, and the building could be expanded as the need arose. The immediate cost would be about the same as for the first plan.

III. In case the change from the present car storage arrangement was considered necessary immediately and the above propositions proved prohibitive as to first cost, it would be possible to construct permanent track layouts on the site of either of the above plans, and instead of a concrete building, to erect

temporary sheds similar in type to the Bush train sheds over the tracks. These sheds could be replaced by permanent concrete structures when feasible. These sheds could be constructed of steel and covered with corrugated iron at a very small cost. The chief objection to this plan is that it would postpone the building of a sightly structure indefinitely.

IV. The feature of the parking space on the roof and the alternative of shutting off Green Street for the present or moving the Southern Pacific freight station might prevent the development along the lines above suggested, but a very feasible plan eliminating both of these objections could be developed along the lines of a double deck car house as shown on page 12. The topography of the surrounding land makes such a layout very practicable. The difference in elevation between Broadway and Marengo on Green Street is 23 feet. Hence allowing 18 feet clearance for trolley wires, the local cars could enter the car house from Marengo on a level and still leave an allowance of 4' for pits under the tracks. In this way the local cars would be kept separate from the interurban cars which would enter the house from a ladder track back of the loading sheds as shown on page 12. The local cars would enter on a viaduct built on the property just south of Green Street, which is at present only occupied by a cheap frame building. This would necessitate the laying of tracks on Marengo from Colorado to Green, but as the tracks would only be used in going to and from the car house this intermittent service would not be a nuisance. The ult-



COLORADO ST.

E1.833.2

Pass.
Sta

Loading
Sheds

E1.846.5

GREEN ST

E1.823.6

Viaduct
E1.846.5

Upper Deck
Cap 40 Local

Lower Deck
Cap 80 Interurban

RAYMOND AVE

A.T. & S.F. R.R.

S.P. Ft. Sta

S.P. Property Line

CENTER ST

Plan IV

Scale 1" = 200'

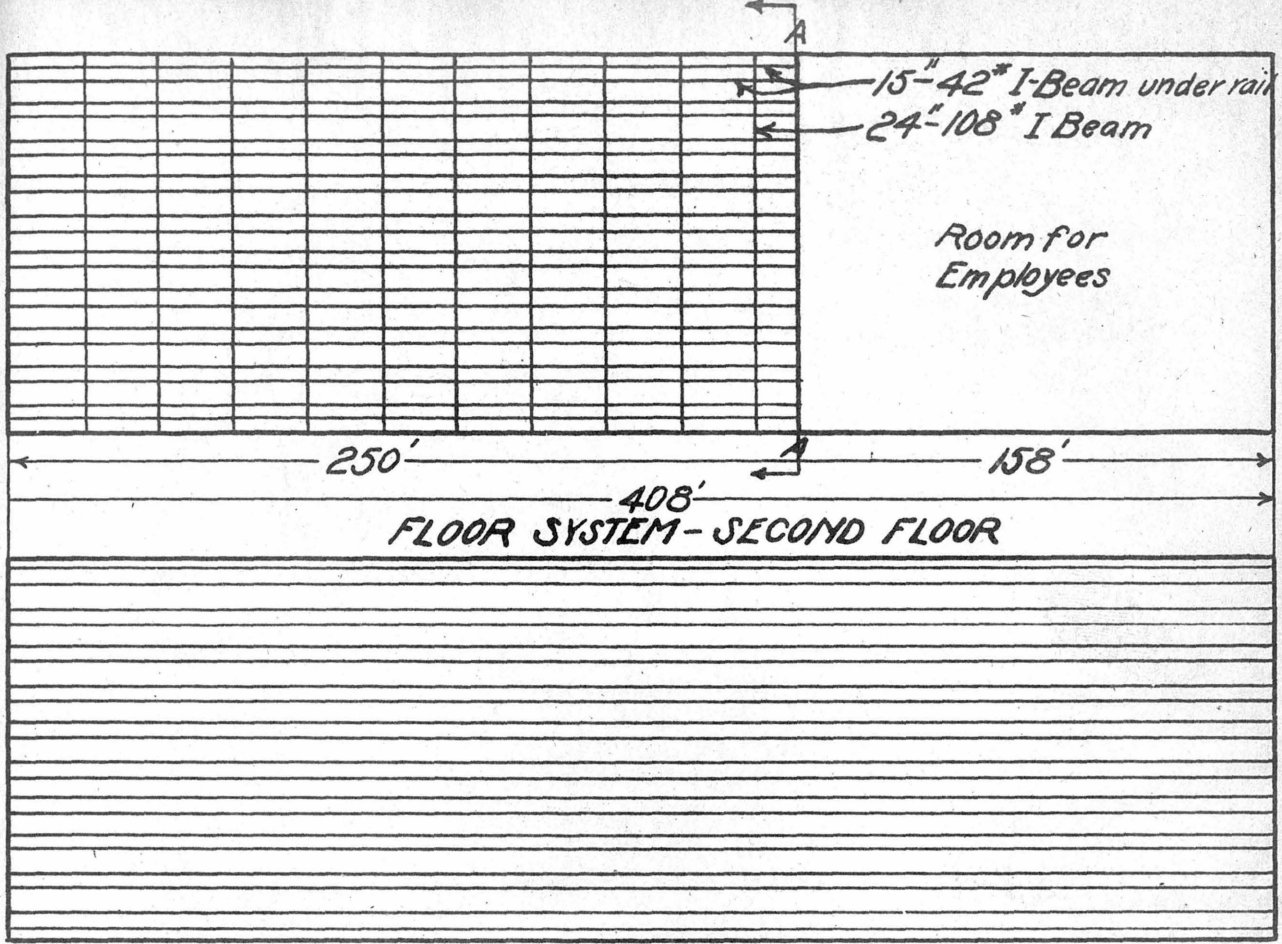
5-1-15 H.B.H.

imate layout as on page 8 would be worked out as for the other plans.

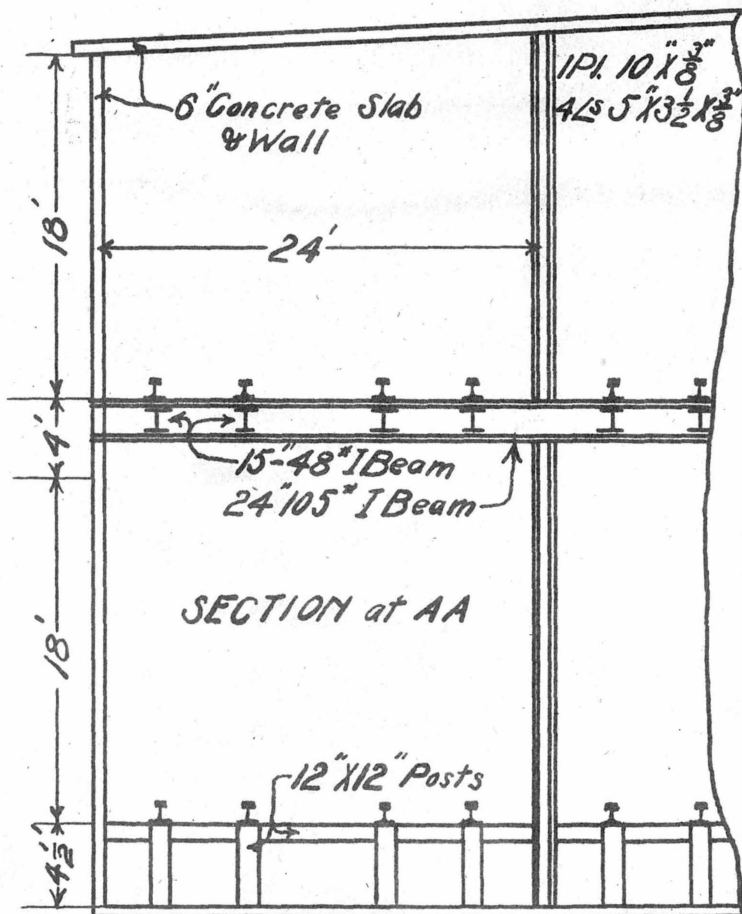
The cost of such a building would not be excessive. A suggested plan is shown on page 14. Panels of 24 ft. square are used allowing two tracks per bay. The roof, floors and walls are of concrete but the columns and network carrying the second floor tracks are of structural steel as shown.

Assuming the weight of a local car to be 36,000 lbs, the tracks to be 30 ft. center to center and the rigid wheel base to be 6 ft., which are average figures for the local Pacific Electric cars, calculations show that the deck loaded full could be carried by 24 in. 105 lb. I-beam floor beams and 15 in. 42 lb. I-beam stringers arranged as shown on page 14. Using a unit cost of 7¢ per lb. for structural steel in place and of \$20 per cu. yd. of reinforced concrete, the estimated cost of the building would be about \$30,000 or \$250 per car exclusive of tracks.

V. The plans thus far suggested have assumed that the most desirable ultimate city plan was one with a civic center and station on Colorado Street between Raymond and Marango. Such large improvements, however, must come slowly and it is not impossible that before the necessary public desire shall have been aroused to demand the change, the property and improvement values on that site will have increased to such a sum that it will be impossible to finance such a plan. In this case another solution must be sought from the standpoint of cheap property values.



FIRST FLOOR



Floor Plans and Section
Plan IV

5-1-15 H.B.H
Scales - Plans: 1" = 60'
Section: 1" = 10'

At the present time the value of the property lying south of the present Southern Pacific Station is assessed at only 15 per cent. of the value of the same area fronting on Colorado Street, and has no improvements of a permanent character on it. Comparatively cheap and unimproved land can also be found on the east side of Raymond Avenue north of Center Street. This land only assessed at \$36 to \$58 per front foot against \$600 to \$700 per front foot on Colorado Street.

Assuming the removal of the Santa Fe tracks from town which is prerequisite to any plan of Pasadena, the above values at once suggest a location for a terminal which if not quite so attractive from the standpoint of a radial plan, is far more so from an economic one than the plans first suggested. On page 16 is suggested a layout which would use the less costly land and leave Colorado Street for business blocks. Immediately behind the lots facing on Colorado Street is a plaza and a civic center which in the other plans would come on the north side of Colorado Street. At the extreme sides of the map are shown the ends of the two proposed diagonal streets which would extend south from the center. It will be seen from these that the layout is symmetrical with regard to these radials. Henrietta Court is cut through and carried on a viaduct from Marengo to Raymond. At the end of the viaduct on Raymond Avenue is placed the Union Station. This, it will be observed, is thus served by the two southern radials directly and is less than 1000 ft. from Colorado Street.

COLORADO ST

Business Blocks

PLAZA

GREEN ST.

CIVIC CENTER

RAYMOND AVE

Business Blocks

BROADWAY

MARENGO AVE

Viaduct

Station

Shed
Cap 40

E1.800

3.7%

E1.803.7

E1.800

High Speed Line in Open Cut

5%

Freight Spur

Car House
Cap 128

Freight Spur

CENTER ST

E1.787.5

E1.803.5

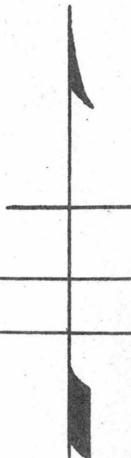
E1.803.7

E1.824

Plan V

Scale 1" = 200'

5-1-14 H.B.H.



CENTRAL PARK

In addition it is facing Central Park. A railway terminal is the gateway to a community, and when it is placed in the least attractive section of a city as is frequently the case, the newcomer to a city is likely to get a poor impression which it will take some time to efface. The placing of the station opposite a permanent beauty spot such as Central Park would undoubtedly improve the city greatly from the standpoint of the visitor.

Trains would enter the station in an open cut on the present Santa Fe right of way, an entrance which would eliminate all grade crossings. The cut could be commenced at a point just north of the Raymond Hill and on a one per cent. grade down to 18 ft. below the present surface level. The 2.5 percent. grade could then be followed to Center Street, where a 5 per cent. grade would bring the tracks to within 4 ft. of the surface at the station, at which level the loading sheds could be built. A 3.7% grade would bring the spur to the car house to the level of Broadway. The heavy grade just before the station is reached is an advantage in some ways. It could be used to brake the cars coming into the station at high speed thus saving wear and tear on the brakes and could be used to assist a quick get-a-way.

This arrangement would remove the necessity of viaducts over Green and Center Streets, and the double decking of Broadway; a fact which should not be lost sight of in a country where open air and sunshine are the biggest capital.

The car house in this layout has been placed on the north-

east corner of Center and Broadway. The sketch on page 19 shows a manner in which this structure could be built at the present time and used with the station in its present location. The initial cost would be about the same as for a car house located as in Plan I. If it were built in this location at the present time it could still be used whether the ultimate station was in the present location or placed as shown on page 16.

Of the plans above suggested the double deck car house presents the most favorable points. It is very accessible to local cars and keeps them separate from the interurban cars. The first cost is less than that of a one story building spread over more ground, the double deck plan being more economical of money and land. It admits admirably of expansion along a unit principle and could grow with the city.

The city should give every aid in its power to the building of such a terminal because it is a matter of interest not only to the Railway but to the community as a whole, and intelligent cooperation between the railway and the city might discover some way whereby both could profit."

COLORADO ST.

E1.833.2

Pass Sta.

Shed Cap 20

E1.846.5

GREEN ST.

E1.823.6

S.P. Fr. Sta.

S.P. Property Line

Gar House Cap 105

RAYMOND AVE

A.T. & S.F. R.R.

BROADWAY

MAREN60 AVE.

E1.805.2

E1.803.5

E1.824

CENTER ST

E1.803.7

Plan V
Scale 1" = 200'
5-1-15 H.B.M.