

Southern Pacific Negotiations With City



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ished, elevating both 17th Avenue and Powell over tracks, as this drawing shows. SP made \$4.5 million traffic package offer to Portland for two projects.

By **ANDREW MERSHON**
Staff Writer, The Oregonian

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Most important of these is an increase in car-holding capacity at the Brooklyn Yard, located just east of McLoughlin and west of Eastmoreland's swank residential area.

SP wants a zone change, the first step in implementing the agreement, to allow the company to install holding and passing tracks in the 6,000-by-135-foot strip it has owned parallel to McLoughlin for 40 years. It is presently zoned for single-family residences.

Complications Seen

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manpower delays, not only for SP, but for cargo handlers on the Portland docks and for warehouses throughout the city.

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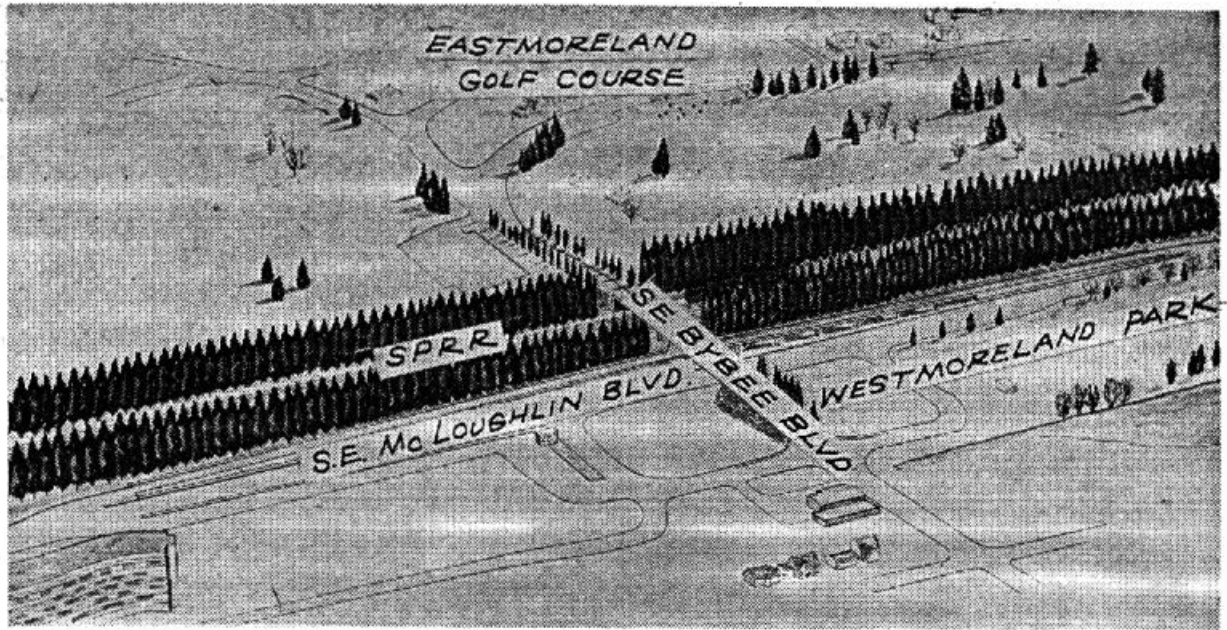
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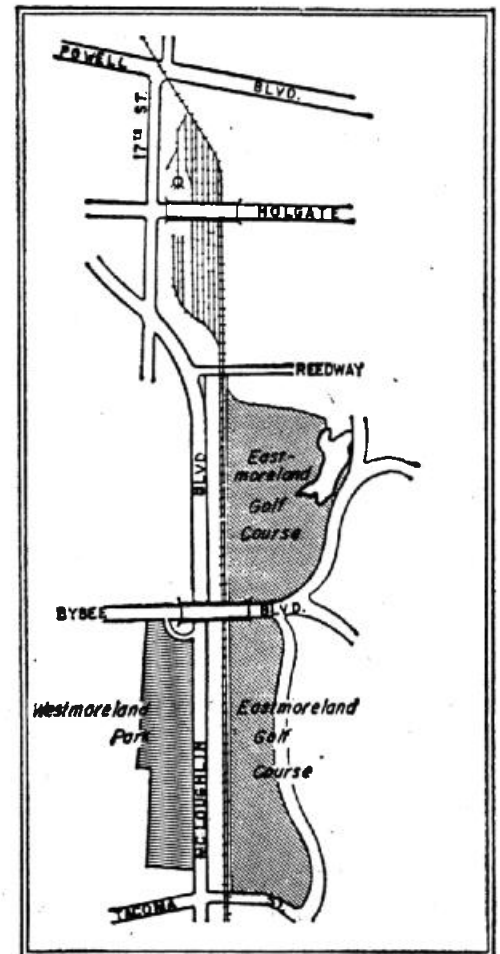
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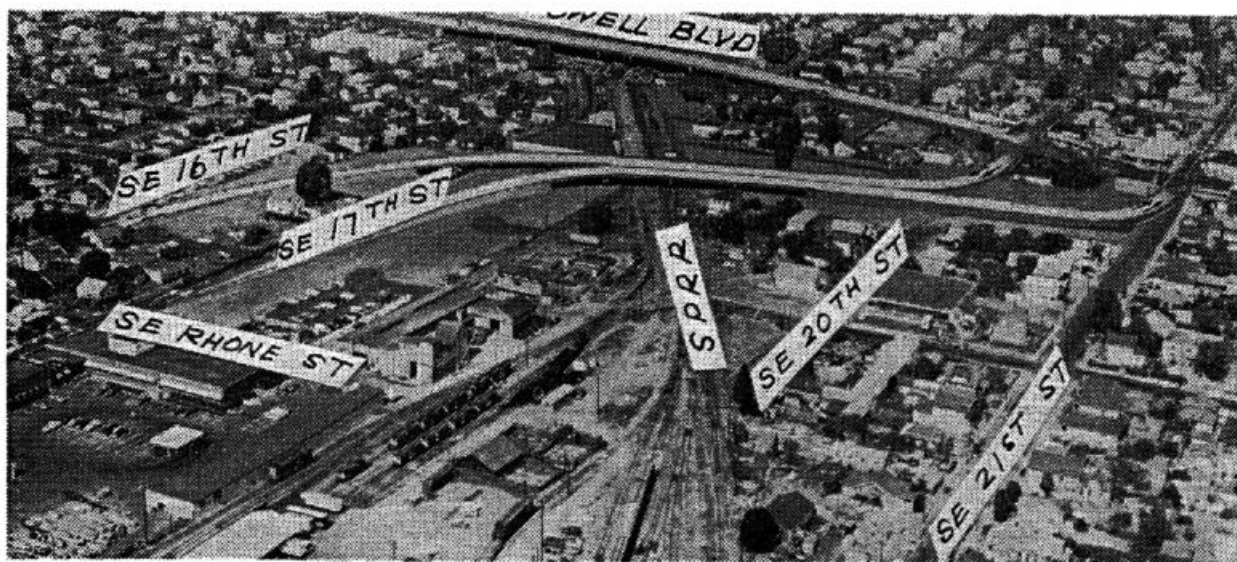
SP has proposed the state pay all of the rebuilding costs up to the east side of McLoughlin as it now exists and also 66 2-3 per cent of the overpass extension to accommodate the new yard construction in the SP strip. SP would pay one-third of this extension and for all the cost of constructing north and southbound ramps.

The railroad will also stand the cost of screening and landscaping.

Young emphasized that no one is committed to the proposal, "except the Southern Pacific Company." SP, however, reserved the right to withdraw its offer



MAP SHOWS present configuration of streets in vicinity of SE Bybee Boulevard overpass which Southern Pacific has asked to rebuild. SE Reedway Street would be vacated under SP plans for area. SP would like to add holding trackage in area



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port would be four to six weeks to come back to normal. Each will hold on the receiving end receive remon-

Young points out that this year, "for the first time in 10 years, Southern Pacific has 1,000,000 cars in the yard. Each car has to use 100 feet of track, he said, docks or to in other lines."

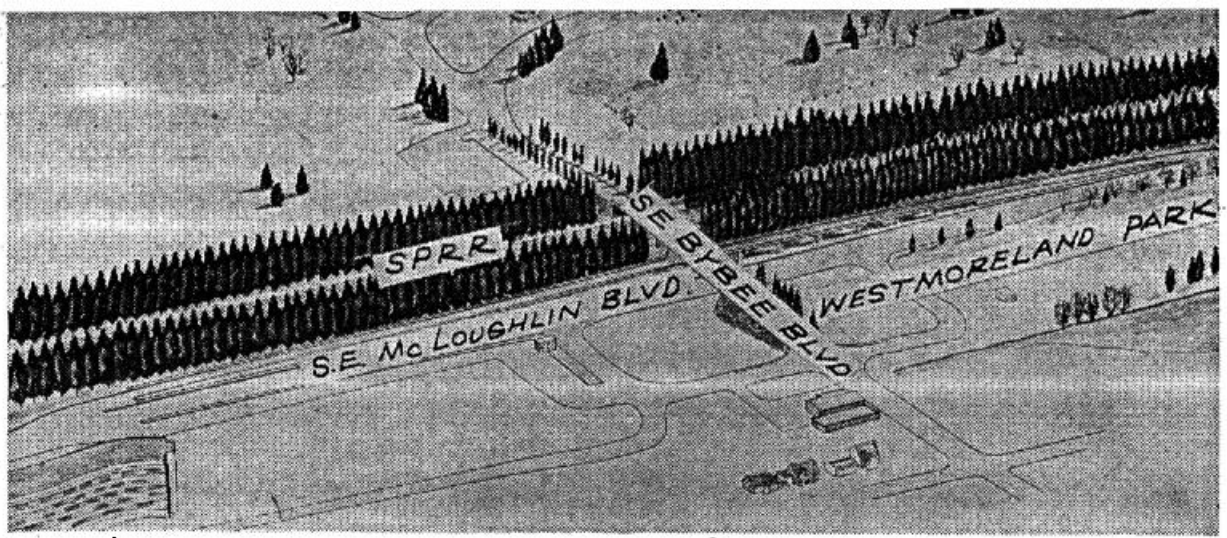
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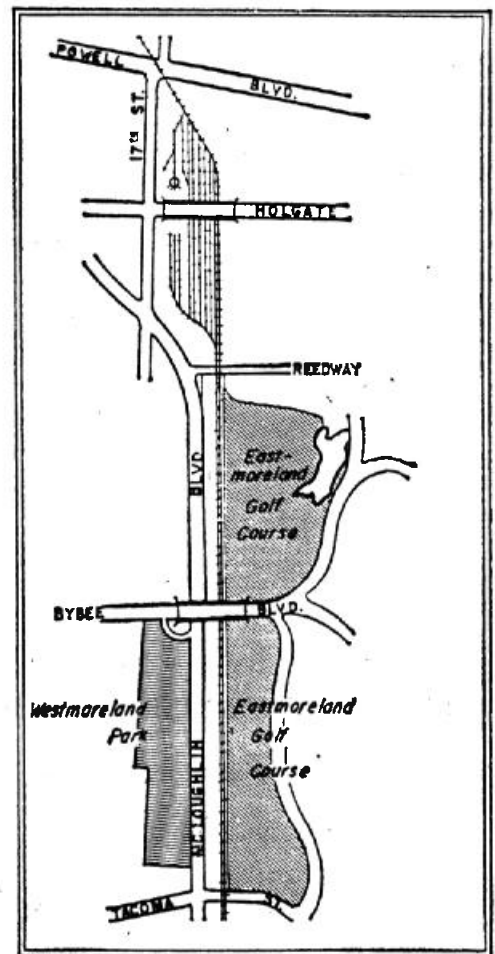
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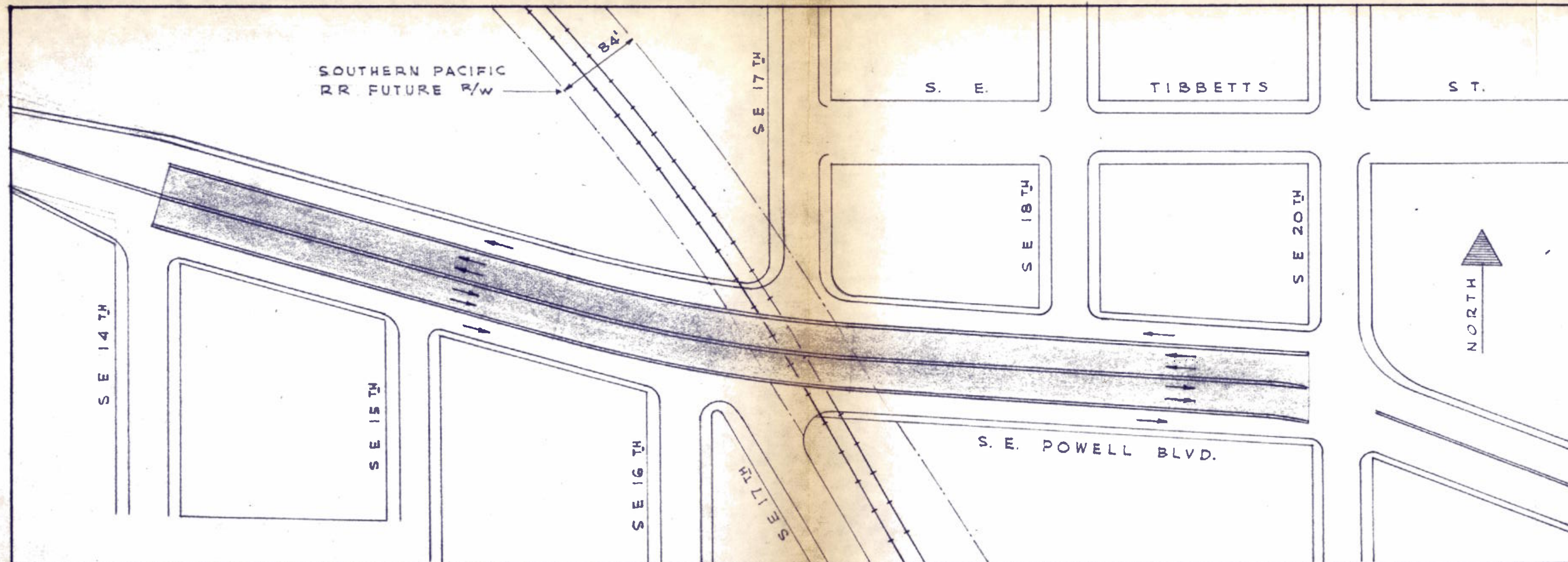
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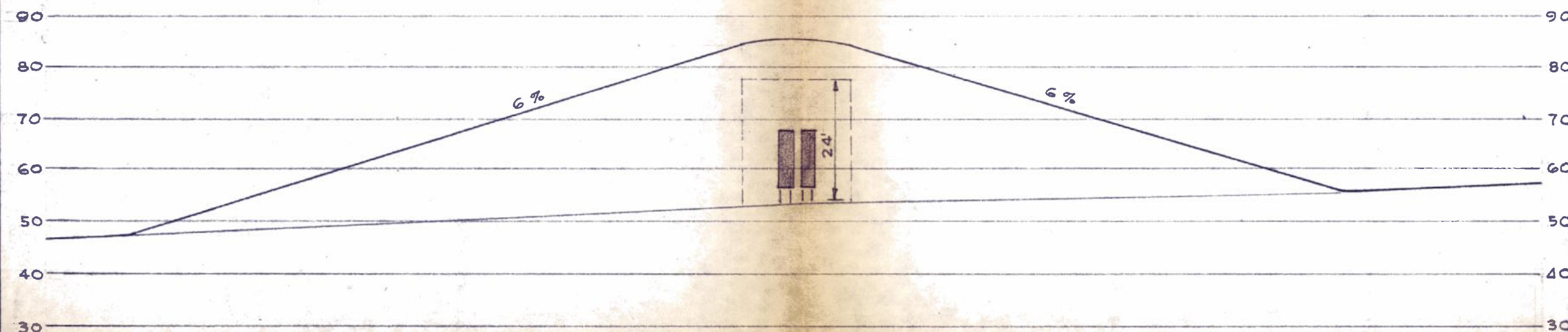
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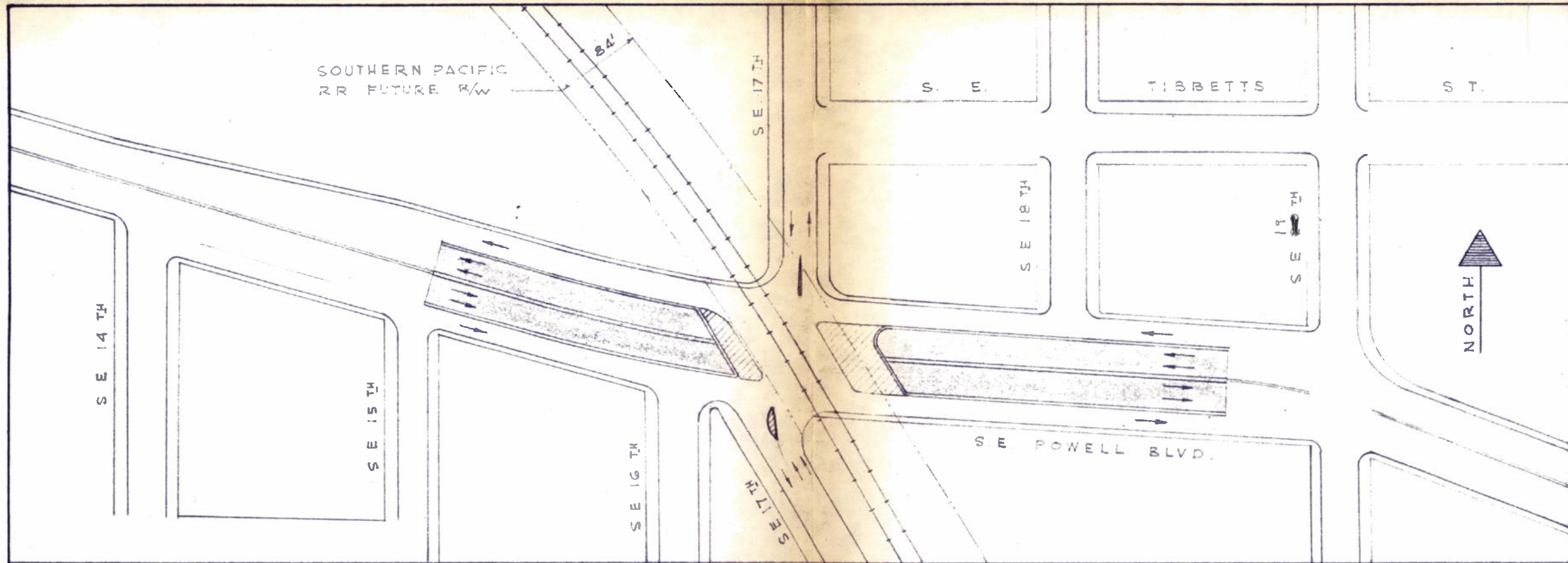
P L A N 1" = 100'



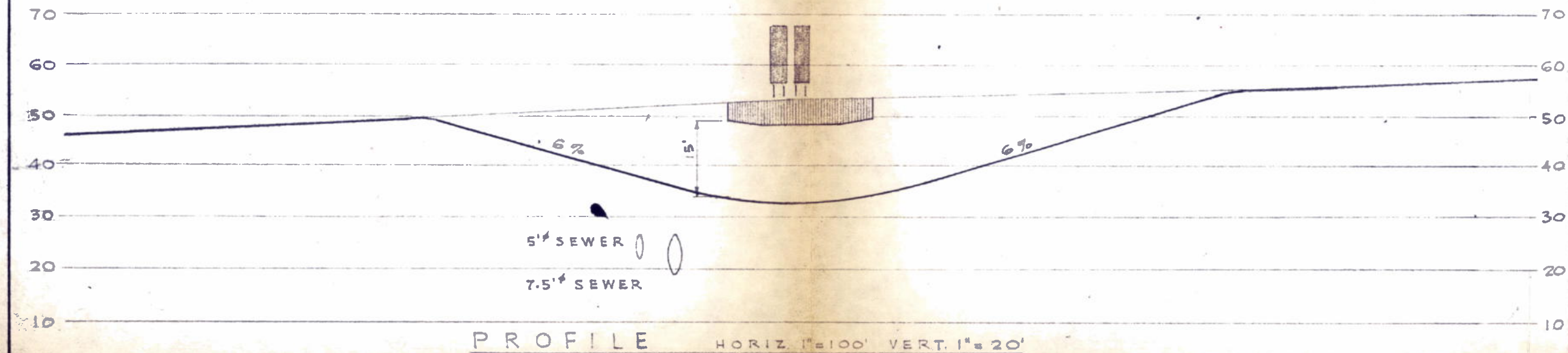
P R O F I L E HORIZ 1" = 100' VERT. 1" = 20'

PROPOSED GRADE SEPARATION
S. E. 17TH AVE. & S. E. POWELL BLVD.

P L A N E

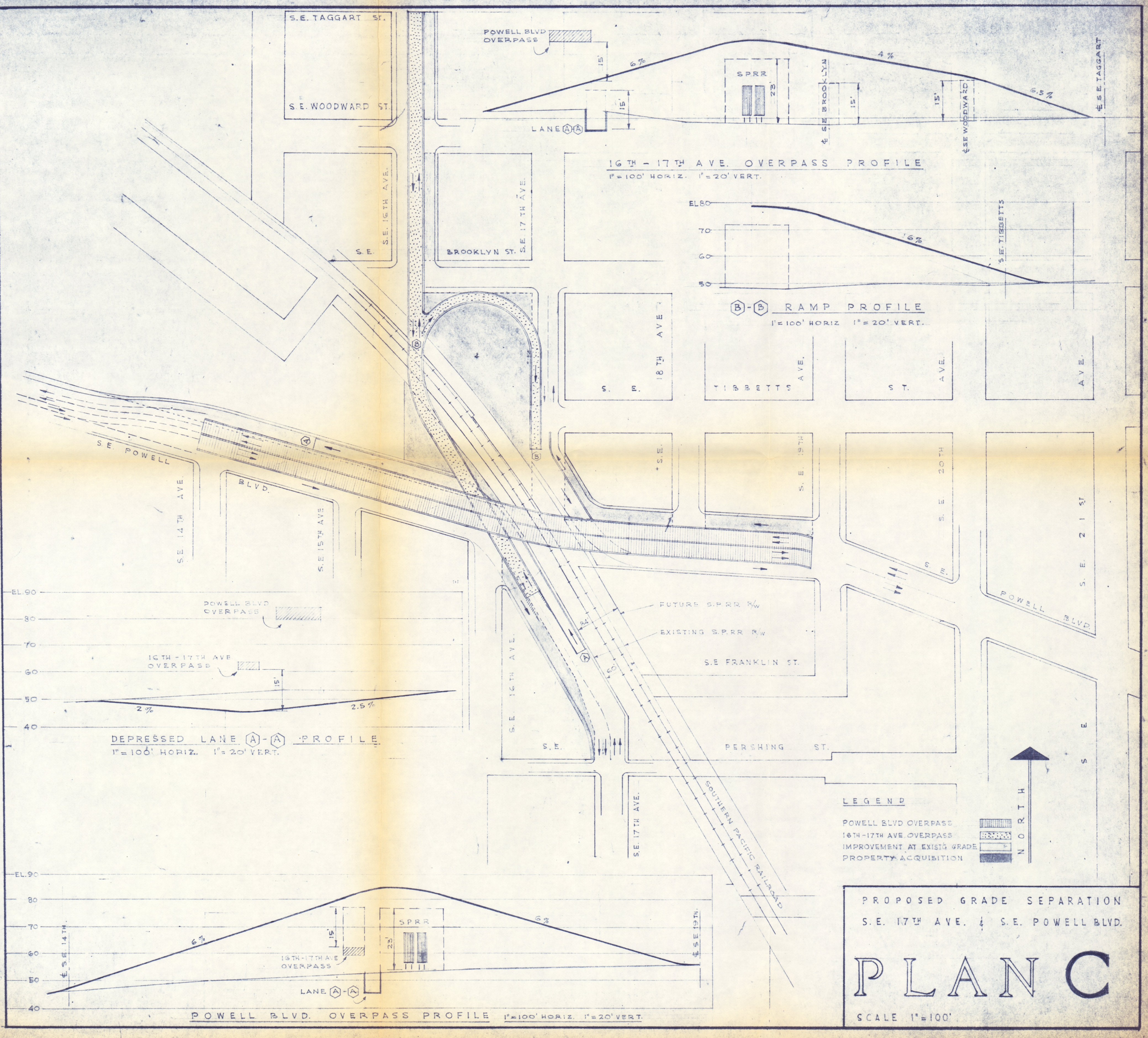


PLAN 1" = 100'



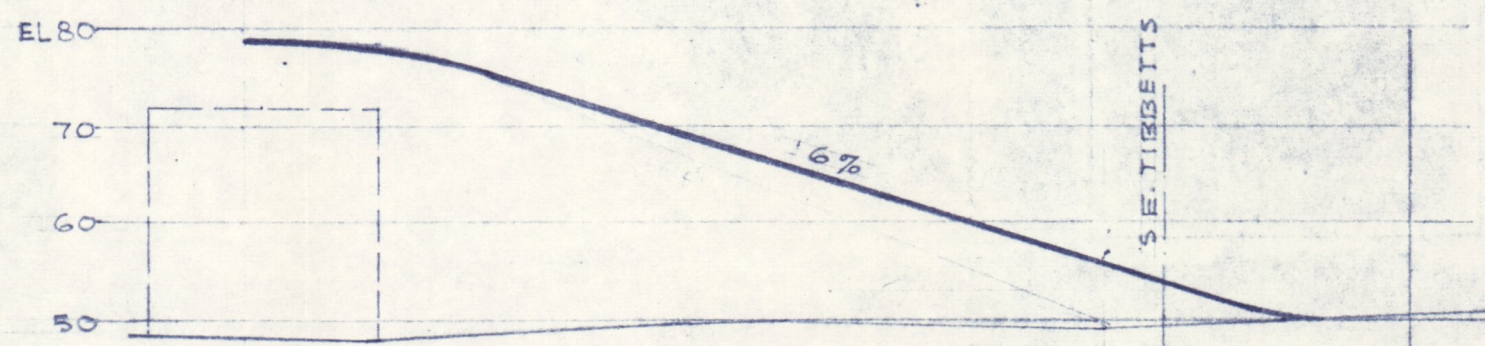
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PLAN D



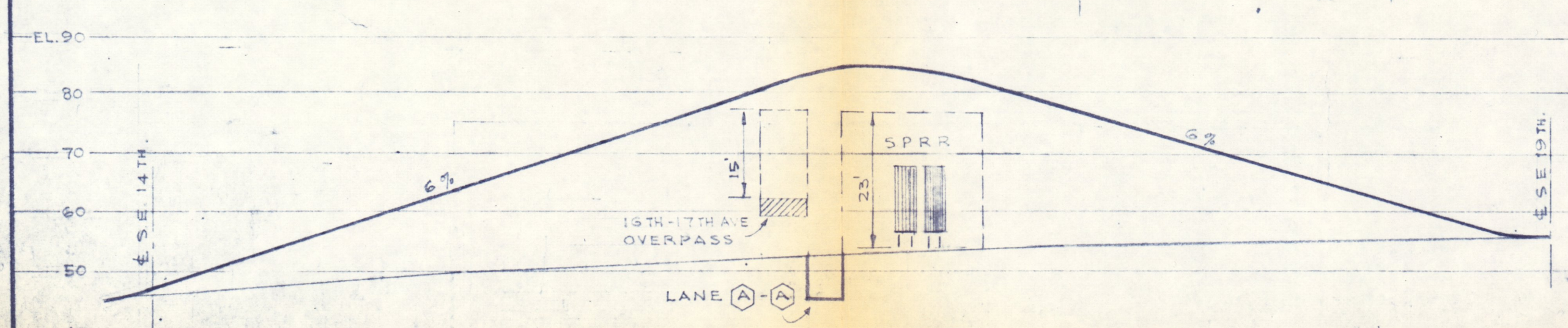
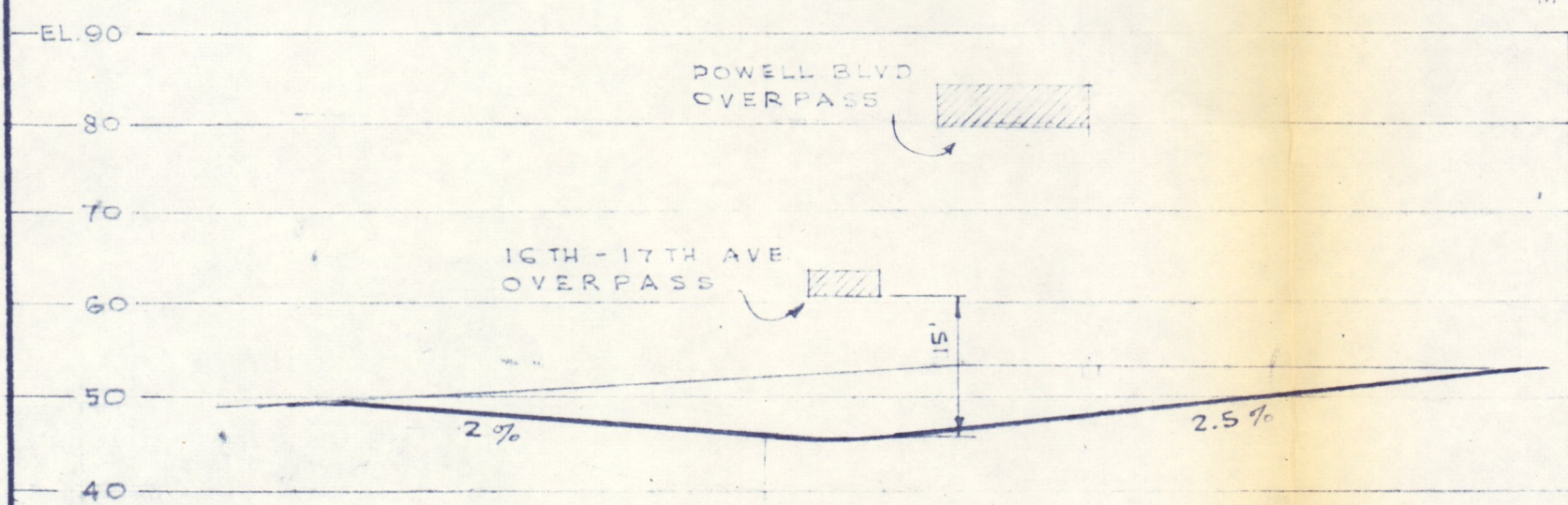
POWELL BLVD OVERPASS

16TH - 17TH AVE. OVERPASS PROFILE
1"=100' HORIZ. 1"=20' VERT.



B-B RAMP PROFILE
1"=100' HORIZ. 1"=20' VERT.

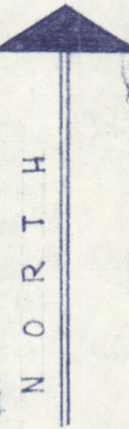
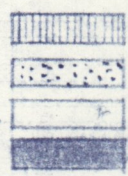
DEPRESSED LANE A-A PROFILE
1"=100' HORIZ. 1"=20' VERT.



POWELL BLVD. OVERPASS PROFILE 1"=100' HORIZ. 1"=20' VERT.

LEGEND

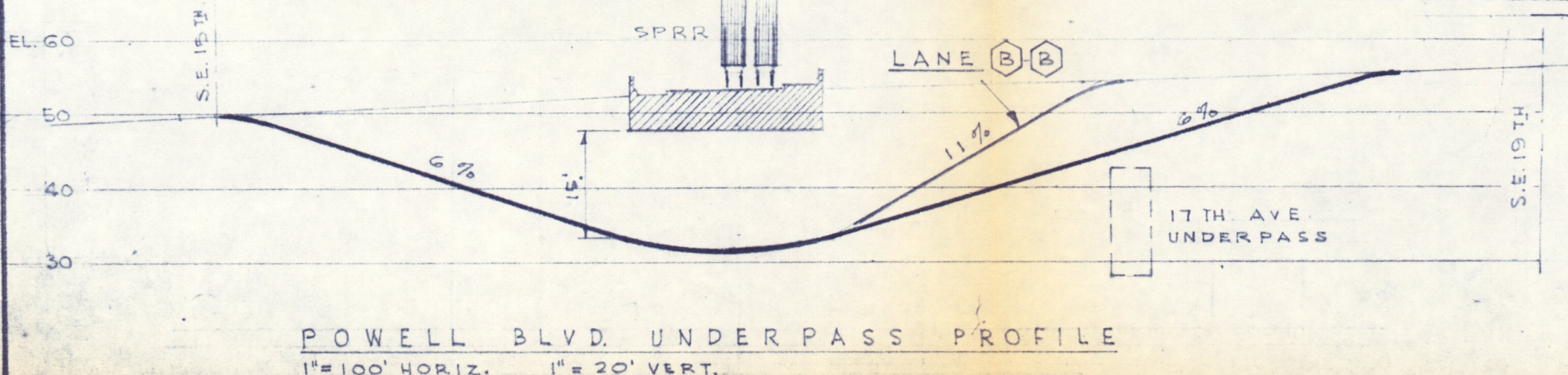
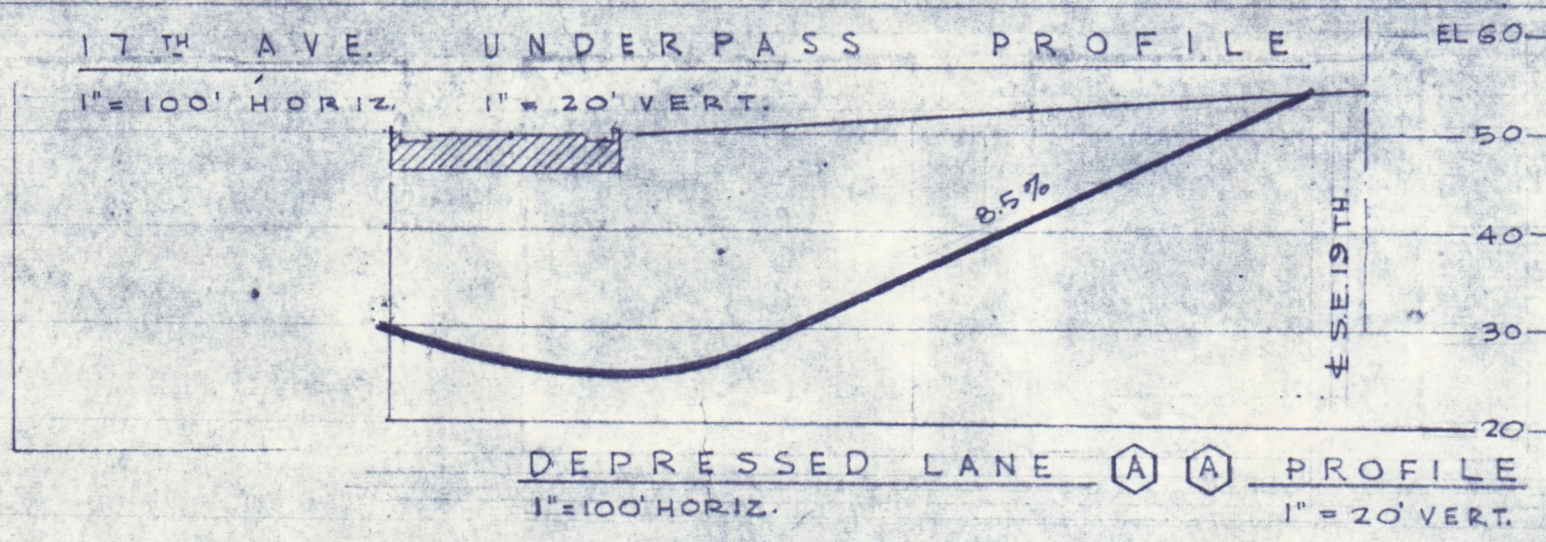
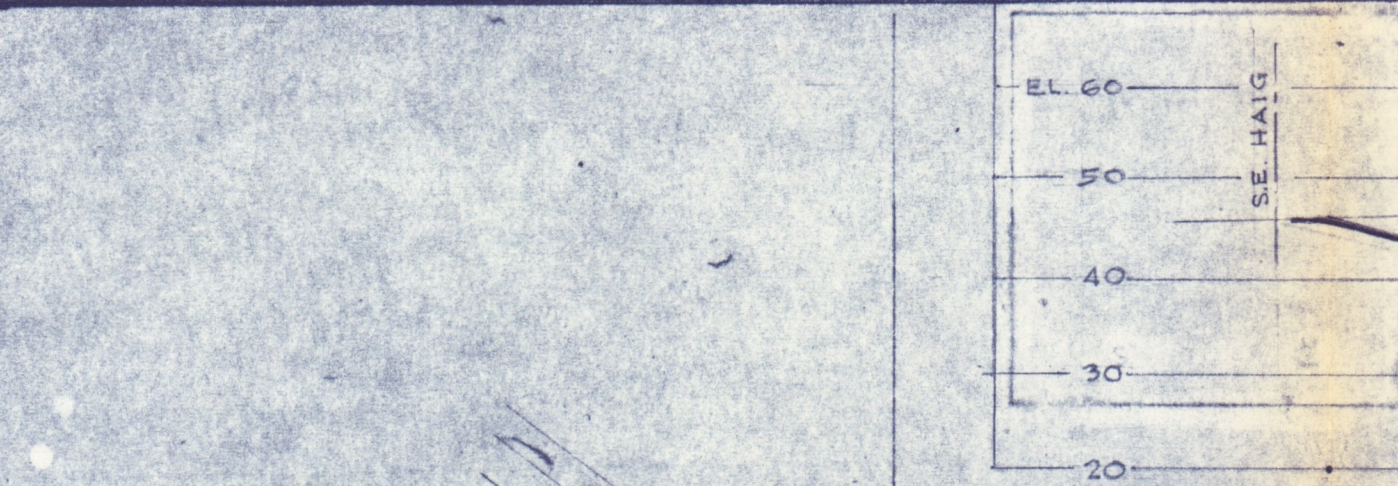
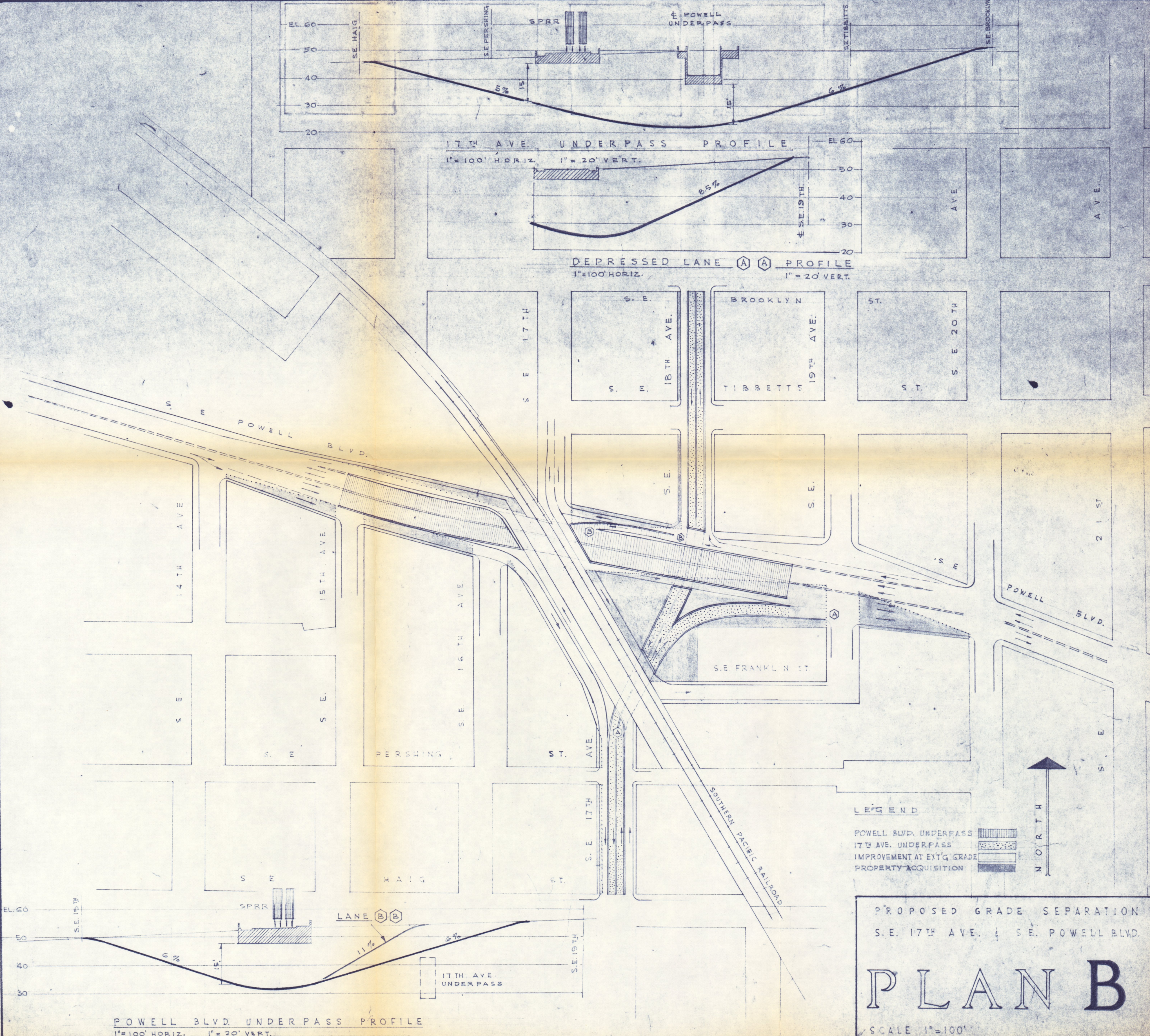
- POWELL BLVD OVERPASS
- 16TH-17TH AVE OVERPASS
- IMPROVEMENT AT EXIST'G GRADE
- PROPERTY ACQUISITION



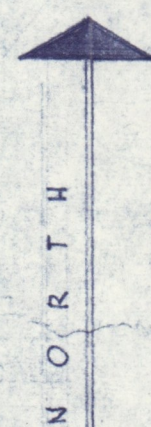
PROPOSED GRADE SEPARATION
S.E. 17TH AVE. & S.E. POWELL BLVD.

PLAN C

SCALE 1"=100'



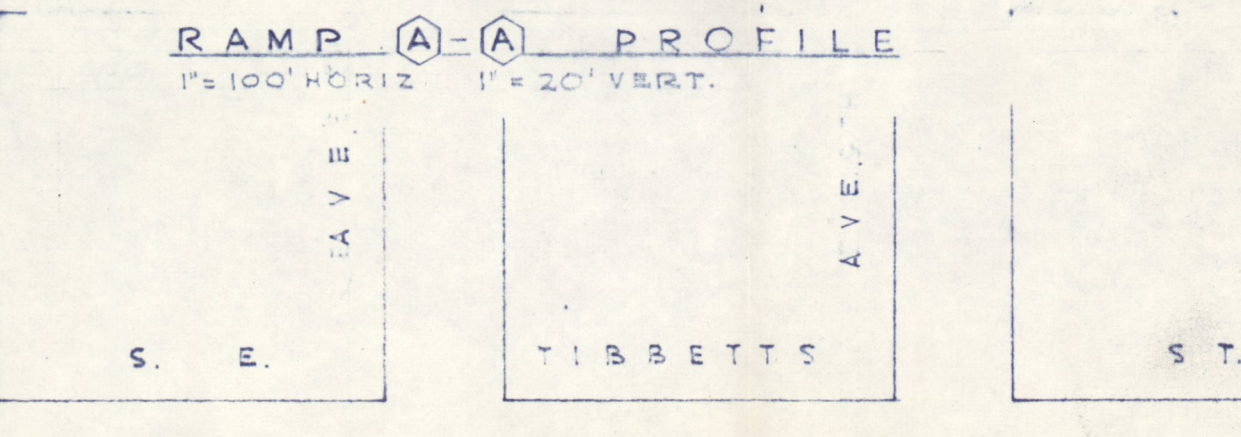
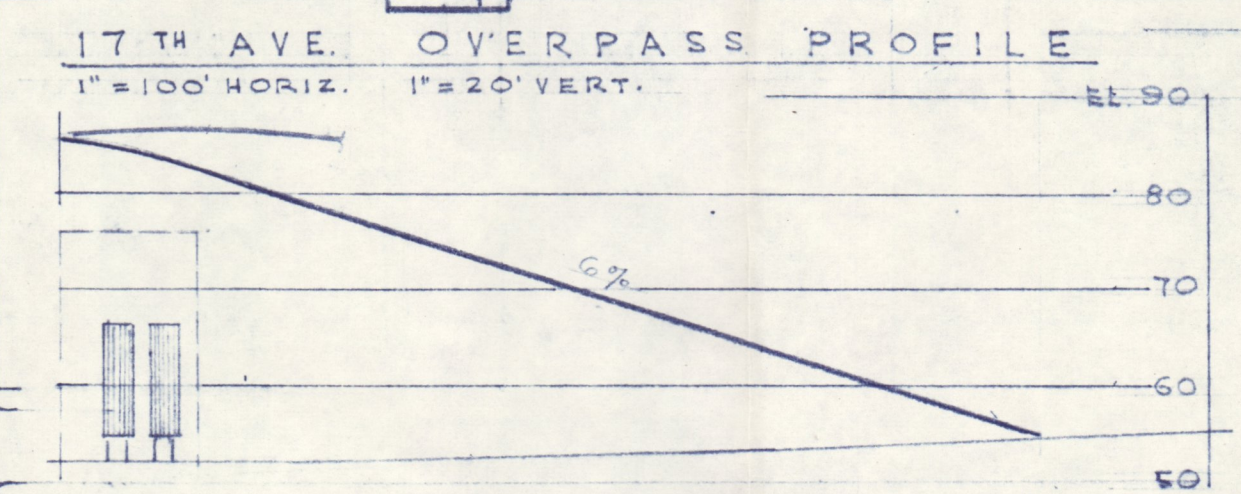
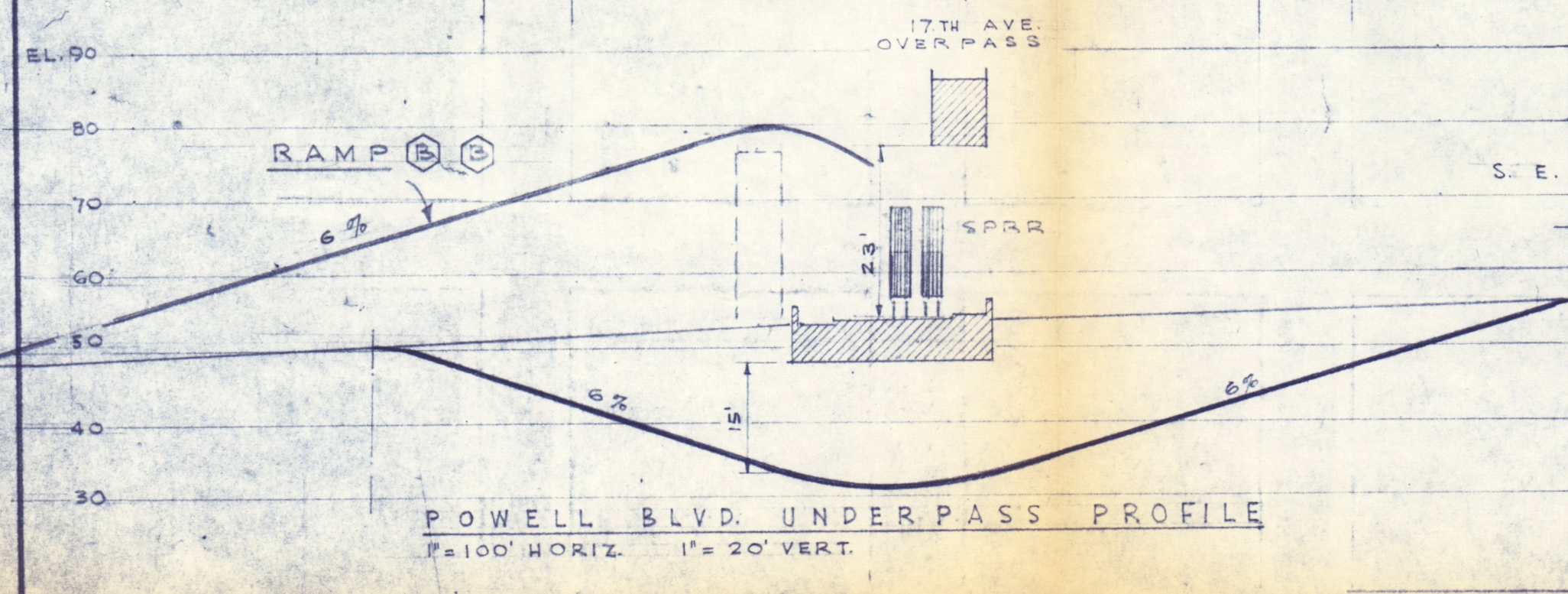
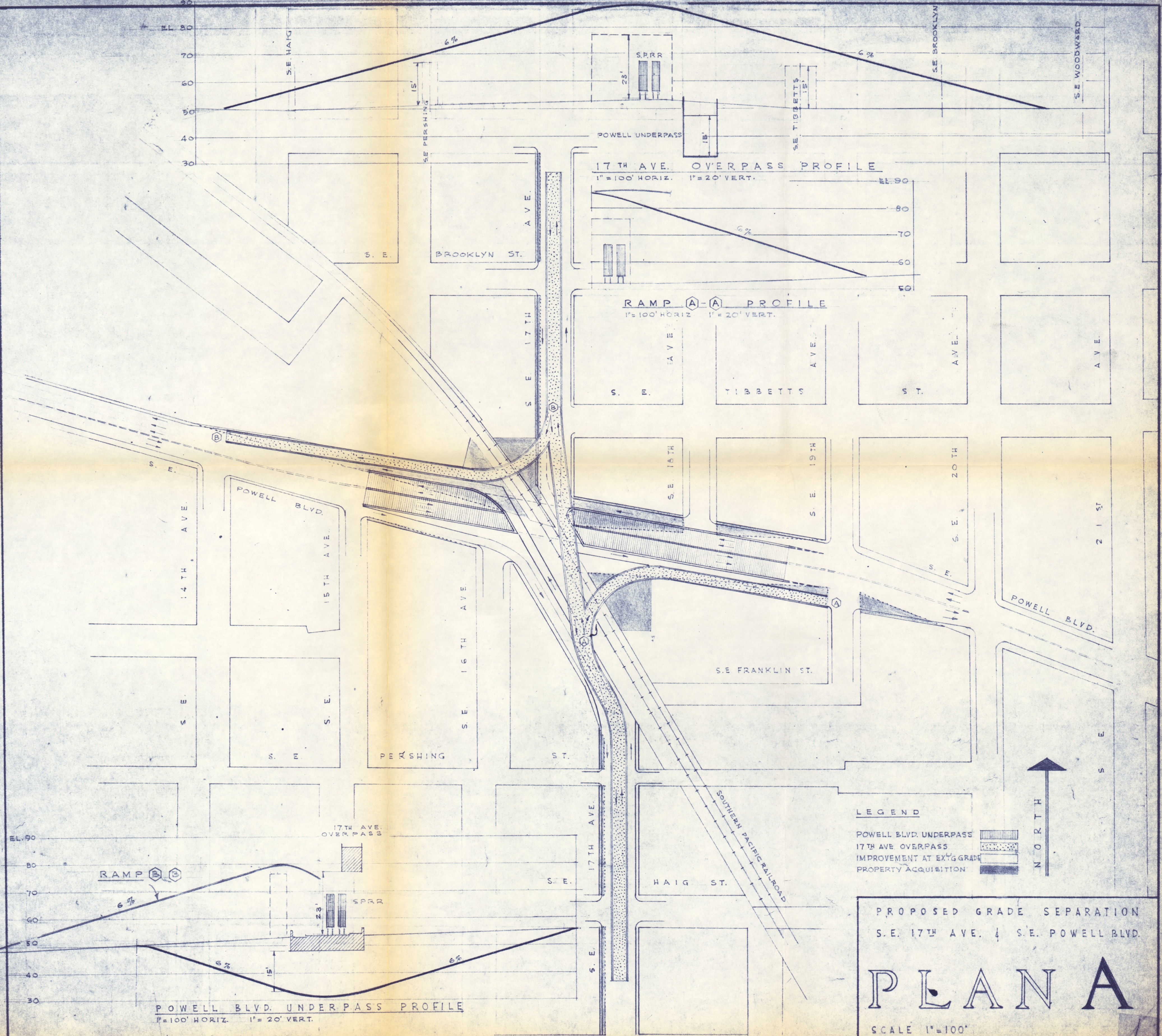
- LEGEND
- POWELL BLVD. UNDERPASS
 - 17TH AVE. UNDERPASS
 - IMPROVEMENT AT EXT'G GRADE
 - PROPERTY ACQUISITION



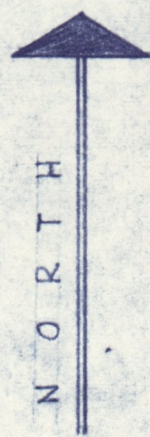
PROPOSED GRADE SEPARATION
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PLAN B

SCALE 1"=100'



- LEGEND
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 - 17TH AVE. OVERPASS
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 - PROPERTY ACQUISITION



PROPOSED GRADE SEPARATION
S.E. 17TH AVE. & S.E. POWELL BLVD.

PLAN A

SCALE 1"=100'

November 30, 1961

Mr. John A. Corenbaum, Chairman
Engineering Committee
Portland Traffic Safety Commission
509 S. W. Oak Street
Portland 4, Oregon

Dear Sir:

We have made a study of the intersection at S. E. 17th Avenue and Powell Boulevard. Our findings and conclusions are contained in the report which is transmitted herewith.

Heavy traffic volume coupled with frequent train movements through the intersection causes delays and congestion. Lost time and extra vehicle operating costs due to delays amount to \$80,000 annually. We recommend the construction of an underpass at Powell Boulevard, as illustrated on the cover of the report, as a remedial measure. The estimated cost for such a structure is \$950,000.

Contingent upon federal design standards and other requirements, a major portion of this project would be eligible for federal funds. Therefore, we further recommend the City of Portland to take appropriate action to replace Powell Boulevard on the Federal Aid Highway System.

Respectfully submitted,

Engineering Sub-Committee

Dr. Fred Courts
George R. Hoffman
Robert Nordlander
William Rice
Howard Stewart
Karl Ngan, Chairman

ENGINEERING SUB-COMMITTEE REPORT
17TH AND POWELL INTERSECTION

Introduction

When the East Side Railroad Company constructed the first leg of the railraod from the east Portland waterfront toward Milwaukie in 1868, Powell Boulevard was a wagon road following a crooked Indian trail beginning at about 19th Avenue and leading eastward to Gresham. The area lying between the railroad at 17th Avenue and the Willamette River was lowland and gulch. Powell Boulevard was not connected to Portland westside until 1926 when the Ross Island Bridge was built.

Today, over 27,000 vehicles daily travel over the intersection of 17th Avenue and Powell Boulevard. This large volume of traffic, being interrupted by as many as 60 train movements per day, creates delay, congestion and inconvenience which costs the traveling public many dollars in terms of lost time and extra vehicle operating cost. In addition, this frequent crossing of trains on grade is a potential and actual traffic hazard. A grade separation is needed.

This report has been prepared to analyze the existing traffic characteristics, evaluate previously proposed plans of improvement, study alternative solutions in light of present and future conditions, and suggest a general scheme which would minimize the delay due to train movements.

Existing Conditions

Powell Boulevard - The general direction of Powell Boulevard

is east and west. Where it crosses 17th Avenue, there is a slight bend and a 2% grade. The right-of-way width near the intersection is 80 feet with a street width of 56 feet curb to curb composed of four traffic lanes and two parking lanes. Opposing lines of traffic are separated by a painted double-line median strip. In the vicinity of the intersection, small commercial establishments, service stations and old residences line both sides of the street. They do not generate any significant amount of traffic, but the parking movements, nevertheless, contribute to the interruption of traffic flow.

S. E. 17th Avenue - S. E. 17th Avenue is a generally 60 foot right-of-way containing two traffic lanes and two parking lanes. It runs in a north-south direction and has a dog-leg offset of 113 feet where it crosses Powell Boulevard. The right-of-way is narrowed down to 50 feet immediately south of Powell Boulevard for a distance of approximately 400 feet. Portland Traction Company's car barn, Portland General Electric Company's shops, the Iron Fireman Company and several other light industries are located on 17th Avenue between Powell Boulevard and McLoughlin Boulevard. The portion north of Powell Boulevard and extended to S.E. Division Street is an older residential district. Any northbound traffic destined beyond Division Street would have to either turn east on Division to 20th Avenue or turn west on Division to 12th Avenue in order to continue its northbound travel.

Southern Pacific Railroad - The main tracks of the Southern Pacific Railroad cut across the intersection at an oblique angle.

Table 1 Traffic Volume at S.E. 17th & Powell Blvd.

| | Powell Boulevard | | | | S.E. 17th Avenue | | | |
|---|-------------------|------------|-------------------|------------|------------------|-------------|-----------------|-------------|
| | East of 17th Ave. | | West of 17th Ave. | | North of Powell | | South of Powell | |
| | West bound | East bound | West bound | East bound | South bound | North bound | South bound | North bound |
| Total Daily Volume Through Intersection | 11518 | 10400 | 12975 | 11205 | 1525 | 1694 | 2704 | 3945 |
| % of Total in Each Leg | 20.6 | 18.6 | 23.1 | 20.1 | 2.7 | 3.0 | 4.8 | 7.1 |
| Peak Hour Volumes | | | | | | | | |
| 7 - 8 A.M. | 1789 | 441 | 1511 | 426 | 198 | 160 | 261 | 492 |
| 5 - 6 P.M. | 647 | 1400 | 568 | 1248 | 148 | 227 | 272 | 481 |

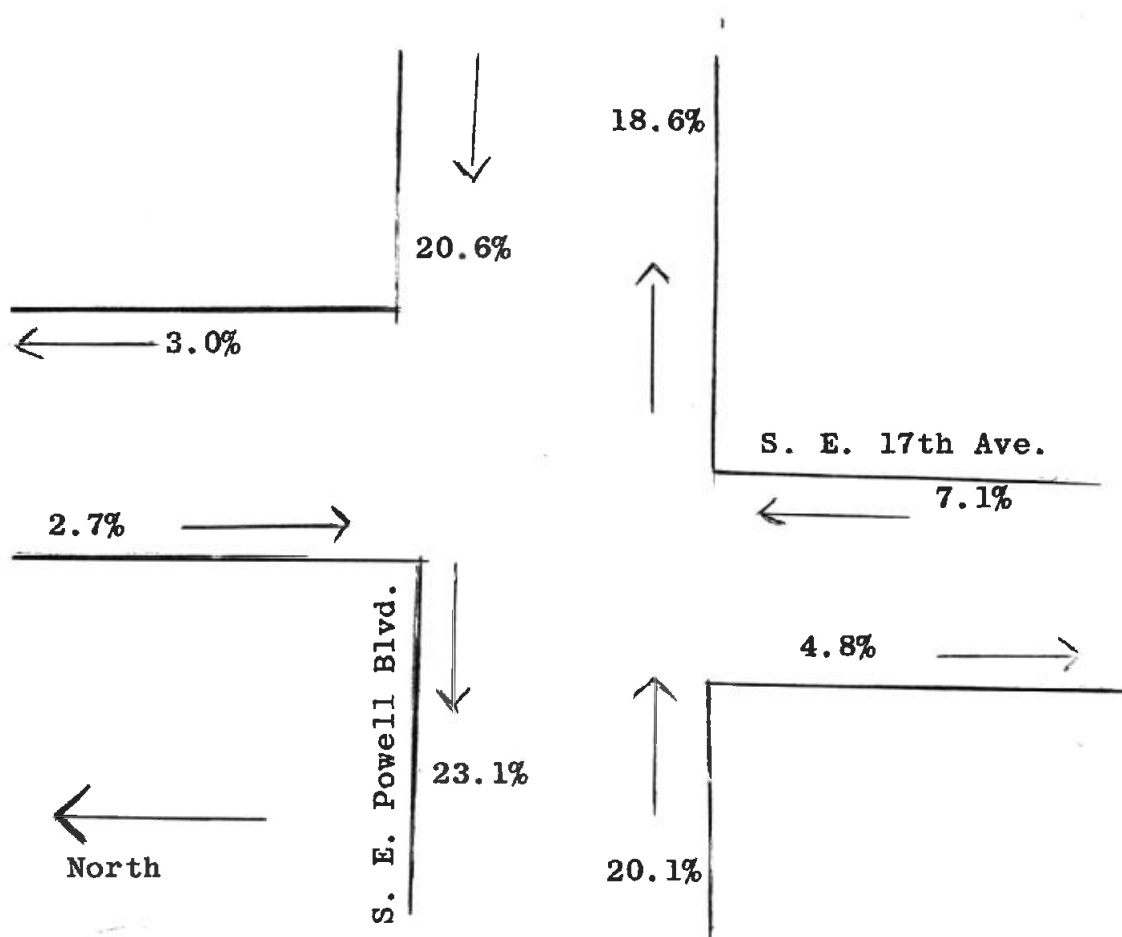


Figure A - Percent of Total Traffic Volume in Each Leg of Intersection.

A double flashing red light with ringing bell is provided as a railroad crossing warning device. It is actuated by approaching trains and its operation is interlocked with the regular traffic signals at the intersection.

The intersection characteristics and the daily traffic volume are shown on Plate 1.

Vehicular and train traffic through the intersection

In 1958, an hourly traffic count at each leg of the intersection was made over a 24 hour period of week-day traffic by the City Bureau of Traffic Engineering. The total daily volume and the peak hour traffic are shown in Table 1, together with a percentage distribution of the total volume classified according to direction of movement in each leg. This distribution is shown graphically in Figure A.

It can be seen that Powell Boulevard traffic constitutes over 82% of the total volume through the intersection. The traffic on 17th Avenue north of Powell Boulevard is only one-half of that south of Powell Boulevard. Figure A also indicates the heaviest turning movements to be those in the southwest quadrant of the intersection.

Train movements crossing the intersection and the delay time for each movement have been recorded by an automatic recorder actuated by the trains. Table II shows a 24-hour record for October 18, 1960. Table III shows a weekly summary for the period from October 14 through October 20, 1960. The number of train movements for a 24-hour period ranges from 33 to 60 with an average

of 51. The total duration of delay for a 24 hour period ranges from 1 hour 32 minutes to 2 hours 40 minutes, with an average of 2 hours 4 minutes. Other records indicate there are as many as 5 train movements within some one hour periods and that the maximum duration of a single delay has been as long as 14 minutes 22 seconds.

Analysis of delay by train movements

Using the hourly traffic count through the intersection and the train movements crossing the intersection at the corresponding hour, the total delay time can be determined if it is assumed that the traffic flow is uniformly distributed throughout the hour. For a 24 hour period, 1550 vehicles are delayed for a total delay time of 6800 vehicle minutes* on Powell Boulevard. In the same period, 380 vehicles are delayed on 17th Avenue for a total delay time of 1690 vehicle minutes.

These delay times are based only on the stoppage of the leading vehicle in the traffic stream. The progressive and pyramiding effects of the following vehicles are not included. Inclusion of these effects, if they could be determined, would result in much longer delay times than those given above.

Since the function of street traffic is to move people and goods expeditiously and safely from one point to another, time is an important element. Any delay would render this function ineffective. Considering the overloading condition on the intersection, together with the delay caused by train movements, it is

* Vehicle minute = 1 vehicle delayed for 1 minute

Table II Train Movements and Delay Time at S.E. 17th Avenue
& Powell Boulevard for a Typical 24 Hour Period

Date: Tuesday, October 18, 1960
12:00 M. to 12:00 M.

| <u>Time</u> | <u>Delay Duration</u> |
|-------------------|-----------------------|
| | <u>Min. Sec.</u> |
| 1:36 <u>A.M.</u> | 0:56 |
| 2:35 | 1:52 |
| 2:43 | 6:15 |
| 3:43 | 0:56 |
| 4:21 | 1:05 |
| 4:56 | 2:15 |
| 5:00 | 8:26 |
| 5:34 | 1:15 |
| 6:41 | 14:22 |
| 8:02 | 1:34 |
| 8:34 | 2:30 |
| 9:49 | 3:45 |
| 9:57 | 2:30 |
| 10:40 | 2:49 |
| 10:48 | 2:30 |
| 10:53 | 0:56 |
| 10:59 | 5:10 |
| 12:25 <u>P.M.</u> | 1:50 |
| 12:29 | 2:11 |
| 12:32 | 2:11 |
| 12:49 | 2:11 |
| 1:54 | 0:37 |
| 2:05 | 1:05 |
| 4:26 | 2:30 |
| 4:37 | 3:12 |
| 5:00 | 1:15 |
| 5:53 | 4:22 |
| 7:15 | 1:00 |
| 7:25 | 1:52 |
| 7:37 | 0:37 |
| 7:41 | 0:30 |
| 7:43 | 3:45 |
| 8:00 | 1:15 |
| 8:54 | 0:37 |
| 8:56 | 1:52 |
| 9:10 | 0:40 |
| 9:33 | 0:46 |
| 9:39 | 1:52 |
| 9:42 | 4:04 |
| 10:12 | 0:37 |
| 10:44 | 5:37 |
| 10:55 | 2:11 |
| 11:15 | 0:56 |
| Total 43 | 87:1301 |

Summary: Trains - 43 Duration - 1 Hour, 48 Min., 41 Sec.

Table III Train Movements and Delay Time at S.E. 17th Ave.
& Powell Blvd. for 7 Day Period

| <u>Date</u> | | <u>Train Movements</u> <u>in 24 Hours</u> | <u>Delay Duration</u> <u>in 24 Hours</u> |
|------------------|-----------|--|---|
| October 14, 1960 | Friday | 33 | 1 hr. 32 min. |
| 15 | Saturday | 56 | 2 hr. 19 min. |
| 16 | Sunday | 44 | 1 hr. 53 min. |
| 17 | Monday | 43 | 1 hr. 44 min. |
| 18 | Tuesday | 43 | 1 hr. 49 min. |
| 19 | Wednesday | 49 | 2 hr. 25 min. |
| 20 | Thursday | 60 | 2 hr. 40 min. |

Average = 47

Average = 2 hrs. 5 min.

obvious that a grade separation facility is surely needed.

Accident Record

While uninterrupted traffic flow and elimination of delay are important considerations in determining the need for a grade separation facility, safety is an equally important factor.

This intersection was the second most dangerous railroad crossing in the City in 1949. Rail traffic was limited to a speed of 10 miles per hour until 1952. Then it was permitted to increase to 20 miles per hour when Southern Pacific Railroad Company spent \$150,000 for crossing gates and warning devices at various railroad crossings in southeast Portland.

The total number and breakdown of all types of accidents occurring at this intersection for the years 1950 through 1960 inclusive are shown on Table IV. Since 1950, there were only two auto and train accidents in this intersection, and no fatalities for the same period. This accident record may appear to be favorable as compared to those of other city intersections. However, any railroad crossing at grade is an actual and potential traffic hazard, particularly when a large volume of vehicular traffic is frequently interrupted by train movements. Even though auto-train accidents may be reduced or eliminated by adequate control devices, the congestion created by interruption and delay increase the likelihood of auto-auto collisions not only at the railroad crossing, but at many other intersections which receive an unusually heavy load of traffic after the train has passed. A grade separation facility would increase safety at this intersection and

Table IV Accident Record - S.E. 17th Ave. & Powell Blvd.

| Year | Number of All Accidents | Number of Injuries | Number of Fatalities | Single Auto Accidents | Auto-Auto Accidents | Auto-Train Accidents | Auto-Pedestrian Accidents | Train-Pedestrian Accidents |
|-------------|------------------------------------|-------------------------------|---------------------------------|----------------------------------|--------------------------------|---------------------------------|--------------------------------------|---------------------------------------|
| 1950 | 43 | 1 | 0 | 0 | 42 | 0 | 1 | 0 |
| 51 | 67 | 2 | 0 | 0 | 66 | 0 | 1 | 0 |
| 52 | 44 | 4 | 0 | 0 | 44 | 0 | 0 | 0 |
| 53 | 38 | 3 | 0 | 0 | 38 | 0 | 0 | 0 |
| 54 | 34 | 4 | 0 | 2 | 31 | 0 | 1 | 0 |
| 55 | 21 | 1 | 0 | 0 | 20 | 0 | 1 | 0 |
| 56 | 29 | 4 | 0 | 2 | 26 | 1 | 0 | 0 |
| 57 | 18 | 1 | 0 | 1 | 16 | 1 | 0 | 0 |
| 58 | 18 | 2 | 0 | 2 | 16 | 0 | 0 | 0 |
| 59 | 25 | 4 | 0 | 2 | 22 | 0 | 1 | 0 |
| 60 | 19 | 6 | 0 | 1 | 18 | 0 | 0 | 0 |

at other points by reducing congestion and by reducing the possible number of auto-auto conflicts and auto-train conflicts.

Future Freeway Construction and S.P.R.R. Expansion

On the basis of their 1956 study of traffic facilities in the Portland Metropolitan area, the State Department of Highways proposed freeway construction and other major street improvements in the southeast area, which are shown on Plate 2. Improvements recommended for Powell Boulevard include widening, prohibition of parking and signalization of certain key intersections. No specific recommendations were made for the intersection of 17th Avenue and Powell Boulevard.

Construction of the Mt. Hood Freeway will no doubt relieve part of the suburban through traffic from Powell Boulevard. Furthermore, Laurelhurst Freeway and other north-south expressways would divert most of the through traffic presently using 17th Avenue. However, it is reasonable to expect that such relief will be offset by the increase of traffic due to normal growth.

The ultimate plan of the Southern Pacific Railroad Company's terminal facility at Southeast Portland area includes five sets of tracks crossing Powell Boulevard at 17th Avenue and will require 84 feet of right-of-way. If this plan were materialized, the train movements would be increased sizeably. The decision as to the type and extent of grade separation could very well be hinged on the firmness of this ultimate plan.

Review of Proposed Plans and Other Alternatives of Grade Separation

The traffic bottleneck as well as the railroad crossing menace at 17th Avenue and Powell Boulevard has been a subject of discussion and study for many years. Various proposals of grade separation have been made, but nothing has been attempted.

In his Portland Improvement Report of 1943, Robert Moses recommended an overpass over the railroad tracks on Powell Boulevard.

During the recent years, the City Engineer's Office and the Traffic Engineer's Office have been working on several schemes of grade separation for this intersection.

Attached in the appendix are five plans which delineate the various schemes.

Plan A calls for an underpass at Powell Boulevard, and an overpass at 17th Avenue with turning ramps at the southeast and the northwest quadrants. No provision is made for Southern Pacific Railroad's future development which requires an 84 foot right-of-way.

Plan B calls for Powell Boulevard to go under the railroad tracks, and 17th Avenue to go under the railroad at Franklin Street and under Powell Boulevard before connecting to 18th Avenue at the north side of Powell Boulevard. One turning ramp is provided at the southeast quadrant. As in Plan A, no provision is made for future railroad development to 84 foot right-of-way. This was the plan, together with a proposed structure at 12th Avenue and Burnside Street, presented to the public for a bond issue in the November 1959

election. Some of the shortcomings of this plan are (1) steep grades for Ramp "A-A" and Lane "B-B" and (2) 30 foot deep cut for the 17th Avenue underpass.

Plan C proposes to carry the Powell Boulevard traffic over the railroad with 17th Avenue traffic threaded under the Powell Boulevard overpass and then going over the railroad north of Powell Boulevard. A depressed lane would be required to carry the 17th Avenue northbound left turn traffic under both overpasses to the Powell Boulevard west bound lanes. 17th Avenue northbound right turn traffic would have to go under the Powell Boulevard, over the railroad tracks, make a 180⁰ turn on Ramp "B-B", and then thread under Powell Boulevard overpass again before it could get on the eastbound lanes on Powell Boulevard. The length of the north approach to the 17th Avenue overpass is quite long, which may interfere with the proposed Mt. Hood Freeway.

It is the concensus of this committee that the small volume of traffic on 17th Avenue crossing the railroad actually does not now warrant a grade separation structure. There is no reason to believe that this situation will change in the foreseeable future.

Plan D is essentially the same plan proposed by the City Traffic Engineer in April, 1960. It calls only for an underpass on Powell Boulevard to carry the through traffic under the railroad, leaving other local traffic patterns as they are. Provisions could be incorporated into this layout for an 84 foot right-of-way for the railroad. The simple and

efficient layout of Plan D not only would relieve a large part of the delay at the intersection under present conditions, its flexible design would permit complete elimination of the railroad crossing at grade should future vehicular and train traffics so require. Footings and other sub-surface work could be designed in such a manner that a future overpass for 17th Avenue could be constructed with a minimum amount of changes or interferences, should that ever become necessary. The small amount of traffic presently using 17th Avenue could avoid the railroad crossing delays by using the Powell Boulevard underpass and circumventing routes. For these and other reasons, the Plan D is recommended.

Plan E calls for only an overpass on Powell Boulevard. It does not have the flexibility of Plan D for adapting to possible future needs. The overpass structure would have to be longer than the underpass as shown in Plan D due to the 24 foot vertical clearance required for the trains.

The committee also investigated other alternative solutions:

1. The intersection of 17th Avenue and Holgate Boulevard could be improved to divert some of the 17th Avenue traffic to the Holgate Boulevard overpass. Curb radii at the intersection could be made larger to provide easier turning movements for trucks and busses.
2. The possibility of using a pair of north-south streets as a one-way couplet was studied. An examination of the map

will reveal that this is not feasible because 17th Avenue is the only north-south through street between 12th Avenue and 26th Avenue.

3. Construction of an overpass over the railroad for the north-south traffic at a location other than 17th Avenue and Powell Boulevard was studied. It was found that an overpass could be built on S.E. Lafayette Street connecting 17th Avenue and 21st Avenue, but the grade on the ramps for this structure would be in excess of 8%.

Estimated Cost

The cost for an underpass on Powell Boulevard as shown on Plan D is estimated roughly at \$950,000. This would include the cost of the structure, utility relocation, sewer relocation, surface drainage, lighting, surface street improvement and acquisition of additional right-of-way.

For an overpass as shown on Plan E, including the same cost items, the estimated cost is \$1,350,000. This higher cost for the overpass is due to the fact that a longer structure and more right-of-way are required.

Benefit vs. Cost

The dollar value of time saved by eliminating delay varies considerably. A representative figure used by the ASSHO for passenger cars is \$1.55 per hour or 2.59 cents per minute. The cost of gasoline, oil, and repair for a standing delay is 0.47 cents per minute. These two items add up to 3.06 cents per

minute while the vehicle is operating at standing delay. The operating cost for a vehicle coming to a stop at approaching speed of 30 miles per hour is 0.74 cents.

Using these cost figures and the delay time determined elsewhere in this report, the saving of time and operating cost are computed as follows:

| | Powell Boulevard. | 17th Avenue |
|--|-------------------|-----------------|
| Number of vehicles stopped per day | 1,549 | 381 |
| Savings @ 0.74 cents per vehicle stopped | \$11.46 | \$2.81 |
| Standing delay time in vehicle minutes | 6,783 | 1,688 |
| Saving of standing delay @ 3.06 per minute | \$207.56 | \$51.65 |
| Total saving per day | \$219.02 | \$54.46 |
| Annual saving | \$79,942.30 | \$19,831.90 |
| Say | \$80,000.00 | Say \$20,000.00 |

Though these savings are not actually money-in-the-pocket, they represent the tangible economic benefits which could be directly derived from eliminating traffic delays by the construction of grade separation facilities. The intangible benefits such as the reduction of accidents, and the comfort and convenience of smooth traffic flow probably would be even greater than the tangible benefits.

Financing

In addition to financing this project by a bond issue, two other sources of funds are available: (1) from the Federal Government through its Federal-Aid Highway Program, and (2) from the Southern Pacific Railroad Company by its franchise agreement with the City of Portland.

Powell Boulevard has in the past been classified under the primary Federal Aid System under which the Federal Government would contribute 60% and the state 40% of the construction cost on any improvement thereon. Due to its proximity and parallel alignment with the projected Mt. Hood Freeway, Powell Boulevard was removed from the Federal Primary System recently. However, federal aid might still be obtained if the City of Portland would request the State Highway Department to replace Powell Boulevard on the Secondary Federal Aid System, especially since this involves a grade crossing.

Under the charter agreement upon which the railroad franchise was granted, it is the obligation of the Southern Pacific Railroad Company to pay 60%; the City, 20%; and the adjoining property 20% of the cost for a grade separation structure over and within the railroad right of way should the City Council decide that one is needed.

Conclusions and recommendations:

1. As many as 60 train movements in a 24 hour period traverse the intersection of 17th Avenue and Powell Boulevard, which

carries a total traffic of approximately 27,000 vehicles daily.

2. Railroad crossing at grade is always a potential and actual traffic hazard, not only at the grade crossing, but also at numerous intersections which are periodically overloaded as a result of traffic delay. A grade separation is needed on Powell Boulevard because it presently carries 80% of the intersection traffic and is likely to continue for some time to be an important route for local traffic.
3. A grade separation for 17th Avenue is not warranted under present vehicular and railroad traffic conditions, nor is it likely to be needed in the near future. Other improvements and circumventing routes could be used to relieve the train movement delay on 17th Avenue.
4. An underpass as outlined in Plan D is recommended to carry the Powell Boulevard traffic under the railroad. The estimated construction cost is about \$950,000.
5. The tangible benefits such as savings in vehicle operation cost and savings in time that might be realized if the Powell underpass is constructed would be \$80,000 annually.
6. The construction of the Powell underpass would further increase safety at this intersection and at other points which now suffer congestion as a result of delays at S.E. 17th Avenue and Powell Boulevard.



EXISTING INTERSECTION CHARACTERISTICS AT
S.E. 17TH AVE. & S.E. POWELL BLVD. 1960

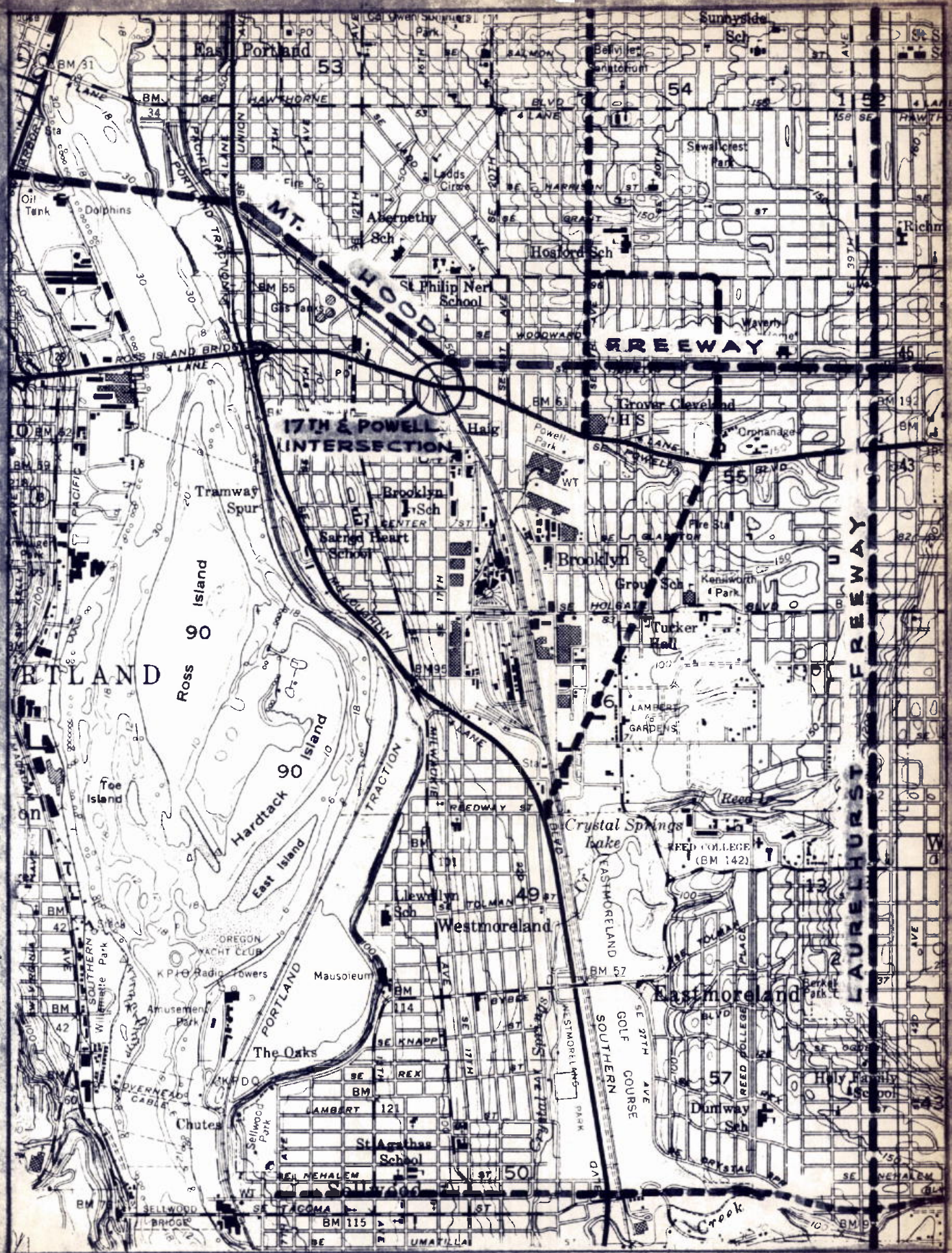


PLATE 2 - PROPOSED FREEWAYS AND EXPRESSWAYS IN S.E. PORTLAND

REPORT ON
GRADE SEPARATION AT
S. E. 17TH AVE. & POWELL BLVD.

