CHAPTER 2
PROJECT DESCRIPTION

2.0 PROJECT DESCRIPTION

2.1 INTRODUCTION

This chapter describes two alternative alignments that are under consideration for the Metro Green Line Easterly Extension project. These alternative alignments have been prescribed as a result of an evaluation of route alternatives and decisions by the Los Angeles County Transportation Commission (LACTC), Planning and Mobility Improvement Committee and the Governing Board.

The first alignment under consideration assumes an aerial configuration throughout its length. The second alignment is a subway configuration that would remain below grade throughout its entire length. Both alignments would begin at the eastern terminus of the Metro Green Line at I-605 and end at the location of the proposed Norwalk Transportation Center east of Bloomfield Avenue.

The following sections describe the physical characteristics, operating characteristics and construction sequence of each alignment as well as methods of construction. Following this is a section that discusses other projects related to the proposed Metro Green Line Easterly Extension.

2.2 AERIAL ALIGNMENT

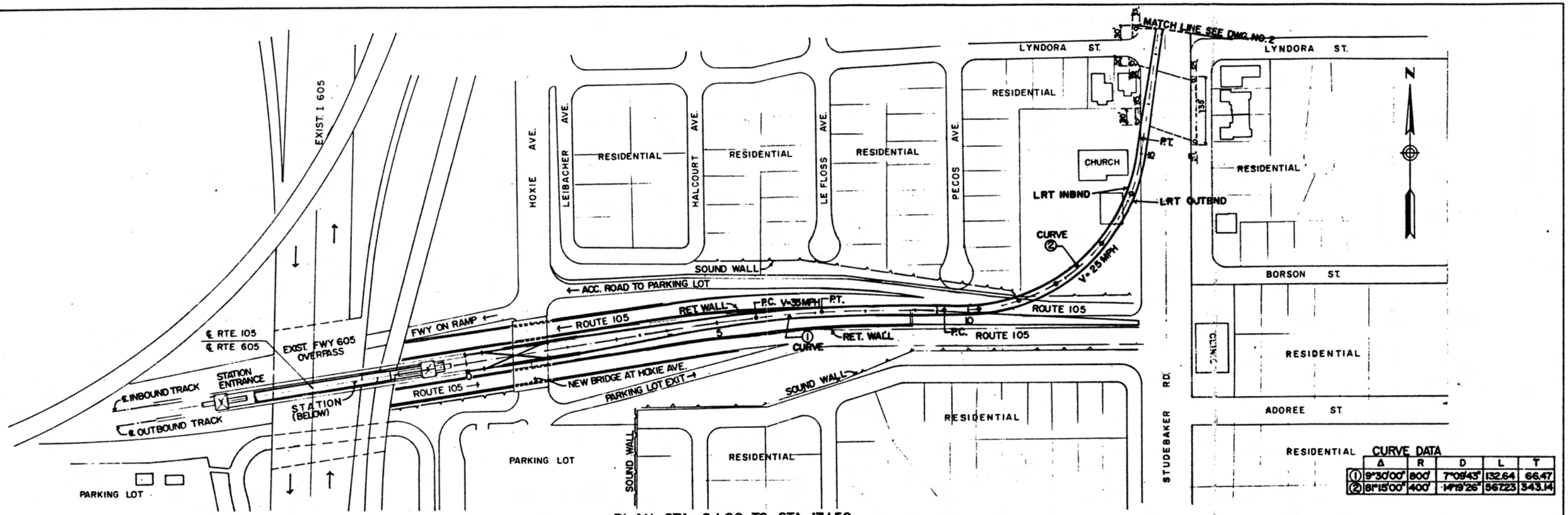
2.2.1 Physical Description

The Aerial Alignment of the Metro Green Line Easterly Extension begins at the I-605/Studebaker Station, currently the eastern terminus station of the Green Line. The aerial alignment is shown in Figure 2-1. I-605/Studebaker Station is in an open cut approximately 20 feet below the existing ground level. The area surrounding the station would be subject to vehicular movements associated with the terminus of the I-105 freeway and the I-605/Studebaker Metro Green Line station.

Traffic from the I-105 HOV lanes would exit at Studebaker Road and proceed to other destinations using arterial streets. In addition to movements from the freeway, access to and from Green Line parking lots (south of I-105) would use separate access ramps along the north side of the parking lots to and from Studebaker Road.

Metro Green Line trains would proceed eastward past I-105 on an independent guideway proceeding northeast, rising from the station to assume an aerial configuration proposed by the Easterly Extension project. Access ramps for both the freeway and parking lot would not be affected by transit operations except during the construction period.

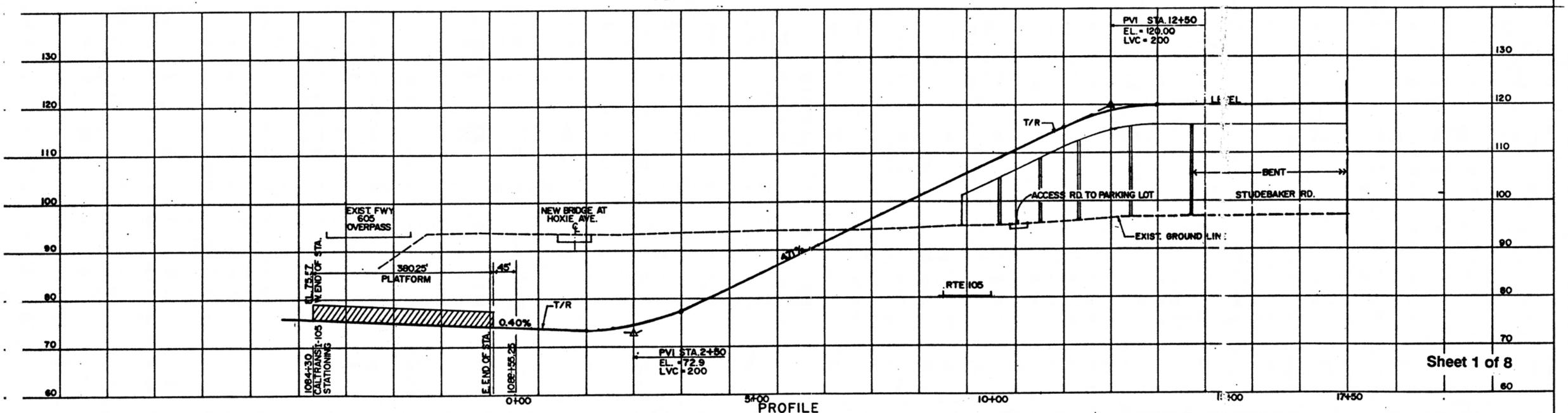
Pedestrians using the Metro Green Line parking lots would use a bridge at Hoxie Avenue and descend the platform via stairs, elevators or escalators. Walk-on patrons from the surrounding area would reach the Green Line station in the same manner.



PLAN STA. 0+00 TO STA. 17+50

CURVE DATA

	Δ	R	D	L	T
(1)	9°30'00"	800'	7°08'43"	132.64	66.47
(2)	81°15'00"	400'	14°19'26"	567.23	343.14



PROFILE

Sheet 1 of 8

Gannett Fleming
ENGINEERS AND PLANNERS

NO.	DATE	REVISION	BY	APP	APP

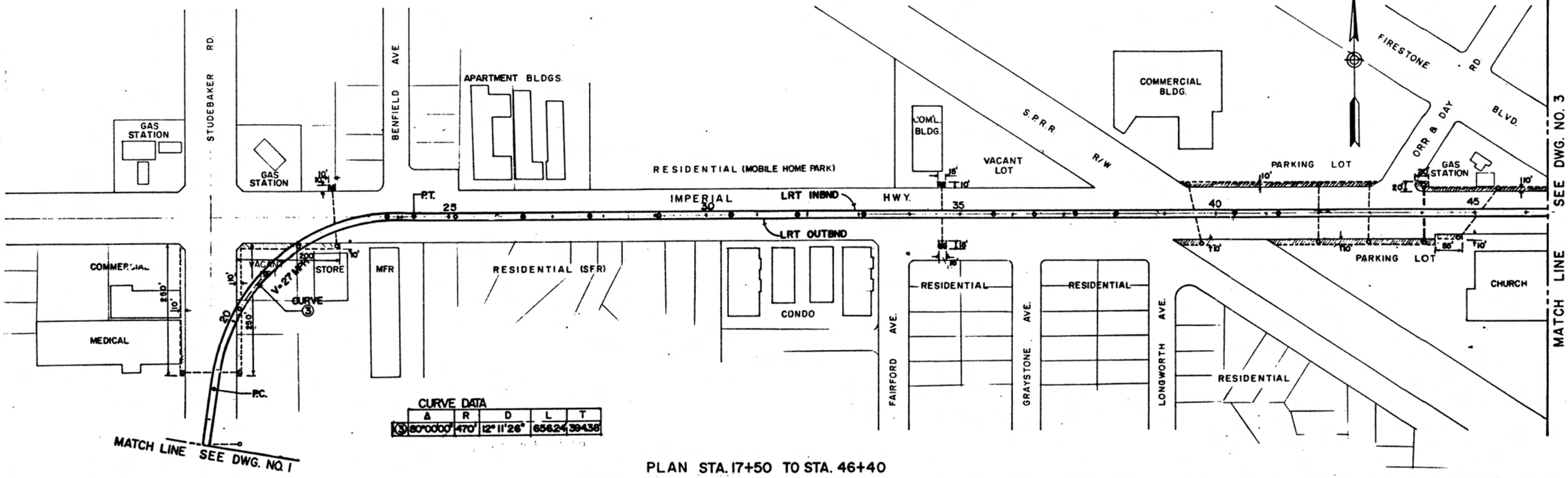
SCALE: HOR. 1"=100 (100 0 100 200); VERT. 1"=10' (10 0 10 20)

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
METRO GREEN LINE EASTERLY EXTENSION

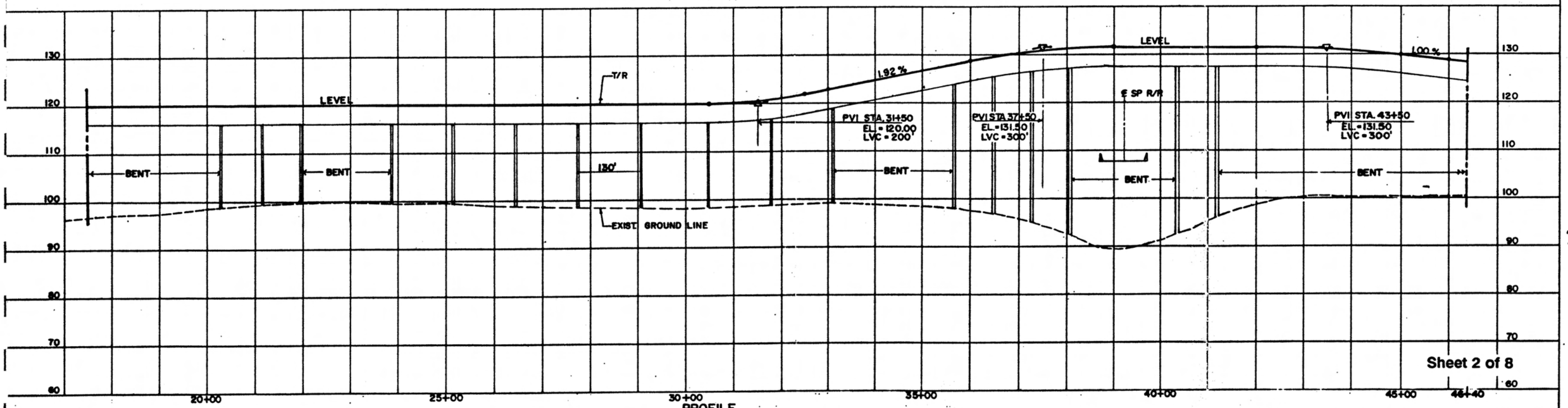
ALTERNATIVE 1
PLAN & PROFILE STA. 0+00 TO STA. 17+50

DRAWN BY:	CHECKED BY:	APPROVED BY:	Date	Dwg. No.
L.D.	D.S.		8-11-92	1

FIGURE 2-1



PLAN STA. 17+50 TO STA. 46+40



PROFILE

Sheet 2 of 8

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NO.	DATE	REVISION	BY	APP	APP

SCALE:
HOR. 1" = 100'
VERT. 1" = 10'

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CHECKED BY: B.S.
APPROVED BY:

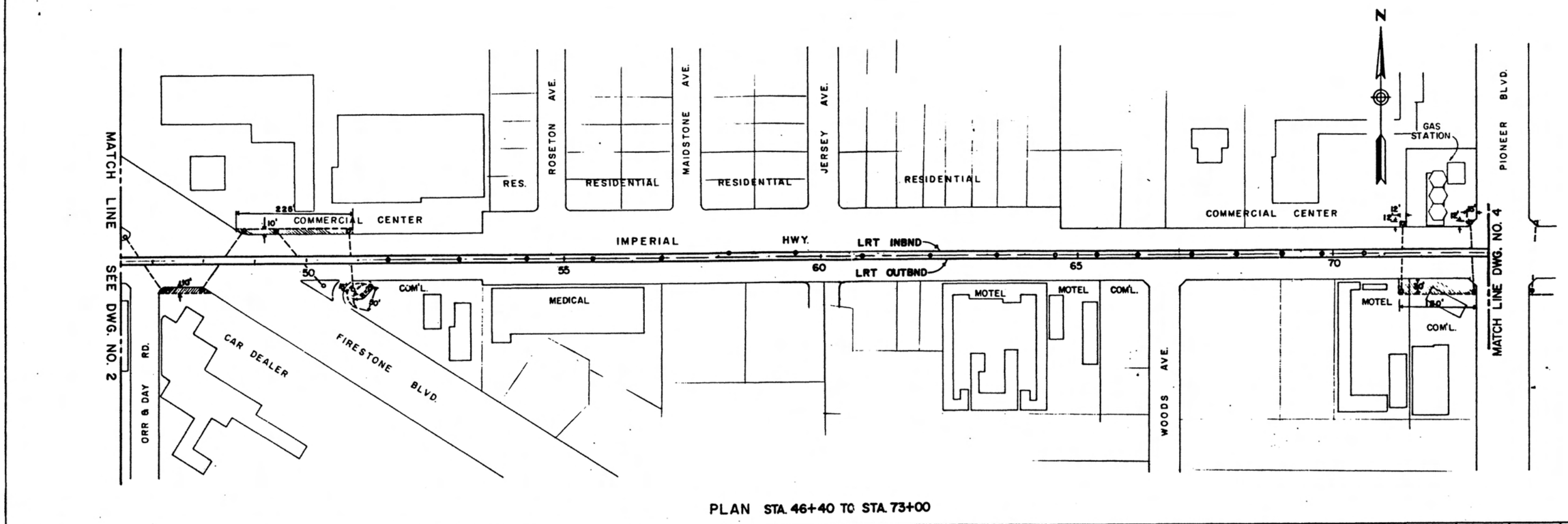
LOS ANGELES COUNTY TRANSPORTATION COMMISSION
METRO GREEN LINE EASTERLY EXTENSION

ALTERNATIVE I
PLAN & PROFILE STA. 17+50 TO STA. 46+40

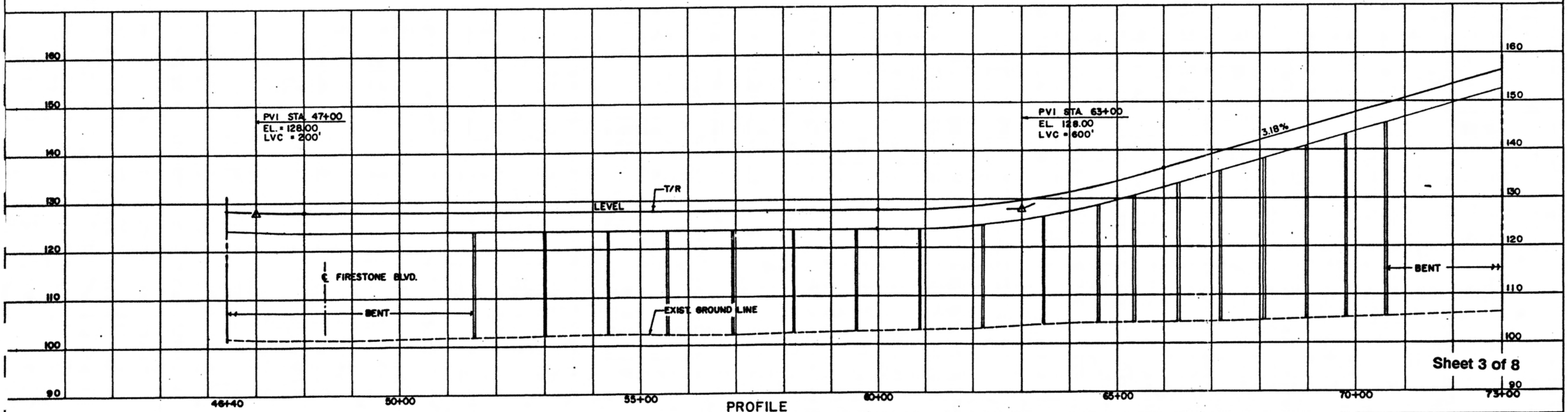
Date: 8-31-92

FIGURE 2-1

Dwg. No. 2



PLAN STA. 46+40 TO STA. 73+00



PROFILE

Sheet 3 of 8

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NO.	DATE	REVISION	BY	APP	APP

SCALE: HOR. 1" = 100' (100 0 100 200); VERT. 1" = 10' (10 0 10 20)

DRAWN BY: L.D. | CHECKED BY: D.S. | APPROVED BY:

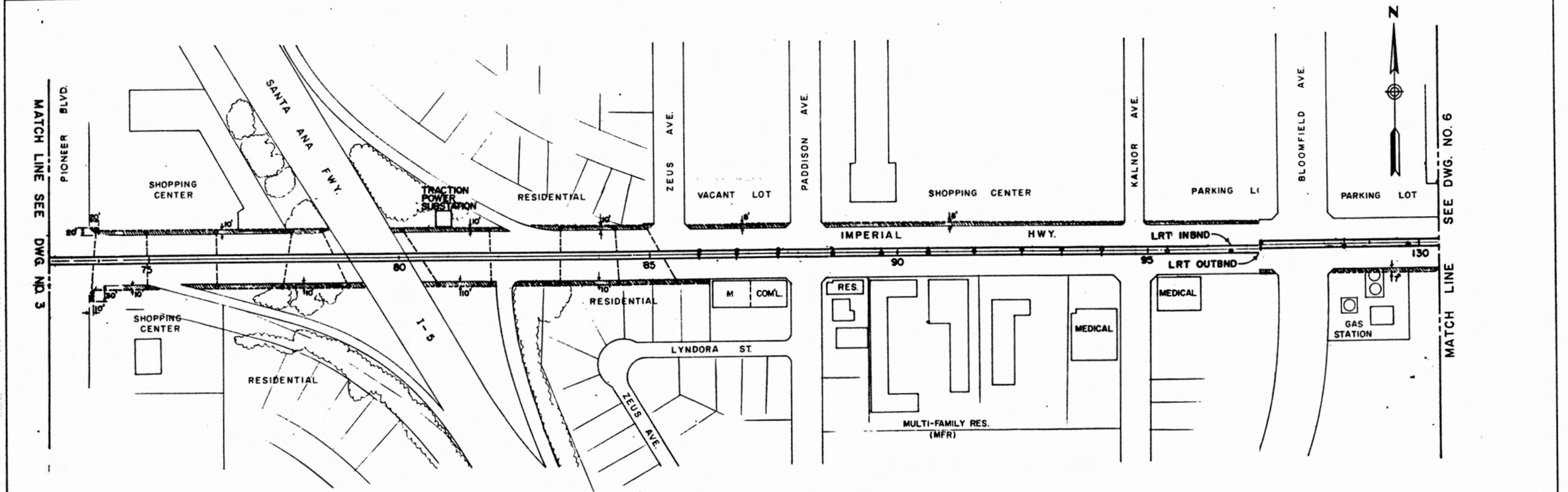
LOS ANGELES COUNTY TRANSPORTATION COMMISSION
METRO GREEN LINE EASTERLY EXTENSION

ALTERNATIVE I
PLAN & PROFILE STA. 46+40 TO STA. 73+00

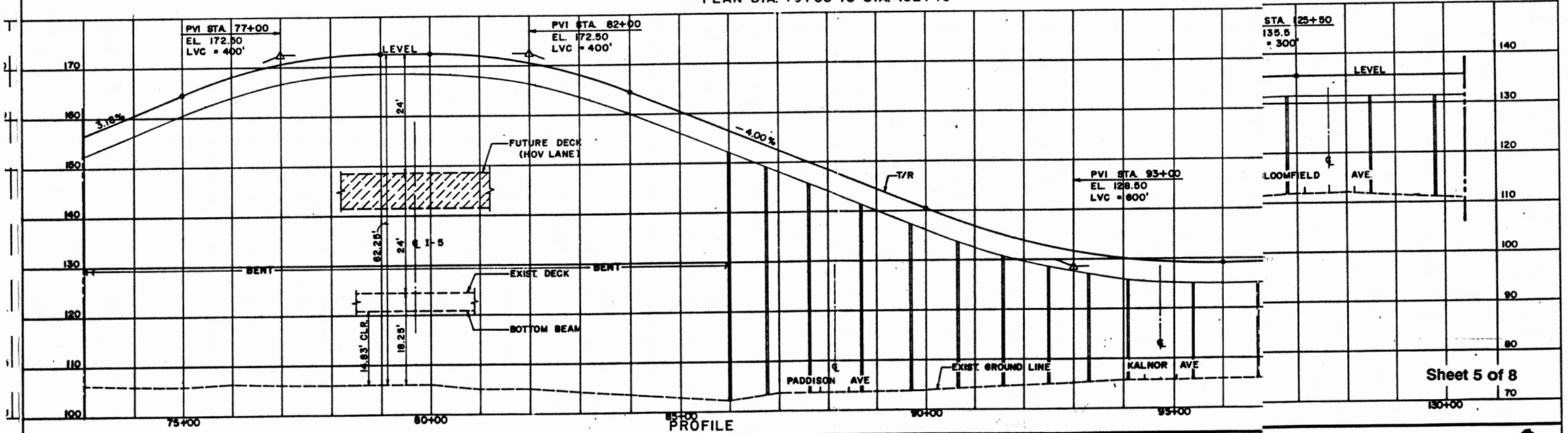
Date: 8-31-92

FIGURE 2-1

Dwg. No. 3



PLAN STA. 73+00 TO STA. 102+40



PROFILE

Sheet 5 of 8

Gannett Fleming
ENGINEERS AND PLANNERS

NO.	DATE	REVISION	BY	APP	APP

SCALE: HOR. 1" = 100' (100 0 100 200); VERT. 1" = 10' (10 0 10 20)

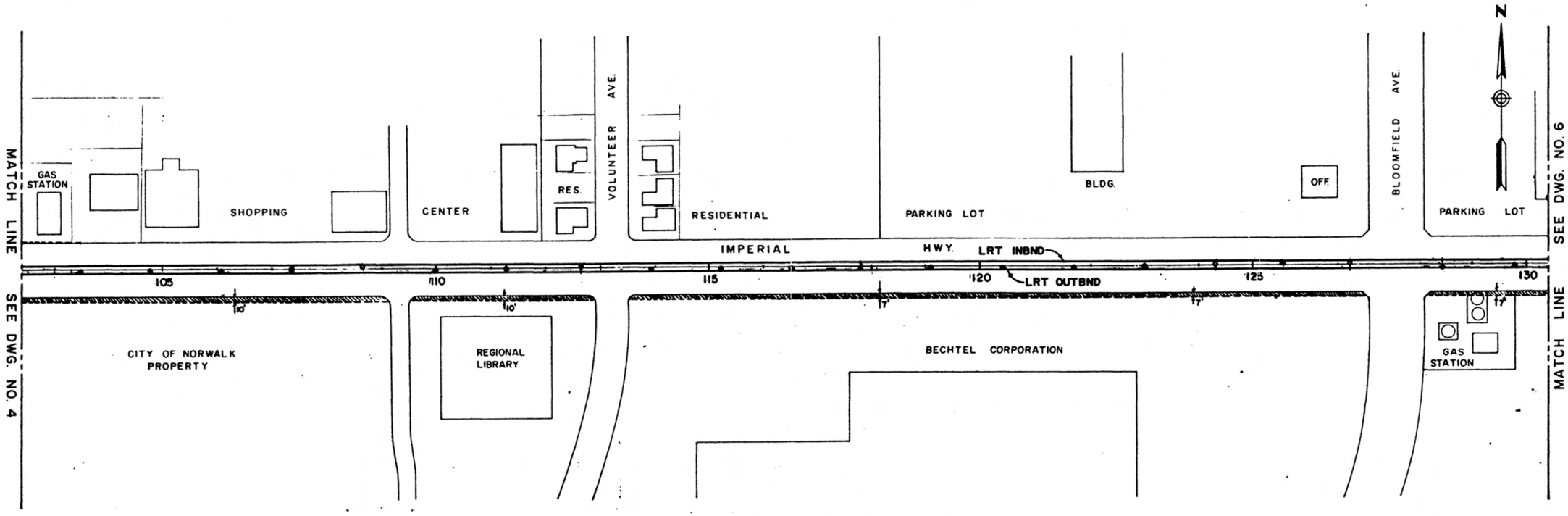
DRAWN BY: L. D. | CHECKED BY: B.S. | APPROVED BY:

LES COUNTY TRANSPORTATION COMMISSION
TRO GREEN LINE EASTERLY EXTENSION

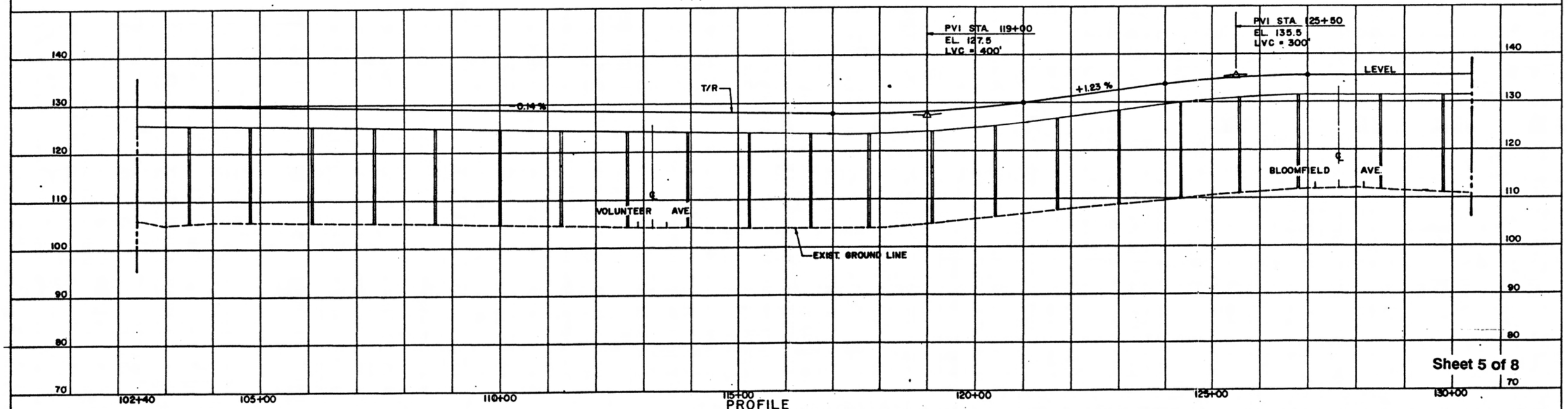
ALTERNATIVE I
AN & PROFILE STA. 102+40 TO STA. 130+40

FIGURE 2-1

Dwg. No. 5



PLAN STA. 102+40 TO STA. 130+40



PROFILE

Sheet 5 of 8

Gannett Fleming
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NO.	DATE	REVISION	BY	APP	APP

SCALE:
HOR. 100 0 100 200 1" = 100'
VERT. 10 0 10 20 1" = 10'

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LOS ANGELES COUNTY TRANSPORTATION COMMISSION
METRO GREEN LINE EASTERLY EXTENSION

ALTERNATIVE 1
PLAN & PROFILE STA. 102+40 TO STA. 130+40

Date 6-21-92

FIGURE 2-1

Dwg. No. 5

MATCH LINE SEE DWG. NO. 5

P.C.

LRT INBND

LRT OUTBND

COMMERCIAL BLDGS. 125' 110'

CURVE ④

IMPERIAL HWY.

CONDO

CITY MAINTENANCE FACILITY

V = 38 MPH

SB COMM

NB COMM

AT & SF RAIL ROAD

NORWALK TRANSPORTATION CENTER

140

IDENTICAL STATION

P.T.

AT & SF

PASSENGER BRIDGE

145 PLATFORM

RAIL ROAD

NB COMM

NO. 8 CROSSOVER

SB COMM

P.C.

TAIL TRACK 150

CURVE DATA

	Δ	R	D	L	T
④	60°00'00"	955'	5° 59'58"	1,000.07'	551.37'
⑤	32°30'00"	300'	19°04'27"	170.40'	87.92'

PLAN STA. 130+40 TO STA. 156+30

PASSENGER BRIDGE

PLATFORM 150'

NO. 8 CROSSOVER

680'

END OF TAIL TRACK

BUMPER BLOCK

TRACTION POWER SUBSTATION

CURVE ⑤

V = 45 MPH

155

P.T.

LEVEL

T/R

BENT

IMPERIAL HWY

NORWALK TRANSPORTATION CENTER

EXIST. GROUND LINE

140
130
120
110
100
90
80
70

130+00 135+00 140+00 145+00 150+00

PROFILE

Sheet 6 of 8

Gannett Fleming
ENGINEERS AND PLANNERS

NO.	DATE	REVISION	BY	APP	APP

SCALE:
HOR. 100 0 100 200 1"=100'
VERT. 10 0 10 20 1"=10'

DRAWN BY: L. D.
CHECKED BY: B. S.
APPROVED BY:

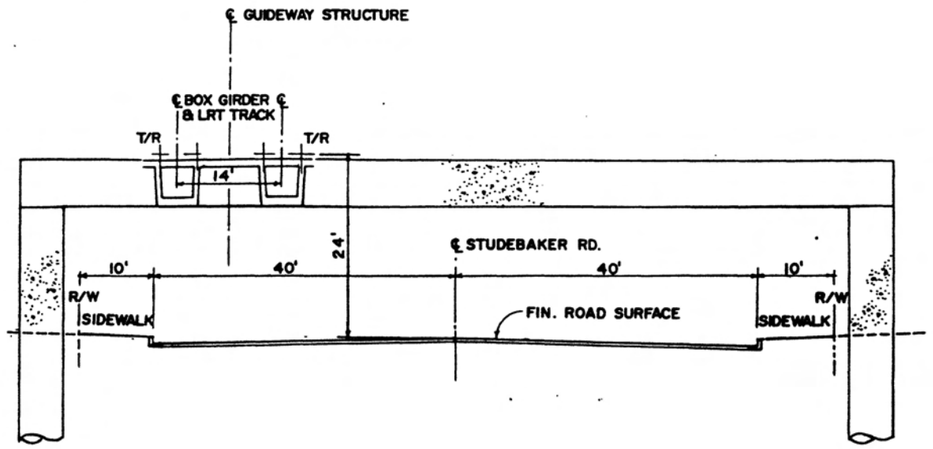
LOS ANGELES COUNTY TRANSPORTATION COMMISSION
METRO GREEN LINE EASTERLY EXTENSION

ALTERNATIVE 1
PLAN & PROFILE STA. 130+40 TO STA. 156+30

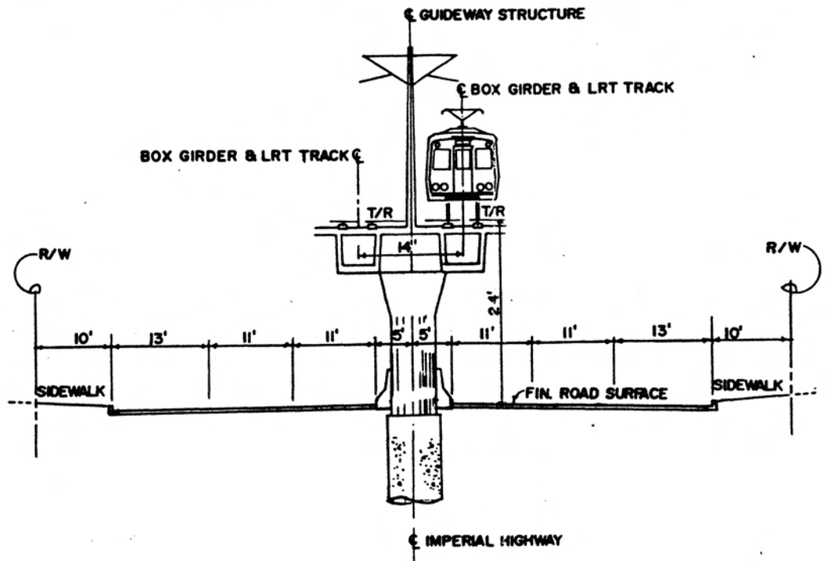
Date 8-31-92

FIGURE 2-1

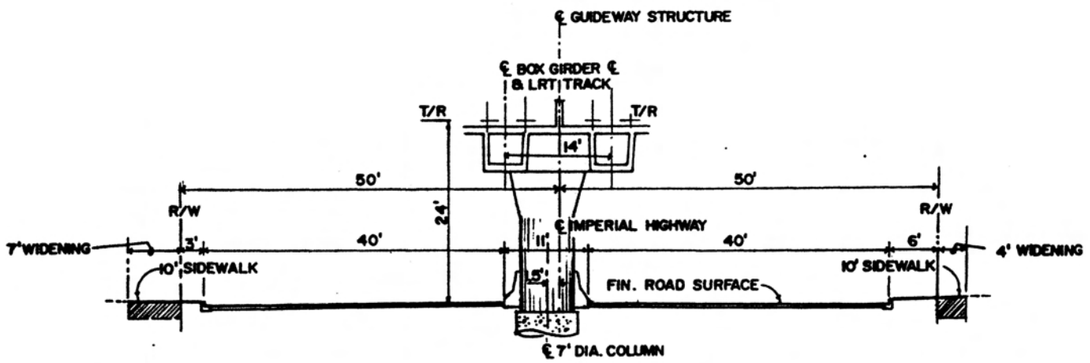
Dwg. No. 6



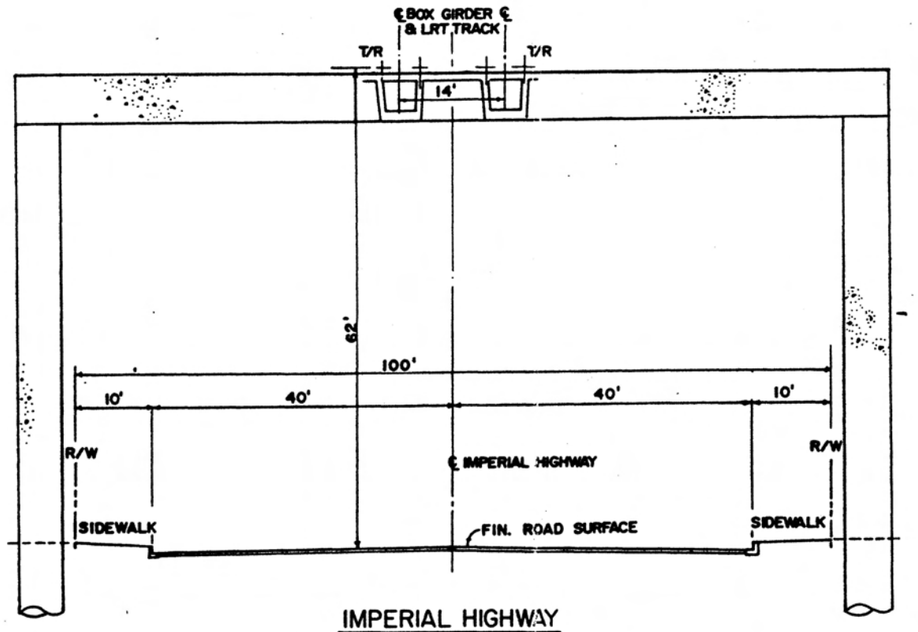
STUDEBAKER ROAD
SECTION STA. 17+00



IMPERIAL HIGHWAY
SECTION STA. 30+00



IMPERIAL HIGHWAY
SECTION STA. 100+50



IMPERIAL HIGHWAY
SECTION STA. 81+00

SECTIONS LOOKING EAST

FIGURE 2-1
Sheet 7 of 8

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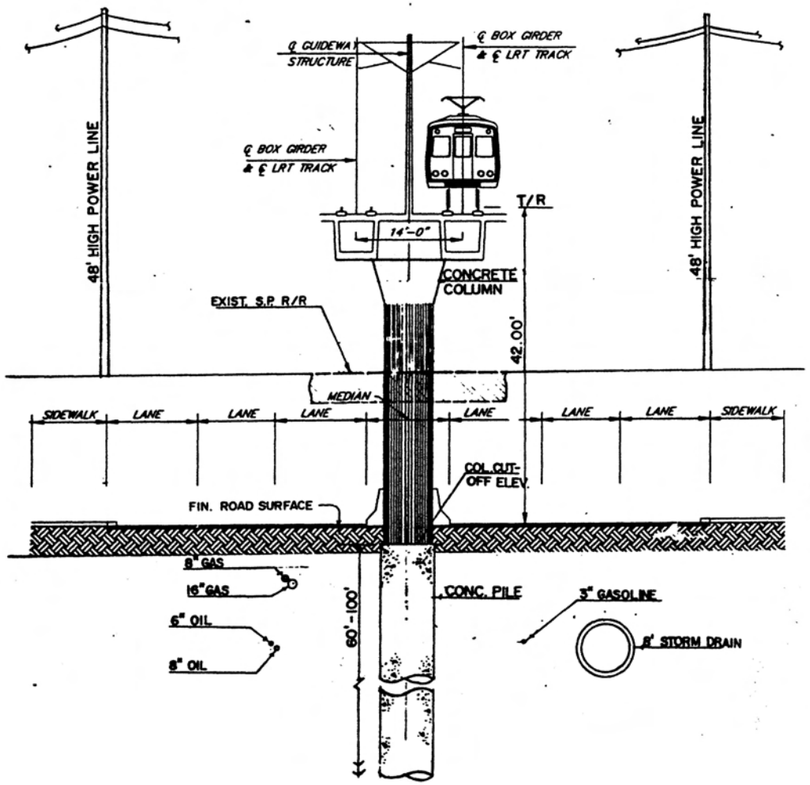
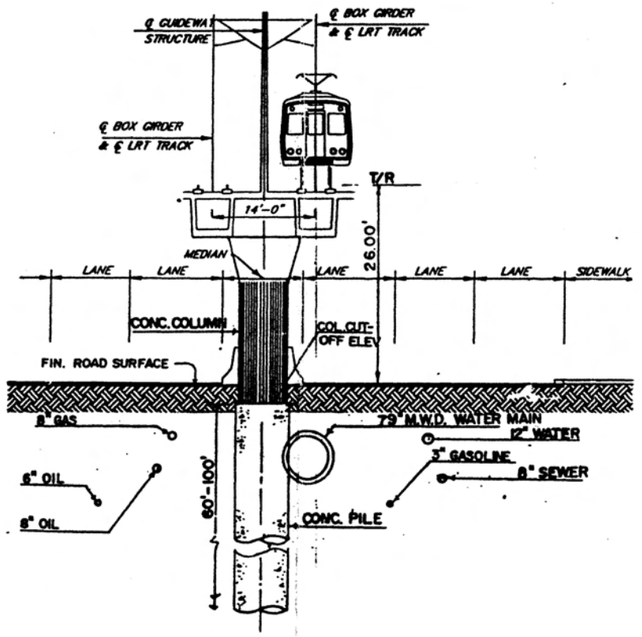
LOS ANGELES COUNTY TRANSPORTATION COMMISSION
METRO GREEN LINE EASTERLY EXTENSION
LACTC

ALTERNATIVE 1
SECTIONS

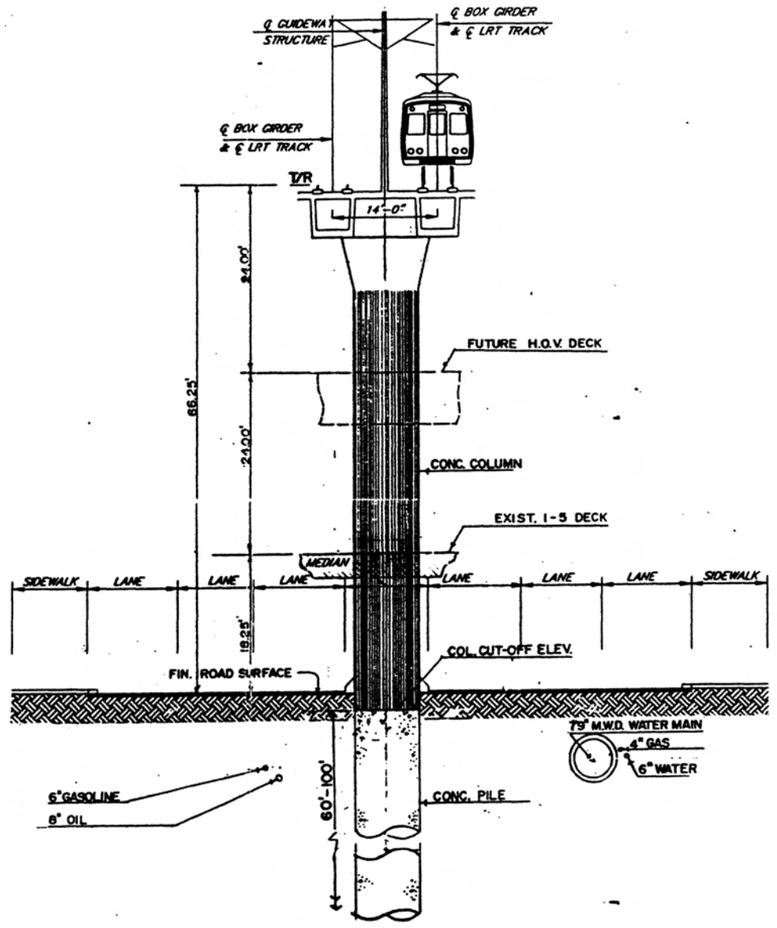
Date	DRAWN BY: L. D.	CHECKED BY: D. S.	Dwg. No.
8-31-92	SECTIONS SCALE: 1" = 10'		7



IMPERIAL HIGHWAY
SECTION STA. 39+20



IMPERIAL HIGHWAY
SECTION STA. 65+50



IMPERIAL HIGHWAY
SECTION STA. 79+70

SECTIONS LOOKING EAST

FIGURE 2-1
Sheet 8 of 8

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LOS ANGELES COUNTY TRANSPORTATION COMMISSION
METRO GREEN LINE EASTERLY EXTENSION
LACTC

ALTERNATIVE I
UTILITY SECTIONS

Date	DRAWN BY: L. D.	CHECKED BY: D. S.	Dwg. No.
8-31-92	SECTIONS SCALE: 1" = 10'		8

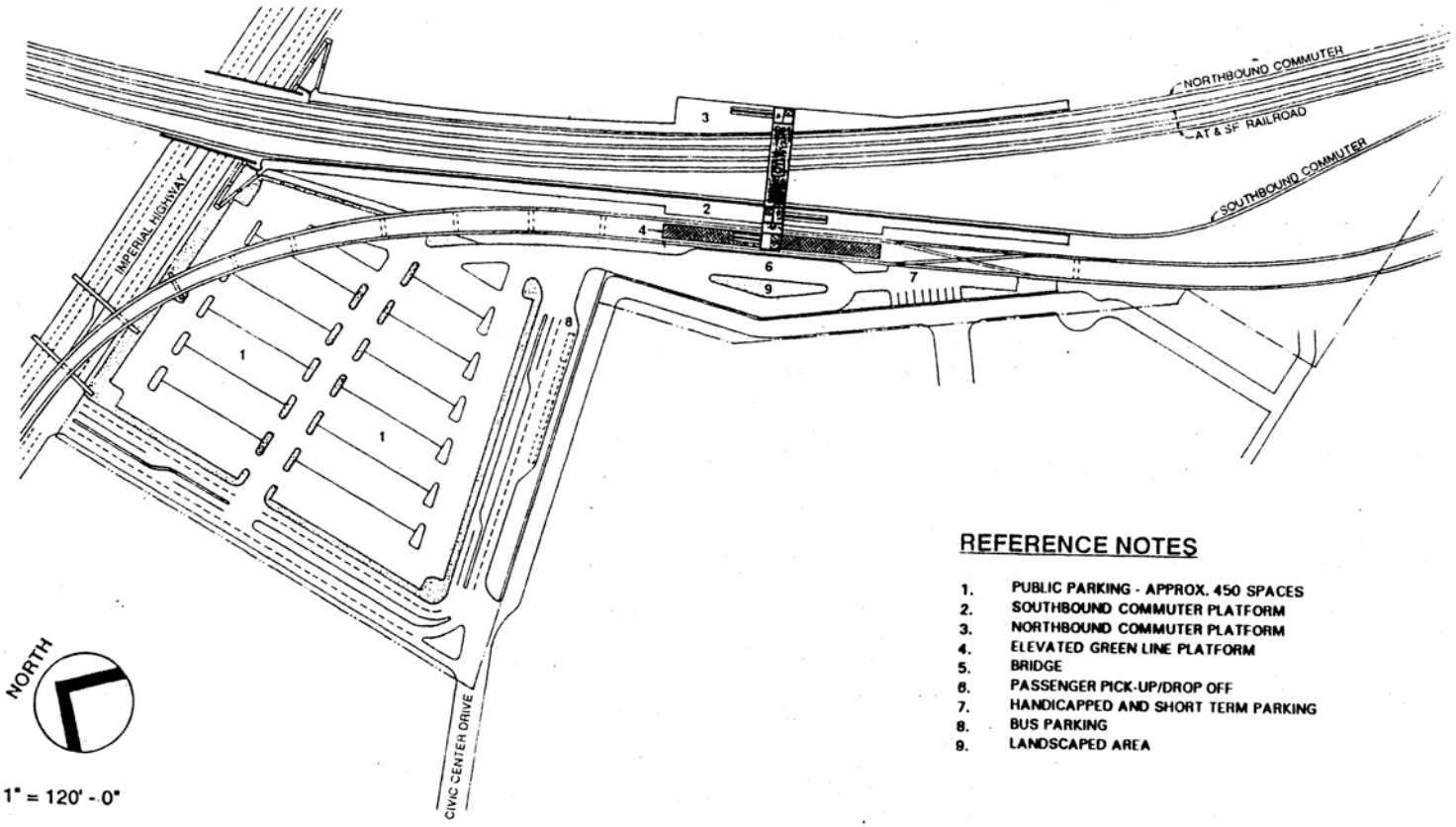
The aerial alignment would follow a route to the northeast toward Studebaker Road, passing over a church property west of Studebaker Road, opposite Borson Street. At Studebaker Road the guideway top-of-rail would be about 23 feet above the existing grade, with a 17-foot clearance between the bottom of the guideway structure and the street below. At this point, the guideway would be a concrete structure about 27 feet wide and generally 6 to 7 feet deep, with catenary poles in the center. The columns would be generally 7 to 10 feet in diameter, and usually a single column would support the center of the guideway, except where roadway geometry would prohibit such an installation, in which case, two columns would be placed outside the road right-of-way and a large concrete beam, or a "bent," would be placed to span the two columns. The guideway then would rest on the bent. The usual span between columns would be 130 feet.

The alignment would turn east on Imperial Highway, passing over a vacant lot on the southeast corner of Imperial Highway and Studebaker Road. At approximately Benfield Avenue, the alignment would be located over the center line of Imperial Highway. Proceeding east of Benfield Avenue, the alignment would cross over the Southern Pacific Railroad tracks, which are located on an overcrossing structure. At this juncture Imperial Highway is depressed below the Southern Pacific overcrossing bridge, and the top-of-rail would be approximately 43 feet above.

The alignment would then proceed east in an aerial configuration over the center of Imperial Highway and cross over the Firestone Boulevard intersection. Further east, after passing Jersey Avenue, the alignment would start an ascent that would be necessary to clear I-5. At Pioneer Boulevard the top-of-rail would be almost 50 feet above street level. The alignment would cross over I-5 at approximately 67 feet above street level, in order to clear a proposed High Occupancy Vehicle (HOV) structure located above I-5. The alignment would then descend to a height of 24 feet at top-of-rail east of Kalnor Avenue and proceed at this approximate height past Norwalk Boulevard and Bloomfield Avenue. Turning south, the alignment would enter the site of the proposed Norwalk Transportation Center (NTC), which is currently occupied by the City of Norwalk Maintenance Yard. The NTC site is south of Imperial Highway and west of the AT&SF railroad tracks.

Within the NTC site the alignment would be west of, and parallel to, the AT&SF tracks. The LRT aerial station would be approximately 24 feet above ground and would provide connection to the commuter rail platform below. Crossovers and tail tracks would be located beyond the center platform station, which would be accessed from the ground level via stairs, escalators and elevators. The commuter rail platforms would be accessed from the elevated station platform by another set of stairs, escalators and elevators via an overpass spanning the AT&SF tracks. The NTC site would also contain parking for approximately 400 cars as well as bus bays for transferring patrons. The southbound commuter track would be on the west side, whereas the northbound commuter track would be on the far east side. Patrons transferring between the Green Line and commuter service would use vertical circulation elements. The station would have a center platform. Transfers to ground transportation from the southbound commuter platform would be made directly at ground level; however, a transfer from a northbound train would require passengers to ascend, cross over, then descend.

Figure 2-2 and Figure 2-3 illustrate the proposed aerial alignment station at the Norwalk Transportation Center.



Source: The Tanzmann Associates.

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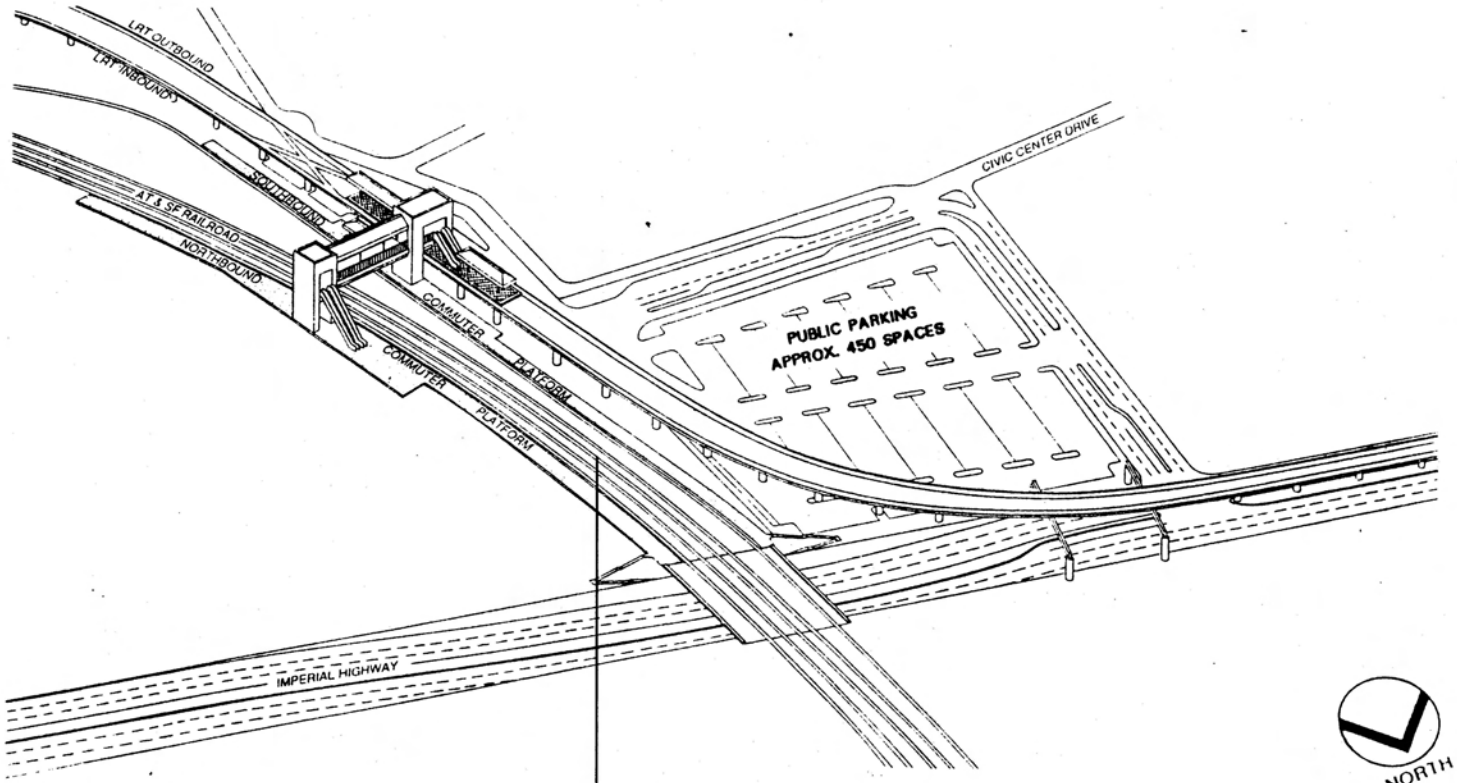
Metro Green Line Easterly Extension
Environmental Impact Report

Figure 2-2: Aerial Alignment - Conceptual Site Plan - NTC



Source: The Tanzim

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Environmental Impact Report

Figure 2-3: Aerial Alignment - Perspective View - NTC

2.2.2 Operating Characteristics

It is assumed that the LRT vehicle to be used on the Green Line Easterly Extension would be similar to that on the Blue Line, powered by an overhead catenary system which would provide 750 volts D.C. Electricity would be routed to the vehicle's traction motors which would be used to turn the wheels.

Initially a 87-foot articulated car would be used on the system. Each car would accommodate 76 seated passengers and 76 standing passengers, and up to three of these cars can be joined together to form a train. Ample room has been allowed at station platforms should patronage dictate more LRT vehicles.

The overall operating speed of the system would be 40 mph, with a maximum allowable speed of 65 mph. The maximum designed desirable grade is 4 percent and 300' is the minimum turning radius.

There would most likely be two traction power substations along this alignment. These take into account the geometry of the line (both horizontal and vertical profiles), vehicle size and capacity, operating speeds, the number of proposed vehicles on one circuit, headways, frequencies, etc. Typically, these substations are placed approximately 1 to 1.5 miles apart. For the aerial alternative, one substation would be placed within the public right-of-way at I-5 inside the ramps, and the second substation would be at the NTC site. The substation could be incorporated as part of a structure, or it could be a separate small structure, usually a brick/cement block building.

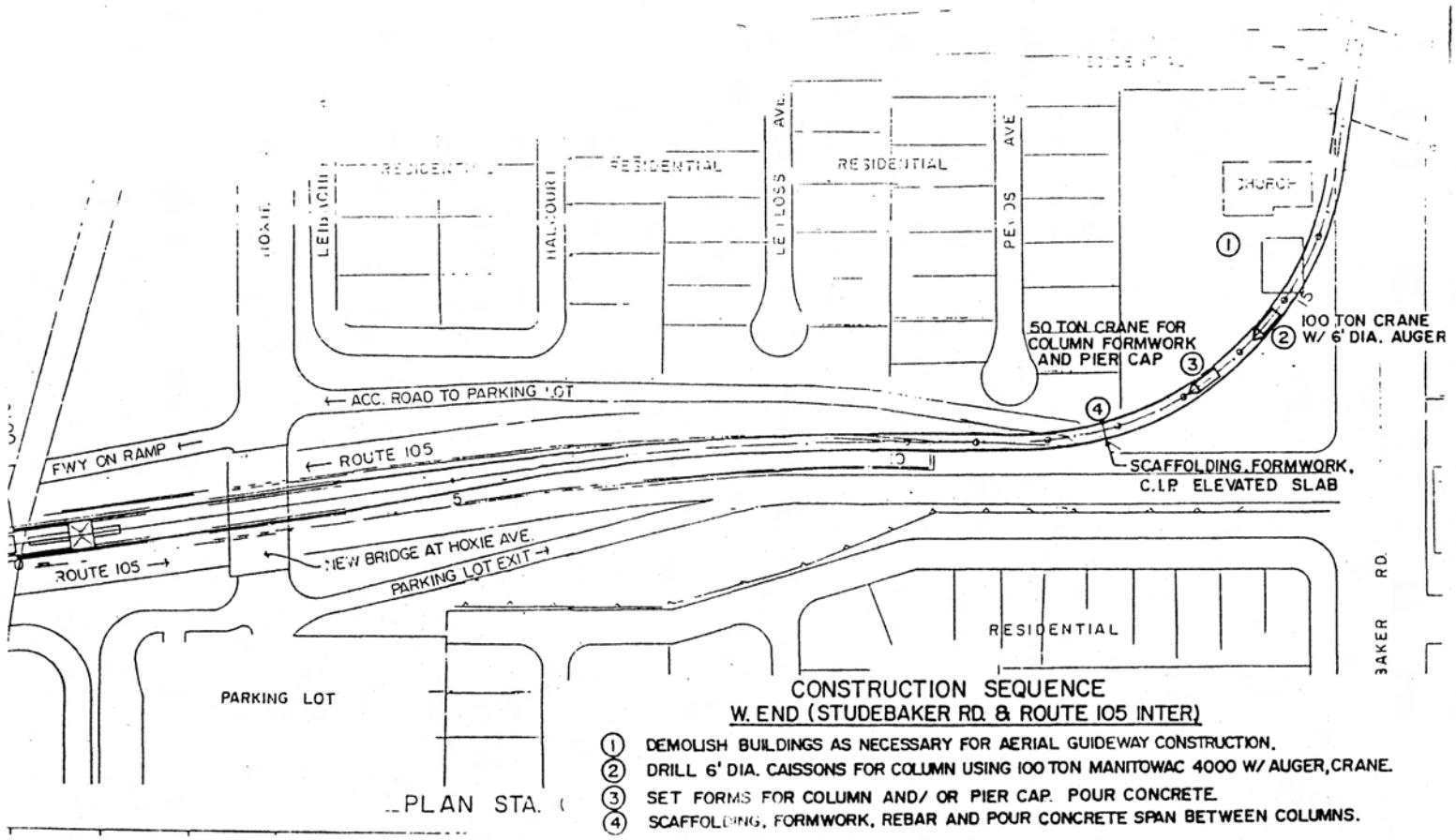
The aerial alternative would have train service 20 hours per day, between 4:30 A.M. and 12:30 A.M. The peak service periods would be weekdays from 5:30 to 8:30 A.M. and from 3:30 to 6:30 P.M. The operating headways would be 5 minutes during peak periods and 8 minutes during off-peak periods for the Metro Green Line's Norwalk to El Segundo section. When the branch to the North Coast Line is built, the headways on the Green Line Easterly Extension would be 2.5 minutes during peak periods and 4 minutes during off-peak periods. To travel the 2.79 mile distance between the I-605/Studebaker Station and the Norwalk Transportation Center Station would take 4.18 minutes, with an overall operating speed of 40 mph.

2.2.3 Construction Sequence

The following narrative describes the overall construction process from the west end at Studebaker/I-105 to the Norwalk Transportation Center on the east end. It should be noted that various segments or specific contract limits may be constructed simultaneously thereby reducing the overall construction period of the project. Figure 2-4 illustrates the construction sequence for this alignment.

<u>West End Construction</u>

Construction activities at the west end of the alignment would include clearing of sites, relocating utilities, managing traffic destined to either the Metro Green Line or the I-605/I-105 freeways, constructing guideway columns and sections, installing operating equipment and fixtures and providing connections to Green Line service.



Sheet 1 of 3

Source: Gannett Fleming, Inc.

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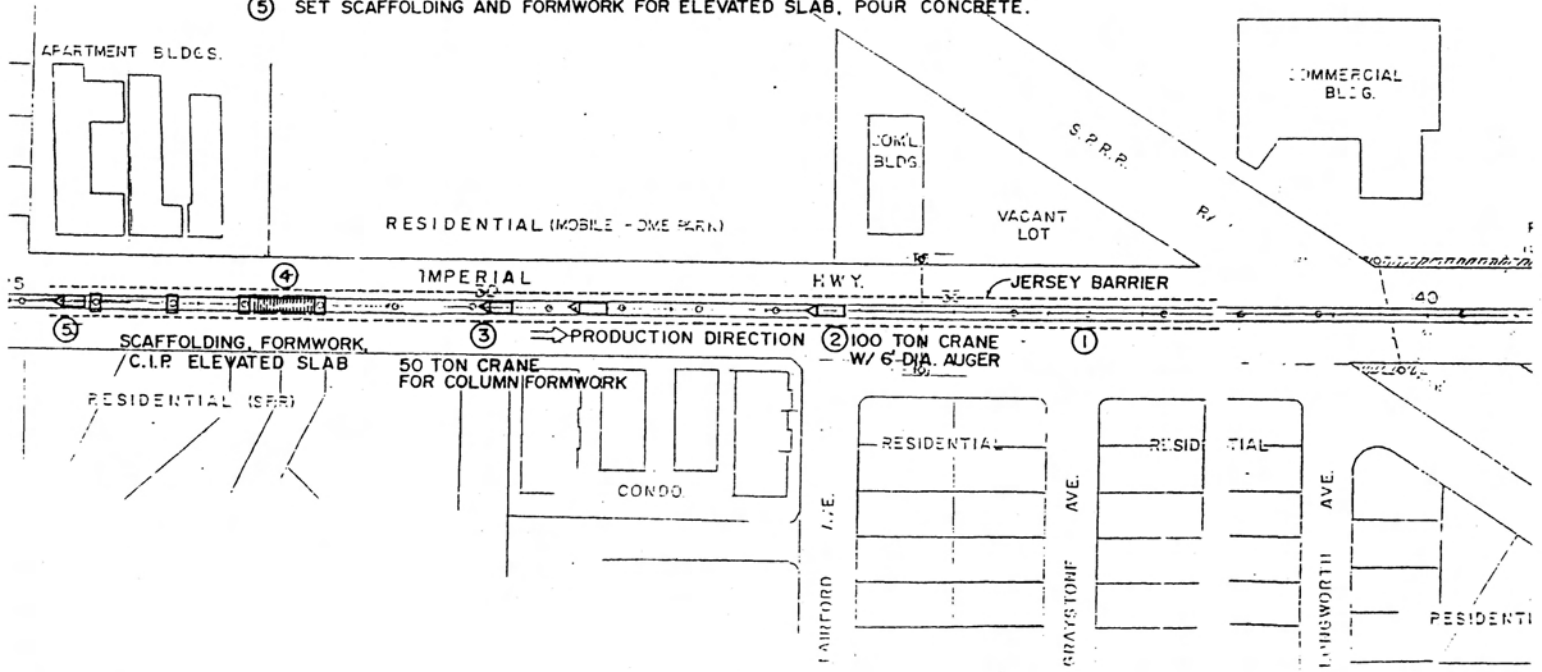
Environmental Impact Report

Figure 2-4: Aerial Alignment - Construction Sequence



Source: Gannett Fleming, Inc.

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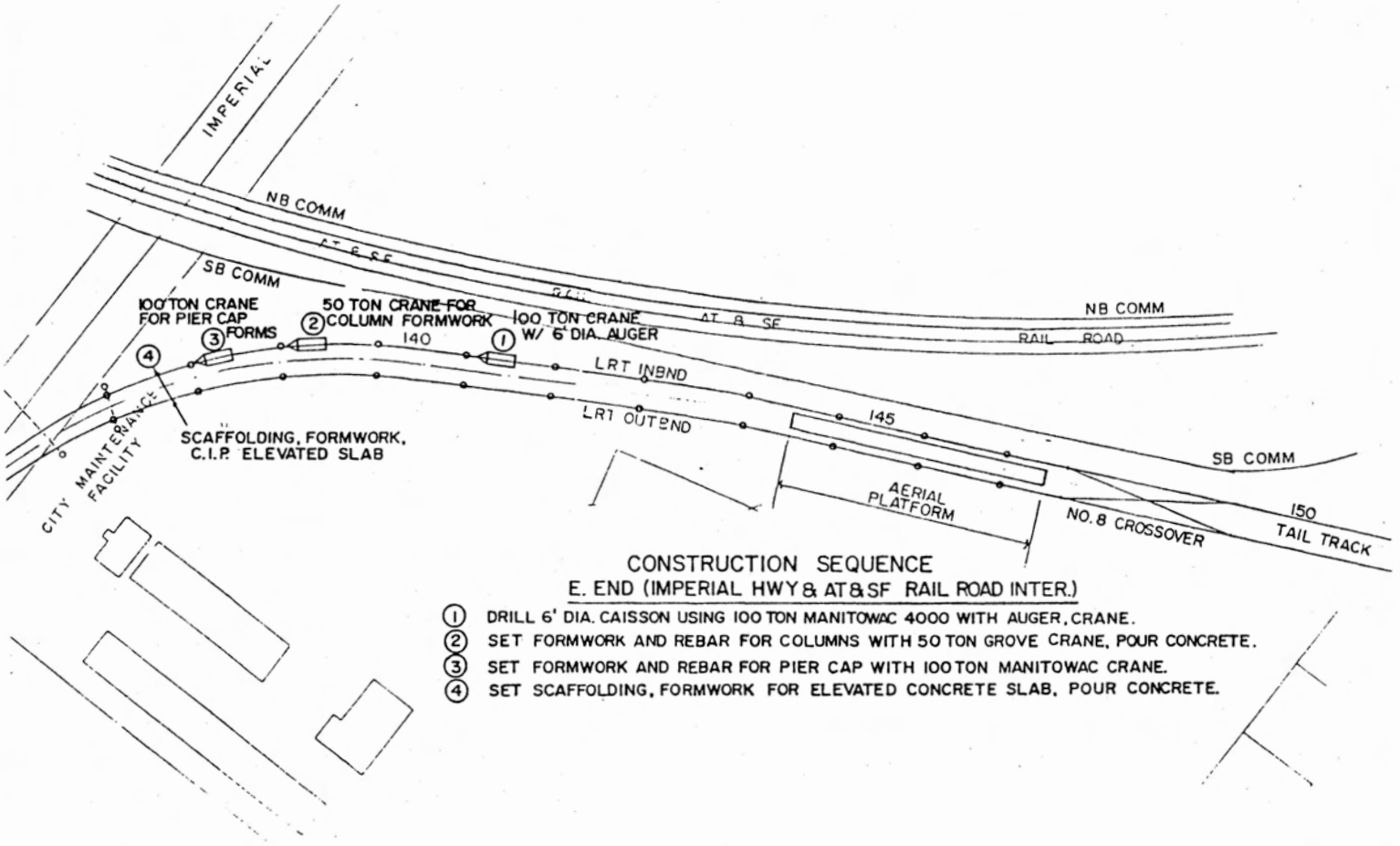
Metro Green Line Easterly Extension
Environmental Impact Report

Figure 2-4: Aerial Alignment - Construction Sequence



Source: Gannett Fleming, Inc.

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Environmental Impact Report

Figure 2-4: Aerial Alignment - Construction Sequence

West End construction would be complicated because the alignment begins to climb near the end of the existing Green Line Station platform, a condition that could necessitate the relocation of tail tracks and crossovers. Crossovers could be relocated to the west end of the platform, which would permit loading and unloading of passengers onto the platform from either inbound or outbound tracks. The lack of a tail track would be disadvantageous because there would be no place to store malfunctioning cars or start-up cars for the morning. Also, access into the retained cut area would be difficult for heavy equipment.

A further disadvantage of west end construction would be the configuration of the guideway over I-105 and access ramp roads. Long spans would be necessary in order to cross this area, and traffic mitigation measures such as nighttime construction and detours would probably be required.

Center Section Construction

The center section of the project would extend from approximately Studebaker Road and Imperial Highway to east of Bloomfield Avenue and Imperial Highway. Construction activities in this portion of the project would include managing traffic and detours, relocating utilities, placing columns, bents and guideway sections, installing operating equipment and fixtures and constructing required street and signalization improvements.

The alignment would be located over the middle of Imperial Highway. Trucks hauling spoil, rebar, forms, and other items would be traveling to and from construction sites, contributing to traffic congestion. A portion of the guideway would be constructed using cross-bents, and in order to drill a caisson on either side of Imperial Highway at a specific location, the drill rig must be set up either in the street or on private property. This would also affect traffic adversely. Also, it would be necessary to span Imperial Highway to set forms and pour transverse sections of the beams.

In areas where the guideway would be required to be extremely high, namely over the SPRR and I-5, additional width at the bottom may be necessary to support scaffolding. If this is the case, adjacent traffic lanes would be further reduced. Construction measures similar to those being used for construction over the HOV facility of the Harbor Freeway may be required. Overall, the construction process to be experienced along Imperial Highway would likely be cumbersome and disruptive.

East End Construction

Construction activities at the east end of the project consist of site clearance, utility relocation, construction activities necessary to bring the guideway into the site from Imperial Highway and construction of the light rail station and related facilities.

This open site would make guideway and station construction less difficult. Typical aerial guideway construction techniques would occur here. Upon approaching the platform the single, two-track guideway would be split into two separate guideways.

It is anticipated that commuter rail service would be in operation at the time the Green Line Easterly Extension is under construction. As a result, the commuter parking lot/bus transfer areas that would be in place for the commuter operation would be displaced during construction of the Green Line Easterly Extension.

2.3 SUBWAY ALIGNMENT

2.3.1 Physical Description

The subway alignment would begin at the I-605/Studebaker Station, currently the eastern terminus station of the Green Line. Figure 2-5 illustrates the subway alignment. The I-605/Studebaker Station is in an open cut approximately 20 feet below the existing ground level.

Conditions to be expected in the vicinity of the freeway and station are discussed in section 2.2.1.

Beginning from a position already partially below grade, the alignment would proceed east and north toward Studebaker Road and descend further underground, with a portal located between LeFloss and Pecos avenues and under the access ramp of I-105. Green Line Easterly Extension tunnels would be approximately 20 to 22 feet in diameter and 30 to 35 feet apart at center. They would not be positioned to disturb the freeway and parking lot ramps as they pass under them.

The alignment would pass under residential and church property. At Studebaker Road the alignment would be almost 50 feet below the existing ground level. The alignment would then turn in a northeasterly direction toward Imperial Highway, while crossing under private property at the southeast corner of Imperial Highway and Studebaker Road. By the time it reaches Benfield Avenue, the alignment would be completely within the public right-of-way of Imperial Highway. From this point on, the alignment would proceed eastward under Imperial Highway and cross under the SPRR overpass. It would then proceed under the Firestone Boulevard and Pioneer Boulevard intersections, cross under I-5, Norwalk Boulevard and Bloomfield Avenue to finally turn south into the site of the proposed Norwalk Transportation Center (NTC). The NTC site is south of Imperial Highway and west of the AT&SF Railroad tracks. Figure 2-6 and Figure 2-7 illustrate the subway alignment station at the Norwalk Transportation Center.

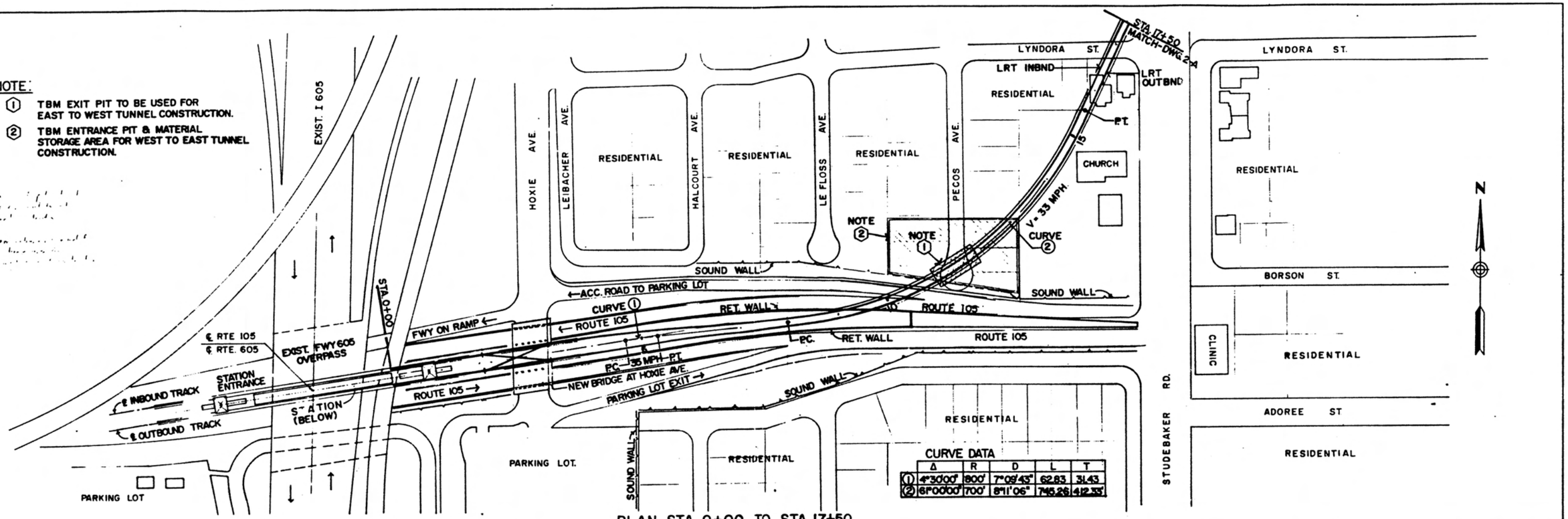
A vent shaft is a necessary component of the subway alignment. The shaft would be located in an open area straddling Imperial Highway immediately east of I-5. Vent shafts are hollow concrete structures that connect the subway tunnels to the ground surface above for the purpose of relieving the air pressure resulting from train movement inside the tunnels. The exact size of the vent shaft would be determined when final calculations are made, but it would be approximately four to six feet square at the surface. The vent shaft may be flush with the surface, such as a sidewalk, or it may be raised above the surface to prevent surface drainage from entering subway tunnels through the vent shafts. The top of the shaft would have a grating flush with its edge. This is to prevent large objects or people from falling into the shaft.

The alignment would climb out of the underground profile to a station within the NTC site at approximately four feet below the existing grade. Crossovers and tail tracks would be located beyond the center platform station, which would be accessed by stairs, escalators and elevators via an overpass. The same overpass would continue to the commuter rail platforms, which are

NOTE:

① TBM EXIT PIT TO BE USED FOR EAST TO WEST TUNNEL CONSTRUCTION.

② TBM ENTRANCE PIT & MATERIAL STORAGE AREA FOR WEST TO EAST TUNNEL CONSTRUCTION.



PLAN STA. 0+00 TO STA. 17+50

CURVE DATA

	Δ	R	D	L	T
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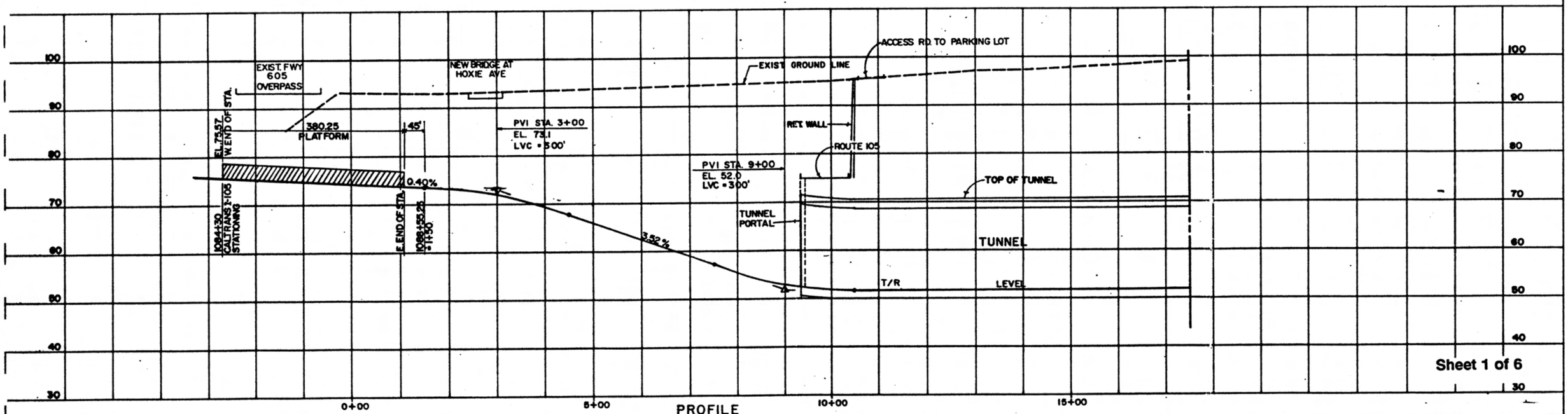
②	61°00'00"	700'	8°11'06"	745.26	412.35



PROFILE

Sheet 1 of 6

Gannett Fleming
ENGINEERS AND PLANNERS

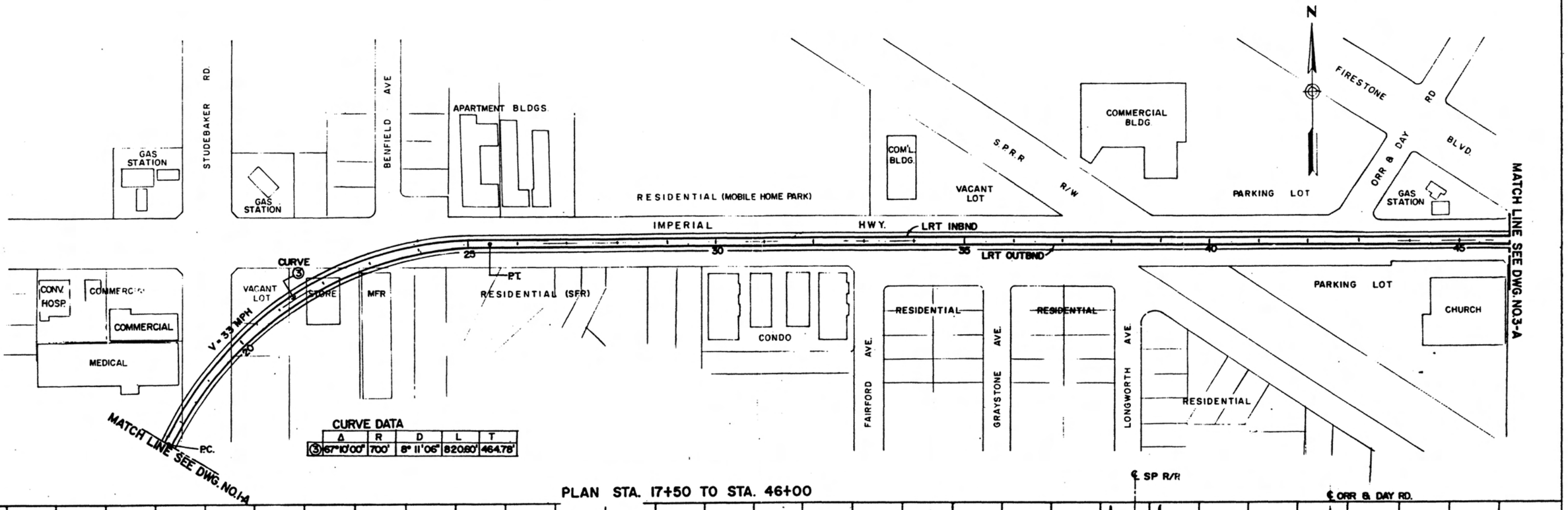
NO.	DATE	REVISION	BY	APP	APP

SCALE: HOR. 1"=100 (100 0 100 200) VERT. 1"=10' (10 0 10 20)

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
METRO GREEN LINE EASTERLY EXTENSION

ALTERNATIVE I-A
PLAN & PROFILE STA. 0+00 TO STA. 17+50

DRAWN BY:	CHECKED BY:	APPROVED BY:	Date		Dwg. No.
L.D.	D.S.		8-31-92	FIGURE 2-5	1-A



Sheet 2 of 6

Gannett Fleming
ENGINEERS AND PLANNERS

NO.	DATE	REVISION	BY	CHK.	APP	APP

SCALE:
HOR. 1" = 100' (100 0 100 200)
VERT. 1" = 10' (10 0 10 20)

DRAWN BY:	CHECKED BY:	APPROVED BY:
L. D.	D.S.	

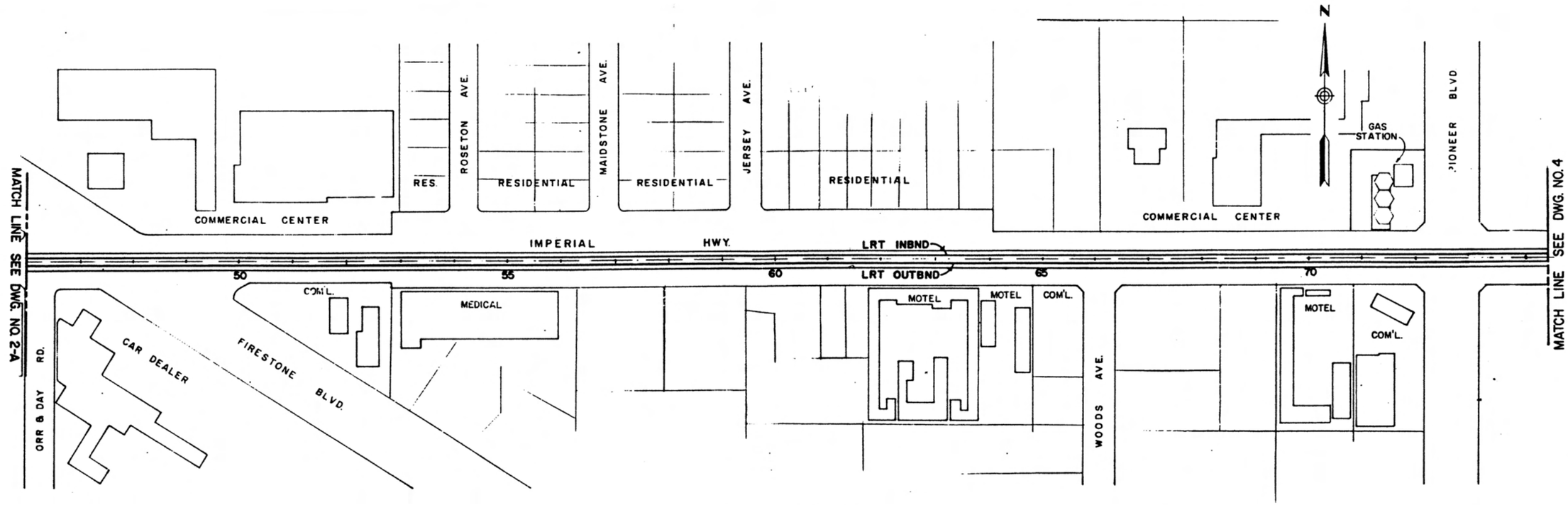
LOS ANGELES COUNTY TRANSPORTATION COMMISSION
METRO GREEN LINE EASTERLY EXTENSION

ALTERNATIVE I-A
PLAN & PROFILE STA. 17+50 TO STA. 46+00

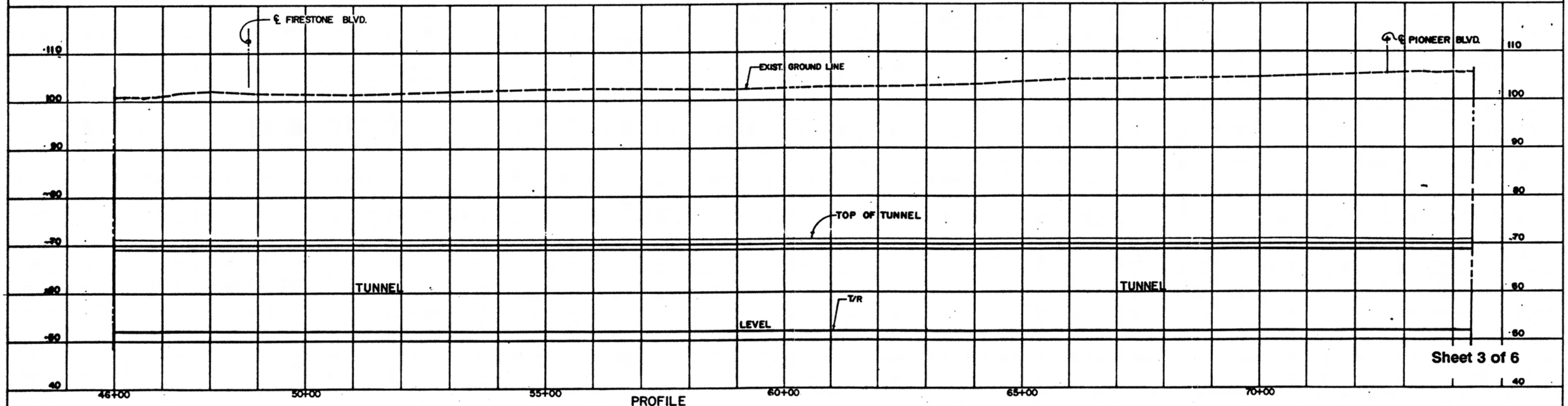
Date: 6-24-92

FIGURE 2-5

Dwg. No. 2-A



PLAN STA. 46+00 TO STA. 74+40



PROFILE

Sheet 3 of 6

Gannett Fleming
ENGINEERS AND PLANNERS

NO.	DATE	REVISION	BY	APP	APP

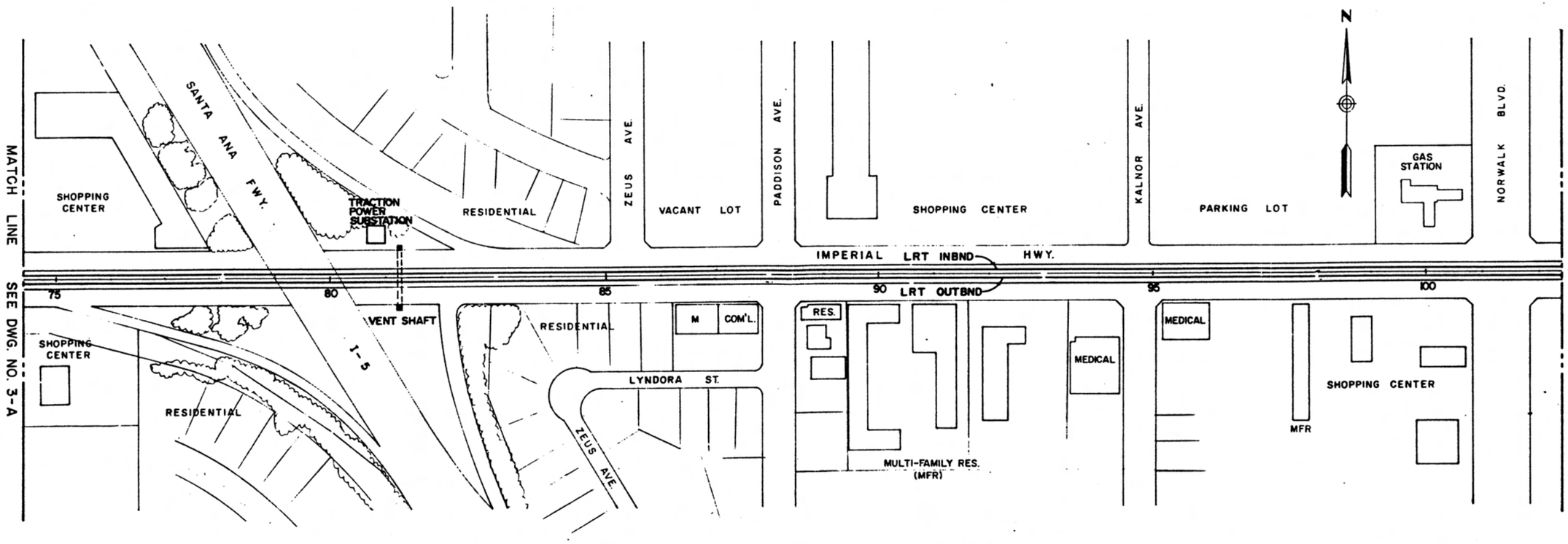
SCALE: HOR. 1" = 100' (100 0 100 200); VERT. 1" = 10' (10 0 10 20)

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
METRO GREEN LINE EASTERLY EXTENSION

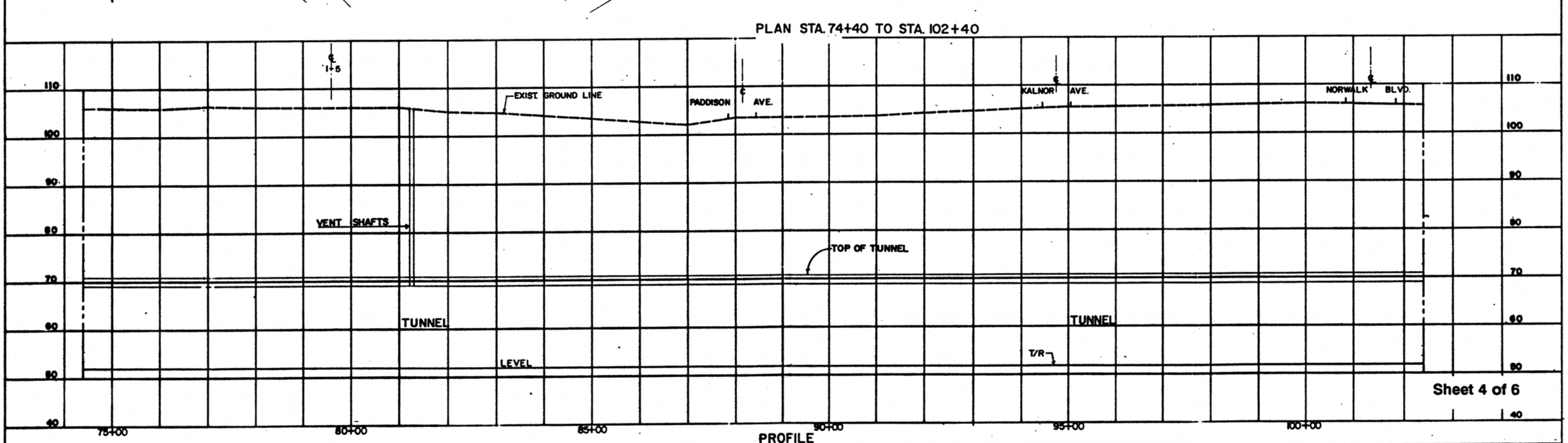
ALTERNATIVE I-A
PLAN & PROFILE STA. 46+00 TO STA. 74+40

DRAWN BY:	CHECKED BY:	APPROVED BY:	Date	Dwg. No.
L. D.	D. S.		8-31-92	3-A

FIGURE 2-5



PLAN STA. 74+40 TO STA. 102+40



PROFILE

Sheet 4 of 6

Gannett Fleming
ENGINEERS AND PLANNERS

NO.	DATE	REVISION	BY	APP	APP

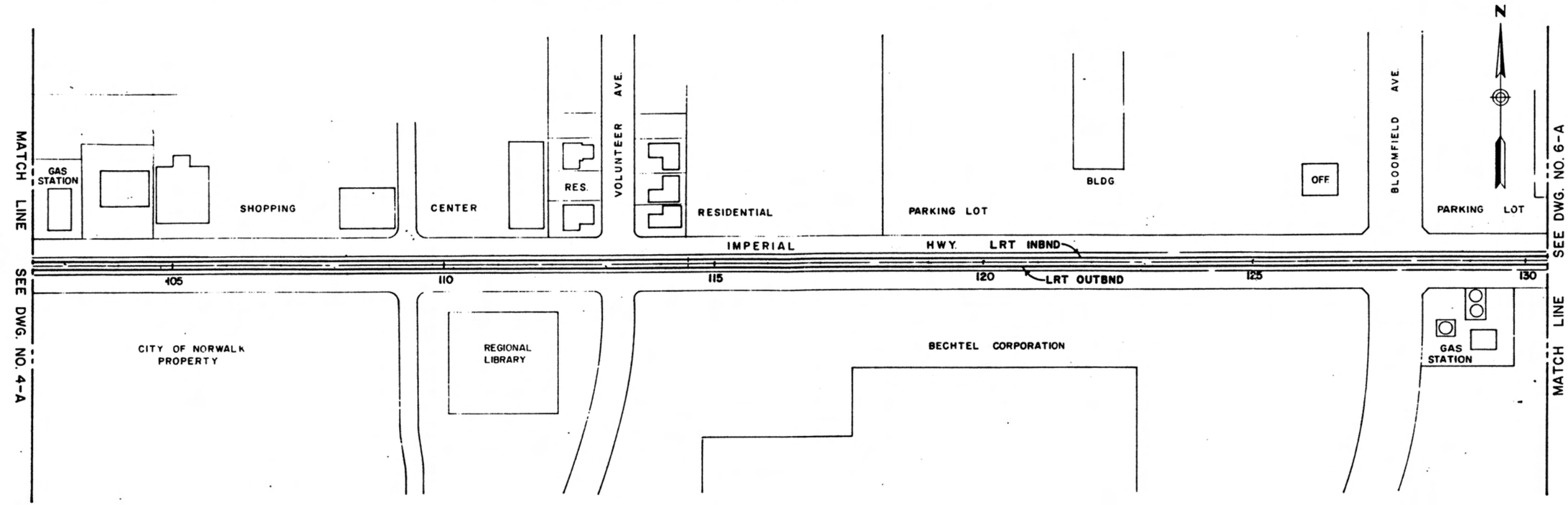
SCALE: HOR. 1" = 100' (100 0 100 200); VERT. 1" = 10' (10 0 10 20)

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
METRO GREEN LINE EASTERLY EXTENSION

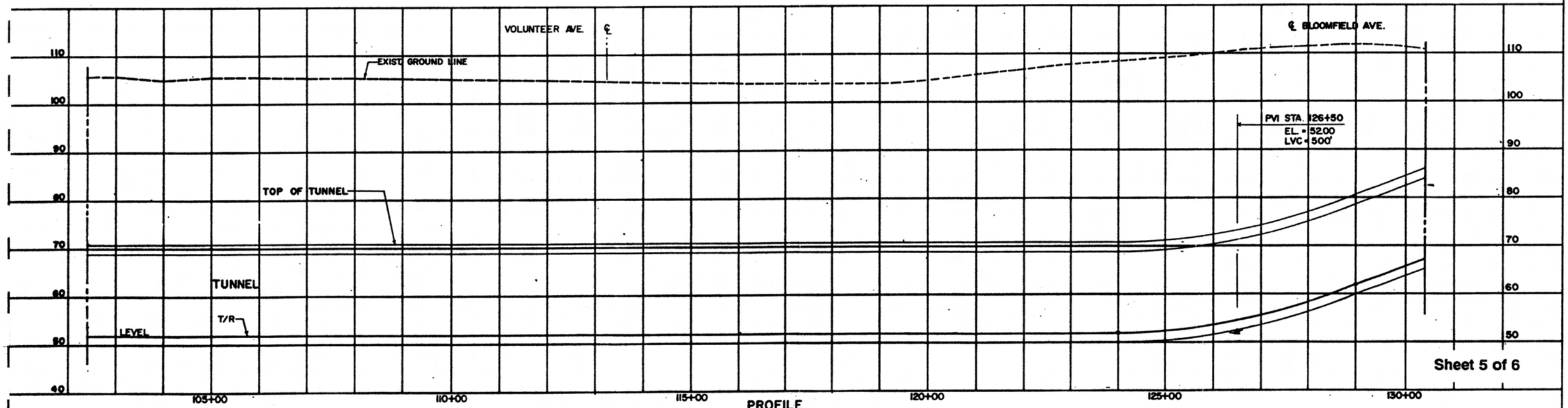
ALTERNATIVE I-A
PLAN & PROFILE STA. 74+40 TO STA. 102+40

DRAWN BY:	CHECKED BY:	APPROVED BY:	Date	Dwg. No.
L.D.	D.S.		8-31-92	4-A

FIGURE 2-5



PLAN STA. 102+40 TO STA. 130+40



PROFILE

Sheet 5 of 6

Gannett Fleming
ENGINEERS AND PLANNERS

NO.	DATE	REVISION	BY	APP.	APP.

SCALE: HOR. 1" = 100' (100 0 100 200); VERT. 1" = 10' (10 0 10 20)

DRAWN BY: L. D. | CHECKED BY: D. S. | APPROVED BY:

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
METRO GREEN LINE EASTERLY EXTENSION

ALTERNATIVE 1-A
PLAN & PROFILE STA. 102+40 TO STA. 130+40

Date: 8-31-92

FIGURE 2-5

Dwg. No. 5-A

MATCH LINE SEE DWG. NO. 5-A

COMMERCIAL BLDGS.

P.C.

LRT INBND

LRT OUTBND

V = 38 MPH

CURVE ④

IMPERIAL HWY.

135

PORTAL

CONDO

CITY MAINTENANCE FACILITY

RET WALL

RET WALL

SB COMM

NB COMM

AT & SF

NORWALK TRANSPORTATION CENTER

140

END OF RETAINED SECTION

IDENTICAL STATION

N

P.T.

AT & SF

144+00

PASSENGER BRIDGE

145

PLATFORM

RAIL ROAD

NB COMM

NO. 8 CROSSOVER

SB COMM

P.C.

150

TAIL TRACK

TRACTION POWER SUBSTATION

V = 45 MPH

155

CURVE ⑤

P.T.

CURVE DATA

	Δ	R	D	L	T
④	60°00'00"	955'	5° 59'58"	1,000.07'	551.37'
⑤	32°30'00"	300'	19°24'27"	737.40'	378.92

PLAN STA. 130+40 TO STA. 156+30

PVI STA. 132+00
EL. = 74.00
LVC = 400'

600'

R/W

PVI STA. 141+00
EL. = 109.50
LVC = 400'

PLATFORM

50'

NO. 8 CROSSOVER

END TAIL TRACK

BUMPER BLOCK

IMPERIAL HWY

79" MWD
5'-5" BELOW ES

24'

TOP OF TUNNEL

PORTAL

EXIST. GROUND LINE

4.00 %

23' MIN.

TUNNEL

140

130

120

110

100

90

80

70

60

50

135+00

140+00

145+00

150+00

155+00

PROFILE

Sheet 6 of 6

Gannett Fleming
ENGINEERS AND PLANNERS

NO.	DATE	REVISION	BY	APP	APP

SCALE:
HOR. 1"=100'
VERT. 1"=10'

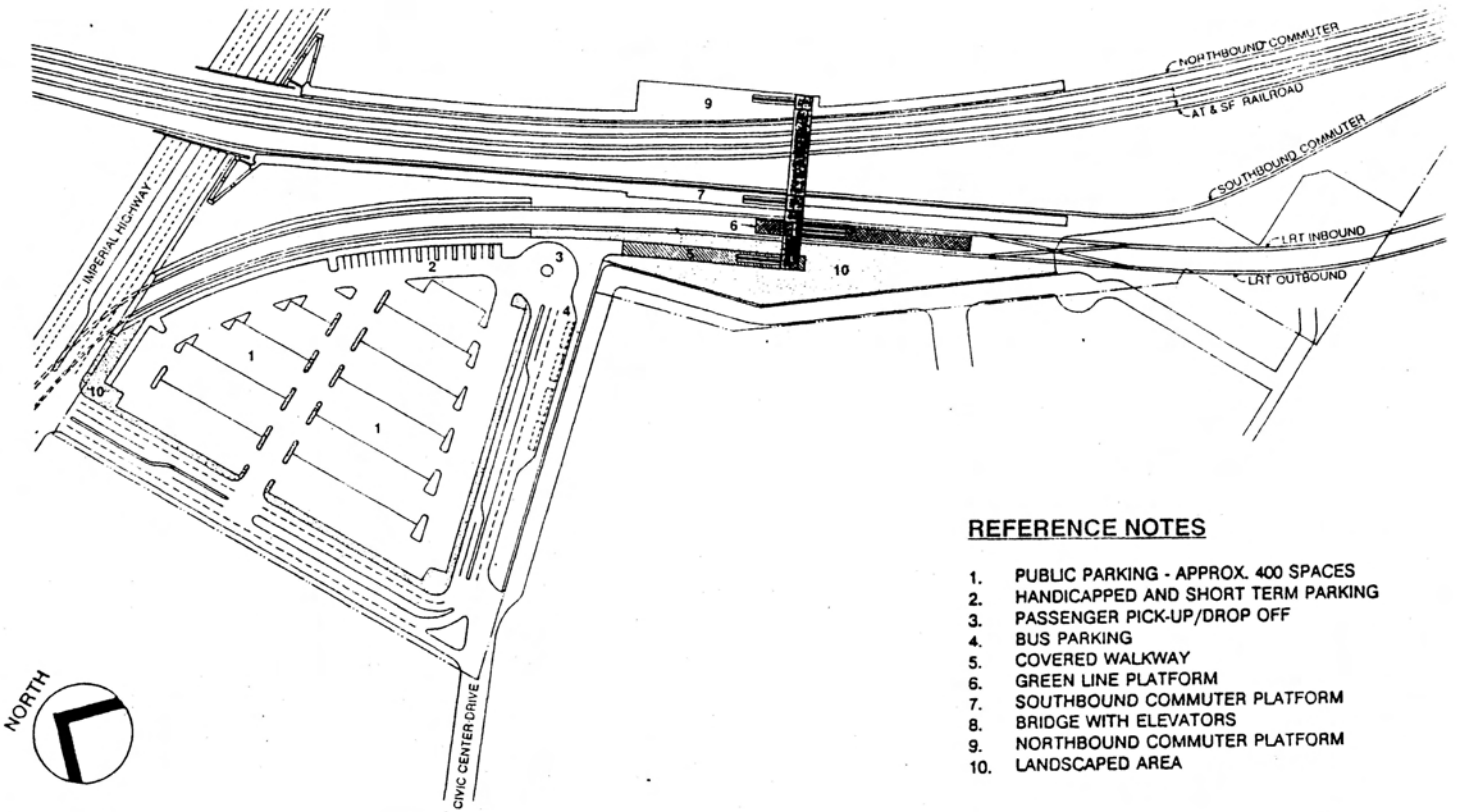
DRAWN BY: L. D.
CHECKED BY: D. S.
APPROVED BY:
Date: 8-31-92

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
METRO GREEN LINE EASTERLY EXTENSION

ALTERNATIVE 1-A
PLAN & PROFILE STA. 130+40 TO STA. 156+30

FIGURE 2-5

Dwg. No. 6-A



REFERENCE NOTES

1. PUBLIC PARKING - APPROX. 400 SPACES
2. HANDICAPPED AND SHORT TERM PARKING
3. PASSENGER PICK-UP/DROP OFF
4. BUS PARKING
5. COVERED WALKWAY
6. GREEN LINE PLATFORM
7. SOUTHBOUND COMMUTER PLATFORM
8. BRIDGE WITH ELEVATORS
9. NORTHBOUND COMMUTER PLATFORM
10. LANDSCAPED AREA

Source: The Tanzmann Associates.

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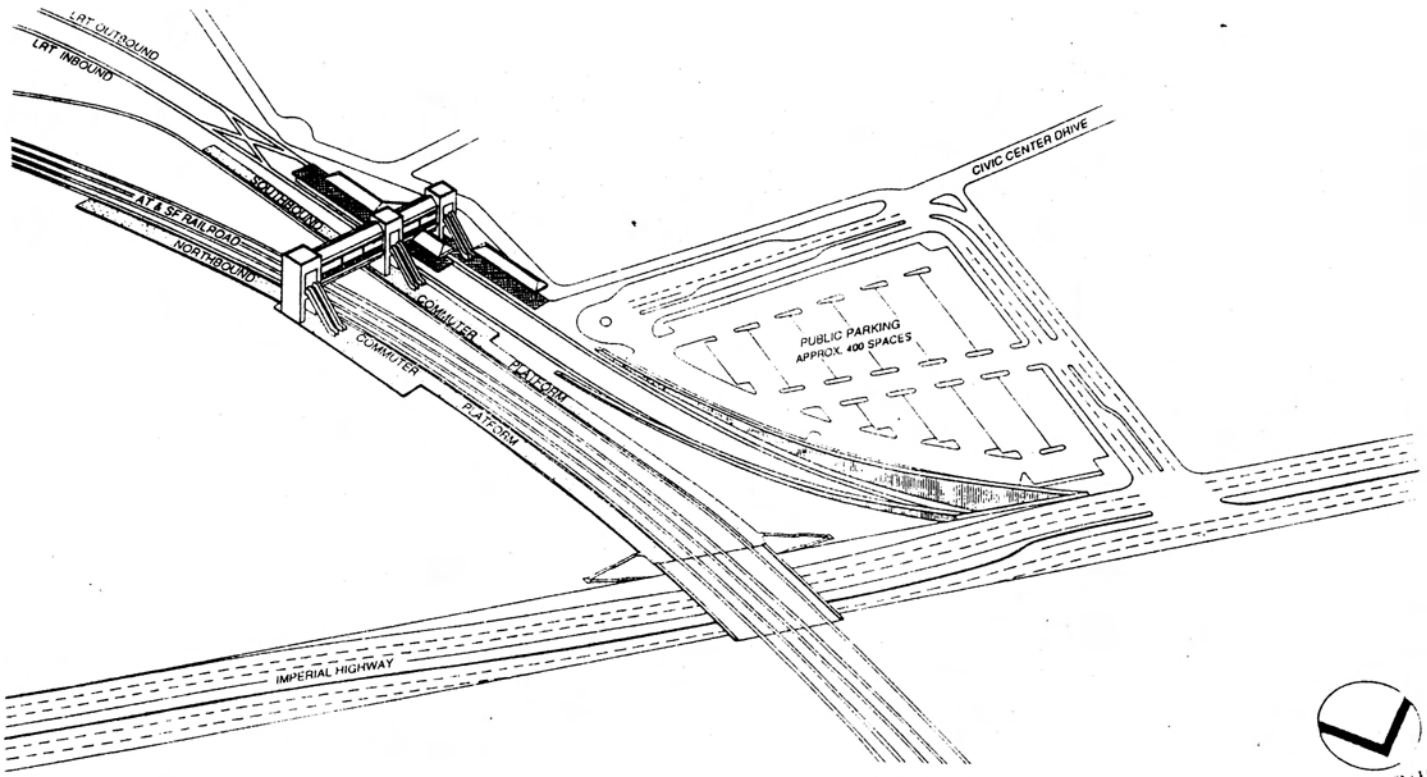
Metro Green Line Easterly Extension
Environmental Impact Report

Figure 2-6: Subway Alignment - Conceptual Section - NTC



Source: The Tanzmann Associates.

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Environmental Impact Report

Figure 2-7: Subway Alignment - Perspective View - NTC

also accessed by stairs, escalators and elevators. The NTC site also contains parking for approximately 400 cars and bus bays for transferring patrons. The southbound commuter track would be on the west side, whereas the northbound commuter track would be on the far east side. Patrons transferring from the Green Line to commuter service, or vice versa, would use vertical circulation elements. The Green Line platform would be a high, center type. However, transfers to ground transportation from the southbound commuter platform would be made directly on the ground, whereas a transfer from a northbound train would require passengers to ascend, cross over, and descend. (Figure 2-8.)

2.3.2 Operating Characteristics

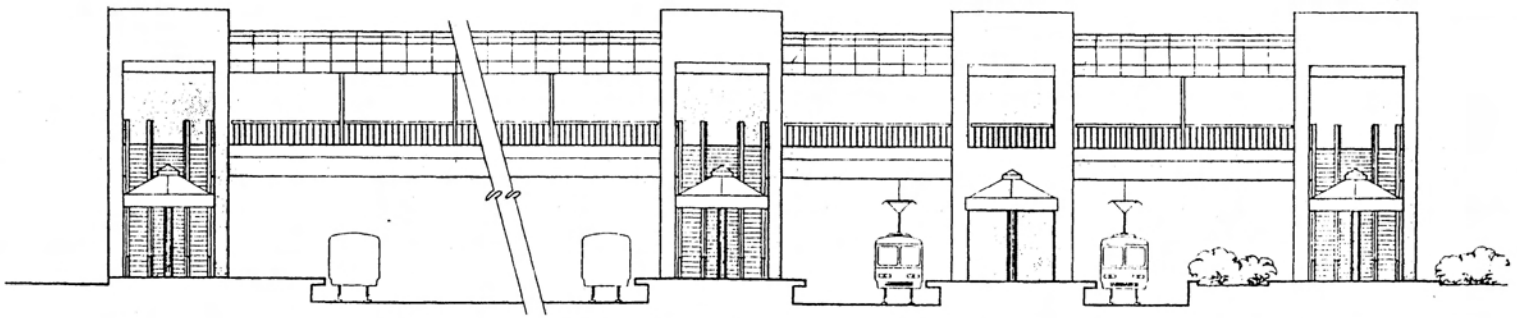
It is assumed that the LRT vehicle to be used on the Green Line would be similar to trains currently being used on the Blue Line. These cars, which accommodate 76 seated passengers and 76 standing passengers, use an overhead catenary system which provides 750 volts D.C. Electricity is routed to traction motors which convert the energy into mechanical form to propels the cars. Typically trains would consist of a 87-foot articulated single car; however, up to three such cars could be joined together to form a longer train, where necessary. Ample expansion room has been allowed at station platforms in the event patronage dictates more vehicles.

There will most likely be two traction power substations along this alignment, taking into account the geometry of the line (both horizontal and vertical profiles), vehicle size and capacity, operating speeds, the number of proposed vehicles on one circuit, headways, frequencies, etc. Typically, these substations are placed approximately 1 to 1.5 miles apart. For the subway alignment, one substation would be placed at I-5 within the public land inside the ramps, and the second substation would be at the NTC site. The substation itself is often hidden along the alignment by making it part of a structure. In other cases where this is not feasible, a separate small structure, usually a brick/cement block building, would be adequate.

The subway alternative would offer train service 20 hours per day, between 4:30 A.M. and 12:30 A.M. The peak service periods would be 5:30 to 8:30 A.M. and 3:30 to 6:30 P.M. on weekdays. Operating headways would be 5 minutes during peak periods and 8 minutes during off-peak periods for the Metro Green Line's Norwalk to El Segundo section. When the branch to the North Coast Line is built, then the train headways on the Green Line Easterly Extension would be 2.5 minutes during peak periods and 4 minutes during off-peak periods, with a travel time of 3.62 minutes for the 2.78 miles between the I-605/Studebaker Station and the NTC station. Trains would attain a maximum average operating speed of 46 mph. The system's overall operating speed would be 40 mph, and the maximum speed would be 65 mph. The maximum desirable grade is 4 percent, and the minimum radius is 300'.

2.3.3 Construction Sequence

Construction activities associated with the subway alignment would differ quite markedly from construction activities associated with the aerial alignment. Nearly all construction activities (excepting the vent shaft) would be focused at the area used to establish the tunnel portal. This area, referred to as the "staging area," would be the location where materials would be removed from the tunnel excavation, installed in the subway and stockpiled for use as needed. The following section discusses the subway construction staging are, and the following describes construction of the vent shaft.



1/16" = 1'-0"

Source: the Tanzmann Associates, 1[illegible].

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Figure 2-8: Concept Elevation - At-Grade Station

Staging

There are two logical tunnel pit locations, one at the east end of the alignment, the other on the west end. The east end site would be within the proposed Norwalk Transportation Center. Existing structures on the site have been cleared away, providing an area for the contractor's laydown and staging arena. The pit itself should begin on a tangent alignment to facilitate operations and to ensure a higher degree of survey accuracy. Trucks hauling tunnel spoil would have direct access to Imperial Highway and the site. The estimated tunnel spoil hauling and the rate of tunnel production would be as per the west end pit discussion below. The tunnel boring machine would exit at the west end once a single tube has been bored from the east. The equipment for drilling under the I-105/access ramp shown in Figure 2-9 would be used for removing the tunnel boring machine. This construction access pit may impact access to one existing home.

The pit location, if situated at the west end, would be somewhat more complicated. For purposes of illustration, the west end staging area has been assumed in the construction sequence shown in Figure 2-9. The area between Lyndora, Pecos, and LeFloss Avenue would be required as an open area for construction staging purposes. As a result, 17 existing homes located there may be acquired and removed or demolished. The tunnel pit would be excavated for the tunnel boring machine. All spoil for the entire operation would exit from this location, and all subway construction materials would enter from this location. Also, construction materials would be stockpiled at the staging area.

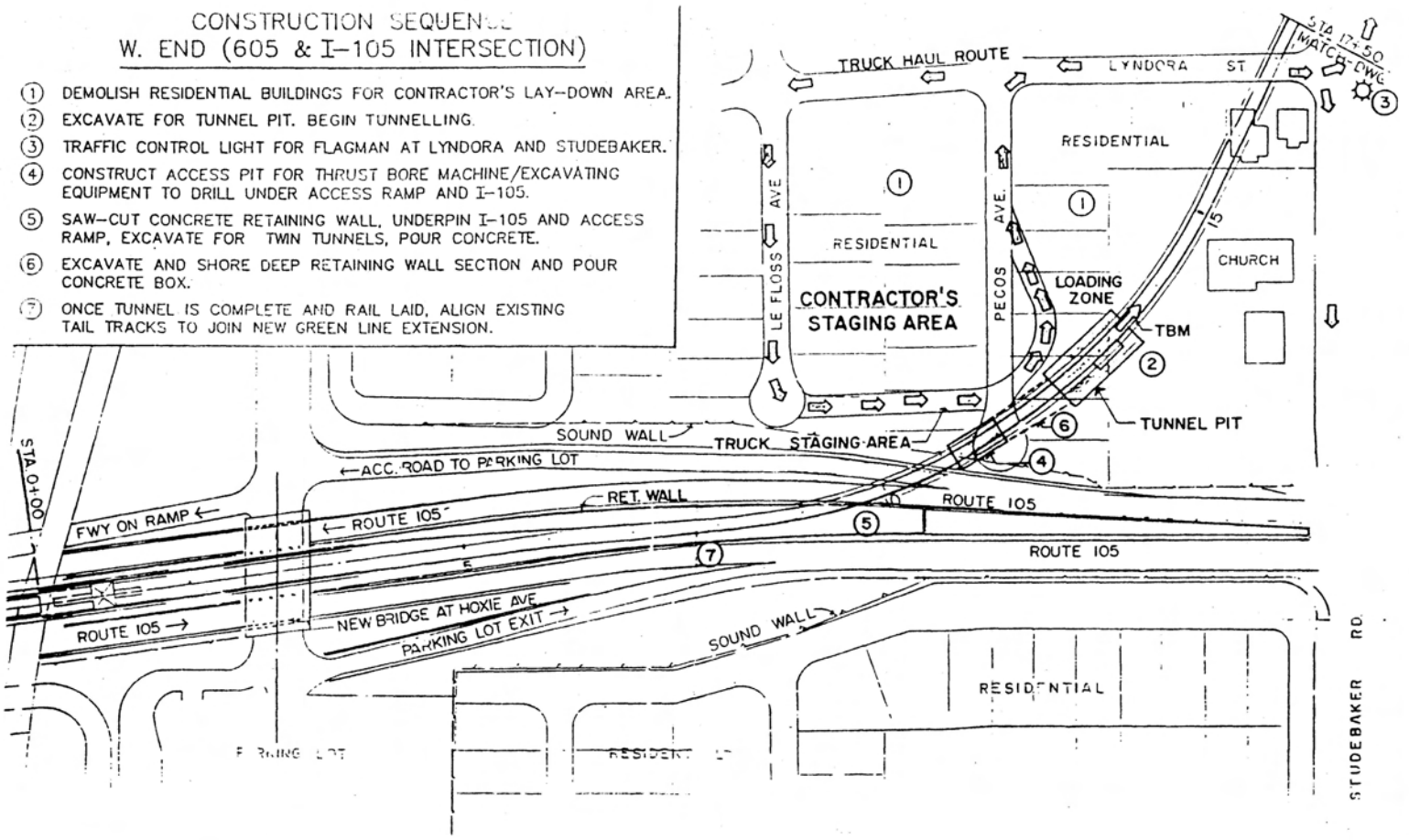
It is estimated that a total of 395,000 cubic yards of material would be hauled from the site, entailing the use of 30 trucks per 8-hour work day for a period of two years. There are many variables affecting this, however, and therefore these figures should be regarded as estimates. The length of haul, tunneling, rate of production and traffic routing are some of the factors involved.

The rate of tunnel production is estimated to be 70 lineal feet per day. Again, this would be affected by soil conditions, soil disposal operations, tunneling methods, etc. However, the number of hauling trucks (30) would balance the lineal footage rate of production.

Tunneling operations could be conducted in such a way that operation of the Green Line would not be compromised. The area under the I-105/ramp can either be done with a thrust bore, underpinned with a pile and bridge method of construction or by means of conventional tunnel lagging.

Noise and dust would be created and therefore mitigation measures would have to be implemented. Portable sound walls to surround the excavation site may be necessary. Also, nighttime construction may not be allowed; hence, the flow of trucks to and from the site during the day would increase congestion on the streets and the freeway.

Construction activities at the alternative east end staging area should begin with the cut/retained section from Imperial Highway into the NTC site. In this way, the Commuter/LRT transfer facility can be constructed without interfering with parking, bus transfers, and patron circulation. Also, this pit could be an excellent site for the tunnel boring machine to exit once a single tube has been bored from the west.



Source: Gannett-fleming

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Figure 2-9: Subway Construction Sequence - West Staging Area

The actual pit/underground exit is simply a retained cut section with variable height walls. Construction, depending on soil conditions, may need to be supported with sheet piling or H-pile and lagging (at the deep end). Since the slope of the tunnel would emerge at only a four percent grade, movement of haul trucks into this area for loading should not be a problem.

The volume of material to be excavated for the retained cut section is approximately 6,000 cubic yards, a relatively small amount. Ten trucks certainly could haul this quantity in less than one month.

After the excavation site is compacted to the proper grade, construction on the bottom slab/invert can begin. Once this slab is formed, reinforced and poured, construction of the retaining walls can begin. Forming, placing rebar and pouring the concrete would be the next step. Once completed, this "U" type section would be ready for rail-laying at any later date. Also, construction of the NTC and related appurtenances can begin. The major underground portion of the site will have been completed. An example construction sequence using the east end staging area is shown in Figure 2-10.

Vent Shaft Construction

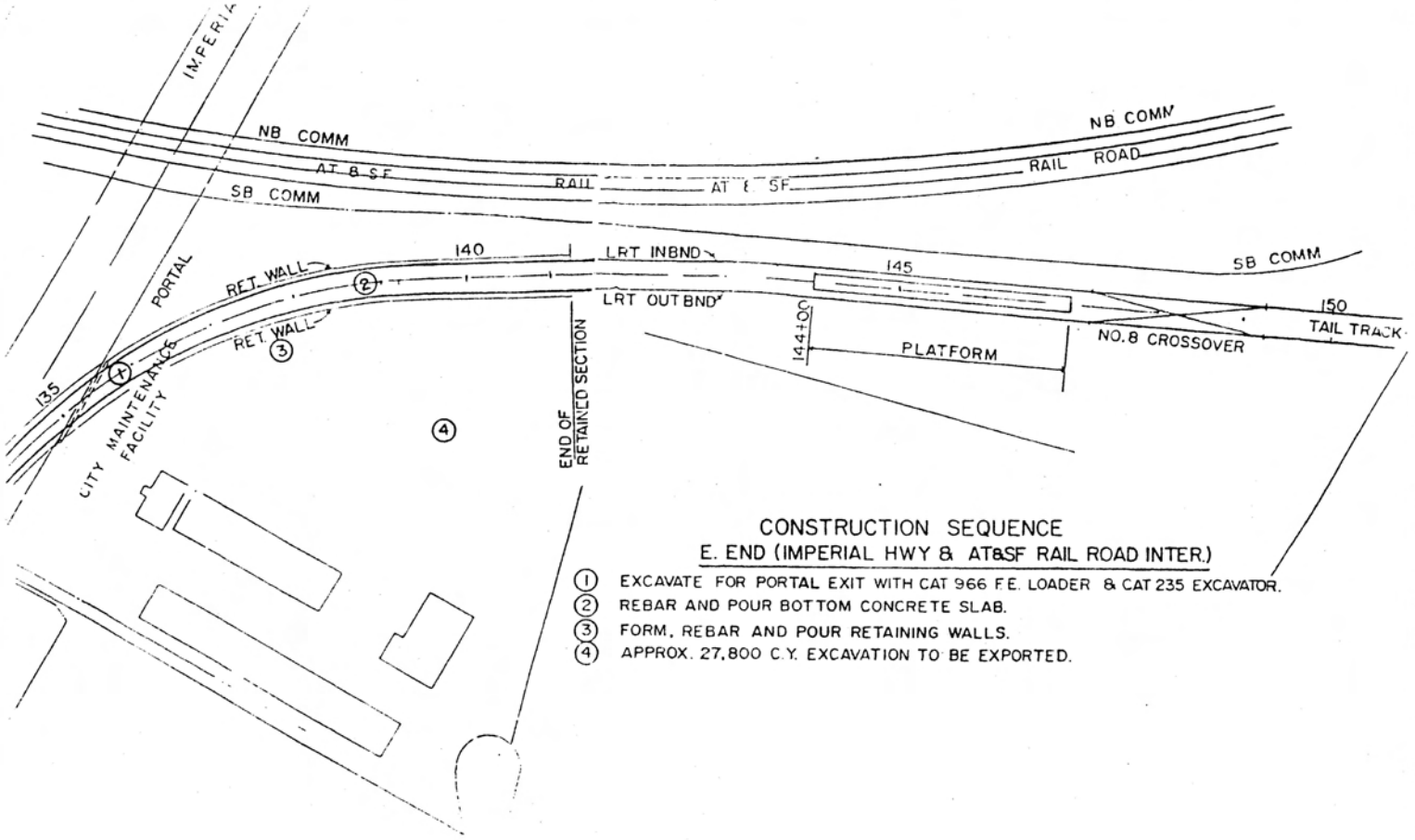
Vent shafts would be built from the subway tunnels in the center of Imperial Highway to the edge of the street. There are two potential methods for accomplishing this: cut and cover or tunneling.

The cut and cover method would affect the street and traffic. In this method a narrow strip of ground would be dug from the tunnels to the edge of the street and covered with decking in order to allow traffic to pass during construction. Utilities would be supported within the cut. After the construction of the vent shafts, the cut in the ground would be filled and the street surface would be paved again.

Tunnels for the vent shaft would be bored or mined if the tunneling method were employed, thereby avoiding the problem of disrupting traffic. The surface above the vent shaft tunnels would only be disturbed where the vertical shafts would be located outside the street and traffic lanes. The application of this method would depend on ascertaining the exact soil conditions during the final engineering phase.

2.4 COST ESTIMATES

Cost estimates have been prepared for both the aerial and subway alignments. Standard cost estimating techniques were used and past cost history of projects under development by the LACTC and the Rail Construction Corporation (RCC) have been reflected. Line item estimates and unit costs were developed from several sources. Included among these were quantity estimates from concept engineering drawings, averages of past bid prices associated with projects previously bid or under construction, and standard reference source values and supplier unit costs. Also included in the estimates are assumptions regarding such items as contingencies, administrative costs, right-of-way costs, project reserve, and so on. Estimates for these items have been developed in consultation with LACTC and RCC staff and are intended to reflect recent knowledge of actual costs.



Source: Myra L. Frank & Associates, 1992.

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Figure 2-10: Subway Construction Sequence - East Staging Area

Taking into account all physical and operating costs, and associated costs of right-of-way acquisition, administrative costs, and so on, the aerial alignment is estimated to cost a total of $215 million, in current dollars. By comparison, the subway alignment cost would range from $240 million (assuming use of the east end staging area) to $241 million (assuming use of the west end staging area). Table 2-1 provides a breakdown of these costs.

2.5 RELATED PROJECTS

The Metro Green Line Easterly Extension is being considered in the context of a number of other transportation projects. The following sections discuss those projects, which include other light rail projects, commuter rail projects, High Occupancy Vehicle projects, and local projects. Most of these projects are part of the recently adopted 30-Year Integrated Transportation Plan for Los Angeles County. Figure 2-11 illustrates the overall transit network envisioned in this plan.

2.5.1 Metro Green Line

The Metro Green Line is a 20-mile light rail project that is located primarily (16.5 miles) within the center of the I-105 freeway. This project, which is scheduled to open in November 1994, extends from the vicinity of Aviation Boulevard and Imperial Highway (south of LAX) to Norwalk, where it would terminate at a station west of Studebaker Road and south of Imperial Highway.

Green Line stations will be located in the freeway and will be accessible by stairs, escalators of elevators. Buses will also serve the 16 stations along the line. Transfers from the Green Line will be possible to the Metro Blue Line, which in turn will permit a transfer to the Metro Red Line, which is also under construction.

Two extensions to the basic Green Line are under consideration. A Southern Branch is being built as part of the project, extending southward to Marine Avenue. An extension of this could continue further south into the South Bay area. The North Coast Branch is currently under study. It would extend from the Green Line northward to the vicinity of Westchester Parkway and Sepulveda Boulevard, and future plans could continue this line further to the Marina Del Rey area.

2.5.2 Other Rail Transit Projects

A number of other rail transit projects are either being built at the present time or are in various stages of planning leading to construction. They are as follows:

Metro Blue Line - Currently in operation, effective 1990. Twenty-two miles in length, connecting downtown Los Angeles with downtown Long Beach.

Metro Red Line (Segment 1) - Under construction, with opening expected in January 1993. 4.4 miles in length, extending from Union Station to Wilshire & Alvarado.

Metro Red Line (Segment 2) - Under construction, with opening expected in 1996. 6.7 miles in length, connecting Wilshire section from Alvarado to Western. A section to Hollywood and Vine would open in 1998.

Table 2-1: Cost Estimates

Item	Description	Aerial Alignment	Subway Alignment[2]	
			East Staging Area	West Staging Area
	Guideway Cost[1]	75.0	94.1	94.1
	Station Cost[3]	5.0	~~1.5~~ 3.0[4]	~~1.5~~ 3.0[4]
	Yards & Shops[5]			
	Vehicle Cost	16.4	16.4	16.4
	System Cost	26.2	26.3	26.3
	Miscellaneous Civil	3.8[6]	4.1[7]	4.1[7]
A	Subtotal Facility & Equipment	126.4	142.4	142.4
B	S/T Test, Insurance. & Agreements[8]	17.7	19.9	19.9
C	Right of Way[9]	2.1	0.1	0.8
D	Contingencies[10]	5.0	5.5	5.5
E	Project Reserve[10]	13.9	15.7	15.7
F	Professional Services[10]	49.7	55.2	55.4
TOTAL PROJECT COST		214.8	$ ~~238.8~~ 240.3	$ ~~239.7~~ 241.2

Notes:

[1] Guideway costs were estimated on the basis of unit cost per level foot of aerial guideway or subway tunnel. Included in the unit costs were such items as device listing, paving, street improvements, vent shafts and tunnel access portals.

[2] Tunnel cost assume a twin tube bore.

[3] Costs for buildings and associated structures at the Norwalk Transportation Center station have not been included. Included items were station platforms and canopies, user conveyances and operating equipment.

[4] Includes cost of pedestrian overpass.

[5] Yards and shops are not proposed as a part of this project.

[6] Includes relocation of 79 inch MWD water line.

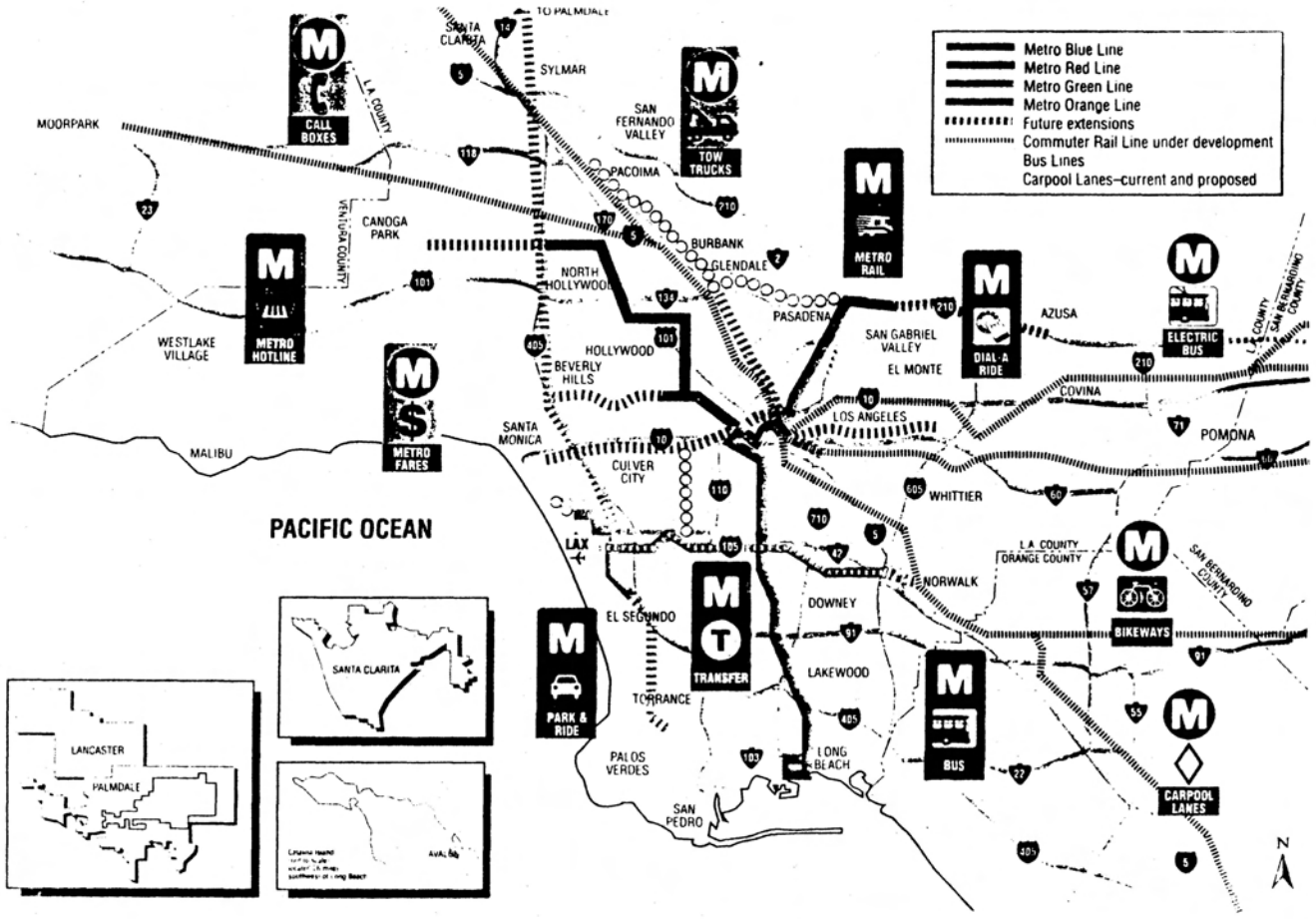
[7] Includes allowance for hazardous materials removal.

[8] Start-up testing insurance and any required agreements.

[9] Calculated at $25 per square foot of area acquired.

[10] Based on standard LACTC/RCC assumptions.

Source: Gannett-Fleming, 1992.



Source: L.A. County Transportation Commission

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Metro Green Line Easterly Extension Environmental Impact Report

Figure 2-11: **LACTC 30-Year Plan Transportation Network**

Metro Red Line (Segment 3) - Construction planned to begin in 1994. 6.3 miles in length, connecting Hollywood/Vine to Lankershim/Chandler, in North Hollywood.

Metro Red Line (Segment 3 Extensions) - One extension (currently in planning) would extend westward from Hollywood/Vine to Pico/San Vicente (2.3 miles). A second extension (also in planning) would extend from Union Station to the vicinity of Atlantic Boulevard and the Santa Ana freeway, in East Los Angeles.

Pasadena-Los Angeles Light Rail Project - Construction planned to begin in fiscal year 1993-94. 13.6 miles in length, connecting downtown Los Angeles (at Union Station) with Sierra Madre Villa, in Pasadena.

Other Light Rail Lines Under Study - Downtown Los Angeles to Glendale, El Segundo to Torrance, Exposition Line, USC/Coliseum Blue Line Branch, North Hollywood to Sylmar.

2.5.3 Metrolink

The Southern California Regional Rail Authority (SCRRA) is currently developing the Metrolink commuter rail network, which would operate conventional locomotives pulling passenger cars on existing railroad rights-of-way. The following projects opened in October 1992:

Pomona to Los Angeles - A 32-mile line between Pomona and Union Station, using the former Southern Pacific track parallel to the I-10 freeway.

Moorpark to Los Angeles - A 45-mile line between Moorpark in eastern Ventura county and Union Station, using the route of the Southern Pacific Coast Main Line. Scheduled to open in October 1992.

Santa Clarita Valley to Los Angeles - A 35-mile line from the City of Santa Clarita to Union Station, using the Southern Pacific Valley Line, which parallels San Fernando Road. Scheduled to open in October 1992.

The following projects are under development:

San Bernardino to Pomona - A 24-mile extension completing the San Bernardino Line, will connect San Bernardino to Pomona. Scheduled to open in 1993.

Riverside to Los Angeles - A 58-mile line running from Riverside to Union Station, paralleling the Pomona freeway, using the Union Pacific line. Scheduled to open in 1993.

Orange County to Los Angeles - A 60-mile line from San Juan Capistrano to Union Station, using the tracks currently used by the Amtrak San Diegan. Scheduled to open in 1993.

Other Commuter Rail Lines Under Study - Riverside County to Los Angeles, San Bernardino through Riverside to Irvine, Hemet to Riverside, Redlands to San Bernardino, San Fernando Valley Rail Project.

2.5.4 Orange County Urban Rail Project

In October of 1991, the Orange County Transportation Authority (OCTA) completed a two-year countywide rail study. the Urban Rail Master Plan developed by the study calls for an 87-mile network serving 17 cities. In January of 1992, the OCTA commissioned a Project Definition

Study for the 47-mile core rail component/Initial Urban Rail Network. This study is still under progress.

For connecting the Orange County Urban Rail to the Metro Green Line, the proposed Green Line terminus at the Norwalk Transportation Center is the preferred location. There are two routes currently under study. One is the AT&SF right-of-way and the other is I-5/Stanstead Avenue to bring the Orange County Urban Rail to the Norwalk Transportation Center.

2.5.5 High Occupancy Vehicle Projects

Caltrans is developing a program of High Occupancy Vehicle (HOV) facilities throughout Southern California, but with primary focus on the highly urbanized areas of Los Angeles and Orange counties. The I-105 will contain HOV lanes that will terminate at I-605. HOV lanes are also planned for SR-91 and I-5. the HOV facility on I-5 would connect SR-91 with I-605. It would be a guideway structure located above the center of I-5, which in the vicinity of the Metro Green Line Easterly Extension is above grade in a structure, to clear Imperial Highway.

2.5.6 Norwalk Transportation Center

The City of Norwalk has proposed the development of a Transportation Center, to be located on a parcel of land currently used by the city for maintenance purposes. The parcel is located east of Bloomfield Avenue and immediately south of Imperial Highway. The site would be used as the focal point of local transit services operating in the City of Norwalk, and it would afford connections with regional commuter rail service arriving from Orange County, and the Metro Green Line Easterly Extension, which would also have a station at this location. The site of the Norwalk Transportation Center could also be a focal point for future commercial development. No development projects have as yet been identified, however.