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ST. LOUIS METRO LINK PROJECT

FINAL ENVIRONMENTAL IMPACT STATEMENT

SEPTEMBER 1987

U.S. DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION

EAST-WEST GATEWAY COORDINATING COUNCIL

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FILE COPY

ST. LOUIS METRO LINK PROJECT
St. Louis City and County, Missouri
East St. Louis and St. Clair County, Illinois

FINAL ENVIRONMENTAL IMPACT STATEMENT

Submitted Pursuant to the National Environmental Policy Act
42 U.S.C. 4332(2) (c)

by the

U.S. DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION

and

EAST-WEST GATEWAY COORDINATING COUNCIL

9-23-87
Date of Approval

Lee Waddleton
for UMTA Lee Waddleton
Regional Administrator

9-21-87
Date of Approval

for EWGCC Jerry F. Costello
Board Chairman

U.S. DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION

EAST-WEST GATEWAY COORDINATING COUNCIL

FINAL ENVIRONMENTAL IMPACT STATEMENT

Pursuant to Section 102(2)(c), of the National Environmental Policy Act of 1969; Sections 3(d) and 14 of the Urban Mass Transportation Act of 1964, as amended; Section 106 of the National Historic Preservation Act of 1966; and Section 4(f) of the Department of Transportation Act of 1966.

RESPONSIBLE AGENCY

Lead Agency: Urban Mass Transportation Administration
Cooperating Agency: East-West Gateway Coordinating Council

TITLE OF PROPOSED ACTION

St. Louis Light Rail Transit Project ("Metro Link Project")

ABSTRACT

The primary focus of this Final EIS is a major transit capital investment in the St. Louis central/airport corridor which connects Metro East, downtown St. Louis, and the Airport/McDonnell Douglas complex. Five primary alternatives were considered to improve transit in the corridor: 1) no-action; 2) transportation systems management (TSM); 3) busway; 4) light rail transit (LRT); and 5) light rail transit with shuttle bus service (to Clayton). The LRT/bus shuttle, known locally as the Metro Link project, is the locally preferred alternative, which has been refined in the preliminary engineering study, including the consideration of three intermediate length options, and compared with updated no-action and TSM alternatives. The following effects of the preferred alternative are considered: transportation; economic development; displacement; neighborhood; visual and aesthetic; air quality; noise and vibration; ecosystem; water; energy; historic, archaeological, and cultural; parkland; and financial effects.

This Final EIS includes revisions to the Draft EIS; a summary of the comments and recommendations received on the Draft EIS; a list of persons, organizations, and public agencies commenting on the Draft EIS; and responses to substantive comments raised in the review and consultation process. Changes in the text of the Draft EIS are indicated in this Final EIS by a solid vertical line in the margin.

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The Final EIS was made available on OCT 9 1987.

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SUMMARY

S.1 PROJECT PURPOSE

The automobile has become the dominant mode of travel in the St. Louis area while the region's public transportation system has declined. This results in several problems in the St. Louis area:

- Slow transit service in the corridor;
- Diminishing transit accessibility to major activity centers;
- Reduced transit revenues;
- A greater demand for low-cost parking at major employment centers;
- Reduced reliability of transit performance resulting from traffic congestion; and
- Inability to attract transit patrons of choice.

The decline in the level of transit service in the region has reduced the mobility of the people who use it, including both transit dependents and those who prefer to use transit. Further, the lack of a reasonable alternative to the automobile makes the region vulnerable to energy shortages and inhibits the area's ability to meet air quality goals. The region's elected officials, therefore, are seeking to develop an effective public transit service to meet mobility, energy, environmental, and financial goals. These goals for improved transit are stated below along with selected (parenthetical) examples of the kinds of objectives which must be achieved in order to meet the goals:

1. Improve transportation service to increase mobility (increase speed, comfort, and reliability of public transportation and increase accessibility to activity centers and the region as a whole);

2. Provide public transportation service which is financially attainable (maximize operating efficiency and revenue, and minimize operating costs and public subsidy);

3. Stimulate economic expansion and job creation (enhance opportunities for public/private development partnerships and increase local government tax receipts); and

4. Enhance the physical and social environment (improve air quality, lower noise levels, and conserve energy plus avoid displacing homes and businesses).

S.2 ALTERNATIVES CONSIDERED

Table S-I lists the alternatives along with their respective numeric designation which were studied during the Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS) and those which were studied during the Preliminary Engineering/Final Environmental Impact Statement (PE/FEIS) phase. Five primary alternatives were examined in the AA/DEIS: 1) No-Action; 2) Transportation Systems Management (TSM); 3) Busway; 4) Light Rail Transit (LRT) from East St. Louis to Clayton and Lambert Airport; and 5) Light Rail from East St. Louis to the airport with connecting shuttle bus service to Clayton. The No-Action, TSM, and LRT/Bus shuttle alternatives, the latter of which is the locally-preferred alternative, were updated and refined during preliminary engineering (PE). The updated No-Action and TSM alternatives are described below, along with brief descriptions of the two unchanged alternatives, which are not discussed further in this document. The locally-preferred alternative is fully described in the following section; it is referred to as Alternative 3 throughout this FEIS. Also, three intermediate length options were considered in the FEIS: building LRT from East St. Louis westward to the Central West End station (3a); to the Delmar station (3b); or to the UMSL-South station (3c).

Table S-II gives the year 2000 transit-system level of service for the No-Action, TSM, and LRT/Bus shuttle alternatives.

The No-Action alternative, Alternative 1, is defined as maintaining the Bi-State bus routing, headways, and fleet in service on December 2, 1985 and programmed north Missouri corridor improvements without change through the design year 2000. This definition reflects the first changes made in the Bi-State Development Agency's Transit Action Plan (TAP), which is a program to completely reorganize Bi-State bus service to improve the responsiveness of transit service to the needs of Missouri and Illinois residents and to address changing population/employment patterns and serve major new activity centers. This

TABLE S-I
TRANSIT ALTERNATIVES STUDIED IN THE AA/DEIS AND PE/FEIS

Description	Identifying Number Used in the AA/DEIS	PE/FEIS
No-Action	1	1
TSM	2	2
Busway	3	-*
LRT with Alternative LRT Connections to Clayton	4A-4F	-*
LRT/Bus Shuttle	5	3**
LRT (Central West End)	-***	3a
LRT (Delmar)	-***	3b
LRT (UMSL-South)	-***	3c

* These alternatives were not updated or studied further during the Preliminary Engineering phase.

** This is the locally-preferred alternative.

*** These alternatives were developed after the Alternatives Analysis phase and circulation of the Draft Environmental Impact Statement.

TABLE S-II
YEAR 2000 TRANSIT SYSTEM LEVEL OF SERVICE BY ALTERNATIVE

Mode	1 No-Action*	2 TSM	3 LRT/ Bus Shuttle
Bus			
Vehicle Miles (in thousands)	26,283	26,801	24,588
Seat Miles (in millions)	1,314	1,340	1,230
Fleet Size (peak-hour vehicles)	616	628	566
LRT			
Vehicle Miles (in thousands)	--	--	1,478
Seat Miles (in millions)	--	--	189
Fleet Size (total vehicles)	--	--	31
TOTAL VEHICLE MILES	26,283	26,801	26,004
TOTAL SEAT MILES (in millions)	1,314	1,340	1,411
Percentage Increase in Vehicle Miles Over No-Action	--	2.0%	-0.8%
(Over TSM)	(-0.2%)	--	(-2.7%)
Percentage Increase in Seat Miles Over No-Action	--	2.0%	7.9%
(Over TSM)	(-2.0%)	--	(5.8%)

* The No-Action alternative assumes maintenance of the Bi-State service provided in December 1985 and programmed north Missouri corridor improvements without change through the design year 2000.

existing level of service involves 616 buses on 134 routes during the a.m. peak period, 53 of which provide express, rapid, or park-n-ride service (to seven Missouri and 14 Illinois park-n-ride lots) and 81 of which provide local service.

The TSM alternative, Alternative 2, provides for the completion of Bi-State's TAP program as well as service-level expansion exceeding the TAP program's financial constraints in order to accommodate projected demand which cannot be served with the current bus service levels that are held constant in the No-Action alternative. (See Figure S-1.) Upgrading existing (No-Action) park-n-ride lots and adding more park-n-ride lots, freeway bus ramps, and other bus stop improvements will complement the TSM bus service reorganization and expansion. The freeway bus ramps include a ramp at: a) northbound I-55/I-44 to Gravois/Russell; b) the I-70 reversible lanes with eastbound-on and westbound-off ramps to/from Kingshighway; and c) the I-70 reversible lanes to North Broadway. Miscellaneous bus stop improvements include providing: a) a bus turnout and stop at the I-55 interchange with 4500 South Broadway; a bus turnout, stairs, and a stop at: b) Lindbergh and Page and c) Lindbergh and Olive; and d) a pedestrian overpass at Lindbergh and Corporate Square.

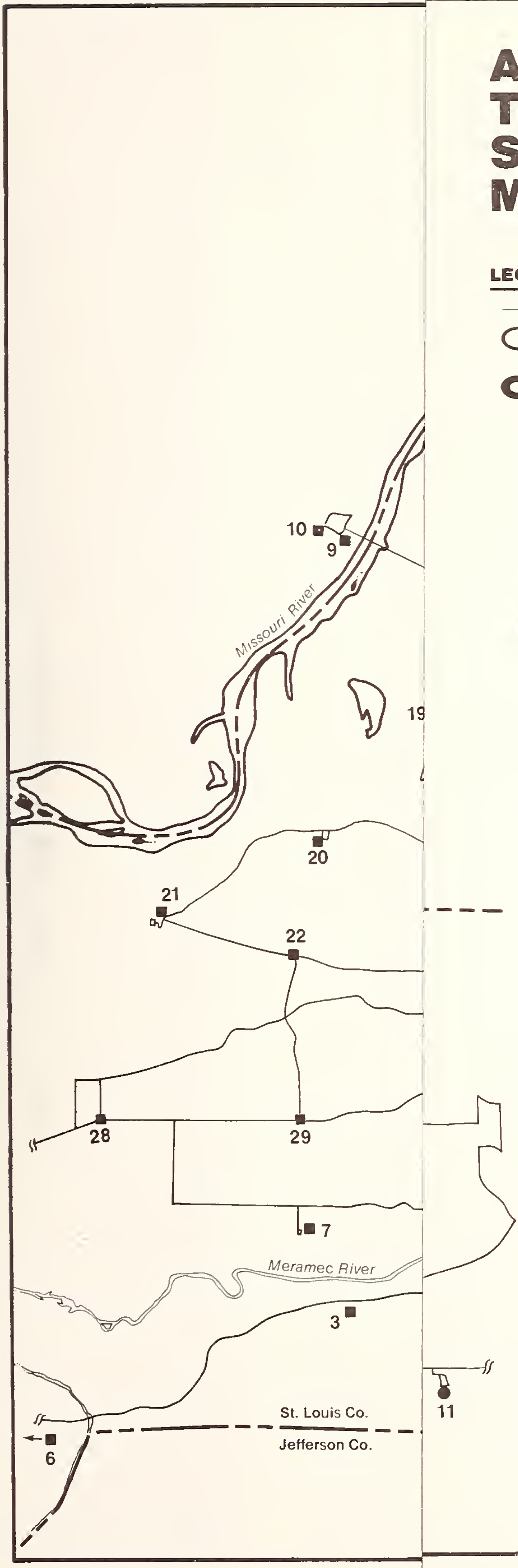
The Busway alternative, AA/DEIS Alternative 3, incorporates TSM improvements with special bus lanes to speed the flow of buses operating in the priority corridor during peak periods. The busway concept involves channeling multiple bus routes into a single high-speed corridor connecting outlying areas to the core area, with limited intermediate stops.

The LRT alternative, AA/DEIS Alternative 4, incorporates some TSM improvements with a light rail route connecting major activity centers in the region. LRT stations will be provided at selected major cross streets and at multiple points in core areas; several park-n-ride lots will be developed in outlying areas. Bus routes will be modified as appropriate to connect with LRT. Some track segments will be developed across or in existing street rights-of-way in which case trackage will be constructed flush with the roadway pavement to permit mixed (LRT and auto) traffic operations. Six alternative LRT Clayton connections (4A-4F) involve development at grade, on structure (where right-of-way is constricted), and in tunnel (where traffic congestion may otherwise be a problem). Options along I-70 will avoid mixed-traffic operating conditions along Natural Bridge Road.

S.3 PREFERRED ALTERNATIVE

The LRT/Bus shuttle alternative is preferred locally. This alternative, referred to as Alternative 3 in this FEIS, involves 18 miles of light rail alignment extending from Metro East and downtown St. Louis to Lambert-St. Louis International Airport and the McDonnell Douglas industrial area. The shuttle bus component of the alternative will connect the St. Louis Galleria plus the County Government Center in Clayton and points in between with the LRT alignment. The alternative incorporates some TSM bus service improvements, and involves a number of bus service modifications designed to integrate the proposed LRT alignment with the existing bus network. Figure S-2 shows the locally preferred alternative.

The LRT alignment will use the existing Eads Bridge rail deck and the Washington Avenue/Eighth Street tunnel to be acquired from the Terminal Railroad Assocation of St. Louis (TRRA) through downtown St. Louis, the northernmost edge of TRRA right-of-way from downtown to Grand Boulevard, and the Norfolk & Western (N&W) trackage from Grand to a point north of Natural Bridge Road. Railroad freight operations will be accommodated on separate parallel tracks along part of the LRT alignment and potentially on a time-sharing basis over part of the LRT alignment. New right-of-way will be developed in downtown East St. Louis, in the vicinity of Kiel Auditorium in downtown St. Louis where the alignment will tie in with the existing baggage tunnel beneath the train shed at St. Louis Union Station, and from the University of Missouri at St. Louis (UMSL) along I-70 to the airport. An unused railroad facility between Jefferson and Twenty-First Street immediately southwest of Union Station will be adapted to become the LRT maintenance and storage facility.



Alternative 2 - Transportation Systems Management (TSM)

LEGEND

—— Bus Routes

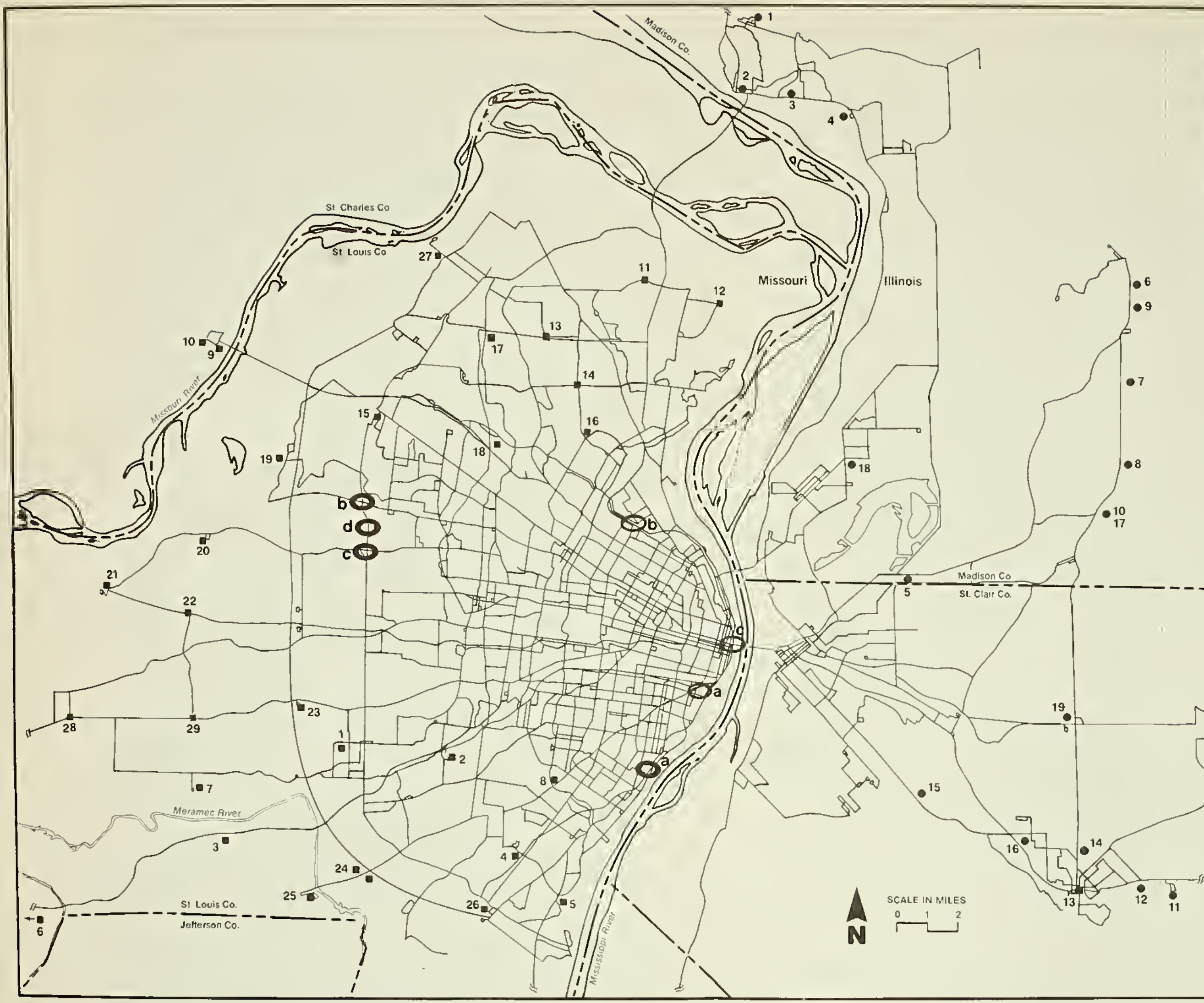
○ Freeway Bus Ramps
(Letters referenced in text)

◉ Other TSM Improvements
(Letters referenced in text)

	Approximate Number of Spaces
■ **Missouri No-Action Parking Lots**	
1. Geyer/Adams	50
2. Memorial Field	40
3. I-44/Route 141 (MHTD)	100
4. I-55/Reavis Barracks (MHTD)	123
5. Sylvan Springs Park	20
6. Eureka CBD	40
7. Big Bend/Hanna	100
	473
■ **Missouri TSM Parking Lots**	
8. Gravois/Hampton	40
9. I-70/Fifth Street (MHTD)	105
10. Boonslick/I-70 Frontage (MHTD)	138
11. Parker Road	300
12. Larimore/Trampe	100
13. Dunn/Waterford	40
14. Chambers/W Florissant	40
15. Northwest Plaza Shopping Center	40
16. Northland Shopping Center	40
17. North Hanley/I-270 (MHTD)	113
18. I-170/Natural Bridge	150
19. Dorsett/McKelvey	75
20. Four Seasons Shopping Center	40
21. Chesterfield Mall	80
22. US40/Woods Mill	300
23. West County Shopping Center	40
24. I-270/Gravois (MHTD)	250
25. Fenton CBD	100
26. South County Shopping Center	40
27. Koch Park	40
28. Manchester/Clarkson	40
29. Manchester/Woods Mill	40
	2,151
● **Illinois No-Action Parking Lots**	
1. IL 111/Alby St., No. Alton (Alton Sq.)	20
2. Alton CBD	58
3. Broadway	10
4. IL 3/Hillbur, E. Alton (E. Gate Plaza)	25
5. IL 111/Wash. St. (Venture)	25
6. IL 159/So. of Edwardsville (K-Mart)	75
7. IL 159/Old Troy Rd (Cottonwood Mall)	25
8. P&R at Maryville	25
9. IL 159/Edwardsville (Bank of Edwardsville)	30
10. IL 159/Collinsville (Orchards S.C.)	15
11. Belleville Area College	25
12. Carlyle Plaza	40
13. Downtown Belleville	15
14. Swansea P&R Lot	10
	398
● **Illinois TSM Parking Lots**	
15. Cahokia Downs Racetrack	100
16. N Belt at West Main	100
17. U.S. 40 at Route 159	50
18. Nameoki Village	100
19. Route 159 at I-64	100
	450

Figure S-1

Alternative 2 - Transportation Systems Management (TSM)

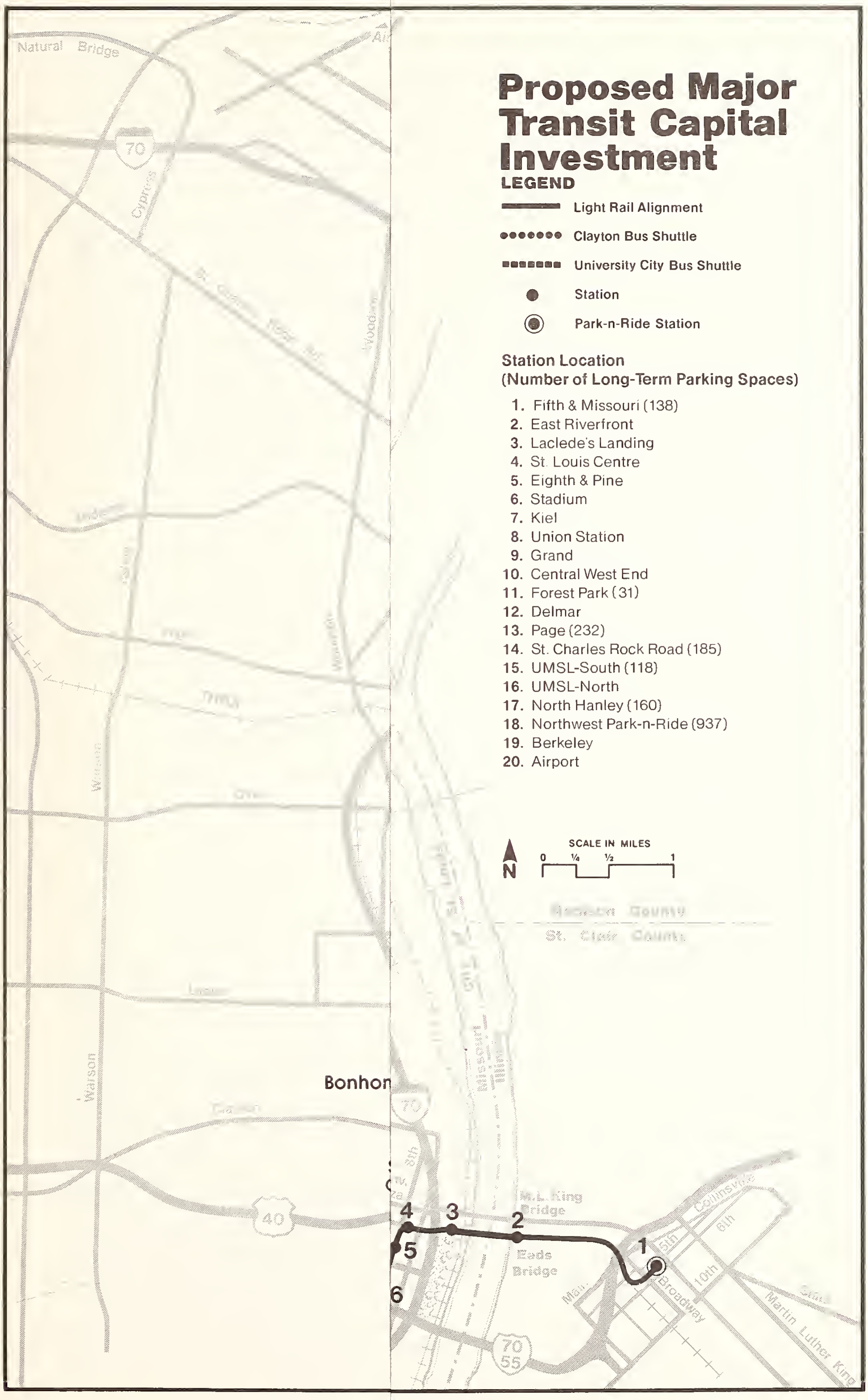


LEGEND

- Bus Routes
- ○ **Freeway Bus Ramps** *(Letters referenced in text)*
- ● **Other TSM Improvements** *(Letters referenced in text)*

■ Missouri No-Action Parking Lots		Approximate Number of Spaces
1	Geyer/Adams	50
2.	Memorial Field	40
3	I-44/Route 141 (MHTD)	100
4	I-55/Reavis Barracks (MHTD)	123
5	Sylvan Springs Park	20
6	Eureka CBD	40
7	Big Bend/Hanna	100
		473
■ Missouri TSM Parking Lots		
8	Gravois/Hampton	40
9	I-70/Fifth Street (MHTD)	105
10	Boonslick/I-70 Frontage (MHTD)	138
11.	Parker Road	300
12.	Larimore/Trampe	100
13.	Dunn/Waterford	40
14	Chambers/W Florissant	40
15.	Northwest Plaza Shopping Center	40
16	Northland Shopping Center	40
17	North Hanley/I-270 (MHTD)	113
18.	I-170/Natural Bridge	150
19.	Dorsett/McKelvey	75
20.	Four Seasons Shopping Center	40
21.	Chesterfield Mall	80
22.	US40/Woods Mill	300
23.	West County Shopping Center	40
24	I-270/Gravois (MHTD)	250
25.	Fenton CBD	100
26.	South County Shopping Center	40
27.	Koch Park	40
28	Manchester/Clarkson	40
29	Manchester/Woods Mill	40
		2,151
● Illinois No-Action Parking Lots		
1.	IL 111/Alby St No. Alton (Alton Sq)	20
2	Alton CBD	58
3.	Broadway	10
4	IL 3/Hillbur, E Alton (E Gate Plaza)	25
5.	IL 111/Wash St (Venture)	25
6.	IL 159/So of Edwardsville (K-Mart)	75
7.	IL 159/Old Troy Rd (Cottonwood Mall)	25
8.	P&R at Maryville	25
9.	IL 159/Edwardsville (Bank of Edwardsville)	30
10.	IL 159/Collinsville (Orchards S C)	15
11	Belleville Area College	25
12.	Carlyle Plaza	40
13.	Downtown Belleville	15
14.	Swansea P&R Lot	10
		398
● Illinois TSM Parking Lots		
15.	Cahokia Downs Racetrack	100
16	N Belt at West Main	100
17	U S 40 at Route 159	50
18	Nameoki Village	100
19	Route 159 at I-64	100
		450

Figure S-1



Proposed Major Transit Capital Investment

LEGEND

- — Light Rail Alignment
- ●●●●●●● Clayton Bus Shuttle
- ■■■■■■■ University City Bus Shuttle
- ● Station
- ◉ Park-n-Ride Station

Station Location
(Number of Long-Term Parking Spaces)

1. Fifth & Missouri (138)
2. East Riverfront
3. Laclede's Landing
4. St. Louis Centre
5. Eighth & Pine
6. Stadium
7. Kiel
8. Union Station
9. Grand
10. Central West End
11. Forest Park (31)
12. Delmar
13. Page (232)
14. St. Charles Rock Road (185)
15. UMSL-South (118)
16. UMSL-North
17. North Hanley (160)
18. Northwest Park-n-Ride (937)
19. Berkeley
20. Airport

Figure S-2

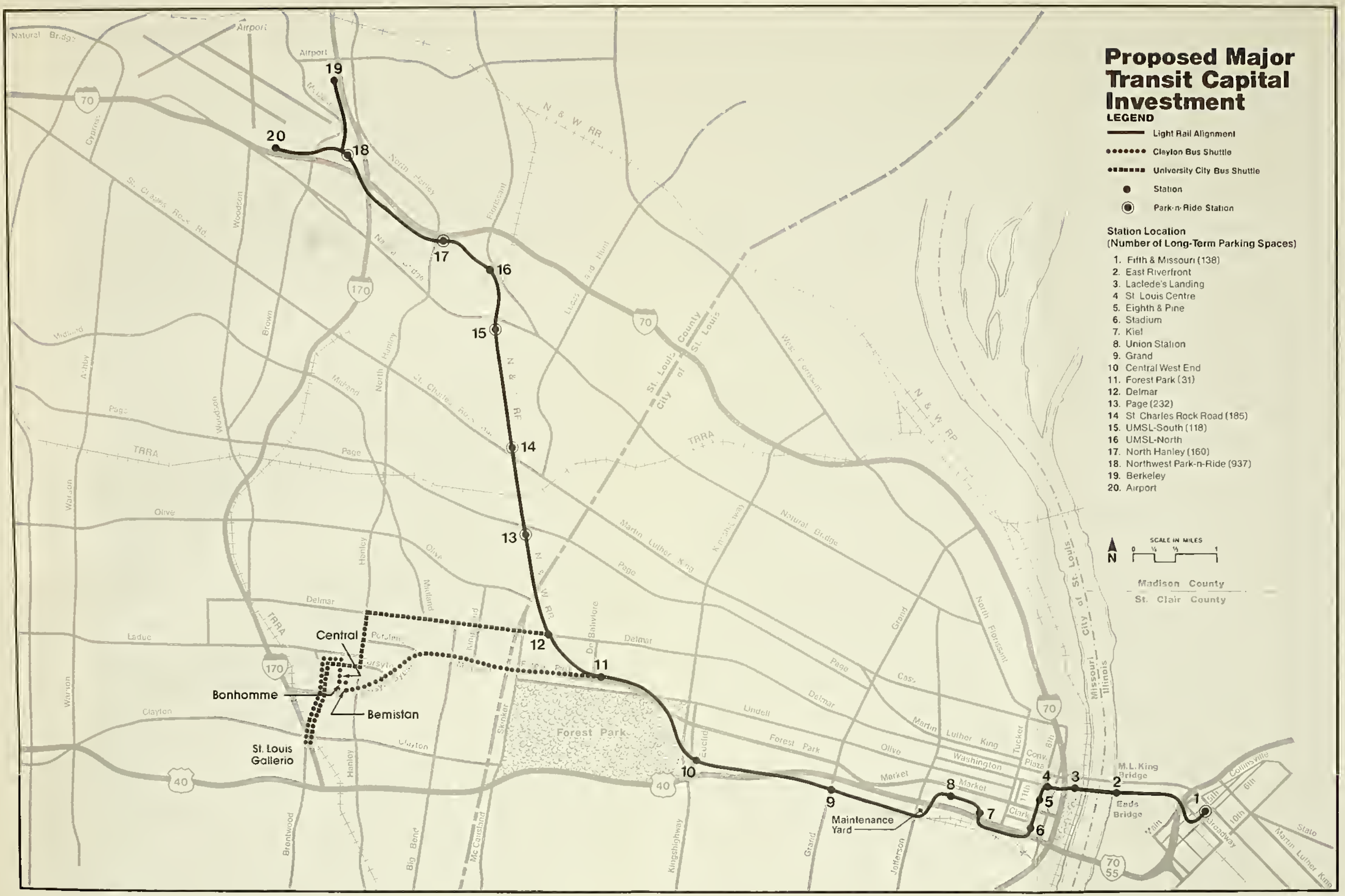

Proposed Major Transit Capital Investment
LEGEND
Light Rail Alignment
Clayton Bus Shuttle
University City Bus Shuttle
Station
Park-n-Ride Station
Station Location
(Number of Long-Term Parking Spaces)
1. Fifth & Missouri (138)
2. East Riverfront
3. Laclede's Landing
4. St. Louis Centre
5. Eighth & Pine
6. Stadium
7. Kiel
8. Union Station
9. Grand
10. Central West End
11. Forest Park (31)
12. Delmar
13. Page (232)
14. St. Charles Rock Road (185)
15. UMSL-South (118)
16. UMSL-North
17. North Hanley (160)
18. Northwest Park-n-Ride (937)
19. Berkeley
20. Airport
N
SCALE IN MILES
0
¼
½
1
Madison County
St. Clair County
Central
Bonhomme
Bemiston
St. Louis Galleria
Maintenance Yard
Forest Park
M.L. King Bridge
Eads Bridge
St. Louis County
City of St. Louis
Missouri
Illinois
N & W RR
TRRA
Airport
Natural Bridge
Cypress
St. Charles Rock Rd.
Woodson
North Hanley
Florissant
Lucas and Hunt
Brown
North
Midland
Ashby
Page
Watson
Olive
Delmar
Ladue
Clayton
Hanley
Brentwood
Big Bend
McCausland
Skinker
Kingshighway
Grand
Jefferson
Tucker
Martin Luther King
Natural Bridge
North Florissant
West Florissant
Union
Forest Park
Olive
Washington
Market
Clark
Conv. Plaza
11th
8th
Main
Broadway
5th
6th
10th
Collinsville
State
De Baliviere
Euclid
Cass
70
170
40
70 55

Figure S-2

The LRT alignment will include a total of 20 stations, six of which will initially include 1,801 park-n-ride parking spaces, as shown in Figure S-2. The station platforms will be high level permitting ready access for elderly and handicapped patrons. Both center and side platforms will be used depending on the station location. A variety of compatible materials and finishes will be specified in the station design, and landscaping will be incorporated where appropriate. Closed-circuit television, lighting, public emergency telephones plus security personnel staffing will be used to enhance safety for system users. A proof-of-payment barrier-free fare collection system will be used. An initial fleet of 31 articulated light rail vehicles will be required to serve the projected year 2000 patronage.

The Bi-State Development Agency, the region's bus system operator, will operate the LRT system. A cost savings will accrue with Bi-State operating both the LRT and bus functions.

S.4 COSTS AND SIGNIFICANT TRANSPORTATION AND ENVIRONMENTAL IMPACTS

Table S-III provides a summary comparison of costs and significant impacts for each of the alternatives studied during PE. These cost estimates include right-of-way, vehicle purchases, contingency (at 10 percent for construction and five percent for vehicles), engineering design and construction management (at 16 percent), and inflation (at four percent annually). The TSM alternative will cost $38.3 million in escalated dollars, and the LRT/Bus shuttle alternative will cost $258 million plus the value of real property assets ($83.8 million) in escalated dollars, based on a four-year construction schedule with revenue service by late 1991. If the construction schedule is not met, revenue service may be delayed and costs could increase at a rate of approximately four percent per year. The intermediate-length LRT alternatives will cost less in proportion to their shorter length. The operating costs for the TSM alternative is estimated to be about five percent more than the cost of the No-Action alternative, and the LRT/Bus shuttle alternative operating costs will be about seven percent more than those of the No-Action alternative.

The guideway facilities will service a year 2000 daily ridership ranging from 37,127 for the LRT/Bus shuttle alternative, Alternative 3, to 16,256 for LRT Alternative 3a. The TSM alternative will

TABLE S-III
SUMMARY OF COSTS AND SIGNIFICANT IMPACTS

Impact Measures	1 No-Action	2 TSM	3 LRT/Bus Shuttle	3a LRT/Bus (CWE)	3b LRT/Bus (Delmar)	3c LRT/Bus (UMSL-South)
Project Cost (in millions of 1984/escalated dollars)*	0	$ 29.7/ 38.3	$262.75/ 341.7	$154.3/ 200.6	$169.8/ 220.9	$190.9/ 248.3
Annual Operating Cost (in millions of 1984 dollars)	$ 86.8	$ 91.2	$ 93.0	$ 94.6	$ 94.7	$ 94.6
Deficit Per Trip (in 1984 dollars)	$ 1.41	$ 1.43	$ 1.33	$ 1.48	$ 1.45	$ 1.41
Daily New Linked Trips**	0	6,181	14,706	6,314	7,608	10,391
Daily Guideway Ridership	0	0	37,127	16,256	19,956	27,982
Average Systemwide Transit Travel Time for Year 2000 Riders (in minutes)	44.3	43.3	40.1	41.9	41.5	40.8
Reduced Daily Parking Requirements at Major Activity Centers***	0	2,818	6,685	2,870	3,458	4,723
Development Potential Near Station Sites (in millions of 1984 dollars)	0	0	$ 488.2	$364.5	$393.4	$440.2
Increased Operating Deficit (in millions of 1984 dollars)	0	$ 3.4	$ 2.0	$ 5.4	$ 5.0	$ 4.4
Equivalent Annual Cost Per New Rider (Federal/Total Index in 1984 dollars)	0	n.a.	$ 6.09/ 8.95	$288.29/ 373.84	$ 27.90/ 36.99	$ 10.21/ 13.98
Equivalent Annual Cost Per Hour of User Benefit (Federal/Total Index in 1984 dollars)	0	n.a.	$ 2.96/ 4.01 to $ 5.44/ 7.37	n.a.	n.a.	n.a.

* The project costs of the LRT/Bus shuttle alternatives include the minimally required value of physical assets to be donated and used as the local share. These donated asset values in 1984 dollars are: $64.4 million for Alt. 3; $34.7 million for Alt. 3a; $38.8 million for Alt. 3b; and $44.7 million for Alt. 3c.

** Daily New Linked Trips are the additional daily trips each alternative, if implemented, will generate by comparison with the no-action alternative. A linked trip is a complete trip from origin to ultimate destination, including walking to and from one's car and/or transit vehicle, plus transfers.

*** Reduced Daily Parking Requirements are computed as one-half the daily new linked trips divided by an average auto occupancy of 1.1 persons per car.

provide transit travel-time savings of about one minute over the No-Action alternative. The LRT/Bus shuttle alternative, Alternative 3 will yield an average systemwide savings of about three minutes per transit trip compared with the TSM alternative. The total LRT/Bus Alternative 3 travel-time savings have an estimated annual value of $10.5 million for year 2000 riders. The action alternatives are expected to reduce the demand for parking spaces at corridor activity centers between about 2,800 (TSM) and 6,700 (LRT/Bus shuttle) spaces daily. The action alternatives will not significantly affect highway traffic volumes in 2000 and will cause minimal interference with cross traffic.

The table also provides a measure for each alternative of the combined capital and operating cost required to attract each new transit rider. The lower the index, the more cost-effective is the alternative. The indices are computed both for each alternative's federal involvement and for the alternative's total (federal and local) participation. Similar indices are provided for the equivalent cost per hour of user benefit. Alternative 3 -- LRT/bus shuttle is the most cost effective of the alternatives.

Implementing any of the alternative transit improvements will potentially enhance land development opportunities and continued development of downtown St. Louis. The most significant difference among the alternatives is that the LRT options also provide a number of station sites which are attractive for development. More of this development is likely to be refocused rather than net growth. The development is expected to occur as a result of improving accessibility, concentrating passenger volumes, reducing site-specific parking requirements, and demonstrating a long-term public commitment at station locations. Specifically, these LRT development factors are expected to enhance developments like St. Louis Union Station and Laclede's Landing which will be more closely tied with the core area of downtown and with each other.

By creating additional people traffic, LRT could strengthen retail sales in the corridor. It will increase office absorption within the corridor by enhancing its competitiveness and permitting economic benefits to accrue sooner to both the public and private sector. It will enhance the tourism/convention package by connecting the airport, numerous hotels, the convention center, and multiple entertainment destinations. The East-West Gateway Coordinating Council estimates that a total of $488.2 million in capital investment entailing 6,758 construction jobs could occur at sites near LRT stations through the year 2000. (These numbers differ from AA/DEIS numbers presented for the preferred alternative because of increased development activity.)

Building the LRT system will displace nine single-family dwelling units, three small businesses, and four parking lot operations; the residential displacements occur as a result of alignment changes made following completion of the AA/DEIS and public hearing. Adequate relocation options and assistance are available. While any displacements could become controversial, the project's residential displacements are not expected to be controversial, because they are caused by an alignment shift made in response to citizen comments raised during the AA/DEIS project stage. Thus, the locally-preferred alignment is now in the I-70 corridor from which some residents have expressed interest in relocating because of highway and airport approach zone noise. Building LRT is not expected to adversely affect any neighborhoods. Multiple mitigation measures will be pursued to assure that the LRT project fits visually with its surroundings.

Air and noise impacts are expected to be relatively minor. LRT-generated noise levels will fall below appropriate guidelines in most locations. In those few locations where LRT will generate noise greater than the guidelines, the ambient conditions resulting from I-70 and airport operations are so high that LRT's additive effect will be negligible.

Effects on ecosystems, water, and energy consumption are expected to be minor.

No historic, archaeological, or cultural properties will be displaced by the LRT project. Constructing LRT will affect eight historic properties including two national historic landmarks, Eads Bridge and Union Station; the effects are expected to be largely positive. The project will have no adverse effect on six of the eight historic properties, and a Memorandum of Agreement has been processed to document satisfactory mitigation of the project's effects on the two national historic landmarks. Changes made in the Laclede's Landing LRT station entrance/exits to Eads Bridge reflect State Historic Preservation Office comments and coordination.

S.5 AREAS OF CONTROVERSY

The major controversial areas identified in the AA/DEIS were:

- o Building any of the LRT alignments to Clayton (Clayton connection LRT alternatives 4A through 4F) was opposed by some residents and officials in University City and Clayton. The locally-preferred alternative eliminates these options and substitutes bus shuttle service favored by those opposed to the Clayton LRT connections.
- o Operating LRT in mixed-traffic on Natural Bridge Road was opposed by some Normandy-area residents and officials. The locally-preferred alternative eliminates this mixed-traffic operating condition with an exclusive LRT alignment along I-70.

S.6 ISSUES TO BE RESOLVED

Agreements with the N&W and TRRA railroad companies are being reviewed by those railroad companies and will be completed in advance of a decision to fund the LRT project. Freight operating conditions will be finalized during final engineering design on the LRT system.

The value of the local match assets which include Eads Bridge, the Washington Avenue/Eighth Street tunnel, and railroad line right-of-way, awaits a final determination, which will be made as a part of the federal decision to fund the LRT project.

Agreements with the Missouri Highway and Transportation Department (MHTD) and the Federal Highway Administration (FHWA) to use the I-70 right-of-way will be finalized during final engineering design on the LRT system.

The use of value capture and joint development techniques will be resolved in final design.

S.7 MAJOR CHANGES BETWEEN THE DEIS AND FEIS

The No-Action, TSM, and LRT/Bus shuttle alternatives from the AA/DEIS were refined in the PE phase to reflect changed study-area conditions and the findings of the more detailed analysis undertaken as a part of PE. The project's design year was assumed to be the year 2000 during PE rather than the year 1995 which was used in the AA/DEIS.

Changes in No-Action Alternative. The No-Action alternative was redefined to be the Bi-State bus routing, headways, and fleet in service on December 2, 1985 and programmed north Missouri corridor improvements, as opposed to the AA/DEIS date of June 13, 1983. The updated definition reflects the first changes made (in the Southwest corridor and Illinois) as a part of Bi-State's Transit Action Plan (TAP), which is a program to completely reorganize Bi-State bus service to improve the efficiency and effectiveness of transit service in the region.

Changes in the TSM Alternative. The TSM alternative was redefined in PE to reflect future system changes which Bi-State is considering as a part of its TAP program in its north, south, and northwest corridors. These changes include bus service changes and the addition of numerous park-n-ride lots. The better structuring of routes and related improvements achieved with the TAP program result in the greater efficiency secured with the TSM alternative in PE. TAP program changes rendered many AA/DEIS TSM recommendations inappropriate; specific AA/DEIS TSM bus service routing and headway modifications are no longer meaningful as a result of the substantial systemwide changes included in the TAP program. In addition, AA/DEIS TSM proposals for signal preemption and a Locust Street bus mall were deleted after further investigation, while the upgrading of existing (No-Action) park-n-ride lots was added to the definition of TSM.

Differences in TSM vehicle and seat miles (which are about 10 percent less in the PE study compared with the AA/DEIS) and in TSM peak-period bus requirements (which are about 16 percent less in the PE study compared with the AA/DEIS) are accounted for by the revised TSM definition. Similarly, the decrease in TSM patronage achieved in PE (152,200 compared with 175,500 in the AA/DEIS, or a decline of 13 percent) is a result of the revised TSM definition and refinements made in the travel forecasting models during PE.

Changes in the LRT/Bus Shuttle Alternative. The LRT/Bus shuttle alternative was thoroughly evaluated in the PE phase and a number of changes in operations, alignment, and station locations were made from the AA/DEIS solution.

LRT headways were adjusted to provide the same 20-minute peak and 30-minute off-peak service on both legs at the end of the line rather than the constant 30-minute headway at the Airport and the 15-minute peak and 60-minute off-peak headway proposed to McDonnell Douglas (Berkeley) in the AA/DEIS. Also, separate parallel freight trackage is proposed in the Page and Sarah Street areas where N&W switching occurs, thus minimizing and potentially eliminating the time-sharing feature of the AA/DEIS operating plan. Through-freight movements will be eliminated and each switching area will be accessed from opposite ends of the line. These features complement a PE decision to use high-level platforms at each LRT station, compared with the base case assumption of low-level platforms in the AA/DEIS. The high-level platforms will maximize handicapped accessibility and minimize loading and unloading time, particularly given the selection of a proof-of-payment fare collection system over the on-board fare collection system, which was also considered in the AA/DEIS.

Multiple affected communities and agencies reviewed the alignments developed and evaluated during the PE phase to refine the AA/DEIS I-70 alignment options. The preferences of the City of Berkeley, Normandy-area municipalities, and UMSL led to the selection of an LRT alignment around the north and east sides of UMSL and the north side of the Washington Park Cemetery, generally paralleling I-70, as opposed to the AA/DEIS base-case Natural Bridge alignment.

The LRT/Bus shuttle alternative alignment and station locations in East St. Louis were also changed during the PE phase. The modifications eliminate mixed-traffic operating conditions on Broadway and on the one-way loop proposed in the AA/DEIS, and consolidate the AA/DEIS park-n-ride and walk-up LRT stations at one location in the East St. Louis core area at Fifth and Missouri Streets.

The LRT/Bus shuttle alternative was also modified in the PE study to eliminate mixed-traffic operations on Fifteenth Street in downtown St. Louis by shifting the alignment eastward closer to Fourteenth Street. This location permits developing a station at Fourteenth and Spruce (Kiel) as opposed to the AA/DEIS Fifteenth and Clark station location. The changed station location will provide better spacing between this station and the Union Station LRT station at Eighteenth Street, and it will be closer to the Mart Building, the Police Station/ Academy, City Hall, and the Municipal Courts.

In addition to the above-described station location adjustments made as a part of alignment changes, other stations were shifted, or in one case deleted, to reflect land use conditions and plans which have changed since the preparation of the AA/DEIS. AA/DEIS Old Post Office and Gateway Mall stations were consolidated into one station at Eighth and Pine Streets midway between the two AA/DEIS stations.

The Union Station LRT station was shifted eastward underneath Eighteenth Street to avoid interfering with the Union Station parking lot and to provide direct access to the REA block, a redevelopment opportunity. This station and/or the Kiel station will serve the proposed Amtrak terminal now to be located at the foot of Sixteenth Street (which will be grade-separated over the LRT alignment near Clark). Therefore, the proposed AA/DEIS LRT station between Twentieth and Twenty-First Streets intended to serve a proposed Amtrak station (when in service) is no longer needed and has been deleted.

The AA/DEIS LRT station at Kingshighway with pedestrian access to Euclid was shifted to Euclid to fit with the preferences of medical center officials and to be able to develop a high-level platform. The AA/DEIS station located immediately west of DeBaliviere Avenue has been shifted east of DeBaliviere to avoid conflict with currently underway development and to better accommodate the bus shuttle with a turnaround as well as to provide for potential joint development. The AA/DEIS park-n-ride lot at St. Charles Rock Road was shifted from a shared status in an existing parking lot west of the N&W trackage to surplus N&W right-of-way east of the N&W trackage.

Refinements in the PE modeling resulted in an 11 percent reduction in patronage compared with the AA/DEIS (37,100 guideway trips compared with 41,778). Also, three fewer LRT vehicles are now expected to be needed as a result of the more detailed study undertaken during PE investigations; tighter scheduling and changes in turnbacks cause the reductions.

S.8 MITIGATION MEASURES

Relocation assistance will be provided for single-family dwelling unit owners to help them relocate. Commercial displacees will also be compensated for their property and assisted in relocating. LRT construction will be sequenced to maintain necessary vehicular and pedestrian flow on all key roadways. Press releases and signage will be used to alert the public to changes in circulation which will be coordinated with building owners and tenants as well as street and highway departments, as appropriate. All utility relocations will be closely coordinated with each utility company to protect their lines during construction and to minimize any disruption in service.

To reduce the possibility of accidents, railroad style flashers and gates with optional bells will be installed at at-grade street crossings, except at the three Broadway crossings in East St. Louis, where traffic lights will be installed. The height, opacity, and other salient features of any fences will be coordinated with municipal officials and neighborhood organizations to avoid adverse safety or security repercusions on adjacent land use activities. A comprehensive station area master planning program has been prepared to ensure compatible development at appropriate locations. Zoning and subdivision regulations that are already in place are expected to be adequate to control development.

To minimize project effects on St. Vincent Park, coniferous trees will be planted in the park along the LRT alignment at the request of the St. Louis County Parks Director, with special emphasis given to the open area near the proposed lake.

To minimize interfering with the UMSL campus, the light rail alignment will be built on structure over East Campus Drive and in cut under Mark Twain Drive. The latter condition will necessitate relocating West Campus Drive as proposed in the University's 1981 UMSL 2000 Master Campus Planning Report. Additionally, the second soccer field proposed in the planning report will be rough graded as a part of building the LRT alignment.

Ultra-light catenary trolley wire and direct suspension trolley wire may be considered in final design to reduce the extent of overhead wiring in visually sensitive areas. Landscaping will be incorporated as a part of station designs, the park-n-ride lot layouts, and along the part of the LRT alignment cutting through the UMSL-North campus. Also, special consideration will be given during final design to station, elevated structure, and retaining wall design on the UMSL campus and to the design of the highly visible I-70/I-170 area LRT bridge structures.

Standard industry practices will be employed to minimize adverse effects on the natural environment during construction. Temporary erosion control measures, prompt reseeding of affected areas with native grasses, and planting of shrubs and trees will be undertaken to minimize harm and restore these areas to their previous condition.

Sprinkling exposed soils, covering the loads of haul trucks, cleaning truck tires as they leave the construction site, and using street cleaners in the vicinity of the work site are among the measures which will be used as needed to satisfactorily mitigate fugitive dust resulting from construction.

Waste materials and debris generated during construction will be properly disposed of in approved sanitary landfills.

All construction activities creating significant noise in residential areas will be limited by construction specifications to normal daytime hours. Construction noise control measures for work in the vicinity of the hospital complex will be developed during final design in consultation with the city of St. Louis and the affected hospitals.

The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings will be applied in any alterations affecting the National Historic Landmark Eads Bridge and St. Louis Union Station. Metals in America's Historic Buildings: Uses and Preservation Treatments by Margot Gayle and David W. Look (1980) will be used as a guide in cleaning and repainting Eads Bridge metal surfaces. The appropriate State Historic Preservation Officer will be notified immediately in the event that any archaeological resources are unearthed during construction in order to ascertain their significance.

CHAPTER 1: PURPOSE AND NEED

This chapter identifies the need for improvements in transportation facilities and services in St. Louis. It specifies both the transportation and non-transportation goals and objectives that those improvements should satisfy in resolving the specific transportation problems in the priority corridor. The chapter also describes the planning context of the current study effort.

1.1 NEED FOR TRANSPORTATION IMPROVEMENTS

The St. Louis region includes two states, eight counties, and 188 municipalities. It covers 4,495 square miles and contains a population of 2.4 million people. The region has developed along a series of transportation corridors radiating from the St. Louis riverfront. Regional growth has spread west, north, and south in Missouri; and east, north, and south into Illinois.

Federal and state programs created a network of interstate highways, expressways, and arterial highways in the St. Louis region during the late 1950s, 1960s, and early 1970s. The effect of these roadways was to stimulate suburban housing development and industrial, commercial, and office decentralization. Subsidies for single-family detached housing following World War II further encouraged an exodus of population from the central core and shaped present development patterns.

The events described above have helped make the automobile the dominant mode of travel in the St. Louis area and have contributed to the decline in the region's public transportation system. This decline in transit service in the region has reduced the mobility of the people who use it, including both transit dependents and those who prefer to use transit. Further, the lack of a reasonable alternative to the automobile makes the region vulnerable to energy shortages and inhibits the area's ability to meet air quality goals. The region's elected officials, therefore, are seeking to develop an effective public transit service to meet mobility, energy, environmental, and financial goals.

A previous study, Systems Analysis for Major Transit Capital Investments, analyzed corridors within the region to help local officials determine priorities for improved service. The corridor connecting downtown St. Louis, East St. Louis, Clayton, and Lambert Airport was determined to have the highest priority for improved service. The corridor includes the highest concentration of population, transit ridership, transit dependents, cultural and institutional facilities, and employment opportunities in the region.

Currently (1984), about 203,000 people live in the corridor and about 344,000 people work there. The major employment centers in the corridor are the St. Louis CBD, the hospital medical center at Kingshighway, the Clayton CBD, and the Airport/Hazelwood area. The McDonnell Douglas world headquarters, located in Hazelwood, is the largest employer in the state of Missouri. Total corridor employment is expected to grow by about 13 percent by 2000, equalling about 32 percent of the total urbanized area employment.

This chapter defines existing transportation problems and identifies measures for evaluating alternative solutions to resolve those problems.

a. Transportation Facilities and Service in the Corridor

The existing highway network in the priority corridor includes several freeways and arterial streets. Freeways include U.S. Highway 40 on the southern limit, I-70 on the northern limit, and the Innerbelt (I-170) on the western limits of the corridor. U.S. Highway 40 connects the Clayton area (and points west) to the St. Louis CBD and Illinois. North-south access from the Airport/McDonnell Douglas area to Clayton is provided by I-170. I-70 provides access between downtown St. Louis and northwest St. Louis County.

East-west arterials in the corridor include the Forest Park Parkway, Natural Bridge Road, Olive Boulevard, Page Avenue, St. Charles Rock Road, and Midland Boulevard. These roads radiate from the St. Louis CBD. North-south arterials include Jefferson, Grand, Kingshighway, Skinker, and Hanley. Hanley serves the Clayton CBD and the others accommodate the areas between Clayton and the St. Louis CBD.

Arterial routes in East St. Louis include Missouri Avenue and M. L. King Drive/State, which serve Fairview Heights and Belleville.

Bridges in downtown St. Louis include the MacArthur, Poplar, Eads, and King. The MacArthur Bridge is closed to highway traffic. The toll-free Poplar Street Bridge, which carries I-70, I-55, and U.S. 40 across the Mississippi River, handles 108,000 vehicles per day and is operating under forced flow conditions for two to four hours per day. The toll-free King Bridge is currently restricted to two lanes, but may be rehabilitated and incorporated into the interstate system to relieve traffic on the Poplar Street Bridge. The Eads Bridge is expected to remain open as an arterial link for local travel across the river. The toll for automobiles to cross the Eads Bridge is currently 50 cents.

Public transportation in the corridor is provided by the Bi-State Development Agency (Bi-State). Currently, service is provided on 26 routes in the peak period in the corridor. A total of 176 one-way trips are operated over these routes in the morning peak. Headways (the time interval between two buses stopping at the same point on a route) range from 10 to 30 minutes. No direct service is provided from East St. Louis to any of the other major activity centers except the St. Louis CBD. At least one transfer is necessary to access other activity centers.

b. Transportation Goals and Objectives

Table 1-I lists the project's transportation goals and objectives. These goals and objectives address a series of transportation issues affecting the region and the corridor under study, such as accessibility and level of service plus economic and fiscal impacts.

The project goals provide the basis for evaluating the alternatives. They are to improve public transportation service in order to increase mobility, and to provide financially-attainable public transportation service. The objectives permit specifically measuring the desirability of each alternative in order to be able to select one for implementation.

TABLE 1-I
TRANSPORTATION GOALS AND OBJECTIVES

Goals	Objectives
1. Improve Transportation Service to Increase Mobility	o Increase speed, comfort, and reliability of public transportation o Increase accessibility to activity centers and the region as a whole o Increase transit system ridership o Provide mobility for transit dependents o Minimize adverse effects on the existing transportation system
2. Provide Public Transportation Service which is Financially Attainable	o Maximize operating efficiency o Minimize capital and operating costs and public subsidy o Maximize revenue

c. Specific Transportation Problems in the Corridor

The alternatives under consideration have been defined to satisfy current and future transportation problems in the priority corridor. They have been defined within the context of regionwide transit problems that may affect project development. These transportation problems are summarized below and reviewed further in the following text:

- Slow transit service in the corridor;
- Diminishing transit accessibility to major activity centers;
- Reduced transit revenues;
- A greater demand for low-cost parking at major employment centers;
- Limited operating funds to subsidize transit services;
- Reduced reliability of transit performance resulting from traffic congestion; and
- Inability to attract transit patrons of choice.

1) Highway Travel. Congestion on existing highways in the corridor is increasing. Many of the arterials and freeways in the corridor are currently operating at capacity. For example, U.S. 40 and I-70 currently experience peak-hour congestion within the city of St. Louis, particularly on the Poplar Street Bridge downtown exits in the a.m. peak and the eastbound approaches in the p.m. peak. U.S. 40 is also heavily congested through extensive portions of St. Louis County; (some stretches of U.S. 40 will be widened to provide additional capacity). I-55/70 is very congested on the Poplar Street Bridge and in East St. Louis. By 1995, many of these facilities will be operating at capacity for extended periods of the day. The Missouri Highway and Transportation Department believes that the resulting congestion will limit, if not preclude, opportunities for improving bus service.

U.S. 40 traffic volumes totaled 95,000 vehicles per day in 1982 (and would likely have been greater except for the Vandeventer overpass construction work, which was recently completed). A few sections of this freeway have average peak hour speeds as low as 17 miles per hour for two hours per day. Traffic volumes totaled 117,000 vehicles per day on I-70 in 1982. Traffic flow on both U.S. 40 and I-70 reaches directional capacity for about three hours each weekday. Forest Park Parkway, the major east-west arterial in the corridor, is also characterized by slow operating speeds and high volumes. Other arterials which will operate at capacity include: Midland Boulevard, Hanley Road, Olive Boulevard, McDonnell Boulevard, and Natural Bridge Road.

Traffic congestion around Lambert-St. Louis International Airport and the McDonnell-Douglas industrial complex is also a growing problem. Currently, Lambert is the sixth busiest commercial air carrier facility in the United States; and McDonnell Douglas, with over 35,600 employees in St. Louis County in 1986, is the largest employer in the state of Missouri. Since these facilities are located adjacent to each other, traffic congestion is increasing on surrounding roads, including Lindbergh Boulevard, Airport Road, North Hanley Road, McDonnell Boulevard, and I-70. Available data shows that, even with staggered employee work hours, sections of McDonnell Boulevard are operating at capacity for about two hours per day. Lindbergh and McDonnell Boulevard interchanges with I-70 and I-270 experience the heaviest congestion. Major expansion plans under way at Lambert are expected to magnify this problem.

Traffic congestion on existing streets and highways in the priority corridor is projected to increase. Current average travel speeds on arterial streets is in the range of 15 to 23 miles per hour. These streets are expected to operate at average travel speeds in the range of 10 to 15 miles per hour under forecast 1995 volumes. The net effect on transit system performance will be slower operating speeds and reduced reliability for transit as a mode of travel to work.

2) Transit Accessibility. Currently, transit service to and between major activity centers within the corridor is slow and time consuming. Overall, bus transit running times in the corridor are about three times slower than a similar automobile trip. This is true for trips between the St. Louis CBD, Clayton, the major universities in the corridor, the hospital medical complex, and most residential areas in the corridor. Average transit operating speeds in the corridor range

from a low of 11.5 miles per hour to a high of 18.5 miles per hour; one freeway express route reaches an average speed of 24 miles per hour. Transit service to Lambert Airport and McDonnell Douglas from the St. Louis CBD and Clayton is more than three times slower than automobile, with transit travel time to the St. Louis CBD or Clayton taking 61 to 81 minutes. (This situation is not attributable solely to highway congestion but rather to a number of variables, including bus routing and fewer express buses.)

About 200 peak-period buses were removed from route service during 1982 and 1983 and were not reinstated in 1984 or 1985. This reduction was the result of efforts to control subsidy costs and improve system efficiency. Service reductions included both increased headways and some route elimination. These removals were generally uniform over the region, including the priority corridor.

Transit service reductions have significantly affected transit dependent persons whose only means of mobility is public transit. Three of the eight routes eliminated in 1981 and not reinstated in 1982, 1983, 1984, or 1985 served areas of high transit dependency, and six of the 13 routes on which service was reduced provided service to areas of high transit dependency. With high concentrations of transit dependents in the priority corridor (an estimated 40,000 persons based on 1980 census auto availability data), the reductions in service have reduced access to employment, cultural, educational, and recreational facilities for transit dependent persons. Similarly, for those who can choose between using transit (primarily for work trips) or their automobile, service reductions have limited their access to routes and have increased waiting time for individual routes and transfers. Waiting times for buses and transfers increased because of these service reductions, which continue to adversely affect patrons.

The decline in transit service has tarnished the user's image of the Bi-State transit system. The decline is especially serious for downtown St. Louis where 28 percent of all workers currently arrive by bus.

3) Transit Efficiency. The efficiency of transit operations in St. Louis is coming under close scrutiny as a result of rising

operating costs and declining subsidy funds. A recently-completed service and policy analysis of the Bi-State transit system shows that part of the system's inefficiency results from route structure, slow travel times, and long headways. These conditions are also reflected in Bi-State's operating expenses, which are relatively high when examined on either a per vehicle-mile or per vehicle-hour basis. Many other factors such as labor costs have also contributed to Bi-State's operating cost problems.

Service cutbacks since 1981 have resulted in a 25 percent reduction in Bi-State's peak period service. These reductions have resulted in some overall improvement in transit efficiency. The gain in efficiency, however, is offset by losses in total patronage. Further service reductions, if needed, would not realize any improvement in transit efficiency. The impact of such cutbacks would weigh heavily on the priority corridor because of the existing high ridership levels. Currently more than 45,000 riders per day use routes wholly within the corridor.

Transit fares in the St. Louis region have increased at about the inflation rate over the past ten years. Since 1981, however, fares have increased from 33 to 50 percent with a resultant decline in ridership. Analysis of the effect of fare increases indicates that the demand for transit service in St. Louis is more sensitive to price than in other cities.

4) Parking. Parking is a key consideration in strategies to adequately satisfy transportation needs, since an auto trip requires a parking space at the trip end. Historically, low-cost parking has been abundant in the priority corridor. In recent years, parking costs in downtown St. Louis and Clayton have increased steadily. They will rise further as the supply of parking is constrained by expanding core-area development. Lambert Airport, McDonnell Douglas, and the hospital medical complex also experience tremendous demand for parking. The geography and existing level of development in each of these areas prevent substantial increases in parking supply. The hospital medical complex has established remote parking facilities for workers with a

connecting shuttle bus system. The potential for employer-provided remote parking, however, is restricted at the hospital medical center and is not possible at other major activity centers. Expected future growth in these areas will worsen the existing parking problems.

d. Other Goals Important in Selection of an Alternative

Table 1-II lists study goals with specific objectives that address non-transportation community needs. The goals are to stimulate economic expansion and job creation as well as to enhance the physical and social environment. The objectives cover issues such as land use effects, social and economic development, and environmental quality. The following discussion highlights the problems and the needs relating to these goals and objectives.

1) Economic Development and Redevelopment. The priority corridor has remained the primary market choice for new investment within the older, denser portions of the St. Louis metropolitan area. In effect, investment decisions typically fluctuate between concentrations within the corridor (downtown, Clayton, the Central West End, and the Airport area) and suburban/exurban locations. Corridor development has been dependent historically on a relatively high level of transit service compared with the outlying locations which cannot support cost-effective transit service. The deterioration of transit service in the corridor in recent years, however, has made decisions to invest in parts of the corridor more expensive than in suburbia because of the high cost of providing parking in a developed urban setting with high land prices.

A consistent and considered policy over the last decade on the part of local, state, and federal officials and civic leaders has concentrated public investment in the corridor. This is evidenced by the patterns of the city of St. Louis Community Development Block Grant (CDBG) expenditures, Urban Development Action Grant (UDAG) projects, Missouri Housing Development Commission financing for residential developments, the Lambert Airport expansion and modernization program, the designation of an enterprise zone in the Wellston area, and the concentration of St. Louis County CDBG funds in the Normandy area.

TABLE 1-II
NON-TRANSPORTATION GOALS AND OBJECTIVES

Goals	Objectives
1. Stimulate Economic Expansion and Job Creation	o Increase attractiveness of land for residential, commercial, and industrial development
	o Enhance opportunities for public/private development partnerships
	o Increase opportunities for value capture
	o Increase local government tax receipts
	o Create jobs
2. Enhance the Physical and Social Environment	o Improve air quality, lower noise levels, and conserve energy
	o Avoid displacing homes and businesses
	o Ensure compatibility with local and regional land use plans
	o Minimize adverse effects on parks, institutions, and historic properties

A substantial number of attractive and stable, racially-integrated neighborhoods, four universities, and the region's primary urban recreational and cultural institutions and attractions are located within the corridor. At the same time, many sites formerly devoted to heavy and light industry within the corridor have become functionally obsolete and have been abandoned. In addition, there is a recognized need to extend the investment focus of the corridor east into Illinois.

Efforts to achieve conservation and enhancement of the residential neighborhoods within the corridor are challenged by the fact that many of these areas were built in a pre-automobile-dependent era. They do not easily lend themselves to the radical restructuring required for the vast majority of their residents to rely exclusively on the automobile, at least not without adversely affecting their inherent amenity and character. In addition, the market for high-density, high-quality housing in the downtown and Clayton business districts needs to be nurtured and expanded to make these core areas attractive places to be beyond the daytime office work period. Traditionally and logically, markets for these residences are found among persons who are employed in other corridor locations and who place a high value on easy and efficient access to their workplaces.

A large under-employed population in need of better job opportunities resides both within the corridor and immediately adjacent to it. Expanding the concentrations of office and commercial activity characteristic of the corridor is particularly appropriate for creating service jobs for these workers. With improved transit access and mobility, St. Louis becomes a more effective competitor against other urban centers in capturing investments that require high-density, central urban locations and depend on large numbers of support employees.

Although the metropolitan area has been a poor competitor for manufacturing jobs over the last several decades (with the notable exception of McDonnell Douglas) and has witnessed a substantial erosion in its manufacturing base, it has experienced important growth in the medical, telecommunications, financial, and office markets. These markets are expected to continue to expand through 2000, and they are markets in which the St. Louis metropolitan area has significant historic strength. The markets for these growth industries are almost entirely within the corridor. The region is therefore facing the challenge of sustaining those investments already in place and making the functionally obsolete manufacturing sites within the priority corridor viable candidates for adaptive reuse.

2) Energy and Environmental Considerations. The St. Louis area, which is highly auto dependent, has found itself to be vulnerable to oil shortages as have many other parts of the country. Increasing transit usage may help conserve petroleum consumption and provide an alternative travel option. St. Louis has also been designated a non-attainment area for the airborne pollutants, ozone, and carbon monoxide. The region is working to implement measures that can aid in meeting ambient air quality standards. Enhancing mass transit is one measure the region can implement to assist in alleviating these environmental and energy problems.

1.2 PLANNING CONTEXT

Responsibility for evaluating alternative long-range transit improvements in the corridor and the region rests with the East-West Gateway Coordinating Council (EWGCC). The agency develops plans for long-range transit improvements in conjunction with the Bi-State Development Agency (the region's public transit operator) and other local, state, and federal agencies. EWGCC is the St. Louis area's council of governments and Metropolitan Planning Organization (MPO).

a. The Planning and Project Development Process

1) Background. As the "Gateway to the West," St. Louis' history and development have been closely tied to transportation. As modes have evolved and technology created new, more efficient methods of moving people and goods, the nature and form of the St. Louis region has also changed. Where streetcars once provided frequent public transit service over a large route structure, the automobile and highways are now the dominant transportation mode.

The Bi-State Transit System, begun in 1963, was the outgrowth of local efforts to stabilize the region's bankrupt private transit system. During the first decade of the system's operation, ridership declined from 86 million passengers in 1963 to 55 million in 1972. Beginning in 1973, operating subsidies were made available to the system, levels of service were increased, and until recently ridership increased. Since 1980, rising costs and declining revenues renewed the downward spiral each year; only in 1985 did this decline appear to stabilize at a plateau slightly below 50 million annual boardings from a 1980 high of 76 million.

EWGCC generated the first comprehensive regional long-range plan in the late 1960s. The plan, based on data from a 1965 travel survey, was adopted by the Council's Board of Directors in 1970. The plan was refined and updated in 1974. This update was predicated on regional population and employment growth of approximately 50 percent between 1970 and 1995. This level of growth has since been recognized as unrealistic. Thus, the recommended 86-mile high-capacity transit system was not implemented and has been deleted from further consideration. Subsequently, EWGCC completed a major systems analysis of St. Louis transit service in 1978. The product of this work was a plan adopted by the Board of Directors which specified an all-bus system, at least until 1985, the horizon year for the study. This plan was adopted following interim Board endorsement of a light rail alternative. The outcome of the systems analysis was inconclusive and EWGCC agreed to conduct further study as the basis for a firm decision. In August 1980, the Bi-State Development Agency concluded its study of an alignment between East St. Louis and Lambert-St. Louis International Airport. The findings of the study suggest that such an alignment for light rail may be technically and financially practical, in large part because of the availability of existing rail rights-of-way in the corridor, although the study did not consider the extent to which such an alignment would be more cost effective than other alternatives.

A systems analysis was initiated in 1981 to help local officials set priorities for transit improvements in four key regional corridors. No-build, transportation systems management (TSM), busway, and light rail transit alternatives were studied.

The result of this study was the selection of the East St. Louis, St. Louis CBD, Clayton, and Lambert-St. Louis International Airport corridor as the priority corridor for further detailed study. This was based on a process which identified those corridors which would benefit most from improved transit. Then ridership and total cost were analyzed to determine which alternatives would optimize transit service. The East St. Louis-Clayton/Airport corridor performed best in terms of projected cost-effectiveness.

The Alternatives Analysis (AA) process, of which the Draft Environmental Impact Statement (DEIS) was the primary product, yields a thorough comparative evaluation of the costs, benefits, and associated impacts of the five alternatives considered in the priority corridor. The process examined each alternative's engineering feasibility, projected their potential ridership, assessed their environmental effects, estimated their operating and capital cost requirements, and analyzed their cost-effectiveness.

A citizen participation program was implemented as a part of the AA/DEIS process for the purpose of informing the public in order to test and refine the alternatives under study. A scoping meeting was held on April 25, 1983 at the University City public library and was followed during the balance of 1983 by over 60 meetings with neighborhood groups, city councils, and business and civic organizations. The scoping meeting drew over 300 persons and attendance at the follow-up meetings ranged from a low of five to well over 100. A telephone opinion survey was conducted, a mailing list of over 2,000 community leaders was developed as a vehicle for disseminating information, and a newsletter called "Transit Future" was prepared. Information was made available to the media and coverage was secured in some 20 local newspapers ranging from the major dailies to neighborhood handouts, in the network television station reporting, and in the reporting of multiple radio stations. Although a questionnaire was handed out to those in attendance at meetings, few chose to respond using the questionnaire, but over 100 letters were sent to EWGCC in 1983, which address local issues of interest relating to the alternatives under study.

Following completion of the AA/DEIS in May 1984, its release for public comment on June 22, 1984, and a July 31, 1984 public hearing on the alternatives, EWGCC selected the light rail transit alternative with shuttle bus service to Clayton as the locally preferred alternative. A Preferred Alternative Report was prepared documenting the decision of the community's elected officials.

2) Current Steps. The preliminary engineering phase, of which this Final Environmental Impact Statement (FEIS) is the primary product, develops the preferred alternative to permit exact descriptions of both its alignment and operations, as well as more detailed capital cost estimates to be used in support of a capital funding request. A public hearing will be held as a part of the capital funding approval process. Following approval of the capital funding request, final engineering plans will be prepared to permit building the selected alternative.

b. Role of the FEIS in Project Development

A Final Environmental Impact Statement is required by the National Environmental Policy Act of 1969. As specified in the act, the alternatives considered as potential recipients of federal funds must be assessed with respect to their effects on the community and surrounding environment. The FEIS provides a detailed description of the locally preferred alternative, clearly identifying appropriate mitigation measures for any adverse environmental impacts.

CHAPTER 2
ALTERNATIVES CONSIDERED

This chapter describes each of the alternatives being evaluated in the EIS. It discusses the screening and selection process and identifies other alternatives which were considered but are no longer deemed appropriate. The chapter also presents both the capital and the operating and maintenance costs of each of the alternatives. (The levels of service, e.g., vehicle miles, fleet size, etc., and patronage levels projected for each alternative studied in PE are discussed in Chapter 4 and in TR-10, Demand Forecasting.)

2.1 SCREENING AND SELECTION PROCESS

a. Summary of Relevant System Planning Activities

Mode and corridor considerations were evaluated during systems analysis. The primary mode choices evaluated include: no-action (existing bus network), transportation systems management (TSM, improved bus network), busway (exclusive and priority bus roadways), and light rail transit (LRT, modern electric-powered steel-wheel-on-steel-rail system on exclusive and non-exclusive rights-of-way). The priority corridor selected during the systems analysis serves the following primary activity centers: downtown, the hospital/medical complex, Clayton, the Airport/McDonnell Douglas area, and the universities.

The abandoned Eads Bridge rail deck and tunnel beneath Eighth and Washington in downtown St. Louis and the little-used Norfolk & Western (N&W) railroad trackage from Grand to Natural Bridge/I-70 were considered desirable LRT alignments to serve major parts of the corridor. Retaining freight movements on the N&W trackage on a time-sharing basis with LRT was considered possible; busway improvements in this depressed rail right-of-way, however, were found to be more costly to accommodate because of the difference in mode and grade, and therefore, were not pursued. The less-constricted Terminal Railroad Association (TRRA) right-of-way along the Inner Belt (I-170) was considered workable for busway improvements, along with the use of arterials within the corridor.

The above-described mode and alignment concepts were reviewed by technical staff and by the community at large through a scoping meeting and numerous other neighborhood level meetings to refine the alternatives into a set of promising options.

b. Modifications to Set of Alternatives in Scoping Process

The scoping process coupled with further study resulted in numerous modifications. LRT with shuttle bus service became a fifth alternative following the formal scoping meeting. This alternative substitutes bus for LRT on the link to Clayton. Similarly, the LRT options for connecting Clayton were expanded as a result of community input to include alternative alignments using Delmar in order to serve the loop area and using the Greenway former streetcar right-of-way. A suggestion to use the West Belt TRRA trackage along the north side of University City was rejected because of its heavier freight movements and considerable adverse travel between downtown and Clayton. The trackage abuts a similar number of residential areas (lower-to-middle income and minority) as does the Forest Park Parkway (Millbrook and Forsyth Bypass) (middle-to-upper income), and therefore offers no special environmental benefits. Also, a University City suggestion to provide a station along the N&W trackage at Olive to serve the city's Cunningham Industrial Park redevelopment was rejected because of the proximity of this location to the Delmar and Page stations and the potentially low usage of an Olive station given the low-density light-manufacturing activities expected to be located in the redevelopment area.

An alternate along I-70 was considered in response to community comment about the part of the LRT alignment along Natural Bridge. Using the N&W trackage between Natural Bridge and McDonnell Douglas was rejected because of conflicts with mainline rail movements and the difficulty of serving the Airport with this alignment. The initial concept to place the Natural Bridge LRT alignment on structure between the University of Missouri at St. Louis (UMSL) and the Bel Acres shopping center was modified to place the alignment at grade in mixed traffic to comply with community interests. Similarly, using a third rail power source in place of overhead wiring for LRT on elevated structure was considered to address aesthetic concerns.

Coordination with the Missouri Historic Preservation Officer resulted in moving the AA/DEIS Old Post Office station entrance/exit from the building's east moat to the sidewalk on Olive at Eighth. This modification will avoid conflict with the east facade of this National Historic Landmark.

2.2 DEFINITION OF ALTERNATIVES

Five primary alternatives were examined in the AA/DEIS: 1) no-action; 2) transportation systems management (TSM); 3) busway; 4) light rail; and 5) light rail with shuttle bus service to Clayton. The light rail Alternative 4 includes five alternative LRT connections with Clayton, labeled A through E. In addition, a variation on the Clayton LRT alternatives B and C/D (labeled F) was considered; an alternate along I-70 parallel to Natural Bridge was also addressed in the AA/DEIS.

The no-action, TSM, and LRT/bus shuttle alternatives, the latter of which is the locally-preferred alternative, were updated and refined during Preliminary Engineering (PE) to reflect changed study-area conditions and the findings of the more detailed study undertaken as part of PE. The project's design year was assumed to be the year 2000 rather 1995 as in the AA/DEIS. The no-action and TSM alternatives form a baseline for comparison with the LRT/bus shuttle alternative. These three refined alternatives, sequentially numbered throughout this document (1, 2, and 3), are fully described below. Alternative 1 - No-Action and Alternative 2 - TSM retain the same number as used in the AA/DEIS, while Alternative 3 - LRT/bus shuttle was numbered Alternative 5 in the AA/DEIS. The busway (AA/DEIS Alternative 3) and LRT (AA/DEIS Alternative 4) alternatives are unchanged from the AA/DEIS, and therefore, are only briefly summarized below. Readers desiring additional detail on these two alternatives should refer to the AA/DEIS.

a. Alternative 1 - No-Action

The no-action alternative was redefined to be the Bi-State bus routing, headways, and fleet in service on December 2, 1985, as opposed to the AA/DEIS date of June 13, 1983. Between June 13, 1983 and December 2, 1985, five bus routes were deleted because of duplication or inefficiency, two new routes were added, and 14 routes were rerouted or extended to serve new areas and park-n-ride lots, to improve transfer links, and to speed up service or eliminate duplication. Two of the routes were rerouted out of the priority corridor. The bus route changes were accompanied by some modifications in service levels.

The updated definition reflects the first changes made (in the southwest corridor and in Illinois) as a part of Bi-State's Transit Action Plan (TAP). This program, which is being implemented without any increase in Bi-State's budget (except for inflation), is intended to completely reorganize Bi-State bus service to improve the responsiveness of transit service to the needs of Missouri and Illinois residents and to address changing population/employment patterns and serve major new activity centers. TAP's primary objective is to improve the efficiency and effectiveness of transit service by "tapping" underutilized resources to improve the quality of bus service. The reorganization will emphasize improved frequencies, schedule convenience, and hours of operation, as opposed to extensive coverage and poorer frequencies. TAP's secondary objective is to explore the potential of new and/or innovative service techniques, concepts, and equipment. Cost-effective approaches approved for funding will be implemented on an experimental basis for a pre-determined period. Bi-State is designing a routing network for work trips which provides frequent service on express routes, gets express buses on highways, and provides a convenient transferring system for passengers on local buses. The backbone of this new routing system is a series of park-n-ride lots and timed transfer centers. The park-n-ride lots are especially designed for express riders and are to be located near highways; while transfer centers are designed to allow buses to meet at strategically located points for synchronized transferring. Non-fixed route demand responsive services will also be provided through purchase of service contracts with other transportation carriers in the metropolitan area. (For further information, see Bi-State's December 1985 document, "St. Louis LRT TSM Alternative.")

The no-action alternative is defined as maintaining the Bi-State bus routing, headways, and fleet in service on December 2, 1985 and programmed north Missouri corridor improvements without change through the design year 2000. This definition includes the first changes made in Bi-State's TAP program (in the southwest corridor and in Illinois). The existing level of service involves 616 a.m. peak buses on 134 routes during the peak period. Figure 1 shows peak-period bus routes, 53 of which provide express, rapid, or park-n-ride service, and 81 of which provide local service. Figure 1 also identifies the seven Missouri and 14 Illinois park-n-ride lots currently in use, which provide totals of 473 and 398 spaces, respectively; all lots are used based on cooperative agreements, none are owned by Bi-State.

The no-action network does not involve any exclusive bus or rail guideways; all bus routes are operated on public streets and rights-of-way, with the exception of the Hodiamont former streetcar right-of-way which is paved for bus use. Bus priority lanes are currently designated in downtown St. Louis on Ninth between Market and Convention Plaza to serve north-city- and county-bound buses; on Washington between Broadway and Tucker to serve northwest-city and county-bound buses; and on Locust between Broadway and Tucker to serve south- and southwest-city and county-bound buses. Reserved lanes are also available on Olive from Tucker (eastbound) and Fourteenth (westbound) through to Lindell and Kingshighway for both a.m. and p.m. peak-hour movements. In addition, several St. Clair County bus routes which use the Eads Bridge use the Washington and Locust priority lanes. The lanes are signed "no parking/no stopping" during rush hours.

Bi-State buses used for local and express/rapid routes have a capacity of 60 passengers. Fares are collected on-board using a machine that accepts dollar bills and change and that provides the driver with a screen display of the amount each passenger deposits; exact fare is required. The Missouri local fare is 75 cents, and the Illinois local fare is 50 cents with 10-cent zone charges for up to two zone boundary crossings. The express/rapid fare is $1.00, and initial transfers cost ten cents, plus an additional 25 cents if the transfer is from a local to an express bus. All subsequent transfers are free as long as the passenger does not backtrack. Student, elderly, and other discounts are available. (See the Chapter 3 Public Transportation fare discussion.) The driver has a direct radio connection available to communicate with the dispatcher, as needed.

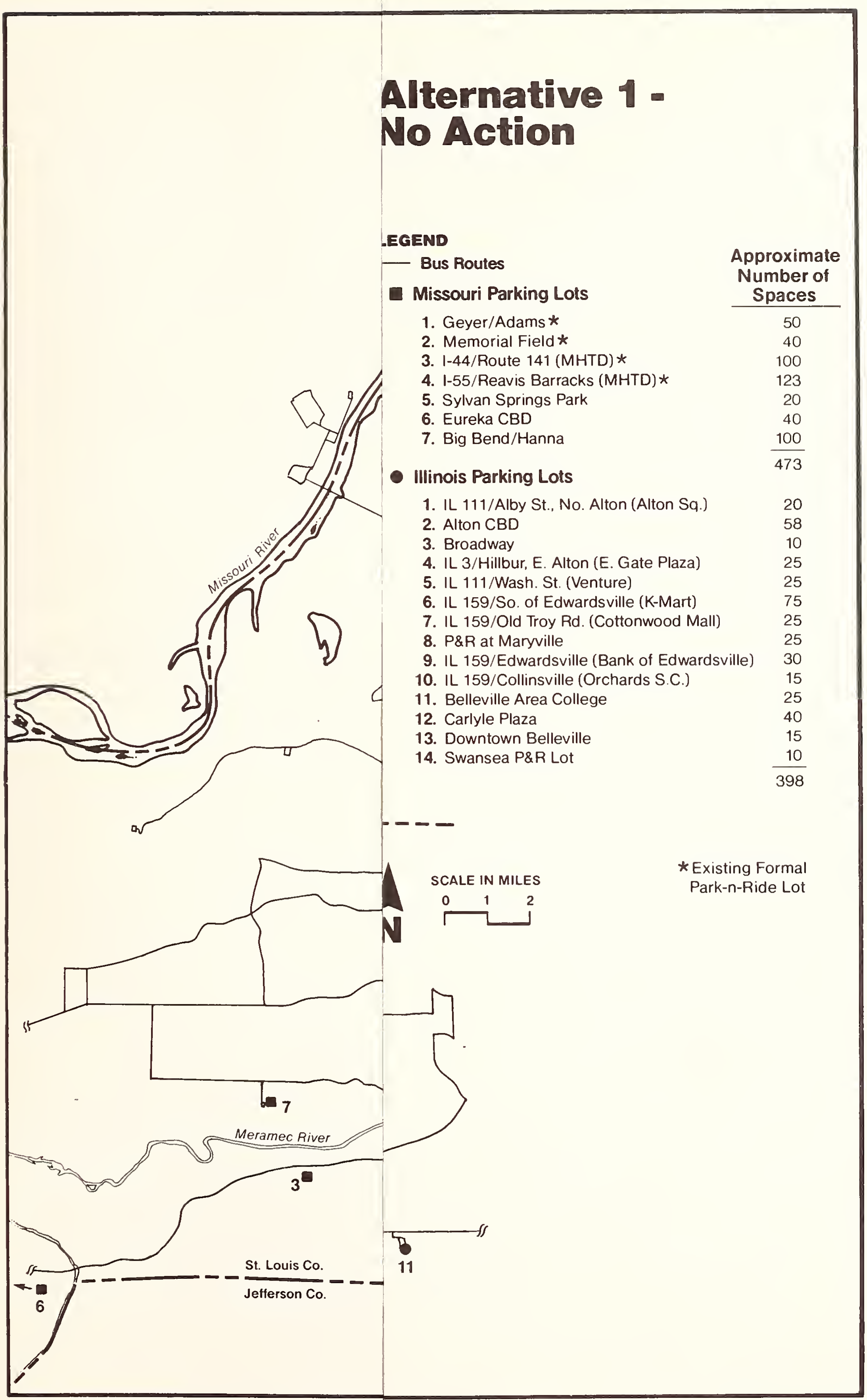
b. Alternative 2 - Transportation Systems Management (TSM)

The TSM alternative was redefined in PE to reflect future system changes which Bi-State is considering as a part of its TAP program in its north (not already programmed for March 1986 implementation), south, and northwest corridors. These changes include bus service changes and the addition of numerous park-n-ride lots. TAP program changes rendered many AA/DEIS TSM recommendations inappropriate; specific AA/DEIS TSM bus service routing and headway modifications are no longer meaningful as a result of the substantial systemwide changes included in the TAP program. In addition, AA/DEIS TSM proposals for signal preemption and a Locust Street bus mall were deleted from consideration.

Signal preemption was found to yield questionable savings based on a detailed study of the AA/DEIS road segments (included in Technical Report No. 10, Demand Forecasting), and it is strongly opposed by municipal and county officials. (See Appendix I letter dated May 16, 1984 from Mayor Schoemehl to Senator Eagleton.) A Locust Street bus mall is strongly opposed by downtown merchants as expressed by their association, Downtown St. Louis Inc. at the AA/DEIS public hearing (see transcript p. 163-4), and will not add any bus capacity because the street presently serves a maximal number of buses, given the width of the public right-of-way and the need to maintain minimum building service access.

The major change provided by the TSM alternative is the completion of Bi-State's TAP program as well as service-level expansion exceeding the TAP program's financial constraints (zero-growth operating budget) in order to accommodate projected demand which cannot be served with the current bus service levels that are held constant in the no-action alternative. Table 2-I lists the bus route service changes

Alternative 1 - No Action



EGEND

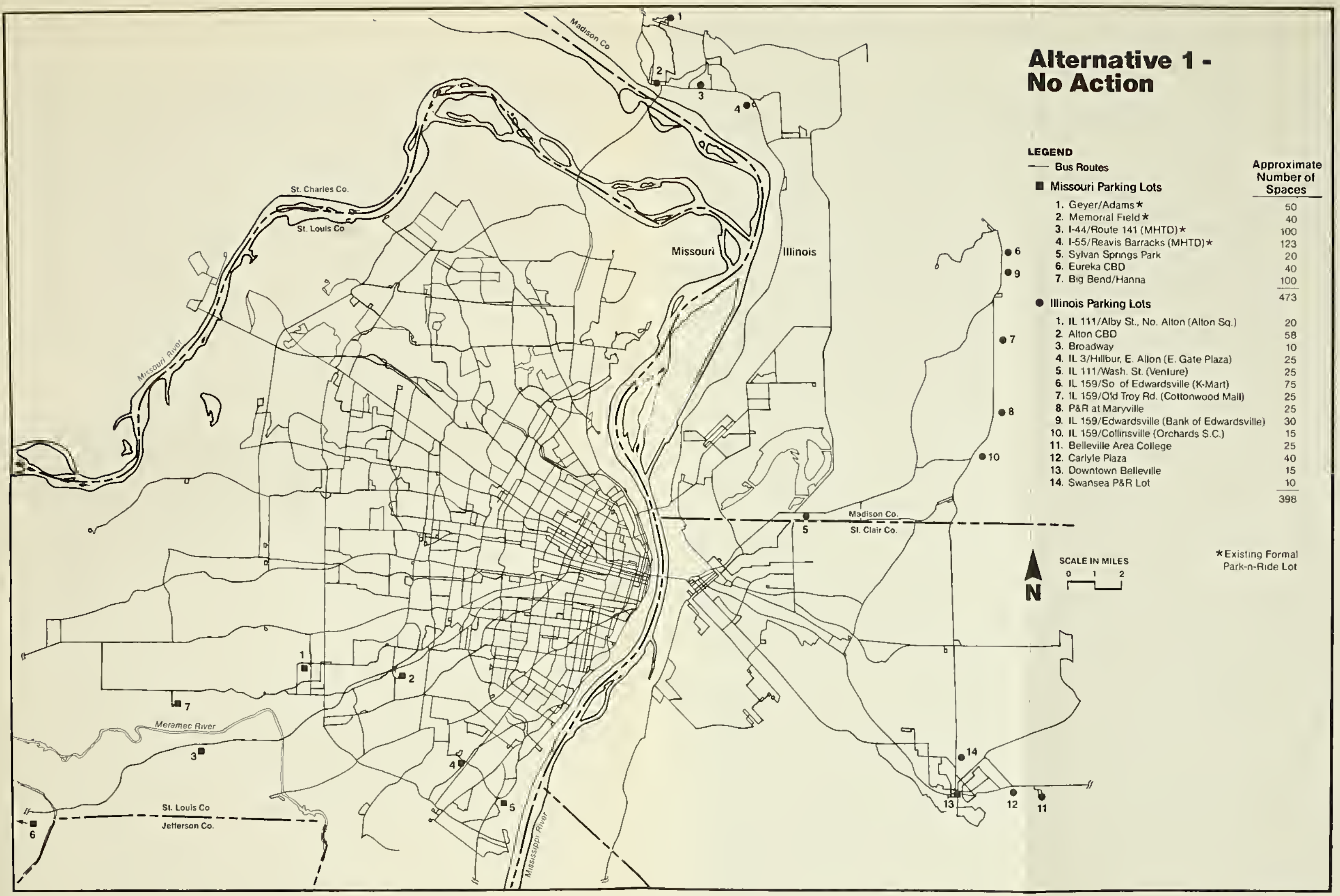
—— Bus Routes

■ Missouri Parking Lots	Approximate Number of Spaces
1. Geyer/Adams*	50
2. Memorial Field*	40
3. I-44/Route 141 (MHTD)*	100
4. I-55/Reavis Barracks (MHTD)*	123
5. Sylvan Springs Park	20
6. Eureka CBD	40
7. Big Bend/Hanna	100
	473

● Illinois Parking Lots	
1. IL 111/Alby St., No. Alton (Alton Sq.)	20
2. Alton CBD	58
3. Broadway	10
4. IL 3/Hillbur, E. Alton (E. Gate Plaza)	25
5. IL 111/Wash. St. (Venture)	25
6. IL 159/So. of Edwardsville (K-Mart)	75
7. IL 159/Old Troy Rd. (Cottonwood Mall)	25
8. P&R at Maryville	25
9. IL 159/Edwardsville (Bank of Edwardsville)	30
10. IL 159/Collinsville (Orchards S.C.)	15
11. Belleville Area College	25
12. Carlyle Plaza	40
13. Downtown Belleville	15
14. Swansea P&R Lot	10
	398

*Existing Formal Park-n-Ride Lot

Figure 1



Alternative 1 - No Action

LEGEND

—— Bus Routes

	Approximate Number of Spaces
■ **Missouri Parking Lots**	
1. Geyer/Adams *	50
2. Memorial Field *	40
3. I-44/Route 141 (MHTD) *	100
4. I-55/Reavis Barracks (MHTD) *	123
5. Sylvan Springs Park	20
6. Eureka CBD	40
7. Big Bend/Hanna	100
	473
● **Illinois Parking Lots**	
1. IL 111/Alby St., No. Alton (Alton Sq.)	20
2. Alton CBD	58
3. Broadway	10
4. IL 3/Hillbur, E. Alton (E. Gate Plaza)	25
5. IL 111/Wash. St. (Venture)	25
6. IL 159/So. of Edwardsville (K-Mart)	75
7. IL 159/Old Troy Rd. (Cottonwood Mall)	25
8. P&R at Maryville	25
9. IL 159/Edwardsville (Bank of Edwardsville)	30
10. IL 159/Collinsville (Orchards S.C.)	15
11. Belleville Area College	25
12. Carlyle Plaza	40
13. Downtown Belleville	15
14. Swansea P&R Lot	10
	398

* Existing Formal Park-n-Ride Lot

Figure 1

proposed as a part of the TSM alternative; proposed TAP changes and proposed revisions in TAP program elements are differentiated. Figure 2 shows the locations of existing (no-action alternative) and additional TSM park-n-ride lots which will be upgraded/developed, as well as the locations of freeway bus ramps and other TSM improvements. The freeway bus ramps include a ramp at: a) northbound I-55/I-44 to Gravois/ Russell; b) the I-70 reversible lanes with eastbound-on and westbound-off ramps to/from Kingshighway; and c) the I-70 reversible lanes to North Broadway. Miscellaneous bus stop improvements include providing: a) a bus turnout and stop at the I-55 interchange with 4500 South Broadway; a bus turnout, stairs, and a stop at: b) Lindbergh and Page and c) Lindbergh and Olive; and d) a pedestrian overpass at Lindbergh and Corporate Square.

c. Alternative 3 - Light Rail Transit (LRT)/Bus Shuttle

The LRT/bus shuttle alternative was thoroughly evaluated in the PE phase and a number of changes in operations, alignment, and station locations were made from the AA/DEIS solution. Alternative 3 is the locally preferred alternative.

LRT headways were adjusted to provide the same 20-minute peak and 30-minute off-peak service on both legs at the end of the line rather than the constant 30-minute headway at the Airport and the 15-minute peak and 60-minute off-peak headway proposed to McDonnell Douglas (Berkeley) in the AA/DEIS. Also, separate parallel freight trackage is proposed in the Page and Sarah Street areas where N&W switching occurs, thus minimizing and potentially eliminating the time-sharing feature of the AA/DEIS operating plan. Through-freight movements will be eliminated and each switching area will be accessed from opposite ends of the line. High-level platforms were selected in the PE phase (compared with the base case assumption of low-level platforms in the AA/DEIS), because high-level platforms will maximize handicapped accessibility, minimize loading and unloading time, and require gantlet (bypass) tracks for the wider freight trains at only two locations given the proposed PE rail-freight operating plan. Also, high-level platforms will be complemented by the PE decision to use a proof-of-payment fare collection system

TABLE 2-I
BUS ROUTE MODIFICATIONS FOR TSM ALTERNATIVE

--NORTH CORRIDOR--

o These routes will be modified slightly and serve new park-n-ride lots:

12 Florissant-McDonnell; 30X Jennings Express; 41X Northside Express; 43X Halls Ferry Express; 69R Ellisville-Ballwin Rapid; 104X Natural Bridge Express; 169X West County Express; 174X Florissant Express; 204X St. Charles Express; 274X Dellwood Express; 369R Twin Oaks Rapid

o These routes will be substantially rerouted:

32X M. L. King Express; 40X Bellefontaine Express; 47 Cross County; 74 Florissant; 90 Hampton; 96 Walnut Park; 104 Natural Bridge

o These new routes will be added:

6X Shackleford Express; 7 City Limits North; 9 New Halls Ferry-Broadway; 249X South County-McDonnell Express; 304X Downtown-McDonnell Express; 404X Florissant-Clayton Express; 405X Clayton-McDonnell Express; 406 Parker Road-McDonnell

o These routes will be eliminated (alternative service will be available):

16 City Limits-Berkeley; 74R Berkeley Rapid; 205X Wilmore Park-UMSL Express

o These limited feeder routes will be replaced with new demand-responsive service:

2 Florissant-Hazelwood; 5 Jennings South; 6 Jennings North; 28 Santa Maria-DePaul

o These routes will undergo miscellaneous service changes:

13 Union; 41 Lee; 49 Lindbergh; 90 Hampton; 636 Spanish Lake

o These routes will be run at present service levels which TAP would reduce:

61 Chambers; 635R Riverview Gardens Rapid

--NORTHWEST CORRIDOR--

o These routes will be modified slightly:

15 Hodiamont; 30 Cass; 119 St. Louis Avenue

o This route will be substantially modified at its outer end: 93 Lindell

o These routes will be timed for transfers:

49 Lindbergh; 191X Olive-Creve Coeur Express; 14 Lucas-Hunt

TABLE 2-I (Continued)
BUS ROUTE MODIFICATIONS FOR TSM ALTERNATIVE

- These routes will be eliminated:

  26 Overland-St. Ann; 27 Overland-St. John; 33X Dorsett-Lackland Express (flow direction only); 132R Ashby-Rapid; 613 Clayton-Northwest Plaza

- These routes will run at their present pre-TAP service levels/routings:

  32 Wellston-M. L. King; 91 Olive; 93X Lindell Express; 94 Page; 94X Page Express; 95 Kingshighway; 97 Delmar-Forsyth; 101 Vandeventer; 603 Midland;606 Maplewood-Airport; 631 Baden-Clayton

- These routes will be revised or rerouted from the TAP plan:

  40 Telegraph-Broadway; 194X University City Express (revised McKelvey-Page Express); 51 Litzsinger Branch of Clayton Road-Litzsinger

- These routes will be added:

  7X Maryland Heights Express; 9X Midland Express; 10X Penrose Express

--SOUTH CORRIDOR--

- These routes will be modified slightly:

  20X Gravois Express (revised Southside Express); 70 Grand; 173X Tesson Ferry Express; 273X Oakville Express (revised Mehlville-St. Louis Rapid)

- These routes will be substantially rerouted:

  24 Morganford-Union; 42 Sarah; 80 Southampton (new Park-Gustine); 103 Arsenal; 112 Chippewa; 140X Loughborough Express (revised Broadway-Barracks Express); 240X Barracks Express (revised Oakville Rapid)

- These routes will be eliminated:

  10 Lemay-Mehlville; 21 Tower Grove; 92 Lindenwood; 98 McCausland-Delor; 99 Lafayette; 105 Gravois; 340X Mehlville-UMSL Express

- These routes will be retained, rather than deleted as proposed in TAP:

  73X Lemay Ferry Express; 80X Southampton Express; 101 Vandeventer; 105X South Grand Express; 120X Affton Express; 220X Watson Road Express

- These routes will be revised from their TAP service levels:

  20 Gravois (revised Cherokee); 73 Carondelet; 106 Bates; 212X Fenton Express (revised Yorkshire Rapid)

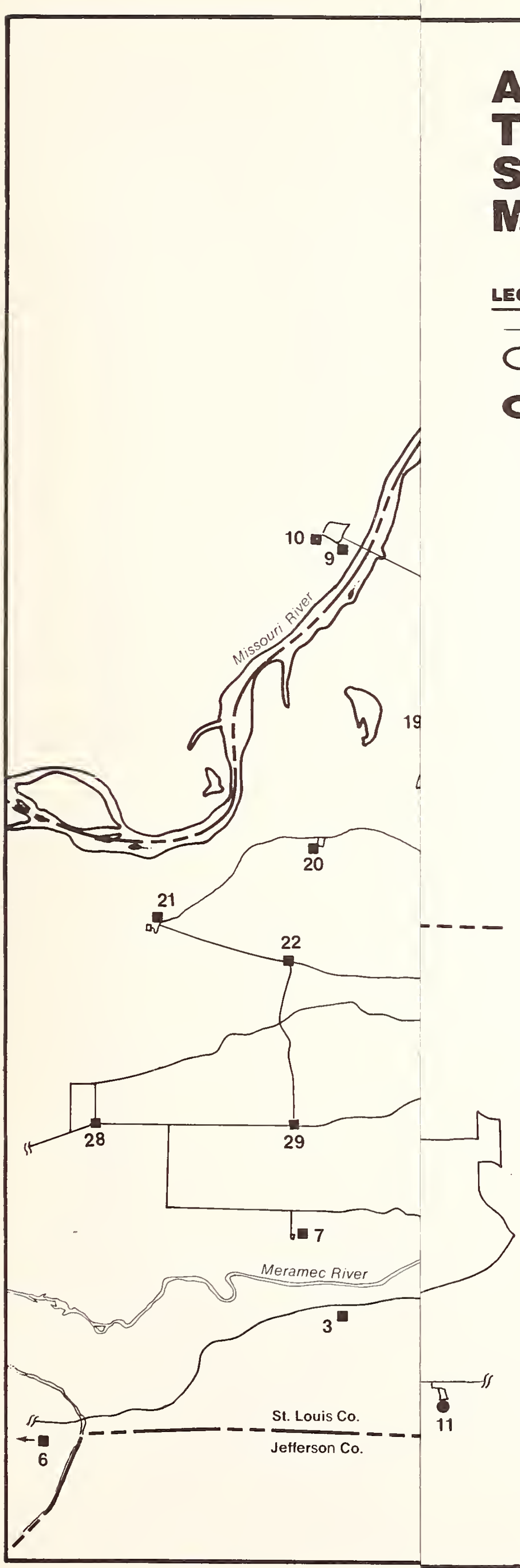
- These routes will be added:

  8 City Limits-South; 21 Magnolia; 81 S. Jefferson-Fyler; 99 Shaw-Macklind

rather than an on-board fare collection system; both fare collection systems were considered in the AA/DEIS. A proof-of-payment system will have a higher initial capital cost but will yield lower operating and maintenance costs, resulting in lower life cycle costs than on-board fare collection. The proof-of-payment system is expected to produce fare evasion rates equal to or lower than an on-board fare collection system, given suitable levels of fare inspection and proper enforcement. Technical Memorandum No. 24, Station Loading Level Analysis, evaluates the merits of high versus low level platform development, and Technical Memorandum No. 20, Design Criteria-Fare Collection, reviews the comparison of the two fare collection systems.

Figure 3 shows the I-70 alignment options evaluated in the PE phase. Alignments in the Florissant Road area were considered but rejected because they would add adverse travel and cost, fail to yield a good station site, or fail to serve UMSL's main campus, depending on the alignment. Alignments crossing I-170 north or south of the I-170/I-70 interchange (as opposed to crossing through the middle of the interchange area) were considered but rejected because of interference with transmission lines and airport clearance requirements or because of adverse travel and private property displacements. Alignments paralleling I-70 where it cuts through the Washington Park Cemetery were considered but rejected because of insufficient non-cemetery right-of-way.

Two major variations on the east and west ends of the I-70 corridor were found to be feasible and were fully evaluated. At the east end, an alignment was evaluated around the north and east sides of UMSL's main campus and another around the south and west sides of the main campus. The village of Bellerive's Bird Sanctuary was considered an area essential to preserve intact, and hence, all alignments were located around the area. Also, problems with access to Natural Bridge through the Normandy City Hall parking lot suggested locating a park-n-ride location on the west side of the N&W trackage on the UMSL-South campus. At the west end, an alignment was evaluated south of I-70 through the industrial park area and around the south side of the Washington Park Cemetery to the airport, and another was evaluated north of I-70 around the north side of the Washington Park Cemetery to the



Alternative 2 - Transportation Systems Management (TSM)

LEGEND

—— Bus Routes

○ **Freeway Bus Ramps**
(Letters referenced in text)

● **Other TSM Improvements**
(Letters referenced in text)

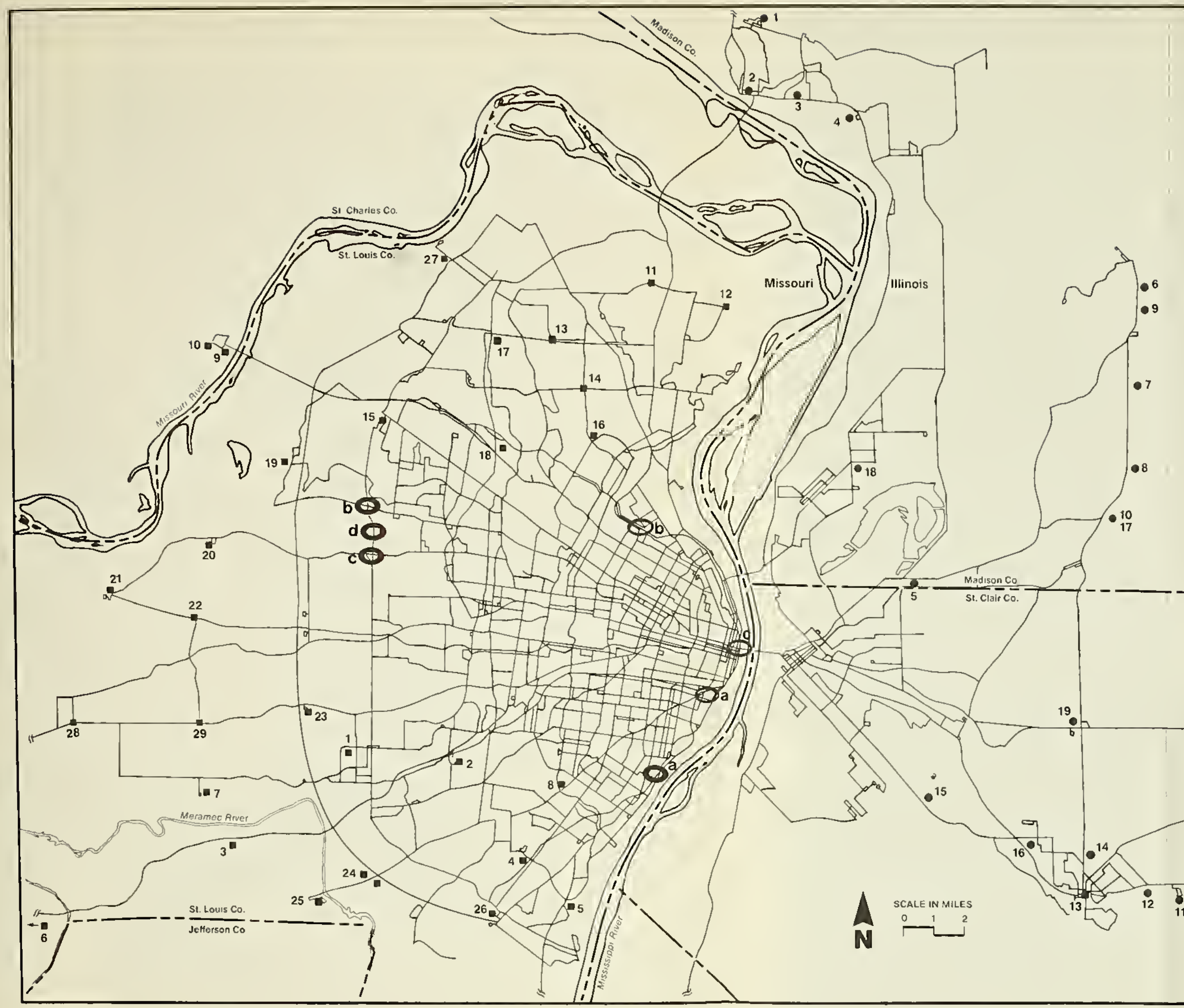
■ Missouri No-Action Parking Lots	Approximate Number of Spaces
1. Geyer/Adams	50
2. Memorial Field	40
3. I-44/Route 141 (MHTD)	100
4. I-55/Reavis Barracks (MHTD)	123
5. Sylvan Springs Park	20
6. Eureka CBD	40
7. Big Bend/Hanna	100
	473

■ Missouri TSM Parking Lots	
8. Gravois/Hampton	40
9. I-70/Fifth Street (MHTD)	105
10. Boonslick/I-70 Frontage (MHTD)	138
11. Parker Road	300
12. Larimore/Trampe	100
13. Dunn/Waterford	40
14. Chambers/W Florissant	40
15. Northwest Plaza Shopping Center	40
16. Northland Shopping Center	40
17. North Hanley/I-270 (MHTD)	113
18. I-170/Natural Bridge	150
19. Dorsett/McKelvey	75
20. Four Seasons Shopping Center	40
21. Chesterfield Mall	80
22. US40/Woods Mill	300
23. West County Shopping Center	40
24. I-270/Gravois (MHTD)	250
25. Fenton CBD	100
26. South County Shopping Center	40
27. Koch Park	40
28. Manchester/Clarkson	40
29. Manchester/Woods Mill	40
	2,151

● Illinois No-Action Parking Lots	
1. IL 111/Alby St. No Alton (Alton Sq.)	20
2. Alton CBD	58
3. Broadway	10
4. IL 3/Hillbur, E. Alton (E. Gate Plaza)	25
5. IL 111/Wash St. (Venture)	25
6. IL 159/So of Edwardsville (K-Mart)	75
7. IL 159/Old Troy Rd (Cottonwood Mall)	25
8. P&R at Maryville	25
9. IL 159/Edwardsville (Bank of Edwardsville)	30
10. IL 159/Collinsville (Orchards S.C.)	15
11. Belleville Area College	25
12. Carlyle Plaza	40
13. Downtown Belleville	15
14. Swansea P&R Lot	10
	398

● Illinois TSM Parking Lots	
15. Cahokia Downs Racetrack	100
16. N Belt at West Main	100
17. U.S. 40 at Route 159	50
18. Nameoki Village	100
19. Route 159 at I-64	100
	450

Figure 2



Alternative 2 - Transportation Systems Management (TSM)

LEGEND

— Bus Routes

○ Freeway Bus Ramps *(Letters referenced in text)*

● Other TSM Improvements *(Letters referenced in text)*

		Approximate Number of Spaces
■	**Missouri No-Action Parking Lots**	
1	Geyer/Adams	50
2	Memorial Field	40
3.	I-44/Route 141 (MHTD)	100
4	I-55/Reavis Barracks (MHTD)	123
5.	Sylvan Springs Park	20
6.	Eureka CBD	40
7.	Big Bend/Hanna	100
		473
■	**Missouri TSM Parking Lots**	
8.	Gravois/Hampton	40
9.	I-70/Fifth Street (MHTD)	105
10.	Boonslick/I-70 Frontage (MHTD)	138
11	Parker Road	300
12.	Larimore/Trampe	100
13.	Dunn/Waterford	40
14.	Chambers/W Florissant	40
15.	Northwest Plaza Shopping Center	40
16.	Northland Shopping Center	40
17.	North Hanley/I-270 (MHTD)	113
18.	I-170/Natural Bridge	150
19.	Dorsett/McKelvey	75
20.	Four Seasons Shopping Center	40
21.	Chesterfield Mall	60
22.	US40/Woods Mill	300
23.	West County Shopping Center	40
24	I-270/Gravois (MHTD)	250
25.	Fenton CBD	100
26.	South County Shopping Center	40
27.	Koch Park	40
28.	Manchesrer/Clarkson	40
29	Manchester/Woods Mill	40
		2,151
●	**Illinois No-Action Parking Lots**	
1.	IL 111/Alby St . No. Alton (Alton Sq)	20
2.	Alton CBD	58
3.	Broadway	10
4	IL 3/Hillbur, E Alton (E Gate Plaza)	25
5.	IL 111/Wash St. (Venture)	25
6.	IL 159/So of Edwardsville (K-Mart)	75
7.	IL 159/Old Troy Rd (Cottonwood Mall)	25
8	P&R at Maryville	25
9	IL 159/Edwardsville (Bank of Edwardsville)	30
10.	IL 159/Collinsville (Orchards S C)	15
11.	Belleville Area College	25
12.	Carlyle Plaza	40
13.	Downtown Belleville	15
14	Swansea P&R Lot	10
		398
●	**Illinois TSM Parking Lots**	
15.	Cahokia Downs Racetrack	100
16.	N Belt at West Main	100
17.	U S 40 at Route 159	50
18.	Nameoki Village	100
19.	Route 159 at I-64	100
		450

Figure 2

PE I-70 Alignment Options

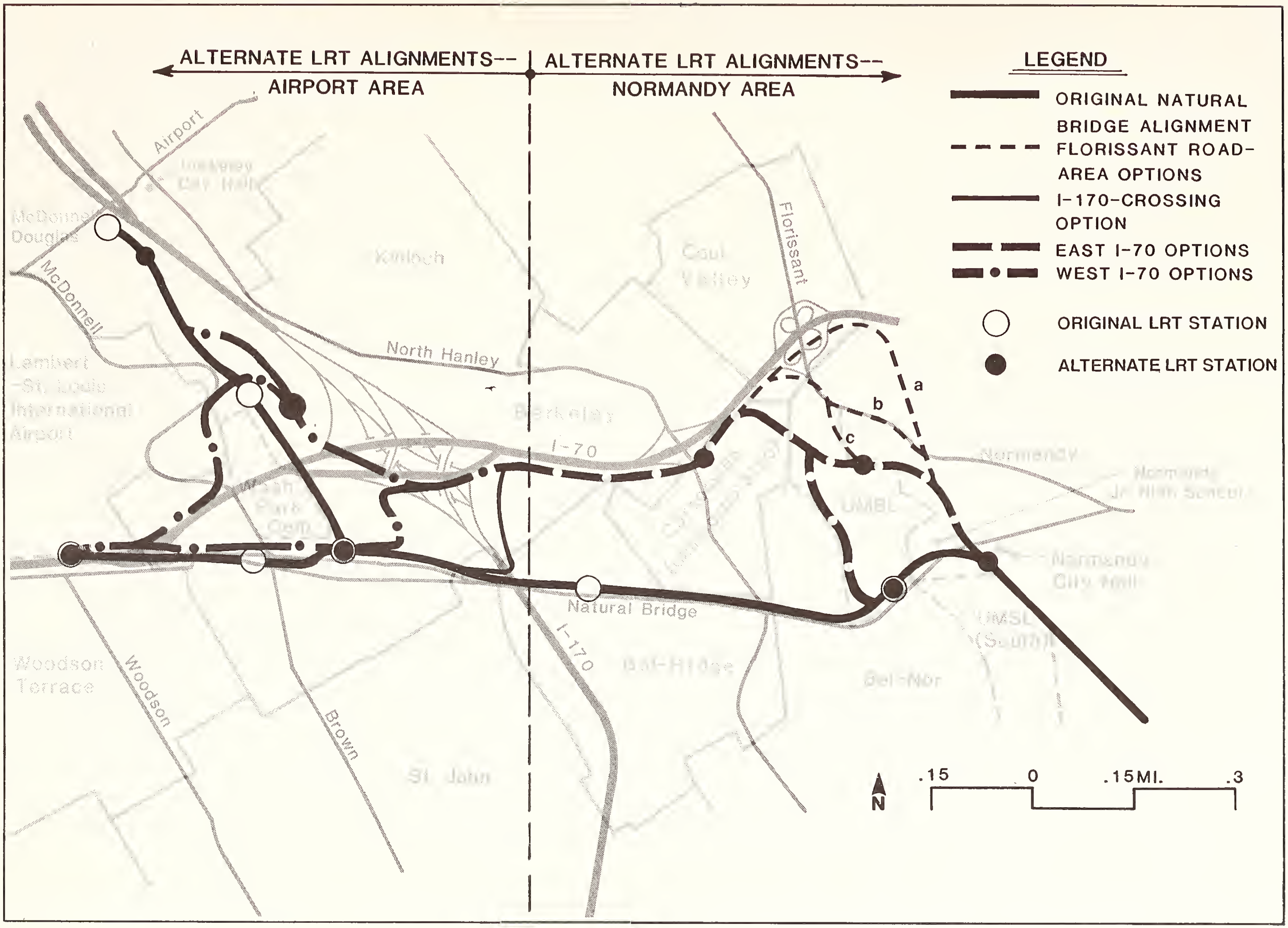


Figure 3

airport. The construction of a building at McKibbon and Natural Bridge since the completion of the AA/DEIS accounts for changes in the alignment and station location around the south side of the Washington Park Cemetery.

The alignment around the north and east sides of UMSL is about a third of a mile shorter, has one additional park-n-ride station potentially yielding higher ridership, will cost $3 million less, will avoid crossing in front of the Normandy Junior High School, and could ultimately stimulate more long-term development relating to its UMSL-North station at Bellerive Drive than the alignment around the south and west sides of the UMSL campus. The latter alignment may better serve the campus with its centrally-located UMSL station and will require less acquisition of privately-owned parcels, including avoiding acquisition of land from the front yards of houses located along Bellerive Drive. The two options will each yield about the same travel time.

The alignment around the north side of the Washington Park Cemetery is about a half mile shorter and has one less station resulting in one minute faster travel time to the airport at a savings of about $4 million compared with the alignment around the south side of the Washington Park Cemetery. The south alignment will potentially yield greater ridership and station-related development as a result of its additional station on Natural Bridge Road.

Both airport-area options provide for terminating the alignment about 1,300 feet south of Airport Road in order to accommodate a future grade-separated extension of the line across Airport Road and to accommodate 500 feet of tail track, rather than continuing the alignment up to Airport Road as proposed in the AA/DEIS. This adjustment will reduce project costs (because of reduced construction), will avoid any interference with Berkeley School District facility access (since the District may now retain its Senior High School at this location rather than relocate as proposed during the AA/DEIS study), and will provide for potential station-related development on the east side of I-170 (since the LRT platform will be located at a point along I-170 where the highway is narrow enough to permit building a pedestrian overpass).

Bi-State bus and McDonnell Douglas shuttle access to the station will remain unchanged from the AA/DEIS solution.

Multiple affected communities and agencies reviewed the alignment options including the cities of Normandy, Bellerive, Bel-Ridge, Bel-Nor, and Berkeley plus the Normandy Municipal Council, UMSL, the Airport Authority, and the Missouri Department of Highways and Transportation. The preferences of the City of Berkeley, Normandy-area municipalities, and UMSL led to the selection of the alignment around the north and east sides of UMSL and the north side of the Washington Park Cemetery. The selected I-70 alignment (shown in Figure 4) will be more costly to build and be slightly longer in length than the AA/DEIS Natural Bridge alignment, but will avoid mixed-traffic operations, result in a savings in overall travel time (two minutes faster to the airport and three and half minutes faster to McDonnell Douglas/ Berkeley), and offer good bus transfer potential, development opportunities, and ridership potential.

The selected I-70 alignment fully satisfies community concerns about mixed-traffic operations on Natural Bridge Road and possible interference with the Laclede Airport Park business/industrial development. Technical Memorandum No. 7, I-70 Alignment Plans, documents the I-70 alignment evaluations and the community participation and support for the selected alignment. This alignment will enhance LRT service as a result of improved operating conditions (fewer stops, avoided mixed-traffic operations, etc.) and will increase transit ridership as a result of better station distribution, additional park-n-ride opportunities (particularly at the UMSL-South and the North Hanley stations), and added bus transfer opportunities (for Florissant and Hanley Road buses). The loss of LRT-related development potential at Springdale and Laclede Airport Park Natural-Bridge-alignment stations will be offset by new development opportunities at UMSL-North, North Hanley, and Berkeley I-70-alignment stations.

The LRT/bus shuttle alternative alignment and station locations in East St. Louis were also changed during the PE phase. The modifications eliminate mixed-traffic operating conditions on Broadway and on the one-way loop proposed in the AA/DEIS, and consolidate the AA/DEIS park-n-ride and walk-up LRT stations at one location in the East St. Louis core area at Fifth and Missouri Streets. These changes eliminate mixed-traffic conflicts, reduce station development costs, including three commercial displacements associated with the AA/DEIS park-n-ride lot, as well as yield superior travel time, development potential, and equal or better ridership potential.

The LRT/bus shuttle alternative was also modified in the PE study to eliminate mixed-traffic operations on Fifteenth Street in downtown St. Louis by shifting the alignment eastward closer to Fourteenth Street. This location permits developing a station at Fourteenth and Spruce (Kiel) as opposed to the AA/DEIS Fifteenth and Clark station location. The changed station location will provide better spacing between this station and the Union Station LRT station at Eighteenth Street. It will be closer to the Mart Building, the Police Station/ Academy, City Hall, and the Municipal Courts. (A diagonal pedestrian linkage could be developed between the station and the Thirteenth and Clark corner of City Hall alongside the U.S 40 westbound on-ramp.) The Fourteenth Street location will provide equal access to Kiel Auditorium and adequate access to the new Federal Building. Fourteenth Street is a "front door" location yielding potential bus interface and good development potential compared with the AA/DEIS location at Fifteenth and Clark.

In addition to the above-described station location adjustments made as a part of alignment changes, other stations were shifted, or in one case deleted, to reflect land use conditions and plans which have changed since the preparation of the AA/DEIS. AA/DEIS Old Post Office and Gateway Mall stations were consolidated into one station at Eighth and Pine Streets midway between the two AA/DEIS stations. With access at both ends of the 200-foot-long LRT platform, a single station will be only about a half block distant from each of the original single-access-per-platform AA/DEIS station locations and it will enhance LRT travel time as a result of eliminating one stop. Given the advancing progress on Gateway Mall construction and the interest to relate LRT to the proposed Two Bell Center and the Arcade/Wright redevelopment potential, the consolidated location will better enhance future development; and it will be less costly to build, will reduce downtown disruption during construction, and will be more efficient to operate than two separate, proximate stations.

The Union Station LRT station will be shifted eastward underneath Eighteenth Street to avoid interfering with the Union Station parking lot and to provide direct access to the REA block, a redevelopment opportunity. This station and/or the Kiel station will serve the proposed Amtrak terminal now to be located at the foot of Sixteenth Street (which will be grade-separated over the LRT alignment near Clark). Therefore, the proposed AA/DEIS LRT station between Twentieth and Twenty-First Streets intended to serve a proposed Amtrak station (when in service) is no longer needed and has been deleted.

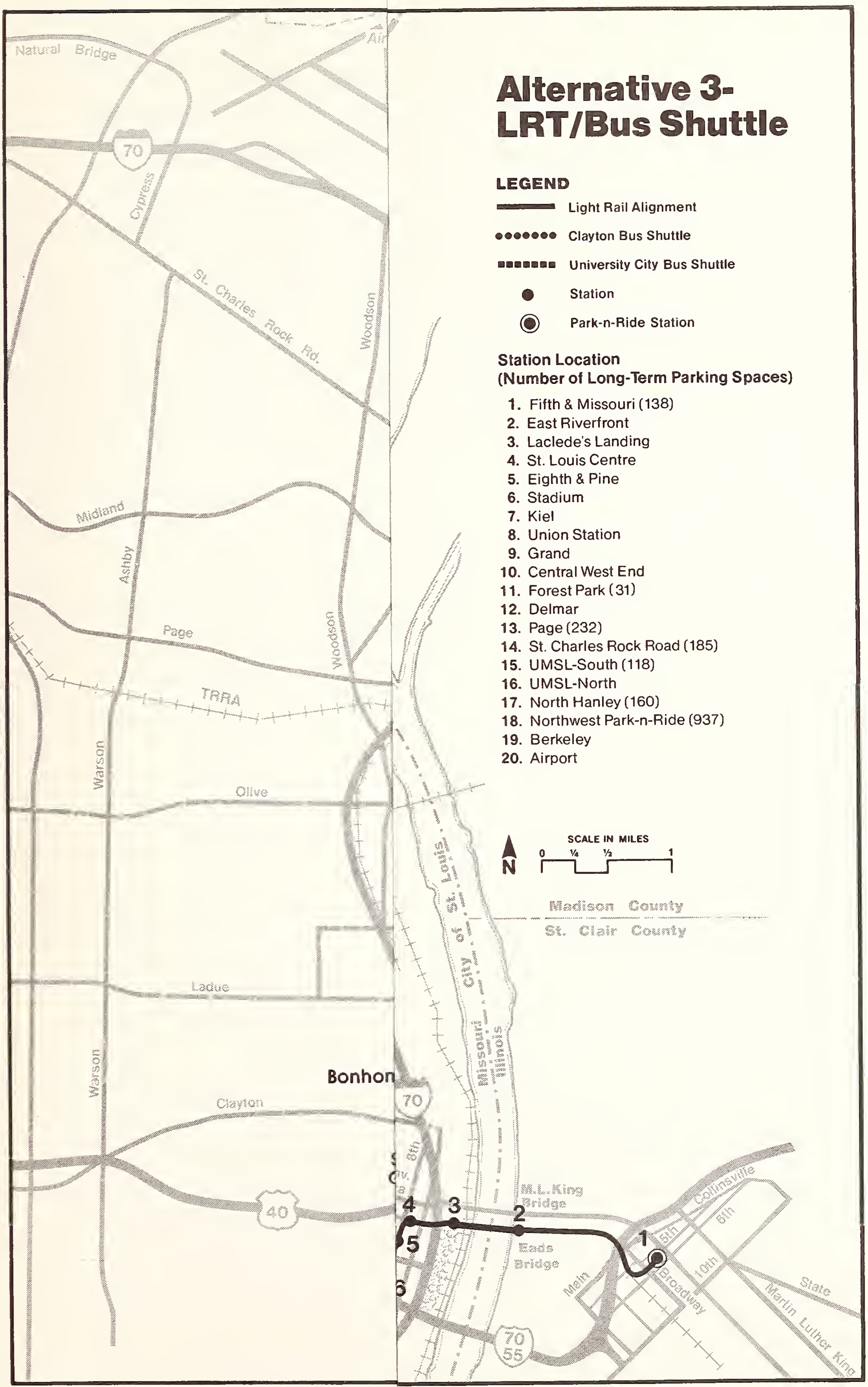
The AA/DEIS LRT station at Kingshighway with pedestrian access to Euclid was shifted to Euclid to fit with the preferences of medical center officials and to be able to develop a high-level platform. The AA/DEIS station located immediately west of DeBaliviere has been shifted east of DeBaliviere to avoid conflict with currently underway development and to better accommodate the bus shuttle with a turnaround as well as to provide for potential joint development. The AA/DEIS park-n-ride lot at St. Charles Rock Road was shifted from a shared status in an existing parking lot west of the N&W trackage to surplus N&W right-of-way east of the N&W trackage.

The LRT alternative incorporates applicable TSM improvements (as described below) with an 18-mile light rail route and shuttle bus service on existing roadways between the Forest Park station and the St. Louis Galleria via the County Government Center in Clayton, and between the Delmar station and the St. Louis Galleria via the County Government Center as well. Figure 4 shows the primary LRT alignment and stations plus the bus shuttle routes; Table 2-II lists the changes in the TSM bus system designed to interface bus routes with LRT; and Figure 5 shows the 2000 LRT service levels and headways. The bus shuttle routes will match LRT headways at their respective LRT stations; they will serve local bus stops along their routes.

Three intermediate LRT alternatives are possible: a) building LRT from East St. Louis westward to the Central West End station, a distance of 7.1 miles, or 41 percent of the full length; b) building LRT from East St. Louis westward to the Delmar station, a distance of 9.2 miles, or 53 percent of the full length; and c) building LRT from East St. Louis westward to the UMSL-South station, a distance of 12.6 miles, or 72 percent of the full line length. Table 2-III gives the bus route modifications associated with each of the intermediate length LRT alternatives; option 3a does not include the bus shuttle connections to the County Government Center and the St. Louis Galleria.

Each of the TSM improvements will be included in the LRT project except for those recommended improvements which will be replaced or negated by LRT facilities and/or services to optimally respond to corridor transit demand. The excluded TSM improvements involve the freeway bus ramps to the I-70 reversible lanes, bus turnouts at Lindbergh and Page and at Lindbergh and Olive, and three park-n-ride lots (Dunn/Waterford, North Hanley/ I-270, and I-170/Natural Bridge). Express buses from outlying areas which presently use the I-70 reversible lanes will interface with LRT prior to reaching the reversible lanes, thus obviating the need for bus ramp improvements at the reversible lanes. Similarly, bus route volumes will be reduced at the proposed Lindbergh turnouts with the LRT/bus shuttle alternative, thus negating the need for the turnouts. Also, the three TSM park-n-ride lots are too close to the LRT park-n-ride lots to draw patrons, since their use would necessitate an additional mode change (a bus ride) to reach LRT. The three intermediate-length LRT alternatives include all of the TSM improvements, except for Alternative 3c (UMSL-South) which excludes the bus turnouts at Lindbergh and Page and at Lindbergh and Olive.

Coordinated bus and LRT operations will minimize transfer time in keeping with the system's primary operational emphasis on providing improved commuter service for work-related travel in peak periods. Union Station, Delmar, and North Hanley LRT stations will be operated as "time points" providing additional recovery time to assure overall schedule reliability.



Alternative 3-LRT/Bus Shuttle

LEGEND

━━━ Light Rail Alignment
●●●●●●● Clayton Bus Shuttle
■■■■■■■ University City Bus Shuttle
● Station
◉ Park-n-Ride Station

Station Location (Number of Long-Term Parking Spaces)

1. Fifth & Missouri (138)
2. East Riverfront
3. Laclede's Landing
4. St. Louis Centre
5. Eighth & Pine
6. Stadium
7. Kiel
8. Union Station
9. Grand
10. Central West End
11. Forest Park (31)
12. Delmar
13. Page (232)
14. St. Charles Rock Road (185)
15. UMSL-South (118)
16. UMSL-North
17. North Hanley (160)
18. Northwest Park-n-Ride (937)
19. Berkeley
20. Airport

Figure 4

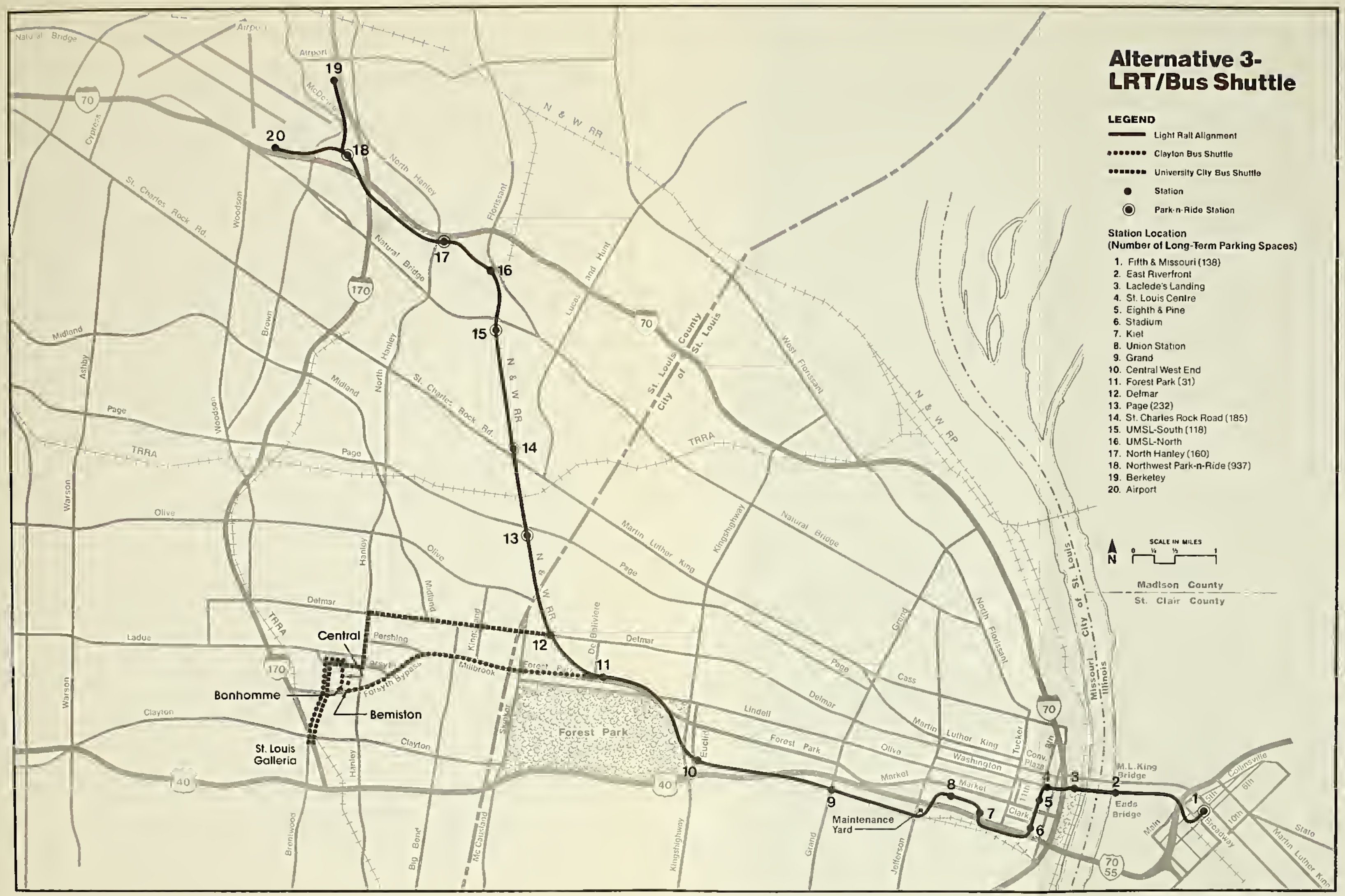

Alternative 3-
LRT/Bus Shuttle
LEGEND
Light Rail Alignment
Clayton Bus Shuttle
University City Bus Shuttle
Station
Park-n-Ride Station
Station Location
(Number of Long-Term Parking Spaces)
1. Fifth & Missouri (138)
2. East Riverfront
3. Laclede's Landing
4. St. Louis Centre
5. Eighth & Pine
6. Stadium
7. Kiel
8. Union Station
9. Grand
10. Central West End
11. Forest Park (31)
12. Delmar
13. Page (232)
14. St. Charles Rock Road (185)
15. UMSL-South (118)
16. UMSL-North
17. North Hanley (160)
18. Northwest Park-n-Ride (937)
19. Berkeley
20. Airport
SCALE IN MILES
0 ¼ ½ 1
N
Madison County
St. Clair County
City of St. Louis
Missouri
Illinois
St. Louis County
City of St. Louis
Central
Bonhomme
Bemiston
St. Louis Galleria
Forest Park
Maintenance Yard
Natural Bridge
Airport
70
170
40
70 55
N & W RR
TRRA
St. Charles Rock Rd.
North Hanley
Florissant
Lucas and Hunt
West Florissant
Midland
Page
Olive
Delmar
Ladue
Pershing
Forsyth
Forsyth Bypass
Millbrook
Clayton
Lindell
Forest Park
Martin Luther King
Kingshighway
Grand
Jefferson
Market
Washington
Olive
Cass
Tucker
Conv. Plaza
Clark
11th
8th
M.L.King Bridge
Eads Bridge
Collinsville
Broadway
State
Main
Woodson
Brown
Warson
Ashby
Cypress
Brentwood
Hanley
Big Bend
McCausland
Skinker
Kingsland
DeBaliviere
Euclid
North Florissant
McDonnell
Natural Bridge

Figure 4

The LRT route will be double track throughout except for the 1.1-mile segment from the Northwest Park-n-Ride station to the Airport, which will be a single track accommodating bi-directional operation. The LRT alignment's termini will be stub-ended.

The LRT alignment will use the existing Eads Bridge rail deck and Eighth and Washington tunnel owned by TRRA in downtown St. Louis, the northernmost edge of TRRA right-of-way from downtown through Mill Creek Valley to Grand, and N&W trackage from Grand to a point north of Natural Bridge, with a second track added on the part of the N&W line between Page and the Florissant Road area. Railroad freight operations will be accommodated on separate parallel tracks served from Grand and on LRT trackage between 1:00 a.m. and 5:00 a.m. between the Florissant Road area and Page. Gantlet tracks will be developed around those LRT stations (St. Charles Rock Road and UMSL-South) where the wider-width freight cars using LRT alignment on a time-sharing basis must be accommodated. This requirement may be eliminated if the Page-area industries can be served from the TRRA's West Belt line. The former baggage tunnel connecting the REA building with Union Station will be used for LRT; it will be accessed on the east through the REA building basement and extended on the west under Twentieth Street and part of Clark Street.

New right-of-way will be developed for LRT from the Eads Bridge east rail approach, which will be reconstructed, to the terminus in East St. Louis. The East St. Louis alignment will parallel both sides of Broadway beneath the MacArthur Bridge rail approach and the I-55/70 viaducts, then curve south onto a vacated portion of Railroad Avenue, and then curve into Fifth Street with a terminus near Missouri Avenue. The alignment will involve signalized crossings of Broadway immediately west of the MacArthur Bridge rail approach for the eastbound LRT track and immediately east of the I-55/70 viaducts for the westbound LRT track, plus signalized LRT crossings of Main and of Fourth Streets at Railroad Avenue as well as Broadway at Fifth Street. Fifth Street between Broadway and Missouri Avenue will be converted into a transit mall, including closing the Division Street crossing of Fifth Street.

New LRT right-of-way will be developed in downtown St. Louis paralleling Fourteenth and Clark Streets between the rail yards and the

TABLE 2-II
BUS ROUTE MODIFICATIONS FOR LRT/BUS SHUTTLE ALTERNATIVE

Route (LRT Station Interface)*		Modifications
33X	Dorsett-Lackland Express	These Missouri routes will be eliminated, with LRT and present or increased routes providing service to the affected areas. (The Clayton portion of the 97 Delmar-Forsyth will be replaced with the University City Bus Shuttle.)
97	Delmar-Forsyth	
7X	Maryland Heights Express (North Hanley)	These Missouri routes will be terminated at an LRT station.
9X	Midland Express (Northwest Park-n-Ride)	
32X	M. L. King Express (St Charles Rock Rd.)	
93X	Lindell Express (Forest Park)	
94X	Page Express (Page)	
194X	University City Express (Delmar)	
204X	St. Charles Express (North Hanley)	
374X	Shackleford Express (Northwest Park-n-Ride)	
12	Florissant-McDonnell (Berkeley)	These Missouri routes will be rerouted and extended as needed to interface with an LRT station.
13	Union (Central West End)	
18	Taylor (Central West End)	
30	Cass (St. Charles Rock Rd.)	
47	Cross County (UMSL-North)	
51	Clayton Road-Litzsinger (Forest Park)	
52	Forest Park (Central West End)	
61	Chambers Rd. (Berkeley)	
62	Kirkwood-Clayton-Wellston (St. Charles Rock Rd.)	
70	Grand (Grand)	
74	Florissant (Berkeley)	
90	Hampton (Forest Park)	
91	Olive (Delmar)	
94	Page (Page)	
104	Natural Bridge (UMSL-South)	
104X	Natural Bridge Express (UMSL-South)	
614	Lucas Hunt (St. Charles Rock Rd.)	
631	Baden-Clayton (UMSL-South)	
501	Caseyville	These Illinois routes will be terminated at the Fifth & Missouri LRT station.
502	Cahokia	
503	Collinsville-Edwardsville	
506	Missouri Ave.-M. L. King	
513	Alton-St. Louis--Illinois Branch	

TABLE 2-II (Continued)
BUS ROUTE MODIFICATIONS FOR LRT/BUS SHUTTLE ALTERNATIVE

Route (LRT Station Interface)*		Modifications
533	Granite-Venice-East St. Louis	
560	Belleville-St. Louis	
702	Rosemont	
703	Washington Park	
706	Alta Sita	
707	20th & Central	
503P	Edwardsville Park-Ride	These Illinois routes will be rerouted and extended as needed to interface with the Fifth & Missouri and St. Louis Centre LRT stations.
504X	O'Fallon Express	
505X	Waterloo-St. Louis Express	
514R	Bethalto-St. Louis Rapid	
553X	Maryville-Beltline Express	
554X	Collinsville Express	
559X	Swansea-W. Main Express	
560X	Belleville Express	
513	Alton-St. Louis--Missouri Branch (St. Louis Centre)	These Illinois routes will be rerouted and extended as needed to interface with an LRT station.
513P	Alton-Hazelwood Park-Ride (Berkeley)	
515P	Alton Park-Ride via Eastgate (Eighth & Pine)	
516X	Alton Express via Wood River (Eighth & Pine)	
530	McKinley Bridge (St. Louis Centre)	
530X	Pontoon Express (Eighth & Pine)	

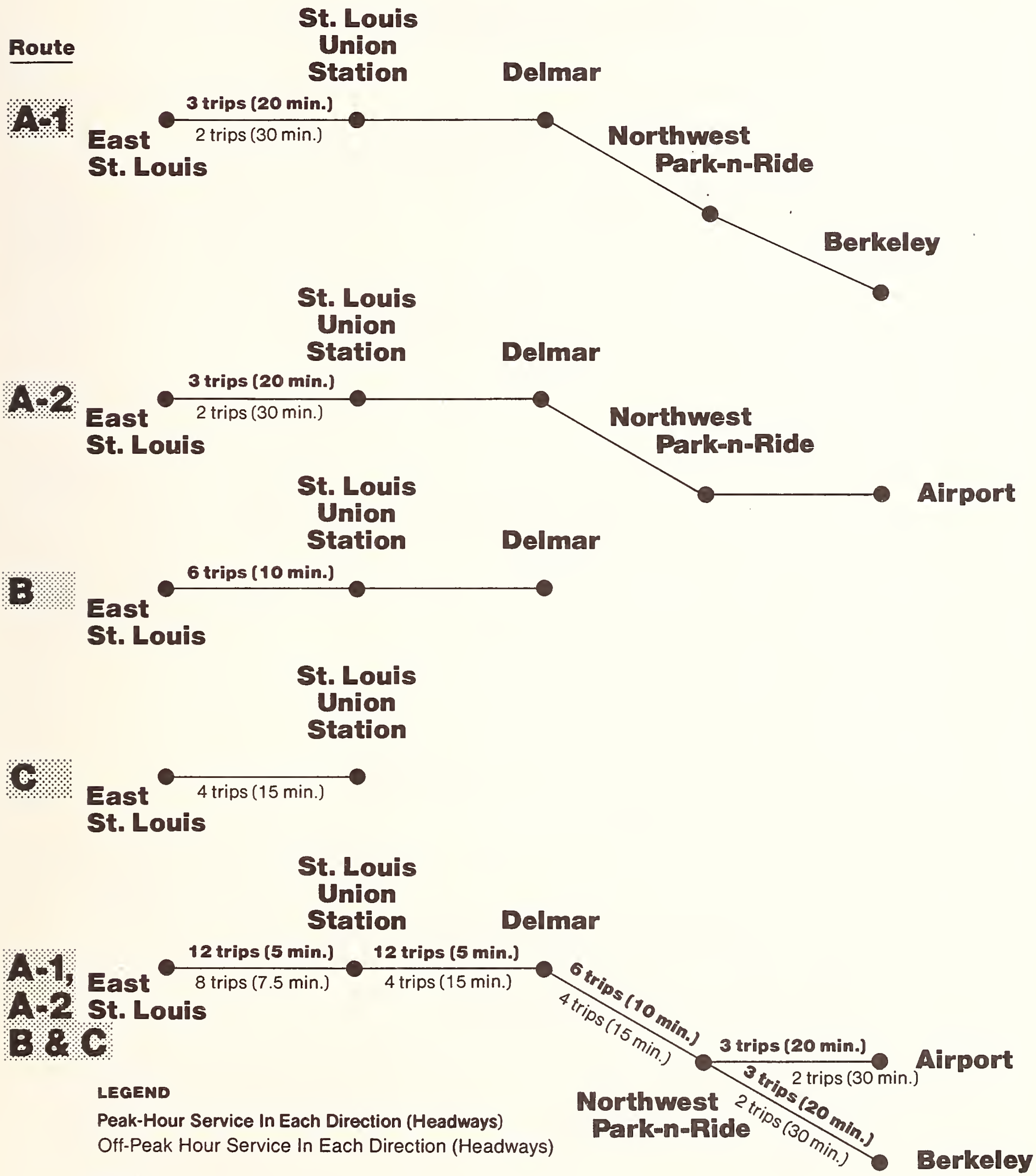
* Buses presently pass or will be rerouted in order to stop at the parenthetically-noted LRT stations.

REA building. This alignment will involve closing Spruce and Fifteenth Streets plus two alleys (one known as Johnson Street and the other as Belmont Street) as well as grade-separating Sixteenth Street.

New LRT right-of-way will be developed from a point south of Florissant Road to the western termini of the alignment. The alignment will extend across the north part of UMSL's main campus parallel to Bellerive Drive with grade-separated crossings of the University's East Campus Drive and Mark Twain Drive, and an at-grade crossing of nearby Geiger Road. The alignment will then parallel I-70 on existing highway right-of-way crossing underneath North Hanley Road, over Springdale, and through the I-170/I-70 interchange generally around the south and west sides of the interchange. From the northwest quadrant of the I-170/I-70 interchange, the alignment will split with one leg paralleling I-170, crossing Scudder Road at grade, and terminating about 1,300 feet south of Airport Road. The other leg will extend around the north and west sides of the Washington Park Cemetery, crossing under McDonnell Boulevard immediately north of I-70 between the I-70 airport exit ramp and the Cargo Service Road, and terminate at the rooftop level of the East Concourse expansion where LRT will interface with a proposed airport people-mover, which will extend to the main terminal.

The LRT alternative includes park-n-ride facilities adjacent to the northwest side of the Fifth Street transit mall in East St. Louis (138 spaces/2.2 acres), at the Forest Park station on DeBaliviere (31 spaces/0.6 acres), at Page on an existing lot owned by St. Louis County (232 spaces/4.0 acres), at St. Charles Rock Road on N&W property (185 spaces/2.6 acres), at Natural Bridge off UMSL's East Entrance Drive on an existing University paved area which will be upgraded (118 spaces/2.0 acres), at North Hanley Road on property to be acquired (160 spaces/4.0 acres), and on airport property off McDonnell Boulevard in a restricted development area (937 spaces/8.0 acres). (See Figure 4 and Appendix C park-n-ride drawings.) An LRT maintenance and storage facility will be developed by adapting an unused railroad facility between Jefferson and Twenty-First Street immediately southwest of Union Station. Fifteen power substations, providing 750-volt DC traction power, will be located

2000 LRT Service and Headways



NOTE:

LRT will operate between 5:30 a.m. and 1:00 a.m. with service to 2:00 a.m. between Fifth & Missouri and Union Station

Figure 5

TABLE 2-III
BUS ROUTE MODIFICATIONS FOR INTERMEDIATE-LENGTH LRT ALTERNATIVES

Route (LRT Station Interface)*		Modifications
--3a LRT (CENTRAL WEST END) BUS ROUTE MODIFICATIONS--		
13	Union (Central West End)	These routes will be rerouted and extended as needed to interface with an LRT station.
18	Taylor (Central West End)	
52	Forest Park (Central West End)	
70	Grand (Grand)	
95	Kingshighway (Central West End)	
--3b LRT (DELMAR) BUS ROUTE MODIFICATIONS--		
97	Delmar-Forsyth	The part of this route west of the Delmar station will be deleted.
93X	Lindell Express (Forest Park)	These routes will be modified slightly to terminate at an LRT station.
194X	University City Express (Delmar)	
13	Union (Central West End)	These routes will be rerouted and extended as needed to interface with an LRT station.
18	Taylor (Central West End)	
52	Forest Park (Central West End)	
62	Kirkwood-Clayton-Wellston (Delmar)	
70	Grand (Grand)	
90	Hampton (Forest Park)	
91	Olive (Delmar)	
95	Kingshighway (Central West End)	
--3c LRT (UMSL-SOUTH) BUS ROUTE MODIFICATIONS--		
33X	Dorsett-Lackland Express	This express route will be deleted and the part of the local route west of the Delmar station will be deleted.
97	Delmar-Forsyth	
32X	M. L. King Express (St. Charles Rock Rd.)	These routes will be terminated at an LRT station.
93X	Lindell Express (Forest Park)	
94X	Page (Page)	
104X	Natural Bridge Express (UMSL-South)	
194X	University City Express (Delmar)	
13	Union (Central West End)	These routes will be rerouted and extended as needed to interface with an LRT station.
18	Taylor (Central West End)	
30	Cass (St. Charles Rock Rd.)	
32	Wellston-M. L. King (St. Charles Rock Rd.)	
47	Cross County (UMSL-South)	

TABLE 2-III (Continued)
BUS ROUTE MODIFICATIONS FOR INTERMEDIATE-LENGTH LRT ALTERNATIVES

Route (LRT Station Interface)*		Modifications
52	Forest Park (Central West End)	
62	Kirkwood-Clayton-Wellston (Delmar)	
70	Grand (Grand)	
90	Hampton (Forest Park)	
91	Olive (Delmar)	
94	Page (Page)	
95	Kingshighway (Central West End)	
104	Natural Bridge (UMSL-South)	
614	Lucas Hunt (St. Charles Rock Rd.)	
631	Baden-Clayton (UMSL-South)	

* Buses presently pass or will be rerouted in order to stop at the parenthetically-noted LRT stations.

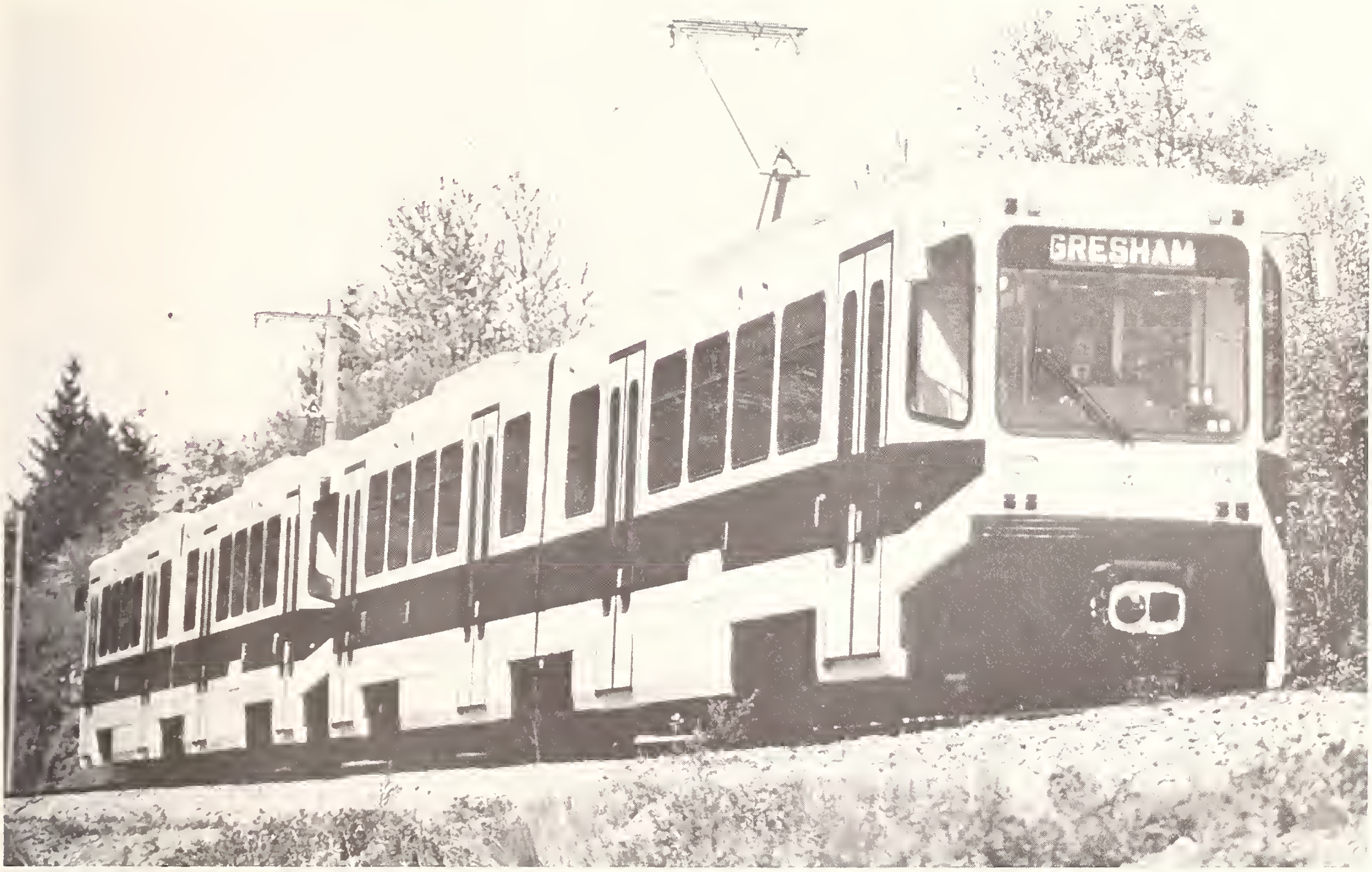
NOTE: Illinois bus route modifications for 3a, 3b, and 3c will be the same as for the full LRT/Bus Shuttle alternative as given in Table 2-II.

at about one-mile intervals near stations along the length of the LRT alignment, and one dedicated power substation will be located in the yards and shops area. (See Appendix C power subsystems drawings.)

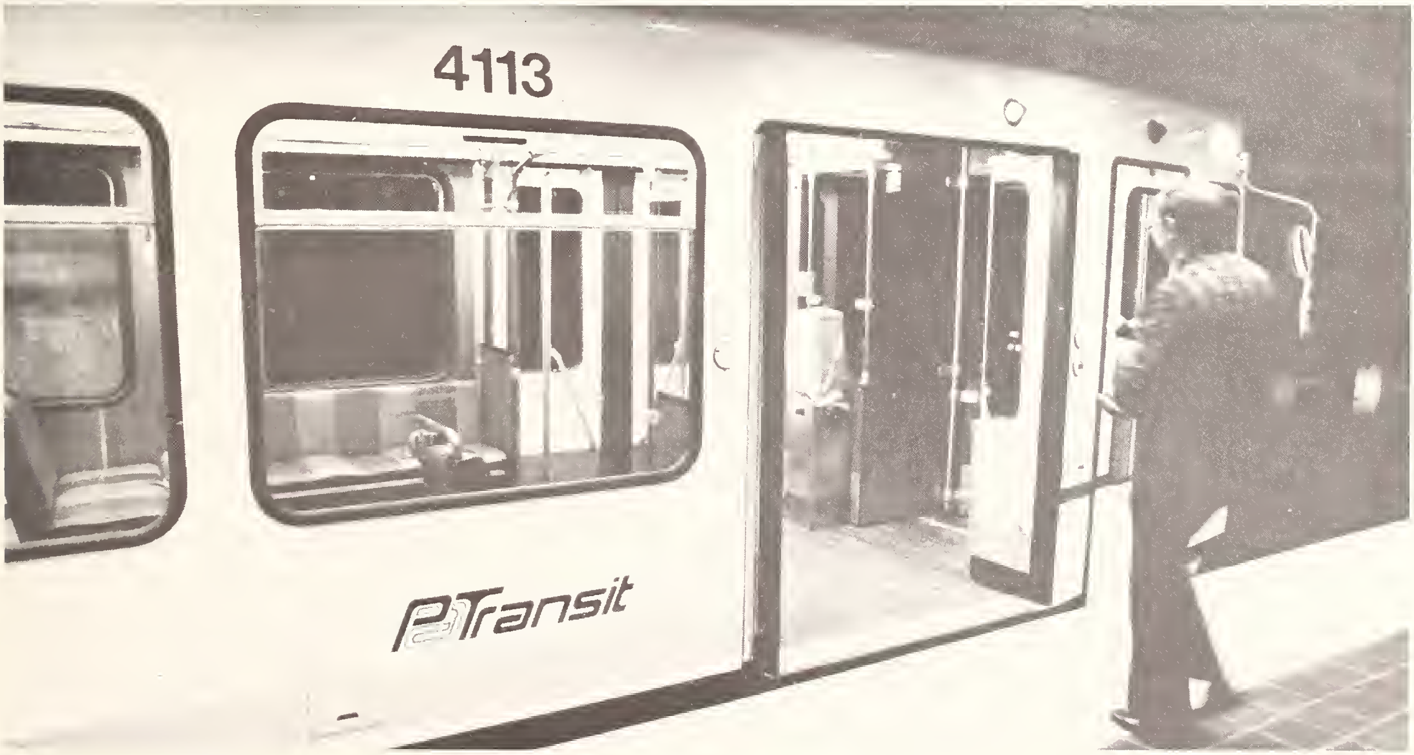
The LRT vehicle is a steel-wheel on steel-track electric vehicle typically powered from an overhead catenary (wire). New rail alignments and existing (rehabilitated) track beds will be fitted with continuous welded rail, except in track stretches with tighter curves, where jointed rail will be used. The vehicles will be 80 to 93 feet long, eight-feet-eight-inches to nine-feet-three-inches wide, and 12-feet-three-inches high plus another 2.5 feet to the top of the pantograph, which connects with the catenary. The catenary may be hung from 12.5 to 22 feet above the ground and will typically be supported by double-arm poles spaced about 200 feet apart. Ultra-light catenary trolley wire or direct suspension trolley wire may be considered in final design as a means of reducing overhead wiring in visually sensitive areas, although trolley wire requires closer pole spacing, normally about 100 feet. The LRT vehicles will be air conditioned and articulated (they will bend in the middle), they will be double-ended (they may be operated from either end), and they will seat 64 to 76 passengers while accommodating 80 to 100 standees with a full load capacity of 184 to 226 persons. The vehicle will have a maximum operating speed of about 55 mph, which will be typical of long, straight stretches of exclusive right-of-way, and an operating speed of 25-35 mph in areas with multiple at-grade crossings or curved alignment. An LRT vehicle has the capacity to stop in an emergency equal to that of a bus. A total of 31 cars, which includes five spares, are projected to be needed. One-car trains will operate in base periods and two-car trains will operate in peak periods. (See Figure 6 typical vehicle pictures.)

LRT stations will be fully accessible to the elderly and handicapped. The LRT design will provide for elevators from street to platform level where grade differences exceed ramping potential, for escalators in high-traffic stations, and for high platform stations, providing direct wheelchair access. Side platforms will each be 200 feet long and 10 feet wide; center platforms will typically be 200 feet

Typical LRT Vehicles



Portland, Oregon's LRT Vehicle



Pittsburgh, Pennsylvania's LRT Vehicle

Figure 6

long and 16-feet-six-inches wide. Additional platforms for surge tracks will be provided at the Stadium station to accommodate peak stadium usage. At-grade and aerial platforms will be open-air and partially covered with canopies; subway station platforms will be fully covered, with the possible exception of open skylights, and, like the other platforms, they will not have any other special climate-control provisions.

Station design will be coordinated to create a unified systemwide identity yet allow for appropriate responses to individual station location conditions. A variety of compatible materials and finishes will be specified, including, for example, granite warning strips along platform edges and pavers on the balance of platform surfaces. Landscaping will also be incorporated into each surface station design. (See Figure 7 LRT station renderings.)

At those stations where transit users will need to cross LRT tracks at grade (Kiel, Forest Park, Page, St. Charles Rock Road, UMSL-South, UMSL-North, North Hanley, and Northwest Park-n-Ride), signals will be provided to alert pedestrians to approaching and departing trains. Low metal fencing between the east- and westbound tracks will be provided within such station areas to channelize pedestrians to the signalized area which will be raised up to provide a smooth crossing flush with the top of the rails. Alternatively, staggered platforms with a midpoint crossover will be investigated in final design at those locations where track conditions will permit the added station length (Forest Park, Page, St. Charles Rock Road, and UMSL-South). This variation places all pedestrian crossings at the departing end of station platforms.

Closed-circuit television on each station platform, lighting, public emergency telephones connected to an LRT central control monitoring unit at the LRT yards and shops headquarters, plus security personnel staffing are among the measures which will be used to enhance safety for system users. Public address speakers will be placed at each station and connected with the system's central control monitoring unit. A two-way radio communication system with separate channels will also be provided for train operations, security, and maintenance personnel.

LRT Station Renderings

Page Station

Eighth & Pine Station

Figure 7

Railroad-style flashers and gates with optional bells will be installed at each of the LRT alignment's 17 grade crossings (ten of which are existing rail crossings) except at the three Broadway crossings in East St. Louis, where traffic lights will be installed. The Scudder Road crossing signal will be interconnected with the nearby I-170 traffic signal, and bells will be excluded at the Geiger Road crossing, or quieter bells will be used.

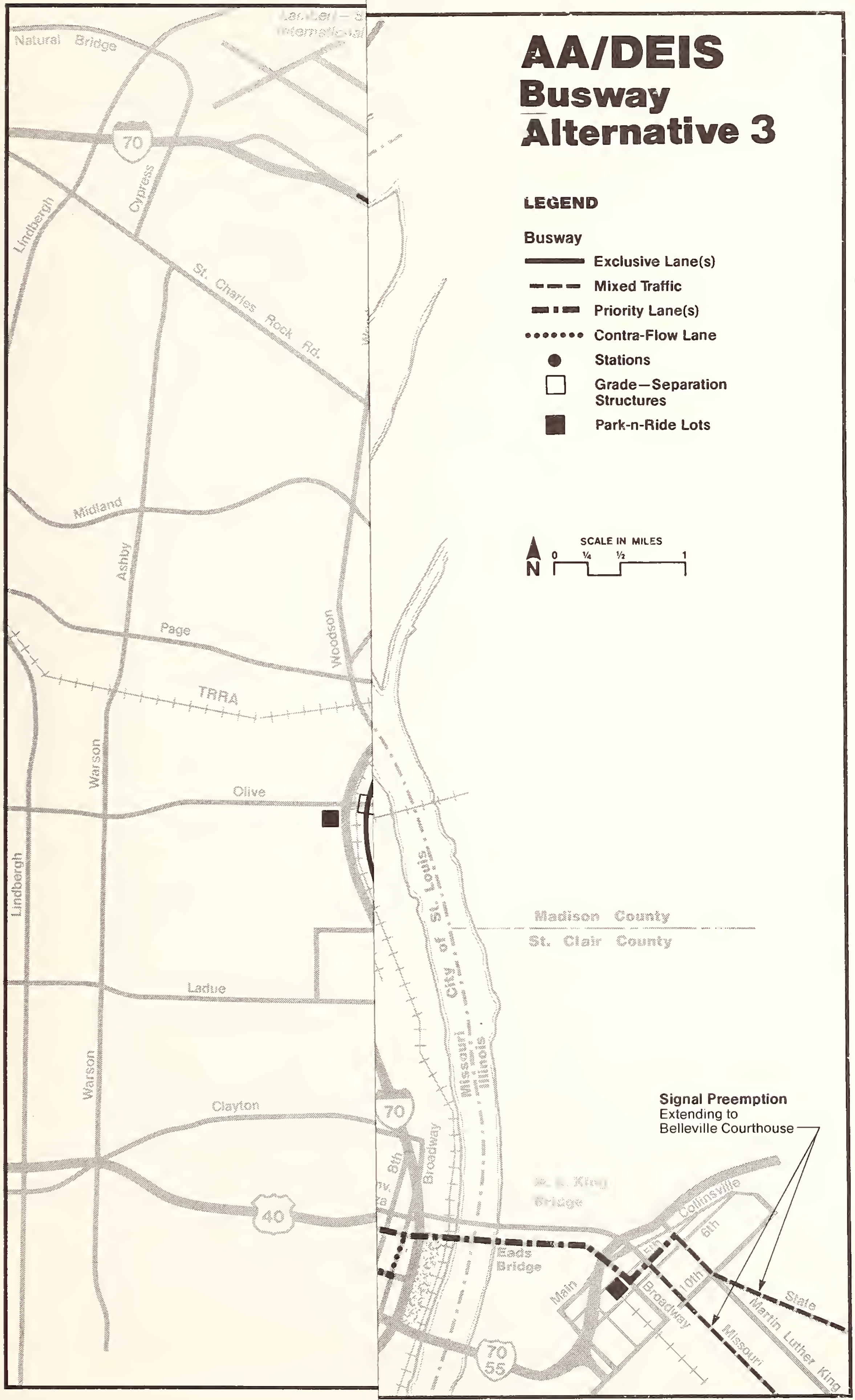
LRT fares are budgeted initially at $1.00, or $1.10 if bus connections are included in the trip, and they are assumed to rise at the rate of inflation. Discount fares and passes similar to those provided by Bi-State are expected to be provided. A proof-of-payment barrier-free fare collection system will be used. Passengers will purchase their tickets in the station area at self-service vending machines and present the ticket to roving inspectors on demand; escalating fines are used to enforce compliance. This system permits all doors to be used for loading and unloading passengers, thus reducing the dwell time in station areas. Park-n-ride lots are expected to be operated without charge.

The LRT vehicle operator will be in two-way radio communication with the LRT system's central control. Operating "on sight" and prepared to stop within the range of vision, the operator will be governed by posted signs, traffic signals, and automatic block signals wherever such devices are positioned.

d. Busway (AA/DEIS Alternative 3)

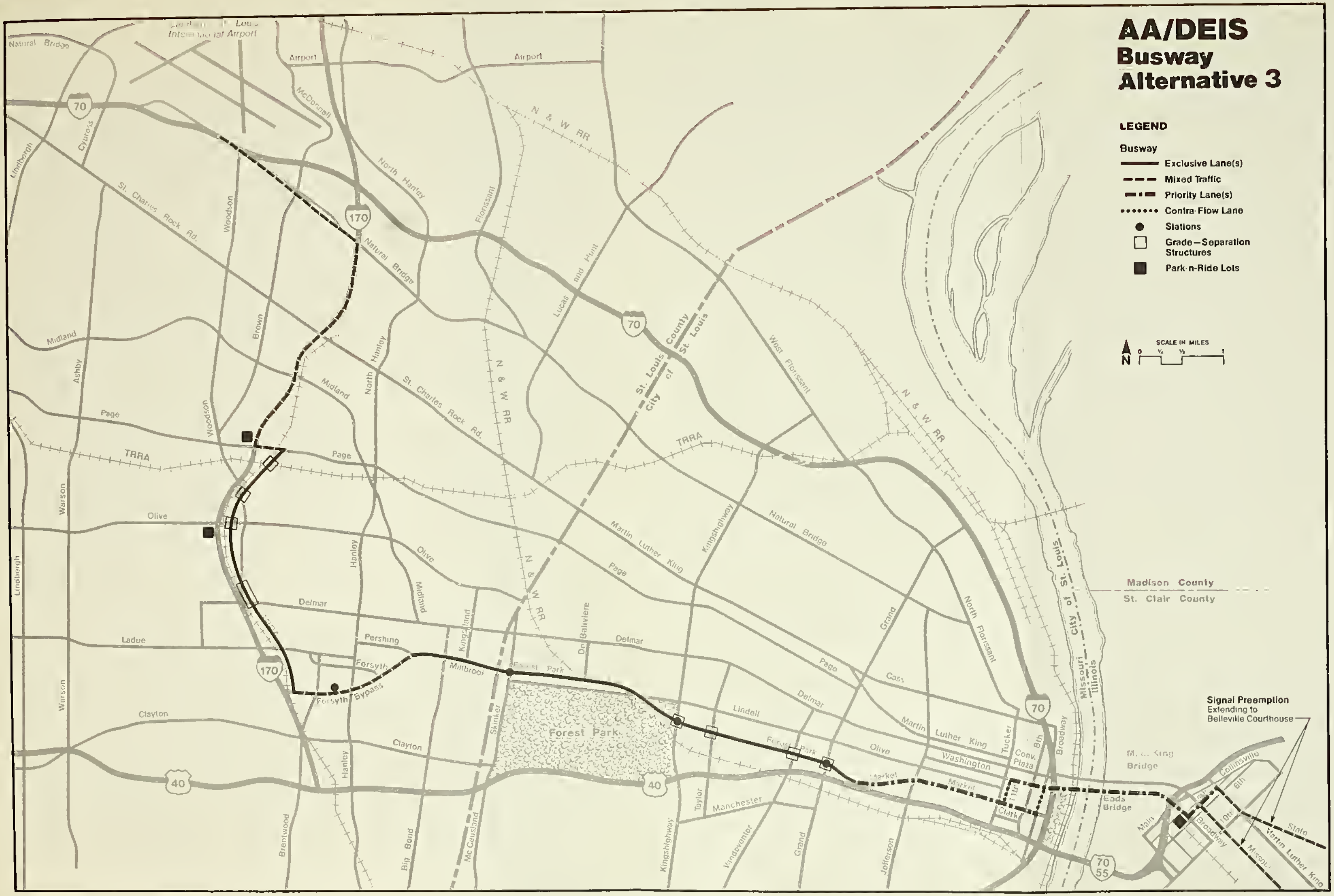
The following summary discussion of the busway alternative is as given in the AA/DEIS. This alternative was not studied in PE, and is not discussed further in this FEIS.

The busway alternative incorporates the TSM improvements with special bus lanes to speed the flow of buses operating in the priority corridor during peak periods. The busway concept involves channeling multiple bus routes into a single high-speed corridor connecting outlying areas to the core area, with limited intermediate stops. Figure 8 shows the busway alignment which involves four operating conditions: mixed traffic, single-lane exclusive right-of-way, double-lane exclusive



AA/DEIS Busway Alternative 3

Figure 8



AA/DEIS Busway Alternative 3

Figure 8

right-of-way, and CBD diamond lanes/contra-flow lanes. The extent of exclusive as opposed to non-exclusive right-of-way is based on the number of projected bus movements, the future traffic-handling capacity of the affected roadways, and the potential of existing right-of-way conditions to accommodate exclusive-lane set-asides. Bus routes will be modified to take advantage of the busway improvements, including rerouting of the 93 Lindell bus as a shuttle on the busway between downtown St. Louis and Clayton.

Buses will operate in mixed traffic on Natural Bridge, I-170, and other roadways north and west of Page. A single lane of new pavement (12 feet wide plus an eight-foot shoulder) parallel to the TRRA trackage and I-170 will accommodate peak-period exclusive bus use from Page to the Forsyth Bypass; the reverse flow will be handled in mixed traffic on I-170. About 1,200 feet of TRRA trackage between Ladue and the Forsyth Bypass will need to be relocated westward within the existing right-of-way to accommodate the busway. A ramp will be provided both from the westbound Forsyth Bypass lanes to the busway and from the busway into the existing service drive that connects with the existing eastbound Forsyth Bypass on-ramp. Buses will operate in mixed traffic on the Forsyth Bypass, using the on- and off-ramps to serve the Clayton CBD and to interface with cross-county transfers at the city-owned parking lot (a potential busway loop with a park-n-ride, kiss-n-ride lot, depending on the interest of the city of Clayton) on Shaw Park Drive between Meramec and Central.

Two 11-foot-wide lanes of new pavement between Pershing and Compton in the middle of a reconstructed Millbrook, a reconstructed Forest Park Parkway, and the Forest Park Boulevard median will accommodate bi-directional peak-period exclusive bus use. Where possible, the existing lanes of pavement will be surfaced with asphalt and used for the busway and the revised roadway lanes. The busway construction on Millbrook will require using about half of a 30-foot-deep right-of-way strip between Pershing and Big Bend owned by St. Louis County and maintained by adjacent property owners in Maryland Terrace. The busway construction along Millbrook will also necessitate acquiring right-of-way from Washington University and partially reconstructing the brick plaza at the Greenway. The busway construction opposite the Washington University power plant will require either relocating the plant's coal hopper, narrowing the busway lanes, narrowing the width of the Millbrook traffic lanes, or some combination of these measures to stay within the available right-of-way. The busway construction along Forest Park Parkway will require taking some land from the Catlin tract alongside the service drive at Des Peres and at Skinker. The busway construction along Forest Park Boulevard will require using some of the existing center-lane pavement in addition to the median, and restriping the roadway, narrowing slightly the present through-lanes and parking lanes. East- and westbound ramps at Compton will connect the exclusive busway lanes with priority bus lanes on Market.

Raised curbs, metal guard rails, or concrete "Jersey" barriers will separate the busway from adjacent roadways. Displaced fencing and walls will be replaced in kind; displaced planted areas will be replaced in kind elsewhere within the affected communities in consultation with the respective municipalities and abutting neighborhood organizations designated by the municipalities. (Parts of the planted public right-of-way along Millbrook are owned by the St. Louis County Highway Department, University City, and the abutting residential subdivision associations.)

Stations will be provided at Skinker, Kingshighway, and Grand to accommodate cross-town transfers. The stations at Kingshighway and Grand will have turnout lanes in each direction to permit buses to leave the through-traffic lane. The Skinker station will not, because the public right-of-way is not wide enough to permit providing turnout lanes. All Bi-State buses will stop at each busway station including the Clayton CBD to board and discharge passengers. Each busway station will be fully accessible to the elderly and handicapped; the existing mix of accessible and non-accessible buses in the Bi-State fleet will be retained.

Existing underpasses will be reconstructed at Union, Grand Drive, Kingshighway, and Grand to accommodate both the existing roadway and the busway; busway-only overpass structures will be built over the

TRRA and the River Des Peres Creek (near Page), Woodson, Olive, Delmar, Taylor, and Vandeventer. The latter two provide for cross traffic and local-traffic left-turns beneath the busway. The Bristol Meyers company parking lot entrance and its crossing of the TRRA tracks will need to be relocated northward to reduce the length of the busway structure over Delmar. Signalized intersections (without signal preemption generally because of the number of buses) will govern at Ladue, Pershing, Big Bend, Skinker, Des Peres, DeBaliviere, Euclid, Newstead, Boyle, Sarah, and Spring.

A curbside "diamond lane" (a bus-priority-designated lane) in each direction on Market between Compton and Tucker will accommodate exclusive bus use during the peak period while a curbside diamond lane on both Market and Washington east of Tucker and a curbside contra-flow lane on both Broadway and Eleventh will accommodate exclusive bus use at all times. The contra-flow bus lanes will be operated in the opposite direction of the other traffic using those two one-way streets. The Washington, Eleventh, Market and Broadway bus lanes will form a one-way loop operated in a counter clockwise direction. The exclusive Washington bus lane will extend across Eads Bridge on Broadway and Fifth in East St. Louis for peak-period use, and connect with priority bus lanes offering signal preemption on Missouri and M. L. King/State/West Main to the County Courthouse in Belleville.

Busway park-n-ride lots are proposed at Page and Olive and in East St. Louis and are expected to be operated without charge. An option park-n-ride lot at the Clayton municipal parking lot would require a charge to control its use.

The fare structure with the busway alternative will be the same as with the no-action alternative. The present Bi-State bus maintenance facilities will be used.

The AA/DEIS provides additional detail on the busway alternative.

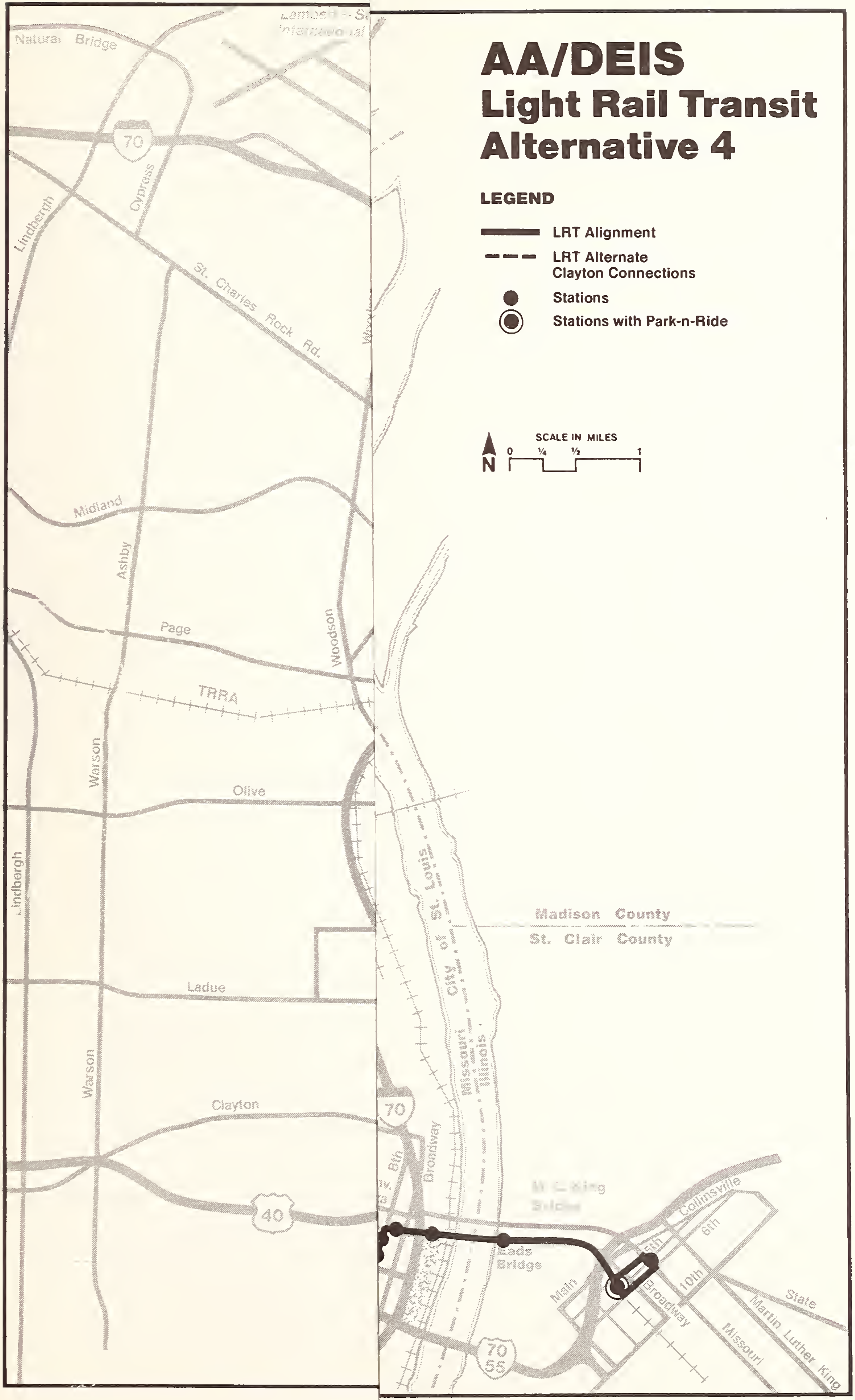
e. Light Rail Transit (AA/DEIS Alternative 4)

The following summary discussion of LRT Alternative 4 is extracted, in part, from the AA/DEIS. This alternative was not studied in PE, and is not discussed further in this FEIS.

The LRT Alternative 4 incorporates the TSM improvements with a light rail route connecting major activity centers in the region. Figure 9 shows the primary AA/DEIS LRT alignments, stations, and park-n-ride lots. Coordinated bus and LRT operations will minimize transfer time in keeping with the system's primary operational emphasis of providing computer service for work-related travel in peak periods. The LRT route will be double track throughout except for the loop in East St. Louis and the short segment from the National-Bridge-at-Brown-Road station to the Airport.

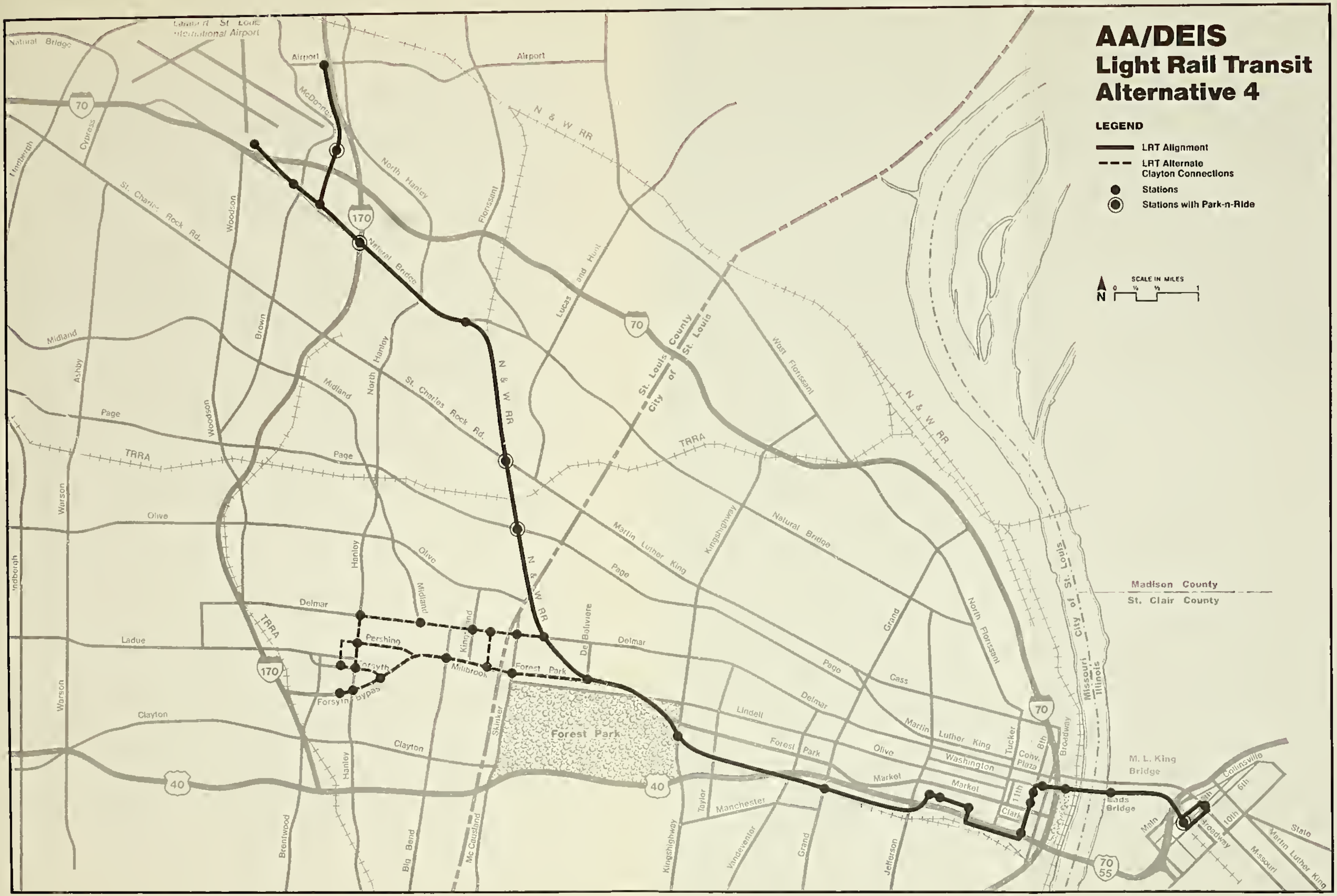
The LRT alignment will use the existing Eads Bridge rail deck and the Washington Avenue/Eighth Street tunnel owned by TRRA in downtown St. Louis, the northernmost edge of TRRA right-of-way from downtown through Mill Creek Valley to Grand, and N&W trackage from Grand to Natural Bridge, with a second track added on the part of the N&W line between Page and Natural Bridge. Railroad freight operations will be accommodated between 1:00 a.m. and 6:00 a.m. on the N&W trackage. On- and off-street right-of-way will be required for the single-track loop in East St. Louis, for a short distance along Fifteenth in downtown St. Louis, for the Clayton connections, and for the parts of the alignment extending from the N&W trackage at Natural Bridge to McDonnell Douglas and Lambert Airport. On-street alignments will involve constructing track flush with the pavement, which will accommodate both LRT vehicles and the present traffic using such lanes. The former baggage tunnel connecting the REA building with Union Station will be used for LRT; it will be accessed on the east through the REA building basement and extended on the west to interface with a proposed Amtrak station between Twentieth and Twenty-First Streets.

Clayton connections, denoted 4A through 4F, were evaluated in the AA/DEIS. Alternatives 4A (Pershing), 4B (Forsyth), and 4C (Forsyth Bypass) extend from DeBaliviere to Clayton and involve development at grade, on structure (where right-of-way is constricted), and in tunnel (where traffic congestion may otherwise be a problem). Alternatives 4D (Greenway) and 4E (Delmar) extend from the LRT Delmar station through the University City loop area to Clayton; they involve at-grade and



AA/DEIS
Light Rail Transit
Alternative 4

Figure 9



AA/DEIS Light Rail Transit Alternative 4

Figure 9

on-structure components. A modified version of options 4B and 4C/D, termed 4F, provides for a tunnel from Pershing to the Carondelet and Central intersection of the County Government Center. Another possible variation on the Clayton LRT connection is to construct the link between Skinker/City Limits to the County Government Center or the entire link from DeBaliviere to the County Government Center in tunnel using the 4B or 4F alignments.

The part of the LRT alignment along Natural Bridge will involve a signalized at-grade crossing of Natural Bridge at the east entrance to UMSL's south campus and a separate right-of-way along the north side of Natural Bridge from that intersection to near the entrance to Bellerive Acres. A narrow strip of right-of-way will be required along the Natural Bridge frontages of the Normandy Junior High School and UMSL. LRT will have signal preemption through intersections along Natural Bridge and will override pedestrian crosswalk lights. A new traffic signal will permit LRT vehicles to cross from the exclusive LRT right-of-way on the north side of the street to right-hand-lane mixed-traffic operations from a point east of the Bellerive Acres entrance through the North Hanley intersection to a point east of the Bel Acres shopping center, where another traffic signal will permit the LRT vehicles to transition to an exclusive alignment on the north side of the Natural Bridge right-of-way. The LRT alignment will continue west underneath the recently-completed I-170 structure between the north bridge columns and the north bridge abutment, where the present slope fill will be removed. The Airport branch of the alignment will be built on structure with the segment between the Brown Road and Airport stations developed as a single track. The LRT Airport station will tie into the roof level of the new East Terminal (the International Building and central plant part of which was recently built along with Concourse D, which connects with the main terminal). (A roof-level airport people-mover will eventually connect the East Terminal with the main terminal.) The McDonnell Douglas branch will cross I-70 and Scudder Road on structure, and require right-of-way from Airport property including land within the Brownleigh subdivision which is being acquired by the Airport in compliance with FAA noise mitigation policies. Alternatively, alignments along I-70 are possible that avoid the mixed traffic LRT operations along Natural Bridge.

The LRT alternative includes park-n-ride facilities at Walnut in East St. Louis, at Page on an existing lot owned by St. Louis County, at St. Charles Rock Road on an existing flea market lot, at Natural Bridge and I-170 on the Bel Acres shopping center lot, and on airport property off McDonnell Boulevard in a restricted development area. The TSM park-n-ride lot at I-70 and Natural Bridge will be eliminated with LRT and used as a station site. An LRT maintenance and storage facility will be developed by adapting an unused railroad facility between Jefferson and Twenty-First Street immediately southwest of Union Station. Power substations will be located at intervals along the length of the LRT alignment.

2.3 CAPITAL COSTS

a. Cost Estimation Methods

Cost estimates were developed for the light rail alternative and each intermediate length LRT alternative. The estimates include the total cost of final design, property acquisition, construction inspection, and operating start-up.

The cost estimates for the LRT alternatives were developed by preparing preliminary engineering drawings on 50-foot-to-the-inch mapping prepared from April 19-21, 1985 aerial photography. Information on existing street and rail rights-of-way, property lines, and rail profiles was collected from the St. Louis city and county, Missouri, and Illinois highway departments; the N&W and TRRA; the St. Louis Metropolitan Sewer District (MSD); and the Airport Authority. Plan and profile drawings showing horizontal and vertical alignments for the LRT alternative are included as an appendix in this document. More detailed studies were made for important features, such as the subway stations, interstate-area aerial structures, and Eads Bridge modifications.

Multiple typical sections were developed and costed in order to accurately project the actual costs associated with building LRT at grade, on structure, in tunnel and under varying types of exclusive and nonexclusive right-of-way conditions. Unit costs were assigned to each of the components of these typical sections based on current rates for similar construction work in the St. Louis area and experience on other transit projects in the U.S. Telephone quotes from rail and vehicle suppliers, recent St. Louis County highway department bid experience on roadway construction, and the 1985 Means Construction Cost Data and Site Work documents for St. Louis were among the sources used to establish the unit prices. Trackwork; street improvements; bridge structures; retaining walls; tunnel improvements; utilities; electrification and power distribution; signals, communication, and control systems; stations and park-n-ride lots; and yards and shops were among the system components identified, measured, and multiplied by the appropriate unit cost values.

Contingency, design and construction management service costs, and inflation factors were added to the cost estimates. A 10 percent contingency factor was applied to the construction costs to account for the uncertainty of unknowns which may be encountered in more detailed final design work and actual construction. A five percent contingency factor was applied to vehicle purchases. Engineering design and construction management costs were budgeted at 16 percent of construction costs and vehicle purchases. In addition, an inflation factor of four percent per year was used to escalate project costs. Testing and start-up costs were also included.

b. Capital Costs

Table 2-IV summarizes the capital and right-of-way costs for the LRT alternative; Table 2-V details the capital cost components for the LRT/bus shuttle alternative. TR-24, "Capital Cost Estimates," provides additional data on the cost estimates. The TSM improvements and right-of-way are reduced for the LRT/bus shuttle and LRT (UMSL-South) alternatives, because certain TSM improvements would not be needed with these LRT alternatives as described above in part 2.2.c., Alternative 3 - Light Rail Transit (LRT)/Bus Shuttle.

TABLE 2-IV
CAPITAL AND RIGHT-OF-WAY COST SUMMARY
(in millions of 1984 and escalated dollars)**

	1 No-Action	2 TSM	3 LRT/ Bus Shuttle	3a LRT/ Bus (CWE)	3b LRT/ Bus Shuttle (Delmar)	3c LRT/ Bus Shuttle (UMSL-South)
TSM improvements and right-of-way	--	$ 7.3	$ 4.4	$ 7.3	$ 7.4	$ 6.6
Guideway improvements and right-of-way*	--	--	182.2	100.0	112.5	130.3
Bus Purchases		18.2	0	6.0	5.4	3.9
LRT vehicle purchases	--	--	33.6	16.3	17.3	19.4
Contingency and engineering	--	4.2	42.6	24.7	27.2	30.7
TOTAL COST IN 1984 DOLLARS	--	$ 29.7	$262.8	$154.3	$169.8	$190.9
Inflation cost**	--	8.6	78.9	46.3	51.1	57.4
ESTIMATE OF TOTAL COST EXPENDED THROUGH JANUARY 1990	--	$ 38.3	$341.7	$200.6	$220.9	$248.3

64.4x

---

* These costs include the minimally-required value of physical assets to be donated and used as the local share for development of the LRT/bus shuttle alternatives. The values of donated assets for each alternative in 1984 dollars are: $64.4 million for Alternative 3; $34.7 million for Alternative 3a; $38.8 million for Alternative 3b; and $44.7 million for Alternative 3c.

** Escalated dollars are actual dollars derived for the year of expenditure by assuming an annual inflation rate of four percent, compounded, and a four-year implementation schedule.

TABLE 2-V

LRT/BUS SHUTTLE CAPITAL COST COMPONENTS
(in millions of 1984 dollars)*

TSM Improvements and Right-of-Way		
- bus park-n-ride lots	$ 3.5	
- bus ramps and turnouts	0.9	
Subtotal		$ 4.4
Guideway Improvements and Right-of-Way		
- line segments	$ 55.8	
- stations	20.1	
- right-of-way (purchased)	2.7	
- right-of-way (donated)	64.4	
- train control, traction power, and other systems elements	29.0	
- maintenance yard and shop	7.5	
- testing and start-up	2.7	
Subtotal		$182.2
LRT Vehicle Purchases (31)		$ 33.6
Contingency and Engineering		
- final design	$ 8.9	
- construction/procurement management	4.9	
- insurance, legal, audit	0.9	
- project management	4.9	
- contingency	23.0	
Subtotal		$ 42.6
TOTAL COST IN 1984 DOLLARS		$262.8
Inflation Cost*		78.9
ESTIMATE OF TOTAL COST EXPENDED THROUGH JANUARY 1990		$341.7

* Inflation is assumed at four percent per year; construction and procurement inflation effects were assumed using a four-year schedule to reach revenue service by late 1991.

c. Comparative Discussion

The TSM alternative will cost 15 percent of the cost of implementing the full LRT alternative. Building LRT to the Central West End station (3a) will cost about 60 percent of the cost of building the full alignment, while building LRT to Delmar (3b) will cost about 65 percent of the amount needed to build the full alignment, and building LRT to the UMSL-South (3c) station will cost about 73 percent of the cost of building the full line length. These reduced costs roughly correspond with the shorter lengths of each of the intermediate lines.

2.4 OPERATING AND MAINTENANCE COSTS

a. Cost Estimation Methods

Annual operating costs were estimated for both bus and LRT operations using separate models for each. Two alternative organizational scenarios were tested in the LRT model; one involving using the current bus operator, Bi-State, to operate the bus network and a separate organization to operate LRT, and a second scenario using Bi-State to operate both the bus network and the LRT system. Scenario 2 integrates central office functions for the two modes that would be partially duplicated with two separate agencies in Scenario 1.

The operating cost models were built up using Bi-State's cost reporting system as the basis for defining cost estimates. Bi-State operating experience for its most recent fiscal year ending June 30, 1985, was used as a key cost source in the bus model. Data from existing and planned LRT operations elsewhere in the U.S. as well as applicable Bi-State unit costs were used as the basis for the LRT model. UMTA Section 15 operating reports were used as a secondary source.

Both the bus and LRT models incorporate fixed and variable cost elements. The fixed costs include items such as office equipment and supplies, telephone, and audit fees among others. The variable costs are those which are sensitive to the amount of service provided, such as some of the personnel categories, fuel or electric consumption, and maintenance expenditures.

The cost estimates were projected to the year 2000 and expressed in 1984 dollars. Wages and fringes are projected to decline in real dollars based on recent historic experience, while diesel fuel and electricity are projected to show real growth in the period between 1985 and 2000.

b. Operating and Maintenance Costs

Table 2-VI summarizes the operating costs for each of the alternatives at the projected 2000 service level. TR-25, Operating Cost Estimates, provides additional details on the operating and maintenance cost estimates.

c. Comparative Discussion

The cost of operating the TSM alternative represents an increase of about five percent over the no-action alternative, while the cost of operating LRT represents an increase of about seven percent over the cost of operating the no-action alternative in 2000. The operating and maintenance cost estimates are dependent on both the physical characteristics of each alternative and on management operating policies. An important difference in the operation of the transit system between the existing system and the future-year alternatives is the projected increase in passenger carrying productivity that will result from generally higher average passenger loadings than currently exist in the peak period. These increased bus loadings will result from two factors. First, current unused capacity will be filled through natural ridership growth (i.e., maintaining transit's share of total person trips, which are increasing). Service improvements and bus reliability performance stemmed the annual decline in bus patronage evidenced between 1980 and 1984. Ridership experienced healthy two-plus percent increases over preceding years in 1985 and 1986. A three-percent setback in patronage for 1987 over 1986 figures has occurred, but this appears to track ridership experience nationally where losses have been credited to lower fuel prices. Second, additional bus service will be provided only when warranted by demand. The difference between Scenarios 1 and 2 is less than one percent of the LRT operating cost, where the separate management structure of Scenario 1 is more expensive to operate.

TABLE 2-VI
OPERATING COST SUMMARY
(year 2000 cost estimate in millions of 1984 dollars)

	1984 Existing*	1 No-Action	2 TSM	3 LRT/Bus Shuttle		3a (CWE)		3b (Delmar)		3c (UMSL-South)	
				Scen. 1	Scen. 2	Scen. 1	Scen. 2	Scen 1.	Scen. 2	Scen. 1	Scen. 2
Bus	$ 81.9	$ 86.8	$ 91.2	$ 83.9	$ 83.9	$ 88.3	$ 88.3	$ 87.9	$ 87.9	$ 86.8	$ 86.8
LRT	--	--	--	9.8	9.1	7.0	6.3	7.4	6.8	8.4	7.8
TOTAL	$ 81.9	$ 86.8	$ 91.2	$ 93.7	$ 93.0	$ 95.3	$ 94.6	$ 95.3	$ 94.7	$ 95.2	$ 94.6

* FY1984 Bi-State Development Agency Audited Report submitted to UMTA.

Scenario 1 provides for separate bus and LRT operating companies.

Scenario 2 assumes Bi-State will operate the bus system and LRT.

CHAPTER 3: AFFECTED ENVIRONMENT

This chapter serves two functions in describing the areas and conditions in the corridor that might be affected by the proposed project. First, it clearly identifies those areas in which impacts may occur, so that full attention can be focused on these areas. The locations and nature of potential impacts have been identified in cooperation with various local governments, agencies, and corridor residents to ensure completeness. Second, the chapter describes existing conditions and trends in the potentially affected areas. These descriptions serve as the basis for comparison with the impacts presented in Chapters 4 and 5.

3.1 LAND USE AND ECONOMIC ACTIVITY

a. Regional Summary

This section presents land use, population, and economic activity information for the St. Louis region, which consists of the city of St. Louis and nine counties in Missouri and Illinois (Figure 10). The figure shows the region's boundaries as defined by the U.S. Census Bureau in 1980, an area which the Agency terms the Metropolitan Statistical Area (MSA). It differs from the earlier Bureau-defined Standard Metropolitan Statistical Area (SMSA) by the addition of Jersey County. Figure 16 also shows a cordon line around that part of the region expected to contain the major urbanized core in 1990.

1) Land Use. Three major factors have influenced regional land use patterns; these are the Mississippi-Missouri River system, the rail corridors, and highways. The Mississippi River has acted as a natural magnet for industries desiring access to its navigable waters. The River's floodplain has also provided ample flat land desirable for agricultural activity, conducive to easy rail movements, and suitable for industrial development.

Rail corridors have not only provided multiple feasible sites for industrial development but have also caused the earliest decentralization of population from the city into the surrounding counties, establishing pockets of residential land uses. The construction of the Missouri Pacific Railroad, for example, promoted the establishment or growth of suburbs and vacation communities along its tracks. New residential areas just outside the St. Louis city limits also developed around the turn of the century; their growth was associated with the development of streetcars.

Thus, the pattern of land use established during the early part of the 20th century was associated with the development of rail transportation and the beginnings of an industrial and mining based economy. During the second quarter of the century, population and industrial growth began to slow and established communities began to experience decentralization. Prior to 1950, residential land use was confined within municipal boundaries, and commercial activities were located primarily in central business districts with industrial land uses concentrated close to transportation facilities.

Since 1950 development of residential and commercial uses has expanded most rapidly into areas formerly occupied by agricultural and other rural uses. The dispersal of urban functions away from established urban cores represented an acceleration of the decentralization process. This process can be associated with the mass availability of the automobile, improved highways (U.S. 40 and the interstate system), and a favorable federal government housing policy (i.e., low interest FHA loans and tax benefits). Commercial activities have also expanded to outlying areas, following the residential development and taking advantage of cheaper land and ample parking space.

Table 3-I gives the percentage distribution of land uses within the transit cordon line shown in Figure 10. Other land uses, which include agricultural, forest, and vacant land, dominate, followed by residential land uses. The major land uses in St. Louis city and county (the areas in which the proposed alternatives would be implemented), are more characteristic of urbanized areas.

2) <u>Land Use Plans, Policies, and Controls</u>. Land use plans, policies, and controls exist at several governmental or administrative levels within the region.

The St. Louis Region

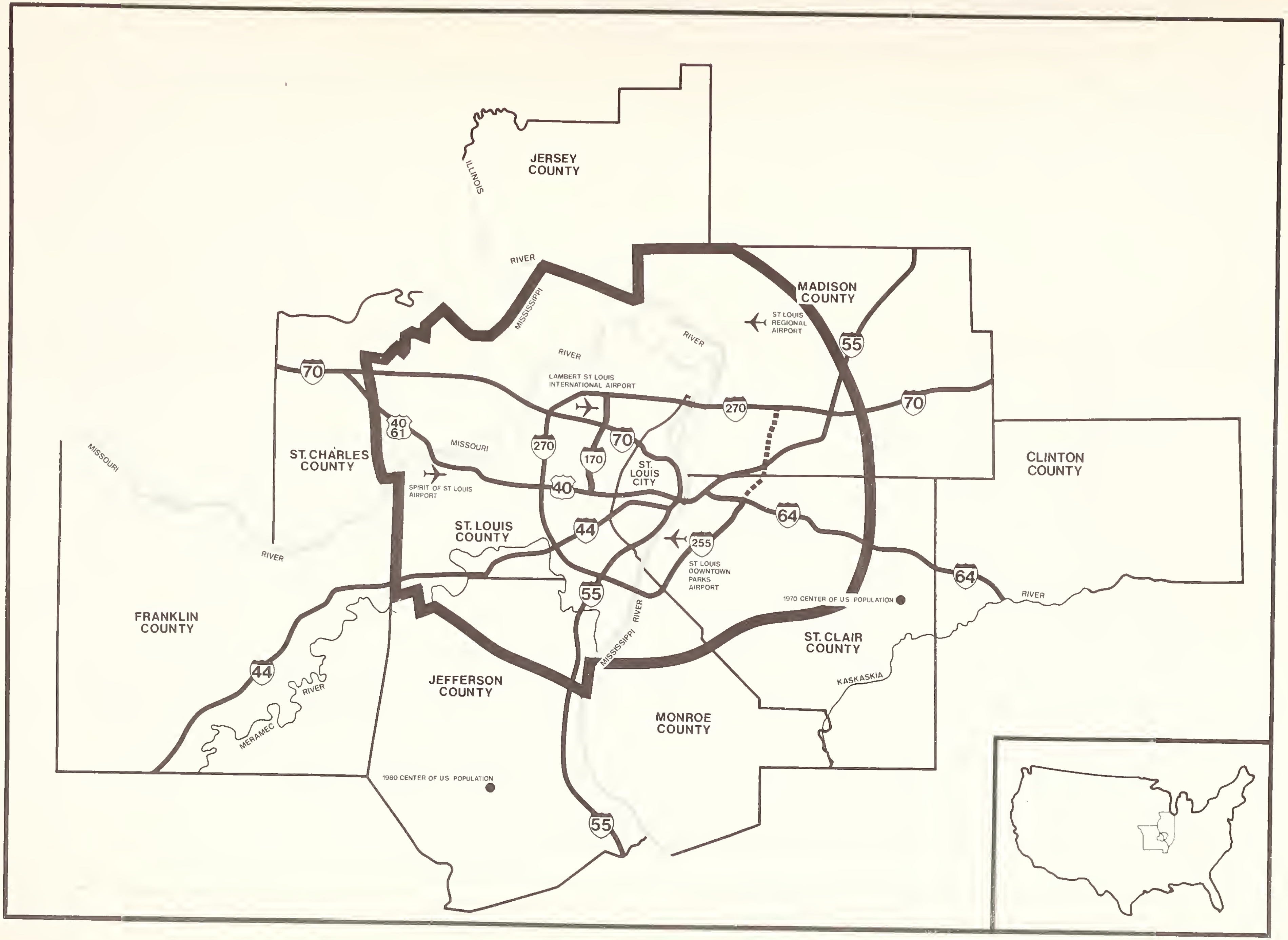


Figure 10

TABLE 3-I

PERCENTAGE DISTRIBUTION OF LAND USE WITHIN THE CORDON LINE

County	Resid.	Comm.	Ind.	Pub.	Rec.	Trans.	Extract.	Other*	Total
St. Charles	9.1	0.9	0.3	5.0	5.5	0.2	0.2	78.8	100
St. Louis	40.1	6.0	2.9	6.0	9.0	1.0	0.6	34.4	100
St. Louis City	43.6	11.5	14.4	6.2	7.0	8.6	0	8.7	100
Jefferson	12.5	1.0	0.4	0.6	1.8	0	0.2	83.5	100
Madison	10.9	1.4	2.8	2.3	1.6	0.4	0.2	80.4	100
St. Clair	13.1	1.6	1.6	2.4	1.6	1.1	0.6	78.0	100
Monroe	3.5	0.4	0.3	0.3	0.6	0.2	0.1	94.6	100
TOTAL	20.4	3.0	2.4	3.9	4.6	0.9	0.4	64.4	100

* Includes agricultural, forest, and vacant land.

SOURCE: Land Use 1984, Unpublished Data, EWGCC, (1985 Estimated Data).

EWGCC functions as the regional planning organization for the St. Louis metropolitan area. The agency's current planning documents for the region are the Year 2000 Land Use Plan, St. Louis Metropolitan Region and the Metropolitan Development Guide, A Unified Direction for the St. Louis Region.

The St. Louis County Planning Department in Missouri and the St. Clair County Comprehensive Planning Office in Illinois are the relevant county level planning agencies in the study area. Both agencies are responsible for establishing zoning regulation in unincorporated areas within their jurisdiction and for developing general, countywide land use goals and policies. Zoning regulations and land use plans are reviewed and approved by the County Council in St. Louis County and the County Court in St. Clair County. General planning and zoning guidelines for St. Louis County are provided in the General Plan published in 1980. St. Clair County planning guidelines are addressed in the Land Use and Assessment Document for St. Clair County published in 1978. Both documents address transportation related goals and policies that are of relevance to the proposed alternatives. Specifically, the St. Louis County General Plan includes the following goals and policies:

- Continue to contribute reasonable subsidy support to the Bi-State Transit System, using monies received from the Transportation Sales Tax.
- Support studies of alternate mass transportation systems to determine their feasibility and economy.
- Encourage the Bi-State Transit System to redesign its service system in the County to provide better and more cost-effectve bus transportation for county citizens.

Likewise, St. Clair County's land use document addresses the following goals and policies:

- Attain energy efficient and economic movement of people and materials by maximizing transit alternatives in St. Clair County and by coordinating the transportation infrastructure with all land use activities.

- Improve and expand mass transit facilities and devise additional mass transit alternatives.
- Encourage and support the inclusion of the urbanized portion of St. Clair County in the planning and development of alternative mass transit networks for the St. Louis metropolitan area.
- Encourage the development of park and ride locations to increase bus ridership on existing and planned routes.

At the municipal level, East St. Louis city, St. Louis city, and the various, potentially-affected municipalities in St. Louis County all have land use planning and/or development documents. As with the county plans, these documents provide objectives, policies, and guidelines for general comprehensive planning. Zoning regulations are also in force at the municipal level. These are addressed in more detail in the impacts section of the study as appropriate. In general, the municipalities in which transit improvements could cause changes in land use (such as the cities of East St. Louis, St. Louis, Normandy, Berkeley, and others) may be expected to retain residential uses, particularly single-family zoning designations, rather than rezone to accommodate higher density residential, commercial, or industrial development near guideway stations located in or adjacent to residential areas, except in those residentially zoned areas which experience high noise from the airport and I-70. Development at the appropriate density for each station located in non-residentially-zoned and blighted areas may be expected to be encouraged through the use of multiple incentives in each municipality. Conditional use permits, liquor license restrictions, and similar measures may be used in each of the area's municipalities to control such development so that it does not adversely infringe on the quality of life in affected areas.

3) Population. After more than a century of continuous population growth, the population of the St. Louis metropolitan area declined slightly (-2.2 percent) during the 1970-1980 decade, with both the Illinois and the Missouri portions losing population (Table 3-II). Although several counties (particularly St. Charles, Jefferson, and Franklin) grew considerably, significant population losses in Madison

TABLE 3-II

ST. LOUIS SMSA POPULATION, 1950-2000

	1950	1960	1970	1980		Estimated January 1986		Estimated 2000	
St. Louis SMSA	1,791,210	2,144,205	2,410,891	2,356,460	(-2.2%)	2,383,200	(1.1%)	2,464,700	(3.4%)
Missouri Portion	1,367,032	1,617,471	1,827,635	1,788,504	(-2.1%)	1,811,800	(1.3%)	1,891,300	(4.4%)
Franklin Co.	36,046	44,566	55,127	71,233	(29.2%)	74,400	(4.4%)	91,000	(22.3%)
Jefferson Co.	38,077	66,377	105,647	146,183	(38.4%)	155,000	(6.0%)	177,700	(14.6%)
St. Charles Co.	29,834	52,970	92,954	144,107	(55.0%)	167,100	(16.0%)	221,800	(32.7%)
St. Louis Co.	406,349	703,532	951,671	973,896	(2.3%)	986,600	(1.3%)	995,900	(0.9%)
St. Louis City	856,796	750,026	622,236	453,085	(-27.2%)	428,700	(-5.4%)	404,900	(-5.6%)
Illinois Portion	424,178	526,734	583,256	567,956	(-2.1%)	571,400	(0.6%)	573,400	(0.4%)
Clinton Co.	22,594	24,029	28,315	32,617	(15.2%)	33,000	(1.2%)	35,000	(6.1%)
Madison Co.	182,307	224,689	250,911	247,691	(-1.3%)	250,000	(0.9%)	254,400	(1.8%)
Monroe Co.	13,282	15,507	18,831	20,117	(6.8%)	20,200	(0.4%)	22,500	(11.4%)
St. Clair Co.	205,995	262,509	285,199	267,531	(-6.2%)	268,200	(0.3%)	261,500	(2.5%)

NOTE: Parenthetical numbers are the percent change between the year given in that column and in the previous column.

SOURCE: U.S. Bureau of the Census; estimate: EWGCC.

and St. Clair Counties, and St. Louis city offset these gains. For the third consecutive decade, the city of St. Louis experienced substantial population loss, declining 169,151 (-27.2 percent); and for the first time since 1900, St. Louis County's population growth was relatively slight--up 22,000, a gain of only 2.3 percent since 1970. Franklin, Jefferson, and St. Charles Counties continued a three-decade pattern of substantial population growth. Population estimates prepared by EWGCC for January 1986 show a modest gain in population for all jurisdictions, except St. Louis City which continues to lose population but at a significantly slower rate. Although the regionwide increase is small, the change does show some recovery from the loss experienced during the 1970s.

The continued decline in the city of St. Louis population is largely the product of three decades of large-scale out-migration (particularly among the white population), resulting in a diminishing and aging population, declining births and household size, and two decades of substantial net housing abandonment and demolition. Large portions of St. Louis County also experienced declines in population and household size during the 1970s.

The total population of the four counties currently comprising the Illinois portion of the metropolitan area have consistently totaled 20 to 25 percent of the metropolitan area population. As Table 3-II indicates, St. Louis County's portion of the metropolitan area population has consistently increased, first surpassing that of the city of St. Louis in 1960 and widening the gap thereafter. The population of the city of St. Louis comprised 19 percent of the area's 1980 population, while St. Louis County's population comprised 41 percent. Figure 11 shows the current distribution of population density in the SMSA by census tract.

Urbanized area population is forecasted to grow 43,128 from 1984 to the year 2000, i.e., from 2,122,693 to 2,165,821. Corridor population is expected to decrease by 8,829, or four percent, from 203,149 in 1984 to 194,320 in the year 2000.

4) Population Characteristics. This section summarizes population characteristics for the following selected variables.

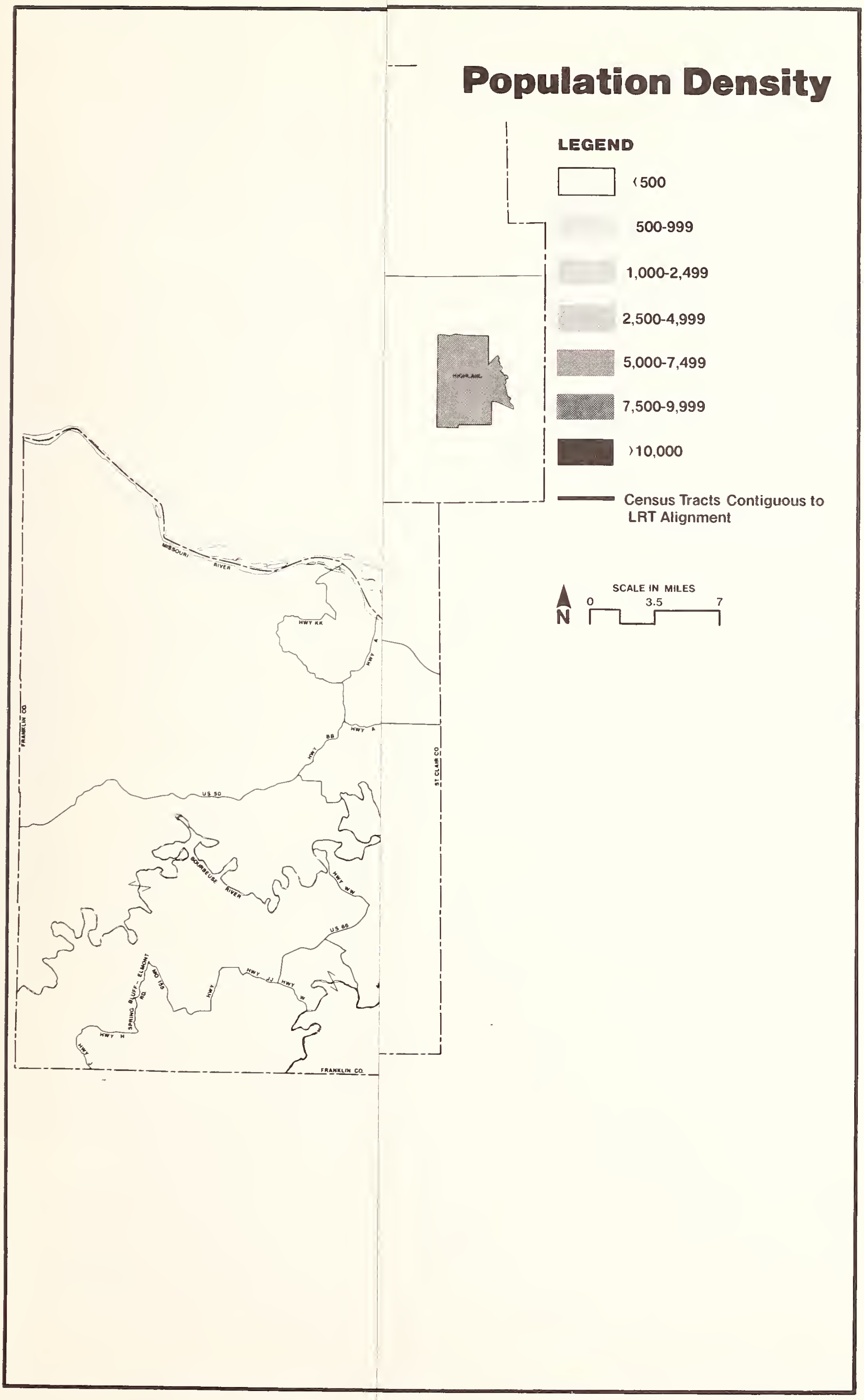
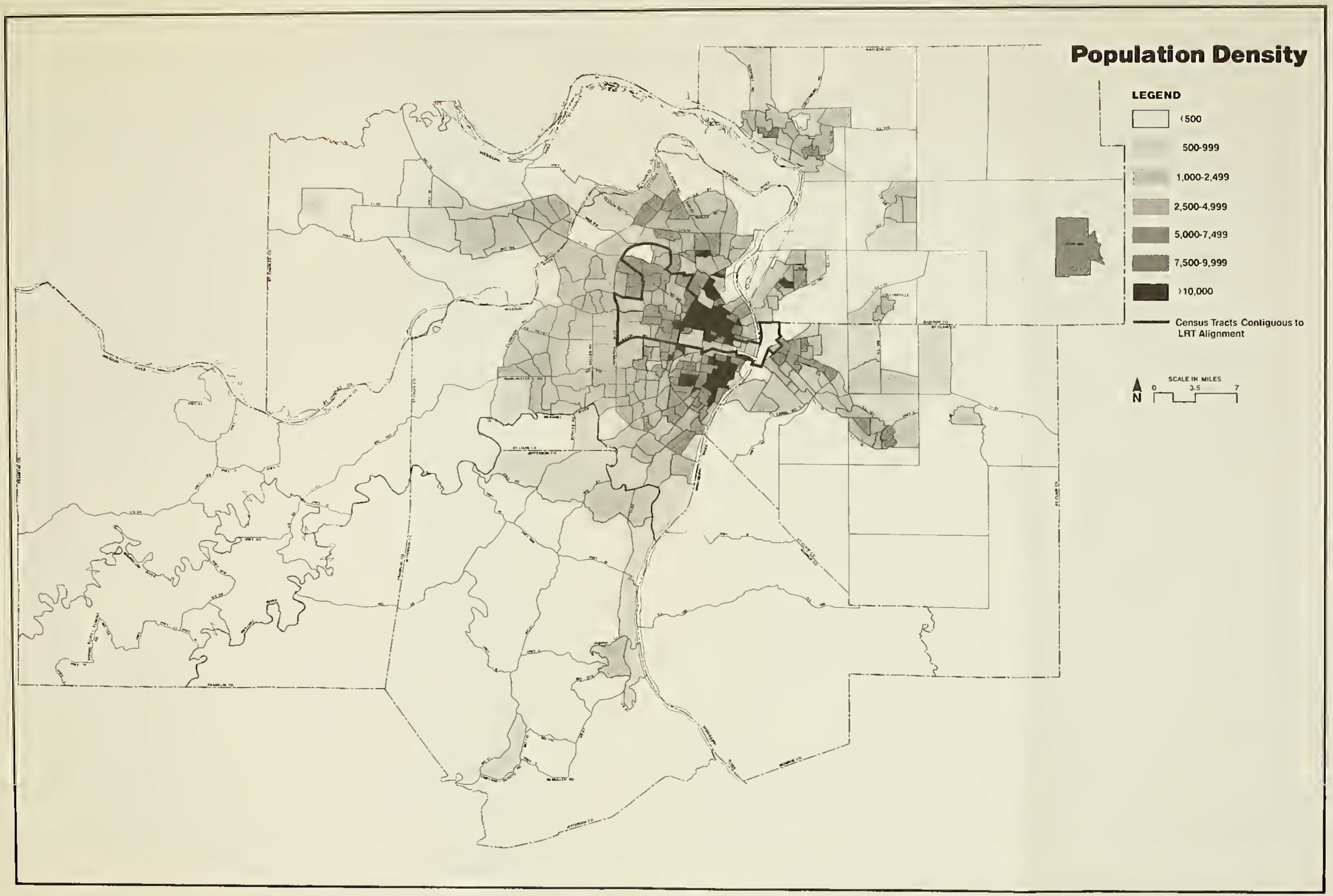

Population Density
LEGEND
☐ ‹500
500-999
1,000-2,499
2,500-4,999
5,000-7,499
7,500-9,999
›10,000
Census Tracts Contiguous to LRT Alignment
SCALE IN MILES
0
3.5
7
N
HIGHLAND
MISSOURI RIVER
HWY KK
HWY A
HWY BB
HWY A
US 50
FRANKLIN CO
ST CLAIR CO
BOURBEUSE RIVER
HWY WW
US 66
HWY JJ
HWY W
HWY
SPRING BLUFF - ELMONT RD.
OLD 185
HWY H
HWY J
FRANKLIN CO.

Figure 11



Population Density

Figure 11

o Age: The median age of the area's population increased from 28.2 years in 1970 to 30.3 years in 1980. This change resulted from a decline in the child and youth (under 18) population and increases in the adult (18-64) and senior citizen (65 and over) components Table 3-III.

o Racial Composition: The white population declined 4.8 percent (-97,389) to 1,924,645 between 1970 and 1980; the black population increased 28,827 (+7.6 percent) to 407,856. Three factors account for these race-specific differences in population change. They are both the higher birth and natural increase (difference between births and deaths) rates for the black population, and the higher out-migration rates for the white population.

The region's 1980 Hispanic population of 22,287, representing 0.9 percent of the region's population, increased by 146.1 percent over 1970. The region's American Indian and Alaskan native 1980 population of 3,275 accounted for 0.1 percent of the region's total population, and the region's Asian and Pacific Islander 1980 population of 12,662 accounted for 0.5 percent of the region's population. Comparable 1970 data is not available to permit a comparison for the latter two classifications.

o Households and Families: The total number of households increased 12 percent during the 1970s, while family households (three-fourths of all households) grew by four percent. The average household contained 2.8 persons in 1980, while the average 1980 family consisted of 3.3 persons; by comparison, the average 1970 household contained 3.2 persons.

About one-fourth (23.1 percent) of all 1980 households contained only one person; these one-person households increased 47 percent between 1970 and 1980, and are disproportionately comprised of women and/or senior citizens.

Eleven percent of all households are female-headed families. Over one-half (52 percent) of all 1980 families had children under 18. One-fifth of all families (and eight percent of all households) were one-parent families with children under 18; such families increased by 56 percent between 1970 and 1980.

TABLE 3-III
ST. LOUIS SMSA AGE DISTRIBUTION
1970 and 1980

	1970	1980
0-17 Years	35.5%	28.6%
18-64 Years	54.7%	59.7%
65 and Over	9.8%	11.7%
TOTAL	100.0%	110.0%

SOURCE: U.S. Bureau of the Census

TABLE 3-IV
STUDY AREA MODE OF TRAVEL TO WORK

Mode	Percent of Workers
Private Auto	67
Car Pool	21
Public Transit	6
Walk	3
Other (e.g., Bicycles)	1
Work at home	2
	100

SOURCE: 1980 Census of Population and Housing

TABLE 3-V
ST. LOUIS SMSA HOUSING

	1970	1980	Percent Change 1970-1980
Total Year-Round Housing Units	799,079	895,213	+ 12.0%
Total Occupied Units	749,860	837,997	+ 11.8%
(% Occupied)	(93.8%)	(93.6%)	-
(% Vacant)	(6.2%)	(6.4%)	-
Owner-Occupied Units	486,561	571,838	+ 17.5%
(% of Total Occupied)	(64.9%)	(68.2%)	-
Renter-Occupied Units	263,299	266,159	+ 1.1%
(% of Total Occupied)	(35.1%)	(31.8%)	-

SOURCE: U.S. Bureau of the Census

The number of households in the corridor (76,458 in 1984) is expected to increase by 4,214, or 5.5 percent, by 2000 to 80,672.

o Education: About two-thirds (64 percent) of the area's 1980 adults 25 years of age and over had at least a high school education; 16 percent of area adults are college-educated.

o Intraregional Migration: Migration within the region is low. Nearly three-fifths (58 percent) of persons five years old and over in 1980 resided in the same house as in 1975 and an additional fourth (24 percent) lived in a different house but in the same county as in 1975; thus, 82 percent of the area's residents lived in the same county in both 1975 and 1980, while eight percent lived in a different county in the metropolitan area in 1975. Ten percent of the 1980 metropolitan area residents lived outside the area in 1975.

5) Journey to Work. Most workers in the St. Louis SMSA (88 percent) commute to work by means of a privately-owned motor vehicle. The remainder use public transportation or some other form of conveyance (Table 3-IV). The private automobile and carpooling constitute the major transportation modes for area workers.

Figure 12 illustrates the employment distribution in St. Louis city and county (76 percent of the SMSA employment). The average travel time to work in the region is approximately 23 minutes. On average, 27 percent of area workers commute to work in less than 15 minutes while seven percent take an hour or more to get to work.

The majority (88 percent) of households have at least one motor vehicle available. Thirty-seven percent of households have at least two vehicles available while 15 percent have three or more vehicles. St. Louis city and St. Clair County have the largest proportion of households without vehicles (31 and 15 percent respectively). All other counties exceed the study area average for car ownership. The differences are probably due, in part, to the higher concentration of elderly and lower income groups in St. Louis city and St. Clair County.

About two percent of the adult population 16 to 64 years old had a public transportation disability status in 1980; 15 percent of the senior citizen population (65 and over) had a public transportation disability status. Of the area's noninstitution population 16 to 64 years old in 1980, 111,170 (7.9 percent) had a work disability; of the work-disabled, 47,649 (40 percent) were in the labor force.

6) Housing. The number of year-round and occupied housing-units in the St. Louis metropolitan area increased by 12 percent between 1970 and 1980, see Table 3-V. The increase in the housing stock and the slight decline in the total population led to a decrease in the number of persons per household (occupied housing unit) during the decade (from 3.2 to 2.8 percent).

Of the metropolitan area's 895,000 year-round housing units in 1980, 94 percent were occupied and six percent were vacant. Of the occupied units, 68 percent were owner-occupied and 32 percent were renter-occupied. Owner-occupied units increased 18 percent from 487,000 in 1970 to 572,000 in 1980, while renter units increased one percent from 263,000 to 266,000. Between 1970 and 1980, home ownership increased in the study area. During this period, the proportion of owner-occupied units increased from 65 to 68 percent while the proportion of renter-occupied units decreased from 35 to 32 percent.

Regional housing totals obscure the scale of the suburban housing increase, which was offset by a large decline in the city of St. Louis housing stock. (St. Louis city housing stock declined 15 percent between 1970 and 1980, from 238,000 units to 202,000 units.)

Most (74 percent) of the region's housing units are single-family; nearly one-fourth (23 percent) are in multi-family units, and three percent are mobile home or trailer units.

The 1980 median value of owner-occupied housing units was $42,100, compared with $16,400 in 1970, and the 1980 median contract rent for renter-occupied units was $161 compared with $79 in 1970.

Twenty percent of the region's 1980 housing units were constructed between 1970 and 1980 and 28 percent were more than 40 years old.

7) Employment. Area unemployment rates are slightly above the state and national averages. Several factors have contributed to relatively high unemployment rates. One has been the loss of jobs,

Employment Distribution
St. Louis City and County

Figure 12

particularly in the manufacturing sector, as companies have relocated out of the area. Also, the recession in the automotive industry, an important area employer, has contributed to job losses. Another factor has been the area population loss coupled with a disproportionate growth in the labor force. Female entrants have contributed significantly to growth in the labor force. Between 1970 and 1980 the number of males 16 years old and over increased 11 percent and the male component of the labor force grew eight percent; male labor force participation, however, declined from 79 to 77 percent. At the same time, females 16 years old and over increased nine percent, the female component of the labor force increased by 33 percent, and female labor force participation increased from 42 percent to 51 percent.

According to the Missouri Division of Employment Security, the civilian labor force for the St. Louis metropolitan area grew from 1,118,892 (revised) in 1980 to 1,192,884 in 1985, a gain of 6.6 percent in five years. Total employment rose 72,249 to 1,101,401; at the same time, the unemployment rate dropped from 8.0 to 7.7 percent.

Manufacturing no longer remains the major employment activity in the region; it has recently been supplanted by the wholesale and retail trade sectors which provide 23 percent of MSA employment (Table 3-VI).

Based on the 1980 census, about 59 percent of the workers in the SMSA (16 years old and over) resided in the same county where they worked; one-third worked in a different county of the St. Louis SMSA, one percent worked outside of the St. Louis SMSA, and seven percent did not report a place of work. About one-third of the SMSA's workers are employed in the city of St. Louis and three-fifths work in some other county in the metropolitan area.

Urbanized area employment is projected to be 1,203,908 in the year 2000, up 138,150 from 1,065,758 in 1984. CBD employment is expected to be 154,022 (up 33,926 from 120,096 in 1984), or, as in 1984, some 12 percent of the urbanized area employment. LRT corridor employment is projected at 387,680, a growth of 43,840 jobs from 343,840 in 1984.

TABLE 3-VI

ST. LOUIS MSA LABOR FORCE AND EMPLOYMENT CHARACTERISTICS, 1975-1985*
(in thousands)

	1975	1980	1981	1982	1983	1984	1985
Civilian Labor Force	1,023.4	1,118.9	1,126.2	1,123.6	1,141.7	1,169.1	1,192.9
Total Employment	960.1	1,029.2	1,031.2	1,012.6	1,012.6	1,073.9	1,101.4
Unemployment Rate (%)	(6.2%)	(8.0%)	(8.4%)	(9.9%)	(10.7%)	(8.1%)	(7.7%)
Total Nonagricultural Employment	907.4	1,003.7	1,002.2	986.6	998.7	1,040.3	1,056.4
Manufacturing	235.6	239.0	231.3	217.9	215.1	227.3	227.4
Construction	37.4	44.3	44.1	42.0	43.3	48.9	49.4
Transportation, Communications & Public Utilities	62.3	72.7	72.5	70.3	70.7	73.6	73.6
Wholesale and Retail Trade	209.1	229.2	234.1	230.5	234.1	244.2	250.7
Finance, Insurance & Real Estate	49.5	57.8	58.0	59.4	60.1	62.1	63.9
Services	176.2	217.8	223.7	226.1	235.5	245.0	251.4
Government	134.6	139.3	135.2	137.0	136.5	135.7	136.1

SOURCE: Missouri Division of Employment Security

*1975 and 1980 through 1982 data are SMSA statistics, which exclude Jersey County.

8) Income and Poverty. Personal income in the St. Louis MSA was approximately $30.5 million in 1983. About 44 percent of personal income is generated from private, non-manufacturing sources (e.g., finance, real estate, professional services). About 20 percent of the area's personal income is provided by the manufacturing sector.

Table 3-VII summarizes area income and poverty status. In 1979, median household income was $18,268 and per capita income was $7,667.

About 20 percent of area households had an income of $7,500 or less in 1979, 33 percent had incomes of $25,000 or more, and 14 percent had household incomes of $35,000 or more.

Ten percent of area residents had a below poverty level income in 1979; 14 percent of persons under 18 were in families with sub-poverty level incomes; about 12 percent of senior citizens had sub-poverty-level incomes in 1979.

More than one-fourth (27 percent) of St. Louis area households were receiving Social Security income in 1979; 7.5 percent were receiving public assistance income in the same year.

b. Study Area

Land use information is presented for an approximately 2,000-foot-wide band centered on the LRT alignment (Figure 13). This band provides for a general service area for pedestrians of about 1,000-foot walking distance on either side of an alignment and includes the area where direct physical impacts, such as changes in noise levels or aesthetics, may be experienced.

1) Land Use. The 2,000-foot-wide band contains 4,366 acres of urban uses distributed among land use categories as listed in Table 3-VIII. The majority of the corridor land use is industrial, followed by residential, commercial, institutional, and parks. Over 40 percent of the study area band is in the industrial land use category, which includes undeveloped land and transportation-related uses such as rail yards and airport clearance zones. The residential use accounts for nearly 30 percent of the study area band. The remaining uses combined account for about 30 percent of the total.

TABLE 3-VII

ST. LOUIS SMSA POVERTY AND INCOME, 1979

Below Poverty Level	
% of Total Population	10.3%
% Under 18	13.0%
% 65 & over	11.5%
1979 Income	
Median Household Income	$18,510
Median Family Income	21,778
Median Unrelated Individual Income	7,664
Mean Household Income	$21,391
Mean Family Income	24,602
Mean Unrelated Individual Income	9,820
Income Distribution	
% Households Under $7,500	18.9%
% Households Between $7,500 and $25,000	48.6%
% Households $25,000 or more	32.5%
% Households $35,000 or more	14.3%

SOURCE: U.S. Bureau of the Census

2) Major Activity Centers and Redevelopment Activities. Figure 14 shows the major activity centers in the priority corridor. They include three central business districts (East St. Louis, St. Louis, and Clayton), four university campuses, the Lambert Airport/ McDonnell Douglas complex, and the Wellston enterprise zone. The following text highlights their development and employment characteristics.

- CBDs. Downtown East St. Louis is a relatively small commercial/governmental node serving the nearby parts of Madison and St. Clair Counties. It had a 1980 employment base of 5,000 compared with a 1970 core-area employment of some 3,800. It has excellent interstate highway access given its proximity to downtown St. Louis, and it is a common point for most Bi-State bus routes operating in the eastern part of the region. The East St. Louis CBD has experienced an infusion of governmental funds in recent years with the construction of a new city hall, state office building, and community college, plus a three-story 77,000-square-foot federal courthouse now under construction at Seventh and Missouri. A number of retail operations remain in business and some new ones have been developed, although the commercial area contains multiple vacant buildings and lots. The Federal Building, Bell Telephone Building, and St. Mary's Hospital are major employment sites on the southeast edge of the CBD. East St. Louis is working to expand its industrial base and has long pursued development of its riverfront. In the area opposite the Jefferson National Expansion Memorial, a non-profit organization, Gateway Center of Metropolitan St. Louis, Inc., purchased 50 acres of former railroad property, erected a American flag visible from the Arch grounds and is preparing plans to install a 450-foot geyser-jet fountain and a scenic overlook along the East St. Louis riverfront with the idea of improving the east bank to make it compatible with the Gateway Arch grounds on the west. In addition, a U.S. Secretary of Interior-appointed commission, the Jefferson National Expansion Memorial Commission, is currently studying the area opposite the Arch for park expansion including a national museum of ethnic

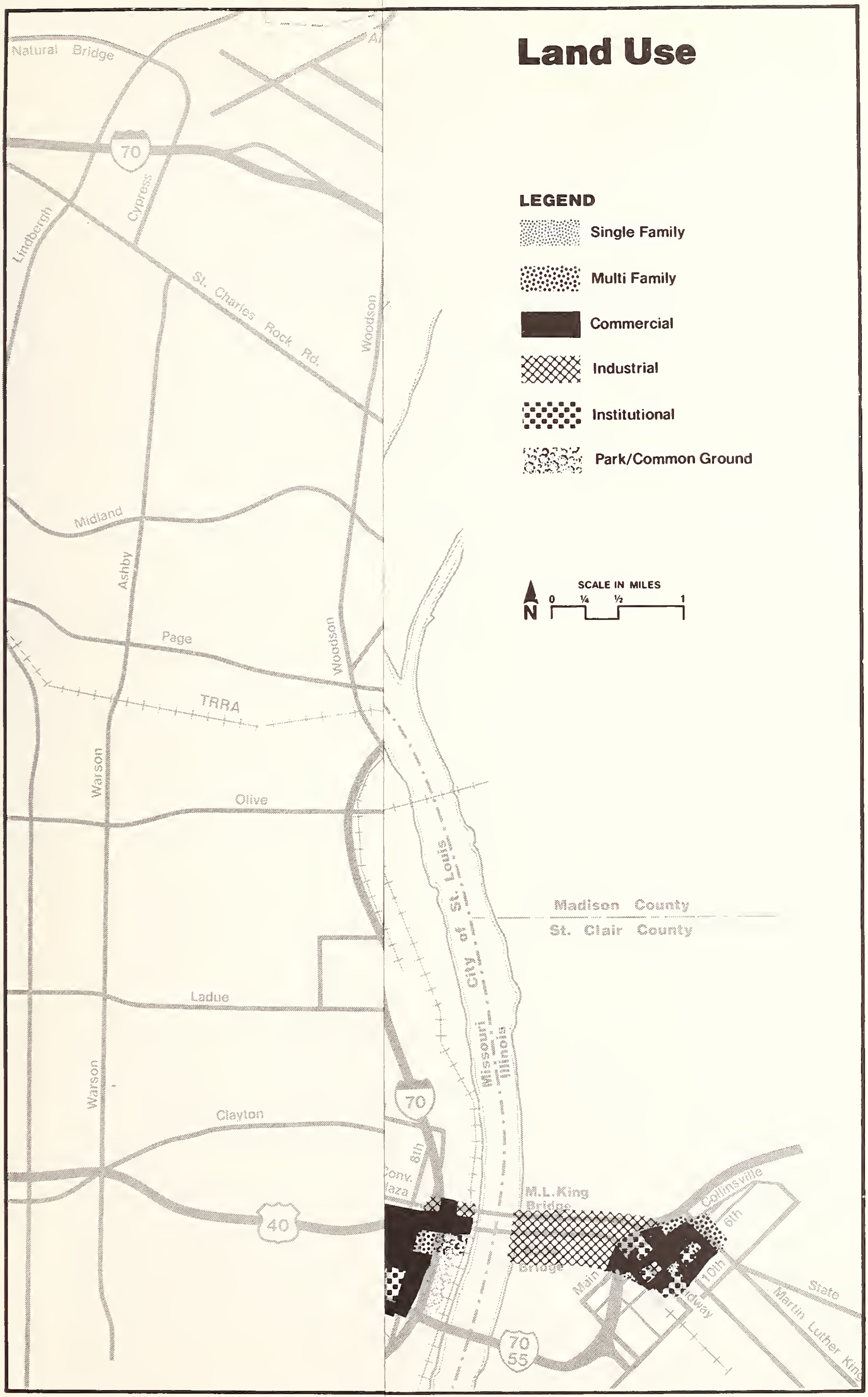
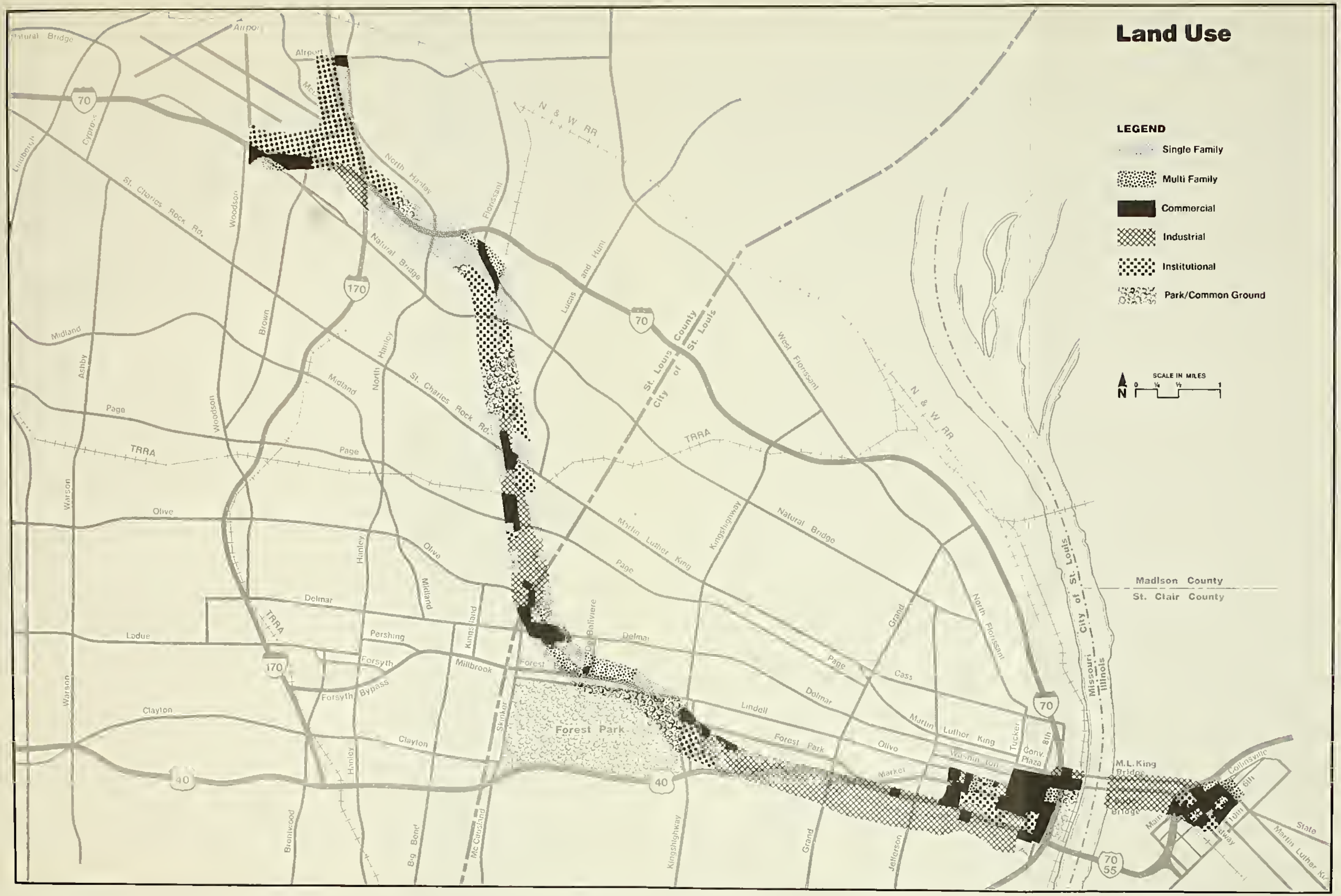

Land Use
LEGEND
Single Family
Multi Family
Commercial
Industrial
Institutional
Park/Common Ground
SCALE IN MILES
0
¼
½
1
N
Natural Bridge
70
Cypress
Lindbergh
St. Charles Rock Rd.
Woodson
Midland
Ashby
Page
Woodson
TRRA
Warson
Olive
City of St. Louis
Madison County
St. Clair County
Ladue
Missouri
Illinois
Warson
70
Clayton
8th
Conv. Plaza
M.L. King Bridge
40
Bridge
Collinsville
6th
Main
10th
Broadway
State
Martin Luther King
70
55

Figure 13



Land Use

Figure 13

TABLE 3-VIII

STUDY AREA LAND USE BY MAJOR POLITICAL DIVISIONS
(in acres)

Land Use Categories	East St. Louis	St. Louis City	St. Louis County	Total
Residential	1	533	728	1,262
Commercial	60	301	142	503
Industrial[1]	260	883	668	1,811
Institutional	15	64	333	412
Parks	0	170	208	378
Total	336	1,951	2,079	4,366

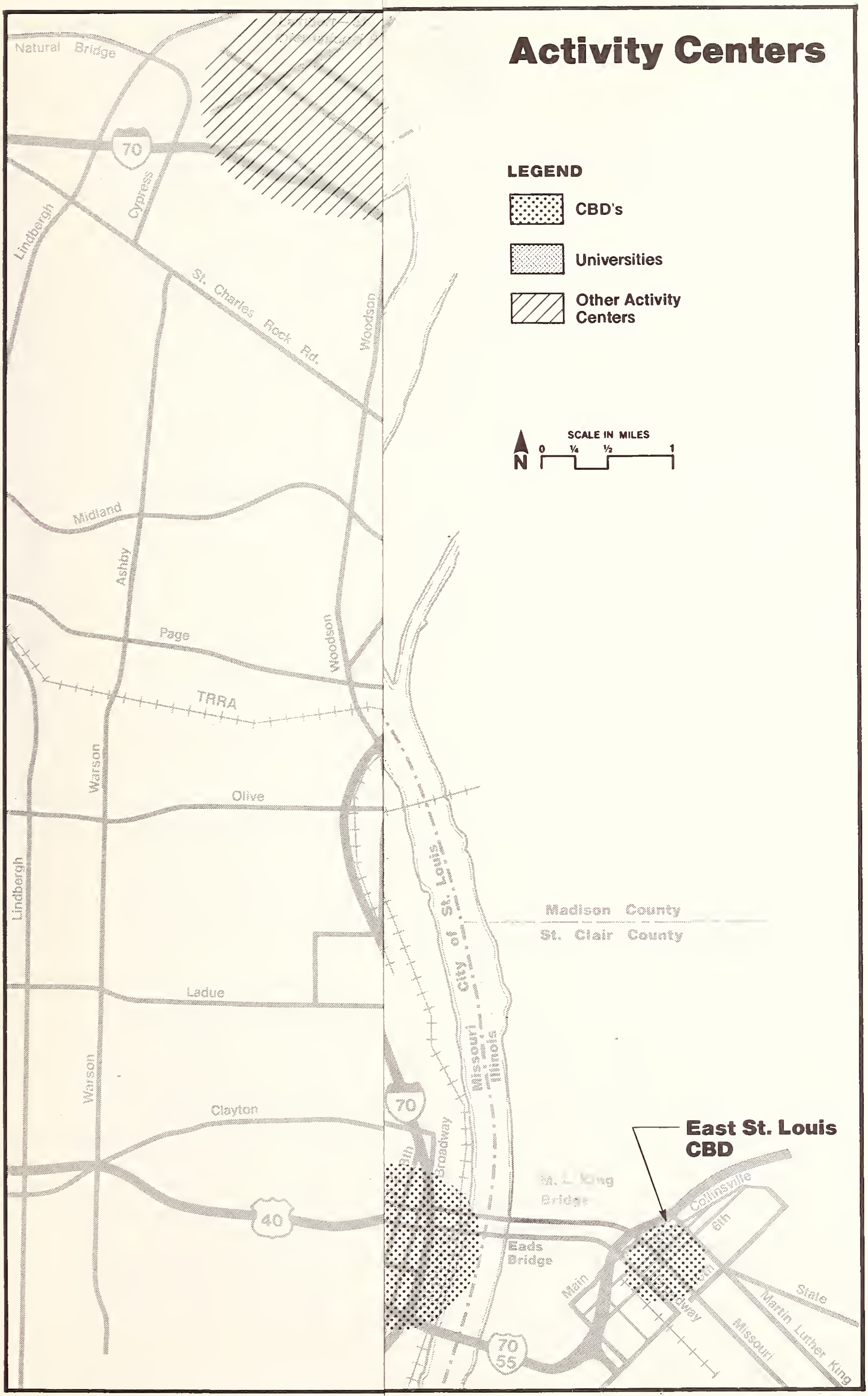
[1] Includes industrially-zoned, undeveloped land use and transportation-related land uses.

SOURCE: EWGCC

culture. In the area north of the Eads Bridge, the city of East St. Louis is pursuing development of Rivergate East--a $125 million, four high-rise and multiple low-rise apartment project, providing 1,250 units for low and moderate income tenants. In the area north of the King Bridge, the city of East St. Louis is working to develop a major port facility and a waste-recycling plant on 800 acres of riverfront property owned by the Terminal Railroad Association (TRRA) using $400 million in bond money to pay the projects.

Downtown St. Louis lies at the center of both the region's interstate highway network and the Bi-State bus network; both networks radiate out from downtown St. Louis. Downtown St. Louis is more readily accessible from all parts of the region than any other single location in the area. It is the single most important focus in the region. It had a 1980 employment base of 102,000 workers, the largest concentration of employment in the region, representing 9.4 percent of the region's total employment. Its 1980 employment represents a 17 percent increase over the 1977 level, and given the substantial construction underway in downtown St. Louis, continued employment growth is expected. An estimated 28 to 30 percent of downtown employees currently use transit.

Downtown St. Louis has experienced major redevelopment over the last few years and multiple additional projects are now underway or in the development stages. Construction of the Gateway Arch and Busch Memorial Stadium in the mid-1960s, followed by completion of the Cervantes Convention and Exhibition Center in the mid-1970s, have provided the anchors which, along with improved roadway linkages and development incentives, have resulted in major office, hotel, retail, and entertainment development in downtown St. Louis. About $200 million in new investment was underway or completed in the St. Louis CBD in 1980, a figure which grew each year thereafter culminating in a record-breaking total of more than $1 billion of new investment underway or completed in 1985. About $600 million in new construction was underway in 1986. Table 3-IX and Figure 15 show current development activities in downtown St. Louis, based on a survey of developers, the Community Development Agency, and Downtown St. Louis, Inc. undertaken for this document.



Activity Centers

Figure 14

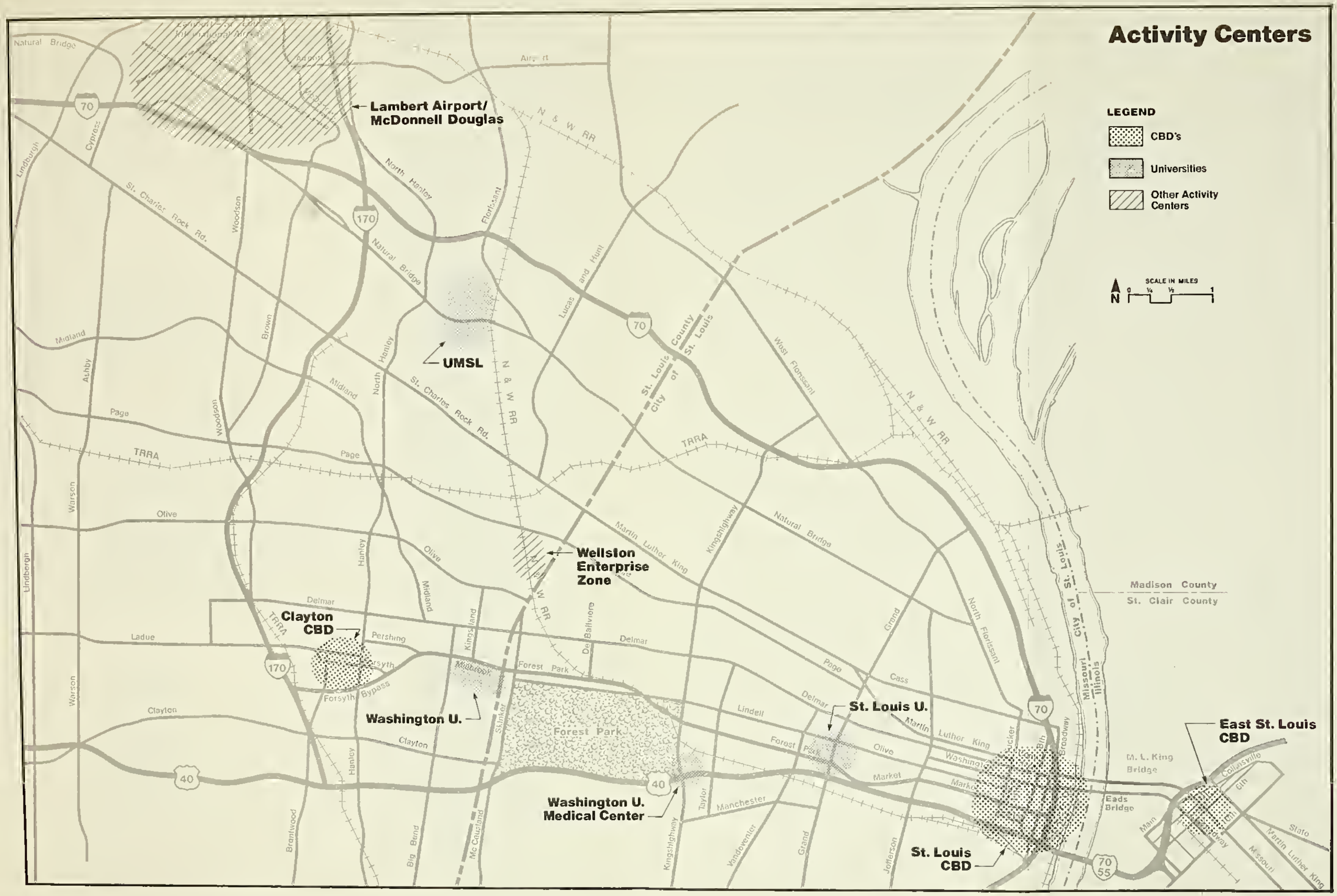

Activity Centers
LEGEND
CBD's
Universities
Other Activity Centers
SCALE IN MILES
0
¼
½
1
N
Lambert Airport/ McDonnell Douglas
UMSL
Wellston Enterprise Zone
Clayton CBD
Washington U.
Washington U. Medical Center
St. Louis U.
St. Louis CBD
East St. Louis CBD
Forest Park
St. Louis County
City of St. Louis
Madison County
St. Clair County
Missouri
Illinois
M. L. King Bridge
Eads Bridge
70
170
40
70 55
N & W RR
TRRA
Natural Bridge
Airport
North Hanley
Florissant
Lucas and Hunt
West Florissant
St. Charles Rock Rd.
Woodson
Brown
Lindburgh
Cypress
Midland
Ashby
Page
Olive
Warson
Hanley
Delmar
Ladue
Pershing
Forsyth
Forsyth Bypass
Clayton
Kingsland
Millbrook
Skinker
DeBaliviere
Forest Park
Martin Luther King
Kingshighway
Lindell
Grand
North Florissant
Cass
Washington
Market
Tucker
18th
Broadway
Taylor
Manchester
Vandeventer
Jefferson
Brentwood
Big Bend
McCausland
Main
Collinsville
6th
10th
Broadway
Missouri
Martin Luther King
State

Figure 14

TABLE 3-IX
CURRENT DOWNTOWN ST. LOUIS DEVELOPMENT ACTIVITIES

No.	Name	Uses	Schedule	Value (in million $)	Developer
1	Laclede's Landing (warehouse rehabilitation/ new construction to create mixed use/entertainment district)	700,000-sq-ft office 150,000±-sq-ft retail 100,000±-sq-ft restaurant/ food service 50,000-sq-ft residential	65% complete 33% complete 95% complete Under study	$80 (remaining)	Multiple under umbrella redevelopment corporation
2	Riverside (46-ac new construction)	300-room Embassy Suites Hotel 270,000 sq ft U.S. Postal Service data processing center 20-25% residential; 50% office; 25-30% mixed uses, including parking; Cousteau Center	Opened 1985 Approved Proposed	$250-300	Riverside Redevelopment Corp.
3	Parking Garage (on Arch grounds)	1,208 spaces roof designed to accommodate public gatherings	Opened 1986	$8	Bi-State Development Agency, city of St. Louis
4	Admiral (4,000 passenger excursion boat to be permanently moored as entertainment spot)	42,000-sq-ft show and amusement space 20,500-sq-ft food service 8,500-sq-ft retail	Opened 1987	$31	Six Flags Corp.
5	Union Market (rehabilitation of city-owned market building and parking garage)	80,000-sq-ft retail (3 large restaurants, food stalls, shops) 450 parking spaces 176-room Drury Hote	Commercial opened January 1987; 1988 hotel completion date	$13	Lipton Realty
6	555 Washington Avenue (rehabilitation of Dollar Store, cast-iron front Ackley Building, and Thomas Market Building)	135,000-sq-ft of luxury offices; 43,000-sq-ft retail shops and restaurants	Underway; 1987 completion date	$17	Kimble Cohen & James Dwyer

TABLE 3-IX (continued)

No.	Name	Uses	Schedule	Value (in million $)	Developer
7	Edison Brothers Stores, Inc. (headquarters office tower)	12-story, 580,000-sq-ft office building with ground-level retail and 185 underground parking spaces	Completed Fall 1985	$43	Edison Brothers Stores, Inc.
8	St. Louis Centre (1.32-million-sq-ft enclosed shopping center with office tower, hotel, and parking garage)	800,000-sq-ft department store (existing Famous Barr) 150,000-sq-ft rehabbed department store (Dillard's) 308,500-sq-ft retail (new) (200+ shops) 20 story 420,000-sq-ft office tower (new) 240 2-room suite hotel (top 7 floors of Dillard building) 1,427-space parking garage with 61,500-sq-ft of street-level retail	Garage complete; retail opened August 1985; office tower completed 1986; Dillard's hotel and expanded retail connecting with an expanded exhibition center proposed	$168.5	Melvin Simon & Assoc. of Indianapolis and May Center Inc., St. Louis (Office tower--Cabot, Cabot & Forbes of Boston)
9	Cervantes Convention and Exhibition Center Expansion	240,000 sq ft exhibition hall addition; 70,000 sq ft meeting rooms expansion; plus 600 hotel rooms, office tower, parking, and retail linkage to St. Louis Centre	Projected by end of decade	$68.4	City of St. Louis
10	Washington Avenue Redevelopment (14-block rehabilitation and new construction)	Rehabilitation of Lammerts Bldg. for 133,000 sq ft of office and 42,000 sq ft of commercial; rehabilitation of Lennox Hotel into 109 apartments; rehabilitation of 500,000-sq-ft Merchandise Mart for office, retail, and support parking in annex	Underway; Lammerts office conversion and Lennox residential conversion opened 1986; Merchandise Mart began construction in 1986	$225+	Pantheon; Mackey and Associates, Inc.; and Taylor-Morley-Simon (Merchandise Mart--Ameritas, Inc. of Atlanta, GA)

TABLE 3-IX (continued)

No.	Name	Uses	Schedule	Value (in million $)	Developer
		building; rehab of Gateway hotel to go with rehabbed Mayfair; office condominiums and loft apartment conversion of Curlee Clothing, Dorsa, and other buildings; construction of new residential, office, and parking structures on vacant and cleared land, notably the block west of Dillard's Bldg.; plus extension of the landscaped mall from the Convention Center to the Old Post Office			
11	Old Post Office (mixed-use rehab of historic federal building)	Federal offices and community meeting rooms on upper floors; 53,000-sq-ft of commercial and restaurant space on ground and lower levels	Offices complete; commercial space being leased	$16.4	General Services Administration
12	Chemical Building (office rehabilitation)	160,000-sq-ft office; ground-floor retail	Underway	$7.5	Chem. Bldg. Ptnr., Dubinsky Realty
13	LGL Center (office rehabilitation)	100,000-sq-ft of office space with ground floor retail	Opened 1985	$8.5	Harold Kanefield
14	Paul Brown Building (office rehabilitation)	16-story, 212,000-sq-ft office building; ground-floor retail	Underway tenant-by-tenant	$3	Murdock & Coll, Inc., Chicago
15	Majestic Hotel and Garage	100-hotel room gut rehab plus 329-space new parking garage with 15,000 sq ft of retail space	Underway; hotel opened 1987; 1988 garage completion	$7.3	Majestic Redev. Corp.--Harold Kanefield

TABLE 3-IX (continued)

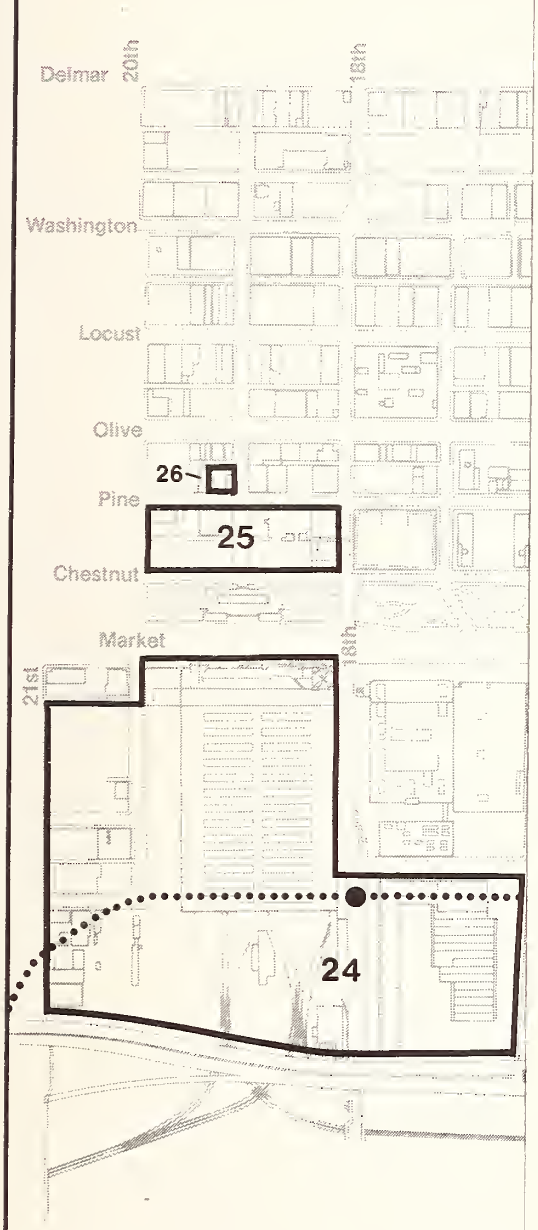
No.	Name	Uses	Schedule	Value (in million $)	Developer
16	Metropolitan Square	42-story, 1.5-million-sq-ft office building with 53,000-sq-ft of retail and 900 parking spaces	Under construction; mid-1988 completion date	$100	Metropolitan Life Insurance Co. (New York)
17	Lerwick Clinic (reuse of bank building and new construction)	40,000-sq-ft medical clinic	Opened 1986	$7	401 Pine Redev. Corp.
18	Adam's Mark Hotel (reuse of Pierce office building shell plus new construction)	17-story, 907-room luxury hotel with banquet/ballroom, restaurant/lounge, health club/pool facilities	Opened 1986	$90	HBE Corporation
19	Two Bell Center	Expansion comparable to One Bell Center	Site preparation underway	NA	Southwestern Bell Telephone Company
20	One Bell Center	44-story, 1.5-million-sq-ft office building plus 6-level 1,350-space parking garage (20a)	1985 completion	$130	Southwestern Bell Telephone Company
21	Gateway Mall (office buildings on the north half and park strip on the south half of 3-block area)	12-14 ± story office buildings with limited underground parking; park development on the south halves of the blocks plus on a fourth block to the east of the buildings	One Gateway Mall opened 1986; Two Gateway Mall construction start 1987	$100-125	Pride of St. Louis Redevelopment Corp. (Turco Development Co., Linclay Corp., and the Forsythe Group)
22	MCI Building	250,000-sq-ft new office building	Construction underway	$27	Forsythe Group
23	Mart Building	1.1 million-sq-ft gut rehab for federal offices	April 1990 completion	$64	General Services Administration

TABLE 3-IX (continued)

No.	Name	Uses	Schedule	Value (in million $)	Developer
24	St. Louis Union Station (conversion of Union Station to multipurpose entertainment complex)	550-room hotel with 16,000 and 8,000-sq-ft ballrooms and 35,000-sq-ft of meeting space plus a variety of retail shops, a food market, restaurants, gardens, and entertainment activities	August 1985 completion; Postal Annex office conversion completed in 1986; Powerhouse office construction underway; REA Bldg. block under study	$135	James W. Rouse Co.; Columbia, MD; Oppenheimer Properties, Inc.; New York, NY; Omni International Hotels Ltd., of Atlanta, GA; Ralph Korte Const. Co., Inc.
25	Aloe Plaza (Century Electric conversion)	300,000 sq ft of office, 10,000 sq ft of retail, and 550 parking spaces	Construction underway	$40	Forsythe Group
26	1900 Station Plaza (warehouse conversion)	81,500-sq-ft of office	Completed December 1985	$5.4	Jerome Schlicter

SOURCE: EWGCC survey of developers, City of St. Louis Community Development Agency, and Downtown St. Louis, Inc.

Current Downtown Development Activities



LEGEND

1	Laclede's Landing
2	Riverside
3	Arch Parking Garage
4	Admiral
5	Union Market
6	555 Washington Avenue
7	Edison Brothers Stores, Inc.
8	St. Louis Centre
9	Cervantes Convention/Exhibition Center Expansion
10	Washington Avenue Redevelopment
11	Old Post Office
12	Chemical Building
13	LGL Center
14	Paul Brown Building
15	Majestic Hotel and Garage
16	Metropolitan Square
17	Lerwick Clinic
18	Adam's Mark Hotel
19	Two Bell Center
20	One Bell Center
20a	Parking Garage
21	Gateway Mall
22	MCI Building
23	Mart Building
24	St. Louis Union Station
25	Aloe Plaza
26	Station Plaza
••••	**LRT Alignment**
●	**Stations**

SCALE IN FEET

0 375 750

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Figure 15

Current Downtown Development Activities

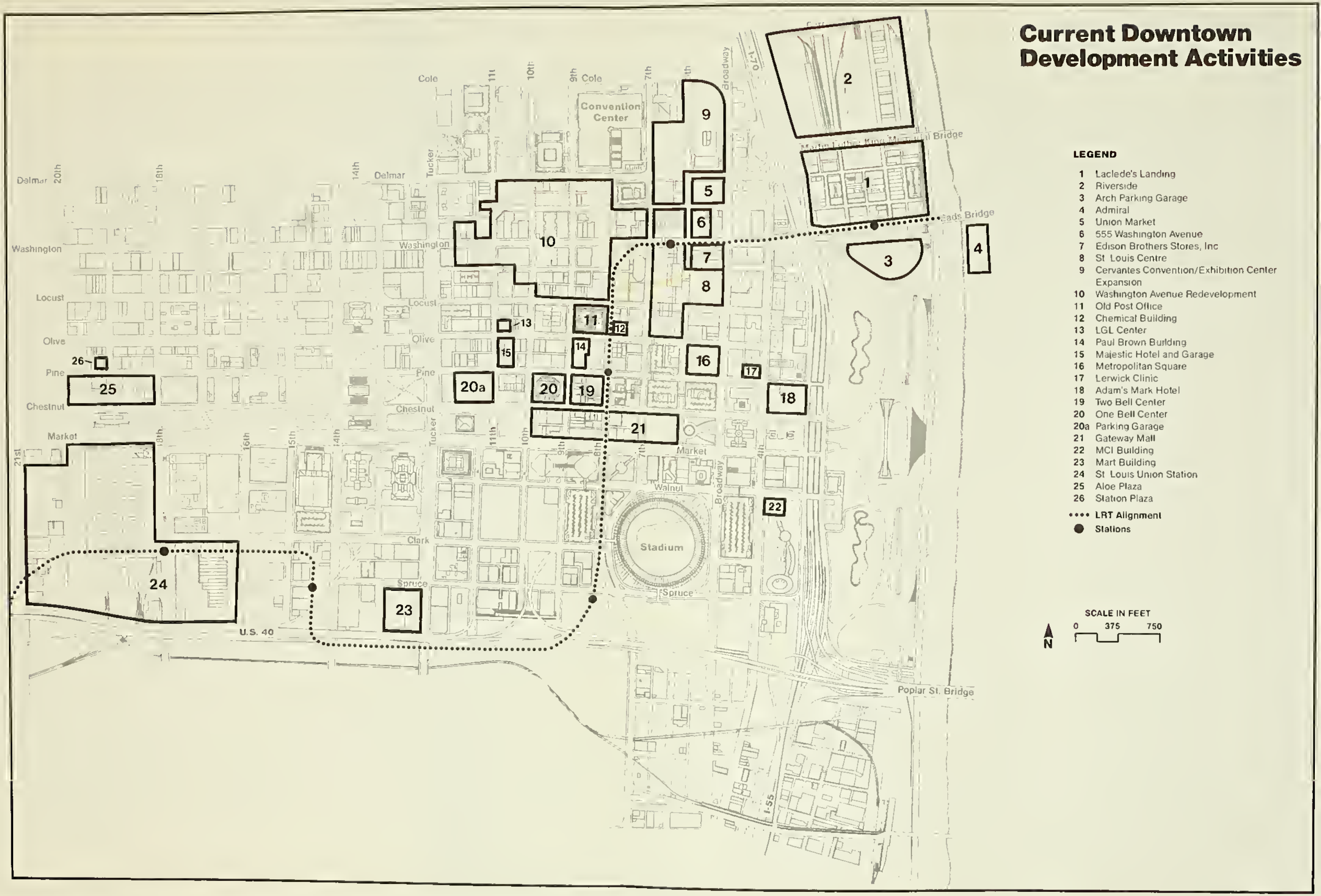


Figure 15

The governmental buildings in downtown St. Louis are concentrated along Market Street between Eleventh and Eighteenth Streets. They include the City Hall; municipal, civil, and federal court buildings; the new federal building; the main post office and annex; Kiel Auditorium and Opera House; and the federal Mart Building, which is currently undergoing a $64 million renovation. Also, the city of St. Louis is working to double the exhibition space at the Cervantes Center to provide a total of 480,000 square feet which, along with additional meeting rooms and complementary retail, hotel, and office space, will be connected directly into St. Louis Centre through the Dillard's Building.

Residential units are a relatively small component of the downtown land uses. The high-rise Mansion House Center apartments opposite the Arch, Plaza Square apartments opposite the Market Street governmental concentration, the Lucas Park Loft Apartments on Washington Avenue, and older hotels converted to housing for the elderly (Jefferson Arms and Alverne) are among the primary residential options available downtown. Reconstructed public housing units and construction of market-rate apartments and townhouses in Columbus Square plus the $12.2 million conversion of the Lennox Hotel into luxury apartments are projects yielding additional units on the north side of downtown; additional loft apartments are proposed along Washington Avenue west of Ninth Street and in Laclede's Landing.

The Clayton CBD is a high-quality, high-rise suburban office center built around the St. Louis County Government Center. It has an estimated employment base of 24,000 compared with 19,900 in 1970; Clayton may be expected to grow as new construction continues. It is served by I-170 and relatively closeby U.S. 40; it is among the most important bus transfer points in St. Louis County. Clayton's first high-rise building, the Pierre Laclede Building, opened in 1964. Since then, numerous high-rise buildings have been completed and house headquarters of major corporations, like General Dynamics and Graybar. Over four million square feet of office space is occupied by or competitively leased to general tenants. Hotel space, retail facilities, and high-rise residential units complete the core area development. Several office buildings are under construction or currently proposed for the Clayton CBD, including the large-scale, mixed-use Clayton Towers development in the triangle between Forsyth, the Forsyth Bypass, and Hanley.

o <u>University Campuses</u>. St. Louis University at Grand, the Washington University Medical School at Kingshighway, the main campus of Washington University between Skinker and Big Bend, and the University of Missouri at St. Louis (UMSL) on Natural Bridge are located within the priority corridor. Each has good roadway accessibility and is served by more than one bus line, although UMSL's bus service is less than that available at the other three university campuses. All four institutions have been stable or grown slightly over the last few years and may be expected to continue in that pattern. UMSL has grown the most rapidly and has the greatest growth potential.

St. Louis University serves about 10,000 students, most of whom come from the local area. The University employs some 3,200 full-time and 1,500 part-time faculty, administrative, and support personnel. Immediately to the north of St. Louis University is the Grand Center, a major redevelopment area that includes Powell Hall, home of the St. Louis Symphony, and the Fox Theater, a refurbished 1920s movie palace offering a full range of multi-media productions. The University's medical campus is on South Grand.

The Washington University Medical School with about 1,000 students is located within a major hospital complex which includes Barnes, Jewish, and Children's Hospitals as well as the Central Institute for the Deaf and the St. Louis College of Pharmacy. These institutions provide employment for some 11,500 persons. Also, these institutions participate in the Washington University Medical Center Redevelopment Corporation which is spearheading a major mixed-use redevelopment of the area surrounding the medical-hospital complex. The area is part of the Central West End which includes high-density housing, fashionable townhouses, and entertainment and institutional land uses.

The main campus of Washington University has an enrollment of about 9,700 and a staff of about 550. Over 80 percent of the 4,400 undergraduates come from outside the area. Some 2,300 of the students are part-time, generally-local students who attend mostly night classes.

UMSL is the only major public university serving the metropolitan area; it was founded a little over 20 years ago. It has an enrollment of about 11,500 students with 421 full and 459 part-time faculty. The campus draws 98 percent of its students from metropolitan St. Louis, more than 70 percent of them are over age 21, and about 77 percent are employed. Some 73 percent of UMSL's full-time students live with parents; UMSL has no dormitories. Part-time students comprise 57 percent of UMSL's enrollment, and 46 percent of them live with spouses and children. UMSL has the largest number of black students in any four-year higher-education institution in the state. Some 86 percent of UMSL's students presently get to campus by auto.

o <u>Lambert Airport--McDonnell Douglas Complex</u>. Lambert St. Louis International Airport is the sixth busiest airport in the nation and is the operating hub for TWA and Ozark Airlines. The airport has experienced major growth over the last few years; projects underway include a major terminal expansion, runway extensions, noise abatement purchases of adjacent housing, and land use planning to accommodate airport-related businesses. The airport has also generated substantial hotel development (Marriott, Hilton, Stouffers Concourse) serving airlines and passengers. McDonnell Douglas, the largest employer in the state, has its headquarters, research and development, and manufacturing facilities adjacent to the airport. Numerous other manufacturing operations are located in the area, including a Ford Motor Company Assembly Plant. The five census tracts incorporating the Airport and adjacent industrial areas accounted for over 50,000 employees in 1980, a figure which may be expected to grow in the near term. The area has good roadways that are congested in peak periods; it has comparatively little bus service.

o <u>Wellston Enterprise Zone</u>. The former Wagner Electric facility on 55 acres in Wellston is now owned by St. Louis County and is being subdivided for industrial tenants with the goal of replacing lost jobs and generating tax revenues. Following demolition, some 15 buildings with a total of 565,000 square feet will be available for reuse. Two new tenants have been attracted to date. The tract, as is all the land in the city of Wellston, is designated as a State enterprise zone to provide incentives for industry to locate there. Additional adjacent land may be included in the future. The site does not have interstate highway access; bus service is provided along Page which is accessible at one edge of the site.

3.2 TRANSPORTATION

a. Travel Patterns

Daily regional travel patterns in the 2000 design year are expected to be similar to those of today, although most movements will be somewhat heavier as a result of increased numbers of households in the region and increased numbers of trips per household. The St. Louis CBD will remain the principal employment center, containing about 12 percent of the urbanized area's jobs in 2000. Other major employment centers in the study corridor will include Clayton (three percent of regional employment), the hospital-medical complex at Kingshighway (two percent), and McDonnell Douglas and Lambert Airport (two percent).

Total daily trips within the region are projected to be approximately 4,520,945 in 2000 up from 4,264,000 in 1984. Of these, over 36 percent, or approximately 1,632,000, are expected to be home-to-work and work-to-home trips.

Travel by auto will remain the predominant mode in 2000, with over 95 percent of all trips being made by auto. (Table 3-XIV gives the expected increases in average daily traffic on major highways and arterials in the study corridor.)

Transit ridership (linked trips) is expected to increase by 30 percent from approximately 112,100 per day in 1985 to about 146,000 in 2000, given the present peak-hour bus fleet, or to about 152,200 if sufficient peak-hour buses were added to satisfy the demand for service and TAP efficiencies are realized. The latter figure is lower than the level of ridership on the Bi-State system in 1980, after which time service was cut and fares were raised. The eight percent difference in AA/DEIS (174,500) and FEIS (160,800) ridership numbers is the result of using refined travel demand forecasting models and revisions in the bus network.

The projected increase in 2000 transit ridership is the result of: expected growth in the number of households in the region; expected growth in employment in the region; projected increases in major activity center parking costs (related primarily to higher densities and decreasing parking supply); increases in automobile operating costs (projected by the U.S. Department of Energy); and the expectation that fares will increase with the rate of inflation rather than at a substantially higher rate as occurred in St. Louis since 1981.

b. Public Transportation

Public transportation in the St. Louis region is provided by a fleet of buses operated on the public road network by the Bi-State Development Agency. No other modes of public transit are available.

Bi-State operated 134 regular-service routes covering approximately 2,220 route-miles (shown on Figure 2) as of December 2, 1985. In addition, the Agency provides call-a-ride service in West St. Louis County and special express service to the Fairmont Race Track in Illinois. During the peak hour, 616 buses are in revenue service. The distribution of existing routes is summarized in Table 3-X. Weekday boardings averaged approximately 167,652 throughout the entire region in fiscal year (FY) 1986 (July through June), comprising approximately 112,100 person trips per day. Total annual ridership (boardings) decreased from a high of 76,320,400 in FY80 to 46,685,116 in FY84, increased in FY86 to 48,931,474 and experienced a decrease to 47,471,340 in FY87. (Chapter 1 discusses the factors contributing to losses in Bi-State ridership in the early 1980s, such as reduced service and increased fares; recent increases in ridership may be attributed to TAP service improvements and, despite the FY87 setback, should be sustained with the continuity of improved bus service and the expected increase in auto fuel costs.)

Bi-State presently operates two official park-n-ride lots and serves multiple unofficial lots in both Missouri and Illinois, which are simply outlying portions of existing shopping center lots, with no charge for parking. Bi-State also uses 12 transit loops and seven highway pull-offs.

TABLE 3-X

EXISTING BI-STATE SERVICE
(December 2, 1985)

Area	Regular Bus Route Service				
	Local	Express	Rapid	Park-Ride	Total
Missouri					
City of St. Louis	17	3	0	0	20
St. Louis County	20	1	0	0	21
City/County	21	22	15	0	58
Illinois					
Madison County	6	2	0	2	10
St. Clair County	13	3	0	0	16
Madison/St. Clair	4	2	1	1	8
Monroe/St. Clair	0	1	0	0	1
TOTAL	81	34	16	3	134

Bi-State operates 14 local routes and 12 express and rapid routes that provide primary service in the priority corridor addressed in this report. Details of the service provided by the primary routes are listed in Table 3-XI. Nearly all of the routes are radial in nature, connecting the St. Louis and Clayton CBDs with the outlying suburbs. In addition, several local north-south routes cross the priority corridor and provide connections to the radial routes.

Local service is provided over most of the system between the hours of 5:00 a.m. and 1:00 a.m., with express bus service operating only during the morning and evening peaks. Local buses provide service in both directions throughout the day, while most express routes operate inbound to the St. Louis CBD only in the a.m. peak and outbound only in the p.m. peak. A few express routes, as noted in Table 3-XI, also provide reverse-flow service during both peak periods. A significant part of the patronage on local routes in the corridor is in the reverse-flow direction. Headways in the corridor during peak periods average about 12-20 minutes for local service and about 20-30 minutes for express service.

In-vehicle travel times for selected trips in the study corridor are shown in Table 3-XII; the estimates exclude walk time for auto trips and both walk and wait time for bus trips. Although these trips are listed as interchanges between major activity centers, the Lambert Airport, Clayton, Washington U., and UMSL activity centers can also be considered nodes of representative residential areas. These data show that travel times by bus are frequently two and three times longer than those for the same trip by auto. When considering average wait times, travel by bus exceeds three times the average automobile trip time. Thus, even for relatively short work trips to the St. Louis CBD from within the city or the inner ring of suburbs, some transit riders spend nearly an additional hour every day in travel time over that spent by the auto commuter.

Recent data on weekday ridership for each of the bus lines operating in the study corridors are shown in Table 3-XI. These routes carry approximately 31 percent of Bi-State's total daily system ridership.

TABLE 3-XI
EXISTING PUBLIC TRANSPORTATION SERVICE IN THE PRIORITY CORRIDOR

Route Number	Route	Total Inbound Trips[a] Per Day	Total Inbound Trips[a] a.m. Peak Only	Midday Headway (min)	Hours Per Day	Weekday Ridership[d] (April 1985)	Average Speed (mph)
	Local Service						
15	Hodiamont	49	10	25	20	2,864	11.3
32	Wellston-M. L. King, Jr.	66	12	18	20	5,169	13.1
33	Dorsett-Lackland	8	1	120	11	257	16.3
49	Lindbergh	29	7	42	14	1,538	20.6
52	Forest Park	89	17	15	19	5,669	12.9
57	Manchester	46	7	30	19	3,005	15.3
91	Olive-McKnight	89	18	20	19	7,292	14.5
93	Lindell	72	13	16	20	5,521	12.6
94	Page	77	14	15	20	5,317	11.7
97	Delmar-Forsyth	56	12	20	19	5,228	11.0
104	Natural Bridge	15	1	51	11	6,811	13.2
603	Midland	19	4	45	13	577	16.4
606	Maplewood Airport	16	3	54	12	582	15.9
613	Clayton-Northwest Plaza	15	4	49	11	337	15.1
	Express Service						
32X	St. Charles Express	3	3	--[b]	--[b]	169	15.5
33X	Dorsett-Lackland Exp.	7[c]	3	--	--	405	17.1
52X	Brentwood Exp.	4	4	--	--	167	12.9
56X	Manchester Rd. Exp.	4	4	--	--	157	15.8
69R	Ellisville-Ballwin Rapid	6	5	--	--	390	20.2
93X	Lindell Exp.	6	6	--	--	343	13.9
94X	Page Exp.	14[c]	6	--	--	906	13.8
104X	Natural Bridge Exp.	5	5	--	--	384	15.7
152X	Clayton Rd. Exp.	4	4	--	--	139	15.4
191X	Olive-Creve Coeur Exp.	9[c]	7	--	--	822	16.8
194X	McKelvey-Page Exp.	4	4	--	--	162	19.0
204R	Airport Rapid	2	2			58	24.8

SOURCE: Bi-State Development Agency Schedules and Passenger Counts, April 1985.

[a] Some bus routes have several branches. This table presents data (except for ridership and average speed data) for only those branches which serve areas that could also be served by LRT.

[b] Express service operates only during the a.m. and p.m. rush hour periods.

[c] This express route operates both inbound and outbound during the a.m. and p.m. rush hour periods.

[d] Ridership is expressed in unlinked trips.

TABLE 3-XII

IN-VEHICLE TRAVEL TIMES FOR SELECTED TRIPS DURING P.M. PEAK HOURS

From	To	In-Vehicle Travel Time (in minutes)	
		Auto	Bus
St. Louis CBD	Lambert Airport	25	35
St. Louis CBD	Clayton CBD	24	44
St. Louis CBD	Washington Univ.	20	34
St. Louis CBD	UMSL	21	46
St. Louis CBD	Barnes Hospital	14	28
Clayton CBD	Lambert Airport	18	39
Clayton CBD	Barnes Hospital	14	32
Barnes Hospital	McDonnell-Douglas	27	73
East St. Louis	Clayton CBD	25	60*
East St. Louis	McDonnell Douglas	30	83**

Source: EWGCC (auto) and Bi-State (bus)

* Assumes five minutes of travel from Main and Broadway to Fourth and Washington plus an average 11-minute wait to board the Lindell Express.

** Assumes five minutes of travel from Main and Broadway to Fourth and Washington, an average 10-minute wait to board the Berkeley Rapid, a 41-minute ride to Chambers Road, an average 13-minute wait for the Chambers local, and a 14-minute ride to McDonnell Douglas.

There are no exclusive rights-of-way available to the bus system (with the exception of the paved, former Hodiamont streetcar right-of-way), although bus priority lanes are currently provided in the St. Louis CBD for outbound buses. Use of these lanes is restricted to buses and right-turning vehicles during the weekday afternoon peak period, between 4:00 and 6:00 p.m. The lanes are on Ninth between Market and Convention Plaza, on Washington between Fourth and Tucker, and on Locust between Broadway and Tucker. Reserved lanes are also available on Olive from Tucker (eastbound) and Fourteenth (westbound) through to Lindell and Kingshighway for both a.m. and p.m. peak-hour movements.

Current fares are $0.50 on local Illinois routes, $0.75 on local Missouri routes, and a $1.00 on express routes. Transfer charges are $0.10 between local routes and $0.35 between local and express routes. In addition, a zone charge of $0.10 is in effect in the Illinois part of the region, where up to two zone boundaries may be crossed on any one route. The fare for the elderly, handicapped, and children is $0.35 in Missouri and $0.25 in Illinois. (Children under five are free.) Weekly passes are available for $10, commuter 10-ride tickets are available for $9.00, and student 10-ride tickets are available for $3.75. Bi-State also offers a $36 gold monthly pass for unlimited bus use, a $27 red monthly pass for unlimited local bus service, and an $18 green monthly pass for unlimited Illinois local bus service. Free fare service is currently available on any bus while operating in downtown St. Louis.

c. Highways

Major highways in the study corridor include radial routes U.S. 40, the Forest Park Expressway, and I-70, plus a cross town route, I-170, which connects I-70 on the north with the Forest Park Expressway and U.S. 40 on the south. The I-170 route is known locally as the Inner Belt. The Forest Park Expressway is composed of four segments, generally known locally as: Forest Park Boulevard between Compton and Kingshighway; Forest Park Parkway between Kingshighway and Skinker; Millbrook between Skinker and Pershing; and the Forsyth Bypass between Pershing and the Inner Belt. Major arterials which also serve the corridor include the following state highways: Manchester, Page, St. Charles Rock Road, and Natural Bridge; plus Delmar, a county arterial, and Lindell, a city street. Expected physical characteristics of these roads in 1995 are presented in Table 3-XIII.

Traffic volumes on the major highways and arterials of the study area are shown on Table 3-XIV. This table presents the Average Daily Traffic (ADT) at several points along each of the routes and the projected 1995 ADT.

Travel times, distance, and average speed by auto between key activity centers in the area are shown in Tables 3-XV and XVI.

d. Parking

Within the St. Louis CBD (bounded by U.S. 40, Eighteenth Street, Carr Street, and the Mississippi River), the most recent survey by EWGCC identified approximately 23,250 off-street parking spaces, although only about 35 percent of these spaces lie within the central core of the CBD bounded by Memorial Drive, Clark, Tucker, and Washington, with many of these spaces reserved for employees. In general, parking demand in the central core significantly exceeds the supply, with many commuters parking in areas around the periphery and walking to their place of employment in the core area. A study by the St. Louis Community Development Agency indicates a future need for 3,000 to 10,000 parking spaces in the CBD, resulting primarily from new developments and their displacement of existing on- and off-street parking areas, assuming current transit usage trends continue.

Daily rates generally range from approximately $1.50 to $4.00 depending on the location, with a peak of $8.00. In a survey of seven lots with a total capacity of 936 spaces, peak usage during the day averaged 95.8 percent of capacity.

Approximately 4,000 on-street parking spaces are also available on most streets in the St. Louis CBD between the hours of 9:00 a.m. and 4:00 p.m. Their cost is low compared to commercial lots, but there is a two hour limit on most spaces. Usage rates for the on-street spaces are high.

TABLE 3-XIII

EXPECTED PHYSICAL CHARACTERISTICS OF MAJOR HIGHWAYS AND ARTERIALS IN 1995

Highways	Number of Lanes	Limited Access
U.S. 40		
I-70/55 to Vandeventer	6	Yes
Vandeventer to Skinker	8	Yes
Skinker to Innerbelt	6	Yes
Forest Park Expressway		
Innerbelt to Big Bend	4	Yes
Big Bend to Skinker	4	No
Skinker to Euclid	4	Yes
Euclid to Grand	6	No
Grand to Market	4	Yes
I-70		
Airport to Union	6	Yes
Union to St. Louis CBD	8[a]	Yes
I-170		
I-70 to Page	6	Yes
Page to Forsyth Bypass	6	Yes
Forsyth Bypass to U.S. 40	4[b]	Yes
Arterials		
Manchester/Chouteau	4	No
Lindell	4	No
Delmar	4	No
Page	4	No
St. Charles Rock Road	4	No
Natural Bridge	4	No
Bridges		
Poplar St. (I-70/I-55)	6	Yes
Eads	4	No
M. L. King, Jr.	4[c]	No

SOURCE: EWGCC

[a] I-70 has three lanes in each direction throughout the study area. In addition, two reversible lanes which rush-hour flows east of Union.

[b] This presently-four-lane-wide segment may be considered for widening to six lanes before 1995.

[c] This bridge is currently restricted to one lane in each direction.

TABLE 3-XIV

TRAFFIC VOLUMES ON MAJOR ROUTES

Route	Location	Average Daily Traffic	
		Existing	Projected
Highways			
U.S. 40	W of I-170	92,120 (1982)	94,900* (1995)
U.S. 40	City Limits	92,970 (1982)	91,800* (1995)
U.S. 40	W of Kingshighway	78,000 (1982)	79,200 (1995)
U.S. 40	E of Grand	51,880 (1982)	83,800 (1995)
U.S. 40	W of CBD	50,020 (1982)	64,500 (1995)
Forest Park Expressway	E of I-170	28,690 (1982)	28,800 (1995)
Forest Park Expressway	City Limits	21,750 (1982)	48,600* (1995)
Forest Park Expressway	W of Kingshighway	20,900 (1982)	51,760* (1995)
Forest Park Expressway	E of Grand	25,720 (1982)	31,700 (1995)
I-70	Lambert Airport	87,450 (1982)	108,700* (1995)
I-70	City Limits	98,820 (1982)	103,400* (1995)
I-70	E of Kingshighway	100,420 (1982)	102,200 (1995)
I-70	W of Grand	104,210 (1982)	94,400 (1995)
I-70	N of CBD	116,710 (1982)	113,500 (1995)
I-170	S of Natural Bridge Rd.	70,668 (1984)	87,795 (2000)
I-170	N of I-70	70,007 (1984)	NA
Arterials			
Lindell	E of Kingshighway	18,903 (1983)	27,100* (1995)
Olive	W of Jefferson	11,190 (1982)	10,500 (1995)
Delmar	E of Des Peres	19,507 (1983)	25,500 (1995)
Delmar	E of Skinker	12,255 (1983)	25,500 (1995)
Page	W of Hodiamont	19,997 (1983)	19,900 (1995)
Page	W of Skinker	18,516 (1983)	20,175 (2000)
St. Charles Rock Rd.	E of Lucas & Hunt	19,691 (1983)	34,144 (2000)
Natural Bridge Rd.	W of W Florissant	14,382 (1985)	22,136 (2000)
Natural Bridge Rd.	E of Brown Rd.	16,934 (1984)	30,068 (2000)
North Hanley	S of I-70	15,657 (1985)	26,328 (2000)
McDonnell Blvd.	S of Airport Rd.	8,181 (1984)	13,673 (2000)
Airport Rd.	E of McDonnell Blvd.	8,071 (1985)	27,240 (2000)
Bridges			
Poplar St. Bridge	(I-70, I-55, U.S. 40)	108,000 (1984)	142,700* (1995)
Eads Bridge		3,940 (1982)	12,400 (1995)
M. L. King Bridge		4,560 (1982)	20,200 (1995)

*Projected volume exceeds theoretical roadway capacity, based on accepted engineering practice.

SOURCE: 1982 Traffic Map, Missouri Highway and Transportation Department, Division of Planning and EWGCC traffic projections.
January 1985 Traffic Volumes Summary, Transportation and Traffic Division, City of St. Louis, Missouri.
St. Louis County Department of Highways and Traffic.

TABLE 3-XV

P.M. PEAK HOUR TRAVEL TIMES BY AUTO BETWEEN MAJOR ACTIVITY CENTERS

From	To	Distance (miles)	In-Vehicle Travel Time (minutes)	Average Speed (mph)
St. Louis CBD	Lambert Airport	13.2	25	32
St. Louis CBD	Clayton CBD	9.7	24	24
St. Louis CBD	Washington Univ.	7.1	20	21
St. Louis CBD	UMSL	10.5	21	30
St. Louis CBD	Barnes Hospital	4.3	14	18
Clayton CBD	Lambert Airport	7.4	18	25
Clayton CBD	Barnes Hospital	4.5	14	19
Barnes Hospital	McDonnell-Douglas	21.3	27	47
East St. Louis	Clayton CBD	11.7	25	28
East St. Louis	McDonnell-Douglas	18.6	30	37

TABLE 3-XVI

P.M. PEAK HOUR TRAVEL SPEEDS BY AUTO ALONG MAJOR ARTERIALS

Route	Section	Distance (miles)	Travel Time (minutes)	Average Speed (mph)
Clayton Road	Skinker-Clarkson	15.89	39.45	24
Forest Park/ Millbrook	Skinker-I-170	2.49	5.67	26
Forsyth/Maryland	Skinker-Ladue	2.05	8.18	15
I-70	Pine-Brown Road	11.94	17.15	42
I-170	Eager-Page	5.97	9.18	39
Ladue/Maryland	Maryland-I-270	5.31	15.63	21
Market Street	4th-Compton	1.96	8.83	13
McDonnell Blvd.	Airport Road-I-270	4.75	14.42	21
Natural Bridge Road	West Florissant-Airport Road	9.50	25.98	22
Olive Street Road	Skinker-US40	15.12	36.35	25
Page Avenue	Skinker-I-270	9.18	26.08	22
U.S. Route 40	14th-Woods Mill	15.57	25.75	38

SOURCE: EWGCC, 1983

The most recent study of parking in the Clayton CBD, conducted in 1978 by the Clayton Department of Planning, identified a total of approximately 12,000 off-street parking spaces in the 16-block core area. There are approximately 700 metered on-street spaces in the same area. These spaces are heavily used. Based on floor area ratios, the Clayton core area had an off-street parking deficiency of over 1,600 spaces, which is accommodated by peripheral parking. As in downtown St. Louis, the greatest parking deficit is in the center of the CBD area, in this case near the County Government Center.

Since that report was completed, the city of Clayton has opened a new 436-car garage and several new office buildings have been constructed with small parking surpluses. These developments have essentially kept pace with the growth in parking demand in the remainder of the area. The city of Clayton has several small sites available for construction of off-street parking garages that could be developed when the city feels that demand warrants.

e. Transportation Plan

EWGCC is the Metropolitan Planning Organization for the St. Louis region, and is responsible for coordinating transportation planning for the area. EWGCC prepared the first comprehensive long-range plan for the region in the late 1960s. The plan was adopted, and later refined and updated in 1974. Unrealistic growth projections at that time called for an 86-mile high capacity transit system, which has since been deleted from further consideration.

EWGCC completed a major analysis of transit service in 1978, which called for an all-bus system through 1985, the plan's horizon year. A systems analysis study was initiated in 1981 to analyze four corridors in the region to determine the need for major transit capital investments in these corridors and the priorities for making those investments. The conclusion of this study was that the East St. Louis-St. Louis CBD-Clayton-Lambert Airport corridor should receive further refined study as the priority corridor for major transit improvements. This Final EIS is a product of that further study.

EWGCC also prepared the highway component of the Long-Range Transportation Plan and the associated short-range (five-year) implementation program for that plan, known as the Transportation Improvement Program (TIP) for fiscal years 1983 through 1987. The Program identifies 316 proposed highway improvements totalling approximately $900 million dollars over the five-year period.

The Missouri Highway and Transportation Department has announced plans to widen U.S. 40 to eight lanes between I-270 and Mason Road and to six lanes from Mason Road west to Route 141, with interchange improvements at Ballas and at Mason Roads. These improvements are expected to provide adequate capacity for the next 20 years, during which time traffic volumes along this section of U.S. 40 are expected to double.

The Illinois Department of Transportation is working to complete I-255 in Metro-East from the Jefferson Barracks bridge to I-270 at the Cahokia Mounds Historic Site, with a future extension to the Alton area. The Department is also studying improvements in I-55/70 in the East St. Louis CBD.

No other major new construction in the federal-aid interstate system is anticipated in the St. Louis region. Most of the improvement projects consist of resurfacing, bridge rehabilitation, road widenings, and intersection improvements. Other than minor route adjustments and the addition of several park-n-ride lots along outlying portions of existing radial bus routes, no service improvements are planned for public transit within the corridor.

f. <u>Freight Railroads</u>

St. Louis is one of the largest railway traffic centers in the nation; as such, it has been criss-crossed by numerous rail alignments for more than a century. A number of these lines currently receive only light use, and some are no longer used at all. The LRT alternative will use two of these existing rail alignments; a bridge and tunnel alignment owned by the TRRA and part of Norfolk & Western's (N&W) UD line.

The TRRA right-of-way under consideration involves a double-track alignment running from Eads Bridge on the east, through a tunnel beneath Washington Avenue and Eighth Street, to the TRRA yard southeast of Union Station. The track has been removed from the bridge and most of the tunnel, which have not been used in over a decade; some minor switching movements still occur on the tracks along the yard and in the first couple hundred feet of the south end of the tunnel.

The part of N&W's UD line under consideration extends from a switch off the TRRA trackage at Grand Avenue westward through the medical-hospital complex and the northeast corner of Forest Park, along the Forest Park Parkway to DeBaliviere, where it turns to the north-west to the Delmar Station. The line continues to the northwest as a double track mainline as far as Page Avenue and then as a single track to Florissant Road and beyond.

N&W's UD line currently carries one westbound through-train per day and a switching train, which runs about three days per week. The N&W trackage is single track west of Page Avenue and double track east of Page, except that the eastbound main is out of service between Delmar Boulevard and Taylor Avenue. The trackage requires some maintenance, but is generally in fair condition. A total of 17 users were served on the line between March and September 1985, four of which account for 75 percent of the cars moved. An average of 92 cars per month were moved, 86 percent of which were deliveries and 14 percent of which were originating cars. About 57 percent of the car movements were concentrated in the Sarah Street area and the balance in the Page Avenue area. The 1985 car movements represent a decline of about 36 percent from a comparable period in 1983, when 20 users were served.

3.3 NEIGHBORHOODS

Figure 16 shows the five residential concentrations that abut the proposed LRT alignment; these residential areas contain one or more neighborhoods based on resident perceptions of their "neighborhood". Tables 3-XVII and 3-XVIII give demographic and transit-dependent characteristics for each of the areas which are described below. Other sections of this chapter describe pertinent aesthetic, ambient noise, and air quality characteristics of these residential areas.

o Midtown. This area was first developed over 100 years ago and reached a peak between World Wars I and II, with a major concentration of movie palaces, medical offices, clubs, hotels, and institutional uses. The portion of the area east of Grand, and south of Olive was almost entirely cleared as a part of the Mill Creek Valley urban renewal project in the early 1960s. Laclede Town and Operation Breakthrough housing was constructed for moderate and low-income residents and St. Louis University expanded its facilities east of Grand. Today, the City Center Redevelopment Corporation is working to restore Grand Avenue as a regional theater arts and entertainment center with office, commercial, and residential uses as well. Also, the part of the Midtown area west of Grand and south of Laclede falls within the city of St. Louis' Midtown Enterprise Zone, which provides state income tax credits for businesses locating in the zone and hiring disadvantaged and zone residents.

Population continues to decline in the Midtown area. Clusters of special population concentrations abound in the area such as senior citizens in retirement housing complexes, college students in dormitories and apartments, and lower income families in Laclede Town. The traditional housing stock has thinned out; market rate housing is being added in the Lucas Heights development east of Powell Hall in the north part of the midtown area.

o Central West End. The Central West End was developed at the turn of the century and has seen major construction in several periods since then. Today it is again one of the fashionable areas in St. Louis. Mansions, townhouses, and hotels were first developed with the 1904 World's Fair, which was held in Forest Park. For example, large, single-family homes line Lindell opposite the park, with those west of Union generally located on 500 foot deep lots (the Catlin tract) which extend back to the Forest Park Parkway and the parallel N&W trackage, the LRT alignment. In addition, many of the homes were developed on private places, a St. Louis custom which continues today, where the residents own and maintain their streets, which are closed to through-traffic by sometimes-elaborate gates.

Residential Concentrations

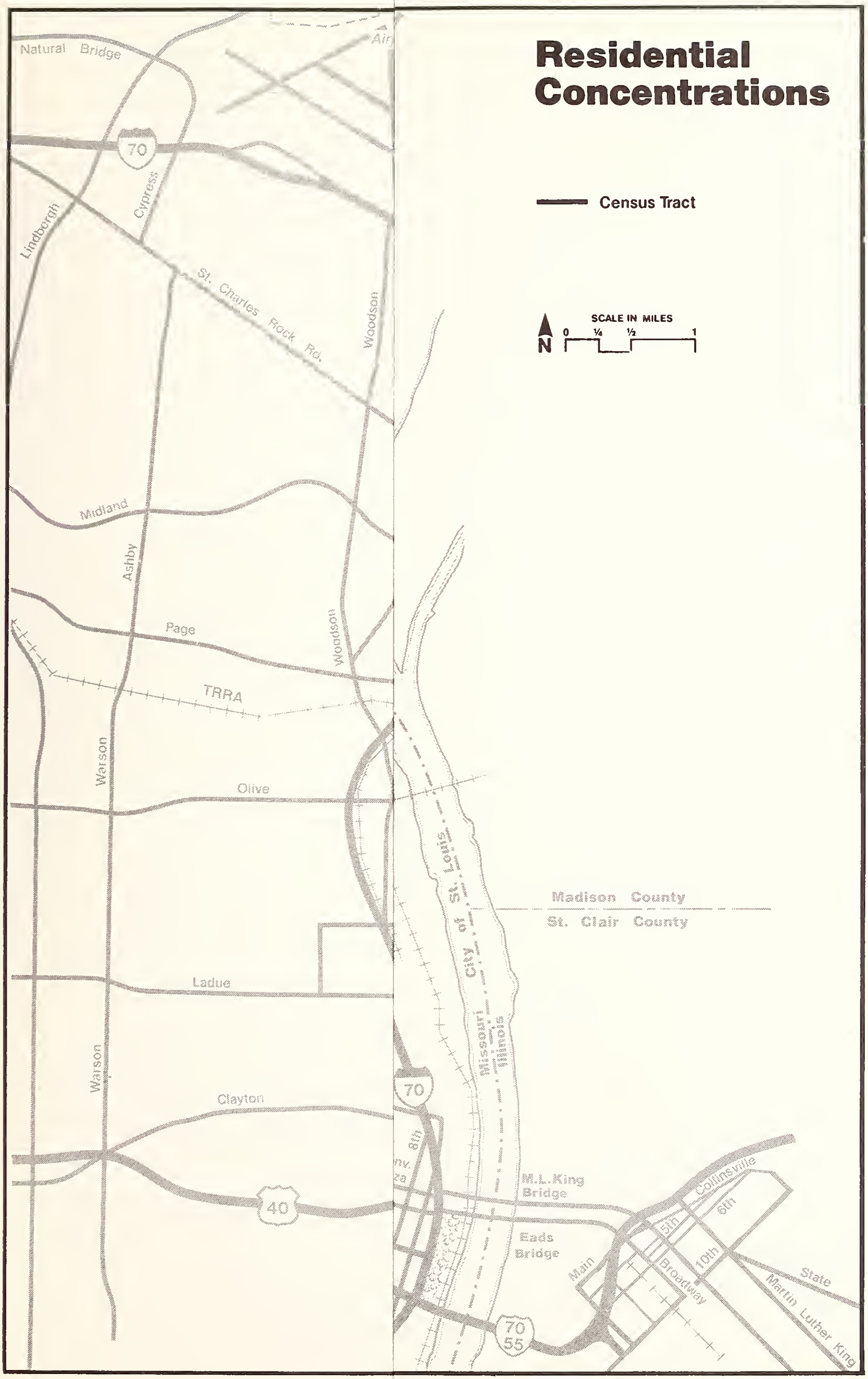


Figure 16

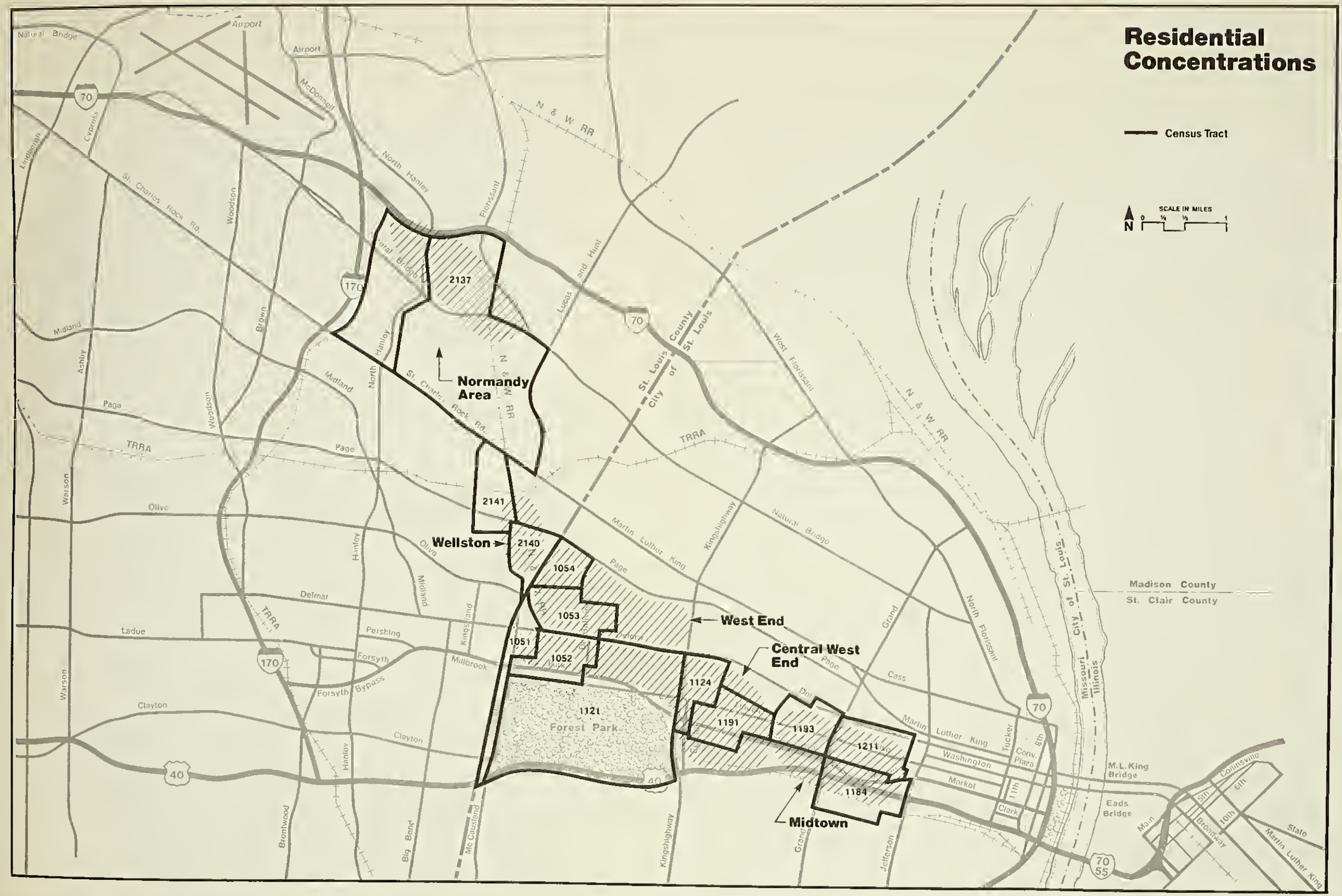

Residential Concentrations
Census Tract
SCALE IN MILES
0
¼
½
1
N
Normandy Area
Wellston
West End
Central West End
Midtown
2137
2141
2140
1054
1053
1051
1052
1121
Forest Park
1124
1191
1193
1211
1184
St. Louis County
City of St. Louis
City of St. Louis
Missouri
Illinois
Madison County
St. Clair County
Airport
Natural Bridge
Lindbergh
Cypress
St. Charles Rock Rd.
McDonnell
North Hanley
Florissant
N & W RR
Lucas and Hunt
West Florissant
Woodson
Brown
Midland
Ashby
Page
TRRA
Warson
Olive
Delmar
Ladue
Pershing
Forsyth
Millbrook
Forsyth Bypass
Clayton
Kingsland
Hanley
Brentwood
Big Bend
Mc Causland
Kingshighway
Martin Luther King
Natural Bridge
Grand
North Florissant
Cass
Washington
Market
Tucker
Conv. Plaza
11th
8th
Clark
Jefferson
M.L. King Bridge
Eads Bridge
Main
5th
6th
10th
Broadway
Collinsville
State
Martin Luther King
70
170
40
70 55

Figure 16

Numerous institutional uses enrich the area including the medical-hospital complex at Kingshighway and the Cathedral and archdiocesan activities of the Catholic Church in St. Louis. Commercial areas along Maryland Plaza, Euclid-McPherson, and Euclid south of Lindell include restaurant/entertainment facilities that draw tourists and patrons from the whole region.

The part of the Central West End lying south of Lindell (between Sarah and Newstead) and south of the Forest Park Parkway (between Newstead and Euclid) falls within the city of St. Louis' Midtown Enterprise Zone, which provides state income tax credits for businesses locating in the zone and hiring disadvantaged and zone residents.

The area includes a significant concentration of high-rise apartments along Lindell east of Kingshighway, plus numerous high- and low-rise condominum conversions as well as new in-fill townhouse and condominum construction.

About 1,500 residential units have been or are being rehabilitated along Pershing and Waterman at DeBaliviere (site of the proposed Forest Park LRT station); additional rehabilitation and in-fill construction are proposed. This large-scale redevelopment has involved total reconstruction of older multi-family housing with the addition of off-street parking, landscaping, swimming, and tennis amenities. Office, service, and retail uses are now being developed in rehabilitated commercial buildings. This neighborhood has undergone a complete transformation from an area known for drugs, crime, and subsidized rentals in the 1960s to an attractive community with a comparatively-affluent, young, professional population in the 1980s.

The Central West End contains a significant concentration of senior citizens and handicapped residing in a number of specialized housing facilities. In addition, the area is attracting "empty-nesters" (those whose children have grown and now find a smaller, low-maintenance condominium an attractive living solution), and young adults who may study or work in the medical-hospital complex or choose to restore an old house.

TABLE 3-XVII
NEIGHBORHOOD DEMOGRAPHIC CHARACTERISTICS

Neighborhood	Census Tract	Population 1980	Population Change 1970-80	Median Age (years)	Average Household Size	Median Household Income	% Black
Midtown	1184	1,466	-13.0%	61.4	1.26	$ 7,103	40.4%
	1193	3,829	-38.2	24.2	1.59	6,469	36.8
	1211	4,806	+12.2	26.0	2.58	11,151	79.0
	Total	10,101	-17.0%	N.A.	2.33	N.A.	57.3%
Central West End	1051	4,286	- 5.6%	29.1	2.25	$13,580	33.6%
	1052	2,871	-57.3	27.6	3.09	11,467	87.9
	1121	4,055	-43.1	39.1	1.87	11,667	46.7
	1124	4,487	-14.7	40.2	1.73	16,693	26.1
	1191	6,303	-20.6	46.8	1.43	8,679	32.7
	Total	22,002	-30.0%	N.A.	2.40	N.A.	41.7%
West End	1053	4,013	-40.4%	25.5	2.77	$8,536	97.4%
	1054	3,564	-33.5	23.0	3.39	8,971	98.4
	Total	7,577	-42.1%	N.A.	3.04	N.A.	97.9%
Wellston	2140	1,183	-41.7%	24.5	3.20	$8,103	88.8%
Normandy Area	2136	6,088	-21.2%	26.7	2.73	$16,167	30.4%
	2137	7,352	-16.8	32.0	2.72	18,445	32.7
	Total	13,440	-18.2%	N.A.	2.73	N.A.	31.9%
St. Louis City		453,085	-27.2%	31.7	2.49	11,511	45.6%
St. Louis County		973,896	+ 2.3%	31.3	2.79	22,128	11.3%
St. Louis SMSA		2,356,460	- 2.2%	30.5	2.77	18,628	17.3%

SOURCE: U.S. Bureau of the Census

TABLE 3-XVIII
NEIGHBORHOOD TRANSIT-DEPENDENT CHARACTERISTICS

Neigborhood	Census Tract	% Workers Using Public Transit	% Households with Auto Available	Average Travel Time to Work (minutes)	% With Transit-Use Disability	% With Work Disability
Midtown	1184	24.7%	42.6%	15.0	6.6%	9.9%
	1193	27.6	40.6	16.0	7.9	9.0
	1211	23.9	68.5	18.6	4.9	9.6
	Total	25.4%	52.2%	N.A.	6.5%	9.3%
Central West End	1051	16.3%	81.0%	20.6	5.6%	6.5%
	1052	26.2	64.8	21.9	8.5	14.9
	1121	16.2	65.7	18.5	5.8	7.0
	1124	16.9	72.1	17.8	6.4	6.5
	1191	20.9	53.9	16.8	9.1	12.5
	Total	18.8%	65.3%	N.A.	7.2%	12.3%
West End	1053	33.5%	62.3%	21.7	7.3%	18.7%
	1054	26.3%	53.0	28.6	11.6	17.1
	Total	30.5%	58.2%	N.A.	9.2%	17.9%
Wellston	2140	14.0%	65.6%	21.7	7.3%	13.2%
Normandy Area	2136	4.2%	93.4%	21.9	1.9%	5.1%
	2137	5.2	91.4	21.4	5.5	6.9
	Total	4.7%	92.3%	N.A.	3.9%	6.1%
St. Louis City		18.6%	68.8%	23.0	6.5%	11.6%
St. Louis County		3.8%	94.3%	22.7	3.1%	6.0%
St. Louis SMSA		5.7%	87.6%	23.0	3.9%	7.9%

SOURCE: U.S. Bureau of the Census

- West End. This area was developed following the 1904 World's Fair. It contains predominantly single-family units, many of which are very large. The area was the location of a controversial urban renewal project in the 1960s, one product of which was Gwen Giles Park along Hodiamont and Skinker at the western edge of the area near the N&W light rail alignment.

  The West End is about 98 percent black and includes a high percentage of workers who use public transit to reach their places of employment. Similarly, the percentage of area households with access to an automobile is comparatively low.

- Wellston. Wellston is a low income, black community with a declining population. Its housing stock is composed of predominantly modest-sized single-family units. The area includes industrial activities located in close proximity to the residential units, and numerous vacant lots where abandoned or fire-damaged units have been removed. The River des Peres, a local drainage channel near the N&W trackage (light rail alignment), floods nearby houses during heavy rainfalls. The city of Wellston is designated as a state enterprise zone, an area in which state-enabled incentives are available to attract businesses.

- Normandy Area. This area is composed of three comparatively small, largely-residential municipalities (Bellerive, Bel-Nor, and Bel-Ridge), an unincorporated area known as Carsonville, and the UMSL campus. Bellerive is located west of UMSL and north of Natural Bridge, the light rail alignment. It contains the largest houses in the area, the first of which were developed in the 1920s to 1930s with many constructed since UMSL located on the former country club grounds immediately to the east 20 years ago. Bel-Nor is located on the south side of Natural Bridge opposite UMSL and Bellerive. It contains attractive single-family units, generally constructed from the 1920s to 1930s period through the 1950s. Bel-Ridge straddles both sides of Natural Bridge west of North Hanley. It includes modest bungalows from the 1920s to 1930s period as well as some in-fill housing from the post-World War II period. Carsonville, an unincorporated part of St. Louis

County, is located immediately north of Bel-Ridge; its housing stock is similar to that of Bel-Ridge. Some of the single-family units in Normandy face the light rail alignment along Bellerive Drive as do some of those in Carsonville at Geiger Road and at Springdale Drive.

3.4 VISUAL AND AESTHETIC CONDITIONS

The St. Louis metropolitan area's main visual and aesthetic resources are the Mississippi River, the Jefferson National Expansion Memorial (Gateway Arch), and Forest Park. The Gateway Arch is located on the west bank of the Mississippi River at St. Louis' historic core and its 91 acres are framed on the north by the Eads Bridge, a National Historic Landmark, on the south by the Poplar Street Bridge (U.S. 40, I-55/70), and on the west by the 15 to 40-story buildings comprising St. Louis' CBD. The 1,293-acre Forest Park is one of the largest U.S. municipal parks and is located at the west edge of St. Louis about five miles from the Gateway Arch. The park was the site of the 1904 World's Fair and contains the Zoo, Art Museum, Jefferson Memorial, and Science Center as well as a wide variety of recreational facilities and activities. The light rail corridor passes through the northeast corner of Forest Park on the existing N&W right-of-way, which is screened by a berm.

Elsewhere, the typical range of urban activities and uses is found. Brick, single-family residential units, rather than apartments, are more common in St. Louis; and the residential areas in the St. Louis area, particularly the older areas within the corridor, are characterized by fairly extensive tree coverage. For example, residential areas in proximity to the guideway alignments in the western part of the city of St. Louis are characterized by two- to three-story, single-family houses that are distinguished by mature trees and shrubs. Public medians and roadway edges in the residential areas are also planted with ornamentals and evergreens, such as DeBaliviere.

A factor affecting the visual and aesthetic environment is the lack of topographic relief in the St. Louis area. The terrain is flat to gently rolling with local relief of rarely more than 100 feet. This lack of relief means that the opportunities for vistas are rare, and that structures rising above the built environment are visually dominant.

As is the case with most urban centers, industrial and commercial uses are in proximity to existing rail and highway corridors. Industrial uses generally predominate along rail corridors and usually have less sensitive visual environments. In contrast, the visual environment along highway corridors is more varied with high and low density residential use a frequent part of the landscape. The I-70 corridor from North Hanley to I-170 is frequently in cut, diminishing visibility to those single-family housing units near the right-of-way.

3.5 AIR QUALITY

a. Relevant Pollutants

Air pollutants generally of concern in transportation projects are carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NO_x), photochemical oxidants, or ozone, (O_3), and total suspended particulates (TSP).

Carbon monoxide is a colorless and odorless gas formed through the incomplete combustion of fossil fuels. Although natural and industrial sources contribute to ambient CO concentrations, mobile sources--primarily gasoline-powered internal cumbustion engines--account for most of the carbon monoxide in the atmosphere. CO emissions tend to decrease on a per-mile basis with increasing vehicle speed.

Hydrocarbons emitted by mobile sources result primarily from unburned gasoline passing through the engine and from gasoline evaporation. Aside from odor problems, hydrocarbons of themselves are relatively inoffensive at ambient concentrations; they are of concern because they react chemically in the atmosphere with NO_x and sunlight to produce photochemical oxidants. HC emissions also tend to decrease with increasing vehicle speed.

The two most important oxides of nitrogen are nitric oxide and nitrogen dioxide. Most mobile source emissions of nitrogen oxides are caused by the oxidation of atmospheric nitrogen to nitric oxide, which occurs at high temperatures. At ambient concentrations, nitrogen oxides can corrode materials, kill plant foliage, and damage lung tissue. They also play an important role in the chemical formation of photochemical oxidants. NO_x emissions tend to increase on a per-mile basis with increasing vehicle speeds.

Photochemical oxidants, comprised principally of ozone and peroxyacetyl nitrate, are formed in the atmosphere through complex chemical reactions involving HC, NO_x, and sunlight. In spite of considerable study, these reactions are still not well understood. Ozone is a highly reactive substance and is very corrosive. As a strong oxidizer, O_3 can oxidize materials and tissue and is considered quite toxic to both plants and animals.

Particulates are individual bits of dispersed matter, either liquid or solid, and can be emitted by mobile sources as droplets of unburned hydrocarbon, bits of rubber, metal, asbestos from brake shoes, lead particles, and entrained dust. Particulates can be toxic to humans depending on their chemical composition and can cause plant damage. Their interaction with other pollutants is also a public health concern.

The U.S. Environmental Protection Agency has promulgated ambient air quality standards for the above-described pollutants; these are presented in Table 3-XIX. The Clean Air Act amendments of 1977 called for achieving these standards by December 31, 1982. Where compliance with that schedule was not possible, as in the St. Louis region, the states were required to submit State Implementation Plans demonstrating attainment of the standards by the extended deadline of December 31, 1987. Attainment of the primary standards is considered necessary for the maintenance of public health, while the secondary standards are designed to protect the public welfare.

b. Regional Compliance with Standards

As of 1982, the entire St. Louis region was designated nonattainment for ozone, and the Missouri portion of the region within the I-270 ring was designated nonattainment for carbon monoxide. The St. Louis region was also unable to meet the standards for total suspended particulates (TSP), but since transportation activities are

TABLE 3-XIX

NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	Federal Standards Primary (Health)	Federal Standards Secondary (Welfare)
Carbon Monoxide (CO)	8 hours(a) 1 hour(a)	10 mg/m^3 40 mg/m^3	10 mg/m^3 40 mg/m^3
Hydrocarbons (Nonmethane) (HC)	3 hours(a) (6-9 a.m.)	160 ug/m^3	160 ug/m^3
Nitrogen Dioxide (NO_2)	Annual Arithmetic Average	100 ug/m^3	100 ug/m^3
Ozone (O_3)(b)	1 hour(c)	235 ug/m^3	235 ug/m^3
Total Suspended Particulates (TSP)	Annual Geometric Mean 24 hours(a)	75 ug/m^3 260 ug/m^3	100 ug/m^3 150 ug/m^3

SOURCE: U.S. Environmental Protection Agency

(a) Not to be exceeded more than once per year.
(b) A non-health-related standard used as a guide for ozone control.
(c) A statistical standard, but basically not to be exceeded more than an average of once per year based on the most recent three years of data.

ug/m^3 = micrograms per cubic meter
mg/m^3 = milligrams per cubic meter

responsible for only a small portion of the TSP problem, they are not addressed further in this document.

In order to plan for the attainment of the standards by 1987, EWGCC, the local lead air quality planning agency, developed the Transportation Element of the 1982 Air Quality Plan for the St. Louis Metropolitan Area. That document focuses on reducing mobile source emissions, which contribute significantly to the carbon monoxide and ozone pollution problems (50 percent of the recorded O_3 levels and more than 70 percent of the CO levels were attributed to vehicular travel). The plan contains commitments to the following transportation control measures:

- Promote a ridesharing program to increase the average vehicle occupancy rate to 1.5;
- Increase mass transit ridership by 30 percent over the 1977 level;
- Increase average regional peak hour vehicle speeds by four percent through systematic improvements in the traffic network;
- Increase the number of vanpools to 500;
- Promote bicycling and walking for short trips;
- Promote alternative fuels; and
- Initiate a motor vehicle inspection/maintenance program (I/M) to ensure that motor vehicle emission control systems are operational and properly maintained.

The above transportation control measures (TCM) will reduce mobile source hydrocarbon emissions an estimated 6.5 percent by 1987 according to air quality modeling. While no specific target reduction has been established for carbon monoxide emissions, the proposed TCMs will provide reductions in CO emissions comparable to those estimated for HC. Reductions of that magnitude, combined with reduced emissions from newer, less-polluting vehicles and additional control of stationary sources, are expected to be sufficient to achieve attainment of the National Ambient Air Quality Standards.

All of the TCMs mentioned above are currently being pursued. The projected speed increases are expected to result from a wide variety of traffic flow improvements, including 13 grade separations; 26 bridge reconstructions, widenings, or lane additions; 59 street widenings and lane additions; 43 signalization projects; 48 intersection improvements; 18 road realignments; and 19 resurfacing projects. These projects were all scheduled for completion between 1979 and 1986 at the time the transportation element of the plan was prepared.

c. Identification of Sensitive Sites

Hypothetical "worst-case" situations were examined for both line sources and point sources to investigate the potential for adverse CO impacts at sensitive receptors. (Sensitive receptors are considered to be any location where a person might reasonably be expected to be exposed to the air pollutant source for an eight-hour period.)

CO concentrations were determined at a distance of 50 feet from the maximum expected volume of buses operating on the bus shuttles connecting to the Forest Park station (line sources) and from the maximum expected volume of autos accessing the busiest park-n-ride lot (area sources). Concentrations of CO at the 50-foot distance were found to be well below the national standards, and they will also be well below the standards at any sites further than 50 feet from the sources. Because no receptors of any kind lie within 50 feet of the sources, it was determined that no sensitive receptors would be affected.

3.6 NOISE AND VIBRATION

Technical Memorandum No. 14, Noise and Vibration Control, details the noise study prepared for the LRT alternative.

Sound levels are measured on a logarithmic scale and expressed in units of decibels. In this study, as in most studies to determine the impacts of transportation noise, sound levels are measured on an "A-weighted" scale, expressed in dBA. The A-weighted scale generally replicates the frequency response of the human ear, thus discounting to some extent low and extremely high frequency sounds. A sound level increase of 10 dBA results in an apparent doubling of loudness. Thus, a noise level of 73 dBA would be perceived as twice as loud as one of 63 dBA. An increase of 3 dBA is barely perceptible to the human ear.

Typical sound levels are generally 30-45 dBA in very quiet outdoor environments, 45-65 dBA in urban residential areas, and above 70 dBA in particularly noisy areas. Other examples of common levels are:

Library	32 dBA
Gas Lawnmower at 100 ft	70 dBA
Diesel Truck at 50 ft	85 dBA
Jet Flyover at 1,000 ft	105 dBA

Since sound levels vary with time, statistical analysis is generally used to characterize a time-varying sound level by a single parameter. Two measures which are used in this analysis are the maximum single event sound level, expressed L_{max}, and the equivalent sound level, expressed L_{eq}. L_{max} is the maximum sound level caused by a single event, such as a passing train. L_{eq} is the single steady noise level that would contain the same acoustic energy as the actual time-varying noise over a given period of time.

a. Standards

1) Local Ordinances. The city of St. Louis has no ordinance regulating the noise levels of routine operation of any motor vehicle with a gross vehicle weight rating exceeding 10,000 pounds. Any bus or light rail vehicle under consideration in this study would exceed that limitation and therefore would not be subject to the noise ordinance governing passenger cars and other small vehicles. The ordinance also prohibits the sounding of any signaling device which produces a sound level in excess of 85 dBA at 50 feet, except as a warning of danger. (Noise measurements of the San Diego light rail vehicle horn at 25 feet range from 76-79 dBA, well below the limit.)

St. Louis County currently has no ordinance regulating noise levels from motor vehicles.

2) DOT Guidelines. UMTA guidelines for the evaluation of transit system noise impacts involve the comparison of current ambient noise levels with the combined noise levels expected during LRT operation. The relative increase in community noise levels expected to

result from LRT operations are analyzed in two specific time periods: 1) during peak periods when LRT operations noise is at its greatest, and 2) during off-peak hours when ambient levels are at their lowest.

The UMTA guidelines for assessing the significance of change in noise levels resulting from transit operations are given in Table 3-XX; they are expressed in equivalent sound levels (L_{eq}).

3) <u>APTA Guidelines</u>. The American Public Transit Association (APTA) has established guidelines for the design of rapid rail facilities, including goals for maximum noise levels produced by transit operations. These guidelines have been used extensively by various transit authorities throughout the country. APTA states that community acceptance should be expected if the noise levels do not exceed these guidelines at the affected buildings or use areas at night.

Because of the short duration of train noise and the possible large difference between the maximum passby noise and the average community ambient noise, APTA recommends that the single event maximum noise levels (L_{max}) should be used for transit facility design. These guidelines are shown in Table 3-XXI.

b. <u>Noise Measurement Program</u>

1) <u>Selection of Monitoring Sites</u>. A total of 13 ambient noise measurement sites were identified along the proposed light rail alignment, see Figure 17. The sites were selected to provide representative locations along each segment of the alignment where sensitive receptors are located such as in residential areas and at the Washington University Medical Center, Forest Park, and the University of Missouri at St. Louis. The selected sites also provide that each concentration of residential areas along the alignments is evaluated by the consideration of a site that is generally representative of the surrounding area.

2) <u>Ambient Noise Levels</u>. Ambient noise level measurements were made at the first three sites and the seventh site between April 26 and May 18, 1983; at Sites 4 and 5 on July 2, 1986; and at the other seven sites between January 21 and February 21, 1986. Three half-hour readings were taken during different periods of the day at each of the sites, except for Sites 6 and 9. These were the peak traffic periods,

TABLE 3-XX

UMTA NOISE ASSESSMENT GUIDELINES FOR LRT OPERATIONS

Insignificant Impact	An increase or decrease in noise levels of 3 dBA (L_{eq}) or less. The new noise environment is not expected to cause annoyance.
Possibly Significant	An increase or decrease in noise levels of 4 to 10 dBA (L_{eq}). Extent of impact and the need for mitigation measures will depend upon the existing ambient level and the presence of noise-sensitive receptors.
Significant Impact	An increase or decrease in noise levels of 10 dBA (L_{eq}) or greater. The severity of impact will depend on the relative location of noise-sensitive receptors and mitigation measures are required.

SOURCE: Department of Transportation, Urban Mass Transportation Administration Circular UMTA C5620.1, October 16, 1979.

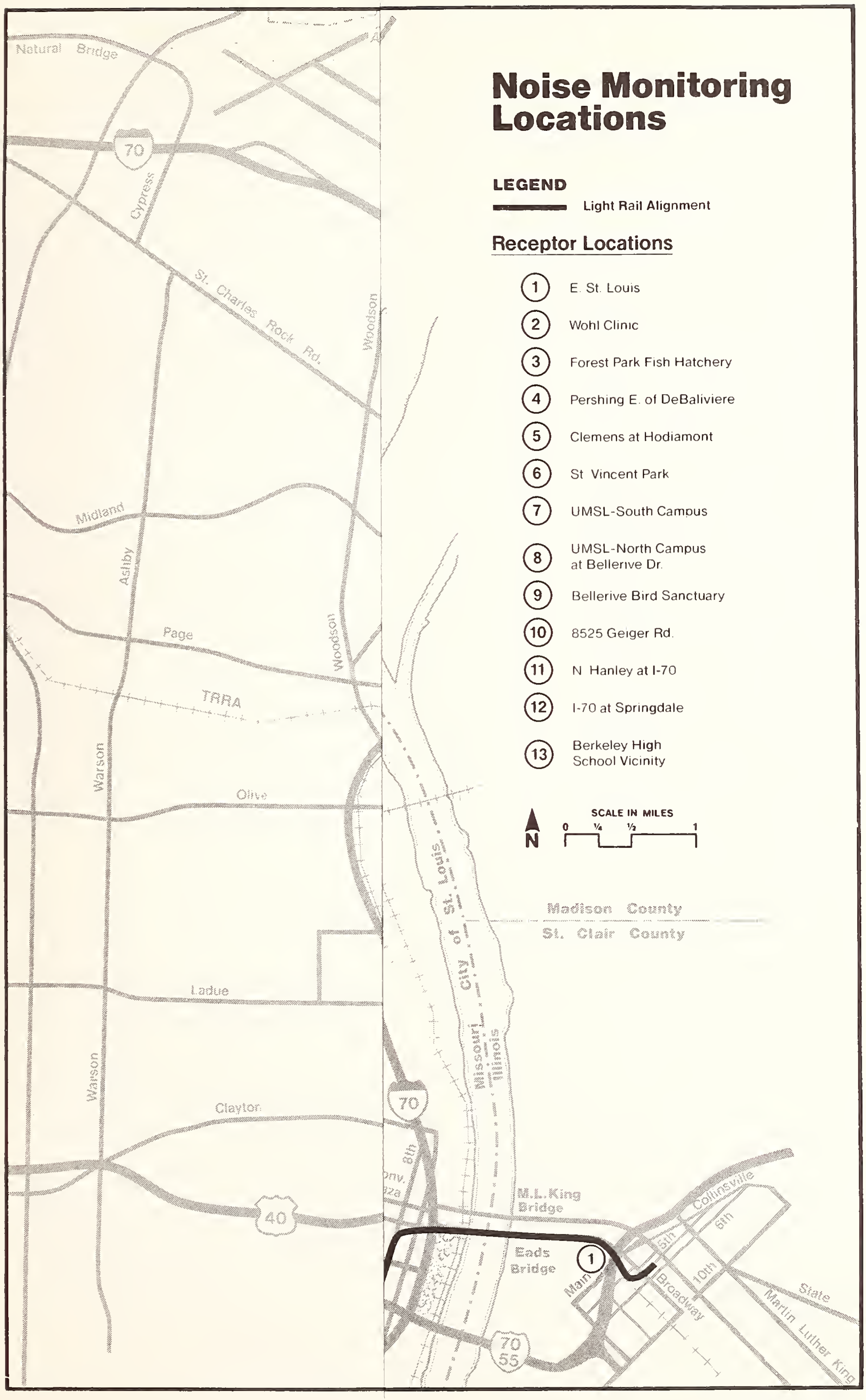
TABLE 3-XXI

APTA GUIDELINES FOR MAXIMUM AIRBORNE NOISE FROM TRAIN OPERATIONS

Community Area Category	Single Event Maximum (L_{max}) Noise Level Design Goal (in dBA) Single-Family Dwellings	Multi-Family Dwellings	Commercial Buildings
I Low Density Residential	70	75	80
II Average Residential	75	75	80
III High Density Residential	75	80	85
IV Commercial	80	80	85
V Industrial/Highway	80	85	85

Building or Occupancy Type	Single Event Maximum (L_{max}) Noise Level Design Goal (in dBA)
Amphitheatres	60
"Quiet" Outdoor Recreation Areas	65
Concert Halls, Radio and TV Studios, Auditoriums	70
Churches, Theatres, Schools, Hospitals, Museums, Libraries	75

SOURCE: "1981 Guidelines for Design of Rail Transit Facilities," APTA Rail Transit Committee, January, 1979.



Noise Monitoring Locations

Figure 17

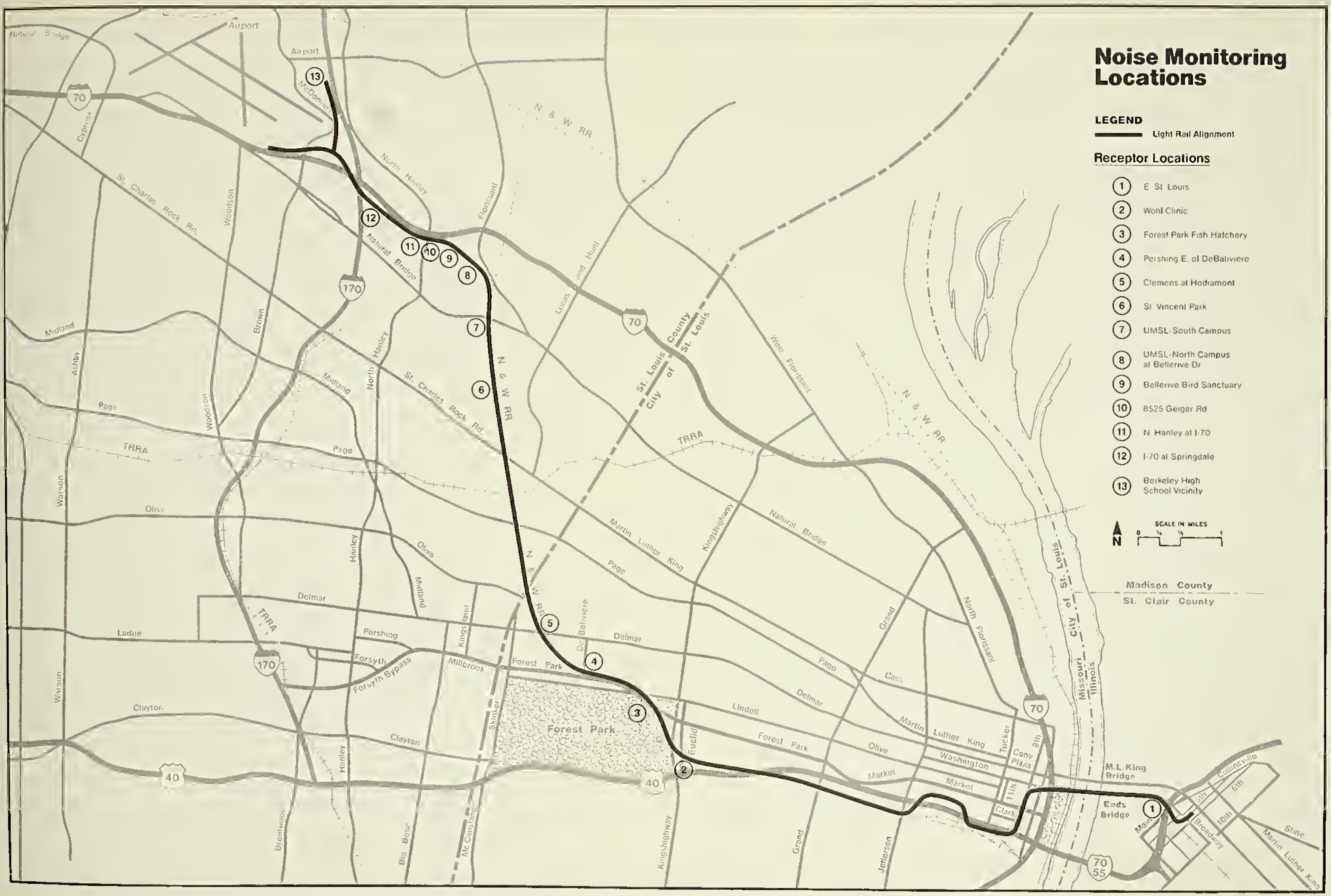

Noise Monitoring Locations
LEGEND
Light Rail Alignment
Receptor Locations
① E St Louis
② Wohl Clinic
③ Forest Park Fish Hatchery
④ Pershing E. of DeBaliviere
⑤ Clemens at Hodiamont
⑥ St Vincent Park
⑦ UMSL-South Campus
⑧ UMSL-North Campus at Bellerive Dr
⑨ Bellerive Bird Sanctuary
⑩ 8525 Geiger Rd
⑪ N Hanley at I-70
⑫ I-70 at Springdale
⑬ Berkeley High School Vicinity
N
SCALE IN MILES
0
¼
½
1
Madison County
St. Clair County
St. Louis County
City of St. Louis
Missouri
Illinois
Forest Park
Airport
N & W RR
TRRA
70
170
40
70 55
M.L.King Bridge
Eads Bridge
Natural Bridge
St. Charles Rock Rd.
Midland
Page
Olive
Delmar
Ladue
Clayton
Pershing
Forsyth
Forsyth Bypass
Millbrook
Lindell
Forest Park
Market
Martin Luther King
Washington
Cass
Kingshighway
Grand
Jefferson
North Florissant
West Florissant
Lucas and Hunt
Florissant
North Hanley
Hanley
Brown
Woodson
Warson
Ashby
Cypress
McDonnell
Brentwood
Big Bend
McCausland
Skinker
Kingsland
DeBaliviere
Euclid
Tucker
Conv Plaza
8th
11th
Clark
Main
5th
6th
10th
Broadway
Collinsville
State
Martin Luther King

Figure 17

7:15 a.m. to 8:45 a.m. and 4:30 p.m. to 6:00 p.m.; the midday period, 8:45 a.m. to 4:30 p.m.; and the evening period, after 6:00 p.m.

Table 3-XXII presents the L_{eq} for each of the measurement periods at each site. (A technical background working paper provides additional details on the measurement procedures and equipment used.) Equivalent sound levels ranged from 53 to 77 decibels, depending on the distance between the monitoring sites and major streets and highways, and on the volume of traffic on those roadways. One of the measurements was affected by a noise source which is not typical of the site throughout the day, or from day to day. The passby of a freight train beneath the medical-hospital complex at Site 2 resulted in half-hour readings eight to ten decibels higher than occurred at the site during other measurement periods. Sites surveyed in 1986 along the westernmost quarter of the alignment are affected by frequent, although not constant, landing and departing airplanes from Lambert-St. Louis International Airport, and to a lesser extent by I-70 or I-170 traffic.

Ambient noise readings exceeding 67 dBA were obtained at eight of the 13 sites. However, many of the monitoring sites were located on public property along the road rights-of-way, and thus the actual noise levels on private property at the building line would be somewhat lower than measurements made near the street.

c. Vibration

Some vibration impacts on residences currently occur as a result of bus operations. The Bi-State Development Agency receives about four or five complaints per month from residents along routes. Investigation has shown that most complaints stem from buses operating over unsound pavement, and many of the problems are eliminated by repairing the street. Bi-State personnel report no correlation between the volume of bus traffic on a particular route and the incidence of vibration complaints from residents along that route.

Light rail transit vehicles produce vibration by the interaction of the vehicle wheels with the rail. These vibrations are transmitted to the ground and propagate outward from the transit alignment to nearby structures. The speed and mass of the vehicles, the type of

TABLE 3-XXII

AMBIENT NOISE LEVELS

Site Number	Location	Period	L_{eq} (dBA)
1	Broadway, East St. Louis	Peak	68.3
		Midday	70.3
		Evening	63.1
2	Washington University Medical Center	Peak	60.4
		Midday	70.4[a]
		Midday	62.8
		Evening	61.5
3	Forest Park Fish Hatchery	Peak	59.2
		Midday	59.9
		Evening	57.8
4	5300 Pershing	Peak	61.7
		Midday	56.8
		Evening	62.2
5	Hodiamont at Clemens	Peak	60.7
		Midday	57.8
		Evening	56.4
6	St. Vincent Park	Midday	56.4
7	UMSL--Marillac Campus	Peak	60.3
		Midday	55.3
		Evening	53.5
8	UMSL-North Campus At Bellerive Drive	A.M. Peak	66.2[b]
		Midday	77.1[c]
		P.M. Peak	63.7[b]
		Evening	76.2[b]
9	Bellerive Bird Sanctuary	Midday	67.5
10	8525 Geiger Rd.	A.M. Peak	68.5[b]
		Midday	80.5[c]
		P.M. Peak	65.4[c]
		Evening	70.1[c]

[a] This measurement included a two-minute freight train passby on the N&W tracks.

[b] Directly beneath Lambert Airport approaching flights.

[c] Directly beneath Lambert Airport takeoff flights.

TABLE 3-XXII (Continued)

AMBIENT NOISE LEVELS

Site Number	Location	Period	L_{eq} (dBA)
11	N. Hanley @ I-70 Behind Berkeley Manor	A.M. Peak	67.2[b]
		Midday	62.9[d]
		P.M. Peak	69.2[b]
		Evening	74.3[b]
12	I-70 At Springdale	A.M. Peak	76.5[c]
		Midday	69.6[c]
		P.M. Peak	69.7[b]
		Evening	70.1[b]
13	Berkeley Senior High School 5962 Berkeley Drive	A.M. Peak	71.3
		Midday	66.5
		P.M. Peak	63.4
		Evening	64.4

[b] Directly beneath Lambert Airport approaching flights.

[c] Directly beneath Lambert Airport takeoff flights.

[d] Directly beneath Lambert Airport flight path with no air traffic occurring during this test interval.

SOURCE: TM-14, Noise and Vibration Control.

wheel, the type of trackbed, and the transmission properties of the soil are the principal determinants of vibration magnitude.

Previous studies of light rail systems in other cities (e.g. August 1980 Banfield Transitway Project FEIS) indicate that vibrations are generally below the threshold of perception at a distance of 30 feet or more from the alignment. A potentially sensitive area for vibration impacts is the medical-hospital complex, where a number of buildings have been constructed immediately adjacent to the N&W tracks. These buildings house numerous laboratories with sensitive equipment such as electron microscopes, and no vibration problems have been reported from the current freight train operations, according to Washington University Medical School personnel. Structural measures have been incorporated into the design of new buildings in the medical-hospital complex to prevent vibration impacts from rail operations.

3.7 ECOSYSTEMS

a. Existing Wildlife in Adjacent Areas

As the transit corridor is in an intensively developed area, the number and variety of animal communities are limited. In general, wildlife value increases in areas where the variety of habitats (e.g., old fields, streams, ponds, forests) meet, and this condition is generally lacking in the area. Mammals may include the common grey squirrel, rabbit, raccoon, short-tailed shrew, white-footed mouse, striped skunk, and opposum. Common reptiles are skinks, box turtles, and rat, brown, and worm snakes. Common birds are urban tolerant species and include starling, grackles, robins, jays, pigeons, sparrows. Other nesting species include house wrens, chicadees, mockingbirds, downy woodpeckers, and flickers. During spring migration, the Swainson's thrush, Parula Warbler, and Yellow-rumped warbler, among others, are common in wooded residential areas in the corridor.

The rare and endangered species known to occur in the St. Louis area require habitats which are not found in the proposed transit corridor, such as wet prairie, swamps, mature woods, and glades. None of the ecologically sensitive areas identified by the Missouri

Department of Conservation in a natural areas inventory of St. Louis County are found in proximity to the transit corridor.

b. Existing Vegetation in Adjacent Areas

Residential areas and the extensive grounds of the above noted institutional uses support a variety of urban-tolerant species depending on the density of development and the type and amount of plantings in yards and along streets. Secondary succession in the streamside communities characteristic of the N&W right-of-way between St. Charles Rock and Florissant Roads includes various brambles such as raspberry, rose, strawberry, sumac, black cherry, ragweed, nettle, japanese hops, and honeysuckle.

c. Significant Ecological Relationships

St. Louis city and county lie within the oak-hickory forest region and immediately south of the tall grass prairie biome. The area is characterized by well-drained, gently rolling terrain with low local relief. East St. Louis lies on the extensive floodplain of the Mississippi River. However, because the region has been settled since the mid-eighteenth century and is now the twelfth largest metropolitan area in the United States, little, if any, of the natural environment remains. The oak-hickory forests in Missouri have been cleared for urban/suburban development and extensive flood control and navigation-related improvements along the Mississippi have eliminated the wetlands and bottomland forest originally characteristic of the East St. Louis area.

The only area along the priority corridor retaining some appearance of its natural flavor is along the N&W track between St. Charles Rock and Florissant Roads. Because of the extensive institutional uses along the way, the area has never been developed, although the topography has been altered through grading and the remaining woodland is predominantly second growth. Most of the existing ground cover in this area consists of spacious lawns with numerous ornamental plantings.

3.8 WATER

a. Surface Waters

The St. Louis area is distinguished by the confluence of the Mississippi and Missouri Rivers just north of the city of St. Louis. The only other water body of note is the Meramec River, a tributary of the Mississippi that joins the Mississippi south of the project area. The remaining streams are shallow and insignficant, and almost all reflect the extensive urbanization experienced by the city and region. Their water quality is poor and reflects their urban situation in which runoff from a wide variety of land uses and activities is channeled to these streams. Because of the extensive urbanization, flash floods resulting from runoff from sudden, intense storms is a concern in some areas of the region. In this regard, the River des Peres and Mill Creek are illustrative; both have been channelized and for much of their lengths are in tunnel. Mill Creek at one time drained much of central St. Louis east of Kingshighway. Its relatively broad, shallow valley is now occupied by rail yards and truck terminals. The stream itself is now encased in a large brick conduit. The study corridor includes the north side of the Mill Creek Valley from the Eighth Street tunnel portal near Clark Street west about four miles to Vandeventer Avenue.

River des Peres has also been extensively modified by human settlement and activity. The study corridor includes the River des Peres from the point where it reaches Forest Park to Natural Bridge Road, although as a result of the above-noted channelization/alteration this is not apparent. Only along selected small tributaries of the River des Peres in St. Louis County does the drainage network approximate its natural condition. Human intrusion has been kept at a minimum in the previously-cited St. Charles Rock Road-Natural Bridge Road area near the headwaters of the River des Peres.

b. Groundwater

Groundwater in the study area is present in alluvial aquifers in the floodplain of the Mississippi River and its lower tributaries, the bedrock aquifer, and the perched water tables that occur above the bedrock water table. The most important aquifer in the study area is the alluvial aquifer in the Mississippi River floodplain. This aquifer is recharged by vertical infiltration, upstream and upland flows, and to a limited extent, by the bedrock aquifer. None of the transit improvements under consideration are located within important groundwater recharge areas.

c. Floodplains

The principal study-area floodplains are associated with the Mississippi River and the River des Peres. However, neither resembles its original condition in the study area because of extensive urbanization. Floodworks along the Mississippi River have largely eliminated the flooding potential. The River des Peres is largely in an underground conduit in the study area, but its small tributary creeks and floodplain experience flash floods because of the surrounding urbanization and consequent rapid stormwater runoff.

d. Wetlands

No wetlands lie within the study corridor.

3.9 HISTORIC, ARCHAEOLOGICAL, AND CULTURAL SITES

a. Applicable Legal and Regulatory Requirements

Section 106 of the National Historic Preservation Act of 1966, as amended, and Executive Order 11593 mandate that it is the responsibility of each federal agency undertaking a project: 1) to identify properties or structures within the area of potential environmental impact that are in or eligible for inclusion in the National Register of Historic Places; 2) to examine the impacts of project alternatives; and 3) to take appropriate mitigative actions. The Advisory Council on Historic Preservation (ACHP) has been designated by the Congress as the federal agency responsible for implementing the act. The ACHP's procedures are contained in 36CFR800 "Protection of Historic and Cultural Resources."

Additionally, Section 4(f) of the Department of Transportation Act of 1966, as amended, and its implementing regulations, apply to actions affecting properties and structures in or eligible for inclusion in the National Register. Section 4(f) prohibits the Department of Transportation from using land from a publicly-owned park, recreation area, or wildlife refuge or land from a historic site of national, state, or local significance unless it is determined that there are no prudent or feasible alternatives to the use of the land and, in such event, that all possible planning measures to minimize harm are taken.

The following steps were taken to comply with Section 106 of the National Preservation Act of 1966 and the historic sites provision of Section 4(f) of the Department of Transportation Act:

(1) A cultural resource survey was made to determine properties in or potentially eligible for inclusion in the National Register.

(2) A determination of effect on the subject properties was made by UMTA in consultation with the Missouri and Illinois State Historic Preservation Officers (SHPOs) using ACHP guidelines.

(3) Findings of No Effect and No Adverse Effect were documented, as appropriate, for the subject properties.

(4) Preliminary case reports were prepared for the ACHP and combined with Section 4(f) evaluations prepared for the Department of Transportation on the two properties which were determined to be adversely affected by the project.

(5) A Memorandum of Agreement (MOA) among UMTA, SHPOs, and EWGCC was executed.

b. <u>Description of Sites</u>

A cultural resource survey was conducted of those sites and structures in or eligible for inclusion in the National Register that might be affected by the proposed transit improvements. The Missouri and Illinois SHPOs and local historic preservation groups and agencies were consulted in this process.

In order to determine the spatial frame of reference for the cultural resource survey, the criteria of effect for properties listed in or eligible for inclusion in the National Register, as specified in 36CFR800, were applied. The criteria of effect are "when any condition of the improvement causes or may cause any change, beneficial or adverse, in the quality of the historical, architectural, archaeological, or cultural character that qualifies the property under the National Register Criteria." In practice this means that in the more intensively urbanized core where noise levels are high and vistas are limited, the potential impact zone is only about 200 feet wide (i.e., one-half block on each side of a rail alignment). However, in some suburban areas where noise levels are relatively low and development less intense, the potential impact zone may be expected to extend farther.

Table 3-XXIII lists those properties and structures in, eligible for inclusion in, and potentially eligible for inclusion in the National Register that are near the guideway alignments and thus may be affected by the proposed project. Those structures, sites, and districts that have been noted as potentially eligible for inclusion in the National Register were determined following consultations with local groups and agencies. In particular, Landmarks Association of St. Louis, Inc. has performed a number of surveys of St. Louis neighborhoods in order to identify architecturally significant structures. These surveys have been the source for many of the properties listed in Table 3-XXIII. In addition, the St. Louis County Department of Parks and Recreation and EWGCC were consulted for their lists of historically-significant sites.

No known archaeological resources lie within the limits of proposed project construction. Extensive past development within the heavily urbanized area of the project and the project's limited excavation activities suggests that archaeological resources are not expected to be encountered. Those areas where the most excavation is expected, along I-70 and I-170, have already been extensively disturbed by highway and airport construction activities. The appropriate SHPO will be notified immediately in the event that any archaeological resources are unearthed during construction in order to ascertain their significance.

Architectural/historic inventory survey forms were prepared at the request of the Missouri SHPO for each building which will be displaced by the project and for each bridge which the project will use or

TABLE 3-XXIII

HISTORIC PROPERTIES OF NATIONAL, STATE, AND LOCAL SIGNIFICANCE WITHIN THE STUDY CORRIDOR

Description/Address	Use
NATIONAL REGISTER PROPERTIES	
***Eads Bridge (National Historic Landmark)	Transportation
*Laclede's Landing Historic District	Commercial
*Jefferson National Expansion Memorial (National Historic Site)	Recreational
**May Company Department Store (555 Washington)	Commercial
*Mayfair Hotel (8th & St. Charles)	Commercial
*U.S. Customhouse and Post Office (Old Post Office) (National Historic Landmark) (8th & Olive)	Commercial/ Government
*Chemical Building (721 Olive)	Commercial
***St. Louis Union Station (18th & Market) (National Historic Landmark)	Commercial
**Post Office Annex Building (18th and Clark)	Commercial
*St. Vincent's Hospital (St. Vincent Park/St. Charles Rock Rd.)	Residential
*Wilson Price Hunt House (7717 Natural Bridge Road)	Commercial
NATIONAL REGISTER-ELIGIBLE PROPERTIES	
**Dillard's Building (601 Washington)	Commercial
**Arcade/Wright Buildings (8th Street; Olive to Pine)	Commercial/ Vacant
**Central West End Historic District (federally-certified local district)	Residential
**Delmar Station (located within federally-certified local historic district)	Commercial
NATIONAL REGISTER-POTENTIALLY ELIGIBLE PROPERTIES	
*Former Edison Brothers Building (400 Washington)	Vacant
*Missouri Athletic Club (405 Washington)	Institutional
*709-711 Washington Building	Commercial
*Mercantile Bank Building (8th & Locust)	Commercial
*United Missouri Bank Building 312 N. 8th	Commercial
*Park Keeper's House (Cabanne) (Union & Lindell)	Institutional

NOTE: *No effect **No adverse effect ***Adverse effect cross beneath. Copies of these forms are on file with the Missouri SHPO and EWGCC. None of these buildings is considered historic, and the bridges will not be affected by the project with the exception of two bridge structures, which are not considered historic.

Of the 21 properties listed in Table 3-XXIII, the project will have no effect on 13, no adverse effect on six, and an adverse effect on two of them. The following text documents a finding of no effect on the 13 properties followed by a description of the remaining eight properties. The project's effects on the remaining eight properties are discussed in Chapter 5.

Section 800.3 of the ACHP procedures states that "an effect occurs, when an undertaking changes the integrity of location, design, setting, materials, workmanship, feeling, or association of the property that contributes to its significance in accordance with the National Register criteria." The LRT project will have no effect on the 13 Table 3-XXIII properties which have one asterisk, because these properties lie sufficiently distant from the LRT alignment at points where the alignment will be at a different grade or in tunnel such that no change in the integrity of the properties will result. Station access will not occur at or adjacent to these properties.

The integrity of the Laclede's Landing Historic District and the Jefferson National Expansion Memorial, which lie on opposite sides of the Eads Bridge on the Missouri side of the Mississippi River, will not be affected by any changes in the Eads Bridge. Access to the LRT platform will occur from First and Second Streets internal to the bridge and will not be generally visible from either of the two historic properties. Similarly, the integrity of the Mayfair Hotel, the U.S. Customhouse and Post Office, and the Chemical Building, all three of which front on Eighth Street, will be unaffected by the project, which will operate within the existing tunnel beneath Eighth Street and will have its nearest pedestrian access point one-half block or more south of these properties. The St. Vincent's Hospital property, now an apartment building, and the Wilson Price Hunt House, now used for offices and under threat of demolition, lie sufficiently away from the existing freight railroad line which will be used by the LRT project, that the project will have no effect on their integrity. The existing rail line is in a depressed cut section near the Wilson Price Hunt House. The LRT UMSL-South station will be located south of Natural Bridge Road beyond a convenient walking distance of either of the two properties.

The integrity of the former Edison Brothers Building (now vacant), the Missouri Athletic Club, and the 709-711 Washington Building, all three of which front on Washington Avenue, will be unaffected by the project which will operate within the existing tunnel beneath Washington Avenue and will have its nearest pedestrian access point one-half block or more away from these properties. Similarly, the integrity of the Mercantile and the United Missouri Bank Buildings which face Eighth Street will not be affected by the project which will operate within the existing tunnel beneath Eighth Street and will have its nearest pedestrian access point over a block away. The integrity of the Park Keeper's House will not be affected by the project which will operate on the existing freight rail line that is in a depressed cut section beneath the Union/Lindell intersection near this property; the nearest station will be two-thirds of a mile away.

1) <u>May Company Department Store (555 Washington)</u>. This National Register property was built as three separate buildings: the 1875 five-story corner building (the Bradford-Martin Building); the adjacent six-story building behind the corner building, built in 1888 (the Meyer-Bannerman Building); and the narrow 1876 five-story cast-iron-facaded building east of the corner building (the Finney/Ackley Building). Renovations of the three buildings in 1905 unified the facades at the ground level, after which the complex was used by the May Department Store until 1913. Most recently, the corner building housed the Dollar Store and the building behind it housed the Thomas Market. The complex's elaborate Victorian exterior is presently being restored to its original appearance, and its interior has been gutted and is being converted into luxury office space with the introduction of a large atrium and ground-level retail space.

2) Post Office Annex Building. The Post Office Annex Building at Eighteenth and Clark Streets was designed in 1904 by William S. Eames of Eames and Young and was completely rehabilitated for office space by Garrett A. Balke, Inc. at a cost of $2.9 million in 1986. The red brick building with dressed limestone trim is three stories high and surrounded by the St. Louis Union Station project, of which it is a component.

3) Dillard's Building. This building covers a full city block bounded by Lucas, Sixth, Washington, and Seventh Streets. The eastern two-thirds of the building is nine stories high and the western third is 11 stories high. Eight floors of the eastern two-thirds of the building were built in 1905 (the ninth floor was added in 1947), and the western third was built in 1919. The building is constructed of red and dark buff brick and terra cotta trim with marble panels and cast-iron-trim at the ground level; the 1947 addition is clad in tile panels. Arched decorative panels at the entry bays, cast eagle lamp fixtures, and wrought iron balconies have been removed along with the original cornice on the eastern two-thirds of the building. Also, the 1985 construction of St. Louis Centre altered the building's main south facade by the introduction of a large three-level retail and pedestrian linkage clad in glass and bold green and white panelling. The balance of the building's exterior was cleaned for the opening of St. Louis Centre. The first four floors of the building were gutted and rehabilitated to house the Dillard's Department Store. The upper floors are programmed for hotel use with some 240 two-room suites to be located around a large, recently-opened atrium, with access from an arcade to be developed along the building's Seventh Street frontage by in-setting the ground floor display windows. The basement level has been proposed as a retail mall directly linking St. Louis Centre through new construction behind the Dillard's Building to an eastward expansion of the Cervantes Convention and Exhibition Center, which is located north of Convention Plaza.

4) Arcade/Wright Buildings. This two-building complex extends across the west face of Eighth Street between Olive and Pine

Streets. The Arcade Building is L-shaped in plan and the Wright Building fits within the notch of the "L" at the corner of Eighth and Pine Streets. The Arcade Building is a 17-story steel and concrete office building sheathed in brick and glass with terra cotta trim. Completed in 1919, the building has Gothic Revival detailing with large second-and-third-level bay windows. The building includes a distinctive interior shopping arcade with a mezzanine level extending from Olive Street to Pine Street. Built in 1906, the 18-story Wright Building has a simpler facade treatment than the Arcade Building and connects with its shopping arcade at the ground floor. The buildings have different floor elevations and are not connected at any of the upper floors, a feature which diminishes their rehabilitation potential as well as the fact that they lack any parking. Both buildings are vacant and condemmed for use above the ground floor; some retail uses remain on the ground floor.

5) Central West End Historic District. This federally-certified local historic district covers over a square mile area generally bounded by Delmar, an irregular line east of Kingshighway, Lindell, and DeBaliviere streets. Largely residential, the district includes small townhouses, single-family mansions, and high density, multi-family residential units. The earliest structures date from the 1880s. Most of the single-family units were constructed in the decade before and after the turn of the century, and many of the multi-family units were constructed in the 1920s. The area has undergone extensive restoration and rehabilitation in the last decade and is a fashionable place to live, although multiple structures and vacant lots await redevelopment.

6) Delmar Station. This small one-story train station building with classical, columned, cut-limestone facade was designed by architect R. E. Mohr and built for the Wabash Railroad in 1929 over its mainline trackage. It served as a commuter rail terminal for many years. After a long period of abandonment, the building was rehabilitated by a lighting supplier in 1983 as office and showroom space. At

that time its stairway connections extending from the rear of the building to the lower track-level platforms were removed and the openings leading to the stairways were closed with non-matching brick.

7) Eads Bridge. The Eads Bridge is composed of a series of three steel trussed arches extending over the Mississippi River between St. Louis, Missouri and East St. Louis, Illinois, built between 1867 and 1874. (See Figure 18.) The bridge is a double-decked structure with the 41-foot wide upper deck containing a roadway and the lower deck containing space for two railroad tracks. A stone and brick arched approach structure connects the bridge to land on the Missouri side, and a stone and steel-trussed approach structure connects the bridge to the land on the Illinois side of the river. The extent of the National Register definition of the property is roadway touchdown to roadway touchdown on each side of the river crossing, a distance of about 4,000 feet. The property covers 6.67 acres.

Both the construction and design of Eads Bridge set precedents in bridge building. It was the world's first alloy steel bridge; the first to use tubular cord members; and the first to depend entirely on using a cantilever design in building the superstructure. Pneumatic caissons were used for the first time in the United States in constructing the piers, which were sunk to unprecedented depths (96 feet below mean water level and 122.5 feet below the City Directrix). James Eads, the bridge engineer, also invented the sand pump for removing gravel, sand, and silt from the caissons to allow the sinking operation to proceed without interruption.

The bridge has been modified over the years, including: 1) introduction of steel through-girders in place of stone arches on the west approach rail deck over local streets, alleys, and the elevated rail trestle which parallels the river; 2) bricking up of the rail deck arcade on the west approach; 3) modification and replacement of the roadway deck; 4) reconstruction of the east approach arcade following the 1986 tornado; and 5) modification and replacement of east road and railway approach structures. Rail service was discontinued across the bridge in 1974 because of operational constraints imposed by the tunnel beneath St. Louis city streets which includes a right-angle turn that is too sharp to accommodate modern freight locomotives and cars. The bridge is owned by the Terminal Railroad Assocation (TRRA).

8) <u>St. Louis Union Station</u>. St. Louis Union Station occupies a 20-acre tract of land generally bounded by Market Street, Eighteenth Street, the U.S. 40 elevated structure, and Twentieth Street at the southwest edge of downtown St. Louis. (See Figure 18.) It was designed by Theodore Link and Edward Cameron and opened in 1894. The station complex consists of a four-story, limestone headhouse fronting on Market Street and measuring approximately 100 by 600 feet with pyramidal, hipped, and conical roof sections, which were covered with red tile in the 1950s, replacing the original slate roof. The headhouse is distinguished by a 232-foot-high clock tower, corner turrets, gabled dormers, round arched openings, and asymmetrical massing. The adjoining steel train shed was designed with space for over 32 tracks by George H. Pegram and was the largest in the United States at the time of its construction. The station frequently accommodated 70,000 to 80,000 passengers per day at the time of its peak usage during World War II. The station was extensively modified by the Rouse Company to accommodate hotel, commercial, and entertainment uses and opened to the public in August 1985. All of the tracks were removed from beneath the train shed except for a few at the western end of the train shed, and were replaced with surface parking and commercial uses.

3.10 PARKLANDS

a. <u>Applicable Legal and Regulatory Requirements</u>

Section 4(f) of the Department of Transportation Act of 1966, as amended 49 USC 1643(f), prohibits using land from a publicly owned park, recreation area, or wildlife refuge or land from a historic site of national, state, or local significance without documenting the consideration, consultation, and assessment studies that are the basis for a conclusion that there are no prudent and feasible alternatives to the use or taking of such land, and that the proposed action includes all possible planning to minimize harm to the structure or property. A 4(f)

Eads Bridge

St. Louis Union Station

Figure 18

evaluation detailing the above issues is a requirement for any DOT action with a taking or use of a 4(f)-protected property. This section describes those park facilities which are adjacent to the proposed light rail alignment.

b. Description of Sites

Table 3-XXIV lists those public parks and recreational facilities adjacent to or within one-half block of the LRT alternative. Three of the five study area parks are in the city of St. Louis and range in size from the five-acre Gwen Giles (formerly Hodiamont-Catalpa) neighborhood park to the 1,293-acre Forest Park. They provide a variety of active and passive uses. The two St. Louis County parks show a similar diversity in size and function.

Of the five study area parks, three are adjacent to the LRT alignment. These are Forest Park in the city of St. Louis and St. Vincent Park and the Bellerive Bird Sanctuary in north St. Louis County.

The northeast corner of Forest Park is crossed by the LRT alignment, on the existing N&W trackage. Forest Park is one of the largest municipal parks in the United States and contains the Zoo, Art Musuem, and Science Center as well as a full complement of recreational facilities and activities. In the vicinity of the LRT alignment the park is given over to passive recreational uses.

St. Vincent Park is a 135-acre St. Louis County park of regional significance. It is located between St. Charles Rock and Natural Bridge Roads and borders the N&W right-of-way on the east for about 4,000 feet. The park was formerly part of the grounds of St. Vincent's Hospital, a National Register property, which is now the Castle Park Apartments. The park's master plan envisions a variety of active and passive uses, some of which have already been implemented. The parkland adjoining the track will include a nature study area and a lake.

The Bellerive Bird Sanctuary is a 22-acre wooded area in comparatively rough terrain at the edge of the small village of Bellerive (1980 population of 437); it functions similar to common

TABLE 3-XXIV

MAJOR PARKS AND RECREATIONAL FACILITIES

Park/ Facility	Location	Ownership	Size (Acres)	Service Area	Facilities
Jefferson Nat. Expansion Mem.	Riverfront-Poplar-3rd-Washington	Federal	91.0	National	Passive-Museum, Ponds
Forest Park	Lindell-Skinner Oakland-Kingshighway	St. Louis	1,293.22	Regional	Picnicking, Golf Playing Fields, Zoo, Museums, Tennis, Lakes
Gwen Giles Park	Hodiamont Catalpa	St. Louis	5.35	Neighborhood	Play Field, Playground
St. Vincent Park	St. Charles Rock Rd.	St. Louis County	134.80	Metropolitan	Playground, Tennis, Passive
Bellerive Bird Sanctuary	Lucas Drive	Bellerive	22.00	Neighborhood	Passive

ground surrounding a subdivision. General public use is not encouraged. The tract does not provide habitat for any known rare or endangered species.

CHAPTER 4: TRANSPORTATION IMPACTS

This chapter describes the levels of service and the resulting transit patronage achieved by each of the alternatives, as well as the farebox revenues and operating costs associated with each alternative. The discussion describes the difference between the TSM and No-Action alternatives followed by a comparison of the incremental differences associated with the light rail transit alternative compared to the TSM results. Comparisons are also made to each of three light rail transit segment lengths in several cases important to the required federal analyses of alternative lengths of light rail within the Central/Airport corridor. The differences are related to the relative physical and operating characteristics of each alternative. This presentation format highlights the transportation gains resulting from the capital intensive guideway alternative. The effects of the alternatives on highway congestion, parking demands, freight rail operations, and truck deliveries are also discussed.

This chapter's discussion of transportation effects is based on the definitions of the physical (alignment, grade) and operational (routing plan, headway) characteristics of each alternative described in Chapter 2. Similarly, the Chapter 4 discussion is predicated on the descriptions of projected and current performance and characteristics of the existing transit and highway transportation systems contained in Chapter 3.

4.1 TRANSIT

a. Levels of Service

1) Service Areas and Frequency. The areas served by each of the alternatives are described in Chapter 2. The TSM alternative will involve expanding systemwide service to attract and satisfy increased rider demand anticipated in 2000 (see Table 2-V). It will involve substantially rerouting 14 existing routes, adding eight new routes, eliminating 14 routes, and a variety of important service changes on many other routes. These bus service improvements are also a part of

each of the LRT alternatives except where bus service changes are warranted to accomplish a "feeder" bus system to serve the light rail stations. The TSM improvements will also include additional Saturday and Sunday service on selected routes. Service hours will not be extended significantly with any of the alternatives.

Table 4-I presents the projected transit vehicle miles and seat miles of travel (revenue and non-revenue) for each of the alternatives. The TSM alternative will provide approximately two percent more vehicle miles and seat miles than the No-Action alternative; the LRT alternative will provide approximately 7.9 percent more seat miles with 0.8 percent fewer transit vehicle miles traveled. Comparing LRT to TSM reveals that the LRT alternative will provide 5.8 percent more seat miles with 2.7 percent fewer vehicle miles. These differences reflect the larger size and capacity of light rail vehicles compared to standard bus vehicles.

In most service areas, the frequency of service will be the same for each of the action alternatives, with LRT including the service improvements specified for the TSM alternative. The LRT alternative will offer 12 peak-hour trips from the Delmar station through the St. Louis CBD to East St. Louis; six of those peak-hour trips will originate at the Delmar station, three will originate from the Airport station, and three will originate from the Berkeley station. This equates to peak-period headways of five minutes east of the Delmar station, ten minutes between the Delmar and Northwest Park-n-Ride stations, and 20 minutes west of the Northwest Park-n-Ride station (see Figure 5 in Chapter II).

2) Travel Times. Table 4-II compares each build alternative's projected 2000 systemwide transit travel times with the No-Action travel time. Door-to-door travel time for a transit trip includes time to walk to and from bus stops, in-vehicle travel time, and waiting time for each segment of the trip. The projected reduction and the percent change in transit travel time for existing riders are shown for each alternative as well as an estimate of the resulting dollar savings. The TSM alternative will provide a 3.2 percent reduction in average travel

TABLE 4-I

TRANSIT SYSTEM SERVICE LEVELS
YEAR 2000

Mode	1 No-Action*	2 TSM	3 LRT/ Bus Shuttle
Bus			
Vehicle Miles (in thousands)	26,283	26,801	24,588
Seat Miles (in millions)	1,314	1,340	1,230
Fleet Size (peak-hour vehicles)	616	628	566
LRT			
Vehicle Miles (in thousands)	--	--	1,478
Seat Miles (in millions)	--	--	189
Fleet Size (total vehicles)	--	--	31
TOTAL VEHICLE MILES	26,283	26,801	26,004
TOTAL SEAT MILES (in millions)	1,314	1,340	1,411
Percentage Increase in Vehicle Miles Over No-Action	--	2.0%	-0.8%
(Over TSM)	(-0.2%)	--	(-2.7%)
Percentage Increase in Seat Miles Over No-Action	--	2.0%	7.9%
(Over TSM)	(-2.0%)	--	(5.8%)

* The No-Action alternative assumes maintenance of the Bi-State service provided in December 1985 and programmed north Missouri corridor improvements without change through the design year 2000.

TABLE 4-II
SYSTEMWIDE TRANSIT TRAVEL TIME SAVINGS FOR EXISTING RIDERS*

Alternative	Average Travel Time (in minutes)	Time Savings over No-Action (in minutes)			Annual Value of Time Saved** (in millions of dollars)
		Total	Avg/Trip	% Change	
1 No-Action	44.3	--	--	--	--
2 TSM	42.9	200,864	1.4	3.2%	$3.1
3 LRT/Bus Shuttle	41.5	441,755	3.0	6.3%	6.9

* Includes walk, wait, in-vehicle, and transfer time. A total of 146,000 No-Action daily transit trips are projected for the year 2000.

** Value of time calculated at $3.28 per hour, based on $4.00 per hour for work trips and $2.00 per hour for non-work trips. A weighted value was used to reflect that work trips represent about two-thirds of all transit trips. Annual values were computed using an equivalent annualization factor of 285.

TABLE 4-III
SYSTEMWIDE TRANSIT TRAVEL TIME SAVINGS FOR TSM RIDERS

Alternative	Average Travel Time* (in minutes)	Daily Time Savings over TSM (in minutes)			Annual Value of Time Saved** (in millions of dollars)
		Total	Avg/Trip	% Change	
1 No-Action	44.6	-208,064	-1.4	3.2%	$-3.2
2 TSM	43.3	--	--	--	--
3 LRT/Bus Shuttle	41.3	302,917	2.0	4.8%	4.7

* Includes walk, wait, in-vehicle, and transfer time. A total of 152,200 TSM daily trips are forecasted to be made in the year 2000.

** Value of time calculated as in Table 4-II.

TABLE 4-IV
SYSTEMWIDE TRANSIT TRAVEL TIME AND SPEED FOR YEAR 2000 RIDERS

Alternative	Speed in mph	Average Travel Time (in minutes)	Average Trip Length (in miles)	Annual Value of Time Saved* (in millions of dollars)
1 No-Action	8.7	44.3	6.4	--
2 TSM	9.0	43.3	6.5	$ 2.4
3 LRT/Bus Shuttle	10.1	40.1	6.8	10.5

* Computed for the number of trips in the year 2000 for each alternative compared with the average No-Action alternative travel time. Value of time calculated as in Table 4-II.

time for existing riders over the No-Action alternative. The LRT alternative will achieve a 6.3 percent reduction in travel time. The annual value of time saved by riders of the TSM and LRT alternatives (at $3.28 per hour) is $3.1 and $6.9 million, respectively.

Table 4-III compares each alternative's projected year 2000 systemwide transit travel times with the TSM travel time. The projected reduction or increase and the percent change in transit travel time for TSM riders are shown for each alternative, as well as an estimate of the resulting dollar savings (or increase). The LRT alternative will achieve a 4.8 percent reduction in travel time for TSM riders, which equates to $4.7 million in travel time savings over this bus action alternative.

Table 4-IV shows the systemwide average travel speeds, time, and trip length for each alternative in 2000; these measures show the relative performance of each alternative for those system riders in 2000. The average speed is based on aggregate estimates of annual vehicle miles and hours of travel, including non-revenue travel. The TSM alternative will provide slightly better systemwide average travel speed than the No-Action alternative. Average travel speeds for the LRT alternatives will be greater for several reasons, including LRT's higher maximum operating speed and the use of barrier-free fare collection, which minimizes station dwell time since multiple doors are available for vehicle entry or exit. The TSM alternative will reduce the average transit trip for all riders in 2000 by one minute, and the LRT alternative will save an additional 3.2 minutes beyond the TSM option, or 4.2 minutes over the No-Action alternative. The increased travel speed of LRT alternatives encourages longer trips, which accounts for the slightly longer average LRT trip lengths.

Table 4-V compares transit travel times for a sample of origins and destinations in the region which have a strong relationship to or are within the corridor, see Figure 19. Typical a.m. trip origin zones include residential areas spread throughout the city of St. Louis, in St. Louis County areas within or tributary to the priority corridor, and in Illinois. Typical a.m. trip destination zones include the

TABLE 4-V
2000 A.M. PEAK TRANSIT TRAVEL TIME FOR SELECTED TRIPS
(in minutes)

From	No-Action Travel Time	Travel Time Differences	
		2 TSM	3 LRT/ Bus Shuttle
6th & Olive to:			
Lambert Airport	100	-5	-53
UMSL	66	0	-33
Washington Univ.	58	-6	-26
Clayton CBD	63	-1	-19
Barnes Hospital	39	0	-19
M.L.King @ Jefferson to:			
McDonnell-Douglas	78	-2	-27
UMSL	66	-3	-28
Clayton CBD	55	0	-6
Barnes Hospital	31	0	-7
6th & Olive	18	-5	-5
Penrose Park, N. St.L to:			
McDonnell-Douglas	57	+5	+6
Clayton CBD	55	0	-3
Barnes Hospital	34	0	-1
6th & Olive	26	-2	-2
Pine Lawn to:			
McDonnell-Douglas	39	+2	+1
Clayton CBD	52	-6	-6
Barnes Hospital	37	0	0
6th & Olive	28	-2	-2
Wagner Electric, Wellston to:			
McDonnell-Douglas	61	+5	-32
UMSL	50	-5	-31
Clayton CBD	41	-7	-4
Barnes Hospital	44	-13	-26
6th & Olive	57	-4	-27
Kinloch to:			
Clayton CBD	45	-10	-33
Barnes Hospital	71	-6	-41
6th & Olive	64	-5	-21
St. John to:			
Washington Univ.	66	-9	-19
Clayton CBD	54	-9	-9
Barnes Hospital	55	+13	-13
6th & Olive	39	+9	-15

TABLE 4-V (Continued)
2000 A.M. PEAK TRANSIT TRAVEL TIME FOR SELECTED TRIPS
(in minutes)

From	No-Action Travel Time	Travel Time Differences	
		2 TSM	3 LRT/ Bus Shuttle
Central West End to:			
Lambert Airport	97	0	-56
UMSL	64	-1	-42
Clayton CBD	46	-4	-12
6th & Olive	23	-1	-2
Flynn Park, U. City to:			
Lambert Airport	87	-4	-46
McDonnell-Douglas	56	-3	-16
UMSL	38	-5	-11
Clayton CBD	16	-1	-4
Barnes Hospital	28	+6	-17
6th & Olive	52	+2	-22
Clayton CBD to:			
Lambert Airport	83	-1	-28
UMSL	48	-13	-13
Barnes Hospital	39	-2	-5
6th & Olive	62	-2	-17
Christy Park, S. St. L. to:			
Lambert Airport	124	-1	-63
UMSL	89	-2	-37
Clayton CBD	70	-2	-7
6th & Olive	49	-3	-3
River Des Peres Park S. St. L. to:			
Lambert Airport	156	-16	-64
Clayton CBD	87	-22	-22
6th & Olive	85	-12	-12
East St. Louis CBD to:			
Lambert Airport	136	+1	-72
McDonnell-Douglas	102	+5	-47
Clayton CBD	83	-1	-20
Barnes Hospital	59	0	-21
6th & Olive	24	0	-3
Belleville to:			
Lambert Airport	188	0	-56
Washington Univ.	129	-6	-15
Clayton CBD	135	-1	-7
Barnes Hospital	110	0	-7
6th & Olive	73	0	+14

airport, McDonnell-Douglas, the medical-hospital complex at Kingshighway, and the St. Louis and Clayton CBDs. These selected destination zones contain an estimated 27 percent of the region's employment.

The TSM alternative will improve accessibility to North County, but only yield modest improvements in travel time to central and St. Louis CBD destinations, which are major destinations for the existing bus network. The LRT alternative will improve accessibility to North County and provide the highest level of service improvement for central and St. Louis CBD destinations.

Travel time improvements to North County generally reflect service from new bus routes. Service to McDonnell-Douglas was discontinued from selected regional points in recent years because of budget constraints; patronage on the enhanced service provided by all alternatives will involve mostly new riders. Transit travel times for service to central and St. Louis destinations are representative of the predominant transit markets in St. Louis.

3) Accessibility. Tables 4-VI and 4-VII illustrate the impacts that each alternative will have on transit accessibility for the general population and for the transit-dependent. In both cases, it appears that some trips which will take 31 to 40 minutes to make with the No-Action alternative can be made in under 31 minutes with the build alternatives. Beyond the 50-minute travel time, there are no significant differences across the alternatives.

The improvement in accessibility will be most pronounced for the LRT alternative since the LRT route will directly serve three of the area's five major employment centers and concentrated areas of transit-dependent population.

4) Transferring. Table 4-VIII summarizes the estimated peak-hour transfers for each alternative. The difference in the transfer ratio between the No-Action and TSM alternatives is minimal. The LRT alternatives will result in the highest levels of transferring as a result of transfers from feeder bus service. Increased transfers to express routes and LRT service result from the design of the alternative transit networks which require transferring and from the attractiveness

Selected Origin and Destination Points

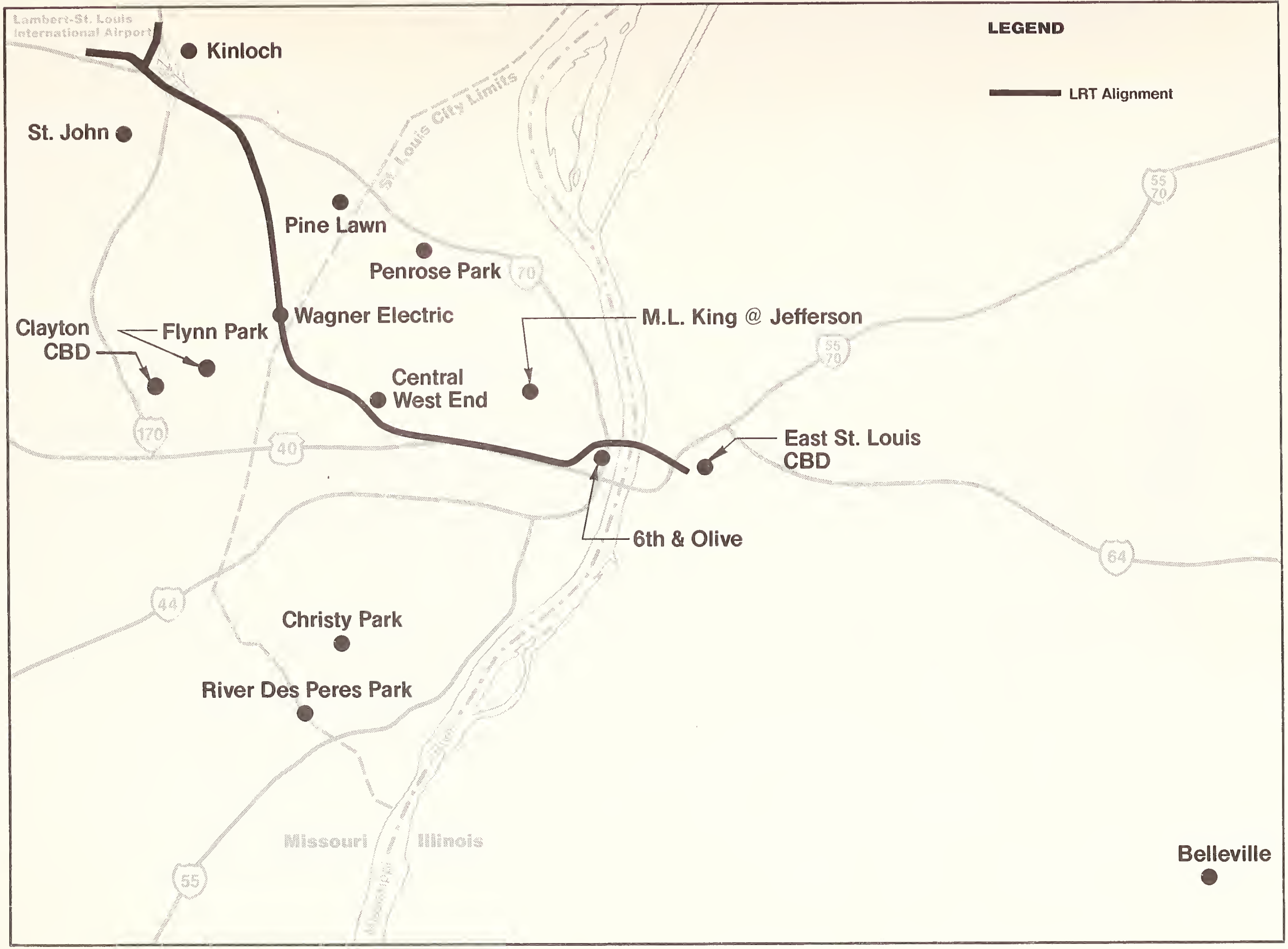


Figure 19

TABLE 4-VI
ACCESSIBILITY TO EMPLOYMENT CENTERS*
YEAR 2000

Percent (Cumulative Percent) of Population Accessible to Employment Centers in the Region

Travel Time (in minutes)	1 No-Action	2 TSM	3 LRT Bus Shuttle
1-30	18 (18)	22 (22)	25 (25)
31-40	14 (32)	18 (35)	13 (38)
41-50	10 (42)	11 (46)	10 (48)
51-60	11 (53)	11 (57)	11 (59)
Over 60	28 (81)	23 (80)	21 (80)
Unserved	19 (100)	20 (100)	20 (100)

*St. Louis CBD, Washington University Medical Center, Westport, Clayton, Fenton.

TABLE 4-VII
ACCESSIBILITY TO JOBS IN THE REGION FROM TRANSIT-DEPENDENT AREAS*
YEAR 2000

Percent (Cumulative Percent) of Regional Jobs Accessible from Areas with Concentrations of Transit-Dependent Persons

Travel Time (in minutes)	1 No-Action	2 TSM	3 LRT Bus Shuttle
1-30	21 (21)	26 (26)	34 (34)
31-40	20 (41)	18 (44)	15 (49)
41-50	11 (52)	12 (56)	11 (60)
51 - 60	8 (60)	7 (63)	7 (67)
Over 60	28 (88)	23 (86)	20 (87)
Unserved	12 (100)	14 (100)	13 (100)

*Wellston, North St. Louis, Forest Park/Euclid, East St. Louis.

TABLE 4-VIII
SYSTEMWIDE TRANSFERS IN THE A.M. PEAK HOUR
YEAR 2000

	1 No-Action	2 TSM	3 LRT/ Bus Shuttle
Local Bus to Local Bus	3,595	3,665	3,117
Local to Express; Express to Local	4,896	4,618	3,542
Express to Express	329	772	237
Bus to LRT; LRT to Bus	--	--	3,918
LRT to LRT	--	--	2
TOTAL TRANSFERS	8,820	9,055	10,816
Peak-Hour Trips	19,499	20,482	20,945
Transfers Per Trip	0.45	0.44	0.52

TABLE 4-IX
AVERAGE FARE PER LINKED TRIP IN THE YEAR 2000
(including fare discounts)

	Average Fare in 1985 Dollars	
Alternative	Priority Corridor	Systemwide
No Action	$0.673	$0.704
TSM	0.683	0.701
LRT/Bus Shuttle	0.766	0.729

of higher-speed line-haul service; the transfers incur penalties in the form of increased wait time and a higher fare included in the model.

5) Fares. Table 4-IX shows the overall average fare per transit trip in 2000 resulting with each alternative, both within the priority corridor and systemwide; each fare category is assumed to increase at the rate of inflation. (Chapter 3's Public Transportation fare discussion fully describes Bi-State's current fare structure.) The differences across the alternatives reflect two characteristics of the fare structure in the corridor. First, because express service has a premium fare, alternatives which carry a higher share of trips on express routes, including LRT, will have higher average fares. Second, because transfers require an added fare, alternatives with higher levels of transferring will also tend to produce higher fares. Hence, the LRT alternatives will result in higher average fares since they involve a higher percentage of passengers in express service and more transferring.

6) Reliability and Comfort. All transit service with the No-Action and TSM alternatives will continue to operate in mixed traffic. Passenger comfort will remain essentially unchanged, with perhaps minor improvements as new advanced-design vehicles replace older models.

The LRT alternatives will utilize approximately 18 miles of exclusive right-of-way, and all grade crossings will be controlled to yield to LRT movements. The length of exclusive right-of-way with no stops for intersecting streets will allow higher average speeds for the LRT operations.

The smoother propulsion provided by electric motors, the use of continuous welded rail, and the largely exclusive right-of-way will give LRT operations better ride quality than comparable bus operations. The LRT equipment will incorporate the latest technology for climate control, passenger comfort, and safety.

Underground and elevated LRT stations will have fully-protected access to each platform so that cross-track pedestrian movements will not be required. Each station in existing tunnels is designed individually to meet the site conditions at each location.

At-grade LRT stations will permit pedestrian travel across the tracks. Specific locations within the station limits will be defined and paved for this purpose. Cross-track walking beyond this area will be prohibited and deferred by fencing.

b. Patronage

All projections of transit ridership are based on a type and structure of travel demand model accepted nationally and tailored specifically to reflect travel behavior in the St. Louis metropolitan area. Its ability to accurately simulate existing ridership in St. Louis was established by a validation check in which the model was used to forecast current Bi-State bus ridership given current population, employment, and transportation characteristics in the St. Louis area.

Forecasts for each of the alternatives are based on a common projection of population and employment patterns. Complete forecasts were developed for Alternatives 1, 2, 3, and three shorter length segments of LRT labeled 3a, 3b, and 3c. (3a involves building the LRT alternative westward from East St. Louis to the Central West End station; 3b involves building the LRT/bus shuttle alternative westward from East St. Louis to the Delmar station; and 3c involves building the LRT/bus shuttle alternative westward from East St. Louis to the UMSL-South station.)

1) Total Transit Riders. Table 4-X shows the projected total number of annual and daily boardings and linked transit trips in the region in 2000 by mode for each of the alternatives. (A linked trip is a complete trip from origin to utlimate destination, including walking to and from one's car and/or transit vehicle, plus transfers.) As the table shows, year 2000 transit ridership with the No-Action alternative is expected to increase by 30 percent over the 1985 level. This growth reflects the expected increase in the number of households and jobs in the region. The projected increases in major activity center parking costs (related primarily to higher densities and decreasing parking supply) and increases in automobile operating costs (as projected by the U.S. Department of Energy) will also increase transit ridership by increasing out-of-pocket costs for private auto users.

TABLE 4-X
YEAR 2000 TRANSIT RIDERSHIP

	1986	1 No-Action	2 TSM	3 LRT/ Bus Shuttle	3a LRT	3b LRT/ Bus Shuttle	3c LRT/ Bus Shuttle
Total Annual Transit Patronage (in millions)							
Boardings-Bus	47.8	60.3	62.7	58.1	59.7	59.6	58.5
-LRT	0	0	0	10.6	4.6	5.7	8.0
-Total	47.8	60.3	62.7	68.7	64.3	65.3	66.5
Linked Trips	32.0	41.6	43.4	45.8	43.4	43.8	44.6
Daily Transit Patronage (in thousands)							
Boardings-Bus	167.7	211.5	219.9	204.0	209.4	209.2	205.5
-LRT	0	0	0	37.1	16.3	20.0	28.0
-Total	167.7	211.5	219.9	241.1	225.7	229.2	233.5
Linked Trips	112.1	146.0	152.2	160.8	152.4	153.7	156.4
Increase in Daily Linked Trips Over No-Action	--	--	4.2%	10.1%	4.4%	5.3%	7.1%

These increased costs are in contrast with the projected stabilization in transit fares expressed in constant dollars (a reversal in the regional trend since 1981 in which transit fares have significantly outpaced inflation). Not shown in the table are the trips by visitors to the St. Louis region (non-residents), because the calibration method, using household survey data from the St. Louis region, does not account for trips made by tourists. The LRT system will directly serve most of the major tourist attractions in the St. Louis area, with an estimated out-of-town attendance of nearly 12 million visitors per year. Based on surveys of other transit systems, it is possible that out-of-town visitors could add nearly 10 percent to the total annual ridership on the 18-mile LRT system, and from two to eight percent on the shorter length LRT alternatives.

The TSM alternative is expected to produce an increase in total daily linked transit trips of approximately 4.2 percent, while the LRT alternative will increase transit ~~linked~~ trips by 10.1 percent over the No-Action alternative in the year 2000. These increases are attributable to the various service improvements provided with each of the alternatives and the direct link provided between major tourist attractions.

While the increase in forecasted 2000 ridership is substantial when contrasted with current ridership, the LRT alternative's ridership is about the same as the region's transit ridership level as recently as 1980 (69.8 million annual passengers). Thus, the projections appear quite reasonable as a basis for evaluating the alternatives. This is particularly the case because the evaluation is keyed to the differences between alternatives, and any uncertainity about projected employment or transportation costs will have approximately the same magnitude of effect on all of the alternatives.

Between 146,000 and 161,000 transit trips will be made daily in 2000 depending on the alternative (see Table 4-X). The differences in these patronage levels directly reflect the service level, user cost, physical alignment, and system design of the individual alternatives. The No-Action alternative will carry fewer riders than any of the action alternatives as a result of its constrained fleet size availability, and therefore its inability to serve the anticipated demand. Approximately 15,000 potential daily riders will be lost because of this capacity constraint.

The TSM alternative will expand the existing fleet and improve service to accommodate the estimated growth in demand. These improvements will enable the system to accommodate all projected transit demand and bring daily system ridership to 152,200. All of the LRT alternatives will also include the TSM improvements, except where modified to properly interface with the rail line. The LRT alternative will offer savings in travel time for system riders, thereby producing an increase of approximately 8,600 daily transit trips compared with the TSM alternative.

2) Ridership on Guideway Facilities. The distribution of passengers by mode of arrival and mode of departure at LRT stations is shown in Table 4-XI. Table 4-XII shows the a.m. peak-hour volumes on each link of the system, and it presents the year 2000 projections for a.m. peak hour boardings and alightings at each LRT station for the 18-mile LRT alternative. Table 4-XIII gives the 24-hour volume of passengers through each station. The maximum load point for the LRT alternative in the a.m. peak hour is projected to occur on the eastbound line between the Forest Park and Central West End stations, where the peak-hour volume will reach 2,112.

Park-n-ride lot access to LRT stations will be provided at Fifth & Missouri, Page, St. Charles Rock Road, UMSL-South, North Hanley, and at the Northwest Park-n-Ride lot east of the airport. Travel demand modeling indicates a daily total of approximately 3,970 auto vehicle trips desiring parking at LRT park-n-ride stations, and an additional 2,137 auto kiss-n-ride trips at those stations. Total commuter parking capacity at the park-n-ride lots will be 1,801 spaces initially, with immediate capability to increase capacity at all but the UMSL-South station lot.

c. Farebox Revenues and Operating Deficits

Bi-State's fiscal year 1985 farebox revenues are estimated to be $22,503,000 (of which $110,835 is charter service revenue). The

TABLE 4-XI

LRT STATION MODE OF ARRIVAL IN THE A.M. PEAK HOUR--YEAR 2000

(Person Trips)

	Arrival Mode			Departure Mode	
Station	Walk	Auto	Bus	Walk	Bus
Berkeley	7	-	19	116	61
Airport	3	-	-	135	-
N.W. Park-n-Ride	32	753	15	15	-
North Hanley	36	144	80	16	44
UMSL-North	43	13	-	20	9
UMSL-South	3	106	10	9	28
St. Charles Rock Rd.	68	314	100	26	96
Page	137	181	74	65	61
Delmar	154	-	288	48	236
Forest Park	214	-	123	65	240
Central West End	98	-	445	375	364
Grand	95	-	704	250	316
Union Station	6	-	-	139	-
Kiel	29	-	-	249	-
Stadium	22	-	-	306	-
Eighth & Pine	56	-	73	469	93
St. Louis Centre	10	-	163	470	131
Laclede's Landing	48	-	-	477	-
East Riverfront	100	-	-	4	-
Fifth & Missouri	17	118	96	15	49
LRT 3 TOTAL	1,178	1,629	2,190	3,269	1,728
Percentage	23%	33%	44%	65%	35%

TABLE 4-XII
LRT STATION AND LINK VOLUMES IN THE A.M. PEAK HOUR - YEAR 2000

	Passengers Aboard Link East of Station (Inbound Only) SERVICE LINE				Boardings (Both Directions) SERVICE LINE				Alightings (Both Directions) SERVICE LINE			
	Airport to E. St. Louis	Berkeley to E. St. Louis	Delmar to E. St. Louis	TOTAL Inbound Passengers A.M. Peak	Airport to E. St. Louis	Berkeley to E. St. Louis	Delmar to E. St. Louis	TOTAL Boardings (Both Ways) A.M. Peak	Airport to E. St. Louis	Berkeley to E. St. Louis	Delmar to E. St. Louis	TOTAL Alightings (Both Ways A.M. Peak
Airport	3	--	--	3	3	--	--	3	135	--	--	135
Berkeley	--	26	--	26	--	26	--	26	--	177	--	177
NW Park-n-Ride	349	334	--	683	403	399	--	802	12	5	--	17
N. Hanley Rd.	486	400	--	886	171	89	--	260	43	17	--	60
UMSL-North	485	399	--	884	0	3	--	3	9	2	--	11
UMSL-South	566	453	--	1,019	102	70	--	172	35	20	--	55
St. Chas. Rk. Rd.	777	630	--	1,407	266	216	--	482	78	44	--	122
Page	951	785	--	1,736	213	179	--	392	86	40	--	126
Delmar	955	790	200	1,945	132	110	200	442	122	89	73	284
Forest Park	965	798	349	2,112	99	76	162	337	112	82	111	305
Central West End	885	716	496	2,097	160	112	271	543	267	223	249	739
Grand	803	655	615	2,073	228	189	382	799	218	175	173	566
Union Station	760	625	579	1,964	2	0	4	6	52	31	56	139
Kiel	688	577	520	1,785	10	1	18	29	90	58	101	249
Stadium	583	502	433	1,518	8	2	12	22	115	81	110	306
Eighth & Pine	261	210	195	666	22	15	29	66	344	311	284	939
St. Louis Centre	181	144	180	505	77	24	135	236	95	75	54	224
Laclede's Landing	17	3	45	65	18	2	28	48	173	146	158	477
East Riverfront	18	3	43	64	27	22	51	100	0	0	4	4
Fifth & Missouri	--	--	--	0	63	44	124	231	18	3	43	64
TOTALS					2,004	1,579	1,416	4,999	2,004	1,579	1,416	4,999

TABLE 4-XIII
DAILY TWO-WAY LIGHT RAIL STATION VOLUMES
YEAR 2000

	Service Line				
STATION	Airport to E. St. Louis	Berkeley to E. St. Louis	Delmar to E. St. Louis	Union Sta. to E. St. Louis*	Total Daily 2-Way Volume
Airport	1,197	--	--	--	1,197
Berkeley	--	1,518	--	--	1,518
NW Park-n-Ride	3,235	3,140	--	--	6,375
N. Hanley Rd.	1,173	890	--	--	2,063
UMSL-North	82	51	--	--	133
UMSL-South	1,089	944	--	--	2,033
St. Chas. Rk. Rd.	2,423	2,216	--	--	4,639
Page	1,887	1,707	--	--	3,594
Delmar	2,395	2,266	993	--	5,654
Forest Park	2,110	1,907	1,000	--	5,017
Central West End	3,449	3,234	1,819	--	8,574
Grand	4,133	3,989	2,055	--	10,177
Union Station	513	421	199	96	1,229
Kiel	989	886	444	183	2,502
Stadium	1,017	941	424	183	2,565
Eighth & Pine	2,292	2,224	1,294	307	6,117
St. Louis Centre	848	739	691	214	2,492
Laclede's Landing	1,739	1,649	648	324	4,360
East Riverfront	143	123	248	17	532
Fifth & Missouri	1,120	1,037	480	846	3,483
TOTALS	31,834	29,882	10,368	2,170	74,254

TOTAL DAILY ONE-WAY = 37,127

* Union Station to E. St. Louis service operates in the base period only.

current systemwide average fare is estimated at $0.704 per linked trip, which includes transfer costs, or an average fare per boarding of $0.467. Survey data show the average fare collected for express routes at $0.817 and $0.438 for local routes. These results are based on actual boardings and revenues collected in each vehicle. Express routes account for about 15 percent of farebox revenue and local service for the remaining 85 percent.

Table 4-XIV presents the projected annual farebox revenues and operating costs and deficits (operating costs less farebox revenues) for each of the alternatives under consideration. The TSM alternative will result in a $3.3 million greater shortfall of farebox revenues over operating costs (or operating deficit) compared with the No-Action alternative. The LRT alternative will have a $1.0 million lower operating deficit than the TSM alternative, and a higher farebox recovery ratio (farebox revenue divided by operating cost) of 33.8 percent compared to 31.7 percent for the No-Action alternative and 31.4 percent for the TSM alternative. The LRT alternative will have a higher farebox recovery ratio (i.e., the percentage of operating costs that transit fares pay for), because of its more efficient use of system capacity resulting in a $1.8 million greater operating cost offset by its $2.8 million greater farebox revenue compared with the TSM alternative. The last column of this table compares each alternative on a deficit per (linked) trip basis; it shows that the LRT/Bus shuttle alternative provides the most cost-effective solution.

4.2 HIGHWAY

a. Congestion

1) Changes in Highway Volumes. The estimated number of a.m. peak hour auto trips diverted to transit for each of the alternatives is presented in Table 4-XV. Since these reductions will be spread over the entire region and will include some cross-town and reverse flow travel in addition to the peak direction radial flow to the St. Louis CBD, the reductions in auto volumes on any particular highway link will generally be small in comparison to the peak-hour volumes on those links.

TABLE 4-XIV

ESTIMATED ANNUAL OPERATING COST, PASSENGER REVENUE, AND OPERATING DEFICIT FOR PROJECTED 2000 PATRONAGE

(in millions of 1984 dollars)

Alternative	Operating Cost	Farebox Revenue	Operating Deficit*	Farebox Recovery Ratio**	Deficit Per Trip (in dollars and cents)
1 No-Action	$ 86.8	$27.5	$ 59.3	31.7%	$1.43
2 TSM	91.2	28.6	62.6	31.4%	1.44
3 LRT/Bus Shuttle	93.0	31.4	61.6	33.8%	1.35

NOTE: This table assumes Bi-State will operate both LRT and bus service.

*Operating cost less farebox revenue.

**Farebox revenue divided by operating cost.

TABLE 4-XV

YEAR 2000 AUTO TRIPS DIVERTED TO TRANSIT

Alternative	Daily Transit Trips	Transit Share *	Additional Transit Trips	Auto Trips Diverted A.M. Peak Hour**
1 No-Action	146,040	3.2%	--	--
2 TSM	152,221	3.4%	6,181	900
3 LRT/Bus Shuttle	160,746	3.6%	14,706	2,139

* The number of daily transit person trips expressed as a percent of total daily person trips (auto and transit) in the region. The current transit share is 2.7%.

** Assuming 16% of total daily trips in the a.m. peak hour and 1.1 persons per auto.

Although any reduction in auto travel will have some beneficial effect, the projected reductions are not expected to yield any significant improvement in highway levels of service, average speeds, or travel times.

2) Impacts of Transit Vehicle Operations. The TSM alternative will increase the bus miles traveled by two percent over the No-Action alternative. Impacts on traffic at any particular location will be negligible, since the TSM service improvements will be spread throughout the region.

The LRT alternative will result in a reduction of total bus miles traveled of about six percent over the No-Action alternative in the year 2000 and about eight percent over the TSM alternative. Most of the reductions will occur in the central corridor, where bus routes will be replaced by LRT operating on exclusive right-of-way. (Chapter 2's Definition of Alternatives details the changes programmed for each bus route with each alternative.) On some roadways in the corridor which currently carry heavy bus volumes, these reductions should result in minor improvements in roadway capacity.

There will be no LRT operations in mixed traffic. The LRT alignment will cross existing roadways at grade in 17 locations. These grade crossings are described in Table 4-XVI. The maximum delay to roadway traffic at these crossings is presented in Table 4-XVII. Appreciable delays are expected at the Taylor Avenue crossing in the Washington University Medical Center area and at two of the five crossings in East St. Louis, although at none of the crossings will the crossing be closed long enough to create capacity problems on the affected roadway. It will not be uncommon for individual vehicles to be delayed at two successive crossings in East St.Louis, because of the location of the LRT alignment and the roadway traffic patterns.

b. Access to Stations

No capacity or traffic problems are expected at any of the park-n-ride lots under the TSM alternative because of the limited volume of park-n-ride patrons on any particular route.

With the LRT alternative, only those stations with park-n-ride lots are expected to generate any significant auto traffic. An analysis of worst-case traffic conditions was made at the most critical intersection serving each of the park-n-ride lots by assuming that the entire lot capacity would enter or leave the lot within one hour coincidental with peak-hour traffic for the year 2000. The results of this analysis are shown in Table 4-XVIII. At none of the lots is this traffic expected to exceed the capacity of the intersection, and at only one (Northwest) is it expected to exceed 90 percent of capacity.

None of the stations accessed principally by pedestrian mode will have sufficient peak hour volumes to create significant congestion on existing pedestrian facilities.

c. Parking

1) Loss of Parking Spaces for Transit Improvements. The TSM alternative will preempt some parking spaces in outlying shopping center parking lots. These spaces are available for park-n-ride lots primarily because they are currently not used, or used only infrequently. Thus, there should be no adverse effect on parking.

The LRT alternative will result in some minor loss of parking spaces, principally in the vicinity of some stations, including the East St. Louis and Kiel stations. On the whole, far more auto trips will be diverted to transit than parking spaces lost.

2) Demand for Parking. All of the action alternatives will result in an increase in transit trips to major activity centers, with a corresponding decrease in the rate of increase in demand for all-day parking spaces needed to accommodate auto commuters. The TSM alternative is expected to reduce the demand for activity-center parking spaces by approximately 2,818, and the LRT alternative by over 6,720.

d. Road Closures

No road closures are proposed with the TSM alternative. With the LRT alternative, ten permanent road closures will be required, see Table 4-XIX. Four of these roadways serve the vicinity of the Kiel station west of Fourteenth Street and south of Clark Avenue. All access from this area will be to the north on Sixteenth Street (which will be grade-separated from the LRT alignment) or to the west. A capacity analysis of the existing intersection of Sixteenth and Clark indicates sufficient capacity for all of the traffic anticipated. All of the

TABLE 4-XVI
LIGHT RAIL TRANSIT GRADE CROSSINGS

				LRT Traffic			Vehicular Traffic		
Crossing Number	Cross Street	Status	Protection Device	Peak Hr.	Daily Total	Speed (mph)	Lanes	1985 Peak Hr. Vol.	1985 ADT
1	Broadway at Fifth St.	New	Traffic Signals & Flashing Lights	24	384	15	4	1,024	8,700
2	Fourth St.	New	Gates & Flashing Lights	24	384	10	2	583	6,600
3	Main St.	New	Gates & Flashing Lights	24	384	10	2	578	6,540
4	Broadway at Third St.	New	Traffic Signals & Flashing Lights	12	192	10	6	1,099	7,000
5	Broadway @ I-55/70	New	Traffic Signals & Flashing Lights	12	192	10	4	1,099	7,000
6	Poplar St.	Existing	Gates & Flashing Lights	24	384	15	2	67	335
7	Theresa	Existing	Gates & Flashing Lights	24	256	55	2	71	355
8	Sarah	Existing	Gates & Flashing Lights	24	256	55	2	122	945
9	Boyle	Existing	Gates & Flashing Lights	24	256	55	4	303	1,634
10	Newstead	Existing	Gates & Flashing Lights	24	256	55	2	381	1,393
11	Taylor	Existing	Gates & Flashing Lights	24	256	55	4	791	3,655
12	Bartmer	Existing	Gates & Flashing Lights	12	184	55	2	200	1,111
13	Etzel	Existing	Gates & Flashing Lights	12	184	55	2	297	1,485
14	Plymouth	Existing	Gates & Flashing Lights	12	184	55	2	200	1,111
15	No. Market	Existing	Gates & Flashing Lights	12	184	55	2	27	180
16	Geiger Rd.	New	Gates & Flashing Lights	12	184	25	2	335	2,830
17	Scudder Rd.	New	Gates & Flashing Lights	6	92	55	2	599	6,360

TABLE 4-XVII
EXPECTED DELAY AT GRADE CROSSINGS

Crossing	Time Closed per Crossing (seconds)	Peak Hr. Crossing Closed %	Year 1990 Peak Hour Total Delay (seconds)	Year 1990 Peak Hour Avg. Delay-All Vehicles (seconds)	Year 1990 Peak Hour Vehicles Delayed	Year 2000 Peak Hour Total Delay (seconds)	Year 2000 Peak Hour Avg. Delay-All Vehicles (seconds)	Year 2000 Peak Hour Vehicles Delayed
Broadway at 5th	34	22.7	5,531	4.8	264	6,936	5.0	314
4th St.	57	38.0	8,232	13.1	238	9,864	13.5	276
Main St.	54	36.0	7,634	11.9	230	9,696	12.3	286
Broadway at 3rd	40	13.3	4,598	3.2	192	5,580	3.3	228
Broadway at I-55/70	47	15.7	5,358	4.5	188	6,600	4.6	223
Poplar St.	48	32.0	576	8.2	22	624	8.4	24
Theresa	40	26.7	456	6.1	20	456	5.8	22
Sarah	40	26.7	792	5.9	36	864	5.6	41
Boyle	40	26.7	1,944	5.8	89	2,304	6.1	101
Newstead	40	26.7	2,688	6.4	113	3,048	6.4	127
Taylor	40	26.7	5,544	6.4	233	11,592	11.7	264
Bartmer	40	13.3	684	3.3	28	672	3.1	29
Etzel	40	13.3	960	3.1	42	960	2.9	43
Plymouth	40	13.3	684	3.3	28	672	3.1	29
No. Market	40	13.3	84	3.0	4	84	3.0	4
Geiger Rd.	43	14.3	1,224	3.5	50	1,296	3.5	53
Scudder Rd.	40	6.7	1,920	3.0	84	2,136	3.1	94
TOTAL			13.6 hrs	5.6	1,861	17.6 hrs	6.3	2,158

TABLE 4-XVIII
PARK-N-RIDE LOT
INTERSECTION CAPACITY ANALYSIS

		Year 2000 Peak Hour Traffic Volumes			
Park-n-Ride Lot	Long Term Lot Capacity	Major Arterial	Access Road	P-R Lot	Intersection Volume to Capacity (%)
Fifth & Missouri	138	824	802	219	79
Page	232	1,876	209	341	88
St. Charles Rock Rd.	185	3,210	--	261	83
UMSL-South	118	2,014	209	178	58
North Hanley	160	1,902	--	220	54
Northwest Park-n-Ride	937	1,199	--	980	96

Note: Peak hour volumes shown for the major arterials and access roads are exclusive of all LRT-generated traffic (shown in the "P-R Lot" column). Park-n-ride lot traffic volumes assume that the entire lot capacity (plus kiss-n-ride traffic) departs within one peak hour, with the exception of the Northwest Park-n-Ride, where 85 percent of capacity was assumed.

TABLE 4-XIX

PROPOSED ROAD CLOSURES

Roadway	From	To
Fifth St., East St. Louis	Missouri Ave.	Broadway
Division St., East St. Louis	at Fifth St.	--
Third St., East St. Louis	South of Broadway	--
TRRA Access Road, East St. Louis	North of Broadway	--
Poplar St.*	Eighth St.	Ninth St.
Spruce St.	Fourteenth St.	Johnson
Johnson (alley)	at Belmont	--
Belmont (alley)	at Johnson	--
Fifteenth St.	Clark Ave.	Belmont
Twenty-First St.	Clark Ave.	R.R. Yards
Weldon Ave.	East of North Hanley Rd.	--

* Poplar Street will be closed at the LRT crossing between Eighth and Ninth Street only during Stadium events.

other roadways to be closed carry only very small volumes of traffic and alternate routes are readily available.

Some partial road closures will be required during construction of the LRT system. Construction of the East Riverfront station on the Eads Bridge will necessitate staging lane and roadway ramp closings for approximately six months. Construction of the Eighth & Pine station will require closing Eighth Street for one-half block either side of Pine Street (Pine will be temporarily bridged to maintain cross traffic.) Half of Washington Avenue will be closed at a time between Sixth and Seventh Streets over a period of four to nine months to build the St. Louis Centre station. Clark Avenue will be closed at Twentieth Street in order to construct the new LRT tunnel west of Union Station. Alternate access routes are available for the businesses in the area. Staging of construction and temporary detours will allow all other roadways to be kept open during all LRT construction.

4.3 FREIGHT MOVEMENTS

a. Freight Railroads

Only the LRT alternatives will have any effect on railroad freight operations. All LRT alternatives will use the existing N&W trackage between Grand and Natural Bridge. Freight movements currently handled on this line will either be shifted to the hours between 1 a.m. and 5 a.m. (the period in which no LRT service is scheduled), or accommodated on separate parallel tracks, thus providing exclusive LRT track use during normal LRT operating hours. (The finalized freight operating plan will be included in the purchase agreement with N&W.) Also, because of the high level LRT station platforms, no freight operations will be allowed on the segment between Taylor Avenue and west of Delmar. Freight operations will not be adversely impacted, because the affected portion of the N&W line averages only 45-60 cars handled per month, and customer access will be maintained.

b. Trucking and Deliveries

No permanent effects on trucking and deliveries are anticipated (other than those mentioned in the previous section). Some minor provisions for temporary access to loading docks will be needed during LRT construction.

CHAPTER 5: ENVIRONMENTAL CONSEQUENCES

This chapter describes the environmental effects that will result from implementing the locally preferred LRT alternative as opposed to the no-action or TSM alternatives, all three of which are described in Chapter 2. The presentation format is organized to follow in the same order as the Chapter 3 Affected Environment discussion.

5.1 LAND USE AND ECONOMIC DEVELOPMENT

This section includes four parts. The first summarizes significant economic development potential expected to result from making a major transit capital investment in St. Louis. The second part describes the development potential at each guideway station. The third aggregates and quantifies the potential station-related development by political jurisdictions as well as by proximity to stations and probability of occurring for the purpose of measuring impacts on services and tax base. The fourth part describes potential employment impacts.

a. Summary of Economic Development Impacts

Major transit investments could change development patterns in the corridor. The nature and amount of development changes are thoroughly discussed later in this section. Four major conclusions regarding the causes of the development impacts result from the work documented in a series of Technical Reports (TR): TR-19, Station Area Market Study; TR-20, Land Use Planning and Zoning; TR-21, Value Capture Opportunities and Policies; TR-22, Joint Development Program; and TR-23, Implementation Plan. These reports examine several important questions relating transit investment decisions to the sources and causes of potential development attracted to the corridor. Each conclusion is addressed below.

1. To what degree, if any, can each transit alternative attract increased private investment to the St. Louis region?

Based on U.S. DOT research studies, there has been no evidence as yet that development associated with major rail investments represents a net increase in total regional development. Rather, the impacts are generally concluded to be a refocusing of ongoing development activity around sites that are made more attractive by the transit improvements. However, these same studies also indicate that this conclusion is based on limited evidence and is subject to further investigation. Reliable data and methods for a reasonable test of this effect are lacking, and , in addition, future approaches to achieving such effects may be different and more effective than those available for existing research. Some opinion exists in cities with recent transit investments that some portion of the new growth related to transit facilities has been a net growth to the region in addition to simple focusing of regional growth in a specific corridor. In summary, therefore:

- There will be development attracted to station sites.
- More of the development impacts are likely to be shifts in development patterns, rather than net increases in development.

2. How do transit investments contribute to attracting economic development to individual sites?

Investments in public transit make individual sites more attractive for development, because such investments can:

- increase the accessibility of a site to the region's population and employment centers;
- provide greater levels of activity at sites as a result of concentrating passenger volumes at those sites;
- yield higher development densities by reducing site specific parking requirements; and
- demonstrate a long-term commitment to the stability of an area depending on the capital investment associated with the transit improvement.

Other social and physical characteristics will also influence station development. These include neighborhood acceptance of development, amenities of the local area, the strength of local markets for residential and office space, and the proximity of the site to the station. Each of these effects has specific influences on site development that depend on the type of development likely at the site and on the magnitude of the change in accessibility, activity, parking demand, or perceived permanence. Facilities that improve access to new or newly-rehabilitated office space can promote faster absorption of that space compared to other office space lacking such accessibility. Where passenger volumes are concentrated around stations, adjacent sites become possible locations for new or expanded retail activities that can serve "walk-in" traffic generated by the transit passengers. Finally, sites at which better transit reduces the costs and difficulties of providing parking can become more attractive for new development because high quality transit provides a competitive advantage over sites with lower quality and less used transit services.

> 3. To what degree does each alternative cause the conditions necessary to attract economic development?

The capacity of each alternative to reinforce development in the corridor relates to its ability to meet the above conditions.

o <u>Accessibility of Sites</u>. The TSM alternative will improve accessibility across the region. Since the bus system is focused on the major employment concentrations in downtown St. Louis, both the TSM and the LRT alternatives will improve accessibility to downtown. Within downtown, there would be some variation in site-specific accessibility tied to the location of the LRT stations. In portions of the corridor outside of downtown St. Louis, LRT will lead to a larger number of specific sites with improved accessibility. Stations at which improved accessibility is likely to provide an important stimulus for development or redevelopment include: Laclede's Landing, Stadium, Kiel, Union Station, Forest Park, Page, and North Hanley.

o <u>Concentrations of Passenger Volumes</u>. The largest concentrations of transit passenger volumes are, and will continue to be, in downtown St. Louis. While the TSM alternative boards and discharges passengers on city streets and bus lanes, the LRT alternative will divert some of the passengers to the downtown LRT stations. This diversion will likely result in higher concentrations adjacent to the LRT stations. Outside of downtown St. Louis, concentrations of passengers will be relatively small at individual station sites. However, the passenger volumes may be sufficient to strengthen existing retail uses near certain stations. Park-n-ride lots as well as stations with high volumes of walk-in passengers are likely to provide a somewhat expanded market for retail activities in the vicinity. Locations outside of downtown St. Louis where this could be an important factor include the Fifth & Missouri station in East St. Louis and the Central West End and Forest Park stations.

- <u>Site Specific Parking Requirements</u>. The TSM and LRT alternatives will result in a diversion of auto users to transit and, therefore, a decrease in the rate of increase in parking demand. Most of this effect will occur in downtown St. Louis. Again, some variation will occur at specific downtown sites tied to the location of the LRT stations, compared with the effect of the TSM alternative. Also, variation will occur at locations on the fringe of the business district (the LRT station at the Stadium) where existing and projected bus service is not so concentrated. Outside of downtown St. Louis, LRT will particularly affect parking demand at the hospital complex at Kingshighway and at McDonnell Douglas.

- <u>Evidence of Long-Term Commitment</u>. The TSM alternative will involve a limited capital investment in fixed facilities. Although additional capacity will be added to the system, it will not be of a fixed nature. The LRT alternative will result in a high level of investment in fixed facilities along the entire length of the corridor.

Unlike bus routes, LRT is perceived by the developer/investor as a "bankable" permanent (fixed) investment and a public-sector commitment to long-term CBD viability. The convention/hotel market, entertainment attractions, specialty-retail shopping facilities, and office and residential developments are image-sensitive for both the user and the developer/investor. The latter perceives LRT as a positive factor in promoting St. Louis' "image," which in turn influences the community's investment climate and the success of area development.

LRT's positive perception in the development/banking community and its potential to strengthen St. Louis' national image and investment perception are among its strongest economic development advantages. Significantly, it offers the potential to sustain the growth momentum in the construction industry within the priority corridor where public-sector investment and policy initiatives have been focused.

4. What public policies already exist to focus development into the priority corridor, and what is the capacity of each alternative to reinforce such programs?

The priority corridor in St. Louis has been the focus of considerable publicly-supported private development aimed at reversing the effects of long-term disinvestment. To a large degree this public policy focus has been successful. Individual policies have improved markets for residential, office, and retail investments. Considerable investment in infrastructure has also been made in the corridor. The consideration of a major transit investment in the St. Louis priority corridor is clearly consistent with past public policy. The existence of these policies enhances the ability to derive economic benefit from a transit investment.

b. Site-by-Site Impacts

Table 5-I identifies the transit-related factors which may influence development at the LRT station locations. Locations that have limited or no transit service at present will benefit from the introduction of LRT stations as will locations where new or future land use activities will benefit from more direct access to activity centers. Examples of locations with these conditions include St. Louis Union Station and Laclede's Landing which will benefit from more direct access to the St. Louis CBD core area. Also, LRT can provide a stronger linkage between the east and west riverfronts, serving the major investments

TABLE 5-I

TRANSIT-RELATED FACTORS AFFECTING THE ATTRACTIVENESS OF STATION SITES

No.	Station	Accessibility of Sites	Concentrations of Passenger Volumes	Reduction in Site-Specific Parking Requirements	Evidence of Long-Term Commitment
1.	Fifth & Missouri		X		X
2.	East Riverfront	X			X
3.	Laclede's Landing	X	X	X	
4.	St. Louis Centre		X		
5.	Eighth & Pine		X	X	
6.	Stadium	X			X
7.	Kiel	X		X	X
8.	Union Station	X	X		
9.	Grand	X			X
10.	Central West End			X	
11.	Forest Park	X	X	X	
12.	Delmar				X
13.	Page				X
14.	St. Charles Rock Rd.				X
15.	UMSL-South	X		X	
16.	UMSL-North	X		X	
17.	North Hanley	X	X		
18.	Northwest Park-n-Ride				
19.	Berkeley				
20.	Airport			X	

proposed for the east side park/museum expansion and the Mississippi River Festival revival that together would totally change the east riverfront image (just as the convention center and related development totally changed the negative public perception of Franklin Avenue and Delmar in downtown St. Louis).

Concentrations of passenger volumes are particularly important for retail sales and to a lesser extent for other high density development activities, and consequently will benefit station locations where such activities may be enhanced or developed. Reduction in major site-specific parking requirements is most significant in activity centers where the capacity to accommodate additional parking is most limited and the cost savings from not needing to provide such parking will offer an incentive for continued investment. Evidence of long-term commitment is most important at those station locations where private-sector market confidence is weak.

Table 5-II categorizes the economic development potential at each of the LRT stations into one or more of four groupings.

1) <u>Stations Generating No Significant Development Impact</u>. Only one LRT station location is assumed to have no significant development potential: Station 18, Northwest Park-n-Ride. This station is located on airport property beneath an approach zone where the Federal Aviation Administration will not permit any development.

2) <u>Stations Enhancing Existing or Programmed Development</u>. Existing and programmed development will be enhanced near a number of stations. The East St. Louis station at Fifth & Missouri (1) will provide service to the East St. Louis City Hall, the Regional Office Building for the State of Illinois, the renovated legal offices on Missouri and a federal office building, courthouse, and post office. The East Riverfront Station (2) will support a proposed $125 million residential condominium project.

Laclede's Landing (3), St. Louis Centre (4), Eighth & Pine (5), and the Union Station (8) LRT stations will serve major CBD developments. LRT will link the entertainment activities at Laclede's Landing, the Old Post Office, and Union Station. It will tie the

TABLE 5-II

ECONOMIC DEVELOPMENT POTENTIAL

No.	Station	Generating No Significant Development Impact	Enhancing Existing or Programmed Development	Potentially Stimulating Nearby Development	Yielding Potential Joint Dev./ Value Capture Opportunities	
					Near Term	Long Term
1.	Fifth & Missouri		X	X	X	
2.	East Riverfront		X			X
3.	Laclede's Landing		X		X	
4.	St. Louis Centre		X	X	X	
5.	Eighth & Pine		X	X	X	
6.	Stadium			X	X	
7.	Kiel			X	X	
8.	Union Station		X		X	
9.	Grand					X
10.	Central West End		X	X		X
11.	Forest Park		X		X	
12.	Delmar					X
13.	Page				X	
14.	St. Charles Rock Rd.					X
15.	UMSL-South		X			X
16.	UMSL-North		X			X
17.	North Hanley			X	X	
18.	Northwest Park-n-Ride	X				
19.	Berkeley		X			X
20.	Airport		X			X

St. Louis Union Station and Laclede's Landing developments into the downtown core, making the activities at these peripheral locations readily accessible to persons in the core area. It will link the Union Station hotel with the convention center. Numerous downtown office developments discussed in Chapter 3 will benefit from LRT access to outlying origin points and remote parking spaces.

The Central West End station (10) will serve the medical-hospital complex and the Central West End neighborhood, where considerable new construction and rehabilitation are under way. Similarly, the Forest Park station (11) will enhance recently rehabilitated and programmed improvements in the Pershing/Waterman neighborhood at DeBaliviere. Stations 15 and 16 at UMSL will put that University on a mainline artery in the region and support the major building programs under way and proposed for the Normandy campus.

Station 19, which will serve McDonnell Douglas near Airport Road, will link the expanding facilities of the state's largest private employer to the rest of the region. Station 20 at Lambert Airport will provide improved access directly from expanded terminal facilities to downtown and residential areas.

3) <u>Stations Potentially Stimulating Nearby Development</u>. Station and park-n-ride lots will be a positive factor in development decisions at a number of locations which are not contiguous to a station but which are within walking distance. For example, the Fifth & Missouri station (1) in East St. Louis is an example of a long-term commitment to the area which will help stabilize the area and anchor the city's retail core. It is likely that the station will assist in future retail expansion decisions and stimulate redevelopment activities such as the recently renovated legal offices on Missouri Avenue. Numerous sites within walking distance of LRT stations in downtown St. Louis offer recognized development opportunities for which no firm plans exist. They include parts of the Washington Avenue Redevelopment area near St. Louis Centre (4), vacant office space and property presently used as a surface parking lot near Eighth & Pine (5), the Cupples property near the Stadium (6), and property surrounding the Kiel (7) station.

While much of the area surrounding the Central West End station (10) is presently being redeveloped, the station will potentially stimulate additional development of Medical Center facilities or ancillary commercial and residential support space.

The North Hanley station (17) has surrounding vacant land which may be developed with multi-family residential and small-scale commercial uses as a result of the stimulus provided by LRT.

4) Stations Yielding Potential Joint Development/Value Capture Opportunities. Each station has been prioritized as to overall joint development/value capture potential in the last column of Table 5-II. Ten stations have immediate potential as a result of strong market forces, available land for development/redevelopment, or public and private sector activities which are in progress or planned. These stations will most likely generate front-end capital revenue, which may be used to defer construction costs. The nine stations with long-range joint development/value capture potential are not expected to generate revenues until after the 2000 design year. They will require improvements in the current market for development coupled with public financial incentives. Joint development/value capture opportunities are discussed in greater detail below.

c. Value Capture and Joint Development

Value capture and joint development techniques will be used as a part of LRT to achieve the transit investment's economic development potential throughout the corridor's affected jurisdictions and to capture through public/private co-venture a portion of the one-time and/or ongoing benefits, either in cash or in kind, to fund the on-going capital, operating, and expansion needs of the entire regional transit system. The techniques to be used will be resolved in final design.

Tables 5-III and 5-IV list the benefits which accrue to the private sector from developing LRT; value capture, of which joint development is a key technique, is a way of enabling public interests to actively share in the monetary benefits accruing to the private sector. Transit related benefits can be realized by private interests in a variety of ways, including: 1) direct impacts on land and development

TABLE 5-III
POTENTIAL BENEFIT CATEGORIES RESULTING
WITH THE ST. LOUIS LRT SYSTEM

Benefit Category	Primary Recipients	Significance
1. Land Value Increases	- Owners of property and buildings physically linked or in close proximity to transit stations.	- Direct monetary gain to private sector of up to $1.00 - $2.00 per square foot, or 10% - 30% increase in property value.
	- Cities of East St. Louis and St. Louis, St. Louis County and its impacted municipalities, through net property tax revenue gains.	- Represents a net increase in corridor values, not regional increase.
2. Retail Sales Increases, Increased Commercial Activity	- Retail merchants with stores physically linked or in close proximity to transit stations.	- Direct monetary gain to private sector, in some areas up to 10% increase.
	- Hotel owners with facilities located within walk access of stations.	- Direct monetary gain to private sector.
	- Cities of East St. Louis and St. Louis, St. Louis County through increased sales taxes, hotel taxes, and convention/visitor spending.	- Direct percentage increase in proportion to increased sales activity.
3. Premium Rentals	- Owners of office and commercial facilities physically linked or in close proximity to transit stations.	- Studies indicate premiums as high as $1.00 - $2.00 per square foot.
4. Employee/Employer Travel Cost Savings	- Diverted motorist through parking and out of pocket cost savings.	- Each diverted motorists would save up to $875 in annual travel costs.
	- Employers through cost savings in parking subsidies.	- Parking costs savings of up to $375 annually for each employee subsidized.

TABLE 5-IV
POTENTIAL PRIVATE SECTOR BENEFIT CATEGORIES/RECIPIENTS

No.	Station	Predominant Land Use	Existing Market Forces	Primary Benefit Categories	Primary Recipients
1.	Fifth & Missouri	Vacant Land	Weak	Land Value	Property Owners
2.	East Riverfront	Railroad and Port uses, Vacant Land	None	Land Value	Property Owners
3.	Laclede's Landing	Entertainment, Retail, Office & Hotel	Strong	Retail Sales Premium Rents Travel Cost Savings	Retain Merchants Building Owners Employers/Employees
4.	St. Louis Centre	Retail, Office, Convention, & Hotel	Strong	Retail Sales Premium Rents Travel Cost Savings	Retail Mercahnts Building Owners Employers/Employees
5.	Eighth & Pine	Office, Retail	Strong	Retail Sales Premium Rents Travel Cost Savings	Employers/Employees Building Owners Retail Merchants
6.	Stadium	Entertainment, Parking	Modest	Land Value	Property Owners
7.	Kiel	Government, Office, Entertainment, & Convention	Modest	Land Value	Property Owners
8.	Union Station	Retail, Hotel, Office	Strong	Land Value Retail Sales Premium Rents Travel Cost Savings	Retail Merchants Property Owners Building Owners Employers/Employees
9.	Grand	Higher Education, Trucking, Warehouse	Weak	Land Value	Property Owners
10.	Central West End	Medical Center, Office, Higher Education	Strong	Travel Cost Savings	Employers/Employees

TABLE 5-IV (Continued)
POTENTIAL PRIVATE SECTOR BENEFIT CATEGORIES/RECIPIENTS

No.	Station	Predominant Land Use	Existing Market Forces	Primary Benefit Categories	Primary Recipients
11.	Forest Park	High Density Residential Retail, Moderate Density Residential	Strong	Land Value	Property Owners
12.	Delmar	Vacant/Underutilized Low Density Residential	Weak	Land Value	Property Owners
13.	Page	Vacant/Underutilized Low Density Residential	Weak	Land Value	Property Owners
14.	St. Charles Rock Rd.	Vacant/Underutilized Low Density Residential	Weak	Land Value	Property Owners
15.	UMSL-South	Higher Education, Low Density Residential	Weak	Travel Cost Savings	Employers/Employees
16.	UMSL-North	Higher Education, Hospital, Moderate Density Residential	Weak	Travel Cost Savings	Employers/Employees
17.	North Hanley	Diverse Residential/ Vacant	Modest	Land Value	Property Owners
18.	Northwest Park-n-Ride	Vacant (Airport Flight Zone)	None	None	None
19.	Berkeley	Office, Industrial, Vacant	Modest	Land Value Premium Rents	Property Owners Building Owners
20.	Airport	Airport, Commercial	Modest	Travel Cost Savings	Employers/Employees

values near transit stations; 2) cost savings associated with automobile operations; and 3) employer and employee benefits relating to commuting and parking costs. The purpose of a value capture program is to identify ways in which the transit entity and consequently, the public at large, can recapture a portion of these financial benefits to offset the capital and operating costs of the system.

Value capture is primarily a financing concept that attempts to derive an income stream from private interests to finance the capital and operating costs of the transit program. Value capture techniques fall into three broad categories: 1) assessments, taxes and fees to private interests benefiting from the transit program; 2) joint development of properties through a public/private partnership; and 3) direct marketing of transit property and facilities for advertising and concessions.

Value capture techniques in the first category include real estate based assessments and taxes, motor vehicle related taxes and fees, and employer/employee related taxes and fees. These techniques create a dedicated, measurable revenue stream which is often used to support bonded debt as part of the overall transit capital financing program.

The concept of joint development is a form of value capture that attempts to provide for the integration of transit properties and facilities with commercial and residential development, often on the same site. The primary objectives of joint development are to reduce front-end capital costs through property dedications and developer contributions to system construction and to provide the transit entity with participation in revenues from commercial and residential development through land and/or air rights leasing, connector fees, and equity positions in the joint development project.

Another category of value capture is the direct marketing of transit property and facilities for advertising and concessions. This form of value capture is probably the most common throughout the transit industry and can provide a minor, yet significant, level of financial support.

Each of the categories of value capture, and the various techniques within each category are briefly identified below.

1) Assessments and Taxes Based on Real Property. The cost of land surrounding transit stations frequently rises after a rail system is implemented because of benefits associated with improved accessibility to the area and related potential for retail and business activity. Access afforded by the rail transit system can create new development sites, enchance existing sites, and provide a strong linkage between activity centers, thereby enlarging the potential "pool" of customers for area businesses. Frequently, public land use and development policy is modified to encourage higher density development in station areas.

Value capture techniques in this category are designed to make owners of land adjacent to a rail station pay for the benefits they receive from the public investment. The techniques are based on the premise that the development of a rail transit system increases the value of land in the vicinity of stations. Special assessment districts, tax increment financing, and dedicated infrastructure funds are the primary value capture techniques involving assessments and taxes based on real property.

2) Assessments and Taxes Based on Motor Vehicle Use. The increased accessibility afforded by the implementation of a rail transit system provides benefits to businesses and industries located near transit stations in the form of reduced need to provide parking for employees and from access to an increased labor pool and customer base. Area residents benefit from increased access to highways and parking facilities and the opportunity to travel without a car. Value capture through assessments and taxes on motor fuel, vehicles, and parking is aimed at recovering some portion of these benefits to support the transit improvement.

3) Employer/Employee Taxes and Charges. Employers and employees benefit from transit access through savings in travel time, out-of-pocket commuting expenses and parking costs. Employers also

potentially benefit from an expanded labor pool as persons whose movements were previously restricted now have access to new job markets as a result of transit. Value capture techniques in this category are aimed at recapturing a portion of the benefits accruing to employers and employees through corporate payroll and employee income taxes.

4) Potential Joint Development Opportunities. Joint development is a key element of the St. Louis Light Rail Transit station area master planning process. Joint development offers opportunities to combine the public investment in transit facilities with private real estate development to maximize potential benefits to both sectors. Joint development is the pairing of public and private resources to accomplish a project which may not have occurred without the combined effort, or only occurred to the direct financial benefit to the private sector.

All LRT stations except the Northwest Park-n-Ride station (18) offer the potential for joint development of stations through negotiated private sector investment, connector fees, air/land rights leasing, or joint venture development. Table 5-V indicates the type of joint development techniques which may be realized at each station. The four approaches and general estimates of the monetary value that might be realized from each are discussed below. These potential joint development opportunities generally provide for private-sector investments to enhance stations or station sites and to integrate LRT with an existing or planned development. Some may generate proceeds in the form of lease payments or fees that can be applied to LRT operations and maintenance. Still others may be for enhancements which may be eligible for consideration as project costs. However, as currently envisioned, the potential private-sector joint-development opportunities are not part of the federal capital grant budget.

- Negotiated Investment. A negotiated investment is an agreement between a developer and a public agency, through which the developer agrees to contribute property and/or capital costs for a transit improvement in exchange for some concession which will benefit his development. Station cost elements which can be included in negotiated

TABLE 5-V
POTENTIAL JOINT DEVELOPMENT TECHNIQUES BY STATION

No.	Station	Negotiated Private Sector Investment	Connector Fees	Air/ Land Rights Leasing	Joint Venture Development
1.	Fifth & Missouri	X	X	X	
2.	East Riverfront	X	X		X
3.	Laclede's Landing	X			
4.	St. Louis Centre	X	X		
5.	Eighth & Pine	X	X		
6.	Stadium	X	X	X	X
7.	Kiel			X	X
8.	Union Station	X	X		
9.	Grand	X	X		
10.	Central West End		X	X	X
11.	Forest Park	X		X	X
12.	Delmar	X	X		
13.	Page			X	X
14.	St. Charles Rock Rd.	X	X	X	
15.	UMSL-South	X	X		
16.	UMSL-North	X	X		
17.	North Hanley	X		X	X
18.	Northwest Park-n-Ride				
19.	Berkeley	X			
20.	Airport				X

agreements include: 1) access improvements, such as escalators, elevators, entranceways, and plazas; 2) all or part of the station structure, excluding systemwide elements; 3) parking facilities; 4) property and easements; and 5) operating and maintenance costs.

Negotiated private sector investment opportunities exist at locations which have identified near-term development potential or where identified developers are in the process of packaging and selling projects. These locations include stations at Fifth & Missouri (1), the East Riverfront (2), Laclede's Landing (3), St. Louis Centre (4), Union Station (8), and UMSL-North (17). At Eighth & Pine (5), Southwestern Bell officials have indicated that the company plans to build a second office building immediately east of its recently completed building. After preliminary discussions, the company views this as an opportunity to integrate the LRT station into its development. Table 5-VI indicates that up to $20,200,000 could be generated from negotiated private sector investment. These funds could be used to enhance the stations over and above the federal cost.

o <u>Connector Fees</u>. Connector fees can be charged to owners/developers of both existing and future buildings for being physically connected to a station facility. These fees can include: 1) lump sum payments to cover capital costs of knock-out panels and entrance areas; 2) an annual contribution to the operating cost of the station facility; 3) in lieu dedication of property for station areas or easements; and 4) architectural and operational enhancements to the transit facility. As indicated by Table 5-V it is feasible that connector fees could be generated at 12 stations. A prime example of a station where connector fees could be generated is St. Louis Centre (4). At this station, a direct access will be provided to the basement level of Dillard's department store thereby permitting the conversion of the store's basement into 40,000 square feet of retail space. Additionally, knockout panels should be constructed to provide for the future extension of the underground passageway to the west, which would provide access to the Washington Avenue Redevelopment Area. It is possible that a minimum of $68,000 could be generated annually systemwide through the collection of connector fees.

TABLE 5-VI
JOINT DEVELOPMENT REVENUE ESTIMATES

No.	Station	Negotiated Private Sector Investments (One Time Revenue)	Connector Fees (Annual)	Land & Air Rights Leasing (Annual)	Joint Venture Development (Annual & One-Time Revenue)	Total One-Time	Total Annual
1.	Fifth & Missouri	$ 500,000	$ 5,000	$ 60,000		$ 500,000	$ 65,000
2.	East Riverfront	900,000	5,000			900,000	5,000
3.	Laclede's Landing	900,000				900,000	---
4.	St. Louis Centre	5,000,000	10,000			5,000,000	10,000
5.	Eighth & Pine	5,000,000	10,000			5,000,000	10,000
6.	Stadium	900,000	15,000	400,000	$ 200,000	1,100,000	415,000
7.	Kiel			240,000	400,000	400,000	240,000
8.	Union Station	5,000,000	5,000			5,000,000	5,000
9.	Grand	100,000	500			100,000	500
10.	Central West End		10,000		120,000/Yr	---	130,000
11.	Forest Park	500,000		10,000	48,000/Yr	500,000	58,000
12.	Delmar	50,000	5,000			50,000	5,000
13.	Page			20,000		---	20,000
14.	St. Charles Rock Rd.		1,000	48,000		---	49,000
15.	UMSL-South	50,000	500			50,000	500
16.	UMSL-North	200,000	1,000			200,000	1,000
17.	North Hanley	1,000,000		10,000	100,000	1,100,000	10,000
18.	Northwest Park-n-Ride					---	---
19.	Berkeley	100,000				100,000	---
20.	Airport				1,000,000 90,000/Yr	1,000,000	90,000
	TOTAL	$20,200,000	$68,000	$788,000	$1,700,000 258,000/Yr	$21,900,000	$1,114,000

Source: TR-22, Joint Development Program.

- o Air/Land Rights Leasing. This joint development approach involves a straightforward negotiation of a long-term lease agreement for real property originally purchased for transit purposes, such as station sites or parking areas. In these cases, a plan is developed whereby the transit facility requirements can be met within the structure of a larger project, thus creating space for incremental commercial uses. In most cases, the station facilities are wholly integrated into the development project, and ancillary facilities such as parking and entranceways are shared. The lease revenues can be derived from a base rental value or as a percentage of project income, making the transit entity a true equity partner in the development.

Development utilizing air/land rights leasing is expected to occur at eight LRT stations. Large-scale air/land rights developments are expected at the Stadium (6) and North Hanley (17). A 500,000-square-foot office development could be constructed at the Stadium station. Given the proximity to other areas of potential high growth, this location offers a good opportunity for the LRT system to undertake a bid/selection process for the office facility, including construction of the station itself. The North Hanley station (12) may have the highest air/land rights development opportunity of any station on the system. The combination of LRT system ownership of property, and the station's potential to intercept I-70 uses provides the opportunity to defer some capital costs as well as generate a long-term revenue stream. The preliminary program for the site calls for the development of 200 residential units. Approximately $788,000 could be realized annually through land and air rights leases.

- o Joint Venture Development. By utilizing an approach similar to air/land rights leasing, transit agencies can combine transit station sites with adjacent properties to create a major joint development site. In some instances a transit agency may actively participate with a private sector developer in the development of a project and may share in the project's equity as well as the income derived from the project, thus creating a joint venture project. In other cases, the transit agency may combine resources with another public agency to enhance a public development or redevelopment project.

Stations at which joint venture developments are probable include the Stadium (6), Kiel (7), Central West End (10), Forest Park (11), North Hanley (17), and Airport (20) stations. Table 5-VI indicates that joint venture development could generate up to $1,700,000 in one-time revenues and $258,000 in annual revenues.

5) Implementation Plan. Implementation of detailed station area master plans, joint development agreements, and value capture will begin at the start of LRT's final design. First, a committee of local citizens and property owners will be formed for each station to provide input into and review of the planning process. These committees along with the affected municipalities and EWGCC will prepare more detailed master plans for each station area, which with any needed rezoning should be formally adopted by the respective municipalities by the time final design is completed. New or modified, existing redevelopment districts will be established as needed to help implement the plans. Appropriate utility, traffic, and circulation improvements will be coordinated with the station construction schedule and phased station-area development. A marketing program will be initiated to attract private investment in accordance with the plans.

Negotiations for private-sector capital contributions for station construction will be initiated at the beginning of final design. Similarly, connector fee agreements will be negotiated at the beginning of final design to provide for the proper incorporation of connectors between the station and associated development. A leasing program for land/air rights leasing agreements will begin after right-of-way has been acquired and will continue after the project is built as development conditions warrant. Also, joint development agreements can begin shortly after the start of final design and continue after the project is built as development opportunities emerge.

Implementing value capture will begin with feasibility analyses and planning for special business and tax increment financing districts associated with the stations once the station-area land use plans are basically established. The districts will be adopted before LRT construction is completed in order to be able to generate revenue once LRT operations begin. A downtown parking fee will be explored during final design. Also, negotiations will begin during final design to properly integrate advertising and concessions into the final station designs.

d. Impacts on Tax Base

Tables 5-VII through 5-XI display the economic development potential described above in Part b. (Site-by-Site Impacts) in a 21-cell matrix. The column headings provide a geographic stratification; and the rows group the station development potential into seven development types ranked according to the extent of LRT's potential first to stimulate new development and secondarily to enhance under-construction or committed development. Proximity to an LRT station and the probability of the development occurring are the factors which differentiate the development types. The first three and the sixth development type involve projects that will physically touch (be adjacent to) an LRT station; the others include projects that will be within walking distance, generally limited to four blocks (walk-access) of an LRT station.

The first development type is contingent on LRT, i.e., air rights office development over the Stadium station (6). The second development type includes projects expected to be completed shortly after LRT is in operation (near-term, in advance of the 2000 design year) that will occur as a result of an LRT station-related development program initiated by the public sector. Residential development at the North Hanley station (17) is included as a Type 2 development. The third development type includes public-sector LRT-initiated projects similar to the second development type, except that these projects may be started but not necessarily completed by the 2000 design year. These projects will be implemented as a result of a development program initiated by the public-sector transit authority at stations where there is no identifiable developer interest at present, with the exception of the federally-initiated East Side riverfront park and the airport industrial research park (and related commercial development), which is expected to occur as a result of airport authority initiative.

The fourth development type includes other possible projects which are generally-recognized development opportunities within walk-access of an LRT station, but which presently lack an identifiable developer, a project schedule, and other factors necessary for implementation. LRT could be the stimulus to advance the timetable on some of these projects. The fifth development type includes other projects which are within walk-access of an LRT station and which have been proposed by a developer but which have not yet been financed and therefore are not firmly committed. These projects are generally more likely to occur even in the absence of LRT than the Type 4 projects; they will benefit by faster lease up of office space and more retail traffic.

The sixth development type includes near-term projects adjacent to a proposed station which are already under construction by either a private or a public-sector entity. These projects will benefit from immediate LRT access and could be asked to participate in the cost of providing that access. The seventh development type includes other projects which are within walk-access of an LRT station and which are financed, under construction, or recently-completed but not fully leased.

Table 5-VII shows the estimated office and retail space associated with the projects; Table 5-VIII shows the number of hotel rooms and residential units associated with the projects; and Table 5-IX shows the estimated capital investment associated with the projects. The latter values are limited to construction cost only (as opposed to land costs, design services, financing, and related costs included in the dollar amounts given in Chapter 3); the lower values are used to estimate the Tables 5-X and 5-XI data.

Table 5-X gives an estimate of the temporary (man-years of construction) employment and permanent (full-time) employment associated with the projects. (Temporary employment was calculated using an average annual construction salary and related cost of $43,000, and assuming that labor costs will account for 55 percent of total estimated construction cost. Permanent employment was based on four jobs per 1,000 square feet of office space, 1.875 jobs per 1,000 square feet of

TABLE 5-VII
ESTIMATED OFFICE AND RETAIL SPACE ASSOCIATED WITH ECONOMIC DEVELOPMENT AT OR NEAR LRT STATIONS
(in thousands of square feet)

Type of Development	East St. Louis		St. Louis City		St. Louis County		Total	
	Office	Retail	Office	Retail	Office	Retail	Office	Retail
1. Development Contingent on LRT	150	0	80	0	0	0	230	0
	150	0	80	0	0	0	230	0
2. Near-Term Adjacent Development by LRT Authority	0	0	500	0	0	0	500	0
	150	0	580	0	0	0	730	0
3. Long-Term Adjacent Development	500	0	0	0	495	80	995	80
	650	0	580	0	495	80	1,725	80
4. Other Possible Walk-Access Development	50	0	3,650	147	460	5	4,160	152
	700	0	4,230	147	955	85	5,885	232
5. Other Proposed Walk-Access Development	0	0	4,600	215	0	0	4,600	215
	700	0	8,830	362	955	85	10,485	447
6. Near-Term Adjacent Development Underway by Others	0	0	938	0	0	0	938	0
	700	0	9,768	362	955	85	11,423	447
7. Committed Walk-Access Development	80	0	90	0	0	0	170	0
	780	0	9,858	362	955	85	11,593	447

Note: The lower number in each pair of numbers is a cumulative total.

TABLE 5-VIII
ESTIMATED NUMBER OF HOTEL ROOMS AND RESIDENTIAL UNITS ASSOCIATED WITH ECONOMIC DEVELOPMENT AT OR NEAR LRT STATIONS

Type of	East St. Louis		St. Louis City		St. Louis County		Total	
Development	Hotel	Res.	Hotel	Res.	Hotel	Res.	Hotel	Res.
1. Development Contingent on LRT	150 150	0 0	0 0	0 0	0 0	0 0	150 150	0 0
2. Near-Term Adjacent Development by LRT Authority	0 150	0 0	0 0	0 0	0 0	200 200	0 150	200 200
3. Long-Term Adjacent Development	0 150	0 0	0 0	220 220	0 0	460 660	0 150	680 880
4. Other Possible Walk-Access Development	500 650	0 0	800 800	0 220	200 200	0 660	1,500 1,650	0 880
5. Other Proposed Walk-Access Development	0 650	0 0	720 1,520	95 315	0 200	0 660	720 2,370	95 975
6. Near-Term Adjacent Development Underway by Others	0 650	0 0	0 1,520	0 315	0 200	0 660	0 2,370	0 975
7. Committed Walk-Access Development	0 650	500 500	0 1,520	0 315	0 200	0 720	0 2,370	500 1,475

Note: The lower number in each pair of numbers is a cumulative total.

TABLE 5-IX
ESTIMATED CAPITAL INVESTMENT ASSOCIATED WITH ECONOMIC DEVELOPMENT AT OR NEAR LRT STATIONS
(in millions of 1986 dollars)

Type of Development	East St. Louis	St. Louis City	St. Louis County	Total
1. Development Contingent on LRT	$ 17.8 17.8	$ 5.2 5.2	$ 0 0	$ 23.0 23.0
2. Near-Term Adjacent Development by LRT Authority	0 17.8	50.0 55.2	9.7 9.7	59.7 82.7
3. Long-Term Adjacent Development	32.5 50.3	10.7 65.9	59.3 69.0	102.5 185.2
4. Other Possible Walk-Access Development	25.8 76.1	281.8 347.7	39.3 108.3	346.9 532.1
5. Other Proposed Walk-Access Development	0 76.1	366.8 714.5	0 108.3	366.8 898.9
6. Near-Term Adjacent Development Underway by Others	0 76.1	91.4 805.9	0 108.3	91.4 990.3
7. Committed Walk-Access Development	64.0 140.1	5.8 811.7	0 108.3	69.8 1,060.1

Note: The lower number in each pair of numbers is a cumulative total.

TABLE 5-X
ESTIMATED NUMBER OF TEMPORARY AND PERMANENT JOBS ASSOCIATED WITH ECONOMIC DEVELOPMENT AT OR NEAR LRT STATIONS

Type of Development	East St. Louis		St. Louis City		St. Louis County		Total	
	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.
1. Development Contingent on LRT	226 226	645 645	66 66	320 320	0 0	0 0	292 292	965 965
2. Near-Term Adjacent Development by LRT Authority	0 226	0 645	635 701	2,000 2,320	123 123	200 200	758 1,050	2,200 3,165
3. Long-Term Adjacent Development	413 639	2,000 2,645	136 837	0 2,320	753 876	2,130 2,330	1,302 2,352	4,130 7,295
4. Other Possible Walk-Access Development	328 967	350 2,995	3,579 4,416	15,156 17,476	499 1,375	4,039 6,369	4,406 6,758	19,545 26,840
5. Other Proposed Walk-Access Development	0 967	0 2,995	4,658 9,074	18,893 36,369	0 1,375	0 6,369	4,658 11,416	18,893 45,733
6. Near-Term Adjacent Development Underway by Others	0 967	0 2,995	1,161 10,235	3,752 40,121	0 1,375	0 6,369	1,161 12,577	3,752 49,485
7. Committed Walk-Access Development	813 1,780	320 3,315	74 10,309	360 40,481	0 1,375	0 6,369	887 13,464	680 50,165

Note: The lower number in each pair of numbers is a cumulative total.

TABLE 5-XI
ESTIMATED ANNUAL TAX REVENUES ASSOCIATED WITH ECONOMIC DEVELOPMENT AT OR NEAR LRT STATIONS*
(In Thousands of 1986 Dollars)

Type of Development	East St. Louis	St. Louis City	St. Louis County
1. Development Contingent on LRT	$ 822.6 822.6	$ 115.2 115.2	$ 0 0
2. Near-Term Adjacent Development by LRT Authority	0 822.6	838.2 953.4	147.3 147.3
3. Long-Term Adjacent Development	1,510.6 2,333.2	72.4 1,025.8	1,095.9 1,243.2
4. Other Possible Walk-Access Development	1,186.1 3,519.3	4,528.1 5,553.9	731.2 1,974.4
5. Other Proposed Walk-Access Development	0 3,519.3	7,735.0 13,288.9	0 1,974.4
6. Near-Term Adjacent Development Underway by Others	0 3,519.3	938.0 14,226.9	0 1,974.4
7. Committed Walk-Access Development	2,940.6 6,459.9	90.0 14,316.9	0 1,974.4

Note: The lower number in each pair of numbers is a cumulative total.

*Includes revenues from real property, franchise, and municipal and transportation sales taxes, plus, in the city of St. Louis only, revenues from employee earnings, parking lot, hotel occupancy, and merchant license taxes.

retail space, 0.3 employees per hotel room, 2.77 employees per 1,000 square feet of entertainment space, and 1.97 employees per 1,000 square feet of manufacturing space.)

Table 5-XI provides an estimate of the annual tax revenues associated with the projects at a 2000 development level. It includes revenues from real property, franchise, municipal sales, transportation sales, and hotel occupancy taxes and, in the city of St. Louis only, revenues from employee earnings taxes, parking lot taxes, and merchants license fees. (Excluded from the calculations are revenues which will accrue in some of the geographic areas listed from personal property and corporate earnings taxes, liquor and restaurant license fees, and restaurant gross receipts taxes.)

For data shown in Tables 5-VII through 5-XI emphasis should be placed on column entries for individual jurisdictions. The column entries estimate the specific impact on particular jurisdictions. The row totals must be interpreted with care because they include both refocusing of development and whatever net growth may occur.

The entries in Tables 5-VII through 5-XI include three Type 1 developments that will be constructed only if LRT is built. Tables 5-VII through 5-XI include projects that are likely to be attracted to the corridor if LRT is built, including Type 2, 3, and 4 development projects. (These projects may be built with development dollars that would have otherwise been spent elsewhere in the region, or some might be new dollars attracted from outside the region, given, for example, the growing national interest in the development potential in downtown St. Louis.) By stimulating these Type 1, 2, 3, and 4 projects, EWGCC estimates that LRT will potentially attract $532.1 million in development involving 6,758 construction jobs and 26,840 permanent jobs.

In addition, Tables 5-VII through 5-XI include projects that will probably or definitely occur, even if LRT is not built. Many of these latter projects (Types 5, 6, and 7) are expected to generate additional retail sales or secure faster lease-up as a result of LRT. Similarly, the enhanced attractiveness of competitively-marketed corridor office space may be expected to cause that space to be absorbed faster. This increased rate of office absorption in the corridor will allow economic benefits to accrue sooner to both the public and the private sector, which will contribute to the growth in the local economy.

While estimates of LRT's effect on the convention market in St. Louis are difficult to quantify, such a system will improve St. Louis' convention/tourism package, for example, by directly connecting the Cervantes Convention and Exhibition Center with Kiel Auditorium and by increasing the number of hotel rooms which are readily accessible to the Convention Center, thus increasing the size and number of conventions which can be attracted to St. Louis. It will enhance the tourism package available by directly connecting St. Louis Union Station, St. Louis Centre, Laclede's Landing, the Admiral, the Gateway Arch, and the proposed east side riverfront park, museum, and festival complex. If LRT improves St. Louis' tourism/convention package sufficiently to increase the Convention and Visitors Bureau 1985 convention delegate expenditures by five percent, EWGCC estimates that LRT will bring $8.45 million of direct expenditures annually from outside the region into the local economy.

e. Impact on Public Services

Limited additional public-sector investment costs in the form of infrastructure, such as sidewalk improvements, are expected to be needed in the city of St. Louis, for example, to accommodate the new growth associated with LRT. Similarly, additional traffic policemen may be needed during construction. These costs are the typical public-sector incentives that are offered in order to secure the earnings, sales, hotel, and other tax revenues needed for the city to be able to provide the full package of urban services. The city of St. Louis expects a greater return from the development than will be required in up-front public-sector costs.

f. Employment Impacts of Construction and Operation

1) Construction. Construction-related activities will create direct employment in the metropolitan area. Table 5-XII summarizes the construction-related employment effects of each alternative,

expressed in man-years of construction employment. Because construction employment is directly related to the total construction expenditures associated with each alternative, TSM will produce the fewest man-years of construction employment and building the full LRT alignment will produce the most.

The direct employment associated with construction will contribute to non-construction-related employment opportunities as construction employees spend part of their salaries for local goods and services. This indirect employment is said to be generated through the "multiplier effect" of the original capital expenditures. The employment multiplier value for the St. Louis SMSA is estimated at 2.0. Thus, for every construction job created, one additional job will be generated locally. The sum of the direct and indirect employment is termed total employment and is shown in Table 5-XII.

2) Operations and Maintenance. Permanent employment opportunities will result from operating and maintaining the facilities associated with the various alternatives. Table 5-XIII presents permanent employment positions for each alternative under the two operating scenarios. In general, scenario one will result in more employment under some alternatives, than scenario two, because of an overlap or redundancy of job functions associated with operating two separate systems. All alternatives will increase permanent employment opportunities beyond no-action employment levels.

Just as the construction phase of any of the alternatives will provide indirect employment gains, the permanent employment associated with operating and maintaining any of the build alternatives will also generate indirect employment opportunities. This indirect employment represents those jobs created by increased activity throughout the local economy from operating and maintaining a transit system. These job increases do not include local employment generated by new business activity (e.g., from joint development) that will occur as a result of the transit improvements. This latter source of employment is discussed in the preceding section. A permanent employment multiplier of 2.0 was also used to derive the total employment associated with the creation of permanent operations and maintenance jobs.

TABLE 5-XII
CONSTRUCTION PHASE
EMPLOYMENT IMPACTS
(in man-years of construction-related employment)

	Alternatives				
			Intermediate-Length LRT		
Employment	2 TSM	3 LRT	3a	3b	3c
Direct	82	2,594	1,301	1,522	1,855
Total	164	5,188	2,602	3,044	3,710

TABLE 5-XIII
OPERATIONS PHASE
EMPLOYMENT IMPACTS

	Alternatives					
				Intermediate-Length LRT		
Employment	1 No-Action	2 TSM	3 LRT	3a	3b	3c
Scenario 1:*						
Direct	2,000	2,043	2,089	2,144	2,141	2,133
Total	4,000	4,086	4,198	4,288	4,282	4,266
Scenario 2:*						
Direct	2,000	2,043	2,065	2,120	2,117	2,109
Total	4,000	4,086	4,148	4,240	4,234	4,218

*Scenario 1 provides for separate bus and LRT operating companies. Scenario 2 assumes Bi-State will operate both the bus system and LRT.

5.2 DISPLACEMENTS AND RELOCATION OF EXISTING USES

a. Displacements

The preferred (LRT) alternative will require displacing nine occupied, moderate-income, single-family dwelling units near the North Hanley station plus one lessee on Eighth Street and two small businesses and four small parking lot operations near the Kiel station. The intermediate-length LRT alternatives will avoid the residential displacements, but not the commercial displacements. Table 5-XIV summarizes the displacements for each of the alternatives. A number of full and partial parcel acquisitions, involving unimproved or vacant land, or land used for surface parking, will also be required.

The displacements will occur along the alignment in East St. Louis, in the vicinity of six LRT stations (Eighth & Pine, Stadium, Kiel, Grand, UMSL-North, and North Hanley), and along I-70.

1) <u>East St. Louis</u>. Ten full acquisitions totaling about 2.8 acres, and three partial acquisitions consisting of about two-thirds of an acre will be required in East St. Louis. None of these will result in the acquisition of any buildings.

The primary impact of property acquisition in East St. Louis will be the displacement of a parking lot bounded by an alley paralleling Missouri, Fifth, Division, and Fourth Streets. This area, which will be utilized for a park-n-ride lot, consists of six parcels with four individual owners and comprises approximately 2.5 acres. St. Clair County owns one-half acre of this parking area.

The remaining acquisitions in East St. Louis entail property required for LRT right-of-way. A total of seven parcels, four requiring complete acquisition and three which will entail only partial purchase, will be acquired. These properties are vacant undeveloped tracts; buildings on the three partial acquisitions will not be affected by the proposed alignment. The city of East St. Louis owns two-tenths of an acre of this vacant land.

2) <u>Eighth & Pine</u>. A small wig shop which leases space in the Wright Building will be displaced to provide access to the Eighth & Pine subway station.

TABLE 5-XIV
SUMMARY OF DISPLACEMENTS

	No-Action	2 TSM	3 LRT/Bus Shuttle	3a LRT (CWE)	3b LRT (Delmar)	3c LRT (UMSL-South)
Single-Family Dwelling Units	0	0	9	0	0	0
Lessee (Wig Shop)	0	0	1	1	1	1
Small Businesses (Foam Fabricators-partial and bar/restaurant)	0	0	2	2	2	2
Surface Parking Lot Operations	0	0	4	4	4	4

3) Stadium. A one-third-acre portion of Washington University's Cupples land holding will be required to build the Stadium LRT station.

4) Kiel. Property acquisition in the vicinity of the Kiel Station will entail the purchase of 11 full parcels and two additional partial takings along Fourteenth and Clark streets. The displacements involve taking two buildings and four parking lot operations, three of which have on-site attendants and one of which is a 24-hour slot payment operation.

Five parcels under three separate owners comprising about one and a half acres will be acquired along the west block face of Fourteenth Street at the Kiel station, along with one partial property acquisition. These acquisitions will result in the displacement of two surface parking lot operations with a total of about 275 parking spaces. The one operation has an on-site parking fee collector who works at this lot as well as other nearby lots unaffected by LRT, and the other operation is a 24-hour slot payment operation connected with other lots in downtown St. Louis. The partial taking will involve acquiring a small surface parking area at the rear of a building housing a restaurant and bar, which will not be acquired.

Six parcels involving five separate owners and about one and a half acres will be acquired along the south block face of Clark Avenue at the Kiel station, along with one partial property acquisition. The partial acquisition will involve only the southwest corner of the property owned by Union Electric. A surface, commercial parking lot with approximately 81 spaces operated by an on-site attendant will be acquired along the Clark block face east of Fifteenth Street, along with a single-story, 7,500-square-foot, brick building, which is presently used as a warehouse and for light manufacturing/fabrication. This building, which has a small office area in front, warehouse space, and three loading docks, is estimated to house about five to ten full-time employees; it is part of the adjacent Foam Fabricators operation. A single-story, 2,700-square-foot, brick structure, presently divided into a bar and restaurant under single ownership (called Chad's Place), and approximately 45 surface parking spaces will be acquired along the Clark block face west of Fifteenth Street, along with two other surface parking lots with a total of about 50 spaces and a half-acre tractor trailer parking lot used by the U.S. Postal Service. Two of the three surface parking lots west of Fifteenth Street are part of the parking lot operation east of Fifteenth Street; they require a second attendant. The remaining lot, which is the smallest of all, is a separate operation maintained by a different on-site attendant.

5) Grand. Only two properties will be partially acquired in the area east of the Grand station. A part of the city of St. Louis outdoor storage area and a vacant, undeveloped, 2.7-acre strip along the edge of the Sigma Corporation facility will be acquired along the Mill Creek Valley rail yards between Jefferson and Compton.

6) UMSL-North. A total of 13 properties will be affected in the UMSL-North area. Of these, two will be totally displaced, while the remaining 11 will be subject to only partial acquisition. The two are vacant, undeveloped parcels located east of Lauderdale Drive immediately northwest of UMSL. A small strip will be acquired across the front yards of seven properties along Bellerive Drive and across the rear of three residential properties along the east side of Lauderdale Drive and at the edge of one other property at the end of Lauderdale Drive.

7) North Hanley. Three parcels at Geiger Road involving three single-family units plus about 11.4 acres involving six single-family units on Weldon Avenue will be completely acquired, and 3.5 acres from the Berkeley Manor Nursing Home will be purchased in the North Hanley area. The nine single-family residential structures are of frame construction with detached garages and range from roughly 750 to 1,200 square feet in size. The units on Geiger Road appear to be in relatively good condition, while the Weldon Avenue units appear to be in fair to poor condition. One of the units on Weldon Avenue is further improved as a dog kennel facility, which is a non-conforming use.

8) I-70. Five parcels will be partially acquired along the I-70 portion of the LRT alignment; no structures will be displaced.

b. Relocation

The owners of the two commercial structures and the nine single-family dwelling units, which will be displaced in order to accommodate the LRT system, will receive relocation assistance as discussed below. The remaining properties to be fully acquired are vacant in the case of the UMSL/I-70 area, or are surface parking lots, such as in the East St. Louis and Kiel segments of the alignment. Owners of these surface parking lots will be fully compensated, including receiving fair market value for their respective properties. The potential loss of parking will be partially mitigated by reestablishing a park-n-ride lot on the affected properties in East St. Louis, and by allowing parking on the surface lots impacted in the Kiel station area.

1) Commercial Relocations. Comparable, vacant space is available in the Arcade/Wright Buildings to accommodate the wig shop lessee, and relocation assistance will be made available for the lessee as needed. The owners of the 7,500-square-foot light manufacturing facility and a 4,000-square-foot bar and restaurant, which will be displaced by LRT, will be compensated, receiving fair market value for their property and related expenses as set forth under the 1970 Uniform Relocation Assistance and Real Property Acquisition Policies Act and any implementing regulations. As an alternative, the Act provides firms which qualify, the option of choosing a fixed relocation payment based on the firm's average annual net earnings. A number of downtown locations, both developed as well as awaiting development, are suitable for the relocation of both of these businesses. Also, a number of sources of assistance are available through various redevelopment and business development agencies to assist in their relocation.

2) Residential Relocations. A total of nine single-family residential units will be displaced in the North Hanley area. These units, which range in size from approximately 750 to 1,200 square feet, are typical of the style and price range of housing to the north, east, and west of the affected area, generally within the Normandy, Ritenour, and Ferguson-Florissant School Districts. Ample available housing exists in the general area to accommodate those residents who will be

displaced by LRT construction activities. A total of 56 units under $30,000 and 444 units between $30,000 and $50,000 in value were available for purchase within the three districts on June 17, 1986.

As in the case of the commercial relocations, each of the affected property owners will be compensated for the fair market value of his respective property and assisted in relocating. The rate of compensation will be sufficient to allow those who are displaced to relocate within the general geographical area.

c. Impacts During Construction

1) Effects. LRT construction will necessitate the acquisition of construction easements and the rerouting of traffic to facilitate building activities. The construction of retaining walls adjacent to the LRT right-of-way will require construction easements along Washington Avenue and Eighth Street, at the corner of Johnson and Belmont (two alleys), in the REA building and Union Station, and at Twenty-First Street, as well as near Florissant Road, across the UMSL-North campus, and along I-70. Building LRT may create some minor inconvenience for commercial entities, as well as for pedestrians and motorists who will be rerouted around LRT construction activities, primarily in the downtown area, where extensive new construction in recent years has generated an expectation that such conditions are "normal." (See also the Chapter 4 discussion on road closures.)

2) Mitigation Measures. Press releases and on-site signage will be used to alert the public to changes in circulation, which will be coordinated with building owners and tenants as well as with street and highway departments, as appropriate.

d. Utility Relocations and Mitigation Measures

1) Relocations. Building the LRT line will require altering a number of utility lines, including sewer, water, gas, electric, telephone, steam, communication, and lighting lines. The communication lines include police and fire alarm connections as well as a telephone company fiber optics cable located on Eads Bridge and in the Washington Avenue/Eighth Street tunnel connecting with the bridge. The lighting lines include service to street lighting and airport approach lights.

The greatest concentrations of utility relocations will occur in the St. Louis Centre, Eighth & Pine, Kiel, and Union Station LRT station areas. The only relocation required beyond the immediate project limits is the relocation of a 42-inch sewer around the Wainwright State Office Building (bounded by Pine, Seventh, Chestnut, and Eighth Streets) to provide access to the Eighth & Pine station.

2) Mitigation Measures. All utility relocations will be closely coordinated with each utility company to protect their lines during construction and to minimize any disruption in service which might result from relocation. Relocation of the sewer line around the Wainwright State Office Building will be accomplished sequentially in advance of developing LRT station access where the present sewer is located. Access to the state offices will not be adversely affected because the building has a central courtyard and interior circulation system which is accessible from all four block faces of the building complex.

5.3 NEIGHBORHOODS

a. Effects

The LRT alternative will not create barriers to social interaction in residential neighborhoods because the LRT alignment is located along or within existing limited-access or generally heavily-traveled road or rail rights-of-way, or where it will form the dividing line between a residential area and a different land use. Existing pedestrian/bicycle crossings of these road and rail rights-of-way will be maintained; (jay-walking is illegal in the study area and occurs only infrequently on most guideway-alignment streets).

1) Normandy Area. Encroachment on the front yards of Bellerive Drive houses resulting from LRT construction should not adversely affect the small residential area to the north of Bellerive Drive, because the Bellerive Drive housing is at the edge of this residential area, is at a significantly different (higher) elevation than the rest of the area, and already faces the edge of a different land use (an UMSL surface parking lot, Blue Metal Building, and parking garage).

2) Carsonville Area. Similarly, the LRT displacement of three dwelling units on Geiger Road should not adversely affect the Geiger Road residential area because the LRT alignment falls on the dividing line between Cool Valley/Normandy and unincorporated St. Louis County (Carsonville). Multi-family housing and a nursery with limited numbers of single-family dwelling units lie on the Cool Valley/ Normandy side of the line whereas only single-family housing is located in this part of unincorporated St. Louis County. The protected at-grade LRT crossing of Geiger Road should not limit pedestrian or vehicular accessibility within the area. Removing the six houses on Weldon Avenue, which are all the houses on this street which faces I-70, will not adversely affect the integrity of the adjacent residential area to the south.

Comments raised in Alternatives Analysis-stage community meetings suggested some concern that LRT will lead to an increase in neighborhood crime. However, there is no known correlation between improved transit service and neighborhood crime.

Development associated with LRT stations is not expected to be a problem in residential neighborhoods. Noise and vibration, visual and aesthetic, air quality, and historic property effects in residential areas are discussed in other parts of this chapter.

b. Mitigation Measures

The LRT alternative is not expected to result in any special safety or security problems. Should any fencing be deemed appropriate along the LRT alignment, its height, opacity, and other salient features will be coordinated with the respective municipal officials and neighborhood organizations during final design to avoid adverse safety or security repercussions on adjacent land use activities. Open-air design, lighting, closed-circuit television monitoring, and roving security personnel are among the measures which will be used, as appropriate, to make the LRT vehicles, stations, and park-n-ride lots safe.

A comprehensive station area master planning program has been prepared to ensure compatible development at appropriate locations. Zoning and subdivision regulations that are already in place are expected to be adequate to control development.

5.4 VISUAL AND AESTHETIC

a. Effects

Much of the light rail alignment will be located in industrial areas, or in cut or behind existing earth berms where it will lie adjacent to parkland (e.g., Forest Park) or residential areas (e.g., between Union and Delmar and along I-70). East of I-70/55 in the East St. Louis CBD, at Fourteenth and Clark streets in downtown St. Louis, and at Bellerive Drive and Geiger Road in the Normandy area, the LRT alignment will be plainly visible and should be as attractive as possible to relate well with existing and future development.

b. Mitigation Measures

Ultra-light catenary trolley wire or direct suspension trolley wire will be considered in final design to reduce the extent of overhead wiring. These methods normally require closer pole spacing, so a final decision on their site effectiveness will depend on a detailed design. Integrating the supporting poles into the final station designs will also affect the decision on the best solution at a particular location. Custom-designed catenary-support poles or special finishes could be incorporated into final design plans where such poles will be particularly noticeable.

Landscaping offers a significant opportunity for enhancing the attractiveness of the LRT facilities and will be incorporated as a part of station designs, the park-n-ride lot layouts (particularly on their peripheries adjacent to residential and institutional land uses), and along the part of the LRT alignment cutting through the UMSL-North campus. Trees and shrubs offering a full range of seasonal color will be specified in final landscape plans.

Special consideration will be given in final design to station plans, to the elevated structure which will cross East Campus Drive at the north edge of the UMSL campus so that it is compatible with the UMSL-North station, and to the retaining walls visible from the UMSL playing fields. Also, special consideration will be given in final design to the highly visible I-70/I-170-area LRT bridge structures to make them attractive to passing motorists, in order to enhance LRT's image in the community.

5.5 AIR QUALITY

a. Regionwide Analysis

Implementing the LRT alternative will reduce auto vehicle miles traveled compared with the no-action alternative, such that LRT will result in a small, but beneficial change in regional air quality. LRT will result in an estimated 0.33 percent reduction in total regional miles traveled, which will yield a reduction in hydrocarbon emissions of 500 pounds per day and a reduction in CO emissions of 7,000 pounds per day. Existing CO levels were not monitored in the project corridor because the LRT project will reduce CO levels. CO levels in the St. Louis region are on the decline as a result of newer, less-polluting vehicles and implementation of an inspection/maintenance program. CO does not persist in the atmosphere; it is readily converted to harmless carbon dioxide through natural processes in all but the most canyon-like downtown areas.

b. Microscale Carbon Monoxide Impacts

1) Line Sources. The operation of the proposed LRT system (Alternative 3) will not generate any air pollutant emissions. The LRT vehicles are electrically powered and result in no combustion related emissions. Further, the power plants at which the electrical energy will be produced are all subject to monitoring and permit requirements of both state and federal clean air legislation.

The TSM component of the LRT alternative will not result in any additional adverse impact on air quality. TSM improvements in the existing bus system will entail scheduling, realignment of routes, and general improvements in the system's operational efficiency; however, the maximum peak hour volume of buses will not be significantly increased over the volume presently in operation. Any addition in the volume of buses is too small to have a measurable impact on air quality.

2) Area Sources. The area sources most likely to generate carbon monoxide impacts are the park-n-ride lots associated with TSM and the LRT stations. A "worst-case" situation was selected to identify and estimate potential CO impacts at these lots. The worst case situation was considered to be a hypothetical sensitive receptor located within 50

feet of the park-n-ride lot with the greatest expected number of auto arrivals. If the National Ambient Air Quality Standards are met in this situation, they are asssumed to be met at all other park-n-ride lots.

The park-n-ride lot generating the greatest amount of auto traffic is the Northwest Park-n-Ride lot located in the northwest quadrant of I-70/I-170 interchange. A total of approximately 1,000 vehicles are projected to be using the lot at one time by the year 2000, with arrivals and departures spread over two-hour periods in the a.m. and p.m. peaks. Vehicles were conservatively assumed to operate in the lot for ten minutes prior to parking or departing. Meteorological conditions of air stability class D and wind speed of one meter per second from the direction that produced the highest concentration of CO were assumed for the worst-case condition.

CO concentrations under the worst-case conditions are predicted to be more than 50 percent below the national ambient air quality standards of 35 ppm for the peak hour and nine ppm for an eight-hour average at the Northwest Park-n-Ride lot, based on a similar worst-case study completed in September 1982 for Chicago's Southwest Transit Corridor using a model of air pollutant dispersion. Since no other park-n-ride lot is expected to have even a quarter of the patronage expected at the Northwest Park-n-Ride lot (and CO concentrations near the lots are proportional to auto volumes, other factors being equal) and no sensitive receptors are located nearer than 50 feet to any of the lots, CO air quality standards are not expected to be exceeded at any of the lots.

c. Impacts During Construction

Three principal categories of air quality impacts are expected during construction:

- o emissions of particulates and oxides of nitrogen from the operation of diesel-powered construction equipment;
- o a slight increase in CO and other pollutant emissions from vehicular traffic forced to decrease speed in the vicinity of construction zones; and

- o emissions of particulates in the form of fugitive dust from earthwork and demolition occurring at major guideway and parking lot construction areas.

Emissions from the first two categories are expected to have a negligible effect on ambient concentrations, because most construction activities will be relatively dispersed and of fairly short duration in most locations.

Fugitive dust from exposed soil will constitute the most significant air quality impact during construction; however, its effect on regional particulate levels will be minor and of short duration. Although generally related to the quantity of earthwork, particulate emissions also depend on the area of disturbed soil, the amount of vehicle activity, the soil moisture level, and wind speed. An estimated 1,092,000 cubic yards of earth are expected to be moved during construction of the LRT system and supporting facilities. The amount of earthwork required to be moved during construction will be widely distributed, so that fugitive dust will be only a minor nuisance in any one location.

d. Conformity with the State Implementation Plan

EWGCC, the region's lead air quality planning agency, has determined that pursuing the preferred alternative will conform with the State Implementation Plan. The LRT alternative will contribute directly to meeting the pollution reduction strategies identified in the 1981 Transportation Control Measure documentation submitted to EPA as a revision to the Missouri and Illinois State Implementation Plans.

e. Mitigation Measures

A number of approaches for improving the air quality of the region are presently underway, including transportation control measures, use of less polluting vehicles, and an inspection/maintenance program for vehicles. LRT coupled with TSM improvements will further aid in reducing adverse air quality impacts in the St. Louis metro area.

Mitigation of adverse impacts from total suspended particulates will be required during the construction phase of the light rail system. A number of mitigation measures are available to control fugitive dust and suspended particulates. Mitigation measures anticipated to be employed will include sprinkling exposed soils with water, providing washing stations for construction vehicles leaving the work sites, requiring haul trucks to cover their respective loads while in transit, and utilization of street cleaning equipment on thoroughfares accessing the construction sites. Finally, all construction sites will be replanted with an appropriate ground cover and mulched to minimize the extent of time these areas are susceptible to blowing. All of the aforementioned measures will be investigated on a case-by-case basis to ensure that individual contractors successfully reduce fugitive dust.

5.6 NOISE AND VIBRATION

a. Summary of Methods

Potential noise impacts were evaluated along the length of the LRT alignment. The parameters evaluated were the maximum passby noise, L_{max}, and the peak hour equivalent sound level, L_{eq}. These projected parameters were compared with guidelines developed by the American Public Transit Association (APTA) and the Urban Mass Transportation Administration (UMTA). Noise parameters and guidelines are discussed in Chapter 3.6.

Projections of maximum passby noise and peak and off-peak hour equivalent noise levels for LRT vehicles are based on research performed for the Calgary LRT system (Calgary LRT Noise and Vibration Assessment, Bolt Beranek & Newman, December 1978). This research developed calibrated models for the Edmonton LRT system's Siemens-DuWag vehicle, which has been adopted as the design standard LRT vehicle for this study. Maximum passby wayside noise generated by a car on tie-and-ballast, continuous-welded tangent track at 40 mph (64 kph) will not exceed 75 dBA at 50 feet (15.2 meters) from the track centerline, according to the design standards set for the St. Louis vehicle purchase.

Equations were developed based on measurements of the Edmonton vehicles in actual revenue service that relate the maximum passby noise and the peak and off-peak hour equivalent noise levels to the speed of the vehicles, the number of vehicles per hour, and the distance from the centerline of the track to the receiver. These equations are calibrated in metric units and are based on operating single LRT vehicles on new welded rail with tie and ballast trackbed, and no air or ground attenuation. Jointed rail will be used in a few curved sections of the LRT alignment, but this condition does not occur where noise projections were made. Speeds were assumed to be equal to the design speed of each particular track segment. In actual practice, speeds (and the resulting noise levels) will often be lower because the LRT vehicle will be stopping at stations and intersecting streets.

To further refine the initial models, adjustment factors were included to permit modeling the effect of two-car trains (based on the Calgary experience), and air and ground attenuation (based on the U.S. Transportation System Center's September 1978 "Prediction and Control of Noise and Vibration in Rail Transit Systems"). Off-peak-hour traffic projections and one-car train consists were used for nighttime L_{max} modeling conditions, while peak hour traffic projections and an equal split of one- and two-car consists were used for the L_{eq} analysis.

Wheel-rail interaction is the principal noise source for electric transit vehicles at speeds up to 50 mph (80 km/hr), which is approximately the maximum design speed along any segment of the LRT system. The source height for this study is therefore assumed to be equal to the elevation of the top of the rail. Some increase in noise levels may occur on small radius curves, but, because of the resilient wheels which will be used on the LRT vehicles, this effect is expected to be slight (based on the Calgary experience).

b. Estimated Noise Levels

Projections of noise impacts along each LRT segment with noise sensitive receptors are presented in Tables 5-XV, XVI, and XVII. Adjoining land uses and the distance to the nearest sensitive receptor are identified for each segment of the proposed alignment in Table 5-XV, along with the APTA guidelines for maximum airborne noise for the respective land uses. The APTA guidelines are applied to nighttime operations because the sensitivity to noise is generally greater at night than during daytime hours when most ambient noise levels are higher. As stated in APTA's 1981 Guidelines for Design of Rail Transit

TABLE XV
PROJECTED MAXIMUM NOISE LEVELS WITH LRT AT POTENTIALLY SENSITIVE AREAS

Area Description	Land Use	Distance To Nearest Sensitive Receptor (m)	APTA Standard (L_{max} dBA)	L_{max} (dBA) At Sensitive Receptor	No. of Receptors at or Above APTA Standard
1. Central West End Station Vicinity	Commercial, Institutional	20	85	66.3	-
2. Union Blvd. - North of LRT	Residential	30	80	73.1	-
3. Union - DeBaliviere Area - North of LRT	Residential	23	80	76.0	-
4. DeBaliviere - Delmar Area Both Sides of LRT	Residential	33	75	76.8	27
5. Delmar Station North	Residential	23	75	78.6	3
6. St. Vincent Park	Park	30	70	77.3	-
7. Bellerive Drive	Residential	18	75	74.7	-
8. Bellerive Bird Sanctuary	Park	10	70	74.8	-
9. Geiger Road	Residential	8	75	73.4	-
10. N. Hanley Road	Residential	18	80	63.1	-
11. Annie Drive	Residential	33	75	76.8	1
12. Springdale Drive	Residential	16	75	80.3	5

TABLE XVI
PROJECTED PEAK-HOUR AVERAGE (L_{eq}) NOISE LEVELS WITH LRT AT POTENTIALLY SENSITIVE AREAS

	Area Description	Adjoining Land Use	Ambient	Projected LRT Noise	Combined Noise Level	Increase
1.	Central West End Station Vicinity	Commercial Industrial	60.4	56.3	61.8	1.4
2.	Union Blvd. - North of LRT	Residential	61.7	59.7	63.8	2.1
3.	Union - DeBaliviere Area - North of LRT	Residential	61.7	62.0	64.9	3.2
4.	DeBaliviere - Delmar Area Both Sides of LRT	Residential	61.7	61.8	64.8	3.1
5.	Delmar Station North	Residential	60.7	60.6	63.7	3.0
6.	St. Vincent Park	Park	56.4	59.3	61.1	4.7
7.	Bellerive Drive	Residential	66.2	58.7	66.9	0.7
8.	Bellerive Bird Sanctuary	Park	67.5	59.7	68.2	0.7
9.	Geiger Road	Residential	65.4	59.3	66.4	1.0
10.	N. Hanley Road	Residential	67.2	51.5	67.3	0.1
11.	Annie Drive	Residential	69.7	58.8	70.0	0.3
12.	Springdale Drive	Residential	69.7	62.3	70.4	0.7

NOTE: Experience indicates that an increase in ambient noise of less than 3 dBA is generally not perceptible.

TABLE XVII
PROJECTED OFF-PEAK-HOUR AVERAGE (L_{eq}) NOISE LEVELS WITH LRT AT POTENTIALLY SENSITIVE AREAS

	Area Description	Adjoining Land Use	Ambient	Projected LRT Noise	Combined Noise Level	Increase
1.	Central West End Station Vicinity	Commercial Industrial	61.5	46.7	61.6	0.1
2.	Union Blvd. - North of LRT	Residential	62.2	50.2	62.5	0.3
3.	Union - DeBaliviere Area - North of LRT	Residential	62.2	52.4	62.6	0.4
4.	DeBaliviere - Delmar Area Both Sides of LRT	Residential	62.2	52.3	62.6	0.4
5.	Delmar Station North	Residential	56.4	54.0	58.4	2.0
6.	St. Vincent Park	Park	56.4	56.1	59.3	2.9
7.	Bellerive Drive	Residential	76.2	52.1	76.2	0
8.	Bellerive Bird Sanctuary	Park	67.5	53.2	67.7	0.2
9.	Geiger Road	Residential	70.1	52.7	70.2	0.1
10.	N. Hanley Road	Residential	62.9	44.9	63.0	0.1
11.	Annie Drive	Residential	69.6	52.3	69.7	0.1
12.	Springdale Drive	Residential	69.6	55.8	69.8	0.2

Facilities, "Because of the transient nature of train noise, community acceptance should be expected if the noise levels do not exceed these guidelines at night at the affected buildings or use areas." APTA guidelines for all land uses are given in Chapter 3, Section 3.6 Noise and Vibration.

Table 5-XV shows six areas where the model projects that maximum passby noise levels will exceed the APTA guidelines. In actuality, vehicle speeds will often be below the maximum design speed, particularly in the vicinity of stations. Incidental screening by garages, fences, vegetation, and embankments will also reduce the noise below the levels projected by 5-10 dBA in many areas. (See for example, Environmental Analysis of Transportation Systems by Louis F. Cohn and Gary R. McVoy, 1982, pp. 169-172.)

Tables XVI and XVII show the relative impact of the LRT noise on average noise levels during peak periods when LRT noise is at its highest and during evening hours when residents' sensitivity to noise is greatest. In each case, the projected average noise level generated by LRT was combined with the ambient noise level, and the expected increase in average noise levels is shown. High ambient noise levels resulting from Lambert Airport operations are a significant factor at the northwestern end of the alignment. In only one location, St. Vincent Park, is an increase of more than 4 dBA projected for average peak-hour noise levels; no off-peak average noise levels are expected to increase by as much as 3 dBA.

c. Mitigation Measures

Mitigation measures are considered for those locations where the APTA standards for maximum nighttime noise and the UMTA guidelines for relative average noise levels are exceeded. The following sections discuss mitigation considerations at locations where the guidelines are exceeded.

1) Along the N&W Tracks between DeBaliviere and Delmar. The APTA L_{max} impact standard in this residential area is 75 dBA. Projected noise levels are expected to be 78.7 dBA (L_{max}) at the nearest sensitive receptor, some 60 feet from the near track. Fewer than five receptors are located this close to the alignment. Nearly all of the remaining 22

buildings that will be impacted are at a distance of 100 feet (33 meters), where the projected maximum nighttime passby noise is 76.8 dBA. A total of approximately 27 residential buildings will have peak noise levels slightly above the APTA guideline at second floor bedrooms, although nearly all of these units are shielded on the first floor by the cut section of the track alignment. Most of the affected structures are at the outside limit of the impact zone and have been included in the analysis to ensure that the "worst case" situation is addressed. To reduce maximum passby noise to APTA guidelines, a five-foot-high noise barrier would have to be constructed at the crest of the cut section 900 feet on the north side of the LRT right-of-way (500 feet to the east of Waterman and 400 feet to the west), and 1,400 feet on the south side of the LRT right-of-way (900 feet to the east of Waterman and 500 feet to the west). This noise mitigation measure would be reasonable if ambient nighttime L_{max} readings were low (i.e., 65-75 dBA), but in fact this is a noisy urban environment. Four of the six ambient nighttime L_{max} readings exceed 75 dBA. (Five-minute L_{max} ambient nighttime readings of 77.3, 76.7, 83.5, 75.5, 74.2 and 66.7 dBA were recorded in this area between 7:25 and 8:00 p.m.) Even if a barrier were constructed to reduce LRT noise, ambient noise levels will still exceed the 75 dBA APTA guideline. Also, the projected increases in both peak and off-peak period average noise levels do not exceed the UMTA guidelines for significant impacts. Under these circumstances and given the substantial costs (about a quarter of a million dollars) for the minor additional noise attenuation that might be achieved, no noise attenuation measures are programmed at this location.

2) Along Hodiamont Avenue, North of Delmar. The L_{max} noise level for adjoining residences is projected to be 78.6 dBA at the 55 mph (87 kph) top speed. However, the LRT vehicles will be traveling at less than top speed within 600 feet of the Delmar station, because of the need to stop at the station under almost all conditions. A 15 mph speed reduction would be required to meet the 75 dBA APTA guideline under all conditions, or a 1,200-foot noise wall, about five feet high, would be required along the west side of Hodiamont Avenue to provide the necessary peak level noise reductions. However, a review of nighttime

ambient L_{max} readings for this area suggests that this is not a reasonable course of action. All ambient nighttime L_{max} readings exceed the 75 dBA APTA standard, and four of the six readings exceed 80 dBA. (L_{max} five-minute readings were taken for this area between 8:19 and 8:54 p.m. and were 85.4, 85.3, 80.4, 75.5, 80.3, and 76.8 dBA.) Neither peak-hour nor off-peak average noise levels are expected to increase significantly with the introduction of LRT. Considering the small difference between the projected L_{max} and the APTA guideline, the small number of affected residences, the high ambient nighttime L_{max} readings, and the insignificant increases in average noise levels, it is reasonable to conclude that no special noise attenuation measures are appropriate at this location.

3) Along the N&W Tracks at St. Vincent Park. Projected noise levels along the eastern park edge (100 feet from edge of rail or about 67 feet into the park) exceed the APTA guideline by about 7 dBA. The area of the park that falls within the 70 dBA L_{max} impact standard is confined to a seldom-used 100-foot-wide linear band along the eastern edge of the park, see Figure 20. The section of affected park is only partially developed at this time. A nature study trail passes a point which is within 100 feet of the LRT right-of-way in the north part of the park, and a lake has been proposed near the LRT line at the south end of the park. The nearest intensively used park facility is the picnic area some 300 to 400 feet from the LRT line.

Off-peak average noise levels are projected to increase by less than 3 dBA and peak-hour average noise levels by 4.7 dBA. These projections are based on worst-case conditions, assuming no screening. Also, they are based on ambient readings which do not reflect runway 12R departures which average 10,000 per year; this runway was not in use at the times the ambient readings were taken. Given the relatively dense vegetation in this portion of the park, LRT noise levels will likely be reduced in this location, essentially eliminating any increase in average noise levels. Given the real ambient conditions, increases in combined noise levels will not exceed APTA guidelines.

St. Vincent Park

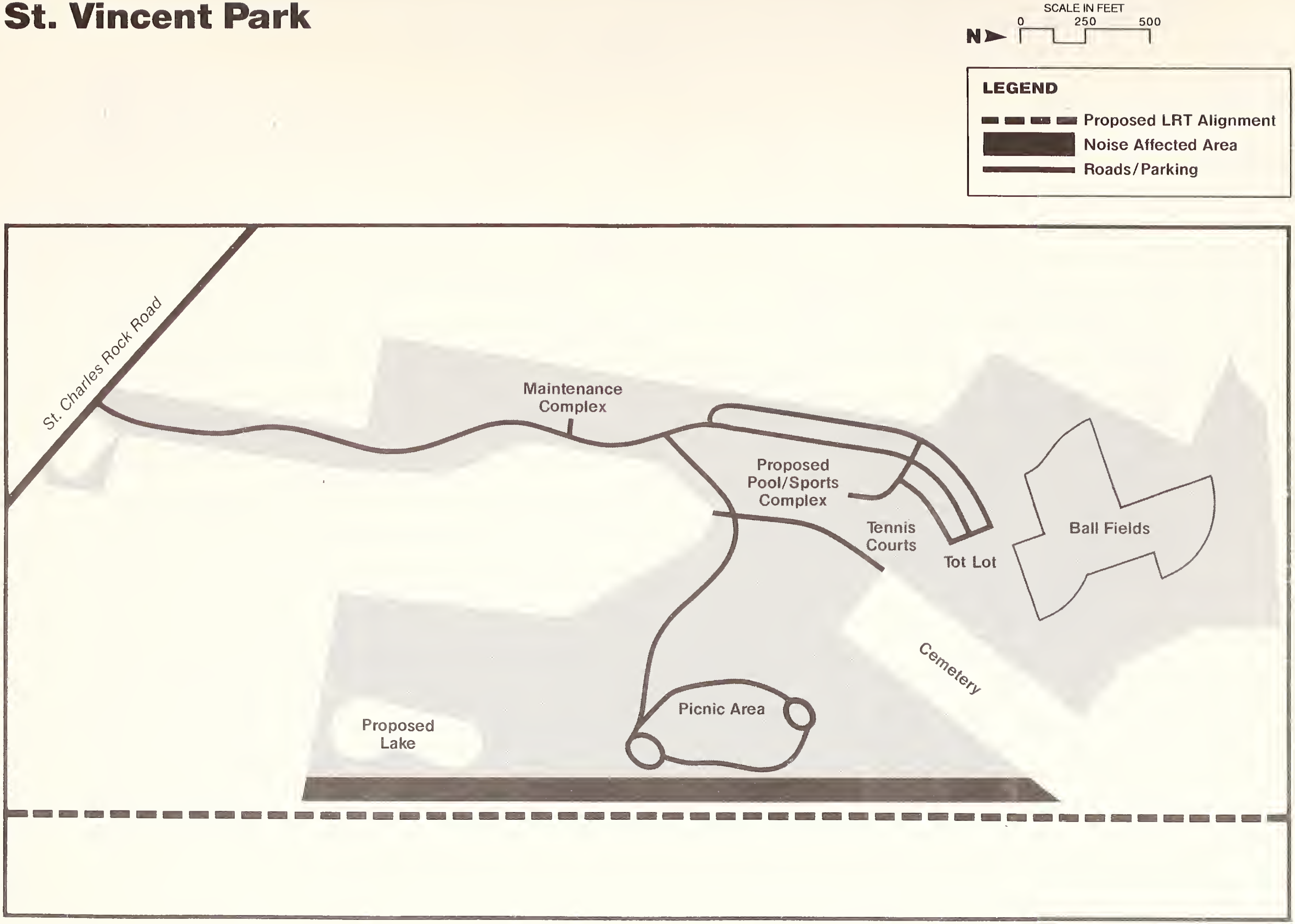


Figure 20

An earth berm noise barrier would not be appropriate to reduce noise in that part of the park exceeding the APTA noise guideline, because an approximately 40-foot-wide, 4,000-foot-long stretch of tree cover would have to be removed and a stream would have to be rechanneled for a distance of about 600 feet. In order to reduce the LRT L_{max} noise level in the affected area to below the 70 dBA APTA guideline, a five-feet-high, 4,000-foot-long noise wall would be required at a cost of over $400,000. This is not a prudent course of action because almost all park facilities and activities are located beyond the 70 dBA impact line and ambient readings generally exceed APTA noise standards in these actively-used parts of the park. At the request of the St. Louis County Parks Director coniferous trees will be planted in the park along the rail line, especially in the open area near the proposed lake, in order to mitigate the project's effects on the parkland. (See Appendix I.) About 650 four-to-six-foot trees generally on 12-foot centers, field adjusted as necessary, will be planted. The proposed plant list involves 40 percent Black Hills Spruce (picea glauca 'densata'), 40 percent Austrian Pine (pinus nigra), and 20 percent White Pine (pinus strobus).

4) Village of Bellerive Bird Sanctuary. The projected L_{max} noise will be about 5 dBA above the APTA noise impact guideline of 70 dBA. This projected noise level will affect about two-tenths of an acre (one percent) of the 22-acre bird sanctuary at the farthest extremity of the site, which is not open to the general public, see Figure 21. Ambient daytime L_{max} readings in this area regularly exceed 80 dBA (six of 12 five-minute readings), and almost all (10 of 12 readings) exceed 70 dBA. LRT will generate no perceptible increase in peak or off-peak average noise levels. Therefore, no special noise mitigation measures will be provided at this location. (Chapter 3.10 Parklands provides additional information on the site.)

5) Along I-70 Between North Hanley and Springdale Drive. The L_{max} noise level for one house on Annie Drive will exceed the APTA impact guideline. This house already experiences considerable noise from I-70 and Lambert Airport traffic. Both peak and off-peak LRT

Bellerive Bird Sanctuary

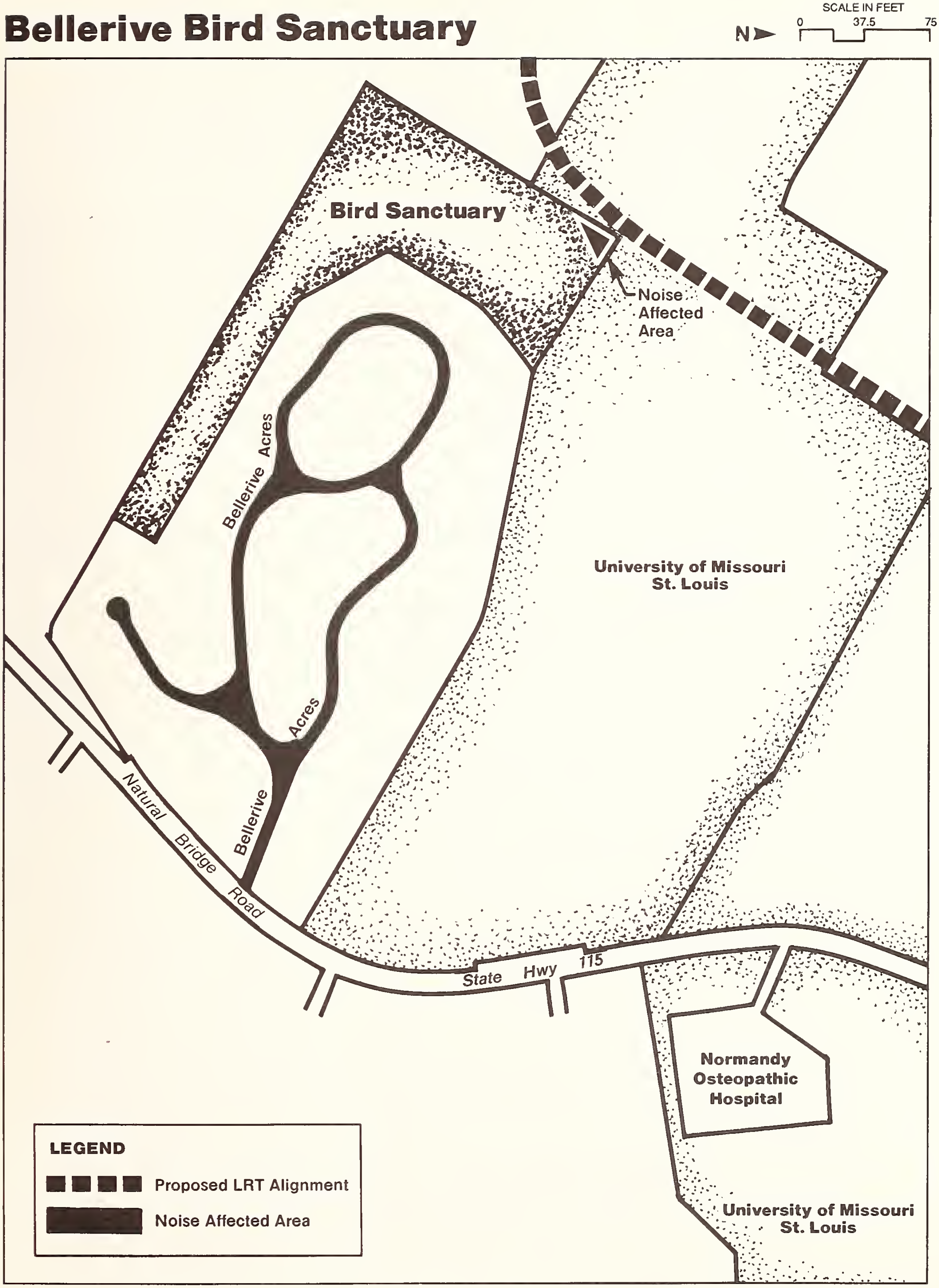


Figure 21

average noise levels are lower than ambient levels and will cause no significant increase. Therefore, LRT noise attenuation would not be of any benefit at this location.

6) Along I-70 in the Vicinity of Springdale Drive. Noise from nighttime LRT operations will produce an L_{max} of 80.3 at the nearest sensitive receptor and will adversely affect a total of five residences. Given the proximity of the affected houses to the heavy traffic flows on I-70, and because of their location directly beneath a major Lambert Airport approach path, ambient noise levels are already high, and, in fact, considerably above the LRT-generated noise levels. Projected average LRT noise levels are lower than ambient levels in both the peak and off-peak periods, as shown in Tables XVI and XVII. Accordingly, LRT-generated noise will not materially affect ambient noise conditions, and thus, LRT noise attenuation measures are not programmed at this location.

d. Noise Impacts During Construction and Mitigation Measures

1) Construction Noise Impacts. Typical construction activities include earthmoving, compacting, concrete placement, paving, and, depending on specific soil characteristics and structural requirements, pile driving. Pile driving is anticipated at the Eads Bridge east approach structure, the UMSL-North structure, the Mark Twain Drive bridge, the structure near Geiger Road, the North Hanley Road bridge, the Springdale Drive bridge, the I-70/I-170 bridges, the McDonnell Boulevard bridge, and the elevated structure at the Airport LRT station. Noise levels at major construction areas will generally average 82-85 dBA at 50 feet from the site (based on the findings presented in the Chicago Southwest Transit Corridor AA/DEIS, September 1980), but could rise during pile driving to over 90 dBA within 200 feet of the site. Pile driving at any single location would probably occur for only a couple days, and only 25 to 30 single-family dwelling units along the LRT alignment are within 200 feet of areas where pile driving could be necessary.

2) Mitigation Measures. All construction activities creating significant noise in residential areas will be limited by construction specifications to normal daytime hours (7:00 a.m. to 7:00 p.m.).

Construction noise control measures for work in the vicinity of the hospital complex will be developed during final design in consultation with the city of St. Louis and the affected hospitals. Table 5-XVIII lists typical noise levels from construction equipment and possible mitigation measures.

e. Qualitative Discussion of Vibration

Along those segments of the proposed alignments that will use the existing N&W tracks, the present freight train operations already produce higher vibration levels than will be caused by LRT operations, although LRT will involve more frequent train movements than the present freight operations. Buildings in the medical-hospital complex immediately adjacent to the tracks presently experience no adverse impacts from ongoing freight operations; new buildings being developed adjacent to and over the tracks include design features to minimize vibration effects from rail operations.

Research data accumulated by the U.S. Bureau of Mines (Bulletin 656) and others indicate that it is most unlikely that vibration from traffic can crack plaster or otherwise damage structures on abutting property. In fact, it will be unusual to find abutting property where such vibrations can be felt even though the threshold for perception is much lower than the threshold for possible structural damage.

The vibration causing concern may be airborne instead of earthborne. Loose boards, windows or window panes may rattle because of the low frequency pulses from engine exhausts. Again, the chance for damage is very slight and the practical measure is to correct the defective mounting or fastener.

Measurements of the Edmonton LRT vehicles in actual operation at speeds up to 30 mph indicate that vibrations barely reach the level of human perception at a distance of 50 feet from the track, while at 100 feet, vibration is well below the level of human perception. Another study of LRT impacts completed in October 1982 for the Muni J Line Connection Project in San Francisco found vibration to be just at the level of human perception inside residences located 33 feet from the

TABLE 5-XVIII
CONSTRUCTION NOISE LEVELS AND SUGGESTED MITIGATING MEASURES

Type of Equipment	Typical Level in dBA at 50 ft	Level in dBA at 50 ft With Feasible Noise Control[1]	Type of Control Method[2]
Earthmoving			
Front Loader	79	75	AMB
Backhoes	85	75	AMB
Bulldozers	80	75	MB
Tractors	80	75	MB
Scrapers	88	80	M
Graders	85	75	M
Trucks	91	75	M
Pavers	89	80	M
Vibrators	76	75	MB
Materials Handling			
Concrete Mixer	85	75	MA
Crane	83	75	MA
Derrick	88	75	MA
Stationary			
Pumps	76	75	ABM
Generators	78	75	ABM
Compressors	61	75	ABM
Impact			
Pile Drivers	101	95	MB
Pavement Breakers	95	85	MB
Pneumatic Tools	86	80	MB

[1] Estimated levels obtainable by selecting quieter procedures or machines and implementing noise control features requiring no major redesign or extreme cost.

[2] A - Acoustic enclosure to reduce noise emission from casing.
M - Muffler on engine exhaust or pneumatic exhaust.
B - Barrier to screen nearby public from work-area noise.

Source: Alternatives Analysis/Draft Environmental Impact Statement for the Southwest Transit Corridor, U.S. DOT/UMTA, and City of Chicago Department of Public Works, September, 1982.

tracks. Vibration levels in St. Louis could vary somewhat from these values because of possible differences in the propagation characteristics of St. Louis soils; however, groundborne vibration levels may generally be expected to be imperceptible beyond approximately 50-75 feet from the proposed alignment. Consequently, no mitigation measures are planned.

5.7 ECOSYSTEMS

The LRT alignment traverses an urbanized area that has been settled, for the most part, for at least 100 years; no ecologically sensitive areas, including wetlands, remain in the study corridor. The study area is characterized by industrial, commercial, and residential development as well as scattered areas of green space such as lawns, parks, golf courses, and to a lesser extent, large tracts of institutional property. Even in these areas of green space, the natural ecosystems have been heavily impacted by a number of urban by-products: air pollution, pesticide over-use, erosion, and organic loading of streams from surface runoff. Thus, as a result of development as well as the secondary impacts of urbanization, wetlands and vulnerable ecosystems no longer exist along the proposed LRT alignment. The Missouri Department of Conservation has been consulted in this matter and concurs with this assessment.

a. Fish and Wildlife

The Missouri Department of Conservation and the United States Department of the Interior, Fish and Wildlife Service have been consulted on the potential effects on fish and wildlife in the study area. Both agencies have concluded that impact, if any, will be minimal because the project area is highly urbanized.

b. Vegetation

No major impact on any significant stand of vegetation is anticipated because of the urbanized nature of the LRT alignment and its supporting facilities.

The LRT alternative will use an existing rail corridor for much of its length, with the result that impacts on vegetation will be limited to the construction phase. This existing rail right-of-way is routinely brush hogged leaving all vegetation adjacent to the rail line cut to a height of 12 to 18 inches. Thus any impacts from LRT construction in this right-of-way will be minimal. Some vegetation loss will occur as a result of constructing park-n-ride lots. The LRT construction on both sides of the UMSL campus will require some minor clearing and pruning in small, isolated wooded areas to accommodate the elevated LRT alignment. The balance of the alignment on new right-of-way will entail the removal of grasses and some isolated trees. None of this loss is considered ecologically significant.

c. Mitigation Measures

The following mitigation measures will be employed, as appropriate, to minimize and mitigate any visual impact associated with the loss of vegetation during construction. Topsoil retention will be accommodated through the use of temporary erosion control measures including, but not limited to, staking straw bales to impede runoff, mulching, temporary terracing of hillsides, and proper grading practices. Stands of existing vegetation will be retained to the maximum extent possible. Finally, all disturbed areas will be promptly reseeded with native grasses and landscaped with a variety of trees and shrubs to minimize harm and restore the area to its previous condition.

5.8 WATER

a. Water Quality

Construction activity in the vicinity of stream crossings will cause some minor stream sedimentation with a resulting temporary deterioration of water quality. Because these areas all lie within heavily urbanized areas, the extent of deterioration on the already impacted condition of these streams is not expected to result in a significant adverse impact on water quality. Further, sedimentation and turbidity conditions, if any, will be of short duration and will cease when construction is finished. Temporary turbidity will occur with the LRT alternative as a result of new track construction along the headwaters of River Des Peres between St. Charles Rock Road and Natural Bridge. In each case, soil erosion from bridge, roadway embankment, or track work may cause some minor, temporary deterioration of surface water quality. Eads Bridge work is not expected to have any effect on Mississippi River water quality.

b. Groundwater

None of the alternatives under consideration will affect the study area's groundwater recharge areas.

c. Floodplain Encroachment

None of the proposed LRT alignment or its associated facilities lie within a 100- or 500-year floodplain as established by the Federal Emergency Management Agency. Thus, there will be no encroachment on any floodplain nor will the LRT alternative directly or indirectly stimulate floodplain development or increase the risk of flooding.

d. Wetlands

No wetlands will be affected by the activities proposed along the LRT alignment or by its associated support facilities.

e. Dredge and Fill

No dredging or filling will be required to construct the proposed LRT system.

f. Mitigation Measures

Adverse impacts on surface water quality resulting from sedimentation and increased turbidity will be mitigated through erosion control measures. These will include utilizing hay bales, scattered straw, and contour grading as well as terracing and installing temporary dikes where topography and conditions warrant. Further, the prompt reestablishment of ground cover plant materials, such as crown vetch or fescue, will assist in minimizing post construction impacts.

5.9 ENERGY

a. Summary of Potential Impacts on Energy Consumption

Table 5-XIX presents a comparison of the fuel which will be consumed with the TSM and LRT alternatives for construction, vehicle manufacturing, and propulsion. (Station and maintenance energy will not

add significantly to overall fuel consumption and were, therefore, omitted from the analysis.) In general, the energy-usage differences between the two alternatives are not significant.

The amount of energy required to manufacture the buses and LRT vehicles is relatively small. Manufacturing LRT vehicles requires more energy than manufacturing buses. The no-action alternative assumes that all vehicles are on-line and no additional buses are required, although replacement vehicles will be required at some point in the future.

Propulsion energy, the energy required to propel the vehicles, shows minimal differentiation among alternatives. The propulsion energy analysis evaluated bus and LRT energy consumption only. All or most of the vehicle-miles traveled with each of the three alternatives are accounted for by bus. LRT fuel consumption only contributes a small amount to total vehicle miles and hence to systemwide fuel usage. The total propulsion energy differences among the alternatives are small, because the differences in the total number of bus vehicle-miles traveled is relatively small.

The number of automobile users shifting to transit under the LRT alternatives is such that it will result in only negligible energy savings.

Table 5-XX presents the relative energy efficiency of each alternative for the propulsion energy category. The table values represent the total annual gallons of fuel consumed per passenger trip mode under each alternative. Relatively minor differences are present among the alternatives.

b. Mitigation Measures

Energy efficiency will be stressed throughout the development and construction of the LRT project to minimize any possible adverse energy impacts. Energy efficiency will be enhanced with development of the LRT option through the provision of an efficient and desirable transit option, which will reduce the region's dependence on automobile transportation.

TABLE 5-XIX
FUEL CONSUMPTION ESTIMATES[1]
(in millions of gallons of diesel fuel)

Energy Category	1 No-Action	2 TSM	3 LRT	3a LRT	3b LRT	3c LRT
Construction	--	0.50	11.50	6.73	7.41	8.78
Vehicle Manufacture	--	0.99	1.70	0.75	0.80	0.90
Propulsion[2] (2000)	5.13	6.31	6.42	6.68	6.64	6.56

1. Multiplying the cell entries by 138,700 will yield the number of million BTUs consumed.

2. LRT electric consumption is converted from kilowatts to gallons of diesel fuel.

TABLE 5-XX
RELATIVE ENERGY EFFICIENCY
(in gallons consumed per passenger trip)

Energy Category	1 No-Action	2 TSM	3 LRT	3a LRT	3b LRT	3c LRT
Propulsion	0.083	0.098	0.088	0.098	0.096	0.092

5.10 HISTORIC, ARCHAEOLOGICAL, AND CULTURAL IMPACTS

The LRT project will affect eight historic properties which are listed or eligible for listing in the National Register of Historic Places. (The affected properties and the applicable federal historic requirements are described in Chapter 3.) A finding of no adverse effect has been made with respect to six of the properties; and a Memorandum of Agreement has been executed for the other two properties and is given in Appendix I. The following text presents the findings of no adverse effect for the six properties. It also presents the combined Preliminary Case Report (Section 106)/Section 4(f) Evaluations, which document the planning measures taken to minimize harm to the other two affected properties: the National Historic Landmark Eads Bridge and St. Louis Union Station properties.

a. Findings of No Adverse Effect

The following sections describe how the LRT project will affect the six historic properties and why these impacts do not meet the federal criteria of adverse effect (36 CFR 800).

FEDERAL CRITERIA

Criteria Number	Type of Adverse Effect
(1)	destruction or alteration of all or part of a property;
(2)	isolation from or alteration of the property's surrounding environment;
(3)	introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
(4)	neglect of a property resulting in its deterioration or destruction; and
(5)	transfer or sale of a property without adequate conditions or restrictions regarding preservation, maintenance, or use.

1) May Company Department Store (555 Washington). LRT will involve developing a stairway access to below grade from an enlarged Sixth Street sidewalk area on the west side of this National Register building, which is now undergoing extensive restoration for office reuse with ground floor commercial space. The expanded sidewalk is a part of the developer's proposal for the 555 Washington project. A railing and signage for this LRT access will be designed to be compatible with the historic property. (See Drawings A-107, A-108 and A-109.)

APPLICATION OF FEDERAL CRITERIA

Criteria Number	Effect
(1)	LRT will not physically alter this building.
(2)	It will not block access to the building or change the building's surrounding commercial environment.
(3)	It will not introduce any visual elements out of keeping with the building's commercial setting and it will not introduce any audible or atmospheric changes; it will not alter the building's setting.
(4)	LRT will not cause the building to be neglected; the developer for the building wishes to have LRT transit access available as a selling point to market his rehabilitated commercial space.
(5)	LRT does not involve any transfer or sale of the building.

2) Post Office Annex Building. LRT will involve developing access to a tunnel station at a point immediately north of this National Register property. The design of architectural/structural elements (e.g., canopies, railings, etc.) and signage will be developed to fit with the mixed-use, rail-themed commercial, hotel, and entertainment reuse of Union Station (where the LRT station will be located), just as the Post Office Annex Building redevelopment was designed to fit with the St. Louis Union Station project of which it is a component part. (See Drawing C-115.)

APPLICATION OF FEDERAL CRITERIA

Criteria Number	Effect
(1)	LRT will not physically alter this building.
(2)	It will not block access to this building or change the building's surrounding commercial character.
(3)	It will not introduce any visual elements out of keeping with the building's commercial setting and it will not introduce any audible or atmospheric changes; it will not alter the building's setting.
(4)	LRT will not cause the building to be neglected; LRT transit access will enhance the building's marketability.
(5)	LRT does not involve any transfer or sale of the building.

3) Dillard's Building. LRT will involve bringing escalators and an elevator from below grade into this National Register-eligible building near its Seventh and Washington corner. These LRT station connections will not alter the Washington Avenue building facade; they will access the existing recessed Dillard's entrance on Washington near Seventh and the proposed hotel entrance on Seventh Street. These entries and related LRT signage and railing will be designed to fit as compatibly as possible with this much-altered structure. (See Drawings A-107, A-108 and A-109.)

APPLICATION OF FEDERAL CRITERIA

Criteria Number	Effect
(1)	LRT will not alter the facade of this building or destroy any part of the building significant to its eligibility for the National Register.

(2)	LRT will not block access to the building or change the building's surrounding commercial character.
(3)	It will not introduce any visual elements out of keeping with the building's commercial setting and it will not introduce any audible or atmospheric changes; it will not alter the building's setting.
(4)	LRT will not cause the building to be neglected; the building owner (St. Louis Land Clearance for Redevelopment Authority), tenant (Dillard's Department Store), and project developer (St. Louis Centre/ Melvin Simon Associates) support the LRT project because they feel it will benefit retail sales and stimulate the upper-level hotel development and expanded retail development related to the proposed Convention Center expansion.
(5)	LRT does not involve any transfer or sale of the building.

4) Arcade/Wright Buildings. LRT will involve bringing a stairway into the ground floor of this two building complex at the midpoint of its Eighth Street frontage from the basement of the Wright Building. This stairway access point will provide direct access into an open-air vestibule of the two-building complex, permitting restoration of the storefront facade in front of the commercial space now occupied by a wig shop. Alterations and signage will be designed to be compatible with the National Register-eligible property. (See Drawings A-112 and A-113 plus S-407 and S-408.)

APPLICATION OF FEDERAL CRITERIA

Criteria Number	Effect
(1)	LRT will not alter the facade of this building complex or destroy any part of the building complex significant to its eligibility for the National Register.

(2)	LRT will not block access to the buildings or change their surrounding commercial character.
(3)	It will not introduce any visual elements out of keeping with the commercial setting of the building complex, and it will not introduce any audible or atmospheric changes; it will not alter the setting of the building complex.
(4)	LRT will not cause the Arcade/Wright Buildings to be neglected; potentially LRT will compensate for the buildings' lack of parking and stimulate the complete restoration of the two buildings, which are presently abandoned above the ground floor.
(5)	LRT does not involve any transfer or sale of the buildings.

5) Central West End Historic District. LRT will involve repairing and using the double track rail line which passes through this federally-certified local district in a depressed cut section parallel to the Forest Park Parkway, a controlled-access expressway. Freight train usage will be removed from the tracks within the district, and passenger rail movements will be restored. An LRT station platform will be developed at the southwest edge of the district immediately east of DeBaliviere Avenue below the grade of the street. The only building lying adjacent to the lower-level LRT station is a commercial facility which does not contribute to the district's historic significance and has been proposed for demolition by the area's designated developer. LRT signage and railings introduced at DeBaliviere Avenue will be compatible with the area redevelopment corporation's commercial redevelopment along the street. (See Drawings C-131, C-132, and C-133.)

APPLICATION OF FEDERAL CRITERIA

Criteria Number	Effect
(1)	LRT will not alter or destroy any building within the district.

(2) LRT will use an existing grade-separated right-of-way, and therefore, will not isolate the district from adjacent land uses, isolate parts of the district from other areas within the district, or alter the district's surrounding environment.

(3) LRT will not introduce any visual, audible, or atmospheric elements that are out of character for the area; LRT will not alter the district's setting.

(4) LRT will not cause the district to be neglected; the designated developer for the area where the LRT station will be built at DeBaliviere Avenue, Pantheon Corporation, strongly supports the LRT project because the developer believes it will enhance the continued marketability of rehabilitated residential units and commercial space within the historic district, since LRT will markedly improve transit service to the district.

(5) LRT does not involve any transfer or sale of property within the historic district other than the freight-train rail right-of-way, which is not a contributing element to the historic significance of the district. The transfer of this property will provide for appropriate use and maintenance.

6) <u>Delmar Station</u>. LRT will involve developing a station platform below this now privately-owned building where rail passengers originally arrived and departed. The LRT improvements will not physically touch the building. Access to the LRT platform will be possible from the south side of Delmar Boulevard (south of the building), from Des Peres Avenue (northwest of the building), and from Hodiamont Avenue (northeast of the building). The design of the LRT platform and its access will be compatible with the historic property. (See Drawings A-124, A-125, and A-126.)

APPLICATION OF FEDERAL CRITERIA

Criteria Number	Effect
(1)	LRT will not physically alter this building.
(2)	It will not block access to the building or alter its surrounding environment.
(3)	It will not introduce any visual elements or audible changes out of character with the building's commercial use, and it will not introduce any atmospheric changes; it will not alter the building's setting.
(4)	LRT will not cause the Delmar Station to be neglected; LRT will enhance the identity and visibility of this building in the community, which will expand the range of potential reuse option's available to the building's owner if he should decide to change its present, specific commercial use.
(5)	LRT does not involve any transfer or sale of the building.

b. Eads Bridge Preliminary Case Report/Section 4(f) Evaluation

1) Description of Proposed Use and Application of Criteria of Adverse Effect. LRT will rehabilitate the National Historic Landmark Eads Bridge to permit its continued utility as a transportation facility. Figure 22 shows the Eads Bridge and the locations of proposed modifications numerically keyed to the discussion below. (See also Appendix Drawings A-103 through A-106 and A-302.)

(1) To use the bridge for light rail transit will require rebuilding the deteriorated east approach rail trestle (which itself is not the bridge's original approach structure). The necessary reconstruction will use the existing approach foundations and employ the same material types and design elements to the maximum extent practical given the state of current technology, such that those viewing the reconstructed approach structure will not be aware of any changes. High

Eads Bridge Key Map

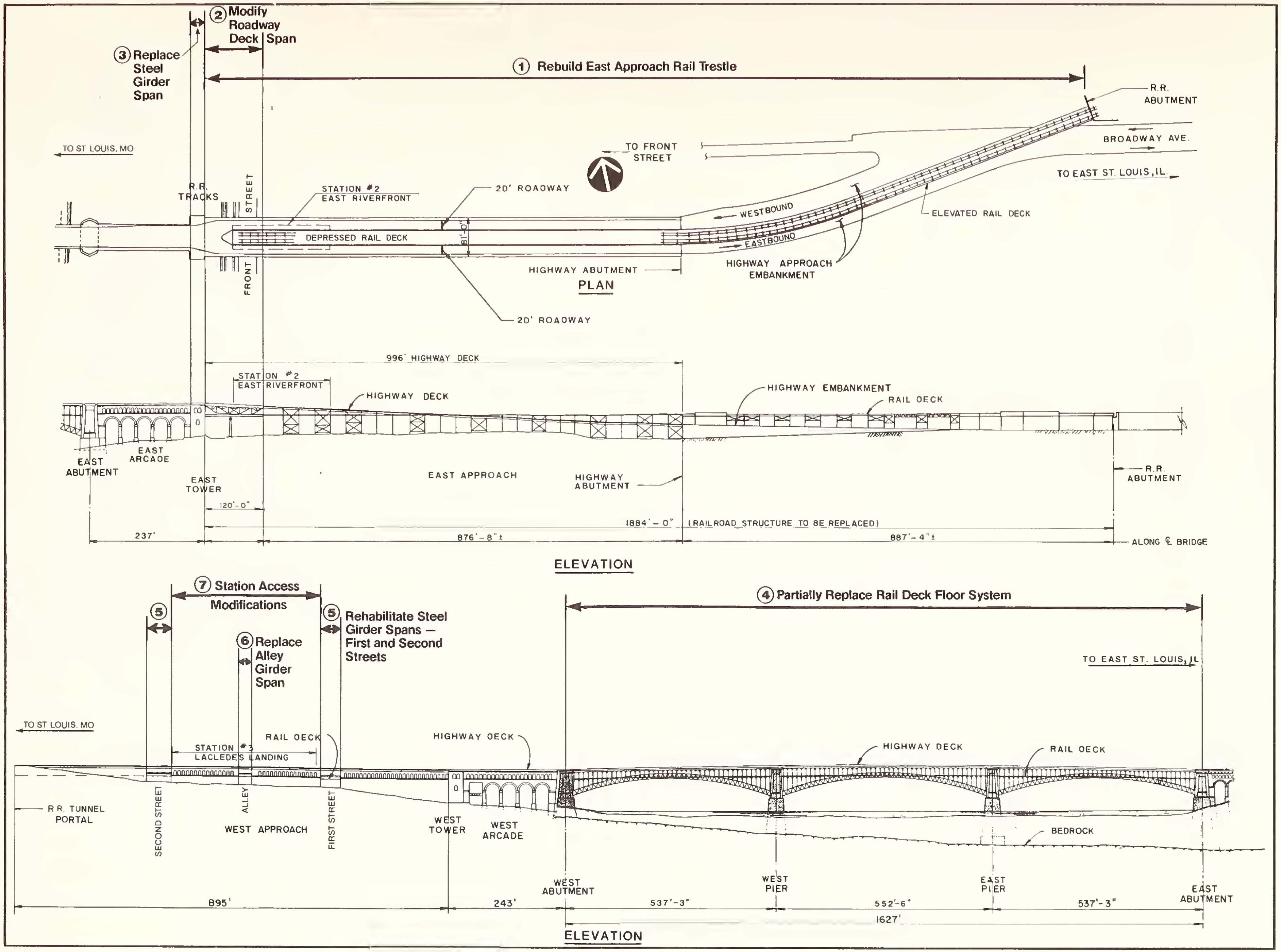


Figure 22

strength bolts will be used to connect all major structural elements, such as, struts and bracing. Shop connections may be welded, if desired.

(2) The roadway deck span over Front Street will need to be modified in the same way the present rail deck span has been modified over Front Street and for a short distance to the east of the street crossing, in order to provide sufficient headroom to develop the East Riverfront station platform.

(3) The deteriorated rail-deck steel-girder span in the east arcade tower will be replaced.

(4) The main span rail deck floor system will be replaced in part, and deteriorated steel floorbeams and stringers will be rehabilitated to upgrade their capacity to carry light rail vehicles. The main span bracing and strut members, and end connections which are missing or excessively deteriorated will be replaced.

(5) Nonoriginal plate girder spans carrying the rail deck over First and Second Streets on the west approach will be rehabilitated to upgrade their capacity to carry LRT vehicles.

(6) The nonoriginal plate girder span over the alley between First and Second Streets will be replaced in order to accommodate the Laclede's Landing station.

(7) The bricked-up arcade-level arches will be returned to what preliminary research indicates was their original open state (per 1883 Scharf steel engraving) to provide for ventilation in the station area and a view of the Gateway Arch. Similarly, two new arches large enough to meet evacuation code requirements for the Laclede's Landing LRT station will replace the original three mock arches within the bridge at Second Street, and two new arches comparable to the existing centered mock arch at First Street will be located on each side of the existing mock arch to provide access to the Laclede's Landing LRT station. Portions of the center wall will be underpinned to facilitate access to the Laclede's Landing station.

(8) The bridge's steel elements will be cleaned and painted; the bridge's masonry will be tuck-pointed, as needed; and deteriorated

concrete will be patched, to restore the Eads Bridge to near its original condition.

The proposed use is permanent. All of the property will be acquired for the project; the roadway deck, however, will remain in service.

2) Alternatives.

- No-Action and TSM. Implementing either the no-action or the Transportation Systems Management (TSM) alternative in lieu of LRT will avoid altering the historic property. However, implementing either of these two alternatives could be argued to meet another of the criteria of adverse effect, namely, neglect of a property resulting in its deterioration or destruction. The Eads Bridge rail deck is abandoned, and its rail owner has no need for the roadway deck where toll revenues about break even with the toll taker's salary without leaving adequate surplus for much-needed maintenance. Clearly, the LRT alternative offers a chance to allow the bridge to continue in its historic transportation function, whereas the no-action and TSM alternatives offer no such potential.

- Alternate River Crossing. Shifting the LRT river crossing up or downstream of the Eads Bridge will involve excessive community disruption, significant adverse transit travel, and exhorbitant cost. The Eads Bridge is flanked by two National Register properties: the Laclede's Landing Historic District which extends to a point over 500 feet north of Eads Bridge and the Jefferson National Expansion Memorial which extends to a point three-quarters of a mile south of Eads Bridge. Figure 23 shows LRT alignments north and south of the Eads Bridge.

North of the Laclede's Landing Historic District is the Martin Luther King Bridge owned by the city of East St. Louis. This single-deck roadway bridge is badly deteriorated and would require considerable, costly modification to accommodate LRT at the exclusion of automobile traffic or in a mixed traffic condition. Restoring the bridge to its original H20 loading condition (which would not be sufficient for LRT use) is estimated to cost $10 million according to Sverdrup Corporation's 1985 bridge inspection report. Additional cost would be required to bring the bridge up to a standard sufficient to accommodate LRT; expenditures which significantly exceed the cost of restoring Eads Bridge, which is estimated to be $4.4 million in June 1986 dollars. Obviously, building a new LRT bridge across the Mississippi River at a point north of the King Bridge would also be considerably more costly than restoring the Eads Bridge. Thomas K. Dyer, Inc. estimated the cost of building a new river crossing for LRT to be $69.3 million in 1983 dollars and Day & Zimmermann, Inc. estimated a new crossing to cost $74.8 million in 1983 dollars (Review Appraisal of Transportation Corridor and Support Facilities in Metropolitan St. Louis by Day & Zimmermann, Inc., March 1984).

Connecting an LRT river crossing over either the King Bridge or a new bridge north of King Bridge with downtown East St. Louis and St. Louis destinations will involve considerable community disruption. Whereas an Eads Bridge connection permits entering downtown East St. Louis on the south edge of the business district, a more northerly crossing will require entering into the center of the business district, given the limited number of available points at which to cross I-70/55 which encircles the west and north sides of the business district. Similarly, whereas an Eads Bridge connection permits using the existing tunnel beneath Eighth and Washington Streets in downtown St. Louis, a more northerly river crossing would require constructing a new tunnel, which would be particularly disruptive and costly to build, or it would require operating in mixed traffic which would significantly disrupt both LRT and automotive traffic operations in downtown St. Louis.

Building a new bridge south of the Jefferson National Expansion Memorial would entail the same excessive costs as building a new bridge north of Laclede's Landing. More importantly, a more southerly location would not permit serving key destinations in downtown St. Louis without excessive adverse travel, because an alignment south of the Jefferson National Expansion Memorial would be south of all of downtown.

3) <u>Mitigation Measures</u>. Mitigation measures will be employed to lessen the adverse effects of altering Eads Bridge. The design and construction of LRT as it affects Eads Bridge will be accomplished in accord with the Secretary of the Interior's <u>Standards for</u>

LRT Alternatives Around Eads Bridge

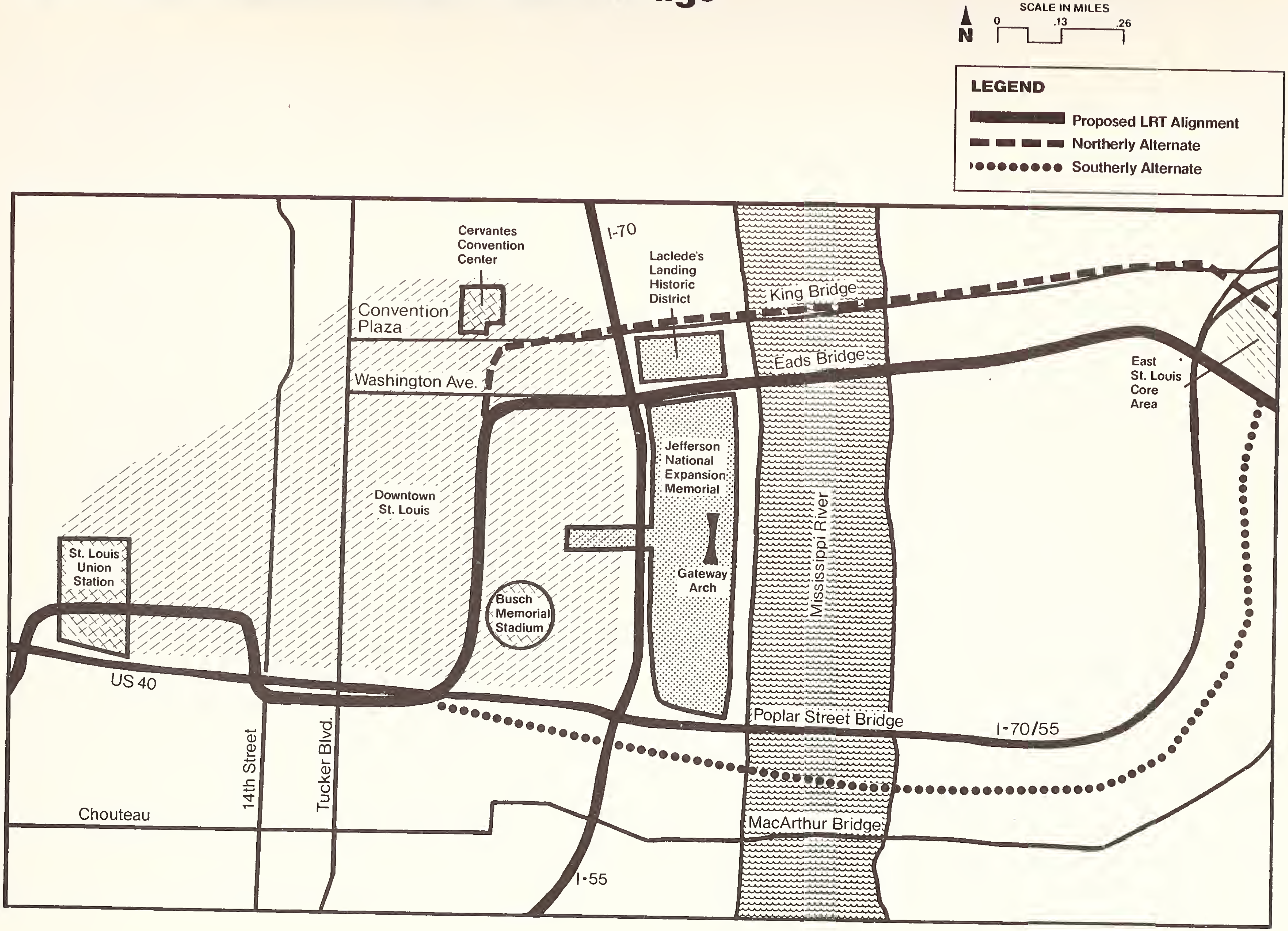


Figure 23

Rehabilitation and Guidelines for Rehabilitating Historic Buildings, and cleaning and repainting Eads Bridge metal surfaces will be guided by Margot Gayle and David W. Look's 1980 publication, Metals in America's Historic Bridges: Uses and Preservation Treatments. The Missouri and Illinois SHPOs will review final design plans, and additional mitigation measures may be determined after their review.

4) Coordination. The LRT project has been coordinated with the Missouri and Illinois SHPOs and the ACHP, and a Memorandum of Agreement has been executed. During the coordination process, the Missouri SHPO questioned alterations proposed at First and Second Streets to provide access to the Laclede's Landing LRT station. After review, the LRT project was modified to include a second, symmetrical arched opening at First Street as requested by the Missouri SHPO, and the SHPO concurred in the project need to replace the three inadequate bricked-up archways at Second Street with two larger arched openings.

c. St. Louis Union Station Preliminary Case Report/Section 4(f) Evaluation

1) Description of Proposed Use and Application of Criteria of Adverse Effect. LRT will use the baggage tunnel right-of-way beneath the train shed and provide access to the St. Louis Union Station project from a platform beneath Eighteenth Street with access under the edge of the train shed near Clark Avenue, see Figure 24. (See also Appendix Drawing C-115.) (The St. Louis Union Station National Register inventory-nomination form makes no mention of the baggage tunnel.) The design of architectural/structural elements (e.g., canopies, railings, etc.) will be developed to fit with the mixed-use, rail-themed commercial, hotel, and entertainment reuse of Union Station recently completed by the Rouse Company. The proposed use is permanent and will be accomplished by easement.

2) Alternates.

o No-Action and TSM. Implementing either the no-action or the TSM alternative in lieu of LRT will avoid altering the historic property. However, implementing either of these two alternatives will leave the St. Louis Union Station project without a first-rate connection to the heart of downtown St. Louis, a feature considered very

St. Louis Union Station/ LRT Interface

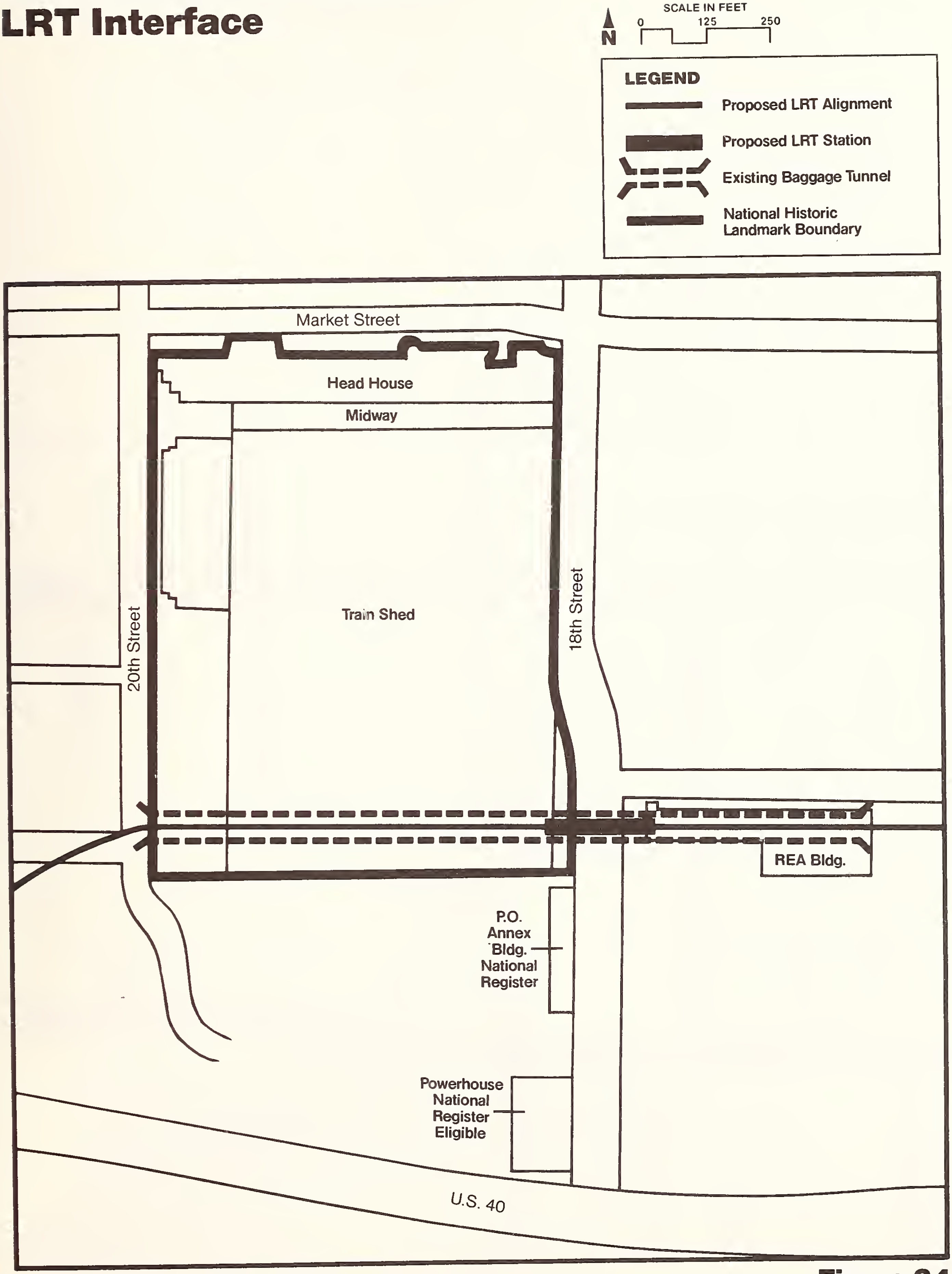


Figure 24

important by the project's developers, the owner of the historic property. To function as a major tourist and conventioneer destination, St. Louis Union Station needs to be readily accessible to the Gateway Arch, the Cervantes Convention and Exhibition Center, downtown hotels, and other attractions in the heart of the central business district. Fixed rail is a most appropriate connection for St. Louis Union Station.

o Alternate Alignments. Figure 25 shows alternate northerly and southerly alignments around St. Louis Union Station. Northerly alternate alignments around St. Louis Union Station would involve considerable additional, expensive project construction and are not possible to build without affecting parkland or requiring particularly disruptive building displacements. Similarly, southerly alternate alignments are not possible to build without coming into conflict with AMTRAK's operations immediately east and west of Eighteenth Street. Also, a southerly alignment would fail to readily serve either the government complex served by the Kiel LRT station at Fourteenth and Spruce Streets, or St. Louis Union Station. Neither of these alternate alignments would meet with the expressed interest of the owner of the historic property for LRT to conveniently serve his project.

3) Mitigation Measures. Mitigation measures may be employed to lessen the adverse effects of altering St. Louis Union Station. The design and construction of LRT as it affects St. Louis Union Station will be accomplished in accord with the Secretary of Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings. The Missouri SHPO will review final design plans, and additional mitigation measures may be determined after his review.

4) Coordination. The LRT project has been coordinated with the Missouri and Illinois SHPOs and the ACHP, and a Memorandum of Agreement has been executed. The Missouri SHPO raised no specific comments requiring resolution with respect to proposed LRT alteration of the St. Louis Union Station property.

d. Concluding Statement and Memorandum of Agreement

Based on the above considerations, all involved parties agree in the determination that there is no feasible and prudent alternative

LRT Alternatives Around St. Louis Union Station

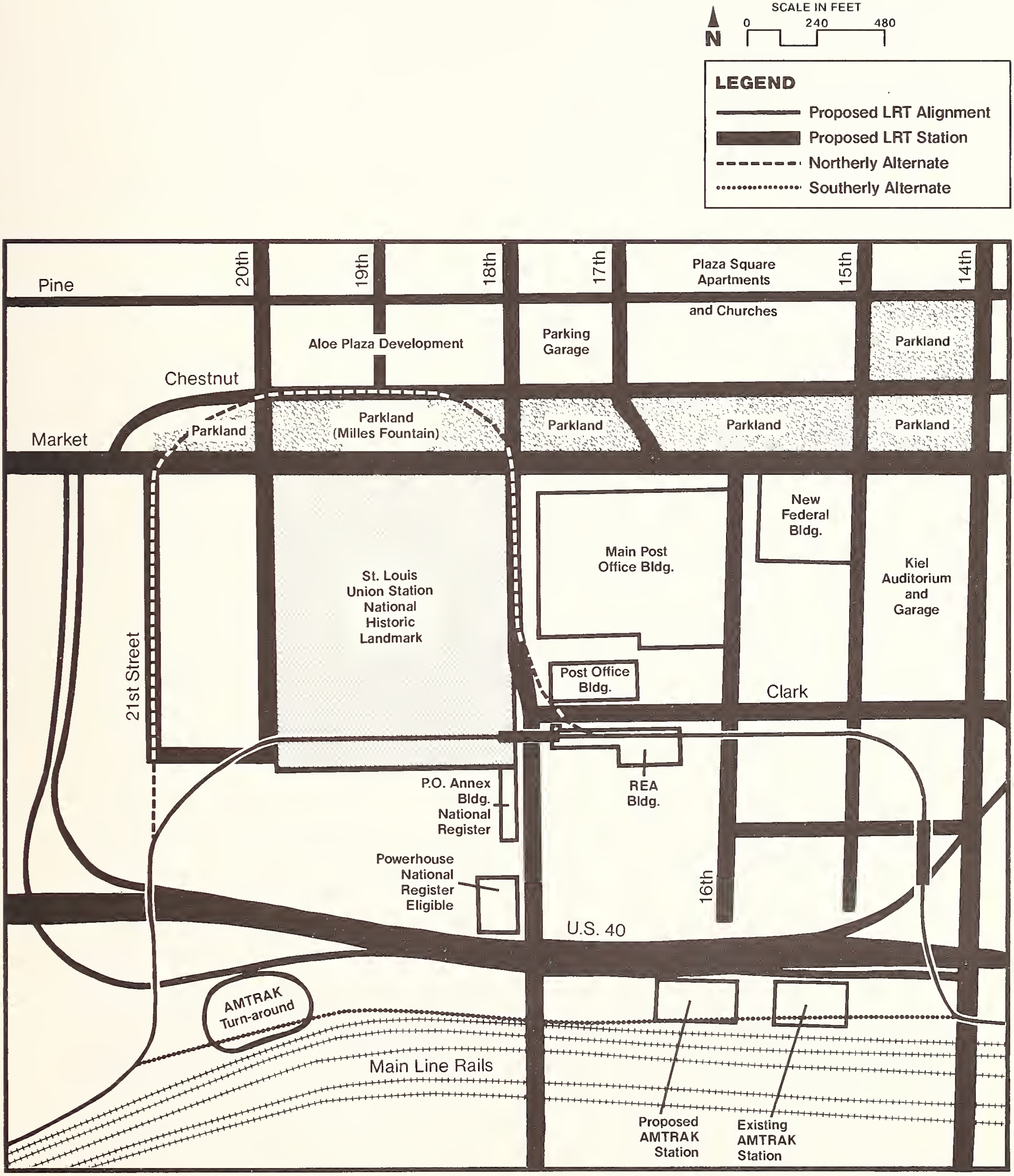


Figure 25

to the use of the Eads Bridge and St. Louis Union Station properties, and that the proposed LRT project includes all possible planning to minimize harm to Eads Bridge and St. Louis Union Station resulting from the LRT use. The Appendix I Memorandum of Agreement documents SHPO and ACHP concurrence in the finding that there are no feasible and prudent alternatives that could avoid or fully mitigate the LRT project's adverse effects on Eads Bridge and St. Louis Union Station, and that it is in the public interest to proceed with the proposed LRT project. The Memorandum of Agreement includes stipulations to minimize adverse effects.

5.11 EFFECTS ON PARKLANDS

a. Description of Likely Impacts

LRT will be adjacent to three parks: Forest Park, St. Vincent Park, and the Bellerive Bird Sanctuary. No takings will occur at any of the three.

The LRT system will have no effect on Forest Park either aesthetically or with respect to park takings. The existing depressed alignment through the park will be maintained as well as the adjoining noise/aesthetic berm. The catenary system will be barely visible above the existing cut and effectively shielded from the park given the lack of park facilities in this area and the existing vegetative screen.

Parts of St. Vincent's Park, a 132-acre St. Louis County park located along the west edge of the LRT alignment between St. Charles Rock and Natural Bridge Roads, will be subject to higher ambient noise levels. The area of the park affected is a nature study area and thus one of the most sensitive of park uses that could be affected. However, the dense vegetation in the nature study area along the bottom of the stream valley serves to screen the LRT system from much of the park as well as other land uses in the non-winter months when park use is heaviest. The nearest intensively used park area is a picnic shelter about 500 feet from the LRT alignment. As such, much of the park is screened both visually and acoustically from the LRT presence. Coniferous trees will be planted in the park along the rail alignment, especially in the open area near the proposed lake, in order to mitigate the project's effects on the parkland.

LRT will not affect the Bellerive Bird Sanctuary. Only the northeasternmost corner of the area will be close to the LRT alignment, and most of the LRT alignment will be in cut in this stretch next to UMSL's playing field.

b. Coordination and Section 4(f) Compliance

No Section 4(f) parkland will be displaced; hence, the LRT project does not require Section 4(f) parkland documents.

5.12 IMPACT ON RESOURCES AND MAINTENANCE OF LONG-TERM PRODUCTIVITY

Chapter 5 discusses the impacts on environmental features within the priority corridor. Many of these can be mitigated to varying degrees. Some are of short duration and cease upon completion of construction, while others, particularly those positive impacts associated with the preferred alternative, are long term. This section reviews the unavoidable adverse impacts anticipated to occur, weighs these against the necessity of maintaining the metro area's long-term productivity, and finally identifies those resources committed to the project that will be irretrievable.

a. Unavoidable Adverse Impacts

The preferred alternative will result in some adverse impacts on both the natural and man-made environment, which may be reduced through various mitigation measures in many instances, but not eliminated. Therefore, they are considered unavoidable adverse impacts. These unavoidable impacts are as follows:

1) Displacement. The LRT alternative will result in the removal of nine single-family dwelling units and the relocation of these residents, as well as the removal of three small businesses and four surface parking lot operations. However, the businesses may also be relocated and some of the parking could be restored on a portion of the land not utilized for the LRT right-of-way.

2) Visual. Additional overhead wiring will be introduced along the proposed light rail alignment. Further, some portions of the

alignment will be built on structure resulting in additional visual impacts.

3) Air Quality. Constructing the LRT park-n-ride lots, stations, and alignment will temporarily increase fugitive dust.

4) Noise. Sound levels will increase temporarily during construction and also at various locations along the alignment.

5) Land Use. Land acquired for station sites, park-n-ride lots, and the proposed LRT alignment could preclude development of housing, retail, or office space on site during the system's construction. However, joint development, value capture strategies, and air rights leasing will all be utilized to assure future residential and commercial development along the proposed alignment. The no-action alternative, by comparison, would eliminate the desirability for these economic development possibilities at sites outside of the downtown and Central West End locations. This would adversely impact the development/redevelopment actions of communities along the proposed LRT alignment.

6) Construction Impacts. Construction activity could result in the disruption of some streets along the alignment. Off-street parking will be displaced during construction and some streets may be partially closed to general traffic, which may inconvenience some local businesses.

b. Relationship Between Local Short-Term Uses of the Environment and the Maintenance of Long-Term Productivity

Maintaining and enhancing of the vitality and viability of the metropolitan St. Louis region is a goal held by local units of government throughout the region as well as EWGCC. Governments in both the Illinois and Missouri portions of the metro area are working to concentrate employment and retail/office development in areas that will be served by the proposed LRT alignment. This is evidenced by development activities underway in the East St. Louis area, extensive commercial/office activity in downtown St. Louis, and efforts by St. Louis County to develop industrial uses in the Wellston Enterprise Zone.

The concentration of development and redevelopment activities in areas with public infrastructure already in place will result in significant savings for the respective governments, and ultimately, for the taxpayers. Provision of transit-related improvements resulting with the LRT alternative will assist in controlling urban sprawl. Failure to provide transportation improvements in the metro area will result in increased development costs from sprawl as well as higher operating costs resulting from decreased productivity caused by traffic congestion. Additionally, such failure to provide transportation improvements will result in the social costs of continued pollution from mobile sources and accompanying health impacts.

Temporary disruption in the environment and a commitment of irretrievable energy, labor, and capital will be required to achieve long-term productivity. The long-term benefits of the LRT alternative, however, will include reduced energy consumption and vehicle exhaust emissions, as well as adequate transit capacity and transit circulation in a significant portion of the metropolitan St. Louis region.

c. Irreversible and Irretrievable Commitments of Resources

Certain types of resources consumed will be irreversible or irretrievable, once committed to an alternative use considered in this EIS. The irretrievable resources will include energy, land, capital, construction materials, and labor. The use of these resources is considered permanent; however, their permanent use for one of the alternatives does not imply that they have been used unproductively.

1) Energy. Energy consumed during construction and operation of the alternative will be irretrievable. Energy demand for construction will be related to excavation of right-of-way, production of cars and rail, construction of stations, etc. Although irretrievable, the ultimate goal is to reduce future energy consumption by providing an alternate means of efficiently transporting large numbers of people in place of the present heavy dependence on the automobile. Energy required for operation of the system is also irretrievable, however, ample electrical capacity is available, and will result in a reduction in the reliance on auto energy consumption.

2) Land. Construction of the preferred alternative will consume land presently or potentially available for other uses. In as much as most of the alignment utilizes existing rights-of-way this commitment will be minimal. Further, strategies employing the use of air rights and joint development will result in maximization of the properties committed to the preferred alternative.

3) Capital. Capital required for construction will be irretrievably committed.

4) Construction Materials. Construction materials irretrievably committed for LRT will include, for example, cement, concrete, aggregate, lumber, and steel. Any attempt to improve the existing traffic situation, such as additional highways, would result in equal or greater commitments of these materials.

5) Labor. The manhours required to construct the preferred alternative will be irretrievably committed.

CHAPTER 6: EVALUATION

This chapter (1) evaluates financial feasibility, (2) compares benefits and costs, and (3) presents the financial plan for the locally preferred alternative. First the chapter presents an evaluation of the financial feasibility of each alternative in order to assess the capacity of the region to fund capital and operating costs. Secondly, the chapter compares the benefits and costs of each alternative with respect to the issues of effectiveness, efficiency, and equity. Effectiveness measures how well each alternative will meet the region's social, economic, environmental, and transportation goals and objectives as described in Chapter 1. Efficiency compares the accomplishment of these goals and objectives with the costs of each alternative. And equity addresses how each alternative will distribute the benefits and costs of transit improvements. The chapter provides a comparative summary that highlights the major trade-offs among the alternatives and presents the reasons for selection of the locally preferred alternative. Thirdly, the chapter concludes with a financial plan for the locally preferred alternative.

6.1 FINANCIAL PLANNING

Accurate estimates of the costs of constructing and operating each alternative and of the revenues available to defray those costs are needed to make an informed assessment of the benefits of each proposal and to select an affordable transit alternative appropriate for the St. Louis region. A number of financial considerations affect the selection of a locally preferred alternative. To establish these costs and understand their implications, a variety of investigations and analyses were performed for each alternative. The year by year capital and operating requirements for each of the alternatives were detailed in "Capital Cost Estimates" (Technical Report No. 24), "Operating Cost Estimates" (Technical Report No. 25), and "Procurement and Construction Schedule" (Technical Memorandum No. 38).

Capital costs were escalated to put these costs into year of expenditure, or actual, dollars; an inflation rate of four percent per year compounded and impacting equally each capital cost element was assumed. Operating costs for the bus and light rail operational units were modeled; and figures developed in 1985, 1995, and year 2000 actual dollars, inflation and/or escalation rates, as well as other inherent assumptions, are fully described in the document entitled, "Operating Cost Model" (Technical Memorandum No. 39).

With costs estimated for each alternative, the next step is to measure financial feasibility. In developing the financial analysis, the major funding sources currently available for transit operating and capital support were assumed, in general, to remain available in the future. The appropriations and/or receipts for most of these existing non-operating revenue sources were also assumed to keep pace with or be adjusted to reflect inflation over time. Any changes in future local, state, or federal transit-funding policies will affect the amount (and, possibly, conditions) of available funding for the region as a whole and for the Central/Airport Corridor project. The key, specific assumptions made regarding the major funding sources and the methodology used to make projections of funding availability through the year 2000 are discussed in the following sections of this chapter. Further, to account for the uncertainty involved in forecasting revenues 15 years into the future from operating and non-operating revenue sources, a range of forecasts was developed.

First, federal participation in the capital funding of any alternative (other than no-action) will be affected by the ability of the region to provide local matching funds. The federal government currently requires a local contribution of the total cost of capital projects. For some build alternatives in St. Louis, fixed capital assets may be contributed toward the region's local share of project costs. However, their attractiveness must be balanced against the cost, primarily local, of a long-term commitment to fund the operating deficits associated with those alternatives.

A range of forecasts was developed to account for the uncertainty involved in forecasting revenues 15 years into the future.

a. Capital Funding

Sources of project capital for the alternatives are varied, as is the certainty of the amount and cash flow (availability). Principal funding sources extant to meet capital requirements are those as described below, and they have been assumed to remain generally available.

1) UMTA Section 3 Funds. Under the provisions of Section 3 of the Urban Mass Transportation Act of 1964, as amended, federal grants are available on a discretionary basis to assist in financing major capital expenses in the TSM and LRT/Bus shuttle alternatives. There are, by definition, no major capital expenses associated with the No-Action alternative. These discretionary federal funds are currently permitted to be used for eligible vehicle purchases (bus and rail), design and engineering, as well as construction of major facilities. Federal funds from Section 3 of the UMT Act are available to finance up to 75 percent of eligible project costs, thus requiring a minimum local match of 25 percent of such project costs. These discretionary federal capital funds are subject to intense competition from other projects around the country.

2) UMTA Section 9 Funds. Under the provisions of Section 9 of the UMT Act, as amended, federal capital funds are available from a formula (or block grant) program. This program is actually a complex set of formulas used to allocate all Section 9 funds to states and localities, and it includes provisions for expending block grant funds on transit operations, as well as capital projects. Section 9 is the only source of federal operating assistance available and generally funds are used by transit operators for operating subsidies up to the limits the law imposes. For capital projects (bus or rail), these Section 9 funds are available to finance up to 80 percent of eligible project costs, and this program requires a minimum local match of 20 percent for such project costs. This formula grant program does not encumber competition among projects around the country. However, within a local transit jurisdiction trade-offs must be made between competing items of a capital expense nature and all routine replacement and rehabilitation projects are required to be completely funded from Section 9

resources before additional costs associated with these, or extraordinary costs for expansions and new major capital projects, are eligible for Section 3 consideration by UMTA.

3) Missouri Transportation Sales Tax. Under the provisions of Missouri Revised Statutes, the City of St. Louis and St. Louis County are authorized to levy a 1/2 cent Transportation Sales Tax; this tax authorization has existed and been exercised since 1973. All of the funds derived from this local source could be used for capital projects. At a minimum, seven percent of the sales tax revenues made available to transit must, by statute, be set aside for capital purposes, a provision adhered to by Bi-State with its Special Sales Tax Capital Fund. As a practical matter, the balance of unencumbered Transportation Sales Tax revenues received by Bi-State are required generally to fund operating deficits. The City of St. Louis currently appropriates 99 percent of its revenues from this source to Bi-State, and St. Louis County maintains a policy of matching the City's funding on a two-to-one basis. This Transportation Sales Tax source is reliable, with funding amounts fluctuating with general economic conditions.

4) Downstate Transportation Act of 1978. This Illinois legislation authorizes the Illinois Department of Transportation to make grants available to mass transit systems operating within Illinois. This Act provides both capital and operating assitance to Bi-State and the mass transit districts in Madison and St. Clair County, Illinois. Local share requirements relating to UMTA capital improvement projects are eligible to be funded, in part, by grants from this source.

5) Illinois Sales Tax. The Madison and St. Clair County Transit Districts, which were established in 1982 by the Illinois Mass Transit District Act, each collect a 1/4-cent sales tax within their districts. The revenues are available for use by the Districts for capital and operating purposes.

Table 6-I documents the calculation of total project costs and required local matches for each alternative. The first set of columns in the table summarizes the capital costs described in Chapter 2 for construction, vehicle acquisition, and right-of-way purchases expressed

TABLE 6-I
PROJECT COSTS
(in millions of dollars)

	Federal Cost			Required Minimum Local Match		Total Project Cost	
Alternative	1984 Dollars	Escalated** Dollars	Source of Local Match***	1984 Dollars	Escalated** Dollars	1984 Dollars	Escalated** Dollars
1 No-Action	$ --	$ --	--	$ --	$ --	$ --	$ --
2 TSM	23.8	30.6	cash	5.9	7.7	29.7	38.3
3 LRT/Bus Shuttle* (Full System)	197.3	256.6	cash/ assets	65.5	85.1	262.8	341.7
3a LRT/(CWE)*	116.4	151.5	cash/ assets	37.9	49.1	154.3	200.6
3b LRT/Bus Shuttle* (Delmar)	128.0	166.6	cash/ assets	41.8	54.3	169.8	220.9
3c LRT/Bus Shuttle* (UMSL-South)	143.7	187.0	cash/ assets	47.2	61.3	190.9	248.3

* Project costs for these alternatives include associated TSM capital costs as follows in millions of 1984/escalated dollars: $5.1/$6.6 for Alt. 3; $15.5/$20.0 for Alt. 3a; $14.9/$19.1 for Alt. 3b; and $12.2/$15.8 for Alt. 3c.

** Escalated dollars are actual dollars derived for the year of expenditure by assuming an annual inflation rate of four percent, compounded, and a four-year implementation schedule resulting in revenue service in late 1991.

*** Cash match may be derived from the following sources: Bi-State capital set-aside; IDOT Series B Bond Issue; or other local tax resources, bond issues. Assets include locally-owned fixed facilities and railroad rights-of-way.

in 1984 dollars. For the TSM alternative, total project costs consist solely of the capital costs, and the necessary local match is simply 20 percent of total project costs. For the LRT alternatives, the bus component requires a minimum 20 percent local match when funded from Section 9, and the LRT component, which is assumed to be funded under Section 3, requires a 25 percent local match, which may be covered in part or wholly by a contribution of locally-owned fixed assets. These assets include the Eads Bridge, the Washington Avenue/Eighth Street tunnel, sections of existing railroad rights-of-way, and miscellaneous facilities. The City of St. Louis is negotiating a trade of the city-owned MacArthur Bridge and other considerations to various railroad companies in return for these assets. Federal regulations permit the City to donate the acquired assets to any transit project using the structures and rights-of-way. The appraised value of the assets could then be counted toward the required local share. With this financing arrangement total project costs for the LRT component would consist of both capital costs and the value of the fixed assets.

Table 6-II shows expenditures for each alternative or the bus component of the LRT/Bus shuttle alternative spread over a four-year construction schedule (as described in Chapter 2); the dollar amounts include the effects of inflation and thus represent the estimated capital outlay required in each fiscal year.

Funding the local share of the TSM alternative or the bus component of the LRT/Bus shuttle alternative would largely depend on local tax and bond resources. The Bi-State capital set-aside from local sales taxes and the Illinois Department of Transportation (IDOT) Series B Bond Issue or state of Illinois general revenue funds have also been used to match federal capital grants in the past and could be used here. The local share required to implement TSM is substantially less than what would be required to implement any of the other alternatives. Some of the dollars needed to fund bus purchases or other TSM capital needs could come from the required set-aside of seven percent of Missouri sales tax revenues made available to Bi-State for capital purposes.

TABLE 6-II
CASH EXPENDITURES FOR A FOUR-YEAR CONSTRUCTION SCHEDULE*
(in millions of escalated dollars)

	Fiscal Years				
Alternative	1988	1989	1990	1991	Total
2 TSM	$ 9	$ 8	$ 10	$ 11	$ 38
3 LRT/Bus Shuttle	36	125	90	7	258
3a LRT/(CWE)	19	70	57	9	155
3b LRT/Bus Shuttle (Delmar)	22	78	61	9	170
3c LRT/Bus Shuttle (UMSL-South)	27	93	69	11	200

* Rounded to nearest million and excluding the local match

TABLE 6-III
FISCAL YEAR 1986 BI-STATE TRANSIT OPERATING REVENUES
(in millions of dollars)

Source	Budget Amount	Percent
Passenger and Service Revenues	$23.3	25.3%
Other Operating Revenues	0.4	0.4%
Non-Operating Revenues		
St. Louis City Sales Tax	14.5	15.8%
St. Louis County Sales Tax	28.9	31.4%
Madison County Sales Tax	1.2	1.3%
St. Clair County Sales Tax	1.7	1.9%
Illinois Operating Assistance	7.5	8.2%
Federal Operating Assistance	11.7	12.7%
Interest Income	2.3	2.5%
Other Income, net	0.5	0.5%
	$92.0	100%

SOURCE: Bi-State Development Agency Annual Financial Report, Fiscal Year Ending June 30, 1986

This set-aside currently provides $2 million per year, it had an uncommitted fund balance of over $5.6 million as of June 30, 1986, and could be increased at Bi-State's option.

The LRT/Bus shuttle alternative will encumber a unique project capital cost consideration. Referred to as a Capital Reserve Account, UMTA has stipulated that all complex rail projects provide a committed source of funds outside the project budget, entirely funded with local monies, as the partial or full reserve needed to finance LRT component cost overruns, if any. This account will be established at the outset of construction in an amount equal to ten percent of the expected equipment procurement and construction contract project expenditures in each fiscal year. At the end of each fiscal year, that portion of the account attributable to contract expenditures during the course of the completed fiscal year(s), which is not needed to cover the payment of any cost overruns on those contracts, will be removed from the account. While certain cost overruns (extraordinary costs) may operate to change the maximum amount of federal funds available for the LRT component, these will require at least a 25 percent local match and all other overruns will require 100 percent funding. The fiscal year requirements and funding of this Capital Reserve Account are discussed in part 6.3 of this chapter.

The basic local share requirement for the LRT/bus shuttle alternatives is proposed to be satisfied at least partially through a contribution of the Eads Bridge and railroad rights-of-way. The Bi-State capital set-aside from local sales taxes and the Illinois Department of Transportation (IDOT) Series B Bond Issue or state of Illinois general revenue funds could be used also. Options for the development of a cash contribution which could be tapped if it becomes necessary include revenue bonds, tax increment financing, or increases in existing local sales, earnings, property, or parking, taxes. Increasing taxes or issuing bonds require legislative approval in each jurisdiction where a tax or bond proposal is made. In addition, the approval of voters is necessary to raise taxes or issue bonds in Missouri.

An independent appraisal of the fixed assets has, in the opinion of EWGCC, determined their value as at least equal to the required local match contribution. This March 1984 appraisal will be updated and the final value of the assets approved by UMTA. The need for any local cash contribution will be determined by comparing the UMTA-approved appraised value of the assets with the minimum required local contribution presented in Table 6-I for each LRT/Bus shuttle alternative.

b. Operating Deficit Funding

Several dedicated funding sources are currently used to finance transit operating deficits; Table 6-III gives the amounts and the percentage contribution of each revenue source in Bi-State's 1986 fiscal-year budget. Bi-State's FY1986 operating revenue sources exceeded the agency's operating costs by $1.8 million. Operating expenses in fiscal 1986 were generally distributed as follows: 50 percent salaries; 24 percent fringe benefits; 14 percent materials and supplies; five percent contract services; three percent casualty and liability costs; one percent administrative charges and interest expense; and three percent other costs. After current operating expenses have been met, assets from operating accounts are restricted to uses which include acquisition of capital assets, retirement of debt, or payment of interest.

The City of St. Louis and St. Louis County, under state authorization, have levied a 1/2 cent sales tax since 1973 to fund transportation. In the past, the City has appropriated virtually all (99 percent) of its available transportation sales tax funds for Bi-State operating deficits. St. Louis County has adopted an ordinance appropriating an amount equivalent to no more than twice the City's contribution. The County currently appropriates its remaining funds from this tax for other transportation projects.

Transit districts in St. Clair and Madison Counties in Illinois, under state authorization, levy a sales tax for transit, currently set at 1/4 cent. The transit districts in these counties contract with Bi-State for fixed route service. Any funds remaining after reimbursing Bi-State can be appropriated for other transit-related projects. The State of Illinois also provides operating assistance to Bi-State in an amount equivalent to 2/32 of specified state tax collections in the St. Clair and Madison County transit districts.

Another source of operating revenue comes from the federal government through the UMTA Section 9 program. Congress recently reauthorized the entire UMTA program for fiscal years 1987-1991 with the passage of the Federal Mass Transportation Act of 1987. The St. Louis area FY 1987 Section 9 program was reduced by 1.2 percent from the 1986 level, and the operating assistance Section 9 portion was reduced by 3.4 percent in federal fiscal year 1987.

Additional non-operating revenues anticipated for the LRT/Bus shuttle alternatives could be derived from the private sector, and conventional or arbitrage-related interest income. A revenue stream from private-sector developments at or adjacent to rail stations is expected to result from implementating connector fees and/or joint development fees. These fees are negotiated using a benefits analysis that assigns a dollar amount to the annual access improvement which the location and transportation service provided by a particular station will afford to a private development or business. (See Technical Report No. 22, "Joint Development Programs," for a full discussion of potential private-sector sources of revenue.) Interest income (net) has been a routine source of financing for Bi-State over the years, and the combination of prudent sales and purchases of financial instruments is expected to continue to generate net interest income.

Should operating deficit funding shortfalls occur even after the application of the above revenue sources, one or more of the following actions could be taken either to reduce operating costs or to increase transit revenues:

o reduce operating costs by modifying services, e.g., extending base-period, evening, and weekend LRT headways, or curtailing late-night LRT service, thereby reducing the demand for electricity, maintenance (as a result of slower growth in vehicle miles operated), and operator and maintenance personnel hours (resulting in lower employee wage and benefit expenditures);

- increase transit fares by modifying the existing fare structure and/or increasing fares at a rate higher than projected (i.e., beyond normal inflation or Consumer Price Index rates);
- increase local subsidies from existing sources in St. Louis County (where nearly 25 percent of the existing Transportation Sales Tax receipts are allocated to other than Bi-State), and in Madison and St. Clair Counties in Illinois (where the existing 1/4 cent sales tax receipts exceed the cost of Bi-State service provisions);
- seek additional funding from the City of St. Louis General Fund to cover short-term deficits; and
- seek other funding mechanisms such as motor vehicle fuel tax increases, special assessment or taxing districts, or other special taxes and/or fees (e.g., parking surcharge).

c. Financial Projections of Operating Costs and Revenues for Alternatives

Implementing any of the six alternatives (including the No-Action alternative) will require subsidizing operating deficits (defined as operating expenses minus operating revenues). The important issue is whether total projected revenues from existing sources, including subsidies, will be greater than projected expenses through the 2000 design year. For comparative purposes, projections were made for each alternative using low and high estimates of available revenue sources in order to assess the probability of projected revenues covering projected expenses. The spread between the low and high estimates provides a range within which revenues are expected to fall. These financial projections have been made assuming the forecast year (2000) riderships and service characteristics of each alternative. Also, costs and revenues have been expressed in 1985 dollars. Table 6-IV gives the major line-by-line assumptions used in developing the low and the high cost and revenue estimates.

TABLE 6-IV
MAJOR ASSUMPTIONS CONTRIBUTING TO COST AND REVENUE ESTIMATES*

Item	Low Estimate	High Estimate
1. Passenger farebox revenue	Patronage and farebox revenue estimated by simulation model, 90% of year 2000 projection	Patronage and farebox revenue estimated by simulation model, year 2000 projection
2. Other operating revenue	Remains a constant 2% of farebox collection annually, plus annual concession revenue of $100,000 for the LRT/bus shuttle alternative and $50,000 for 3a, b, and c (TR-21)	Add revenues at the rate of $0.015 per linked trip, plus annual concession revenue of $200,000 for the LRT/bus shuttle alternative and $100,000 for 3a, b, and c (TR-21)
3. Sales tax - City of St. Louis**	Increases at the rate of inflation only (4%)	Increases at the rate of inflation (4%) plus 1% per year
4. Sales tax - St. Louis County**	Twice the City of St. Louis contribution	Twice the City of St. Louis contribution
5. Sales tax - St. Clair and Madison Counties plus State of Illinois	Increases at the rate of inflation (4%)	Increases at the rate of inflation (4%)
6. Federal assistance	Constant dollars at the fiscal year 1987 amount	Constant dollars at the fiscal year 1987 amount
7. Other non-operating income	Increases at the rate of inflation (4%), plus connector fees at LRT stations (TR-22)	Increases at the rate of inflation (4%), plus connector fees at LRT stations (TR-22)
8. Bus and rail operating costs	Generated by simulation and cost model (TR-25); average 3.35% rate of growth	Generated by simulation and cost model (TR-25); average 3.35% rate of growth

*Inflationary Impacts: for projection purposes, all values shown are presumed to be equally subject to inflation.

**Seven percent of the city and county tax revenue is assumed to go to Bi-State's capital fund.

Note: Parenthetic notations denote specific EWGCC Technical Reports (TR) as references for further details. (See Appendix D.)

The key variable affecting local revenues available to fund transit operations is the level of the City of St. Louis transit sales tax revenues, because the St. Louis County appropriation is provided at a ratio of two times the City contribution. The high revenue estimate of future City sales tax receipts is based on recent City of St. Louis experience; it presumes a level of sales tax receipts of one percent per year more than the rate of inflation. The low revenue estimate of future City sales tax receipts assumes that these receipts will increase only at the rate of inflation. Sales tax receipts are generally reliable sources and closely parallel economic conditions, including inflationary impacts on costs and prices.

In the opinion of EWGCC, federal operating assistance is expected to remain the same in constant dollars. Congress, with the passage of the Federal Mass Transportation Act of 1987, did reauthorize Section 9 operating assistance through 1991 at a constant dollar level. EWGCC, therefore, has assumed that federal operating assistance will be available at the fiscal year 1987 level in constant dollars in either estimate.

Estimated growth in patronage and system operating changes (as part of the No-Action alternative) could increase the farebox recovery ratio from 26.3 percent in 1986 to 31.7 percent in 2000. The TSM alternative at 31.4 percent will yield a lower farebox recovery ratio than the No-Action alternative. The LRT/Bus shuttle alternative at 33.8 percent will add about two percent more to the farebox recovery ratio achieved with either the No-Action or TSM alternatives.

Tables 6-V and 6-VI detail the revenues and expenses forecast for each alternative as well as the income or deficit projections for each alternative in 2000. The results for the build alternatives range between a $7.3 million deficit and a $7 million surplus. The TSM alternative financial projection ranges from a $4.83 million deficit to a $4.47 million surplus. The comparative financial projection for the LRT/bus shuttle alternative ranges from $1.5 million less deficit to $2.5 million greater revenues than the TSM alternative. LRT Alternatives 3a, b, and c will yield from about one-half to two million dollars

TABLE 6-V
2000 FINANCIAL PROJECTIONS FOR OPERATION OF NO-ACTION, TSM, AND LRT/BUS SHUTTLE ALTERNATIVES
(in millions of 1985 dollars)

	1 No-Action		2 TSM		3 LRT/Bus Shuttle	
	Low Estimate	High Estimate	Low Estimate	High Estimate	Low Estimate	High Estimate
REVENUE:						
1. Passenger Fares	$25.83	$28.70	$26.85	$29.83	$29.48	$32.76
2. Other Operating Revenue	0.52	0.62	0.54	0.65	0.69	0.89
Total Operating Revenue	$26.35	$29.32	$27.39	$30.48	$30.17	$33.65
3. Sales Tax - City of St. Louis	$14.23	$16.43	$14.23	$16.43	$14.23	$16.43
4. Sales Tax - St. Louis County	28.55	32.86	28.55	32.86	28.55	32.86
5. Sales Tax - St. Clair County	1.79	1.79	1.79	1.79	1.79	1.79
6. Sales Tax - Madison County	1.40	1.40	1.40	1.40	1.40	1.40
7. State of Illinois	7.56	7.56	7.56	7.56	7.56	7.56
8. Federal Assistance	6.28	6.28	6.28	6.28	6.28	6.28
9. Other Non-Operating	2.87	2.87	2.87	2.87	3.33	3.97
Total Non-Operating Revenue	$62.68	$69.19	$62.68	$ 69.19	$63.14	$ 70.29
TOTAL REVENUE (Total of Operating and Non-Operating Revenues)	$89.03	$98.51	$90.07	$ 99.67	$93.31	$103.94
EXPENSES:						
10. Bus Operations	$90.24	$90.54	$94.90	$95.20	$87.21	$87.51
11. Rail Operations	--	--	--	--	9.44	9.48
TOTAL OPERATING EXPENSES	$90.24	$90.54	$94.90	$95.20	$96.65	$96.99
NET INCOME (DEFICIT): (Total Revenue Less Total Operating Expenses)	($1.21)	$ 7.97	($4.83)	$ 4.47	($ 3.34)	$ 6.95

TABLE 6-VI
2000 FINANCIAL PROJECTIONS FOR OPERATION OF INTERMEDIATE LENGTH LRT ALTERNATIVES
(in millions of 1985 dollars)

	3a - CWE		3b - Delmar		3c - UMSL	
	Low Estimate	High Estimate	Low Estimate	High Estimate	Low Estimate	High Estimate
REVENUE:						
1. Passenger Fares	$27.58	$30.65	$28.01	$31.12	$28.54	$31.71
2. Other Operating Revenue	0.60	0.75	0.61	0.76	0.62	0.77
Total Operating Revenue	$28.18	$31.40	$28.62	$31.88	$29.16	$32.48
3. Sales Tax - City of St. Louis	$14.23	$16.43	$14.23	$16.43	$14.23	$16.43
4. Sales Tax - St. Louis County	28.55	32.86	28.55	32.86	28.55	32.86
5. Sales Tax - St. Clair County	1.80	1.80	1.80	1.80	1.80	1.80
6. Sales Tax - Madison County	1.40	1.40	1.40	1.40	1.40	1.40
7. State of Illinois	7.60	7.60	7.60	7.60	7.60	7.60
8. Federal Assistance	6.28	6.28	6.28	6.28	6.28	6.28
9. Other Non-Operating	2.45	3.08	2.50	3.14	2.56	3.21
Total Non-Operating Revenue	$62.31	$69.45	$62.36	$69.51	$62.42	$69.58
TOTAL REVENUE (Total of Operating and Non-Operating Revenues)	$90.49	$100.85	$90.98	$101.39	$91.58	$102.06
EXPENSES:						
10. Bus Operations	$91.31	$91.69	$90.91	$91.28	$89.87	$90.24
11. Rail Operations	6.50	6.54	6.95	6.99	7.96	8.00
TOTAL OPERATING EXPENSES	$97.81	$98.23	$97.86	$98.27	$97.83	$98.24
NET INCOME (DEFICIT): (Total Revenue Less Total Operating Expenses)	($ 7.32)	$ 2.62	($ 6.88)	$ 3.12	($ 6.25)	$ 3.82

less net revenue, or $1.4 to $2.5 million greater net deficit, than the TSM alternative.

6.2 COMPARATIVE BENEFITS AND COSTS

a. Approach

This section provides a comparison of the benefits and costs that will result from each transit alternative. The comparison is organized into four categories: effectiveness, efficiency, equity, and trade-offs. The effectiveness discussion assesses how well each alternative will satisfy the goals and objectives described in Chapter 1. The efficiency discussion compares marginal changes in ridership against changes in cost. The equity discussion reviews how the service level and costs of each alternative will be distributed among different population subgroups. The trade-offs discussion summarizes each alternative's salient advantages and disadvantages as well as the key benefits and costs that will accrue with each alternative.

b. Effectiveness

The following discussion assesses the effectiveness of each alternative in resolving the transportation problems identified in Chapter 1. The goals and objectives given in Chapter 1 are used as measurement criteria in this discussion.

1) Improve Transportation Service to Increase Mobility

The first goal of the proposed transit improvements is improved transportation service in the priority corridor. All alternatives include transit service improvements both within the priority corridor and in other parts of the region, as identified in the TSM alternative. In summary, the objectives for this goal include increased speed, comfort, and reliability; increased accessibility; increased ridership; improved mobility for transit dependents; and avoiding adverse effects on the existing transportation system. Table 6-VII summarizes the significant transportation effects for each alternative.

Increased Speed, Comfort, and Reliability

The TSM alternative will improve average transit travel times by an estimated one minute, or about two percent regionwide for all

TABLE 6-VII
SUMMARY OF SELECTED TRANSPORTATION IMPACTS YEAR 2000

Alternative	Improved Transit Reliability	Daily New Ridership (Trips)	Daily Guideway Ridership	Systemwide Average Travel Time (in minutes)	Average Trip Length (in miles)	Number of Peak-Hour Corridor Buses Arriving St. Louis CBD
1 No-Action	None	0	0	44.3	6.4	176
2 TSM	Low-Moderate	6,181	0	43.3	6.5	184
3 LRT/Bus Shuttle	High	14,706	37,127	40.1	6.8	107
3a LRT - CWE	Low	6,314	16,256	42.1	6.4	166
3b LRT - Delmar	Moderate	7,608	19,956	41.7	6.5	161
3c LRT - USML	Moderate	10,391	27,982	40.9	6.5	125

transit riders in 2000. These improvements will result from new bus ramps and improved service. The LRT alternatives will improve average regionwide travel time an additional 1.2 to 3.2 minutes over the TSM alternative. The full LRT alignment will achieve the greatest time savings. These improvements will result from LRT's use of an exclusive alignment and relatively high operating speeds between stations. Expressed in dollar terms, actual annual time savings of $2.4 million will result with the TSM alternative, compared with $10.5 million for the full LRT alternative.

An important objective for the priority corridor is to improve service reliability as well as transit running speeds. The TSM alternative should improve transit service reliability somewhat; however, all bus movements will remain in mixed traffic and subject to delay from peak-hour congestion. By comparison, the LRT alternatives will not operate in mixed traffic, particularly in the important downtown St. Louis segment, and will therefore result in further improvements in reliability over the other alternatives.

Increased Accessibility

Two major factors judged to be important are improved accessibility to jobs for the region's population as a whole, and for the transportation disadvantaged in particular. The priority corridor serves four of the region's six major employment centers: downtown St. Louis, Berkeley/Hazelwood (McDonnell-Douglas and other employers), Clayton, and the Washington University Medical Center and hospital complex in the Central West End. (The remaining two are Fenton and Westport.) Improvements directed at line-haul service in the corridor, i.e., LRT, will offer the greatest benefit in terms of access to major employment centers.

Some trips made by both the general population and by the transit dependent which are in the 31 to 40 minute range in the no-action alternative can apparently be made in under 31 minutes with the build alternatives (see Chapter 4.1a3). This effect will be most pronounced for the LRT/bus shuttle alternatives since the LRT route will directly serve three of the area's six major employment centers and concentrated areas of transit-dependent population. The TSM and LRT/bus shuttle alternatives will not result in any significant difference in travel time savings for trips of greater than 40 minutes.

Increased Ridership

The build alternatives will result in ridership increases systemwide (see Table 6-VII). The TSM alternative will increase daily transit ridership by a projected 6,181 persons in 2000 compared with the No-Action alternative. About 4,000 of this increase is estimated to be attributable to TAP service and operational improvements while the rest is attributable to bus fleet expansion which will meet estimated growth in transit ridership in the region that would be constrained by the No-Action alternative. The LRT/bus shuttle alternative will increase daily transit ridership by 8,525 over the TSM alternative; Alternative 3a will yield a 133 trip increase, Alternative 3b will yield an 1,427 trip increase, and Alternative 3c will yield a 4,210 increase in ridership over the TSM alternative.

The guideway facilities will serve a daily ridership ranging from 37,127 for the full LRT/bus shuttle alternative to 16,256 for LRT Alternative 3a. This means that up to 23.1 percent of all trips would use the LRT guideway.

Improved Mobility for Transit Dependents

Concentrations of transportation disadvantaged persons are also directly served by the build alternatives. Generally, those concentrations are found in East St. Louis, the northern half of the City of St. Louis, and in the Wellston area. Two of these areas are directly served (East St. Louis and Wellston) and the third could benefit as well from improvement in line-haul service in the priority corridor. As noted above in the discussions on travel time and increased accessibility, and as described further in Chapter 4, the guideway and TSM alternatives will enhance transit-dependent mobility by comparison with the No-Action alternative.

Minimize Adverse Transportation Effects on the Existing Transportation System

Table 6-VII includes estimates of peak-hour bus volumes entering the St. Louis CBD in the priority corridor. The TSM alternative

will increase slightly the number of buses (eight) on downtown streets, while the LRT alternatives will reduce the number of buses (77) required and the consequent need for additional bus lanes in downtown St. Louis. The fewer corridor-related bus movements on downtown streets will improve overall bus flow on Locust Street and permit the unused capacity to be available for buses serving other parts of the region as well as for future growth. This capacity will become much more important as CBD employment grows to projected 2000 levels. None of the alternatives are expected to significantly affect cross-street or mixed-traffic flows.

2) Provide Public Transportation Service which is Financially Attainable. This goal has three objectives: to maximize operating efficiency; to minimize capital and operating costs and public subsidy; and to maximize revenue. The measurement of this goal and its objectives is discussed in the previous section titled, 6.1 Financial Planning.

3) Stimulate Economic Expansion and Job Creation. Stimulating economic expansion is a very important local goal. Table 6-VIII lists primary objectives of that goal and provides measures of how well the alternatives perform. Each of the alternatives will positively affect land development and generally support the continued development of downtown St. Louis. In addition, the LRT alternatives will provide a number of station sites which could attract significant economic development. More of this development is likely to be refocused rather than net growth. The development is expected to occur as a result of improving accessibility, concentrating passenger volumes, reducing site-specific parking requirements, and demonstrating a long-term commitment at station locations. Specifically, these LRT development factors are expected to enhance existing developments like St. Louis Union Station, St. Louis Centre and Laclede's Landing which will be more closely tied with the core area of downtown and with each other. These station-specific development factors are also expected to result in increased retail sales, faster absorption of recently-completed and under-construction office space, new office space construction, and a more attractive tourism/convention package.

TABLE 6-VIII
POTENTIAL TO STIMULATE ECONOMIC EXPANSION IN THE CORRIDOR

Potential Effects on:	2 TSM	3 LRT/ Bus Shuttle	3a - CWE	3b - Delmar	3c - UMSL
Attractiveness of land for residential, commercial, and industrial development	Some	Significant	Significant	Significant	Significant
Opportunities for public/private development partnerships	Negligible	Significant	Significant	Significant	Significant
Opportunities for value capture	Negligible	Significant	Significant	Significant	Significant
Development Potential Near Station Sites*:					
Capital Investment (in millions of 1984 dollars)	0	$ 488.2	$ 364.5	$ 393.4	$ 440.2
Office space (in thousands of square feet)	0	5,885	4,700	4,930	5,385
Retail space (in thousands of square feet)	0	232	132	147	227
Hotel rooms	0	1,650	1,450	1,450	1,450
Residential units	0	880	0	220	670

*The development potential figures are for an area within a 500 foot radius of the station sites.

Job creation is a major part of the project's economic development goal. Table 6-IX lists the construction employment that will come both from building the alternative improvements and from development projects they will potentially attract to the corridor, as well as the permanent employment each alternative will provide (over and above the No-Action alternative) plus the permanent employment resulting with projects potentially induced by LRT. The total employment figures include indirect employment gains, which are based on a multiplier of 2.0. The TSM alternative will yield a small increase in employment compared with the significant numbers of jobs that will result from building one of the LRT alternatives. The full LRT/bus shuttle alternative will provide the greatest number of construction (18,704) and permanent (26,970) jobs in the corridor.

4) <u>Enhance the Physical and Social Environment</u>. Each of the action alternatives is expected to result in minor improvement in regional air quality as a result of reducing the number of auto vehicle miles traveled. Each would conform with the State Implementation Plan by increasing transit ridership.

The LRT alternatives are expected to increase noise levels by a minor amount in areas where existing and/or projected noise levels exceed or will exceed guidelines, even in the absence of the transit improvements. Trees will be planted in St. Vincent Park along the LRT alignment as a mitigation measure.

Each of the action alternatives will involve additional fuel consumption by transit vehicles compared with the no-action alternative and will result in relatively small net energy savings from auto diversions. The differences in energy consumption among the alternatives are relatively minor.

Only the LRT/bus shuttle alternatives will involve any residential or business displacements. Nine occupied, moderate-income, single-family dwelling units will be displaced near the North Hanley station plus one lessee, two small businesses, and four small parking lot operations downtown. The owners of the residential dwelling units and the commercial structures will receive relocation assistance; relocation land/buildings are readily available.

TABLE 6-IX
CONSTRUCTION AND PERMANENT EMPLOYMENT ASSOCIATED WITH EACH ALTERNATIVE

Man-Years of Construction Employment	2 TSM	3 LRT/Bus Shuttle	3a CWE	3b Delmar	3c UMSL
Direct	82	2,594	1,301	1,522	1,855
Induced	--	6,758	5,046	5,383	6,093
Subtotal	82	9,352	6,347	6,905	7,948
TOTAL*	164	18,704	12,694	13,810	15,896
Permanent Jobs					
Additional Direct	43	65	120	117	109
Associated with Potential Station-Related Development	--	26,840	19,523	20,471	22,717
Subtotal	43	26,905	19,643	20,588	22,826
TOTAL*	86	26,970	19,763	20,705	22,935

*Using a multiplier of 2.0 yields both the total direct and induced man-years of construction and the total permanent jobs resulting with each alternative. The multiplier is not applied to the permanent jobs associated with potential LRT-induced development.

SOURCE: East-West Gateway Coordinating Council

TABLE 6-X
SUMMARY OF SELECTED TRANSIT COST COMPONENTS IN 2000
(expressed in millions of 1984 dollars)

Alternative	Capital Cost	Operating Cost	Equivalent Annual Cost	Increased Operating Deficit	Operating Ratio
1 No-Action	$ 0	$ 86.8	$ 86.8	$ 0	31.7%
2 TSM	29.7	91.2	95.3	3.4	31.4%
3 LRT/Bus Shuttle	262.8	93.0	121.7	2.0	33.8%
3a LRT/Bus - CWE	154.3	94.1	110.7	5.4	31.2%
3b LRT/Bus - Delmar	169.8	94.2	112.6	5.0	31.7%
3c LRT/Bus - UMSL	190.9	94.2	115.9	4.4	32.3%

Each of the alternatives as defined is compatible with local and regional land use plans to the extent that each alternative will enhance transit service and support or potentially stimulate appropriate land use activities. One or more of the action alternatives may not be specifically addressed in various local land use planning documents.

None of the action alternatives is expected to adversely affect parks, institutions, or historic properties; a Memorandum of Agreement has been executed to mitigate the LRT project impacts on the National Historic Landmark Eads Bridge and St. Louis Union Station, which will be benefited by the proposed improvements.

c. Efficiency

The efficiency measures discussed here compare the benefits from each alternative with the costs incurred in implementing and operating that alternative (See Table 6-X). In this context, efficiency is actually cost-effectiveness.

Cost-effectiveness is a primary factor used by UMTA in evaluating the merits of fixed guideway projects. UMTA requires, first, that fixed guideway projects produce a gain in transit ridership (linked trips) compared to the Transportation Systems Management, or TSM, alternative. Secondly, UMTA has developed cost-effectiveness indices which, as computed for individual projects, must not be excessive, i.e., should not produce results which indicate excessive annualized costs for the new transit riders projected for an alternative. Importantly, new transit riders in the UMTA cost-effectiveness indices are measured in linked trips and not boardings.

During the Alternatives Analysis phase, the UMTA approach toward and guidelines for cost-effectiveness indices were only being developed. The AA/DEIS, therefore, did not adhere to the principles now more rigorously expounded by UMTA. As a consequence of the repeated application by UMTA of its cost-effectiveness analysis approach during the last three years, the methodology used for the AA/DEIS and the results reported therein in Table 6-XI of the AA/DEIS are no longer useful. Instead, efficiency, or cost-effectiveness, is here analyzed on the basis of current UMTA guidelines.

TABLE 6-XI
UMTA INDICES

$$\text{Federal Cost-Effectiveness Index} = \frac{\triangle\$CAP + \triangle\$0\&M + \triangle\$TT - \triangle\$LOC}{\text{Riders}}$$

$$\text{Total Cost-Effectiveness Index} = \frac{\triangle\$CAP + \triangle\$0\&M + \triangle\$TT}{\text{Riders}}$$

where the $\triangle$s (deltas) represent changes in costs and benefits as compared with the optional non-guideway (TSM) alternative, and where:

$CAP = capital costs, annualized over the life of the project;

$0&M = annual operating and maintenance cost, Bi-State operator;

$TT = value of annual travel time savings for TSM riders;

$LOC = value of local share of capital funding, annualized over the life of the project; and

Riders = annual transit ridership (year 2000), measured in linked trips.

SOURCE: "Application of the Major Investment Policy for Fiscal Year 1986: Calculation of Indices, Possible Revisions, and Data Requirements." USDOT/UMTA, September, 1984.

TABLE 6-XII
COST-EFFECTIVENESS IN COST PER NEW RIDER
(in 1984 dollars)

		Cost-Effectiveness Index Per New Rider	
	Alternative	Federal	Total
1	No-Action	n.a.	n.a.
2	TSM	Base	Base
3	LRT/Bus Shuttle	$ 6.09	$ 8.95
3a	LRT (CWE)	$288.29	$373.84
3b	LRT/Bus Shuttle (Delmar)	$ 27.90	$ 36.99
3c	LRT/Bus Shuttle (UMSL-South)	$ 10.21	$ 13.98

UMTA has developed two indexing procedures for use in evaluating the cost-effectiveness of fixed guideway projects. A detailed description of the indexing procedures and the methodology for their computation is found in the USDOT/UMTA policy paper dated September 11, 1984, entitled: "Application of the Major Investment Policy for Fiscal Year 1986: Calculation of Indices, Possible Revisions, and Data Requirements."

In the first indexing procedure, three primary measures of potential benefits of a guideway project are recognized: changes in transit ridership (new linked trips), travel time savings for existing riders, and reductions in operating and maintenance costs. In this procedure, fixed guideway projects are compared only to the TSM alternative. The indexing procedure also incorporates the capital cost required to obtain the potential benefits. To capture both a federal program and what UMTA refers to as a societal perspective, this indexing procedure actually calls for two distinct calculations. See Table 6-XI.

These indices provide a measure of the cost, both capital and operating, for each new transit rider. Thus, when two project alternatives are compared in terms of their cost-effectiveness indices, the one with the lower index represents the more cost-effective of the two. A project may be considered cost-effective so long as its index does not exceed the price that decisionmakers are willing to pay for each new rider. UMTA has specified a value of $6 per new rider as the Total Cost Effectiveness Index threshold that should not be exceeded for a project to be advanced with federal funding.

Applying this UMTA cost-effectiveness indexing procedure yields the costs per new rider given in Table 6-XII. The TSM alternative is used as the base for computing incremental changes in costs and benefits.

Based on this indexing procedure, the full LRT/Bus shuttle alternative is more cost-effective than the shorter-segment alternatives considered for the Central/Airport Corridor. Investments in the LRT/Bus shuttle subalternatives, each of which includes the core of the LRT/Bus shuttle alternative but encompasses intermediate lengths of fixed guideway toward the Lambert International Airport and McDonnell Douglas complex, improve transit travel speeds and attract new riders compared to the TSM alternative. However, because of the cost of building and operating any of these intermediate-length fixed-guideway alternatives and the complementary regional bus network, the cost that must be incurred to attract each new rider is relatively high.

The computations for and analysis of the full LRT/Bus shuttle alternative does not, in UMTA's opinion, meet its threshold test. The figure shown for either index above is the result of using the year 2000 ridership (linked trips) figures discussed in Chapter 4.

Because of the ridership sensitivity of this cost-effectiveness indexing procedure, and other weaknesses many communities found with this procedure, UMTA detailed an alternative index. In this alternative indexing procedure, UMTA attempted to take into consideration transit user benefits, wherein benefits are considered in terms of generalized "price" of transit. "Price" in this case means the overall perceived cost, or disutility, of transit and includes travel time, transferring, transit fares, parking charges, and so forth. Unlike the other UMTA indexing procedure, benefits for existing transit riders (i.e., riders who would use the No-Action alternative) are included in computations. This procedure is considered by UMTA to negate some or all of the weaknesses of the previously described indexing procedure. As with the earlier indexing, there are two distinct calculations. See Table 6-XIII.

The Table 6-XIII indices can be interpreted as ratios between the necessary capital investment and the return in user benefits. As with the previous indexing procedure, a project may be considered cost-effective so long as its index does not exceed the price that decision-makers are willing to pay, with willingness to pay herein measured in terms of dollars per work trip hour of user benefit. UMTA has specified a value of $8.00 per hour of user benefits as the Total Cost-Effectiveness Index threshold that should not be exceeded for a project to be advanced with federal funding.

Table 6-XIV presents the results of applying the alternative index. The indices are presented with both upper and lower values where

TABLE 6-XIII
ALTERNATIVE UMTA INDICES

$$\text{Federal Cost-Effectiveness Index} = \frac{\Delta\$CAP + \Delta\$O\&M - \Delta\$\ LOC}{\text{User Benefits}}$$

$$\text{Total Cost-Effectiveness Index} = \frac{\Delta\$CAP + \Delta\$O\&M}{\text{User Benefits}}$$

where the Δs (deltas) represent changes in costs and benefits, and where:

$CAP = capital costs, annualized over the life of the project;

$O&M = annual operating and maintenance cost, Bi-State operator;

$LOC = value of local share of capital funding, annualized over the life of the project; and

User Benefits = benefits to both year 2000 transit riders projected to use the No-Action alternative and new transit riders, both measured in linked trips.

SOURCE: "Application of the Major Investment Policy for Fiscal Year 1986: Calculation of Indices, Possible Revisions, and Data Requirements." USDOT/UMTA, September, 1984.

TABLE 6-XIV
COST-EFFECTIVENESS IN COST PER HOUR OF USER BENEFITS
(in 1984 dollars)

		Cost-Effectiveness Index	
	Alternative	Federal	Total
1	No-Action	n.a.	n.a.
2	TSM	Base	Base
3	LRT/Bus Shuttle	$2.96 - $5.44 per hour of user benefit	$4.01 - $7.37 per hour of user benefit

the range of values reflects confidence intervals for the "price" of transit in certain analysis zones. Because the equations used to calculate user benefits do not function with analysis zones having a zero price for transit, synthetic transit prices for such zones were computed. The synthetic transit price used in zero price zones to generate the higher figure in each index corresponds to the 50th percentile of transit price distributions, and the lower figure in each index corresponds to the use of the 95th percentile of transit price distributions.

Using this second cost-effectiveness indexing procedure, overcoming many if not all of the weaknesses of the first procedure by application of a consumer surplus technique well-established in microeconomic theory, UMTA offers an alternative to judge the merits of a fixed guideway investment. Regardless of the scenario used within the analysis to overcome zero price analysis zones, the full LRT/Bus shuttle alternative meets or significantly stays within the UMTA threshold requirements.

In the opinion of EWGCC, neither of these two indexing procedures should be relied upon to make ultimate decisions on the deployment of a fixed guideway alternative, let alone its full cost-effectiveness. EWGCC has, as have many other communities, made its position in this respect known to UMTA. Furthermore, and as is quite evident from the other analyses required by the National Environmental Policy Act and as are discussed throughout this impact statement, EWGCC is of the opinion that numerous other measurements of the associated impacts of fixed guideway alternatives are at least equally as important as the transportation ones.

Congress itself has expressed concern about the cost-effectiveness measurement methodology advanced by UMTA, and the agency's intended application. Congress' concern resulted in a Congressional directive to UMTA to postpone use of the methodology extant as such use relates to the federal agency's evaluation of project worthiness and sufficiency for federal funding. Subsequently, with the enactment of the Federal Mass Transportation Act of 1987 (P.L. 100-17), Congress endorsed the development of more comprehensive criteria for assessing projects for federal funding by the U.S. Department of Transportation. The Secretary of Transportation is directed to issue guidelines that set forth the means by which the Secretary will evaluate, among other considerations, the cost-effectiveness of new rail projects, but such criteria shall not apply to projects which are in or beyond the preliminary engineering stage of development as of January 1, 1987. Thus, the St. Louis Metro Link project has been exempted by Congress from the necessity to meet either the unacceptable existing or as yet to be established future UMTA cost-effectiveness measurement methodology and threshold requirements. Further evidencing the Congressional intent with respect to the St. Louis Metro Link project have been its appropriation of more than $36 million through FY 1987 to initiate final design and construction, and concomitant direction to UMTA to negotiate a full funding grant agreement for federally funding the entire project.

d. Equity

The primary equity concern within the priority corridor is the fairness and distribution of costs and impacts across the various population subgroups. All alternatives except the No-Action alternative will improve service for disadvantaged groups; the LRT alternatives will improve service for areas with transit-dependent concentrations. Transit service costs will be consistent with each affected government's ability to provide transit subsidies.

The amount of service fully-accessible to mobility-limited residents in the region will be increased with the LRT options, which will provide for handicapped accessibility in stations and on LRT vehicles. The TSM alternative will maintain existing handicapped service on selected bus vehicles. Other paratransit services provided by other agencies will remain in place with each of the alternatives under consideration.

Minority participation requirements for U.S. DOT-funded projects will be applicable to the construction of new facilities associated with any of the alternatives. Hiring for new operations employees will be affirmative and handled in accordance with applicable regulations and practices of the Equal Employment Opportunity Commission.

e. Discussions of Trade-offs

The following comparative discussion highlights the differences among the alternatives. Major advantages, or benefits, are noted along with major disadvantages, or costs. The purpose of the discussion is to provide an understanding of what will be gained or lost by implementing one alternative as opposed to another. Table 6-XV presents selected performance measures that summarize the trade-offs.

Alternative 1 - No-Action

This alternative will not require any extraordinary capital cost outlay or any increase in operating subsidy as a result of an intrinsic alteration of the service or system. It will not provide adequate capacity to accommodate forecast patronage increases. Hence, it will not provide any improvement in transit accessibility and it may discourage development within the region. It will have minimal environmental effects. As such, this alternative maximizes financial feasibility at the expense of any improvements in transit service or community development gains.

Alternative 2 - TSM

This alternative will require a relatively modest capital outlay, which is financially attainable, and will generate a modest increase (4.2 percent) in transit riders compared with the increased ridership which may be attracted by the other build alternatives. Its projected operating cost deficit will exceed that of the full LRT/Bus Shuttle alternative, and this deficit is likely to be fundable within the region's dedicated sales tax revenues. This alternative's environmental effects will be negligible. This alternative will have small but positive land development effects.

Alternative 3 - LRT/Bus Shuttle

This alternative will attract significant additional ridership (10.1 percent) and daily guideway ridership at a greater capital cost. Its adverse environmental effects will be relatively minor -- limited residential and business displacements and some increases in noise levels. It is EWGCC's opinion that the most significant advantage of this alternative is its sizable station-related economic development

TABLE 6-XV
SUMMARY OF SIGNIFICANT IMPACT TRADE-OFFS

Impact Measures	No-Action	TSM	LRT/ Bus Shuttle	3a - CWE	3b - Delmar	3c - UMSL
Daily New Trips	0	6,181	14,706	6,314	7,608	10,391
Daily Guideway Ridership	0	0	37,127	16,256	19,956	27,982
Average Systemwide Transit Travel Time (in minutes)	44.3	43.3	40.1	42.1	41.7	40.9
Total Project Cost* (in millions of 1984 dollars)	0	$29.7	$262.8	$154.3	$169.8	$190.9
Annual Operating Cost (in millions of 1984 dollars)	$86.8	$91.2	$93.0	$94.1	$94.2	$94.2
Reduced Daily Parking Requirements at Major Activity Centers	0	2,818	6,685	2,870	3,458	4,723
Increased Operating Deficit (in millions of 1984 dollars)	0	$3.4	$2.0	$5.4	$5.0	$4.4
Equivalent Annual Cost per New Rider (Federal/Total Index in 1984 dollars)	n.a.	n.a.	$6.09/ 8.95	$288.29/ 373.84	$27.90/ 36.99	$10.21/ 13.98
Equivalent Annual Cost per Hour of User Benefit (Federal/Total Index in 1984 dollars)	n.a.	n.a.	$2.96/4.01 to 5.44/7.37	n.a.	n.a.	n.a.
Development Potential Near Station Sites (in millions of 1984 dollars)**	0	0	$488.2	$364.5	$393.4	$440.2

*Project cost for LRT/Bus shuttle alternatives includes the asset value of locally-owned fixed facilities and railroad rights-of-way.

**Developmental potential dollars are 1986 values expressed in 1984 dollars, based on ENR construction cost index for St. Louis.

benefits, including construction investment, added construction and permanent jobs, faster office space lease-up, increased retail sales, greater convention delegate expenditures, and increased local tax revenues. Also important from the local perspective is the potential to use existing assets to satisfy, at least partially, St. Louis' local match. Among the intermediate-length options, subalternative 3a will generate the least additional ridership, but it will have the lowest capital cost. By comparison, subalternative 3c will have the highest interemediate-length ridership, and the highest intermediate-length cost. Subalternative 3b's ridership and cost will fall between 3a and 3c.

A final consideration is whether any of the build alternatives are cost-effective, as such is defined by UMTA. Using the two indexing procedures developed by UMTA and the agency's federal perspective for each, UMTA uses a figure of $6.00 per new rider and $8.00 per hour of user benefits as an upper level of cost-effectiveness. The full LRT/Bus shuttle alternative completely satisfies this trade-off analysis in terms of cost per hour of user benefit (low of $2.96 to high of $5.44).

Community Perspective

The St. Louis community has expressed negligible interest in the TSM alternative and strong support for the full light rail alternative. Elected officials and the general public support the LRT/bus shuttle alternative. The EWGCC board of directors, which includes the elected leaders of the region's major political subdivisions, has endorsed the LRT/bus shuttle alternative. St. Louis Mayor Vincent C. Schoemehl, Jr. and St. Louis County Executive Gene McNary both support the LRT alignment which will serve their jurisdictions. A November 27, 1986 Central West End Journal poll showed that the President and 21 members of the St. Louis Board of Aldermen feel that St. Louis needs a light rail system; only three board members expressed any reservations. A random telephone survey of 296 registered city voters and 301 county voters conducted in October 1986 by SRI Research Center of Lincoln, Nebraska found 78 percent of the city respondents and 72 percent of the county respondents favor building a light rail transit system between downtown and Lambert Field. Only 18 percent of the city respondents and 23 percent of the county respondents opposed building the system. Reusing underutilized existing assets, including the Eads Bridge, tunnel, and rail rights-of-way, as well as stimulating economic development at station areas are most frequently mentioned as the most positive features of the proposed light rail system.

Citizens for Modern Transit (CMT), which includes a volunteer, dues paying membership of over 300, has been organized to advocate transit improvements in the St. Louis community including the light rail transit project. CMT has made over 100 presentations about light rail transit to community groups, sponsored field trips to Pittsburgh and Portland which informed 77 community leaders about light rail transit in those communities, and hosted a transportation weekend (November 14-16, 1986) at St. Louis Union Station which attracted an estimated 5,000 residents to inspect a new LRT car and light rail transit exhibits. CMT's efforts show substantial interest and growing community support for a light rail transit system in St. Louis.

6.3 FINANCIAL PLAN FOR THE LOCALLY PREFERRED ALTERNATIVE

A financial plan was prepared for the locally preferred alternative, Alternative 3--LRT/Bus shuttle. A full discussion of this plan is presented in Technical Report No. 26 (TR-26), "Financing Plan." While the basic assumptions used in the TR-26 financial plan are similar to those cited in the above section 6.1.c discussion on the comparative analysis of operating costs and revenues for the six alternatives investigated during PE, certain refinements are incorporated in TR-26 to definitively evaluate the LRT/Bus shuttle preferred alternative and to capture the capital funding requirements.

The financial plan for the preferred alternative addresses the recurring and non-recurring revenues and expenses, both operational and capital, in addition to the UMTA-required Capital Reserve Account funding. Upon completion of the LRT/Bus shuttle alternative (Alternative 3), the Capital Reserve Account will be converted to a general operating reserve fund.

Two financial scenarios for funding the Central/Airport Corridor LRT capital improvements and the operating costs of the LRT/Bus shuttle alternative were developed (Tables 6-XVI and 6-XVII). These scenarios encompass the impact on revenue and expense variables that differing assumptions for the future may have. (See TR-26 for details.)

Under UMTA's Major Capital Investment Policy, local financial commitment to proposed projects is evaluated in terms of three factors: the proposed non-federal capital contribution, the strength of the proposed capital financing plan including provisions for cost overruns, and the stability and reliability of sources of operating deficit funding. The EWGCC financial plan responds to these factors as follows:

a. Non-Federal Capital Contributions. Developing the LRT component of the LRT/Bus shuttle alternative in the Central/Airport Corridor is estimated to cost \$335.1 million in escalated dollars. The EWGCC financial plan seeks \$251.3 million in UMTA Section 3 funding, or a federal share of 75 percent. The bus system improvements to be implemented in conjunction with the LRT development require \$6.7 million, and the EWGCC plan proposes funding these improvements with 80 percent federal participation through the UMTA Section 9 program. Assuming the value of real property assets proposed to be used as the local share is reaffirmed by additional appraisal at least equal to \$83.8 million in escalated dollars, the full local match for Section 3 program funds will be realized with these infrastructure assets.

b. Proposed Capital Financing Plan. All necessary non-federal capital costs have been identified for the project. Agreements with the N&W and TRRA railroad companies are being reviewed by those railroad companies and will be completed in advance of a decision to fund the LRT project. To provide for unanticipated capital cost overruns in developing the LRT component, the EWGCC plan proposes to set aside, from annual net operating income and unobligated general reserve funds, an amount equal to ten percent of the value of annual construction contracts to finance the UMTA-required Capital Reserve Account. These funds, i.e., project reserve, are in addition to the \$19.9 million included in the LRT component budget for contingencies.

TABLE 6-XVI
ST. LOUIS LRT PROJECT SOURCES AND USES OF FUNDS--HIGH SCENERIO

(in million of dollars)

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
SOURCES														
Operating Revenues	$24.2	$24.8	$26.2	$28.6	$31.3	$35.5	$37.9	$41.2	$44.7	$47.8	$51.2	$53.6	$56.0	$58.4
State & Local Grants:														
State of Illinois	7.9	8.2	8.5	8.8	9.2	9.5	9.9	10.3	10.6	11.1	11.5	11.9	12.4	12.8
Madison County	1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.6	1.7	1.7	1.8	1.9	2.0	2.0
St. Clair County	2.7	2.8	2.9	3.0	3.1	3.2	3.4	3.5	3.6	3.8	3.9	4.1	4.2	4.4
City of St. Louis	16.8	17.6	18.5	19.4	20.4	21.4	22.4	23.6	24.7	26.0	27.3	28.6	30.1	31.6
St. Louis County	33.5	35.2	36.9	38.8	40.7	42.8	44.9	47.1	49.5	52.0	54.6	57.3	60.2	63.2
General Reserve														
Interest Income	0.0	0.1	0.6	0.8	1.2	1.2	0.3	1.2	0.4	0.5	0.7	0.9	1.0	1.2
Private Sector Contrib.														
a) Recurring	0.00	0.12	0.12	0.12	0.59	0.68	0.68	1.00	1.07	1.11	1.11	1.11	1.11	1.11
b) Single Payment	0.00	4.75	6.85	6.20	1.99	0.00	1.55	0.25	0.00	0.40	0.00	0.00	0.00	0.00
UMTA Section 9														
(Operating Assistance)	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
UMTA Section 9														
(Capital Funds)	10.6	3.0	8.1	9.8	7.7	8.1	8.4	8.8	9.1	9.5	9.9	10.2	10.7	11.1
UMTA Section 3														
(LRT Only)	0.0	1.9	26.3	92.6	112.2	18.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IDOT Grants														
(Bus Capital)	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8
Subtotal Revenue for Operations	94.0	97.6	102.5	108.2	114.9	122.6	127.5	135.8	142.5	149.8	157.6	164.7	171.9	179.4
Subtotal Revenue for Capital Programs	14.6	13.8	45.7	113.2	126.7	31.6	15.3	14.6	15.0	16.0	16.3	17.0	17.8	18.6
Total Revenues	$108.6	$111.4	$148.1	$221.4	$241.6	$154.1	$142.9	$150.4	$157.5	$165.9	$174.0	$181.7	$189.7	$198.0
USES														
Operating Expenses	93.2	96.4	99.6	103.0	106.5	122.9	127.6	132.4	137.4	142.0	146.7	151.5	156.5	161.7
LRT Capital	0.0	1.9	26.3	92.6	112.2	18.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bus Capital	13.3	3.8	10.1	13.6	11.3	10.1	10.5	10.9	11.3	11.8	12.3	12.8	13.3	13.8
Total Expenses	$93.2	$98.2	$125.9	$195.6	$218.6	$141.3	$127.6	$132.4	$137.4	$142.0	$146.7	$151.5	$156.5	$161.7
NET INCOME (LOSS) Operations	$0.8	$1.2	$2.8	$5.2	$8.4	($0.4)	($0.0)	$3.4	$5.1	$7.9	$11.0	$13.2	$15.4	$17.7
NET INCOME (LOSS) Capital Programs	$1.4	$8.2	$9.2	$7.0	$3.2	$3.1	$4.8	$3.7	$3.7	$4.3	$4.1	$4.3	$4.5	$4.8
GENERAL RESERVE														
Beginning Fund Balance, July 1	$0.0	$2.2	$11.4	$21.4	$26.3	$29.1	$30.4	$50.1	$57.2	$65.9	$78.0	$93.1	$110.5	$130.5
Revenues/Expenses														
Capital Program, Net	1.4	8.2	9.2	7.0	3.2	3.1	4.8	3.7	3.7	4.3	4.1	4.3	4.5	4.8
Operations, Net	0.8	1.2	2.8	5.2	8.4	(0.4)	(0.0)	3.4	5.1	7.9	11.0	13.2	15.4	17.7
LRT Capital Reserve Acc't	0.0	(0.1)	(2.1)	(7.3)	(8.9)	(1.5)	14.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest Income	0.0	0.1	0.6	0.8	1.2	1.2	0.3	1.2	0.4	0.5	0.7	0.9	1.0	1.2
Ending Fund Balance, June 30 (Unencumbered)	$2.2	$11.4	$21.4	$26.3	$29.1	$30.4	$50.1	$57.2	$65.9	$78.0	$93.1	$110.5	$130.5	$153.0

SOURCE: Technical Report No. 26. "Financing Plan", East-West Gateway Coordinating Council

TABLE 6-XVII
ST. LOUIS LRT PROJECT SOURCES AND
USES OF FUNDS--LOW SCENERIO
(in millions of dollars)

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
SOURCES														
Operating Revenues	$21.8	$22.2	$23.6	$25.7	$28.2	$32.0	$34.1	$37.1	$40.3	$43.1	$46.1	$48.3	$50.4	$52.6
State & Local Grants:														
State of Illinois	7.9	8.2	8.5	8.8	9.2	9.5	9.9	10.3	10.6	11.1	11.5	11.9	12.4	12.8
Madison County	1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.6	1.7	1.7	1.8	1.9	2.0	2.0
St. Clair County	2.7	2.8	2.9	3.0	3.1	3.2	3.4	3.5	3.6	3.8	3.9	4.1	4.2	4.4
City of St. Louis	16.8	17.4	18.1	18.8	19.6	20.4	21.2	22.0	22.9	23.8	24.8	25.8	26.8	27.9
St. Louis County	33.5	34.8	36.2	37.7	39.2	40.8	42.4	44.1	45.8	47.7	49.6	51.6	53.6	55.8
General Reserve														
Interest Income	0.0	0.0	0.2	0.5	0.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Private Sector Contrib.														
a) Recurring	0.00	0.05	0.05	0.05	0.14	0.14	0.14	0.34	0.41	0.46	0.46	0.46	0.46	0.46
b) Single Payment	0.00	2.25	4.40	3.25	0.70	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UMTA Section 9 (Operating Assistance)	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
UMTA Section 9 (Capital Funds)	10.6	3.0	8.1	9.8	7.7	8.1	8.3	8.4	8.6	8.8	8.9	9.1	9.3	9.5
UMTA Section 3 (LRT Only)	0.0	1.9	26.3	92.6	112.2	18.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IDOT Grants (Bus Capital)	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8
Subtotal Revenue for Operations	91.6	94.4	98.4	103.3	108.7	115.3	119.5	125.6	131.9	137.9	144.2	149.8	155.6	161.6
Subtotal Revenue for Capital Programs	14.6	11.3	43.1	110.2	125.2	31.3	14.3	13.7	14.1	14.5	14.9	15.3	15.7	16.2
Total Revenues	$106.2	$105.7	$141.6	$213.4	$234.0	$146.6	$133.8	$139.4	$146.0	$152.4	$159.1	$165.2	$171.4	$177.7
USES														
Operating Expenses	93.2	96.4	99.6	103.0	106.5	122.9	127.6	132.4	137.4	142.0	146.7	151.5	156.5	161.7
LRT Capital	0.0	1.9	26.3	92.6	112.2	18.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bus Capital	13.3	3.8	10.1	13.6	11.3	10.1	10.5	10.9	11.3	11.8	12.3	12.8	13.3	13.8
Total Expenses	$106.5	$102.0	$136.0	$209.2	$229.9	$151.4	$138.1	$143.3	$148.8	$153.8	$158.9	$164.3	$169.8	$175.5
NET INCOME (LOSS) Operations	($1.6)	($1.9)	($1.2)	$0.3	$2.2	($7.7)	($8.1)	($6.8)	($5.5)	($4.0)	($2.4)	($1.7)	($0.9)	($0.1)
NET INCOME (LOSS) Capital Programs	$1.4	$5.6	$6.7	$4.0	$1.8	$2.9	$3.9	$2.8	$2.8	$2.7	$2.6	$2.6	$2.5	$2.4
GENERAL RESERVE														
Beginning Fund Balance, July 1	$0.0	($0.2)	$3.3	$6.7	$3.6	($1.2)	($7.4)	($6.6)	($10.5)	($13.3)	($14.7)	($14.5)	($13.6)	($12.0)
Revenues/Expenses														
Capital Program, Net	1.4	5.6	6.7	4.0	1.8	2.9	3.9	2.8	2.8	2.7	2.6	2.6	2.5	2.4
Operations, Net	(1.6)	(1.9)	(1.2)	0.3	2.2	(7.7)	(8.1)	(6.8)	(5.5)	(4.0)	(2.4)	(1.7)	(0.9)	(0.1)
LRT Capital Reserve Acc't	0.0	(0.1)	(2.1)	(7.3)	(8.9)	(1.5)	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest Income	0.0	0.0	0.2	0.5	0.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Ending Fund Balance, June 30 (Unencumbered)	($0.2)	$3.3	$6.7	$3.6	($1.2)	($7.4)	($6.6)	($10.5)	($13.3)	($14.7)	($14.5)	($13.6)	($12.0)	($9.7)

SOURCE: Technical Report No. 26. "Financing Plan". East-West Gateway Coordinating Council

c. Operating Deficit Funding. Operating assistance will be available from the dedicated Transportation Sales Tax in Missouri and from the dedicated taxes for the two Mass Transit Districts in Illinois. EWGCC considers the tax bases for these dedicated funds to be stable and reliable over the project construction period and through the year 2000 planning period. Sufficient non-operating revenues are expected to be available to cover operating deficits.

If UMTA decides to financially support the LRT project, EWGCC and UMTA will negotiate a full funding grant agreement with a fixed ceiling on the federal contribution, subject to a defined method of adjustment for inflation. Bi-State will also be a party to the agreement, and together EWGCC and Bi-State will be required to complete construction of the project, as defined, to the point of initiation of revenue operations, absorbing any additional costs incurred, except under certain specified extraordinary circumstances. A schedule of anticipated annual federal grant awards will be included in the agreement; the awards will be dependent on congressional fiscal year appropriations.

CHAPTER 7: DRAFT EIS COMMENTS AND RESPONSES

The purpose of this chapter is to present and respond to substantive comments raised concerning information given in the AA/DEIS. Comments received during the public comment period were responsible for modifying the proposed alignment as well as for significantly influencing the selection of the preferred alternative. This entire FEIS document reflects the responses to those comments, which are individually reviewed in this chapter.

7.1 AA/DEIS REVIEW AND COMMENT PROCESS

UMTA and EWGCC issued the St. Louis Central/Airport Corridor AA/DEIS for public comment on June 22, 1984. The document reviews various major capital investments then under consideration for improving the transporation network in the St. Louis metropolitan area. The public was encouraged to comment on the alternatives presented in the AA/DEIS during a 45-day period following release of the document. A public hearing on the alternatives was held at the Cervantes Convention and Exhibition Center in downtown St. Louis on July 31, 1984. Over 300 persons attended this public hearing, and 86 of those in attendance chose to make comments. Further, 82 copies of the AA/DEIS were distributed to local, state, and federal agencies as well as public libraries and a number of interested associations and groups.

7.2 DESCRIPTION OF COMMENTS RECEIVED

The majority of the 215 comments received was in support of an LRT system for the St. Louis region. A total of 110 (51 percent) expressed support for LRT. Of the remaining 105 comments received, 79 (37 percent) expressed opposition to the proposed Clayton LRT connections, which are exluded from the locally-preferred alternative.

a. Summary of Oral Responses

Out of over 300 persons attending the July 31, 1984 public hearing, 86 commented on various aspects of the transportation alternatives considered in the AA/DEIS. Of the 86 oral statements made at the public hearing, 65 speakers (76 percent) favored LRT, six speakers (seven percent) opposed the Clayton LRT connections, and six individuals (seven percent) expressed opposition to LRT, two of whom noted their support for TSM. Of the remaining 10 percent, two persons favored an expanded LRT system, one person suggested an alternate route for LRT, one person registered concern about LRT's impact on bus service, two parties were concerned about handicapped accessibility, and three persons noted other areas of concern.

b. Summary of Written Comments

A total of 130 written comments was received concerning the AA/DEIS transit alternatives. The majority of written comments indicates support for the LRT alternative. A total of 42 letters, comprising 32 percent of the written comments, expresses support for the LRT alternative. The largest grouping of written comments opposes the Clayton LRT connections. A total of 71 letters (55 percent) indicates opposition to any such alignment. Together these two groups comprise 87 percent of all written comments. Of the remaining 13 percent, the letters of six persons express opposition to any LRT alternative, four make no comment, one supports TSM, one is concerned about handicapped accessibility, one person expresses general concerns about transit, and four comments are from review agencies.

c. Organization of the Comments and Responses

All letters, cards, and the transcript of the public hearing have been reviewed. Substantive comments have been identified, classified into one of eight different subject areas, and numbered consecutively. Because there was some overlap and repetition in many comments, similar comments were consolidated and paraphrased. As a result, the comments that appear in this chapter are often not the precise words found in the letter or oral testimony. This has been done to reduce duplication and is in no way intended to obscure the substance of a comment. Copies of original letters, together with a cross-index of comments, are available for public inspection at EWGCC. The eight subject areas covered in this chapter are as follows:

1. Other Alternatives (Page 7-3 to 7-13)
2. Environmental Concerns (Page 7-13 to 7-14)
3. Expanded LRT System (Page 7-14)
4. Pedestrian Safety (Page 7-15)
5. Impact on Existing Mass Transit (Page 7-15)
6. Coordination with Other Transportation Systems (Page 7-16 to 7-17)
7. Handicapped Accessibility (Page 7-17)
8. Miscellaneous (Page 7-17 to 7-18)

Table 7-I identifies those who provided testimony or written comments on the AA/DEIS. Where agencies or organizations are listed, the spokesperson is also indicated. If a comment did not require a response this is indicated by "comment noted."

7.3 COMMENTS AND RESPONSES BY SUBJECT AREA

a. Other Alternatives

Comment 25.1: "Although the per mile cost of construction may be kept relatively low by using existing right of way, the overall price tag does not appear to be cost effective when compared to the other alternatives. We have taken the position that the more cost effective alternatives must be implemented. We oppose construction of the rail system." (Normandy Municipal Council).

Response: The preferred alternative is more costly than the TSM alternative or maintenance of the existing bus fleet under the no-action alternative. However, it must be noted that cost effectiveness cannot be expressed simply in terms of a comparison of capital expenditures for the alternatives. The cost effectiveness of the system must include a careful review of other benefits realized by the various systems. LRT will significantly reduce total transit vehicle miles resulting in substantial energy savings, while achieving an 8.8 percent reduction in transit system travel time. This reduction equates to a savings in lost productivity which has to be considered in any cost benefit analysis. Finally the development potential stimulated by LRT

TABLE 7-I
GROUPS, AGENCIES, AND INDIVIDUALS WHO COMMENTED ON THE AA/DEIS ALTERNATIVES

FEDERAL GOVERNMENT

1. Quentin Wilson, Congressman Robert Young's Office--Supports LRT, Comment Noted
2. Nathaniel Rivers, Representing Congressman Clay--Supports LRT, Comment Noted
3. United States Department of Agriculture, Soil Conservation Service, Paul F. Larson--Comment Noted
4. St. Louis District Corps of Engineers, Jack F. Rasmusson--Comment Noted
5. U.S. Department of Housing and Urban Development, Gary Oltican--Acknowledges receipt of AA/DEIS--Comment Noted
6. Senator John C. Danforth--Supports LRT, Comment Noted
7. U.S. Department of Health and Human Services, Public Health Service, Stephen Margolis--Pedestrian Safety, Comment 7.1 and Environmental Concerns, Comment 7.2, 7.3
8. U.S. Department of Transportation, Federal Railroad Administration, Robert N. Stearns--Coordination with Other Transportation Systems, Comment 8.1

STATE GOVERNMENT

9. Missouri Department of Natural Resources, Division of Environmental Quality, Robert J. Schreiber Jr.--Environmental Concerns, Comment 9.1
10. Missouri Highway and Transportation Commission, Robert N. Hunter--Coordination with Other Transportation Systems, Comment 10.1

ST. CLAIR COUNTY

11. St. Clair County Board, Jerry F. Costello--Supports LRT, Comment Noted

ST. LOUIS COUNTY

12. St. Louis County Council, Ellen R. Conant, Councilwoman--Acknowledges receipt of AA/DEIS, Comment Noted

CITY OF ST. LOUIS

13. Board of Alderman, City of St. Louis, Thomas E. Zych--Supports LRT, Comment Noted
14. City of St. Louis, Energy Management Program, Roger Tinklenberg--Supports LRT, Comment Noted
15. St. Louis Community Development Agency, Deborah Patterson--Supports LRT, Comment Noted
16. Board of Public Service, Martin Walsh--Supports LRT, Comment Noted

17. Director, A. J. Cervantes Convention Center and Kiel Auditorium, Bruce Sommer--Supports LRT, Comment Noted
18. Office of Business Development, Michael W. Cordes--Supports LRT, Comment Noted
19. Executive Director of Development, Mayor's Office, Lynton Edwards--Supports LRT, Comment Noted

CITY OF UNIVERSITY CITY

20. University City Mayor, Joseph Mooney--Opposes Clayton LRT connections, Comment Noted
21. Chairperson, University City Planning Commission, Janet Majerus--Opposes Busway and Clayton LRT connections, Comment Noted
22. University City First Ward Councilwoman, Cynthia Metcalfe--Opposes Clayton LRT connections, Comment Noted
23. University City City Manager, Frank Ollendorff--Opposes Clayton LRT connections, Comment Noted

CITY OF NORMANDY

24. City of Normandy Councilwoman, Martha Hoffstetter--Questions tunnel safety, Miscellaneous, Comment 24.1
25. Normandy Municipal Council, Janet C. Walker--Supports most cost effective system, Other Alternative, Comment 25.1

VILLAGE OF BEL NOR

26. Village of Bel-Nor, Ronald P. Baron--Supports LRT with I-70 Alignment, Other Alternative, Comment 26.1.

CITY OF CLAYTON

27. City of Clayton, Alderman, Elizabeth Rob--Supports LRT, Opposes Clayton LRT connections, Comment Noted.

CIVIC/INTEREST GROUPS

28. City Center Redevelopment Corp., Paul C. Reinert--Supports LRT, Comment Noted
29. Parkview Subdivision Agents, Gary T. Carr, Secretary--Opposes Clayton LRT connections, Comment Noted
30. University Hills Trustees, Robert Elgin, Miriam Singer, Thomas Harvey--Oppose Clayton LRT connections, Comment Noted
31. Agents of Ames Place, John Morris, Ron Rodgers, Fritz Clifford--Oppose Clayton LRT connections, Comment Noted
32. The Urban League of Metropolitan St. Louis, William E. Douthit--Supports LRT, Comment Noted
33. American Institute of Architects/St. Louis Chapter, Gregory S. Palermo--Supports LRT, Comment Noted
34. St. Louis Symphony Orchestra, David J. Hyslop--Supports LRT, Comment Noted

35. Missouri Athletic Club, Cooper Williams--Supports LRT, Comment Noted
36. St. Louis Labor Council, Robert J. Kelley--Supports LRT, Comment Noted
37. Illinois Rail, W. David Randall--Supports LRT, Comment Noted
38. Target 2000, Willie B. Nelson--Supports LRT, Comment Noted
39. Paraquad, Max. J. Starkloff--Handicapped Accessibility, Comment 39.1.
40. St. Louis Transit Study, R. Hal Dean--Supports LRT, Comment Noted
41. St. Louis Chapter National Association of Industrial and Office Parks, Jack Reis--Supports LRT, Comment Noted
42. Bi-State Development Agency, Michael Setzer--Supports LRT, Comment Noted
43. League of Women Voters, Lenore Loeb--Other Alternatives, Comment 43.1
44. St. Louis Convention and Visitors Bureau, Robert F. Case--Supports LRT, Comment Noted
45. Legislative Director, Paralyzed Veterans of America, Thomas Begley--Handicapped Accessibility, Comment 45.1
46. Associated General Contractors of St. Louis, Joe Hamilton--Supports LRT, Comment Noted
47. St. Louis Regional Commerce and Growth Association, Guy Jester--Supports LRT, Comment Noted
48. St. Louis Electrical Board, Sandy Rothschild--Supports LRT, Comment Noted
49. St. Louis Section American Planning Association, Joe Marking--Supports LRT, Comment Noted
50. Bi-State Drivers and Maintenance, Robert Bartlett--Impact on Existing Mass Transit, Comment 50.1
51. Neighborhoods United Against the University City-Clayton Spur, Susan Sullivan--Miscellaneous, Comment 51.1
52. St. Louis Chapter American Institute of Architects, Gregory S. Palermo--Supports LRT, Comment Noted
53. Light Rail Committee of Parkview Place, Judith Wilson--Opposes Clayton LRT connection, Comment Noted
54. St. Louis Transportation Council, Leonard L. Griggs--Supports LRT, Comment Noted
55. National Association of Railroad Passengers, Mark S. Bucol--Supports LRT, Comment Noted
56. Landmarks Association of St. Louis, Rosemary Davidson--Supports LRT, Comment Noted
57. Target 2000 Metro-East Associates, Ted Hauser--Supports LRT, Comment Noted
58. Coalition for the Environment, Mark Schaeffer--Supports LRT, Pedestrian, Comment 58.1
59. Trustees for Maryland Terrace Subd., David Smith--Supports LRT with Clayton LRT connections deleted, Comment Noted
60. Laclede's Landing Redevelopment Corp., Thomas Purcell--Supports LRT, Comment Noted
61. Lafayette Square Restoration Committee, David A. Visintainer--Supports LRT, Comment Noted

62. Home Builders Association of St. Louis, Celeste Schybal--Supports LRT, Comment Noted
63. Soulard Restoration Group, Paul Kjorlie--Supports LRT, Comment Noted
64. Washington Heights Subd., Edward Jones--No Specific Position, Comment Noted
65. Downtown St. Louis, Inc., Edward Ruesing--Supports LRT, Comment Noted
66. Stella Maris Child Center, Dennis Shaughnessy--Supports LRT, Comment Noted
67. Neighborhood Marketing Services, Laurel Menig--Supports LRT, Comment Noted
68. St. Louis Transit Study, Jill Roach--Supports LRT, Comment Noted
69. Citizens for Modern Transit, Richard Claybour--Supports LRT, Comment Noted

EDUCATIONAL INSTITUTIONS/GROUPS

70. Harris-Stowe State College, Henry Givens Jr.--Supports LRT, Comment Noted
71. Parks College, Robert T. Spiker--Supports LRT, Comment Noted
72. University of Missouri-St. Louis, Arnold B. Grobman--Supports LRT, Comment Noted
73. St. Louis University, Thomas R. Fitzgerald--Supports LRT, Comment Noted
74. Washington University in St. Louis, William H. Danforth--Supports LRT, Comment Noted
75. Crossroads School, Arthur Lieber--Supports LRT, Comment Noted
76. University of Missouri-St. Louis, Janet Sanders--Supports LRT, Comment Noted

BUSINESS ENTITIES

77. Mackey and Associates, Eugene J. Mackey--Supports LRT, Comment Noted
78. Gateway Center of St. Louis, Inc., Myron D. Levey--Supports LRT, Comment Noted
79. Thau-Nolde, Inc., Patricia Thau rudloff--Supports LRT, Comment Noted
80. Hastings & Chivetta, J. James Flynn--Supports LRT, Comment Noted
81. St. Louis Centre, Larry Troyer--Supports LRT, Comment Noted
82. Westminster Builders, Dean Burns--Supports LRT, Comment Noted
83. St. Louis Union Station, Harry A. Pollay--Supports LRT, Comment Noted
84. Midcoast, John T. Tucker--Supports LRT, Comment Noted
85. Boyd's, Robert J. Witt--Supports LRT, Comment Noted
86. Civic Systems, Inc., Lonnie E. Haefner--Supports LRT, Comment Noted
87. Ralston Purina Co., Fred H. Perabo--Supports LRT, Comment Noted
88. River Club, John F. O'Neil--Supports LRT, Comment Noted
89. Pantheon Corp., John G. Roach--Supports LRT, Comment Noted
90. Breckenridge Hotels, Corp., Donald E. Breckenridge--Supports LRT, Comment Noted

91. Stan Musial & Biggie's Inc., Stan Musial--Supports LRT, Comment Noted
92. The Christner Partnership, George W. Johannes--Supports LRT, Comment Noted
93. Kenneth Balk and Associates, John Booth--Supports LRT, Comment Noted
94. 555 Washington Avenue, Kimble Cohn--Supports LRT, Comment Noted
95. Pantheon Corporation, John Roach--Supports LRT, Comment Noted

OTHERS

96. Ken Lauter--Supports LRT, Comment Noted
97. John B. Kistner--Supports LRT, Comment Noted
98. Harry A. Pollay--Supports LRT, Comment Noted
99. Cheryle J. Cann--Supports LRT, Comment Noted
100. Jim Sackett--Supports LRT, Comment Noted
101. T. Kurth Redeker--Supports LRT, Comment Noted
102. Anthony Marchiando--Supports LRT, Comment Noted
103. Janet E. Tervydis--Supports LRT, Comment Noted
104. Carolyn Hewes Toft--Supports LRT, Comment Noted
105. Robert G. Ducker--Supports LRT, Comment Noted
106. Joseph Kaye--Opposes LRT, No Reason Cited, Comment Noted
107. G. Robert Biship--Opposes LRT, No Reason Cited, Comment Noted
108. Hazel Williams--Opposes LRT, No Reason Cited, Comment Noted
109. Mrs. L. D. Warren--Opposes LRT, No Reason Cited, Comment Noted
110. Heinrich & Dorthea Bruschke--Oppose LRT, Prefer TSM, Comment Noted
111. Melinda Burton--Opposes LRT, System Improperly Located, Comment Noted
112. David Smith--Opposes Clayton LRT connections, Comment Noted
113. Cynthia Metcalf--Opposes Clayton LRT connections, Comment Noted
114. Robert W. Herr--Opposes Clayton LRT connections, Comment Noted
115. Mrs. Thomas O. Patterson--Opposes Clayton LRT connections, Comment Noted
116. Richard D. Shewmaker--Opposes Clayton LRT connections, Comment Noted
117. Bea Kleeman--Opposes Clayton LRT connections, Comment Noted
118. Mr. & Mrs. Martiney--Oppose Clayton LRT connections, Comment Noted
119. Williad G. Bollinger--Opposes Clayton LRT connections, Comment Noted
120. James P. Boedeker--Opposes Clayton LRT connections, Comment Noted
121. Signe Lindquist--Opposes Clayton LRT connections, Comment Noted
122. Mary Pfennighausen--Opposes Clayton LRT connections, Comment Noted
123. Blair Pfennighausen--Opposes Clayton LRT connections, Comment Noted
124. Miriam Schonfeld--Opposes Clayton LRT connections, Comment Noted
125. Dr. & Mr. R. L. Kaufman--Oppose Clayton LRT connections, Comment Noted
126. Edward & Wendy Peskin--Oppose Clayton LRT connections, Comment Noted
127. Mr. John J. (illegible)--Opposes Clayton LRT connections, Comment Noted
128. Julia B. Goldstein--Opposes Clayton LRT connections, Comment Noted
129. Larry E. Sidwell--Opposes Clayton LRT connections, Comment Noted

130. Mr. & Mrs. John B. Fitzgerald--Oppose Clayton LRT connections, Comment Noted
131. Richard C. Snyder--Opposes Clayton LRT connections, Comment Noted
132. George D. Wilner--Opposes Clayton LRT connections, Comment Noted
133. Alice Marie Miller--Opposes Clayton LRT connections, Comment Noted
134. Andrea Jackson--Opposes Clayton LRT connections, Comment Noted
135. Victoria B. Lettes--Opposes Clayton LRT connections, Comment Noted
136. Jane E. Brownstone--Opposes Clayton LRT connections, Comment Noted
137. Dr. Jan Eigner--Opposes Clayton LRT connections, Comment Noted
138. Deborah Harris--Opposes Clayton LRT connections, Comment Noted
139. Alfred & Janet Katzenberger--Oppose Clayton LRT connections, Comment Noted
140. No Name Given--Opposes Clayton LRT connections, Comment Noted
141. Stephen & Edith Chan--Oppose Clayton LRT connections, Comment Noted
142. Eileen M. Mathews--Opposes Clayton LRT connections, Comment Noted
143. Alice Beffa Erdelin--Opposes Clayton LRT connections, Comment Noted
144. Mabel B. Schwonengerdt--Opposes Clayton LRT connections, Comment Noted
145. Sara P. Crews--Opposes Clayton LRT connections, Comment Noted
146. Isaak & Michele C. Doore--Oppose Clayton LRT connections, Comment Noted
147. Carol Rose--Opposes Clayton LRT connections, Comment Noted
148. Pat Saur--Opposes Clayton LRT connections, Comment Noted
149. Barbara Fraser--Opposes Clayton LRT connections, Comment Noted
150. Janice Kessler--Opposes Clayton LRT connections, Comment Noted
151. Sofia & Middleton Perry--Oppose Clayton LRT connections, Comment Noted
152. Howard J. Smith--Opposes Clayton LRT connections, Comment Noted
153. Stephen W. Skrainka--Opposes Clayton LRT connections, Comment Noted
154. Edwin D. Harris--Opposes Clayton LRT connections, Comment Noted
155. Sharon Hamel--Opposes Clayton LRT connections, Comment Noted
156. Lewis Fischbein & Gate Gibbs--Oppose Clayton LRT connections, Comment Noted
157. Willmeda Mathis Harris--Opposes Clayton LRT connections, Comment Noted
158. Robert A. Andrews--Opposes Clayton LRT connections, Comment Noted
159. Bruno Sonning--Opposes Clayton LRT connections, Comment Noted
160. Thomas P. Knoten--Opposes Clayton LRT connections, Comment Noted
161. Gerald McMahon Jr.--Opposes Clayton LRT connections, Comment Noted
162. James Markell--Opposes Clayton LRT connections, Comment Noted
163. Mr. W. Friedlander--Opposes Clayton LRT connections, Comment Noted
164. Mark & Mary Hartstein--Oppose Clayton LRT connections, Comment Noted
165. Anthony & Rebecca Graves--Oppose Clayton LRT connections, Comment Noted
166. Margaret Cowdry Park--Opposes Clayton LRT connections, Comment Noted
167. Mr. & Mrs. Lawrence Portnoff--Oppose Clayton LRT connections, Comment Noted
168. Todd & Trinka Wasik--Oppose Clayton LRT connections, Comment Noted
169. Henry A. Christopher--Opposes Clayton LRT connections, Comment Noted

170. Alice Schlessinger--Opposes Clayton LRT connections, Comment Noted
171. Patt Ruck Christie--Opposes Clayton LRT connections, Comment Noted
172. John R. Christie--Opposes Clayton LRT connections, Comment Noted
173. Teresa Thiel--Opposes Clayton LRT connections, Comment Noted
174. Roy & Marilynn Mathiesen--Oppose Clayton LRT connections, Comment Noted
175. Ellen Schlesinger--Opposes Clayton LRT connections, Comment Noted
176. Ernest W. Stix--Opposes Clayton LRT connections, Comment Noted
177. Thomas O. Coleman--Opposes Clayton LRT connections, Comment Noted
178. Michele Cohen--Opposes Clayton LRT connections, Comment Noted
179. Paul A. Britt--Opposes Clayton LRT connections, Comment Noted
180. Ron Taylor--Supports LRT with I-70 Alignment, Comment Noted
181. Reta Madsen--Opposes Clayton LRT connections, Comment Noted
182. Joseph P. McKenna--Other Alternative, Comment 182.1
183. Donna Laidlaw--Supports LRT, Comment Noted
184. Lawrence A. Lewis--Supports LRT, Comment Noted
185. Ron Stephens--Expanded System, Comment 185.1
186. Don Hastings--Supports LRT, Comment Noted
187. Kathy Stephan--Supports LRT, Comment Noted
188. Betty Lou Custer--Supports LRT, Comment Noted
189. Don Scott--Supports LRT, Hopes for Future Expansion, Comment Noted
190. Nathan Friedman--Supports LRT, Comment Noted
191. Susie Campbell--Supports LRT, Comment Noted
192. David Kennell--Supports LRT, Comment Noted
193. Sharon Quigley Carpenter, (Recorder of Deeds, City of St. Louis)--Supports LRT, Comment Noted
194. James Seaman--Supports LRT, Comment Noted
195. Roger Tinklenberger--Supports LRT, Comment Noted
196. Henry G. Siemer--Opposes LRT, Comment Noted
197. James Cartwright--Supports LRT, Comment Noted
198. Willie Mae Long--Supports LRT, Comment Noted
199. Arlen Jolley--Supports LRT, Comment Noted
200. Paul Hales--Supports LRT, Comment Noted
201. Marty Buchheit--Other Alternatives, Comment 201.1
202. A. E. Albert--Miscellaneous, Comment 202.1
203. Mickie Cuddihee--Supports LRT, Comment Noted
204. Darby R. Talley--Supports LRT with Future Expansion to St. Charles, Comment Noted
205. Vernon Cox--Opposes LRT, Comment Noted
206. Stuart Seidman--Supports LRT, Comment Noted
207. Maryietha Taylor--Supports LRT, Comment Noted
208. Robert Spicer--Supports LRT, Comment Noted
209. Donald Steinmeyer--Expanded System, Comment Noted
210. Fred Epstein--Supports LRT, Comment Noted
211. Wilma Kennell--Supports LRT, Comment Noted
212. Carl Pettit--Supports LRT, Comment Noted
213. David Neubauer--Supports LRT, Comment Noted
214. Sister Aline Giroux--Supports LRT, Comment Noted
215. Mike Donahue--Improve Handicapped Accessibility on Present Transit, Comment Noted

and unique to LRT is a significant factor when determining the effectiveness and benefits accruing from the preferred transit alternative.

Comment 26.1: "In our opinion we feel the I-70 Alternative, Figure 9 would provide the best service to the residents of Bel-Nor and also to the entire Normandy area including UMSL. The I-70 alignment provides for two (2) stations that would benefit both UMSL campuses (north and south) and still provide a park and ride log adjacent to the Normandy City Hall making the LRT accessible to the Bel-Nor-Normandy area." (Village of Bel-Nor)

Response: The proposed LRT alignment was altered from its original alignment along Natural Bridge Road to its present location commonly referred to as the I-70 alignment. This realignment of the proposed system responds to the issues set forth in the letter from the Village of Bel-Nor, while providing better access to additional communities in the area.

Comment 43.1: "The price tag for the TSM alternative is $38-$41 million compared to $229-$247.8 million for Alternative 5-LRT/bus shuttle, depending upon whether construction were completed in a four or six year period. The League cannot, in view of the large discrepancy in the price tag, support light rail over TSM unless we are assured that our concerns regarding success of the light rail option are addressed. Our primary concerns are: 1. Stable funding for operation and maintenance of the system; 2. Increased ridership; 3. Maintaining and improving the present bus system; and 4. Control of land use development along the corridor at the light rail stations." (League of Women Voters)

Response: The League's concern about stable funding was addressed in Chapter 6 of the AA/DEIS and is more specifically addressed in Chapter 6 of this FEIS. Other sources of funding, including vehicle sales taxes and motor fuel taxes, will be reviewed if and when additional funding is needed. The coordination of the TSM and bus shuttle service with the preferred LRT alternative will greatly enhance the LRT system's viability. The comfort, convenience, safety, and reliability designed into the LRT alternative will result in increased ridership.

The bus system will be maintained and its operational viability improved under the TSM component of the selected alternative. Finally, the control of land use and development along the alignment has been carefully studied and specific recommendations have been made. (See TR-23: Implementation Plan: Station Area Development.) The use of a single umbrella planning agency, such as EWGCC, will significantly enhance the realization of proper land use and development mixes.

Comment 181.1: "Light rail system would cost much more than the TSM bus improvement plan. The TSM addresses the real need of the St. Louis area...it builds on Bi-State's existing lines, while light rail looks at only one corridor, which is not a corridor in terms of identifiable travel patterns." (Joseph P. McKenna)

Response: The LRT alternative will cost more than the TSM alternative, in part, because the LRT system will be developed in combination with TSM improvements made outside of the LRT corridor. The locally-preferred alternative, the LRT/Bus shuttle FEIS Alternative 3, incorporates all of the TSM (Alternative 2) improvements recommended for the Bi-State bus system, except in the LRT corridor where bus/rail interface will be integrated to effect optimal system and service improvements. Additional benefits which will accrue from LRT include economic development potential, decreased travel times, and improved accessibility to three of the area's five major employment centers as well as concentrated areas of transit-dependent population. The LRT alignment is a corridor in terms of identifiable travel patterns. By far the most pronounced travel pattern in the St. Louis region is the east-west corridor along I-70 and U.S. 40. Further, considerable transit-related movement occurs in the area since three of the area's five major centers of employment, as well as three major universities, are located along the alignment.

Comment 201.1: "My main concern is basically Natural Bridge Road from Normandy, Bel-Nor, Bel-Ridge, and the Berkeley area. How would light rail running along Natural Bridge affect traffic, homeowners, businesses, and the tax base...Where in Natural Bridge is LRT to be constructed?" (Marty Buchheit)

Response: The utilization of Natural Bridge Road from Normandy to Lambert-St. Louis International Airport has been dropped from consideration and replaced with the LRT alignment paralleling I-70. The I-70 alignment results in nine residential takings, no impacts on any commercial property, and ultimately a significant benefit for the region's tax base.

b. Environmental Concerns

Comment 7.2: "The discussions of air quality in Chapter 3 of the Draft EIS should include the specific carbon monixide (CO) levels measured at a distance of 50 feet from the maximum expected volume of buses operating along any segment of the busway or the Locust Street Transit Mall (line sources) and from the maximum expected volume of automobiles accessing the busiest park-n-ride lot (area sources)." (Department of Health and Human Services)

Response: Comments on CO monitoring along the busway and transit mall have been rendered moot since neither of these proposed actions is being pursued. CO levels were established for the busiest park-n-ride lot as well as for the LRT alternative under review in this document. These levels are well under the threshold levels in the National Ambient Air Quality Standards.

Comment 7.3: "The projections of maximum passby noise for light rail transit (LRT) vehicles are based on a model developed for the Calgary LRT system. During the refinement of this model, the Draft EIS stated that adjustments were included to consider air and ground attenuation of the St. Louis area. What procedures were followed and what parameters were considered in this refinement process? Could you specify what "available mitigation measures" will be used at each potential impact area identified?" (Department of Health and Human Services)

Response: The refinements in passby noise estimation are detailed in the AA/DEIS and PE Noise and Vibration (No. 14) technical reports. Further, no noise mitigation measures are required as a result of the selected alternative's proposed design and site-specific conditions.

Comment 9.1: "We feel that it would be safer for worker health if traffic could be diverted completely away from the construction site during work hours. We are concerned that, because of the design of the project (below grade work) and traffic volumes along routes, concentrations of carbon monoxide will increase dramatically if traffic is allowed to congest along reduced lane highways." (Missouri Department of Natural Resources)

Response: Carbon monoxide problems during construction should not be a problem. A complete maintenance of traffic program has been developed to minimize traffic congestion near construction sites; the program will be finalized in Final Engineering. Most of the LRT alignment will use existing rail rights-of-way; mixed-traffic conditions have been eliminated; and the extent of below-grade sections near areas of potential traffic congestion are limited in number. Worker exposure to carbon monoxide from construction-related traffic congestion is frequently encountered in transportation construction projects. Standard roadway construction practice will be followed throughout the development of the light rail system.

c. Expanded LRT System

Comment 185.1: "No consideration is given to locating the Light Rail System in the East St. Louis area in such a manner that it might be extended at some future time further east in Illinois." (Earl Lazerson, Southern Illinois University at Edwardsville)

Response: The system proposed in the preferred alternative is an extensive undertaking designed to service large concentrations of transit dependent population as well as three of the region's five largest employers. Despite the length of the proposed alignment the light rail system under development can be extended and is anticipated to be extended both in Illinois and Missouri. The preferred alignment in East St. Louis does not preclude future expansion. A number of possible connections are possible, including alignments to Alton, Edwardsville, Granite City, Fairview Heights, and Belleville. The present system is the first step in establishing a viable light rail system in the St. Louis region.

d. Pedestrian Safety

Comment 7.1: If the guideway-alignment alternative for the LRT alternative is selected, bicyclists must be alerted to the potential hazard associated with the one-inch joint groove on one side of each rail. The Draft EIS should clarify the safety features that will ensure safe pedestrian/bicycle crossing if the LRT alternative is selected. (Department of Health and Human Services)

Response: Concern for bicyclist safety has been obviated by removing any consideration of on-street right-of-way for joint LRT and traffic use; this will eliminate parallel bicycle and LRT movements in the same right-of-way. In the few instances where the proposed alignment will cross existing streets at grade, signal-protection devices will be used to ensure pedestrian and bicyclist safety.

Comment 58.1: "We strongly suggest bicycle paths to all stations from key neighborhoods with bicycle lockers and storage facilities at stations, racks for carrying bicycles on the light rail cars." In general, "the coalition supports light rail Alternative 5 with the addition of bicycle feeder facilities." (Coalition for the Environment)

Response: The extensive commitment in resources and acquisition for the development of bike feeder paths to LRT stations and the associated improvements to those facilities cannot be justified in terms of the number of individuals who would utilize such facilities. If in the future such a system appears warranted then actions could be undertaken to identify the feasibility of such a system.

e. Impact on Existing Mass Transit

Comment 50.1: "Our concerns are that light rail will never be in direct competition with our present bus service and not be adversely affected by light rail." (Robert Bartlett)

Response: Light rail is being developed in close cooperation with the existing Bi-State bus system. The proposed LRT improvements rely heavily on bus shuttle and bus feeder lines to aid in the movement of transit passengers to and from LRT stations. The system's viability is dependent on a symbiotic relationship between the existing bus network and the proposed LRT system.

f. Coordination with Other Transportation Systems

Comment 8.1: "There is no discussion in the DEIS of shipper and N&W views on whether freight traffic can be satisfactorily accommodated in the hours between 1:00 a.m. and 6:00 p.m. when no LRT service is scheduled as proposed in the DEIS. Also, the DEIS does not appear to have been furnished to the affected railroads or shippers." (Federal Railroad Administration)

Response: Rail deliveries to shippers along the proposed LRT alignment decreased by 36 percent between 1983 and 1985. Further, extensive negotiations have been underway with the N&W and TRRA to mitigate any impacts resulting from changes in deliveries to affected shippers. These negotiations are aimed at ensuring the viability of rail delivery between the hours of 1:00 a.m. and 6:00 a.m. In as much as the affected shippers have separate sidings for unloading and loading, the LRT alternative should not result in any significant adverse impact. Finally, in response to the notification and inclusion of interested parties in review of the proposed project, copies of the DEIS were distributed through out the area and were readily available to any interested party. Publicity concerning the various alternatives including public notices and public hearings offered extensive information, as well as opportunity for input by all interested and/or affected parties. A total of 36 responses were received from various businesses in the vicinity of the proposed alignment.

Comment 10.1: "The local transit option that is finally selected should be well coordinated with the planning and development of other transportation facilities in the area. In this particular case the relationship of the transit alternatives to street, road, and highway development is the major concern." (Missouri Highway and Transportation Commission)

Response: The Missouri Highway and Transportation Commission has been contacted and the project was coordinated with the agency throughout the PE phase. The agency's input and guidance has been particularly important in planning and designing the I-70 alignment. Recognition of the need to coordinate the selected transit alternative with development of other transportation facilities occurred early in the process and has resulted in extensive cooperation with various agencies involved in developing improved transportation systems in the St. Louis region.

g. Handicapped Accessibility

Comment 39.1: "The St. Louis Bi-State Development Agency and East-West Gateway Coordinating Council should seriously address the issue of total accessibility in public transportation and commit themselves, along with the disabled leaders of St. Louis, to developing an accessible transit system which meets the needs of all potential disabled transit users." (Paraquad)

Response: The preferred LRT alternative has been carefully designed to meet the needs of the handicapped. Utilization of high-level platforms at LRT stations coupled with improvements programmed in the existing bus sytem will mitigate existing problems and ensure future accessibility throughout the St. Louis transit system.

Comment 45.1: "We would like to have inspection rights on all platform stations, proposed blueprints, input and inspection into the type and design of transit car, train and bus as well as inside of the station. Further, we want to guarantee that all interested organizations have input into the development of LRT." (Paralyzed Veterans of America)

Response: All aspects of the preferred alternative address accesibility for handicapped individuals. With respect to input into the process, extensive input has and will continue to be received. This is evidenced by the extensive list of comments noted in Table 7.1. Peer review, a technical advisory committee, and a design review committee were used in the PE stage. Similar input will be secured in Final Engineering.

h. Miscellaneous

Comment 24.1: Some concern exists that the tunnels under downtown St. Louis are unsafe; descriptions include cracks, etc. Further, it was discussed that these were to be filled with concrete." (City of Normandy)

Response: The tunnels utilized with the preferred LRT alternative are not unsafe or badly deteriorated, nor are they scheduled to be filled with concrete. Some rehabilitation will be necessary, but nothing to the extent set forth in the aforementioned comment.

Comment 51.1: "This public hearing is taking place six months too late." (Neighborhoods United Against the University City/Clayton Spur)

Response: The timing and scheduling of the public hearing were in accord with statutory requirements, but most significantly in accord with completion and release of the AA/DEIS.

Comment 202.1: "Construction of the LRT system should make sure to employ minority contractors and employ persons in the St. Louis area." (A. E. Albert)

Response: All contracts and employment procedures will be in full accord with equal employment opportunity requirements and minority contracting procedures prescribed by federal, state, and local ordinances.

APPENDIX A

LIST OF PREPARERS

Preparer	Project Assignment	Professional Background
--URBAN MASS TRANSPORTATION ADMINISTRATION--		
Charles L. Donald	Regional Office Staff	MS in Public Administration - University of Missouri, Kansas City, 1976 BS in Civil Engineering - University of Missouri - Columbia, 1969
Robert W. Stout	Washington Office Staff	MCE, Catholic University, 1970 BS in Civil Engineering - Lehigh University, 1965
--EAST-WEST GATEWAY COORDINATING COUNCIL--		
Douglas R. Campion	Program Director - Light Rail	MS in Transportation - Polytechnic Institute of Brooklyn, 1971 BS in Civil Engineering - Polytechnic Institute of Brooklyn, 1969
John N. Culver	Senior Project Engineer	BS Architectural Engineering North Dakota State University, 1961
Oliver W. Wischmeyer	Senior Project Engineer	BS in Civil Engineering - University of Missouri, Columbia, 1973
--SVERDRUP & PARCEL AND ASSOCIATES, Inc.--		
Joseph A. Leindecker	Transportation; Noise & Vibration Control	AICP, MS in Transportation - Northeastern University, 1977 BS in Civil Engineering - University of Santa Clara, 1970
John H. McCarthy	FEIS Editor; Historic, Archaeological, & Cultural Sites	AICP, Master in Urban Planning - Michigan State University, 1972 BS in Economics - St. Louis University, 1970

Preparer	Project Assignment	Professional Background
Luis E. Ortiz	Sociodemographics	MA in Geography/Economics - University of Illinois, 1974 BA in Social Science - University of Puerto Rico, 1972
Thomas J. Regan	Project Manager	MS in Civil Engineering - University of Illinois, 1951 BS in Civil Engineering - Syracuse University, 1948
Steven A. Shedd	Noise & Vibration Control; Visual & Aesthetic	MA in Geography - Michigan State University, 1972 AB in Geography - University of North Carolina, 1969
--CAMPBELL DESIGN GROUP--		
Jon B. Omvig	Land Use and Economic Development; Evaluation	Master in City and Regional Planning - SIU, Edwardsville, 1985 BS in Local and Urban Affairs - St. Cloud State University, MN - 1981
David B. Rickerson	Displacement and Relocation; Air Quality; Ecosystems; Water; Energy; Evaluation; Draft EIS Comment and Responses	MS in Community Development - University of Missouri, 1981 BS in Political Science - Southwest Missouri State University, 1977
Michael P. Weber	Evaluation	BS in Urban Planning - Michigan State University, 1978
--LTK ENGINEERING SERVICES/ROSS & BARUZZINI, INC.--		
John S. Gustafson	LRT Systems/Patronage	BS in Electrical Engineering - State University of New York at Buffalo
Donald K. Ross	LRT Systems/Patronage	Sc. D. in Industrial Engineering - Washington University MS in Electrical Engineering - Massachusetts Institute of Technology BS in Electrical Engineering - University of Minnesota

Preparer	Project Assignment	Professional Background
John W. Schumann	LRT Systems/Patronage	MS in Civil Engineering-Transportation - Drexel University, 1972 BA in Business Administration - Ottawa University - 1964
	--KENNEDY ASSOCIATES--	
J. Steven Coffey	Station Design Concepts	Registered Architect, BA in Architecture - Oklahoma State University, 1971
Michael E. Kennedy	Station Design Concepts	Registered Architect, MA in Architecture - Washington University, 1972 BA in Sociology - Lincoln University (PA), 1968
	--TEAM FOUR--	
Richard Ward	Economic Development	MA in Urban Design and Architecture - Washington University, 1968 Master in Urban & Regional Planning - Virginia Polytechnic Institute & State University, 1965 BA in Architecture - Virginia Polytechnic Institute & State University, 1964

FEIS APPENDIX B
LIST OF FINAL FEIS RECIPIENTS

FEDERAL AGENCIES

- Department of Transportation
  - Regional Representative of the Secretary, Region VII
  - Urban Mass Transportation Administration
  - Federal Aviation Administration
  - Federal Highway Administration
  - Federal Railroad Administration
  - U.S. Coast Guard
- Environmental Protection Agency
- Department of the Interior, National Parks Service
- Department of Commerce, Economic Development Administration
- Department of Agriculture
- Department of Energy
- Advisory Council on Historic Preservation
- Office of Management and Budget
- Interstate Commerce Commission
- U.S. Army Corps of Engineers
- Department of Housing and Urban Development
- Federal Emergency Management Agency
- National Railroad Passenger Corporation (AMTRAK)

STATE AGENCIES

- Missouri
  - Office of the Governor
  - Highway and Transportation Department
  - Department of Natural Resources
    - Division of Energy
    - Division of Environmental Quality
    - Division of Parks, Recreation and Historic Preservation
  - Department of Economic Development, Division of Transportation

- Illinois
  - Office of the Governor
  - Department of Transportation
    - Office of Planning and Programming
    - Bureau of Public Transportation
  - Historic Preservation Agency

LEGISLATIVE BRANCH

- Congressional - Missouri
  - Senator John C. Danforth
  - Senator Christopher Bond

    - Representative William L. Clay
    - Representative Richard A. Gephardt
    - Representative Jack Buechner

- Congressional - Illinois
    - Senator Alan J. Dixon
    - Senator Paul Simon
    - Representative Melvin Price
    - Representative Kenneth J. Gray

REGIONAL AGENCIES

- Southwestern Illinois Metropolitan and Regional Planning Commission
- Bi-State Development Agency

LOCAL GOVERNMENTS

- Missouri
    - City of St. Louis
    - St. Louis County and Cities of
        - Bellerive
        - Bel-Ridge
        - Bel-Nor
        - Berkeley
        - Breckenridge Hills
        - Bridgeton
        - Clayton
        - Cool Valley
        - Ferguson
        - Florissant
        - Hazelwood
        - Jennings
        - Kinloch
        - Maryland Heights
        - Normandy
        - Olivette
        - Overland
        - Pagedale
        - Pasadena Hills
        - St. Ann
        - St. John
        - University City
        - Wellston
        - Woodson Terrace

- Illinois
    - Madison County
    - St. Clair County and City of East St. Louis

OTHER INTERESTED PARTIES

- Amalgamated Transit Union, Local 788 and Local 1307
- Citizens for Modern Transit
- Citizens United Against the University City/Clayton Spur
- Downtown St. Louis, Inc.
- Landmarks Association of St. Louis, Inc.
- League of Women Voters
- Normandy Municipal Council
- St. Louis County Municipal League
- St. Louis Station Associates (Union Station)
- Madison County Transit District

- St. Clair County Transit District
- Washington University School of Medicine
- Laclede's Landing Redevelopment Corporation
- St. Louis Regional Commerce and Growth Association
- St. Louis University - President
- Southern Illinois University at Edwardsville - President
- University of Missouri at St. Louis - Chancellor
- Washington University - Chancellor

NEIGHBORHOOD ASSOCIATIONS

- Ames Place
- Maryland Terrace Trustee
- Parkview Agents
- Pershing Place (Block Association of Parkview)
- Skinker-DeBaliviere
- Washington Heights
- University Heights Subdivision II & III
- West Portland Place

LIBRARIES

- St. Louis Public -- Main, Lashly and Des Peres Branches
- St. Louis County Public -- Headquarters, Mid-County and Natural Bridge Branches
- University City Public
- East St. Louis Public
- St. Louis University
- Southern Illinois University at Edwardsville
- University of Missouri at St. Louis
- Washington University
- St. Louis Community College - Florissant Valley

APPENDIX C
SELECTED PRELIMINARY ENGINEERING DRAWINGS

LRT - Plan & Profile

C-115	Union Station
C-131	Union-Lindell
C-132	Forest Park
C-133	DeBaliviere
C-151	UMSL-Bellerive Drive
C-152	UMSL-West Campus Drive

LRT - Typical Sections

C-190	UMSL Campus Alignment
C-191	UMSL Campus Alignment

LRT - Roadway Plans

C-201	UMSL-West Campus Drive Relocation Plan
C-202	UMSL-Mark Twain Drive Relocation Plan
C-203	UMSL-Bellerive Drive Relocation Plan

LRT - Structural Plans

S-121	Mark Twain Drive Bridge Plan and Elevation
S-407	8th & Pine Surface Plan
S-408	8th & Pine Platform Level Plan

LRT Station Plans

A-101	5th & Missouri Platform Plan
A-102	5th & Missouri Sections/Elevations
A-103	Laclede's Landing Platform Plan
A-104	Laclede's Landing Grade Plan
A-105	Laclede's Landing Sections/Elevations
A-106	Laclede's Landing Sections/Elevations
A-107A	St. Louis Centre Tunnel Section Rendering
A-107B	St. Louis Centre Platform Plan
A-108	St. Louis Centre Grade Plan
A-109	St. Louis Centre Sections/Elevations
A-110	St. Louis Centre Sections/Elevations
A-111	St. Louis Centre Sections/Elevations
A-112	8th & Pine Platform Plan
A-113	8th & Pine Grade Plan
A-114	8th & Pine Sections/Elevations
A-117	Stadium Platform Plan
A-118	Stadium Sections/Elevations
A-119	Grand Platform Plan
A-120	Grand Street Level Plan
A-121	Grand Sections/Elevations
A-122	Forest Park Platform Plan
A-123	Forest Park Sections/Elevations
A-124	Delmar Platform Plan

A-125	Delmar Grade Plan
A-126	Delmar Sections
A-127	Page Platform Plan
A-128	Page Sections/Elevations
A-129	North Hanley Platform Plan
A-130	North Hanley Sections/Elevations
A-301	5th & Missouri Perspective
A-302	Laclede's Landing Perspective
A-303	St. Louis Centre Perspective
A-304	8th & Pine Perspective
A-305	Stadium Perspective
A-306	Page Perspective
A-307	North Hanley Perspective

Park-n-Ride Lot

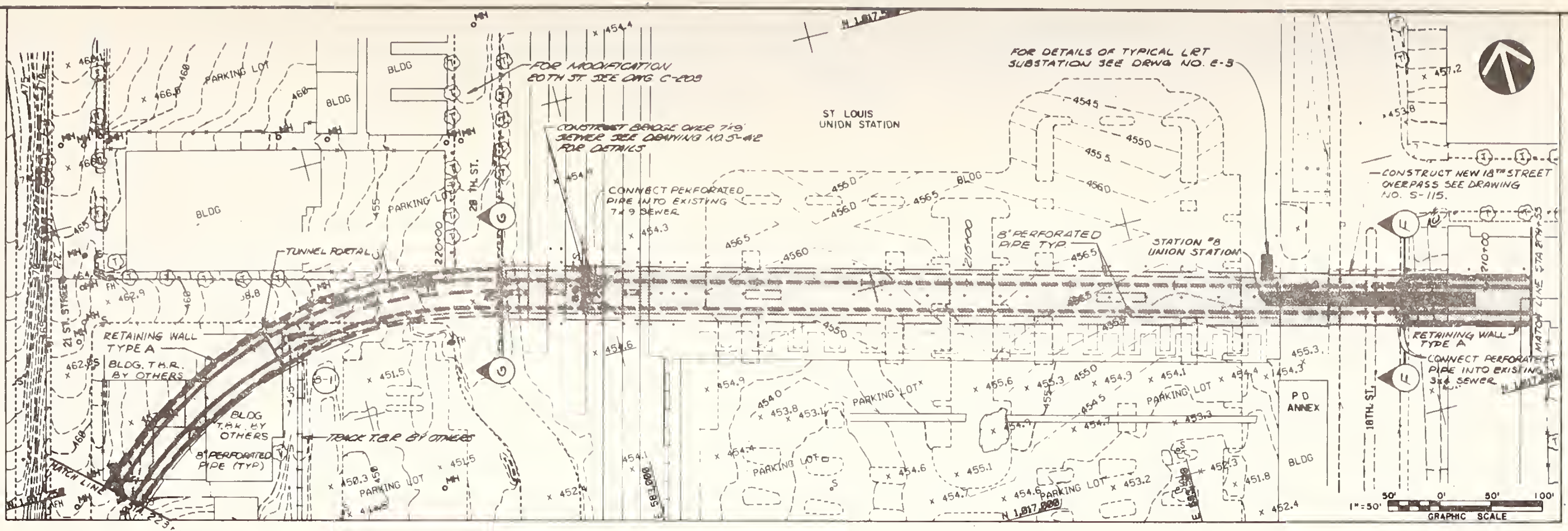
PR-101	5th & Missouri Site Plan
PR-102	Forest Park Site Plan
PR-103	Page Site Plan
PR-104	St. Charles Rock Rd. Site Plan
PR-105	UMSL-South Site Plan
PR-106	North Hanley Site Plan
PR-107	Northwest Park-n-Ride Maintenance Access Road
PR-108	Northwest Park-n-Ride Site Plan
PR-109	Northwest Park-n-Ride Access Roadway

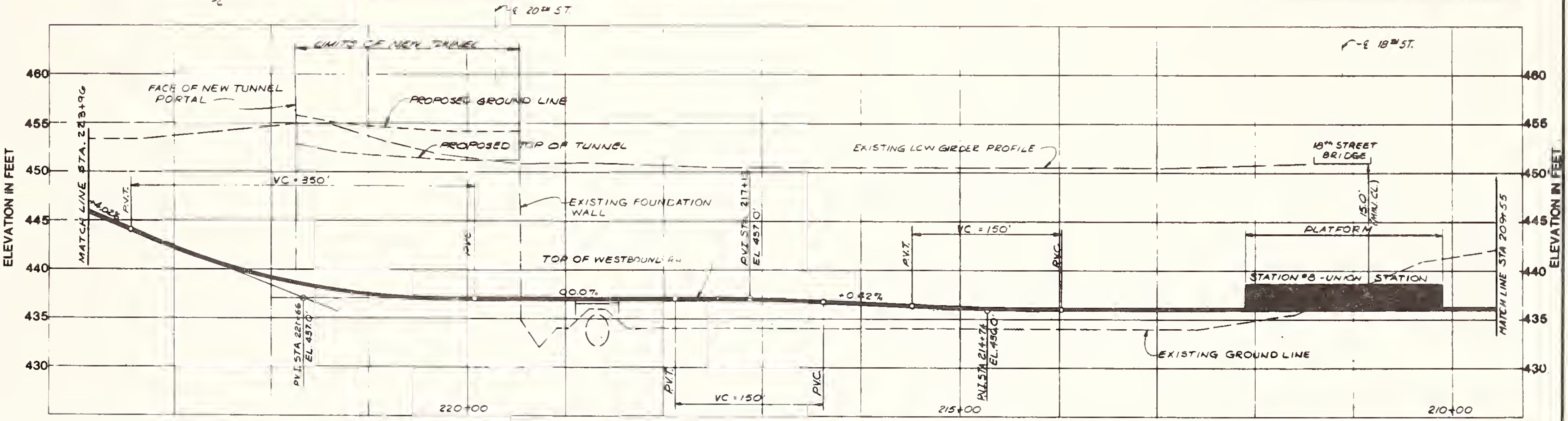
Yards and Shops

YS-101	Site Plan - East
YS-102	Site Plan - West

Power Subsystems

E-1	Single Line Diagram Overhead Electrification
E-5	Traction Electrification Substation Side and End Elevations
TM-9-2	Preliminary Locations of Substations





REV.	DATE	BY	APP.	DESCRIPTION

DESIGNED J.E.O.
DRAWN L.A.H.
CHECKED A.W.N.
APP. BY:
APP. DATE

QUALITY BLUE PRINT-BPC

Campbell Design Group
Fleming Corporation
Hurst-Rosche Engineers, Inc.
KAI Engineering, Inc.

SUBMITTED: R.W. Yeomans 4/27/86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: ____ PROJECT DIRECTOR ____ DATE

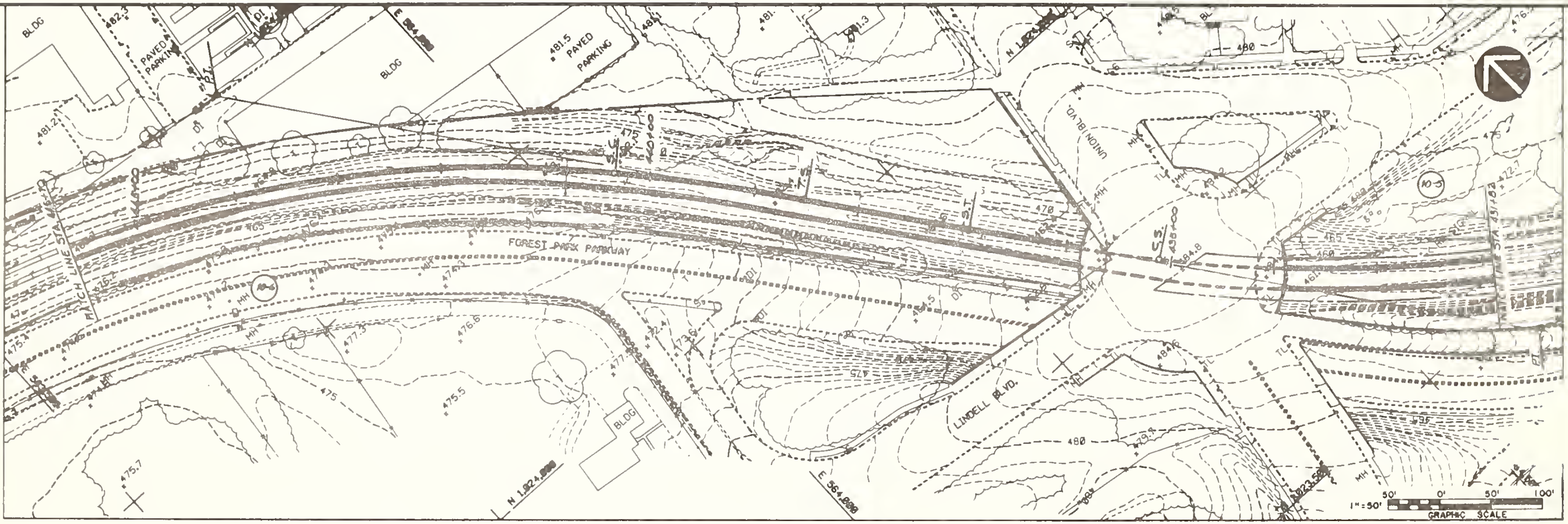
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

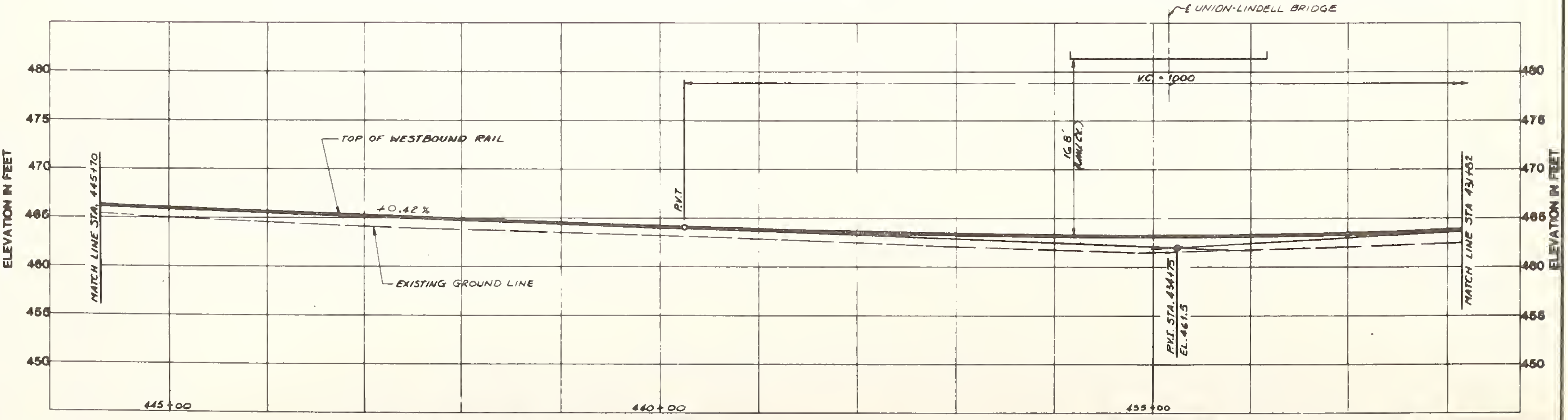
APPROVED: ____ DIRECTOR OF ENGINEERING 7-86 DATE

LRT - PLAN & PROFILE
UNION STATION

STA. 209+55 TO STA. 223+96

CONTRACT NO. MO-03-0023/MO-90-0012
DRAWING NO. C - 115
SCALE: 1" = 50'
SHEET NO. 30





REV	DATE	BY	APP.	DESCRIPTION

DESIGNED T.N.
DRAWN Q.W.W.
CHECKED A.N.N.
APP. BY:
APP. DATE

Campbell Design Group
Planning Corporation
Hurst-Rosche Engineers, Inc.
KAI Engineering, Inc.
SUBMITTED: A.W. Nguyen DATE

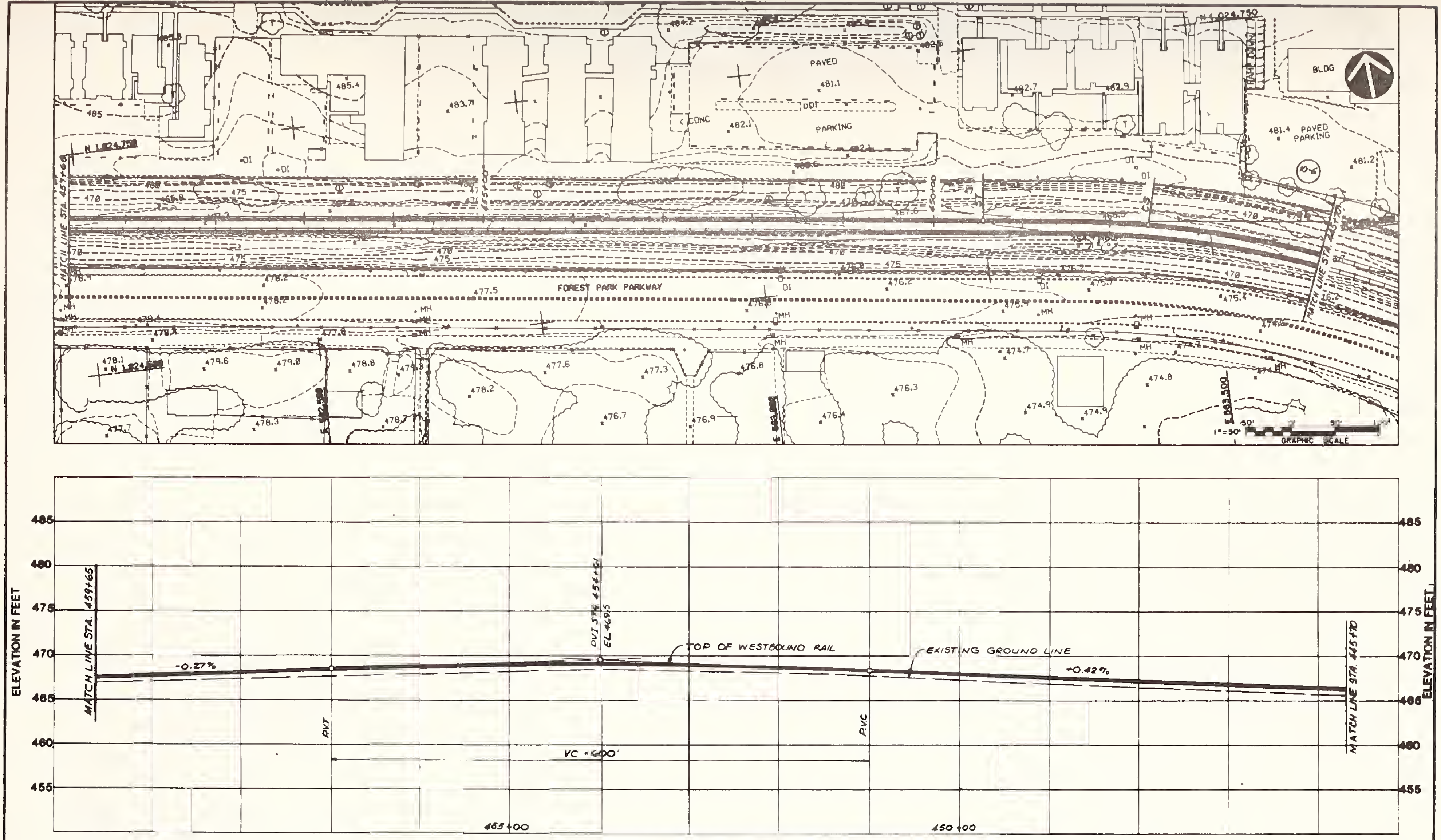
Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: PROJECT DIRECTOR 6/30/86 DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D.R. Canigiani DIRECTOR OF ENGINEERING 7-86 DATE

LRT - PLAN & PROFILE
UNION - LINDELL
STA. 431+82 TO STA. 445+70

CONTRACT NO. MO-03-0023/MO-90-0012
DRAWING NO. C - 131
SCALE: 1"=50'
SHEET NO. 46

QUALITY BLUE PRINT-BPC



REV.	DATE	BY	APP.	DESCRIPTION

DESIGNED T.N.
DRAWN C.A.H.
CHECKED A.W.N.
APP. BY:
APP. DATE

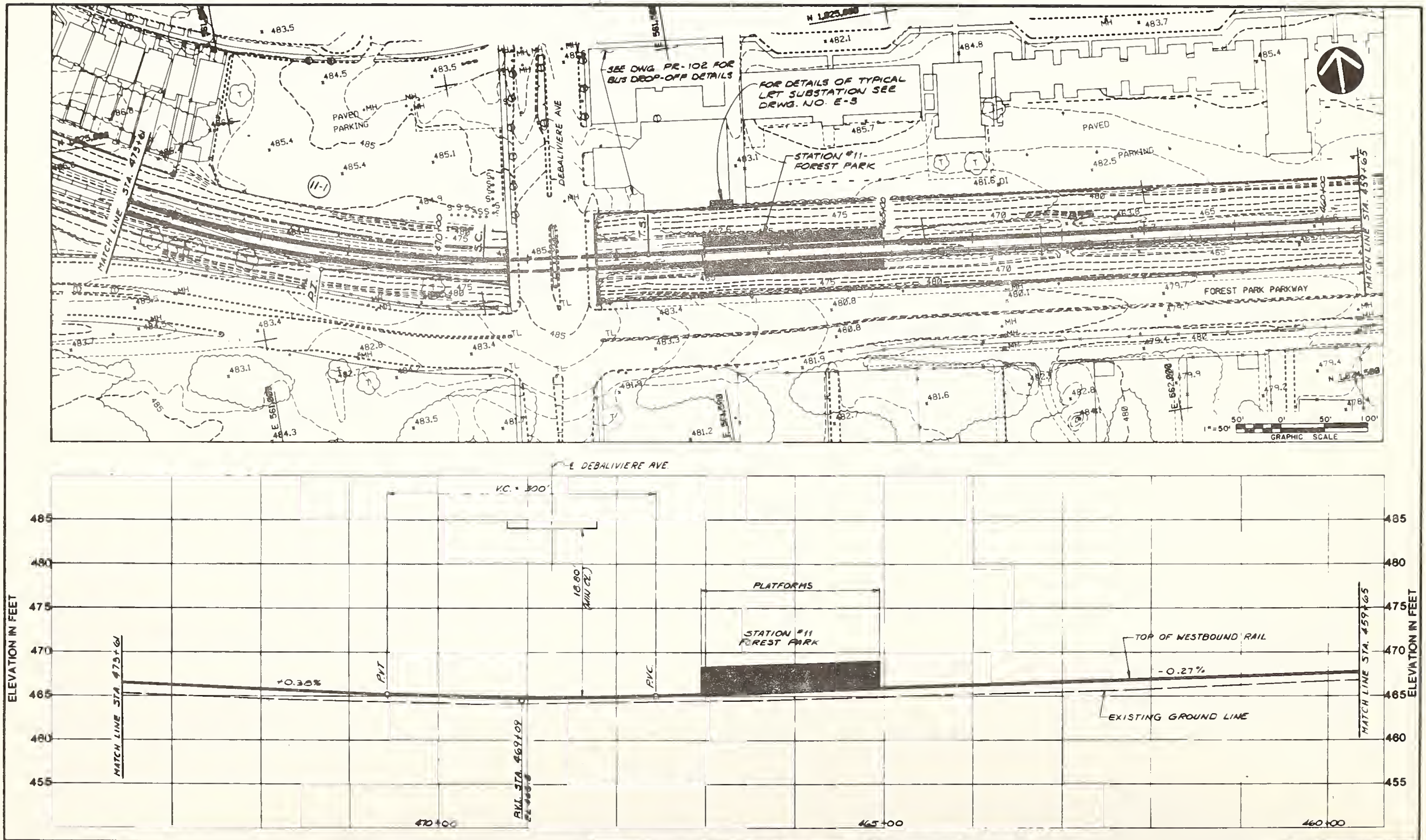
Campbell Design Group
Fleming Corporation
Hurst-Rosche Engineers, Inc.
KAI Engineering, Inc.
SUBMITTED: 5/21/86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: PROJECT DIRECTOR 6/30/86 DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: DIRECTOR OF ENGINEERING 7-86 DATE

LRT - PLAN & PROFILE
FOREST PARK
STA. 445+70 TO STA. 459+65

CONTRACT NO. MO-03-0023/MO-90-0012
DRAWING NO. C - 132
SCALE: 1"=50'
SHEET NO. 47



REV	DATE	BY	APP	DESCRIPTION

DESIGNED T.N.
DRAWN R.L.J.
CHECKED A.W.W.
APP. BY:
APP. DATE

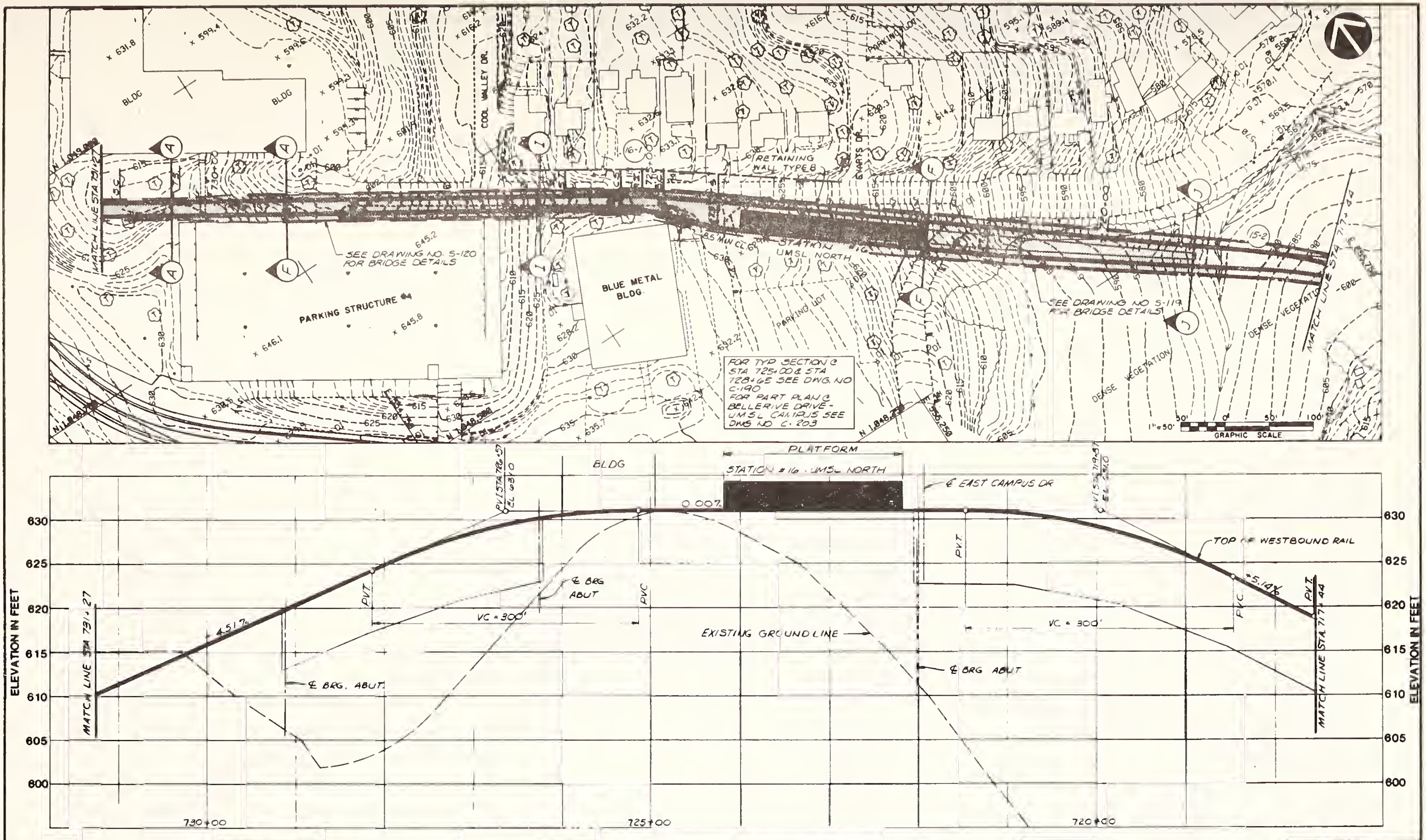
Campbell Design Group
Fleming Corporation
Hurst-Rosche Engineers, Inc.
KAI Engineering, Inc.
SUBMITTED: J.W. Yeargin 5/2/86 DATE

Sverdrup & Parcel
and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: J. Rezan Jr. PROJECT DIRECTOR 6/30/86 DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D.R. Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT - PLAN & PROFILE
DEBALIVERE
STA. 459+65 TO STA. 473+61

CONTRACT NO. M0-03-0023/M0-90-0012
DRAWING NO. C - 133
SCALE: 1" = 50'
SHEET NO. 48



REV	DATE	BY	APP	DESCRIPTION

DESIGNED JED
DRAWN DWW
CHECKED AWN
APP. BY:
APP. DATE

Campbell Design Group
Fleming Corporation
Hurst-Rosche Engineers, Inc.
KAI Engineering, Inc.
SUBMITTED: 5/22/86 DATE

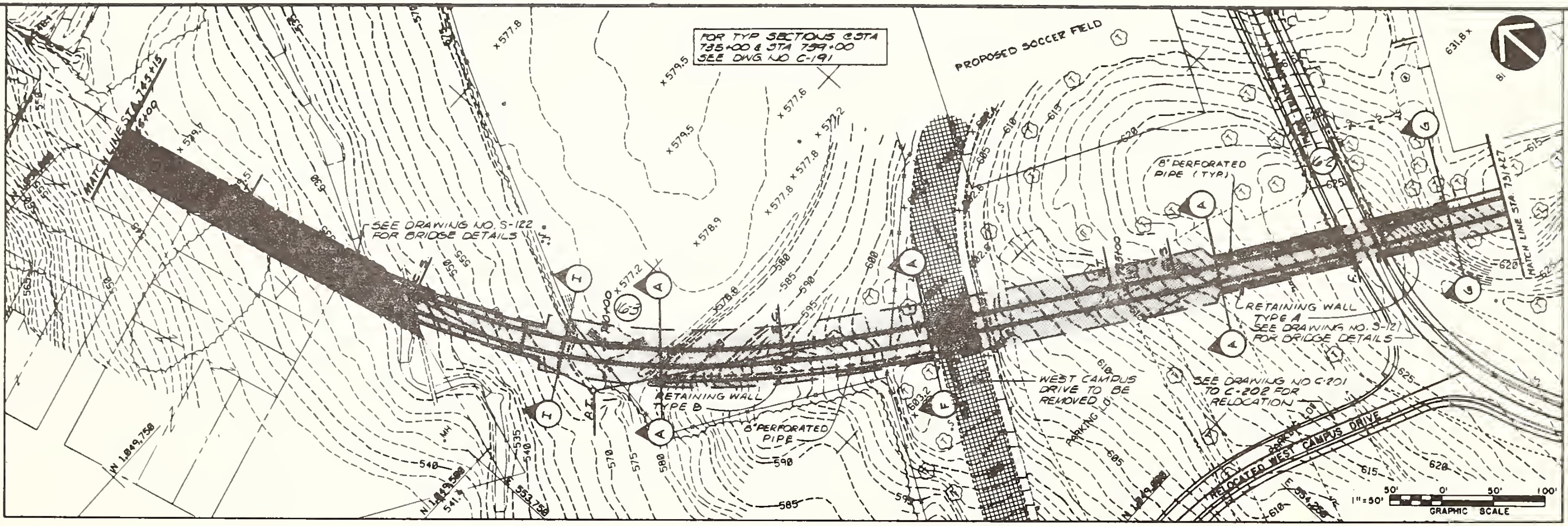
Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: 6.30.86 PROJECT DIRECTOR DATE

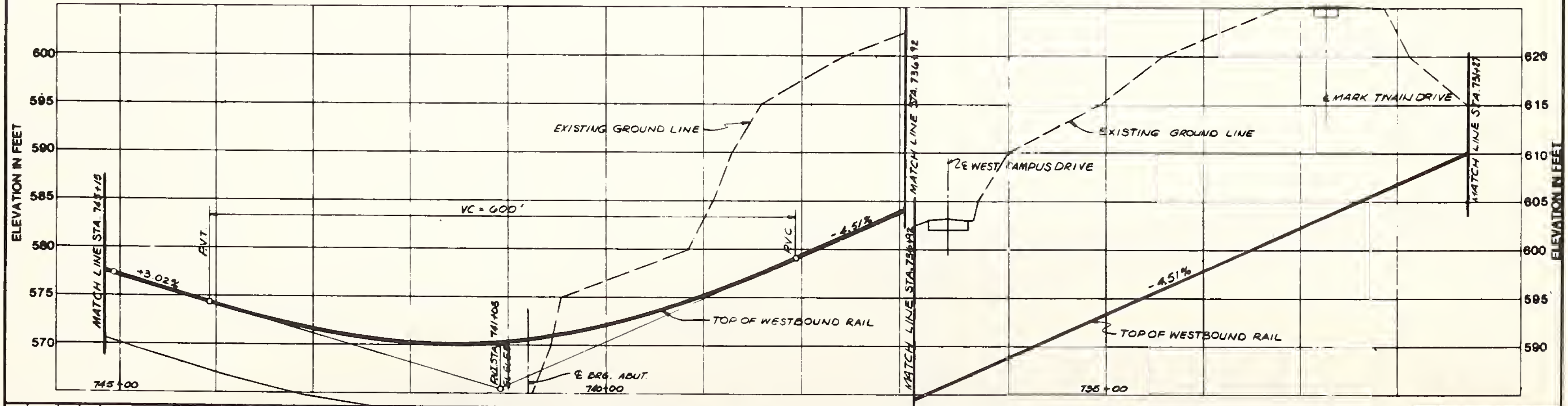
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT - PLAN & PROFILE
UMSL - BELLERIVE DRIVE
STA. 717+44 TO STA. 731+27

CONTRACT NO. 40-03-0023/M0-90-0012
DRAWING NO. C - 151
SCALE: 1' = 50'
SHEET NO. 66

QUALITY BLUE PRINT-SPC





REV	DATE	BY	APP	DESCRIPTION

QUALITY BLUE PRINT-BPC

DESIGNED J.E.D.
DRAWN E.C.H.A.
CHECKED A.W.N.
APP. BY:
APP. DATE

Campbell Design Group
Fleming Corporation
Hurst-Rosche Engineers, Inc.
KAI Engineering, Inc.

SUBMITTED: A. W. Kemper 5/27/86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

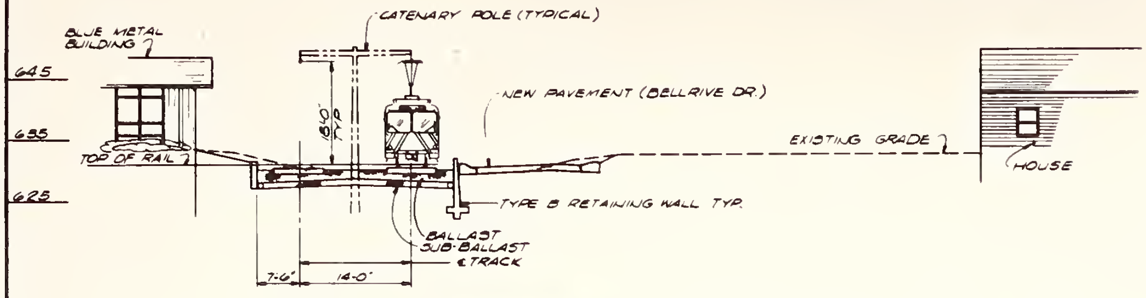
APPROVED: J. Hogan Jr. PROJECT DIRECTOR 6/30/86 DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

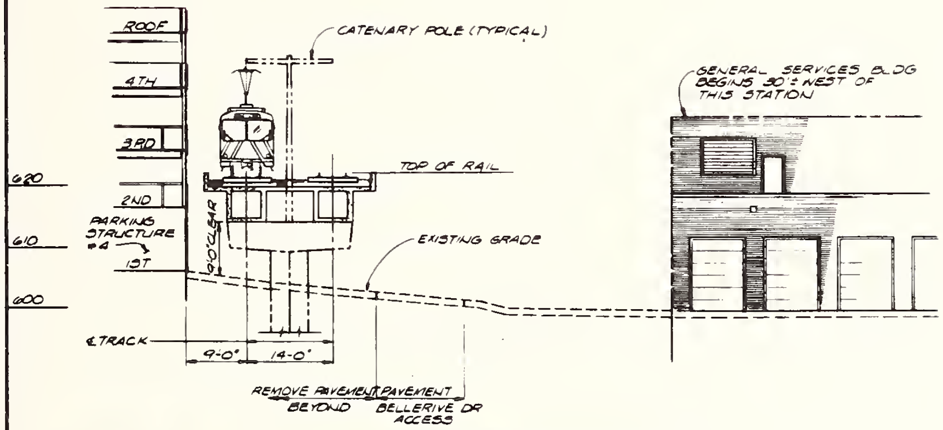
APPROVED: D.R. Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT - PLAN & PROFILE
UMSL - WEST CAMPUS DRIVE
STA. 731+27 TO STA. 745+15

CONTRACT NO. MO-03-0023/MO-90-0042
DRAWING NO. C - 152
SCALE: 1" = 50'
SHEET NO. 67



TYPICAL SECTION STATION 725+00



TYPICAL SECTION STATION 728+65

1" = 10' 10' 0' 10' 20'
GRAPHIC SCALE

REV	DATE	BY	APP	DESCRIPTION

DESIGNED AWN
DRAWN LAH
CHECKED RJP
APP. BY:
APP. DATE

Campbell Design Group
Fleming Corporation
KAI Engineering, Inc.

SUBMITTED: R.W. Hennings 7/31/86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: PROJECT DIRECTOR 7-31-86 DATE

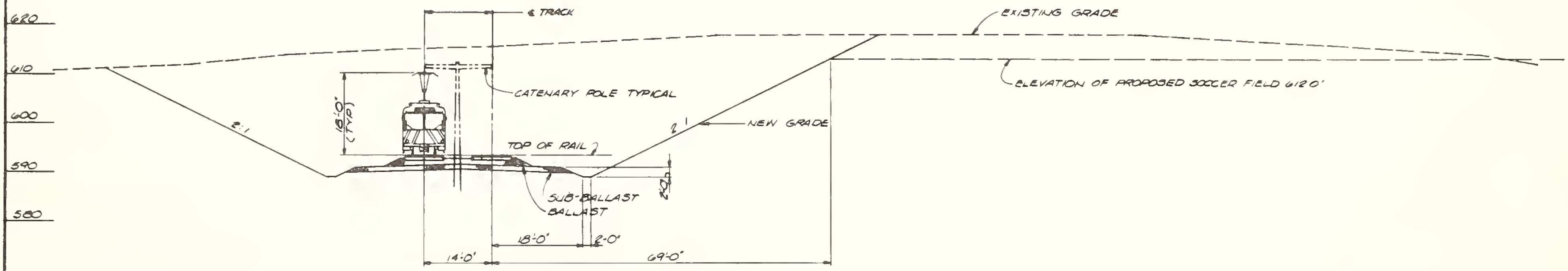
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D.R. Campion DIRECTOR OF ENGINEERING 7-86 DATE

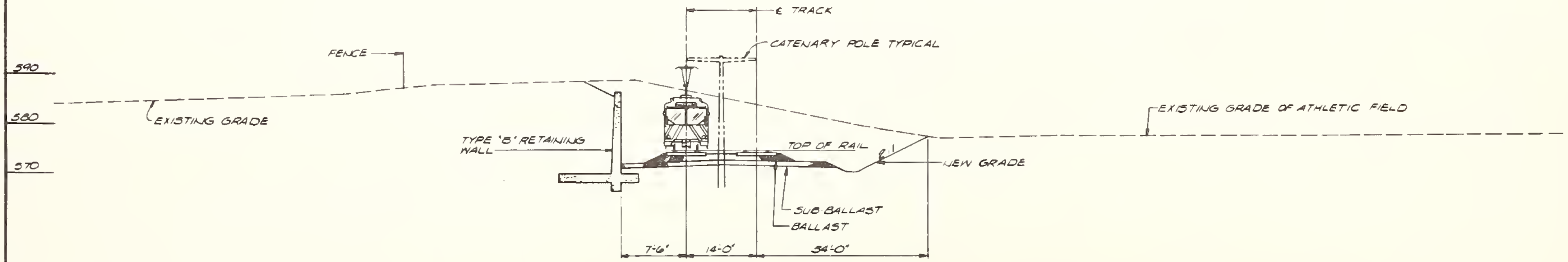
TYPICAL SECTIONS
UMSL CAMPUS ALIGNMENT
STA. 725+00 & STA. 728+65

CONTRACT NO. MO-03-0023/MO-90-0012
DRAWING NO. C-190
SCALE: 1"=10'
SHEET NO 85

QUALITY BLUE PRINT-SPC



TYPICAL SECTION STATION 735+00



TYPICAL SECTION STATION 739+00

1" = 10'
10' 0' 10' 20'
GRAPHIC SCALE

REV	DATE	BY	APP	DESCRIPTION

DESIGNED AWN
DRAWN LAH
CHECKED RJP
APP. BY:
APP. DATE

Campbell Design Group
Fleming Corporation
KAI Engineering, Inc.
SUBMITTED: R.W. Hemmeyer 5/27/86 DATE

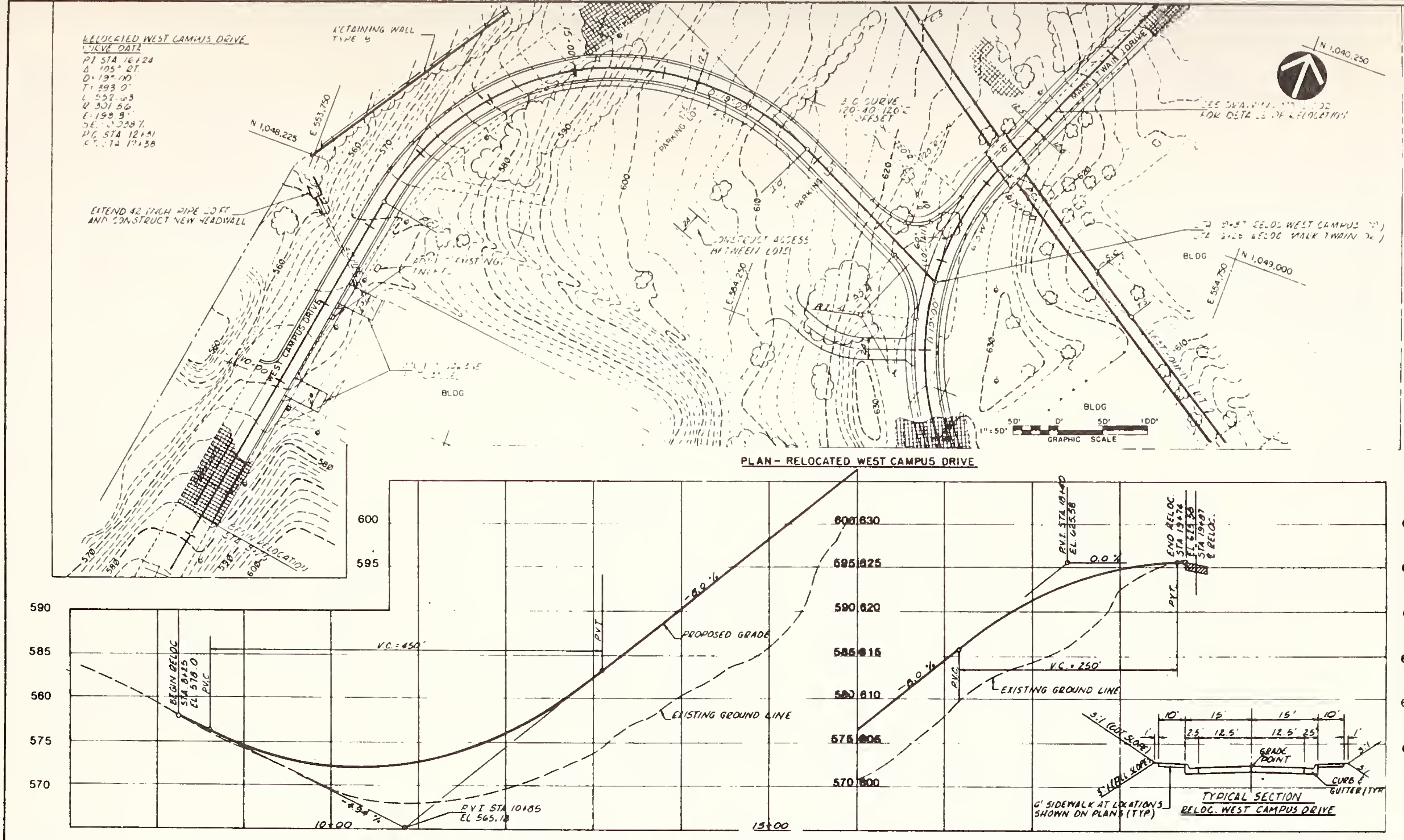
Sverdrup & Parcel
and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: Regan PROJECT DIRECTOR 6/30/86 DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D.R. Campion DIRECTOR OF ENGINEERING 7-86 DATE

TYPICAL SECTIONS
UMSL CAMPUS ALIGNMENT
STA. 735+00 & STA. 739+00

CONTRACT NO. MO-03-0023/MO-90-0012
DRAWING NO. C-191
SCALE: 1"=10'
SHEET NO. 86

QUALITY BLUE PRINT-BPC



PLAN - RELOCATED WEST CAMPUS DRIVE

PROFILE - RELOCATED WEST CAMPUS DRIVE

REV	DATE	BY	APP	DESCRIPTION

DESIGNED ELC
DRAWN JL
CHECKED DVK
APP BY
APP DATE

HURST-ROSCHE ENGINEERS, INC.
Consulting Engineers & Architects
1400 East Tremont Street
Hillsboro Illinois 62049

SUBMITTED: 5/27/86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

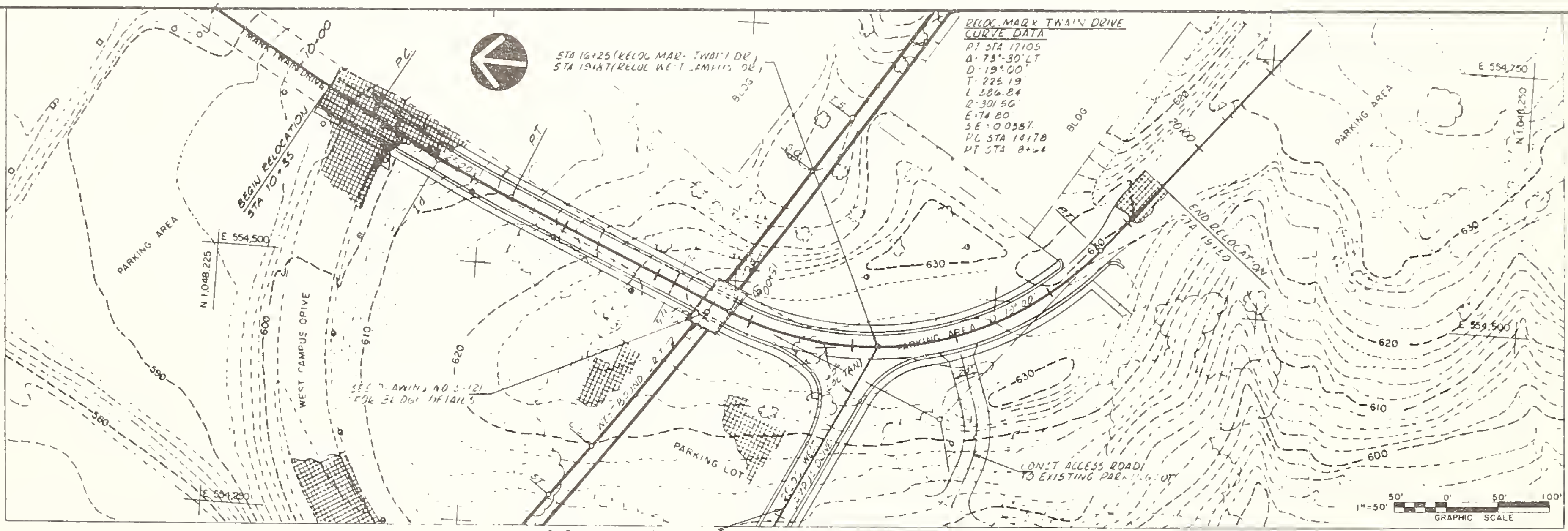
APPROVED: PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

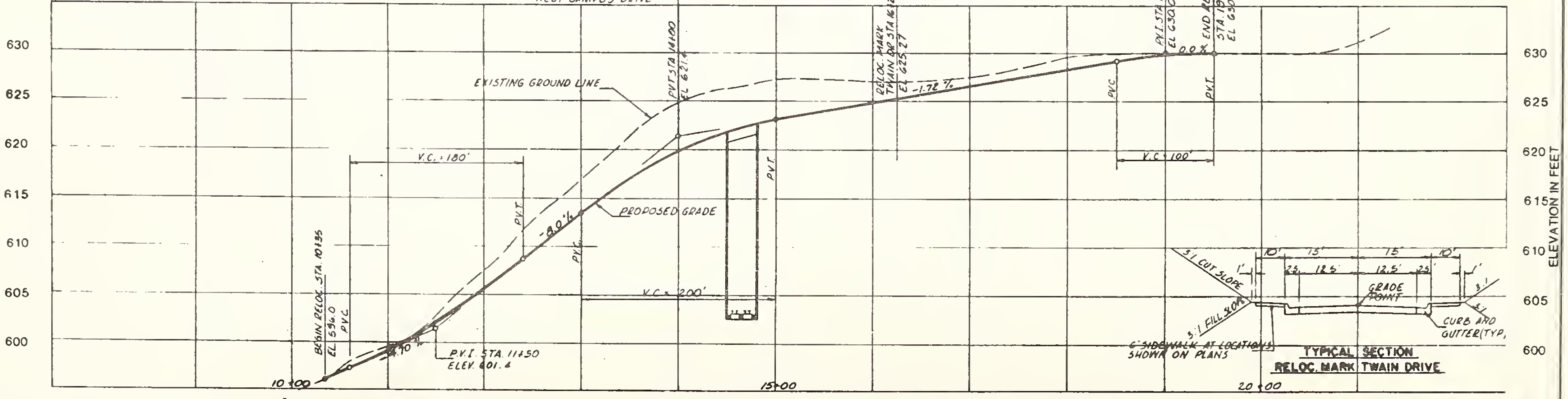
ROADWAY PLAN
UMSL - WEST CAMPUS DRIVE
RELOCATION PLAN

CONTRACT NO
DRAWING NO C - 201
SCALE 1" - 50'
SHEET NO 88



SEE DRAWING NO C-201 FOR DETAILS OF RELOC WEST CAMPUS DRIVE

PLAN RELOCATED MARK TWAIN DRIVE



PROFILE - RELOCATED MARK TWAIN DRIVE

REV	DATE	BY	APP	DESCRIPTION

DESIGNED ELC
DRAWN JL
CHECKED DVK
APP. BY:
APP. DATE

HURST-ROSCHE ENGINEERS, INC.
Consulting Engineers & Architects
1400 East Tremont Street
Hillsboro Illinois 62049

SUBMITTED: Donald Carlson 5-27-86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: PROJECT DIRECTOR DATE

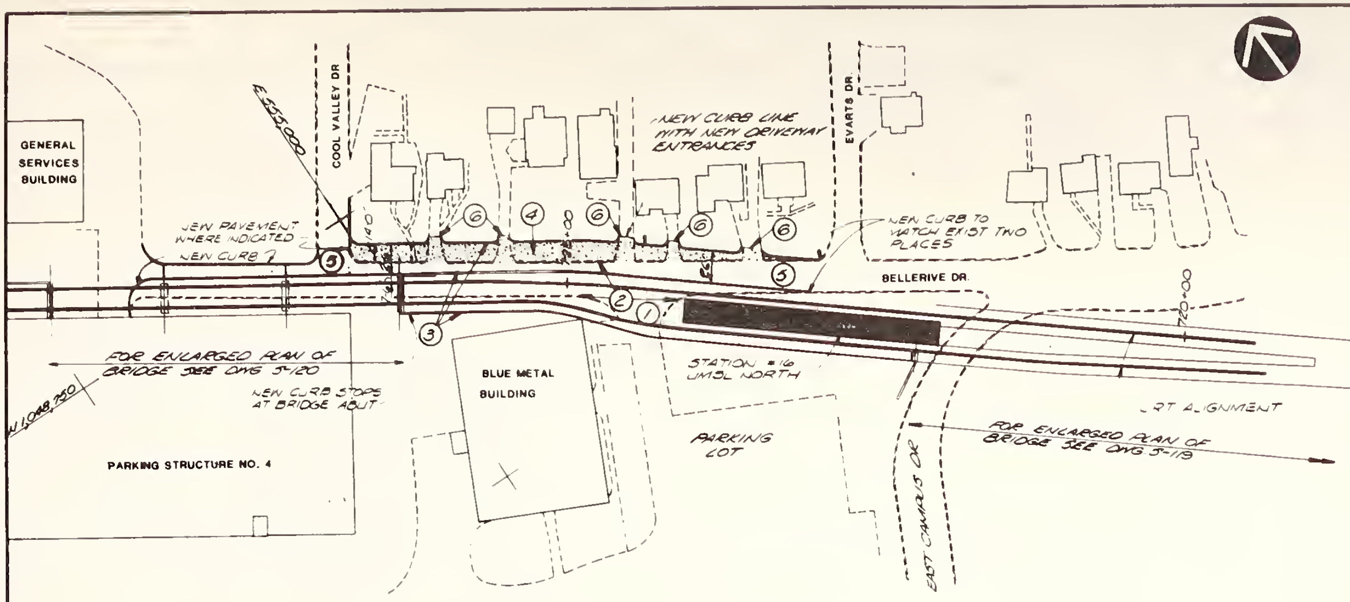
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D.R. Campion DIRECTOR OF ENGINEERING 7-86 DATE

ROADWAY PLAN
UMSL - MARK TWAIN DRIVE
RELOCATION PLAN

CONTRACT NO
DRAWING NO C - 202
SCALE 1" = 50'
SHEET NO. 89

QUALITY BLUE PRINT - BPC



RELOCATED BELLERIVE DR. U.M.S.L. CAMPUS

LEGEND

▨ CONCRETE PAVING
☐ ASPHALT PAVING

MODIFICATION WORK ITEMS

① REMOVE EXISTING CONCRETE CEMENT PAVEMENT
② REMOVE EXISTING CURBING
③ CONSTRUCT NEW CONCRETE CURBING
④ PLACE NEW 8" CONCRETE PAVEMENT
⑤ PROVIDE 1" ASPHALTIC CONCRETE CEMENT OVERLAY
⑥ REMOVE RECONSTRUCT PRIVATE ENTRANCES

NOTE:
1. FOR UTILITY RELOCATION SEE DWG NO. UR-128

1"=50' 50' 0' 50' 100'
GRAPHIC SCALE

REV	DATE	BY	APP	DESCRIPTION

DESIGNED AWN
DRAWN LAH
CHECKED RJP
APP. BY.
APP DATE

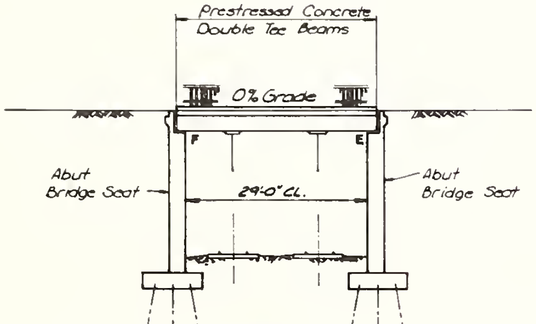
Campbell Design Group
Fleming Corporation
KAI Engineering, Inc.
SUBMITTED: 5/27/86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: PROJECT DIRECTOR DATE

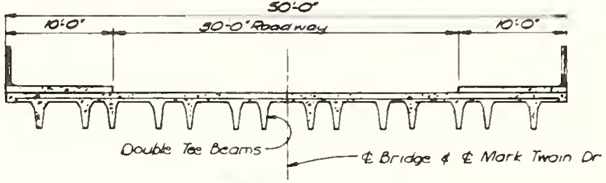
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

ROADWAY PLAN
UMSL - BELLERIVE DRIVE
RELOCATION PLAN

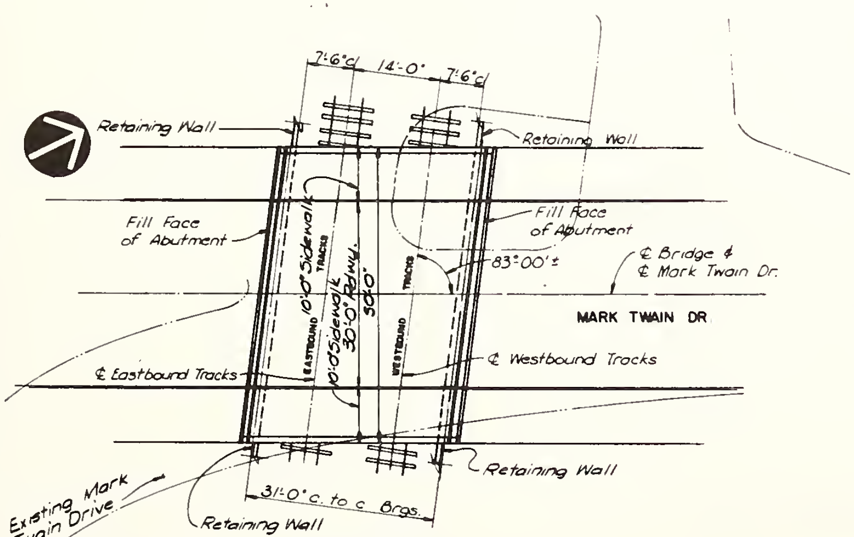
CONTRACT NO MO-03-0025 M
DRAWING NO C -203
SCALE: 1"-50'
SHEET NO 90



ELEVATION
Scale : 1" = 10'



TYPICAL CROSS SECTION
Scale : 3/16" = 1'-0"



PLAN
LRT STA. (732+83)
Scale: 1" = 10'

1" = 10' 10' 0' 10' 20'
GRAPHIC SCALE

REV	DATE	BY	APP.	DESCRIPTION

DESIGNED C.W.
DRAWN G.J.D.
CHECKED C.W.
APP. BY:
APP. DATE

Campbell Design Group
Architects Engineers Planners
St. Louis, Missouri 63139
SUBMITTED: ______ DATE

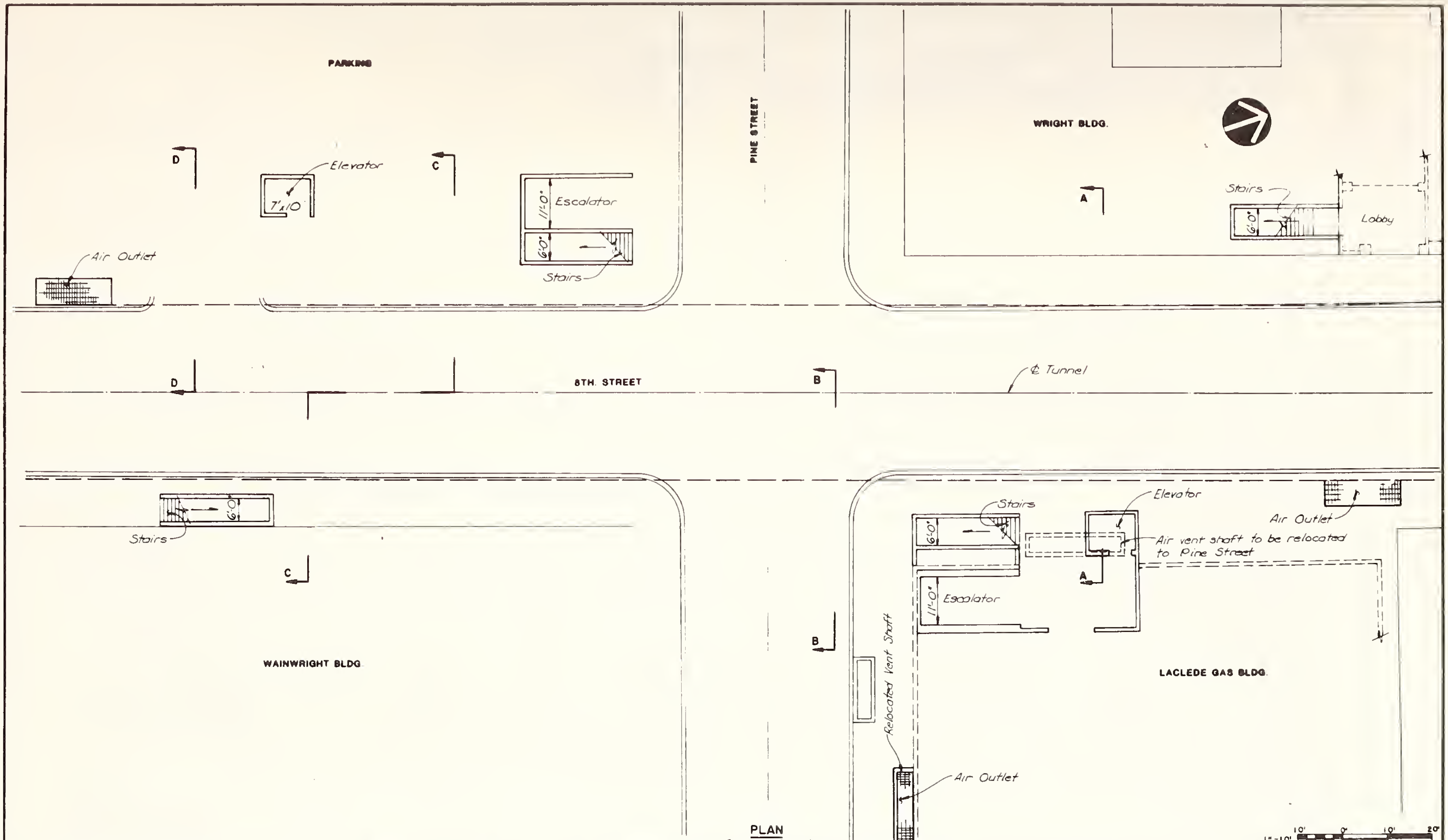
Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: ______ PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: ______ DIRECTOR OF ENGINEERING 7-86 DATE

LRT - STRUCTURAL PLAN
MARK TWAIN DRIVE BRIDGE
PLAN AND ELEVATION

CONTRACT NO. MO-03-0023/MO-90-0012
DRAWING NO. S-121
SCALE: AS NOTED
SHEET NO. 112

QUALITY BLUE PRINT-SPC



PLAN
Scale : 1" = 10'

REV	DATE	BY	APP	DESCRIPTION

DESIGNED C W
DRAWN G J D
CHECKED C W
APP. BY: EJP.
APP. DATE

Campbell Design Group
Architects Engineers Planners
St Louis, Missouri 63139

SUBMITTED: R W 5/27/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: 6/30/86
PROJECT DIRECTOR DATE

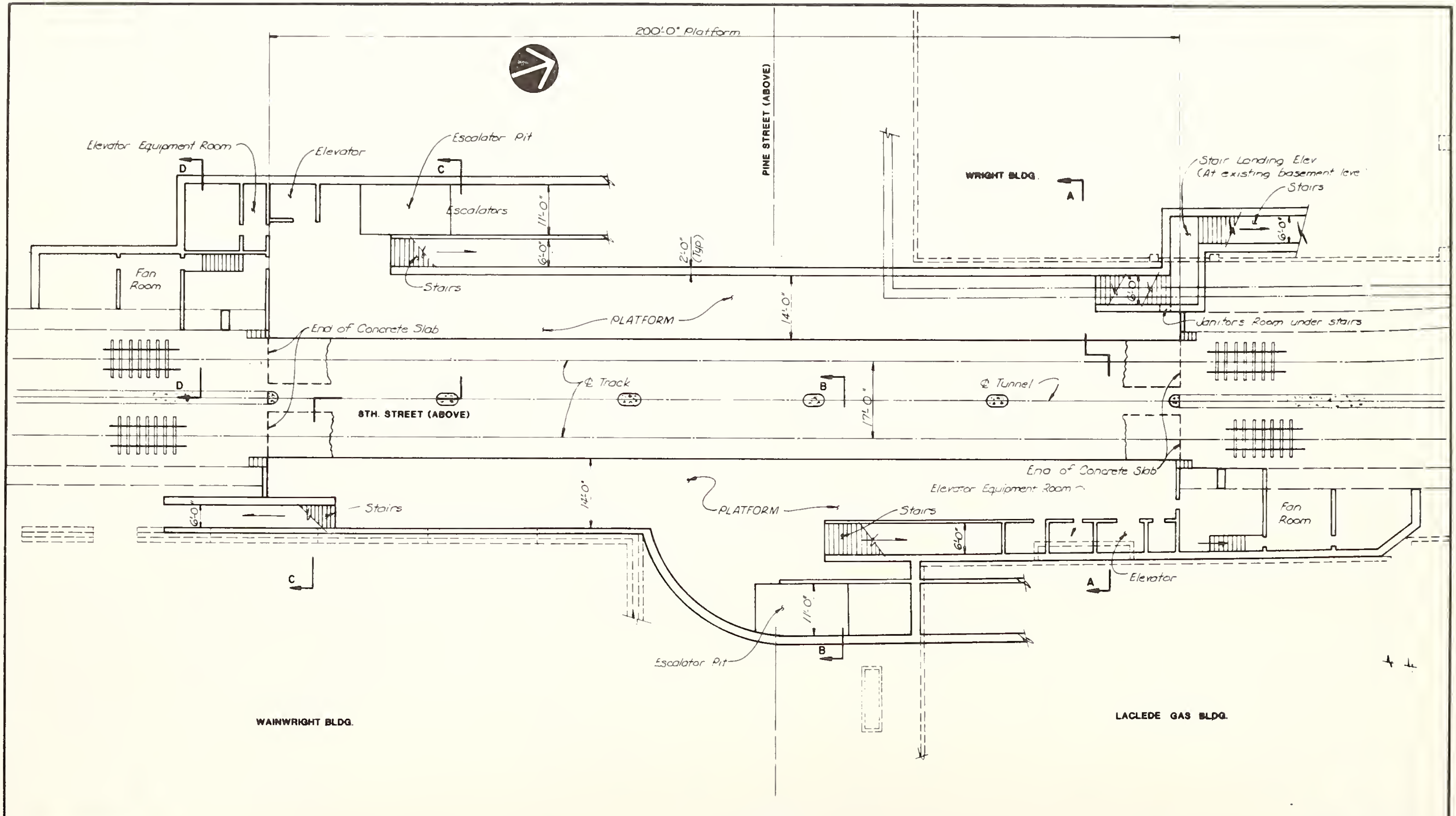
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D R Campion 7-86
DIRECTOR OF ENGINEERING DATE

~~LRT~~ STATION STRUCTURAL PLAN
8TH. & PINE
SURFACE PLAN

CONTRACT NO. MO-03-0023/MO-90-0012
DRAWING NO. S-407
SCALE 1" = 10'
SHEET NO. 136

QUALITY BLUE PRINT - BPC



PLAN

Scale : 1" = 10'

REV.	DATE	BY	APP.	DESCRIPTION

DESIGNED C W
DRAWN G J O
CHECKED C W
APP. BY: E J.P
APP. DATE

Campbell Design Group
Architects Engineers Planners
St. Louis, Missouri 63139

SUBMITTED: Q. W. ______ 5/23/86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: ______ PROJECT DIRECTOR ______ DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

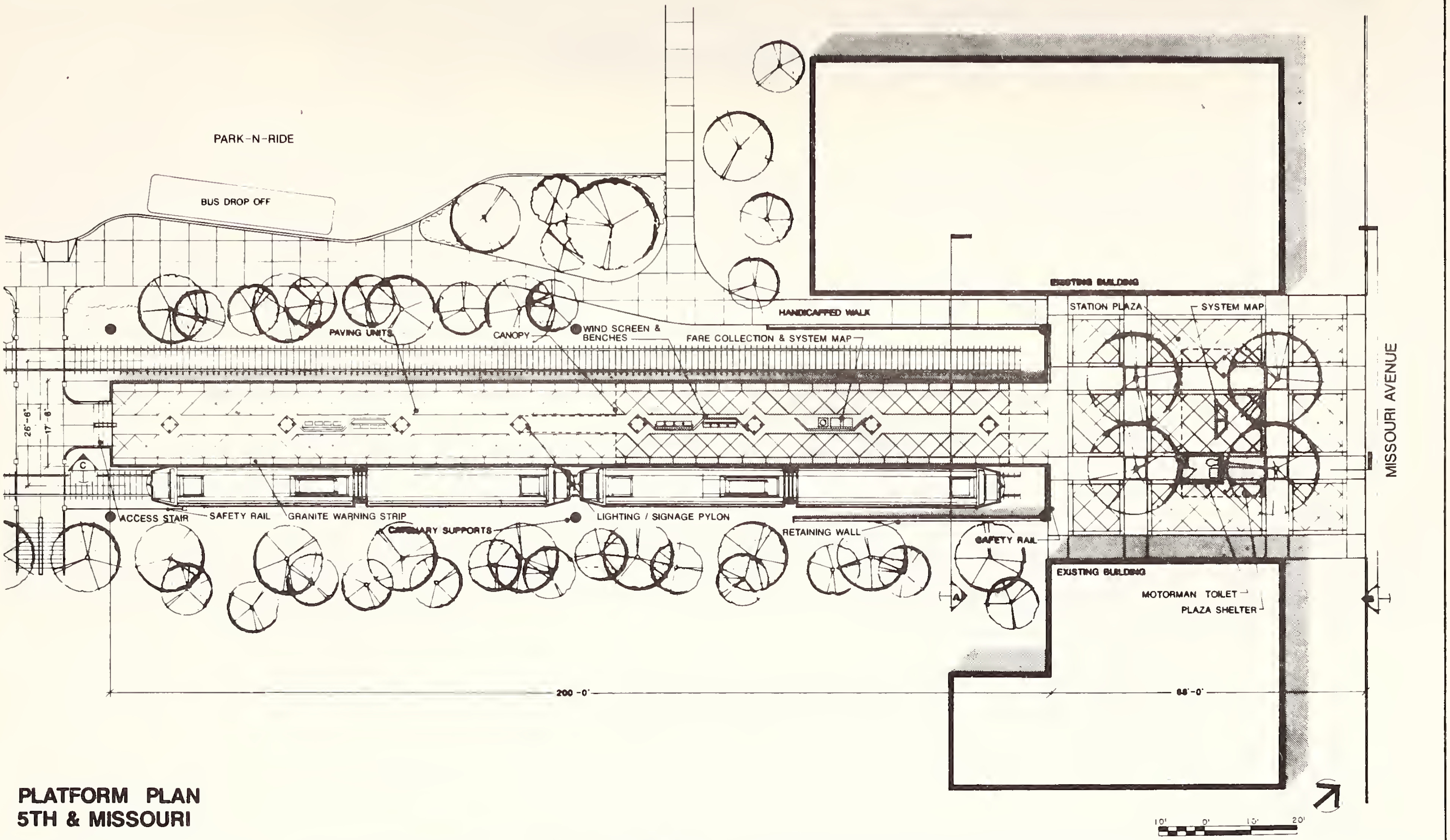
APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT-STATION STRUCTURAL PLAN
8TH. & PINE
PLATFORM LEVEL PLAN

CONTRACT NO M0-03-0023 M0-90-0012
DRAWING NO S-408
SCALE: 1" = 10'
SHEET NO. 137

QUALITY BLUE PRINT-BPC

SEE DWG. PR-101 FOR THE LAYOUT OF THE PARK-N-RIDE LOT



PLATFORM PLAN
5TH & MISSOURI

REV	DATE	BY	APP	DESCRIPTION

DESIGNED RS
DRAWN TL
CHECKED RS
APP. BY.
APP DATE

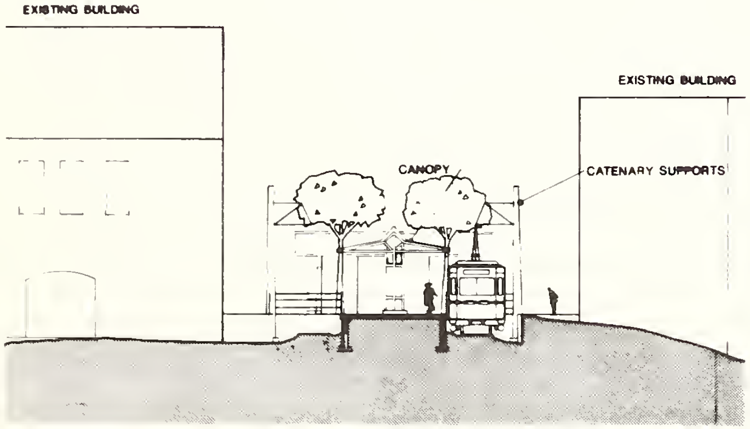
Kennedy Associates
Architects, Incorporated
KENNEDY
417 North Euclid Avenue
St. Louis, Missouri 63108
314/367-8188
SUBMITTED: 5/14/88
DATE

Sverdrup & Parcel
and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED:
PROJECT DIRECTOR DATE

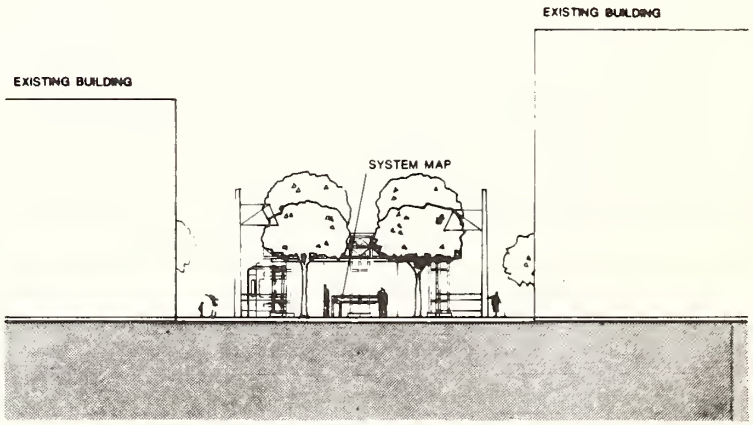
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED:
DIRECTOR OF ENGINEERING DATE

LRT STATION PLAN
5TH & MISSOURI
PLATFORM PLAN

CONTRACT NO
DRAWING NO A101
SCALE 1"=10'
SHEET NO 208

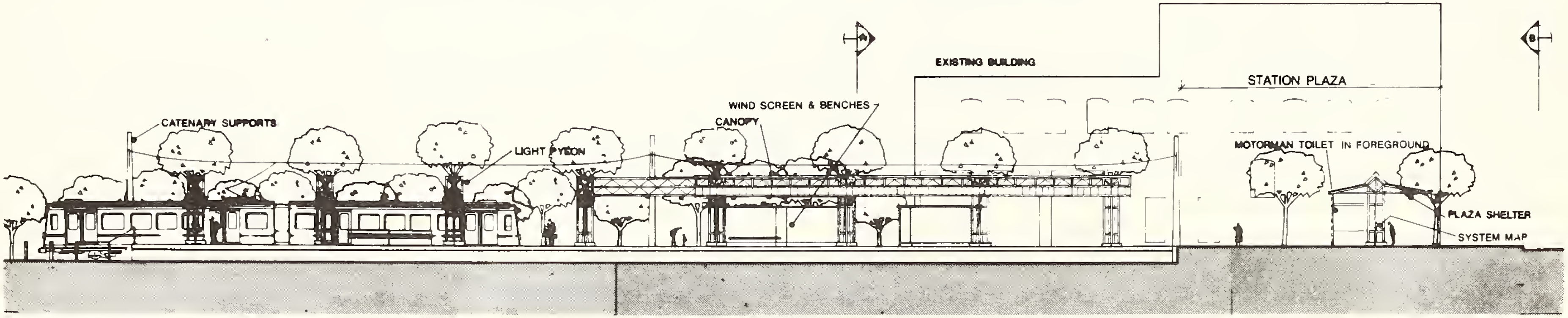


SECTION "A"



SECTION "B"

AT MISSOURI AVENUE



SECTION "C"
5TH & MISSOURI

REV	DATE	BY	APP	DESCRIPTION

DESIGNED RS
DRAWN TL
CHECKED RS
APP. BY.
APP. DATE

QUALITY BLUE PRINT-BPC

KENNEDY
Kennedy Associates Architects Incorporated
417 North Euclid Avenue
St. Louis, Missouri 63108
314/367-8100

SUBMITTED: ______ 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

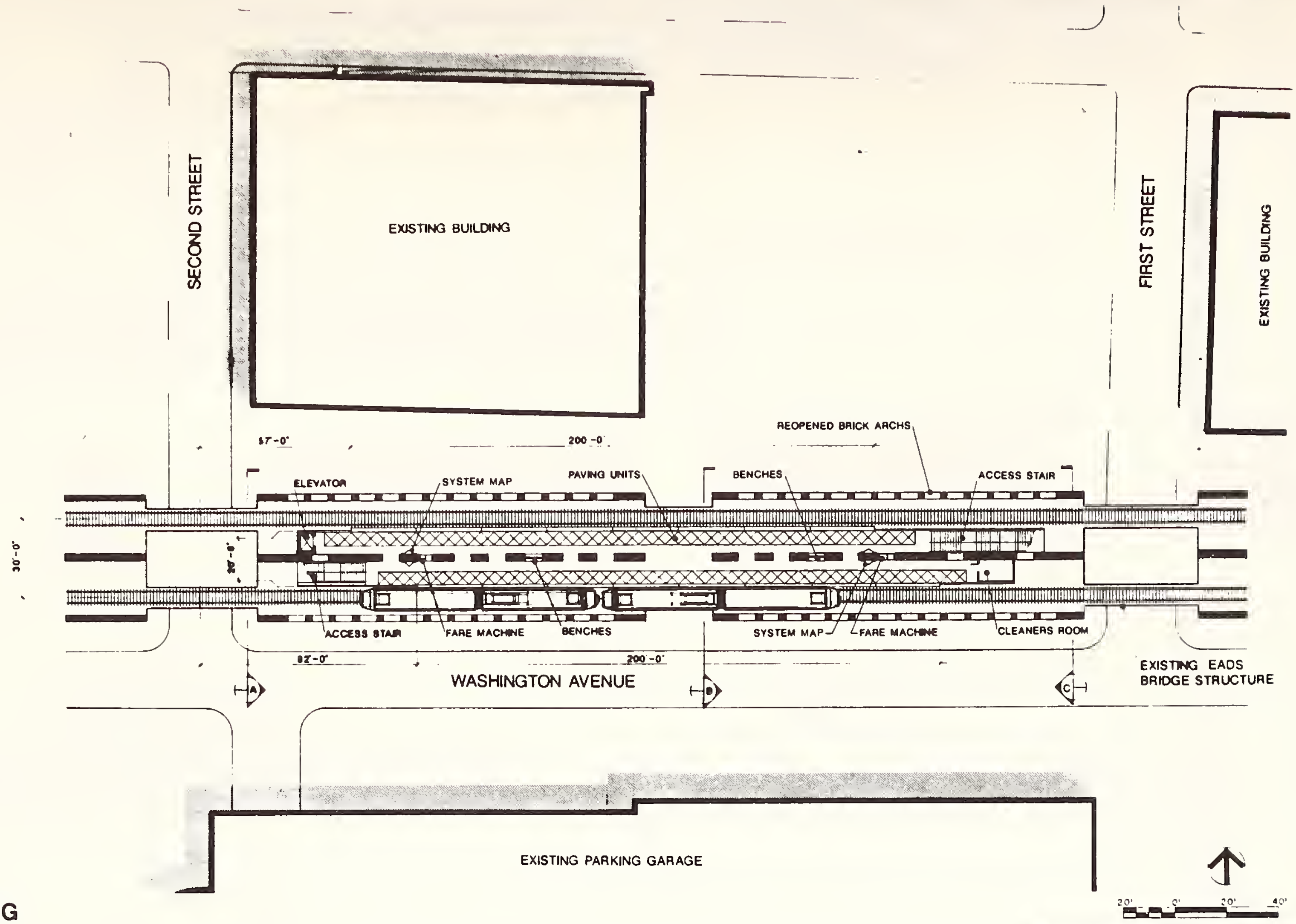
APPROVED: ______
PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D R Campion 7-86
DIRECTOR OF ENGINEERING DATE

LRT STATION PLAN
5TH & MISSOURI
SECTIONS / ELEVATIONS

CONTRACT NO. [illegible]
DRAWING NO. A102
SCALE 1"= 10'
SHEET NO 209



PLATFORM PLAN
LACLEDES LANDING

REV	DATE	BY	APP	DESCRIPTION

DESIGNED J/
DRAWN
CHECKED RS
APP BY
APP DATE

KENNEDY

SUBMITTED: 5/14/86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

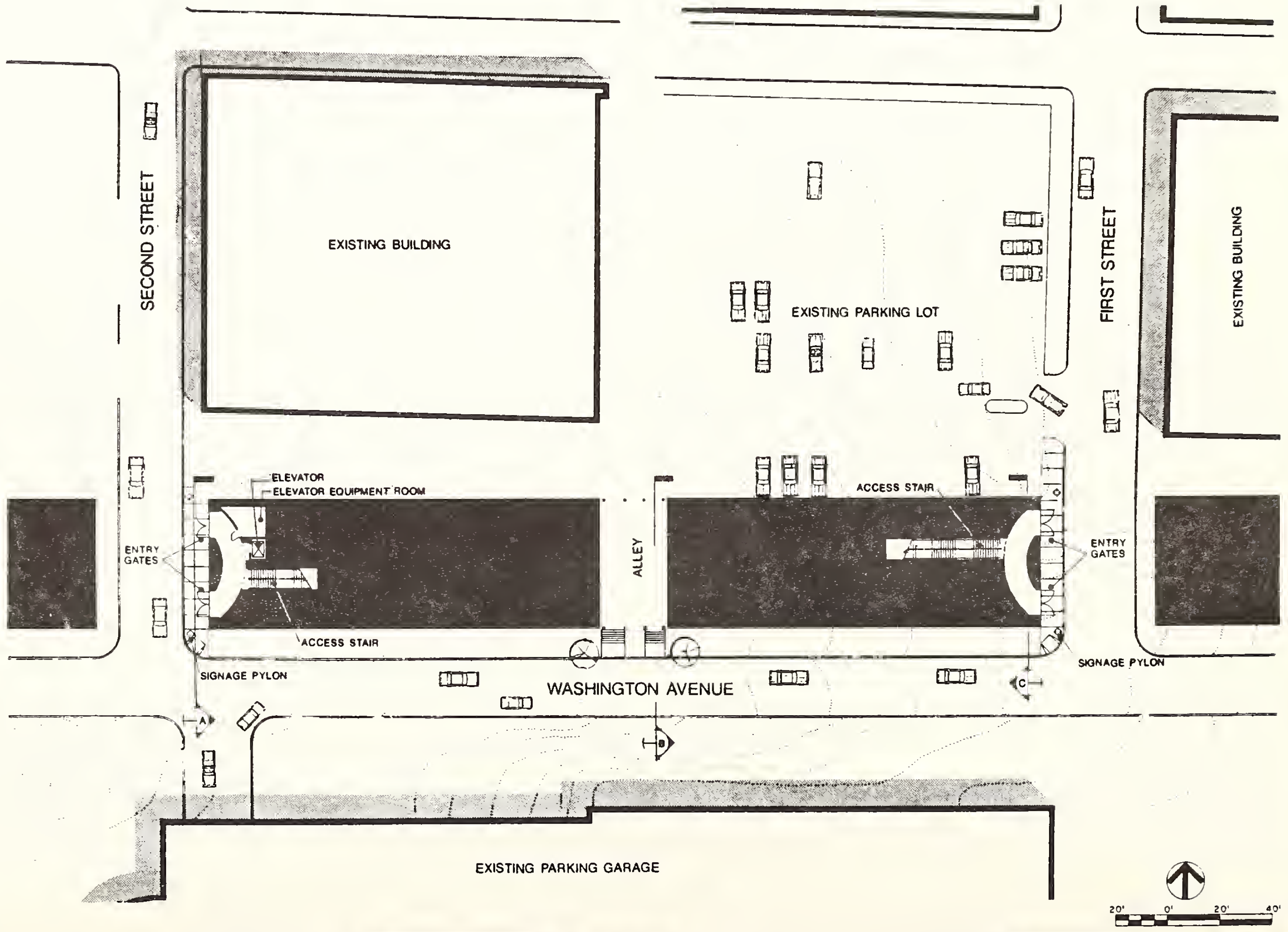
APPROVED: PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN
LACLEDE'S LANDING
PLATFORM PLAN

CONTRACT NO
DRAWING NO A-103
SCALE 1"=20'
SHEET NO 210



GRADE PLAN
LACLEDES LANDING

REV	DATE	BY	APP	DESCRIPTION

DESIGNED JV
DRAWN WJ
CHECKED RS
APP. BY:
APP. DATE

KENNEDY

SUBMITTED: 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

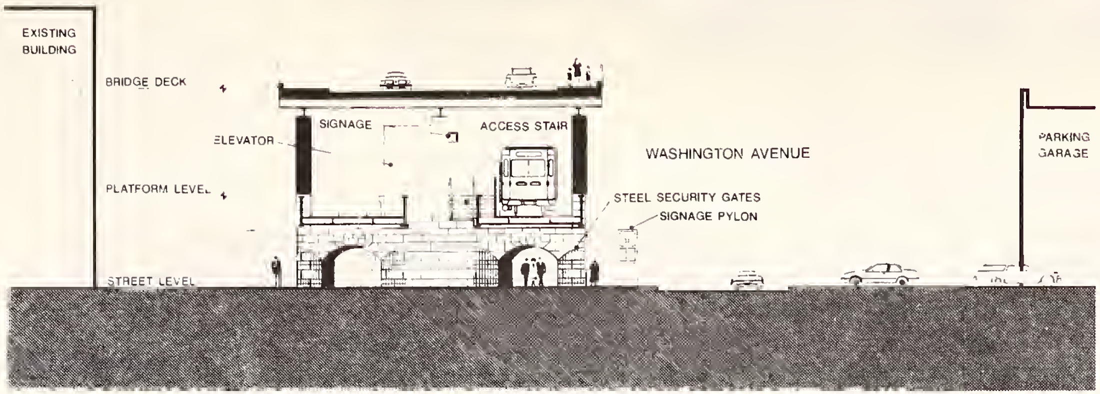
APPROVED:
PROJECT DIRECTOR
DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: Bill Carragan
DIRECTOR OF ENGINEERING
7-86
DATE

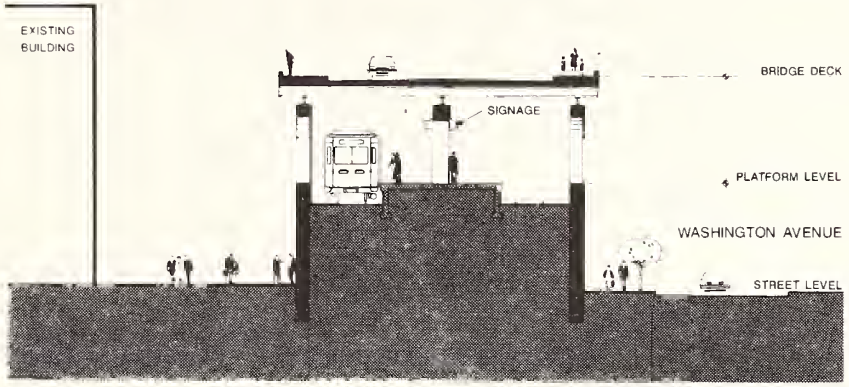
LRT STATION PLAN
LACLEDE'S LANDING
GRADE PLAN

CONTRACT NO. MO 03-[illegible] MO 90 [illegible]
DRAWING NO. A - 104
SCALE: 1"=20'
SHEET NO. 211



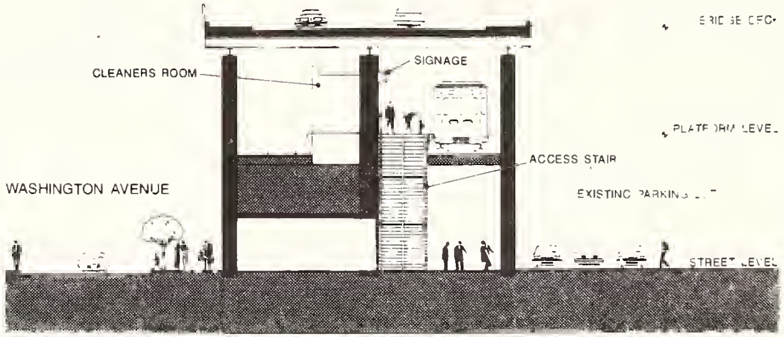
SECTION "A"

AT SECOND STREET



SECTION "B"

AT ALLEY



SECTION "C"

AT FIRST STREET

LACLEDES LANDING

REV DATE BY APP DESCRIPTION

DESIGNED
DRAWN
CHECKED
APP BY
APP DATE

KENNEDY

SUBMITTED 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

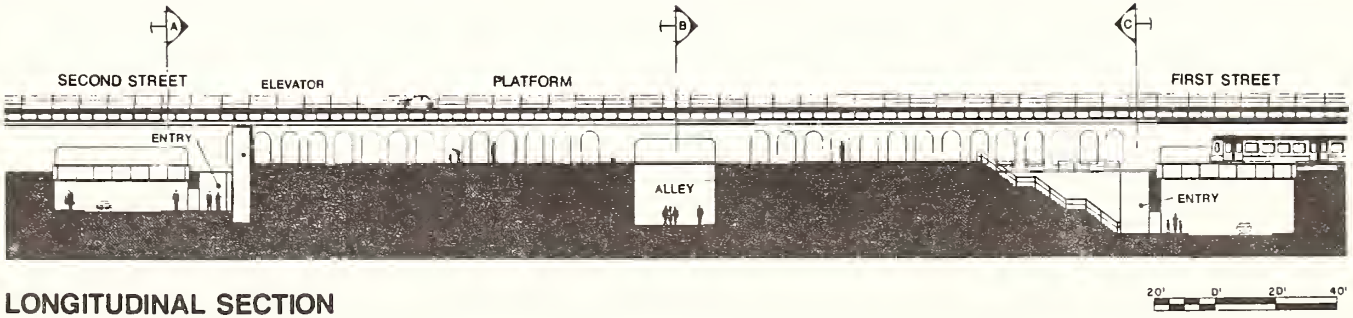
APPROVED
PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

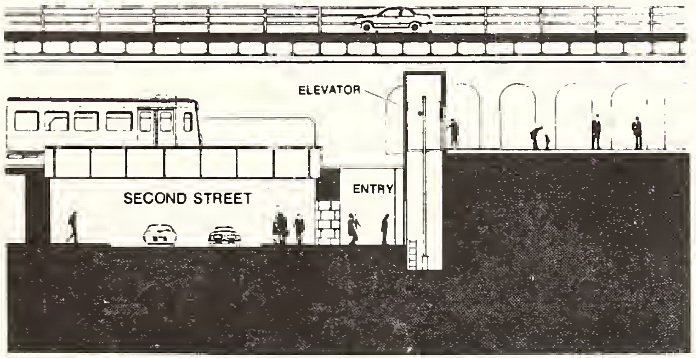
APPROVED
DIRECTOR OF ENGINEERING DATE

LRT STATION PLAN
LACLEDES LANDING
SECTIONS/ELEVATIONS

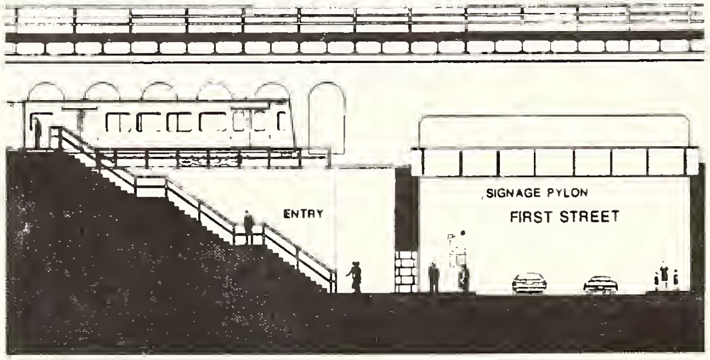
CONTRACT NO
DRAWING NO A - 105
SCALE 1"=10'
SHEET NO 212



LONGITUDINAL SECTION



SECTION AT SECOND STREET



SECTION AT FIRST STREET

LACLEDES LANDING

REV	DATE	BY	APP	DESCRIPTION

DESIGNED J
DRAWN W.
CHECKED RG
APP. BY:
APP. DATE

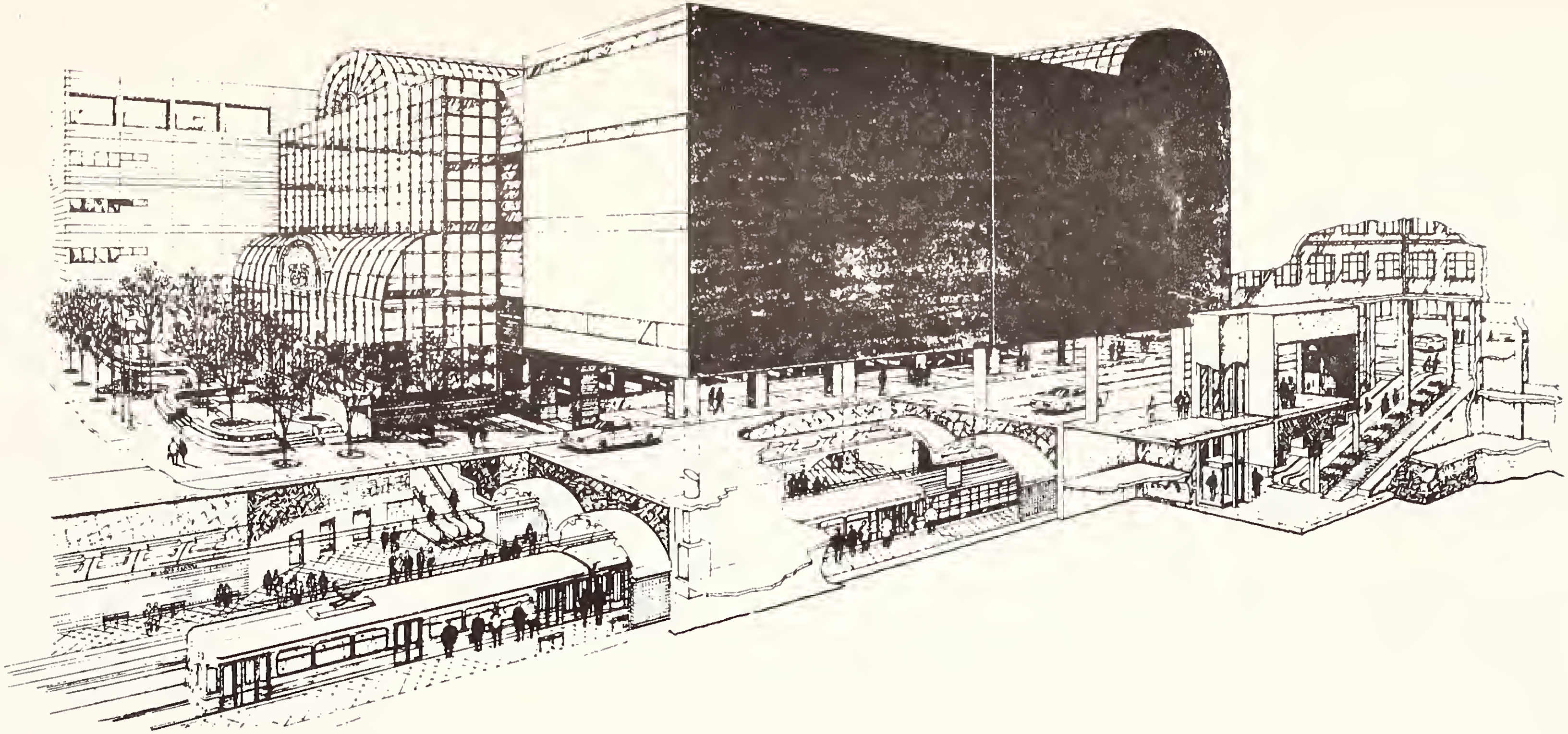
KENNEDY
SUBMITTED: 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED:
PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D.R. Campion 7-86
DIRECTOR OF ENGINEERING DATE

LRT STATION PLAN
LACLEDES LANDING
SECTIONS/ELEVATIONS

CONTRACT NO
DRAWING NO A - 106
SCALE 1"=10'
SHEET NO 213



REV	DATE	BY	APP	DESCRIPTION

DESIGNED BL
DRAWN LFS
CHECKED SC
APP. BY: SC
APP DATE 5-14-8

KENNEDY

SUBMITTED Adi DATE

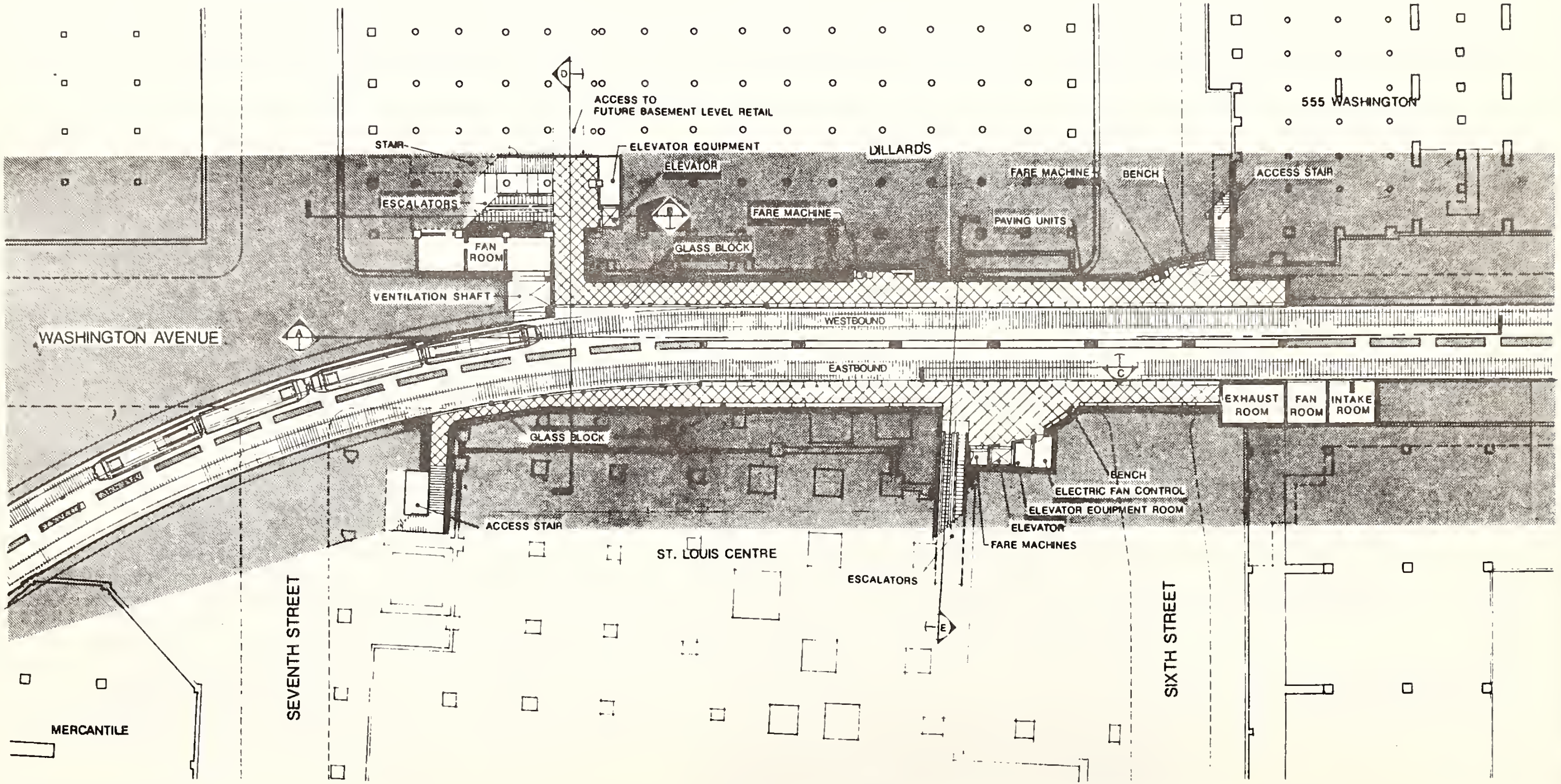
Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED W R Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN
ST.LOUIS CENTRE
TUNNEL SECTION RENDERING

CONTRACT NO
DRAWING NO A-107A
SCALE NONE
SHEET NO 214A



PLATFORM PLAN
ST. LOUIS CENTRE

REV	DATE	BY	APP	DESCRIPTION

DESIGNED BST
DRAWN PW
CHECKED BST
APP. BY: JSC
APP. DATE 5/22/86

KENNEDY

SUBMITTED: 5/22/86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

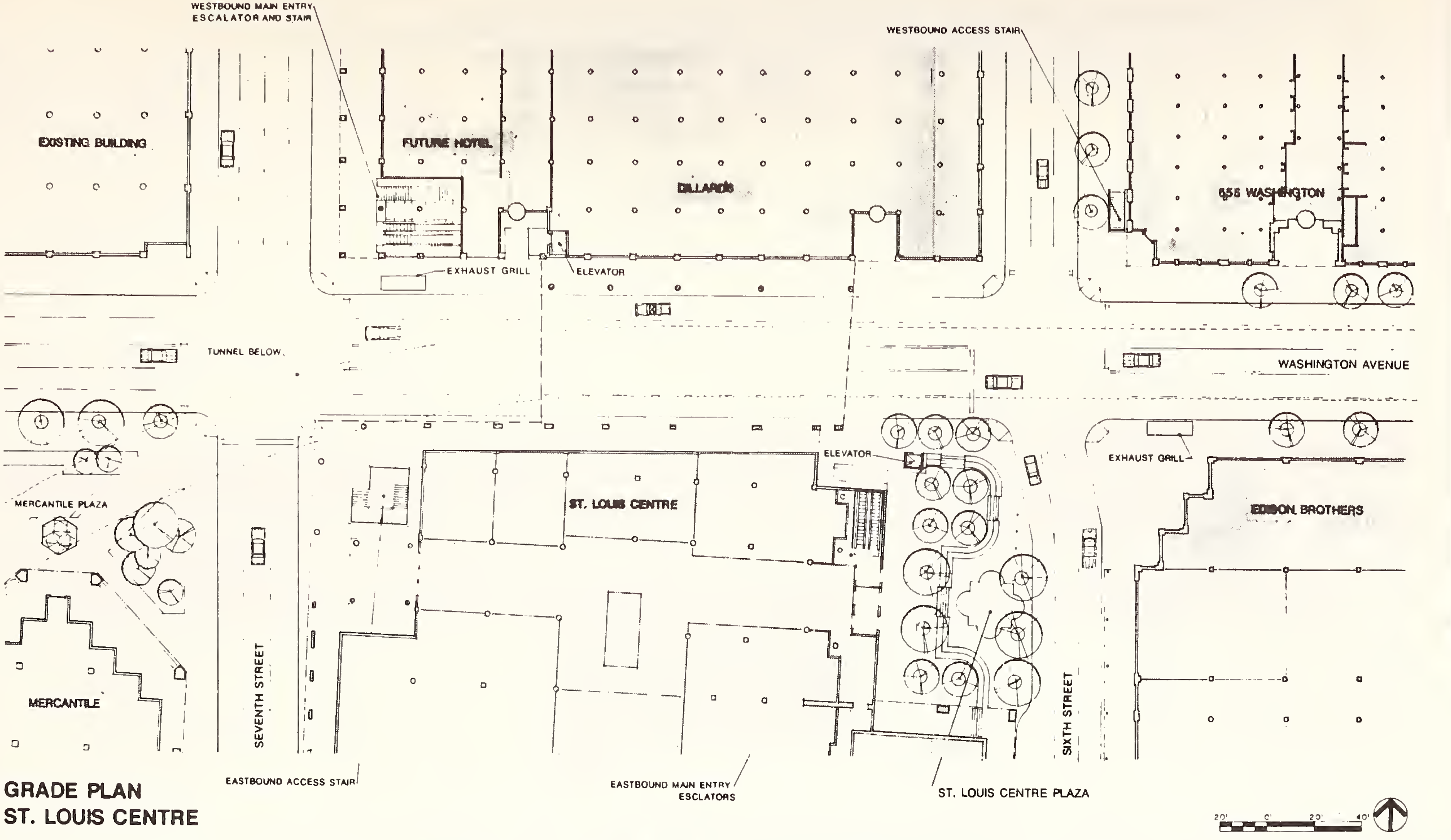
APPROVED: PROJECT DIRECTOR 6/26/86 DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: S.R. Campbell DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN
ST LOUIS CENTRE
PLATFORM PLAN

CONTRACT NO MO-03-0023/MO-90-0012
DRAWING NO. A-107B
SCALE: 1"=20'
SHEET NO. 214B



GRADE PLAN
ST. LOUIS CENTRE

REV	DATE	BY	APP	DESCRIPTION

DESIGNED
DRAWN
CHECKED
APP. BY.
APP DATE

KENNEDY

SUBMITTED 90% ISSUE 3/24/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

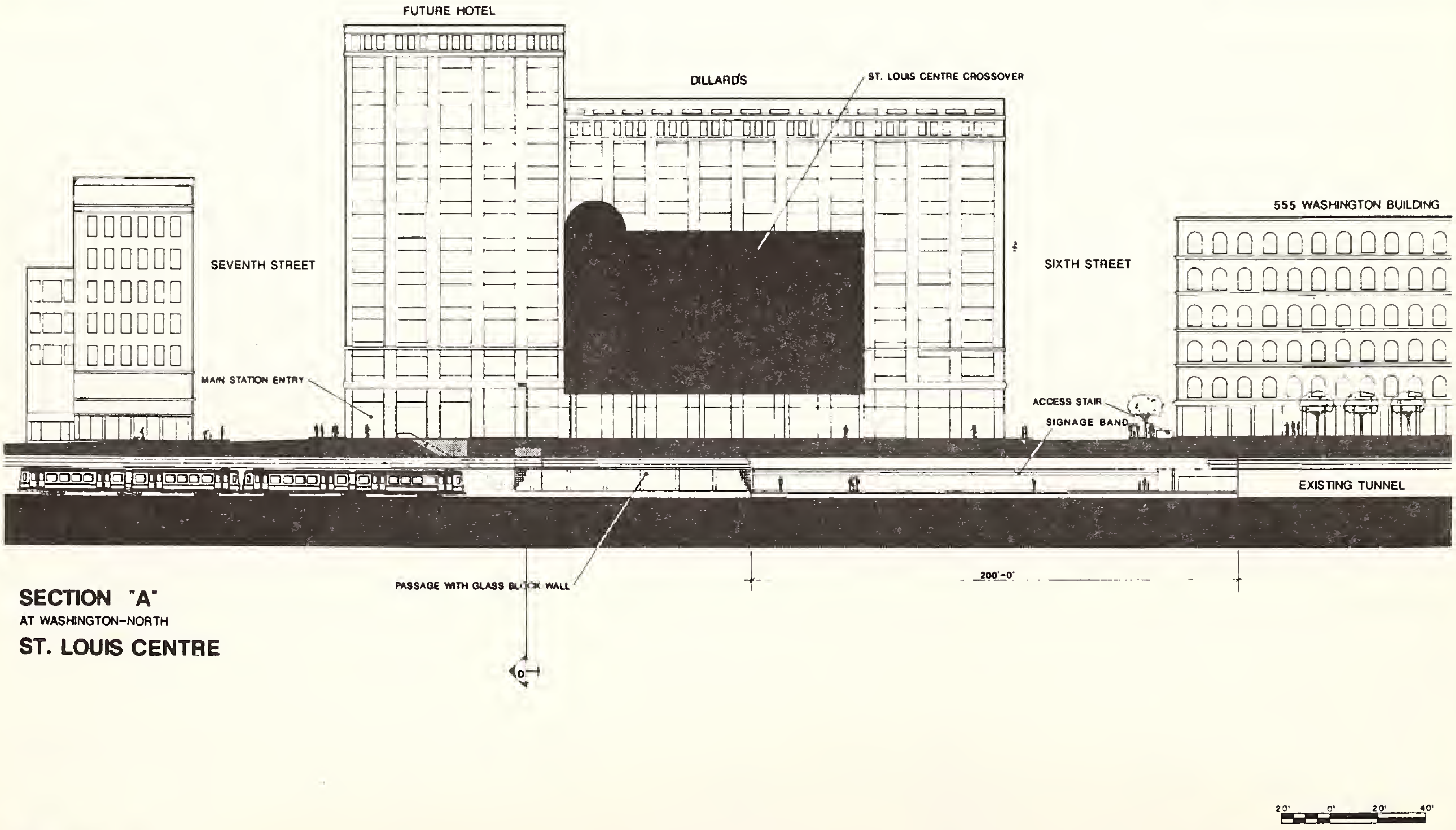
APPROVED: PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN
ST. LOUIS CENTRE
GRADE PLAN

CONTRACT NO [illegible]
DRAWING NO A - 1[illegible]
SCALE 1"=20'
SHEET NO 215



SECTION "A"
AT WASHINGTON-NORTH
ST. LOUIS CENTRE

					DESIGNED BS
					DRAWN PW
					CHECKED BS
					APP. BY: JSC
REV	DATE	BY	APP	DESCRIPTION	APP DATE 5/22/86

KENNEDY
[illegible]

SUBMITTED: _______ 5/22/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: _______ 6/3/86
PROJECT DIRECTOR DATE

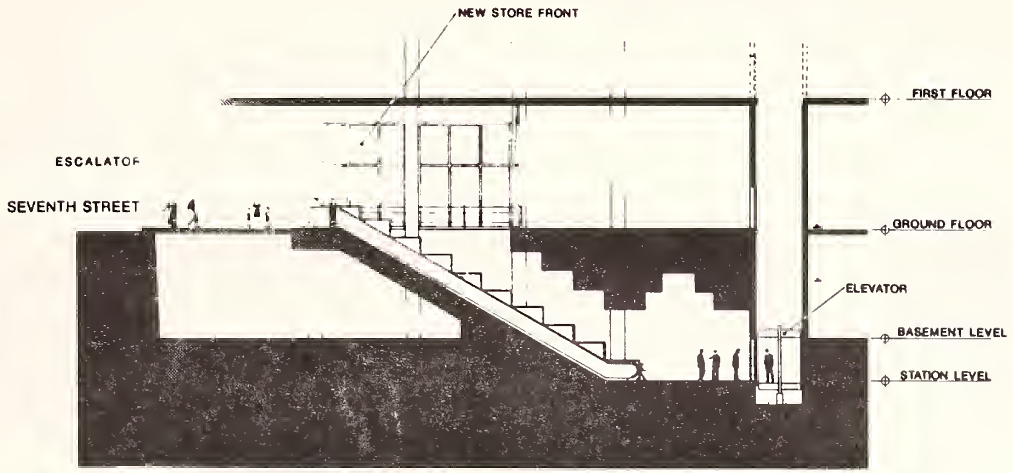
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D R Campion 7-86
DIRECTOR OF ENGINEERING DATE

LRT STATION PLAN
ST. LOUIS CENTRE
SECTIONS / ELEVATIONS

CONTRACT NO [illegible]
DRAWING NO. A - [illegible]
SCALE: 1"=20'
SHEET NO. 216

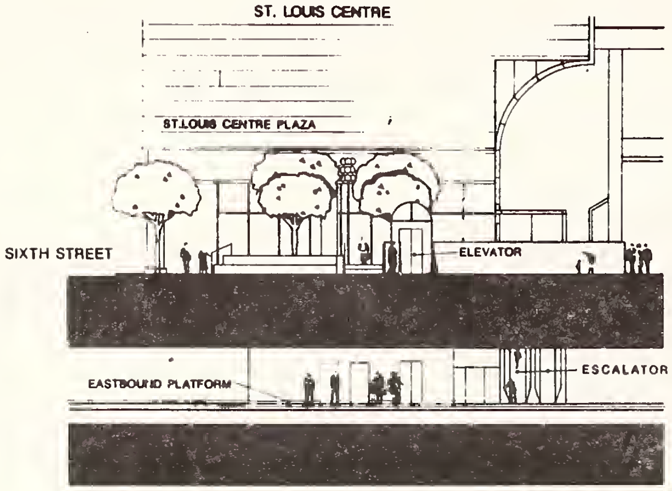
QUALITY BLUE PRINT-OPC



SECTION "B"

AT WESTBOUND PLATFORM MAIN ENTRY

ST. LOUIS CENTRE



SECTION "C"

AT EASTBOUND MAIN STATION ENTRY

10' 0' 10' 20'

REV.	DATE	BY	APP	DESCRIPTION

DESIGNED BS
DRAWN PW
CHECKED BS
APP. BY: JSC
APP. DATE 5/22/86

KENNEDY
SUBMITTED: 5/22/86 DATE

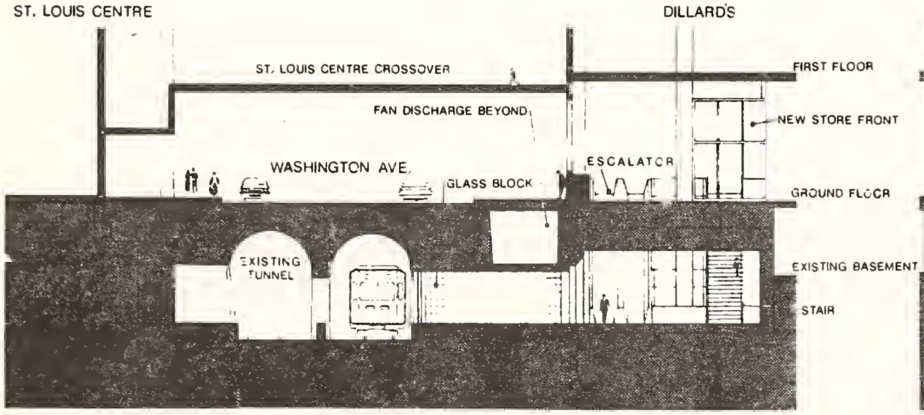
Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: PROJECT DIRECTOR 6/30/86 DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

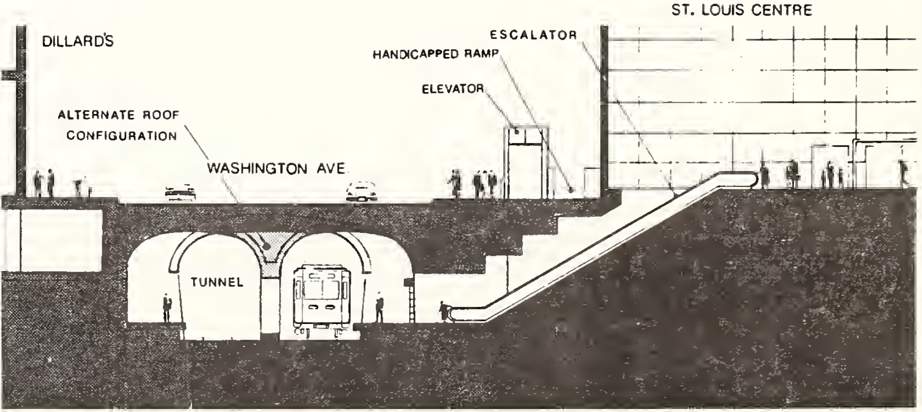
LRT STATION PLAN
ST. LOUIS CENTRE
SECTIONS / ELEVATIONS

CONTRACT NO [illegible]
DRAWING NO A - [illegible]
SCALE: 1"=10'
SHEET NO. .217

QUALITY BLUE PRINT-BPC



SECTION "D"
ST. LOUIS CENTRE



SECTION "E"

REV	DATE	BY	APP

DESCRIPTION

DESIGNED
DRAWN
CHECKED
APP. BY: ~~SC
APP. DATE

KENNEDY

SUBMITTED: 5/22/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

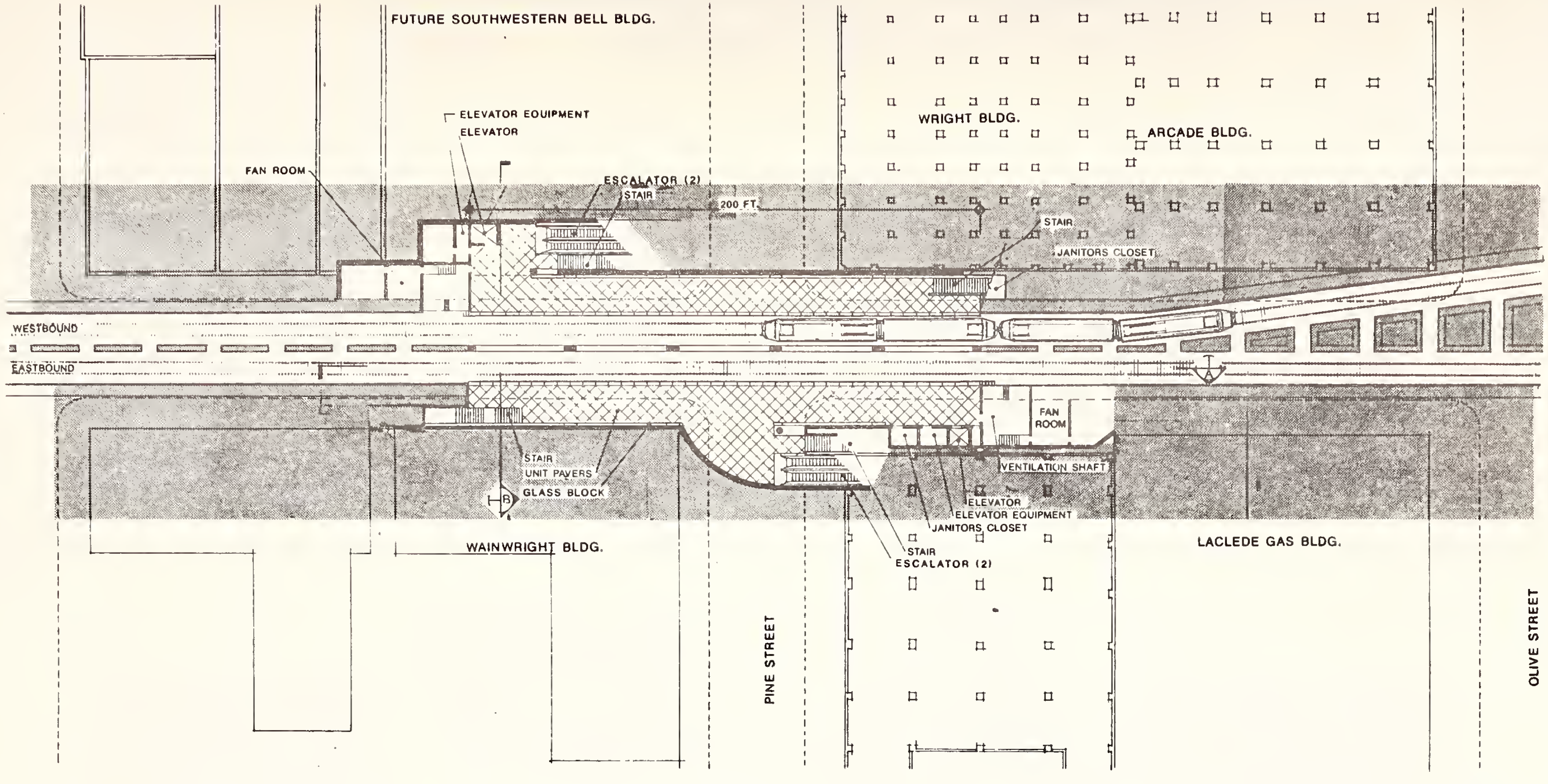
APPROVED:
PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED:
DIRECTOR OF ENGINEERING
7-86
DATE

LRT STATION PLAN
ST. LOUIS CENTRE
SECTIONS / ELEVATIONS

CONTRACT NO MO-03-0023/MO-90-0012
DRAWING NO A - 111
SCALE 1' = 10'
SHEET NO 218



PLATFORM PLAN
8 TH & PINE

REV.	DATE	BY	APP.	DESCRIPTION

DESIGNED RS
DRAWN PW
CHECKED RS
APP. BY: JSC
APP. DATE 5/22/86

Kennedy Associates/Architects Incorporated
KENNEDY
417 North Euclid Avenue
St. Louis, Missouri 63108
314/367-8100
SUBMITTED: 5/22/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED:
PROJECT DIRECTOR
DATE

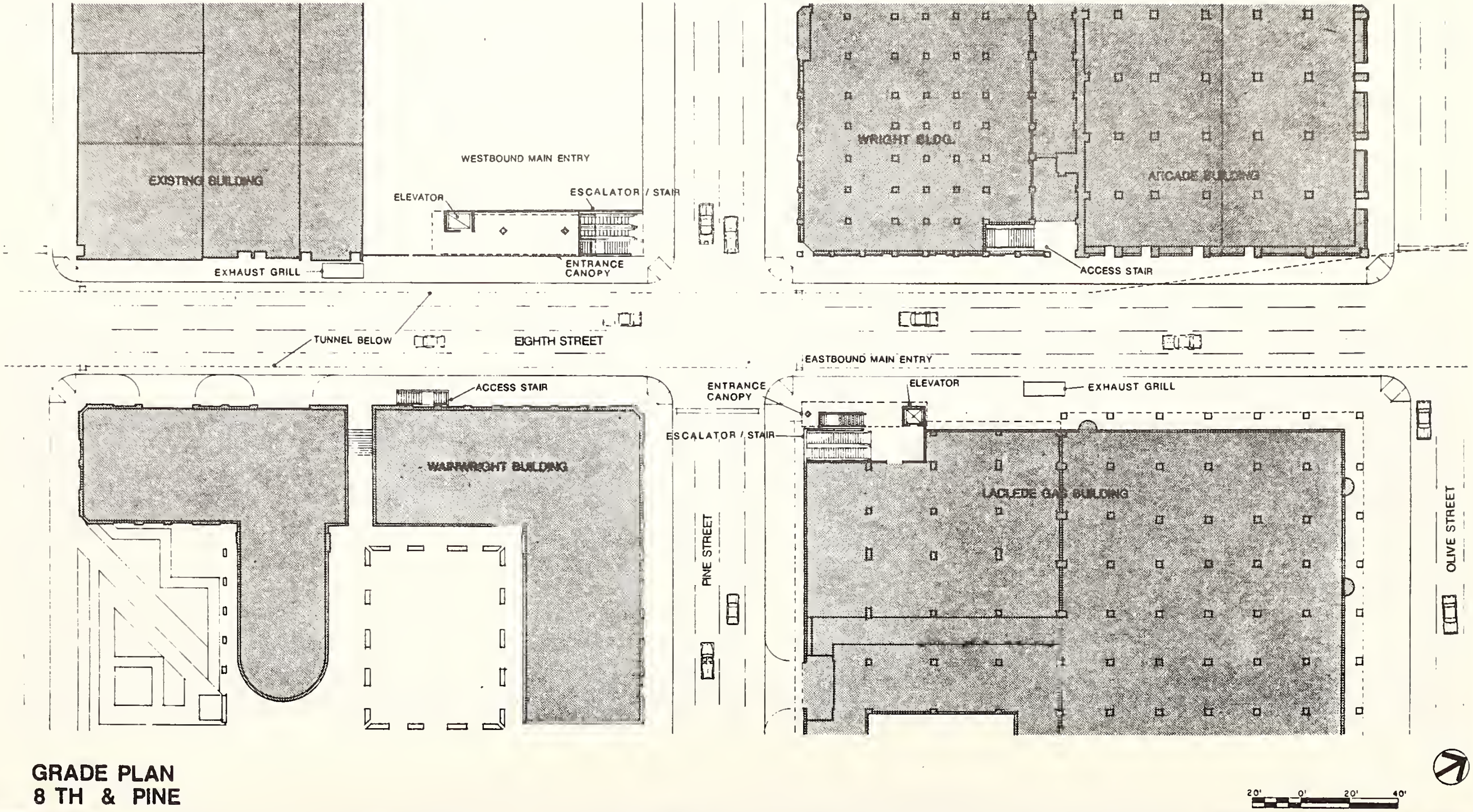
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D R Campion 7-86
DIRECTOR OF ENGINEERING
DATE

LRT STATION PLAN

8 TH & PINE
PLATFORM PLAN

CONTRACT NO. [illegible]
DRAWING NO. A-112
SCALE: 1" = 20'
SHEET NO. 219

QUALITY BLUE PRINT-BPC



GRADE PLAN
8 TH & PINE

REV	DATE	BY	APP	DESCRIPTION

DESIGNED
DRAWN
CHECKED
APP. BY:
APP. DATE

KENNEDY

SUBMITTED: 90% ISSUE 3/24/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

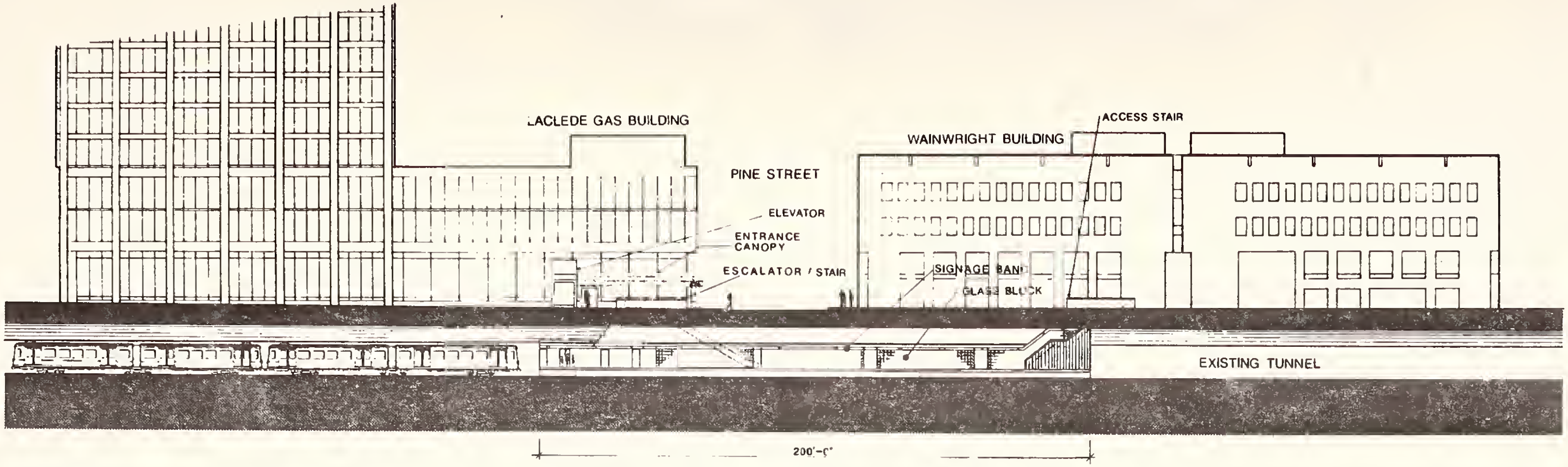
APPROVED: ____ PROJECT DIRECTOR ____ DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

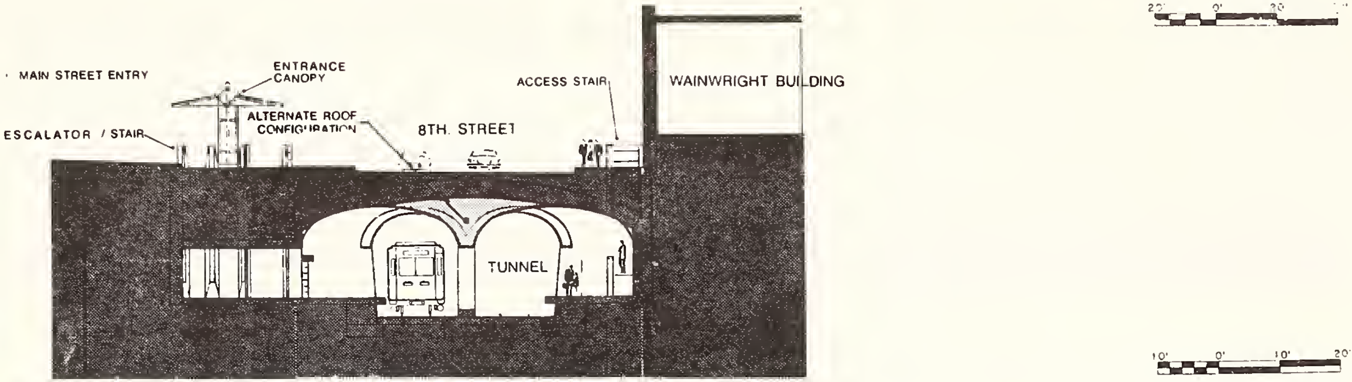
LRT STATION PLAN
8 TH & PINE
GRADE PLAN

CONTRACT NO.
DRAWING NO. A - 113
SCALE: 1"=20'
SHEET NO. 220



SECTION "A"

LONGITUDINAL SECTION AT 8TH STREET-EAST



SECTION "B"

CROSS SECTION WESTBOUND ENTRY-NORTH

8 TH & PINE

REV	DATE	BY	APP	DESCRIPTION

DESIGNED ES
DRAWN DW
CHECKED
APP. BY: TSC
APP. DATE

KENNEDY

SUBMITTED: 5/22/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

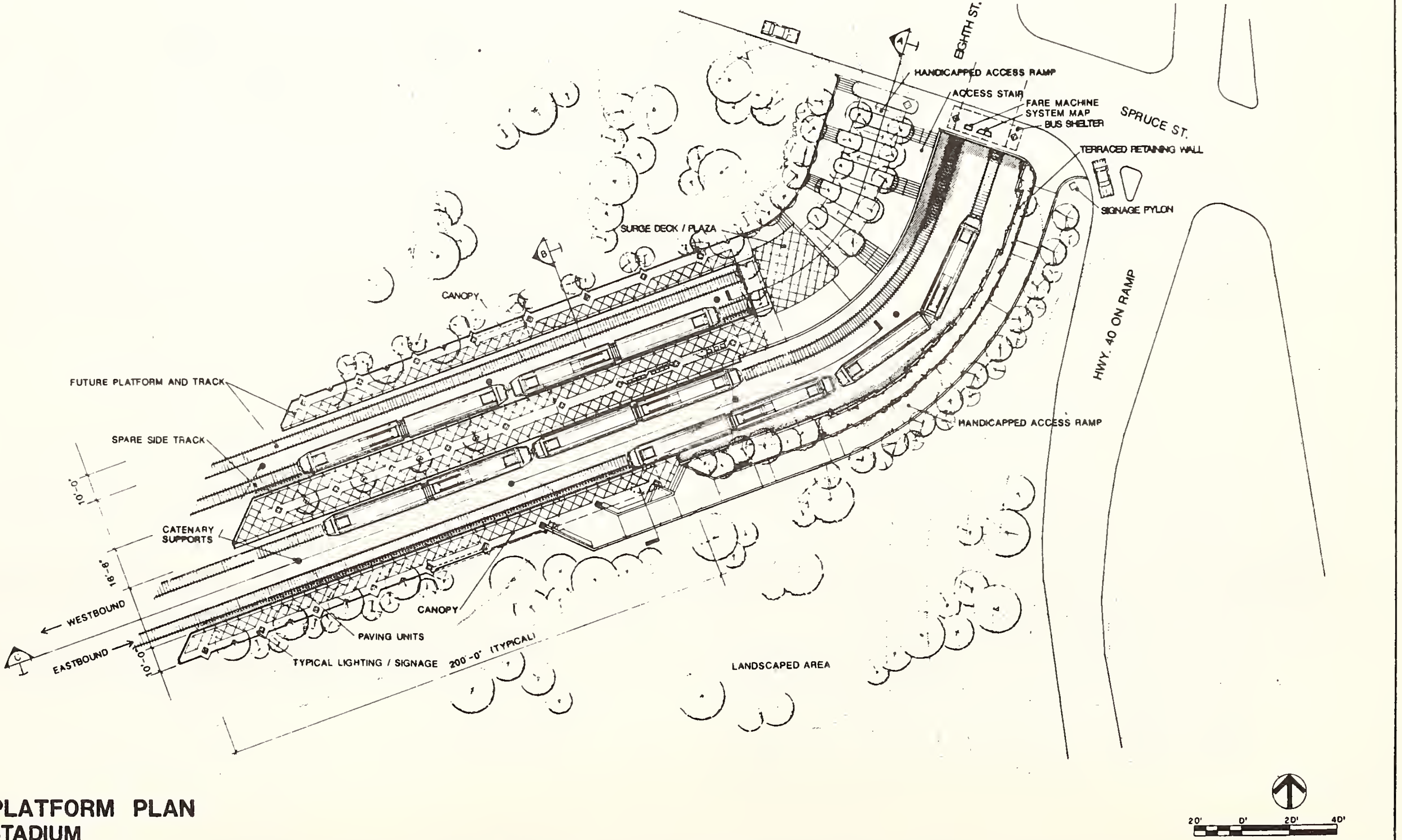
APPROVED: PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: DIRECTOR OF ENGINEERING 7-86
DATE

LRT STATION PLAN
8TH & PINE
SECTIONS / ELEVATIONS

CONTRACT NO MO 03-0073
DRAWING NO A - 114
SCALE 1" = 10'
SHEET NO 221



PLATFORM PLAN
STADIUM

REV	DATE	BY	APP	DESCRIPTION

DESIGNED PW
DRAWN LS
CHECKED RS
APP. BY:
APP. DATE

Kennedy Associates
Architects Incorporated
KENNEDY
617 North Euclid Avenue
St. Louis, Missouri 63108
SUBMITTED: 5/14/86 DATE

Sverdrup & Parcel
and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: PROJECT DIRECTOR 6/30/86 DATE

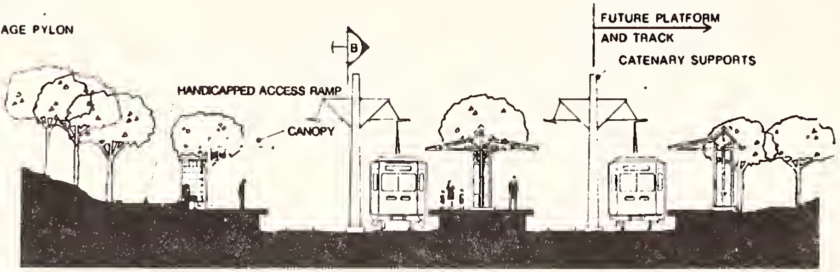
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN
STADIUM
PLATFORM PLAN

CONTRACT NO. [illegible]
DRAWING NO A - 117
SCALE 1"=20'
SHEET NO. 224

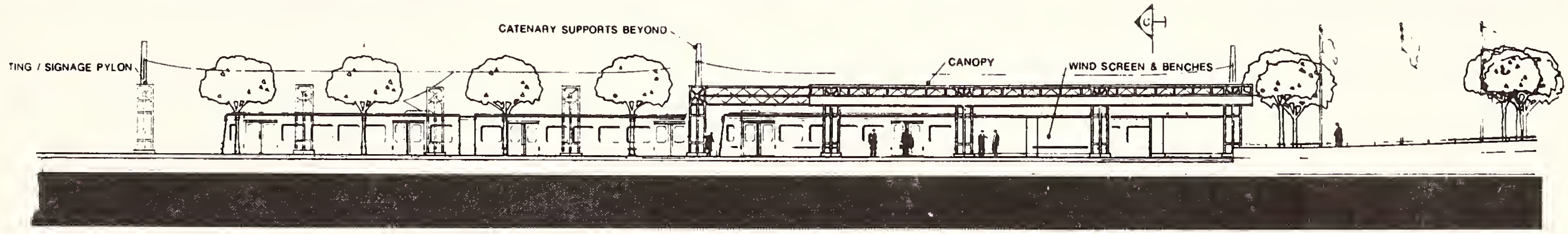
SECTION "A"

AT HANDICAPPED RAMP AND SURGE DECK PLAZA



SECTION "B"

ACROSS PLATFORMS



SECTION "C"

LONGITUDINAL AT CENTER LINE OF TRACK

STADIUM

REV	DATE	BY	APP	DESCRIPTION

DESIGNED PW
DRAWN LS
CHECKED RS
APP. BY:
APP. DATE

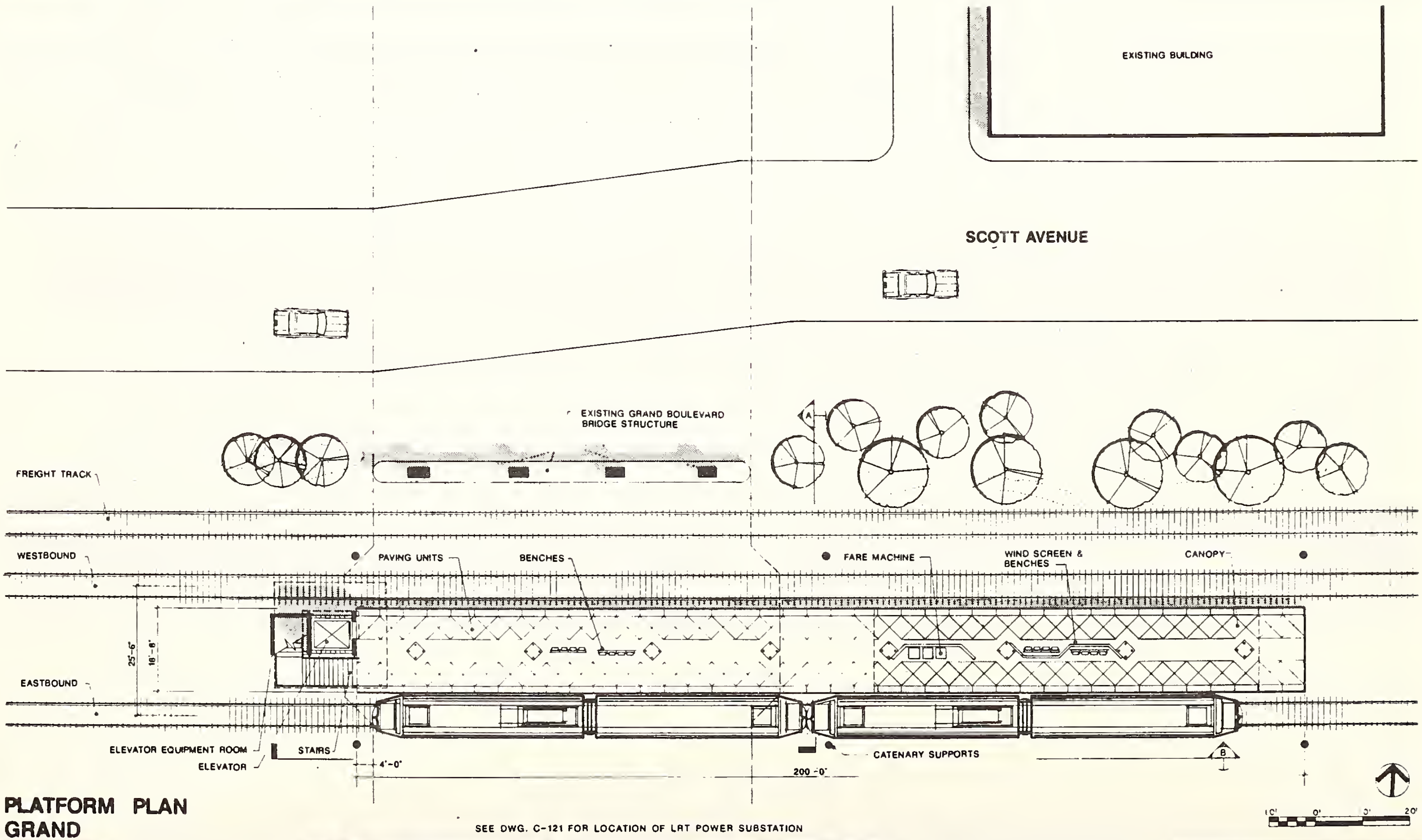
KENNEDY
SUBMITTED: Sella 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: ______ PROJECT DIRECTOR ______ DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN
STADIUM
SECTIONS / ELEVATIONS

CONTRACT NO
DRAWING NO A - 118
SCALE 1"=10'
SHEET NO 225



PLATFORM PLAN
GRAND

SEE DWG. C-121 FOR LOCATION OF LRT POWER SUBSTATION

REV	DATE	BY	APP	DESCRIPTION	
					DESIGNED PW
					DRAWN EM
					CHECKED RS
					APP. BY:
					APP. DATE

KENNEDY

SUBMITTED: 5/14/86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: PROJECT DIRECTOR DATE

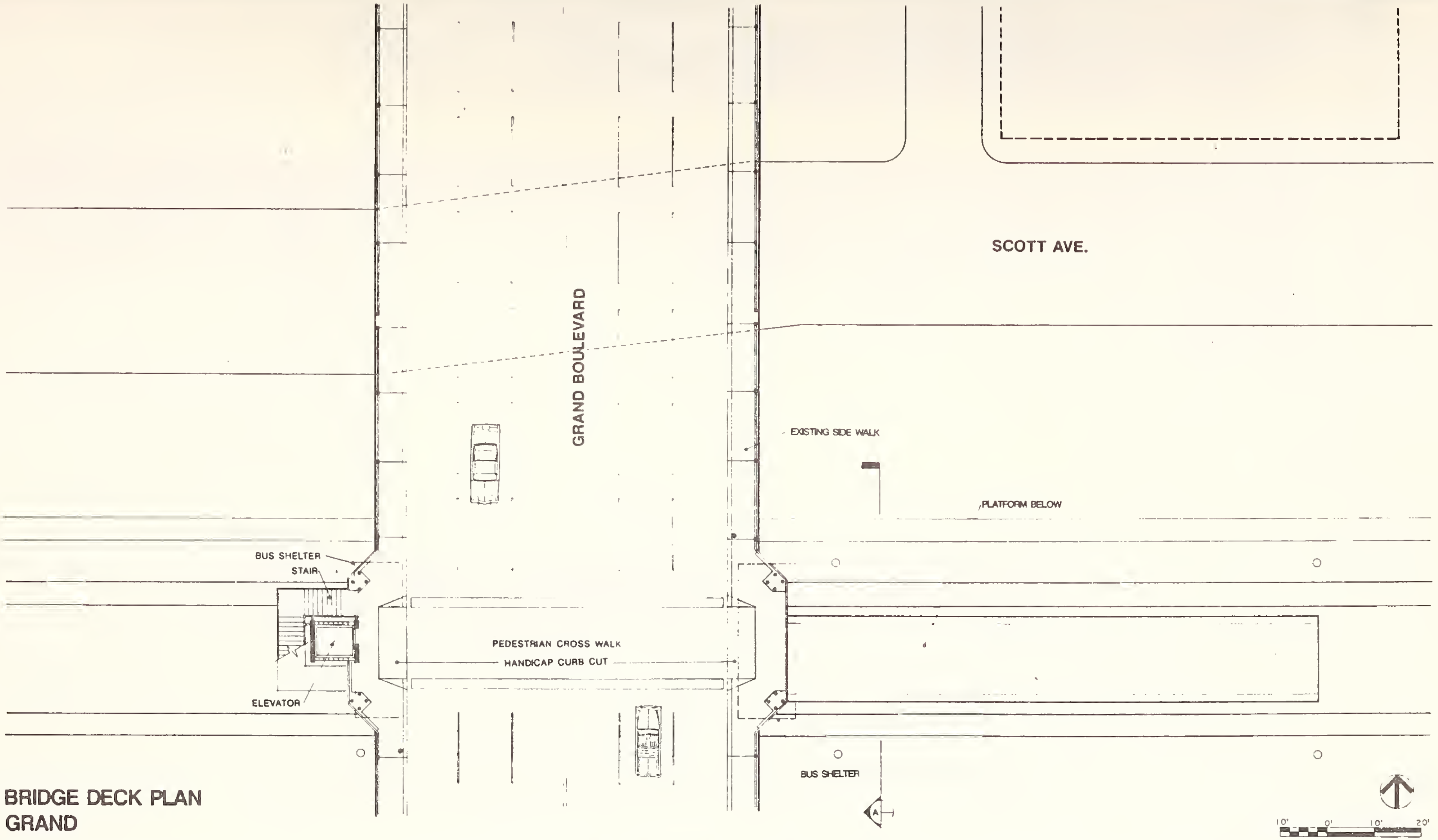
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN
GRAND
PLATFORM PLAN

CONTRACT NO
DRAWING NO A-119
SCALE 1"=10'
SHEET NO 226

BRIDGE DECK PLAN
GRAND



REV	DATE	BY	APP	DESCRIPTION

DESIGNED PW
DRAWN EM
CHECKED RS
APP. BY.
APP DATE

KENNEDY

SUBMITTED: ____________ 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

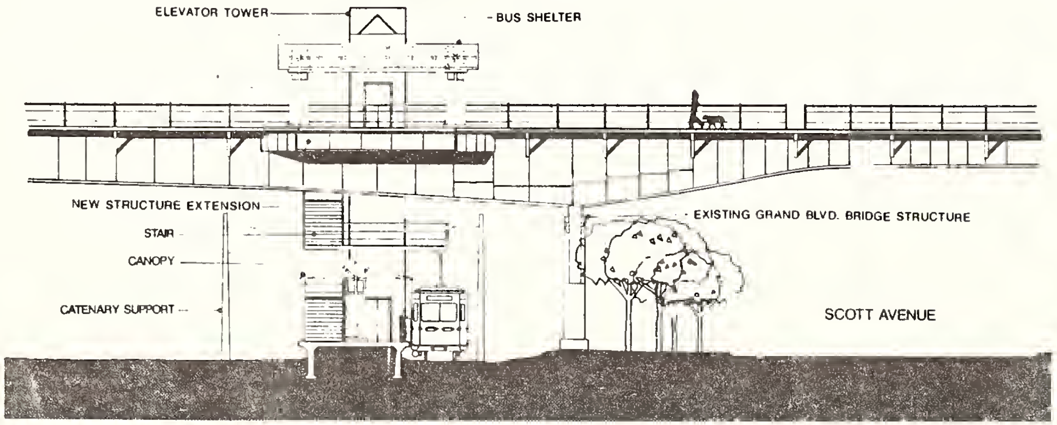
APPROVED: ____________ PROJECT DIRECTOR
DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

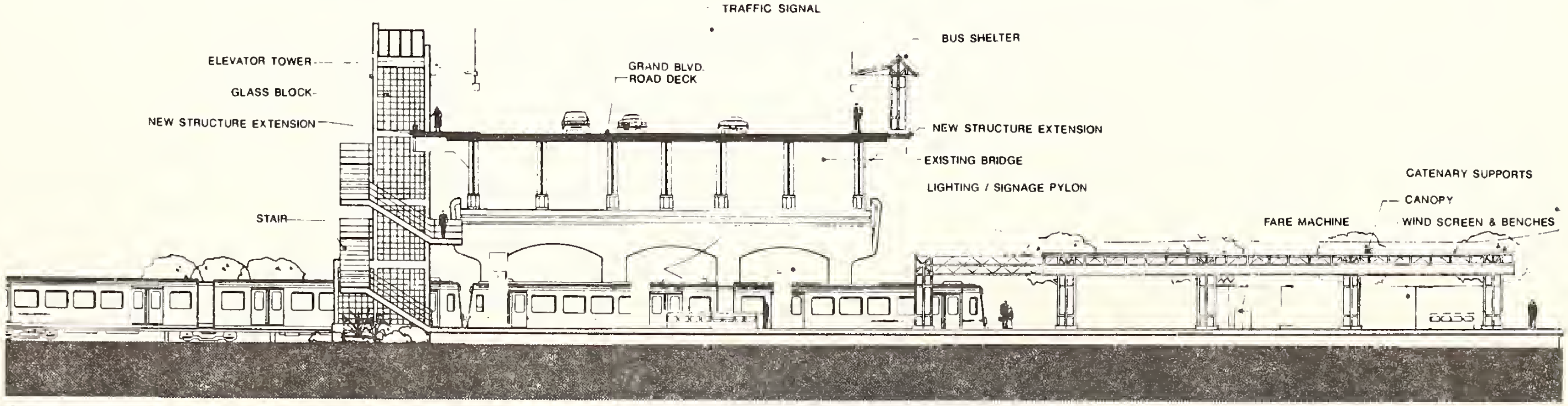
APPROVED: D.R. Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN
GRAND
STREET LEVEL PLAN

CONTRACT NO. [illegible]
DRAWING NO. A-120
SCALE 1"=10'
SHEET NO. 227



SECTION "A"



SECTION "B"
GRAND

REV	DATE	BY	APP	DESCRIPTION

DESIGNED PW
DRAWN EH
CHECKED RS
APP. BY:
APP. DATE

KENNEDY
Kennedy Associates Architects Incorporated
417 North Euclid Avenue
St. Louis, Missouri 63108
314-367-8188

SUBMITTED: 5/14/86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: PROJECT DIRECTOR DATE

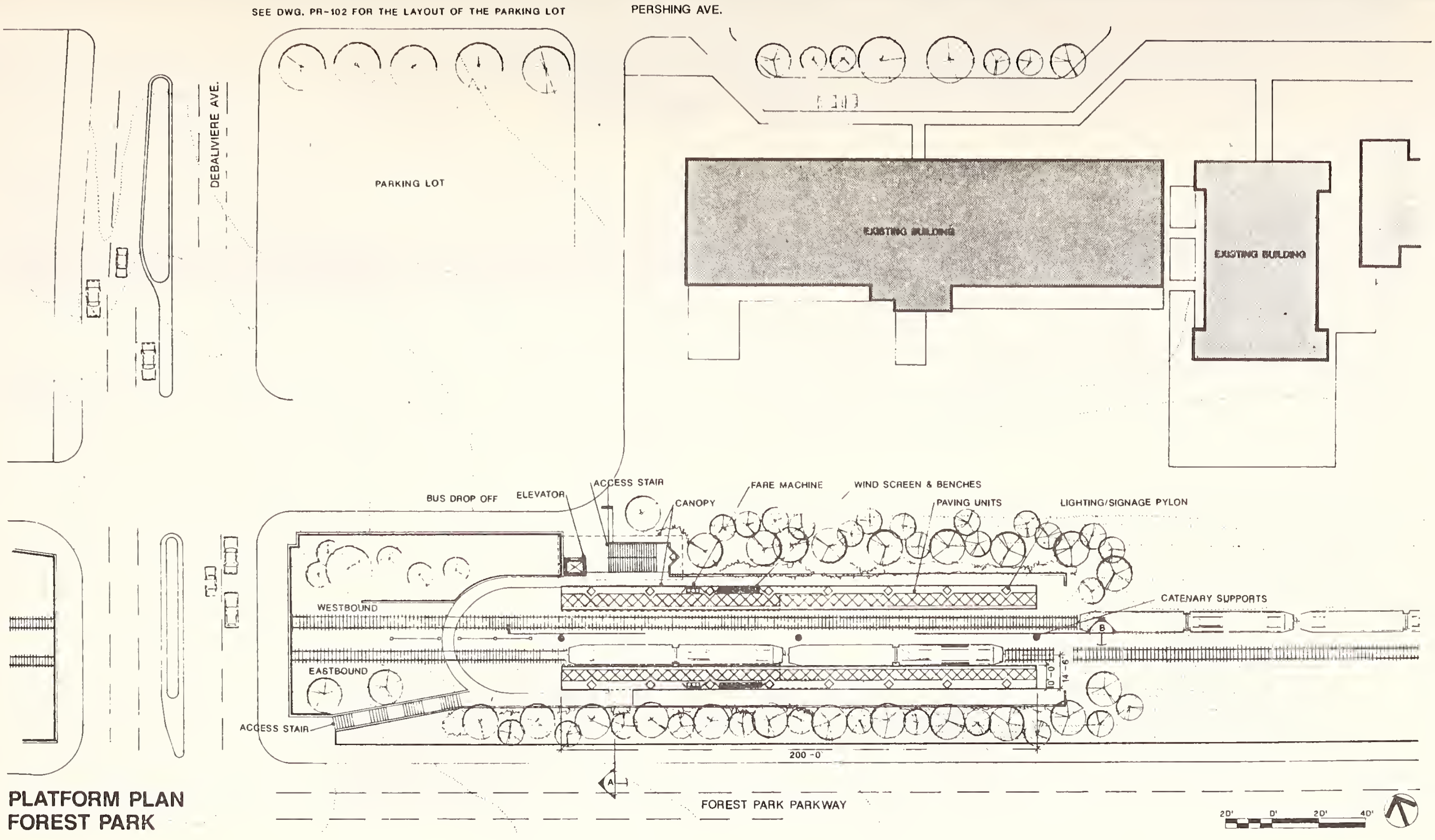
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN
GRAND
SECTIONS / ELEVATIONS

CONTRACT NO. M0-03-0023/M0-90-0012
DRAWING NO. A - 121
SCALE: 1"=10'
SHEET NO. 228

QUALITY BLUE PRINT-BPC



PLATFORM PLAN
FOREST PARK

REV	DATE	BY	APP	DESCRIPTION

DESIGNED MO
DRAWN EH
CHECKED RG
APP. BY:
APP DATE

Kennedy Associates
Architects Incorporated
KENNEDY
[illegible]
MACKEY & ASSOCIATES ARCHITECTS
SUBMITTED: 5/14/86
DATE

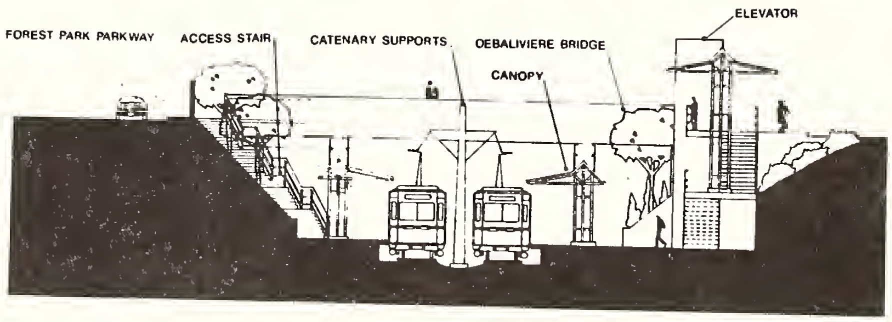
Sverdrup & Parcel
and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED:
PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D R Campion 7-86
DIRECTOR OF ENGINEERING DATE

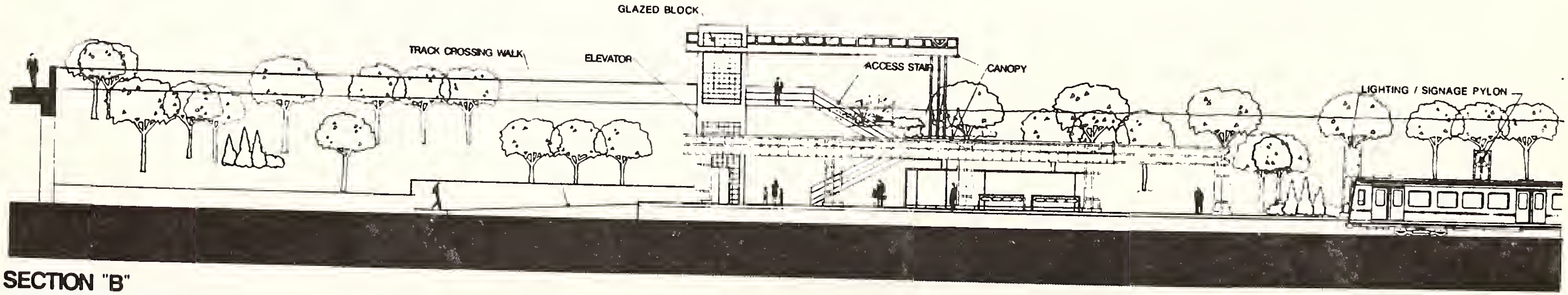
LRT STATION PLAN
FOREST PARK
PLATFORM PLAN

CONTRACT NO M0-03-0023/M0-90-0012
DRAWING NO A - 122
SCALE 1"=20'
SHEET NO 229

QUALITY BLUE PRINT-BPC



SECTION "A"



SECTION "B"
FOREST PARK

10' 0' 10' 20'

REV	DATE	BY	APP	DESCRIPTION

DESIGNED MO
DRAWN EH
CHECKED RS
APP. BY:
APP DATE

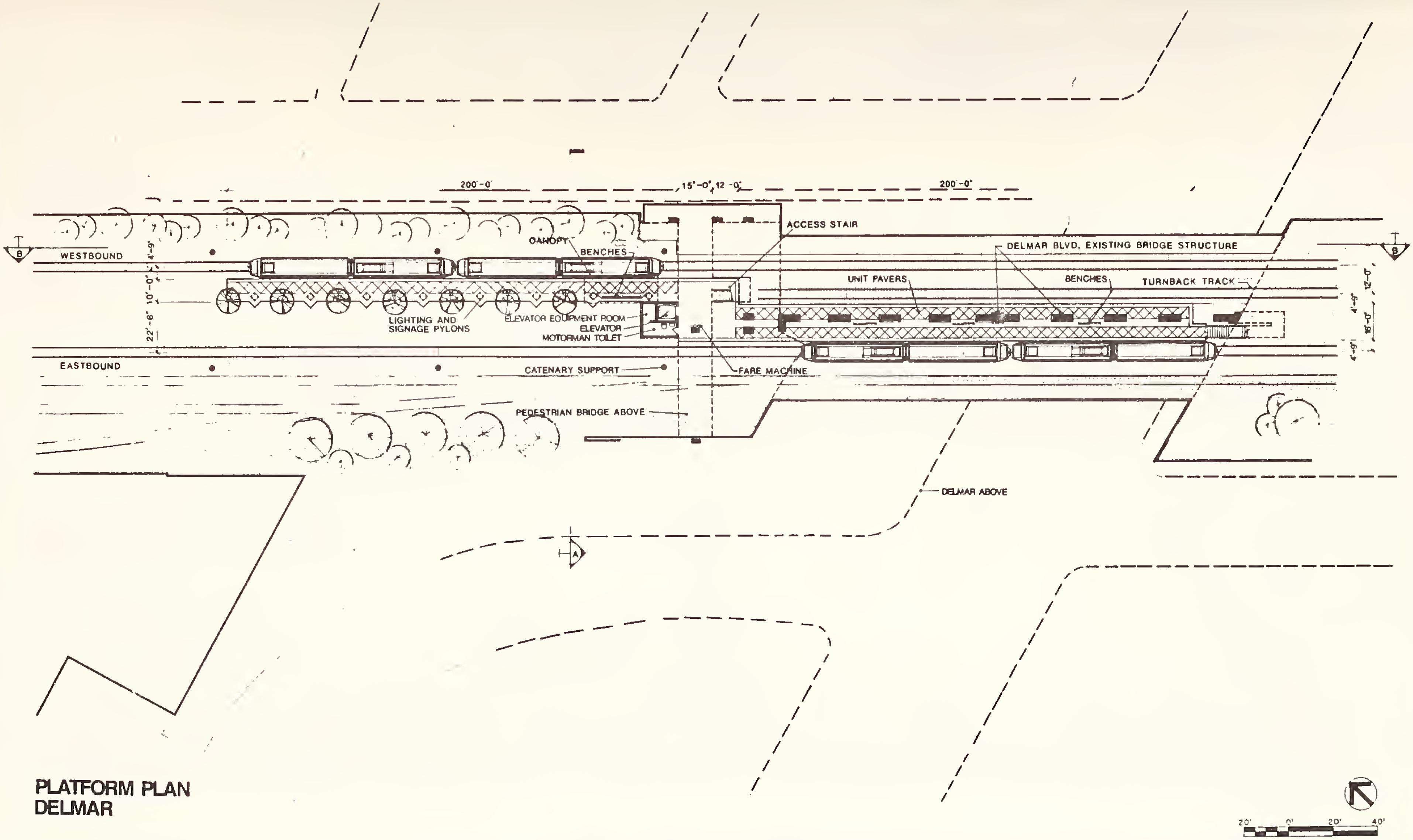
KENNEDY
MACKEY & ASSOCIATES ARCHITECTS
SUBMITTED: 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED:
PROJECT DIRECTOR
DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D R Campion
DIRECTOR OF ENGINEERING
7-86
DATE

LRT STATION PLAN
FOREST PARK
SECTIONS / ELEVATIONS

CONTRACT NO. MO-03-0023, MO-90-0012
DRAWING NO. A - 123
SCALE: 1"=10'
SHEET NO. 230



PLATFORM PLAN
DELMAR

REV	DATE	BY	APP	DESCRIPTION

DESIGNED RC
DRAWN DC
CHECKED RS
APP. BY:
APP. DATE

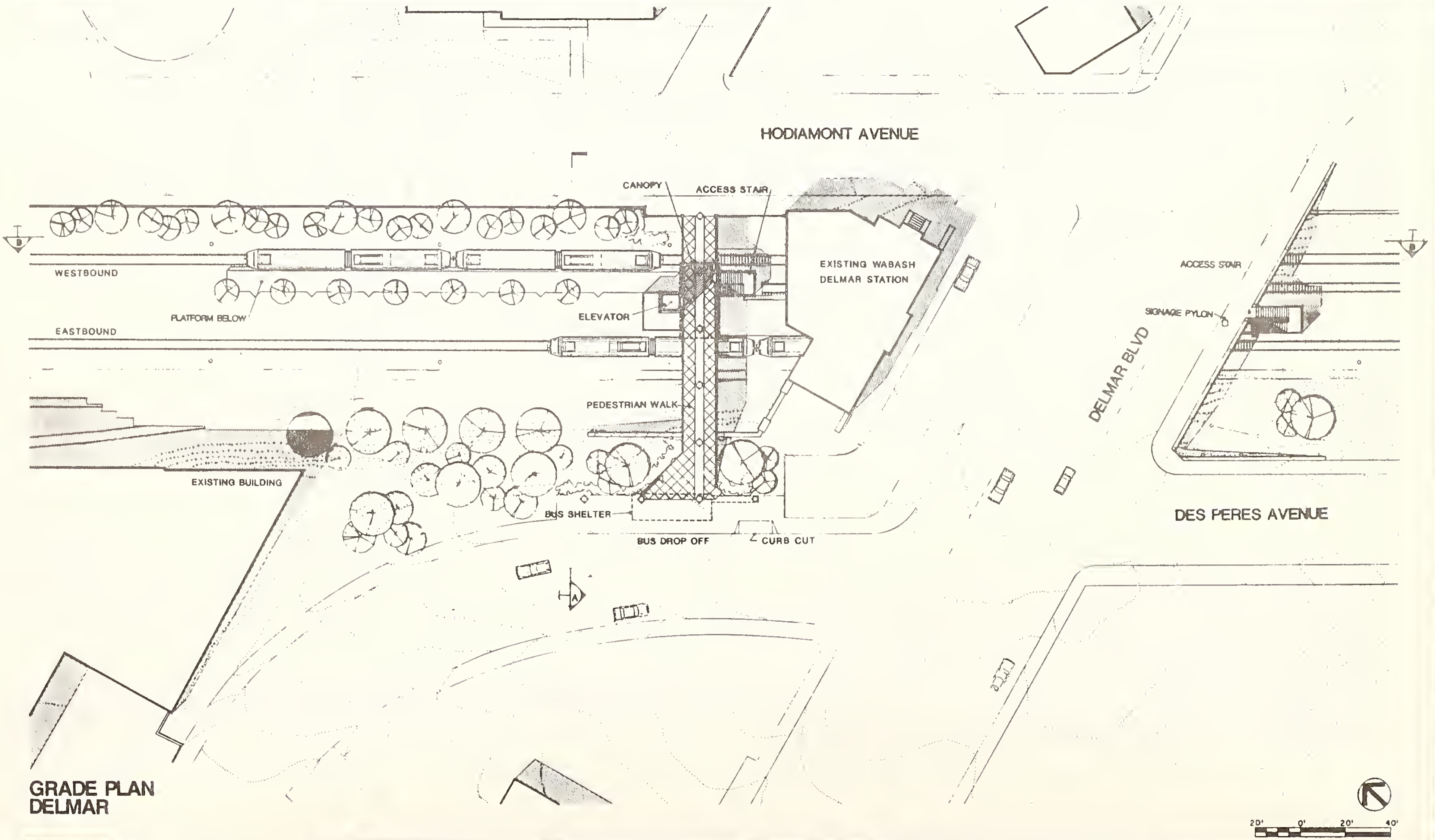
KENNEDY
CLAYBOUR & ASSOCIATES ARCHITECTS
SUBMITTED: 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED:
PROJECT DIRECTOR
DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED:
DIRECTOR OF ENGINEERING
7-86
DATE

LRT STATION PLAN
DELMAR
PLATFORM PLAN

CONTRACT NO MO-03-0023/MO-90-0012
DRAWING NO A - 124
SCALE 1"= 20'
SHEET NO. 231



GRADE PLAN
DELMAR

REV	DATE	BY	APP	DESCRIPTION

DESIDNED RC
DRAWN DC
CHECKED RS
APP. BY:
APP. DATE

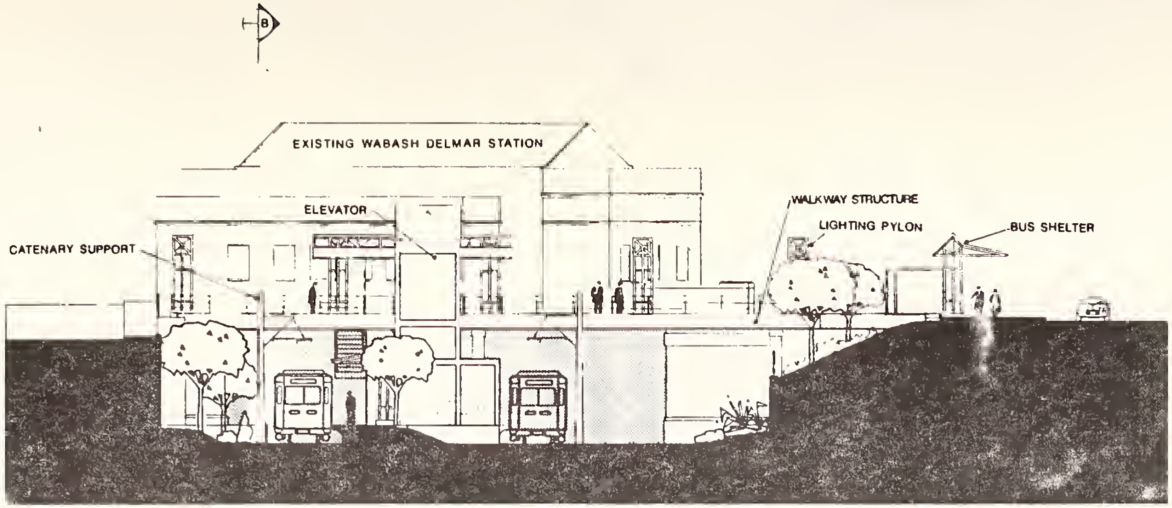
KENNEDY
CLAYBOUR & ASSOCIATES ARCHITECTS
SUBMITTED: J. Stalen 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: PROJECT DIRECTOR 6/30/86 DATE

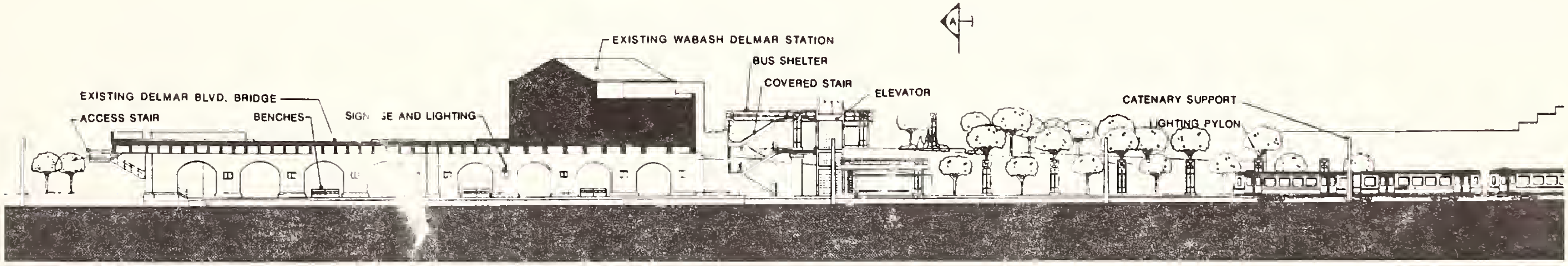
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D. R. Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN
DELMAR
GRADE PLAN

CONTRACT NO. MO-03-0023/MO-90-0012
DRAWING NO. A -125
SCALE: 1"=20'
SHEET NO. 232



SECTION "A"



SECTION "B"
DELMAR

REV	DATE	BY	APP	DESCRIPTION

DESIGNED RC
DRAWN DC
CHECKED RS
APP. BY:
APP. DATE

KENNEDY
Kennedy Associates Architects Incorporated
417 North Euclid Avenue
St. Louis, Missouri 63108
314/367-8188
CLAYBOUR & ASSOCIATES ARCHITECTS
SUBMITTED: 5/14/86
DATE

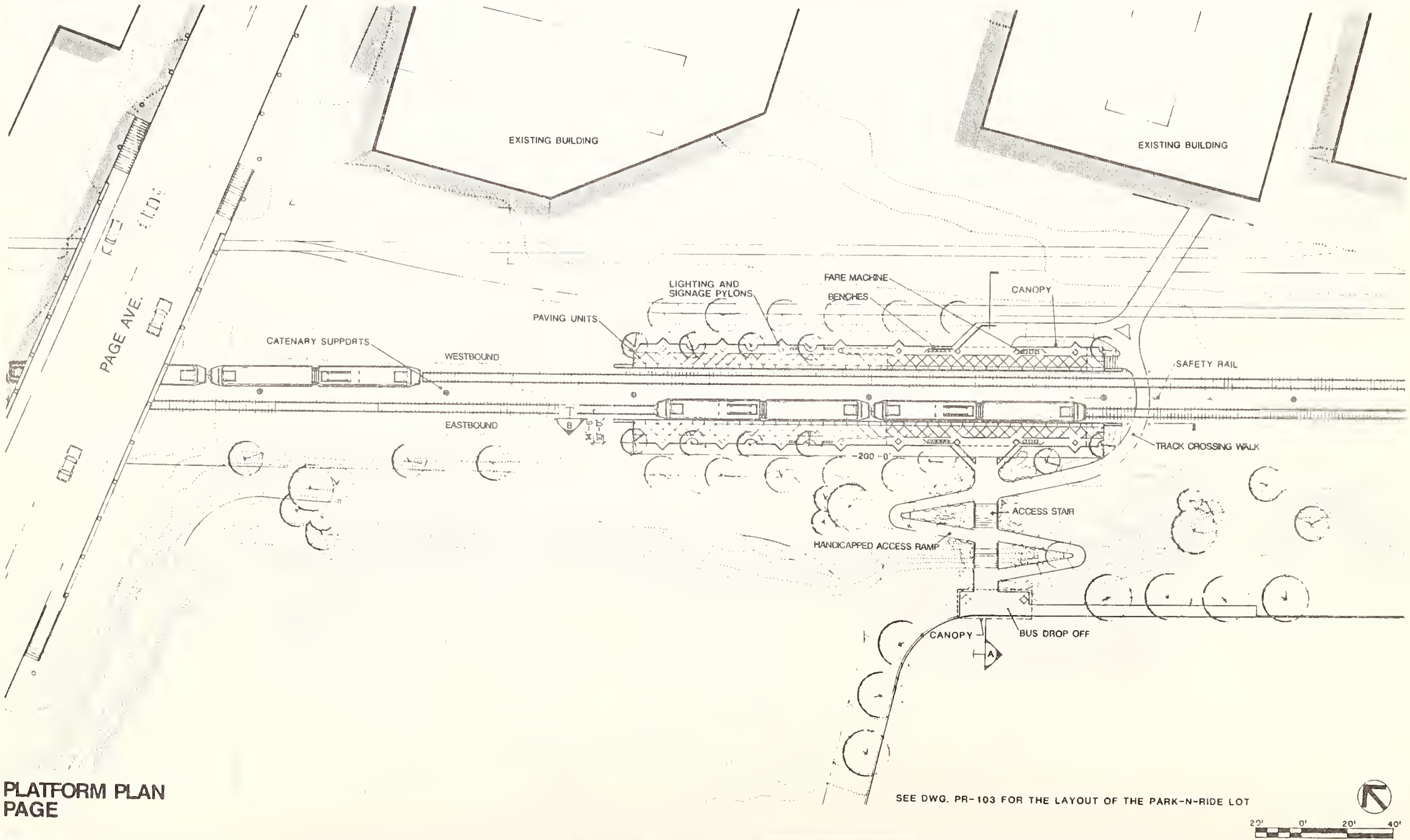
Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED:
PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D R Campion 7-86
DIRECTOR OF ENGINEERING DATE

LRT STATION PLAN
DELMAR
SECTIONS

CONTRACT NO MO-03-0023/MO-90-0012
DRAWING NO A - 126
SCALE 1"=20'
SHEET NO 233

QUALITY BLUE PRINT-BPC



PLATFORM PLAN
PAGE

SEE DWG. PR-103 FOR THE LAYOUT OF THE PARK-N-RIDE LOT

REV.	DATE	BY	APP	DESCRIPTION	
					DESIGNED PW
					DRAWN EM
					CHECKED RS
					APP. BY:
					APP. DATE

Kennedy Associates
Architects Incorporated
KENNEDY

SUBMITTED: 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

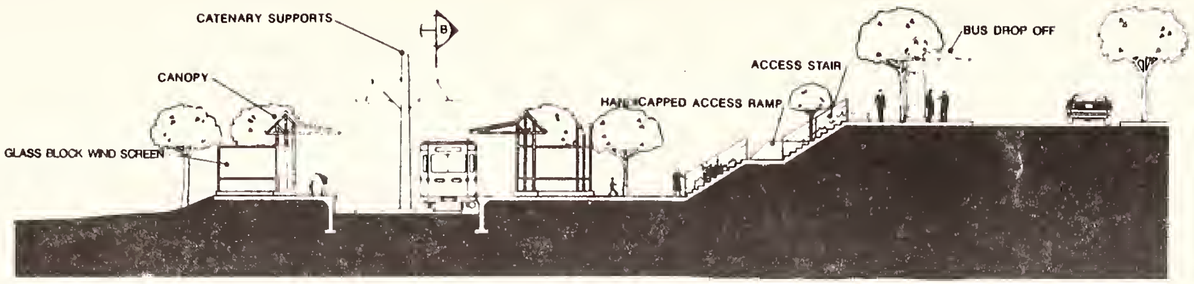
APPROVED: PROJECT DIRECTOR 6-3-86 DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D.K. Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN
PAGE
PLATFORM PLAN

CONTRACT NO. M0-03-0023/M0-00-0012
DRAWING NO. A - 127
SCALE: 1"=20'
SHEET NO. 234



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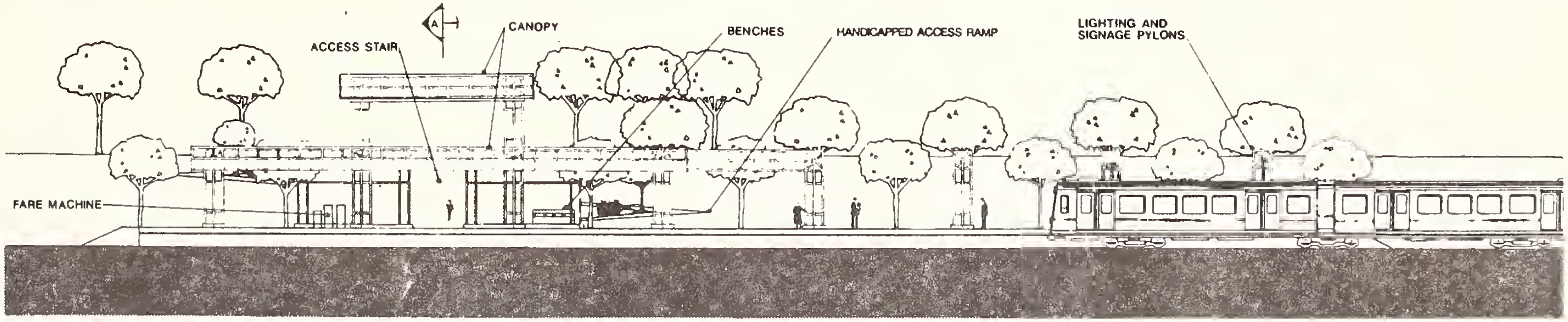


SECTION "B"
PAGE

10' 0' 10' 20'

REV	DATE	BY	APP	DESCRIPTION

DESIGNED FN
DRAWN EM
CHECKED RS
APP. BY:
APP DATE

KENNEDY
Kennedy Associates/Architects Incorporated
[illegible]

SUBMITTED: 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St Louis, Missouri 63101

APPROVED: ______ PROJECT DIRECTOR
DATE

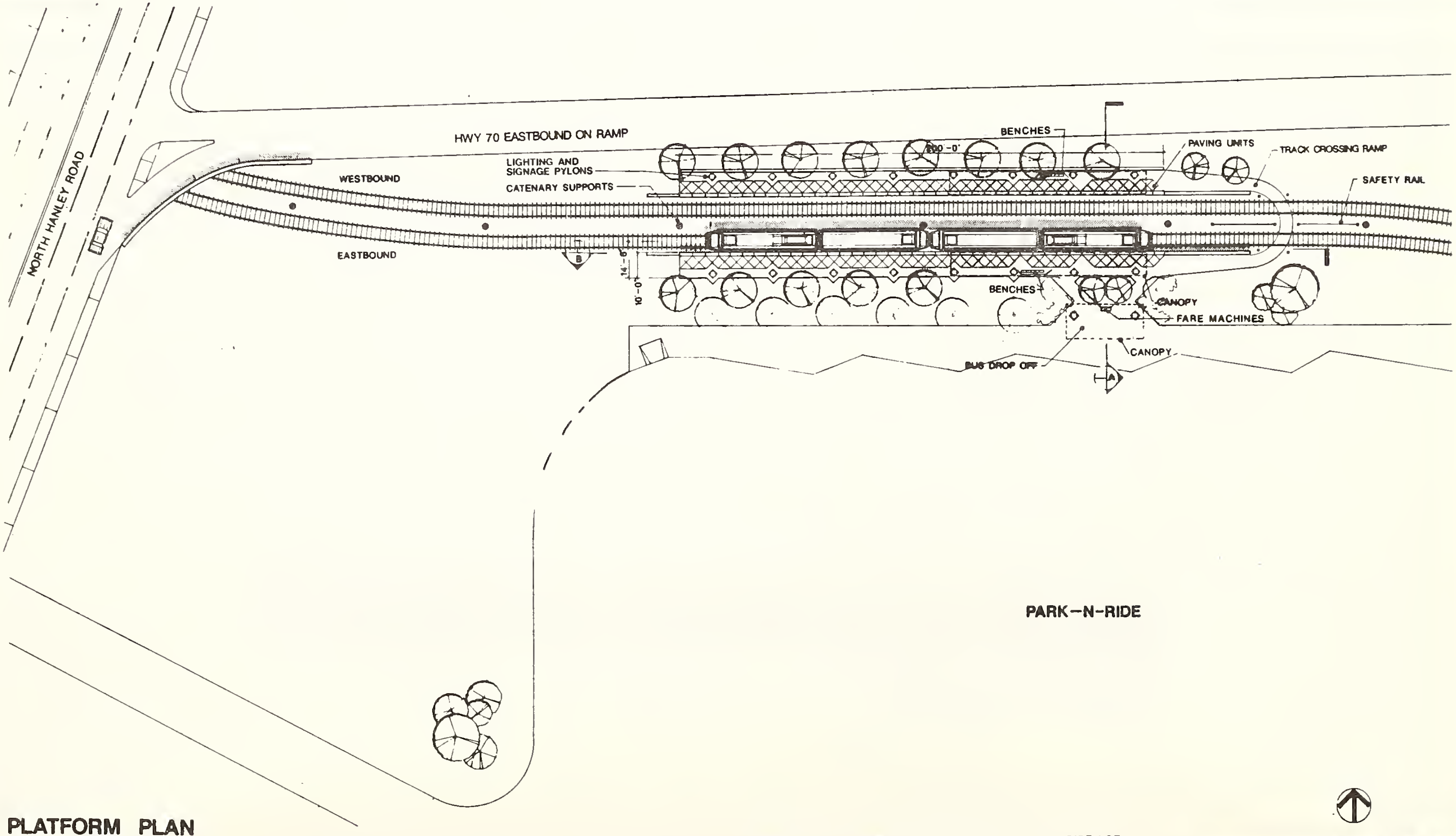
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D R Campion
DIRECTOR OF ENGINEERING
7-86
DATE

LRT STATION PLAN
PAGE
SECTIONS / ELEVATIONS

CONTRACT NO M0-03-0023/M0-90-0012
DRAWING NO A - 128
SCALE 1"=10'
SHEET NO. 235

QUALITY BLUE PRINT-BPC



PLATFORM PLAN
NORTH HANLEY

SEE DWG. PR-106 FOR THE LAYOUT OF THE PARK-N-RIDE LOT

REV	DATE	BY	APP	DESCRIPTION

DESIGNED MR
DRAWN WJ
CHECKED RS
APP. BY:
APP. DATE

KENNEDY
Kennedy Associates/Architects Incorporated
417 North Euclid Avenue
St. Louis, Missouri 63108
314/367-6100
SUBMITTED: 5/14/86 DATE

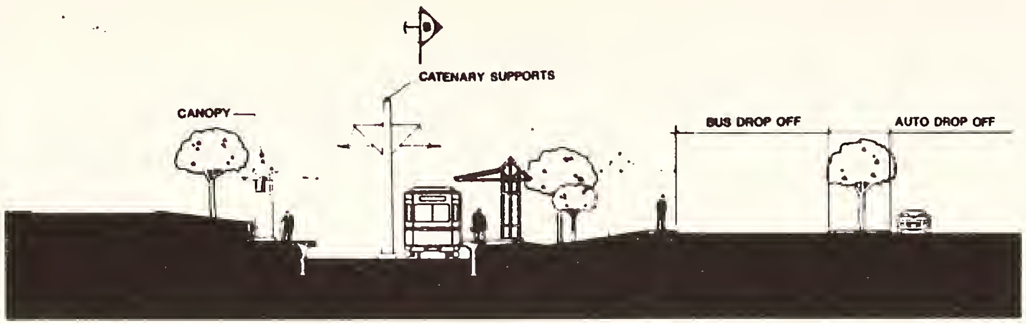
Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: PROJECT DIRECTOR 6/30/86 DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN
NORTH HANLEY
PLATFORM PLAN

CONTRACT NO. MO-03-0023/MO-90-0012
DRAWING NO A-129
SCALE: 1"=20'
SHEET NO. 236

QUALITY BLUE PRINT-SPC



SECTION "A"

SECTION "B" NORTH HANLEY

10' 0' 10' 20'

REV	DATE	BY	APP	DESCRIPTION

DESIGNED MR
DRAWN WJ
CHECKED RS
APP. BY:
APP. DATE

KENNEDY
417 North Sarah Avenue
St. Louis, Missouri 63108
314/531-0100

SUBMITTED: 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: ______
PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: ______ 7-86
DIRECTOR OF ENGINEERING DATE

LRT STATION PLAN
NORTH HANLEY
SECTIONS / ELEVATIONS

CONTRACT NO. M0-03-0023/M0-90-0012
DRAWING NO. A-130
SCALE: 1" = 10'
SHEET NO. 237

QUALITY BLUE PRINT - BPC

REV	DATE	BY	APP	DESCRIPTION

DESIGNED
DRAWN
CHECKED
APP. BY
APP. DATE

KENNEDY

SUBMITTED: 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St Louis, Missouri 63101

APPROVED: PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN
FIFTH & MISSOURI
PERSPECTIVE

CONTRACT NO MO 03-0023/MO 90 0017
DRAWING NO A-301
SCALE NONE
SHEET NO 253

REV	DATE	BY	APP	DESCRIPTION

DESIGNED JY
DRAWN CS
CHECKED RS
APP. BY: 1..
APP. DATE

KENNEDY

SUBMITTED: ______ 5/14/86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

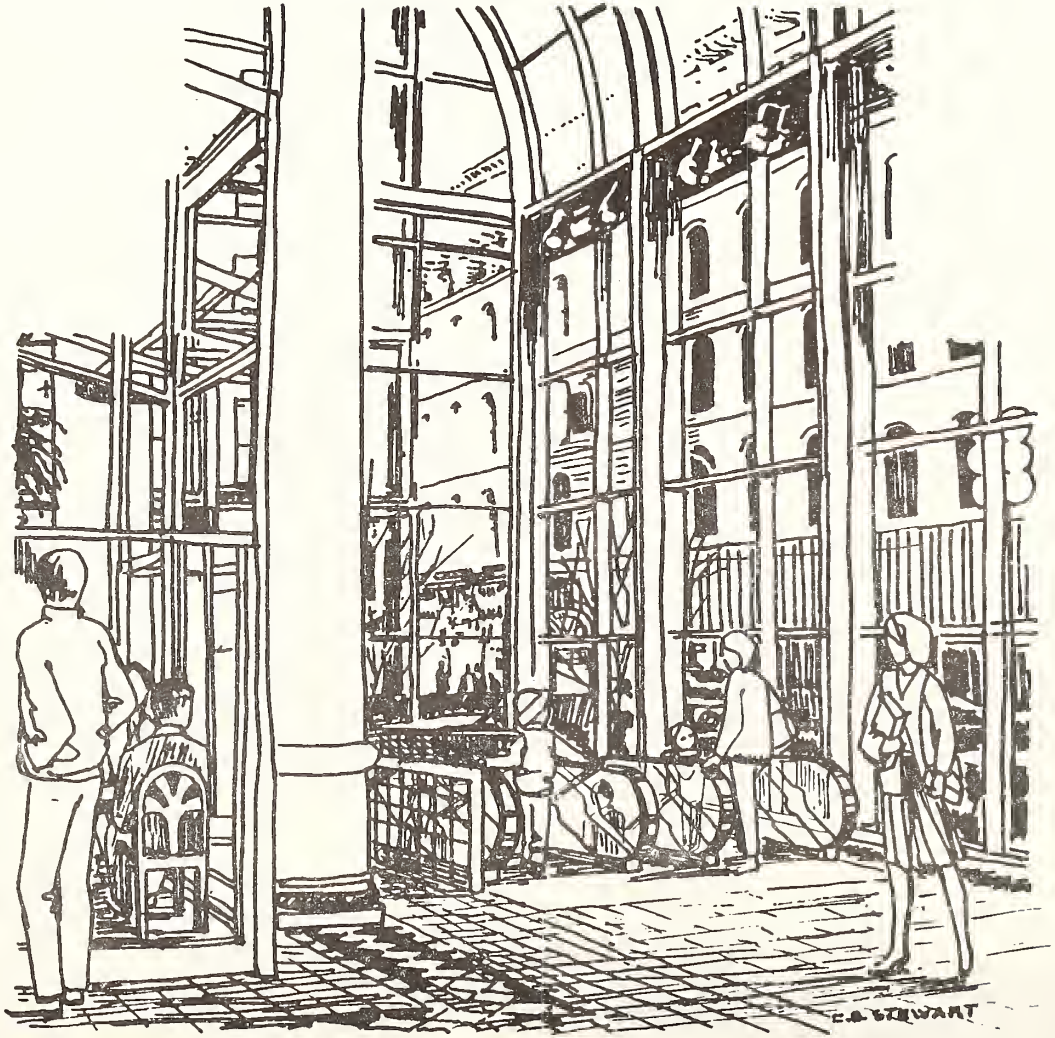
APPROVED: ______ PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: DR Campain DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN
LACLEDE'S LANDING
PERSPECTIVE

CONTRACT NO MO-03-0023 MO-90-00
DRAWING NO A-302
SCALE NONE
SHEET NO 254



REV.	DATE	BY	APP.	DESCRIPTION

DESIGNED PRI
DRAWN CS
CHECKED RS
APP. BY:
APP. DATE

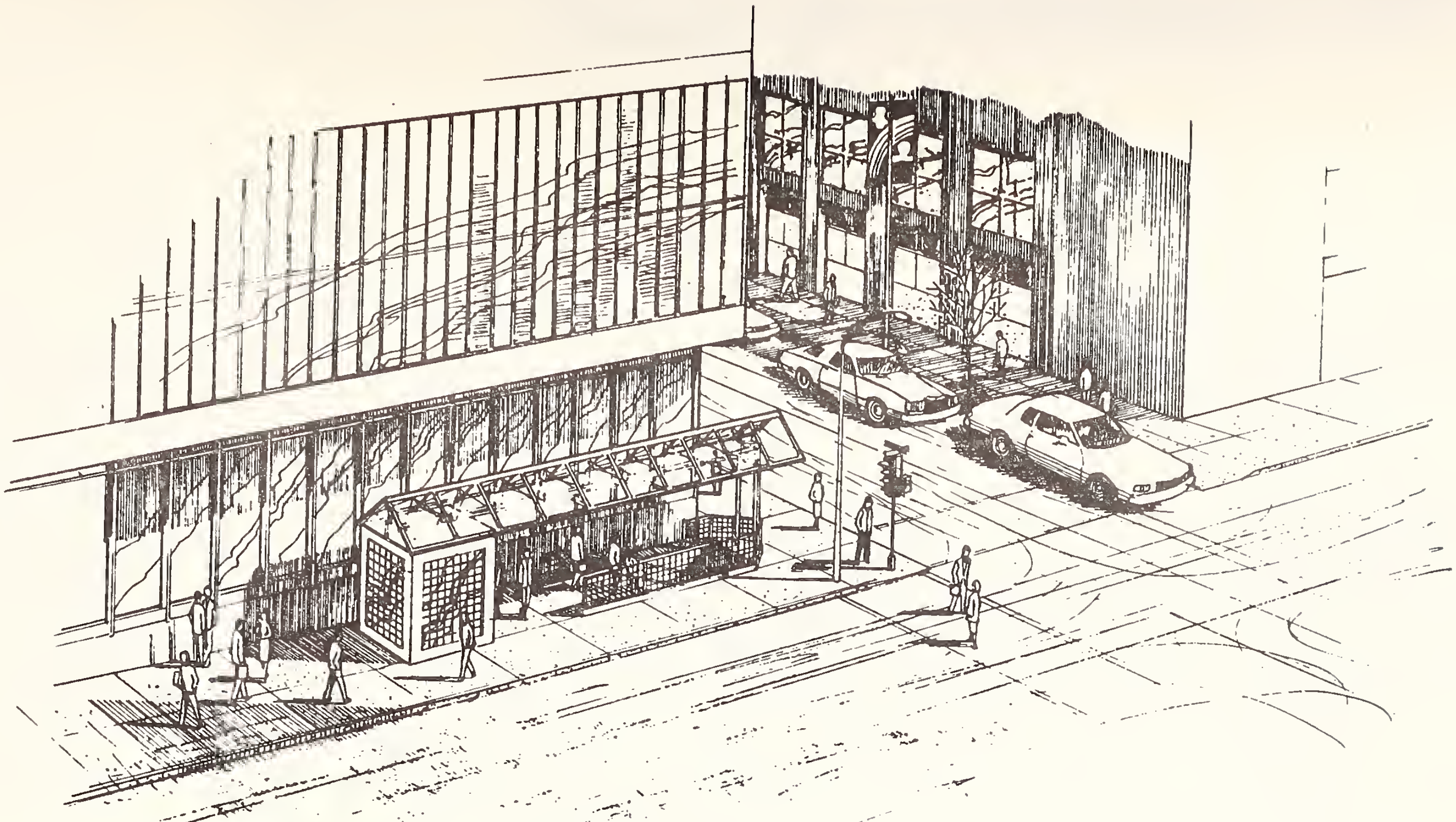
KENNEDY
SUBMITTED: 5/14/86
DATE

Sverdrup & Parcel
and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED:
PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D.R. Campion 7-86
DIRECTOR OF ENGINEERING DATE

LRT STATION PLAN
ST. LOUIS CENTRE
PERSPECTIVE

CONTRACT NO M0-03-0023/M0-90-0012
DRAWING NO A-303
SCALE NONE
SHEET NO. 255



C.B. STEWART

REV	DATE	BY	APP	DESCRIPTION

DESIGNED DM
DRAWN CS
CHECKED
APP. BY:
APP. DATE

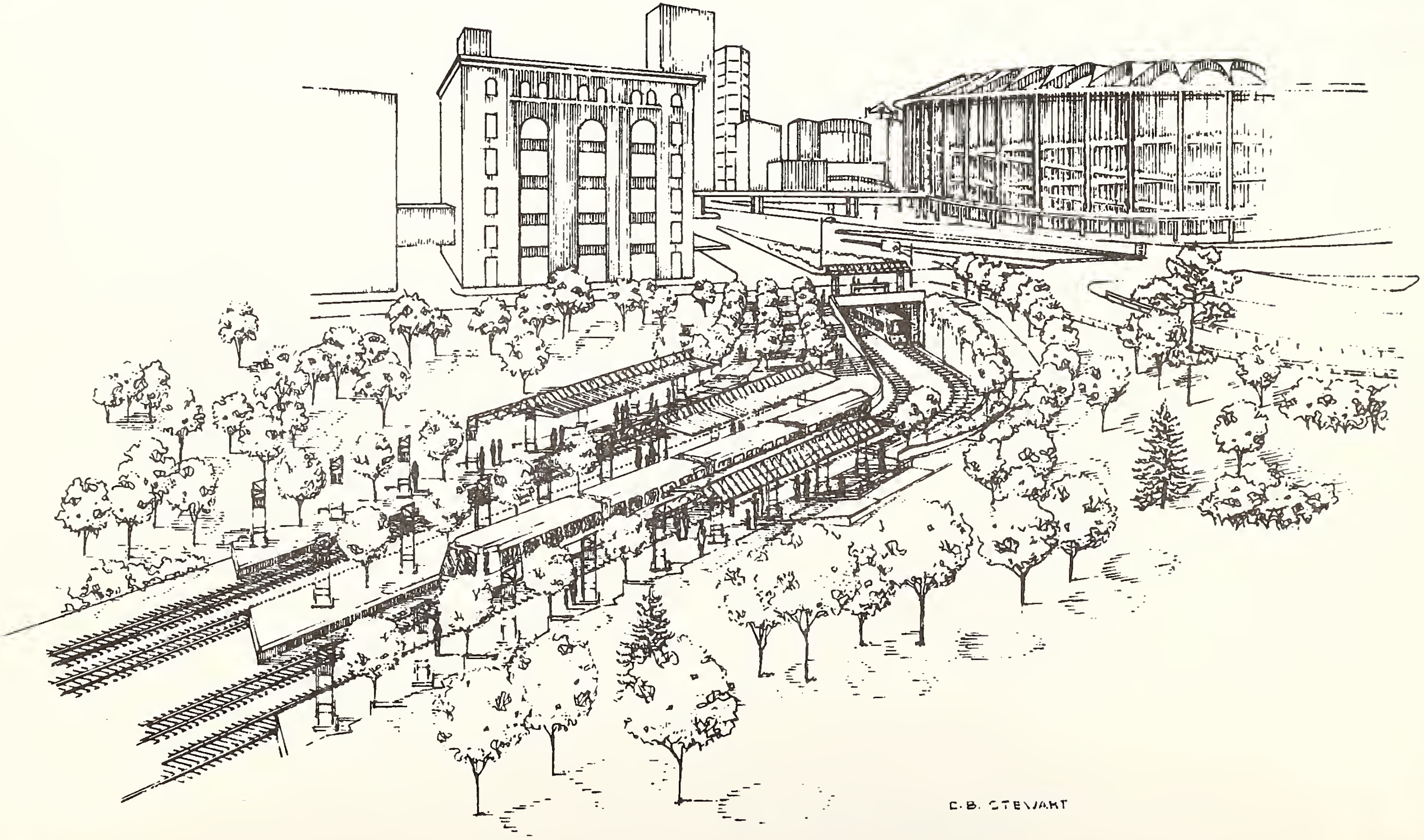
KENNEDY
SUBMITTED: 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED:
PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D R Campion 7-86
DIRECTOR OF ENGINEERING DATE

LRT STATION PLAN
EIGHTH & PINE
PERSPECTIVE

CONTRACT NO MO 03 0023/MO-90 0012
DRAWING NO A-304
SCALE NONE
SHEET NO 256



C.B. STEWART

REV	DATE	BY	APP	DESCRIPTION

DESIGNED PW
DRAWN CS
CHECKED RS
APP. BY:
APP DATE

KENNEDY

SUBMITTED: 5/14/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St Louis, Missouri 63101

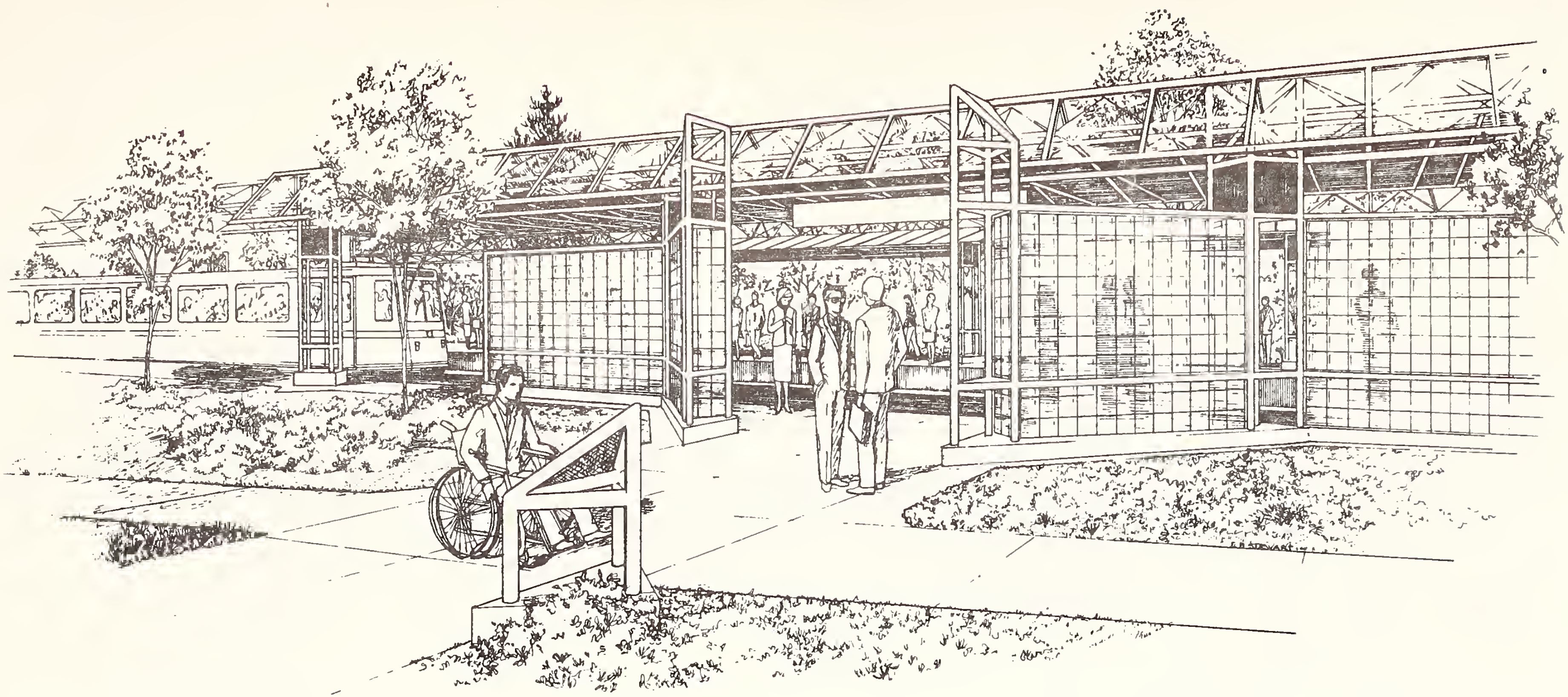
APPROVED:
PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED:
DIRECTOR OF ENGINEERING 7-86
DATE

LRT STATION PLAN
STADIUM
PERSPECTIVE

CONTRACT NO MO-03-0023-MO-90-0012
DRAWING NO A-305
SCALE NONE
SHEET NO 257



REV. DATE | BY | APP | DESCRIPTION

DESIGNED MR
DRAWN
CHECKED RS
APP BY
APP DATE

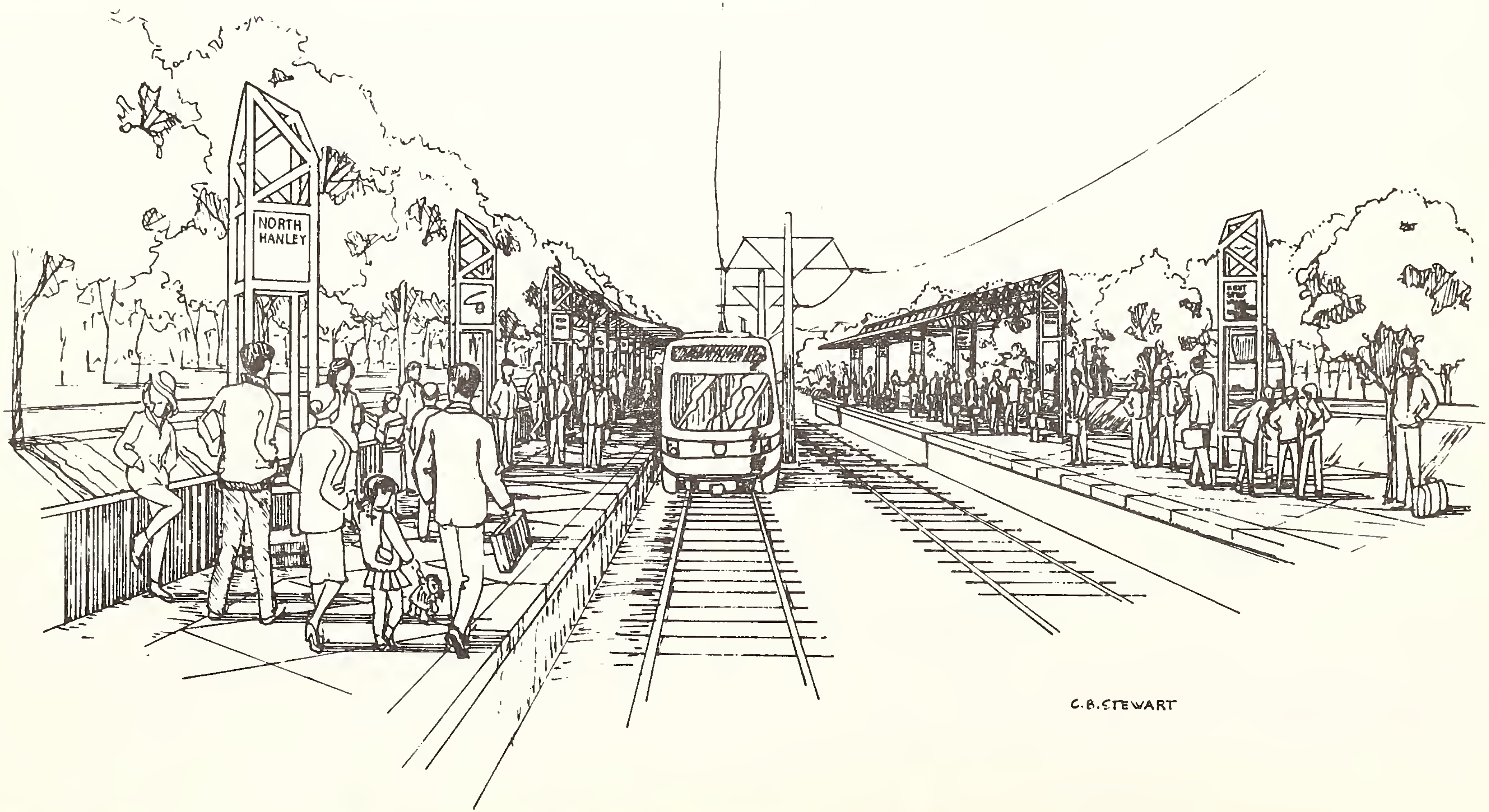
KENNEDY
SUBMITTED:
5-14-86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED:
PROJECT DIRECTOR
DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D R Campion
DIRECTOR OF ENGINEERING
7-86
DATE

LRT STATION PLAN
PAGE
PERSPECTIVE

CONTRACT NO
M0-03-0023 MO-90-0012
DRAWING NO
A-306
SCALE
NONE
SHEET NO
258



REV	DATE	BY	APP	DESCRIPTION

DESIGNED

DRAWN

CHECKED

APP BY

APP DATE

KENNEDY

SUBMITTED: 5/14/86 DATE

Sverdrup & Parcel and Associates, Inc.

801 North Eleventh
St. Louis, Missouri 63101

APPROVED: PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL

ST. LOUIS LIGHT RAIL PROJECT

PRELIMINARY ENGINEERING

APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

LRT STATION PLAN

NORTH HANLEY

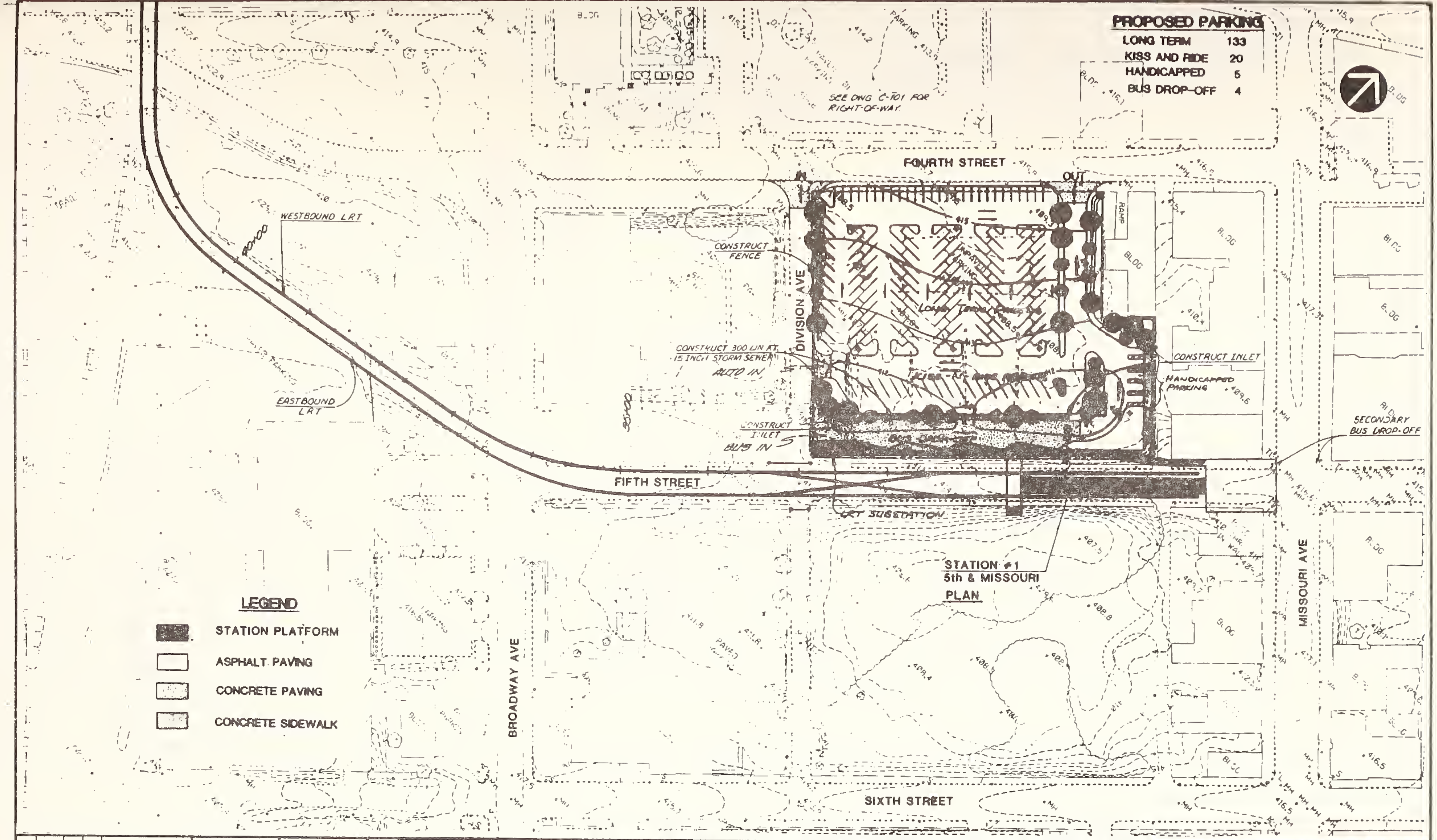
PERSPECTIVE

CONTRACT NO M0-03 0023/M0-90-0012

DRAWING NO A-307

SCALE

SHEET NO 259



PROPOSED PARKING

LONG TERM	133
KISS AND RIDE	20
HANDICAPPED	5
BUS DROP-OFF	4

REV.	DATE	BY	APP.	DESCRIPTION

DESIGNED J.E.O.
DRAWN J.E.O.
CHECKED R.J.P.
APP. BY:
APP. DATE

SUBMITTED: ____________ DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: ____________ PROJECT DIRECTOR 6/30/86 DATE

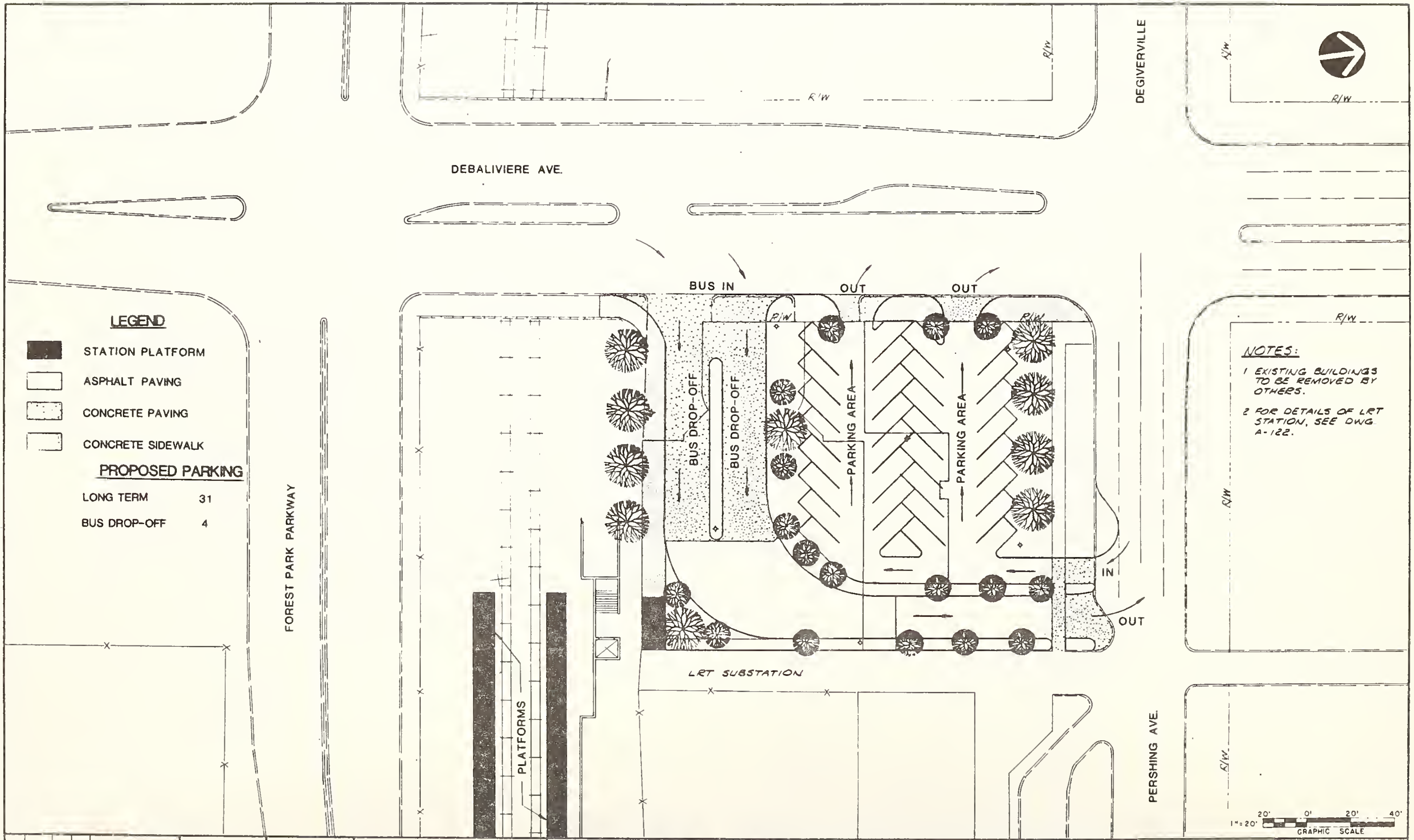
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: ____________ DIRECTOR OF ENGINEERING 7-86 DATE

PARK-N-RIDE LOT
5TH & MISSOURI
SITE PLAN

CONTRACT NO. MO-03-0023/MO-89-0012
DRAWING NO. PR-101
SCALE: 1" - 50'
SHEET NO. 260

QUALITY BLUE PRINT-EPC



REV	DATE	BY	APP	DESCRIPTION

DESIGNED S.R.
DRAWN J.S.
CHECKED R.P.
APP. BY:
APP. DATE

SUBMITTED: ______ DATE

Sverdrup & Parcel and Associates, Inc.
901 North Eleventh
St. Louis, Missouri 63101

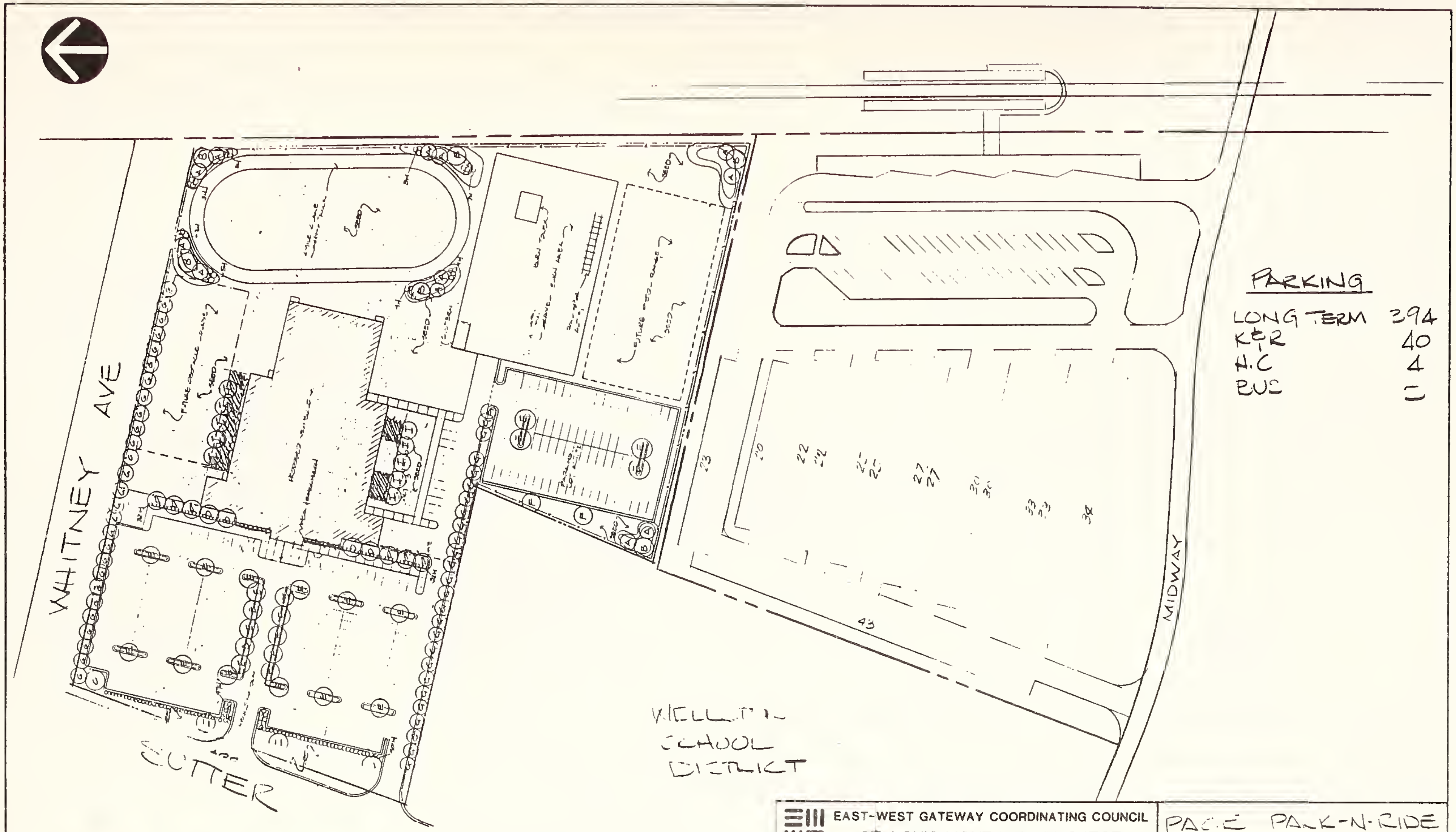
APPROVED: ______ PROJECT DIRECTOR [illegible] DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

PARKING LOT
FOREST PARK
SITE PLAN

CONTRACT NO [illegible]
DRAWING NO. PR- 102
SCALE: 1" = 20'
SHEET NO. 261



1" = 100'
100' 0' 100' 200'
GRAPHIC SCALE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT

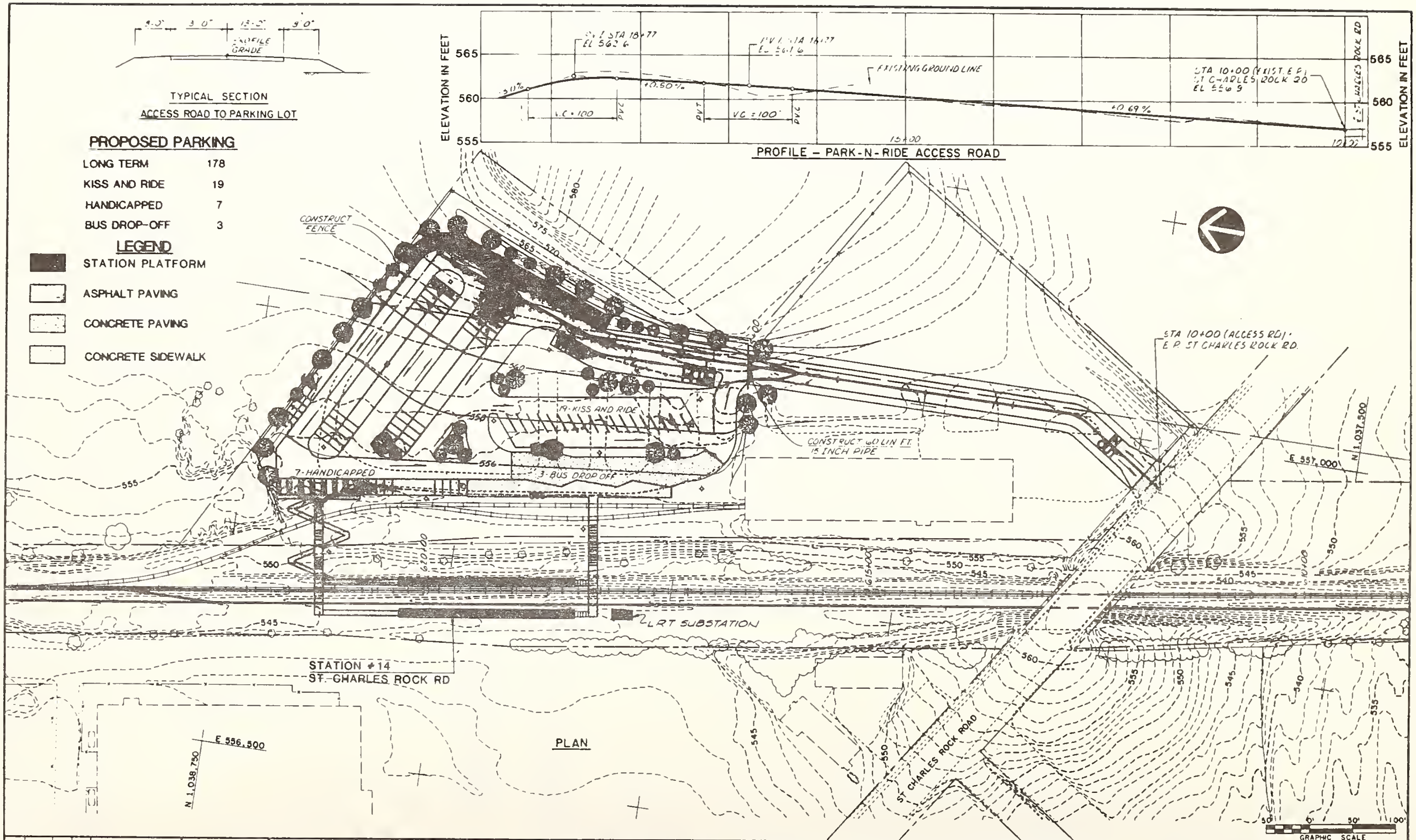
Sverdrup
801 North Eleventh
St. Louis, Missouri 63101

PAGE PARK-N-RIDE

DRAWING NO. PR-103

REV.

QUALITY BLUE PRINT-BPC


TYPICAL SECTION

ACCESS ROAD TO PARKING LOT

PROFILE – PARK-N-RIDE ACCESS ROAD

PLAN

PROPOSED PARKING

LONG TERM	178
KISS AND RIDE	19
HANDICAPPED	7
BUS DROP-OFF	3

LEGEND

■	STATION PLATFORM
☐	ASPHALT PAVING
▨	CONCRETE PAVING
☐	CONCRETE SIDEWALK

REV	DATE	BY	APP	DESCRIPTION

DESIGNED J.M.H.
DRAWN T.T.
CHECKED DVK
APP. BY:
APP DATE

HURST-ROSCHE ENGINEERS, INC.
Consulting Engineers & Architects
1400 East Tremont Street
Hillsboro, Illinois 62049

SUBMITTED: [illegible] 7/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: [illegible] 6/30/86
PROJECT DIRECTOR DATE

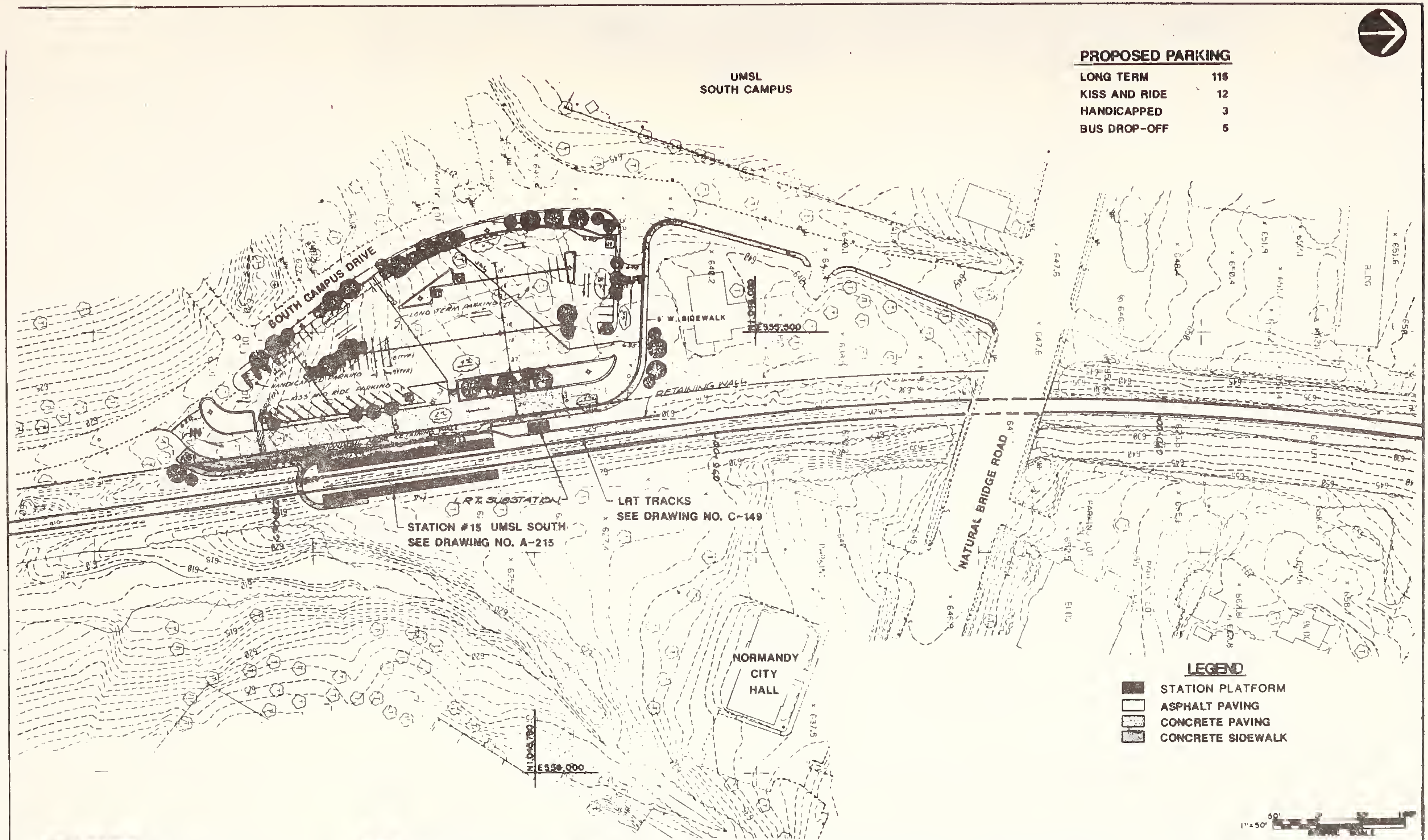
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D R Campion 7-86
DIRECTOR OF ENGINEERING DATE

PARK-N-RIDE LOT
ST. CHARLES ROCK RD.
SITE PLAN

CONTRACT NO. MO 03 0023 MO 90 0012
DRAWING NO. PR-104
SCALE 1"=50'
SHEET NO. 263

QUALITY BLUE PRINT - BPC



PROPOSED PARKING

LONG TERM	115
KISS AND RIDE	12
HANDICAPPED	3
BUS DROP-OFF	5

LEGEND

■	STATION PLATFORM
☐	ASPHALT PAVING
▨	CONCRETE PAVING
▩	CONCRETE SIDEWALK

REV.	DATE	BY	APP.	DESCRIPTION

DESIGNED NAU
DRAWN SOD
CHECKED EMS
APP. BY: VCL
APP. DATE 4 28-86

QUALITY BLUE PRINT - BPC

FLEMING CORPORATION
400 OLIVE STREET
ST. LOUIS, MISSOURI

SUBMITTED: Amos Fischer Jr. 4/29/86
DATE

Sverdrup & Parcel
and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

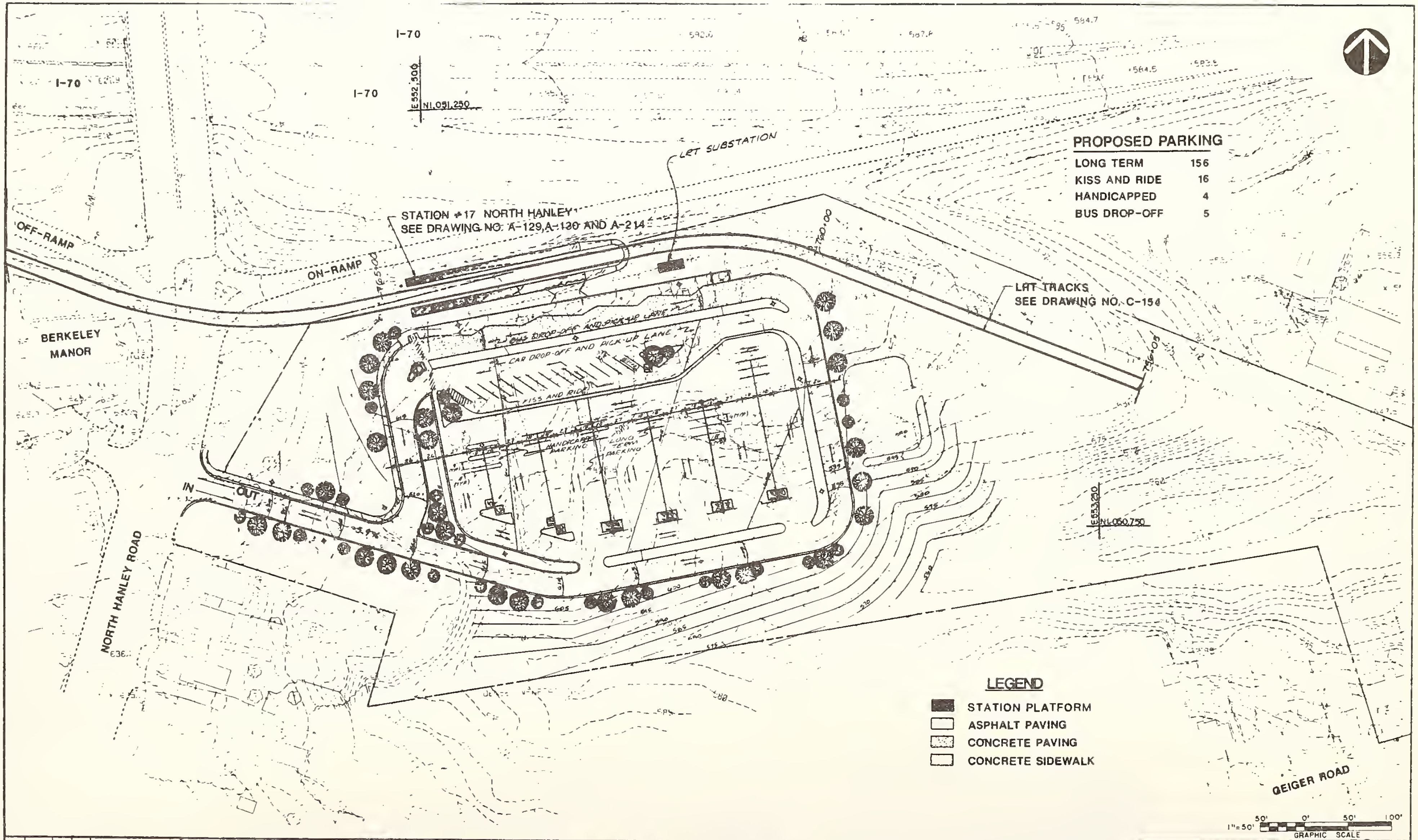
APPROVED: [illegible] 6/30/86
PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D R Campion 7-86
DIRECTOR OF ENGINEERING DATE

PARK-N-RIDE LOT
UMSL - SOUTH
SITE PLAN

CONTRACT NO. M0-03-0023/[illegible]-90-0012
DRAWING NO. PR.-105
SCALE: 1"-50'0"
SHEET NO. 264



REV	DATE	BY	APP	DESCRIPTION

DESIGNED WAN
DRAWN WAN
CHECKED EMS
APP. BY: YCL
APP. DATE 4-28-84

FLEMING CORPORATION
400 OLIVE STREET
ST LOUIS, MISSOURI
SUBMITTED: ______ DATE

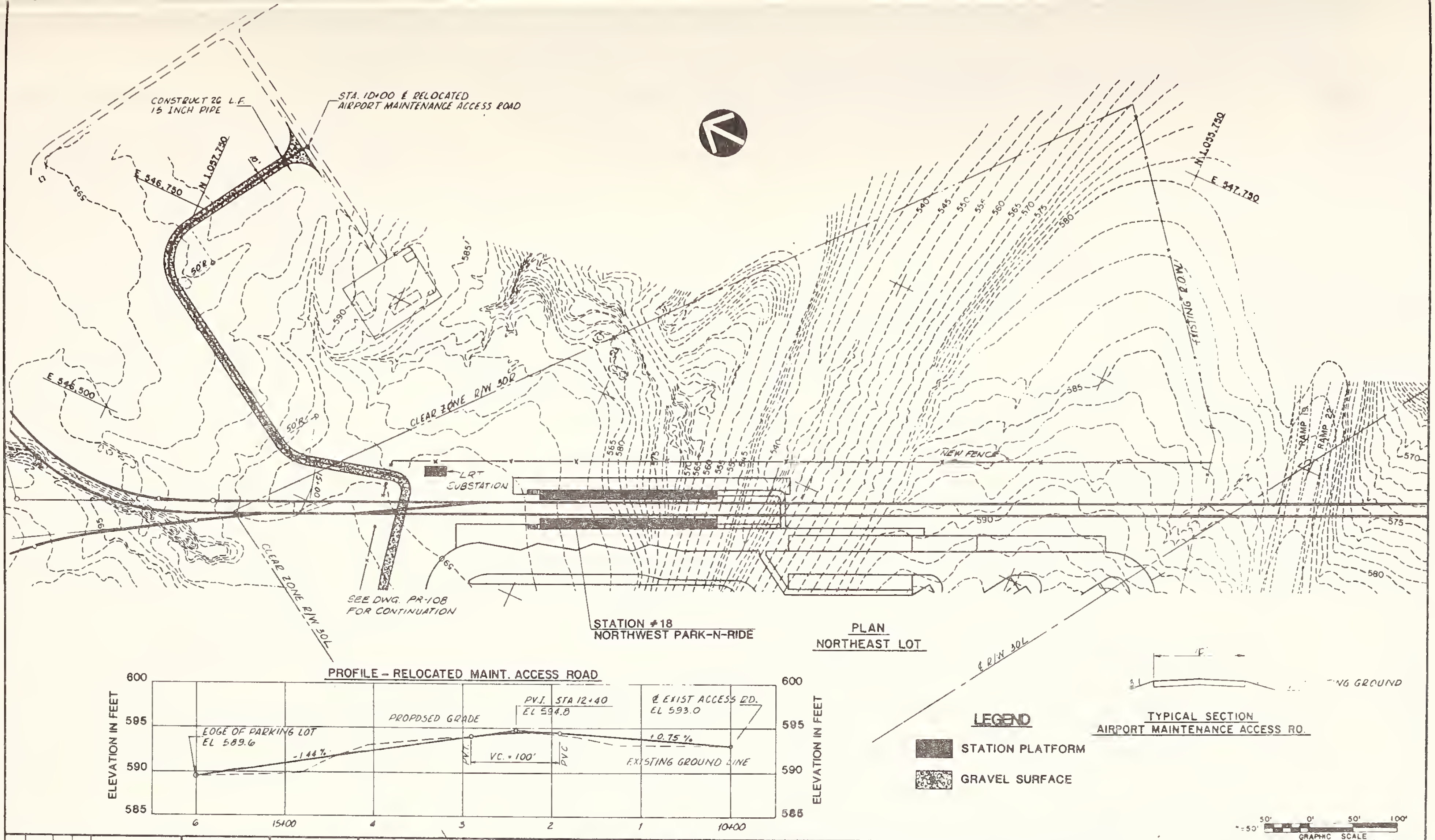
Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: ______ PROJECT DIRECTOR 6/30/86 DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

PARK-N-RIDE LOT
NORTH HANLEY
SITE PLAN

CONTRACT NO. MO-03-0023/MO-90-0012
DRAWING NO. PR-106
SCALE: 1"=50'-0"
SHEET NO. 265

QUALITY BLUE PRINT-BPC



REV	DATE	BY	APP	DESCRIPTION

DESIGNED J M H
DRAWN T T
CHECKED D V K
APP. BY:
APP. DATE

HURST-ROSCHE ENGINEERS, INC.
Consulting Engineers & Architects
1400 East Tremont Street
Hillsboro, Illinois 62049

SUBMITTED: Donald Karben 5/27/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: PROJECT DIRECTOR 6/30/86
DATE

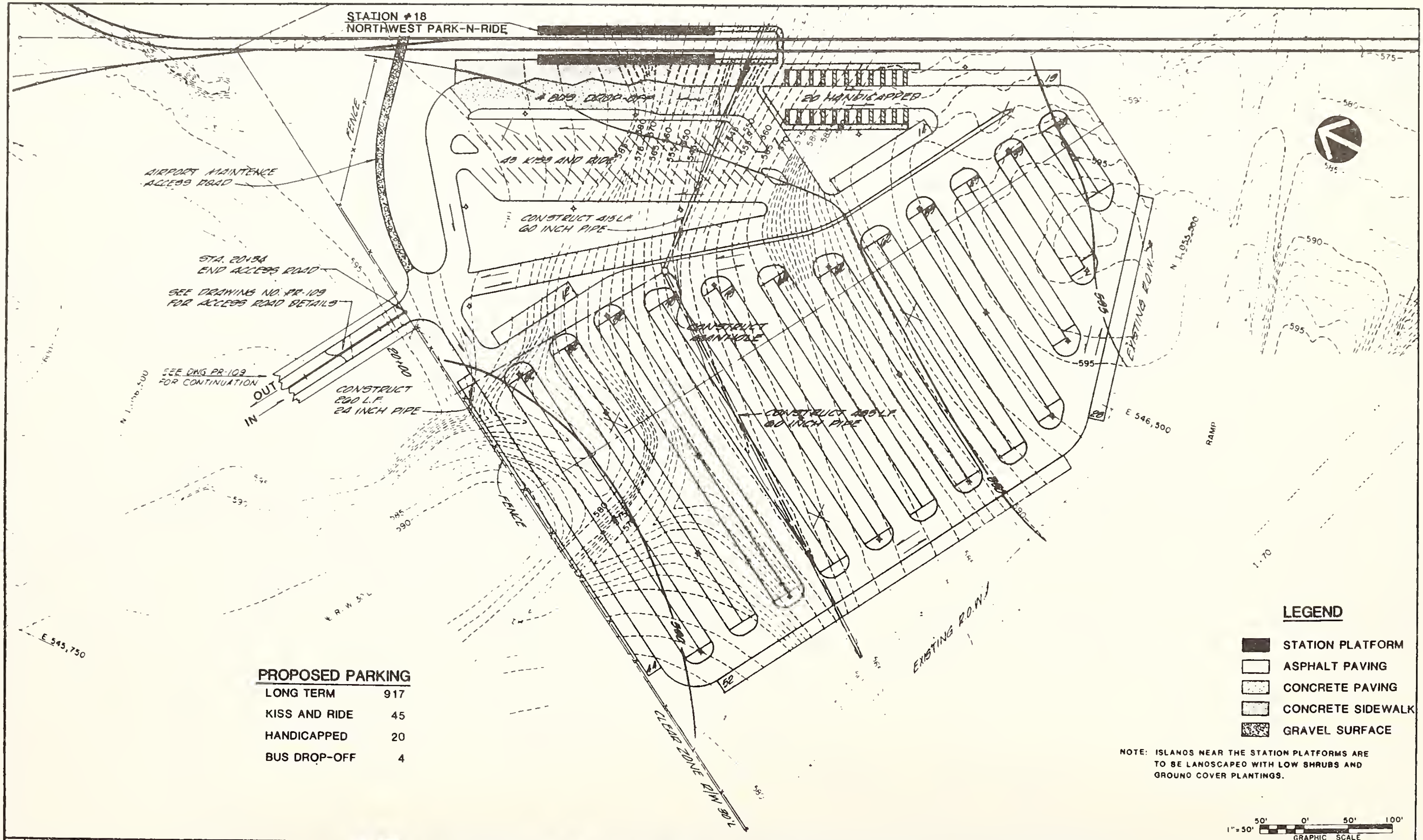
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINA ENGINEERING

APPROVED: DIRECTOR OF ENGINEERING 7-86
DATE

PARK-N-~~RIDE~~ LOT
NORTHWEST PARK-N-~~RIDE~~
MAINTENANCE ACCESS ROAD

CONTRACT NO. MO 03-0023/MO 90 0012
DRAWING NO. PR-107
SCALE 1" 50'
SHEET NO. 266A

QUALITY BLUE PRINT-BPC



PROPOSED PARKING

LONG TERM	917
KISS AND RIDE	45
HANDICAPPED	20
BUS DROP-OFF	4

LEGEND

■	STATION PLATFORM
☐	ASPHALT PAVING
▨	CONCRETE PAVING
▨	CONCRETE SIDEWALK
▨	GRAVEL SURFACE

NOTE: ISLANDS NEAR THE STATION PLATFORMS ARE TO BE LANDSCAPED WITH LOW SHRUBS AND GROUND COVER PLANTINGS.

1"=50' 50' 0' 50' 100'
GRAPHIC SCALE

REV	DATE	BY	APP	DESCRIPTION

DESIGNED J.M.H.
DRAWN C.J.D.
CHECKED D.V.K.
APP. BY:
APP. DATE

HURST-ROSCHE ENGINEERS, INC.
Consulting Engineers & Architects
1400 East Tremont Street
Hillsboro, Illinois 62049

SUBMITTED: Donald Larson 5/27/86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: PROJECT DIRECTOR 6/30/86 DATE

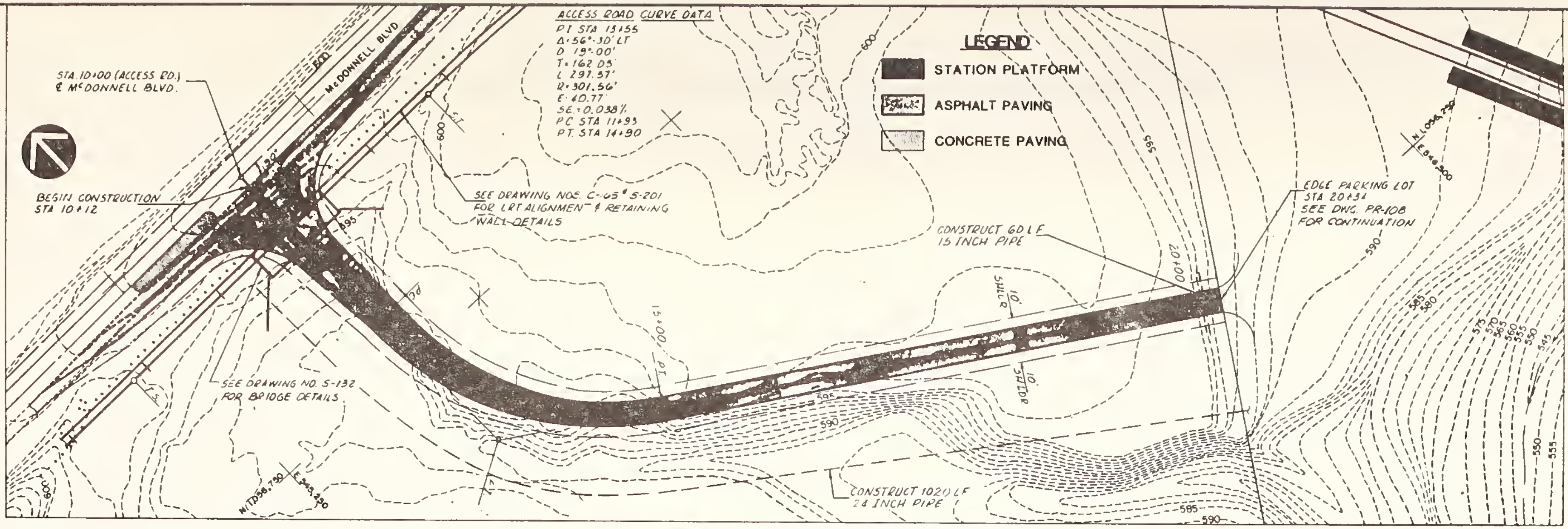
EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D.R. Canavan DIRECTOR OF ENGINEERING 7-26 DATE

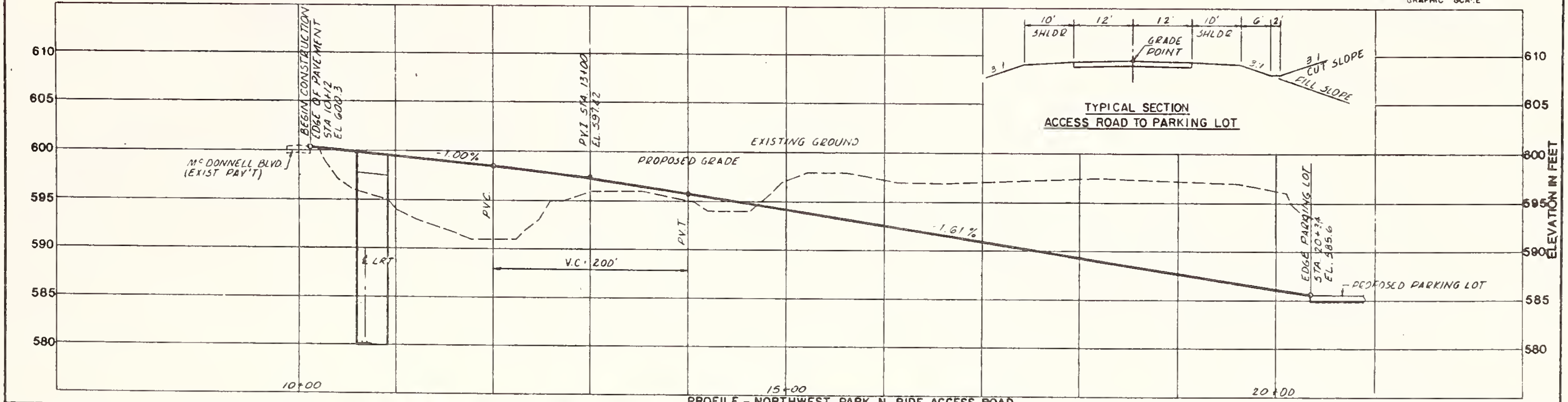
PARK-N-RIDE LOT
NORTHWEST PARK-N-RIDE
SITE PLAN

CONTRACT NO.
DRAWING NO. PR-108
SCALE: 1"=50'
SHEET NO. 266

QUALITY BLUE PRINT-SPC



PLAN – NORTHWEST PARK-N-RIDE ACCESS ROAD



PROFILE – NORTHWEST PARK-N-RIDE ACCESS ROAD

REV	DATE	BY	APP	DESCRIPTION

DESIGNED JMH
DRAWN TT
CHECKED DVK
APP. BY:
APP. DATE

HURST-ROSCHE ENGINEERS, INC.
Consulting Engineers & Architects
1400 East Tremont Street
Hillsboro Illinois 62049
SUBMITTED: Donald Kastner 5/17/86 DATE

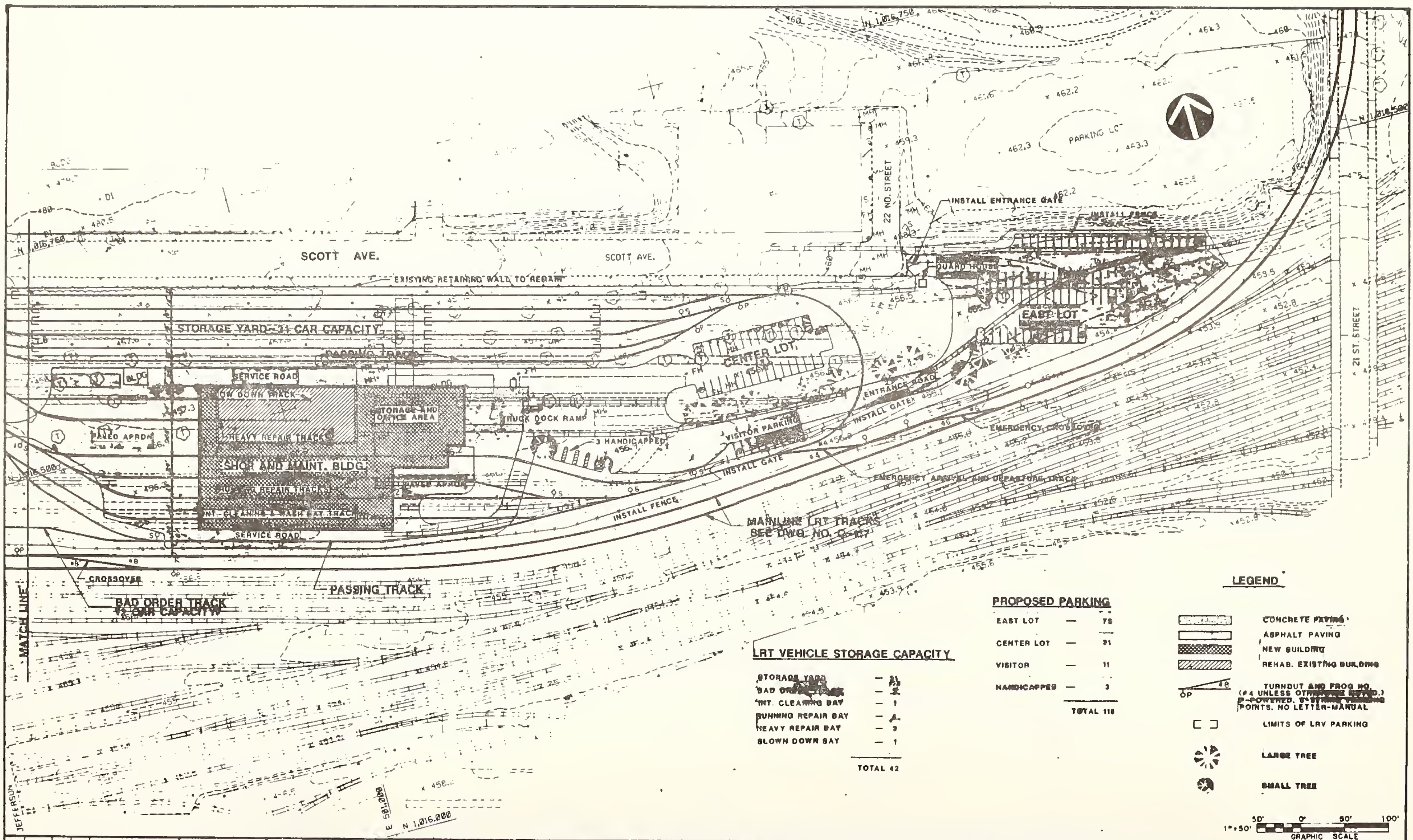
Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: [illegible] 6/30/86 PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D R Campion DIRECTOR OF ENGINEERING 7-86 DATE

PARK-N-RIDE LOT
NORTHWEST PARK-N-RIDE
ACCESS ROADWAY

CONTRACT NO
MO 03-0023/MO-90-0012
DRAWING NO
PR-109
SCALE: 1" = 50'
SHEET NO.
267

QUALITY BLUE PRINT • BPC



LRT VEHICLE STORAGE CAPACITY

STORAGE YARD	—	31
BAD ORDER TRACK	—	1/2
INT. CLEANING BAY	—	1
RUNNING REPAIR BAY	—	4
HEAVY REPAIR BAY	—	3
BLOWN DOWN BAY	—	1
		TOTAL 42

PROPOSED PARKING

EAST LOT	—	75
CENTER LOT	—	31
VISITOR	—	11
HANDICAPPED	—	3
		TOTAL 118

LEGEND

░	CONCRETE PAVING
▭	ASPHALT PAVING
▩	NEW BUILDING
▨	REHAB. EXISTING BUILDING
OP #8	TURNOUT AND FROG NO. (#4 UNLESS OTHERWISE NOTED.) P-POWERED, S-SPRING SWITCHING POINTS, NO LETTER-MANUAL
[ ]	LIMITS OF LRV PARKING
✳	LARGE TREE
●	SMALL TREE

50' 0' 50' 100'
1" = 50'
GRAPHIC SCALE

REV.	DATE	BY	APP.	DESCRIPTION

DESIGNED EMS
DRAWN SOO
CHECKED VCL
APP. BY: VCL
APP. DATE 4-29-86

FLEMING CORPORATION
490 OLIVE STREET
ST. LOUIS, MISSOURI

SUBMITTED: Vance Finch 4/29/86
DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh,
St. Louis, Missouri 63101

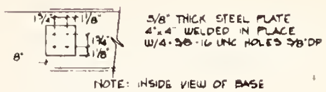
APPROVED: PROJECT DIRECTOR 4/30/86 DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

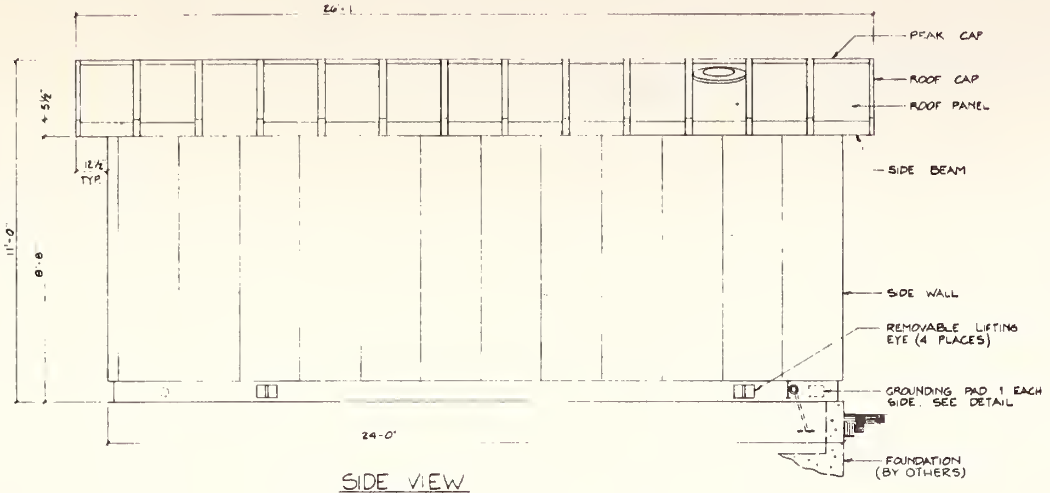
APPROVED: D.R. Cameron DIRECTOR OF ENGINEERING 7-86 DATE

LRT - YARDS AND SHOPS
SITE PLAN - EAST

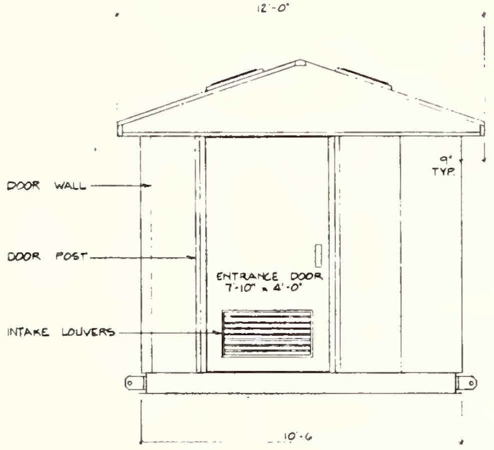
CONTRACT NO. MO-03-0023/MO-90-0012
DRAWING NO. YS-108
SCALE: 1" = 50'
SHEET NO. 197



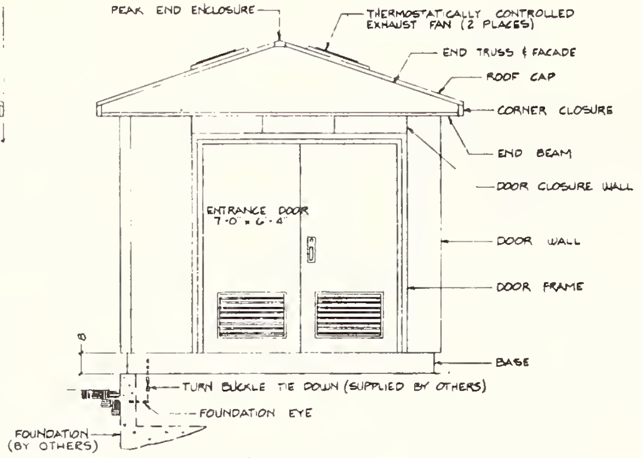
ND PAD



SIDE VIEW
SCALE: 1/2" = 1'-0



END VIEW
SCALE: 1/2" = 1'-0"



END VIEW
SCALE: 1/2" = 1'-0"

2 0 2 4
GRAPHIC SCALE

REV	DATE	BY	APP	DESCRIPTION

DESIGNED
DRAWN S.C.B.
CHECKED
APP BY
APP DATE

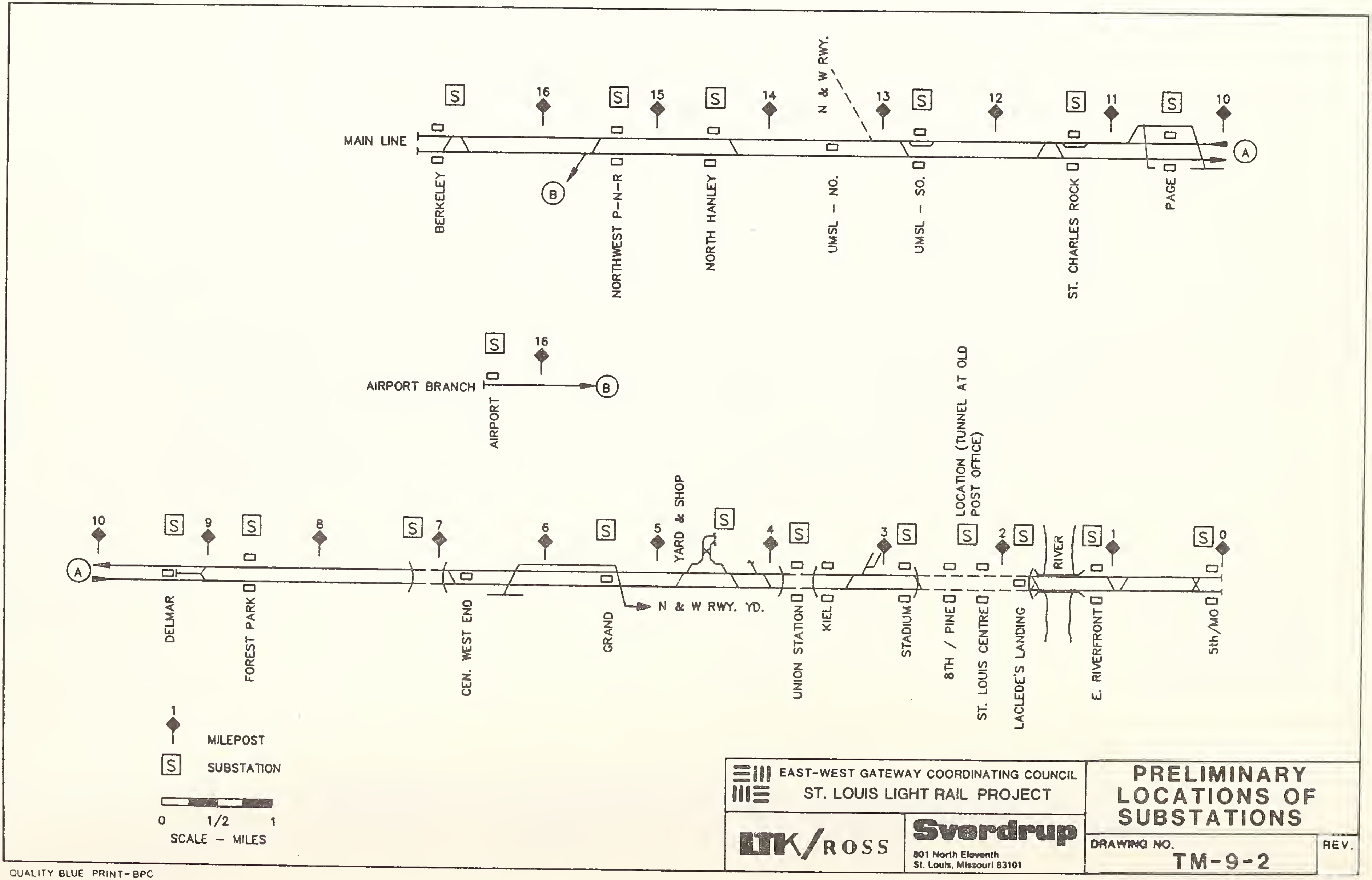
ROSS
SUBMITTED George McLean DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101
APPROVED: J Keegan Jr. PROJECT DIRECTOR 6/30/86 DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING
APPROVED: D.R. Campion DIRECTOR OF ENGINEERING 7-86 DATE

TRACTION ELECTRIFICATION
SUBSTATION
SIDE AND END ELEVATIONS

CONTRACT NO MO 03-0023/MO-90-0012
DRAWING NO E-5
SCALE AS NOTED
SHEET NO 272



EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT

LTK/ROSS

Sverdrup
801 North Eleventh
St. Louis, Missouri 63101

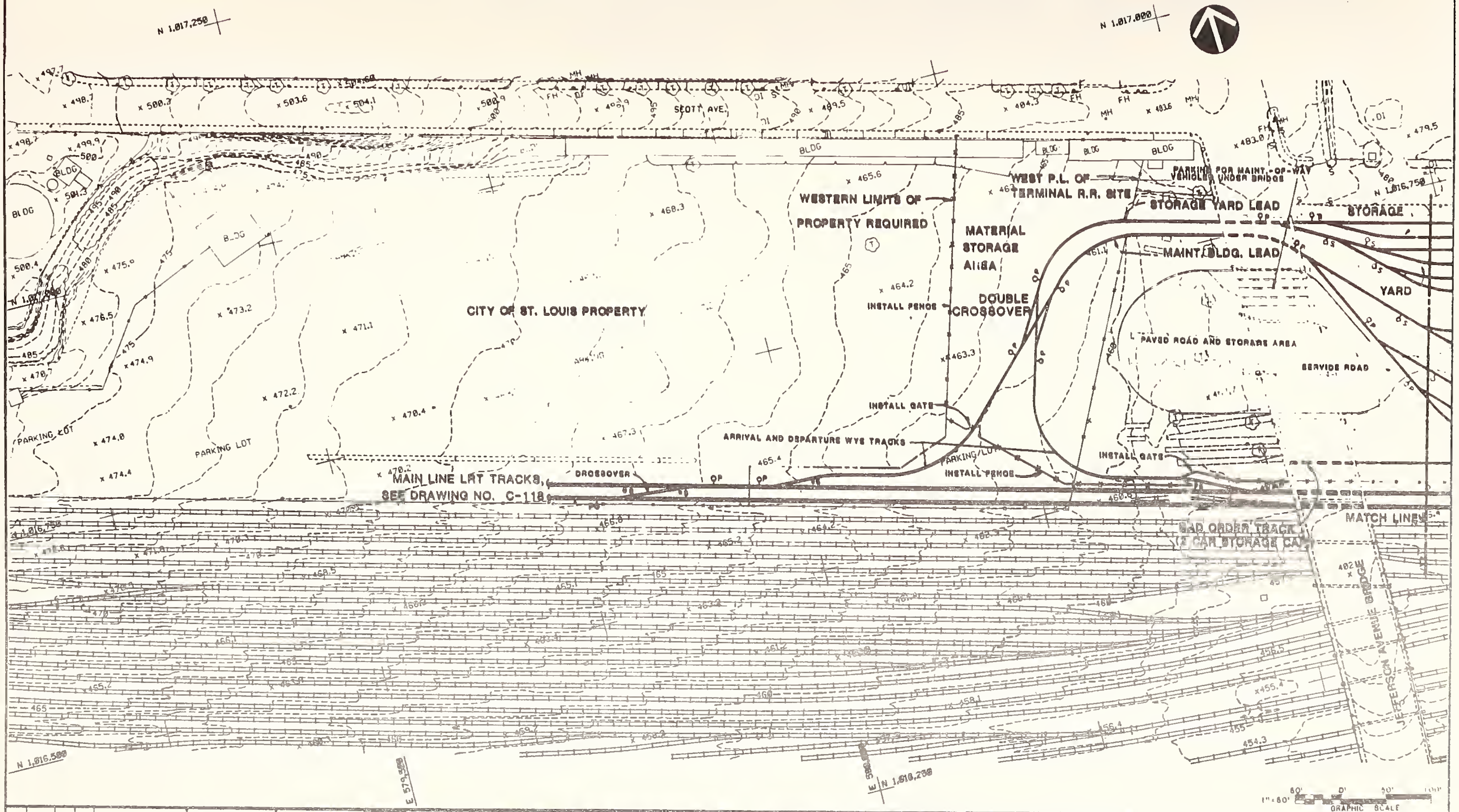
PRELIMINARY LOCATIONS OF SUBSTATIONS

DRAWING NO. TM-9-2

REV.

QUALITY BLUE PRINT-BPC

FIGURE 2



REV	DATE	BY	APP	DESCRIPTION

DESIGNED EMS
DRAWN SOO
CHECKED VCL
APP. BY: VCL
APP. DATE 4/28/86

QUALITY BLUE PRINT-EPC

FLEMING CORPORATION
400 OLIVE STREET
ST. LOUIS, MISSOURI

SUBMITTED: 4/29/86 DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

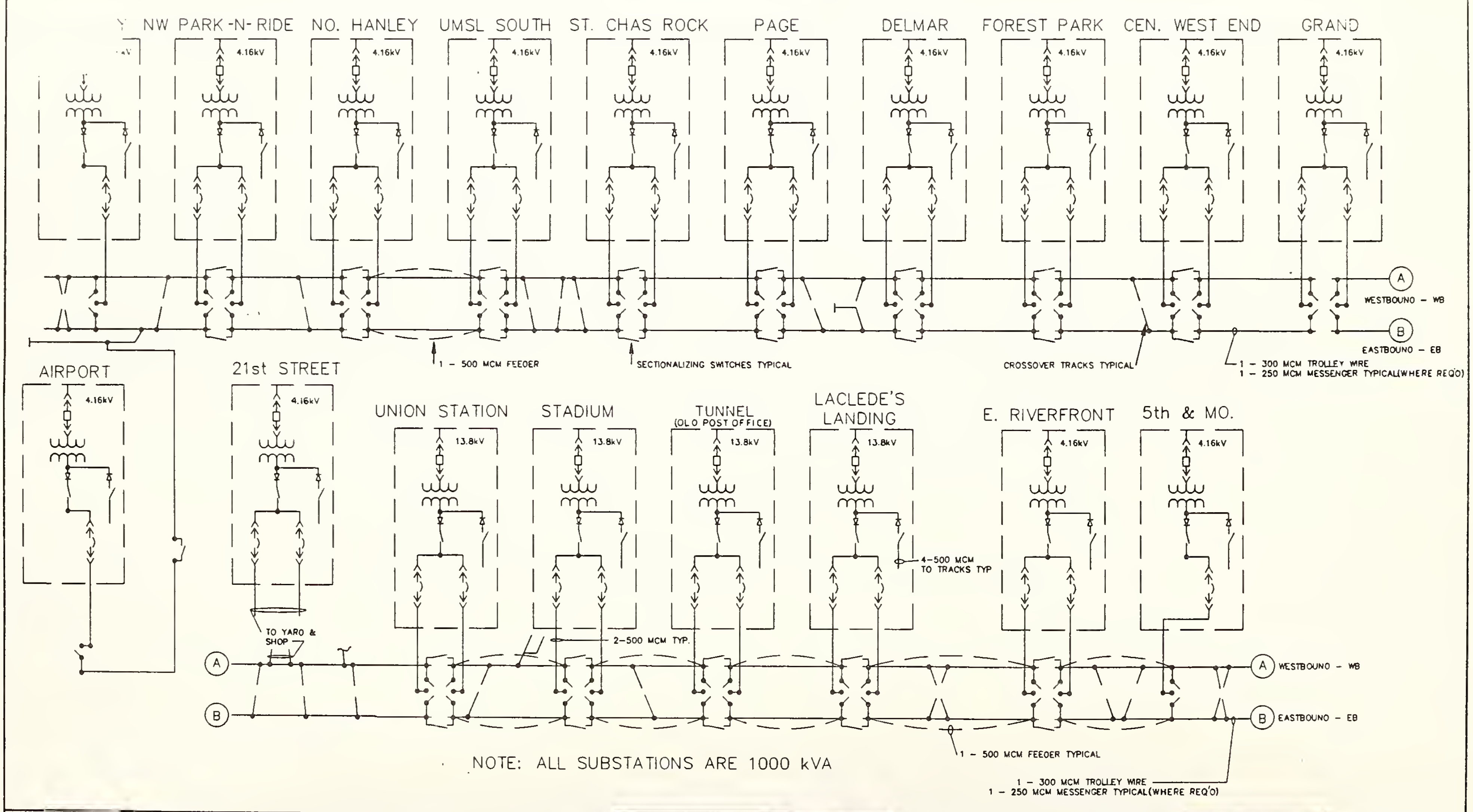
APPROVED: PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: DIRECTOR OF ENGINEERING 7-86 DATE

LRT - YARDS AND SHOPS
SITE PLAN - WEST

CONTRACT NO
DRAWING NO YS 102
SCALE 1-50-0
SHEET NO



REV	DATE	BY	APP	DESCRIPTION

DESIGNED
DRAWN D.K.M.
CHECKED
APP. BY:
APP DATE

LTK/ROSS

SUBMITTED: DATE

Sverdrup & Parcel and Associates, Inc.
801 North Eleventh
St. Louis, Missouri 63101

APPROVED: PROJECT DIRECTOR DATE

EAST-WEST GATEWAY COORDINATING COUNCIL
ST. LOUIS LIGHT RAIL PROJECT
PRELIMINARY ENGINEERING

APPROVED: D.R. Campion 7-86
DIRECTOR OF ENGINEERING DATE

SINGLE LINE DIAGRAM

OVERHEAD ELECTRIFICATION

CONTRACT NO MO-03-0023/MO-90-00·2
DRAWING NO E-1
SCALE: NONE
SHEET NO. 268

APPENDIX D
REFERENCES

The following Technical Reports (TR) and Technical Memorandums (TM) were prepared as a part of the Preliminary Engineering study. They are the primary reference documents for this FEIS. Copies are available for inspection at EWGCC and the UMTA Region VII office.

TR No.	Title
1	Project Management Plan
2	Detailed Work Scope
3	Topographic Surveys
4	Engineering Report - Existing Structures
5	Building Interface Survey
6	Definition of Alternatives
7	Evaluation of Environmental Impacts - I-70 Alternatives
8	Station Design Studies
9	Design Criteria Manual - Transit Facilities
10	Demand Forecasting
12	Vehicle, Line & Station Maintenance Systems
13	Safety and Fire Protection
14	Design Criteria Manual - Systems
15	Design Criteria - Vehicles
16	Operating Plan
17	Staffing and Organization
19	Station Area Market Study
20	Land Use Planning and Zoning
21	Value Capture Opportunities and Policies
22	Joint Development Program
23	Implementation Plan: Station Area Development
24	Capital Cost Estimates
25	Operating Cost Estimates
26	Financing Plan
27	Cost Reduction Measures
28	Private Investment Workshop
29	Economic Development Analysis I-70/Natural Bridge Alternatives
30	Value Engineering Report
31	Final Project Report

TM No.	Title
1	Progress/Cost Reports
2	Document Standards
3	Geotechnical Investigation Program
4	Geotechnical Finds
5	Utility Relocations
6	Traffic Engineering Inventory
7	I-70 Alignment Plans
8	Design Criteria - Architectural
9	Design Criteria - Power Subsystems
10	Design Criteria - Structures & Guideway
11	Design Criteria - Yards, Shops, Maintenance Facilities
12	Design Criteria - Park-n-Ride Lots
13	Phasing and Traffic Maintenance
14	Noise and Vibration Control
15	Roadway Design Criteria
16	Roadway Design - Traffic Operations
20	Design Criteria - Fare Collection
21	Design Criteria - Security Systems
22	Design Criteria - Communications and Control
23	Design Criteria - Train Control and Signal System
24	Station Loading Level Analysis
25	Accessibility Systems
26	Reliability and Maintainability Analysis
27	Failure Management Program
28	Power System Performance Analysis
29	LRT Segment Analysis
30	Training, Organization and Start-Up
31	Trackwork, Modifications and Improvements
32	Railroad Operating Rules and Schedules
34	LRT Operating Rules
36	Relocation Assistance Plans
37	Capital Cost Estimating - Methodology
38	Procurement and Construction Schedule
39	Operating Cost Model
40	Privatization Potential
41	Innovative Financing Options
42	Existing Revenue Sources
43	Cost Effectiveness Analysis
44	FEIS - Compliance with State Historic Preservation Requirements
45	Environmental Mitigation Measures
48	Tunnel Environmental Life Safety
49	Vehicle Procurement Requirements

FEIS APPENDIX E
LIST OF AGENCIES CONSULTED

FEDERAL

- Department of Transportation
  - Urban Mass Transportation Administration
  - U.S. Coast Guard
  - Federal Railroad Administration
  - Federal Highway Administration
  - Federal Aviation Administration
- U.S. Army Corps of Engineers
- Advisory Council on Historic Preservation
- Department of the Interior, National Parks Service
- National Railroad Passenger Corporation (AMTRAK)

STATE

- Missouri Highway and Transportation Department
- Missouri Department of Natural Resources
- Missouri Department of Economic Development, Division of Transportation

- Illinois Department of Transportation
- Illinois Historic Preservation Agency

REGIONAL

- Southwestern Illinois Metropolitan and Regional Planning Commission
- Bi-State Development Agency

LOCAL

- City of St. Louis, Missouri
- St. Louis County, Missouri and Cities of
  - Bellerive
  - Bel-Nor
  - Bel-Ridge
  - Berkeley
  - Breckendridge Hills
  - Bridgeton
  - Clayton
  - Cool Valley
  - Ferguson
  - Florissant
  - Hazelwood
  - Jennings
  - Kinloch
  - Maryland Heights
  - Normandy
  - Olivette
  - Overland
  - Pagedale
  - Pasadena Hills
  - St. Ann
  - St. John
  - University City
  - Wellston
  - Woodson Terrace

- Madison County, Illinois
- St. Clair County, Illinois and
  City of East St. Louis

OTHERS

- Washington University Medical School
- St. Clair County Transit District
- Madison County Transit District
- University of Missouri at St. Louis
- St. Louis University
- Southern Illinois University at Edwardsville
- St. Louis Community College at Florissant Valley
- Landmarks Association of St. Louis, Inc.
- Terminal Railroad Association of St. Louis
- Norfolk Southern Railroad
- Downtown St. Louis, Inc.
- St. Louis Regional Commerce and Growth Association

FEIS APPENDIX F
PUBLIC PARTICIPATION

Public participation has been an integral part of the St. Louis Light Rail Transit (LRT) system preliminary engineering project in order to keep the general public informed about the work program progress and results. At each major decision point in the engineering process, citizens were acquainted with the alternatives and impacts. This led to an interactive citizen involvement process. The region's transit provider, the Bi-State Development Agency, was also involved in all tasks as appropriate.

Plans, activities and progress was monitored using established major milestones, technical reports and standing citizen groups. Project activity was described in brochures, bi-monthly newsletters, and by oral presentations to the public.

The objectives of public participation throughout this phase of the project have been to provide:

1. Citizen education to produce informed participation.
2. Coordination of public participation in policy development.
3. Municipal and neighborhood planning support.
4. Citizen consensus development.

Various public participation groups/committees were organized with specific emphasis on this project, other public groups which were already in existence were used as a sounding board at each of the major division points.

A Technical Advisory Committee was organized at the outset of preliminary engineering and consisted of representatives from all affected and interested citizens, local agencies, and governments. It was formed to be an information sharing and feedback mechanism on all aspects of the project. It met monthly to review project activities and concerns, and to provide its respective comments on all technical and administrative matters. This committee's membership is detailed later in this Appendix.

A Design Review Committee was established midway through preliminary engineering after enough technical work had been completed to discuss. It consisted of local professionals, not otherwise associated with the project, who independently reviewed all design approaches and products with a focus on cost-effectiveness, quality, constructability and maintainability within the St. Louis region. Representatives of the construction industry, architectural and engineering profession, labor, business and special interests (elderly, handicapped) made up the committee. It met bi-weekly to review all the technical aspects of the project. This committee's membership is detailed later in this Appendix.

There are two existing standing committees which advise the East-West Gateway Coordinating Council's (EWGCC) Board on decisions affecting the project. The Executive Advisory Committee consists of the staff aids appointed by each Board Member, as well as other cooperating agencies. The Regional Forum is the Council's standing citizen advisory group. Each of the committees has reviewed the major decisions and has advised the EWGCC Board on how to react. The membership of these committees is detailed later in this Appendix.

A broad-based organization of business and civic leaders and residents throughout the region called Citizens for Modern Transit (CMT) organized during this phase of the project. Its members have expressed support for improved transportation in the St. Louis region with special interest in the light rail system. In addition to publishing a newsletter with their membership fees, they make oral presentations to the public informing them about the light rail transit system in order to build an informed constituency for excellent, regional, public transportation. CMT was provided with regular briefings on the status and requests of the engineering analysis so as to maintain current and accurate data.

TECHNICAL ADVISORY COMMITTEE MEMBERS (TAC)

Mr. Edward A. Ruesing, President
Downtown St. Louis, Inc.

Mr. Stephen Schindel
Illinois Department of Transportation

Mr. Dick Smith
Illinois Department of Transportation

Mr. Thomas W. Purcell, President
Laclede's Landing Redevelopment Corporation

Mr. William R. Haine
Madison County Transit District

Mr. Frank G. Kriz, District Engineer
Missouri Highway and Transportation Department

Mr. Joseph G. Bushko
Missouri Highway and Transportation Department

Mr. William Bruns
Normandy Municipal Council, Inc.

Mr. Tim P. Fischesser, Executive Director
Normandy Municipal Council, Inc.

Ms. Delores Lysakowski, Chairperson
St. Clair County Transit District

Mr. T. Joseph Marking, District Manager
St. Clair County Transit District

Ms. Natalie Rulkoetter, Executive Director
St. Louis County Municipal League

Mr. Stephen Ables, Assistant Director
St. Louis County Municipal League

Mr. Patrick Sullivan, Vice President
Governmental Affairs Home Builders Association

Mr. Thomas Wobbe
Southwestern Illinois Planning

Mr. Franz Kraintz
Southwestern Illinois Planning

Mr. Robert Blackburn, Director of Community and Government Relations
Washington University in St. Louis

Mr. Robert Hickok, Assistant Vice Chancellor
Washington University School of Medicine

Mr. Ron Baron, Trustee
Village of Bel-Nor

Mr. Raymond G. Knapp, III, Chairman of Trustees
Village of Bel-Ridge

Mr. Clarence Squellati, Chairman of Trustees
Village of Bellerive

Ms. Dolores Fink, Councilwoman
City of Berkeley

Mrs. Deborah Schneider
City of Berkeley

Mr. Archie Ledbetter, Chairman of Trustees
Village of Breckenridge Hills

Mr. Bob Little
City of Bridgeton

Mr. Terrence B. Keran, City Engineer
City of Clayton

The Honorable Eileen H. McCartney, Mayor
Village of Cool Valley

Mr. Michael Preston, Capital Improvement Commission
City of East St. Louis

The Honorable Charles H. Grimm, Mayor
City of Ferguson

The Honorable James J. Eagan, Mayor
City of Florissant

Mr. Edwin W. Carlstrom
City of Hazelwood

Mr. Ralph Kuehn, Director of Public Works
City of Jennings

Ms. Bertha Robinson
City of Kinloch

The Honorable Edwin Dirck, Jr., Mayor
City of Maryland Heights

The Honorable Patrick F. Hambrough, Mayor
City of Normandy

Mr. Jerry L. Simpson
City of Pagedale

The Honorable Jeffrey W. Buck, Mayor
City of Pasadena Hills

The Honorable Jack Rehagen, Mayor
City of St. Ann

Mr. William E. Polka, Superintendent of County Highways
St. Clair County

The Honorable M. C. Nicholson, Mayor
City of St. John

Ms. Jill Roach, Community Development Agency
City of St. Louis

Mr. James Farrell, Administrative Assistant
St. Louis County Government

Mr. Frank Ollendorff
City of University City

Ms. Linda Moore
City of Wellston

Mr. Robert J. Gereaux, Administrative Assistant
City of Woodson Terrace

Mr. Michael H. Setzer, General Manager of Transit
Bi-State Development Agency

Ms. RoseMary Covington, Deputy General Manager
Marketing, Planning and Research
Bi-State Development Agency

Ms. Betty Van Uum, Assistant to Chancellor - Public Affairs
University of Missouri - St. Louis

Ms. Sandra S. Kling, Executive Director
Citizens for Modern Transit

Ms. Betty Duvall, Dean of Instruction
St. Louis Community College at Florissant Valley

Mr. David McDonald, Director of Light Rail
Bi-State Development Agency

Mr. T. J. Regan, Jr., Project Director
Sverdrup & Parcel & Associates

The Honorable Janet Majerus, Mayor
City of University City

EXECUTIVE ADVISORY COMMITTEE MEMBERS (EAC)

Richard R. Oldenburg, Chairman EAC
Franklin County Planning Commission

David Wagner, Vice Chairman EAC
Administrative Manager
St. Clair County Intergovernmental Grants Department

Dan Borgmeyer

D. Michael Bowen

Susan Coombs, Administrative Assistant
St. Louis Office of the Governor

Mr. R. Raleigh D'Adamo, Executive Director
Bi-State Development Agency

Elizabeth Faulkenberry, Presiding Judge
Jefferson County

Dale Klohr
Illinois Department of Transportation

Dr. Robert Koepke, Coordinator
Earth Science, Geography & Planning
Southern Illinois University - Edwardsville

Theadore H. Mikesell, Executive Director
Southwestern Illinois Metropolitan and Regional Planning
Commission

James Monday, Director of Administration
Madison County Courthouse

David Morris
Illinois Department of Commerce & Community Affairs

Ronald A. Polka

Jill Roach, Community Development Agency
City of St. Louis

Natalie Rullkoetter, Executive Director
St. Louis County Municipal League

William A. Skaggs, Executive Assistant
St. Louis County Government

Artis Talley, Jr., Community Development Commissioner
City of East St. Louis

David Edwards, Community Planner
Federal Highway Administration

Lloyd G. Gilworth
Federal Aviation Administration

Bureau Chief, Urban Program Planning
Illinois Department of Transportation

Mr. Frank G. Kriz, District Engineer
Missouri Highway and Transportation Department

Kenneth G. Lange, Manager
Department of Housing and Urban Development

H. Richard McLane, Planning Engineer
Federal Highway Administration

Lee Waddleton, Regional Administrator
Urban Mass Transportation Administration

DESIGN REVIEW COMMITTEE MEMBERS (DRC)

NAME	AREA OF EXPERTISE
Mr. Max J. Starkloff Executive Director Paraquad, Inc.	Handicapped
Ms. Lynn Randall State Director American Association of Retired Persons	Elderly
Mr. Gregory Palermo HOK, Inc.	Architecture
Dr. Steve Hanna School of Engineering Southern Illinois University - Edwardsville	Engineering
Mr. Joseph F. Shaughnessy, President Bannes-Shaughnessy, Inc.	Construction
Mr. Cassell Williams, President International Association of Machinists District 837	Labor
Mr. John Wuest Executive Vice President Mercantile Trust Company	Business/Finance
Mr. Kenneth A. Jawarski International Association of Machinists District 837	Labor

REGIONAL FORUM MEMBERS (RF)

Robert A. Cohen, Chairman RF
St. Louis County

Michael Bingman
Jefferson County

Anabeth Calkins
St. Louis City

Dorothy J. Haegele
Madison County

Debra H. Moore
St. Clair County

Larry Reinneck
St. Clair County

Lowell Andrew
Monroe County

Hamilton Brightwell
Franklin County

Robert H. Allen
St. Clair County

Donald Hawkins
St. Louis County

Jacqueline T. Niekamp
St. Louis County

Sharon Ross
City of East St. Louis

Charles Billups
St. Clair County

Dr. James R. Buck
Madison County

Rev. Arthur Ebeling
Franklin County

Matthew Melucci
Madison County

Dr. Joseph Olszewski
Jefferson County

John H. Saunders
St. Louis City

John J. Scarpinato
St. Charles County

Darby R. Tally
St. Charles County

William L. Slaten
St. Louis City

Mary Jane Thaman
St. Louis County

Artis Talley, Jr.
City of East St. Louis

David M. Witter
St. Clair County

FEIS APPENDIX G
PEER REVIEW

East-West Gateway Coordinating Council (EWGCC) hosted a two day Peer Group Forum just after 30% of the Preliminary Engineering had been completed. The purpose of the Forum was to review the engineering that had been done and have the experience of other projects brought to bear on the St. Louis project engineering, construction and operating concepts, and to identify opportunities for avoiding problems the others encountered.

The Forum brought together a panel of professionals from throughout the U.S. and Canada that were chosen for their knowledge and first hand experience on all aspects of rail transit systems. The esteemed panel included the following:

- Trackwork and Civil - Roberto J. Conrique, Project Manager, Kaiser Engineers, Inc.
- Signals and Control - T. E. Hopkins, Consulting Engineer, formerly with the San Francisco Municipal Railway.
- LRT Project Development - Donald L. McDonald, Director of Operations, British Columbia Transit.
- Systems and Light Rail Vehicles - David G. Randolph, Senior Systems Engineer, Dallas Area Rapid Transit.
- Scheduling and Project Control - Ronald S. Steiner, Vice President, Fogel & Associates.
- Operations and Maintenance - Peter D. Tereschuck, Manager of Transportation, San Diego Trolley, Inc.
- Structural - Harry N. Wenke, Senior Associate, Envirodyne Engineers, Inc.

Also attending the Forum were representatives from the Urban Mass Transportation Administration (UMTA), the Illinois Department of Transportation (IDOT), the St. Louis City and County governments, and the Bi-State Development Agency.

The panel of professionals was brought up-to-date on every facet of the St. Louis light rail transit system during the first day of the Forum by oral presentations and a tour of the alignment.

Once familiarized with the project, the rail experts devoted the second day of the Forum to assessing work done on the system. All the preliminary engineering details on items such as vehicle deisgn, power systems, trackwork, fare collection, communication, safety, security, train operations, station design and potential development were covered during the critique. Also reviewed in detail was the project budget and its detailed cost breakdown.

The panel of rail professionals summarized the two day Peer Group Forum by stating that:

- The Preliminary Engineering work done to date is very complete and has gone further than other rail properties have gone in the same period.

- Although it will require extraordinary efforts to keep within the planned budget and schedule, the Council's excellent track record in preliminary engineering bodes well for attaining these goals.

- The Council is doing a good job of not "redesigning the wheel." They are using proven technology.

- EWGCC appears to be on the way to providing a cost effective light rail transit system for the St. Louis region.

FEIS APPENDIX H
RESOLUTIONS/ENDORSEMENTS/COMMITMENTS

The East-West Gateway Coordinating Council Board of Directors, composed of government representatives and regional citizens from the eight counties in the St. Louis metropolitan region, has endorsed a resolution requesting funds to complete the engineering and construction of the light rail transit system in the St. Louis metropolitan region.

The Board of Directors of the Bi-State Development Agency, the St. Louis metropolitan region's existing public transit operator, has passed a resolution supporting light rail transit for the region to complement and enhance the existing bus system presently operated by them.

The Regional Commerce and Growth Association, the St. Louis metropolitan region's "Chamber of Commerce", has come out in favor of adding the light rail transit system to the existing bus public transportation system.

Approval has been received from the Federal Aviation Administration allowing the use of airport property to the east end of the runways for the Northwest Park-n-Ride station and parking lot. They have also approved running the alignment and the electrical catenary in the vicinity of the airport facilities.

General agreement has been reached with the Missouri Highway and Tranportation Department and the Federal Highway Administration allowing the use of Interstate highway right-of-way for the light rail transit system alignment.

The University of Missouri at St. Louis has agreed to allow the use of their property, developed in accordance with their long range plan, for the alignment and to provide them with access to the light rail transit system.

Overall local public reaction to building the light rail transit system has been favorable. This was verified by a professional survey commissioned by the local press (St. Louis Post-Dispatch) and a local radio station (KMOX) and reported in the St. Louis Post-Dispatch on October 12, 1986. The survey showed that over 75% of the people in St. Louis City and St. Louis County that had an opionion about light rail transit were in favor of it.

Endorsements and commitments of supports have been received from the private sector in the St. Louis metropolitan region. Private developers presently owning property in the immediate area around the alignment and especially in the station areas, have committed themselves to increased development possibilities and for support of the system.

A public support group, composed of volunteers who are concerned about public transportation issues in the St. Louis metropolitan region, called Citizens for Modern Transit (CMT) has been formed. CMT has within its membership business and civic leaders and other members of the general public. Its membership heartily endorsed the light rail transit system as an efficient system of connecting bus lines, commuter parking lots and neighborhoods with entertainment areas and employment centers.

APPENDIX I

MEMORANDUM OF AGREEMENT AND LETTERS

**Advisory
Council On
Historic
Preservation**

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

MEMORANDUM OF AGREEMENT

WHEREAS, the Urban Mass Transportation Administration (UMTA) has determined that construction of the St. Louis Central/Airport Corridor light rail transit system (Project) in St. Louis City and County, Missouri and East St. Louis, Illinois, will have an effect upon the Eads Bridge and St. Louis Union Station, properties listed in the National Register of Historic Places and has requested the comments of the Advisory Council on Historic Preservation (Council) pursuant to Section 106 of the National Historic Preservation Act (16 U.S.C. 470f) and its implementing regulations, "Protection of Historic Properties" (36 CFR Part 800),

WHEREAS, UMTA, the Illinois State Historic Preservation Officer (SHPO), the Missouri SHPO, and the Council have agreed to invite the East-West Gateway Coordinating Council to concur in the Agreement,

NOW, THEREFORE, UMTA, the Illinois SHPO, the Missouri SHPO, and the Council agree that the Project shall be implemented in accordance with the following stipulations in order to take into account the effect of the Project on the Eads Bridge and St. Louis Union Station.

Stipulations

UMTA will ensure that the following measures are carried out.

1. Prior to alteration of the Eads Bridge, the Historic American Engineering Record (HAER); a division of the National Park Service, shall first be contacted to determine what material shall be required to adequately document the Bridge to assure a permanent record of its present appearance and history. All documentation must be accepted by HAER prior to alteration of the Bridge. Copies of this documentation should be made available to the Missouri and Illinois SHPOs and appropriate local archives designated by the SHPOs.

2. The Secretary of the Interior's <u>Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings</u> (Revised 1983) will be applied in any alterations affecting the Eads Bridge and Union Station. <u>Metals in America's Historic Buildings: Uses and Preservation Treatments</u> by Margot Gayle and David W. Look, 1980 (GPO stock number: 024-005-00910-8) will be used as a guide in cleaning and repainting Eads Bridge metal surfaces.

3. Final project construction bid plans and specifications affecting the historic properties will be furnished to the Missouri and Illinois SHPOs for review and comment in order to assure that alterations affecting the historic properties are substantially in accord with the Preliminary Engineering plans (dated June, 1986) and specifications on which this agreement is based.

4. Should either the Missouri or Illinois SHPO note any objection to the final plans and specifications, they will so notify UMTA, who shall consult with the objecting party to resolve the disagreement. If UMTA determines that the objection cannot be resolved, UMTA shall forward all documentation relevant to the dispute to the Council. Within thirty days after receipt of all pertinent documentation, the Council will either:

a. accept the Project as presented by UMTA,

b. advise UMTA of changes to the Project that would make it acceptable, or,

c. decide to comment on the undertaking, in which case the Council shall provide its comments within sixty days of receiving UMTA's submission, unless UMTA agrees otherwise.

Execution of this Memorandum of Agreement evidences that UMTA has afforded the Council an opportunity to comment on the Project and its effects on the Eads Bridge and St. Louis Union Station and that UMTA has taken into account the effects of the Project on historic properties.

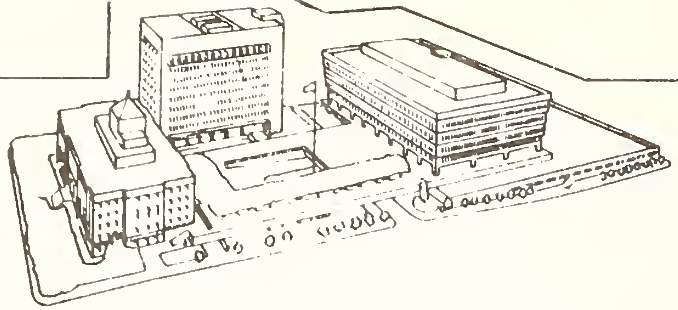
(date) 29 Oct 86
Advisory Council on Historic
Preservation

(date) 2-2-87
Urban Mass Transportation
Administration

(date) 12/7/86
Missouri State Historic
Preservation Officer

(date) 1-5-87
Illinois State Historic
Preservation Officer

1/23/87
(date)
Concurrence:
East-West Gateway
Coordinating Council



ST. LOUIS COUNTY, MISSOURI
GENE McNARY, COUNTY EXECUTIVE
DEPARTMENT OF PARKS AND RECREATION
WAYNE C. KENNEDY, DIRECTOR

February 20, 1987

Mr. Douglas R. Campion
Light Rail Program Director
East-West Gateway Coordinating Council
911 Washington Avenue
St. Louis, Missouri 63101

Dear Mr. Campion:

Subject: St. Vincent Park/LRT Interface

The St. Louis County Department of Parks and Recreation is pleased that East-West agrees to the Department's suggestion to plant coniferous trees along the proposed LRT alignment within St. Vincent Park, as discussed at our December 16, 1986, meeting.

This Department understands the tree planting proposal as developed by East-West's LRT consultant, Sverdrup, to involve the planting of 650 four-to-six-foot trees. This planting and all costs associated with establishment of this buffer will be the responsibility of the light rail developer. The proposed plant list involves 40 percent Black Hills Spruce (picea glauca "densata"), 40 percent Austrian Pine (pinus nigra), and 20 percent White Pine (pinus strobus).

We look forward to coordinating with you further as the light rail project advances.

Sincerely,

Wayne C. Kennedy
Director

WCK/ps

cc: Gerry Biedenstein, SLCP
John McCarthy, Sverdrup

0337f

41 SOUTH CENTRAL AVENUE CLAYTON, MISSOURI 63105 (314) 889-2863

200 City Hall
Tucker & Market Streets
St Louis, Missouri 63103
(314) 622-3201

Office of the Mayor

Vincent C. Schoemehl, Jr.
Mayor

May 16, 1984

Honorable Thomas F. Eagleton
U. S. Senator from Missouri
1209 Dirksen Building
Washington, D.C. 20510

Dear Tom:

I am very distressed to hear that there are statements being made in Washington to the effect that an improved all-bus system for Saint Louis would accomplish for us the same objectives as light rail. I can assure you that a practical examination of transit service here could never produce such a conclusion.

The fact is that Saint Louis is faced with two choices. One is to carry out the implementation of light rail, which will enhance transit service, both bus and rail, throughout the region. The other is to fight a losing battle with an all-bus system, the results of which will be continued ridership decline and service deterioration, increased traffic congestion, further financial burdens on the public sector to construct and operate parking garages, and stifling of the renewed private sector investment activity we have worked so hard to bring about.

The Transportation Systems Management (TSM) all-bus alternative may conceivably have some appeal on paper to technocrats in Washington. It is, however, totally unworkable, and completely unacceptable to the area's citizens and businesses. It involves massive traffic disruption in the congested downtown area, requiring the use of many contraflow lanes and designation of exclusive bus streets in a downtown where streets are narrow, pedestrian amenity is already somewhat below par, and where lack of off-street delivery facilities for many of our historic older structures mandates the use of the streets for such purposes. In short, I feel strongly that there is no way that our merchants will ever go along with the traffic changes in the downtown required to achieve the bus operating speeds and efficiencies needed to attract the riders projected in the Alternatives Analysis for the TSM option.

The TSM alternative also assumes that it will be possible to implement trip-signaling for buses on virtually all arterial streets carrying any appreciable amount of bus traffic. Carrying off such a program in Saint Louis would be a political nightmare. The Saint Louis County Highway Department has already taken a formal position opposing trip-signaling.

We have taken many steps already to improve bus service, including the passage of a dedicated transportation sales tax in 1973, the construction of modern new maintenance facilities, the implementation of a High Occupancy Vehicle service redesign program in the downtown, the installation of hundreds of new bus shelters, the inclusion of bus turnouts along streets in redevelopment areas. We shall continue to do whatever is possible within our resources to make our bus service attractive.

But we have reached the end of the line with what we can do practically and politically with the bus alone to meet our transit service, environmental and land use needs. We must re-attract the discretionary transit rider to the system if we are to maintain its viability for all our residents. Light rail will help us insulate our transit funding base by attracting the loyalty and support of groups in addition to the transit-dependen

City development policies throughout the last decade have been directed to the goal of rebuilding our core area. Hard work, dedication to the task, and federal support have enabled us to achieve considerable success. Now, however, we must provide the basic transit infrastructural investment to serve these densely-developed areas, if they are to continue to compete effectively with the urban sprawl created by the federal highway investment.

The TSM all-bus alternative is nothing but a pipe dream. It cannot be implemented, and, I honestly believe, if implemented, it would not achieve the advertised results. By contrast, in examining the potential for light rail in Saint Louis, our project team has been guided throughout the process by the need to minimize costs and to make honest assessments of ridership potential, and funding capabilities. No optimistic forecasts, inflated claims, or shellgame techniques have been involved. The result is that we have come up with a solid plan to bring a project on line for a cost-per-mile that is lower than any other project in the country competing for federal funds, yet provide a high-quality system linking virtually all the major activity centers in the region.

I am frankly amazed that the professionals at UMTA are not wildly enthusiastic about the project. Whatever their motives, or whatever considerations guide their decision-making, it seems to me that the Congress should give due regard to a carefully-reached local decision involving the deliberations of persons intimately familiar with Saint Louis, its people, its history, its traditions and its prospects.

Yours truly,

Vincent J Schoemehl
MAYOR