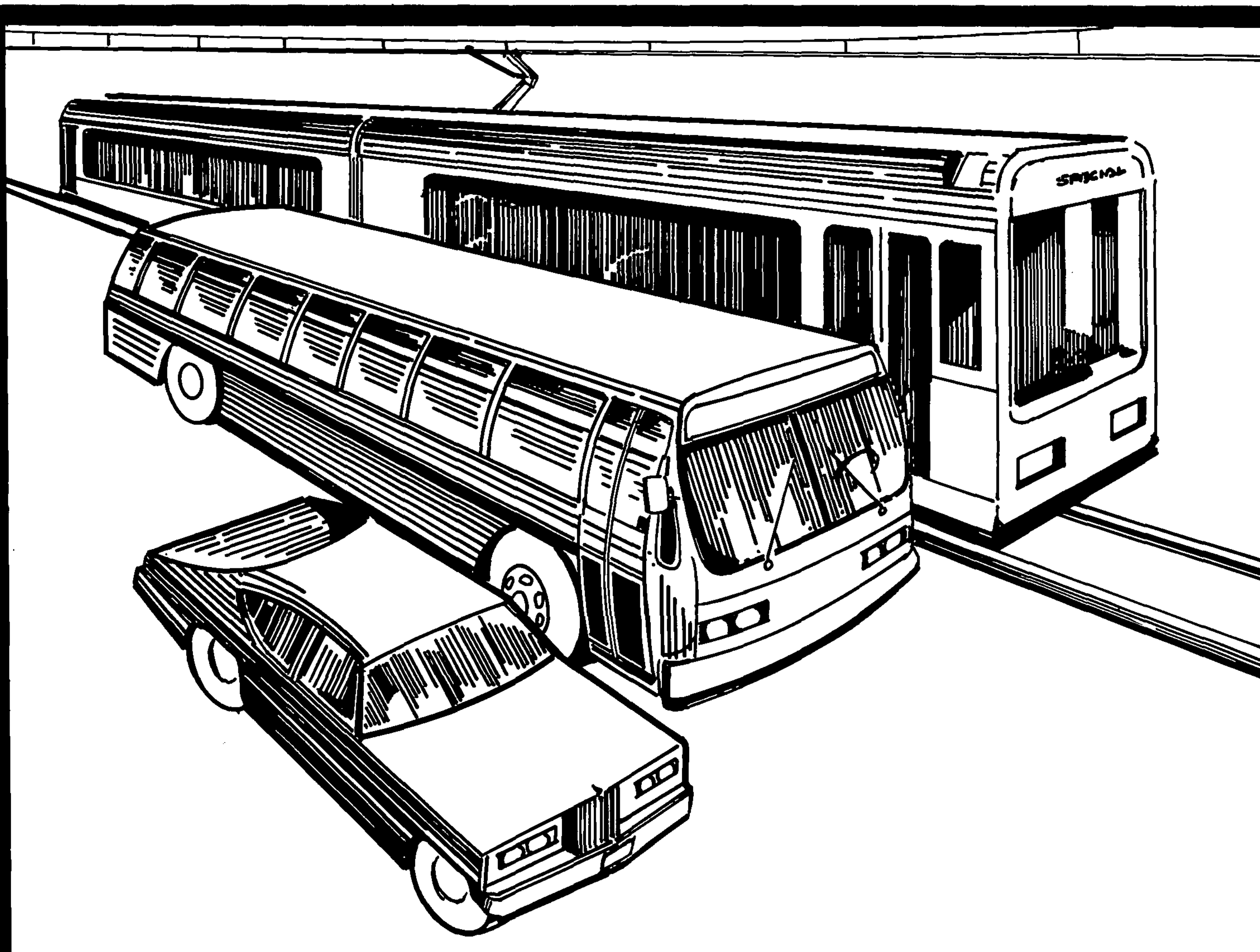
BANFIELD TRANSITWAY

DRAFT ENVIRONMENTAL IMPACT STATEMENT



Volume 2

OREGON DEPARTMENT OF TRANSPORTATION

VOLUME II/RESEARCH REPORTS

Introduction

This volume contains the major research reports prepared by the Oregon Department of Transportation and used in the evaluation of social, economic and environmental impacts of the Banfield Transitway project alternatives. The research reports are divided into two categories: one, "Human Environment" and two, "Natural Environment." Research topics discussed under the "Human Environment" include: Economics, Land Use, Social, Cultural, Right of Way, Air Quality and Noise. "Natural Environment" subjects include: Biology, Water Quality and Geology.

The content of these reports has been used as the basis for environmental impact descriptions and conclusions contained in Volume I, Part C, of the Banfield Transitway Draft Environmental Impact Statement. The reports contained herein are for those reviewers desiring more comprehensive information concerning impacts of the proposal project alternatives.

VOLUME II

TABLE OF CONTENTS

HUMAN ENVIRONMENT REPORTS

HUMAN ENVIRONMENT

This section of Volume II of the Banfield Transitway Project Draft Environmental Impact Statement contains five research reports, ordered as follows:

Social
Economic
Planning and Land Use
Cultural Resources
Right of Way

These research reports examine the project impacts relating to several topics in the human environment. Two or more reports may contain discussions of the same impact topic. The perspectives on the topic differs from report to report depending on the discipline and provide complimentary points of view on elements of the topics.

The social report discusses population change and forecasts, demographic characteristics, community institutions, neighborhoods, and the transportation disadvantaged. The economic report consists of the regional and local economic conditions (including employment and business activity), on-street parking, transit station analysis, and measures of economic performance. The planning and land use report examines current planning, particularly land use planning, by the appropriate political jurisdictions and the conformance of the project with the planning.

The cultural resources report inventories and assesses impacts on historical properties and investigates potential archeological impacts. The right of way report evaluates right-of-way requirements, including residential, business and non-profit institutional displacements, relocation, and tax base changes.

The research reports contain two major sections--the existing setting and the impacts section. These sections are generally organized by topic and study area. The right of way report contains no existing setting, due to the nature of the impact. A table of contents at the beginning of each research report provides quick reference to the organization and content of that report.

Four major study areas are used for the evaluation of project impacts on the human environment. These study areas were drawn on U.S. Census-determined areas to facilitate data gathering. Delination of the study areas was a cooperative effort by the Oregon Department of Transportation, Tri-Met, Multnomah County, and the City of Portland.

Region Study Area

The Region Study Area, the largest of the study areas, is the Portland Standard Metropolitan Statistical Area (SMSA). The Portland SMSA contains the four counties in the metropolitan area--Clackamas, Multnomah, and Washington, in Oregon, and Clark, in Washington State. The Region Study Area is shown in Figure I-1.

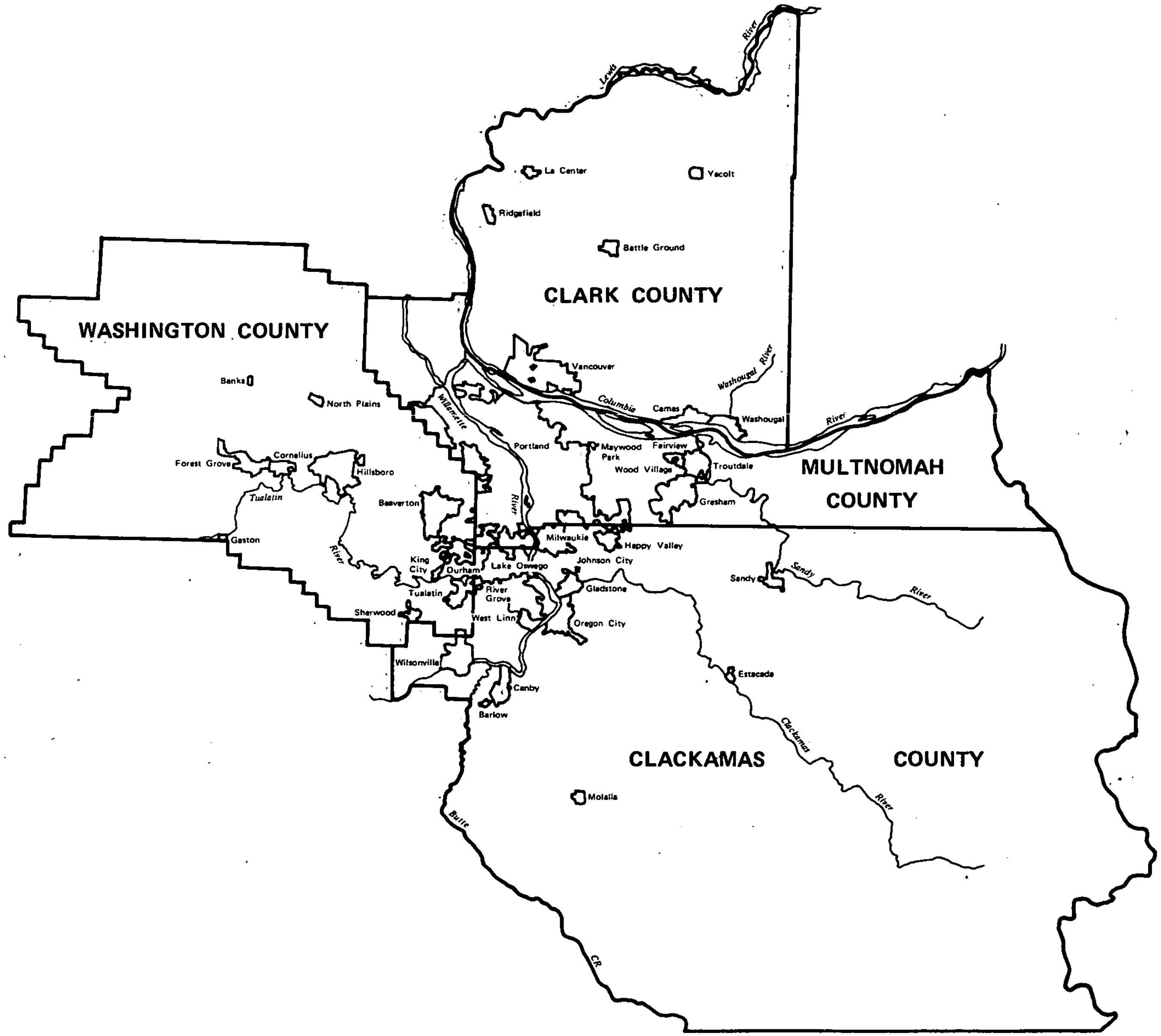
Downtown Study Area

The western terminus for transit operations of the Banfield Transitway project is the Portland Transit Mall in the Central Business District (CBD). The importance of the project to the central portion of the metropolitan area necessitated the establishment of the Downtown Study Area (Figure I-2). This study area contains five census tracts and is bounded by I-405 (Stadium Freeway) and the Willamette River. The Portland CBD, which contains high density office buildings, hotels and stores, consists of two census tracts in the Downtown Study Area.

East Portland Study Area

The East Portland Study Area (Figure I-2) lies between the Willamette River and approximately the I-205 corridor. It consists of the

PORTLAND–VANCOUVER
Standard Metropolitan Statistical Area
Figure I-1



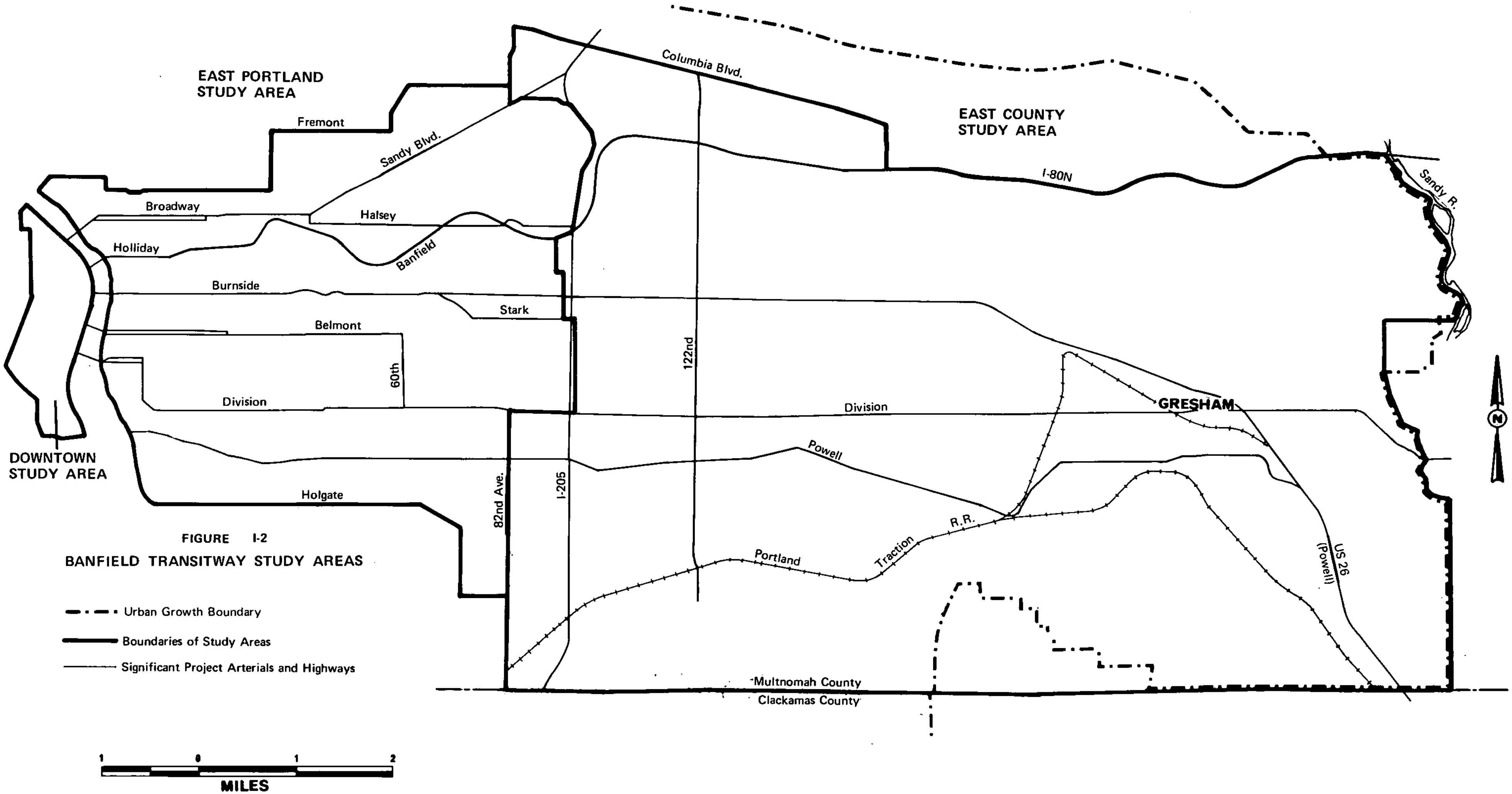


FIGURE I-2
BANFIELD TRANSITWAY STUDY AREAS

transit service drawing area of the project build alternatives. The study area contains thirty-eight (38) census tracts within the City of Portland.

East County Study Area

The East County Study Area (Figure I-2) includes the drawing area for the potential users of the transitway. Thirty-one (31) census tracts are in this study area. A portion of the City of Portland is in the southwest sector of the study area. The study area also contains unincorporated areas of Multnomah County and all or most of the incorporated cities of Maywood Park, Troutdale, Fairview, Woodvillage, and Gresham. The east boundary of this study area coincides roughly with the urban growth boundary.

Adjacent portions of Clark County, Clackamas County, and Multnomah County were excluded from the East County Study Area because of the relatively small influence of the project on these areas. Transit ridership from Clark and Clackamas Counties was projected to be less than five percent of the total transitway ridership. Urban densities are not allowed outside the urban growth boundary, thus the addition of more census tracts in Multnomah County east of the urban growth boundary was not required nor appropriate.

The Downtown, East Portland and East County Study Areas in total encompass about three percent of the land area of the Portland SMSA. In 1975, the population in the three study areas was 27.5 percent of the total population in the SMSA.

Other study areas are utilized in the research reports in addition to those described above. These study areas include corridor areas and transit station areas and are described in the relevant parts of each report.

ECONOMIC RESEARCH REPORT

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I. INTRODUCTION, STUDY APPROACH AND USES OF DATA

This report discusses the existing economic setting, the economic impacts and the steps to minimize the adverse economic impacts. The existing setting consists of a brief description of the present and projected economic conditions in the four study areas (Region, Downtown Area, East Portland Area, and East County Area). In addition, there is a description of the conditions in the corridors and transit stations of the alternatives.

The impacts section consists of parking removal impacts, transit station impacts, and other impacts such as changes on the railroad operations in Sullivan's Gulch and developmental impacts not discussed elsewhere. This section also discusses the measures of economic performance such as project costs, transit subsidies required and overall monetary benefits to the traveller. In contrast to the existing setting which is discussed by study area, the impacts are dealt with by topic.

The economic aspects of "short-term use versus long-term productivity" and "irreversible and irretrievable commitment of resources" are in Volume I of this DEIS.

A bibliography, which includes all references, is found at the end of this report.

Right-of-way impacts are not discussed in this report. The economic aspects of right-of-way impacts are combined with the sociological and land use aspects of right-of-way impacts in a separate Right of Way Research Report.

On a project of this scale, the discussion of the existing setting and the impacts is necessarily generalized.

Secondary data sources are used extensively. These include census data and CRAG projections of population and employment, substantial material from Tri-Met, as well as the City of Portland and Multnomah County. Information and insights for this report were also provided by various citizens involved in the public information meetings held throughout 1976 and 1977.

II. EXISTING SETTING

A. The Study Areas

1. The Region. The regional study area is the SMSA which consists of Clackamas, Multnomah and Washington Counties in Oregon and Clark County in Washington State. Portland is located at the junction of two major rivers, the Columbia and Willamette. The rivers in turn, divide the metropolitan area into three parts. North of the Columbia is Vancouver, presently accessible by only one bridge. The eastern and western portions of Portland are divided by the Willamette River. The original settlement was on the west bank of the river, where downtown is now located. The subsequent development was largely on the east side of the river, where there were fewer geographical barriers to urbanization. The extensive development east of the Willamette River has helped to create many of the traffic and transportation problems there.

Table E-1 shows the anticipated population growth for the region (as well as the other three study areas). Regional population and employment growth is not expected to grow as rapidly in the next several decades as it has in the past. This can be largely explained by the overall reduction in the birth rate, which also results in a smaller growth in the labor force.

Historically, Portland has been the service center for much of the Columbia River watershed and has a higher proportion of trade employment than many other SMSA's of its size. It also serves as the processing center for the lumber and wood products of the hinterland. The lumber and wood products industry has become relatively less important with the growth of other manufacturing, particularly electronic equipment and transportation machinery.

2. The Downtown Study Area. For the Downtown Study Area, population dropped from 1970 to 1975 as households moved to other parts of the city and the suburbs (see Table E-1). As the urban area develops and the renovation of downtown continues, the area's population is expected to grow from 7,484 in 1975 to 8,450 in the year 2000, an average annual increase of 0.6 percent.

By 1970 the employment of the area was nearly 50,000. Most of this employment was in the core retail and office area south of West Burnside Street. By 1990, employment is expected to increase to 87,350 or an average annual increase of 3.7 percent for the twenty-year period.

Within the Downtown Study Area there is a varying array of economic activities. At the north end of the area is some industrial activity, including rail yards. Immediately to the south of this is a mixture of light industrial and warehousing, low income transient housing, an oriental district and Old Town--an historic area being developed commercially. Generally, the light industrial and warehousing is west of N.W. 6th Street and N.W. Broadway Street and the other activities are east of N.W. 6th Street and N.W. Broadway Street.

West Burnside Street acts as a boundary between the industrial-Old Town area and Portland's Central Business District (CBD), although Old Town extends south of West Burnside. The CBD is the heart of the urban area, serving as the center of the various activities in the metropolitan area. In the past decade the CBD has

TABLE E-1

POPULATION, HOUSING, EMPLOYMENT, AND SQUARE MILES
BANFIELD TRANSITWAY STUDY AREAS

STUDY AREAS	POPULATION	HOUSING	EMPLOYMENT	SQUARE MILES
REGION				3,710
1970	1,007,130	358,920	310,001	
1975	1,090,700			
1990	1,398,000		633,900	
2000	1,608,400		719,000	
DOWNTOWN				1.44
1970	8,231	5,404	49,983	
1975	7,484			
1990	7,800		87,350	
2000	8,450			
E. PORTLAND				20.7
1970	155,070	62,195	61,129	
1975	144,108			
1990	147,100		93,270	
2000	148,250			
E. COUNTY				55.8
1970	137,975	41,432	26,298	
1975	147,986			
1990	185,250		53,485	
2000	210,250			

Sources: 1970 population data: 1970 Census of Population and Housing. 1970 employment data; 1975, 1990, 2000 data; square miles: estimates provided by the Columbia Region Association of Governments.

become less important as a retail center with the construction of suburban shopping centers such as Washington Square. This decline has been offset by the recent increase in retail activity. This is evident by the recent opening of Nordstroms, a large department store, and the conversion of the Rhodes store to the Galleria, a set of shops.

Offsetting the slowdown of retail activity has been the healthy growth in office space and associated employment. Many private firms and government agencies require central office locations where face-to-face contact is convenient, a large pool of labor is available and rapid access to information is possible. Growth in office-related employment also helps to develop the retail sector of the CBD.

A recently finished project in the CBD is the Fifth and Sixth Avenues Portland Mall. This undertaking has redesigned S.W. 5th and S.W. 6th between W. Burnside and S.W. Madison from traditional city streets to high capacity transit corridors, handling buses from the Banfield Transitway and other parts of the metropolitan area. Private vehicles are permitted on only one lane for certain blocks of S.W. 5th and S.W. 6th Streets. As stated in the Final Environmental Impact Statement for this project:

> "In addition to the basic transit improvements, the Mall has been designed to provide an environment inviting to residents and visitors, thereby benefiting downtown businesses and making the downtown more competitive with suburban locations. It will include such pedestrian amenities as widened sidewalks, street trees and landscaping, separation of passenger waiting zones from the store fronts and sidewalks, improved street lighting, more attractive street graphics, signing, traffic control and street furnishings." (9, p.5.)*

*All numbers in parentheses refer to numbers in the Bibliography.

To the south of the CBD, but within the Downtown Study Area, are lower-density offices, some high density residential areas, an urban renewal area and the campus of Portland State University. This part of the Downtown Study Area will be less heavily impacted from the project because the inbound bus routes do not come into downtown south of the CBD; nevertheless this area does have impacts from proposed alternatives of the Banfield Transitway.

3. The East Portland Study Area. Many of the economic impacts would occur within the East Portland Study Area. As shown in Table E-1, both this area and the Downtown Study Area lost population from 1970 to 1975 as residents moved to the suburbs. There are several factors which should reduce this downturn in population in the East Portland Study Area: (1) as the cost of energy rises, households may prefer to reside in the central city to reduce transportation costs, (2) transportation costs will also rise as congestion (a form of transportation costs) becomes more acute, (3) as population in the region grows, so will this area. From 1975 to 1990, population is expected to grow slightly from 140,108 to 144,150 and then increase by the year 2000 to 148,250. Employment will increase from 60,220 in 1970 to 92,270 in 1990, an average annual increase of 2.66 percent. Most of this increase will probably be in retail and commercial activity as the Downtown Study Area continues to be transformed from a retail to an office center. Only a small portion of this growth is expected to be industrial since there is little acreage in the East Portland Area available for industrial expansion. The character of the residential population is expected to change. Residential density will increase as multi-family units are substituted

for single-family units. Since population will remain stable, this will mean that less land will be used for residences. Commercial uses will replace much of the land formerly used for residential.

Roughly speaking, the East Portland Study Area grew eastward from the Willamette River in successive waves. In addition, much of the early development, particularly commercial expansion, occurred along the streetcar lines; many of these areas are still commercial centers. Both the pattern of early development, and the closer proximity to the downtown core have made the residential areas closer to the river more dense. The commercial areas are strung out along the arterials, reflecting the original development and the influence of the automobile in this area.

Table E-2 presents some relevant data on the East Portland Study Area from the 1970 Census of Population and Housing.* As can be seen from the middle two columns, a little less than half the residents moved from another house, with about one-sixth from outside the SMSA, reflecting in-migration from other areas of the state and the nation. It also shows that about three-fourths of the workers used the private automobile to get to work, and a little over one in ten used the bus. The bus ridership percentage probably has increased since 1970 as Tri-Met has increased its ridership. For example, usage of Portland's bus system increased 59 percent from 1970 to 1975 or an increase of about a million passenger trips.**

As expected, a substantial majority of workers are employed in the City of Portland with ten percent working in the Central Business District. This reflects the fact that people live fairly close to where they work, and reinforces the hypothesis that residential location is largely determined by proximity to workplace. (3.)

*These figures are the latest available for the various study areas.

**Information provided by Tri-Met.

TABLE E-2
SELECTED CHARACTERISTICS OF THE
SMSA, EAST PORTLAND STUDY AREA
AND EAST COUNTY STUDY AREA
1970

	SMSA			EAST PORTLAND STUDY AREA			EAST COUNTY STUDY AREA		
RESIDENCE IN 1965	Amount		Percentage	Amount		Percentage	Amount		Percentage
a) Same house as in 1970	435,136		53.18%	72,375		53.74%	57,040		49.56%
Different House									
in central city of SMSA	132,992		16.25%	33,216		24.66%	23,061		20.04%
in other part of SMSA	125,368		15.32%	6,919		5.14%	14,388		12.50%
outside this SMSA	124,777		15.26%	22,174		16.46%	20,597		17.90%
Total	818,273		100.00%	134,684		100.00%	115,086		100.00%
b) MEANS OF TRANSPORTATION TO WORK									
Private auto									
Driver	287,478		73.08%	41,667		65.42%	41,265		77.96%
Passenger	40,497		10.30%	7,475		11.74%	5,336		10.08%
Bus	22,818		5.80%	7,452		11.70%	2,568		4.85%
Walked	22,325		5.68%	4,101		6.44%	1,446		2.73%
Other	20,213		5.14%	2,996		4.70%	2,317		4.38%
Total workers	393,331		100.00%	63,691		100.00%	52,932		100.00%
c) PLACE OF WORK									
CBD	29,794		7.57%	6,535		10.26%	3,689		6.94%
Rest of City of Portland	173,334		44.07%	39,867		62.59%	25,129		47.30%
Rest of Multnomah County	40,745		10.36%	6,705		10.53%	16,188		30.47%
All other in SMSA	114,385		29.08%	5,375		8.44%	3,898		7.34%
Work outside SMSA	9,151		2.33%	1,133		1.78%	1,124		2.12%
Place of work not reported	25,922		6.59%	4,064		6.38%	3,102		5.84%
d) HOUSING DATA*									
Owner Occupied	221,860		64.97%	32,725		55.24%	29,546		70.73%
Renter Occupied	119,645		35.03%	26,463		44.67%	12,228		29.27%
Weighted mean value, owner occupied		$16,700			$13,605.26			$17,835.48	
Weighted median rent, renter occupied		$97			$ 99.95			$ 113.58	
Weighted median income for 1969		$ 7,963			$ 9,432.66			$10,845.68	
e) OCCUPATION BY INDUSTRY OF RESIDENTS									
Construction	23,658		5.92%	3,054		4.69%	3,684		6.81%
Manufacturing	83,962		21.01%	10,928		16.80%	10,453		19.33%
Transportation	20,780		5.20%	3,541		5.44%	3,125		5.78%
Communication, Utilities and Sanitary Services	13,988		3.50%	2,680		4.12%	[illegible],925		3.56%
Wholesale Trade	27,418		6.86%	5,178		7.96%	4,116		7.61%
Retail Trade	64,940		16.25%	12,263		18.85%	9,745		18.02%
Finance, Insurance & Real Estate	25,719		6.44%	4,916		7.56%	3,519		6.51%
Services	107,777		26.96%	18,067		27.77%	13,945		25.79%
Public Administration	17,063		4.27%	3,106		4.77%	2,272		4.20%
Other Industries	14,335		3.59%	1,333		2.05%	1,281		2.37%
Total	399,640		100.00%	65,066		100.00%	54,[illegible]65		100.00%

*Does not include unoccupied housing units

SOURCE: 1970 Census of Population and Housing

-8-

The two right-hand columns show the occupations of those living in the East Portland Study Area. The high percentage of those in services (over one-fourth) reflects the growing importance of this sector of the economy. Also important are the retail trade and manufacturing sectors. The East Portland Study Area contains or is near several important retail centers. Also several industrial areas--Eastside Industrial District, Guilds Lake Industrial Area and Swan Island--are located in or near East Portland.

Within the East Portland Study Area there are two important retail centers near the Banfield Freeway: the Lloyd Center and the Hollywood District. Both these areas would be affected by the alternatives utilizing the Banfield Corridor as well as by the Low Cost Improvement alternative. An overview of these centers is presented here. Specific aspects of Lloyd Center and Hollywood are discussed in more detail in the corridor analysis section of the existing setting and in the impacts section.

The Lloyd Center area consists of a regional shopping center plus numerous other activities. The shopping center comprises over 100 shops. It opened in 1960 and has continued to expand. The shopping center was a prototype for later developments; it includes an enclosed mall area, climate control and an ice skating rink.

The shopping center and much of the adjacent development contains 360 acres bounded by N.E. Schulyer St., N.E. 22nd Avenue, the Banfield Freeway and I-5. The Lloyd Corporation owns about 100 of the 360 acres. In addition to the shopping center, this area contains two high-rise office buildings, a Sheridan Hotel, a Sears Roebuck Company store, as well as numerous shops, restaurants, and apartments. Also within this area is a federally-owned office building used by the U.S. Department of the Interior. This agency plans to expand, probably in the Lloyd Center area, by 1985.

Within this area are about 15,000 parking spaces, of which about 2500 are on-street spaces. Employment in the 360 acres was 12,000 in 1975 (1).

At present there are only about 8 acres available for development by the Lloyd Corporation. These areas include the West Block and the area bounded by N.E. Wasco St., N.E. 6th Ave., N.E. Multnomah St., and N.E. Grand Ave.

The Hollywood retail center is located at the confluence of the Banfield Freeway, N.E. 39th Ave., N.E. Sandy Blvd., and N.E. Broadway St. Retail development began along N.E. Sandy Blvd. soon after the turn of the century when a streetcar line ran along the boulevard.

Because of the traffic congestion in the Hollywood area, the city initiated a study early in 1977 to improve traffic circulation. The initial report proposes two alternatives: Alternative A would remove on-street parking from N.E. Sandy Blvd., place it onto side streets, and provide continuous left-turn refuges. Alternative B would provide diagonal parking along N.E. Sandy Blvd., making it a one-way local street with through traffic placed onto side streets.

Both alternatives would place a transit station at the site of the present freeway off-ramp at 41st Avenue with the rebuilt pedestrian overcrossing serving as the connector between the on-line station and the bus access route. Development along N.E. Sandy Blvd. is fairly compact within Hollywood, more so than most other arterials in East Portland. Its high proportion of office activity gives it some characteristics of a CBD. The potential for additional retail and office development exists, but the extreme congestion as well as high land costs and fragmented ownership are obstacles to development.

Table 3 shows selected population and housing data for the area near the Hollywood area. Census tract 19 is to the south of Hollywood and comprises most of the Laurelhurst neighborhood. The housing was predominately owner-occupied as of 1970. The two columns in the right of the table give the percentile ranking of housing values compared to other tracts in the city. A 50th percentile is average; A 79th rating (for 1960) and 76th rating (for 1970) places Laurelhurst housing in the top quarter (in terms of value) of Portland's housing.

Table E-3

1970 POPULATION AND HOUSING CHARACTERISTICS
IN AND NEAR THE HOLLYWOOD AREA

CENSUS TRACT	POPULATION	DWELLING UNITS	PERCENT OWNER-OCCUPIED	PERCENT RENTER-OCCUPIED	PERCENTILE RANKING OF HOUSING VALUES 1960	1970
19 (Laurelhurst)	6,372	2,028	82%	18%	79	76
26	3,187	1,112	86%	14%	76	66
27.01	3,704	1,209	88%	12%	69	59
27.02	2,708	1,323	39%	61%	67	59

SOURCE: 1970 Census of Population and Housing

The other three census tracts are north of the Banfield Freeway. Census tracts 26 and 27.01 are west and north of Hollywood respectively. Both are predominately single family with above average housing values. The census data plus discussions with city planners indicate that all three tracts are stable single family residential areas.

In contrast, census tract 27.02 is predominately multi-family. This is because this tract contains the triangular area noted above which has extensive multi-family development. This tract also has housing values above the city-wide average.

It should be noted that the drop in percentile rankings from 1960 to 1970 does not mean that the housing values decreased; in fact they increased. However, they did not increase as much as housing values in other parts of the city.

More extensive discussion of the existing conditions adjacent to the transit station areas and the areas adjacent to the low cost improvements is given below.

4. <u>The East County Study Area.</u> The last of the four study areas lies mainly outside the City of Portland. As Table E-1 shows, population in this area is expected to grow steadily from 137,975 in 1970 to 210,250 in the year 2000, an average annual increase of 1.7 percent and an overall thirty-year increase of 52.4 percent. Density is expected to increase from about 2,473 persons per square mile in 1970 to about 3,768 persons per square mile in the year 2000. This is still substantially less than the population density in the East Portland Study Area which in 1970 was about 7,491 persons per square mile, but more than the Region which was 271 persons per square mile.

Employment is expected to more than double from 23,992 in 1970 to 53,485 in 1990, an average annual increase of 5.2 percent. Much of this increase will be in the retail and service sectors to accompany the expected population increases in this area. Some of the increase will be in manufacturing, stimulated by the opening of I-205.

As shown in Table E-2, the East County population had more residential mobility between 1965 and 1970 than those in East Portland; only about half the residents were living in the same house in 1965 and in 1970. One-fifth moved outward from the central city to the suburbs in East County, and nearly an equal amount in-migrated from outside the SMSA.

Being less dense and further from downtown, the residents in East County are more dependent upon the automobile; in 1970 nearly 9 out of 10 used the automobile to get to work and only 5 percent used the bus (See Table E-2). The percentage of bus users has increased since then; between 1970 and 1975 bus ridership in East Multnomah County increased 100 percent.*

About 55 percent of the workers are employed in the city with another third employed east of Portland in the county. With the proportionately higher increase in employment compared to population from 1970 to 1990, the percentage of those working in East County will probably increase.

With the higher percentage of newer, single family housing in this area than in the East Portland Study Area, there is also a greater percentage of owner-occupied housing. In addition, the suburbs of East County have higher income, housing values and housing rents than the central city area of East Portland.

Table E-2 also shows the breakdown of occupation by place of residence. In contrast to the East Portland Study Area, the East County has a high level of manufacturing employment. This can be ascribed partly to the relatively large amounts of manufacturing employment in the northern part of the East County Study Area (approximately north of E. Burnside) and north of the study area, known as

*Information provided by Tri-Met.

the South Shore. In a preliminary survey in 1975, there were 1,820 persons employed in manufacturing in these two areas. Projections are for these areas to increase industrial activity with the completion of I-205. (5) Industry in East Multnomah County has been constrained by the lack of a north-south freeway. I-205 will provide substantially improved access to the rest of the metropolitan area, particularly Vancouver. Industrial growth in this area will require substantial investment in sanitary sewer systems, storm drainage, arterials and highways.

The other large employment sector is retail employment. Much of this can be attributed to the large percentage of retail employment in the East County area. A 1975 survey showed that 2,522 were employed in retail trade in the study area north of E. Burnside. (5)

B. Description of the Economic Condition in the Corridors.

In terms of impacts, there are two types of corridors: (1) those such as the Banfield and I-205 corridors which are existing transportation routes, usually grade separated and where few economic impacts would occur except at the transit stations. (2) Those which are routed onto existing city and county streets, such as the LCI routes, the downtown routes and the LRT routes on E. Burnside and S.E. Division. These corridor types are discussed more extensively since the impacts upon adjacent activities are generally greater along city and county streets.

1. Downtown Routes. Several major routes would be used downtown by buses and light rail vehicles.

The route for the HOV, bus, and LRT on-mall alternatives would be the connection between the Steel Bridge and the Transit Mall via N.W. Glisan St., N.W. Everett St., N.W. 5th and 6th Avenues. N.W. Glisan St. has numerous older buildings, with warehousing and light industry predominating. On the north side of N.W. Glisan St. Between N.W. 5th and 6th Avenues is the proposed Union Station Transportation Center. On N.W. 5th and 6th Streets high rise office structures and retail outlets line the Transit Mall; employment density can be expected to increase subsequent to the Mall's opening.*

In contrast, the cross-Mall LRT route would pass through a much lower density area.** The northern end of this route, near the Steel Bridge, passes along First Avenue through Old Town, passes the Saturday Market, the New Market Theatre and numerous parking lots before reaching S.W. Morrison Ave. and S.W. Yamhill Ave. The Saturday Market is a group of small businessmen, mainly craftsmen and food vendors, who bring their wares into the area under and around the Burnside Bridge on weekends.

S.W. Morrison and S.W. Yamhill Avenues are lined with higher density activities, including offices and retail outlets. Density here is not as high as along the Portland Mall.

2. <u>Holladay, Multnomah and Sullivan's Gulch Routes.</u> The N.E. Holladay Street and N.E. Multnomah Street areas are discussed under relevant transit stations.

a. <u>The Union Pacific Rail Line.</u> Sullivan's Gulch is and has been for some time a major transportation corridor. In addition to the Banfield Freeway, the corridor also contains the main line of the Union Pacific Railroad.

*For example, the Oregon Bank is placing its new headquarters at the south end of the Mall.

**Density in this discussion is employment per square mile.

The existing Union Pacific Railroad line through Sullivan's Gulch was constructed during the period of 1880 to 1882 on right-of-way varying in width from 10 to 100 feet.

In the middle 1940's, when the Highway Department began consideration of the Banfield Freeway, the Union Pacific decided that a side track on the south side through the Gulch would no longer be necessary since the freeway would eliminate industry or customers which could utilize rail service to the south.

To construct the freeway, easements were granted by the Union Pacific Railroad to the then State Highway Commission. These are, in effect, perpetual leases to the state. The Union Pacific owns the land and if the state decides to abandon this facility, the property would revert back to the railroad.

From its original ability to construct four rail lines through Sullivan's Gulch, the Railroad has been reduced to a potential of two lines due to the construction of the Banfield Freeway.

The Union Pacific Railroad line running through Sullivan's Gulch is the western end of a transcontinental line which runs from Council Bluffs, Iowa to Portland. Just north of the western end of Sullivan's Gulch lies the Albina Yard, which is Union Pacific's main freight terminal in the Pacific Northwest. Since the Union Pacific's line extends from Portland to Seattle, Washington, all rail traffic between Washington and points east passes through this yard which handles in excess of 1/2 million cars per year, 11 percent of all Union Pacific's rail traffic.

The line through Sullivan's Gulch connects to the Steel Bridge and the railroad facilities on the west side of the Willamette River, including Portland Terminal Railroad and Burlington Northern, Inc. In 1978, they plan to construct a direct connection between the Gulch line and the Union Pacific-Southern Pacific interchange yard at the mouth of Sulluvan's Gulch, adjacent to the Willamette River.

None of Union Pacific's operations in Sullivan's Gulch conflicts with, or in any way inconveniences the motoring public at this time. This facility is unique; every other rail line in the Portland area has crossings at grade which interrupts the flow of the motoring public.

At the present time there are 16 through train movements at an average of four switch movements per day on the main line through the Gulch. All this is freight except for the AMTRAK run. AMTRAK has commenced daily passenger service between Portland and Salt Lake City which utilizes the main line. The average length of a through freight train using the mainline is 70 cars, making 1,120 freight cars a day. When projected into an annual basis, this amounts to over 400,000 freight cars per year arriving and leaving Portland over this route.

In addition to through movements by trains in Sullivan's Gulch, there are 43 businesses and industries which receive or ship merchandise, raw materials, parts and other commodities utilizing the 29 sidings and spurs on the north side of the mainline. These customers of Union Pacific represent a cross-section of the business community of Portland; everything from medical supplies to fuel, telephones and paper bags to concrete accessories and caskets is shipped or received. Around 35 rail cars per day are taken in or out of all businesses along the Gulch. Many of these businesses could not remain in their present location without rail service.

Some time in the future, the railroad plans to install two tracks (double tracking) through the Gulch when the rail traffic volume is anticipated to be large enough to warrant this expansion.*

*See pp. 32-3 for a discussion of which alternatives will allow double tracking.

Double-tracking increases the movement capacity over four times and also results in a great saving of time in the movement of trains. Another major benefit derived from double-tracking is the elimination of potential head-on collisions of trains traveling in the opposite direction, resulting in a considerable decrease of rail accident potential. At the present time, double-tracking is possible to the south of the existing mainline, except between N.E. 35th and N.E. 37th Avenues. In this area, a slight shifting of the existing mainline track to the north will allow the addition of the second track.

Within the near future the Union Pacific plans to install centralized train control (CTC) through the Gulch. CTC allows better control and coordination of train movements for better utilization of track and efficient movement of trains.

As the supply of petroleum diminishes in years to come, the Union Pacific anticipates electrification of their mainline, using their extensive coal fields in Wyoming as the source of electricity. With future decrease in petroleum supplies, more freight will be switched from motor transit to rail resulting in an increase in the number and size of trains. With this increase will be a higher demand on rail facilities. Increased demand will accelerate the building of the double-track facility and the electrification of the line.

b. Transit Station Areas. As noted in the description of the alternatives, there are six proposed transit stations in the East Portland Study Area. They are: Coliseum, Union/Grand, Lloyd Center, 39th (Hollywood), 60th and 82nd. Lloyd Center and 39th (Hollywood) have been discussed earlier but will be described here as transit station areas.

Table E-4 shows 1970 population, employment and housing occupancy for the areas around the transit stations. It has been assumed that the area of immediate impact is approximately one-quarter mile from the station site. This is the approximate distance that people will walk to a station. The quarter mile radii from the Coliseum, Union/Grand, and Lloyd Center overlap; hence they are considered as one transit station area.

Unfortunately, 1970 employment figures are not available for the Coliseum, Union/Grand, and Lloyd Center station area.* However, the number of employed in this area as indicated by Census data is well above the employment figures for the other transit station areas. Population, however, is lower than for the other areas since nearly all this area is devoted to commercial and office space. The high number of owner occupied housing is attributable to two high-rise senior retirement condominiums located at the edge of the transit station area.

The 39th Street station area has both a substantial amount of population and employment.** Nearly all the employment and most of the population is located north of the freeway in the Hollywood area. Most of the single-family residences are located to the south in the Laurelhurst area; the renters are largely in the Hollywood area.

The 60th Street transit station area is less developed than the 39th Street one. Most of the population is located south of the freeway; the employment is divided about equally north and south of the Banfield.

Of those transit station areas, 82nd is the least developed, although 82nd is more developed as a business arterial, with slightly greater employment, than 60th.

3. The Low-Cost Improvement Corridors. As noted in the description of the alternatives, the low-cost improvement alternatives would operate numerous buses during peak hours on exclusive bus lanes of various city arterials. To

*However Lloyd Center employment is given on Page 9 above.

**See p. 21.

analyze the impacts of the low-cost improvements, it is necessary to describe the existing condition of the low-cost improvement routes. A brief description of the activities along each route is given in Figures E-1 through E-3, as well as information from the 1970 Census of Population and Housing block data.

a. Broadway/Weidler/Sandy/Halsey LCI Corridor Route. The characteristics of this route are shown on Figure E-1. This figure as well as Figures E-2 and E-3, give some of the more important economic attributes of the LCI corridors. They are meant to provide the reader with an overview of the existing situation along the LCI routes. The reader may wish to study the land use mapping and accompanying text in the Planning and Land Use Research Report to determine land uses along the LCI routes.

The 1970 block data information is shown in Table E-5. As noted earlier, the weighted mean rents and weighted mean values are rough averages and somewhat outdated and should be used only for comparative purposes.

From the Broadway Bridge to 41st, this route shows a high proportion of renters in the area, reflecting a high density along this corridor. There are numerous well-kept homes near this route, giving a fairly high housing value.

The Broadway/Halsey section from 41st to I-205 gives a lower percentage of renters than the corridor to the west. Owner-occupied housing stayed about the same, reflecting the housing values along and near Broadway. Rental values were higher; this is partly due to the well-kept multi-family units near 67th.

The data on the Sandy Boulevard section of this route show the low percentage of renters, indicating the lack of multi-family development in this corridor compared to other corridors in this section. Housing values are also lower.

Table E-4

SUMMARY OF 1970 CENSUS BLOCK DATA AND EMPLOYMENT ESTIMATES
EAST PORTLAND TRANSIT STATION AREAS

Station Area	Population	Employment	Renter Occ. Housing	Owner Occ. Housing
Coliseum, Union/Grand Lloyd Center	640	*	176	297
39th (Hollywood)	1834	1205	564	349
60th	1297	516	270	277
82nd	1102	571	102	271

*Information Unavailable.

Source: 1970 Census of Population and Housing.

TABLE E-5

SUMMARY OF BLOCK DATA
1970 CENSUS OF POPULATION AND HOUSING
LOW COST IMPROVEMENT AND
LIGHT RAIL TRANSIT ROUTES

ROUTE	Number of Blocks	Total Population	- - - - - - - H O U S I N G * - - - - - - - Total Housing	Renter-Occupied	Percent Renter	Owner-Occupied	Percent Owner	Weighted Mean Rent, Renter Occupied	Weighted Mean Value, Owner Occupied
I. LCI Routes									
a. Broadway/Weidler/Sandy/Halsey									
(1) Broadway Br. to 41st	79	2,282	1,491	899	60.3%	334	22.4%	$ 95.82	$15,620
(2) Broadway-Halsey Couplet--41st to 67th. Halsey--67th to 99th.	93	5,140	2,323	1,169	50.32%	1,007	43.35%	$113.78	$15,480
(3) Sandy Blvd.--39th to Columbia Blvd.	99	3,560	1,442	519	35.99%	822	57%	$102.91	$14,506
b. Burnside/Stark--Burnside Br. to I-205	114	5,919	2,588	1,336	51.04%	1,117	43.16%	$ 98.38	$16,974
c. Belmont/Morrison/60th Morrison Br. to 25th. Belmont--25th to 60th. 60th--Belmont to Division	88	5,295	2,691	1,761	65.44%	704	26.16%	$ 80.55	$16,211
d. Division	123	7,636	2,878	1,200	41.7%	1,556	54.07%	$ 99.31	$14,082
II. LRT Routes									
a. Burnside Route: I-205 to 1st and Burnside (Gresham)	93	10,851	3,754	1,908	50.8%	1,600	42.6%	$112	$17,414
b. Division Route: I-205 to 1st and Burnside (Gresham)	101	16,319	5,458	3,576	65.5%	1,615	29.6%	$107	$17,668

*The difference between the sum of Percent Owner and Percent Renter is the Percent Vacant.

SOURCE: 1970 Census of Population and Housing.

FIGURE E-1

**EXISTING SETTING
BROADWAY/WEIDLER/SANDY/HALSEY
LCI CORRIDOR ROUTE**

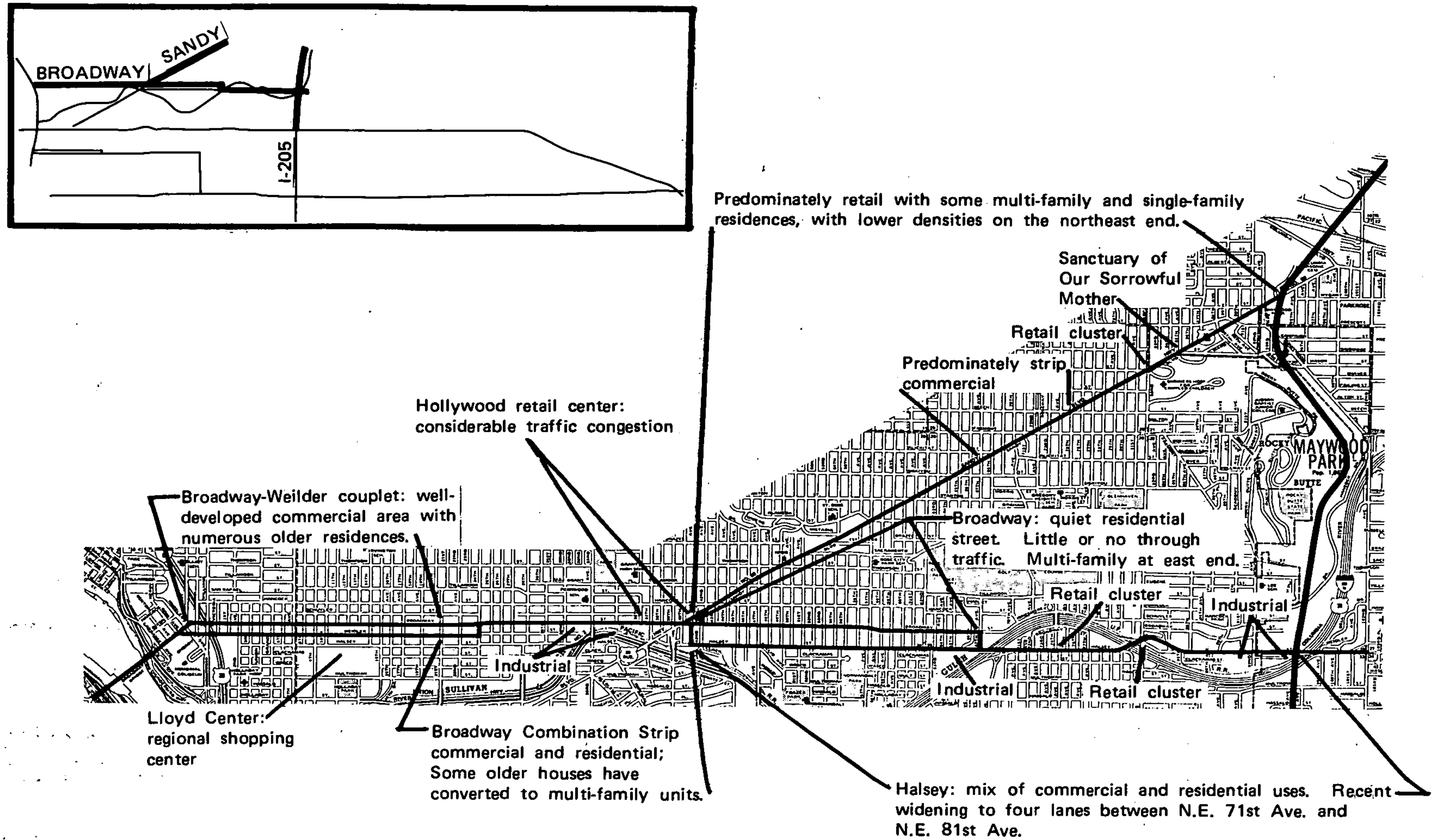
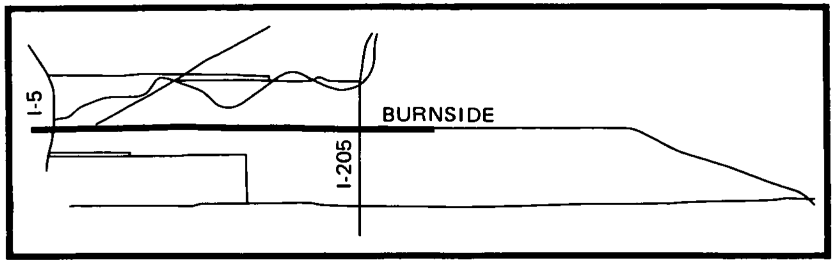
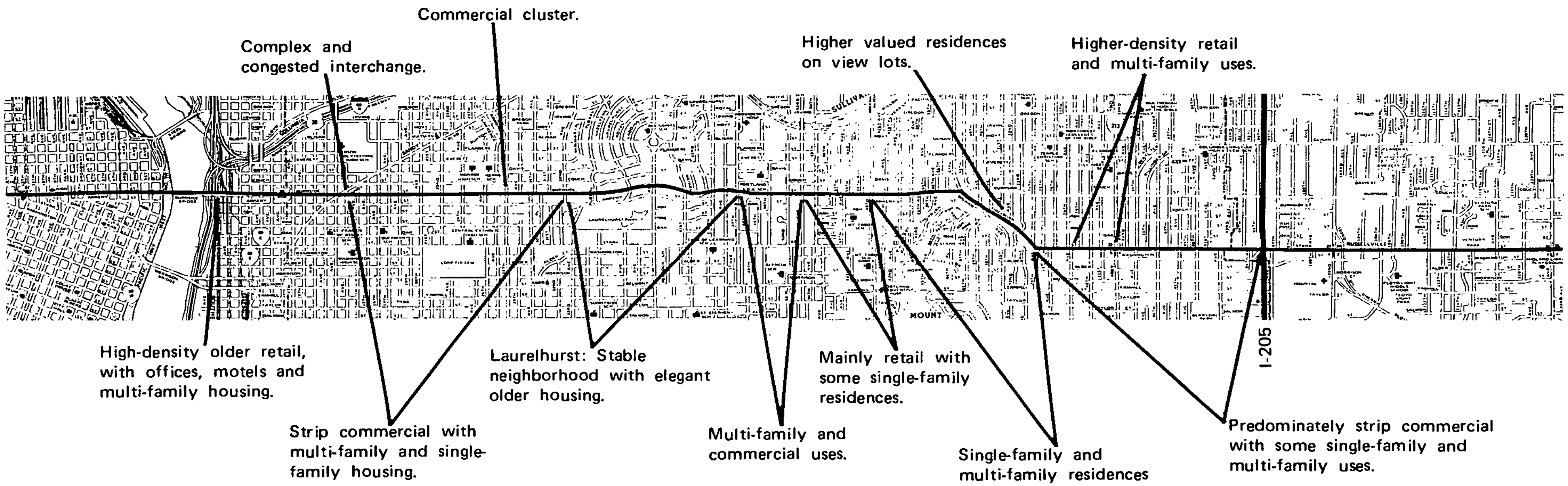


FIGURE E-2

EXISTING SETTING
BURNSIDE/STARK
LCI CORRIDOR ROUTE





b. Burnside/Stark LCI Corridor Route. Figure E-2 shows the characteristics along this route.

The block data from Table E-5 shows high values for owner-occupied and low values for renter-occupied housing along this route. The high owner occupied values are probably the result of the homes in the Laurelhurst area, the low values of renter occupied housing can be ascribed to the multi-family housing along the inner portions of this route.

c. Belmont/Morrison/60th LCI Corridor Route. Figure E-4 lists the characteristics of this route. This would be an auto improvement route to offset the reduced capacity along the other LCI routes.

Block data shows that there is a high percentage of renter-occupied housing and that the average rent is low. This reflects some of the deteriorating housing west of 33rd.

d. Division LCI Corridor Route. This LCI route, which actually uses S.E. Division Street east of S.E. 7th Avenue also has characteristics shown in Figure E-4.

The block data shows this area to be predominantly owner-occupied with low housing values. Much of this low value can be ascribed to the low housing values along the inner parts of this route.

4. East County LRT Areas. In contrast to the other options, alternative 5 would require construction along and/or east of I-205. Hence, it is necessary to examine these corridors also. There are three routes identified: Burnside, Division and I-205. The I-205 line like the Banfield portion of the transitway would pass through an established or soon-to-be established transportation corridor. Hence

the impacts on adjacent activities will have largely occurred because of the freeway. For this reason the existing setting is not as detailed in the I-205 corridor as with the Burnside and Division corridors. Because of the numerous transit stations proposed for the LRT routes, they are described here only briefly and are discussed more thoroughly in the impacts section.

a. Burnside LRT Corridor Route. Figure E-4 gives the characteristics of the light rail corridors east of I-205. Table E-5 also shows the block data for the Burnside route. As is characteristic of most suburban areas, there is a lower percentage of renters and higher housing values than in the central city area. In contrast to the LCI corridors which all had 1970 housing values under $17,000, both LRT corridors had values above $17,000 reflecting the higher incomes east of I-205.

The high total populations in both these corridors is due to the large areas these blocks cover.

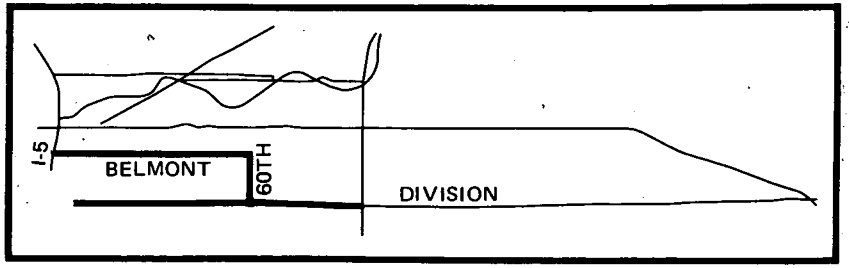
Along the route there are a variety of activities, most of which are low density in character. E. Burnside is not a highly developed arterial street.

The eastern end of this line runs along the Portland Traction Line railroad route. This is a minor rail line; at present only two trains per week run along this track.

b. Division LRT Corridor Route. Figure E-4 also shows the characteristics along S.E. Division St. between I-205 and Gresham. This route is more characteristically "suburban" than the Burnside route. Housing values are higher and the proportion of renters is lower. The high housing values and low proportion of renters is largely because of the well established residential areas at the west end of this route (near I-205) and near the Fairgrounds.

FIGURE E-3

EXISTING SETTING
BELMONT/MORRISON/60TH/DIVISION
LCI CORRIDOR ROUTES



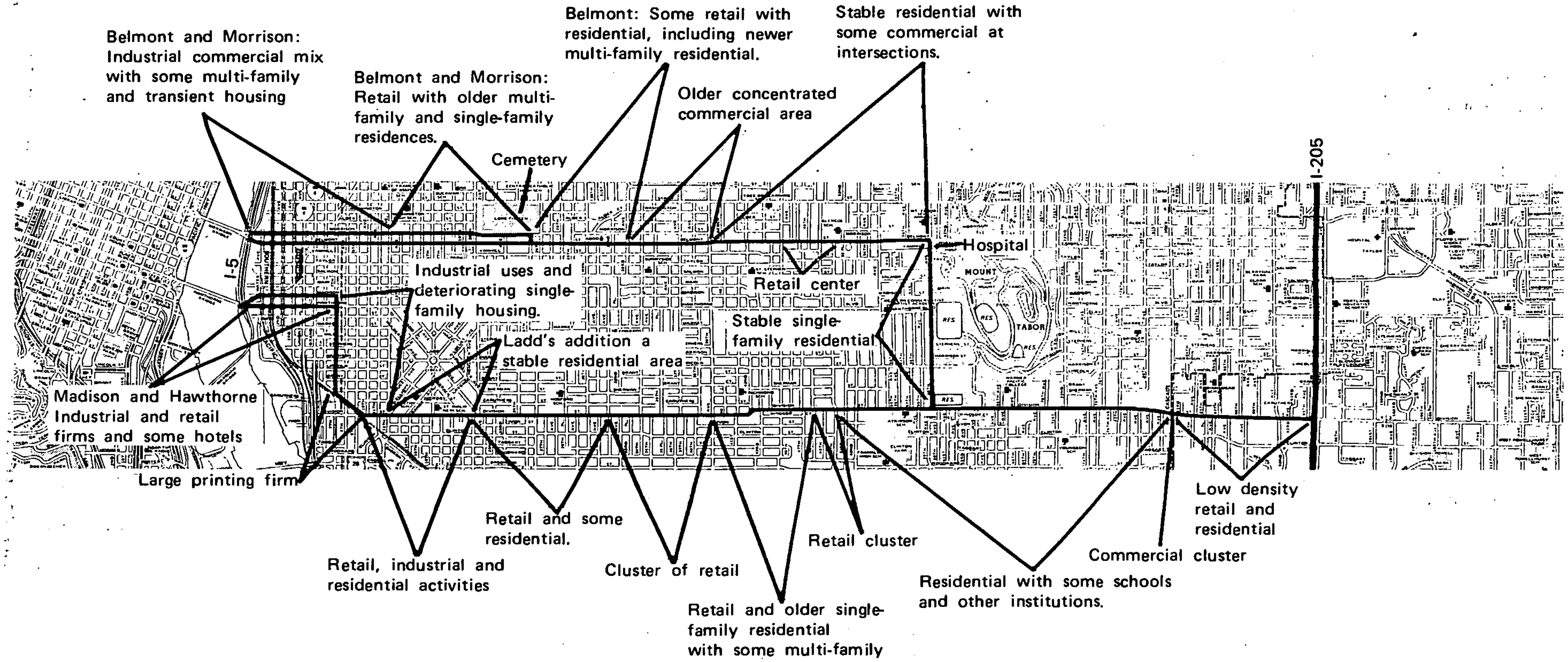
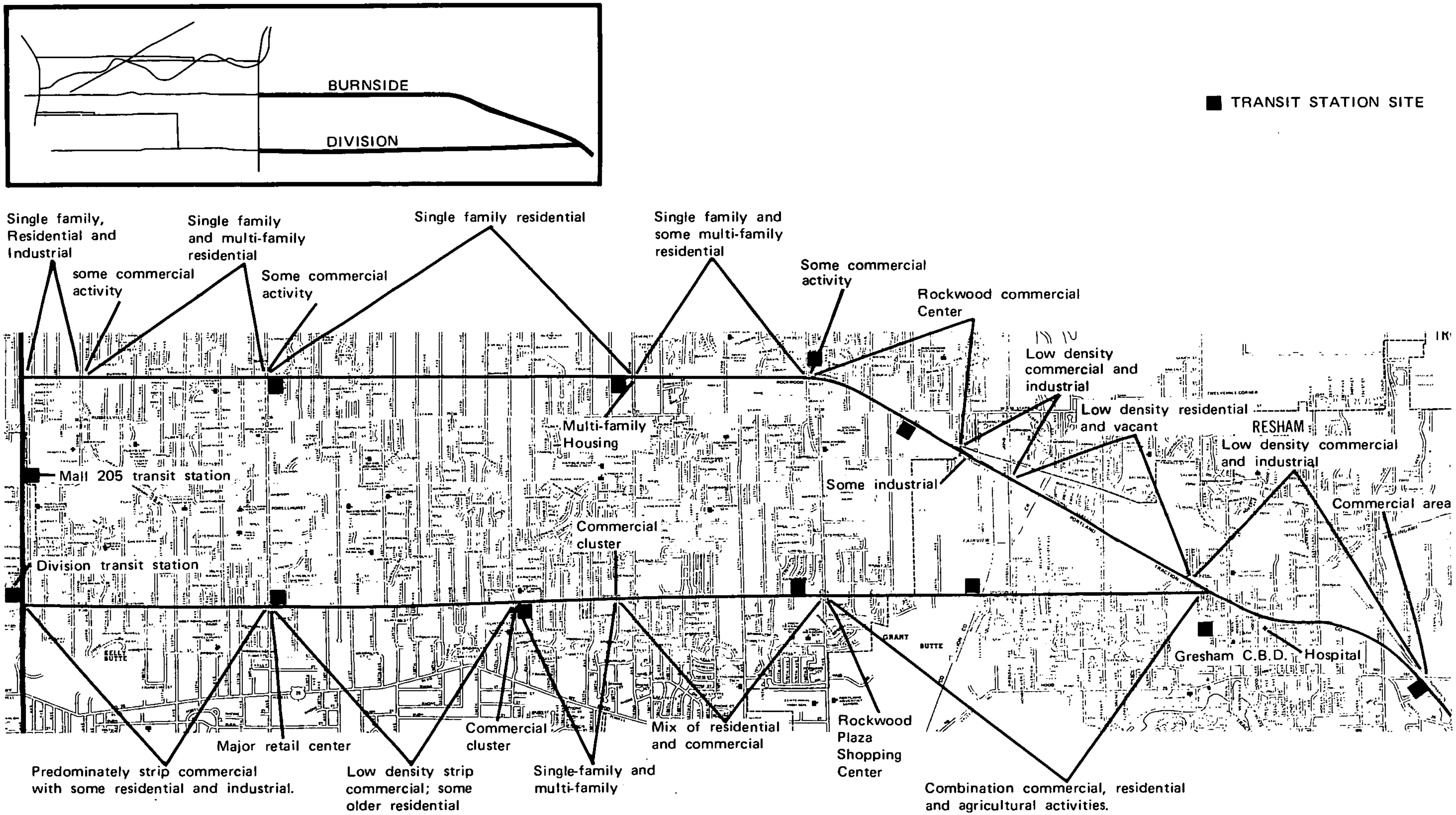


FIGURE E-4

EXISTING SETTING BURNSIDE AND DIVISION LRT CORRIDOR ROUTES



Another difference is the substantially greater amount of land used for commercial purposes along Division compared to Burnside. (See the Planning and Land Use Report for a more detailed description of land uses.)

c. I-205. The I-205 rail corridor extends from Gateway to Lents. Most of the economic impacts (e.g. relocation and adjacent effects) will have occurred with the construction of I-205. As with the portion of the Transitway adjacent to the Banfield Freeway, there will be few economic impacts other than near the transit stations on the portion of the Transitway adjacent to the I-205 Freeway. The Gateway and Mall 205 station areas are sites of established retail centers; Division and Powell station areas are the locations of residential and some commercial activity and the Lents station area is the site of an older commercial area. Presently there is a considerable amount of pressure for highway oriented development at the soon-to-be constructed interchanges along this portion of I-205.

5. <u>I-205 Busway</u>. South of Gateway, the I-205 busway follows the I-205 LRT route. The busway extends north of Gateway to the Columbia River crossing with the same stops as the I-205 LRT route plus a stop at Sandy Blvd.

III. IMPACTS AND PERFORMANCE MEASURES

Generally speaking, none of the subalternatives of alternatives 2, 3, and 4 is treated separately. The three subalternatives of alternative 5--Burnside, Division and I-205 LRT routes--are usually discussed separately because they follow different alignments in East County. Alternatives 3 and 4 (HOV and Busway) are generally considered together because there are few or no differences in impacts between them.

A. Impacts on Adjacent Activities.

1. Removal of On-Street Parking and Access Changes. One of the more controversial impacts of this project is the removal of on-street parking for exclusive transit lanes. The severity of the impact would depend upon the availability of off-street parking and the type of facility adjacent to the route. Businesses, particularly those without off-street parking, would be more adversely affected by parking removal than businesses with off-street parking and most residences. Many businesses which are auto-orientated depend upon on-street parking to attract customers. Without this on-street parking, many customers would shop elsewhere; business sales and profits would fall, and some firms may be forced to terminate operations. Some types of businesses which are auto-orientated and fall into this category are:

convenience grocery stores
dry cleaners
restaurants
hardware and appliance stores
shoe repair shops
TV repair and parts stores

These firms can be classified as "comparison-type" stores: customers drive through an area making comparisons at several similar shops before choosing a product. If one or more firms has inadequate parking, potential customers will patronize other outlets which have parking adequate for stopping and making purchases.

National firms with "comparison-type" shops along these arterials may have a loss in sales with the removal, but will be able to absorb these losses. On the other hand, the local, on-site firm, with a loss in revenue, may not have the ability to relocate or to acquire property for off-street parking and may be forced out of business.

The East Portland area would experience the most substantial impact from parking removal; hence it is discussed first.

a. East Portland

All the build alternatives would require the removal of some on-street parking in East Portland; however, the low cost improvement alternative would require by far the most parking removal. Figures E-5 through E-8 show the existing and proposed parking with the low cost improvement scheme in East Portland.

The number of blocks affected by some removal of parking are: 115 for the Broadway/Weidler/Sandy/Halsey route; 89 for the Burnside/Stark route; 63 on the Belmont/Morrison/60th route; and 83 on the Division route.

Along the low cost improvement arterials are several blocks with clusters of shops which have little or no off-street parking and may be particularly hard-hit by parking restrictions. Their locations and the changes in parking are given below in Table E-6.

Table E-6

LOCATIONS OF PERTINENT RETAIL CLUSTERS ALONG LOW COST IMPROVEMENT ROUTES

Area	Change in Parking
Sandy Blvd., 39th - 45th	From limited time parking to no parking during peak periods.
Stark, 77th - 82nd	Limited time parking to no parking during peak periods.
Belmont 33rd - 35th	Some limited time parking to no peak hour parking.
Division, 32nd - 39th	Limited time parking to no parking during peak periods, possibly no parking at any time.
Division, 48th - 50th	Limited time parking to no parking during peak periods, possibly no parking at any time.

In addition, businesses along all the routes which have exclusive bus lanes would have some reduction in access because customers would find it more difficult to reach the business. This would tend to reduce sales and profits to these firms.

b. Downtown. As shown in Table E-6, the amount of parking required would differ by alternative. Alternative 2 would require 30 spaces between the Portland Mall and the Steel Bridge. Alternatives 3 and 4 would remove 150 spaces and much of the auto access in the same area, in particular along N.W 5th and 6th Streets and N.W. Glisan and Everett Streets. The two on-Mall LRT alignments would not require as much parking removal along this route, mainly because these alignments would not require any removal along N.W. Everett Street. The cross-Mall LRT alignment would require the largest amount of removal, 235 spaces along N.W. and S.W. First Avenue and S.W. Morrison and Yamhill Streets, as well as extensive reduction in access along N.W. and S.W. First Avenue. These amounts are summarized in Table E-6.

The parking removal impacts in Downtown would not be as severe as initially expected because a limit on the total number of parking spaces has been placed on the Downtown. In other words, if spaces are not taken out by the Banfield Transitway, they will be replaced elsewhere in the Downtown. Nevertheless, some business along these routes may experience an initial reduction in activity with the removal of parking and reduction in access. This will be at least partially offset by the increased activity the transit ridership brings along these route (see transit station impacts).

c. East County. Parking removal impacts in East County would not be as severe as with the LCI alternatives in E. Portland, although reductions in access would be greater. The lower densities allow more extensive off-street parking for businesses along E. Burnside and S.E. Division Streets. While either

FIGURE E-5(a)

PARKING
BROADWAY/WEIDLER/HALSEY
LCI CORRIDOR ROUTE

Legend:

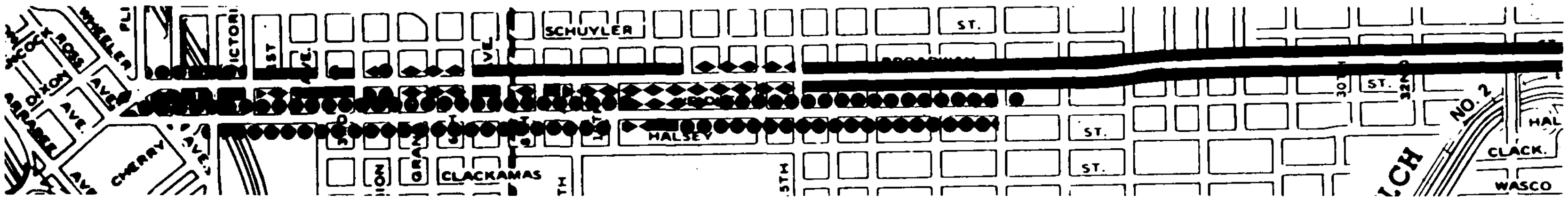
●●● No parking at any time

▬▬ No parking during peak periods, possibly no parking at any time or limited time parking

▶◆◆ Unrestricted parking

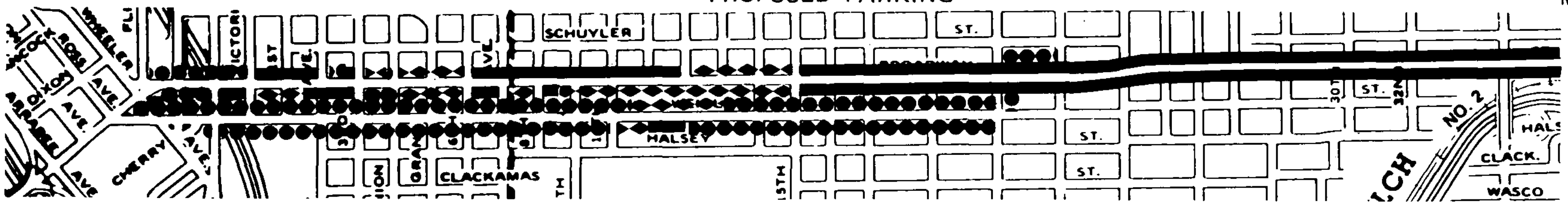
EXISTING PARKING

MATCH LINE



PROPOSED PARKING

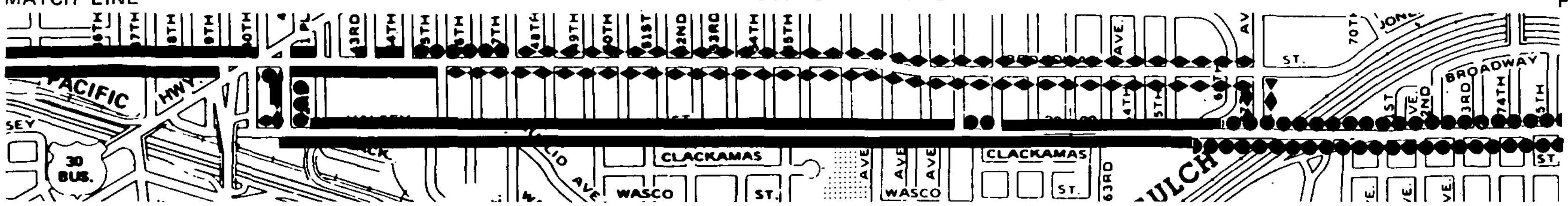
MATCH LINE



MATCH LINE

EXISTING PARKING

MATCH LINE FIGURE E-5(b)



MATCH LINE

PROPOSED PARKING

MATCH LINE FIGURE E-5(b)

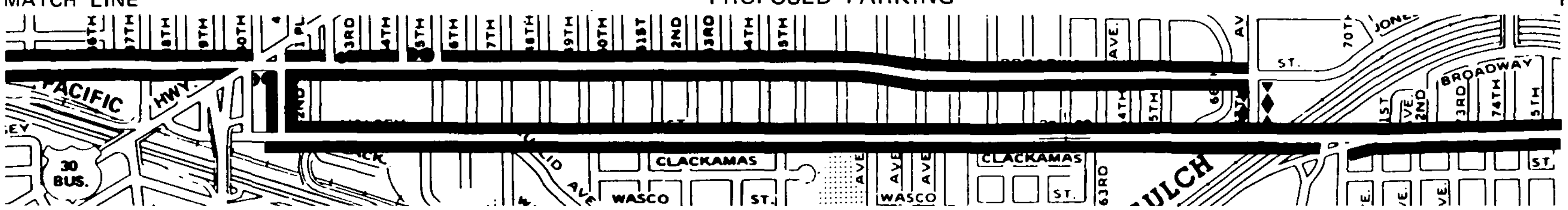


FIGURE E-5(b)

PARKING
BROADWAY/WEIDLER/HALSEY
LCI CORRIDOR ROUTE

Legend:

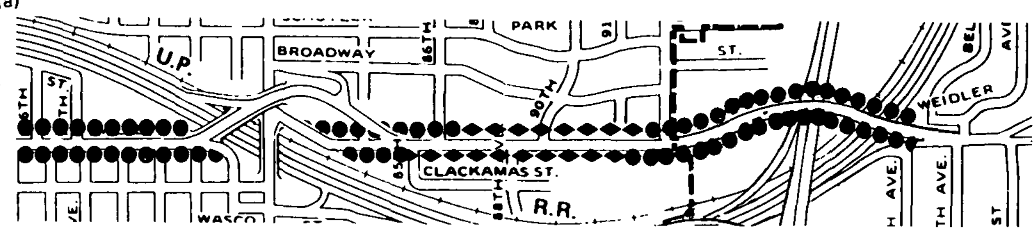
●●●●● No parking at any time

▬▬ No parking during peak periods, possibly no parking at any time or limited time parking

◆◆◆◆ Unrestricted parking

MATCH LINE
FIGURE E-5(a)

EXISTING PARKING



MATCH LINE
FIGURE E-5(a)

PROPOSED PARKING

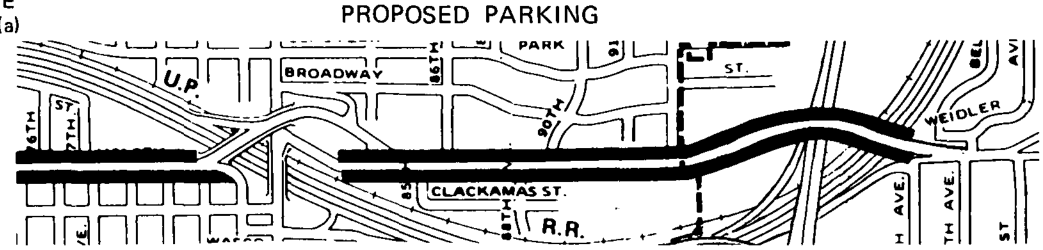


FIGURE E-6

PARKING
SANDY
LCI CORRIDOR ROUTE

Legend:

●●●●●●●● No parking at any time

▬▬▬▬ No parking during peak periods, possibly no parking at any time or limited time parking

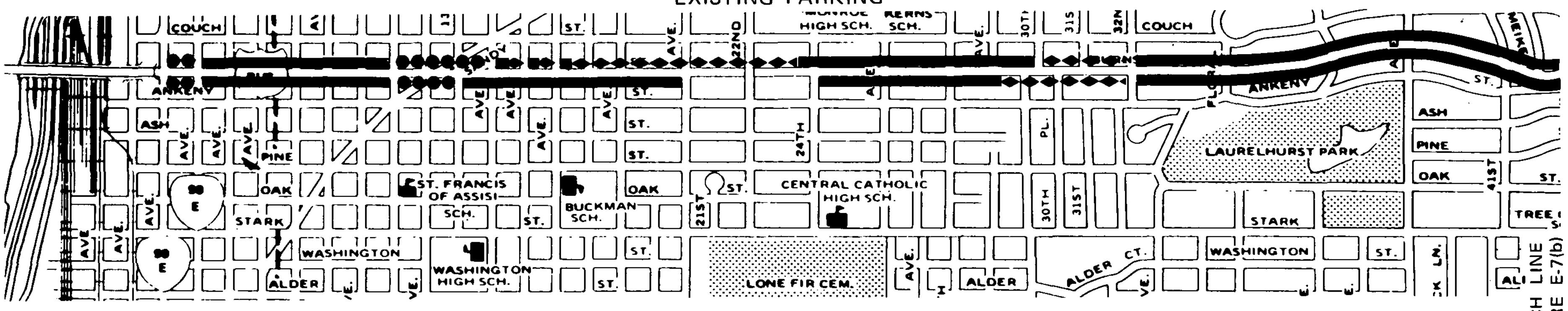
◆◆◆◆◆◆ Unrestricted parking

FIGURE E-7(a)

PARKING
BURNSIDE/STARK
LCI CORRIDOR ROUTE

Legend:
No parking at any time
No parking during peak periods, possibly no parking at any time or limited time parking
Unrestricted parking

EXISTING PARKING



PROPOSED PARKING

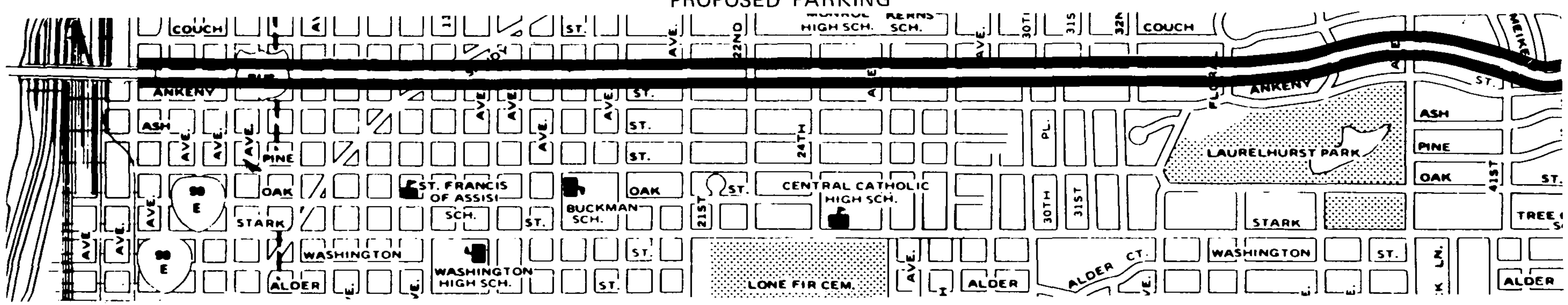


FIGURE E-7(b)

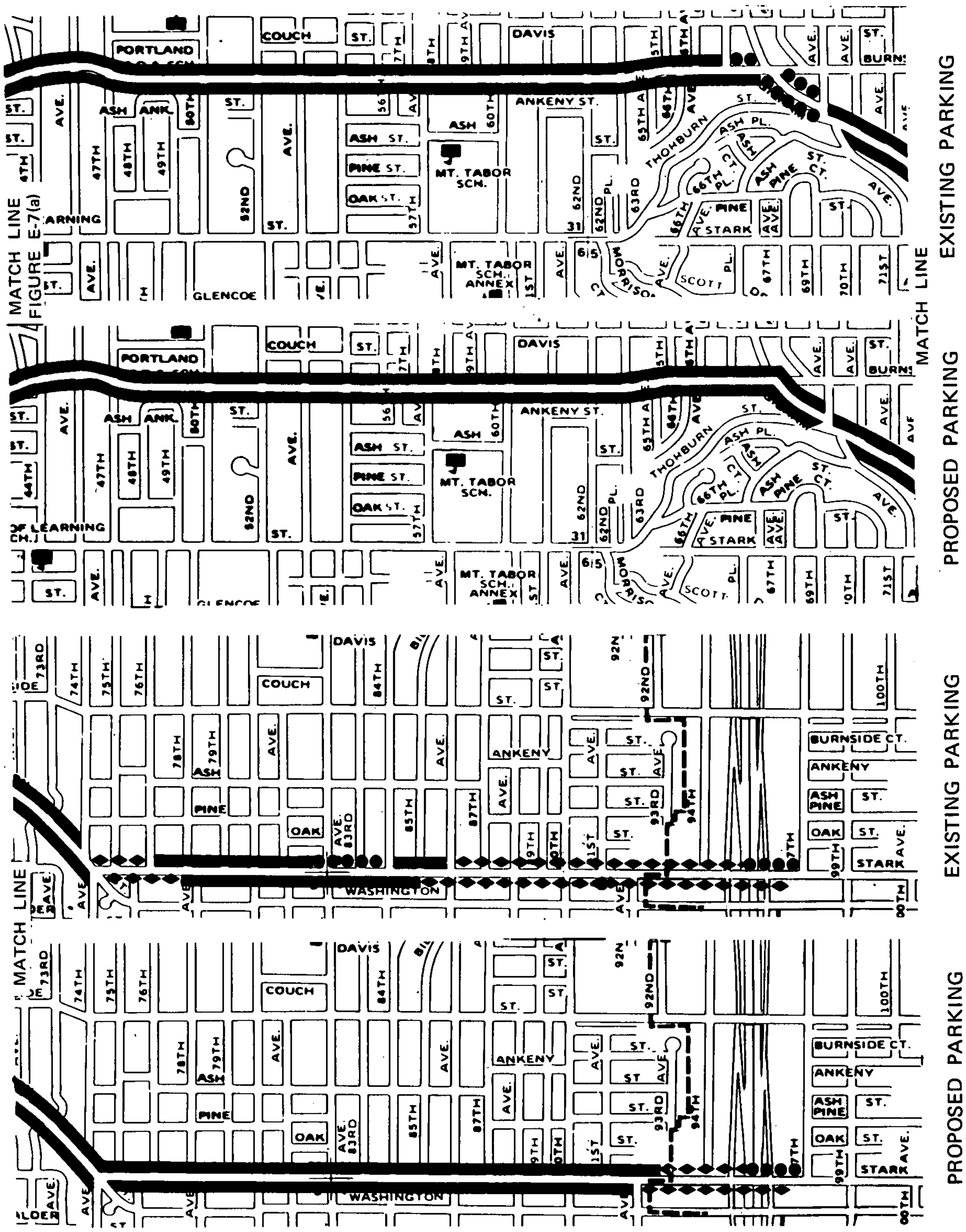
PARKING
BURNSIDE/STARK
LCI CORRIDOR ROUTE

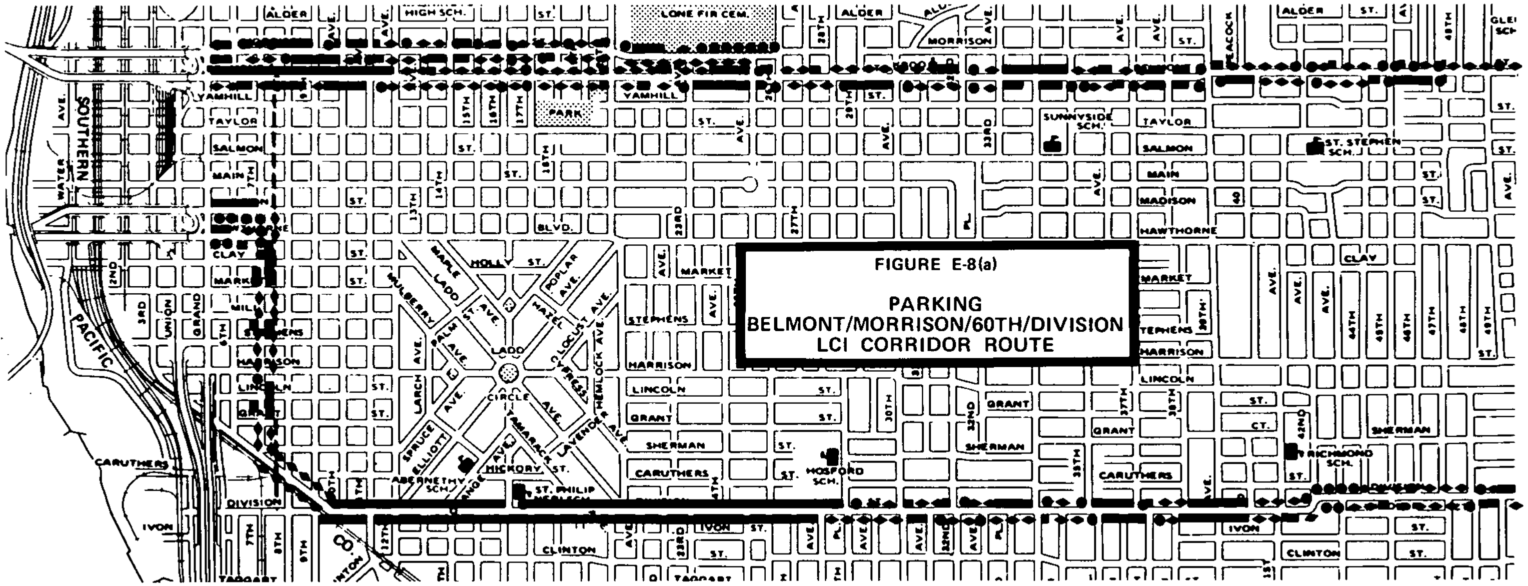
Legend:

No parking at any time

No parking during peak periods, possibly no parking at any time or limited time parking

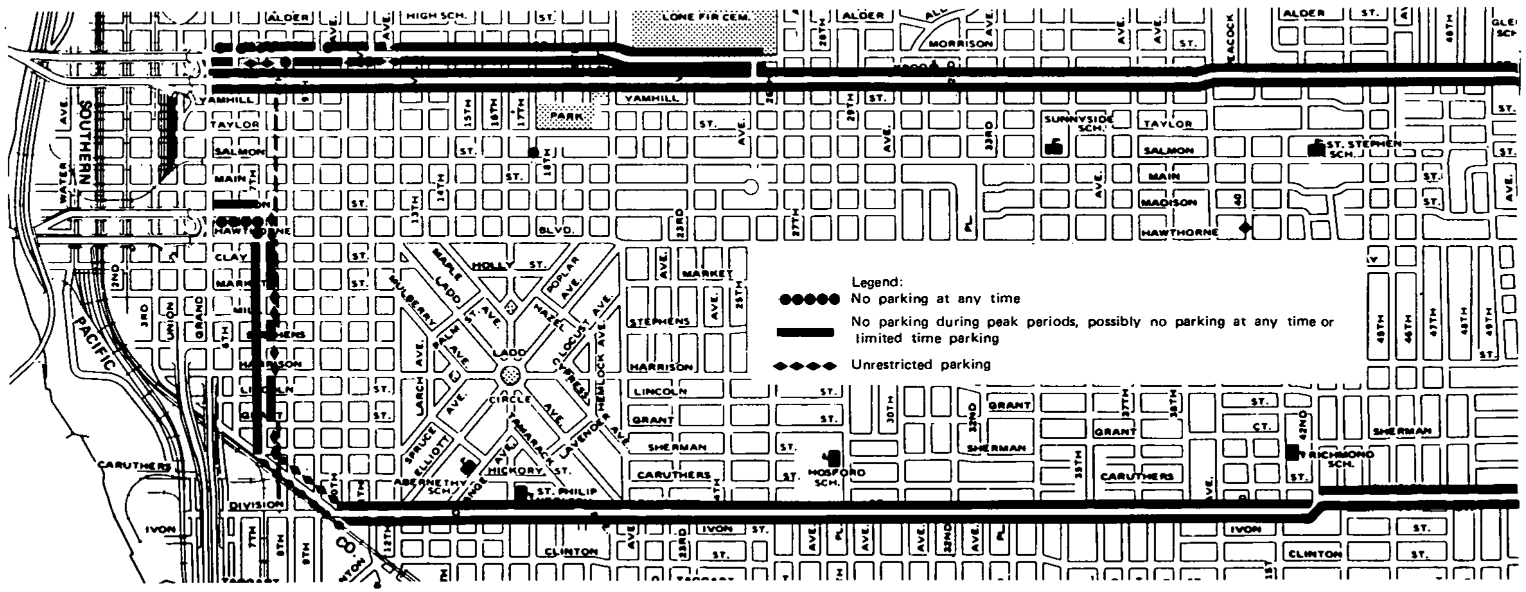
Unrestricted parking





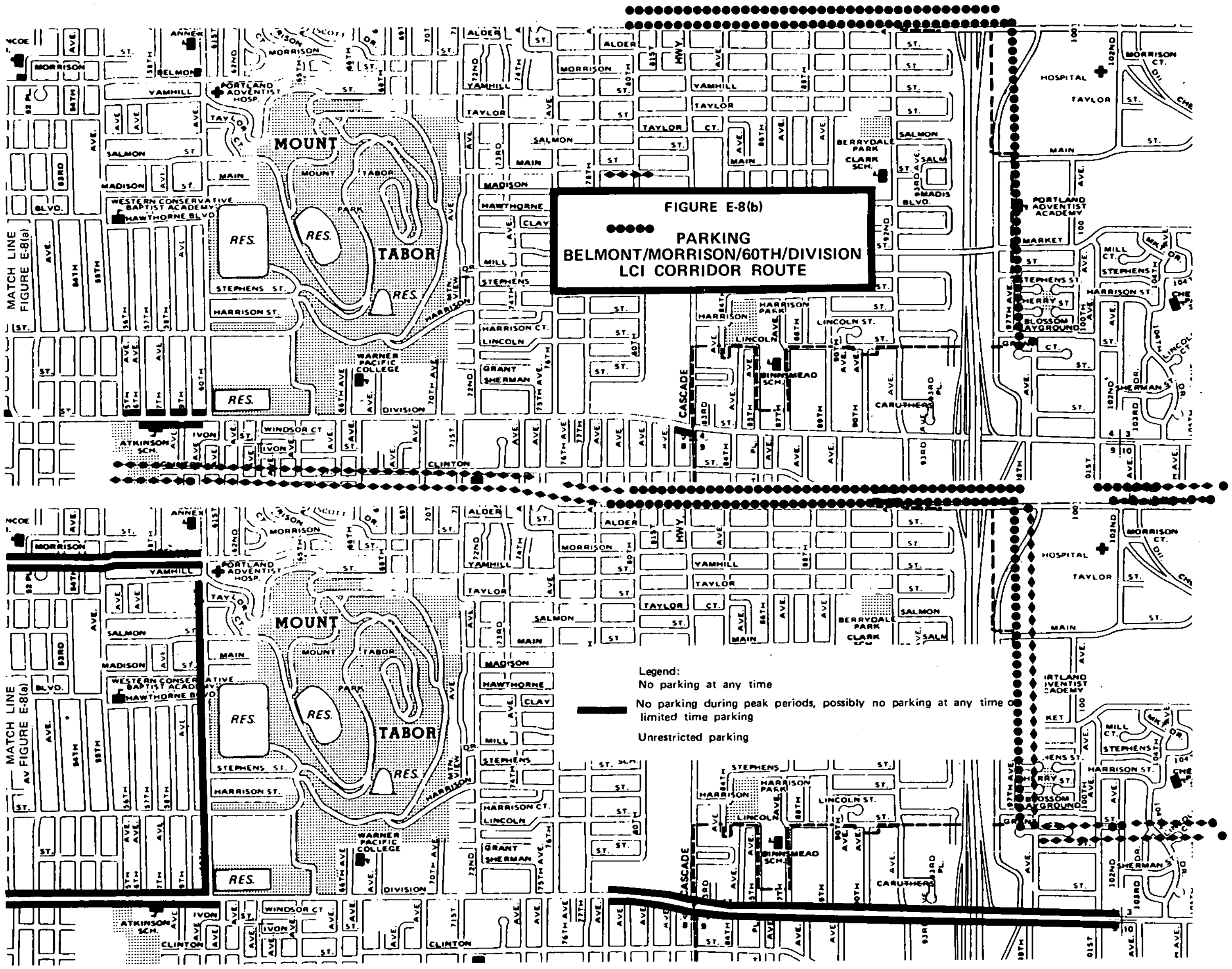
MATCH LINE
FIGURE E-8(b)

EXISTING PARKING



MATCH LINE
FIGURE E-8(b)

PROPOSED PARKING



EXISTING PARKING

PROPOSED PARKING

the Burnside or Division route would remove a considerable amount of on-street parking, this would be offset somewhat by the additional parking in the park-and-ride stations.*

All parking would be removed along E. Burnside from I-205 to S.E. 202nd Ave., a total of about 100 blocks which now have some on-street parking.

For the Division alignment, all parking would be removed between I-205 and S.E. 221st Street. Along this segment, there are approximately 110 blocks where some on-street parking exists. Parking removal on S.E. Division may have an adverse impact on these (remaining) businesses located along Division Street because customers will shop where access and parking is better.

The LRT line in the middle of the street would only allow access at certain cross streets. This would reduce access for businesses not located near these cross streets. Since there are more businesses along the Division Street route, this impact would be greater for this alignment.

*However, parking at these stations may be limited to LRT users only.

2. Development in Transit Station Areas. At termini points of transportation facilities or at places of transfer, passengers usually have to stop for a period of time. Having to do so, they have the opportunity to shop. Hence, business often flourish at these sites. This occurs particularly where there is little development and land can be easily converted to commercial uses.

The development of transit station areas takes place when businessmen see the advantages of locating close to the station. They bid a higher price for the land and/or improvements (e.g. buildings) and if the property is available, they obtain it for their use. Those who bid higher prices (or rents as they are sometimes called) utilize the area near the transit station more intensively. Concentrated commercial and multi-family residences replace lower density retail outlets and single family dwellings. Residents will be attracted to the multi-family units because of the proximity to transit and the availability of nearby shopping.

Several types of businesses find it advantageous to locate near a transit station. Shops where commuters can leave goods in the morning for cleaning and/or repair and pick them up in the evening fluorish near a transit station. These shops include cleaners, as well as clothing, shoe and watch repair firms. Other businesses which tend to locate near transit stations include fast food restaurants and convenience grocery stores, where commuters and other transit users can shop before or after the trip.

There are several criteria for ascertaining the development potential of a transit station area. These include:

1) Number of transit users who stop at the station and could do some shopping there.
2) The availability of developable land. This includes the amount of land which could be converted to transit-orientated uses.
3) Other development in the area. Existing uses in the area could either be competitive or complementary to transit station development. If there already exists some transit orientated development, then this will serve transit users and there will be less development. Complementary uses including both commercial and residential development would enhance the transit station development. Where a shopping area exists with an established market, the transit related development will also attract customers from the shopping area. Nearby residents will also utilize the transit-related development. There are no new transit stations for alternative 1; there is only one new transit station for alternative 2. This is the Gresham transit station, either at the Fairgrounds or the 1st and Burnside site in Gresham. The transit station development impacts associated with alternatives 3, 4, 5 will not occur with alternatives 1 or 2 (except with the Gresham transit station).
4) Accessibility of commercial developments from transit platforms.

TABLE E-7

ON-STREET PARKING REQUIRED

Alternative	Downtown	East Portland	East County
1	0	0	0
2	30 parking spaces	Parking partially or completely removed on 350 blocks.	0
3 & 4	150 parking spaces	Parking removed in 7 blocks of Holladay St. route or 16 blocks of Multnomah Street route.	0
On-Mall LRT Oak St.	100 parking spaces		
On-Mall LRT Pioneer Sq.	100 parking spaces		
Cross-Mall LRT	235 parking spaces		
Burnside LRT Alignment			Approximately 100 blocks would have parking removal.
Division LRT Alignment		Parking removed in 7 blocks of Downtown connection (Holladay St.)	Approximately 110 blocks would have parking removal.
I-205 LRT Alignment			0

a. Downtown

i. The Mall. Since the Mall is already a major transit station at or near bus capacity, the transitway options should have only marginal impact on additional development in the Portland Mall area.

ii. Other Station Areas. With alternatives 3, 4 and the on-mall alignments of alternative 5, transit vehicles will run between the Steel Bridge and the Transit Mall. The stops along this route may well encourage some transit-orientated development, particularly those areas with low conversion costs, such as parking lots.* This routing will also support the development of the Union Station Transportation Center, particularly at N.W. Glisan Street between N.W. 5th and N.W. 6th avenues where the Transportation Center and the transit route come together.

The cross-mall alignment for the LRT would run along S.W. First Avenue between the Steel Bridge and S.W. Morrison and S.W. Yamhill Street. This is an area with relatively low density development. Of the approximately 25 blocks along this section of S.W. First, only 4 blocks are not devoted at least in part to parking, indicating that conversion costs would be comparatively low. If this alignment is built, there would be considerable pressure for development, particularly at the transit stations. In effect, a major transportation route would be placed along a relatively minor downtown street. In conjunction with the completion of the Waterfront Park, retail outlets and hotels/motels would be drawn to this route. This alignment could provide the catalyst for a major commercial center at the west end of the Morrison Bridge, and for the development of the eastern portion of the Old Town area.

*See the Land Use Report for exact land uses along this and the cross-mall route.

b. East Portland. With alternatives 3, 4 and 5, there would be six transit stations in the East Portland Study Area, three in the Downtown Connection and three in the Banfield corridor. Generally speaking, these areas are well-developed and little additional development is expected. Table E-7 gives a description of each site and the expected change in economic activity.

c. East County. The LRT alternative consists of numerous transit stations within the East County area. Implicit in this alternative is the extensive development around the transit stations, particularly for the Burnside and Division routes. The steps needed to achieve this are discussed in depth in the Planning and Land Use Research Report. This section summarizes those steps as well as the impacts associated with the transit stations.

There are two scenarios associated with each of the LRT routes:

1) The alignment is not built, in which case the on-going trends will continue as before.
2) The revised land use case. The alignment with the transit stations is built, and land use policy either adopted or in preparation provides for the desired population and employment concentrations around the stations.

A summary of the existing setting for each transit station and the impacts for each development scenario are given in Tables E-9, E-10 and E-11. The summary for the Fairgrounds and 1st and Burnside sites are stated in the Burnside route table (E-8) and not restated in the Division route table (E-10) since these transit station impacts are the same with either route.

TABLE E-8

TRANSIT STATION IMPACTS
EAST PORTLAND (BANFIELD)

LOCATION	DESCRIPTION OF SITE(S)	EXPECTED CHANGE IN ECONOMIC ACTIVITY
Coliseum	Located adjacent to an industrial area, Interstate 5, with access to the Memorial Coliseum, and Holladay Park Hospital.	To provide pedestrian access to nearby activity centers, such as the Memorial Coliseum, industrial sites, and the Holladay Park Hospital. Some vacant property adjacent to the site may develop with the station there.
Union/Grand	Situated at the hub of major arterials with four hotels and motels in the area. With the Multnomah St. route, station sites could be on Multnomah.	Designed to serve large number of transfers along Union and Grand. Station may aid in further development, such as office development and fast food restaurants. Greater potential for development along Multnomah Street than Holladay Street where vacant parcels and parking lots are available.
Lloyd Center	Densely developed site with regional shopping center and high rise office buildings. Three station sites have been identified: one on Multnomah Street and two on Holladay Street.	The station would enhance existing development, reinforce this area as a key regional activity center, and tie the regional center more closely to Downtown. The Multnomah Street station would better serve the retail center while a Holladay Street station would provide better access for the high-rise offices.
Hollywood	Located next to an older retail and office center. Four stations have been identified: (A) an on-line station at 39th; (B) an off-line station at 39th; (C) an off-line station at 41st; (D) an on-line station at 41st.	The station would serve the Hollywood business center and could contribute substantially to the revitalization of this center. An on-line station would present fewer operational problems, less automobile conflict, lower operational costs and no off-line displacements. An off-line station would be more integrated with the retail area. Sites (C) and (D) would be further away from the congestion at 39th. Site (D) is favored by the citizens task force. Preliminary plans for improving transportation in Hollywood include the site (D) transit station.
60th	Located near some residences, industrial activities and offices.	Would serve as a transfer facility for local service and for the residential and employment activities in the area. Little increase in economic activity is expected from this station.
82nd	Located on a major north-south arterial with extensive strip commercial development.	Would serve primarily as a transfer point to north-south service on 82nd Avenue and local east-west transit service on N.E. Halsey Street. Little expected change in economic activity because of the lack of developable land, auto orientation of the area, and proximity to Gateway Shopping Center and transit station.

The summary for the Gresham station site (Table E-9) is also relevant for alternative 2, 3, and 4 since this station would be built with these alternatives.

The summary for the I-205 stations (Table E-11) is also relevant for alternatives 3 and 4 since an I-205 busway would be built with these alternatives.

3. Impact on Railroad Operations. The Transitway could impact the operations of two rail lines: the Union Pacific Route in Sullivan's Gulch and the Portland Traction Line in East County. All the alternatives which would require the modification of the Banfield Freeway would have an impact on the Union Pacific rail line. These include all but alternatives 1, 2a, 2b, and 3a. With any of the other alternatives, operations would be delayed during the construction period. In addition, these other alternatives would not allow double tracking along the section of the line near N.E. 28th Avenue. Next to Barker Manufacturing Company, located on the east side of N.E. 28th Avenue, there would not be enough room for two tracks plus the spur line to this firm if any modification is made to the Banfield Freeway. To compensate the railroad for a single line along this section, the Oregon Department of Transportation will compensate the Union Pacific Railroad for centralized track control for six miles in Sullivan's Gulch.

TABLE E-9

TRANSIT STATION IMPACTS
EAST COUNTY STUDY AREA
BURNSIDE CORRIDOR

LOCATION	DESCRIPTION OF STATION ZONES	CONTINUATION OF CURRENT TRENDS (No-Build case)	1990 REVISED LAND USE CASE
102nd	Low density single-family development with some commercial, small industrial and community service uses.	Some infilling of residential and commercial uses on vacant parcels.	Some 50 acres of land could be converted to multi-family residential, supporting approximately 2,000 persons. Some conversion of single family units to more intensive uses would be expected.
122nd	Located on a north-south arterial with substantial strip commercial with single-family behind the commercial uses, some vacant land.	Some additional commercial development with perhaps some multi-family development on vacant land.	Approximately 900 jobs and 1400 residents could be supported at this station. Intensive residential along with some office, public service or neighborhood commercial uses are desirable.
148th	Predominately low density single family with some multi-family development at the intersection. Large amounts of vacant land scattered throughout area.	Additional multi-family perhaps some commercial development.	Approximately 1300 additional residents on about 40 acres of land could be anticipated. Multiple family infilling and some single family conversions would be anticipated.
162nd	Predominately multi-family residential. Some single family residential and open space and community service. Commercial uses along Glisan and Stark.	Further infilling of multi-family development.	The station could support up to 1700 additional residents, in multi-family units. Expanded multiple family and some local convenience commercial uses would be appropriate.
172nd	A transition area from single-family to multi-family with some commercial activity along Stark.	Additional multi-family with perhaps some additional commercial development.	Development could include 2300 additional residents and 1800 new multi-family dwelling units into the area. Could support medium to high intensity residential uses.
181st/ Rockwood	The triangle of Burnside, 181st and Stark contains major auto-oriented mixed uses in East County. Multi-family and single family residences lay adjacent to this center.	This commercial center would continue to develop and perhaps expand with some additional multi-family residential.	The center would be oriented to transit-supportive commercial uses and high density residential uses. Approximately 700 new jobs and 1300 new residents could be accommodated.
192nd	A mix of vacant land, commercial and industrial uses, as well as scattered single-family and multi-family residential.	Gradual infilling of vacant land to other uses.	Good potential for development with 1700 new residents and 700 new jobs possible in the area. A mix of intensive residential, community commercial and industrial uses would be appropriate.
Fairgrounds	This site is under single ownership and is scheduled to be developed into a multi-use center, including an auditorium, offices, and multi-family residential.	Center would probably develop, but would not be transit oriented.	High density residential, office/professional and community commercial can be assumed.
1st & Burnside (Alternative to Fairgrounds)	Ongoing commercial development in this area with a Fred Meyers Shopping Center, several new restaurants, and multiple family development. There are large amounts of as yet undeveloped land.	Continued development of this area to commercial and multi-family uses.	Approximately 2215 new residents and 1000 new jobs could be supported at this station site. High density residential, office/professional and community commercial can be assumed.

-37-

TABLE E-10

TRANSIT STATION IMPACTS
EAST COUNTY STUDY AREA
DIVISION CORRIDOR

LOCATION	DESCRIPTION OF STATION ZONES	CONTINUATION OF CURRENT TRENDS (No-Build case)	1990 REVISED LAND USE CASE
122nd	Strip commercial on both Division and 122nd, with single family and some multi-family behind the commercial properties.	Some additional commercial and multi-family possible.	An additional 400 residents and 250 jobs is possible. Development options limited by lack of redevelopable parcels. Continued commercial infilling and increase in multiple family residences.
136th	A multi-family residential core with some retail, and a wrecking yard.	Additional multi-family and commercial uses.	Some public development may be necessary here. A maximum additional 1500 residents could be put into this area. Intensive redevelopment of the area to high and medium density multiple family development with some local commercial would be beneficial.
148th	Strip commercial on both Division and 148th, with some multi-family uses.	Some increase in commercial activity possible.	Approximately 500 additional residents and 100 jobs is possible. Redevelopment opportunities are constrained by existing single and multiple family development immediately to the north. Further infilling of vacant land and redevelopment to medium density residential and local commercial could be expected.
170th	A multi-family residential core with a 300 unit trailer park, as well as some commercial activity in the station area.	Some increase in multi-family development and/or commercial uses is probable.	Redevelopment would require considerable property assemblage and plan policy changes to achieve an increase of 2400 persons and 50 jobs.
182nd	Some locally-orientated commercial development with a school and single-family residences in the area.	Relatively small increases in commercial activity.	Approximate increase of 300 persons and 150 jobs could occur. Minor impact on development patterns expected. Continuation of existing trends with some intensification of automobile-oriented commercial anticipated.
199th	Largely undeveloped open land with a gravel quarry in the area.	Some conversion to urban uses can be expected.	Because of the amount of undeveloped land, an approximate increase of 500 jobs and 2000 persons is possible.

TABLE E-11

TRANSIT STATION IMPACTS
EAST COUNTY STUDY AREA
(I-205-Lents)

LOCATION	DESCRIPTION OF STATION ZONES	CONTINUATION OF CURRENT TRENDS (No-Build case)	1990 REVISED LAND USE CASE
Gateway (East side of freeway)	Commercial core on Halsey and Weidler Streets and single and multiple family development to the south.	On-going multi-family development should continue along with increased commercial activity with the opening of I-205 freeway.	A high density activity center is possible with a possible 2000 new residents and 500 new jobs in the area. High density residential south of the planned commercial/hotel complex would be appropriate and consistent with existing plan designations.
Mall 205 (East side of freeway)	A major shopping center, a private school and hospital, as well as other commercial uses are located to the east of I-205. To the west of I-205, single family residences are predominant. Commercial uses along Stark, Berrydale Park, and Clark School are also on the fringe of the station area.	Increased activity at the shopping center with the opening of the freeway.	An additional 1500 jobs and 400 persons could be accommodated in this area. Land uses west of the alignment are quite stable. Development of a large amount of potentially developable and redevelopable land, as well as commercial expansion of Mall 205, could be expected. Multi-family and office uses could also develop.
Division (West side of freeway)	Residential and strip commercial along Division. There are also several areas of vacant land.	Considerable development could occur once Division becomes a major interchange at I-205.	Medium and high density residential development would be emphasized; approximately of 2640 residents could be situated in this area. Removal of some single family housing would be necessary.
Powell (West side of freeway)	Considerable vacant land exists, much of it dedicated to the defunct Mt. Hood freeway interchange. A bowling alley, school and State Police Office building are also in this area.	Land conversion could be considerable with the opening of I-205.	As with Division, medium and high density residential development and local commercial would be emphasized with a possible increase of 2200 persons in this area.
Lents (West side of freeway)	West of the station is the Lents commercial center, a deteriorating commercial area. Single family residential is predominant to the east of I-205.	Should undergo change from a neighborhood and pedestrian-oriented shopping district to a commercial center serving I-205.	Approximately 400 new residents and 350 new jobs is possible for this area. Moderate and high density housing surrounding a neighborhood commercial core would be appropriate.

This would not be necessary with alternatives 1, 2a, 2b, and 3a; double tracking is possible throughout the length of the gulch. A retaining wall would have to be built immediately to the north of the Banfield Freeway and south of Barker Manufacturing Company to accommodate two tracks plus the siding with alternatives 1, 2a, 2b, and 3a.

Overall reduction in operations would only be slight without double tracking the length of Sullivan's Gulch.

The Burnside LRT route would run parallel to the Portland Traction Line Railroad in East County. If the 1st and Burnside station is selected, both the Burnside and Division LRT alternative would run parallel to this rail line between S.E. Division Street and the transit station. Since this line is so lightly used (two times per week) it is expected that either LRT alternative will have a negligible impact on the railroad operations.

B. General Economic Impacts. This section has a two fold purpose: it looks at impacts which are not discussed elsewhere and also discusses the overall implications of the alternatives in each study area.

1. Region. The various alternatives have regional implications both because some impacts occur outside the other three study areas and because the alternative choosen will set a precedence for the type of transit improvements elsewhere in the Region.

With the no-build and low cost improvement alternatives, a likely result would be a lower level of improvements in the Region. There would be little de-emphasis of the use of the auto since there would be fewer incentives to use public transit. Mt. Hood Freeway funds could be used for other transportation projects since relatively few (or none) of them would be spent on the Banfield Transitway.

The HOV Lanes and Busway alternatives would encourage the use of transit and carpools throughout the Region. It would also set a precedent for exclusive high occupancy lanes and encourage construction of them elsewhere in the Region.

Likewise, the LRT alternatives would encourage the extension of such a system. The Burnside route would draw in population and employment concentrations which would otherwise be located elsewhere in the Region.

2. Downtown. Essentially, there are three different scenarios for the Downtown: No-build, all bus and light rail.

The No-build would provide the lowest level of access to and from the Downtown. Transportation costs would increase within Downtown and between other parts of the Region and Downtown. Since there would be no new incentives to use transit, auto usage would continue to be high in this area, thereby creating congestion (a transportation cost). Over time, this would discourage influx of shoppers, and more importantly for the Downtown, the influx of office-type activity. Businesses would tend to locate elsewhere in the Region where transportation costs would be relatively lower. Of all the options, the No-Build would be the least beneficial to the continued growth of Downtown because of the high transportation costs it would impose.

Alternatives 2, 3 and 4 would provide an extensive system of bus movement in the Downtown. This would increase access between the Downtown and the East Portland/East County area. This would enhance the development of the Downtown allowing growth, particularly employment growth, to occur as commuters have increased access Downtown.

The LRT alternatives would give best access into the Downtown and would be most condusive to the continued development of this area. It would enhance the area by providing a transportation mode less noisy and with fewer diesel fumes than the all bus or no-build scenario. It would also accommodate development along which ever route is chosen, to a greater extent than the other alternatives.

East Portland. With the no-build, the existing system in this area would remain about the same. No new bus routes would be implemented; bus usage would increase only slightly since there would be no additional incentives to utilize transit. With increased congestion on both arterials and side streets, many parts of East Portland could experience deterioration and lower residential property values. At the same time, however, some households who would have lived further out had better transportation become available, will choose to live in the central city areas such as East Portland because of the high costs of reaching the Downtown and other close-in employment centers.

The Low Cost Improvement alternatives would change the character of parts of East Portland. Several east-west arterials would be converted from auto-oriented streets to express bus routes with auto traffic. The extensive parking removal and reduction in access with the exclusive bus lanes would reduce the sales levels of numerous businesses along the routes as customers would shop elsewhere where parking and access would be better.

By widening the Banfield Freeway to six lanes during the peak hours (Alternatives 3b and 3c) and eight lanes during the non-peak hours for general traffic, traffic will move more rapidly on the Banfield than any other option.

Through traffic will also be reduced on East Portland streets. This will make the area a more attractive place to live and shop and should raise the overall quality and economic well-being of the area.

The Busway alternative would concentrate transit movements along the Banfield Transitway by allowing East Portland local buses to become express vehicles on the Transitway. With the exclusive bus lanes and a minimum of transfers, this alternative makes transit very attractive, especially to those near the Transitway. There could be some stimulus to development, although this would be small because the East Portland stations areas are already developed.

In East Portland, the LRT alternative is similar in many respects to the Busway option, having the same transit stations and routing. However, at the transit stations in the LRT options, transit costs would be higher than the bus options because more transfers would be required, increasing travel time, discouraging ridership, and providing an overall lower level of service to East Portland.

3. East County

With the No-Build, there would be virtually no transit improvements in East County. The existing system of transit would remain the same with no increase in transit route mileage. With few incentives to ride the bus, the heavy dependence on the auto in East County would continue.

Because of the costs resulting from congestion in travelling to other parts of the Region, particularly the Downtown, this area would tend to become more autonomous. Employers would tend to locate here, particularly along I-205, the one transportation corridor which would not be congested during 1990 peak hours under this alternative.

None of the low cost improvement routes would extend into East County. However, it would provide better transit service and relieve congestion slightly more than the no-build.

The impacts of the HOV Lanes and Busway alternatives in East County would be virtually the same. The major difference between these alternatives and the Low Cost Improvement alternatives is that the I-205 busway would be constructed with their implementation. As noted on the section on transit stations, there would be major transit stations along I-205 at Sandy, Gateway, Mall 205, Division, Powell, and Lents. This would concentrate development of business and residences around the transit stations as well as provide increased transit access, particularly to those stations at the west end of this study area.

The LRT alternatives would provide the most substantial economic impacts in East County. It is the only alternative which includes a corridor built east of I-205. In addition, with the Burnside and Division alignments, there could be a rearrangement of population and employment. Instead of a fairly homogeneous dispersion of population and employment, concentrations could occur near transit stations. Economic incentives could be used to encourage transit stations development.

C. Costs and Measures of Economic Performance or Effectiveness*

This section evaluates project alternatives on the basis of dollar costs and benefits. Cost are divided into several categories to assure proper consideration of each alternative. In the first evaluation, project costs and the 1990 transit costs and revenues are presented. The second evaluation looks at 1990 auto road user benefits from improvements in traffic conditions.

Both derive data from models, which are simplifications of the real world. The numerical results from each of these models are based upon a set of assumptions, which are summarized in each section below. It is especially important to note that the options which involve lower initial investments require higher operating costs over time while the options which involve higher initial investments require lower operating costs over time.

Evaluation of Transit Operations. This evaluation was done by Tri-Met and is discussed in detail in the report entitled "East Side Transit Operations." The U.S. Department of Transportation UPTS model was used to forecast transit demand for the 1990 target planning year. The assumptions of the analysis include:

1. All radial transit routes are assumed to terminate in Downtown.
2. Several types of service, such as the LIFT service for the transportation handicapped, is assumed invariant for all alternatives and left out of the analysis.
3. Prices are assumed to remain constant. This is a common analytical technique to allow costs and revenues (i.e., fares) to be judged in terms of the present buying power of dollars. Inflation would, in reality, increase these costs, but at the same rate for each alternative.
4. CRAG 1990 forecasts of population and employment distribution are

*This section is also found in Chapter 2, Part C, Volume I.

used. Major trip attractors assumed built by 1990 are also considered, such as hospitals, schools, shopping areas, low income housing, large employment concentrations and major visitor attractions.

5. Transit vehicles are allocated to the various lines in East Portland and East County according to Tri-Met's service standards. Peak hour headways* were set at 10 minutes for most lines and 5 minutes for heavily used lines.

6. The 1990 no-build is a slightly modified 1976 system with additional buses provided for increased population and employment in Downtown, East Portland and East County.

Tables E-12 and E-13 show major results of this analysis. Column (1) of Tables E-12 gives the direct construction and right-of-way costs of the various alternatives. These are the costs that would be used as the basis of requests for federal funds, and that represent the "official" project cost estimates. Costs are relatively low for alternatives 2a, 2b and 3a, because no extensive widening of the Banfield Freeway is required. Conversely, alternatives 3c, 4 and 5 require extensive rebuilding numerous overpasses in Sullivan Gulch and correspondingly higher costs. The Division LRT route is higher than the other two LRT routes largely because of right-of-way costs along the route (approximately $20 million). All costs in this column include both transit and auto improvements.

Column (2) consists of costs required to complete an east side transit system, but not assigned to this project. These consist of:

1. $1.5 million for the Gresham transit station for all the build alternatives.

2. $39.9 million for the I-205 busway which would be built with alternatives 3 and 4.

*Time intervals between buses.

TABLE E-12

SUMMARY OF PROJECT COSTS ($MILLIONS)

		(1) Project Constr. Costs	(2) Related Transit Costs	(3) Total Constr. Costs (1) & (2)	(4) Vehicle Costs (1990)	(5) Total Project Costs (3) & (4)
No Build		-	-		13.0	13.0
LCI	3a	7.1	1.5	8.6	18.4	27.0
	2b	9.7	1.5	11.2	18.2	29.4
HOV Lanes	3a	13.7	39.9	53.6	18.2	71.8
	3b	67.1	39.9	107.0	18.2	125.2
	3c	75.4	39.9	115.3	18.2	133.5
Busway	4a	83.3	39.9	123.2	20.1	143.3
	4b	79.6	39.9	119.5	20.1	139.6
LRT Burnside	5-1a	119.7	1.4	121.1	37.9	159.0
	5-1b	129.9	1.4	131.3	37.9	169.2
LRT Division	5-2a	144.6	5.5	150.1	38.2	188.3
	5-2b	154.8	5.5	160.3	38.2	198.5
LRT I-205	5-3a	108.5	11.6	120.1	31.6	151.7
	5-3b	118.7	11.6	130.3	31.6	161.9

3. $1.4 million for additional construction in the I-205 corridor for the Burnside LRT route.
4. $5.95 million for additional construction in the I-205 corridor for the Division LRT route.
5. $11.6 million for additional construction in the I-205 corridor for the I-205 LRT route.

The third column is the sum of the first two columns and gives the total dollar construction costs of (including right-of-way) the various alternatives. It is evident from column (3) that large differences in construction costs exist between project alternatives. The most expensive alternative to construct is 5-2b, Division LRT, at 160.3 million dollars--which is approximately 30 million dollars more than the I-205 or Burnside LRT options.

The Separated Busway option on the northside (4a) would be the most expensive bus-only option, costing $123.2 million dollars--approximately the same as the LRT options on I-205 or Burnside, which do not include shoulders on the Banfield freeway. The HOV options are least expensive of the bus-only option which include a transitway in the Banfield corridor. HOV option 3a, which would not add additional traffic lanes to the Banfield between 37th and I-205, would be less than one-half expensive to construct at 53.6 million dollars than options 3b and 3c.

Low cost improvements are substantially lower in construction costs since a transitway would not be constructed on the Banfield. Alternative 2b, which would add lanes to the Banfield Freeway, is estimated to cost 11.2 million dollars, which is 2.6 million dollars more than option 2a but one-fifth the cost of the least expensive HOV option, 3a.

Column (4) lists the costs of the vehicles required in 1990. It indicates that the No-Build alternative, with 125 vehicles required, would entail costs of about $13 million; the Separated Busway alternatives would require the greatest number of vehicles (223); and the LRT alternatives would involve the highest vehicle costs but the smallest number of vehicles. Fewer light rail vehicles are required because of their greater passenger capacity.

The vehicle cost estimates stated for the year 1990 overstates the true cost differences between the bus and light rail modes. Since the service life of light rail vehicles are approximately twice that of buses (25 versus 12 years), a longer planning period, encompassing the service life of the more durable mode, would require buses to be purchased twice. To eliminate this problem, annualized costs were used as discussed below.

Column (5) consists of the capital total costs associated with the project up to 1990. Again, the Division LRT route is most expensive and the low cost improvements least costly in terms of total construction and vehicle costs. Division LRT route, with standard treatment of the Banfield Freeway ("b" options), costs nearly 30 million dollars more to construct and equipment, compared with the Burnside option, which offers similar levels of service. This large of a cost difference does not occur between any of the other transitway options which entail similar treatment of the Banfield (4a and 4b or 3b and 3c).

Table E-13 is a summary of various costs, revenue and ridership data. Column (1) gives the annual originating passenger trips (in millions)--the number of transit trips (less transfers) over the period of a year. The annual operating costs for 1990 (column 2) are based upon the ridership estimates from the model. The annual operating revenue, (column 3), is based upon the 1977 fare structure and expected ridership. Column (4) is the costs less revenue; it gives the subsidy required for each alternative for the design year. Presently, the net costs are financed by a combination of payroll tax and Federal grants. Columns (4) and (5) give operating costs per passenger and net costs per passenger mile.

TABLE E-13

SUMMARY OF ANNUAL RIDERSHIP COSTS AND REVENUES AND PER CAPITA COSTS

	(1) Annual Orginating Passenger Trips (Million)	(2) Annual Operating Costs ($Million)	(3) Annual Operating Revenue ($Million)	(4) Annual Net Cost (2)-(3)	(5) Operating Costs Per Passenger* (2)÷(1)	(6) Net Costs Per Passenger* (4)÷(1)
(1976 Existing)	10.016	9.161	3.005	6.156	.91	.61
1990 No-Build	13.518	12.090	4.055	8.035	.89	.59
1990 Low Cost Improvement	15.316	15.342	4.595	10.747	1.00	.70
1990 HOV Lanes	18.323	15.893	5.497	10.396	.87	.57
1990 Busway	19.238	17.876	5.771	12.105	.93	.63
1990 LRT: Burnside	19.223	14.369	5.767	8.602	.75	.45
1990 LRT: Division	18.634	14.411	5.590	8.821	.77	.47
1990 LRT: I-205	17.430	13.770	5.631	8.139	.79	.49

*Note that the difference between column (5) and (6) is $0.30--the revenue per passenger. This is less than the current fare of $0.40 because some passengers, such as those with monthly passes, pay less than $0.40 per trip.

The 1990 figures are based upon the assumption of constant prices. With increasing costs, the 1990 costs will undoubtly be higher than the 1976 costs. Based upon the same relative buying power as 1976 dollars, however, the costs of the 1990 alternatives would be at the levels shown in Table E-13.

As noted above, one major deficiency in the analysis is that the data are for one year only: 1990; this distorts the costs over time. Those alternatives with lower initial investments but higher costs in later years (i.e., the bus alternatives) appear less costly than those alternatives with higher initial investments but lower costs in later years (i.e., the LRT alternatives).

To make the data for the bus and LRT alternatives more comparable, all costs were put into an annualized basis. By this technique, the construction costs and the operating costs can be aggregated and compared. The resulting total annualized transit cost excludes certain items which are strictly auto-oriented in nature (such as improving Banfield ramp configurations). These items would constitute less than 10 percent of total capital costs.

The life of the facility was assumed to be 40 years; hence, construction costs are "spread-out" over 40 years. In a similar manner the service life of the buses was assumed at 13 years and the life of a light rail vehicle 25 years. This procedure is similar to the manner a businessman amortizes the costs of his capital equipment over time.*

The annualized 1990 construction and vehicle costs were added to the 1990 operating costs to give the 1990 total annual cost (TAC) shown in column (1) of Table E-14. Among the build options, the lowest TAC ($18.1 million) would be experienced with the Low Cost Alternative, while the highest would be the Banfield/Division LRT Alternative ($29.3 million).

*An interest rate of 7 percent was used to reflect the opportunity cost of the money invested.

TABLE E-14

1990 TOTAL ANNUAL COST DATA

		Total Annual Cost (TAC) in Millions	TAC per Passenger	TAC per Passenger Mile
No Build	1	$13.7	$1.01	$.18
LCI	2a,b	$18.1	$1.18	$.16
HOV Lanes	3a	$22.1	$1.21	$.18
	3b,c	$25.8	$1.41	$.21
Busway	4a	$28.6	$1.48	$.20
	4b	$28.3	$1.47	$.19
LRT: Burnside	5-1a,b	$27.0	$1.40	$.20
LRT: Division	5-2a,b	$29.3	$1.57	$.20
LRT: I-205	5-3a,b	$25.8	$1.48	$.20

Columns (2) and (3) of Table E-14 show the TAC per passenger and TAC per passenger mile. "TAC per Passenger" indicates the total cost of each alternative per 1990 rider served. The characteristics of capital costs and operating costs counteract each other in this indicator in a variety of ways. For example, the capital-intensive build alternatives are mostly within the range of $1.21 to $1.48 per passenger (except for the Banfield/Division LRT Alternative, which is highest at $1.57). The Low Cost Improvements option is close, at $1.18 per passenger, because its high per passenger operating costs overshadow its low capital cost.

Most cost-effective of the remaining options are the three HOV Alternatives and the Banfield/Burnside LRT Alternative. In "TAC per Passenger Mile," the differences between the alternatives are smaller, especially between the No-Build and build options. This is another reflection of the greater utility provided to riders in all the build alternatives, due to their ability to attract trips of greater length. (East Side Operations Study, p. 50.)

This is, in a sense, the "bottom line" of the transit analysis, assessing the efficiency of the system by amortizing the initial costs and adding the 1990 operating costs.

Evaluation of Traffic Operations. In addition to the benefits of additional transit, the build alternatives would improve traffic flow, particularly in East Portland, either by diverting travelers to transit, improving capacity on the Banfield, or both. To determine the extent of improvement to the private vehicle user, an analysis was done to determine the monetary benefits to the private vehicle user with any of the build options for the target year, 1990. The results are summarized in Table E-15. The benefits consist of time savings, vehicle operating savings and accident savings over the No-Build option.

TABLE E-15

SUMMARY OF 1990
ADDITIONAL USER BENEFITS

Alternative	Annual Travel Time Savings ($Million)	Annual Vehicle Operating Cost Savings ($Million)	Annual Accident Savings ($Million)	Total Savings (1)+(2)+(3)
1990 No-Build (1)	None	None	None	None
1990 Low Cost Improvement (2a)	2.9	2.8	0.684	6.4
1990 Low Cost Improvement (2b)	4.4	3.2	1.137	8.7
1990 Existing HOV Extended (3a)	3.6	3.0	0.828	7.4
1990 Preferential HOV (3b)	4.9	3.0	1.272	9.2
1990 Separated Busway (4)	4.4	2.8	1.11	8.3
1990 Burnside LRT (5-1)	4.4	4.3	1.413	10.1
1990 Division LRT (5-2)	4.2	3.2	1.134	8.5
1990 I-205 LRT (5-3)	3.5	2.2	.630	6.3

To calculate the monetary savings with each build alternative, the following key assumptions were made.

> The annual savings will be converted to dollars by assuming the worth of time at $4.20 per vehicle hour. The calculated savings for the build alternatives will be about five percent high because travel time costs for persons diverted to transit has not been included... In this analysis, operating costs for each vehicle mile of travel by automobile will be 7.2 cents on the city streets and 6.0 cents on the freeway. These costs include fuel, oil, maintenance and taxes. For trucks (combination of light and heavy trucks) the average operating cost will be 19.0 cents. Because of better gas mileage on the freeway, the average operating cost for passenger cars was estimated 1.2 cents less than the operating cost on the city streets. The same rate for trucks on freeways and arterials was assumed because better gas mileage for trucks on the freeway would be offset by a greater percentage of heavy trucks with higher operating costs.... Because of the complexity of predicting accident changes, this analysis will predict 1990 accidents based only on total study area VMT and accident rates by facility type--freeway versus arterial street. Based on accident data for the years 1973, 1974 and 1975 on the Banfield Freeway, 1.5 reportable accidents occur per million vehicle miles of travel. The rate on the arterial streets based on accident data for the same years on Union Avenue, Sandy Boulevard, Burnside Street, 82nd Avenue, and Powell Boulevard is 8.0 accidents per million vehicle miles of travel. Data are available from the National Safety Council regarding accident costs involving property damage only. Based on the occurrence of these types of accidents in the Portland area, an average cost per accident of $3,000 has been calculated.

Column (1) shows the travel time savings. The extended HOV lanes (3b) gives the greatest benefit in this category because it provides the best traffic flow on the Banfield Freeway, diverting autos from city streets onto the freeway.

Column (2) gives the vehicle operating cost savings. The LRT Burnside route gives the greatest benefits because of the improvement of traffic flow on the Banfield Freeway, the increased access in East Portland and East County, and the reduced number of auto trips because of the potential for more concentrated population and employment levels around the transit stations. In other words, those living and/or working in the transit station areas require fewer auto trips, increasing cost savings. For the same reason, accident savings (column (3)) are highest for the LRT Burnside route; less congestion plus fewer auto trips result in fewer accidents and cost savings. This helps to give this alternative the highest total in this analysis.

Conclusions. The transit analysis shows that the No-Build and LCI alternatives are least expensive to build, but provide relatively poor level of service. The other alternatives are substantially more costly to build, but provide a significantly higher level of transit service (and transit benefits) to the community.

It must be remembered that these two sets of analyses are but two criteria for judging the relative worth of each alternative. Because these indicates or measures have been quantified does not, *per se*, make them more important than the other measures in this DEIS.

STEPS TO MINIMIZE ADVERSE IMPACTS

There are various steps to minimize adverse economic impacts. The steps to minimize adverse right-of-way impacts are discussed in the Right-of-Way Research Report. With the LRT alternatives, there are various proposals to implement land use controls in the East County transit stations. These implementation mechanisms are discussed in the Planning and Land Use Research Report.

Unlike right-of-way acquisition, displacement and removal of access, no compensation is paid for removal of on-street parking. At present, there are no Federal or State regulations which allow the Oregon State Highway Division to compensate businesses for the removal of on-street parking. On-street parking is part of the street system and under public ownership; hence its removal does not require any acquisition of private land.

Some non-monetary assistance and loans can be provided to businesses. The City of Portland can build off-street parking and tax the adjacent businesses for the cost of acquiring the land, as well as constructing and maintaining the facility.

In a project such as this where Federal funds are involved, the Small

Business Administration can make direct loans to those businesses that have been adversely impacted by the parking removal. The Small Business Administration will also provide advisory assistance through a program whereby retired businessmen can assist those businesses to adapt to the changes resulting from on-street parking removal.

BIBLIOGRAPHY

1. CH2M-Hill. 1974. Transportation Control Strategy Plan for Lloyd Corporation, Ltd. Prepared for the Lloyd Corporation, Ltd. Portland.

2. City of Portland Bureau of Planning, 1976. Downtown Employment Projections: Survey and Synthesis. Portland.

3. J.F. Kain. 1961. The Journey-to-Work as a Determinant of Residential Location Behavior. The RAND Corporation, P- 2489.

4. Lord/Leblanc. 1974. Economic Analysis for the Portland Downtown Guidelines Plan: Outlook and Recommendation for Implementation. Prepared for the City of Portland. Portland.

5. Multnomah County, Oregon. 1977. Draft Comprehensive Framework Plan. Portland.

6. U.S. Bureau of the Census. 1971. Census of Housing: 1970 Block Statistics, Portland, Oregon-Washington Urbanized Area, Final Report HC93)-195. Washington, D.C.

7. ________________________. 1972. Census of Population and Housing: 1970 Census Tracts, Portland, Oregon-Washington SMSA, Final Report PHC(1)-1965. Washington, D.C.

8. U.S. Department of Transportation. 1975. Notebook 3, Economic Impacts. In Environmental Assessment Notebook Series. Washington, D.C.

9. U.S. Department of Transportation, Urban Mass Transportation Administration. 1975. Fifth and Sixth Avenues Transit Mall, Portland, Oregon. Portland.

10. Wilsey and Ham. 1977. An Analysis of Land Use Planning, Population Projections and Alternative Futures in the Portland-Vancouver Metropolitan Area. Prepared for the Metro Water Resources Study, Portland District, Corps of Engineers. Portland.

LAND USE RESEARCH REPORT

TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

TABLE OF CONTENTS (cont'd)

LIST OF TABLES

LIST OF FIGURES

PLANNING AND LAND USE RESEARCH REPORT
BANFIELD TRANSITWAY PROJECT

INTRODUCTION

General

This report will examine the planning and land use impacts associated with the Banfield Transitway project. Transportation facilities have both direct and indirect impacts on land use. Direct impacts are caused by the removal of property from existing uses in order to construct the facility; these impacts are discussed in the Right-of-Way Report. Indirect impacts pertain to those changes in land use which follow construction, being stimulated by changes in access and transportation service. Through time, indirect changes often outweigh the significance of direct effects.

Future changes in land use can significantly affect the use and utility of the transportation improvement itself. Recognition of this interrelated nature of land use and transportation continues to be a major focus of coordinative planning by state, regional and local governmental units involved with the subject proposal.

Methodology

Planning is an ongoing process which attempts to guide the quantity and quality of growth for an area. Because of the developmental implications of transportation systems, it is essential to evaluate proposed transportation projects in light of planning policies and trends.

Political jurisdictions and planning trends in the three Banfield Transitway study areas will be described in the "Existing Setting." The various alternatives have been examined for conformance with existing state, regional and local plans in the "Impact" section under "Conformance with Planning Documents."

The existing conditions ("Existing Land Use") and current trends ("Land Use Trends") in land development for the study areas are described in the "Existing Setting" to provide the basis for and insight to the evaluation of developmental impacts. Projected land use and developmental impacts associated with the implementation of each of the Banfield Transitway project alternatives are described in the "Land Use Impacts" portion of the "Impact" section.

The section entitled "Steps Taken To Minimize Adverse Land Use Impacts," describes means of assuring that positive steps are taken to accentuate beneficial land use impacts (namely those which lend direct support to public transit) and that adverse consequences are minimized.

The remaining sections address the temporal nature of the major land use impacts, and are entitled: "Short-Term Use of the Environment Versus the Maintenance and Enhancement of its Long-Term Productivity" and "Irreversible and Irretrievable Resource Commitments."

Existing land use mapping was obtained from city and county mapping for all of the alternative corridors except the Lents LRT route (Alternatives 5-3a, 5-3b), which was obtained from field observation. Land use is mapped for the entire Downtown Study Area because of development implications associated with the alternatives.

The impacts associated with the Low Cost Improvement (LCI) alternatives (2a, 2b) would be concentrated on those blocks immediately adjacent to the proposed routes. Therefore, existing land use is mapped for one block on either side of the project-related portions of Broadway/ Weidler/Sandy/Halsey, Burnside/Stark, Belmont/Morrison/60th, and Madison/ Hawthorne, 7th and Division.

The nature of the Banfield expressway corridor prompted land use mapping only for those properties in the immediate vicinity of the freeway. Land use is mapped for a one-fourth mile radius around station sites because of developmental implications associated with these areas; it is considered to be the area which would attract walk-on ridership and which would be most conducive to land use intensification.

Land use mapping was initially obtained for one-fourth mile on either side of the Burnside LRT route because of numerous "long" blocks and the natural borderlines created by Glisan and Stark Streets. Mapping is provided for one-fourth mile on either side of the Division and Lents routes in order to maintain consistency.

Zoning for the study areas tends to follow existing uses. Since the comprehensive plans now take precedence over zoning in guiding the future use of an area, zoning information is not contained in this report.

The magnitude of the Banfield Transitway project resulted in extensive research and planning efforts by the Tri-County Metropolitan Transportation District of Oregon (Tri-Met), the Columbia Region Association of Governments (CRAG), the City of Portland, Multnomah County, and the Oregon State Department of Transportation (ODOT). The coordinative studies and resultant reports generated by these agencies have been extensively utilized in the production of this planning and land use report. References are cited in the text and a complete listing of references is found in the bibliography of this report.

EXISTING SETTING

Statewide Influences

Land Conservation and Development Commission (LCDC). LCDC was created by legislative mandate in 1973 by Senate Bill 100. Its basic responsibility centers on making statewide comprehensive planning policy decisions. Briefly, its duties include the development of statewide land use planning goals and guidelines; coordination of activities of statewide significance; identification of critical geographic areas of state concern; strengthening of local planning through coordination of activities; and assuring citizen involvement in all phases of the planning process. (References Cited No. 8, p. 2.) "Local jurisdictions, working with LCDC, have arrived at schedules to bring local comprehensive plans into conformance with the state planning goals and guidelines." (18, p. 4) The statewide planning goals, in effect since January, 1975, are of particular significance to planning, land use and transportation issues. Goals 1 through 14 have relevance to this project and are summarized in Appendix A.

In general terms, LCDC goals require the minimization of adverse social, economic and environmental impacts and costs when constructing transportation facilities. Relevant goals are further discussed in the "Impact" section of this report.

Tri-County Metropolitan Transportation District of Oregon (Tri-Met). The problems of continued suburbanization, environmental impacts of the automobile, and the cost of continued freeway development prompted the federal government to make funds available for the revival of urban transit systems. (16, p. 6) Tri-Met, formed in 1969 in response to this trend, is the transit agency for this area. Its primary function is to provide effective mass transportation in the metropolitan area.

Basically, Tri-Met is responsible for planning, constructing, and operating mass (public) transportation in the Portland metropolitan area. In 1977 Tri-Met initiated the Central Area Transit Circulation Study to develop alternative transit circulation configurations in the CBD for the design year 1990. The intent of the study was to develop recommendations for each of the most probable combinations of bus and light rail modes in the central area. (7, p. 2) The resultant document, Banfield Transitway Project, Downtown Circulation Alternatives, describes the Banfield Transitway alternatives and probable impacts in the downtown area.

Tri-Met has also extensively studied bus and LRT routings in the East Portland and East County Study Areas. Studies have been conducted on transit feasibility, transit stations, development alternatives, and land use. Some of these studies are referenced in the appended bibliography.

Regional Area

Planning Responsibilities and Plan Status. The Columbia Region Association of Governments (CRAG) was designated by the state in 1973 as the agency responsible to coordinate planning efforts in the Portland metropolitan area. A major step in this planning process is the adoption of a regional plan, which will be used as a basis for all regional decisions and actions relating to land use. At this time, the estimated completion date of CRAG's Regional Plan is mid-1981. In the interim, CRAG has adopted a set of regional Goals and Objectives (September, 1976), and the regional Land Use Framework Element (December, 1976). Both of these documents will be incorporated into the final Regional Plan.

The purpose of the Goals and Objectives is to guide regional planning efforts to assure compliance with state land use planning statutes. The Goals and Objectives emphasize the need for "compact, efficient and orderly land use development, conservation of energy, maintenance or improvement of air, water and land resources quality, and improvement in the ratio of public transit trips to auto trips." (18, p. 4)

The Land Use Framework Element is a policy guide for local governments on land development within the CRAG region. This plan element has legal authority to direct conformance of local planning, zoning and the extension of services. The Land Use Framework Element calls for staging growth through an orderly extension of public services; infilling of partially developed urban and suburban areas; and urban development which enhances "the efficiency of existing transportation resources and the feasibility of public transit." (6, p. 2) "The element outlines nine policies which are summarized as follows: growth and development will be achieved by a cooperative regional management effort; no-growth or fixed population philosophies are rejected; population projects will be used only as a check on calculations for needed urban land; urban development in unincorporated urban areas will occur contiguous to existing communities; and CRAG will review only those local land use decisions relating to issues of regional significance." (12, p. 12)

Adoption of the Land Use Framework Element entailed coordination between CRAG and local jurisdictions in establishing urban, rural and natural resources boundaries for the region. The resultant boundaries, as well as jurisdictional boundaries for the project study areas, are graphically presented in Figure P-1.

The designated Urban Growth Boundaries include existing urban areas and future urbanizable land forecasted to meet urban population needs for a minimum of twenty years. All urbanization up to the year 2000 must occur within these boundaries. Within a year from the adoption of the Land Use Framework Element, urbanizable lands are to be specifically categorized by local jurisdictions as immediate growth areas or future urbanizable lands. Most of the project study area is within this urban designation and must meet these growth management requirements.

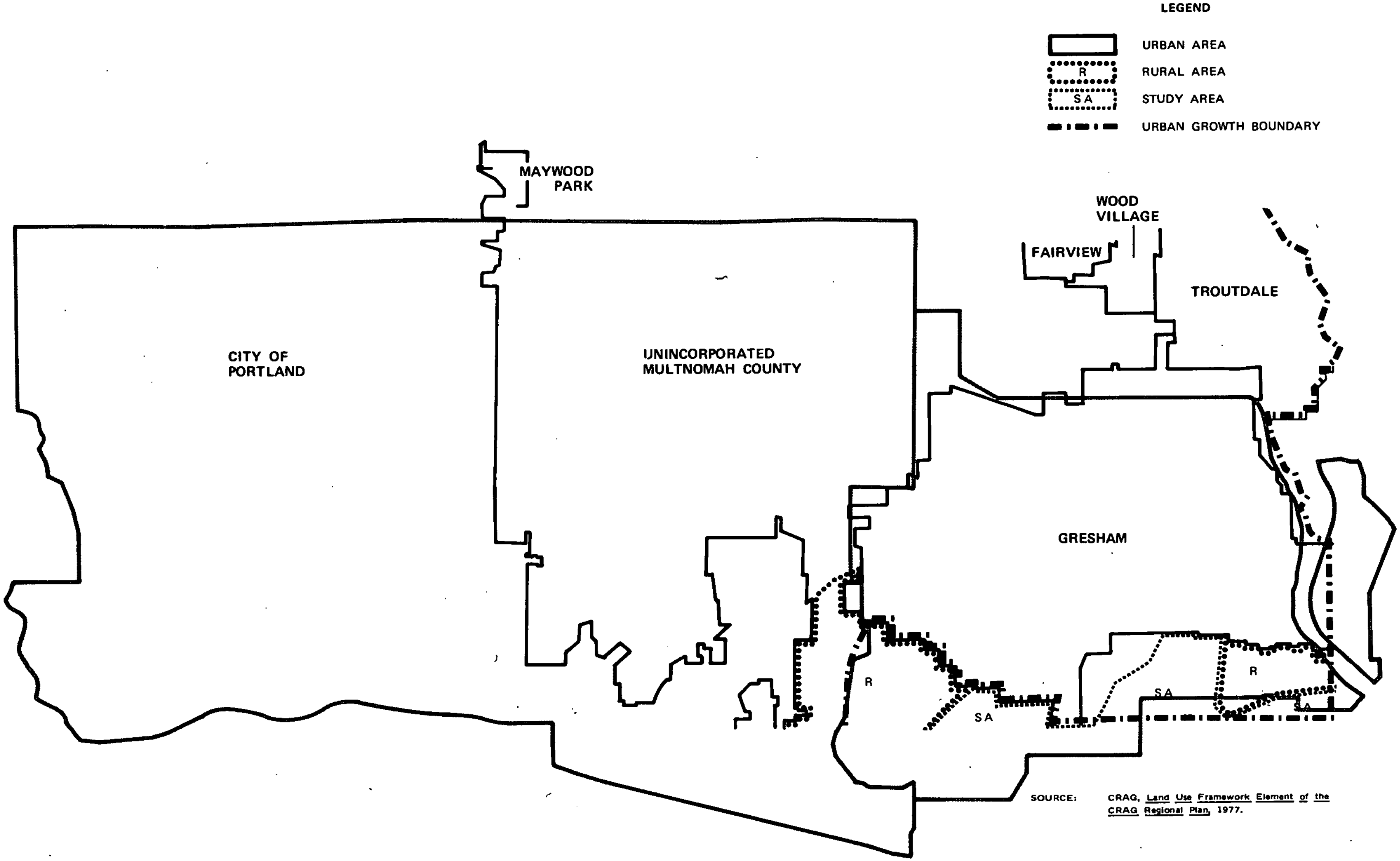
Transportation Planning. "The current regional transportation planning process is integrated within CRAG's total planning process." (12, p. 12) With the recent adoption of the regional Land Use Framework Element, "the major emphasis for metropolitan area planning will shift to transportation, although considerable energies will be spent on land use planning. Most planners foresee that land use planning issues will be focused on resolving the remaining areas of conflict at the outer urban edge, and coping with the impacts associated with proposed transportation facilities." (12, p. 43)

"The focus of long-range transportation planning in the Portland region since 1973 has been on the development of exclusive transit corridors radiating from downtown Portland." (7, p. 1) The Interim Transportation Plan (ITP) was adopted by CRAG in 1975. It is an interim plan developed to guide long-range transit and highway development decisions within the region until a complete transportation plan is adopted. This plan, which is geared to 1990, emphasizes the role of public transit in providing mobility in the urban area. "Regional policy has established that no new urban freeways will be built and that transit must accommodate future increases in trip making in the region." (10, p. 1) The ITP promotes intensive use of existing corridors in order to prevent adverse environmental impacts and property losses associated with urban freeways.

The ITP identifies four major transit corridors which radiate from the downtown area: the Banfield, Oregon City and Johnson Creek, Sunset and I-5 North. The location of these corridors is shown in Figure P-2. The Banfield corridor in the ITP is considered to consist of an exclusive busway between I-5 and I-205. As a statement of transportation policy, the ITP recognizes that project development can alter mode and route considerations in light of new information. It was in this context that the light rail mode was introduced and that the corridor extensions along either Burnside or Division Streets into Gresham were made.

Suburban transit stations are also specified in the ITP as focal points for transit service to major residential areas of the region. Major transit stations are indicated in the project study area for Gateway, Mall 205, Gresham and Lents.

FIGURE P-1
JURISDICTIONAL BOUNDARIES
LAND USE FRAMEWORK ELEMENT
DESIGNATIONS IN PROJECT STUDY AREAS



SOURCE: CRAG, Land Use Framework Element of the CRAG Regional Plan, 1977.

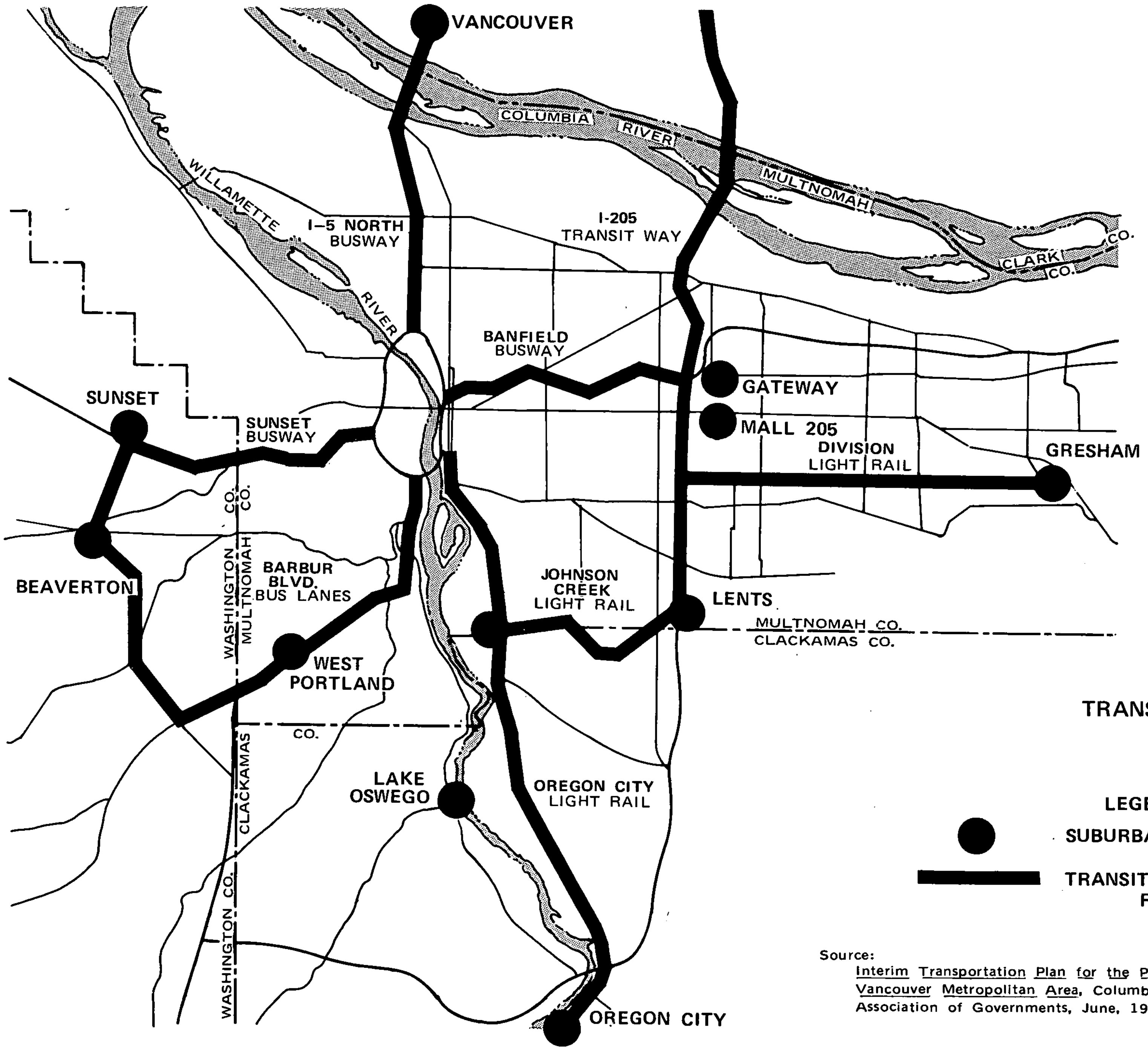


FIGURE P–2
TRANSIT CORRIDOR SYSTEM

LEGEND

SUBURBAN TRANSIT STATIONS

TRANSITWAYS

RESERVED LANES / BUSWAY CONNECTIONS

Source:
Interim Transportation Plan for the Portland—Vancouver Metropolitan Area, Columbia Region Association of Governments, June, 1975.

<u>Existing Land Use</u>. The Columbia Region Association of Governments' 1970 Generalized Land Use Map is shown in Figure P-3. Generalized land use on a regional scale is typical of most urban areas. Commercial and high rise office development is concentrated in the core of the region (downtown Portland). Heavy strip commercial activity radiates from the CBD along major arterials. Most industrial activity in the region is concentrated along the Willamette River and along Columbia Boulevard south of the Columbia River. Residential uses are dispersed throughout most of the region, with densities decreasing as distance from downtown Portland increases. Parks and public facilities are interspersed throughout the metropolitan area. Agriculture, forests, and open space are generally on the fringes of or beyond the urban growth boundary.

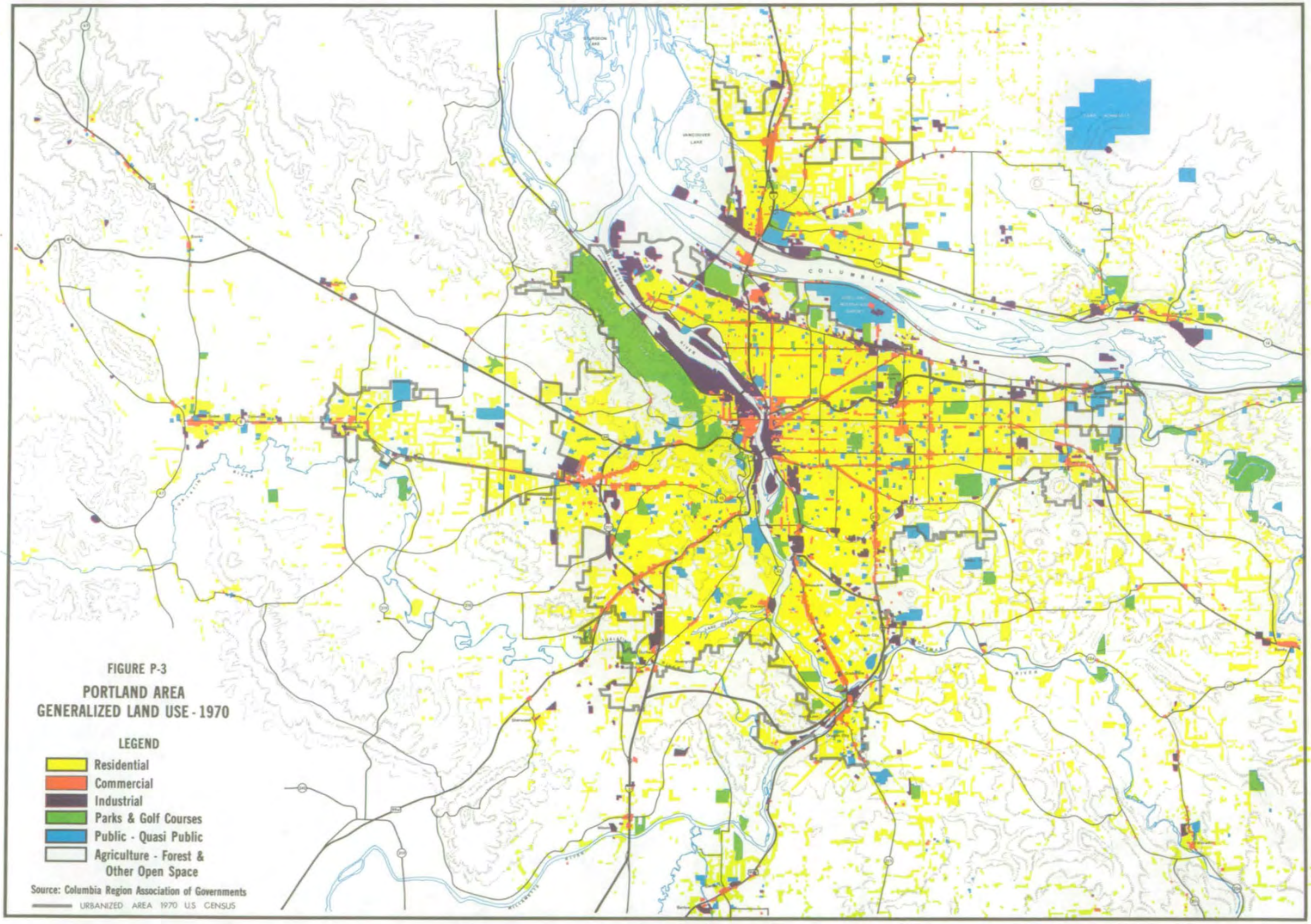
<u>Land Use Trends</u>. "The history of the metropolitan area is dominated by the history of the City of Portland which was incorporated in 1851. Portland's early growth and development was not guided by a community plan but occurred rather as a result of individual and business decision-making. Like many early American cities, Portland's early development related directly to commerce and transportation. Community growth and form were, therefore, directly tied to growth in commerce and transportation services." (12, p. 3)

According to Alfred Staehli, "It was the influence of new means of transportation which began to take control of Portland's form, beginning slowly with wagon roads in the '50's, bridges, railroads, and streetcar lines in the '70's, '80's, and '90's; and concluding with the motor car and truck in the 1920's and later." (11, p. 10) It was the dramatic rise in the use of the private automobile which generated the sharp growth experienced by Portland's suburban areas.

Portland's growth has, in general, occurred from the original site (present downtown area) to the east and northeast. The Willamette River maintained its role as the primary focus for commerce, manufacturing and transportation. Growth to the north and east occurred in the form of incorporated communities, such as St. Johns, Albina and Sellwood, which were consolidated into the City of Portland in 1891. By 1915, Portland had achieved 82% of its 1976 size. (12, p. 3)

By the 1880's, Gresham, Troutdale and Fairview were established communities with commercial centers, churches and some schools. The transcontinental railroad line increased industrial growth in Troutdale, while Fairview remained an agricultural and residential center. Gresham, the largest of the three communities, became a trade center serving farmers from East Multnomah and Clackamas Counties.

All three towns were incorporated into cities before 1910. After the turn of the century, Troutdale began losing industry and population. The opening of the Columbia River Highway in 1914 helped slow the decline, but industry did not begin to locate near there again until the Reynolds plant opened in 1948. Fairview gained population slowly during the early part of the century, while Gresham grew rapidly. The unincorporated areas of the county remained primarily agricultural with scattered suburban development until after World War II, when these areas grew rapidly and


COLUMBIA RIVER
FIGURE P-3
PORTLAND AREA
GENERALIZED LAND USE - 1970
LEGEND
Residential
Commercial
Industrial
Parks & Golf Courses
Public - Quasi Public
Agriculture - Forest &
Other Open Space
Source: Columbia Region Association of Governments
URBANIZED AREA 1970 U.S. CENSUS

became suburban. In the 1960's population growth changed Gresham from a small town serving farmers to a suburb. (18, p. 12)

Current trends indicate continued employment growth and possible residential decrease in the downtown area. Efforts to stabilize and promote downtown Portland's residential use are in progress by the City of Portland. Refer to the following discussion of "Land Use Trends" in the Downtown Study Area for further information. Residential development will continue east of the river, with most of the growth occurring in East County. Population is projected to stabilize and employment to rise in the East Portland Study Area.

Downtown Study Area

Planning Responsibilities and Plan Status. The Downtown Study Area is under the political jurisdiction of the City of Portland. Planning activities in the City of Portland are primarily the responsibility of the Bureau of Planning. "The City's planning approach for the last 15 years has been development [or redevelopment] oriented. Its planning energies have been directed toward specific projects--downtown renewal, waterfront development, the transit mall, neighborhood redevelopment, etc. The current planning process is an attempt to tie some of those projects together through a consistent set of city-wide policies." (12, p. 21)

LCDC has required all jurisdictions in the state to prepare a comprehensive plan which conforms to LCDC Goals and Guidelines; therefore, the City of Portland began to take initial steps in the comprehensive planning process in early 1976. Development of work elements for undertaking this task have been underway for nearly a year. It is estimated that the plan will be adopted in 1980.

In order to assist in the planning and decision-making process, "The planning staff has assembled three alternative land use plans for the city. Although none is likely to be exactly what is recommended to the Planning Commission, and as all will be refined and revised in response to public comment, each is a workable, coordinated set of choices about the type, amount and location of housing, commerce and industry...for Portland.... Strategies II and III are particularly supportive of Transit." (18, p. 6)

The first strategy supports a continuation of "current land use and development policies promoting concentration of activity near the center of the City and lower density activity in the surrounding areas.... A slight growth in population, housing and jobs within the City" (18, p. 6) would be promoted.

The second strategy would maintain an important share of the region's people and jobs with a significant increase in population. Higher density apartment and commercial uses at centers and along corridors would be promoted, and an electric transit system would be developed to provide clean, quiet transit service. Jobs within the city and greater tax revenue for city government would be promoted by increasing the number of commercial jobs. (18, p. 7)

The third strategy for Portland's growth would "promote efficient use of existing facilities and services through an increase in families and homeowners. [Land use and development policies would] promote higher density single family housing, lower density apartments and higher paying industrial jobs in order to attract families and homeowners to the City." (18, p. 7)

Although Portland does not have a comprehensive plan, a Portland Downtown Plan was adopted in December, 1972, before LCDC goals became mandatory considerations in the planning process. This plan is a statement of goals and objectives "intended to serve as a framework for making land use decisions." (4, p. 4)

In essence, these goals emphasize enhancement of the downtown as the retail, office, and cultural and entertainment center for the metropolitan area. "Supportive warehousing and wholesaling [is to be maintained] in a cohesive district close to downtown." (4, p. 18) In addition, historic preservation, provision of open space, and utilization of the river as a community focus are emphasized. The plan also calls for increasing the number of residential units in the downtown area.

Particularly significant to this project is the transportation goal in the existing Portland Downtown Plan. The stated goal is "To design a balanced transportation system which is supportive of the other Downtown goals; and which recognizes that the transportation system should provide more efficient use of both right-of-way and vehicles. This means reducing reliance on the automobile, increasing the number of persons per car and increasing the number of persons moving through concentrated areas on multiple-passenger facilities." (4, p. 14)

A mass transit system which is fast, economical, convenient, comfortable, quiet and non-polluting is a specific goal. Improvement of pedestrian access and increased use of bicycles are also emphasized.

Transportation Planning. The Arterial Streets Classification Policy was adopted by the city council in June, 1977. In the absence of an adopted comprehensive plan, the City of Portland's Arterial Streets Classification Policy functions as the basic transportation policy instrument for the city. (18, p. 10)

> The Arterial Streets Classification Policy has been developed to guide investments in transportation improvements within the City of Portland. As such, it is not intended to be a plan. No new construction, no changes in traffic movement or transit service are mandated by this document. However,... [as an] adopted City Council policy, it...serve[s] as a guide for designing specific solutions to transportation related problems as those problems arise. It is also intended to guide certain aspects of private development as it occurs adjacent to arterial streets within the City. (1, p. 1)
>
> The Arterial Streets Classification Policy documents transportation resources and opportunities. It identifies transportation corridors and indicates where funds can most effectively be spent to improve automobile, transit, and truck movement. It also designates what kind of improvements are appropriate for each of the major transportation corridors within the City. These designations have been made from the standpoints of economy, improved movement of people and goods, and neighborhood livability. (1, p. 5)
>
> The Arterial Streets Classification Policy sets out a clear hierarchy of traffic and transit corridors, designating separate facilities for trips of different speed, volume and length. Such a system would ideally discourage both higher speed through traffic from using local neighborhood streets, and local traffic from using expressway facilities. This would add not only to the overall efficiency of the system but also to the livability of city neighborhoods. (1, p. 9)
>
> For the purposes of the Arterial Streets Classification Policy, City streets have been grouped into two basic hierarchical classifications:

TRAFFIC STREETS	TRANSIT STREETS
1. Regional Trafficways	1. Regional Transitways
2. Major City Traffic Streets	2. Major City Transit Streets

3. Neighborhood Collector Streets	3. Minor Transit Streets
4. Local Service Traffic Streets	4. Local Service Transit Streets. (1, p. 11)

The Arterial Streets Classification Policy also provides for pedestrian, bicycle, or trucking classifications for streets.

Of particular significance to this project, the Arterial Streets Classification Policy calls for planned land use in areas surrounding transit stations which would reinforce existing development and provide good station access. Increased housing and employment are encouraged in areas within one-fourth mile of transit stations.

The Arterial Streets Classification Policy divides the city into "Transportation Districts." These six districts are graphically depicted in Figure P-4. The Downtown Portland Transportation District was not discussed in the Arterial Streets Classification Policy because the transportation policies for this district were previously adopted by the City Council in the Downtown Parking and Circulation Policy.

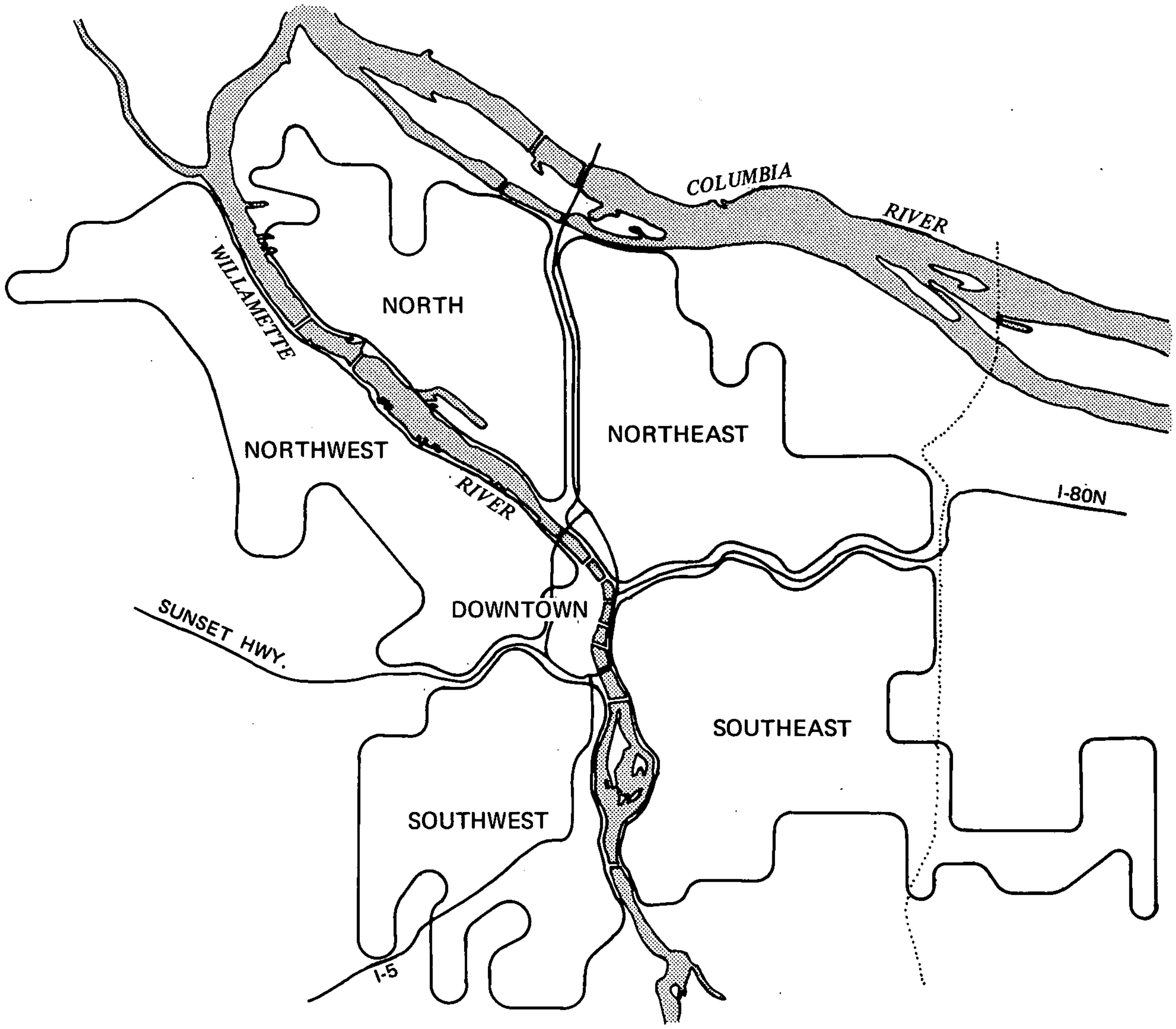
The Downtown Parking and Circulation Policy, adopted in February, 1975, provides the necessary parking and circulation elements to the Downtown Plan. The stated intent of this policy is "to provide guidelines and incentives for development of efficient, adequate and convenient parking which supports the goals and guidelines of the Downtown Plan and encourage[s] desirable land use, zoning goals and policies..." This policy also reiterates the city's intent "to encourage the improvement of public transportation services to downtown, to thereby accomplish a reduction in the need for parking in this concentrated area of the region, to separate public transportation routes and pedestrian bicycle ways from automobile traffic to the extent feasible, and to improve the efficiency and convenience of parking access through the encouragement of identifiable concentrations of short-term parking [for shoppers and other commercial users] throughout the downtown..." (2, p. 1). Long-term parking for commuters is distinctly discouraged.

The Downtown Parking and Circulation Policy places a limit on the total number of parking spaces available for use in the downtown area. Parking spaces are allocated to different parking sectors according to the existing number of spaces, possible future needs, possibilities for new parking structures, and anticipated improvements of public transportation services. This parking space limit requires that public transportation take on an increased role in the transport of commuters to downtown Portland; the Banfield Transitway would be a major step in this direction.

In order to clarify the major traffic access system and to provide appropriate transit, pedestrian and bicycle routes, the Downtown Parking and Circulation Policy classifies downtown streets into traffic access, non-automobile oriented, and local service streets. Traffic access streets are intended to become the principal downtown routes for automobile traffic. Non-automobile oriented streets are to be protected "from further development of automobile-oriented facilities which require access to new parking." (2, p. 20) These streets may become public transit, pedestrian or bicycle routes in the future. Local service streets are intended to serve local circulation, access and service requirements. Streets in the downtown which

FIGURE P–4

CITY TRANSPORTATION DISTRICTS



Source:
City of Portland, Arterial Streets Classification Policy, Portland, 1976 (P. 23)

are not classified as traffic access or non-automobile oriented streets are classified as local service streets. Figures P-5, P-6 and P-7 detail these designated street classifications.

Existing Land Use. The Downtown Study Area is the major retail and employment center for the Portland metropolitan area. Activity in the central area is concentrated along a commercial core running north/south from Burnside to Harrison Street, with concentration along the Portland Mall, generally east of Park Avenue. The majority of urban renewal and redevelopment investment has occurred in this area. (7, p. 2)

Existing land use in the downtown area is shown in Figure P-8. Office development has become the dominant land use in this area. According to a DeLeuw-Cather study, Banfield Transitway Project, Downtown Circulation Alternatives, "although there is some retail activity throughout the downtown area, it is particularly concentrated in the retail core, bounded by Third, Tenth, Stark and Yamhill Streets. After a period of decline in the 1950's and 1960's, retail activity in downtown Portland stabilized." (7, p. 19)

Housing in the downtown area has been steadily declining. More intensive uses have gradually displaced residential activities. "Housing is now largely restricted to the area north of Burnside, west of Tenth Avenue, and around the PSU campus." (7, p. 19)

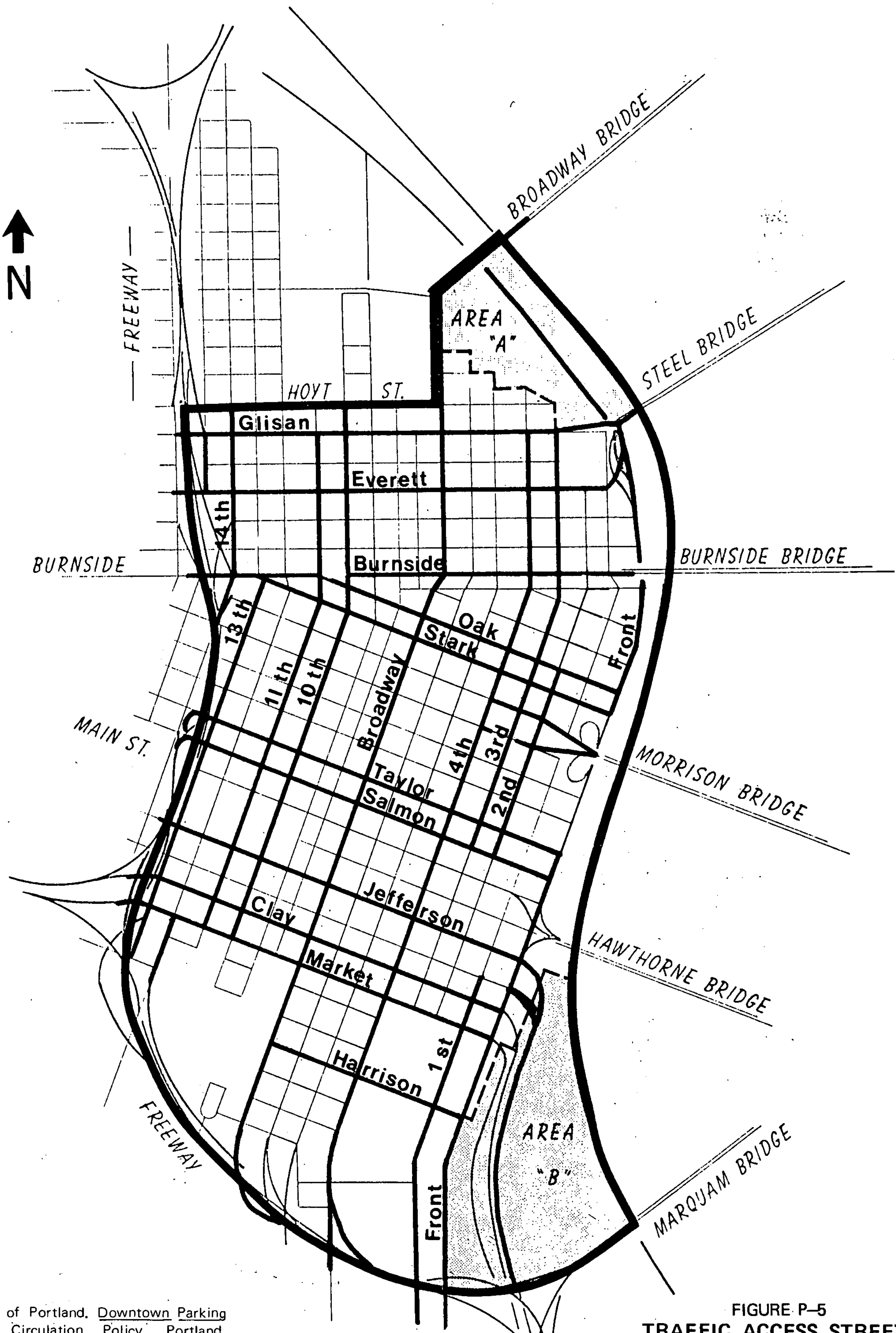
Industrial use is minimal in the downtown area. Some warehousing and light industrial use is located north of Burnside. However, heavier industrial activity is concentrated northwest of the CBD, outside the bounds of this project.

The majority of the public or semi-public land use in the downtown area is concentrated south of Burnside Street. The public service land uses in the CBD include city, county and federal services, social service clubs, Union Station, a variety of churches, Portland State University, the civic center, the art museum, the Oregon Historical Society, the YMCA, and the Salvation Army.

The waterfront area (between Front Street and the Willamette River) is open space. Park Avenue is also lined with park blocks, both at the northern and the southern portions of that street. The other major park/open space land uses in the CBD are the park blocks along 3rd and 4th Avenues, immediately to the east of city hall and the county courthouse; between Park and 8th; Forecourt Fountain; Lovejoy Fountain; and O'Brian Square. Several other smaller parks and open space areas are distributed in the Downtown Study Area.

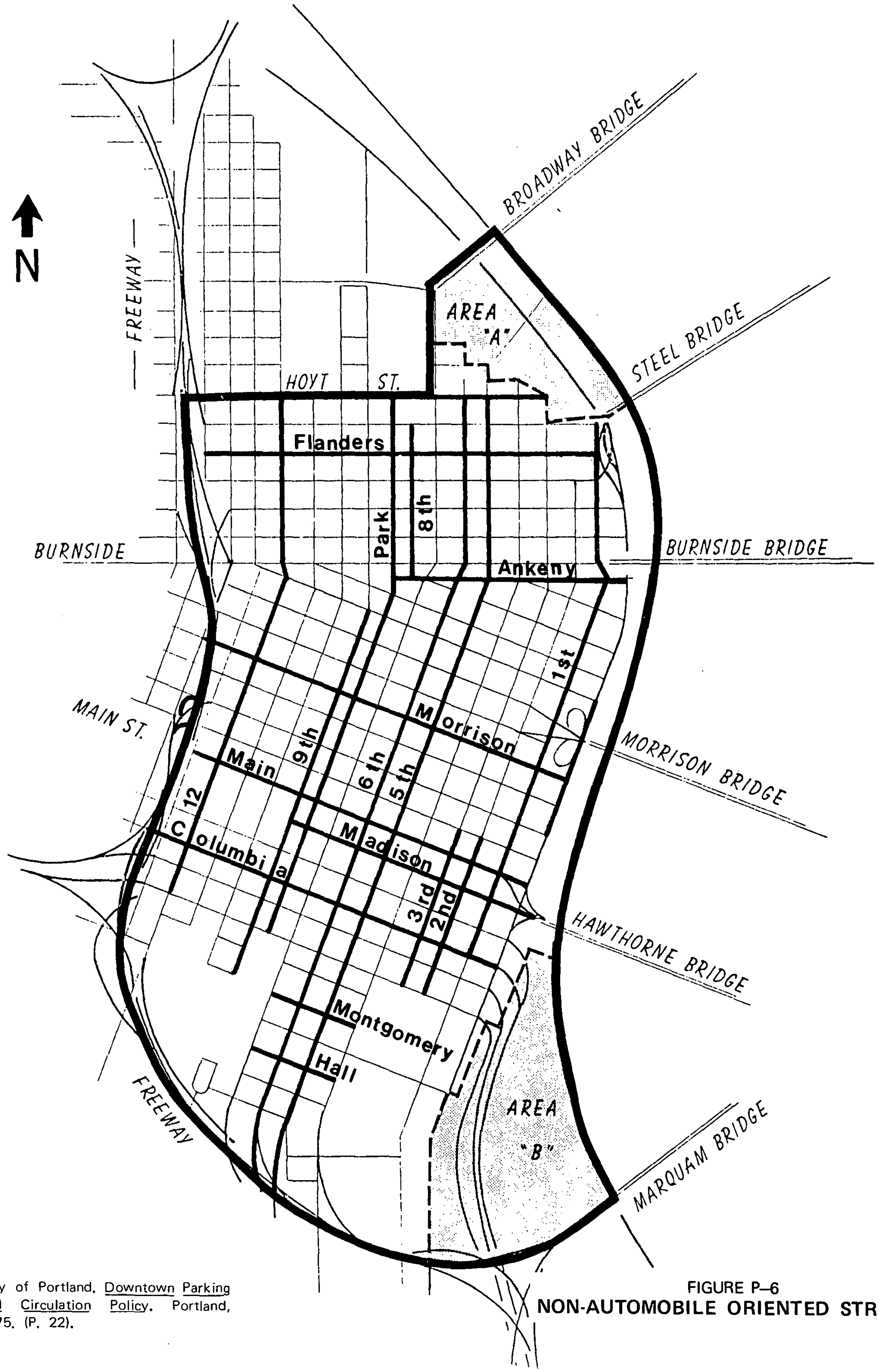
Land Use Trends. "While the regional land use plans call for a continuation of modest but sustained growth of central Portland, and its continuation as the regional center, the regional transportation plans call for a de-emphasis on automobile travel region-wide, and particularly to the central area." (7, p. 2)

Figure P-9 illustrates the land use plan for the central area, as described in the Portland Downtown Plan. Office development has become the dominant land use in the downtown area. During the 1960's, office space doubled and it is still rapidly increasing. The Portland Downtown Plan calls for a reinforcement of the existing high density concentration of offices extending from Burnside to Market between Fourth and Broadway, oriented to



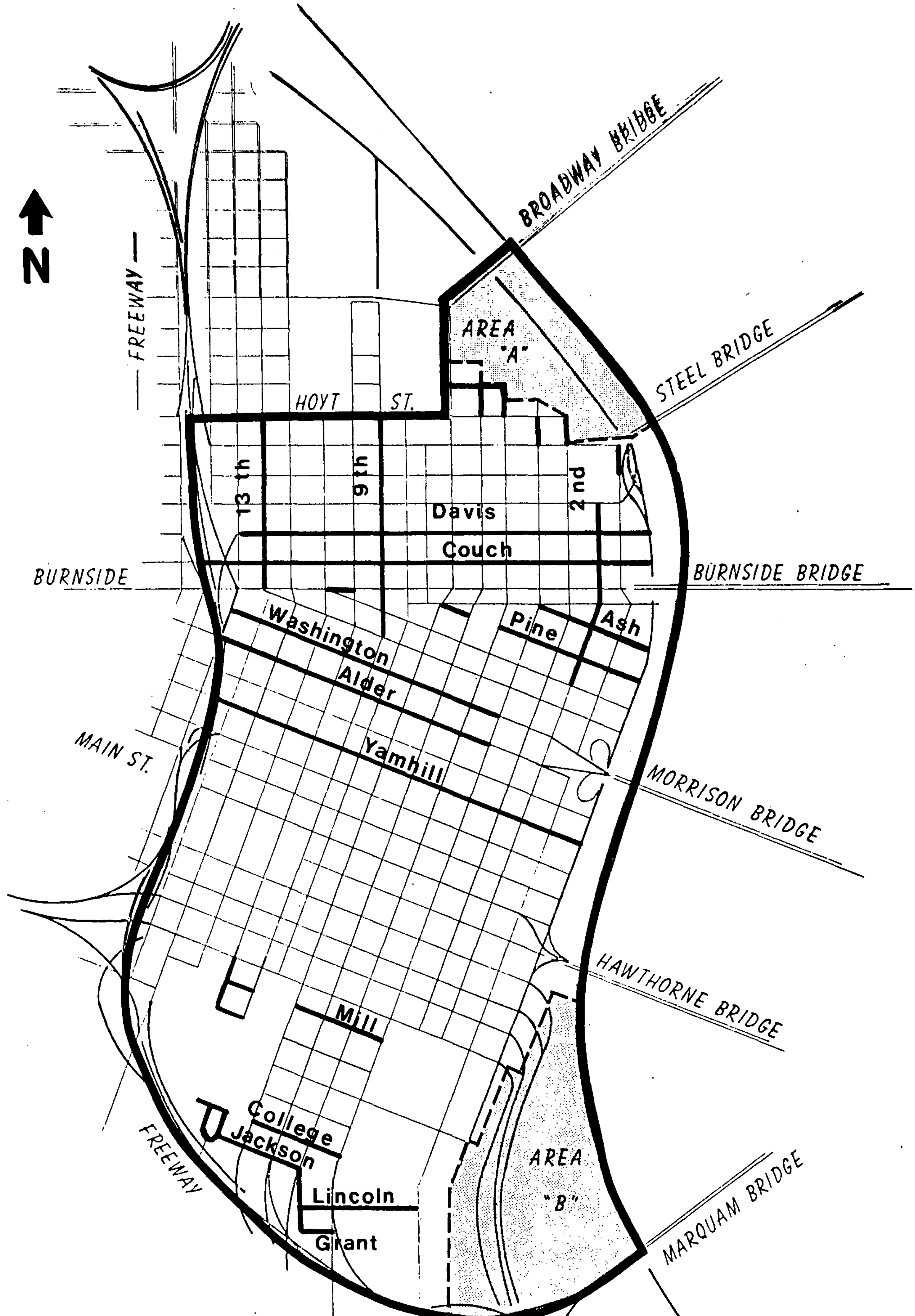
SOURCE: City of Portland. Downtown Parking and Circulation Policy. Portland, 1975. (P. 19).

FIGURE P–5
TRAFFIC ACCESS STREETS



SOURCE: City of Portland, Downtown Parking and Circulation Policy. Portland, 1975. (P. 22).

FIGURE P–6
NON-AUTOMOBILE ORIENTED STREETS



SOURCE: City of Portland. Downtown Parking and Circulation Policy. Portland, 1975. (P. 24).

FIGURE P–7
LOCAL SERVICE STREETS

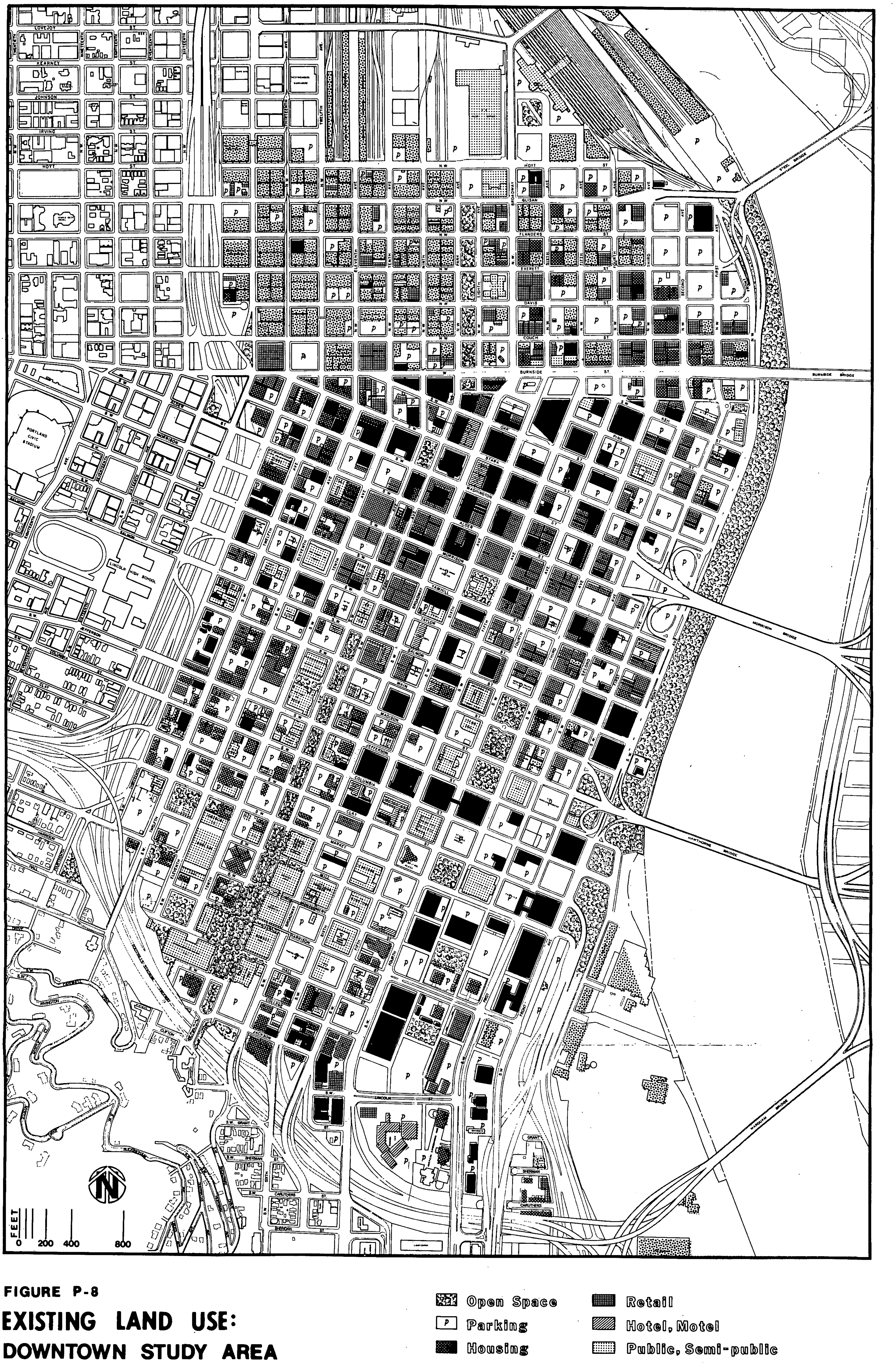


FIGURE P-8

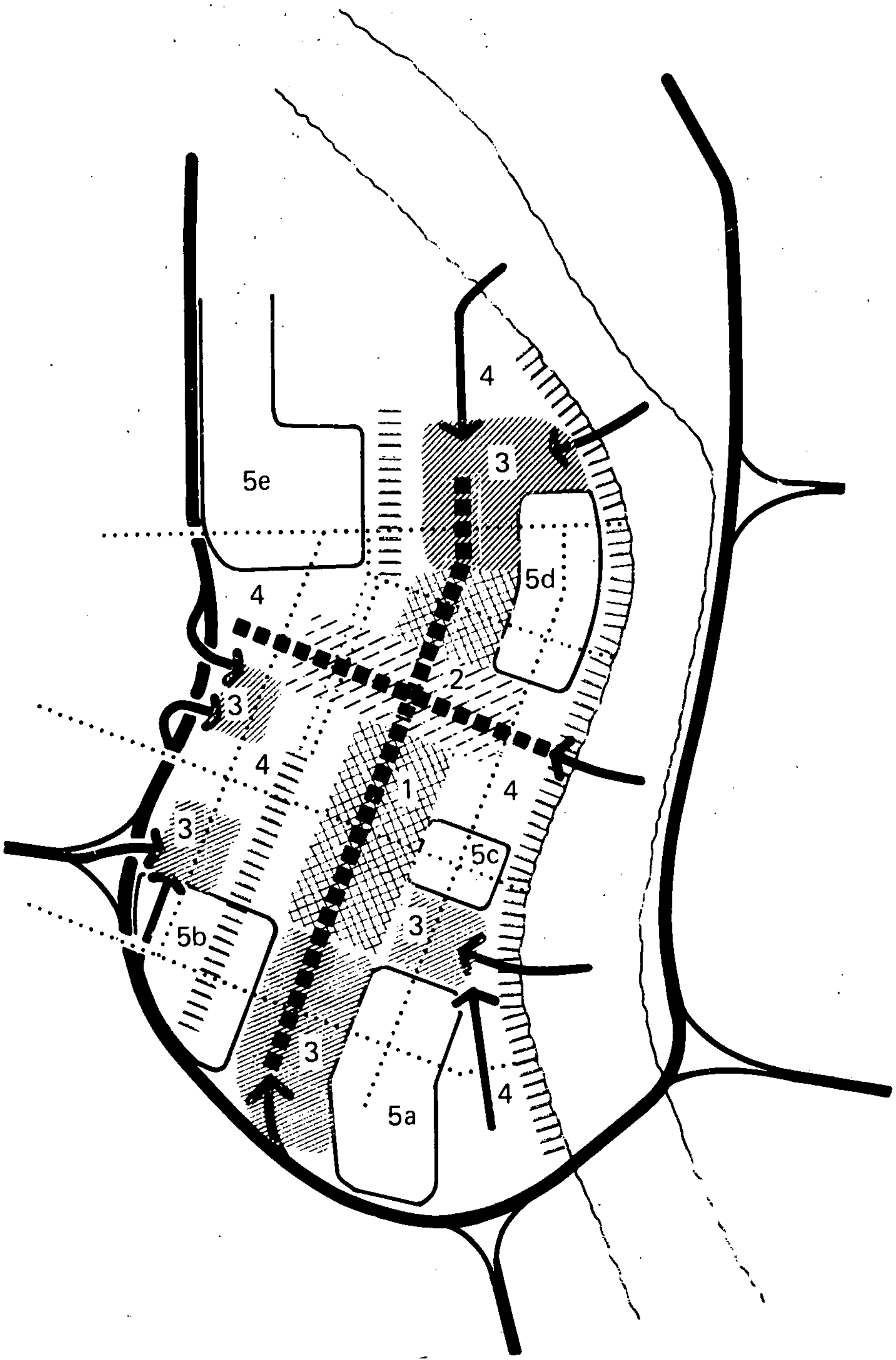
EXISTING LAND USE:

DOWNTOWN STUDY AREA

- Open Space
- Parking
- Housing
- Office
- Retail
- Hotel, Motel
- Public, Semi-public
- Mfg., Warehouse

FIGURE P-9

PORTLAND DOWNTOWN PLAN CONCEPT



1. HIGH DENSITY OFFICES RELATED TO NORTH-SOUTH TRANSIT

2. STRONG, COMPACT RETAIL CORE RELATED TO MAJOR ACCESS & PERIPHERAL PARKING

3 MEDIUM-DENSITY OFFICE RELATED TO MAJOR ACCESS & PERIPHERAL PARKING

4. LOW-DENSITY MIXED USES INCLUDING HOUSING, OFFICES & COMMUNITY FACILITIES

5. SPECIAL DISTRICTS

   a. PORTLAND CENTER
   b. PORTLAND STATE UNIVERSITY
   c. GOVERNMENT CENTER
   d. SKIDMORE FOUNTAIN/OLD TOWN
   e. INDUSTRIAL

MAJOR VEHICLE ACCESS

MASS TRANSIT

MAJOR PEDESTIANWAYS

MAJOR OPEN SPACE

0' 1200' 2400'

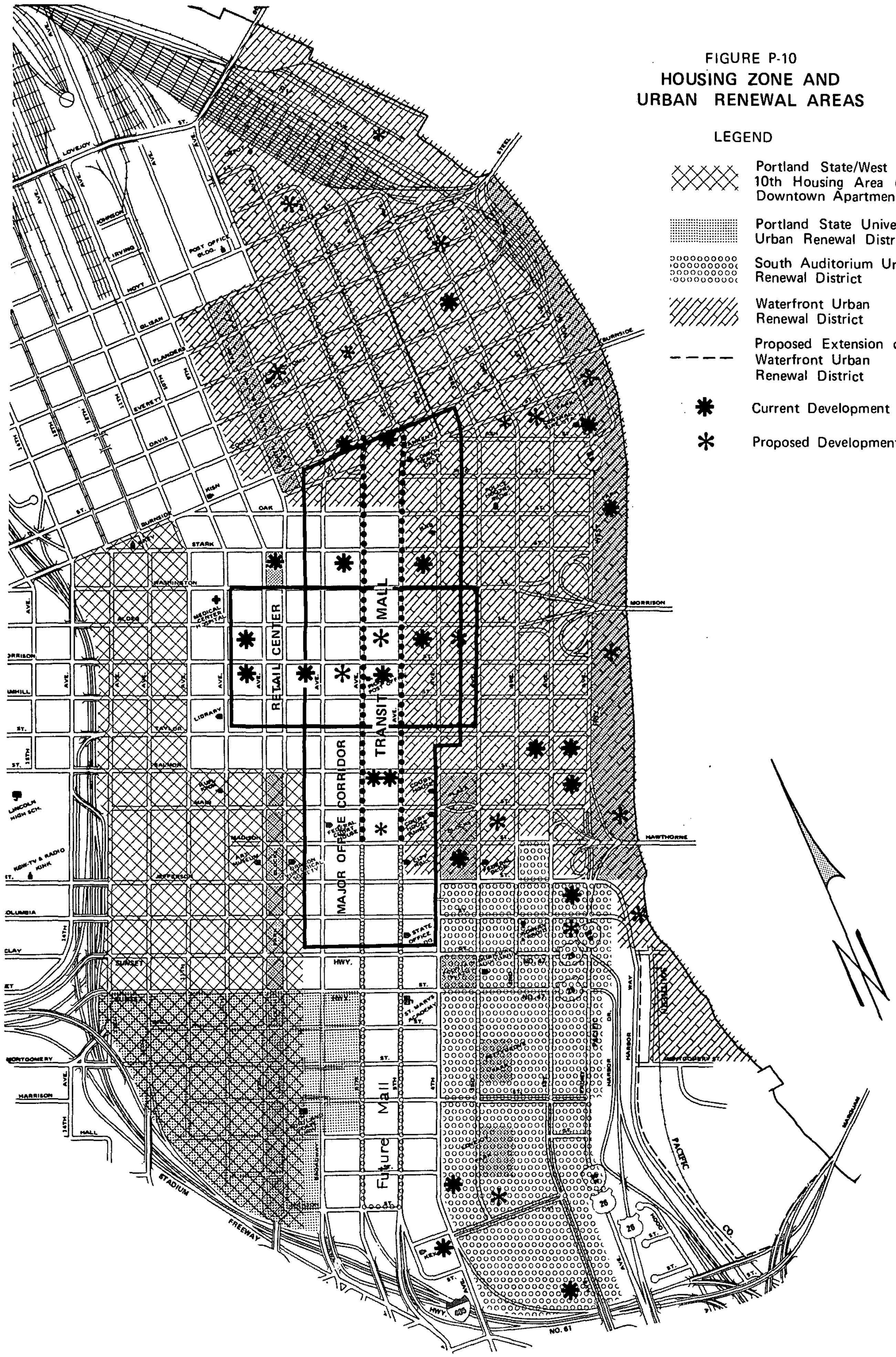
N

SOURCE: DeLeuw-Cather Banfield Transitway Project, Downtown Circulation Alternatives Portland, 1977. (P. 20).

FIGURE P-10
HOUSING ZONE AND URBAN RENEWAL AREAS

LEGEND

- Portland State/West of 10th Housing Area (AX Downtown Apartment Area).
- Portland State University Urban Renewal District
- South Auditorium Urban Renewal District
- Waterfront Urban Renewal District
- Proposed Extension of Waterfront Urban Renewal District
- Current Development
- Proposed Development



the Portland Mall, together with medium density office development adjacent to major access points to downtown and related to peripheral parking structures. Office development is specifically discouraged adjacent to the waterfront and the south park blocks. (7, p. 19)

"The Portland Downtown Plan seeks to strengthen...retail activity [and]...to increase the number of residents downtown by rehabilitating housing stock and encouraging new development." (7, p. 19) The increasing cost of property in the downtown area has led to a gradual decline in residential land use. More intensive uses have gradually displaced residential activity. The city is currently developing a program to actively promote housing and to stabilize existing housing by the designation of a housing zone area in which commercial properties would be limited and medium and high density housing would be encouraged; these steps should reverse the decline. The boundaries of this zone, known as the Portland State/West of 10th Housing Area (AX Downtown Apartment Area), are delineated in Figure P-10.

Figure P-10 also outlines the boundaries of the South Auditorium, Waterfront, and Portland State University Urban Renewal Districts. These districts have officially designated boundaries, and development restrictions are imposed on the properties within these boundaries. The Portland Development Commission has been responsible for instituting the plans for these areas. In terms of urban renewal activities, the Portland State University Urban Renewal Area is completed; the South Auditorium Urban Renewal Area is virtually completed; and the Waterfront Urban Renewal Area is underway.

The light industrial use north of Burnside has been gradually declining due to high property values, poor freight access, and antiquated buildings. This trend is anticipated to continue. However, in recent years numerous small shops and restaurants have opened in the Old Town portion of this area. The Downtown Plan calls for the gradual replacement of the light industrial portion in this area by medium density office and residential development. (7, p. 21)

The enhancement of the waterfront area by the removal of Harbor Drive has led to increasing developmental pressures on the area east of the Portland Mall. High rise development near the waterfront would be contrary to the goals of the Downtown Plan, although high density uses could be allowed. (7, p. 21)

Development regulations specifying height restrictions on the downtown area should go before the City Council by early 1978. If passed, these limitations would have the force of law and would demonstrably affect the design of future construction. These height restrictions would be particularly relevant to the waterfront area.

<u>East Portland Study Area</u>

<u>Planning Responsibilities and Plan Status</u>. The East Portland Study Area is predominantly under the local political jurisdiction of the City of Portland. Refer to the previous discussion of Planning Responsibilities and Plan Status in the Downtown Study Area for specific information on planning activities in the City of Portland.

In terms of the Banfield corridor planning activity, one other City planning effort is significant. The Hollywood commercial center is an older sub-regional shopping area located adjacent to the Banfield at the intersection of Sandy Boulevard and N.E. 39th." (3, p. 4) Since the opening of the Lloyd Center, the commercial area has suffered somewhat economically. "As a result, the City initiated detailed study activities in the Hollywood area in January, 1977, for the purpose of first determining the exact nature of the problems facing the area, and then recommending specific methods by which the problems could be ameliorated. While not limited to transportation problems, it quickly became clear that the more fundamental problems in the area were generally transportation in nature." (3, p. 4) High levels of congestion, traffic and pedestrian circulation, traffic and pedestrian safety problems, and parking difficulties have been recognized by both Hollywood businessmen and the city as serious impediments to the continued viability of the commercial activity.

According to the Hollywood study, the relevance of the Banfield Transitway project to the Hollywood district concentrates on the effect it would have on traffic problems. While not solving the traffic problems in the area, improvement of the Banfield Transitway would help siphon regional trips off of Sandy onto the Banfield. Therefore, by 1990, traffic in the Hollywood district would not increase over present levels. A transitway on the Banfield would also improve access and circulation (particularly routing to and from the Banfield) and transit service. If the Banfield is not improved, additional traffic would add to present problems.

Transportation Planning. Refer to the previous section of Transportation Planning in the Downtown Study Area for a generalized discussion of the Arterial Streets Classification Policy, which guides transportation planning in the City of Portland.

According to city planners, the city's comprehensive planning process "will assume the modification of the Banfield freeway in order to improve the capacity for transit and automobile movement." (3, p. 3) The Arterial Streets Classification Policy assumes construction of "exclusive transitways" in the Banfield, Sunset, Johnson Creek, Oregon City, I-205, Barbur Blvd., and I-5 North corridors.

The Banfield and I-205 corridors are classified in the Arterial Streets Classification Policy as both regional trafficways and regional transitways. An important land use objective to be served by these classifications is to focus new land development adjacent to the regional facilities. New development in proximity to transitways would improve future opportunities for trips by public transit. Preservation of existing and abandoned rail rights-of-way and their eventual use for freight and passenger movement is also encouraged. (1, p. 42)

The Arterial Streets Classification Policy states specifically that "a basic objective shall be to reduce traffic volumes by emphasizing transit service improvements to the Downtown, Lloyd Center, the Hollywood business district, and within Northwest neighborhoods." (1, p. 52) The Hollywood district and Lloyd Center are to be recognized as regional and district commercial areas.

The policy also states that "Major City Traffic Streets" and "Neighborhood Collector Streets" within the City of Portland should not serve as alternate routes for regional trips. Figure P-11 indicates the Traffic Streets in the Northeast and Southeast sectors of the city. The Low Cost Improvement streets (Alternatives 2a, 2b) are all classified as either "Major City Traffic Streets" or "Neighborhood Collector Streets." Broadway, Weidler, Sandy and the eastern portion of Halsey are classified as "Major City Traffic Streets," while Burnside, Stark, 7th, Division, 60th and Belmont, and a portion of Halsey are indicated as "Neighborhood Collector Streets." These routes are also classified as "Major City Transit Streets," with the exception of 60th Avenue, which carries the designation of "Minor City Transit Street," and Broadway between 41st Avenue and 67th Avenue, which is designated as a "Local Street." (See Figure P-12.)

Bicycle pathway and pedestrian trafficway designations are discussed in the Social Environment Research Report in this volume.

The <u>Arterial Streets Classification Policy</u> lists classifications and policies for truck traffic. Provision is made for adequate truck access to commercial and industrial land uses, with minimal impacts on residential areas. The truck policies are shown in Figure P-13. The Banfield and I-205 are designated "Through Truck Routes." Truck districts, located adjacent to the river, contain a large amount of truck traffic. The only truck district east of I-5, south of Columbia Blvd., is west of 12th and north of Division.

Refer to the regional Transportation Planning section of this report for the Transit Corridor System outlined in the Interim Transportation Plan.

Existing Land Use. Existing land use for the various transit routes in the East Portland Study Area is shown in Figure P-14 (Parts A, B, C & D). Discussion of land use along the Lents route is found in the East County Study Area section.

The East Portland area is basically urbanized. Residential land use predominates, with commercial activity concentrated along the major arterials; Broadway, Sandy, Burnside, Hawthorne, Division, Powell, Foster, and 82nd. As previously indicated, industrial activity is basically concentrated along the Willamette River, while public services/institutions and parks/open space are dispersed.

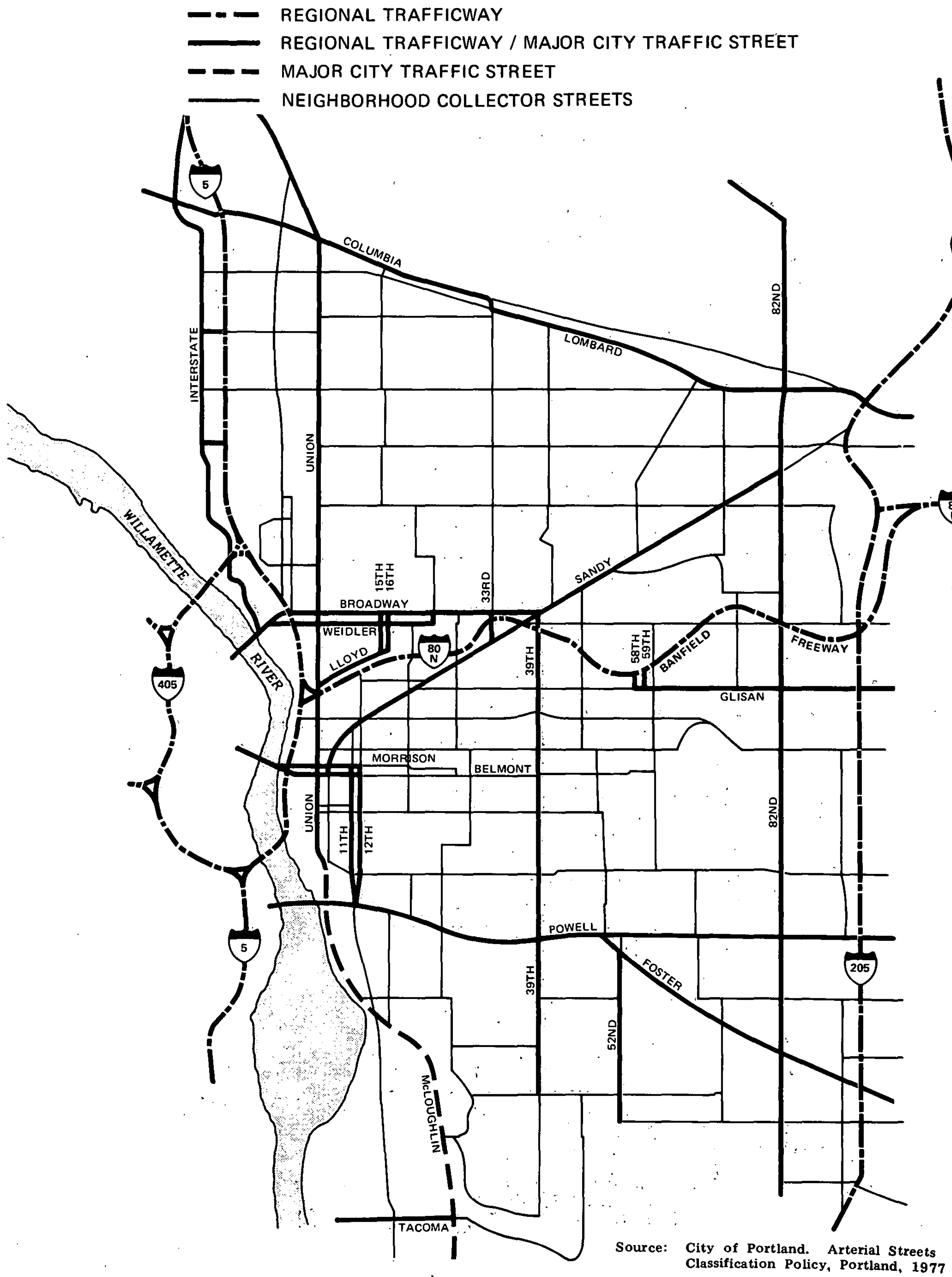
The following description of land uses along project routes in East Portland indicates particularly significant uses. A more detailed discussion of the impacted land uses is described in the Economic Research Report and the Right-of-Way Report.

Banfield Corridor. Land use throughout Sullivan's Gulch is strongly oriented towards the transportation facilities found there. Both the railroad and the Banfield freeway have historically attracted businesses and industry because of the superior transportation access afforded. This influence is seen by the fact that industry is a predominant land use along the corridor.

Commercial uses in the vicinity of the Banfield corridor tend to concentrate west of 15th Avenue and along Sandy Boulevard. Of particular

FIGURE P-11

EAST PORTLAND MAJOR TRAFFIC STREETS



Source: City of Portland. Arterial Streets Classification Policy, Portland, 1977

FIGURE P–12

EAST PORTLAND MAJOR TRANSIT STREETS

LEGEND

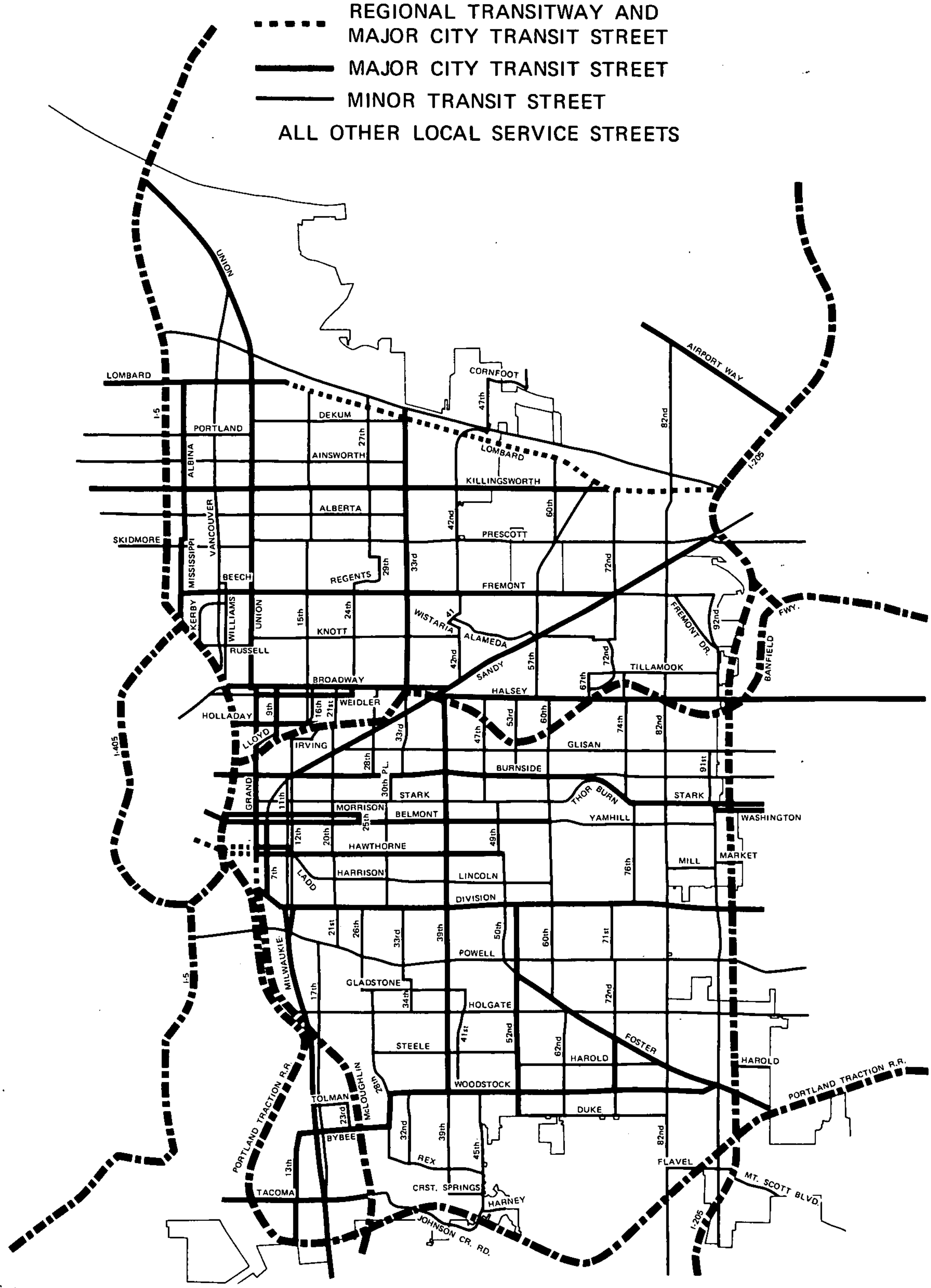
REGIONAL TRANSITWAY

REGIONAL TRANSITWAY AND MAJOR CITY TRANSIT STREET

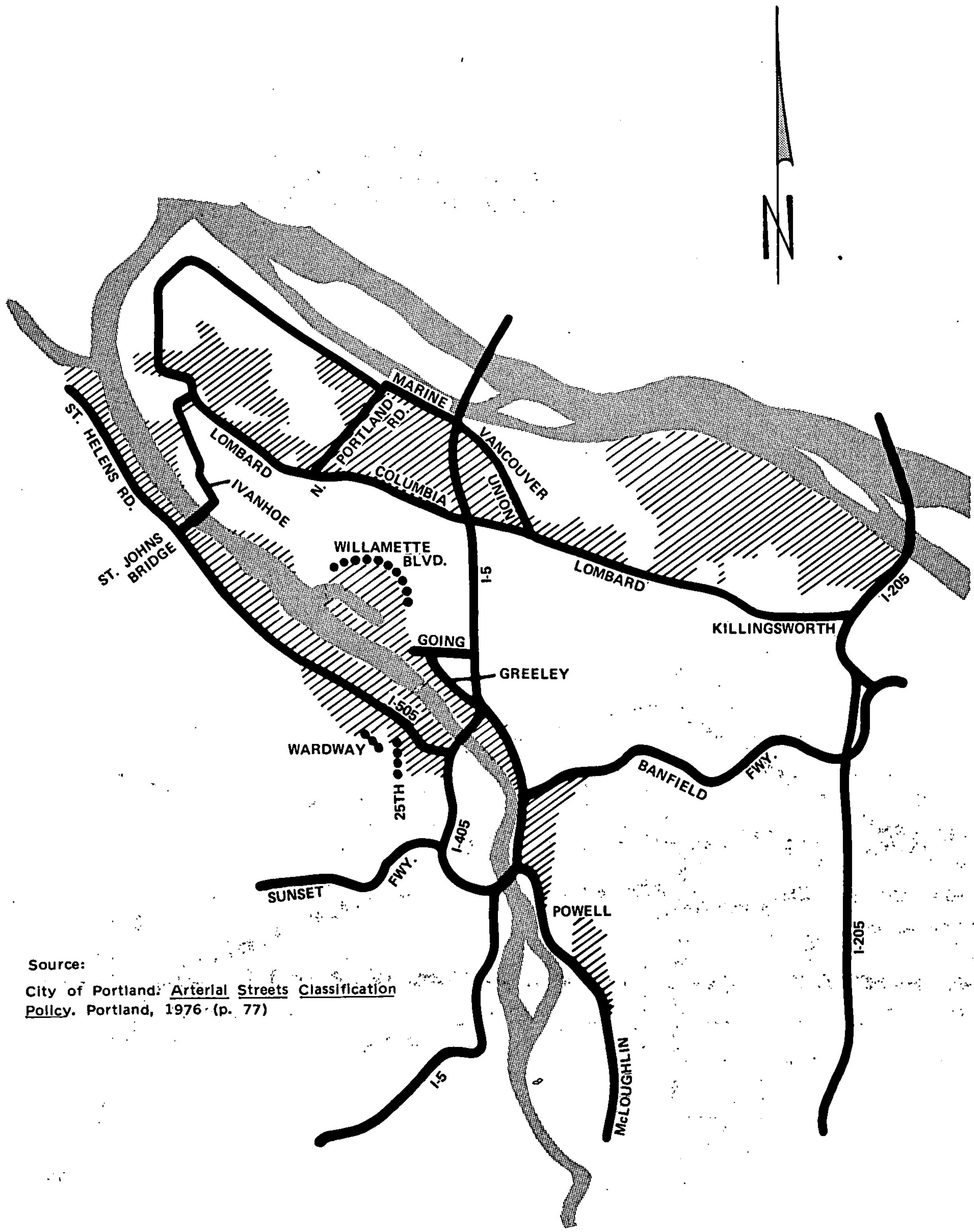
MAJOR CITY TRANSIT STREET

MINOR TRANSIT STREET

ALL OTHER LOCAL SERVICE STREETS



Source:
City of Portland, Arterial Streets Classification Policy, Portland, 1976.



Source:
City of Portland: Arterial Streets Classification Policy. Portland, 1976 (p. 77)

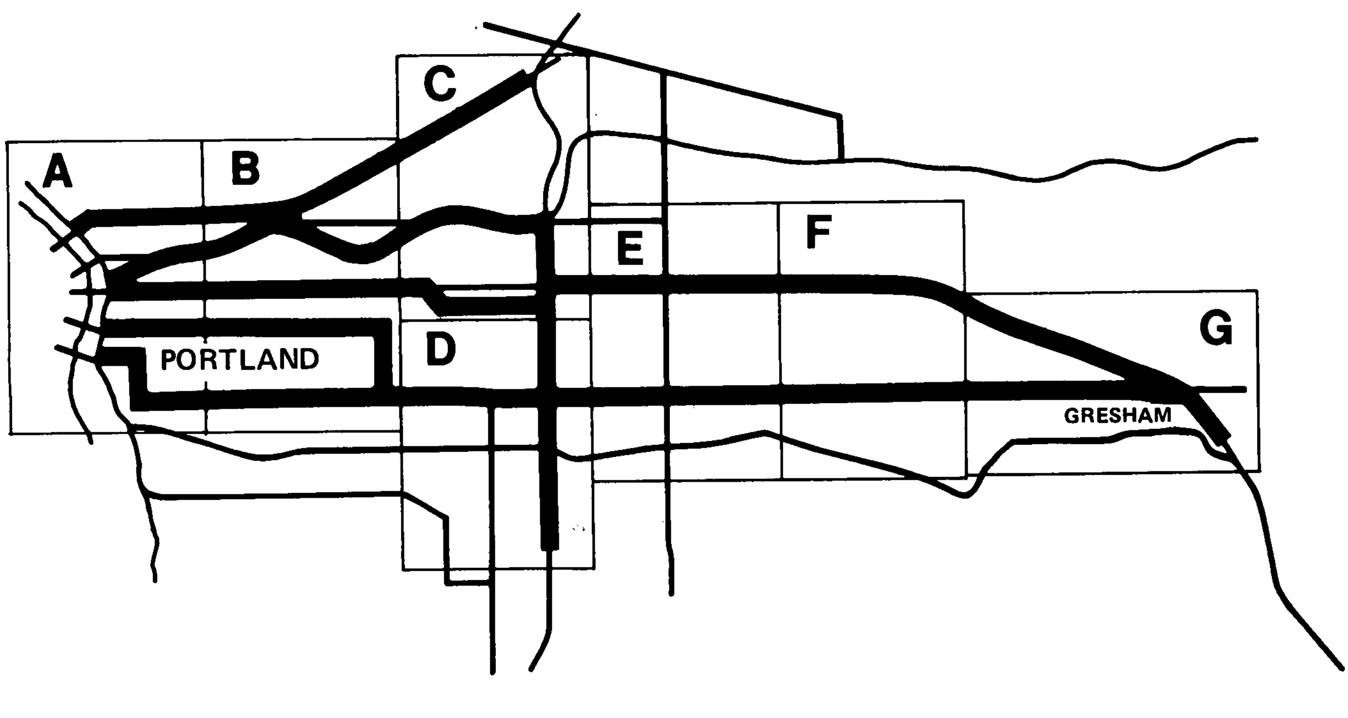
FIGURE P–13
EAST PORTLAND TRUCK POLICIES

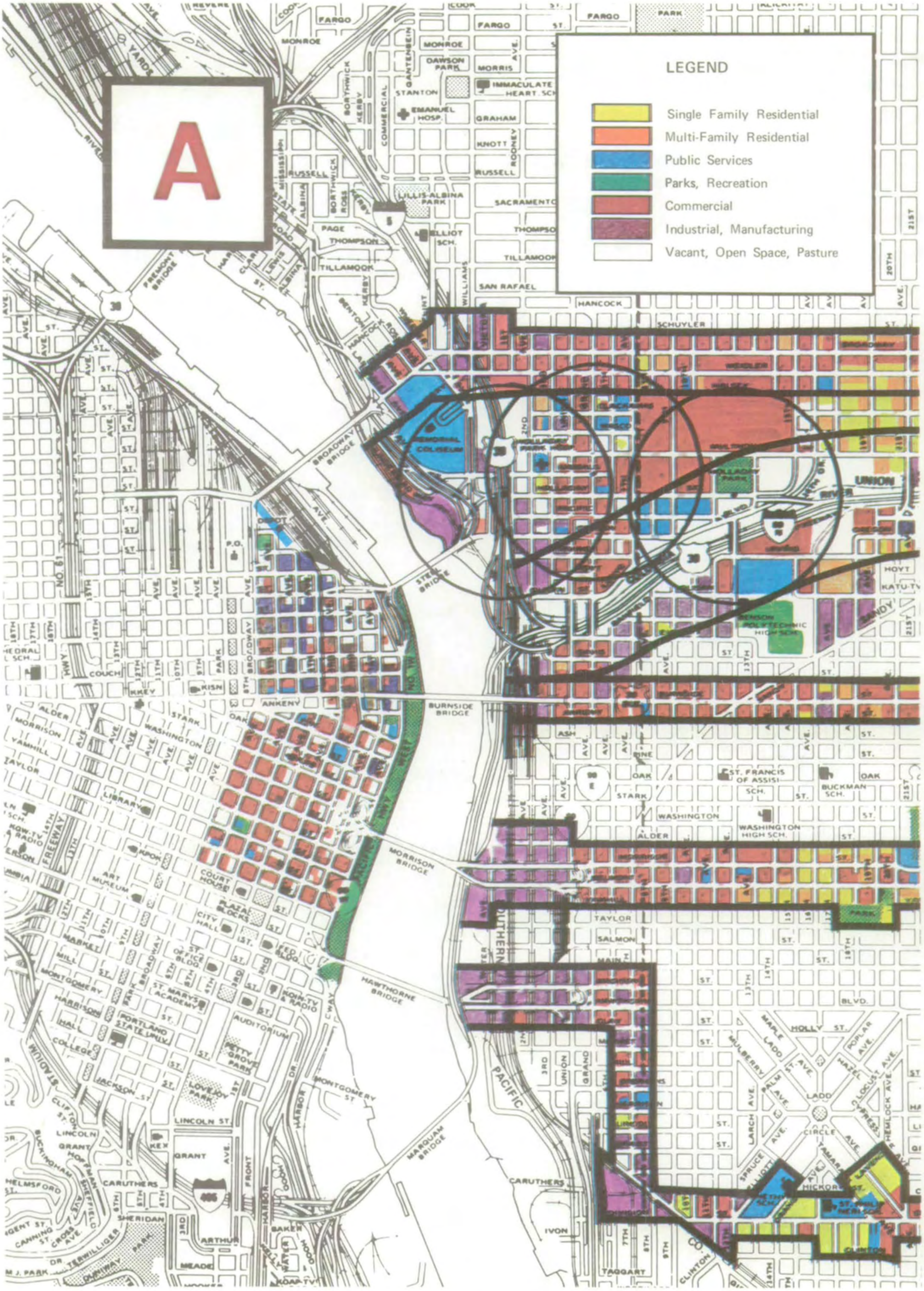
TRUCK DISTRICT

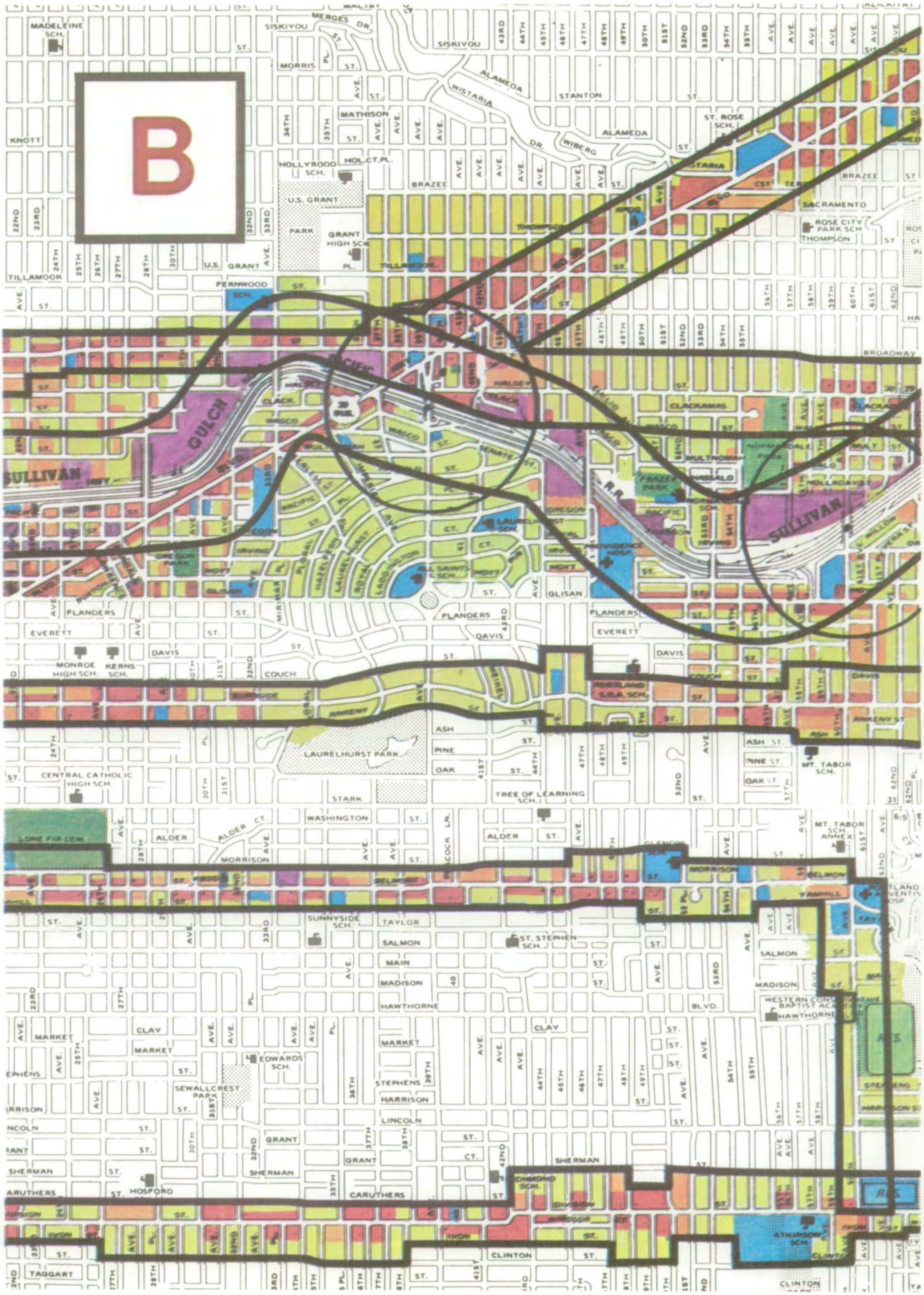
THROUGH TRUCK ROUTES

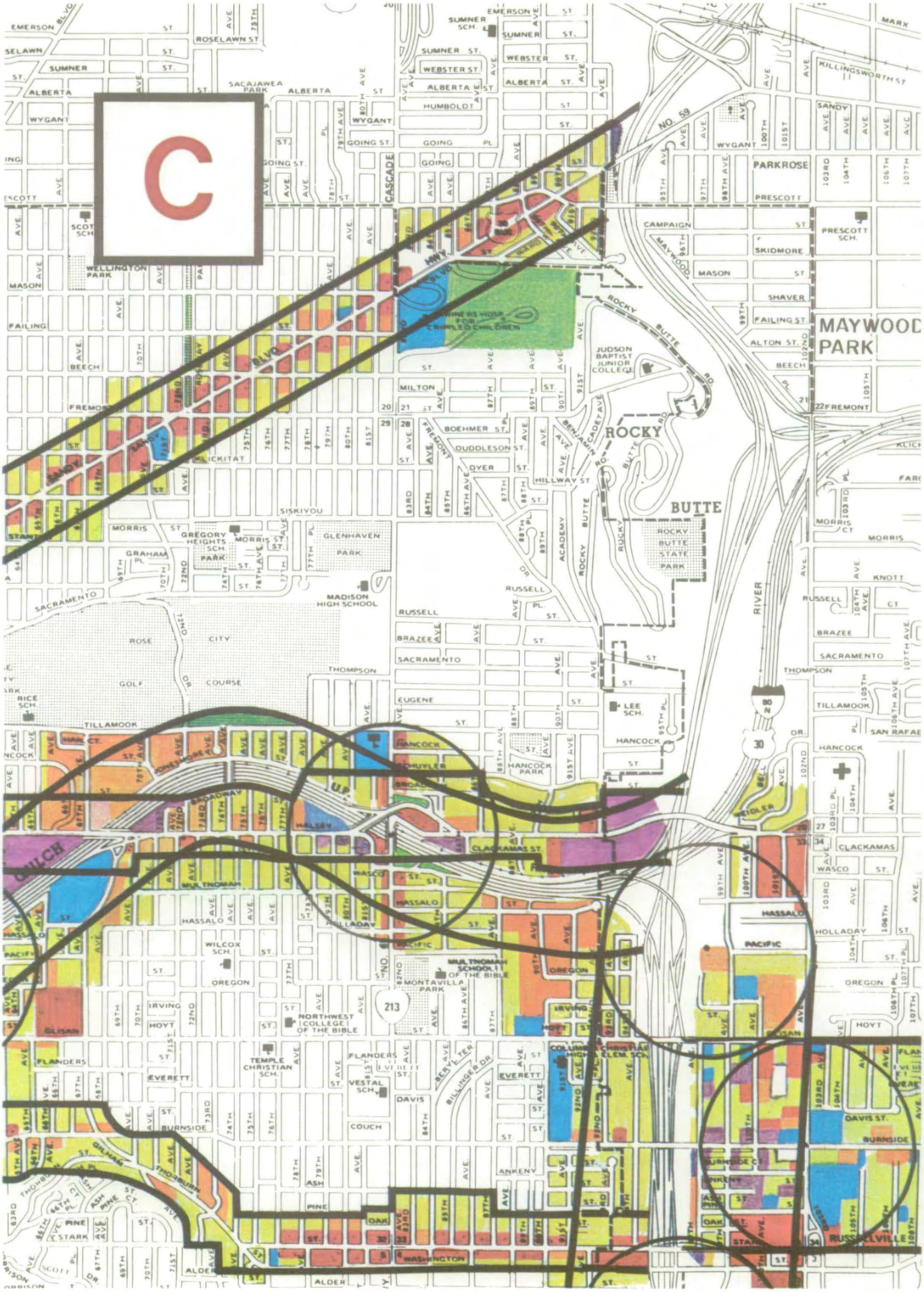
TRUCKS RESTRICTED

FIGURE P–14
EXISTING LAND USE:
BANFIELD LCI/LRT CORRIDORS

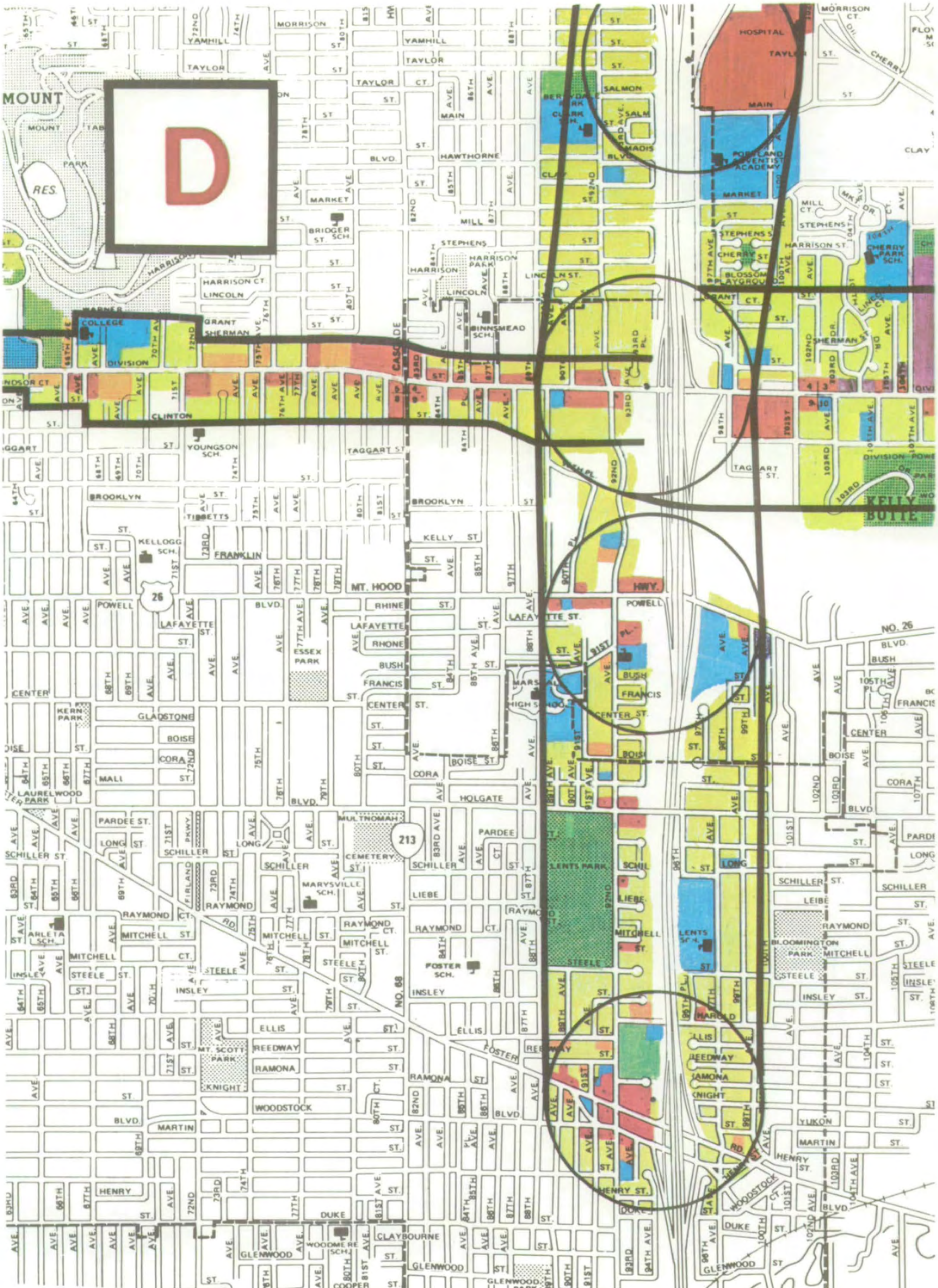



A
LEGEND
Single Family Residential
Multi-Family Residential
Public Services
Parks, Recreation
Commercial
Industrial, Manufacturing
Vacant, Open Space, Pasture
MEMORIAL COLISEUM
BROADWAY BRIDGE
STEEL BRIDGE
BURNSIDE BRIDGE
MORRISON BRIDGE
HAWTHORNE BRIDGE
MARQUAM BRIDGE
FREMONT BRIDGE
LLOYD CENTER
HOLLADAY PARK
BENSON POLYTECHNIC HIGH SCH.
WASHINGTON HIGH SCH.
ST. FRANCIS OF ASSISI SCH.
BUCKMAN SCH.
EMANUEL HOSP.
IMMACULATE HEART SCH.
LILLIS-ALBINA PARK
ELLIOT SCH.
DAWSON PARK
PORTLAND STATE UNIV.
ST. MARY'S ACADEMY
LOVEJOY PARK
PETTY GROVE PARK
AUDITORIUM
CITY HALL
PLAZA BLOCKS
COURT HOUSE
ART MUSEUM
LIBRARY
LADD CIRCLE
UNION
SANDY

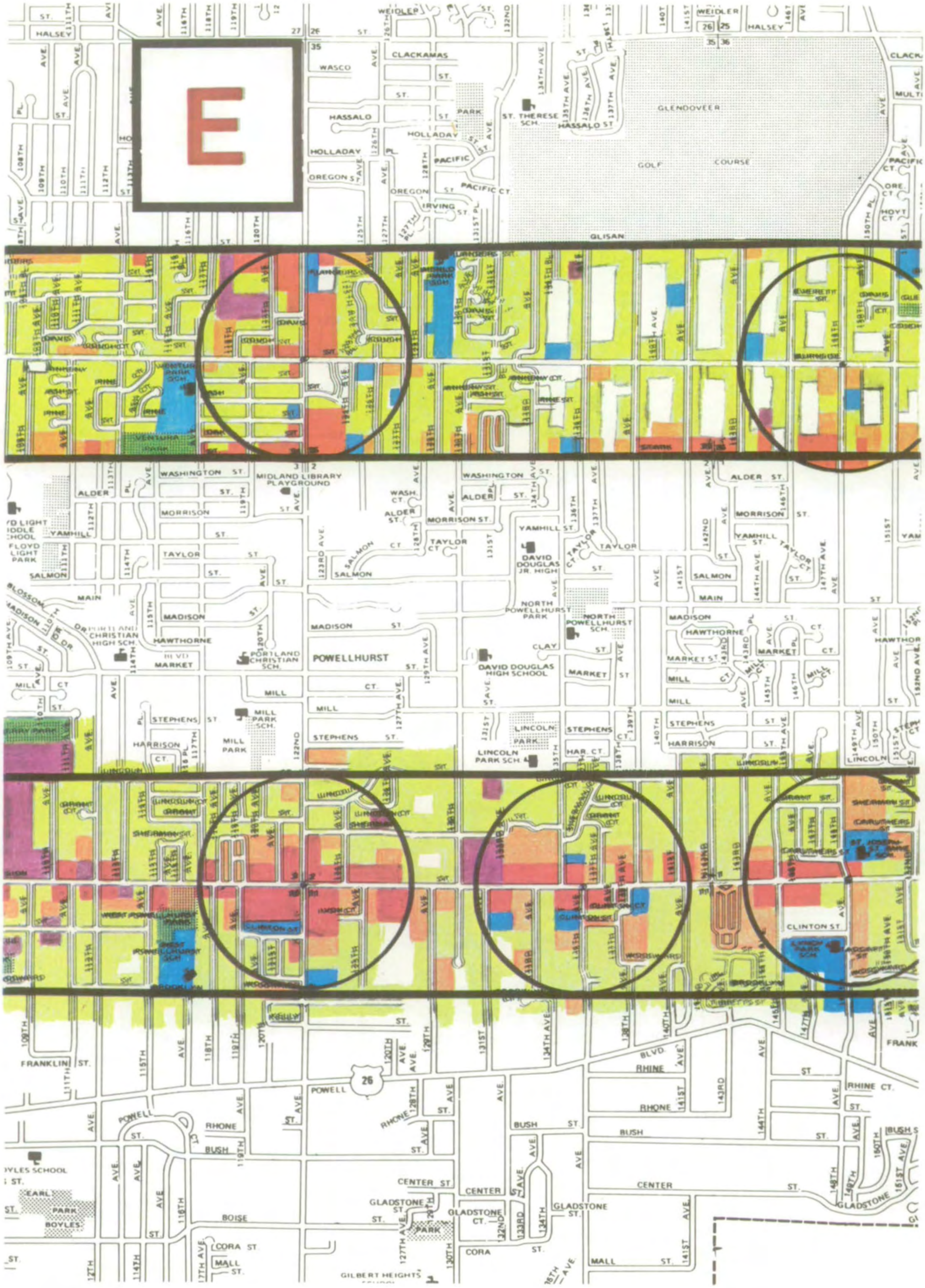

B
MADELEINE SCH.
SISKIYOU
MERGES DR.
MORRIS
ALAMEDA
WISTARIA
STANTON
MATHISON
ST. ROSE SCH.
KNOTT
WIBERG
HOLLYROOD SCH.
HOL.CT.PL.
BRAZEE
U.S. GRANT
PARK
GRANT HIGH SCH.
SACRAMENTO
ROSE CITY PARK SCH.
THOMPSON
TILLAMOOK
U.S. GRANT PL.
FERNWOOD SCH.
BROADWAY
HALSEY
CLACKAMAS
GULCH
SULLIVAN
WASCO
MULTNOMAH
NORMANDALE PARK
HASSALO
FRAZER PARK
PACIFIC
R.R.
LAURELHURST SCH.
PROVIDENCE HOSP.
OREGON PARK
IRVING
HOYT
ALL SAINTS SCH.
GLISAN
FLANDERS
EVERETT
DAVIS
MONROE HIGH SCH.
KERNS SCH.
COUCH
PORTLAND S.D.A. SCH.
BURNSIDE
ANKENY
ASH
PINE
OAK
LAURELHURST PARK
CENTRAL CATHOLIC HIGH SCH.
MT. TABOR SCH.
TREE OF LEARNING SCH.
STARK
WASHINGTON
ALDER
LONE FIR CEM.
MORRISON
MT. TABOR SCH. ANNEX
BELMONT
YAMHILL
PORTLAND ADVENTIST HOSP.
SUNNYSIDE SCH.
TAYLOR
SALMON
ST. STEPHEN SCH.
MAIN
MADISON
HAWTHORNE
BLVD.
WESTERN CONS. BAPTIST ACAD.
CLAY
MARKET
EDWARDS SCH.
STEPHENS
SEWALLCREST PARK
HARRISON
LINCOLN
GRANT
SHERMAN
CARUTHERS
HOSFORD
RICHMOND SCH.
DIVISION
IVON
CLINTON
ATKINSON SCH.
TAGGART
RES.



C
EMERSON
ROSELAWN ST
SUMNER
WEBSTER
ALBERTA
SACAJAWEA PARK
HUMBOLDT
WYGANT
GOING ST.
CASCADE
PRESCOTT
MARX
KILLINGSWORTH ST
NO. 59
PARKROSE
CAMPAIGN
PRESCOTT SCH.
SKIDMORE
MAYWOOD
MASON
SHAVER
FAILING ST
MAYWOOD PARK
ALTON ST.
BEECH
WELLINGTON PARK
SANDY BLVD
SHRINERS HOSP FOR CRIPPLED CHILDREN
ROCKY BUTTE RD.
JUDSON BAPTIST JUNIOR COLLEGE
MILTON
FREMONT
BOEHMER ST.
DUDDLESON ST.
DYER
HILLWAY ST.
ROCKY
BUTTE
ROCKY BUTTE STATE PARK
SISKIYOU
MORRIS
GREGORY HEIGHTS SCH. PARK
GLENHAVEN PARK
MADISON HIGH SCHOOL
KNOTT
SACRAMENTO
RUSSELL
ROSE CITY GOLF COURSE
RIVER
BRAZEE
THOMPSON
EUGENE
RICE SCH.
LEE SCH.
TILLAMOOK
80 N
30
HANCOCK
HANCOCK PARK
BROADWAY
HALSEY
CLACKAMAS ST.
CLACKAMAS
WASCO
COUCH
MULTNOMAH
HASSALO
HOLLADAY
PACIFIC
WILCOX SCH.
OREGON
MULTNOMAH SCHOOL OF THE BIBLE
MONTAVILLA PARK
213
IRVING
HOYT
GLISAN
NORTHWEST COLLEGE OF THE BIBLE
FLANDERS
TEMPLE CHRISTIAN SCH.
COLUMBIA CHRISTIAN HIGH & ELEM. SCH.
EVERETT
VESTAL SCH.
DAVIS
DAVIS ST.
BURNSIDE
ANKENY
ASH
PINE
OAK
STARK
WASHINGTON
ALDER
RUSSELLVILLE

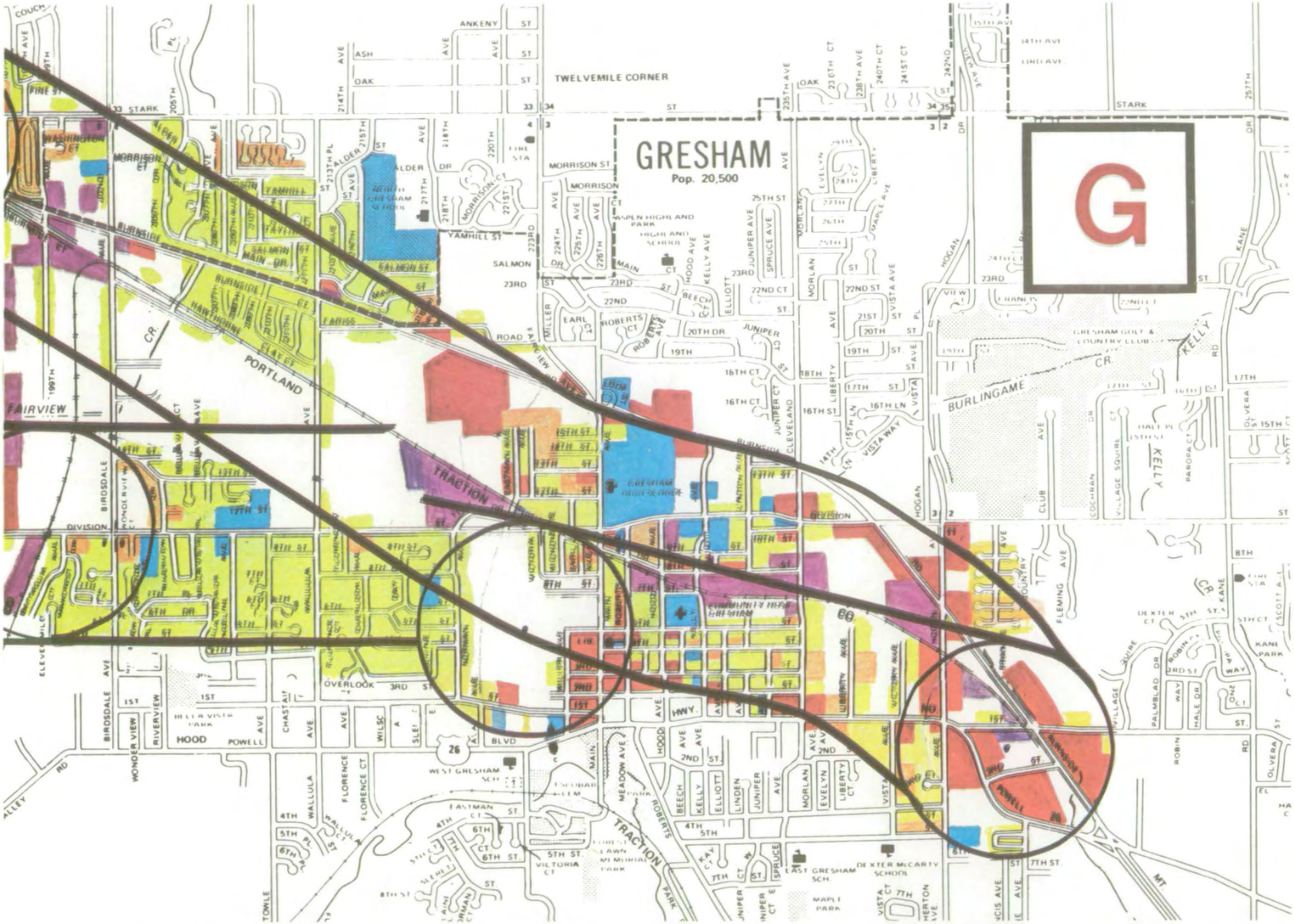


D
MOUNT TABOR PARK
RES.
HOSPITAL
PORTLAND ADVENTIST ACADEMY
BERRYDALE PARK
CLARK SCH.
BRIDGER SCH.
HARRISON PARK
BINNSMEAD SCH.
WARNER PACIFIC COLLEGE
CHERRY PARK SCH.
CHERRY BLOSSOM PLAYGROUND
YOUNGSON SCH.
KELLY BUTTE
KELLOGG SCH.
ESSEX PARK
MARSHALL HIGH SCHOOL
KERN PARK
LAURELWOOD PARK
MULTNOMAH CEMETERY
MARYSVILLE SCH.
LENTS PARK
LENTS SCH.
ARLETA SCH.
FOSTER SCH.
BLOOMINGTON PARK
MT. SCOTT PARK
WOODMERE SCH.
GLENWOOD PARK
DIVISION
CLINTON
POWELL
MT. HOOD HWY.
HAWTHORNE BLVD.
FOSTER RD
WOODSTOCK
HOLGATE
DUKE
NO. 26
NO. 68
26
213



E
HALSEY
WEIDLER
CLACKAMAS
WASCO
HASSALO
HOLLADAY
PACIFIC
OREGON
IRVING
PACIFIC CT.
ST. THERESE SCH.
GLENDOVEER GOLF COURSE
GLISAN
WASHINGTON ST.
MIDLAND LIBRARY PLAYGROUND
ALDER ST.
MORRISON
YAMHILL
TAYLOR
SALMON
MAIN
MADISON
HAWTHORNE
MARKET
MILL
STEPHENS
HARRISON
DAVID DOUGLAS JR. HIGH
NORTH POWELLHURST PARK
NORTH POWELLHURST SCH.
PORTLAND CHRISTIAN HIGH SCH.
PORTLAND CHRISTIAN SCH.
POWELLHURST
DAVID DOUGLAS HIGH SCHOOL
MILL PARK SCH.
MILL PARK
LINCOLN PARK
LINCOLN PARK SCH.
FLOYD LIGHT PARK
CLINTON ST
FRANKLIN ST.
POWELL
26
RHINE
RHONE
BUSH
CENTER ST
GLADSTONE
BOISE
CORA ST
MALL ST.
EARL PARK
BOYLES SCHOOL
GILBERT HEIGHTS


F
GRESHAM
Pop. 21,000
HALSEY
CLACKAMAS
WASCO
MULTNOMAH
COLUMBIA VIEW INTERMEDIATE SCH.
HASSALO ST.
HOLLADAY
COLUMBIA VIEW PARK
PACIFIC
OREGON
HARTLEY PARK
ROCKWOOD HARTLEY SCH.
IRVING ST
HOYT
GLISAN
ROCKWOOD DAVIS SCH.
ALDER
WASHINGTON
MORRISON
ROCKWOOD ALDER SCH.
YAMHILL
TAYLOR ST.
HAROLD OLIVER MIDDLE SCH.
SALMON
LYNCH PLAZA SCH.
PARKLANE PARK
ROCKWOOD PARK
MAIN
MADISON
HAWTHORNE BLVD.
MARKET
VANCE PARK
LYNCHVIEW PARK
LYNCHVIEW SCH.
CLAY
MILL
STEPHENS
HARRISON
GRANT
BUTTE
KELLY
FRANKLIN
HAIG
RHINE
LYNCHWOOD SCH.
PERSHING CT.
LAFAYETTE
RHONE CT.
MT. HOOD
POWELL
CENTENNIAL HIGH SCH.
PORTLAND ADVENTIST SCHOOL
MARIE
BUSH
FRANCIS
PORTLAND TRACTION
BLVD.
NO. 26



GRESHAM
Pop. 20,500
G
TWELVEMILE CORNER
STARK
ANKENY
BURNSIDE
PORTLAND
FAIRVIEW
DIVISION
TRACTION
POWELL
BLVD
HOOD
HWY.
BURLINGAME
GRESHAM GOLF & COUNTRY CLUB
GRESHAM HIGH SCHOOL
WEST GRESHAM SCH.
EAST GRESHAM SCH.
DEXTER McCARTY SCHOOL
ASPEN HIGHLAND PARK
HIGHLAND SCHOOL
BELLA VISTA PARK
KANE PARK
MAPLE PARK
26

significance is the Lloyd Center located along Multnomah between 9th-15th. It is a regional shopping center containing numerous private and public office buildings in addition to the retail complex.

Residential land use becomes more predominant east of 15th Avenue, north of the Banfield, and east of 28th Avenue, south of the Banfield. This usage presents a mix of older single family and relatively recent multi-family structures. Public/semi-public uses, as well as parks and open space serving this area, are dispersed along the corridor. Public/semi-public facilities include: U.S. Department of Interior complex, Bonneville Power Administration, Benson Polytechnic, Fernwood School, The Mann Home, Laurelhurst School, Providence Hospital, state office facilities, and the Multnomah County Juvenile Home. In addition, numerous churches, a YMCA center, and the Portland Bureau of Fire dispatch office at 21st and Pacific are located in the Banfield corridor vicinity.

Parks and open space intended to serve the area include: Holladay Park, Buckman Field, Oregon Park, Frazier Park and Normandale Park.

Banfield Transit Station Areas. The same six transit stations are proposed in the Banfield corridor for Alternatives 4 and 5. Existing land use in the vicinity of each station is summarized in Table P-1 following page 59. Land use becomes less intensive and more mixed (residential, commercial and industrial) as one proceeds eastward from the "Downtown Connection" to the Gateway area in the Banfield corridor proper. Most of the area within one-fourth mile of the stations is developed, which limits redevelopment opportunities oriented towards increased public transit use. (There is some overlap within the one-fourth mile radius of the Coliseum, Union-Grand and Lloyd Center station sites.)

The area in which the Coliseum station would be located is presently dominated by roads and underused properties such as parking lots and vacant land. The land immediately adjacent to the station area is right-of-way for the I-5 freeway. The properties within the station service area which are developed are generally industrial or commercial in nature. The Holladay Park Hospital is located within both the Coliseum and the Union-Grand station service areas.

The Union-Grand Avenue station "lies at the hub of major district roadways in an area zoned light industrial - a situation already recognized by four hotel/motel chains which have developed facilities in the area." (14, p. 15) Most of the land in the vicinity is in commercial use. Besides Holladay Park Hospital, school administration offices, two churches and the U.S. Department of Interior offices are located within one-fourth mile of the proposed Union-Grand station.

The Lloyd Center would be the primary focus of a transit station in its vicinity. The Lloyd Center station sites under consideration on Multnomah and Holladay Streets are near Holladay Park. The U.S. Department of Interior offices, Bonneville Power Administration offices, and Benson Polytechnic are also located in the Lloyd Center station service area.

Several alternative station sites near 39th Avenue are being considered for the Hollywood district, which is an old commercial core area for Portland's northeast neighborhoods. The diversity and intensity of development in this center tend to be pedestrian-oriented. North of the Banfield, commercial uses predominate, while south of the Banfield residential land use is prevalent.

Large industrial complexes north of the Banfield, and the state offices to the south comprise a large portion of the 60th Street station service area. North of the industrial properties, east of the state office facilities, a mixture of single and multiple family residential use has developed. The southeast portion of Normandale Park is also within this service area.

The 82nd Avenue station area is typified by concentrated commercial land usage along 82nd; some light industrial use along the Banfield; and predominantly single family uses behind the commercial strip along 82nd Avenue. Also, an elementary school is located in the northwest quadrant and the Oregon Bus Service has a large facility in the southwest quadrant.

Low Cost Improvement Routes (LCI). All of the LCI streets have a predominance of industrial and/or commercial uses in the western portion of the routes. Residential activity increases east of 21st along most routes, while many commercial properties are located intermittently along the arterials. Residential activity also increases to the north and south of the land uses shown on the mapping which accompanies this report. The Regional Framework Plan Map shown in Figure P-3 provides a general picture of this development.

Of particular significance on the Broadway/Weidler/Sandy/Halsey route is the Memorial Coliseum, a regional sports complex and recreation center located at the west end of the alignment on Broadway and Williams. Some industrial activity has developed along Broadway and Halsey where these routes are in close proximity to the Banfield. Sandy (from Broadway to I-205) is characterized by strip commercial activity. The Shriner's Hospital for Crippled Children on 82nd and Sandy and the Grotto on 85th and Sandy are significant land uses along this route. The natural setting of the Grotto provides substantial open space along Sandy, While Normandale Park, south of Halsey, is the only other large recreational area along the Broadway/Weidler/Sandy/Halsey route.

The scattered commercial uses along the LCI routes are noticeably absent along Burnside between 32nd and 47th Avenue in the Laurelhurst residential area. The Belmont/Morrison route has the least intensive development of the LCI routes. Of particular significance are the county offices at 20th and Morrison, Glencoe School at 49th and Belmont, and the Portland Adventist Hospital, at 60th and Belmont. The Lone Fir Cemetery is located between 20th and 26th along Morrison.

Sixtieth Avenue is a narrow residential street with the exception of the hospital and Mt. Tabor Park, a regional park and recreation area located east of 60th from Madison to Division.

Land Use Trends. The East Portland Study Area is urbanized and is already extensively developed. Population projections for the year 1990 indicate a slight increase in population, while employment is forecast to increase sharply, approximately 53% over 1970 levels. Most of this employment is expected in commercial and light industrial uses. Expansion of heavy industrial uses should be minimal because of the lack of large parcels. A general infilling of underutilized properties and an overall intensification of use is occurring. Single family residential use is declining slightly, particularly along major arterials, where a conversion to commercial use and multiple family housing is occurring. Many large, older, single family dwellings are undergoing this type of transformation. This trend can be expected to continue.

The City of Portland does not have an adopted land use plan for this area. Neighborhood groups have formed or are in the process of forming. (See Social Environment Report.) Neighborhood plans which have been completed to date have emphasized protection of single family dwellings from commercial/multi-family encroachment.

East County Study Area

Planning Responsibilities and Plan Status. A large portion of the East County Study Area is outside municipal boundaries and is under the jurisdiction of Multnomah County. Portland, Gresham, Troutdale, Wood Village and Fairview also have jurisdictional responsibilities in the study area.

Multnomah County. Multnomah County is in the process of preparing a revised comprehensive plan which will comply with state and regional goals and guidelines. Completion of the plan is expected in 1979 or 1980. The plan is being developed in three stages: A "Framework Plan," a "Development Plan," and an "Operations Plan." The "Framework Plan" was circulated for final review by citizens and adopted in July, 1977. This portion of the plan establishes an urban growth boundary; defines urban, rural and natural resource areas; and designates goals, policies, strategies and standards to be applied in the "Development Plan" and the "Operations Plan."

Essentially, the "Development Plan" will be an amplification of the Framework and includes "Functional Community" plans. The urban and future growth areas are the primary focus. Contained in the plan will be all of the statewide goal requirements not addressed in detail in the "Framework Plan." Because community issues, needs and values will vary, the plan will be individualized for local areas. The "Operations Plan" would consist of measures designed to carry out the "Framework" and "Development Plans." (9, p. 2)

> By February, 1978, a refinement of the urban [growth] boundary is to be completed [by CRAG]. This effort will identify immediate growth areas and future growth areas as well as defining a plan for staging growth through the orderly provision of urban services. It should be noted that [the area contained within] the proposed urban boundary drawn at the eastern city limits of Gresham and Troutdale includes land already committed to urbanization and the emphasis will be on infilling the area, increasing density levels and staging growth.
>
> Adoption of the eastern urban [growth] boundary removes vast acreage from potential suburban low-density sprawl. It provides the framework to proceed with efficient land use development within a definite contained area. Emphasis in the adopted Multnomah County Plan policies are on infilling of the existing urban-suburban area, increasing urban densities and supporting increased transit usage through land use policies.
>
> The policies emphasize improving transit service to provide a more balanced transportation system which conserves

energy, enhances the community environment, enhances transit rider convenience and reduces travel time. In addition, the plan policies call for:

- locating population concentrations, commercial centers, employment centers and public facilities where they can be served by public transportation
- increasing overall densities in urban areas
- increasing density and intensity of development to reinforce transit corridors and centers and employment and commercial centers

These policies will be pursued in the development of urban area plans. Detailed community plans for the urban area are scheduled to be completed by mid-1978. These plans will delineate appropriate uses, densities, location of uses conforming to the policies and strategies set forth in the Comprehensive Framework Plan. In addition, immediate urban growth areas and future urban growth areas are to be defined as stipulated by the adopted CRAG Plan Element. As the urban area plans which reveal the location of more intense development areas are completed, appropriate water, sanitary sewer, lighting, road improvements will be programmed to support the priorities set forth in the plans. (18, p. 5)

Local Jurisdictions. As previously indicated, Portland, Fairview, Gresham, Maywood Park, Troutdale and Wood Village also have jurisdictional responsibilities in the East County Study Area. These local jurisdictions have arrived at schedules to bring local plans into conformance with the state planning goals and guidelines. The compliance schedule of the cities in East Multnomah County is:

Maywood Park	Nov. 1977 (temporary extension)
Gresham	June 1980
Fairview	June 1977
Wood Village	June 1980
Troutdale	June 1978

Preliminary work on the transportation sections of the plans by key jurisdictions, such as Gresham and Multnomah County, has emphasized an increase role for transit. (18, p. 2)

Transportation Planning. "The transportation plan for East Multnomah County is based on the I-205 and subsequent policy decisions by the County and East County cities and has been developed with the assistance of Fairview, Wood Village, Troutdale, Gresham and Maywood Park." (15, p. 376)

The county's transportation policy is to implement a balanced, safe and efficient transportation system. It is the county's policy to support transportation proposals which implement the Comprehensive Plan; protect or enhance water and air quality, and reduce noise levels; protect social values and the quality of neighborhood and communities; and support economic growth. The county is also committed to equality of access to urban opportunities; the degree of mobility available to all people in terms of alternative types of transportation; energy conservation and efficiency; system flexibility; and pedestrian crossing and safety. (3, p. 304)

In order to achieve the best possible public transportation system, the county policies support increased density levels in the urban area; concentrated population, commercial and employment centers and public facilities to promote public transportation use; and an improved transit system to make it a more attractive and effective transportation option. (3, p. 310)

The county also intends to establish a street classification system and improve streets accordingly, as well as maintain and improve the existing trafficways to maximize capacity rather than to construct new facilities. (3, p. 306)

Existing Land Use. Existing land use for the East County Study Area is shown in Figure P-14 (Parts C, D, E, F, and G). The East County Study Area consists of suburban and rural sections of Multnomah County. Single family residential use is predominant. However, the number of multiple family dwellings is increasing, expecially along major arterials. As the regional land use map (Figure P-3) indicates, most of the concentrated commercial land use in the East County Study Area is located along Halsey, Stark, Division, Powell, 102nd and 122nd and 182nd. Gresham, the study area's largest city, is a growing commercial center for East Multnomah County.

Some industrial use has developed adjacent to the Banfield and immediately east of 181st Avenue. Parks, recreation areas, and public/semi-public land uses are dispersed in the study area. Glendover Golf Course, Gresham Golf and Country Club, and Powell Butte are prominent parks/recreational areas, as indicated on the regional land use map. Lands in agriculture, forest or open space are dominant uses in the southeast portion of the study area.

The light rail transit alternatives along Burnside and Division necessitate a study of these streets east of I-205. Discussion of alternatives 5-3a and 5-3b will concentrate on the station areas, where most land use impacts are expected to occur.

Burnside Corridor (LRT Alternatives 5-1a, 5-1b). Burnside Street is largely single family residential. Many of these single family homes are located on large lots. East of 160th Avenue medium density multi-family residences increase, especially at intersections up to 199th Avenue.

Commercial use along the Burnside route is clustered activity near Gateway, 102nd, 122nd, and Stark. Commercial uses also increase as the central area of Gresham is approached.

Light industrial use is mixed with commercial and single family residential uses between I-205 and 102nd Avenue in the Burnside corridor. A 9-acre industrial parcel is located on Glisan and 120th. However, most industrial use is concentrated at the junction of Burnside and the Portland Traction Line and further east along the traction line, where the rail facility provides for transport of materials.

The following community services maintain facilities in the Burnside corridor: Multnomah County I.E.D., County Health Department, U.S. Forest Service, Social Security, Ventura Park School, Glenfair School, Rockwood Park School, Rockwood School, and Gresham Union High School. In addition, a convalescent hospital, two nursing homes and various churches are located in this corridor.

Recreational area is provided in this corridor by open space connected with school properties and a baseball diamond located on Burnside between 133rd and 136th Avenues.

Vacant properties are almost exclusively located east of the Stark/Burnside intersection, along the Portland Traction Line. Other vacant properties are widely dispersed due to the suburban-rural nature of the East County Study Area. However, east of 192nd, land conversions from vacant to urban uses point to the progressive trend toward urbanization of this area.

Future land use in the Burnside Corridor can be expected to consist of single and multiple family residential development with some commercial retail development. The form this development takes will depend on whether or not the light rail mode using Burnside Street is selected. If light rail Burnside is selected, significant opportunities exist to orient future development to support transit, especially in the transit station zones. These opportunities are evaluated in the discussion of land use impacts under "Land Development Opportunities."

<u>Burnside Street Transit Station Areas</u>. Tables P-2 (gateway) and P-3 following pages 64 and 69 summarize the existing land uses and developmental opportunities associated with the Burnside Street Transit Station Areas. The following discussion is intended to highlight the predominant or particularly significant uses found in the vicinity of the proposed stations. Refer to the existing land use portion in the I-205 - Lents Section for a discussion of the Gateway station service area.

The service area for the 102nd Avenue station has mixed land uses. The area is typified by medium density single family development with some local commercial, small industrial, and community service uses oriented to existing arterials at 102nd and Burnside. Of particular significance are the Multnomah County I.E.D. offices, church offices and a nursing home.

The 122nd Avenue station area "existing land conditions are dominated by the strip commercial nature of 122nd. Conditions here, however, are somewhat atypical for 122nd, as large areas of commercially zoned land lie dormant.... A varying mix of single family development is the dominant use behind the strip development along 122nd." (18, p. III.D.4) There is also a large parcel of industrial use on 120th and Glisan, and the County Health Department and U.S. Forest Service maintain facilities on 122nd and Glisan.

The 148th Avenue station area "is currently stable low density single family residential with limited duplex/apartment development adjacent to 148th south of Burnside. Large amounts of vacant land are scattered throughout the station service area." (18,p. III.D.4) Multiple family units have been developing on 148th Avenue between Burnside and Stark.

Multiple family development has been increasing in the service area for the proposed 162nd Avenue transit station. It is the dominant use, surrounded by single family and vacant properties.

Existing land conditions in the vicinity of the 172nd Avenue station area "are undergoing a period of transition from uniform low density residential to higher intensity multiple family. The predominant use remains single family." (18,III.D.4) North Rockwood School and Park, a land use compatible with the current residential setting, is located northeast of 172nd Avenue. "The triangle of Burnside, 181st and Stark represents a major auto-oriented mixed use center in East County.... The [181st Avenue] station service area is largely built up with a mix of multiple and single family residential uses along with the commercial pocket" (18,III.D.4) at the intersection and in the southeast quadrant. There is also a large vacant parcel between Couch and Everett east of 181st. A church, adjacent school and library north of Stark Street occupy much of the southwest quadrant of the station area.

"Existing uses [in the 192nd Avenue station area] include large amounts of open space, scattered single family and multiple family residential, some commercial, and limited industrial activity on the southeast periphery of the station area." (18,III.D.4) The Rockwood Water District has a water storage tank in the southeast quadrant. Residential subdivisions occupy most of the northwest and southwest quadrants, while a sand and gravel pit is predominant in the northern portion of the northeast quadrant.

The eastern terminus of the Burnside LRT route would be either the Fairgrounds or on First and Burnside. Land use within a 1/4 mile radius of the proposed station location at the Fairgrounds is predominantly property associated with the Fairgrounds itself. There is also some residential activity northeast and some commercial activity southeast of the proposed facility.

The proposed alternate Gresham station at 1st and Burnside is "situated at the eastern edge of Gresham in a rapidly developing area.

The station service area contains large amounts of as of yet undeveloped land, new automobile-oriented commercial/suburban shopping centers, including a Fred Meyers Center, and multiple family development." (18, III.D.4)

Division Corridor (Alternatives 5-2a, 5-2b). "The existing land use pattern along Division is highly auto-oriented." (13, p. 6/1) Division Street, as a major traffic street, has far more intense land use and a wider variety of uses along the arterial than does Burnside Street. Residential use, in general, tends to be located off the Division Street frontage. Most of the multiple family dwellings are located west of 174th Avenue, and many are in the form of large complexes.

Division, as a major traffic street, has spawned strip commercial development throughout its length, and intensifies somewhat in the vicinity of major intersections. In fact, commercial use in this corridor is located almost exclusively along Division Street, with the exception of dispersed commercial use in Gresham.

Most of the industrial use occupies large parcels. Heavy industry is dominant due to two large gravel pits located in the corridor: one at 106th on Division and the other to the north of Division on 190th Avenue.

Community services in the Division Street corridor include: Cherry Park School, West Powellhurst School, Lincoln Park School, Lynch Park School, Lutheran High School, and Lynch Terrace School. In addition, the school district, water district, U.S. Forest Service, General Telephone, and the state have facilities in the Division corridor. An electric substation, various churches, the Elks, a hospital, and a communications center on Kelly Butte are also located in this corridor.

There is less vacant or agricultural property in the Division corridor than in the Burnside corridor. Most of it is located east of 182nd Avenue. A considerable amount of vacant, developable land is found in the center of large residential blocks. As indicated in the Burnside corridor description, much of this vacant property is not shown on the accompanying maps, but may be viewed at the county offices.

Division Street, being a major four-lane intra-county arterial with a full interchange planned with I-205, will probably continue to attract auto-oriented commercial uses in the future without the selection of the LRT-Division Street option and application of strong land use controls. Other major land development in the corridor should largely consist of multi-family dwelling units and, to a less extent, single family residences.

Division Street Transit Station Areas. Tables P-2 (Gateway, Mall 205 and Division), P-3 (Gresham site), and P-4 following pages 64 and 69, describe existing and proposed land use around Division Street transit station areas. Refer to the I-205-Lents station area discussion in this report for existing land use within the Gateway, Mall 205, and Division station services areas.

"The 122th and Division intersection is, presently, very low key, featuring a fast food restaurant, gas stations and similar auto dependent uses. Limited multi-family redevelopments have occurred around this intersection in compliance with the previous County comprehensive plan...The principal urban feature in the corridor segment between 115th and 129th Streets along Division is the complex of auto-generated mixed commercial, multi-family residential and office uses at, and around the 122nd intersection." (13, p. 6/11) "Some multiple family pockets have developed on the fringe [of the station service area], but single family is the predominant development type behind the strip." (18, III.D.4) development along Division.

The process of intensified land use redevelopment is occurring in the vicinity of 136th Avenue in the form of new townhouse and apartment developments. "The remainder of the station service area has numerous instances of large but, lower improvement value single family residences....The County Comprehensive Plan allows limited commercial and extensive multi-family uses in the area." (13, p. 6/12)

There are approximately 350 apartments and an 80-unit mobile home park in the station service area around the 148th Avenue intersection. "Commercial land uses, though allowed by the comprehensive plan and zoning, have not matured--being presently...represented by strip commercial, a small grocery store (±18,000 sq.ft.) and a moderately large restaurant and bar. Part of the commercially zoned land in the southwest quadrant of the intersection is vacant, but according to County staff, development plans for this parcel have been approved." (13, p. 6/12)

Existing commercial development in the 162nd Avenue station service area is relatively "cohesive, but remains very small, convenience shopping. The northeastern quadrant of the intersection is completely occupied by a school. The other quadrants are occupied by single family residences, modest apartment units and miscellaneous strip commercial along Division." (13, p. 6/13)

The 170th Avenue station area has a core of multiple family development. North of the 170th Avenue station location lies a 300-unit mobile home park. There is also an abundance of vacant and large parcel, lower improvement value land in the vicinity. (13, p. 6/14)

"A 'neighborhood' node of auto-oriented commercial development has occurred in the northeast quadrant of...[the 181st Avenue] intersection... The southeastern quadrant is used by a well-established auto dealer." (13, p. 6/15) The northwest quadrant contains a substantial single family neighborhood, while the southwest quadrant is dominated by a...school. "The remainder of the 1/4 mile station service area is occupied by established single family neighborhoods." (13, p. 6/15)

The 199th Avenue station area is largely undeveloped open land, "a greenbelt between urban pressures from the east, north, and the west." (18, III.D.4) Part of the station area is being quarried for gravel. The Forest Service and Rockwood Water District also occupy properties in this service area.

Refer to the Burnside LRT section on existing land use for a description of the alternative Gresham station areas.

I-205 and Lents Corridor (portions of alternatives 5-1a, 5-1b, 5-2a and 5-2b; all of alternatives 5-3a, 5-3b). As evidenced by Figure p-14 residential land use predominates in the area between proposed transit stations. The corridor itself is largely vacant, since it consists of right-of-way to be used in the future construction of I-205 (fully operational within five years).

Future land use in the I-205 corridor, and especially surrounding proposed transit stations, will largely be influenced by whether or not a busway or LRT facility is constructed and whether land use controls will be sufficient to minimize land use nonsupportive of public transit. Present comprehensive plan designations and zoning would allow a proliferation of auto-related uses such as motels, restaurants and service stations to occur. Opportunities to reorient future development in a manner consistent with improved public transit productivity is discussed in the impact section under "Land Development Opportunities."

I-205 and Lents Route Transit Stations. Table P-2 (following page 64) summarizes the existing land use and developmental possibilities for the proposed I-205-Lents station areas. The proposed Gateway station would be located in a "strategic position at the intersection of existing and proposed regional transportation systems." (18, III.D.4) A growing regional commercial center is located adjacent to the proposed station. "The area around the station zone is not now very amenable to pedestrians being dominated by auto-oriented mixed commercial uses." (13, p. 7/20) "The existing pattern of development is split between the commercial core running from the Gateway Center out Halsey/Weidler and single and multiple family development to the south." (18, III.D.4)

The areas around the Mall 205 station site "are for the most part quite stable. To the west commercial uses line both sides of Stark. Other areas are residential with homes in standard condition. Clark School is located within the neighborhood to the southwest. To the east of the alignment the major land uses are Mall 205, a private school and hospital, and other commercial uses. In the northeast area, new commercial uses have developed but are intermixed with low intensity uses...To the southeast, Mall 205 is the major shopping center in this area. South of the Mall and west of the new hospital, there is a large tract of land with a private school on it, the Portland Adventist Academy." (18, III.D.4)

Much of the area surrounding the Division Street station area is residential, with some low intensity strip commercial at the intersection and farther west on Division. There are also several acres of vacant, and in some instances state-owned land, adjacent to the station to the west and to the north. (18, III.D.4)

The Lents commercial center is located immediately adjacent to the site of the proposed Lents transit station. Multiple family residential is increased to the west and east of the site, while single family predominates to the north and southwest and industrial activity to the southeast. "In recent years, due in part to the increased traffic moving through the commercial center from the opened I-205, the Lents commercial center has experienced a significant rate of deterioration and abandonment." (18, III.D.4)

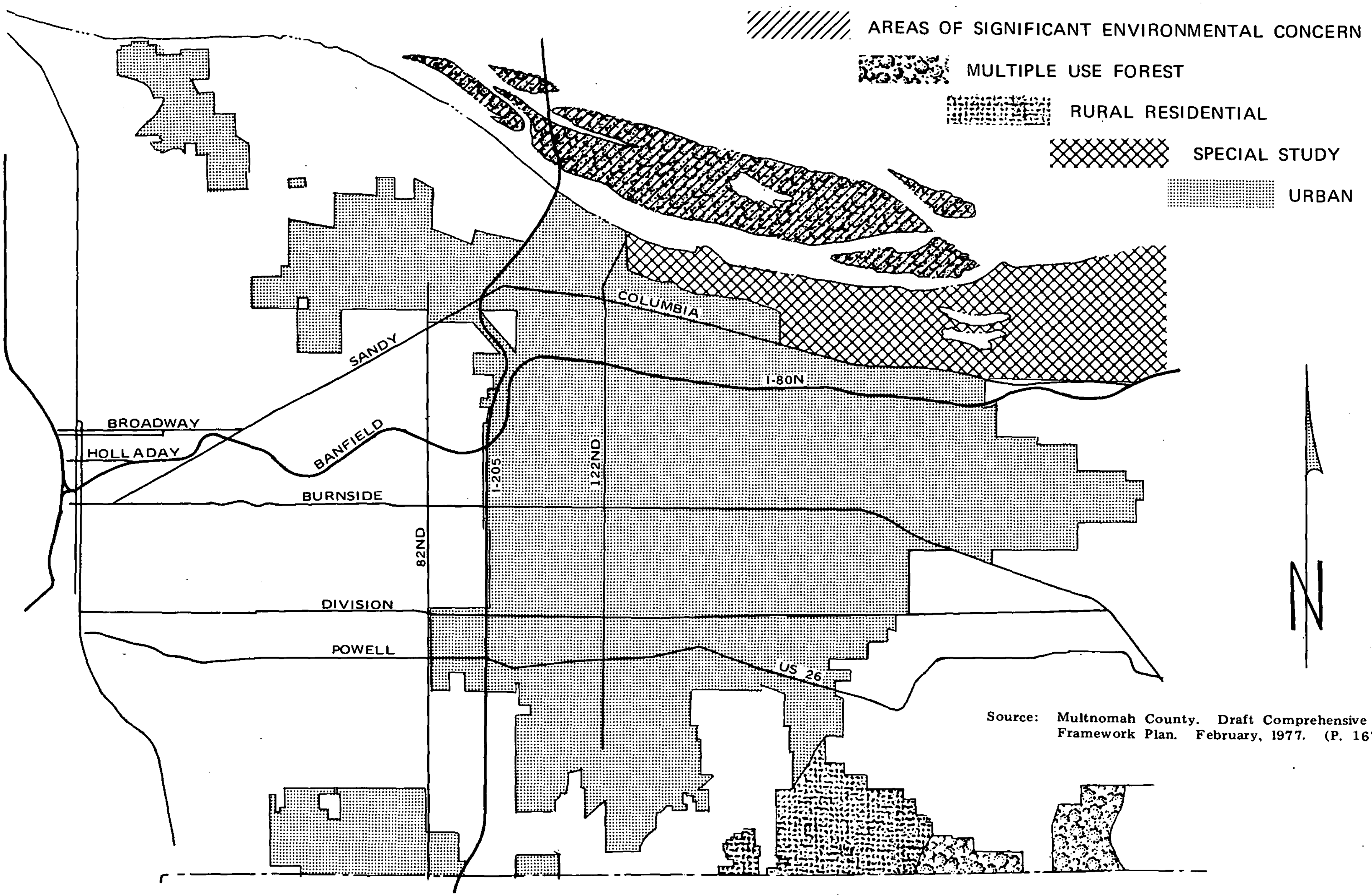
Land Use Trends. East County Study Area growth has been steady for many years, taking the form of leap-frog development since the early 1960's. "Historically Multnomah County's most intense urbanization pressures have occurred to the east along Division and Burnside streets, and the construction of the Mt. Hood freeway was expected to accelerate that trend. However, the abandonment of freeway plans has reduced the intensity of the eastward urban movement, effects of which will continue to be felt as the corridor and service areas are replanned in the next few years.

Considerable development pressures are occurring, however, in the east county communities, along portions of Columbia River industrial areas and in several areas adjacent to Washington and Clackamas counties." (12, p. 18)

"Development in East Multnomah County is presently continuing at a stable rate. There is a substantial amount of vacant and redevelopable land proximate to existing urban services which continues to be converted to residential, commercial and industrial uses." (18, p. 13) Population forecasts for the Portland Metropolitan area indicate that most future residential development in the east side will occur east of I-205. (See Social Research Report)

> The focus of higher intensity uses on the existing comprehensive plan is the arterial grid. The arterials include Sandy Boulevard, Halsey Street, Glisan Street, portions of Burnside Street, Stark Street, Division Street, portions of Powell Boulevard, 102nd Avenue, 122nd Avenue, portions of 148th Avenue and 181st Avenue. Commercial, industrial and multi-family uses are dispersed along the arterial system. Larger commercial and multi-family use designations are shown in the Gateway area from I-205 to 102nd Avenue and from Main Street to Halsey Street and the Rockwood triangle (bounded by 181st Avenue, Burnside Street and Stark Street). In Gresham, the downtown area north of Powell Boulevard from the old Fairgrounds site to Hogan Avenue and Burnside Street from Eastman Avenue to Powell Boulevard have extensive commercial designations. Major industrial designations are found between the Columbia River and Sandy Boulevard, at the Union Pacific Industrial area (bounded by 181st Avenue, I-80N, Halsey Street and 190th Avenue), south of Powell Boulevard from 162nd to 182nd Avenues with Johnson Creek on the south and along the Portland Traction right-of-way from Division to Yamhill/Burnside Street. Zoning of higher intensity uses follows the same arterial grid pattern but is not as extensive as the plan.

FIGURE P–15
MULTNOMAH COUNTY DRAFT FRAMEWORK MAP



Source: Multnomah County. Draft Comprehensive Framework Plan. February, 1977. (P. 167)

> Between 1960 and 1976 the number of multiple family units has grown dramatically. In 1960 multiple family units made up three percent of the housing stock of the study area. By 1976, 26% of the housing was in multiple family units. The increase in multiple family units accounted for 53% of the multiple family unit increase in the East County study area.
>
> An examination of what has happened between 1960 and 1975 is an aid in viewing the next fifteen years. In 1960 the population of the study area was about 102,000. By 1970 the population had grown to 137,000; by 1975, 151,000. The population growth between 1960 and 1970 represents a 10% increase. For both time intervals, a higher rate of growth was experienced by the East County Study Area than was experienced by the SMSA. (18, p. 13-14)

The Urban-Rural Growth Management Policy in the Multnomah County Draft Comprehensive Framework Plan is intended to direct growth into appropriate locations, which will lead to an infilling of urban uses. The urban, rural, and natural resource designations for Multnomah County's jurisdiction in the East County Study Area is shown in Figure P-15. The majority of the East County Study Area has been designated urban, with smaller rural residential, multiple use farm and multiple use forest designations indicated in the more remote southeastern portion of the study area.

According to CRAG's regional Land Use Framework Map most of East Multnomah County which is not under county jurisdiction is classified as "urban." Small sections of "rural" and "study area" have been designated in the remote southeast portion of the East County Study Area.

LAND USE IMPACTS OF PROJECT ALTERNATIVES

Changes in accessibility caused by transportation improvements influence land use, but do not determine particular types and patterns.

Ultimate uses of the land are guided by policies and plans set forth by local governments. In the case of the subject transportation proposal, major opportunities exist to orient future land use to support both public transit and the efficient provision of other public services such as sewer and water. These opportunities stem from the multi-modal nature of the project in addition to land use policies adopted in Multnomah County's Comprehensive Framework Plan.

In part, these policies call for "locating population concentrations, commercial centers, employment centers and public facilities where they can be served by public transportation, and increasing density and intensity of development to reinforce transit corridors...." (9, p. 300-316) These policies provide the framework from which mutually reinforcing land use and transportation plans can be implemented.

The land use impacts of the Banfield Transitway Project alternatives will be divided into two parts. The first impact topic will be entitled "Conformance to Planning Documents," and will evaluate the conformance of proposed alternatives with adopted state, regional, county and city plans and policies. The second topic concerns "Land Development Opportunities" given past trends and the present context of plans and policies. Immediate land use conversions for right-of-way purposes are the only primary impacts associated with land use. These impacts are covered in the Right-of-Way Research Report in this document and will not be repeated in this section. All of the predicted land use conversions discussed here are considered secondary, and unless otherwise stated, are long-term impacts.

An analysis of the types of developmental pressures exerted within the three study areas is found in the Economic Research Report.

Conformance With Plans and Policies

When evaluating conformance with transportation plans, it is necessary to consider the fact that planning is an ongoing process and that alterations to the plans are often deemed appropriate. Specific designations, such as the ITP projects and some of the classifications in the Arterial Streets Classification Policy (ASCP), are only indications of alternatives developed at the time the documents were prepared, and are subject to reevaluation and change within the policy framework. It is within this context that conformance evaluations are made.

All of the current plans and planning trends encourage development adjacent to regional trafficways and transitways, and emphasize an increased role of transit and the necessity for orderly growth. This growth should occur extensively within the urban growth boundary and less intensively outside the urban growth boundary. In general, development which is predicted to occur with the Banfield Transitway alternatives may or may not be compatible with the goals and guidelines established for the area. Local jurisdictions would have to assess and resolve potential conflicts.

The following discussion of impacts for the Banfield Transitway alternatives is intended to concentrate on conformance with the transportation elements of most of the given plans.

<u>LCDC Goals</u>. Alternative 1 (No-Build) is inconsistent with the aspect of the LCDC Transportation Goal #12, which emphasizes reliance on various modes of transportation. The no-build alternative does not encourage greater use of public transit (although use would increase over existing levels) and, by implication, reinforces the existing principal reliance on the automobile. In addition, congestion predicted to accompany the no-build is in conflict with policies aimed at strengthening the local and regional economy by facilitating the flow of goods and services, and with city and county policies encouraging improved transit and traffic movement.

The following aspects of the LCI alternatives (2a and 2b) conform to LCDC's requirements: Increased reliance on public transit is fostered; the regional flow of goods and services is improved, thereby strengthening the regional economy. However, Alternative 2a is similar to the no-build and is not as effective as Alternative 2b in improving transit and traffic flow because 2a would not improve the Banfield Freeway east of 37th. The following impact of the LCI alternatives does not conform to LCDC goals: parking removal and access reduction adversely affects adjacent businesses, thereby having a negative effect on the local economy.

The HOV, exclusive busway and LRT alternatives are all in conformance with the LCDC transportation goal in that there is emphasis placed on multi-modal transportation, and the flow of goods and services with resultant strengthening of the local and regional economy would be improved. HOV alternative 3a would be the least effective in improving travel because it does not provide for widening the Banfield east of 37th.

The exclusive busway and the LRT alternatives are comparatively more effective that the HOV alternatives in attracting public ridership, although the difference in 1990 ridership is only about 5 percent.

The LCDC goal on transportation further states that a transportation plan shall "conform with local and regional comprehensive land use plans." Therefore, if an alternative does not conform to local and regional plans, it can be considered in conflict with LCDC goals.

CRAG's Goals and Objectives and the Land Use Framework Element. The same criteria by which the alternatives are considered for LCDC compliance are applicable to CRAG's *Goals and Objectives* and the *Land Use Framework Element*.

Interim Transportation Plan. "Transit can help to achieve regional transportation goals by providing auto-free mobility within the region, and by supplementing the highway system's capacity to move people in the peak hour without additional highway facilities." (17, p. 5/2)

The no-build and LCI alternatives are not in conformance with the ITP transit corridor system designations. In addition, conflicting with the ITP, the no-build and LCI Alternative 2a "would force increased future traffic onto existing auto and local bus facilities and would perpetuate difficult and congested auto travel without providing any viable improvements." (5, iii)

The HOV alternatives are not in conformance with the ITP if a strict interpretation is made, since an exclusive bus or rail corridor was recommended. The HOV alternatives may conform, however, if a broad definition of "exclusive bus" corridor is used. In any event, these alternatives could eventually be in conformance with the ITP if a conversion to an exclusive bus or rail facility occurred. However, this conversion would be cumbersome because of additional costs and construction delays. In addition, the land use intensification envisioned with the LRT option in East County may not be possible after the short-term due to foregone developmental opportunities. Therefore, if implementation of an LRT system is postponed, the transit-supportive land use response to it would be substantially more difficult to develop.

The Busway and LRT alternatives are in conformance to the Banfield designation in the ITP, which is as an express corridor with an exclusive transitway from at least I-5 to I-205. The suburban transit stations indicated in the ITP are integrated into the exclusive bus and LRT alternatives. The additional transit stations in the Banfield corridor are more consistent than the HOV options with policies aimed at concentrating development to support public transit.

Portland Downtown Plan. Alternative 1 would not be in conformance with the Portland Downtown Plan because the no-build alternative does not promote increased use of mass transit, thereby placing continued heavy reliance on the automobile. It is predicted from traffic projects that congestion that would accompany this alternative would decrease the viability of the downtown area as the retail, office, cultural and entertainment center of the metropolitan area. Increased congestion would also discourage pedestrian and bicycle traffic in the CBD.

All of the build alternatives are in general compliance with the Portland Downtown Plan. However, traffic congestion, transit mall capacity and qualitative factors (air, noise), which are different between the modes, could eventually detract from the downtown's role as a regional center, regardless of the alternative chosen. However, the LRT alternatives would be most effective in reducing congestion and air and noise problems, and in increasing Portland Mall capacity.

Downtown Parking and Circulation Policy. The city's intent in the Downtown Parking and Circulation Policy is in part "to encourage the improvement of public transportation services to downtown, to thereby accomplish a reduction in the need for parking in this concentrated area of the region..." (2, p. 1) The no-build alternative "conflicts with the stated goals in that it does not support [greatly] increased transit use, and by implication will lead to more traffic." (7, p. 95) The no-build option is incompatible with city policies aimed at increasing the number of employment trips to the CBD taken by transit versus auto. Given the existing limits on parking spaces, public transit will have to accommodate a high percentage of CBD trips from the new employment in order for the additional employment to be realized--or parking rates and spaces will have to be relaxed. The downtown parking policy, then, will largely dictate the degree of auto congestion in the downtown area. Also, the no-build option, by placing increased reliance on the automobile and its associated congestion, would tend to decrease pedestrian and bicycle circulation in the CBD, which is in opposition to stated goals. This alternative would also "result in little direct change in 1977 conditions on the transit system." (7, p. 7)

The LCI, HOV, and busway alternatives "are generally consistent with the city's land use and traffic policies, but may conflict with the environmental goals. The long-term development of an all bus system, which would eventually require expanded bus activity on a number of other streets may conflict in other areas, by adding buses to streets presently designated as traffic access routes in the CBD." (7, P. 95)

"The LRT options are also generally consistent with the city's land use and traffic policies, and are...compatible with downtown environmental goals." Light rail transit would be most effective in substantiating downtown Portland's role as a regional center because of inherent transit capacity advantages and environmental factors which would be more favorable than other options. (7, P. 95) However, the LRT option is heavily supported by buses, and could also eventually require expanded bus activity on traffic access routes.

Arterial Streets Classification Policy. Alternative 1 is in opposition to one of the basic objectives of the Arterial Streets Classification Policy, which is the increased utilization of mass transit. The LCI and HOV alternative are consistent with this goal, as are the separated busway and LRT alternatives.

The Arterial Streets Classification Policy calls for improved capacity for transit and automobile movement, as well as the construction of exclusive transitways in the Banfield corridor. The busway and LRT alternatives are the only options which are in conformance to the Banfield designations indicated in the Arterial Streets Classification Policy. The HOV alternatives and LCI alternatives are in partial conformance with this policy in that improved traffic movement on the Banfield east of 37th would result if these alternatives were initiated. The LCI and HOV options do not, however, provide for exclusive transitways in the Banfield corridor, and, as such, are not in conformance with this aspect of the Arterial Streets Classification Policy.

The no-build and LCI alternatives would increase traffic congestion on the LCI streets and are therefore in conflict with the Arterial Streets Classification Policy. (LCI Alternative 2a would increase congestion on LCI streets more than Alternative 2b because the Banfield is not widened with Alternative 2a. However, removal of one lane of traffic during peak hours would increase congestion with both of these alternatives.) In addition, both the no-build and the LCI options could generate regional trips on Major City Traffic Streets and Neighborhood Collector Streets, which is in conflict with the policy. (The express transit route of the LCI alternative would be developed to accommodate large numbers of through buses during the peak hours.) Also, the LCI alternatives are in conflict with the Arterial Streets Classification Policy in that Broadway between 41st and 67th east of Hollywood, is classified as a Local Service Street.

Improved traffic and transit conditions occur to a greater degree with the separated busway and LRT alternatives.

Multnomah County Comprehensive Framework Plan. Similar to policies and plans previously mentioned, the Multnomah County Comprehensive Framework Plan supports increased transit usage. Conformance with this policy by the alternatives is the same as that indicated in the discussion on the Arterial Streets Classification Policy.

Policies in the Framework Plan call not only for orderly growth and increased density in the urban areas, but also for locating population concentrations, commercial and employment centers and public facilities where they can be served by public transit. County policy, then, supports clustered development with transit stations. The incentives necessary to promote this growth and location policy would not be fostered by the no-build alternative or the low cost improvement options.

Since selection of an HOV alternative would also include the construction of a busway and transit stations along I-205, HOV options conform with county policies aimed at concentrating population and employment in support of public transit.

None of the bus alternatives would extend a fixed transitway facility into the county nor would express bus lanes be established. Opportunities for intensifying land use in support of transit are therefore limited relative to the light rail potential.

The LRT options would create the greatest opportunities for compliance with county policies for orderly growth and increased densities in urban areas. This stems from the positive land development opportunities which would exist in the vicinity of light rail transit stations along Burnside or Division Streets.

Land Development Opportunities

Since the land use impact potential is significantly different in each study area, the alternatives herein are separately evaluated by study area (Downtown Portland, East Portland and East Multnomah County).

Moreover, particular attention is given to East Multnomah County, including the I-205 corridor, since major revisions in the present direction of future land use would be required around transit stations to assure uses compatible with increased public transportation use.

To better understand the importance of these changes, especially in regards to the light rail transit alternatives, two future land cases are presented for the I-205 corridor and the Burnside Street and Division Street corridors east of I-205:

1) Construction of present trends in land use in conformance with existing plans.
2) Reorientation of existing trends toward increased densities and uses which support public transit utilization.

This contrast underscores the significance of positive land use controls (comprehensive plan designations, etc.) whose purpose is to achieve maximum compatibility between land use and transportation productivity.

Downtown Study Area. None of the proposed alternatives are expected to generate developmental opportunities significantly different than no-build conditions through 1990 in downtown Portland. However, in comparison with no-build transit service potential, build options provide superior service to the downtown. Consequently, build options are more compatible with 1990 projections of population and employment in the downtown.

No-Build Alternative. If the no-build alternative is chosen, a continuation of current land use trends could be expected. A general infilling and intensification of land use in the CBD will most likely occur. Residential increases in west downtown and decreases in the core area, as well as some employment growth and office development can be expected. However, direct development stimulus is not expected without changes in the status quo. Through time fewer developmental opportunities would arise, since transportation access to the downtown would be progressively constrained. Increased traffic congestion and associated environmental consequences under the no-build alternative could also discourage development.

Although the Portland Downtown Plan calls for low density, low profile development along the waterfront, the current increased pressure for development in this area will continue regardless of the alternative chosen for this project. The no-build could affect this trend by possibly decreasing developmental pressures exerted on the waterfront area. Refer to the Economic Research Report for further discussion of developmental pressures.

LCI, HOV, Separated Busway Alternatives. The provision for improved accessibility to the downtown area afforded by the LCI, HOV and separated busway would result in increased pressure for development relative to the no-build.

To the extent that these alternatives increase public transit trips into the CBD, they are consistent with employment forecasts which indicate over a 50 percent increase in employment between now and 1990.

Most of the trips from this new employment would have to be by public transit because parking for autos will not exist.

The HOV, LCI and separated busway options, while not of themselves generating redevelopment opportunities, might become the catalyst for future extensions to the Portland Mall, to create additional transit capacity. The provision of more intensive transit service on streets outside the present mall could cause some redevelopment of adjacent buildings. This could be expected to occur because the all-bus alternatives overtax the capacity of the transit mall, thereby creating a need for mall expansion.

<u>LRT Alternatives</u>. "In the long-term, supported by the appropriate city policies, an LRT system would have considerable potential to shape development and redevelopment in the downtown." (7, p. 96) Current commercial and residential trends would be stimulated by improved access and the environmental amenities of an LRT system. Intensification and infilling can be anticipated to occur where possible along the routes, particularly around the station sites.

The two on-Mall LRT alignments (Oak Street and Pioneer Square) tend to reinforce downtown plan development policies and current trends, particulary with regard to the current north-south orientation of office development. Increased use of the Union Station Transportation Center at the Amtrak Station and associated land use conversions could result if this option is chosen. The on-Mall LRT alignments offer redevelopment opportunities for the north half of the block between Fourth and Fifth at Glisan, which would possibly be acquired for constructing a transit station. The station would occupy about half of the ground level area of this parcel, permitting redevelopment of the remainder, and the air rights above. This would, however, require the displacement of a building of historic significance potential. The location of this station, together with other supportive developments, could also affect redevelopment opportunities in the area between the Transportation Terminals and Burnside.

"It should be noted that the on-Mall alignments are generally more supportive of the existing development patterns in downtown, while the cross-Mall alignment may stimulate additional development pressures along the First Avenue access, in conflict with city planning guidelines." (7, p. 95) The LRT cross-Mall alternative does not present any significant, direct redevelopment opportunity. Indirectly, it could stimulate redevelopment in the north waterfront area, including the Northwest Natural Gas blocks, (2nd and Flanders), and along First Avenue between the Steel Bridge and Morrison and Yamhill Streets. (7, p. 96) Redevelopment on First Avenue could include use of the street air rights, for instance over the proposed station between Pine and Ash Streets.

East Portland Study Area

Developmental opportunities are limited in East Portland because it is largely a built-up urban area. Major land use conversions west of I-205 are not expected with any of the build alternatives. Current trends of increased commercial and multi-family development along arterials will continue regardless of the alternative chosen. Some minor changes could occur in association with transit stations proposed in the "Downtown Connection" (along N.E. Holladay Street and/or N.E. Multnomah Street) or in the Banfield corridor. However, transit stations in the Banfield corridor would be constructed only with a separated busway or light rail line. Table P-1 details the existing land uses and developmental opportunities in the Banfield Transit Station areas.

No-Build Aternative. This alternative would have little if any, immediate land use impacts. A continuation of current development trends in the East Portland Study Area could be expected. Doing nothing to improve traffic or public transit service in East Portland would decrease developmental opportunities since mobility in the area would be constrained as traffic congestion grows worse. For example, as traffic becomes more congested and it becomes more difficult to ship and receive goods, industrial activity along the Banfield could be discouraged. In addition, possible encouragement of additional strip commercial development and decrease in single family residences on arterial streets might be anticipated due to the increase in traffic occurring on these streets as the Banfield becomes more congested in the future. Some larger retail or office uses could be encouraged to move to East County, where congestion would be less and employers would be closer to sources of labor.

LCI Alternatives. The LCI alternatives would have significant land use impacts in the East Portland area. While commercial and multiple family uses would be generally promoted along the major arterials in conjunction with the transit system, the parking removal that would accompany this alternative would result in some significant residential and commercial land use conversions. Many of the small commercial businesses located along the transit improvement and auto improvement routes are dependent on auto commuter trade for part of their business. Without adequate parking this trade would be lost and could bring about a change from commercial to other uses. (Refer to the parking analysis in the Economic Research Report for further details.) Commercial interests in these routes, however, would increase and conversion from residential use to transit-oriented commercial use is likely where parking is available. Some existing single family residences in the area around transfer points would probably convert to multiple family and/or commercial uses.

Development opportunities stemming from these alternatives would be largely lacking. The increased use of city arterials for peak-hour express bus service is not expected to encourage development. However, Alternative 2b, which includes widening the Banfield Freeway, would establish a better atmosphere for development, in general, since congestion on city arterials would be somewhat relieved.

HOV Alternatives. The City of Portland has indicated that no major land use conversions would occur with the HOV alternatives. A continuation of current land use trends (a general infilling and intensification of properties) associated with the East Portland Study Area would occur if any of the HOV alternatives were chosen. These options (3a, 3b and 3c) would support minor developmental opportunities in the "Downtown Connection" portion of the transitway in the vicinity of the Coliseum, Union/Grand and Lloyd Center transit stations. In this respect the HOV options are similar to the separated busway and light rail options, which also would have transit stations at these three locations. Widening of the Banfield which would occur with Alternatives 3b or 3c could also promote general development in the broader area since traffic mobility on city streets would be improved.

Separated Busway and LRT Alternatives. These alternatives are the same with respect to developmental opportunities in the "Downtown Connection" and Banfield corridor proper. As with the HOV options, developmental opportunities from transit operations and station development would be minor in the "Downtown Connection." Unlike the HOV options, transit stations would be constructed in the Hollywood area, 60th and 82nd Avenues. These stations increase public transit accessibility to and from East Portland relative to existing conditions and other build alternatives. However, the predominately built-up nature of the station zones would make land conversion costs high, restricting major redevelopment opportunities. General improvements in public transit service and traffic mobility in East Portland possible with these options would be consistent with promoting general development trends in the area.

The exclusive nature of a separated busway and LRT system which contribute to higher transit ridership, would likely encourage more rapid conversion of underutilized properties in the station service area to higher densities. Concentrated commercial uses and multiple family dwellings would tend to replace lower density uses such as small commercial establishments and single family dwellings.

East County Study Area

East County has witnessed a dramatic growth over the past twenty years. Growth will most likely continue there in the near future, regardless of the transit development option chosen for the East Side. However, the alternative selected potentially has a significant bearing on the future direction of land use in the Burnside, Division and I-205 corridors.

It is well documented that mass transit facilities can help reorient development--especially fixed-route systems supported by a series of transit stations. This potential creates opportunities for land development and public transit to be mutually supportive. On the other hand, general mass transit operations which have poorer service and only minor transfer points instead of stations, generally offer little potential in terms of supportive land development opportunities.

This section addresses developmental opportunities or their lack in East Multnomah County. Extensive use was made of the "Transit: Land Use Considerations" report prepared by Tri-Met in cooperation with Multnomah County.

No-Build and LCI Alternatives. These alternatives would not generate land development opportunities from the operation of public transit, since service would be similar to that of today. County policies which stipulate that future population and employment concentrations are to be served by public transit would still be in effect. However, major opportunities for concentrating housing and employment in support of transit would be lacking since an I-205 busway would be excluded under no-build and low cost improvement conditions. The transit supportive development potential present today in the I-205 corridor would largely be replaced by auto-oriented development, as evidenced by land use along many urban freeways in which transit-supportive land use controls have not been applied.

It is recognized by local planning authorities that effective planning in the I-205 corridor is required to minimize otherwise strong pressures to orient development around the interchanges to the private auto. Planning tools, such as comprehensive plan land use designations, required to prevent substantial auto-orientation would be very difficult to apply or enact in the absence of major public transit service along I-205.

Increased congestion due to the continued use of the automobile encouraged by the no-build, could slow the rate of development of suburban, low-density sprawl currently occurring east of I-205, but the general trend toward conversion of rural residential and agricultural lands to suburban area would continue.

Eventually the congestion in the downtown and East Porltand areas could foster increased commercial and industrial use in East County as employers move closer to the source of labor. This development would probably occur in the form of commercial and industrial use along major arterials and in pockets throughout the area. Economic conditions would probably prevent opportunities for more concentrated urban development in the East County area.

Alternative 2a is very similar to the no-build, and could slow the rate of suburban development in East Multnomah County more than any of the other build options. Alternative 2b would improve the Banfield and establish express transit corridors, thereby encouraging a continuation of suburban development because of improved accessibility afforded by the express transit corridors. "Since express bus service fans out to all parts of East County, low-density, areawide growth will continue along its present course, with some increase in linear apartment development along certain arterials." (16, Land Development Impacts) Growth, then, would tend to be broadly distributed throughout East County. The rate of conversion of rural residential and agricultural properties to suburban sprawl would be likely to increase. The proposed Gresham bus station at the Fairgrounds or 1st and Burnside would stimulate development in this transit station area.

HOV and Separated Busway Alternatives. These alternatives are identical with respect to transit service in East Multnomah County, both would include an I-205 busway between Sandy Boulevard/Columbia Street (north) and Foster Road (south). It is along the busway, at the various transit stations, where transit-supportive land development opportunities exist. Opportunities for intensifying land use in a manner compatible with increased utilization of public transit are summarized in Table P-2 for the five stations between and including Gateway and Lents. The table also includes a description of existing land use and future development probable without a busway in operation, which represents a continuation of present land use trends. As mentioned previously, without strong land use controls many transit-supportive opportunities would be lost to freeway-oriented uses; whereas a major transit facility in the corridor should provide the impetus for applying the required controls.

The transit-supportive potentials are approximately equal for a busway or light rail line in the corridor, so opportunities pertaining to LRT are discussed herein.

TABLE P-2

TRANSIT STATION IMPACTS
EAST COUNTY STUDY AREA
(I-205-Lents)

LOCATION	DESCRIPTION OF STATION ZONES	LAND USE WITH CONTINUATION OF CURRENT TRENDS (No-Build case)	LAND USE WITH REORIENTATION TO TRANSIT-SUPPORTIVE USES
Gateway (East side of freeway)	Commercial core on Halsey and Weidler Streets and single and multiple family development to the south.	On-going multi-family development should continue along with increased commercial activity with the opening of I-205 freeway.	A high density activity center is possible with 2000 new residents and 500 new jobs in the area. High density residential south of the planned commercial/hotel complex would be appropriate and consistent with existing plan designations.
Mall 205 (East side of freeway)	A major shopping center, a private school and hospital, as well as other commercial uses are located to the east of I-205. To the west of I-205, single family residences are predominant. Commercial uses along Stark, Berrydale Park, and Clark School are also on the fringe of the station area.	Increased activity at the shopping center with the opening of the freeway.	An additional 1500 jobs and 400 persons could be accommodated in this area. Land uses west of the alignment are quite stable. Development of a large amount of potentially developable and redevelopable land, as well as commercial expansion of Mall 205, could be expected. Multi-family and office uses could also develop.
Division (West side of freeway)	Residential and strip commercial along Division. There are also several areas of vacant land.	Considerable development could occur once Division becomes a major interchange at I-205.	Medium and high density residential development would be emphasized; approximately of 2640 residents could be situated in this area. Removal of some single family housing would be necessary. Upzoning of single family and strip commercial to higher density levels would be necessary.
Powell (West side of freeway)	Considerable vacant land exists, much of it dedicated to the defunct Mt. Hood freeway interchange. A bowling alley, school and State Police Office building are also in this area.	Land conversion could be considerable with the opening of I-205.	As with Division, medium and high density residential development and local commercial would be emphasized with a possible increase of 2200 persons in this area. Upzoning of some single family areas and limiting of strip commercial development would be necessary.
Lents (West side of freeway)	West of the station is the Lents commercial center, a deteriorating commercial area. Single family residential is predominant to the east of I-205.	Should undergo change from a neighborhood and pedestrian-oriented shopping district to a commercial center serving I-205.	Approximately 1400 new residents and 350 new jobs are possible for this area. Moderate and high density housing surrounding a neighborhood commercial core would be appropriate.

It is important to note that the problems and opportunities for devising and implementing transit-supportive land development in this corridor are much different that those in the Burnside or Division LRT alignments. This stems from the large difference in transportation capacity between I-205 and the Burnside and Division arterials and that the freeway will not be fully operational until 1982. What follows is a summary of the major developmental opportunities and constraints in the vicinity of the I-205 transit stations, assuming a reorientation of future development to uses which support transit. Reviewers desiring further detail are referred to the technical report entitled Transit Land Use Considerations, published by Tri-Met in November, 1977.

a. Gateway Station Area. Situated between I-205 and the proposed expansion to the south of the Gateway Shopping Center, this station is potentially the most important station location in the I-205 corridor. Due to its strategic position at the intersection of existing and proposed regional transportation systems, and adjacent to a growing regional commercial center, the station is well-suited for major transit activity area with a high level of auto, feeder bus and pedestrian traffic.

A large undeveloped parcel makes land conversion susceptibility high. In addition, an existing high density residential area south of a planned commercial/hotel complex would support transit. Moreover, existing plan designations are consistent with high density development in which public transit can be effectively integrated.

b. Mall 205 Station Area. This station would be located between the I-205 Freeway and the Mall 205 Shopping Center. Mall 205 is a good example of private sector response to a new urban freeway, but its full potential has not been attained because of area competition and delays in constructing I-205.

The major emphasis for future development would be automobile-related uses because of accessibility to I-205. Expansion of office and multiple family development would be encouraged along with planned commercial expansion as transit-supportive development consistent with the function and orientation of the Mall 205 area.

c. Division Station Area. This station would be positioned in the northwest quadrant of the I-205/Division Street interchange and east of S.E. 92nd Avenue. Preliminary study indicates opportunities to develop extensive medium-density housing as the first phase of any redevelopment strategy. This would require the removal of some existing housing within the site and primarily along S.E. 92nd Avenue. The existing zoning, which is predominately single family residential with some strip commercial, would need revision if full redevelopment opportunities are to be realized.

d. Powell Station Area. The proposed station would be west of the I-205 Freeway near Powell Boulevard. Considerable vacant property exists in this area. Immediately adjacent to the proposed station are two parcels, one owned by the State of Oregon which is being developed as a State Police office building, and a second which currently houses a bowling alley. This latter site, along with property across S.E. 92nd Avenue, would be a suitable location for housing opportunities due to the good access to the transit station. However, the presence of the bowling alley could curtail this potential. Current zoning, which includes single family areas and some commercial strip development, is inconsistent with the potential development of medium to high density residences. Zoning conforming with these residential designations would require support in the comprehensive plan and eventual "upzoning" of the single-family residential areas.

e. Lents Station Area. This station would be positioned between the I-205 Freeway and the Lents commercial center. In recent years the Lents commercial district has deteriorated and its role as a neighborhood-oriented shopping center diminished. Moreover, given existing zoning and the usual market reaction to the opening of the I-205 freeway interchange, it can be anticipated that the Lents commercial center will undergo further decline, changing from a neighborhood and pedestrian-oriented shopping district to a commercial center serving a broader commercial market from its access to the I-205 freeway. Such freeway-oriented change would likely foreclose important opportunities for directing land use in support of public transit and the surrounding residential community.

In spite of these formidable drawbacks, the Lents area is otherwise suited for both commercial and residential development. Opportunities exist to encourage moderate-density housing (16-20 units per acre) in areas currently zoned commercial which are undergoing abandonment. Such uses would not only be compatible with public transit service, but would also blend with surrounding residential neighborhoods.

LRT Alternatives. Because the LRT alternatives extend to Gresham, these options have the most potential for directing land use in the East County Study Area. The nature of this development would depend on the land use controls and developmental stimuli utilized by local jurisdictions. Without creative land use controls LRT has been shown to facilitate sprawl, foster increased reliance on the automobile, rise water and air pollution levels, contribute to greater neighborhood displacement, and diminish the efficiency of the LRT line. With land use controls for concentrated transit-oriented development, light rail could reorient East Side growth into more efficient, high density patterns. Local policies currently support use of these land use controls. To effect the concentration necessary to support transit, revision of the existing plan would be necessary. During the period in which such revisions are being made, some of the conversion potential would be lost.

The linear nature of the light rail line could encourage higher density development in the selected corridor. Growth would most likely occur within walking distance of stations; the actual extent of potential development would depend upon zoning and comprehensive plan policies and various market factors. Planning staffs have estimated that an increase in population and employment could be expected within station service areas if LRT were implemented. Station zones were carefully located in areas which were estimated to accommodate intensive transit-supportive land use and which would also support community objectives. Controlled land use policies (implementation mechanisms) and increased accessibility could lend support to high density development in the station areas.

Transit stations provide the opportunity for the establishment of transit-related development, such as apartments and offices, on adjacent land parcels. This development would tend to be dense and more resource-conserving than similar auto-oriented development, and it would foster increased transit usage in the corridor.

The LRT impacts anticipated if land use transit-oriented development is encouraged are summarized as follows:

> The conversion of a considerable portion of the corridor's vacant land and some lower value structures to higher intensity uses (multiple family, commercial/office),
>
> A rapid conversion to higher density uses within the corridor,
>
> A shift of multiple family development into the LRT corridor,
>
> A reduction in the growth rate outside the corridor,
>
> The need for significantly improved urban services within the corridor, a general positive impact on property values. (18, p. 3)

Also, the primary effect on properties adjacent to the light rail line, but not associated with the transit station, would be a reduction in access. Land use conversions or developmental modifications may be necessitated.

Tables P-2 (following page 64), P-3, and P-4 detail the existing land uses and developmental opportunities in the transit station areas. The LRT/I-205 station areas and developmental opportunities are further described in the "HOV/Separated Busway Alternatives" section. Developmental opportunities provided by the LRT for the Burnside and Division routes follow. Further description of the existing use and anticipated impacts of LRT in the Burnside, Division and I-205/Lents routes and station zones may be found in the "Transit: Land Use Considerations" in Volume 3 of this document.

1. LRT/Burnside. A light rail facility fixed in the center of E. Burnside Street, and supported by eight transit stations at or near major intersecting streets, offers high potential for land development in support of transit. Three zones are particularly well suited for more intense development: Gateway/122nd, Rockwood (162-192nd) and Gresham (Fairgrounds site). Each zone would be planned as a mixed-use center with high intensity residential, neighborhood/community commercial; office/professional/public service, and light industrial (labor intensive) uses. By establishing such transit-supportive zones, a basis for an efficient combination of residential, commercial and light-industrial development could be created. Table P-3 summarizes developmental opportunities at individual station sites; Table P-3 is supplemented with the following discussion.

a. 102nd Station Area. It is not likely that commercial/office development could be supported within the station service area, given the proximity to Mall 205 and Gateway. Future use of the area is probably moderately intensive multiple family residential, drawing on the catchment areas of the commercial nodes to the north and south, and the presence of an LRT station. Land conversion opportunities in the area are high, but limited in extent by the small parcel ownership pattern. Current planning is largely consistent, but may require "up zoning" in the southeast quadrant to allow for multiple family. Some conversion of single family units with low improvement-to-land

TABLE P-3

TRANSIT STATION IMPACTS
EAST COUNTY STUDY AREA
BURNSIDE CORRIDOR

LOCATION	DESCRIPTION OF STATION ZONES	LAND USE WITH CONTINUATION OF CURRENT TRENDS	LAND USE WITH REORIENTATION TO TRANSIT-SUPPORTIVE USES
102nd	Low density single-family development with some commercial, small industrial and community service uses.	Some infilling of residential and commercial uses on vacant parcels.	Some 50 acres of land could be converted to multi-family residential, supporting approximately 2,000 persons. Would require upzoning in southeast quadrant to allow for multiple family. Some conversion of single family units would be anticipated.
122nd	Located on a north-south arterial with substantial strip commercial with single-family behind the commercial uses, some vacant land.	Some additional commercial development with perhaps some multi-family development on vacant land.	Approximately 900 jobs and 1400 residents could be supported at this station. Intensive residential along with some office, public service or neighborhood commercial uses are desirable. May require change of zoning from commercial and single family to multi-family.
148th	Predominately low density single family with some multi-family development at the intersection. Large amounts of vacant land scattered throughout area.	Additional multi-family perhaps some commercial development.	Approximately 1300 additional residents on about 40 acres of land could be anticipated. Upzoning of single family to multi-family/medium density residential would be necessary. Multiple family infilling and some single family conversions would be anticipated.
162nd	Predominately multi-family residential. Some single family residential and open space and community service. Commercial uses along Glisan and Stark.	Further infilling of multi-family development.	The station could support up to 1700 additional residents, in multi-family units. Expanded multiple family and some local convenience commercial uses would be appropriate. Some upzoning of existing single family areas will be necessary.
172nd	A transition area from single-family to multi-family with some commercial activity along Stark.	Additional multi-family with perhaps some additional commercial development.	Development could include 2300 additional residents and 1800 new multi-family dwelling units into the area. Could support medium to high intensity residential uses. Upzoning of single family to multi-family would be necessary.
181st/ Rockwood	The triangle of Burnside, 181st and Stark contains major auto-oriented mixed uses in East County. Multi-family and single family residences lay adjacent to this center.	This commercial center would continue to develop and perhaps expand with some additional multi-family residential.	The center would be oriented to transit-supportive commercial uses and high density residential uses. Approximately 700 new jobs and 1300 new residents could be accommodated. Upzoning of single family areas would be necessary.
192nd	A mix of vacant land, commercial and industrial uses, as well as scattered single-family and multi-family residential.	Gradual infilling of vacant land to other uses.	Good potential for development with 1700 new residents and 700 new jobs possible in the area. A mix of intensive residential, community commercial and industrial uses would be appropriate. Major zone changes would not be necessary.
Fairgrounds	This site is under single ownership and is scheduled to be developed into a multi-use center, including an auditorium, offices, and multi-family residential.	Center would probably develop, but would not be transit oriented.	High density residential, office/professional and community commercial can be assumed. No change in land use policy is expected here.
1st & Burnside (Alternative to Fairgrounds)	Ongoing commercial development in this area including a major shopping center, several new restaurants, and multiple family development. There are large amounts of as yet undeveloped land.	Continued development of this area to commercial and multi-family uses.	Approximately 2215 new residents and 1000 new jobs could be supported at this station site. High density residential, office/professional and community commercial can be assumed.

TABLE P-4

TRANSIT STATION IMPACTS
EAST COUNTY STUDY AREA
DIVISION CORRIDOR

LOCATION	DESCRIPTION OF STATION ZONES	LAND USE WITH CONTINUATION OF CURRENT TRENDS	LAND USE WITH REORIENTATION TO TRANSIT-SUPPORTIVE USES
122nd	Strip commercial on both Division and 122nd, with single family and some multi-family behind the commercial properties.	Some additional commercial and multi-family possible.	An additional 400 residents and 250 jobs is possible. Development options limited by lack of redevelopable parcels. Continued commercial infilling and increase in multiple family residences.
136th	A multi-family residential core with some retail, and a wrecking yard.	Additional multi-family and commercial uses.	Some public development may be necessary here. A maximum additional 1500 residents could be put into this area. Intensive redevelopment of the area to high and medium density multiple family development with some local commercial would be beneficial. Is consistent with plan policies.
148th	Strip commercial on both Division and 148th, with some multi-family uses.	Some increase in commercial activity possible.	Approximately 500 additional residents and 100 jobs is possible. Redevelopment opportunities are constrained by existing single and multiple family development immediately to the north. Further infilling of vacant land and redevelopment to medium density residential and local commercial could be expected. Is consistent with plan.
170th	A multi-family residential core with a 300 unit trailer park, as well as some commercial activity in the station area.	Some increase in multi-family development and/or commercial uses is probable.	Redevelopment would require considerable property assemblage and plan policy changes to achieve an increase of 2400 persons and 50 jobs.
182nd	Some locally-orientated commercial development with a school and single-family residences in the area.	Relatively small increases in commercial activity.	Approximate increase of 300 persons and 150 jobs could occur. Minor impact on development patterns expected. Continuation of existing trends with some intensification of automobile-oriented commercial anticipated. Consistent with plan.
199th	Largely undeveloped open land with a gravel quarry in the area.	Some conversion to urban uses can be expected.	Because of the amount of undeveloped land, an approximate increase of 500 jobs and 2000 persons is possible. Upzoning of strip commercial and single family residential would be necessary.

value ratios would be required to maximize the influx of transit-supportive multiple family use.

b. 122nd Station Area. This area offers good opportunities for future transit supportive development due to large vacant parcels of commercially zoned land. Future development would be well-served by high accessibility to light-rail transit and feeder bus service in addition to park and ride facilities for automobiles. Suitable future development could include a mix of medium density residential, office, public service and neighborhood commercial uses. A transition to these preferred uses would require some rezoning of commercial and single-family zones to multiple-family. In addition, maximum development of multiple-family complexes would require some displacement of existing single family units.

c. 148th Station Area. The area is currently stable low density single family residential with limited duplex/apartment development adjacent to 148th south of Burnside. Large amounts of vacant land are scattered throughout the station service area. Current plan designations reflect existing conditions. Medium density residential development would be necessary to support a station. However, this requires extensive "up zoning" in the station area.

d. 162nd Station Area. More than any other proposed station site along the Burnside alignment, the 162nd station service area has in place an existing core of multiple family residential development which can be expanded upon. The area also contains some single family residential and open space, some of which could converted to create a medium density community oriented to the LRT station. Expanded multiple family and some local convenience commercial would also be appropriate for future uses. Land susceptibility is good with over 50 acres of vacant and low value parcels of small to moderate ownership patterns in the service area. Some zoning of existing single family areas would be necessary to realize full development potential.

e. <u>172nd Station Areas</u>. The station is located in the center of a proposed high intensity activity corridor extending from 162nd to 194th and could support medium to high intensity residential uses. Limited convenience commercial within this residential area may be appropriate to service the immediate neighborhood. Land use in this station zone is undergoing a transition from uniform low density residential to higher intensity multiple family. Single family uses are supported by current plan designations which would have to be substantially changed to support an LRT station. Low improvement value parcels held in reasonably large ownerships, make conversion opportunities good, although most lots lack arterial frontage. Existing plans allowing only single family use would have to be rezoned to multi-family, reflecting observable trends.

f. 181st/Rockwood Station Area. The triangle of Burnside, 181st and Stark represents a major auto-oriented mixed use center in East County and would represent a major origin and destination for LRT patrons. The station service area is largely built up with a mix of multiple and single family residential uses along with the commercial pocket. With LRT the area will have very high accessibility (automobile, LRT, and feeder bus) allowing high density residential and transit-supportive commercial to be effectively integrated into the area to form the core of the Rockwood transit development zone. A mix of intensive residential to the west of 181st, office and community commercial to the east could be intergrated into the existing activities to create a balanced center. Some rezoning of single family areas to the west would be required.

g. 192nd Station Area. This station service area currently lacks a definable focus. Existing uses include large amounts of open space, scattered single family and multiple family residential, some commercial, and limited industrial activity on the southeast periphery of the station area. A mix of intensive residential, community commercial, and industrial uses would be transit-supportive uses here. Over 50 acres of susceptible parcels could be converted to multiple family dwellings. Further, potential transit-supportive uses are consistent with existing zoning designations.

h. Gresham Station Areas. Two alternate sites are being investigated for a transit station in Gresham: Fairgrounds and 1st and Burnside. Adjacent to the existing commercial core of Gresham, the Fairground site is under single ownership and is scheduled to be developed as a multi-use center. A large auditorium, some commercial office and multiple family development are assumed in the plans. The developers of the site have been consulted and are supportive of an LRT station within their site: accordingly their master plan would be revised to reflect the rail alignment, facilities, and supportive development once a decision on an alignment and mode is determined.

Situated on the eastern edge of Gresham in a rapidly developing area, the 1st and Burnside station area contains large amounts of undeveloped land, new automobile-oriented commercial/suburban shopping centers and multiple family development. Both sites contain adequate vacant and susceptible parcels to accommodate growth potentials from transit supportive development.

2. LRT/Division. Division Street east of I-205 is a distinctly different transit environment than the Burnside alignment previously discussed. Whereas Burnside Street at present and in the foreseeable future is a minor two-lane arterial street, Division is a major four-lane intra-county arterial, which will be supported by a full interchange with I-205. Hence, the realization of future development potential on the Division Street LRT alignment presents a number of constraints that were not present in the Burnside LRT alignment. In

particular, development patterns along Division Street, especially around major intersections, are dominated by uses heavily dependent upon automobiles. In these areas transit-oriented development would be difficult to promote due to severe competition and high land use conversion costs. In addition, Division Street lacks parallel arterials, like those near Burnside Street, which can efficiently provide local feeder transit service.

In spite of these limitations, there are several zones which are well-suited for more intense, transit-supportive development. These areas are Division/I-205, 136th Avenue, 170th Avenue, 195th Avenue and the Gresham site alternatives. Because of the commitment of existing resources, development patterns, and anticipated future trends, it is expected the development activities around the Gateway, Mall 205, 122nd, 148th, and the 182nd transit stations as well as the rest of Division would have a minimal transit support potential and would continue to be dominated by the development oriented primarily to the automobile. Table P-4 (following page 69) summarizes developmental opportunities at individual station sites.

a. <u>122nd Station Area</u>. Future development options are limited by lack of redevelopable parcels; however, a continuation of existing trends--continued commercial infilling with a swing to multiple-family residences--is anticipated to capture the opportunities from increased automobile and transit access. The encouragement of the trend for office/professional development to the north along 122nd would be consistent with support of public transit.

b. <u>136th Station Area</u>. The transit station is situated in mid-block as a means to encourage the development of a transit node within Division's automobile-dominated environment. Given proper planning, it is possible to segregate automobile and transit uses here, emphasizing public transit and creating an attractive pedestrian environment.

The area has an existing core of new multiple-family and better than average opportunities for redevelopment. Existing uses generally are on large lots, many with low improvement values.

Intensive redevelopment of the area to high and medium density multiple-family development with local commercial to serve transit patrons and area residents would be consistent with planning objectives for the station area. Public development of some parcels together with advanced land acquisition may be necessary to stimulate private transit-supportive development schemes. This scenario is consistent with Multnomah County's Framework Plan policies.

c. 148th Station Area. This station area is unique in that it could have an equal influence from both transit and automobiles on the shape of development in its service area. Redevelopment opportunities are constrained somewhat by existing single and multiple-family development immediately to the north. Further infilling of vacant land and redevelopment to medium density residential and local commercial would be consistent with the objectives of the revised land use case.

The new County Framework Plan has policies to discourage strip development; hence, the plan as it exists appears consistent with the elimination of strip development and and enlargement somewhat of multiple family at the expense of single-family areas. The inclusion of multiple family into single-family areas is an observable trend which has already begun to occur.

d. <u>170th Station Area</u>. Similar in many respects to the 136th Station, the 170th Station is situated in the mid-block and segregated from the automobile areas as a means to facilitate the establishment of a nodal development zone. The objective would be to build on existing conditions which are conducive toward the establishment of a pedestrian environment oriented to the light rail transit station.

The area has a core of multiple-family development, the most significant being a 300-unit trailer park adjacent to the proposed assemblage, a task which is eased somewhat at 170th, based on an existing structure of development with many large lots with low improvement values.

The existing comprehensive plan shows strip development with multiple-family development acting as a buffer for single family. Transit-supportive land use would require significant changes to be consistent with the adopted County Framework Plan policies. To achieve a reorientation to medium and high density multiple-family development, a package of government development programs and incentives may be necessary to stimulate the private market.

e. <u>182nd Station Area</u>. The presence of a transit station at 182nd is anticipated to have a minor impact on development patterns. The station area has some neighborhood commercial development oriented to 182nd, the scale and intensity of which is much less than at 182nd and Burnside immediately to the north. Future development opportunities on the periphery of the station service area are limited by the presence of a school in the southwest quadrant and solid single-family development in both northern quadrants.

It has been assumed that automobile oriented development trends would be difficult to reverse. Moreover, these trends are consistent with the existing County comprehensive plan.

f. 195th Station Area. This station zone offers significant opportunities for attracting transit-oriented growth. In its existing condition the area is largely undeveloped open land, a greenbelt between urban pressures from the east, north, and the west. Further, part of the station area is being quarried for gravel and may be available for development in the future.

Land development opportunities which support public transit key on the Portland Traction Rail Line adjacent to the station as a potential industrial link, together with vacant land zoned industrial.

City of Gresham zoning for the station area, however, is inconsistent with the type and intensity of development desired. The plan which shows strip commercial and extensive areas of single family would need uniform rezoning in undeveloped single-family areas and the elimination of strip commercial zones.

g. Gresham Station Areas. See section on "Light Rail Transit-Burnside Street."

MITIGATION OF ADVERSE LAND USE IMPACTS

Adverse land use impacts discussed in the previous section generally fall into two categories: one, nonconformance with plans and policies; and two, lack of future land development opportunities which support public transit. Regarding the first category, mitigational measures *per se* do not exist; i.e., adoption of an alternative which does not conform with major goals and policies is tantamount to rejection of the desired direction in land use and transportation the Portland metropolitan area is attempting to take. In other words, mitigation is accomplished by selecting an alternative which conforms with land use goals the plans and policies would attain.

Only Alternatives 1 and 2, are substantially inconsistent with plans and policies. Increased use of public transit and supporting land use would not be realized under no-build conditions, nor would improved traffic flow occur on the freeway and arterial system. Redirecting land use to accomplish these desired land use and transportation goals could occur only through the selection of another alternative. Although Alternatives 2a and 2b would result in increased transit ridership relative to the "no-build," they would not create significant opportunities for future transit supportive development since major transit stations would not be constructed. Major opportunities for concentrating transit-supportive land use, especially in the I-205 corridor, would be foreclosed. Again, the only means of mitigating this adverse impact is the selection of an alternative which provides for this land use potential.

Other project alternatives largely conform with policies aimed at creating land use opportunities which support public transit and improved traffic flow. In this regard, it is not mitigational measures, but the opportunities themselves, which are relevant. These opportunities and differences between project alternatives were evaluated in the previous section under "Land Development Opportunities." However, given existing trends in land use, which are largely oriented towards automobile transportation, developmental opportunities which support public transit can be lost in spite of the alternative selected. This apparent contradiction is possible due to land development allowable given existing plans and zoning in some of the areas where transit-supportive potential is high. Swift and positive mitigative action on the part of local government would be required to ensure future development of transit-supportive uses--especially in the area around transit stations in the I-205 corridor and along Burnside or Division streets, since plans and zoning along the Banfield segment are largely consistent with transit-supportive development.

As mentioned previously, local policies consistent with transit supportive development already exist. What is needed are the control mechanisms necessary to ensure that maximum land use potential is realized. A variety of creative implementation mechanisms are potentially available to encourage the level of development desired. Along with incentives for development in station areas, some disincentives to development outside the corridor would be necessary. (18, p. 3) The Tri-County Metropolitan Transportation District of Oregon (Tri-Met) in conjunction with Multnomah County and the City of Portland have comprehensively studied mitigational needs and techniques. (18, III.D.4) What follows describes the general nature of mitigational measures, which are oriented towards transit station areas proposed in the I-205 corridor, given the selection of the HOV, separated busway or light rail alternative, and along Burnside Street or Division Street route with the light rail alternative, only.

Interim Development Controls

These controls could be applied through the enactment of a temporary ordinance. The intent of the ordinance would be to prevent further incompatible development until the planning process is completed and permanent controls (e.g., plan designations and zones) to implement the plan are adopted. Development which is in accord with policies of the contemplated plan could proceed. These controls are therefore a short-term means of minimizing the intrusion of nonconforming uses in proposed transit station zones. The most common interim development control is a moratorium on development.

> Development Moratoria (in the form of building permits, water and sewer extensions, subdivision, and zone change moratoria) can be enacted "to preserve transit-supportive development opportunities until the rudiments of a long range plan is in place." (18, III.D.5)

Long Term Development Controls

Long Term Development Controls can be used to promote the long-term fundamental shifts in development patterns necessary for transit-supportive land use. These controls normally take the form of comprehensive plan designations with zoning as the implementing mechanism. While these are necessary conditions in the pursuit of desired land use goals, they are not sufficient to assure a timely response on the part of the land development market. Potentially developable land can lie dormant and in non-support of the transit system.

A number of governmental responses of a more permanent nature can be made which provide the incentives to stimulate the private development market. A notable technique is the creation of transit station development or zoning districts. Multnomah County has proposed the use of this concept as a means of instituting greater design and development flexibility in station zone areas. In addition, the district could remove zoning restrictions that may otherwise dampen the private market development response to a major public investment in transit facilities.

A number of additional developmental controls could be enacted if deemed prudent by units of local government. These include such entities as a "Transportation Corridor Development Corporation"; "Urban Development Action Grants", site value taxation incentives, and joint development/value capture techniques.

Special Zoning Districts "requiring the provision of amenities and the integration of transit into new development," (18, III.D.5) **can be used as special** development incentives.

Transit Station Development Districts, "as proposed by County staff... would provide greater design and development flexibility in the areas (1/4 mile) surrounding transit stations and attempt to eliminate zoning restrictions that hamper private market development response to major public investments in transit facilities...The purpose of the Transit Station Development District (TSD) is to provide a framework for more intense use of land surrounding transit stations on major transit corridors while producing a desirable living environment by application of contemporary site planning techniques and architectural forms, which are not permitted through the strict application of primary district regulations, zoning article or subdivision article or other article or regulations of Multnomah County related to development of land." (18, III.D.5) The Transit Station Development District designation would be adopted as part of the County Comprehensive Plan.

Transporation Corridor Development Corporations, "as now conceived...would possess development powers similar to any other public development corporation allowed under existing local and state regulations and statutes. The only universal distinction would be that the geographic focus of its authority would be defined by the boundaries of the transportation facility corridor. Originally, UMTA was considering a definition of a 2500 feet radius, but now the actual definition is considered a local prerogative...The TCDC would be responsible for packaging, coordinating and managing compatible development with the corridor."

Urban Renewal "is a mechanism used to prevent or reduce urban blight or deterioration, stimulate residential construction and stimulate economic activity which enhances the public health, safety, morals and welfare and avoids excessive and disproportionate expenditures of public funds for public services and facilities.

The declaration of necessity and purpose specifically mentions land assembly and stimulation of residential construction as appropriate objectives of an urban renewal agency." (18, III.D.5)

Urban Development Action Grants "may be used for housing, neighborhood improvement and economic development. The Urban Development Action Grant program could be a potential funding source which is particularly well suited to help fund development schemes." (18, III.D.5)

Site Value Taxation is "an additional incentive for development...which spurs development through imposition of a higher tax on land only. Site value taxation would require new legislation and a constitutional amendment according to a City of Portland study. Representing a substantial change in tax law, new legislation on this point would be a major and probably long term effort." (18, III.D.5)

Joint Development/Value Capture "is a means whereby the land in the vicinity of transportation facilities is purchased, managed, or controlled in some manner by which the public is able to share in potential financial and community design benefits from the facilities in a way that would not otherwise be possible." (18, III.D.5)

Land Banking is an implementation mechanism whereby governments "obtain land through purchase in order to achieve land use objectives." (18, III.D.5) In this way, the jurisdiction can "'insure the continuing availability of sites; control the timing, location, type, and scale of development; prevent urban sprawl; and reserve for the public those gains in land values resulting from governmental activity'..., Land banking... is, however, a technique surrounded by controversy and considerable legal/procedural constraints regarding its use by local government." (18, III.D.5)

While some of the aforementioned means of implementing desirable land development in the vicinity of transit stations may be provocative, they nonetheless establish an important basis from which transit supportive development can proceed. Many of the techniques such as interim zoning, development moratoria and urban renewal are available under existing statuatory powers of local jurisdictions, which enhances the feasibility of their use. Others such as transportation development corporations would require cooperative agreements between governments, if not new enabling legislation. In any event, a range of mitigative tools are currently or potentially available to better guarantee the success of transit-supportive development in the study areas.

SHORT-TERM USE OF THE ENVIRONMENT VERSUS THE MAINTENANCE AND ENHANCEMENT OF ITS LONG-TERM PRODUCTIVITY

Short-term land uses refer to those changes directly brought about by the project. These include land necessary for right-of-way and the construction of the facility. These impacts are discussed in Chapter 5, "Right-of-Way." Long-term changes pertain to secondary conversions in land use caused by the operation of the facility. Productivity in the sense used here refers to potential land use change which is consistent with implementing goals and policies governing land use and transportation planning in the study area.

No-Build Alternative

This alternative has the least direct impact on land use since additional right-of-way is not required. Through time, however, the No-Build would be counter-productive since the opportunity to reorient future land use in support of an improved public transit system in the East Side and in downtown Portland would be largely foreclosed. This stems from the high probability that areas where transit supportative uses could be developed (especially around proposed transit stations) would be converted to other uses. Moreover, without major capability on the part of local government to increase transit service, the impetus for enacting land use controls which support public transit would be forestalled.

LCI Alternatives

These alternatives are similar to the No-Build except that existing land use in East Portland would be better served by transit.

Widening the Banfield Freeway allowed with Alternative 2b would improve traffic circulation on East Portland arterials, encouraging past trends in land use. In the long-term major opportunities to reorient land use in support of increased transit use would be lacking due to the overall improvement in traffic circulation and absence of major transit stations along the LCI routes.

HOV Alternatives

These alternatives would include the construction of high occupancy vehicle lanes in the Banfield corridor and the operation of an exclusive busway in the I-205 corridor between Sandy Boulevard and Foster Road. Immediate land use conversions are not great as little right-of-way is required. In the long-term, however, opportunities exist to establish transit-supportive land uses around stations in the I-205 corridor, but less so in "Downtown Connection" portion of East Portland, since the area is largely developed. Overall, these opportunities provide moderate potential for increased transit productivity from supportive land use change in East Portland.

Alternatives 3b and 3c would also substantially improve traffic service in East Portland due to the combined effect of additional lanes on the Banfield freeway and improved transit service. In general these improvements would support past land trends in land use which have tended to be auto-oriented.

Separated Busway Alternatives

The transit improvements proposed with these alternatives (4a and 4b) offer moderate-high potential for establishing transit-supportive land use in the vicinity of transit stations. This potential is somewhat higher than with the HOV options since minor redevelopment opportunities exist near the three additional transit stations in the Banfield corridor (Hollywood, 60th and 82nd); otherwise the transit productive land use potential of the option is virtually the same as the HOV alternatives.

The Separated Busway options would also include two additional lanes on the Banfield freeway between 37th Avenue and I-205. This traffic capacity improvement, which is aimed at auto-trip demand, would also support land use trends oriented toward the auto.

Light Rail Alternatives

These options are very similar to the Separated Busway alternative in the East Portland study area and the I-205 corridor with respect to transit station location and development potential. However, in East County, the transit-supportive development potential with either Alternative 5-1 (Burnside Street) or Alternative 5-2 (Division Street) is substantially greater than other options. This is due to the construction of transit stations at major intersections and the resultant improvement in transit service. In net, these additional transit-supportive opportunities generate the highest potential for increased transit productivity of all alternatives. Along Division Street, however, these potential long-term gains could only be achieved with considerable disruption of existing uses from the required right-of-way.

IRREVERSIBLE AND IRRETRIEVABLE RESOURCE COMMITMENTS

Technically, there are no absolutely irreversible land use commitments. Theoretically, land use could be altered at any time. However, for the purpose of this report, the following land use impacts have been considered irreversible because the expense of reversing the impact would be prohibitive.

Land use conversions from the purchase of right-of-way and construction of the physical facility are generally considered irreversible in the short-term and in many cases the long-term, as evidenced by the durability of major transportation investments nationwide. In this regard the light rail options which extend into Gresham via Burnside or Division are considered most durable and permanent. Construction of a light-rail or bus transitway in East Portland is also a long-term commitment to a public transit facility, although the flexible design of the facilities would not preclude conversion of the facilities to other uses. In this regard the No-Build and Low Cost Improvements are least permanent in nature, allowing conversions to other transportation purposes or modes without undue cost.

Land use changes brought about by the various options would be irreversible in the short-term, unless public policy and/or economic conditions dicatate otherwise. The degree of irreversibility would largely depend on market conditions and the cost of converting to other uses.

REFERENCES CITED

1. City of Portland. Arterial Streets Classification Policy. Portland Planning Commission. Fall, 1976.

2. City of Portland. Downtown Parking and Circulation Policy. Adopted by City Council, February 26, 1976.

3. City of Portland. "Overview: Planning in the City of Portland" (Draft). May, 1977.

4. City of Portland. Planning Guidelines/Portland Downtown Plan. December 28, 1972.

5. ITP Columbia Region Association of Governments. Interim Transportation Plan for the Portland-Vancouver Metropolitan Area. June 18, 1975.

6. Columbia Region Association of Governments. Land Use Framework Element of the CRAG Regional Plan. February 5, 1977.

7. De Leuw, Cather and Company. Downtown Circulation Alternatives. June, 1977.

8. Land Conservation and Development Commission. LCDC Facts. Date unknown.

9. Multnomah County Planning Commission. Draft Comprehensive Framework Plan. Multnomah County, Oregon. February, 1977.

10. Oregon Department of Transportation. "Transitway News." Issue No. 14. October, 1977.

11. Staehli, Alfred. Preservation Options for Portland Neighborhoods, A Report on the History of Portland's Neighborhoods and Their Historic Centers. The Portland Neighborhood History Project. December, 1975.

12. Wilsey and Ham. An Analysis of Land Use Planning, Population Projections and Alternative Futures in the Portland-Vancouver Metropolitan Area. Prepared for the Metro Water Resources Study, Portland District, Corps of Engineers. June, 1977.

13. Tri-County Metropolitan Transportation District of Oregon. Banfield Transitway Project, Light Rail Alternative Report on Station Zones. November, 1977.

14. Tri-County Metropolitan Transportation District of Oregon. Banfield Transitway Station Analysis. February, 1977.

15. Tri-County Metropolitan Transportation District of Oregon. Documentation of Range of Alternatives. May, 1977.

REFERENCES CITED - cont.

16. Tri-County Metropolitan Transportation District of Oregon. East Side Transit Operations Study. November, 1977.

17. Tri-County Metropolitan Transportation District of Oregon. Regional Transit Development Alternatives and Sketch Planning Analysis. August, 1977.

18. Tri-County Metropolitan Transportation District of Oregon. Land Use Considerations. November, 1977.

SOCIAL RESEARCH REPORT

TABLE OF CONTENTS
SOCIAL RESEARCH REPORT

LIST OF FIGURES

LIST OF TABLES

Appendix

SOCIAL RESEARCH REPORT

I. INTRODUCTION

A. Structure of Analysis

The purpose of this research report is to assess the social effects of the no-build and build alternatives of the Banfield Transitway Project. In particular, this research report examines these topics in the existing social environment of the project setting (Part II of the report):

Population Change and Forecasts
Selected Socioeconomic Characteristics
Neighborhood Associations
Community Institutions
Transportation Modes and the Transportation Disadvantaged

The project alternatives would create a wide range of diversified impacts in the social environment. These impacts are grouped under three major categories in Part III:

Population
Accessibility
Proximity and Neighborhoods

The report concludes with brief discussions of the mitigational measures for the adverse impacts (Part IV) and the short-term use versus the long-term productivity of the project (Part V).

B. Research Study Areas

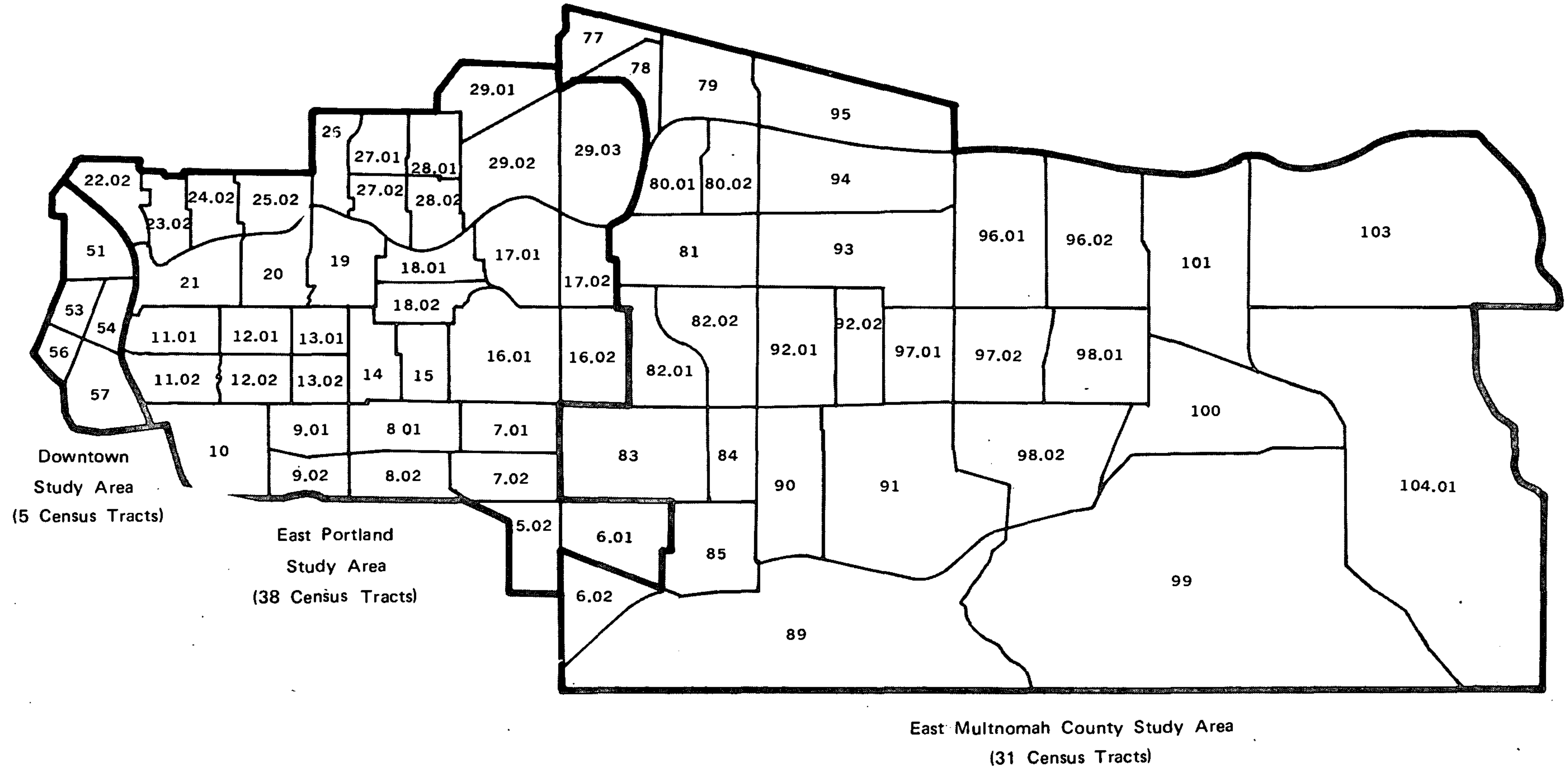
Social assessment of this project utilizes several study areas, ranging in size from the four-county Portland Standard Metropolitan Statistical Area (SMSA) to the narrow corridor routes under study. In most cases, the study areas are a composite of either political units or census areas. Detailed information on special study areas is provided when the study area is introduced.

The research extensively uses two types of study areas--(a) project study areas which contain large areas of the Portland Metropolitan area, and (b) smaller, corridor impact areas. These study areas are delineated in Figures S-1 and S-2. The project study routes are shown for each study area.

C. Assessment Methodology and Resources

The presentation of data, analysis techniques, and determination of findings are based, in part, on two environmental assessment documents--U.S. Department of Transportation, Social Impacts Handbook 2, Environment Assessment Notebook Series, (1975), and Federal Highway Administration, Social and Economic Effects of Highways (1976). Likewise, special reports furnished by Tri-Met, Columbia Region Association of Governments (CRAG), Multnomah County, City of Portland, and the Oregon Department of Transportation have also been utilized.

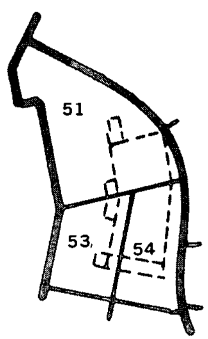
Primary and secondary data were gathered from numerous sources. (A bibliography at the end of this report provides a list of the major references.) Population changes and forecasts were obtained from CRAG. U.S. Census data provided the basis for examining socioeconomic characteristics in the study areas. Unfortunately, the latest U.S. Census was conducted in 1970. Seven years beyond the data of information collection reduces the accuracy of the socioeconomic picture of the fast changing Portland metropolitan area. Nonetheless, the census' value, particularly for depth and for comparison purposes, is unsurpassed. Information on community institutions and neighborhoods was collected from the City of Portland, Multnomah County, and field observation.



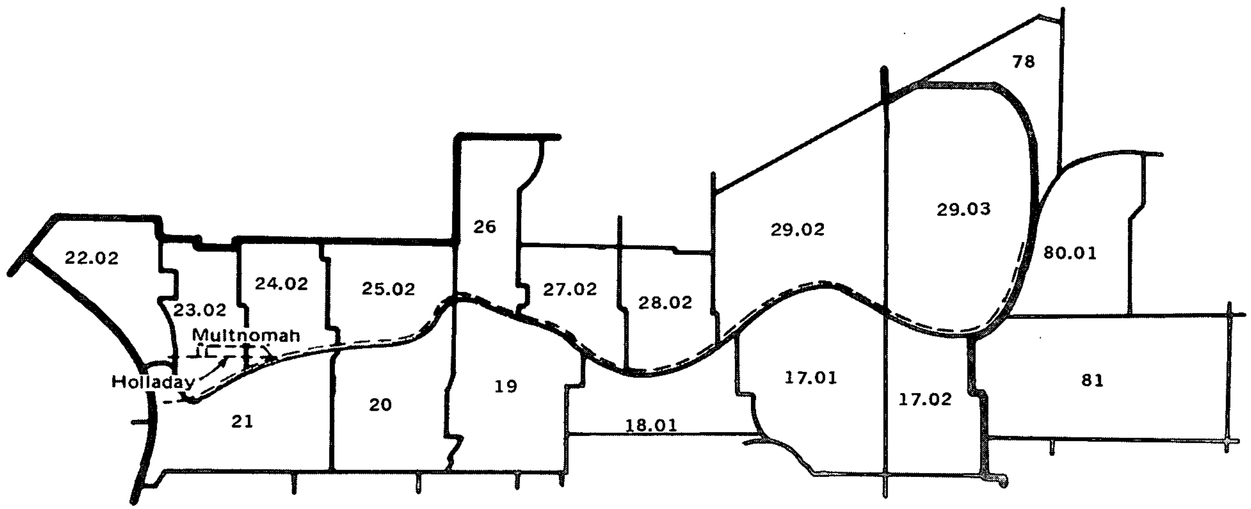
Numbers are Census Tracts
established by the U.S. Bureau
of the Census in the 1970 Census.

FIGURE S-1

PROJECT STUDY AREAS



Downtown Connection Corridor
3 Census Tracts

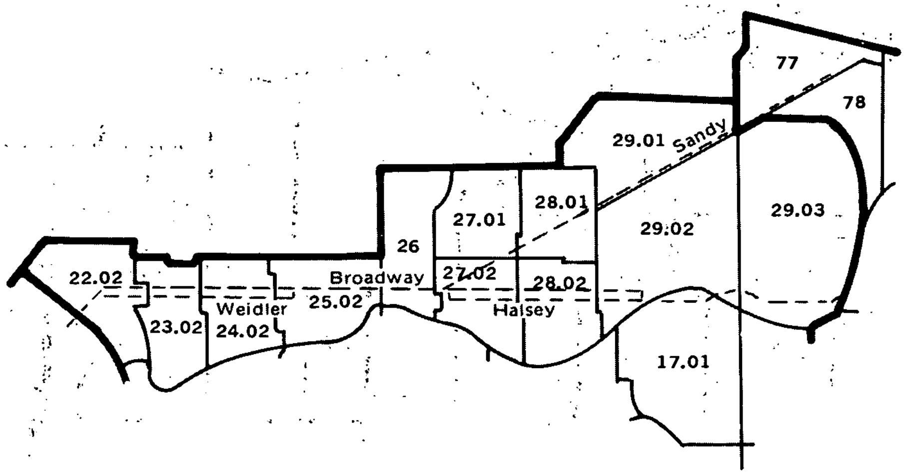


Banfield Expressway Corridor
18 Census Tracts

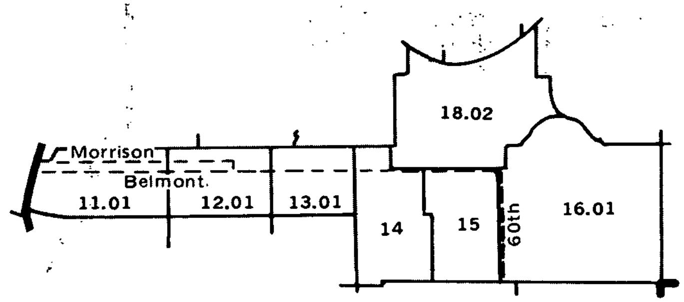
Note Numbers are U.S. Bureau of the Census, Census Tracts

FIGURE S-2
Project Corridor Study Areas

LOW COST IMPROVEMENT CORRIDORS

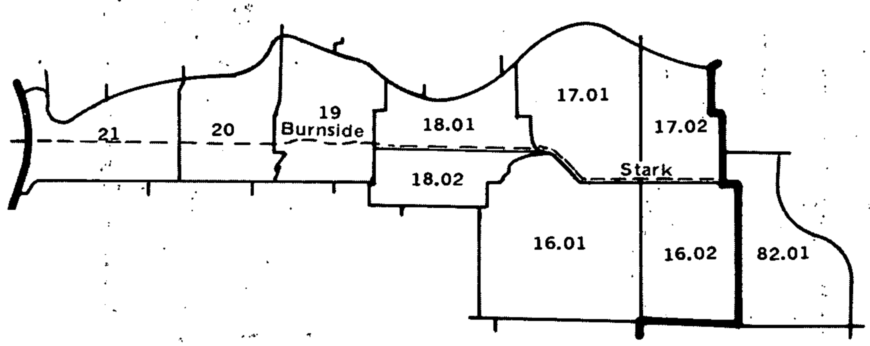


Broadway/Weidler/Sandy/Halsey L.C. I. Corridor
15 Census Tracts

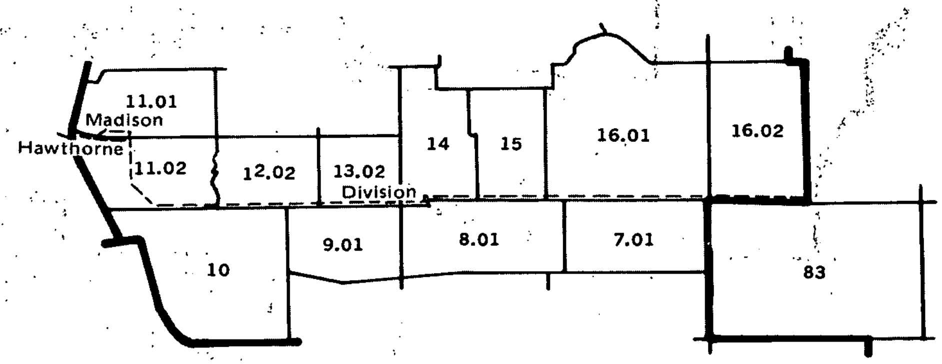


Morrison/Belmont/60th L.C.I. Corridor

7 Census Tracts



Burnside/Stark L.C.I. Corridor
10 Census Tracts

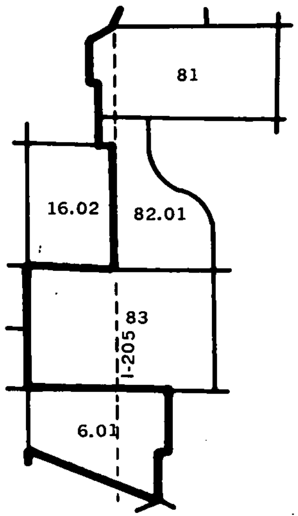


Division L.C.I. Corridor
13 Census Tracts

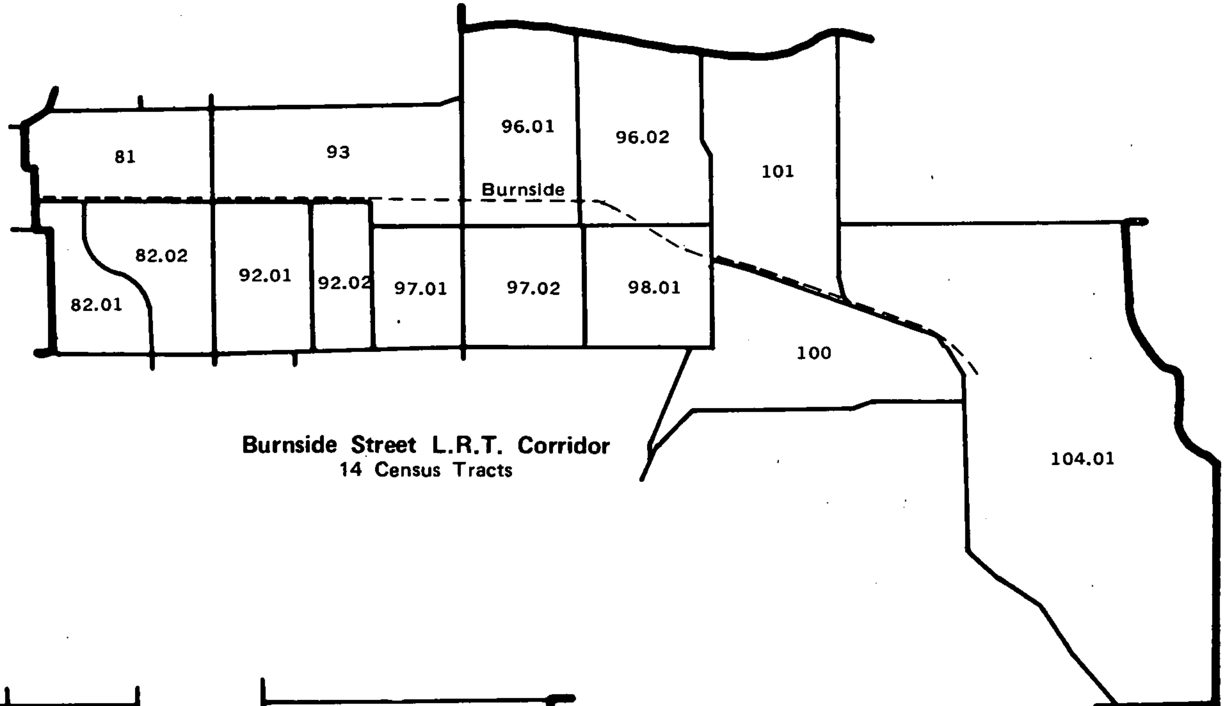
Numbers are U.S. Bureau of the Census, Census Tracts

FIGURE S-2A
Project Corridor Study Areas

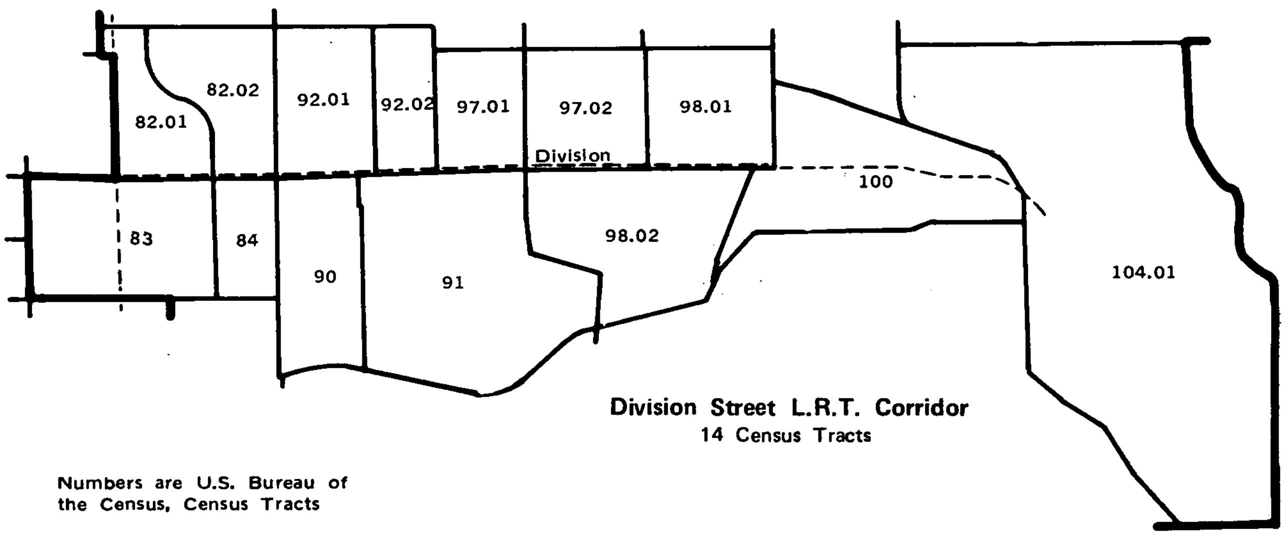
LIGHT RAIL TRANSIT CORRIDORS



I-205 to Lents
L.R.T. Corridor
5 Census Tracts



Burnside Street L.R.T. Corridor
14 Census Tracts



Division Street L.R.T. Corridor
14 Census Tracts

FIGURE S-2B
Project Corridor Study Areas

Numbers are U.S. Bureau of the Census, Census Tracts

II. EXISTING SOCIAL SETTING

A. Population Change and Forecasts

1. Region

The Portland SMSA has been growing in recent years at nearly the same rate as the State of Oregon. Between 1960 and 1970, the SMSA added 185,233 residents for a 22.5 percent change in population. During the same period, the State of Oregon had an 18.3 percent change. By 1975, the population of the SMSA had increased to 1,090,700. As noted in Table S-1, growth rates have differed in various parts of the SMSA. Multnomah County, which includes most of the City of Portland, experienced the slowest rate of population change, a trend which is forecast to continue. Washington County is experiencing the largest increases in population in the SMSA, followed in order by Clackamas and Clark Counties. Multnomah County in 1975 contained half of the population (50.2 percent) in the SMSA. About 70 percent of Multnomah County's population in 1975 was contained in the City of Portland. The Multnomah County share of the total SMSA population has declined steadily since the 1930's, as a result of the suburbanization in Clark, Clackamas and Washington Counties. The population within Multnomah County and Portland changed little between 1960 and 1970, 6.1 percent and 2.1 percent respectively. CRAG estimates from 1970 to 1975 for both political jurisdictions show a small loss of population. (The Center for Population Research and Census, Portland State University, estimates that as of July 1, 1977, the City of Portland had a population of 384,500 and Multnomah County, 556,400. These forecasts indicate small increases in population in the city and county.)

Various population forecasts have been made for the Portland SMSA by public and semi-public agencies. Since 1960 over twenty major population forecasts have been prepared. In general, forecasts for 1980 cluster around a total SMSA population of 1.18 to 1.2 million persons; while forecasts for 1990 cluster around 1.4 million.[1]

TABLE S-1

POPULATION CHANGE

PORTLAND, OREGON-WASHINGTON,
STANDARD METROPOLITAN STATISTICAL AREA
(Period from 1960 to 2000)

	Population					Rate of Change (%)			
	1960	1970	1975	1990	2000	1960-70	1970-75	1975-90	1975-2000
Clackamas County	113,038	166,088	202,900	295,150	364,900	46.9%	22.2%	45.5%	79.8%
Multnomah County	522,813	554,668	547,900	615,500	648,600	6.1%	-1.2%	12.3%	18.4%
Washington County	92,237	157,920	190,900	303,575	348,350	71.2%	20.9%	59.0%	82.5%
Clark County	93,809	128,454	149,000	183,775	246,550	36.9%	16.0%	23.3%	65.5%
TOTAL SMSA	821,897	1,007,130	1,090,700	1,398,000	1,608,400	22.5%	8.3%	28.2%	47.5%

Source: (a) U.S. Bureau of the Census, Census of Population and Housing: 1960, Census Tracts, Final Report PHC(1)-121, Portland, Oregon-Washington SMSA, Washington, D.C., 1962; (b) U.S. Bureau of the Census, Census of Population and Housing: 1970, Census Tracts, Final Report PHC(1)-165, Portland, Oregon-Washington SMSA, Washington, D.C., 1972; (c) CRAG, General Planning Data and Projections: Population, Employment and Land Use for the CRAG Region, Portland, 1976; and (d) CRAG, Planning and Adoption Process of the Land-Use Framework Element of the CRAG Regional Plan, Portland, 1977.

For purposes herein, CRAG population forecasts will be used. CRAG is the regional agency authorized to coordinate and direct land use planning for the counties and cities in the Portland metropolitan area. These population forecasts are assumed in the CRAG Regional Plan, presently being developed. These forecasts for the SMSA population in 1975, 1990 and 2000 are shown in Table S-1. The SMSA is expected to increase by 28.2 percent between 1975 and 1990 and 47.5 percent between 1975 and 2000. Multnomah County is expected to increase by 12.3 percent and 18.4 percent respectively. CRAG's forecasts (1976) are based on 1975 estimates prepared for the Interim Transportation Plan, which projected the total distribution of population within traffic zones and census tracts. The 1976 forecasts, although based on the 1975 forecasts, show a more centralized distribution of population than the 1975 figures which assumed continued urban sprawl. The 1976 figures are compatible with CRAG's policies for the Land-Use Framework Element of the CRAG Regional Plan, which require the implementation of growth management strategies by local jurisdictions.

2. Project Study Areas

The Downtown and East Portland Study areas are within the City of Portland. The East County Study Area includes all of Maywood Park, a small portion of Portland, and most of Gresham, Troutdale, Woodvillage, and Fairview. About half of this study area is comprised by the unincorporated portion of Multnomah County.

The City of Portland has maintained a near static growth rate, with a small loss in population between 1970 and 1975 (Table S-2). The unincorporated area of the county experienced growth rates somewhat higher than Multnomah County as a whole. Phenomenal increases in county population have occurred in the incorporated cities in the eastern part of the county. Gresham and Troutdale,

TABLE S-2

POPULATION CHANGES FOR INCORPORATED AND UNINCORPORATED AREAS OF MULTNOMAH COUNTY (1960-1975)

	Population			Rate of Change (%)	
	1960	1970	1975	1960-70	1970-75
Multnomah County	522,813	554,668	547,900	6.1%	-1.2%
Portland	372,298	380,060	379,825	2.1%	-0.1%
Fairview	578	1,045	1,405	80.8%	34.4%
Gresham	3,944	10,030	21,000	154.3%	109.4%
Maywood Park[a]	--	1,230	1,065	--	-13.4%
Troutdale	522	1,661	2,500	218.2%	50.5%
Woodvillage	822	1,533	2,605	86.5%	69.9%
Unincorporated Multnomah County	144,649	159,109	139,500	10.0%	-12.3%

Source: U.S. Bureau of the Census, 1970, Census of Population, Number of Inhabitants, Oregon, Final Report PC(1)-A39, Washington, D.C., 1971; Multnomah County Planning Department, Multnomah County Framework Plan, Inventory Section, Draft 1, Portland, 1977.

[a]City of Maywood Park incorporated in August, 1967. Population decrease is primarily due to residential displacement from I-205 corridor.

in particular, are examples of suburban cities that changed from rural farming communities to metropolitan bedroom communities between 1960 and 1975. Between 1960 and 1970, Gresham had a population increase of 154.3 percent; Troutdale, 218.2 percent. High growth rates for these areas are anticipated to continue.

a. Downtown. The Downtown Study Area decreased in population by 34.3 percent between 1960 and 1970 and continued a declining rate through 1975. (See Table S-3). Most of this decline can be attributed to the reduction in housing stock by urban renewal projects, Portland State University expansion, and private development, such as in Oldtown. CRAG population forecasts indicate a reversal in the declining population in the downtown. Slight increases in population are expected by 1990 and 2000 as some new housing is added to the southern and western ends of the downtown.

b. East Portland. This established inner-city residential area has a stable population with little anticipated fluctuation.

The Banfield Freeway and four LCI corridors are located in the East Portland Study Area. Table S-4 indicates population changes in these corridors. (The corridor study areas were delineated is Figure S-2.) As noted, only small population changes to 1990 and 2000 (less than 5 percent) are anticipated in these corridors. Some population loss would occur between 1990 and 2000 in three of the corridors.

TABLE S-3

POPULATION CHANGES IN THE
PROJECT STUDY AREAS
(1960 to 2000)

Study Area	Population 1960	Population 1970	Population 1975	Population 1990	Population 2000	Rate of Change 1960-70	Rate of Change 1970-75	Rate of Change 1975-90	Rate of Change 1975-2000
Downtown	12,615	8,290	7,484	7,800	8,450	-34.3%	-9.7%	4.2%	12.9%
East Portland	155,753	155,070	144,108	149,150	148,250	-0.4%	-7.1%	3.5%	-0.6%
East County	102,073	137,975	147,986	185,250	210,250	35.2%	7.3%	25.2%	42.1%
TOTAL	270,441	301,335	299,578	342,200	366,950	11.4%	-0.6%	14.2%	22.5%

Source: CRAG, General Planning Data and Projections: Population, Employment, and Land Use For the CRAG Region, Portland, 1976.

TABLE S-4

POPULATION FORECASTS FOR PROJECT
CORRIDORS IN THE EAST PORTLAND STUDY AREA
(1975 to 2000)

Corridor	Population 1975	Population 1990	Population 2000	Rate of Change 1975-1990	Rate of Change 1975-2000
Banfield Freeway	65,006	67,800	68,000	4.3%	4.6%
Low-Cost Improvement Corridors:					
(a) Broadway/Weidler/ Sandy/Halsey	47,742	50,050	49,750	4.8%	4.2%
(b) Burnside/Stark	43,436	45,450	45,450	4.6%	4.6%
(c) Morrison/Belmont/ 60th	27,207	28,400	28,300	4.4%	4.0%
(d) Division	52,758	54,900	54,550	4.1%	3.4%

Source: CRAG, General Planning Data and Projections, 1976.

c. East County. Suburbanization trends in East County will continue. Population in this study area would increase by 37,264 new residents between 1975 and 1990 (25.2 percent increase) and 62,264 by 2000 (42.1 percent change). The highest rate of growth would occur in the incorporated cities of Gresham, Troutdale, Fairview, and Woodvillage.

Three Light Rail Transit (LRT) routes are currently under consideration in the East County Study Area. CRAG population forecasts for the route corridors are shown in Table S-5.* These corridors would have increased growth, yet below the average for the total East County Study Area. Burnside Street Corridor would have the largest population increase of the three corridors. The difference between Burnside and Division is slight. The corridor study areas are shown in Figure S-2.

*The forecasts for the LRT corridors do not assume the population effects of LRT systems. See pages 26-31 for a discussion of LRT impacts on population in East County.

TABLE S-5

POPULATION FORECASTS FOR THE LRT CORRIDORS IN
THE EAST MULTNOMAH COUNTY STUDY AREA
(1975 to 2000)

Corridor	Population 1975	Population 1990	Population 2000	Rate of Change 1975-1990	Rate of Change 1975-2000
Burnside Street	75,729	90,450	106,600	19.4%	40.8%
Division Street	71,609	82,600	97,608	15.4%	36.3%
I-205 to Lents	22,886	25,750	26,600	12.5%	16.2%

Source: CRAG, General Planning Data and Projections, 1976

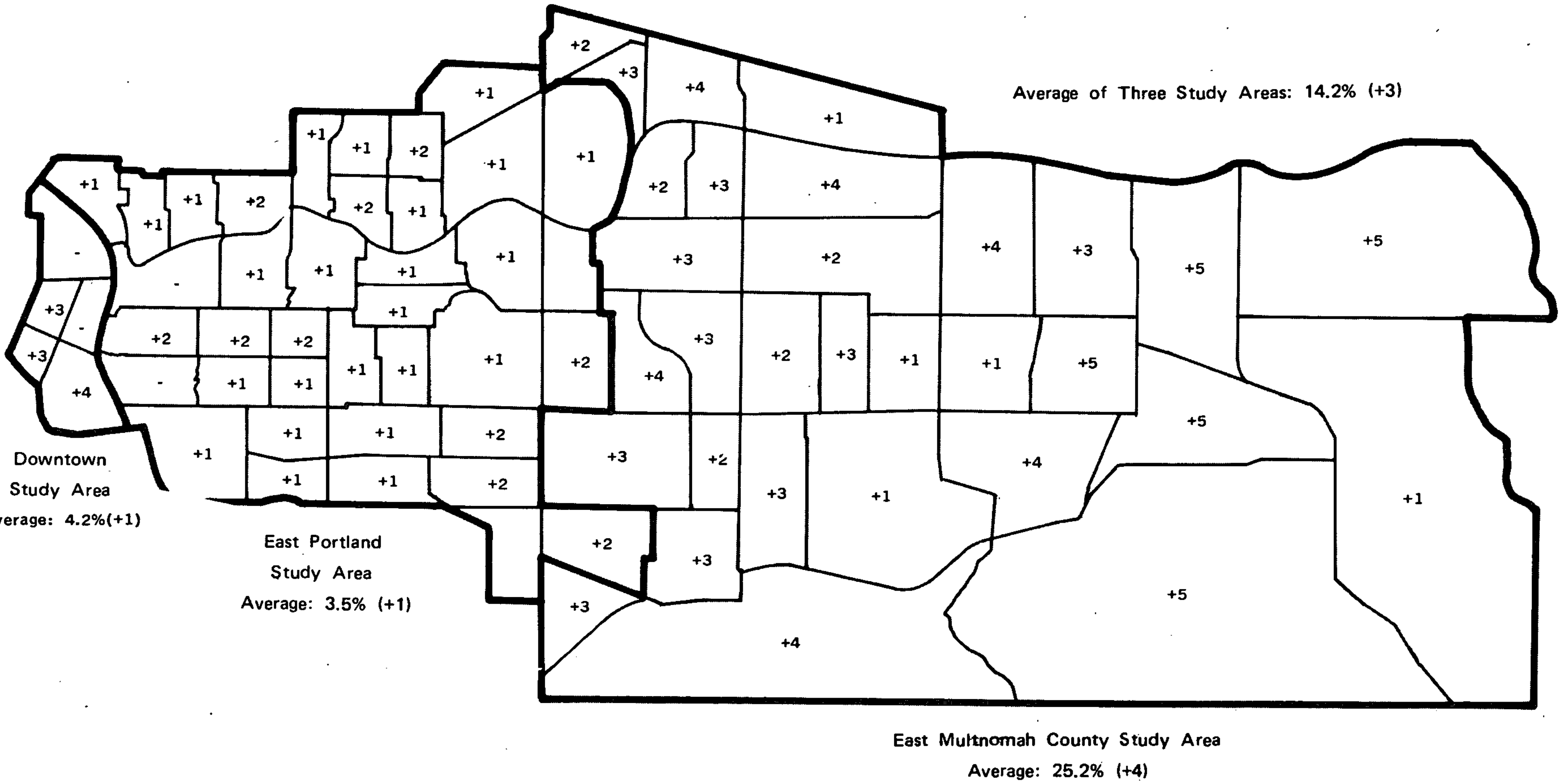
Figure S-3 indicates the forecasted population change, from 1975 to 1990, by census tract, in the project study areas. (Appendix A contains the population density of the study areas.)

B. Socioeconomic Characteristics

The following accumulation of data is a synopsis of several socioeconomic characteristics in the study area. The intent of this data is to make comparisons between the SMSA, the project study areas, and the corridor study area. The majority of data was extracted from the 1970 decennial census counts. Statistical averaging, although it facilitates the construction of demographic profiles, may hide important extremes. Data backup for many of the generalizations made herein, if not shown in a figure or table, is contained in Appendix B.

1. Age Distribution

America's population is increasing in age with the trend toward smaller families and increased longevity. Between 1960 and 1970, there was a



FORECASTED
POPULATION CHANGE
(1975-1990)

+5	Greater than 50.0% Increase
+4	20.1% - 50.0% Increase
+3	10.1% - 20.0% Increase
+2	5.1% - 10.0% Increase
+1	0.0% - 5.0% Increase
-	Decrease

FIGURE S-3

POPULATION CHANGE,
BY CENSUS TRACT, IN
PROJECT STUDY AREAS
(1975 - 1990)

Source: Crag, General Planning Data
and Projections, 1976

dramatic increase in persons 65 years of age and over and a decrease in children under 14 in the SMSA. One result of this has been decreasing enrollment in the schools, particularly the elementary schools.

In 1970, the State of Oregon had 226,799 persons over 65 years of age, or 10.8 percent of the total population. Multnomah County had nearly one-third of the state's older population--70,515, ranking first in the counties in Oregon.[2] Over 12 percent of Mulnomah County's population was 65 and over.

Figure S-4 shows the percentage of the population 65 years of age and over in the study areas. The older population within the study areas is concentrated in the Downtown and East Portland Study Areas. Conversely, the young population is in the East County Study Area and reduces in proportion as one moves into the East Portland Study Area to Downtown.

2. Race

The Portland SMSA has a very small percentage of Blacks and other minorities in the population. Figure S-5 indicates the percentage of Blacks in the study areas. The highest percentage of Blacks is in the Downtown Study Area--3.0 percent. The census tracts with the highest proportion of Blacks in the population are in the northwest corner of the East Portland Study Area near I-80N.

3. Income and Poverty

Figures S-6 reveals the median family income for the census tracts and the study areas. In 1970, the median family income in the SMSA was $10,458. Only the East Portland Study Area of the three areas contained a median family income ($10,846) higher than the SMSA. Income is lowest in the downtown. The

East Portland Study Area is midway in income between the Downtown and East Portland Study Areas. Thus, income increases from the downtown to the suburbs.

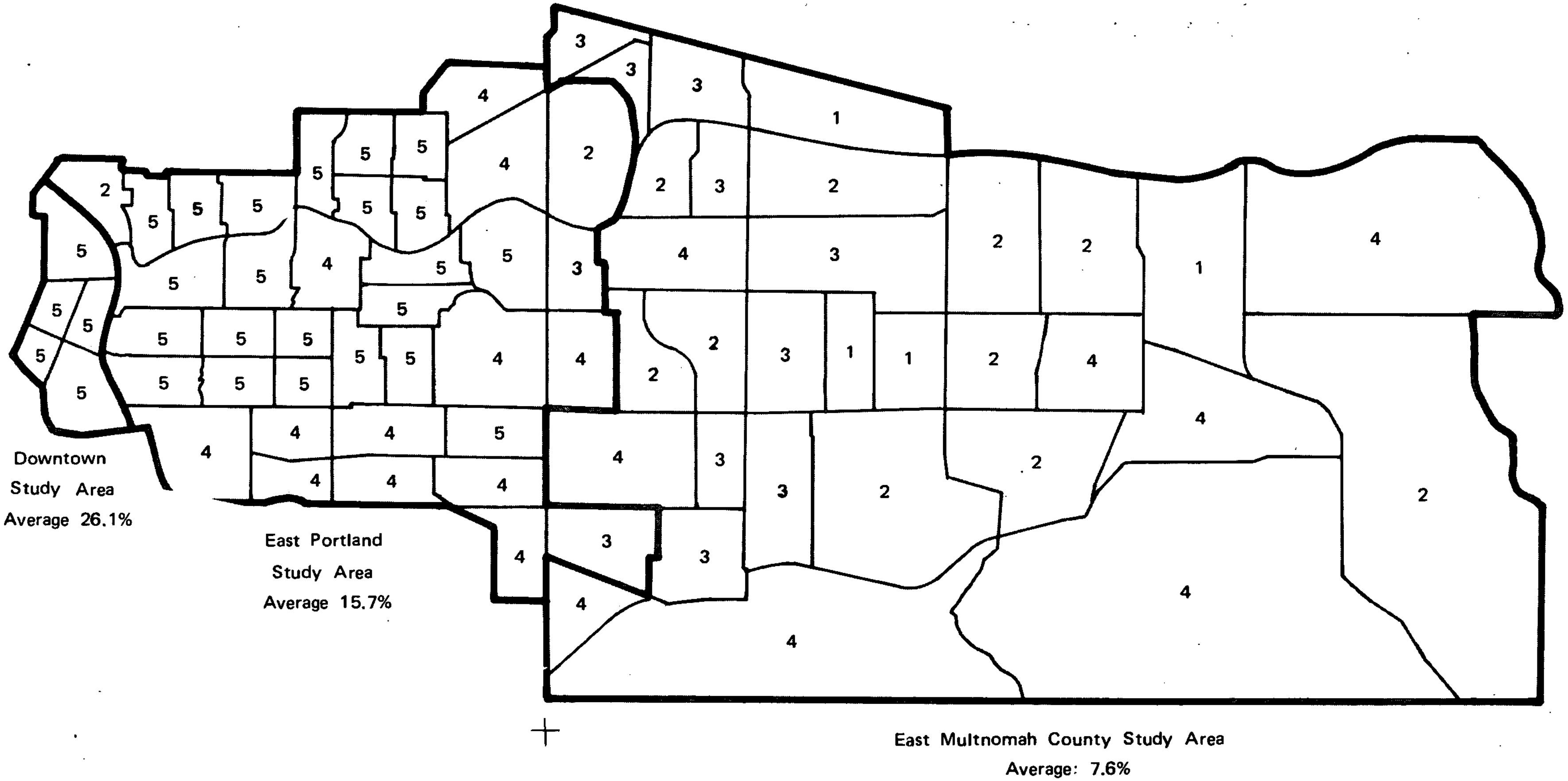
The 1970 census delineated a poverty level threshold, adjusted by such factors as family size, sex of the family head, number of children under 18 years of age, and farm and non-farm residence. For example, the average poverty level for a non-farm family of four, headed by a male, was $3,745 in the 1970 census. (In 1977, the poverty level threshold for a non-farm family of four is $5,850.) Figure S-7 maps the percentage of families below the poverty level in 1970 in the project study areas. For comparison, the SMSA had 6.9 percent of the families so designated. The highest percentage of poverty level families is in the Downtown Study Area and in the older parts of the inner city near the Willamette River in the East Portland Study Area.

4. Education

In 1970, 62.9 percent of persons 25 years of age and over in the SMSA were high school graduates. The median school years completed for the SMSA was 12.4. Educational attainment, like income, tends to increase outward from the downtown, but not as evenly as income levels. The lowest percentage is in the north end of the downtown and in the near-river portion of the East Portland Study Area.

5. Housing

Housing in the Portland SMSA is characterized by the predominance of single-family dwellings, although in recent years there has been an increasing number of apartments, duplexes, townhouses, and mobile homes. Figure S-8 indicates the change from 1960 to 1970 in the proportion of owner-occupied and renter-occupied housing units in the SMSA and the three project study areas. In the



PERCENT

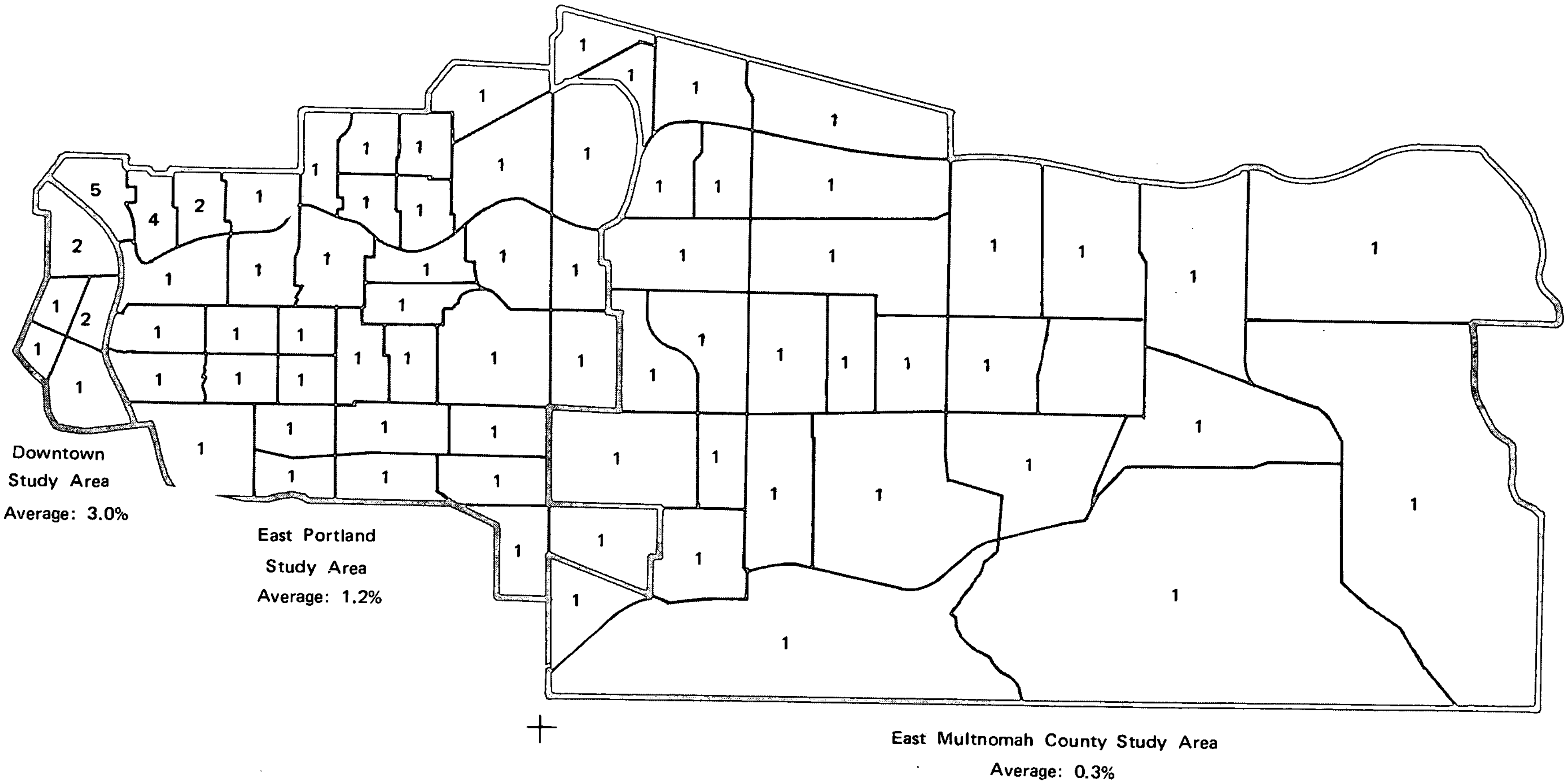
5	15.0 or Over
4	10.0 - 14.9
3	7.0 - 9.9
2	4.0 - 6.9
1	0.0 - 3.9

SMSA Average: 10.9%

FIGURE S-4

PERCENT OF POPULATION 65 YEARS OF AGE OR OLDER (1970 CENSUS)

SOURCE: U.S. Bureau of the Census, Urban Atlas, Portland, Oregon-Washington, SMSA, 1974; Census Tracts, 1970 Portland, Oregon-Washington, SMSA, 1972.



PERCENT

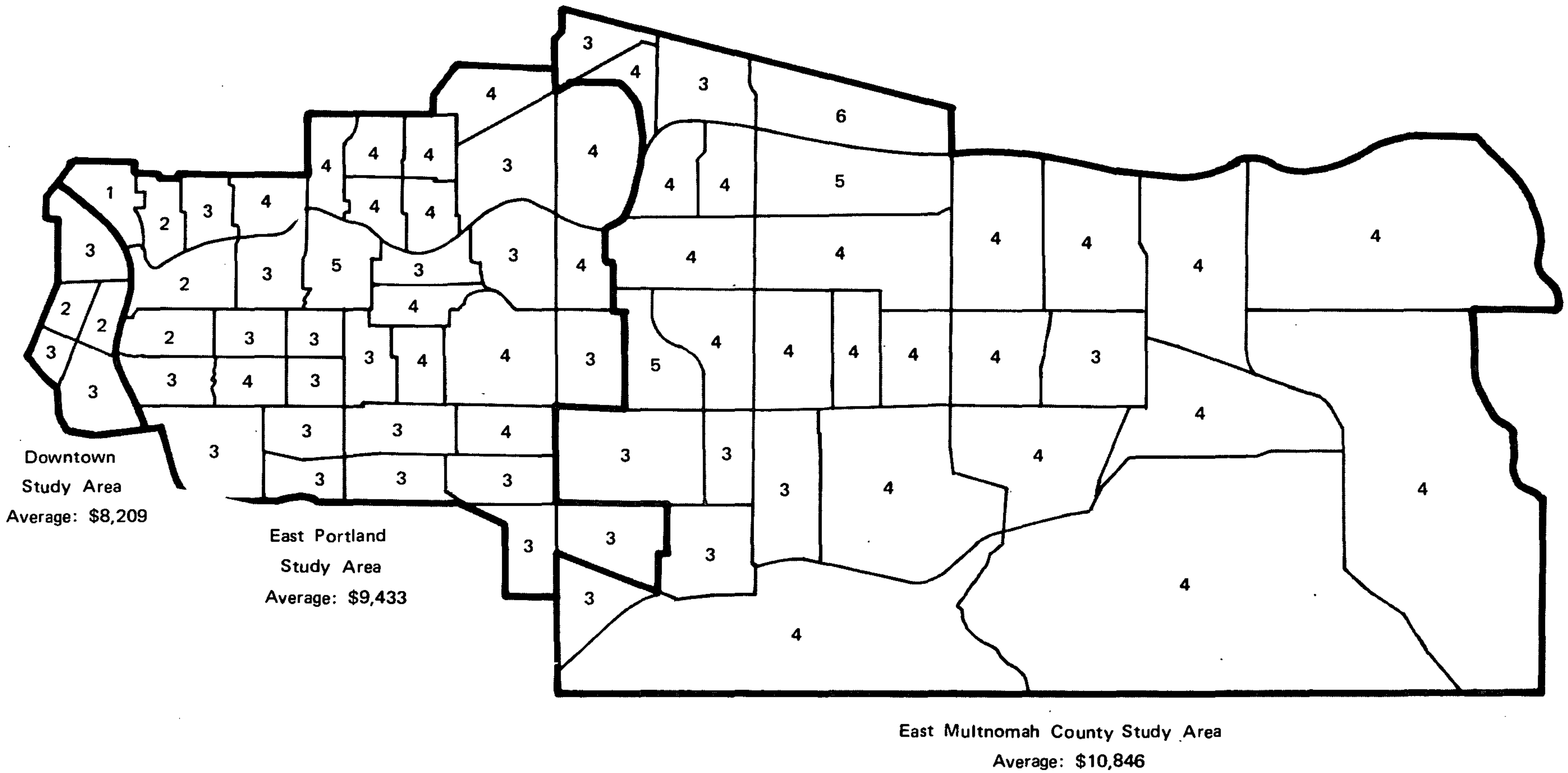
5	50.0 or Over
4	20.0 - 49.9
3	10.0 - 19.9
2	5.0 - 9.9
1	0.0 - 4.9

SMSA Average: 2.3%

FIGURE S-5

BLACK POPULATION AS A PERCENTAGE OF THE TOTAL POPULATION (1970 Census)

SOURCE: U.S. Bureau of the Census, Urban Atlas, Portland, Oregon-Washington, SMSA, 1974 and Census Tracts, 1970, Portland, Oregon-Washington, SMSA, 1972.



DOLLARS

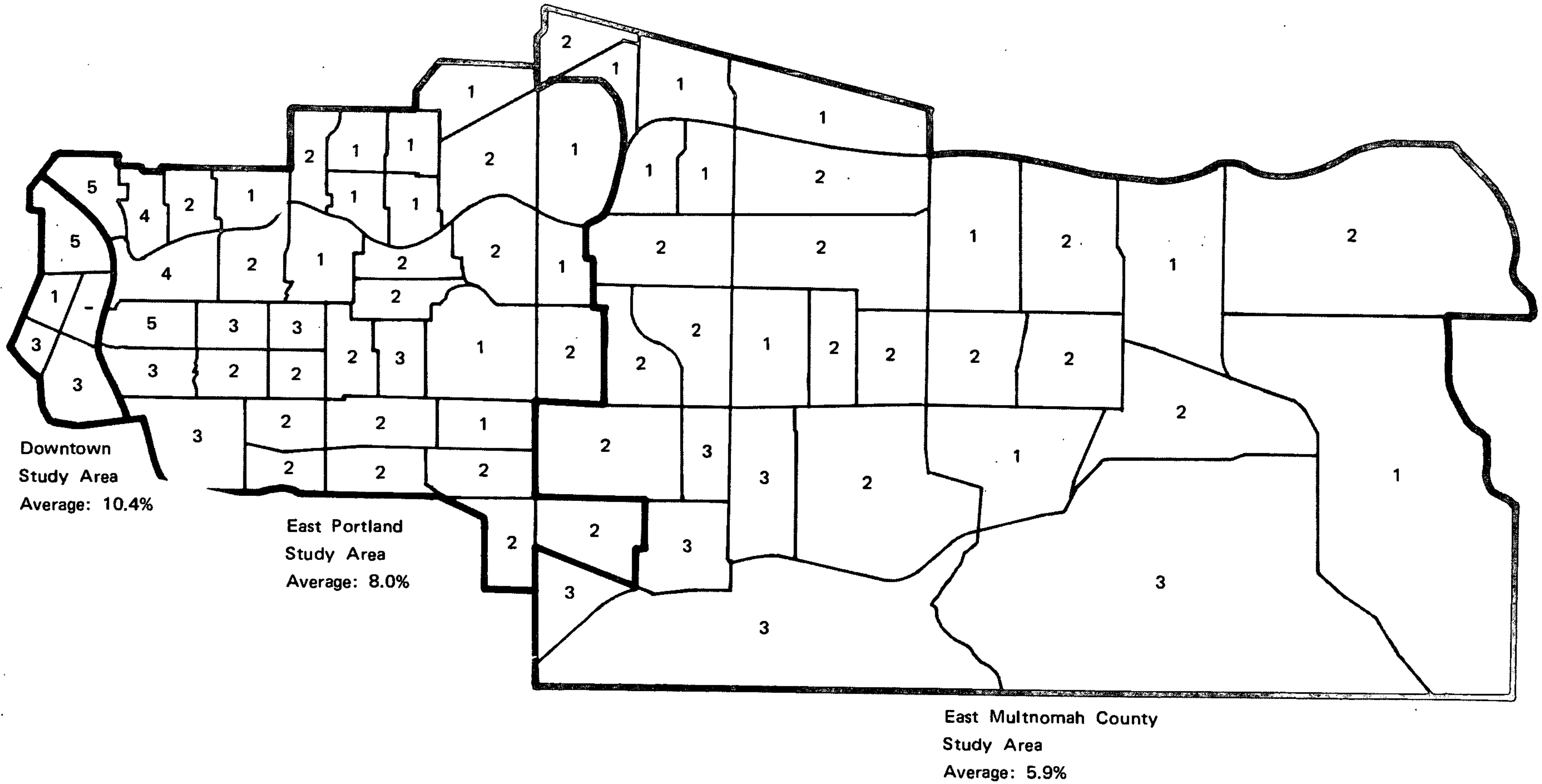
- 6 15,000 or Over
- 5 12,000 - 14,999
- 4 10,000 - 11,999
- 3 7,000 - 9,999
- 2 5,000 - 6,999
- 1 Under 5,000

SMSA Average: $10,458

FIGURE S–6

MEDIAN FAMILY INCOME
(1970 Census)

SOURCE: U.S. Bureau of the Census,
Urban Atlas, Portland, Oregon-Washington,
SMSA, 1974, and Census Tracts, 1970, Portland,
Oregon-Washington, SMSA, 1972



PERCENT

- 5 20.0 or Over
- 4 15.0 - 19.9
- 3 10.0 - 14.9
- 2 5.0 - 9.9
- 1 0.0 - 4.9

SMSA Average: 6.9%

FIGURE S-7

PERCENTAGE OF FAMILIES WITH INCOMES BELOW THE POVERTY LEVEL (1970 Census)

SOURCE: U.S. Bureau of the Census, Census Tracts, 1970, Portland, Oregon-Washington, SMSA, 1972

East Portland and East County Study Areas, the proportion of owner-occupied housing decreased between 1960 and 1970, primarily due to increases in apartments and townhouses. Housing in the downtown is almost exclusively renter-occupied. The East County Study Area has 70.7 percent of its housing owner-occupied. The East Portland Study Area is about half and half.

Figure S-11 shows the percentage of all housing units which are owner-occupied, by census tract, in the study areas.

During the period 1970 to 1974, about 23,400 new dwelling units were built in Multnomah County. Less than one half of that total was in the City of Portland. On the other hand, residential development in the East County Study Area has been growing steadily. Between 1970 and 1976, 11,405 dwelling units were added to the housing stock of the area. Multiple family units made up 53 percent of that number. In 1960, multiple family units made up only three percent of the housing stock in the East County Study Area. By 1975, 26 percent of the housing was in multiple housing units.

Contributing to the multiple family housing growth in the study areas is the change in household size. The number of persons per household is decreasing, with one-and two-member households increasing. In 1960, 1970, and 1977 the average household size in Multnomah County decreased from 2.9 to 2.7 to 2.5; in Portland, 2.7 to 2.6 to 2.4. More households require more housing units.

Within Portland, 55 percent of the housing units are over 35 years old and over 70 percent are over 25 years old. These older homes require more maintenance than newer homes and are generally more prone to rapid deterioration. Nonetheless, the low vacancy rates and the high cost of new single-family residences provide an incentive to upgrade older housing in the city. The number of residential rehabilitations is high in the City of Portland and increasing.

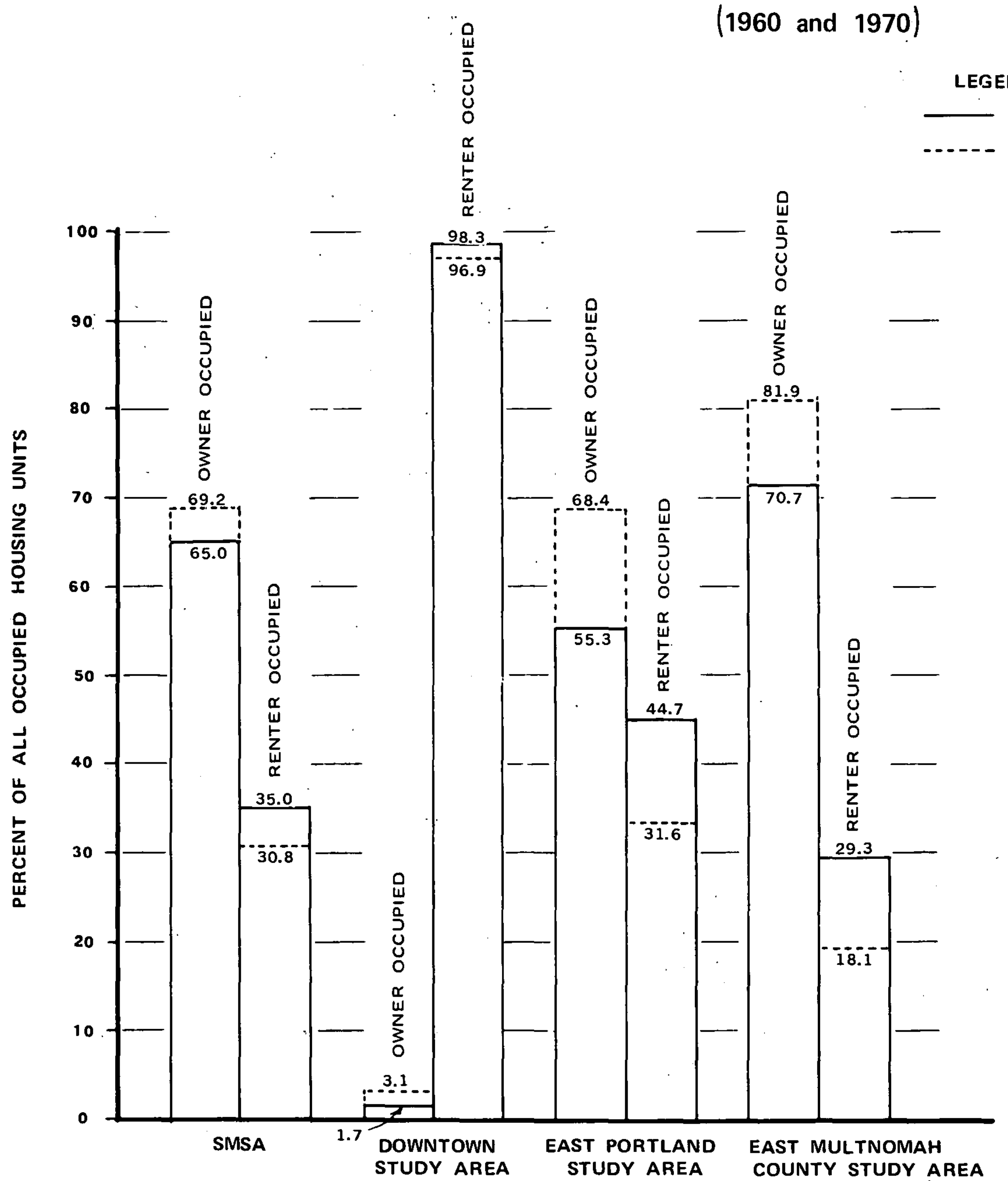
C. Neighborhood Associations

The City of Portland is a community of neighborhoods. Inner city neighborhoods such as Rose City Park, Montavilla, Arleta, and Lents in East Portland were once suburbs and bear the names of streetcar stations around which they originally developed. The competitive growth of the suburban areas, increases in through-traffic through the neighborhoods, deterioration of some of the older residences, and land use conversions (single to multiple family, residential to commercial and industrial) have put increasing pressures on the older inner-city neighborhoods. Low to median income residents, lower education attainment levels, high incidence of poverty, large concentrations of seniors and transient population are significant features which are contributing to transition in the neighborhoods. Nonetheless, these neighborhoods have major assets as places to live: (a) the central location and proximity to downtown and other commercial areas; (b) a heterogeneous group of people, living and working in the neighborhoods, and (c) an abundance of older homes, established parks, services and convenient transit. There is a growing appreciation and market for older homes. A growing number of persons are thinking of these neighborhoods as places to settle down in, rather than being a "stopover" until something better is available. Two East Portland neighborhood areas, in particular, Ladd's Addition and Laurelhurst, have remained among the most desirable places to live in the city.

In recent years, CRAG, The City of Portland, and the residents of East Portland have shown renewed interest in preserving, restoring, and enhancing the neighborhoods. Neighborhood groups are quite concerned about any physical or economic change that could influence the success of their efforts to stabilize and improve the neighborhood for residential use.

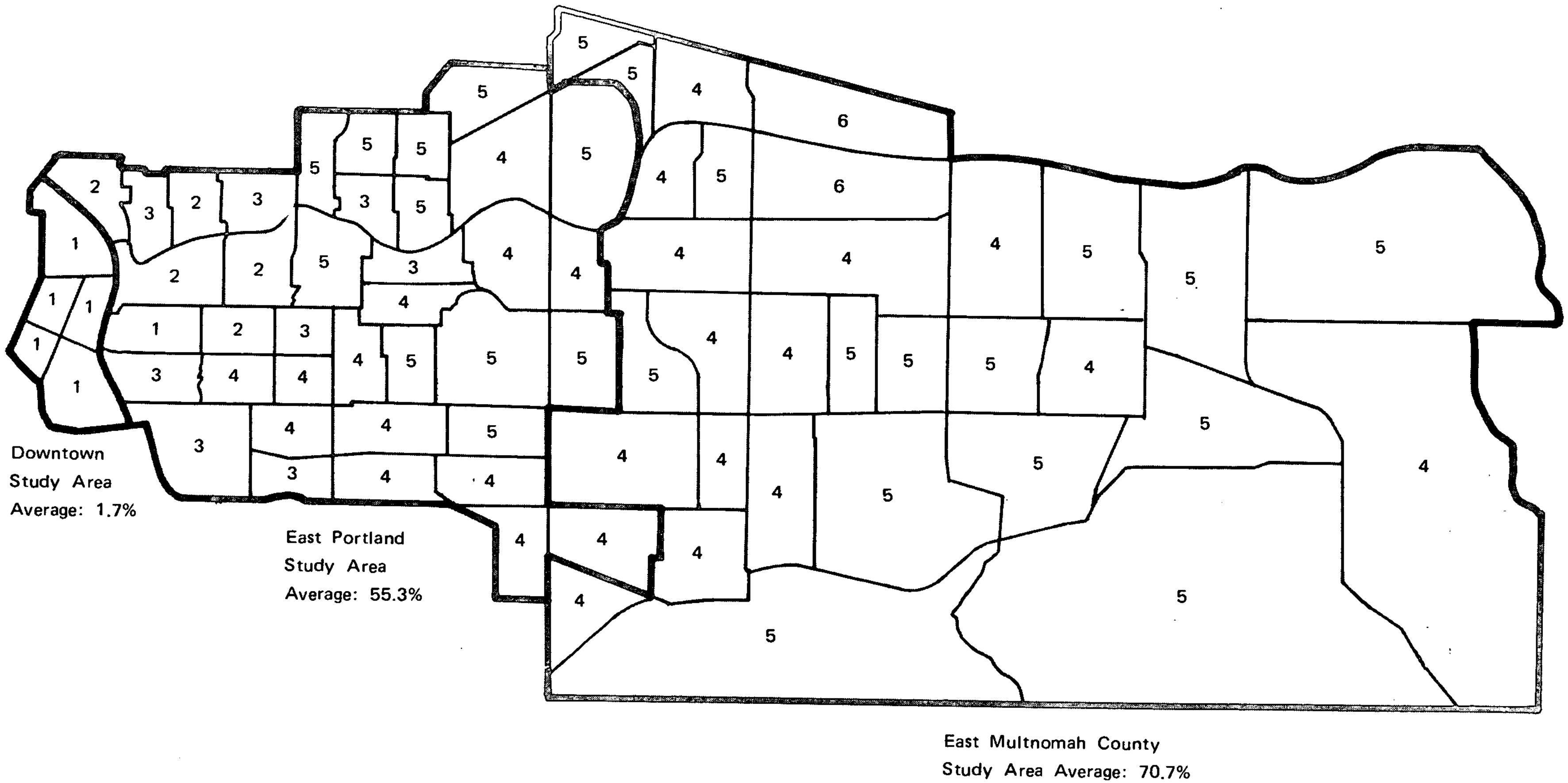
FIGURE S-8

CHANGES IN PERCENTAGE OF OWNER OCCUPIED AND RENTER OCCUPIED HOUSING UNITS (1960 and 1970)



	SMSA	DOWNTOWN STUDY AREA	EAST PORTLAND STUDY AREA	EAST MULTNOMAH COUNTY STUDY AREA
OCCUPIED HOUSING UNITS — 1970	341,505	4,879	59,188	41,774
OCCUPIED HOUSING UNITS — 1960	269,192	8,468	55,002	28,867
DIFFERENCE	72,313 26.9%	-3,589 -42.4%	4,186 7.6%	12,907 44.7%

SOURCE U.S. Bureau of the Census, 1960 and 1970 Census Tracts, Portland, Oregon-Washington, SMSA.



PERCENT

- 6 90.0 or Over
- 5 70.0 - 89.9
- 4 50.0 - 69.9
- 3 30.0 - 49.9
- 2 10.0 - 29.9
- 1 0.0 - 9.9

SMSA Average: 65.0%

FIGURE S-9

PERCENTAGE OF ALL HOUSING UNITS
WHICH ARE OWNER OCCUPIED
(1970 Census)

SOURCE: U.S. Bureau of the Census, Urban Atlas, Portland, Oregon-Washington, SMSA, 1974, and Census Tracts, 1970, Portland, Oregon-Washington, SMSA, 1972.

Currently, sixty-one neighborhood associations[3] exist (or are at some stage of forming) in the City of Portland. These associations are recognized by the city as political units with delineated boundaries. Five of these associations have developed neighborhood plans that were adopted by the City Council.

The East Portland Study Area contains, either totally or in part, twenty neighborhood associations. The Downtown Study Area contains all of the Burnside Neighborhood Association, most of the Downtown Community, and portions of Lair Hill Park and Corbett Terwilliger.

Neighborhood associations are beginning to develop in the East County area. Wilkes, Powell Butte and a portion of Lents S.U.R.G.E. are in this study area. In the interim, community planning areas have been formed in unincorporated East County by Multnomah County.

The neighborhood associations and community plan areas in the study areas are shown in Figure S-10.

Figure S-11 shows the relationship of the project corridor route study areas to the boundaries established by the neighborhood associations. Note that only infrequently are the census tract and neighborhood boundaries contiguous. Figure S-11 also indicates an index of community stability for each of the census tracts along the study route. The Mobility Index (MI) attempts, in effect, to reveal the present residential stability of the tracts by utilizing the percent of households in the same dwelling unit for five years or more.[4] Use of this index provides a simplistic and rough measure of neighborhood cohesion. The values of the index range from 0 to 200. The lower the value of the Mobility Index, the higher the stability and cohesion in the census tract. As noted, the Downtown Connection Corridor has the highest index value, indicating low stability.

The East Portland Corridors vary little and have the lowest values (higher stability) of the corridors in the three study areas. The corridors in the East County Study Area are somewhat higher than those in the East Portland Area. Of the three East County Corridor Study Areas, Lents to I-205 would appear the most stable, with Division and Burnside next in order of increasing index values.

D. Community Institutions

The project study areas contain a well developed system of public, quasi-public and private facilities and services which supports the population.

1. Major Institutions in the Study Areas

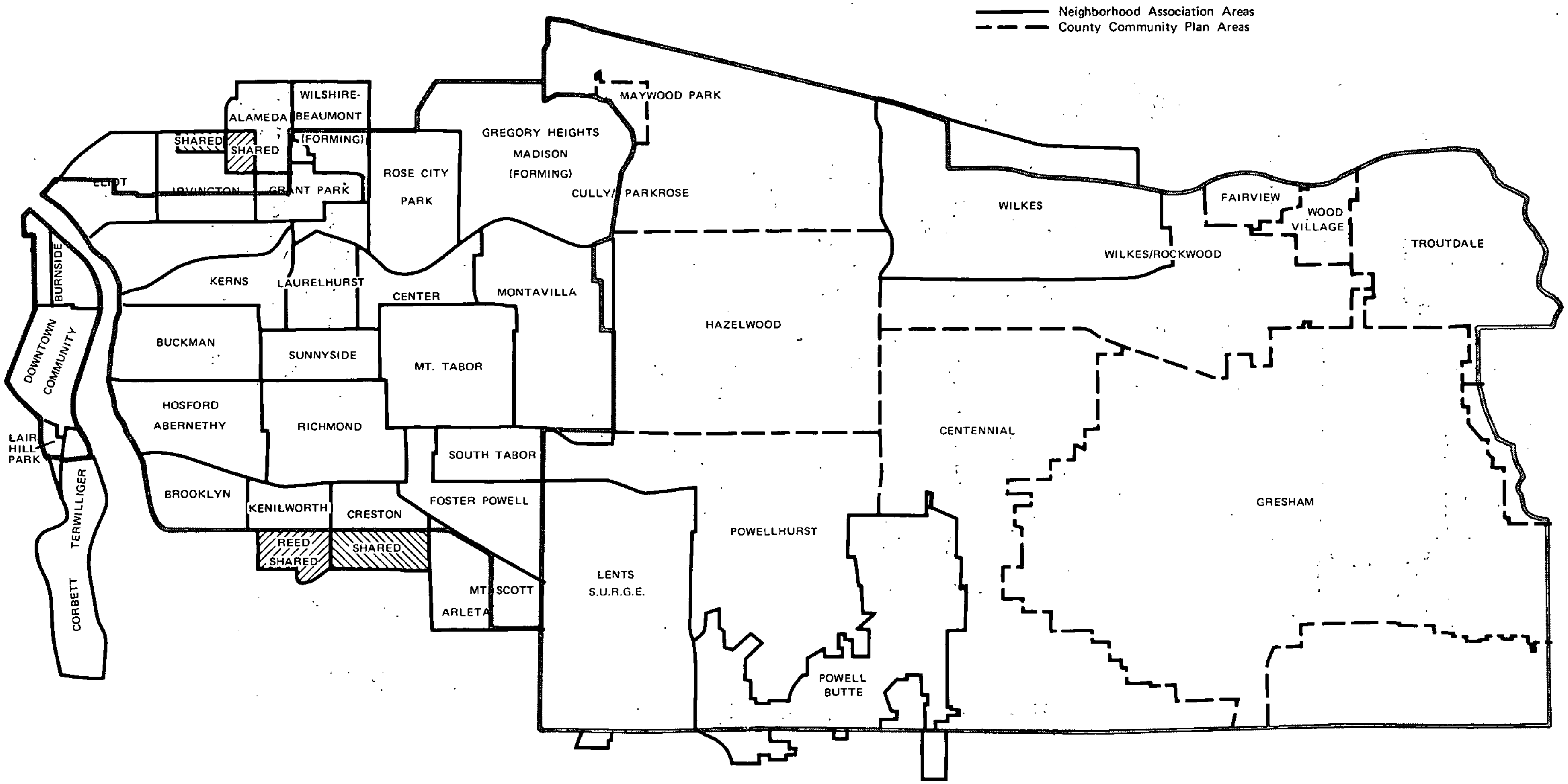
a. Schools, Colleges, and Universities. The total study area encompasses all or portions of six public school districts (Figures S-12). The Downtown Study Area is in Portland School District 1, Area 1. The East Portland Study Area is part of Portland School District 1, Areas 2 and 3. The East County Study Area is served by five school districts: Parkrose District 3, David Douglas District 40, Lynch District 28, Reynolds District 7, and Gresham District 4. The location of all public or private elementary, intermediate and secondary schools is shown in Figure S-12.

There are two higher education facilities in the study areas which are a part of the Oregon State System of Higher Education--Portland State University in the southern end of the Downtown Study Area and Mt. Hood Community College in Gresham. There are several private colleges in the East Portland and East County Study Areas, including Warner Pacific College, Judson Baptist Junior College, Northwest College of the Bible, and Western States Chiropractic College.

FIGURE S-10

NEIGHBORHOOD ASSOCIATIONS AND MULTNOMAH COUNTY COMMUNITY PLAN AREAS

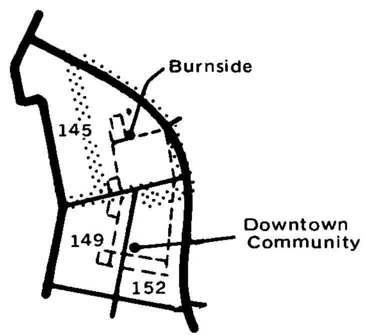
SOURCE: *City of Portland, Office of Neighborhood Associations, 1977; Multnomah County, Division of Planning and Development, 1978.*



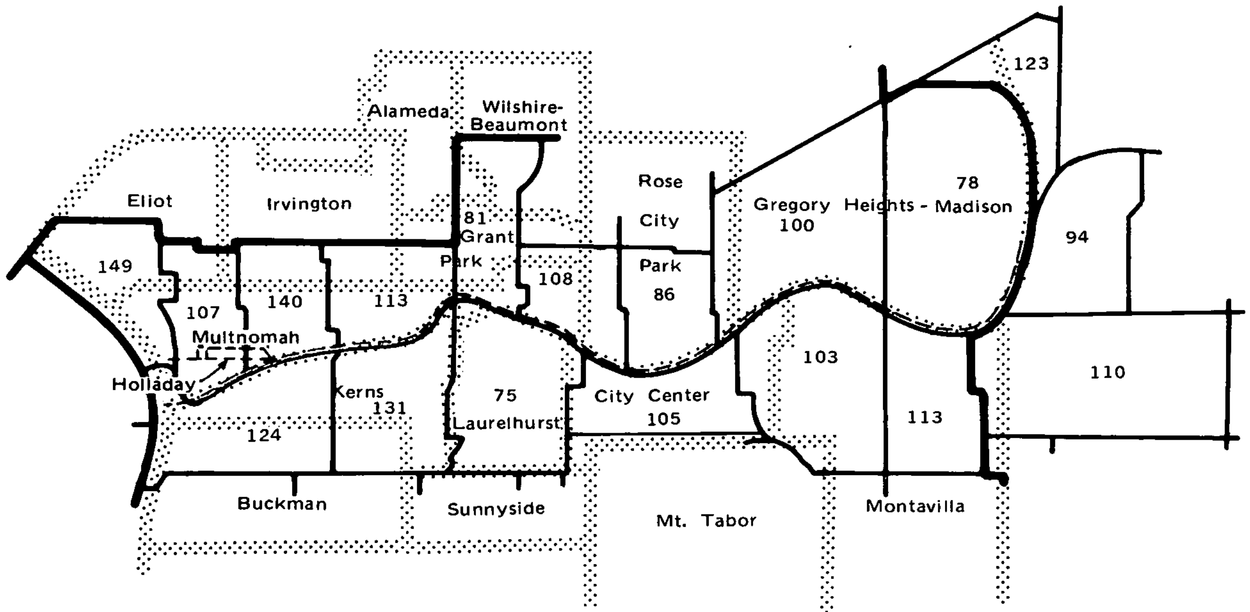
EAST PORTLAND STUDY AREA AVERAGE: 99

SMSA AVERAGE MI: 106

DOWNTOWN STUDY AREA
MI AVERAGE: 154



Downtown Connection Corridor
AVERAGE: 149



Banfield Expressway Corridor
AVERAGE: 108

LEGEND

:::::::::::: Neighborhood Association Boundary

———— Census Tract Boundary

– – – – – – Study Route.

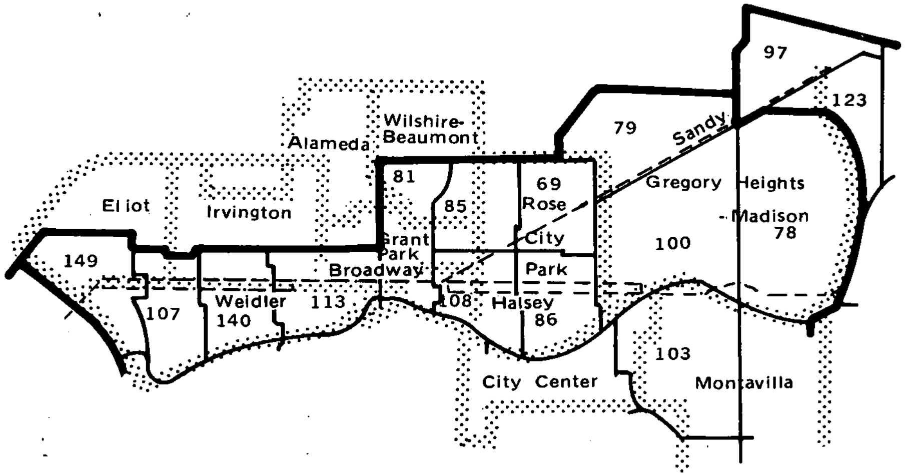
110 Mobility Index (M.I.) M.I.=200-x
Where x is the percentage of households who have lived in the same housing unit 5 years or more.

(The lower the value, the higher the residential stability of the Census Tract.)

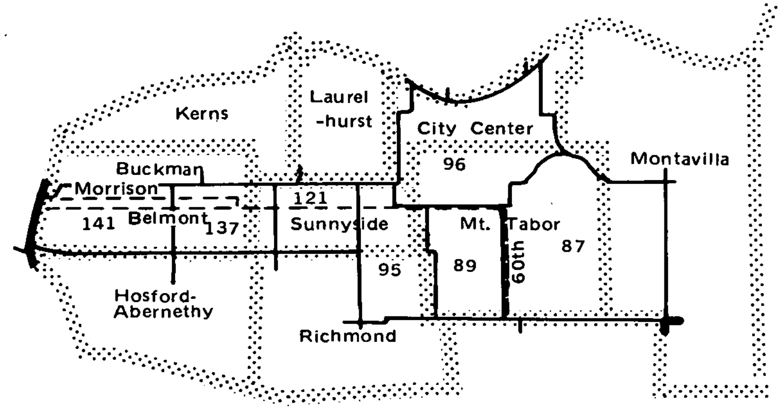
FIGURE S-11
RELATIONSHIP BETWEEN PROJECT CORRIDORS, NEIGHBORHOOD ASSOCIATION BOUNDARIES, AND RESIDENTIAL STABILITY.

SOURCE
City of Portland, Office of Neighborhood Associations, 1977; U.S. Bureau of the Census, Census Tracts, 1970, Portland, Oregon-Washington, SMSA, 1972.

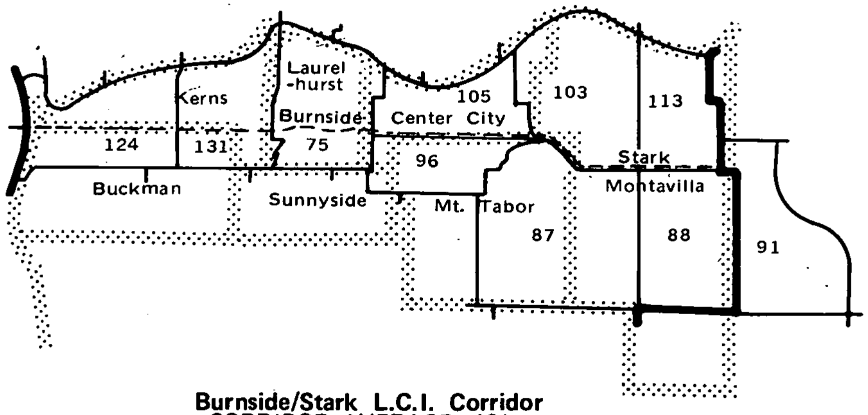
LOW COST IMPROVEMENT CORRIDORS
EAST PORTLAND STUDY AREA AVERAGE: 99



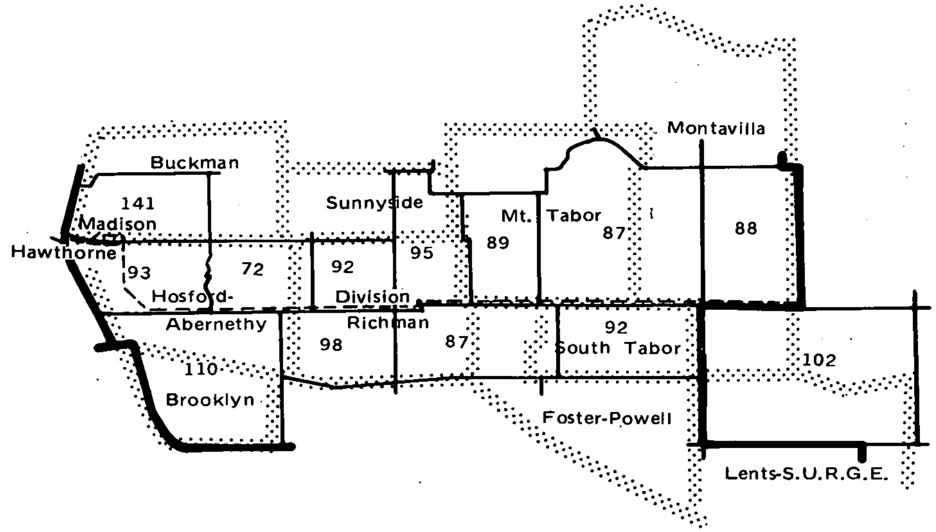
Broadway/Weidler/Sandy/Halsey L.C. I. Corridor
CORRIDOR AVERAGE: 101



Morrison/Belmont/60th L.C.I. Corridor
CORRIDOR AVERAGE: 109



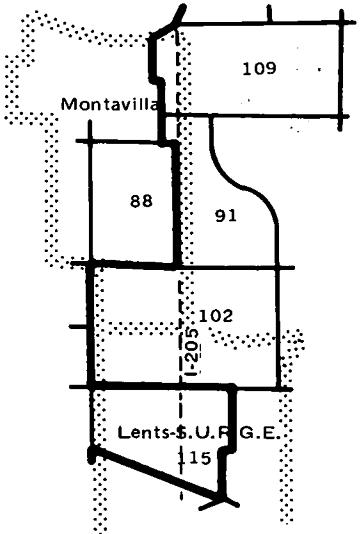
Burnside/Stark L.C.I. Corridor
CORRIDOR AVERAGE: 101



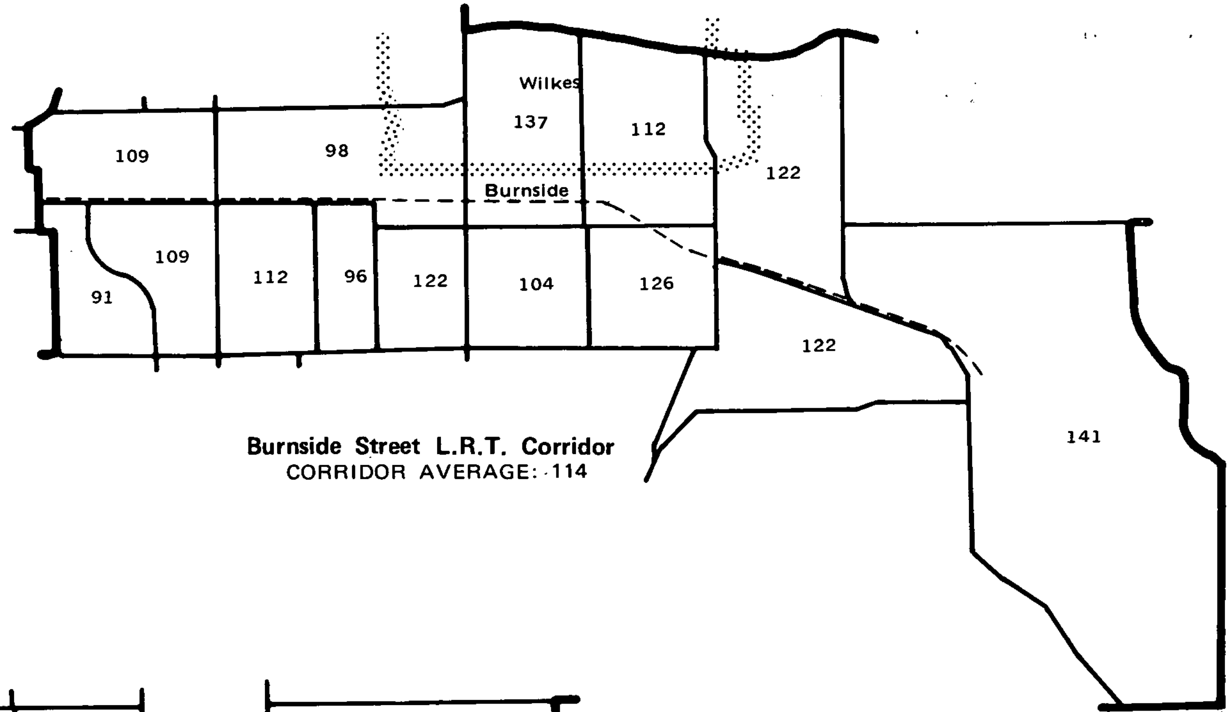
Division L.C.I. Corridor
CORRIDOR AVERAGE: 96

FIGURE S-11A

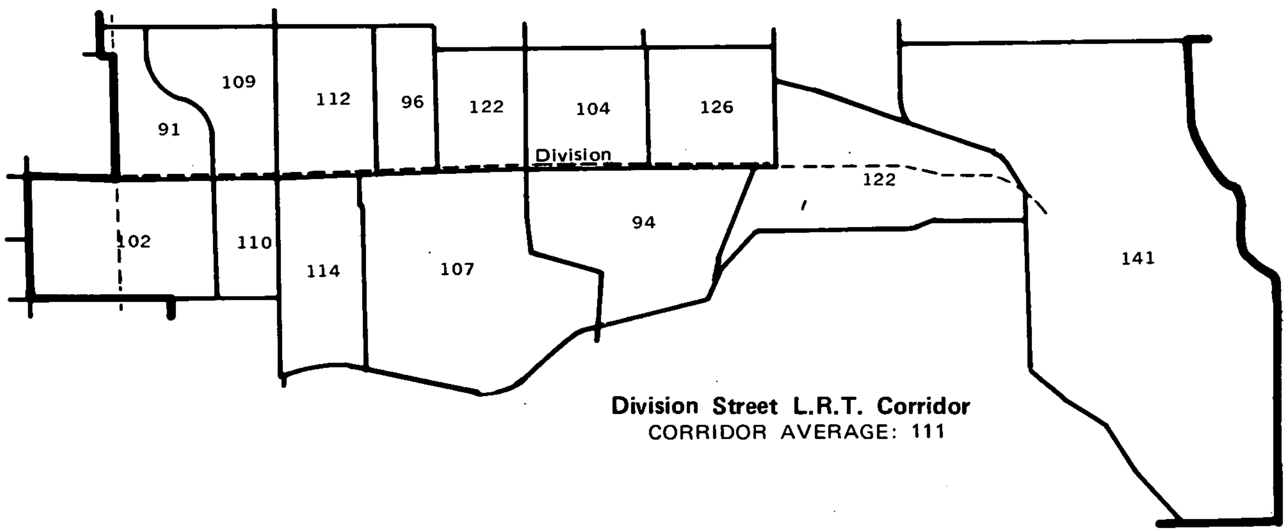
LIGHT RAIL TRANSIT CORRIDORS
EAST MULTNOMAH COUNTY STUDY AREA AVERAGE: 107



I-205 to Lents L.R.T. Corridor
CORRIDOR AVERAGE: 101



Burnside Street L.R.T. Corridor
CORRIDOR AVERAGE: 114



Division Street L.R.T. Corridor
CORRIDOR AVERAGE: 111

FIGURE S-11B

b. Public Parks, Open Space and Existing Bicycle Routes. The study area is dotted with public parks and open space areas (Figure S-13). Most of the public parks are small neighborhood parks, attracting visitational use from a local area. There are several large, regional parks with a broader service area. Examples of these parks are the Downtown Waterfront Park (under development), Laurelhurst Park, Mt. Tabor Park, and Rocky Butte Park.

In total, Multnomah County has 21.8 miles of established bike routes. The longest new bicycle route in the metropolitan area is presently under construction in the I-205 Corridor. This bikeway will be 12.2 miles long, running from the new I-205 Columbia River Crossing on the north to Sunnyside Road in Clackamas County. The bike and pedestrian pathway has been designed for use as a transportation facility and for improved access to community facilities along the I-205 corridor. Connections from the pathway to the arterial and local streets are provided for convenient access. In general, the pathway will pass through the proposed transit station areas to augment local pedestrian and bicycle access to the transit facility. The pedestrian/bicycle crossing of I-205 are located to facilitate access to shopping areas, schools and parks.

c. Emergency Services. The location of hospitals, fire stations, and police stations is shown in Figure S-14.

(1) Hospitals. Seven hospitals are located in the total project study area. All of the hospitals, with the exception of the Shriner's Hospital for Crippled Children and Portland Adventist at 60th Street and Belmont, have emergency room facilities. Two other major Portland hospitals serve the population in the study area, but are outside the boundaries of the study area--Emanual and Eastmoreland Hospitals.

(2) Fire Protection. Within the City of Portland, the Portland Fire Department provides fire protection. P.F.D. Engine Houses are within the Downtown and East Portland Study Area. There are no fire district boundaries, per se, in Portland. A central dispatcher assigns engines to a particular emergency, sending the closest available equipment. In the East Multnomah County, Multnomah County Rural Fire District 10 and the Gresham Fire Department provide fire protection coverage.

(3) Police. Police protection in the study areas is provided by the Portland Police Department, Multnomah County Sheriff's Office, Gresham Police Department, and the Oregon State Police.

(4) Ambulances. Several private ambulance services operate in the study areas and provide emergency transport and care.

1. Corridor Institutions.

Figure S-15 lists the community institutions--churches, schools, parks, fraternal associations, government offices, ambulances, hospitals, fire and police stations, public utilities, and senior care centers--which directly line the study routes. (For the location of other institutions within ¼ mile each side of the study route, refer to the land-use maps in the Land Use Report.)

E. Transportation Modes and the Transportation Disadvantaged

1. Modes of Travel

The urban dweller is a mobile person with frequent trips to and from work, school, shopping, entertainment, personal business, and services. Today an average family living in the Portland region travels over 14,000 miles

FIGURE S-12

SCHOOLS, COLLEGES AND UNIVERSITIES
IN THE PROJECT STUDY AREAS

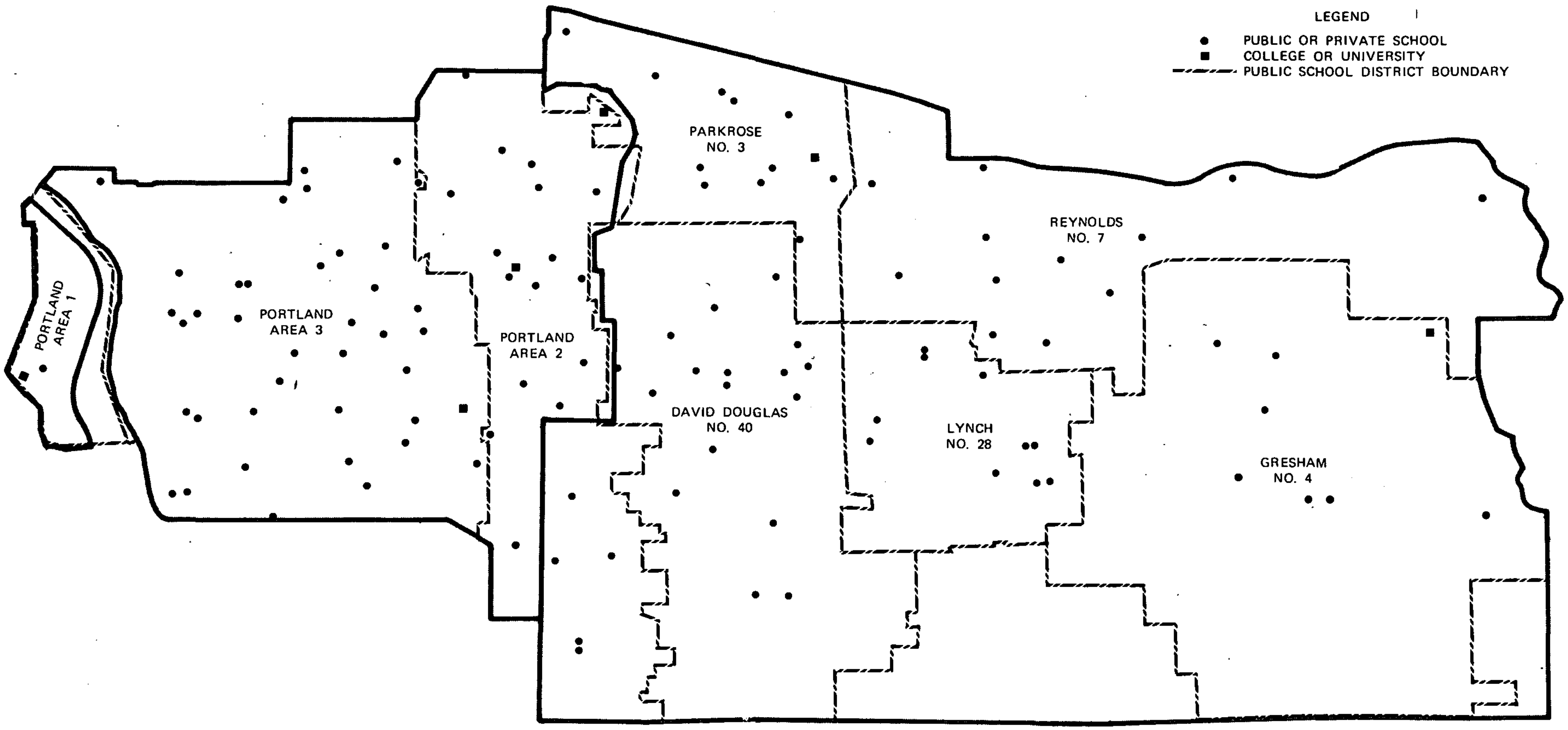


FIGURE S-13

PUBLIC PARKS, OPEN SPACE, AND EXISTING BICYCLE ROUTES

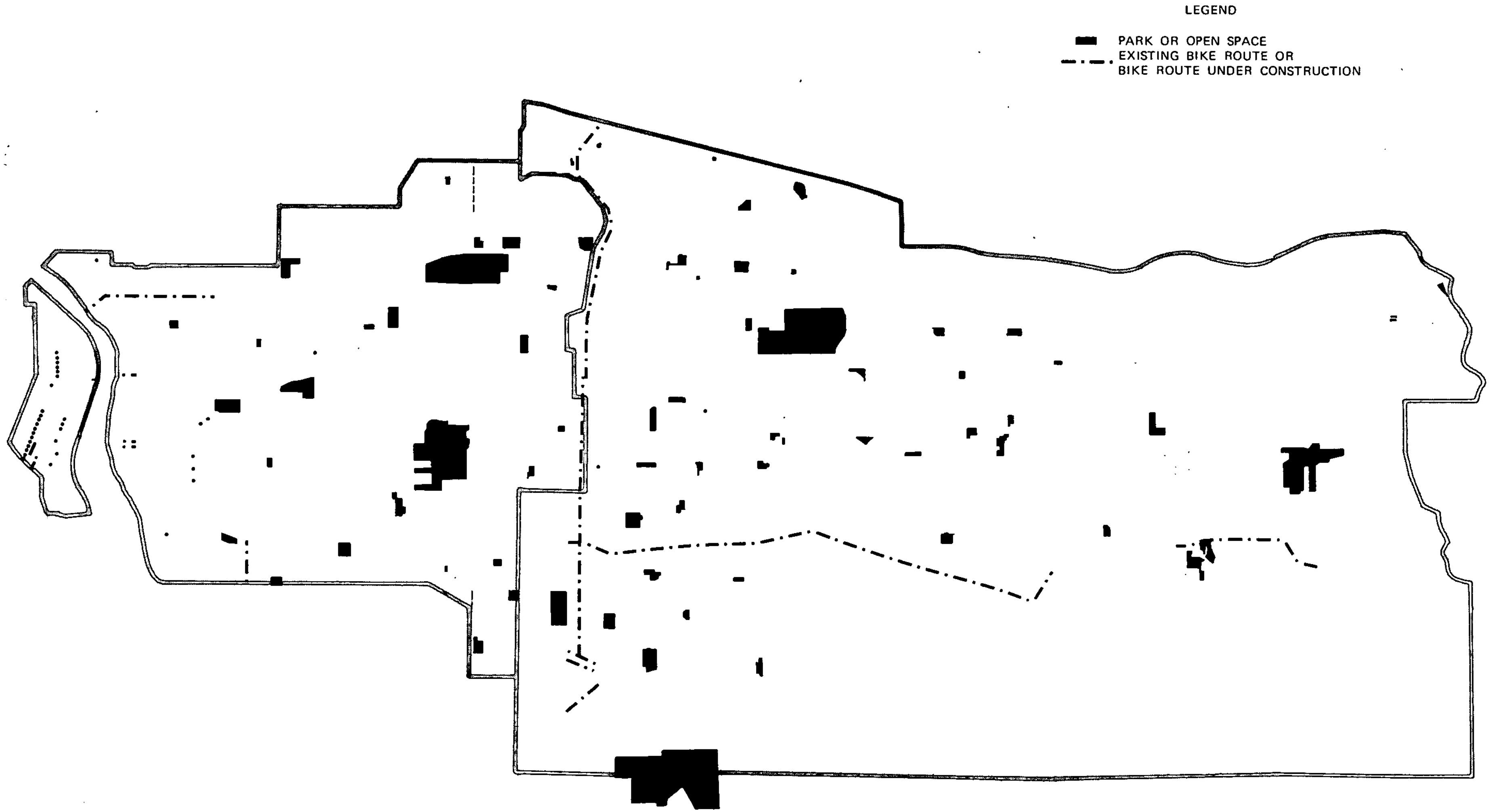
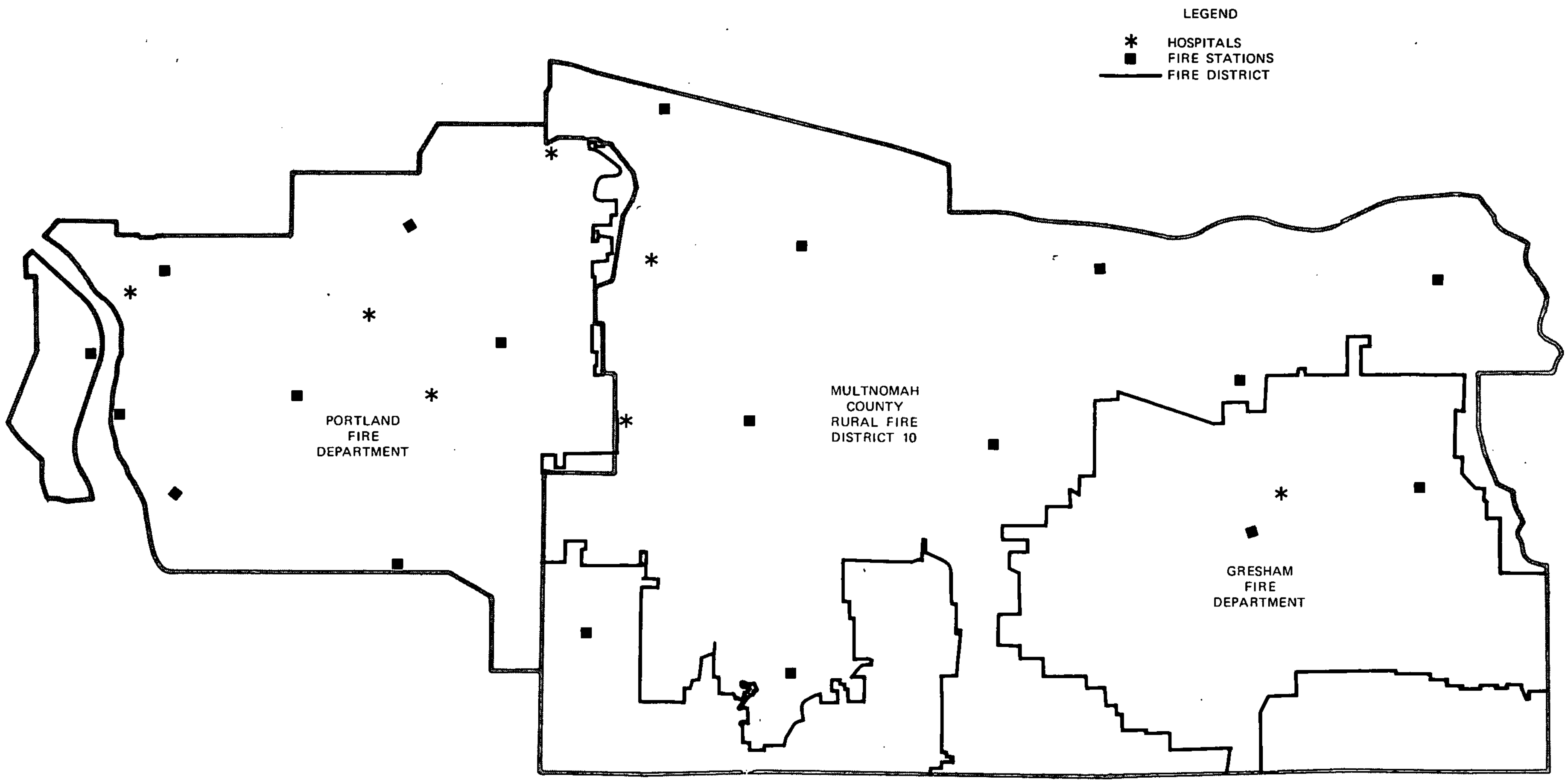


FIGURE S-14

EMERGENCY SERVICES IN THE STUDY AREA



annually, or nearly 40 miles per day.[5] The modes of travel within the metropolitan area are usually private vehicle, bus, taxi, bicycle, or walking. Automobile is the most common choice.

a. Automobile. The 1970 census indicated that 83.4 percent of the workers in the SMSA used the private automobile to get to work, up from 72.9 percent in 1960. The Downtown Study Area had the lowest percentage of workers using automobiles (24.7 percent), and East County had the highest percent (88.1) of the three study areas, indicating the high automobile dependency of the suburban area. The East County also had the highest percentage of 2, 3 or more automobiles per household (6.4 percent). In 1970, 77.2 percent of the workers in the East Portland Study area either drove or were passengers in an automobile. Currently, it is estimated that over 96 percent of all person trips (to work, shopping, entertainment, etc.) in the Portland region are made by auto.[6] (Additional information on vehicular travel is available in the Traffic Report in Volume II of this statement.)

b. Bus. Tri-Met is the regional transit agency and provides bus service in the metropolitan area. (Continental Trailways and Greyhound Bus Lines do not provide any service to the suburban areas.) According to the U.S. Census in 1970, 5.8 percent of the workers in the SMSA used bus transit for getting to work. About 19 percent of the Downtown Study Area workers used the bus; about 12 percent in East Portland Study Area and 4.8 percent in East County.

In 1970, Tri-Met carried about 60,000 passengers on the average weekday. By 1976, that figure had nearly doubled, 110,000 passengers. In 1976, the Tri-Met system served 35,000,000 annual passenger trips with 460 buses operating on over 70 routes.

In conducting sample surveys of its ridership, Tri-Met has found that the largest percentage of riders are women, young adults (18 to 29 years of age) and older adults (50 and over), persons without a car, and white collar employees with middle to lower family incomes.[7] About ten percent of Tri-Met's passengers are over 65 years of age.

c. Taxi. Three taxi cab companies operate in the study areas--Broadway Deluxe Cab, Veterans Radio Cab, and New Rose City.

d. Pedestrian. Particularly in the more densely populated areas of the metropolitan area, primarily young adults and seniors walk to work, shop and do other activities. In the 1970 Census, 5.7 percent of the SMSA's workers walked to work--44.4 percent in the Downtown Study Area, 6.4 percent in the East Portland, and 2.7 percent in the East County.

Figure S-16 reveals some indications of general pedestrian dependency in the project corridor study areas. For comparison, the 1970 census tract percentage of workers who walked to work is shown. The General Pedestrian Dependency (GPD) index attempts to show the relative existence of pedestrian dependency in a localized area through the use of secondary data, in particular, the percent of households without an automobile, persons per household, and median family income.[8] The formula for GPI has no maximum value. Higher values indicate more relative dependence on walking.

As indicated in Figure S-16, the highest pedestrian dependency is in the downtown, Lloyd Center area, and in those neighborhoods bordering the river in East Portland. The lowest values are in the East County area.

2. The Transportation Disadvantaged

Certain elements of the population--the poor, the young (age 10-15), the elderly, and the disabled or handicapped--do not share the same level of

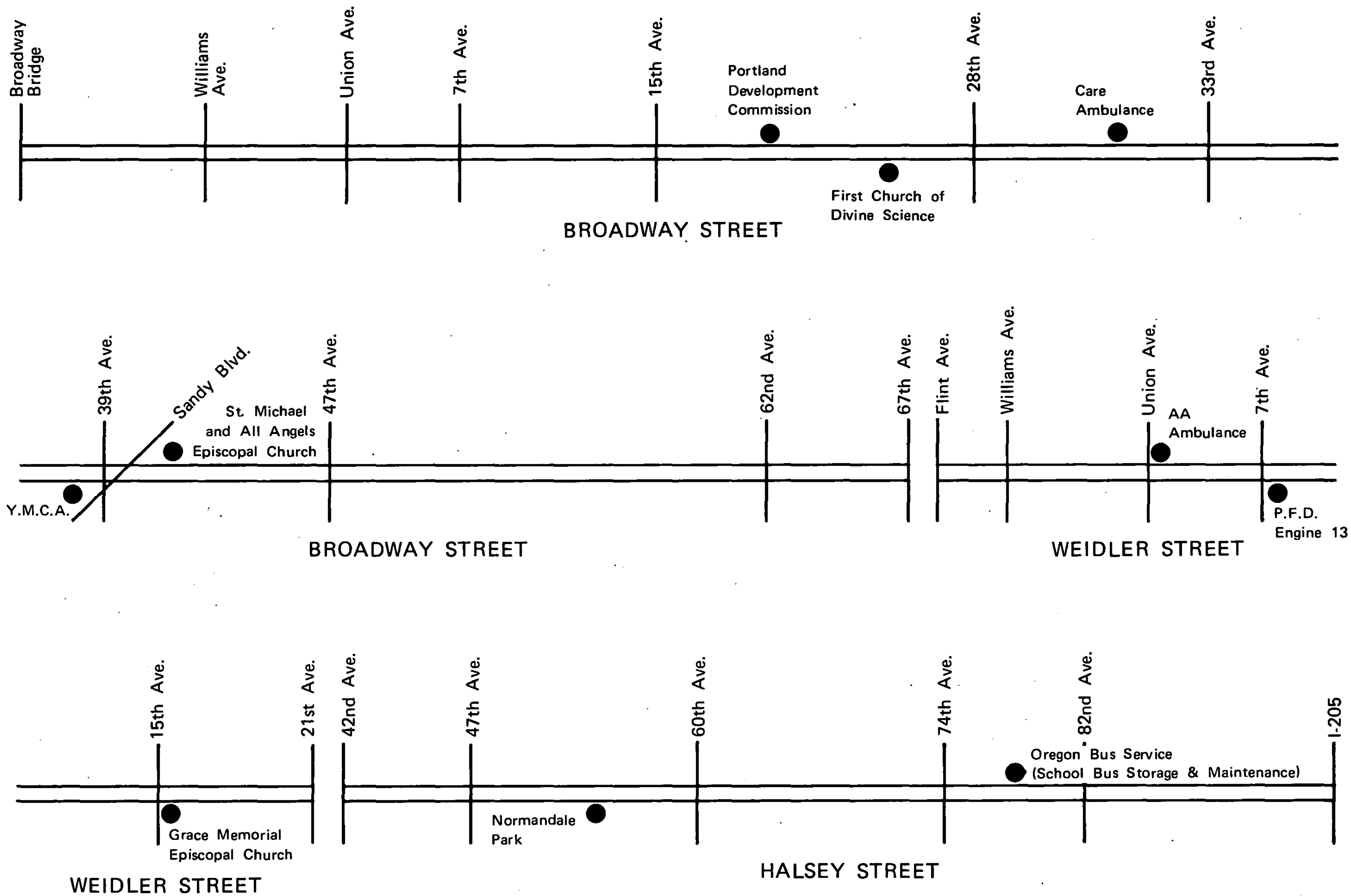
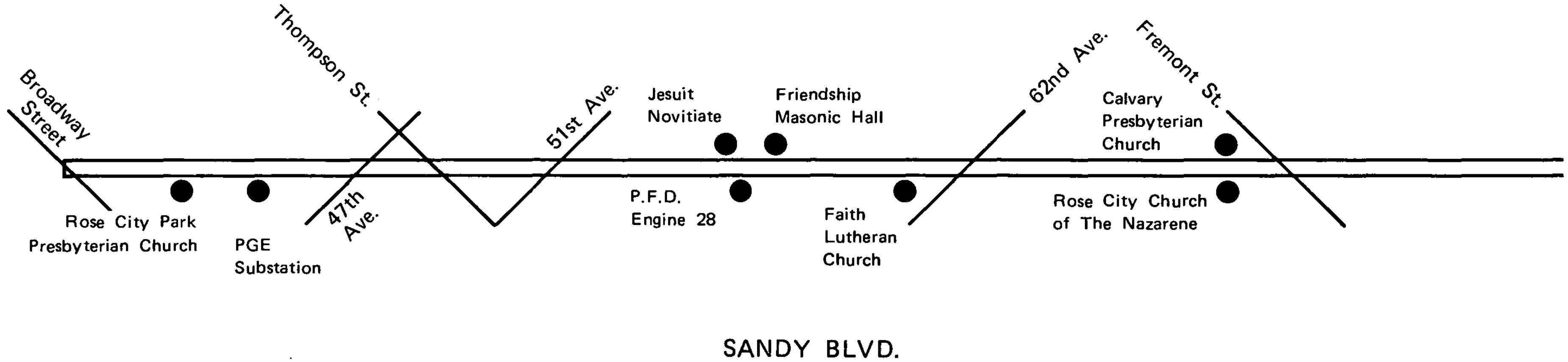


FIGURE S-15A

EAST PORTLAND STUDY AREA
BROADWAY/WEIDLER/HALSEY/SANDY ROUTE (LCI)

SHEET 1 of 2



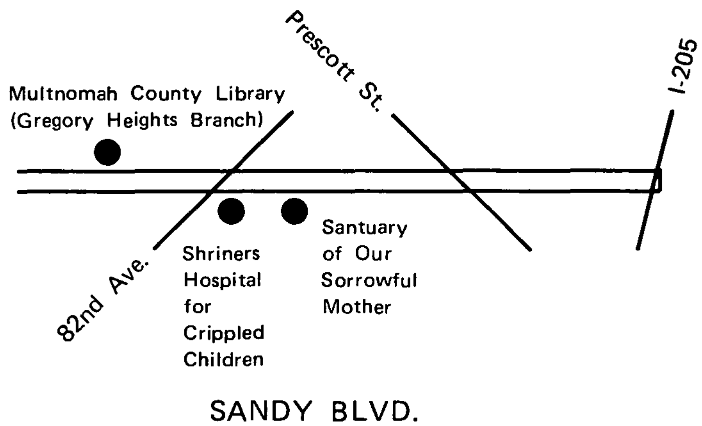


FIGURE S-15A

EAST PORTLAND STUDY AREA

BROADWAY/WEIDLER/HALSEY/SANDY/ROUTE (LCI)

SHEET 2 of 2

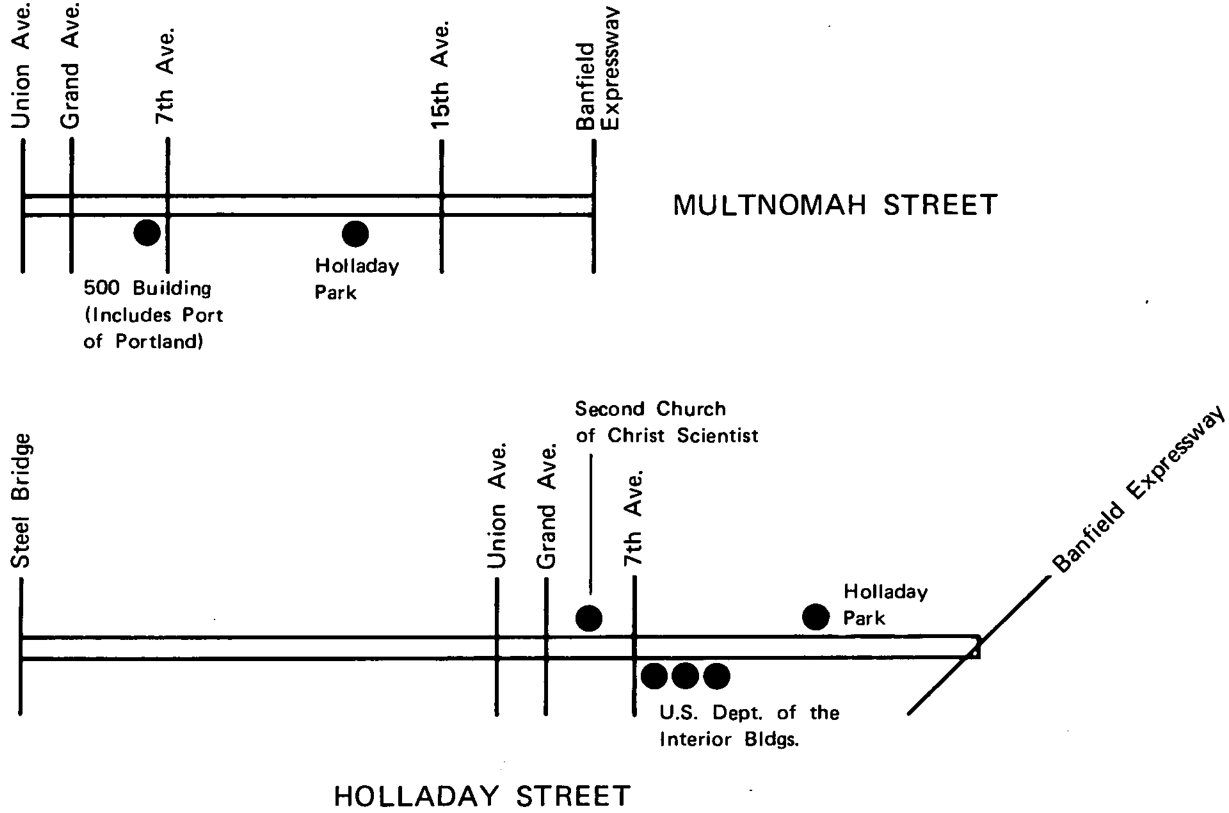
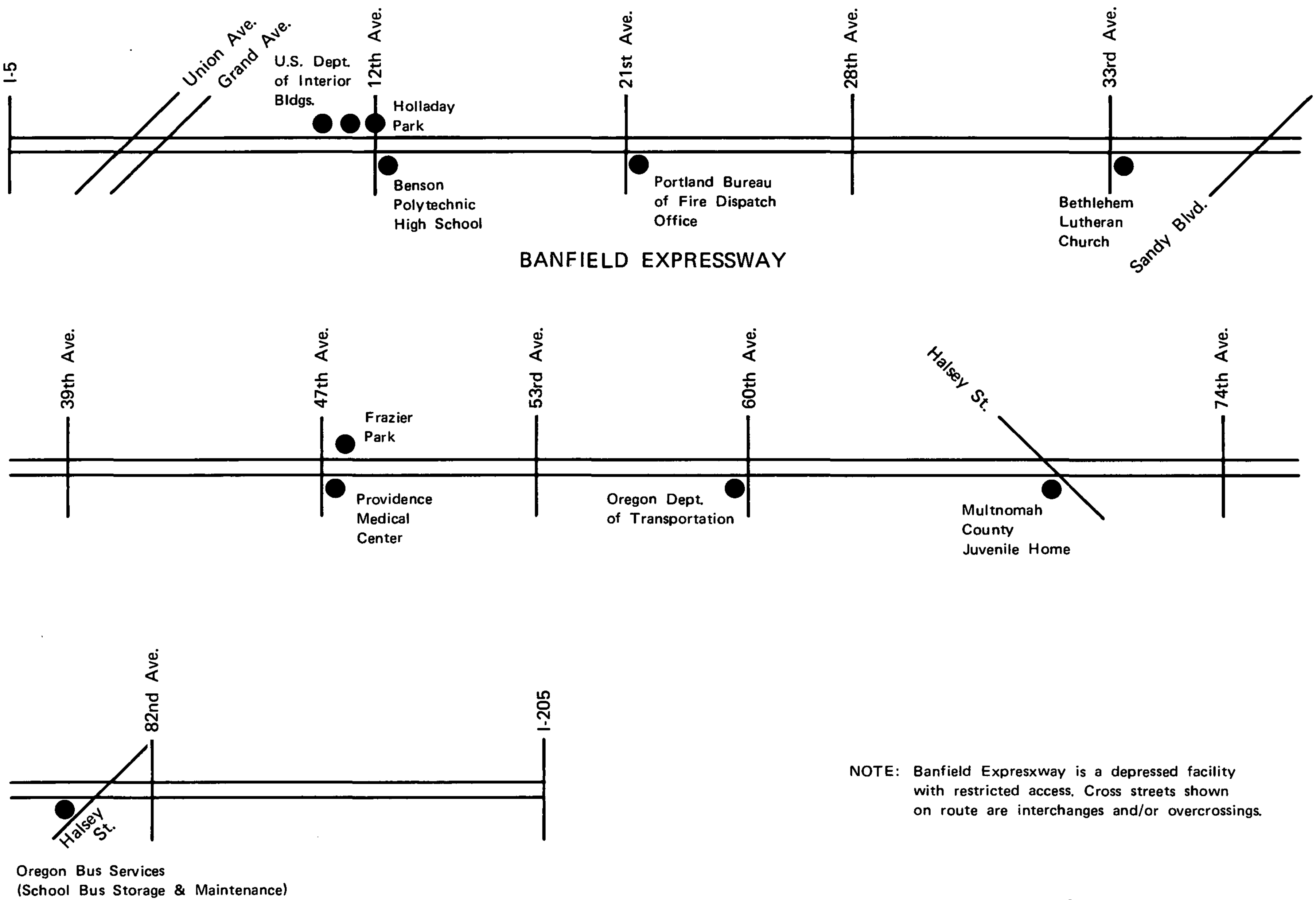


FIGURE S-15B

EAST PORTLAND STUDY AREA
BANFIELD ROUTE

SHEET 1 of 2



NOTE: Banfield Expresxway is a depressed facility with restricted access. Cross streets shown on route are interchanges and/or overcrossings.

FIGURE S-15B

EAST PORTLAND STUDY AREA
BANFIELD ROUTE

SHEET 2 of 2

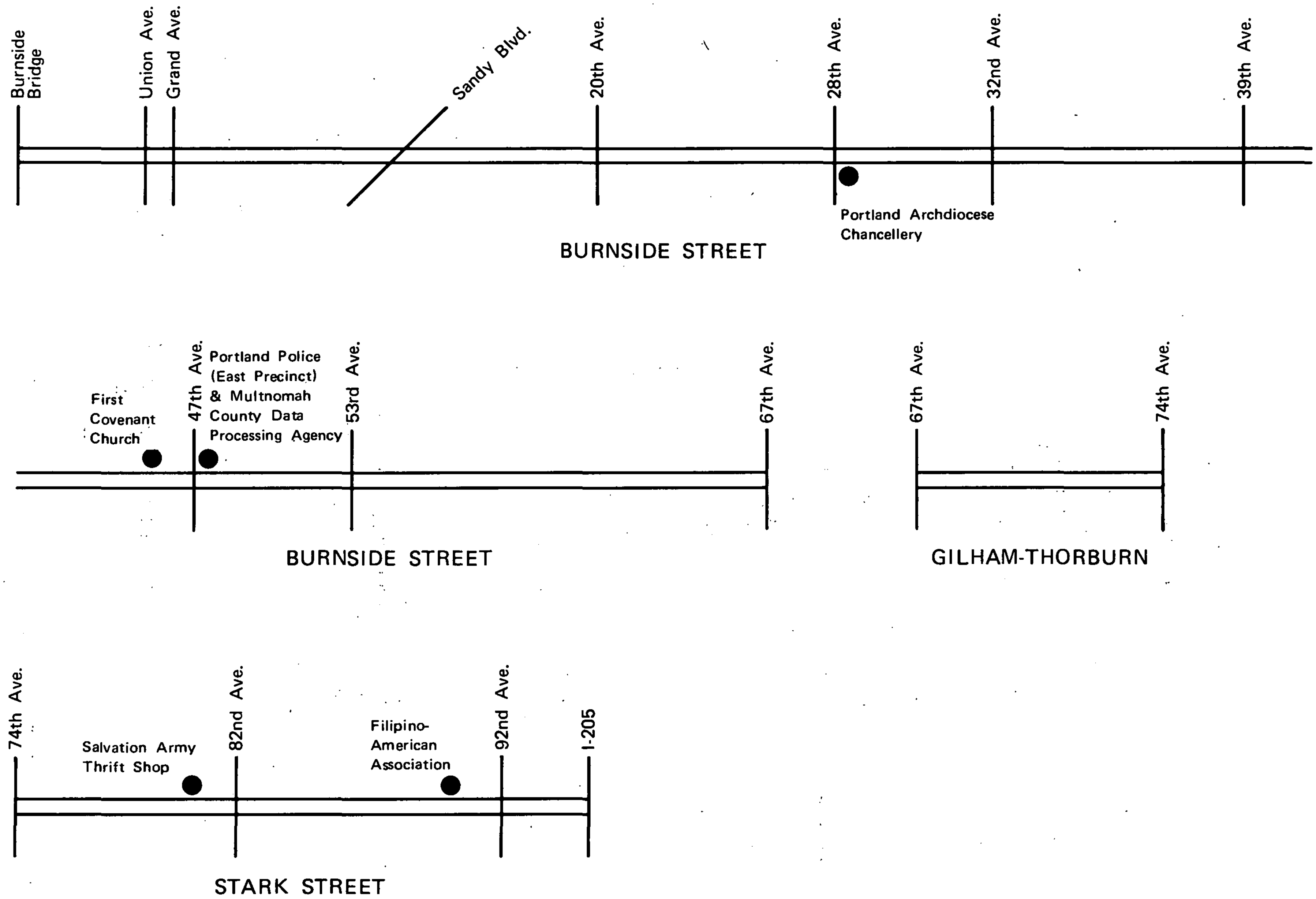


FIGURE S-15C

EAST PORTLAND STUDY AREA
BURNSIDE/STARK ROUTE (LCI)

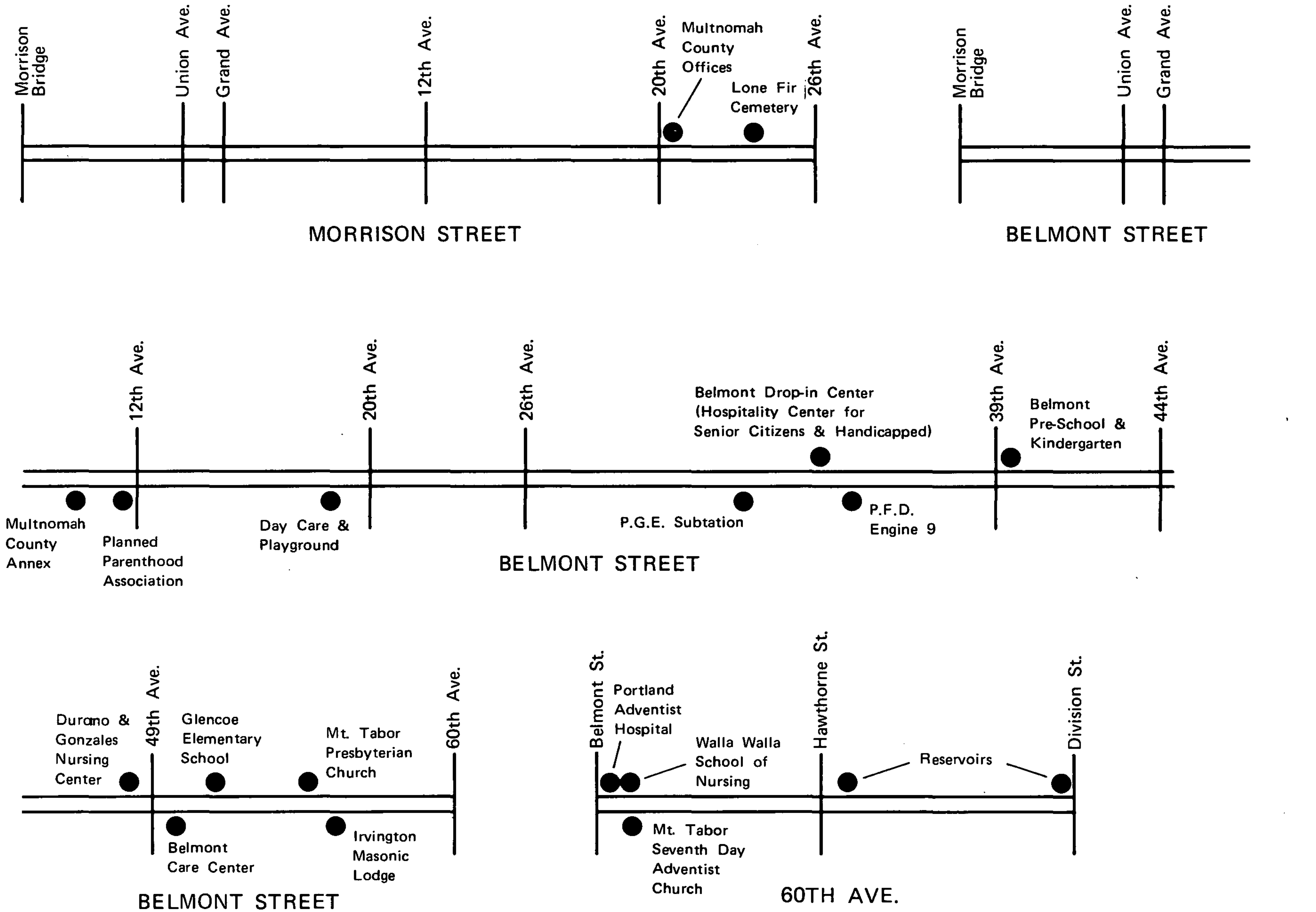


FIGURE S-15D

EAST PORTLAND STUDY AREA
MORRISON/BELMONT/60th AVE. ROUTE (LCI)

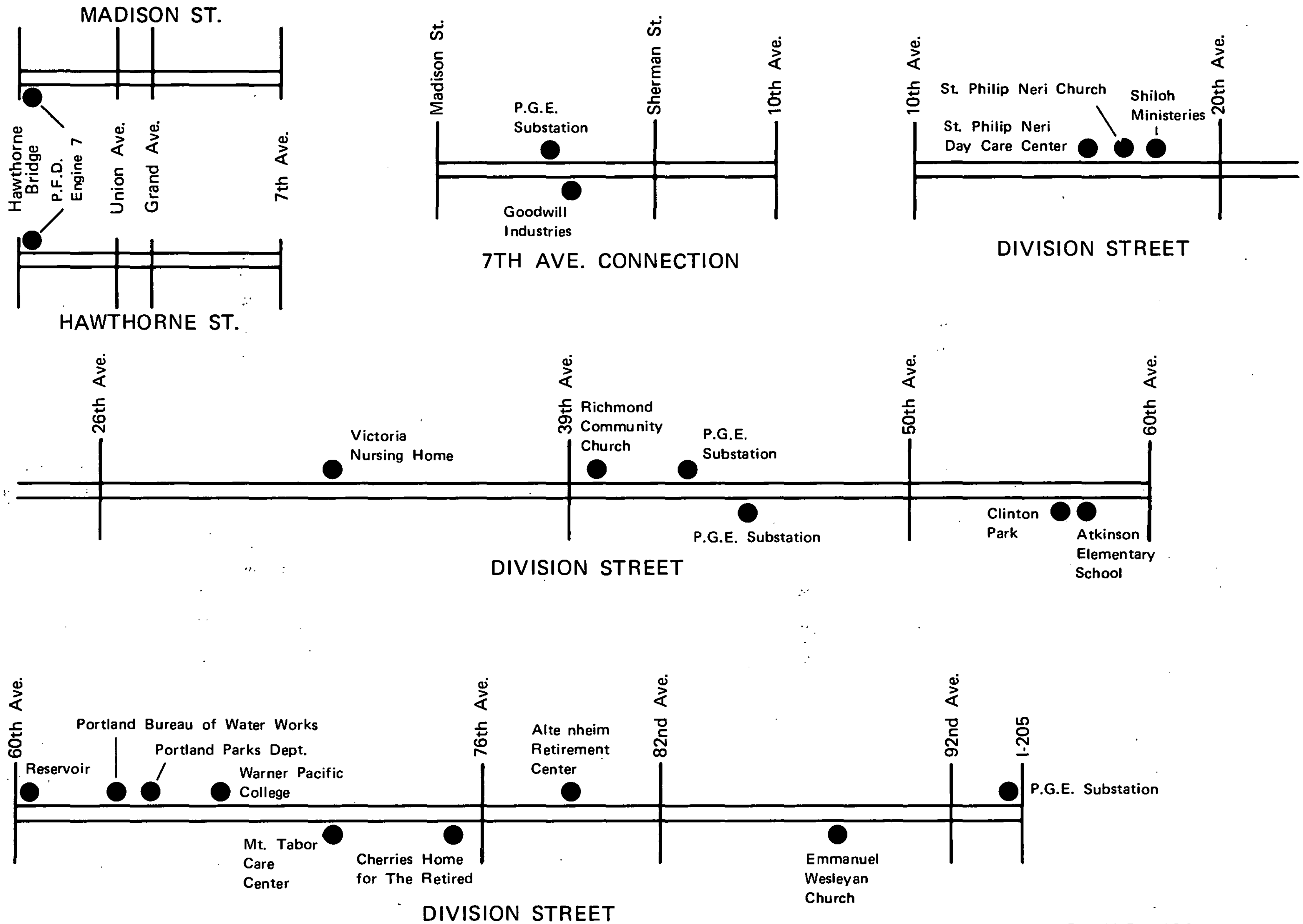


FIGURE S-15E

EAST PORTLAND STUDY AREA
DIVISION STREET ROUTE (LCI)

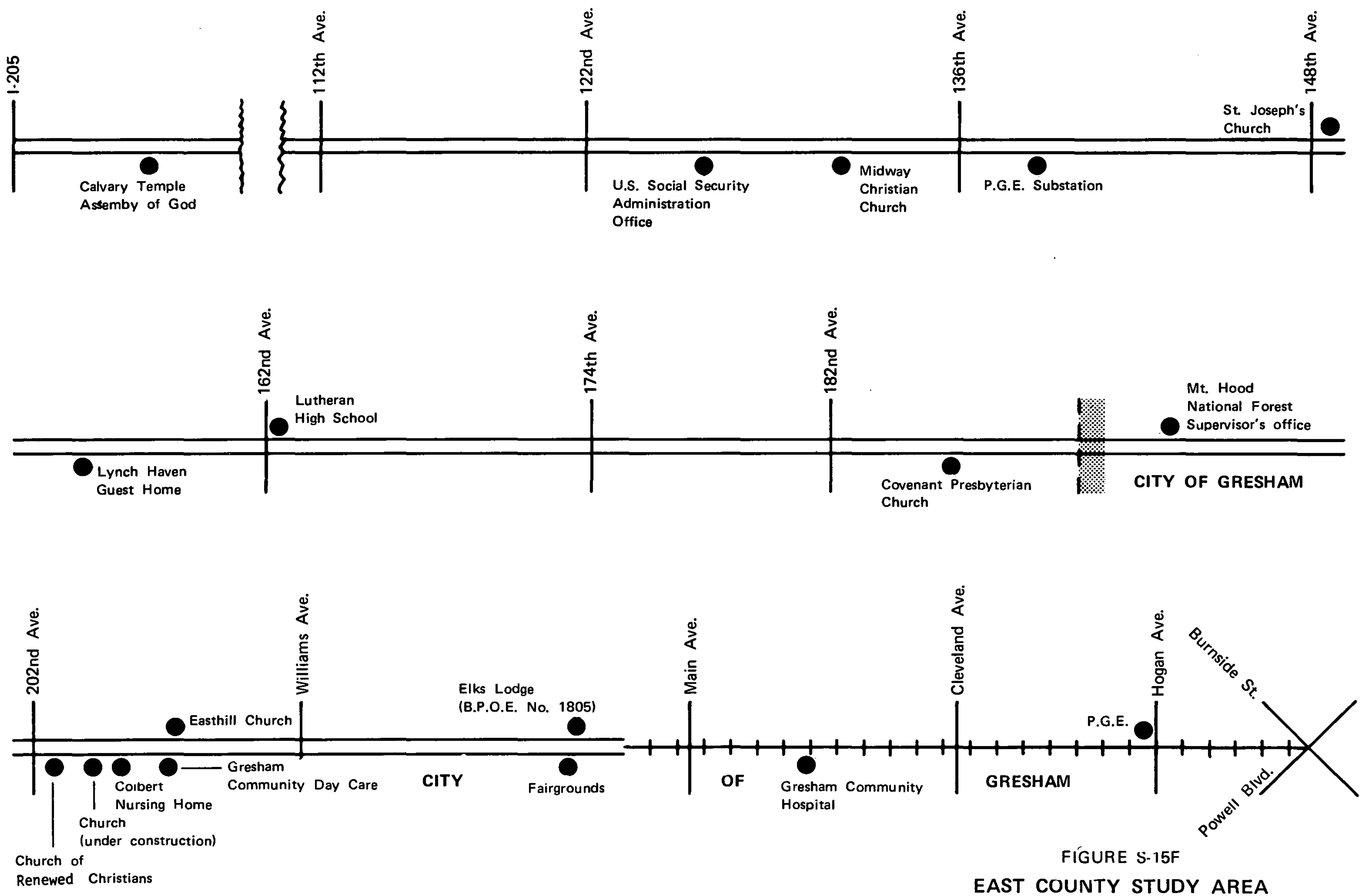


FIGURE S-15F

EAST COUNTY STUDY AREA DIVISION STREET LRT ROUTE

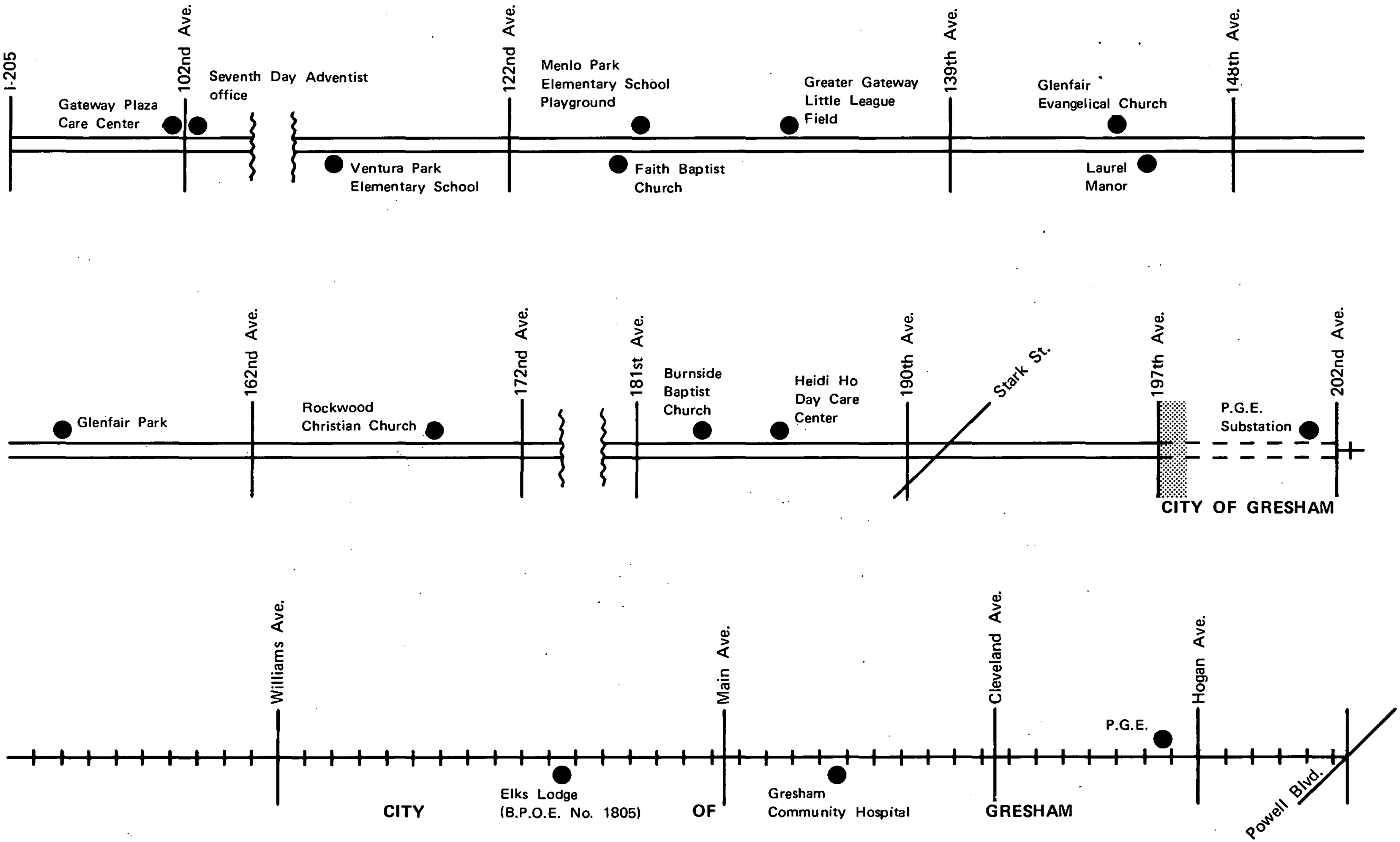
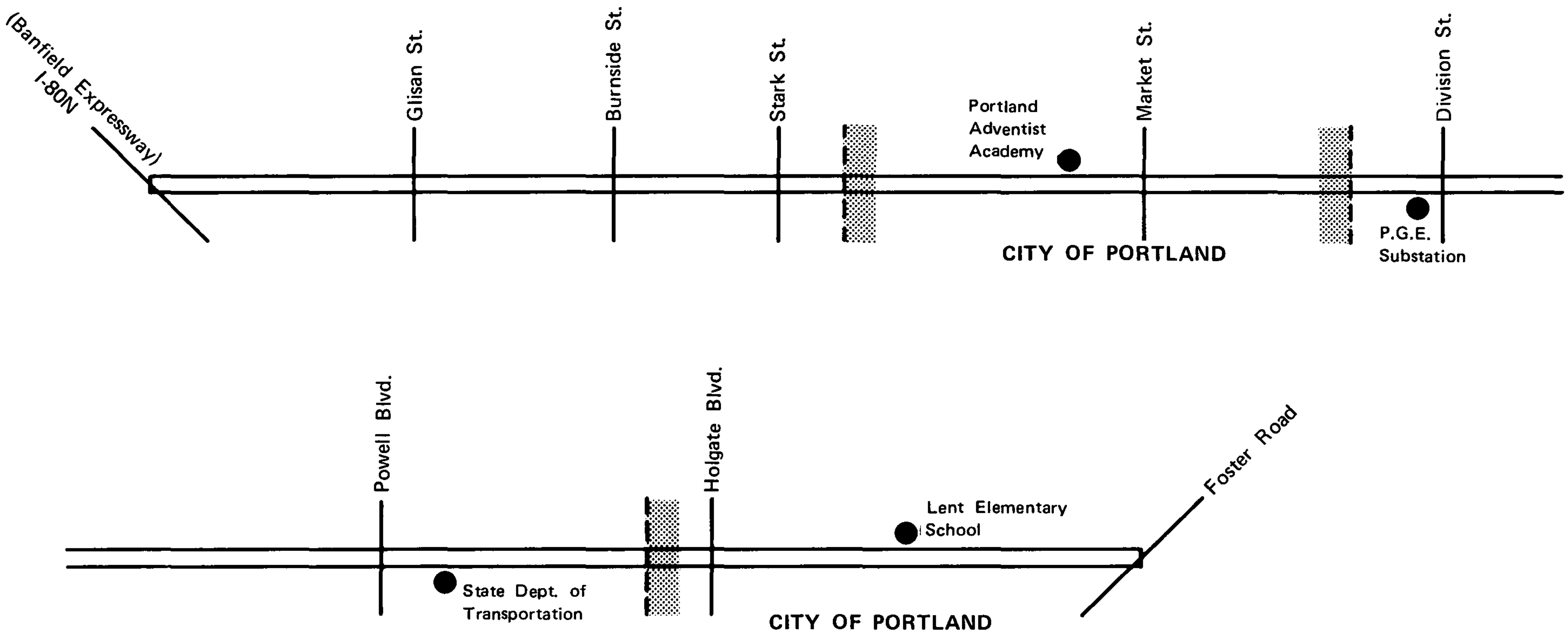


FIGURE S-15G

EAST COUNTY STUDY AREA
BURNSIDE STREET LRT ROUTE



NOTE: I-205 is a restricted access facility. Full interchanges are at Foster Road, Division-Powell, and Gateway (I-80N).

FIGURE S-15H

EAST COUNTY STUDY AREA
I–205 TO LENTS LRT ROUTE

mobility enjoyed by most of the population. These groups, for physical, economic, or legal reasons, are unable to drive their own car and are thus defined as "transportation disadvantaged."

A 1977 Oregon Department of Transportation study, The Transportation Disadvantaged in Oregon, estimates that 39 percent of Oregon's population in 1975 is disadvantaged, after the obvious overlap of the subgroups is adjusted. The study defined 39.5 percent of Multnomah County's population as transportation disadvantaged.

Tri-Met is currently taking part in an Urban Mass Transportation Administration, U.S. Department of Transportation, demonstration project that will test some special transportation services for handicapped persons.[9]

In application for that demonstration project, a comprehensive household survey was conducted to measure the incidence of transportation handicapped persons and something of their existing travel behavior and problems. (The study's definition of transportation handicapped is "elderly and handicapped persons who "are unable without special facilities or special planning or design to utilize mass transportation facilities and services as effectively as persons who are not so affected.") It was found that 5.75 percent of Portland citizens are so transportation handicapped. This number is divided between those who are severely handicapped (3.2 percent) and those who are moderately handicapped (2.55 percent). About 50 percent used one or more aides (support canes, help of another person, walker, wheel chair, and crutches). The handicapped make fewer trips per day than the general population. The automobile is used for over 75 percent of all trips, with the handicapped person being either the driver or passenger.

About 20 percent of the moderately handicapped and 10 percent of the severely handicapped say they use the present bus service. There is a disproportionate use of buses and taxis by those in lower income groups. Severely handicapped persons are the largest taxi users, in spite of their generally lower incomes. This reflects their lack of access to other less expensive modes.

No attempt is made herein to determine the distribution of the transportation handicapped and disadvantaged, although those areas with high percentages of poverty families, older populations and young persons would obviously contain larger populations of the disadvantaged.

III. SOCIAL IMPACTS

The Banfield Transitway Project, as developed, includes five alternatives. The project alternatives are the following:

Alternative 1--No-Build Alternative

Alternative 2--Low-Cost Improvements (LCI)

- Subalternative 2a--LCI
- Subalternative 2b--LCI plus Minimum 6-Lane Banfield

Alternative 3--High Occupancy Vehicle (HOV) Lanes

- Subalternative 3a--HOV Lanes plus 6/4-Lane Banfield
- Subalternative 3b--HOV Lanes plus 6-Lane Banfield
- Subalternative 3c--HOV Lanes plus 6-Lane Banfield with Shoulders

Alternative 4--Separated Busway

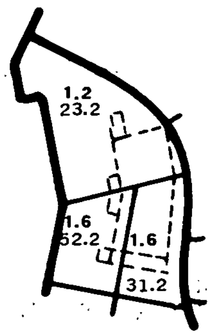
- Subalternative 4a--Northside Busway plus 6-Lane Banfield with Shoulders
- Subalternative 4b--Median Busway plus 6-Lane Banfield with Shoulders

Alternative 5--Light Rail Transit (LRT)

Subalternatives 5-1a--Burnside, 5-2a--Division, 5-3a--I-205 to Lents: LRT plus Minimum 6-Lane Banfield

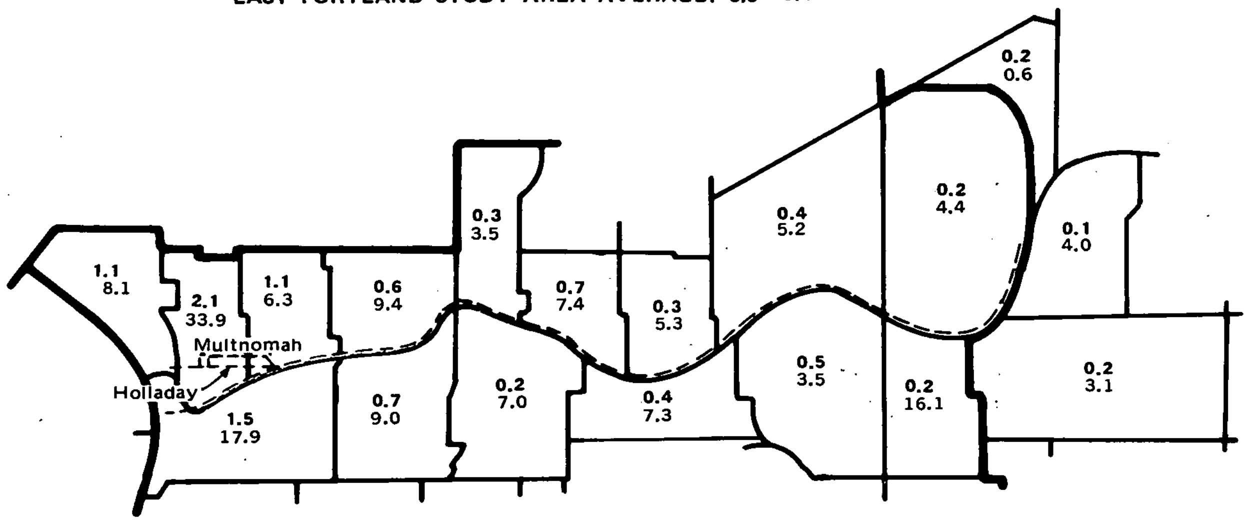
SMSA AVERAGE: 0.4 5.7

DOWNTOWN STUDY AREA AVERAGE: 1.2 44.4



Downtown Connection Corridor
CORRIDOR AVERAGE: 1.5

EAST PORTLAND STUDY AREA AVERAGE: 0.6 6.4



Banfield Expressway Corridor
CORRIDOR AVERAGE: 0.6

$$0.0 - \text{G.P.O.} = \frac{h\% \times p \times I}{i}$$

Where h% = Households without Autos

P = Persons Per Household

I = Median Family Income for SMSA

i = Median Family Income for Census Tract

(The higher the value, the higher the dependency on Pedestrian Travel.)

0.0 - Percentage of workers who walks to work

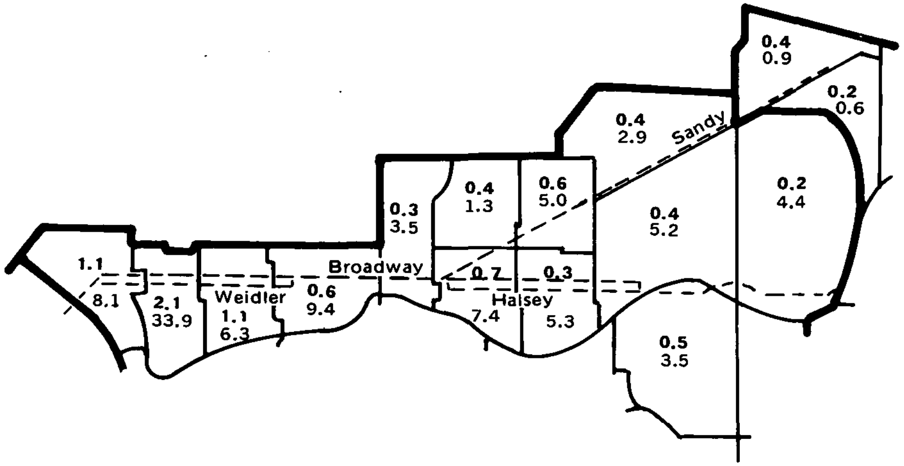
FIGURE S-16

GENERAL PEDESTRIAN DEPENDENCY AND PERCENTAGE OF WORKERS WHO WALKED TO WORK (1970 Census)

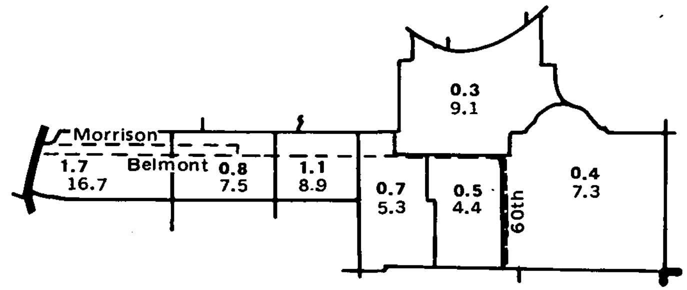
SOURCE
U.S. Bureau of the Census, Census Tracts, 1970, Portland, Oregon-Washington, SMSA, 1972.

LOW COST IMPROVEMENT CORRIDORS

EAST PORTLAND STUDY AREA AVERAGE: 0.6 6.4

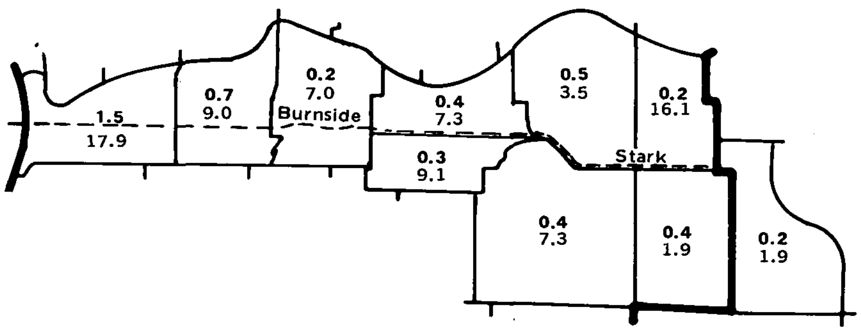


Broadway/Weidler/Sandy/Halsey L.C. I. Corridor
CORRIDOR AVERAGE: 0.6

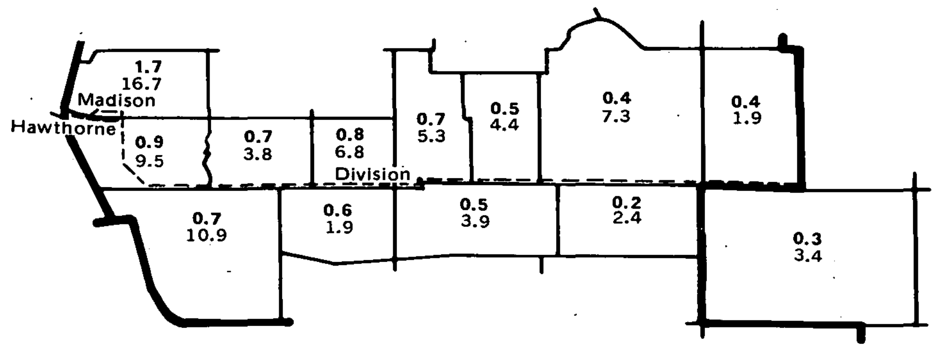


Morrison/Belmont/60th L.C.I. Corridor

CORRIDOR AVERAGE: 0.8



Burnside/Stark L.C.I. Corridor
CORRIDOR AVERAGE: 0.5



Division L.C.I. Corridor
CORRIDOR AVERAGE: 0.6

FIGURE S-16A

LIGHT RAIL TRANSIT CORRIDORS

EAST MULTNOMAH COUNTY STUDY AREA AVERAGE: 0.2 2.7

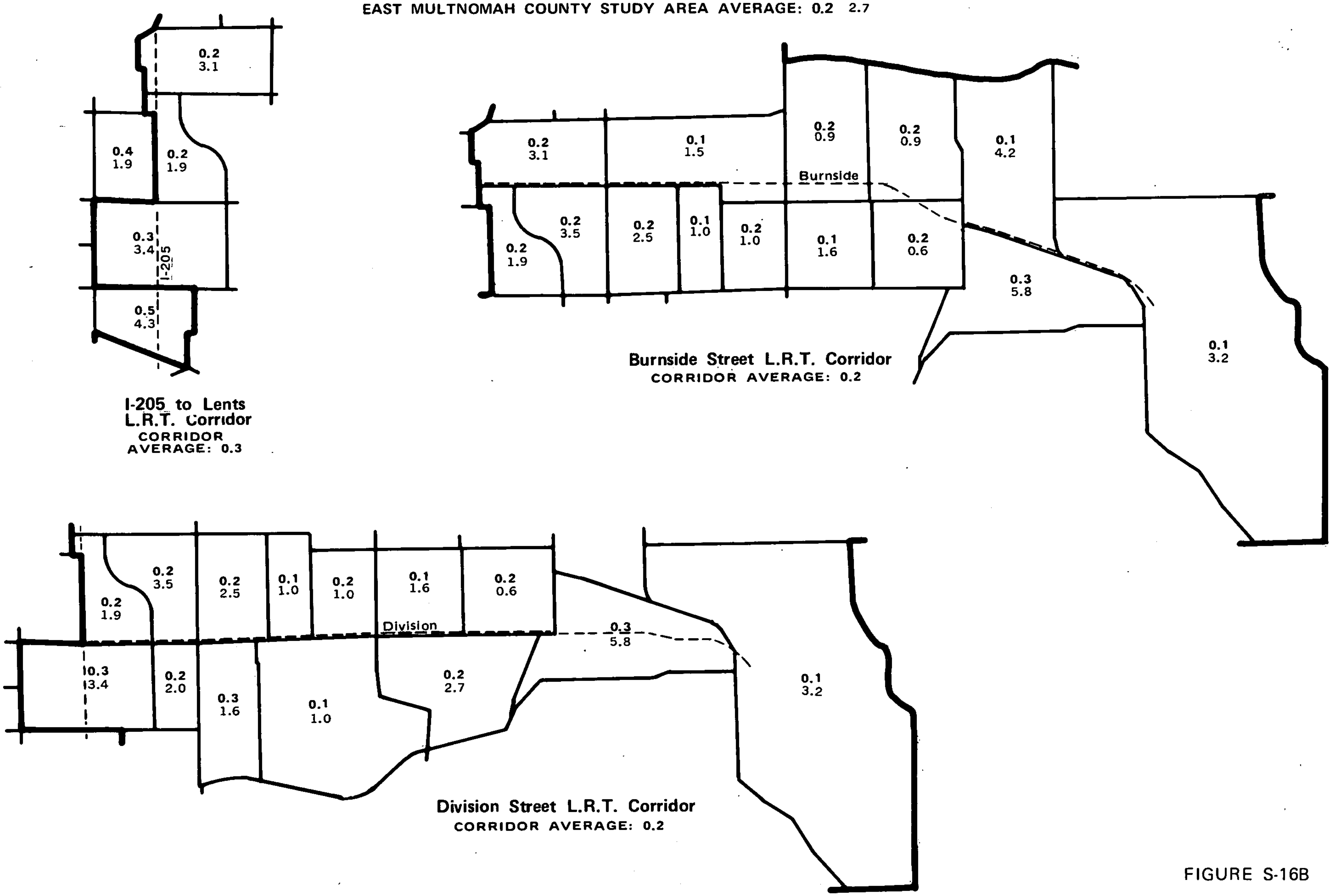


FIGURE S-16B

Subalternatives	5-1b--Burnside 5-2b--Division 5-3b--I-205 to Lents	LRT plus Standard 6-Lane Banfield with Shoulders

A complete description of the alternatives is provided in Volume I of this statement. As noted above, the subalternatives involve design differences in the Banfield Freeway. These design variations within the major alternatives pose no significant differences in the social impact analysis, with the exception of right-of-way displacement.

The beneficial and adverse, short-term and long-term social impacts of this project are grouped under three headings in this section of the report: (A) Population, (B) Accessibility, and (C) Proximity and Neighborhoods. A summary matrix at the end of each heading facilitates comparison of the impact topic by alternative and study area (Region, Downtown, East Portland, and East County).

A. Population

Population growth or decline in any given area is caused by a multitude of factors. Such factors include, but are not restricted to, the following:

--Demographic characteristics of the population (fertility, mortality, and in- and out- migration)

--International, national, regional and local health of the economy, i.e., employment or job opportunities

--Housing and development pressures

--Amount of developable land and the availability of sewer and water services

--Decentralization forces in the metropolitan area

--Energy supply

--Life style preferences, i.e., high rise apartments in the city to semi-rural life on a few acres

--Governmental planning and control

--Convenient access by transportation facilities

Since transportation improvements may make major changes in accessibility, a discussion of the project impacts on population is warranted. Nonetheless, generalizations about the effects of the improvement on population should be viewed cautiously because of the multiple causation of the topic.

1. Region

a. No-Build Alternative

CRAG population forecasts for the Portland region examined in the existing setting were prepared in 1976 and are based on the Interim Transportation Plan and available land use information. The population forecasts assume a convenient and supportive transportation system for the region, but make no explicit assumptions concerning the influence of transportation facilities on the distribution and focus of development. The CRAG population forecasts do not, therefore, reflect the no-build condition. If a no-build alternative were chosen, CRAG would be required to adjust the population forecasts based on the economic and land use patterns anticipated to result from a no-build condition.

In the short run, Alternative 1 would have an insignificant effect on population change in the Portland SMSA and Multnomah County. Population increases now occurring as a result of I-205 and other forces would be expected to continue. In the long run, however, Alternative 1 may have a small influence on reducing the SMSA rate of growth as forcasted. Anticipated traffic congestion on the Banfield Freeway and certain East Portland city streets and arterials would decrease regional accessibility, particularly for trips between the downtown and east suburbs of Multnomah County. Decreasing accessibility would weaken the economic and social ties between the East County area and the downtown.

Economic and residential development slated for East Multnomah County may not be realized to the degree anticipated. Other areas of the metropolitan region with better access would absorb some of the development slated for Multnomah County, thus increasing population rates in the other counties of the SMSA and changing the spatial distribution of the SMSA. Multnomah County, although historically decreasing in its percentage of the SMSA's total population, would probably decline at a faster rate with the no-build condition. Cumulatively, a no-build may cause a small reduction in the SMSA's total future population since Multnomah County's share of the growth would be retarded.

b. Build Alternatives

All of the build alternatives provide major improvements for moving people between the East County and downtown, with transit playing an increasing role in this accessibility. Although improved transit service would not likely stimulate and significantly increase regional population growth, it would direct growth along particular corridors in the east sector of the SMSA. The improvement would facilitate and encourage planned growth for Multnomah County, particularly in the East County. On a regional (SMSA) basis, the effects of each of the build alternatives would be similar and indistinguishable.

2. Downtown

a. No-Build Alternative

Population has been declining in the downtown, but CRAG forecasts indicate a reversal of that trend with small population increases expected to occur by 1990 and 2000. The no-build condition would have an insignificant effect on population in this area. Without improved access and circulation, the economic and social vitality of the downtown may suffer, thus discouraging the renovation of existing housing and the construction of new housing. The existing downtown population may stay but few incentives would exist to draw more residents to the downtown. In the long run, the no-build condition may contribute to a reduction in downtown population, already forecast to be small.

b. Build Alternatives

The effect on the downtown population for Alternatives 2, 3, 4, and 5 would be small and insignificant. By increasing the economic vitality of the downtown, some new residential development (e.g. apartments) may occur, increasing the population. However, these population increases would not appear to be dramatic.

3. East Portland

a. No-Build Alternative

In both the short-term and long-term, Alternative 1 would affect little change in the total population in this study area. Nevertheless, lack of changes in population numbers hides some trends which could occur in land use and the residential style in the East Portland Area. Increased traffic volumes and congestion would create pressures for conversion of single-family residential land use to multiple-family or commercial along major arterials. The result would be fewer single-family residences and more multiple-family and commercial development near the arterials. The area is developed to urban densities now, and the no-build would not affect the area population magnitude nor distribution.

b. Build Alternatives

The LCI Alternative, unlike Alternatives 3, 4, and 5, provides for exclusive bus lanes on three routes on city streets in the East Portland Study

Area. Unlike the other alternatives which provide for transit facilities in the Banfield Freeway corridor, Alternative 2 would create a more diffuse pattern of moving people through the East Portland Study Area. The LCI alternative would create some, if small in magnitude, increased concentrations of population around the transfer points on the LCI routes. The level of increase around transfer point would not reach the matnitude of density anticipated to occur around major transit stations planned for Alternatives 3, 4, and 5. The transfer points are located in areas already fully developed. Population increases at these locations would result from conversion of single-family residences to multiple-family. Alternative 3, 4 and 5 would improve transit in the Banfield Corridor in the East Portland Study Area. Moderate population increases would occur in the influence zone of the transit stations on the Banfield, particularly at the Hollywood, 60th, and 82nd Avenue stations. CRAG forecasts for the traffic zones around these stations may be low and would need to be inflated to reflect the multiple-family housing increases near the stations. (Detailed information on the effects of the LRT and its stations on population and land use is contained in Tri-Met report.)

That portion of the East Portland Study Area outside the Banfield Corridor would remain stable and experience growth as forecast by CRAG. Since this area can be considered nearly fully developed, population change would be small in magnitude.

Of the build alternatives, Alternatives 4 and 5 would contribute the greatest impetus to infilling and residential redevelopment in the Banfield Corridor due to the greater number of stations. Little population change is expected to occur at the Coliseum, Union/Grand and Lloyd Center on-street stations.

4. East County

a. No-Build Alternative

Population forecasts for this suburban area indicate a 25.2 percent increase from 1975 to 1990, and a 42.1 percent change to 2000. These rates of increases may not be realized with Alternative 1. Suburban growth is directly related to the convenient, comfortable, and fast access to the central city. A no-build would reduce the interdependence of the City of Portland (particularly the downtown) and East Multnomah County. The incorporated cities of East County would tend to become more autonomous and less "bedroom" communities for the City of Portland. Population forecasts for the East County, based on a no-build, would indicate a slower rate of change with somewhat lower population long-term magnitudes.

b. Build Alternatives

Alternatives 2, 3, and 4 assume a system of feeder and collector buses in the East County Study Area which ties in with the express bus service through the East Portland Area. No concentration of buses on any one street in the East County is assumed. This is consistent with CRAG population forecast assumptions which provide for dispersed growth and scattered development along the major arterials in East County. Population growth would occur as forecasted by CRAG and described in the existing setting for this study area. Alternatives 2, 3, and 4 would facilitate the planned growth for the East County Area. With Alt. 2, no busway nor transit stations would be constructed on I-205, although the Gresham transit station would be built. Alternatives 3, 4, and 5 would construct transit stations on I-205. Concentrations of population at the station influence areas would occur, requiring some population forecast refinement at these areas since these population numbers would exceed CRAG's forecasts.

The effect of LRT on the East County Study Area is not assumed in CRAG's population forecasts for the area. CRAG population forecasts for the East County do not reflect the rail facility nor the progressive program of transit supportive policies being considered by Tri-Met and Multnomah County if this alternative is selected. LRT would have a major impact on population change in the East County. Fixed rail facilities would contribute with creative land use controls to higher density, compact development along either the Burnside, Division, or I-205 to Lents LRT routes. To a lesser degree, higher densities would also occur along feeder bus routes leading to major transit lines. Census tracts containing the LRT routes and stations would increase in population well above presently forecasted levels. Likewise, population in census tracts in the East County, not located near the routes and stations, may grow at a slower rate than assumed in CRAG forecasts. Overall 1990 and 2000 population magnitudes in the East County study area would be similar for the LRT reallocated population forecasts and CRAG ITP forecasts. Tri-Met Reports discussed the specific population changes by corridor, station area, and outside areas that would be expected to occur with the implementation of LRT. As noted, Multnomah County, the City of

Portland, and Tri-Met have formulated a preliminary set of new population projections which would reflect the assumptions that rail can affect development patterns and that a series of progressive land use policies would be required to shape and direct development oriented toward rail facilities. Tables S-6 and S-7 indicate the population increase anticipated with LRT as forecast by Tri-Met, Multnomah County, and the City of Portland.* As noted in Table S-6, the station areas on the Burnside route would increase by 16,234 persons between 1975 and 1990; Division, 15,540; and I-205, 8,640 persons.

Table S-8 summarizes the discussion of population impacts associated with the five alternatives and the study areas.

B. Accessibility

Transportation projects modify existing accessibility to local and regional services and facilities by either increasing or decreasing the travel time, comfort, convenience or cost. The incidence and extent of changes in accessibility vary for different groups and modes of travel. Accessibility, defined in a general way, is the ability of reaching desired destinations.

This section of the social environment report examines features of transportation-related access:

--Access to Community Institutions

--Access to Alternatives Modes of Transportation

--Access for the Transportation Disadvantaged

Access is discussed only generally. Specific evaluations of the costs, travel times, traffic volumes, and operational characteristics of the alternatives are contained in Volume I and and appropriate Tri-Met reports. The Economic Research Report discusses access to place of work and commercial and industrial activity centers.

*The corridor study areas in Table S-7 are somewhat larger than the LRT corridor study areas shown in Figure S-2. Subsequently, Tables S-5 and S-7 contain population forecasts based on different total areas.

TABLE S-6

LRT STATION AREA POPULATION INCREASE

Corridor	Number of Stations	1975 Population (CRAG)	1990 Population (Reallocation Forecast)	Population Increase Difference No.	%	Average 1990 Population by Station (Reallocated)
Banfield	6	5042	5063	21	0.4%	843
Burnside[a]	9	7789	24,023	16,234	208%	2669
Division[b]	10	6588	22,128	15,540	236%	2212
I-205 to Lents	6	3788	12,428	8,640	228%	2485

SOURCE: Tri-Met, Banfield Transitway Project: Light Rail Alternative Report on Land Use, Portland, 1977.

NOTE: The population forecasts are for the areas within ¼ mile of the station, with the exception of the Gresham station which is ½ mile.

[a]Includes Gateway Station

[b]Includes Gateway, Mall 205 and Division Street stations.

TABLE S-7

LRT CORRIDOR POPULATION INCREASE IN EAST COUNTY

Corridor	Population 1976 (CRAG 208 Forecast)	Population 1990 (ITP Forecast)	Population 1990 (Reallocation Forecast to Revised Land Use)	Change 1976-1990 (Not reallocated)	Change 1976-1990 (Reallocated)
Burnside	64,983	81,550	88,015	25.5%	35.4%
Division	78,301	91,800	98,400	17.2%	25.7%
I-205 to Lents	63,124	69,730	76,130	10.5%	20.6%

SOURCE: Tri-Met, Banfield Transitway Project: Light Rail Alternative Report on Land Use, Portland, 1977.

NOTE: The corridor areas consist of the census tracts surrounding the LRT route. The Burnside corridor consists of 12 census tracts; Division, 15; and I-205, 16 census tracts. The boundaries for these study areas are contained in the referenced source.

TABLE S-8
SUMMARY MATRIX OF IMPACTS ON POPULATION CHANGE

<table>
<tr><th></th><th>ALTERNATIVE 1</th><th>ALTERNATIVE 2</th><th>ALTERNATIVE 3</th><th>ALTERNATIVE 4</th><th>ALTERNATIVE 5</th></tr>
<tr><td>REGION</td><td>Would have a small influence on reducing total forecasted SMSA population, particularly Multnomah County's portion of SMSA growth.</td><td colspan="4">Overall regional magnitude of population forecast would be accommodated Differences among alternatives on region would not be discernible.</td></tr>
<tr><td>DOWNTOWN STUDY AREA</td><td>Population increase in downtown would occur at slower rate than is forecast.</td><td colspan="4">Alternatives would insignificantly affect population in Downtown. Differences among alternatives is not discernible.</td></tr>
<tr><td rowspan="2">EAST PORTLAND STUDY AREA</td><td rowspan="2">Population would remain stable in numbers, but conversions from single family to multiple-family and commercial land uses would increase along major arterials.</td><td colspan="4">All alternatives would encourage population change as forecast by CRAG.</td></tr>
<tr><td>Express bus service on several city streets (not the Banfield Corridor) may cause growth in LCI corridors to exceed CRAG forecasts.</td><td colspan="3">Alternatives 3, 4, and 5 would have little population effect, other than to facilitate CRAG forecasts for planned growth and to increase population density at major transit station locations in the Banfield Corridor where residential development can occur.</td></tr>
<tr><td rowspan="2">EAST COUNTY STUDY AREA</td><td rowspan="2">Forecast population increase for East County suburban area may be less than anticipated or planned. I-205 completion would cause increase in population, but a No-Build on Banfield would reduce the vitality of the change for the entire East County area.</td><td colspan="3">The difference among Alternatives 2, 3, and 4 in the East County are small and indistinguishable. All would facilitate CRAG's current forecasts for population growth in this area.</td><td rowspan="2">CRAG forecasts do not assume LRT. Population increases above and beyond CRAG forecasts would occur along LRT routes and around major stations. Growth outside corridor and station areas would occur at a slower rate than CRAG forecasts indicate.</td></tr>
<tr><td></td><td colspan="2">I-205 transit stations for buses would increase density and population within their influence areas.</td></tr>
</table>

1. Region

a. No-Build Alternative

Regional population growth combined with an increase in daily trips per person (2.76 in 1970 to 2.95 in 1990) will result in more regional trips. As discussed previously, most of the population growth is forecast to occur in the suburban areas, but many of the additional trips will require the use of city streets. Traffic conditions in 1990 with the no-build indicate that most of East Portland's streets will become increasingly congested. The peak travel hours would extend over a longer period of time without any improvements. Bus traffic would have to compete in this congestion. With congestion and lower levels of traffic service, there would be an adverse effect on accessibility in the region, particularly in East Portland.

b. Build Alternatives

One of the principal purposes of the Banfield Transitway Project is to improve accessibility. On the regional level, all of the build alternatives would improve travel movements in the metropolitan area. Both transit operation and traffic circulation would be beneficially affected. Few ascertainable differences are seen on a regional access for the build alternatives. The major difference lies with the build and no-build condition.

2. Downtown

a. No-Build Alternative

Without major regional traffic and transit improvements, access into the Downtown area would decrease and the Downtown may decline as the cultural business center. The institution and facilities in the Downtown--major governmental offices, Portland State University, and the entertainment activities (restaurants, theaters, etc.)--would be more difficult to reach, especially during peak travel periods. Pedestrian travel in the downtown would have to compete with increased volumes of automobile traffic, which would reduce the ease and safety of pedestrian travel. The no-build condition would be detrimental to present downtown planning for the Waterfront Park, Oldtown Redevelopment, and urban renewal. These plans facilitate and encourage increased pedestrian travel in the downtown.

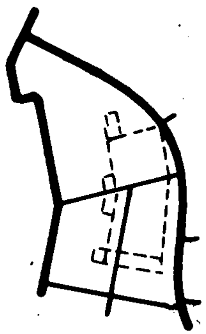
b. Build Alternatives

The combination of the Transit Mall and the express buses or LRT entering the downtown would provide beneficial transit access. The community institutions in the downtown and pedestrian travel would be beneficially affected by the build alternatives. The differences among the build alternatives would be insignificant for purposes herein. Alternatives with higher levels of transit use would result in slightly higher levels of accessibility.

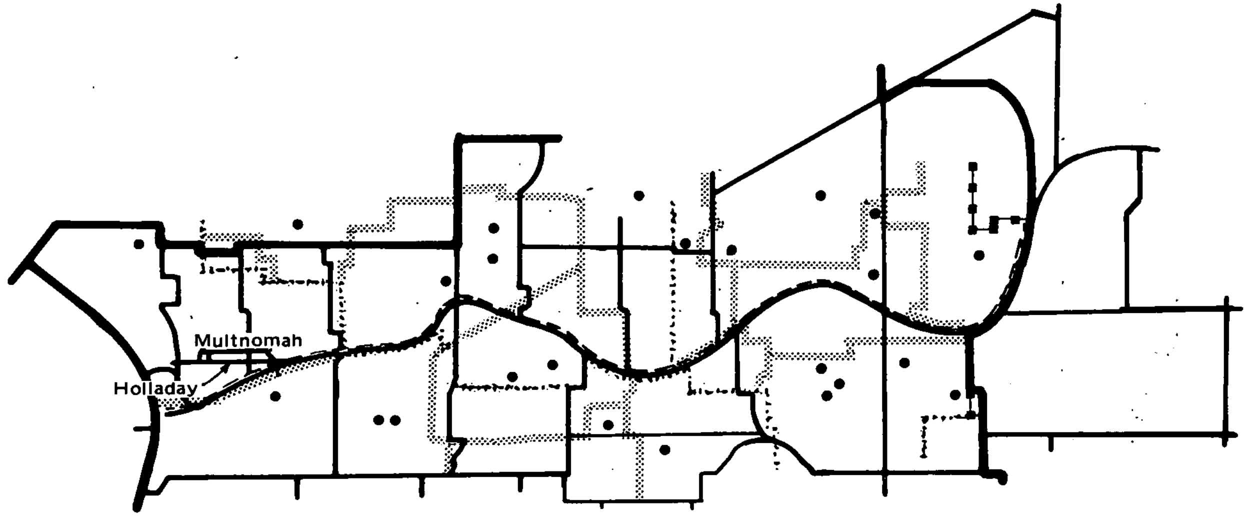
3. East Portland

a. No-Build Alternative

Of the project study areas, East Portland would experience the most adverse impact on accessibility with the no build alternative. Suburban growth in the East County area would necessitate increased use of arterials and city streets in this area. Increases in through-traffic, coupled with local traffic, would lessen access to the major community institutions in the East Portland Area. Particularly significant for the people dwelling there would be the impact on emergency services. Access to Providence, Holladay Park, and Portland Adventist Hospitals, fire protection, police protection, and ambulance service would decrease. Emergency vehicles would not be able to operate as effectively in higher volumes of traffic.



Downtown Connection Corridor



Banfield Expressway Corridor

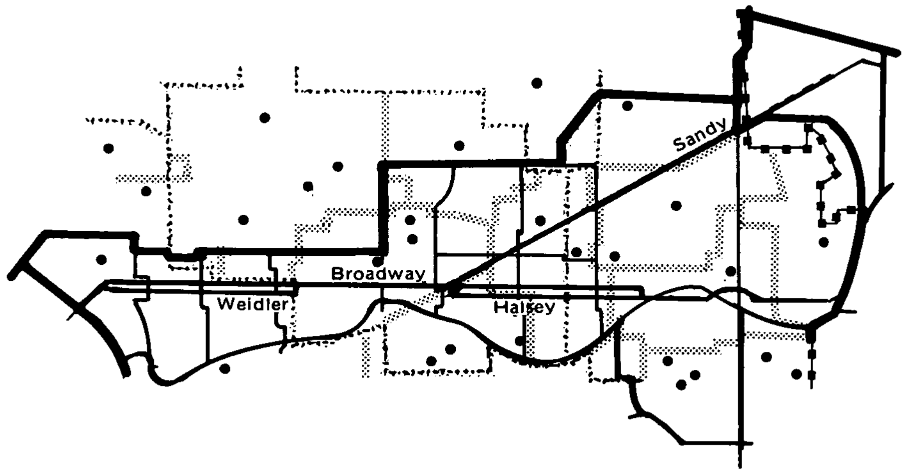
FIGURE S-17
SCHOOLS AND SCHOOL BOUNDARIES

LEGEND

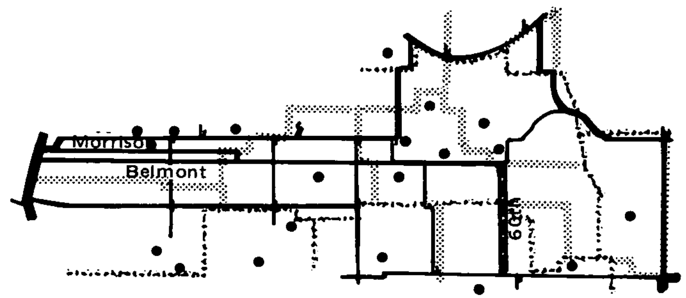
- Route
- District Boundary
- Secondary School Boundary
- Elementary School Boundary
- School

SOURCE Portland Public Schools, District 1, 1977

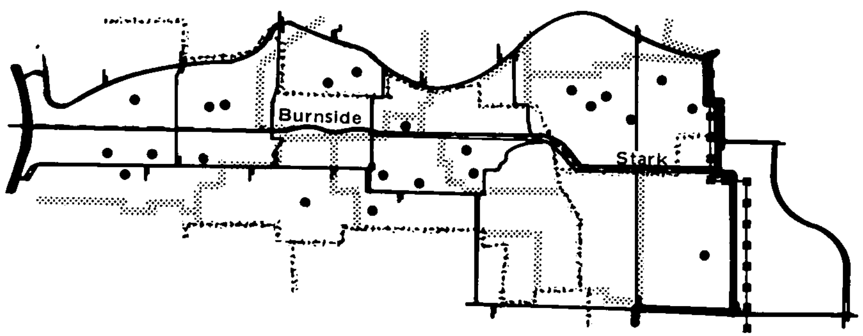
LOW COST IMPROVEMENT CORRIDORS



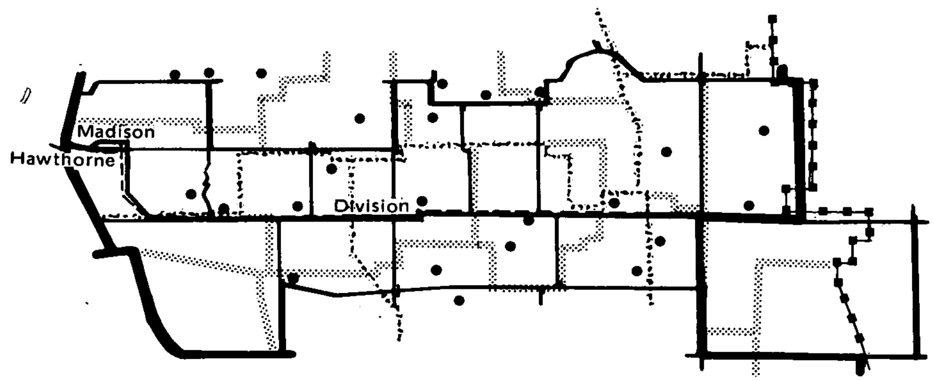
Broadway/Weidler/Sandy/Halsey L.C. I. Corridor



Morrison/Belmont/60th L.C.I. Corridor



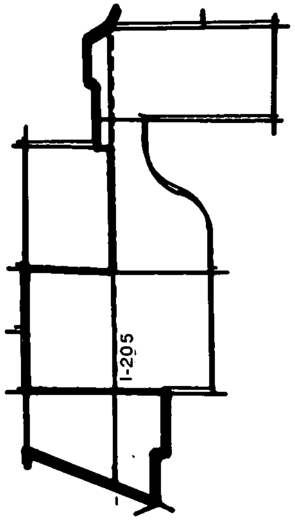
Burnside/Stark L.C.I. Corridor



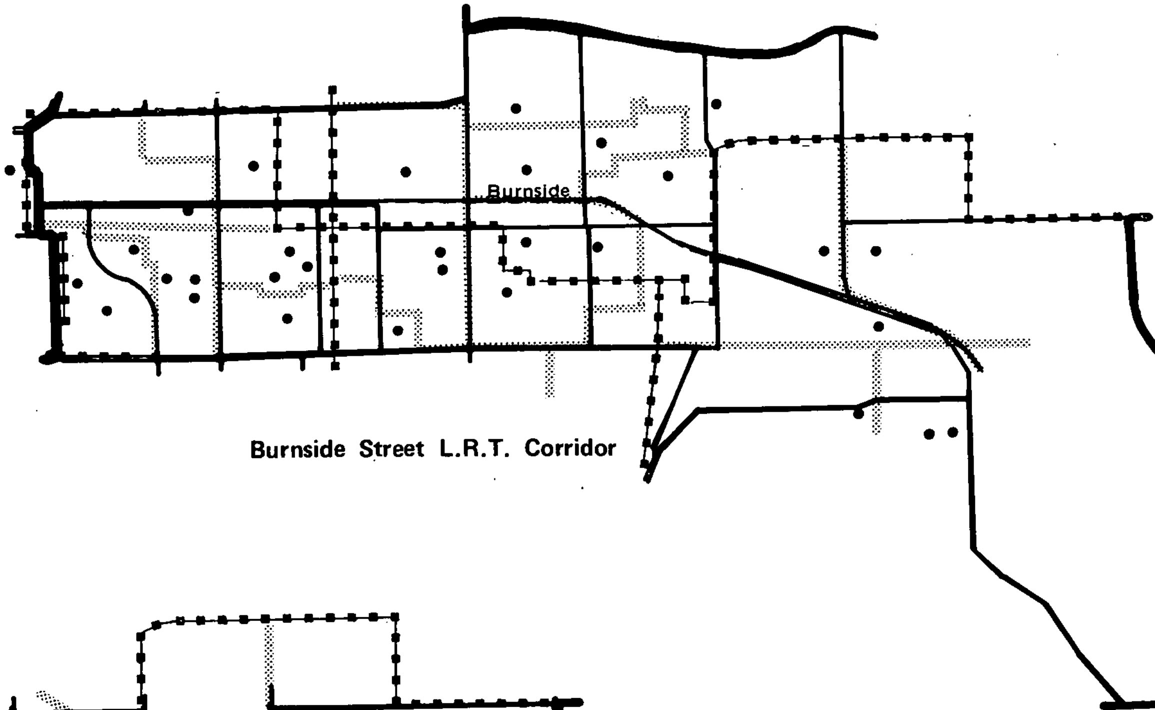
Division L.C.I. Corridor

FIGURE S-17A

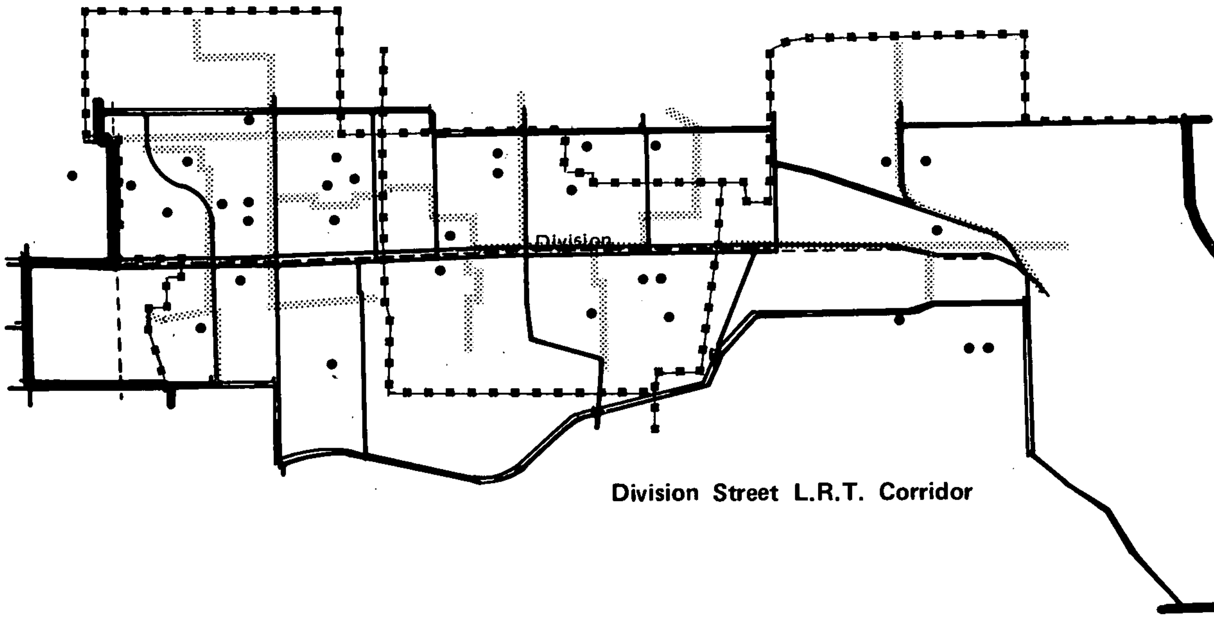
LIGHT RAIL TRANSIT CORRIDORS



I-205 to Lents
L.R.T. Corridor



Burnside Street L.R.T. Corridor



Division Street L.R.T. Corridor

FIGURE S-17B

In the long run, this would decrease the quality of service and may necessitate the extension and duplication of more services. Routine trips to hospitals in the area would also become less convenient.

Figure S-15 indicated the myriad of community institutions bordering the project corridors in East Portland. Convenient access to these would decrease under the No-Build Alternative.

The Portland neighborhoods support a complex system of schools. Figure S-17 establishes the relationship of the East Portland and East County routes to the elementary school attendance areas. Increased traffic in the Banfield Corridor would not seriously affect these school boundaries since the freeway is depressed in Sullivan's Gulch and frequent interchanges and over-crossings provide intra-accessibility between the school attendance areas. Also, being a major barrier in the area, most school attendance areas use the Banfield as a border. This is not the case with the other East Portland routes. These streets traverse many school attendance areas. More traffic on these streets with the no-build would tend to increasingly sever some school attendance areas, requiring school buses and school children to cross potentially hazardous streets with heavy traffic. Portland Public Schools may be required to readjust school boundaries or to install more stringent school crossing procedures to insure the safety of children walking to and from the area schools.

With the no-build, mass transit options for transportation in the East Portland Study Area would experience limitations. Providing more transit trips would be reduced due to the necessity for existing buses to operate in mixed traffic.

As indicated in Figure S-16 previously, the relative pedestrian dependencies in the East Portland Study Area are high, especially in the area close to the Downtown. Pedestrian access would conflict with heavier traffic on city streets in East Portland. The City of Portland Arterial Streets Classification Policy, adopted in June 1977, delineates special pedestrian districts (Lloyd Center, Hollywood Business District, and Lents Business District) and pedestrian paths in East Portland (Figure S-18). The benefits of this classification to better pedestrian access may not be accrued with a No-Build Alternative.

Bicycle travel within the City is an alternative mode that is being encouraged since its environmental impact are negligible. The proposed bikeway routes for East Portland (and East County as well) are shown in Figure S-19. The no-build is not compatible with the establishment of this system of bicycle routes, since heavier street traffic would interfere with convenient bicycle travel and access.

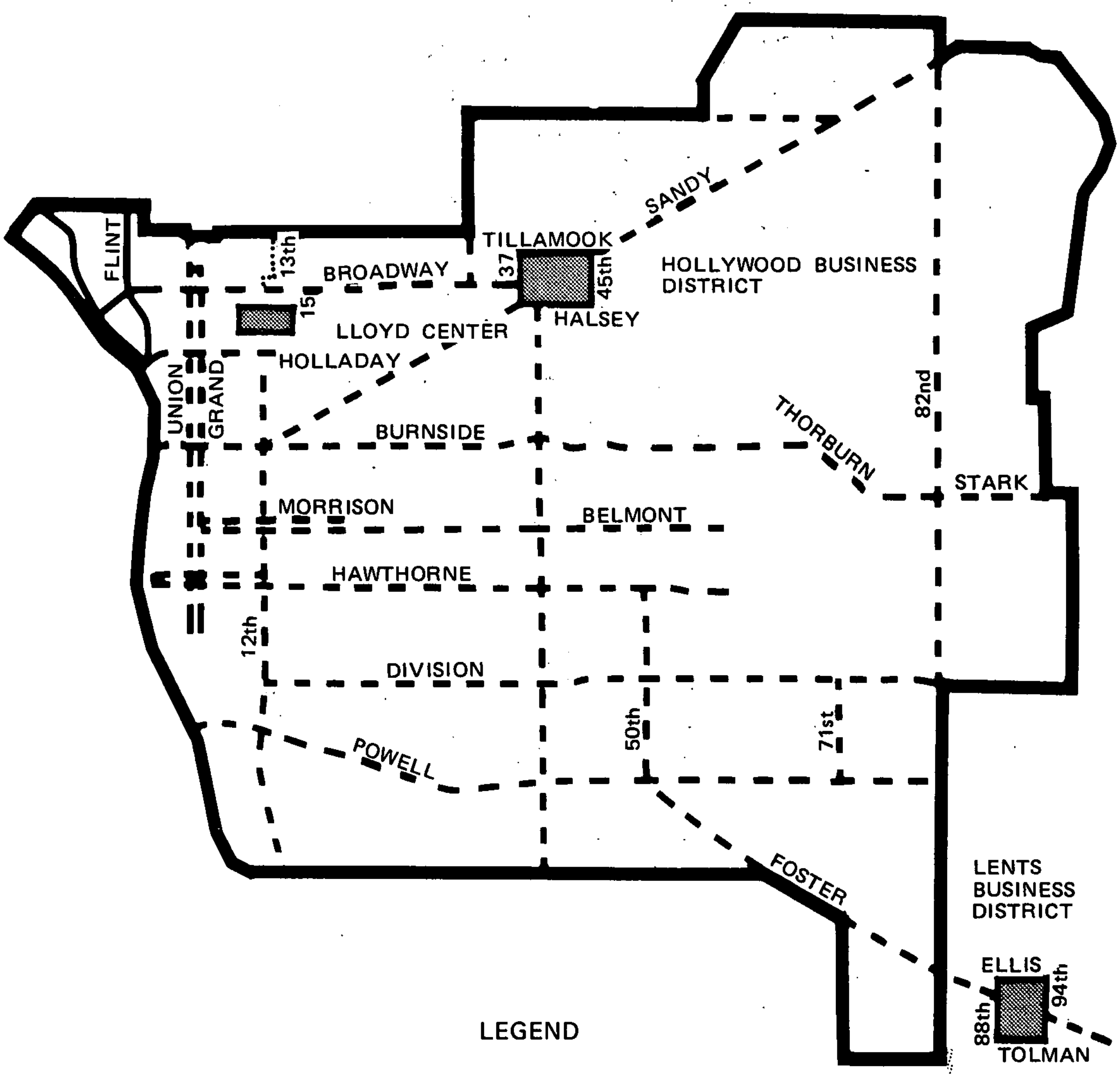
Socioeconomic information of the East Portland Study Area reveals that this area includes the highest proportions of low-income families, the elderly, and persons without an automobile. These transportation disadvantaged would experience no increases in transportation options with a no-build alternative since mass transit would tend not to improve. Special transit provisoins for the handicapped, incorporated in the build project, would not be made or would be delayed in implementation with the no-build.

b. Build Alternatives

Alternative 2 would establish exclusive express bus lanes on three east-west city street systems. Morrison, Belmont and 60th Avenue would have auto capacity improvements. Alternative 2b would widen the Banfield to six lanes with shoulders eastward from 37th Avenue. These transit and traffic improvements would provide beneficial access through the East Portland Area.

FIGURE S-18

PEDESTRIAN DISTRICTS AND PATHS IN EAST PORTLAND

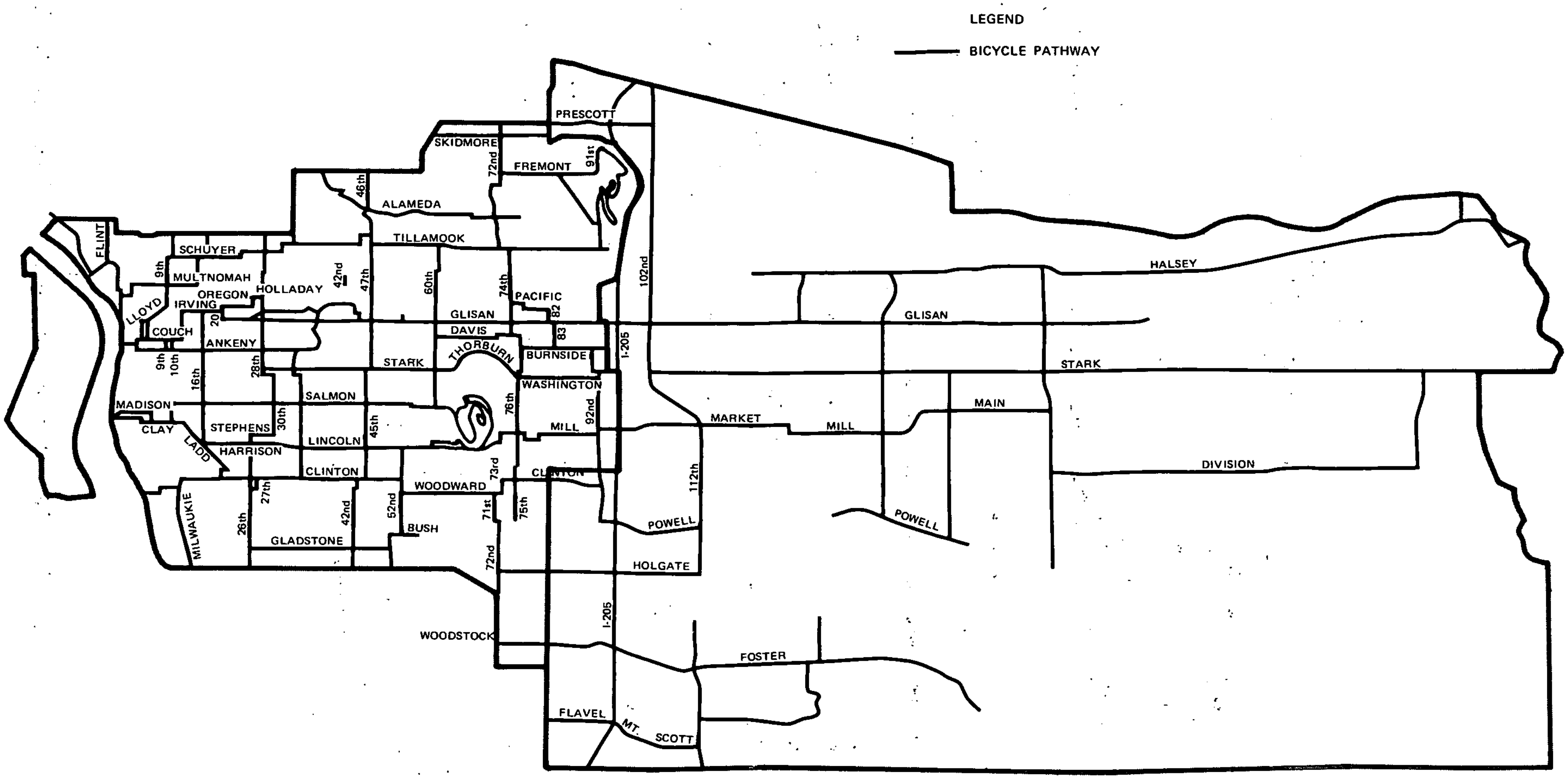


LEGEND

PEDESTRIAN DISTRICT
PEDESTRIAN PATH WITH CROSSINGS
PEDESTRIAN PATH
PEDESTRIAN WAY

FIGURE S-19

PROPOSED BIKE ROUTES



Source: City of Portland, Arterial Streets Classification Policy, 1977; Multnomah County, Citizen's Bikeway Report: East Multnomah County, 1974.

In general, the LCI Alternative would provide somewhat better transit service to East Portland and less attractive service to outer areas, because of lower line-haul speeds. Local access would be improved by the establishment of several crosstown transfer points on the exclusive bus routes. Those transfer points are listed in Table S-9. Alternative 2, unlike Alternatives 3, 4, and 5, diffuses express bus service throughout East Portland streets, not just in the Banfield Corridor. The residents located near transfer points in Alternative 2 would experience gains in access to the downtown. Nonetheless, these transfer points would be merely bus stop areas, not intended to be the sophisticated major stations planned for the other build alternatives along the Banfield and in East County.

TABLE S-9

TRANSFER POINTS ON THE LCI ROUTES
(ALTERNATIVE 2)

LCI Route	Transfer Points	Curbside or Loading Island
Broadway/Weidler/ Sandy/Halsey	Broadway/Weidler--	
	Union	Curbside
	21st	Curbside
	Broadway--33rd	Loading Island
	Broadway/Sandy--39th	Curbside
	Sandy--	
	40th	Loading Island
	57th	Loading Island
	82nd	Loading Island
	I-205	Unknown, not an island
	Broadway--57th	Curbside
	Halsey--	
	60th	Curbside
	82nd	Loading Island
	I-205	Unknown, not an island
Burnside/Stark	Union/Grand	Curbside
	20th	Loading Island
	39th	Loading Island
	60th	Loading Island
	82nd	Curbside
	I-205	Unknown, but not an island
Division	20th	Loading Island
	39th	Loading Island
	60th	Loading Island
	82nd	Loading Island
	I-205	Unknown, not an island

SOURCE: Tri-Met, Low Cost Improvement Alternatives, Portland, 1977.

Exclusive bus lanes on some of the streets would operate in a center lane, thus requiring pedestrian loading islands in the center of the street. (Table S-7 indicates whether the transfer point is at curbside or from a loading island.) These islands would appear to be less safe for transit users than curbside facilities due to their relatively isolated nature in the middle of the street and close proximity to traffic. However, these islands would tend to provide a safety area for pedestrians crossing the LCI routes, particularly older persons who walk slowly. Pedestrian signals would be installed for center-loading islands.

Although the general transit benefits of this alternative would be for the East County Area, the incorporation of exclusive bus lanes in the East Portland routes would provide some additional service for the residents of the area. Because of the number of suburban lines funneling into the preferential lanes, the corridors would function as high-frequency routes throughout the urban area. These would shorten waiting lines considerably for passengers boarding along the express corridors, or for those transferring from crosstown lines. Thus, the project's benefits would also accrue to urban residents.

With its heavy dependency on transit, this alternative would increase the opportunities for transit service for the transportation disadvantaged. Transit service would improve and provide access for the elderly, low income, carless and the handicapped. In accordance with the guidelines established by UMTA, all recipients of Federal funds for mass transportation are required to provide the "same rights" to transportation for the elderly and handicapped as other persons enjoy. The scope of this project would allow increasing design options on buses and at transfer points to assist the handicapped. (This advantage for the handicapped is contained in all of the build alternatives.)

No bicycle routes are proposed on the LCI routes. Proposed bicycle routes in the City of Portland are compatible with Alternative 2.

Access to community institutions would improve with Alternative 2. Fire, police, and ambulance service would benefit, due to decreased traffic volume. The reduction in vehicular traffic on some streets would allow greater mobility. Although details have not been worked out, emergency vehicles would probably be allowed use of the exclusive transit lanes, this benefiting from not having to travel in traffic during rush hour periods. This use of the exclusive lanes would increase the speed, safety and ease with which emergency services could respond.

Many of the institutions and facilities such as hospitals and schools depend on transit service for their staff and users of the institution. Better transit service would connect the hospitals in the area.

As discussed under the no-build, school attendance areas are bisected by these LCI Routes. Implementation of Alternative 2 would continue to separate students from their schools. However, less traffic congestion on these streets would decrease their barrier effect. Student safety would tend to improve with the LCI alternative.

Alternatives 3, 4, and 5 provide for transit and highway improvements in the Banfield Freeway Corridor. Transit routes would enter the Downtown across the Steel Bridge via routing on Holladay Street on a combination of Holladay and Multnomah Streets. As such, these major improvements in accessibility occur for those residents in or near the Banfield Corridor. Inter-access across the Banfield will not be changed by any of the build alternatives. Fifteen overcrossings on the Banfield in the East Portland Study Area provide convenient and easy intercommunication between the north and south sides of the expressway.

The differences in the quality of access in the East Portland Area among Alternatives 3, 4, and 5 centers on the number of transit stations. Alternative 3 provides for three stations--Coliseum, Union/Grand, and the Lloyd Center. Alternative 4 and 5 assume the immediate implementation of six stations in East Portland. The idea of using intermediate stations on the Banfield is an important one which differentiates Alternatives 3 and Alternatives 4 and 5. Without numerous stations, the transitway would act simply as a channel in which to funnel suburban trips to and from the downtown area. It would be useful primarily during peak hours. Stations are required in order to allow urban residents to share in some of its accessibility benefits.

The Banfield route has been in existence in the Portland urban area for many years. Consequently, school boundaries and other service boundaries have been formulated with this route as a usual border. Alternatives 3, 4 and 5 would not disect or disrupt any service areas. The institutions bordering the route do not have direct and free access to the Banfield and are located on the city street level above the Banfield Freeway. Access to the bordering institutions would be mostly unchanged. Transit operation on Holladay or Multnomah-Holladay would facilitate convenient use of Holladay Park Hospital, the Coliseum and the Lloyd Center.

This alternative would beneficially improve pedestrian, walk-in, access at the transit stations. Heavy pedestrian walk-in use is expected at the Lloyd Center Station; moderate walk-in at Union/Grand; and light walk-in at the Coliseum. Special sidewalk, cross block walkways, signalization at street crosswalks and other new developments would improve pedestrian safety. Those stations are located in areas where many people do walk and have a large percentage of elderly and low income residents nearby. The City of Portland has designated the Lloyd Center as a pedestrian district. A transit station at that location is compatible with the city's designation.

The transit stations would provide bicycle storage facilities. Consequently, bicycle travel to the stations from the immediate neighborhoods or by the proposed bicycle routes in East Portland, would be expected to increase.

The build alternatives (particularly Alternatives 3, 4, and 5) create major new transit facilities and stations in the Banfield corridor which could improve the opportunities for mobility of those classified as "transportation disadvantaged." Special vehicular and station design features (and as ramps and wheelchair lifts) would assist the handicapped transit user.

4. East County

a. No-Build Alternative

In general, intra-accessibility within the East County Study Area would not be as adversely affected with the no-build as would be East Portland. However, inter-accessibility between the East County and Portland would decrease with the no-build. Traffic on East County streets and arterials would increase, thus decreasing overall accessibility. The major community institutions in the East County Area (Mt. Hood Community College, Gresham Hospital, Woodland Park Hospital, and Portland Adventist Medical Center) would become less convenient for regional and local users of these facilities. Likewise, other emergency services would encounter access problems in delivering their services. Traffic volume increases would interfere with convenient access to institutions bordering the major arterials in East County.

The East County Area is presently heavily auto-oriented and the no-build would increase the dependency on the auto.

In comparison with the Downtown and East Portland Study Areas, the magnitude of transportation disadvantaged persons in the suburbs is lower due to the high auto ownership and relative affluence of the area. Nonetheless, the suburban area does contain handicapped persons and a large percentage of young people who legally cannot drive. These groups are components of the transportation disadvantaged. The no-build would provide little of any new options for these groups.

b. Build Alternatives

Alternative 2 provides for no major changes east of I-205 other than a transit station in Gresham. A system of feeder/collector buses would connect with the LCI routes in the East Portland Area. Although access in this area would be improved, the absence of a busway and transit station on I-205 decreases the access advantage of this alternative over Alternatives 3, 4, and 5. Of the build alternatives, this would afford the least accessibility benefit for the East County Area.

Alternatives 3, and 4 would connect East Portland transit improvements into a separated busway on I-205. Transit stations for buses would be constructed at Gateway, Mall 205, Division, Powell and Lents. These stations would serve the East County area by a system of collector and feeder buses throughout the area. Likewise, these stations would contain park and ride facilities for autos and bicycles. Figure S-19 shows the location of proposed bike routes in the East

County. These routes would tie into the transit stations or the bikeway presently under construction in the I-205 Corridor. Transit stations on the I-205 would improve non-auto access to the new Portland Adventist Medical Center and Woodland Park Hospital.

Alternative 5 would establish light rail in East County, and three routes under consideration are Burnside, Division, and I-205 to Lents. Local accessibility changes discussed herein are around the Burnside and Division Routes. The I-205 to Lents access changes were discussed fully in the I-205 FEIS.

The Burnside and Division LRT routes would have an adverse impact on the residences and institutions located along the routes and in the corridor areas paralleling the routes due to the limited number of grade crossings. Community circulation because of the restricted number of crossings would necessitate out-of-direction travel for some local trips.

On the Burnside route, the following selected north-south streets would remain open across the rail system:

102nd Avenue	162nd Avenue
113th Avenue	172nd Avenue
122nd Avenue	181st Avenue
139th Avenue	Stark Street
148th Avenue	199th Avenue
	202nd Avenue

The access reduction would affect the properties abutting the street or properties on side streets which currently access only Burnside. Tri-Met estimates that there are 541 property ownerships abutting Burnside where full east-west access to Burnside would be affected. In addition, there are 38 properties on side streets which connect only to Burnside which would be affected.

Bicycle and pedestrian crossings would occur at all stations and open cross streets and at 16 other locations on Burnside. This would allow a crossing approximately every 800-1200 feet. In the East County Study Area, transit stations would be located at Gateway (Park and Ride), 102nd Avenue, 122nd (P & R), 148th, 162nd (P & R), 172nd, 181st (P & R), 192nd (P & R) and Fairgrounds (P & R). An alternative for the Fairgrounds Station is at 1st and Burnside in East Gresham. Gateway and the Fairgrounds Stations would have heavy walk-in pedestrian use. The remainder of the stations on the Burnside Route would have moderate walk-in use. The average spacing between stations for the entire Burnside segment line is 0.76 miles.

The Division Street LRT route would provide LRT stations at the following locations along Division Street: 112th, 122nd (P & R), 136th, 148th (P & R), 170th, 182nd (P & R), 199th (P & R), and Fairgrounds (P & R). Again, an alternative for the Fairground Station is under consideration at 1st and Burnside in East Gresham. Other north-south streets that are to remain open across the LRT tracts are 130th, 162nd, 174th, 190th, 202nd, and 212th. All other north-south streets would be closed to traffic across the light rail alignments.

Pedestrian crossings on Division Street are proposed at each end of the station platforms and at 23 other locations throughout the project. This would provide crossings approximately every 800-1200 feet. Heavy pedestrian use of the 170th, 182nd, and Fairgrounds Stations is expected, while moderate to light pedestrian use is expected at other stations.

There are 1700 properties and 2950 housing units on Division and adjacent streets that would be affected by out-of-direction travel.

In the Lents route, five stations in the I-205 corridor would be built at Gateway, Mall 205, Division, Powell and Lents. All of these stations would have park and ride facilities. Gateway and Mall 205 are expected to have heavy pedestrian walk-in traffic. Division Station would be moderate, and Powell and Lents would be light.

Only the larger stations on these three routes would have bicycle storage facilities. Proposed bicycle routes in East County are shown in Figure S-19. For the most part, the proposed bike routes are compatible with the LRT routes and stations. Whether or not the proposed bikeway on Division from 182nd eastward is compatible with an LRT on Division is unknown and would be resolved if the Division Street LRT route were built. At this time, bike routes are not being considered for the shoulder areas along the Burnside or Division routes.

Figure S-15 listed the community institutions bordering the three LRT routes. These institutions would have better visibility and regional accessibility with the LRT. Nonetheless, out-of-direction travel would decrease the ease and convenience of local accessibility.

The primary means of transportation for school students along the corridors is by school bus. Although changes in school bus routings would be required, there would be little change in access for bus riding students. There would be some out-of-direction travel to pedestrian crossings by students who walk to school. LRT routes would bisect some elementary school attendance areas in East County. Local school districts may be required to readjust attendance areas to border the LRT route.

The delivery of emergency services would be adversely affected by the degree of out-of-direction travel. As shown in Figure S-14, several fire stations are located near the LRT corridors. However, out-fo-direction travel would affect fire protection in that it may increase the distance to the nearest fire station. Both Multnomah County Fire District 10 and the Insurance Services Corporation, which establishes fire insurance ratings, feel it is very unlikely that the overall quality of fire protection service to the corridor would change enough to influence its rating nor consequently the fire insurance rates of individual property owners.

Along with the other build alternatives, this alternative would improve travel options for the transportation disadvantaged by improving mass transit opportunities. The effect on the transportation handicapped would be similar for Alternatives 2, 3, 4, and 5.

Tables S-10, -11, and -12 summarize the relative impacts on accessibility on community institutions, on alternative travel modes, and on the transportation disadvantaged.

C. Proximity and Neighborhoods

The third topic of the impact section is related to the project routes' immediate proximal impacts and the more general effects on the neighborhoods along the project routes.

Convenient transportation accessibility and mobility is necessary for our urban system to function. However, for those residents and "sensitive" institutions along the transportation routes, the construction and operation of transportation routes frequently constitute a "necessary nuisance." Unfortunately, some institutions, residences and neighborhoods would be affected by the Banfield Transitway Project.

Proximal impacts discussed in this section include those relating to construction and operation.

Neighborhoods, as social units, are susceptible to changes from transportation improvements. The most readily discernible social impacts involve displacement and separation. Transportation facilities may result in the removal of homes, businesses, churches, schools, parks andother community facilities which provide a focus for individual and group social interaction. Increased traffic on an established transportation route may also divide or disrupt neighborhood boundaries, thereby severing important social linkage and identities and requiring adjustments in boundaries. The importance of these direct effects is a function

TABLE S-10
SUMMARY MATRIX OF IMPACTS ON ACCESS TO COMMUNITY INSTITUTIONS

	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
REGION	Reduced access to regional institutions, particularly in East Portland.	Improved regional access overall. No ascertainable difference on the SMSA region for the build alternatives.			
DOWNTOWN STUDY AREA	Reduced access from East County suburbs.	Access to and within Downtown institutions would be facilitated. Differences between build alternatives would be small and indistinguishable.			
EAST PORTLAND STUDY AREA	Adverse impact due to congestion of through and local traffic, especially significant for emergency vehicles. Congestion on major arterials would sever school attendance areas and decrease student safety.	Multiple LCI exclusive express bus routes and frequent transfer points would provide very beneficial access to institutions in area. Bus routes would lessen school attendance area barrier effect of no-build.	The access improvements of these alternatives relate to the Banfield Corridor and number of stations. Alternatives 4 and 5 would provide better access due to increased number of stations over Alternative 3. Portland School Attendance Areas would be reinforced.		
EAST COUNTY STUDY AREA	Small adverse effect on local access, but severe impact on access to Portland and Downtown.	Minor change due to lack of busway on I-205 and stations. Least access benefits of the build alternatives.	Addition of busway and stations on I-205 would improve access. Feeder bus system would focus access on I-205 stations. Little change on school attendance areas and emergency services.		LRT routes would improve access within the total area. Restricted number of crossings of LRT routes would cause out-of-direction travel, moderately affecting residents, institutions and emergency services. Numerous stations would be beneficial.

TABLE S-11
SUMMARY MATRIX OF IMPACTS ON ACCESS TO ALTERNATIVE TRAVEL MODES

	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
REGION	Would discourage mass transit and encourage continued use of private vehicle.	Alternative afford increased options for private vehicle and mass transit modes. Alternatives 2, 3, and 4 are bus options. Alternative 5 introduces a rail option.			
DOWNTOWN STUDY AREA	More auto traffic in area would decrease pedestrian movements. Transit Mall would not function fully as planned.	Little discernible difference in build alternatives. Build situation would improve mass transit options and pedestrian movement.			
EAST PORTLAND STUDY AREA	Increased auto traffic would conflict with mass transit usage and would discourage transit gains. Bicycle and pedestrian movements would not function safely in traffic congestion.	Build Alternatives would provide beneficial improvements in mass transit.			
		Transfer points would provide convenient pedestrian use of LCI buses. Loading islands would be less safe for pedestrians than curbside platforms. Proposed bicycle routes would be compatible with LCI routes.	Transit stations would offer safe, convenient pedestrian movement and would tie in well with proposed bicycle routes since stations would have bicycle storage facilities.		
EAST COUNTY STUDY AREA	East County would continue to be predominantly auto-oriented with few gains in transit operation.	Feeder and collection bus routes in East County would improve transit option. Additional stations on I-205 with Alternatives 3 and 4 would increase transit use and facilitate pedestrian movements.			LRT would offer big gain for transit. Major stations would connect with proposed East County bikeways. Proposed bikeway on Division may not be compatible with LRT route.

TABLE S-12
SUMMARY MATRIX OF IMPACTS ON ACCESS FOR THE TRANSPORTATION DISADVANTAGED

	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
REGION	No increase in transportation options for disadvantaged.	Increased transit operation and facilities with the build alternatives would have beneficial affect on mass transit options for the disadvantaged. No discernible differences among the build alternatives.			
DOWNTOWN STUDY AREA	Same as above.	Proportionately higher percentage of low income persons and families and the elderly in Downtown and East Portland Study Area would be better served by transit with build alternatives. All build alternatives incorporate advantages for the handicapped/disabled. Little difference among alternatives.			
EAST PORTLAND STUDY AREA	Same as above.	Proportionately higher percentage of low income persons and families and the elderly in Downtown and East Portland Study Area would be better served by transit with build alternatives. All build alternatives incorporate advantages for the handicapped/disabled. Little difference among alternatives.			
EAST COUNTY STUDY AREA	Same as above.	Percentage of transportation disadvantaged in East County would be less due to relative affluence and younger population in area. Increase in options for the transportation disadvantaged.			

of several factors, of which the age and stability of the neighborhood is a significant one. The effect of an improved transportation facility located through a older, established neighborhood is quite different than if it were located through an area where the housing substantially changes ownership every few years. People living in the older areas who were born and raised there have strong sentimental attachments to their homes and surroundings that are difficult to sever.

Neighborhoods are also impacted by the pressures for land use conversions, intrusion of heavier traffic, and accessibility changes.

1. Downtown

a. <u>No-Build Alternative</u>

Proximity impacts would appear to be minimal. The Downtown Study Area in the vicinity of the Downtown connection corridor of the project includes the Burnside and Downtown Community Neighborhood Associations. Alternative 1, as well as Alternatives 2, 3, 4, and 5 would have minor and indistinguishable effects on these neighborhoods. The Burnside community, in particular, is in rapid transition. Portland's "skid road" area of predominately male, aging, low income, transitory population is changing from the influence of the Old Town development and Waterfront Park development.

b. <u>Build Alternatives</u>

Alternatives 2, 3, and 4 are all-bus alternatives. Their impact on the downtown would be minor with insignificance differences among these alternatives. These alternatives would increase the noise levels along their routes in the Downtown Study Area. (See Noise Report in this volume of the statement for specific impacts.) Alternatives 3 and 4 would require the displacement of the Athens Hotel, a low-income residential hotel in the Burnside community. Relocation of the hotel's ninety residents would be problematic due to the low income housing in the downtown. (The displacement is discussed in the Right of Way portion of this statement.)

The Light-Rail Transit Alternative would require the laying of fixed rails, erection of overhead wiring, and the construction of stations, crossing lights, a maintenance facility, etc. The impacts of this construction period for areas outside of the Banfield and I-205 corridors would be adverse. Noise, localized air pollution, vibration, and general confusion from construction equipment would temporarily interfere with normal activities nearby. The overhead wires used by the light-rail cars may be considered a visual/aesthetics problem in the Downtown and in the East County Area.

Neither Alternatives 2 or 5 would require residential displacements in the Downtown Study Area. None of the build alternatives displace any non-profit organizations in this study area.

2. East Portland

a. <u>No-Build Alternative</u>

The No-Build Alternative would increase the volume of traffic in the East Portland Study Area, particularly on the east-west arterials. With increased congestion of these arterials, traffic increases on neighborhood streets could be expected as less congested routes are sought. Neighborhood access would decrease. Overall traffic increases and no time savings for mass transit would adversely affect the neighborhoods of this area.

The barrier effect of increasing traffic volumes in these arterials which traverse neighborhood association boundaries would reduce the cohesion of the neighborhoods. Increases in traffic on the Banfield Freeway would not pose any new effect on the related cohesiveness of its bordering neighborhoods, since this route already is a boundary for these neighborhoods. (See Figures S-10 and S-11.) More traffic on other routes in the East Portland Study Area would contribute to the barrier effect. Neighborhood associations would be required to readjust boundaries or adapt to part of its neighborhood population separated from the remainder of the neighborhood. Residential identity related to neighborhood would, consequently, be reduced for those residents separated from their neighborhood. Neighborhood associations in East Portland wish the single-family residence to persist and constitute a large percentage of the total residential choice in the neighborhood. Traffic increases would tend to contribute to conversion of single-family to multiple-family or commercial near busy streets. This trend may be counter-productive to the goals of the associations.

Proximity effects on the institutions and residences bordering the Banfield would be small with the no-build, since the corridor is largely separated from sensitive land uses by the nature of its topography and since it already includes a freeway and a rail line. The institutions and residences along other major arterials in East Portland would experience additional noise, localized air pollution, and vibration effects of increased traffic. Some on-street parking for residents and businesses would eventually be removed on these routes to lessen the traffic congestion of the no-build by allowing greater traffic capacity. This would pose a hardship on those residents who depend upon on-street parking. Furthermore, getting in and out of private residential driveways would become more hazardous with a no-build condition.

b. Build Alternatives

The LCI alternative would cause minor proximity impacts on the three exclusive bus routes and the auto improvement route. These impacts would not accrue because of construction of the facility but rather its operation. Tri-Met estimates that about 30 to 50 buses per hour would operate on the exclusive bus lanes during their operation in the peak hours. The noise and localized air pollution of these buses would intrude upon the residences and institutions bordering the routes. To accommodate the exclusive bus lanes, on-street parking would be removed in certain areas. This would affect the residents who are dependent on this availability of parking.

Of all the build alternatives, Alternative 2 would tend to most adversely affect the established neighborhood boundaries in East Portland. Use of several east-west streets for exclusive express transit would increase the barrier effect on those LCI routes that do not follow neighborhood boundaries. However, the extent of the impact would be significantly less than the No-Build Alternative. Table S-13 indicates the relationship of the LCI routes and the Banfield Freeway to the neighborhood associations boundaries.

The City of Portland's Arterial Streets Classification Policy, which classifies the streets in Portland according to their nature and use. Broadway from Sandy Boulevard to 67th Street is a quiet, primarily single-family street. The classification policy designates this street as a "local service street." It would appear that introducing express buses into that segment of Broadway would be incompatible and inconsistent with city policy.

The proximity impacts of Alternative 3 would occur in the Banfield Corridor and along Holladay and a combination of Holladay/Multnomah Streets near the Lloyd Center. Since the sensitive land uses bordering the Banfield are

TABLE S-13

EAST PORTLAND STUDY ROUTES
AND THE NEIGHBORHOOD ASSOCIATIONS

Study Route	Bordering Neighborhoods	Divided/Separated Neighborhoods
Banfield Freeway (including Holladay and Multnomah/Holladay Connection to Steel Bridge)	Rose City Park Gregory Heights-Madison Kerns Laurelhurst Center Montavilla Grant Park	----
Broadway/Weidler/ Sandy/Halsey LCI Routes	Eliot Irvington Grant Park Wilshire-Beaumont	Rose City Park Gregory Heights-Madison
Burnside/Stark LCI Route	Kerns City Center Buckman	Laurelhurst Mt. Tabor Montavilla
Morrison/Belmont/ 60th LCI Route (Non-Transit)	Richmond	Buckman Sunnyside Mt. Tabor
Division LCI Route	Mt. Tabor Foster-Powell South Tabor Montavilla	Hosford-Abernathy Richmond

SOURCE: City of Portland, Office of Neighborhood Associations, 1977.

somewhat separate and isolated from the expressway, few proximity impacts would occur. Generally, the all-bus alternatives would involve less construction impacts than LRT. Construction impacts on the neighborhoods and sensitive institutions would be minor.

Alternatives 3, 4, and 5 would be beneficial to the neighborhood associations in the study area, since through transit trips would be funneled through the Banfield Corridor. The proximity and neighborhood impacts for these alternatives would be similar. The health and vitality of the neighborhoods would benefit with less through traffic on the neighborhood streets. A detrimental effect would occur on those neighborhoods bordering the Banfield where household displacements would occur. Also, the transit stations may increase the amount of vehicle traffic on the streets near the stations. Some residents of the East Portland neighborhoods have already referred to these stations as "attractive nuisances" in public meetings on this project, because of anticipated traffic volumes near the stations.

Alternatives 3, 4, and 5 would require the acquisition and displacement of residences and an institution along the Banfield Corridor. Table S-14 indicates the relative number of displacements. Alternative 2 would require no displacements. In the East Portland Study Area, Alternative 3 and 4 have a maximum residential displacement of 85 housing units. Alternative 5 could displace 59. Three of the alternatives would displace a church . (The effects of these displacements are discussed in the Right of Way Report.)

TABLE S-14

RESIDENTIAL AND NON-PROFIT ORGANIZATIONAL
RIGHT OF WAY DISPLACEMENT

Alternative	DOWNTOWN		EAST PORTLAND		EAST COUNTY		TOTAL	
	Residential	Non-Profit	Residential	Non-Profit	Residential	Non-Profit	Residential	Non-Profit
2	-	-	-	-	-	-	-	-
3a	90	-	8	-	-	-	98	-
3b	90	-	55	1[a]	-	-	145	1
3c	90	-	85	1[a]	-	-	175	1
4a	90	-	78	1[a]	-	-	168	1
4b	90	-	85	1[a]	-	-	175	1
5-1a*	-	-	16	-	11	-	27	-
5-2a*	-	-	16	-	135	2[b]	151	2
5-3a*	-	-	16	-	-	-	16	-
5-1b	-	-	59	1[a]	11	-	70	2
5-2b	-	-	59	1[a]	135	2[b]	194	4
5-3b	-	-	59	1[a]	-	-	59	2

SOURCE: Oregon Department of Transportation, Metro Right of Way Section, 1977.

Note: Right of Way Displacements are entire and partial property acquisitions requiring relocation. In Alternative 5, 1 is Burnside Route, 2 is Division, and 3 is I-205-to-Lents.

[a] Includes a church.

[b] Includes a church and Federal administration office

None of the build alternatives would require right-of-way from any public park, open space or recreational facility.

3. East County

a. No-Build Alternative

Proximity and neighborhood impacts would be minor with the no-build condition. The relative youth and lack of strong identity of the neighborhoods in East County as compared with East Portland would contribute to less impact from heavier traffic volumes in this area.

b. Build Alternatives

Alternatives 2, 3, and 4 would have insignificant neighborhood and proximity effects on the East County Study Area.

Introduction of LRT to the East County would create some adverse proximal impacts. Construction in the Burnside and Division Corridors would temporarily interfere with the residents and institutions bordering these routes. During construction, there would be some traffic disruption. These disruptions would occur in stages: during relocation of utilities; during right-of-way widening and roadway relocation; during the installation of trackage and platforms; and during the construction of park-and-ride lots.

Right-of-way requirements, particularly for the Division LRT route, would be the largest of the alternatives and affect numerous households. A maximum 11 households would be displaced on the Burnside route between I-205 and Gresham. The Division route would displace a maximum of 135 households. In addition, the Division route would displace a church and a Federal office buildings.

The stations with park-and-ride facilities may add to traffic congestion in neighborhoods from overflow parking and displacement. On-street parking removal would also adversely affect those residents and institutions which are accustomed to the convenience.

Tables S-15 and S-16 summarize the above discussion of proximity and neighborhood impacts of the alternatives and study areas.

IV. MITIGATIONAL MEASURES FOR ADVERSE IMPACTS

The build alternatives of the Banfield Transitway project are anticipated to create several adverse social impacts. Final design of the selected alternative will incorporate positive measures to reduce, to the extent possible, many of the adverse social effects.

Population and economic growth induced by the project is a concern of CRAG, Multnomah County, the City of Portland and other political jurisdictions in the affected project area. Except for coordinated planning, the form and timing of these effects are beyond the control of this project. Land use controls such as zoning, permits, etc. would guide and control growth in accordance with local desires.

This project may not be compatible with some fire districts, other service districts, and community institutions. The incompatibility can be resolved through planning assistance which would involve the analysis and/or adjustment of existing public service boundaries to reflect changes in levels of accessibility created by the improvement.

The safety and movement of pedestrians and transit riders at the transfer points and stations will be investigated more thoroughly after a project alternative has been selected.

TABLE S-15
SUMMARY MATRIX OF IMPACTS ON PROXIMITY

	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
REGION	----------------------Assessment not required due to nature of impact ------------------------				
DOWNTOWN STUDY AREA	Impacts not discernible.	All bus alternatives would increase noise levels.			Major construction impact.
EAST PORTLAND STUDY AREA	Increased traffic on city streets would increase noise and decrease air quality and access.	Addition of 30-50 buses per hour during peak period on express routes on city streets would increase noise and localized air pollution. On-street parking would be removed, affecting residents and institutions dependent on the parking option. Portion of Broadway LCI is inconsistent with City's <u>Arterial Classification Policy.</u>	Construction and operation in the Banfield Corridor would minimize proximity effects except for right-of-way displacement of households. Alternatives 3, 4, and 5 would require displacement of a church.		
EAST COUNTY STUDY AREA	Minor proximity impact.	-----------------Insignificant proximity effects.-----------			Major construction period impact. Right-of-way impacts, particularly in Division route, would be severe. One church and a government office displaced.

NOTE: None of the build alternatives would require right-of-way from any public park, open space or recreational facility. Consequently, the project contains no parkland Section 4(f) involvement.

TABLE S-16
SUMMARY MATRIX OF IMPACTS ON NEIGHBORHOODS

	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
DOWNTOWN STUDY AREA REGION	--------------------Assessment not required due to nature of impact-------------------------				
	--------------------Minor and indistinguishable effects on Downtown Neighobrhood-------------				
EAST PORTLAND STUDY AREA	Increase congestion and traffic in neighborhoods would be contradictory to goals of neighborhood associations. Boundary maintenance would be difficult, thus reducing cohesion and identity of neighborhoods.	Would contribute most of the build alternatives to severance of established neighborhood boundaries. Severance would be less than No-Build.	Alternatives 3, 4, and 5 would be beneficial to neighborhoods not bordering the Banfield. In neighborhoods near Banfield, right-of-way would displace numerous households. Stations would attract vehicular traffic on streets near the stations.		
EAST COUNTY STUDY AREA	Minor affect on neighborhoods.	Insignificant neighborhood effects.			On-street parking removal and out-of-direction travel would interfere with quality of neighborhoods. Conversion of single-family to multiple family and commercial land use near station would occur.

An unavoidable impact of this project is the adverse effects of construction. During the construction period, short-term and localized adverse impacts would occur. Noise, dust vibration and congestion resulting from construction would temporarily degrade the environment for those residents and institutions near or in the construction area. The construction would be controlled by the standard specifications written for the contract. In addition, the contractor must conform to all pertinent statutes, laws, ordinances, rules and regulations of the Federal, State and local governments.

V. SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

In the short-term, this project would require the acquisition of additional right-of-way and displace residences and non-profit institutions. The magnitude of the right-of-way displacement varies with the five build alternatives. Regional and local accessibility would be improved. The construction and operation of transit stations would focus growth and development. Those neighborhoods through which the LCI and LRT routes would pass would be exposed to a different transportation operation or facility and would be affected by the construction period and by its operation.

In the long-run, the project would beneficially affect accessibility in the Downtown, East Portland and East County areas. Population growth for these areas, as forecast by CRAG, would be accommodated. Neighborhoods, school districts and other public districts and facilities would be required to adjust from the influence and effects of the project. Implementation of the project would cause an intensification and increased density of development along the transit route and stations under Alternatives 3, 4, and 5.

CITED REFERENCES/FOOTNOTES

1. Wilsey and Ham, An Analysis of Land Use Planning, Population Projections and Alternative Futures in the Portland-Vancouver Metropolitan Area, Portland, 1977, Table 1, p. 24.

2. Oregon Department of Human Resources, Older Oregonians Universe: Facts on Older Oregonians, Salem, 1974, pp. 1-2.

3. For purposes herein, neighborhood associations are defined as a group of people organized within the boundaries of a neighborhood area for the purpose of considering and upon a broad range of issues affecting neighborhood liveability.

4. U.S. Department of Transportation, Notebook 2 Social Impacts, in Environmental Assessment Notebook Series, Washington, D.C., 1975, pp. 80-90.

5. Frances Diemog, "The Transportation Problem," 1000 Friends of Oregon Newsletter 2 (May, 1977), Portland, p. 1.

6. Ibid.

7. Bardsley and Haslacher, Inc., The Community Looks at Tri-Met, An Opinion Survey, Portland, 1973, p. 14.

8. U.S. Department of Transportation, Notebook, pp. 104-105.

9. Crain Associates, Incidence Rates and Travel Characteristics of the Transportation Handicapped in Portland, Oregon, Menlo Park, California, 1977, p. 4.

10. Multnomah County Planning Department, Multnomah County Framework Plan, Inventory Section, Draft 4, Portland, 1977.

SELECTED SOCIAL BIBLIOGRAPHY

Bardsley and Haslacher, Inc. 1973. The Community Looks at Tri-Met, An Opinion Survey. Portland.

City of Portland Human Resources Bureau. 1973. Project Mobility: Access to the City. Portland.

City of Portland, Planning Bureau. 1977. Arterial Streets Classification Policy. Portland.

______________________. 1976. Housing Market Analaysis, Portland SMSA Area. Portland.

Columbia Region Association of Governments. 1976. General Planning Data and Projections: Population, Employment and Land Use for the CRAG Region. Portland.

______________________. 1976. Goals and Objectives and Implementing Rules. Portland.

______________________. 1975. Interim Transportation Plan for the Portland-Vancouver Metropolitan Area. Portland.

______________________. 1977. Land Use Framework Element of the CRAG Regional Plan. Portland.

______________________. 1977. Planning and Adoption Process of the Land Use Framework Element of the CRAG Region Plan. Portland.

Crain Associates. 1977. Incidence Rates and Travel Characteristics of the Transportation Handicapped in Portland, Oregon. Prepared for the Urban Mass Transportation Administration. Menlo Park, California.

Deleuw, Cather and Co. 1971.Portland Downtown Plan Inventory and Analysis. Portland.

Diemoz, Frances. 1977. "The Transportation Problem." p. 1 in 1000 Friends of Oregon Newsletter. Vol. II, No. 8. (May). Portland.

Federal Highway Administration, Oregon Department of Transportation, and Washington State Department of Highways. 1976. Final Environmental Impact Statement, I-205, Lewis and Clark Highway, Clark County, Washington to S.E. Foster Road. Multnomah County/Portland, Oregon. Vol. I and II. Salem.

Federal Highway Administration. 1976. Social and Economic Effects of Highways. Washington, D.C.

Multnomah County Planning Department. 1974. Citizen's Bikeway Report: East Multnomah County. Portland.

______________________. 1977. Multnomah County Framework Plan, Inventory Section, Draft 1. Portland.

Oregon Department of Human Resources. 1974. Older Oregonians Universe: Facts on Older Oregonians. Salem.

Oregon Department of Transportation. 1977. The Transportation Disadvantaged in Oregon. Salem.

U.S. Bureau of the Census. 1971. Census of Housing: 1970 Block Statistics, Portland, Oregon-Washington Urbanized Area, Final Report HC(3)-195, Washington, D.C.

________________. 1962. Census of Population and Housing: 1960 Census Tracts, Portland, Oregon-Washington SMSA, Final Report PHC(1)-121, Washington, D.C.

________________. 1972. Census of Population and Housing: 1970 Census Tracts, Portland, Oregon-Washington SMSA, Final Report PHC(1)-1965, Washington, D.C.

________________. 1971. U.S. Census of Population: 1970 Number of Inhabitants, Oregon, Final Report PC(1)-A39, Washington, D.C.

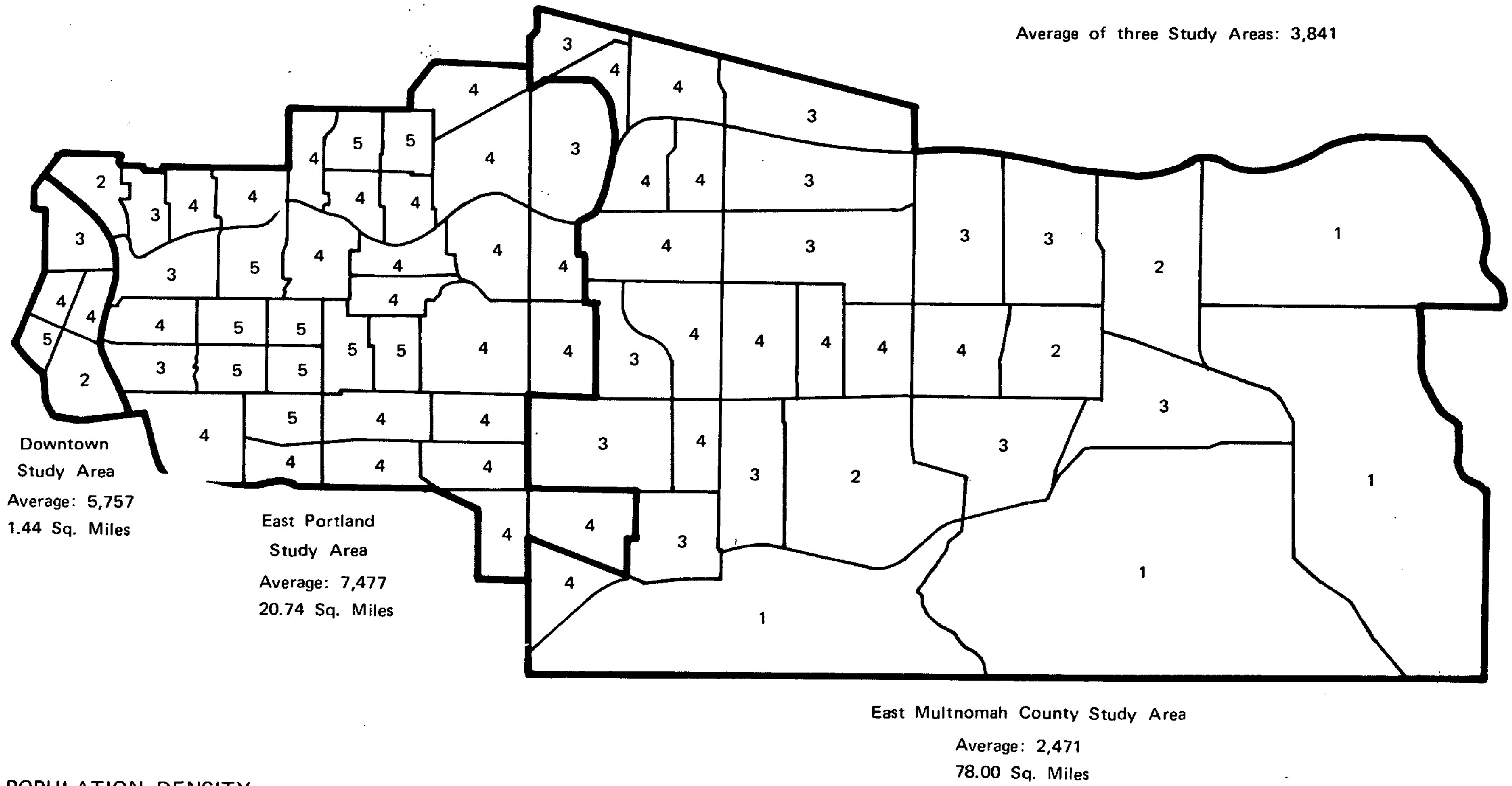
U.S. Bureau of the Census and Manpower Administration, 1974. Urban Atlas, Portland, Oregon-Washington, SMSA, Washington, D.C.

U.S. Department of Transportation. 1975. Notebook 2, Social Impacts. In Environmental Assessment Notebook Series. Washington, D.C.

Wilsey and Ham. 1977. An Analysis of Land Use Planning, Population Projections and Alternative Futures in the Portland-Vancouver Metropolitan Area. Prepared for the Metro Water Resources Study, Portland District, Corps of Engineers. Portland.

APPENDIX A

POPULATION DENSITY



POPULATION DENSITY

(Population Per Square Mile)

- 5 10,000 and Greater
- 4 5,000 - 9,999
- 3 2,500 - 4,999
- 2 1,000 - 2,499
- 1 100 - 999

SMSA Average: 276 Persons Per Square Mile

FIGURE S-A

POPULATION DENSITY, BY CENSUS TRACT, IN PROJECT STUDY AREA (1970 Census)

SOURCE: U.S. Bureau of the Census, Urban Atlas, Portland, Oregon-Washington SMSA, 1974, CRAG, General Planning Data and Projections, 1976

APPENDIX S-B

SOCIOECONOMIC CHARACTERISTICS OF THE POPULATION

TABLE S-A

SUMMARY OF SOCIOECONOMIC DATA,
SMSA AND THREE PROJECT STUDY AREAS
(1970 Census)

Characteristic	SMSA	Downtown Study Area	East Portland Study Area	East Multnomah County Study Area
Population	1,007,130	8,290	155,070	137,975
Sex:				
Male (%)	48.2	60.4	45.7	49.0
Female (%)	51.8	39.6	54.3	51.0
Age:				
Under 5 (%)	8.0	0.6	6.9	8.9
5-14 (%)	19.0	0.6	15.4	21.1
15-24 (%)	17.1	24.2	18.2	16.7
25-44 (%)	23.5	17.6	20.6	26.1
45-64 (%)	21.5	30.9	23.2	19.6
65 & over (%)	10.9	26.1	15.7	7.6
Race:				
Black (%)	2.3	3.0	1.2	0.3
White (%)	97.7	97.0	98.8	99.7
Spanish Language (%)	1.4	2.3	1.4	0.7
Socioeconomic Characteristics				
Marital Status:				
Single (%)	22.7	43.7	23.5	21.2
Married or Separated (%)	64.5	24.8	58.5	68.4
Divorced or Widowed (%)	12.8	31.5	18.0	10.4
Education[a]:				
High School Grad. (%)	62.9	48.5	58.9	62.6
Median School Yrs. Completed	12.4	10.9	12.1	12.3
Income:				
Median Family Income in 1969	$10,458	$8,209	$9,433	$10,846
Persons with income below the poverty level (%)	9.7	34.2	12.3	7.5
Families with income below the poverty level (%)	6.9	10.4	8.0	5.9
Older persons (65 and over) with incomes below the poverty level (%)	24.1	31.2	31.6	18.9

Characteristic	SMSA	Downtown Study Area	East Portland Study Area	East Multnomah County Study Area
Housing:				
All occupied housing units	341,505	4,879	59,188	41,774
Owner-occupied housing (%)	65.0	1.7	55.3	70.7
Renter-occupied housing (%)	35.0	98.3	44.7	29.3
Median Value of owner-occupied	$16,893	$7,320	$13,605	$17,846
Median Contract rent of renter-occupied	$97	$81	$100	$114
Persons per household	2.9	1.3	2.5	3.2
Families with female head (5)	9.6	14.1	13.6	8.3
Same Residence in 1970 as 5 yrs. earlier(%)[b]	46.9	23.0	50.3	46.6
Transportation				
Means of Getting to work (All Workers):				
Private Auto:				
Driver (%)	73.1	18.6	65.4	78.0
Passenger (%)	10.3	6.1	11.8	10.1
Bus (%)	5.8	19.1	11.7	4.8
Walked (%)	5.7	44.4	6.4	2.7
Other (%)	5.1	11.8	4.7	4.4
Automobiles per Household:				
None (%)	13.8	72.7	21.0	6.4
1 (%)	45.8	22.8	50.2	46.4
2 (%)	33.5	4.1	23.8	39.7
3 or more (%)	6.9	0.4	5.0	7.5

SOURCE: U.S. Bureau of the Census, Census of Population and Housing: 1970 Census Tracts, Portland, Oregon-Washington, SMSA, Final Report PHC(1)-165, 1972.

[a]For those 25 and over in age.

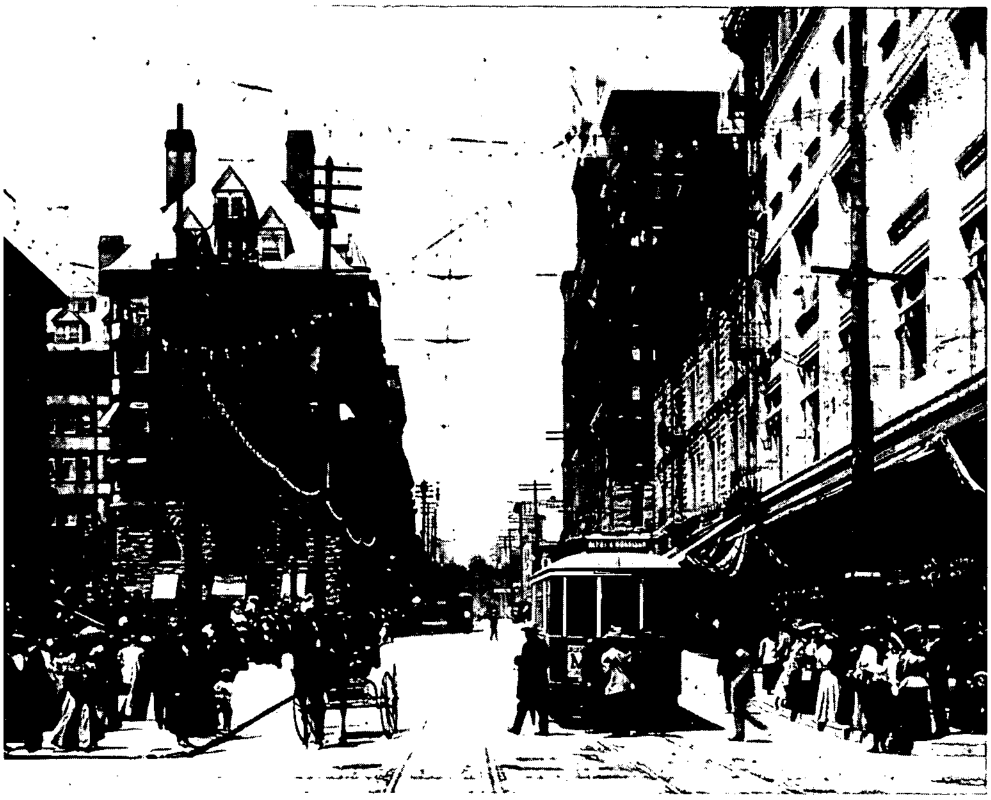
[b]Persons 5 years old or over.

CULTURAL RESOURCES REPORT

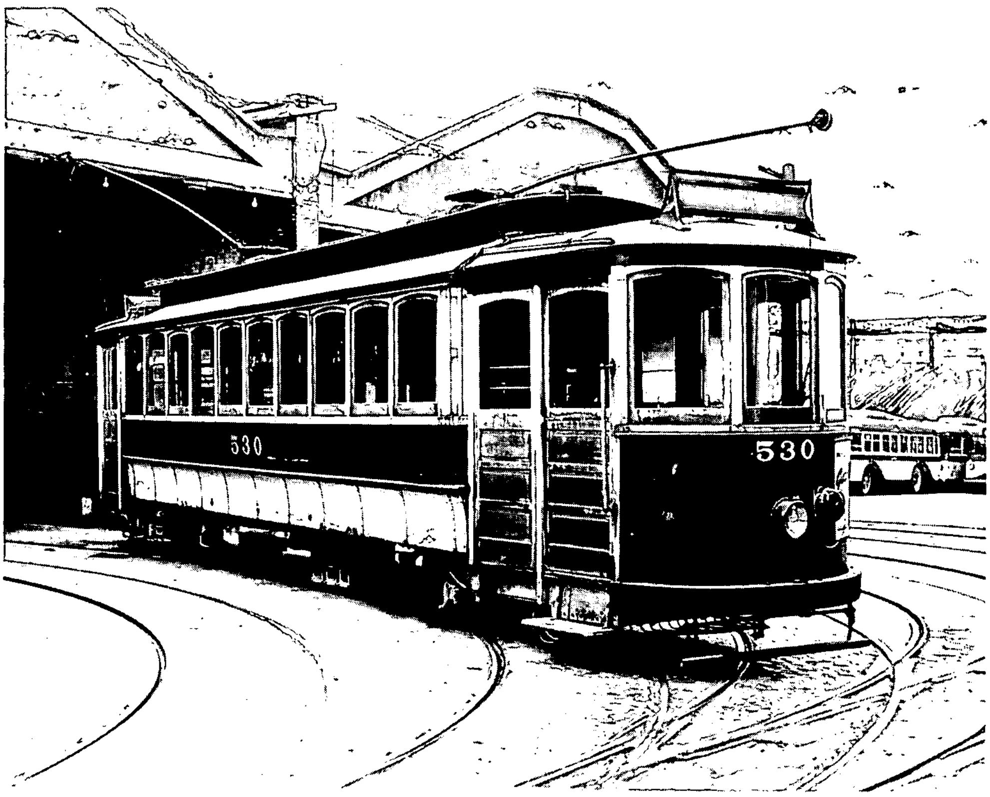
Table of Contents

List of Figures

List of Tables



Portland in 1900 at S.W.
5th and Morrison. (Oregon
Historical Society Photo).



Mt. Tabor Streetcar at
the East Burnside Streetcar Barns.
(Oregon Historical Society Photo).

The cultural resources report identifies within the project area those historic and archeological properties which have national, state or local significance or interest. Selection and protection of these properties are governed by various Federal and state laws and implementing regulations. Foremost among these laws is the National Historic Preservation Act of 1966, which established the National Register of Historic Places, listing each state's most important historic and archeological structures and sites. This record is maintained and constantly updated by the Department of Interior through a process of nomination from individual states.

At the state level, nominations to the National Register are submitted by the State Advisory Committee on Historic Preservation. Properties selected for this recognition may be proposed by the Council or by agencies, organizations or individuals. Nominations may also be made from the Statewide Inventory of Historic Sites and Buildings, a continually updated listing of historic and archeological properties compiled by the State Historic Preservation Office. This inventory includes National Register listings and potential candidates for designation and also structures and sites of local historic interest which may not qualify for more protective designations.

In the Portland area, significant historic buildings and sites are identified by the Portland Historical Landmarks Commission (established by the City Council and administered by the Bureau of Planning). These properties are considered eligible for National Register nomination and placed on the Statewide Inventory by the State Historic Preservation Office.

In order to determine the degree of significance assigned an individual property and the extent of protection warranted, the following categories are employed, from most important to least important.

1. Properties which are listed, nominated or given national eligibility for the National Register of Historic Places. These properties are afforded considerable protection by Federal laws and regulations, including Section 4(f) of the Department of Transportation Act of 1966.

2. Portland Historical Landmarks Buildings and Sites and any additional properties which are regarded by the State Historic Preservation Office as eligible for National Register listing. A measure of protection is extended to these properties by the same laws which apply to the previous category.

3. The Statewide Inventory of Historic Sites and Buildings. This inventory may include properties with historic potential warranting preservation and/or those which are deemed significant under Section 4(f), and therefore given some consideration for protection.

4. Additional sites or buildings which may or may not have future potential for recognition, but which do have historic interest in terms of architectural merit, uniqueness of design, scarcity of style or historic value to the neighborhood.

The reason for inclusion of this fourth category is twofold. Primarily, it is because such structures are a finite resource, and from this category future listings may be selected, depending upon economic feasibility, emphasis on preservation, loss of currently designated properties or discovery of previously unknown historic values.

Secondarily, it is because of the contribution these buildings make to the historic and architectural heritage of each neighborhood. In some areas of extensive modern development, scarcity of period styles may place additional value on those remaining. Except in extreme cases, neither condition nor size is a major consideration, since restoration is conceivable and period architecture should depict a wide range of style and economic circumstance. Such properties are a valuable and rapidly diminishing historic resource which, in the aggregate, contribute to the character of the city as a whole.

In this report on the Banfield Transitway, the project study area is divided into three areas: Downtown Portland, East Portland and East Multnomah County. Specific historic properties in each of these areas and their relationship to the project alternatives will be described in the Existing Setting.

The effects of project construction on these sites are detailed in the Impacts section of the report, and evaluated as applicable to various alternatives. Following this discussion, the Record of Coordination and Mitigation proposes the means for alleviating adverse impacts on these properties and documents coordination with other agencies and organizations.

EXISTING SETTING

I. Downtown Portland

For purposes of this report, the Downtown Study Area for the Banfield Transitway Project is bounded by the Waterfront on the east, I-405 on the west, S.W. Clay Street to the south and N.W. Lovejoy to the north. This area has been more extensively surveyed by authorities in the field of historic preservation than other sections of Portland, and has within these boundaries nineteen properties which are listed in the National Register. These structures and an additional fifty-one are also designated Portland Historical Landmarks and Statewide Inventory properties. (See Map, Figure 1, for location and identification of these buildings.)

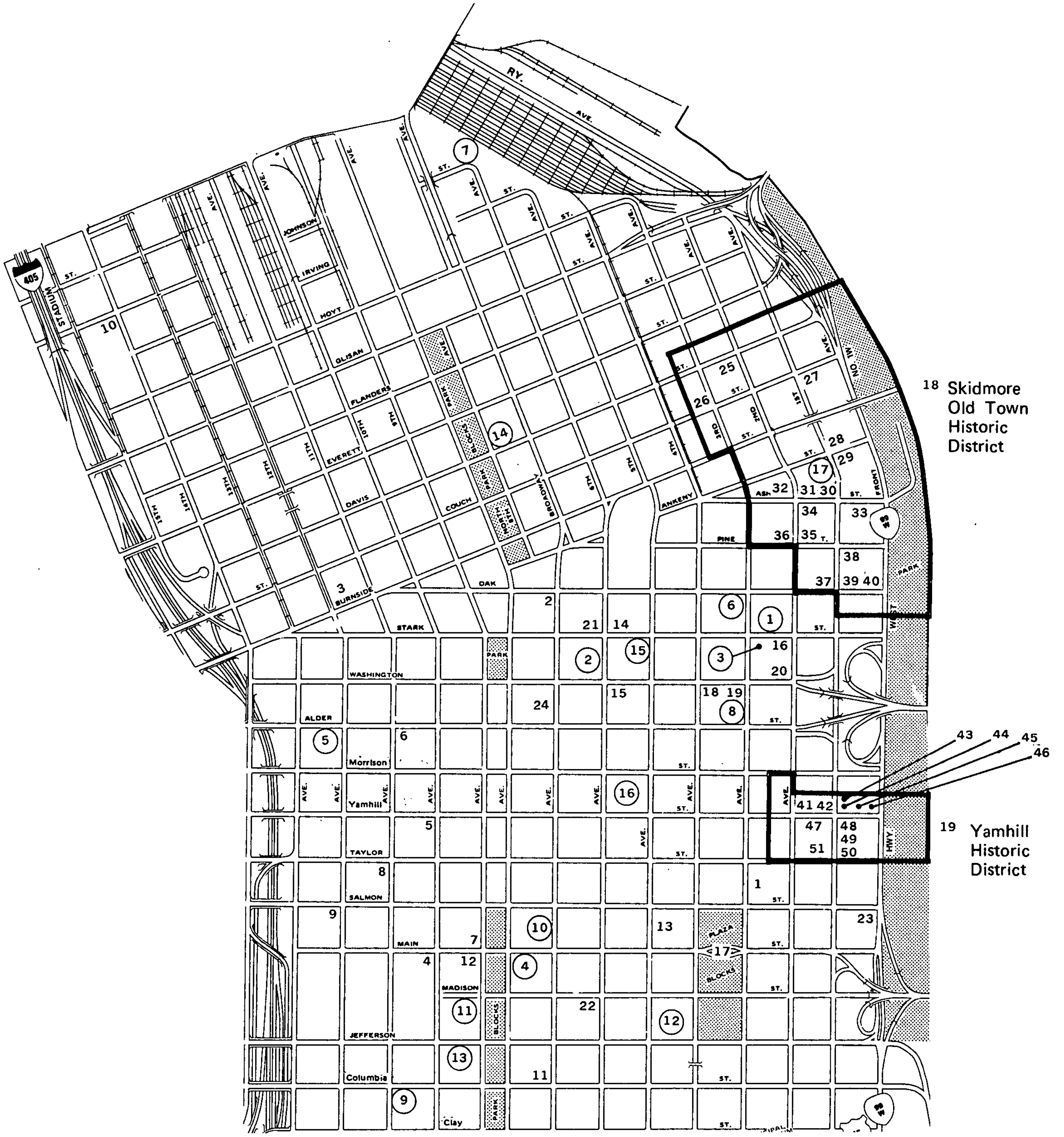


FIGURE 1
PORTLAND DOWNTOWN STUDY AREA

(2) Properties Listed in the National Register of Historic Places.

15 Portland Historical Landmarks (also listed in the Statewide Inventory of Historic Sites and Buildings.)

Properties Listed in the National Register of Historic Places (Year of construction indicated).

1. Bishop's House, 219-223 S.W. Stark, 1879.
2. Commonwealth Building, 421 S.W. 6th, 1948.
3. Concord Building, 208 S.W. Stark, 1891.
4. First Congregational Church, 1126 S.W. Park, 1889-1890.
5. First Presbyterian Church of Portland, 1200 S.W. Alder, 1886-1890.
6. Forbes and Breeden Building (Sherlock Building), 309 S.W. 3rd, 1894.
7. Grand Central Station (Union Station), N.W. 6th, 1890.
8. Hamilton Building, 529 S.W. 3rd., 1893.
9. The Old Church, (Calvary Presbyterian), 1422 S.W. 11th, 1882-1883.
10. Paramount Theatre, 1037 S.W. Broadway, 1927.
11. Portland Art Museum, 1219 S.W. Park, 1932-1939.
12. Portland City Hall, 1220 S.W. 5th, 1895.
13. St. James Lutheran Church, 1315 S.W. Park, 1891 and 1907-1908.
14. U.S. Customhouse, 220 N.W. 8th, 1901.
15. Old First National Bank, Oregon Pioneer Savings, 409 S.W. 5th, 1915.
16. U.S. Courthouse and Custom House, (Pioneer Post Office), 520 S.W. Morrison, 1869 and 1873.
17. New Market Theatre, 50 S.W. 2nd, 1872.
18. Skidmore/Old Town Historic District.
19. Yamhill Historic District

Portland Historical Landmarks (also listed in the Statewide Inventory of Historic Sites and Buildings)

1. Auditorium Building, New Haven Hotel, 920-928 S.W. 3rd, 1875.
2. Benson Hotel, 309 S.W. Broadway, 1913.
3. Blitz-Weinhard Brewery, 1133 W. Burnside, 1906.
4. Burrell's Elm, 1111 S.W. 10th, 1820's.
5. Central Library, 801 S.W. 10th, 1913.
6. Elks Temple, 614 S.W. 11th, 1920. This building has been approved for nomination to the National Register by the State Advisory Council on Historic Preservation.
7. Farrell's Sycamore, N.W. corner of S.W. Main and S.W. Park Intersection, 1880.
8. First Baptist Church, 909 S.W. 11th, 1894.
9. First Unitarian Church, 1011 S.W. 12th, 1924.
10. Gann Building, 1410 N.W. Johnson, 1909.
11. Ladd Carriage House, 715 S.W. Columbia, 1883.
12. Masonic Temple, 1119 S.W. Park, 1924.
13. Multnomah County Courthouse, 1021 S.W. 4th, 1909 and 1914.
14. Old Bank of California, northeast corner of S.W. 6th and S.W. Stark, 1924.
15. Olds and King Store (Exchange Building), 514 S.W. 6th, 1903.
16. Pacific Stationery, 415 S.W. 2nd, 1886 and 1894.
17. Plaza Blocks, bounded by S.W. Salmon, S.W. 3rd, S.W. Madison and S.W. 4th, 1852.
18. Reingold Clock, 504 S.W. 4th, 1900.
19. The Dekum Building, 519 S.W. 3rd, 1892.
20. The Leland, 421-429 S.W. 2nd, 1886.
21. U.S. National Bank, 321 S.W. 6th, 1916 and 1925.
22. University Club, 1225 S.W. 6th, 1913.
23. Visitors' Information Center, 1021 S.W. Front, 1949.
24. Zale's Clock, 529 S.W. Broadway, 1900.
25. Merchants Hotel, 200 N.W. Davis, 1885.
26. McDonnell Building, 105 N.W. 3rd, 1883.
27. Blagen Block, 78 N.W. Couch, 1888.
28. Packer Scott Building, 28 S.W. 1st, 1890.
29. Skidmore Fountain, S.W. 1st and S.W. Ankeny, 1887-1888.
30. Poppleton Building, 83 S.W. 1st, 1873.
31. New Market Annex, 58 S.W. 2nd, 1889.
32. Bickel Building, 213 S.W. Ash and 208 S.W. Ankeny, 1885.
33. Smith's Block, 10 S.W. Ash and 111, 117 S.W. Front, 1872.
34. Chown Electric, 112 S.W. 2nd, 1889.
35. Spaghetti Factory, 126 S.W. 2nd, 1886.
36. Haseltine Building, 133 S.W. 2nd, 1893.
37. Oregon Marine Supply, 235 S.W. 1st, 1886.
38. Two-Story Cast Iron and Masonry Building, 224 S.W. 1st, 1889.
39. Commercial Building, 71 S.W. Oak, 1865.
40. Hallock and McMillan Building, 233 S.W. Front, 1857.
41. Willamette Block, 722-738 S.W. 2nd, 1880.
42. Strowbridge Building, 101 S.W. Yamhill, 1875.
43. Three-Story Cast-Iron and Masonry Building, 728 S.W. 1st, 1878.
44. Two-Story Masonry Building, 730 S.W. 1st, 1878.
45. Commercial Building, 71-73 S.W. Yamhill, 1878.
46. Northrup and Blossom-Fitch Building, 737 S.W. Front, 1858.
47. Four-Story Cast-Iron and Masonry Building, 124 S.W. Yamhill, 1885.
48. Flynn Office Supply, 814 S.W. 1st, 1875.
49. Commercial Building, 816-818 S.W. 1st, 1875.
50. Harkes Building, 824 S.W. 1st, 1878.
51. Mikado Block, 837 S.W. 1st, 1880.

Because certain of these properties are located on specific alignments for the alternatives, their involvement with construction of the project is of more concern. For this reason, the following listing includes National Register, Portland Historical Landmark and Statewide Inventory properties which are adjacent to the Cross Mall, On Mall, Pioneer Square and On Mall, Oak Street alignments. Properties which have historic interest or future potential for historic designation are also included when located adjacent to an alignment.

Official historic designations and indication of future potential for these properties is given by alternative in Tables 1, 2 and 3. Since the status of some buildings of historic value has not yet been determined by official survey, a category is included for this contingency.

A. Cross Mall Alternative (Table 1)

1. Skidmore/Old Town Historic District. (See Map, Figure 2).

Federal regulations stipulate that an historic district must be a "geographically definable area, urban or rural, possessing a significant concentration, linkage or continuity of sites, buildings, structures or objects which are united by past events or aesthetically by plan or development."

The Skidmore/Old Town Historic District contains Portland's largest remaining collection of mid-to-late 19th century business buildings, and next to New York City, one of the largest collections of Victorian Italianate cast iron architecture.

Official recognition began in 1959 when the City Council adopted the Skidmore Fountain Design Zone, and further progressed with designation of fourteen Historical Landmarks buildings within the area in 1969-1970. In December, 1975, the district was listed in the National Register of Historic Places and designated a National Historic Landmark.

TABLE 1

PORTLAND DOWNTOWN AREA/CROSS MALL ALTERNATIVE

Historic Properties Adjacent To Alignment	National Register Listing	National Historic Landmark	Portland Historical Landmark	Category To Be Determined	National Register Potential	Portland Historical Landmark Potential	Statewide Inventory	Future Designation Potential	Historic Interest	Removed By Project
1. Skidmore/Old Town Historic District	X	X	X				X			
2. New Market Theatre	X		X				X			
3. Yamhill Historic District	X		X				X			
4. U.S. Courthouse (Pioneer Post Office)	X	X	X				X			
5. Blagen Block			X		X		X			
6. Packer Scott Building			X		X		X			
7. Skidmore Fountain			X		X		X			
8. Poppleton Building			X		X		X			
9. Two Story Bldg., 224 SW 1st			X		X		X			
10. Oregon Marine Supply			X		X		X			
11. Strowbridge Building			X		X		X			
12. Three Story Bldg., 728 SW 1st			X		X		X			
13. Two Story Bldg., 730 SW 1st			X		X		X			
14. Building, 71-73 SW Yamhill			X		X		X			
15. Flynn Office Supply			X		X		X			
16. Building, 816-818 SW 1st			X		X		X			
17. Harker Building			X		X		X			
18. Mikado Block			X		X		X			
19. Building, 804 SW 3rd				X						
20. Goodenought Building				X						
21. Building, 411-415 SW Yamhill				X						
22. Pacific Building				X						
23. Fifth & Yamhill Food Market						X			X	
24. Four Story Bldg., 220 SW Morrison				X						
25. Corbett Building				X						
26. Kress Building (J.C. Penney Co.)				X						
27. Meier & Frank Building				X						
28. First National Bank				X						

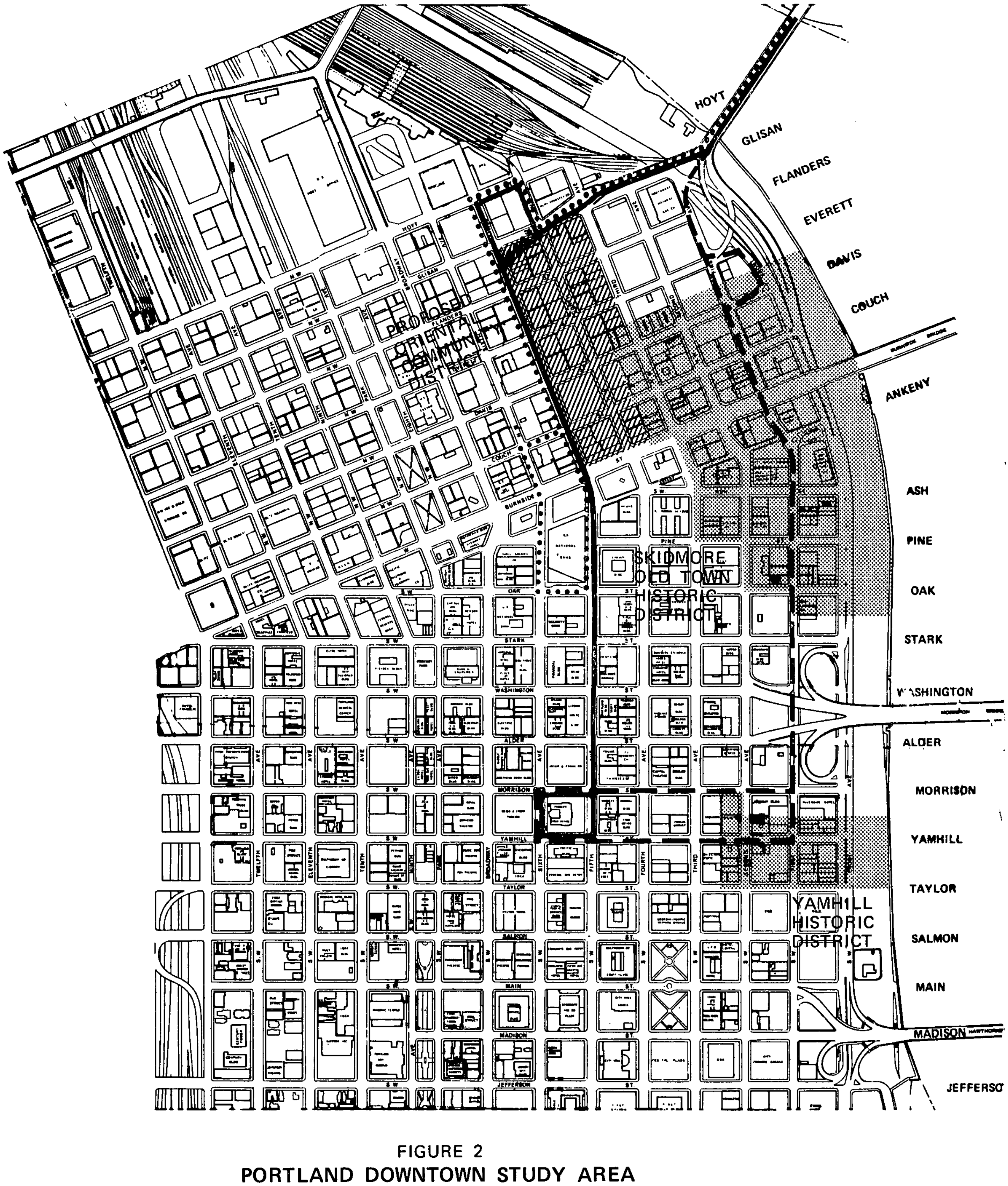


FIGURE 2
PORTLAND DOWNTOWN STUDY AREA

DOWNTOWN ALIGNMENT ALTERNATIVES

ON MALL, OAK STREET ....

ON MALL, PIONEER SQUIRE ———

CROSS MALL — — — — —

Currently the district consists of 16.55 acres with a total of 75 buildings. Of this number, 17 are designated Historical Landmarks, 14 are potential landmarks and 28 are considered compatible with district character. Predominant architectural styles are the Italianate with cast iron fronts dating from the 1870's and early 80's and the more massive brick and stone Richardsonian Romanesque of the late 80's and early 90's. Although considerably altered in appearance, the city's oldest structure, built in 1857, is located at 233 S.W. Front.

It is interesting to note that Portland's first public transit, a mule-drawn streetcar, appeared in the Skidmore/Old Town district in 1872. Electric streetcars were introduced in 1889, and by 1905 a unified system had been developed. Historically, streetcars have operated on First Avenue as late as the 1930's, passing through the Yamhill District and a portion of Old Town/Skidmore. Original trackage was placed in the center of the street, the location now proposed, and underground utilities and vaults along either curb.

Skidmore/Old Town has a distinct 19th Century feeling and character and can be considered one of Portland's most valuable cultural resources. It has both a single and a composite entity, as an historic district and as individual contributions to architectural heritage.

2. The New Market Theatre, 50 S.W. 2nd, is the only building within the historic district to be listed separately in the National Register. This imposing structure was built by pioneer seaman and merchant, Alexander P. Ankeny, in 1872. Originally the ground floor was occupied by a market arcade and the second floor by the City's grandest theatre. This charming old building is an excellent example of Victorian cast iron architecture in Italian Renaissance Revival Style. The eastern portion of this structure is adjacent to S.W. 1st.

3. Yamhill Historic District (See Map, Figure 2).

This historic district is the only other area of the city, in addition to Skidmore/Old Town, which retains a significant concentration of 19th Century business buildings. The architectural styles are primarily Italianate, and many of the structures have cast iron fronts. Most were built between the years 1875 and 1885, resulting in a remarkable degree of architectural unity throughout the district. This area was a portion of the 22 blocks devastated by fire in 1873 and contains one of the buildings which survived. This structure at 737 S.W. Front was built in 1858 and is the City's oldest building in its original condition.

At the present time, the district encompasses 3.53 acres including 22 structures. Of this total, 11 are designated Portland Historical Landmarks, 6 are potential landmarks and an additional 3 are considered compatible in character.

Like Skidmore/Old Town, the Yamhill Historic District has an intrinsic value to the cultural heritage of Portland. These are finite resources without the potential of replacement.

4. U.S. Courthouse and Custom House (Pioneer Post Office), 520 S.W. Morrison, built in 1869 and 1873, is the oldest permanent Federal Building in the Northwest. It is a rare example of post-Civil War government architecture in an Italianate style of stone construction. In addition to <u>National Register</u> listing, the courthouse has also been designated a Portland Historical Landmark and a National Historic Landmark.

5. Blagen Block, 78 N.W. Couch, in Skidmore/Old Town Historic District, was built in 1888 and is a fine example of cast iron architecture in High Victorian Italianate style.

6. Packer Scott Building, 28 S.W. 1st, in the Skidmore/Old Historic District is a significant 1890 design of Whidden and Lewis, one of Oregon's most distinguished 19th Century architectural firms.

7. Skidmore Fountain, S.W. 1st and S.W. Ankeny, designed by Olin J. Warner, a nationally renowned sculptor, and built in 1887-1888. Pioneer druggist Stephen G. Skidmore was the donor.

8. Poppleton Building, 83 S.W. 1st, in the Skidmore/Old Town Historic District, is of 1873 vintage featuring cast iron pilasters and leaf ornamentation.

9. Two-Story Cast Iron and Masonry Building, 224 S.W. 1st, in the Skidmore/Old Town Historic District, was built in 1889.

10. Oregon Marine Supply, 235 S.W. 1st, in the Skidmore/Old Town Historic District, designed in 1886 by Warren H. Williams, prominent 19th Century architect.

11. Strowbridge Building, 101 S.W. Yamhill in the Yamhill Historic District, built in 1875.

12. Three-Story Cast Iron and Masonry Building, 728 S.W. 1st in the Yamhill Historic District, built in 1878.

13. Two-Story Masonry Building, 730 S.W. 1st, in the Yamhill Historic District, circa 1878.

14. Commercial Building, 71-73 S.W. Yamhill in the Yamhill Historic District, circa 1878.

15. Flynn Office Supply, 814 S.W. 1st, 1875, in Yamhill Historic District.

16. Commercial Building, 816-818 S.W. 1st, 1875, in Yamhill Historic District.

17. Harker Building, 824 S.W. 1st, 1878, in Yamhill Historic District.

These three structures (15, 16 and 17) in the 800 block, east side of S.W. 1st, are particularly unique in their diversity of ornamentation and period styles. The fourth and last building in the block, corner of 1st and S.W. Taylor, is regarded as a potential Historical Landmark.

18. Mikado Block, 837 S.W. 1st, built in 1880, in the Yamhill Historic District, this building has architectural as well as historic significance, having once housed the Olds and King Store and the G.A.R. Meeting Hall.

19. Commercial Building, 804 S.W. 3rd.

20. Goodenought Building, 467 S.W. Yamhill and 730 S.W. 5th.

21. Commercial Building, 411-415 S.W. Yamhill.

22. Pacific Building, 520 S.W. Yamhill.

23. The Fifth and Yamhill Food Market (Figini Bros. Fresh Fruit and Vegetables), 444-476 S.W. Yamhill, is a smaller and more contemporary reminder of the large farmers' market which once flourished at this location. Its survival in this incongruous setting is attributed to protective measures initiated by interested citizens.

24. Four-Story Building, 220 S.W. Morrison.

25. Corbett Building, 430 S.W. Morrison.

26. Kress Building (J.C. Penney Co.), 638 S.W. 5th.

27. Meier and Frank Building, 621 S.W. 5th.

28. First National Bank, 635 S.W. 6th.

B. On Mall, Pioneer Square Alternative (Table 2)

1. Old First National Bank, Oregon Pioneer Savings, 409 S.W. 5th, 1915. This two-story, steel frame building is an excellent example of Greek period architecture with Colorado Yule marble facing and cast iron window trim. Also designated a Portland Historical Landmark Building and on the

TABLE 2
PORTLAND DOWNTOWN AREA
ON MALL, PIONEER SQUARE ALTERNATIVE

Historic Properties Adjacent To Alignment	National Register Listing	National Historic Landmark	Portland Historical Landmark	Category To Be Determined	National Register Potential	Portland Historical Landmark Potential	Statewide Inventory	Future Designation Potential	Historic Interest	Removed By Project
1. Old First National Bank	X		X				X			
2. U.S. Courthouse (Pioneer Post Office)	X	X	X				X			
3. Building, 510 N.W. 3rd									X	
4. Pike Tent and Awning Shop								X		
5. Hunt Transfer Company Building									X	
6. Three Story Building, 5th and Glisan									X	
7. Two Story Building, 601 N.W. 5th									X	
8. Block bounded by Glisan, 4th, 5th, Flanders						X			X	X
9. Building, 403 N.W. 5th									X	
10. Buildings, 310 and 338 N.W. 5th									X	
11. Buildings, 100 block, westside, N.W. 5th									X	
12. Building, 19 N.W. 5th									X	
13. Building, 5 N.W. 5th									X	
14. Building, N.E. corner, 5th and Burnside									X	
15. Oregon Trails Building				X						
16. J.K. Gill Building				X						
17. Mead Building				X						
18. A.U.S. Building				X						
19. Yeon Building				X						
20. Lipman's				X						
21. J.J. Newberry Building				X						
22. Meier and Frank Building				X						
23. Kress Building, (J.C. Penney Co.)				X						

Statewide Inventory.

2. U.S. Courthouse and Custom House (Pioneer Post Office), 520 S.W. Morrison. Previously described.

3. Commercial Building, 510 N.W. 3rd.

4. Pike Tent and Awning Shop, 417 N.W. 3rd, one of the last old Portland, wood-frame storefronts in the downtown core area.

5. Hunt Transfer Company Building, north side of N.W. Glisan between N.W. 3rd and N.W. 4th.

6. Three-Story Brick Building, northeast corner of N.W. 5th and Glisan.

7. Two-Story Brick Building, 601 N.W. 5th.

8. Block of Commercial Buildings, bounded by N.W. Glisan, N.W. 4th, N.W. 5th and N.W. Flanders. This group of seven buildings, circa 1890, is primarily two to four stories in height and of brick construction with ornamentation typical of the era. It is a contiguous block of structures without intrusion of more modern types of architecture.

An important component of this block is the three story Enterprise Building of brick construction at 406 N.W. Glisan, currently housing the Columbia River Ship Supply. Another large brick structure at 401 N.W. 4th was originally the New Chinese Building owned by Wong On, manager of the Kwong Mun Yuen Company. A substantial portion of this area north of Burnside was Portland's Oriental business community in the late 19th and early 20th centuries.

Because of this ethnic history and importance of the area and since many of the original buildings remain, the Portland Historical Landmarks Commission is considering historic designation as the Oriental Community District. (Refer to Figures 3 and 4, letters from Portland Historical

Landmarks Office and State Historic Preservation Office.) Such a district would encompass the block of buildings previously described and approximately eight other blocks to the east and south, bounded by N.W. Glisan, N.W. 5th, West Burnside, N.W. 3rd and the Skidmore/Old Town Historic District. (See Map, Figure 2).

9. Commercial Building, 403 N.W. 5th.

10. Brick Buildings, 338 and 310 N.W. 5th.

11. Commercial Buildings, 100 block of N.W. 5th, west side of block, good examples of various period styles in a contiguous grouping.

12. Brick Building, 19 N.W. 5th.

13. Commercial Building, 5 N.W. 5th.

14. Commercial Building, northeast corner of N.W. 5th and Burnside.

15. Oregon Trails Building, 333 S.W. 5th.

16. J. K. Gill Building, 408 S.W. 5th.

17. Mead Building, 421 S.W. 5th.

18. A.U.S. Building, 510 S.W. 5th.

19. Yeon Building, 522 S.W. 5th.

20. Lipman's, 521 S.W. 5th.

21. J. J. Newberry Building, 620 S.W. 5th.

22. The Meier and Frank and Kress (J. C. Penney) Buildings were previously described on the Cross Mall Alternative.

C. On Mall, Oak Street Alternative (Table 3)

1. Buildings on N.W. Glisan and on N.W. 5th. Previously described.

2. Apolistic Faith Church, northeast corner of N.W. 6th and Burnside. Atop this building is one of the last remaining examples of the giant neon sign with its moving reader board. The sign inscription, "Jesus, the Light of the World" has been a familiar Burnside landmark for many years.

Figure 3

PORTLAND HISTORICAL LANDMARKS COMMISSION

25 November 1977

Maxine Banks
Environmental Section
Room 412
Transportation Bldg.
Salem, OR 97310

Dear Ms. Banks:

This letter is a response to your inquiries regarding the historical significance of the Portland block bounded by NW Glisan, 5th, Flanders, and 4th Avenues. This block is outside the Skidmore/Old Town Historical District.

Even though this block is outside that historical district, it is of historical significance. It is within an area that is under consideration by the Portland Historical Landmarks Commission for designation as an Oriental Community District.

I have enclosed a downtown map delineating possible study boundaries of this district and another possible district that future transportation corridors might affect. This district is the South Park Blocks and would be affected by any corridor crossing those blocks.

If you have further questions concerning the impact of these projects, please contact me.

Sincerely,

L. Rudolph Barton

L. Rudolph Barton
Urban Design

LRB:ww
Enclosure

cc: George McMath

424 SW Main Street Portland Oregon 97204 (503) 248-4468

Figure 4

ROBERT W. STRAUB
GOVERNOR

Department of Transportation

STATE HISTORIC PRESERVATION OFFICE

Parks and Recreation Branch

525 TRADE STREET S.E., SALEM, OREGON 97310

December 21, 1977

Ms. Maxine Banks
Environmental Section
412 DOT Building
Salem, OR 97310

Dear Ms. Banks:

This is to confirm the interest of our office in the seven buildings on the block in Portland bounded by NW Glisan, 5th Avenue, Flanders, and 4th Avenue.

It is our understanding that the buildings fall within a seven or eight block area adjacent to Skidmore/Old Town National Historic Landmark presently under consideration by the Portland Historical Landmarks Commission for designation as a historic district honoring the city's early Oriental community.

We would hope that these and other Portland buildings falling within areas under consideration for possible district designation would remain intact until their landmark status can be duly evaluated. Because of our prior knowledge of buildings bordering Portland's South Park Blocks, we can say that, in our opinion, the South Park Blocks district is eligible for nomination to the National Register of Historic Places.

I hope these comments will be helpful.

Sincerely,

David Powers

D.W. Powers III
Historic Preservation Coordinator

EWP:ko

cc: George McMath
Leo Williams
Rudolph Barton

TABLE 3

PORTLAND DOWNTOWN AREA
ON MALL, OAK STREET ALTERNATIVE

Historic Properties Adjacent To Alignment	National Register Listing	National Historic Landmark	Portland Historical Landmark	Category To Be Determined	National Register Potential	Portland Historical Landmark Potential	Statewide Inventory	Future Designation Potential	Historic Interest	Removed By Project
1. Building, 510 N.W. 3rd									X	
2. Pike Tent and Awning Shop								X		
3. Hunt Transfer Company Building									X	
4. Three Story Building, 5th and Glisan									X	
5. Two Story Building, 601 N.W. 5th									X	
6. Block bounded by Glisan, 4th, 5th, Flanders						X			X	X
7. Building, 403 N.W. 5th									X	
8. Buildings, 310 and 338 N.W. 5th									X	
9. Buildings, 100 block, west side, N.W. 5th									X	
10. Building, 19 N.W. 5th									X	
11. Building, 5 N.W. 5th									X	
12. Building, N.E. corner, 5th and Burnside									X	
13. Apolistic Faith Church and Sign						X			X	
14. Star Theatre									X	
15. Four Story Building, 211-215 S.W. 6th									X	
16. Wells Fargo Building				X						
Alternatives 3a-c and 4a-b										
1. Athens Hotel									X	X

3. Star Theatre, 9 N.W. 6th, and the frame building adjacent to the north, are both older buildings with some unique qualities, but in these cases, the condition of the structures might prove a deterrent to future restoration.

4. Four-Story Building, 211-215 S.W. 6th.

5. Wells Fargo Building, southwest corner of S.W. 6th and S.W. Oak.

D. Alternatives 3a-c and 4a-b (Table 3)

These alternatives will involve no National Register, Portland Historical Landmark or Statewide Inventory properties in the downtown project area. One property of local historic interest may be removed by these alternatives. Because of the severity of this impact, a description of this property is included.

1. Athens Hotel Building, 220-230 N.W. 6th, a four-story brick structure of early 20th Century vintage. Although not officially regarded as having potential for historic designation, the structure is compatible with the styles of existing older buildings and contributes to the local historic character of the area.

Archeological Resources

All of the alternatives in the Downtown Study Area are located in the core area of downtown Portland where extensive urban development has occurred. Consequently, no undisturbed archeological sites exist in this area, and archeological surveys are not required.

II. East Portland

In the East Portland area, the cultural resources report is concerned primarily with the Low Cost Improvements Alternatives, 2a and 2b. Although the Banfield Freeway is involved with all alignments, it contains no adjacent properties which have been given official historic designation nor any of local historic interest or future potential. This applies to the various transit station and lift out ramp areas in the vicinity of the Banfield.

Portions of N.E. Holladay, Multnomah, Union and Grand Streets were also surveyed in those blocks located on proposed project alignments. No historic resources were identified in these areas.

Since the various bridges over the Willamette River are involved with the approach to East Portland, these structures were investigated for historic value and potential. Five bridges are being considered for designation as Portland Historical Landmarks. (Date bridge was opened to traffic is indicated.)

1. Steel Bridge, July 10, 1888.
2. Broadway Bridge, August, 1913.
3. Burnside Bridge, July 4, 1894.
4. Morrison Bridge, April 12, 1887.
5. Hawthorne Bridge, January 11, 1891.

The East Portland arterials which comprise the Low Cost Improvements Alternative include four corridors which would be modified to accommodate reserved bus lanes. The following descriptions include historic buildings which are adjacent to each of the four corridor routes and which have been given historic recognition, or eligibility for designation. Also included are some properties which are of historic interest and may have future potential for designation. (See Table 4 for status of these buildings.) Additional buildings of historic interest are listed in Appendix A. Since extensive historic surveys have not been conducted in East Portland, and there are fewer designated properties, more emphasis is placed on those structures with obvious potential for recognition.

TABLE 4

EAST PORTLAND
LOW COST IMPROVEMENTS ALTERNATIVES

Historic Properties Adjacent To Alignment	National Register Listing	National Historic Landmark	Portland Historical Landmark	Category To Be Determined	National Register Potential	Portland Historical Landmark Potential	Statewide Inventory	Future Designation Potential	Historic Interest	Removed By Project
1. Hollywood Theatre					X	X	X			
2. First Church of Divine Science					X	X	X			
3. Sanctuary of Our Sorrowful Mother					X	X	X			
4. Bekins Moving and Storage								X	X	
5. Jesuit Novitiate									X	
6. RFD 28, Fire Station								X	X	
7. Sandy Jug Tavern						X			X	
8. Shriners' Hospital								X	X	
9. East Burnside Street Car Barns					X	X	X			
10. Laurelhurst Neighborhood						X			X	
11. Lone Fir Cemetery and Macleay Mausoleum			X		X		X			
12. Apartments, 1505-1517 S.E. Morrison									X	
13. Residence, 1636 S.E. Morrison								X	X	
14. Studebaker Wagons Building						X			X	
15. Building, 1216 S.E. Belmont									X	
16. Residence, 1232 S.E. Belmont									X	
17. S.E. Belmont, 1500-3800 Blocks								X	X	
18. Residence, 3043 S.E. Belmont								X	X	
19. Blaine R. Smith Residence								X	X	
20. J.H. Cook Residence								X	X	
21. Mt. Tabor Presbyterian Church								X	X	
22. Residences, 1200-1400 S.E. 60th									X	
23. Mt. Tabor Reservoir Buildings								X	X	
24. Ladd's Addition			X		X		X			
25. Fire Station and Residences, 1900 block, S.E. 7th								X	X	
26. Residence, 2518 S.E. 17th									X	
27. Residence, 2322 S.E. Division									X	
28. Building, 3303-3305 S.E. Division								X	X	
29. Residences, 3800 block, S.E. Division								X	X	
30. Altenheim Retirement Center and Residence									X	

A. Broadway-Weidler-Sandy-Halsey Route

1. Hollywood Theatre, 4122 N.E. Sandy in the vicinity of the Broadway-Sandy Intersection. This fantastically ornate structure was built in 1923 in European Baroque style, which has been well preserved. The spires, mosaics and figures decorating the facade are reminders of the opulence and adulation rampant in the Big Star era of cinema's earlier years. The increasing scarcity of such architectural showcases and the nostalgic feeling of the age represented are criteria which identify this theatre as a significant historic property which the State Historic Preservation Office considers eligible for the National Register.

2. First Church of Divine Science, 1644 N.E. 24th Avenue. This church, built in 1909, is considered an excellent example of the shingle style of religious architecture. President William Howard Taft was present for the ceremony of laying the cornerstone on October 3, 1909. The church is also eligible for National Register consideration.

3. The Sanctuary of Our Sorrowful Mother, N.E. 85th and Sandy Boulevard. This religious shrine and accompanying facilities in the wooded setting of the Grotto have been a unique attraction in Portland since 1924, and may have potential for Portland Historical Landmark designation.

4. Bekins Moving and Storage, 407 N.E. Broadway. This excellent example of brick construction, built by Portland Van and Storage in 1926, features inlaid ornamentation of exterior walls and wrought iron and wood grillwork framing the entrance. Although designed to serve as a warehouse, it contains such interior amenities as a central chandelier, fireplace and balcony.

5. Jesuit Novitiate (formerly Holy Child Academy), 5404 N.E. Alameda.

6. RFD 28, Fire Station, 5440 N.E. Sandy.

7. Sandy Jug Tavern, N.E. Beech and Sandy.

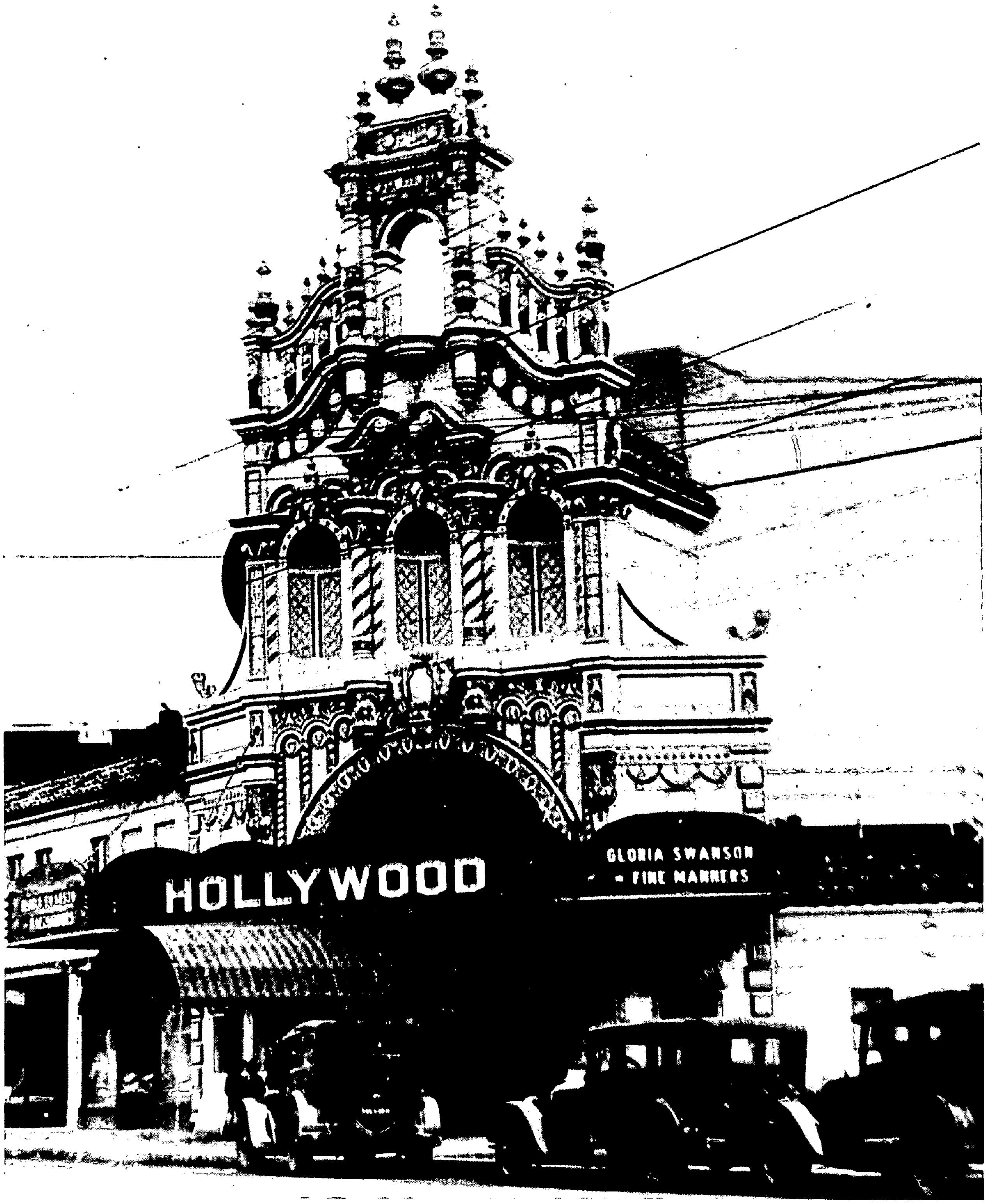
8. Shriners' Hospital for Crippled Children, 8200 N.E. Sandy.

B. Burnside-Gilham-Thorburn-Stark Route

1. East Burnside Street Car Barns, N.E. Sandy between N.E. 27th and 28th, north side of street. This unusual brick structure, circa 1890, is an early example of bow-string truss construction and classic industrial architecture. It is one of only two street car barns still in existence in the Portland area and has been well preserved without major alteration in the intervening years. Because of its unique style and historic use, this building is now being considered for nomination to the National Register and is also eligible for Portland Historical Landmark designation.

2. Laurelhurst Neighborhood. The two sandstone gate pylons at 32nd Avenue and E. Burnside identify the western entrance to Laurelhurst, a gracious and aesthetically appealing area of East Portland. Laurelhurst was platted in 1909 by the Ladd Estate Company, who also platted Ladd's Addition before the turn of the century. Approximate boundaries of this neighborhood are: I-80N on the north, S.E. Stark Street on the south, 44th and 47th Avenues on the east and 32nd and 33rd Avenues on the west.

The area includes Laurelhurst School, Laurelhurst Park, the statue of Joan of Arc (1924) in Coe Circle, the Eighth Church of Christian Science and the Presbyterian Church of Laurelhurst. The residences are excellent examples of architectural styles employed during the decades from 1910 to 1939. Original deed restrictions stipulated the homes were to be single, detached residences costing "at least $3,000," and no apartments or commercial buildings would be allowed.



Hollywood Theater in June, 1927.
(Photo from Oregon Journal
Collection, Oregon Historical Society).

In the intervening years to the present date, Laurelhurst has been able to maintain its neighborhood identity and the architectural integrity and feeling intended by the original developers. The homes are well landscaped and maintained and continue to provide a contrast and variety of design seldom found in more modern counterparts.

A number of structures within this neighborhood could be identified as possessing potential for official historic designation. At the present time, however, in view of the historic and architectural identity of the entire area, it is more reasonable to assume future district designation by the Portland Historical Landmarks Commission.

C. Morrison-Belmont-60th Route

1. Lone Fir Cemetery, Portland Historical Landmark, bounded by S.E. Stark, S.E. Morrison, S.E. 20th and S.E. 26th Avenues. The cemetery was established in 1854 and has within its 20 acres the graves of many early Portland pioneers.

The Macleay Mausoleum is an exceptional stone monument in this cemetery, constructed in Gothic style with leaded glass windows. This structure is also eligible for National Register consideration.

2. Apartment Houses, 1505 to 1517 S.E. Morrison. The tall Ionic and Tuscan columns and classic Colonial Revival style of these adjacent structures add a distinct charm and grace to a predominantly commercial neighborhood.

3. Residence, 1636 S.E. Morrison, a Queen Anne style Buckman Home of late 19th century vintage.

4. "Studebaker Wagons" Building, S.E. 2nd Avenue adjacent to the eastbound Belmont ramps of the Morrison Bridge. This commercial building of frame construction is a feature of cultural interest with the old identifying sign still visible to motorists crossing the bridge. Date of construction may

have been 1905, although it is possible the existing structure is the remodeled Buffalo Pitts Thresher Company built in 1895. This building may have future potential for Portland Historical Landmark designation.

5. Commercial Building (formerly residential), 1216 S.E. Belmont.

6. Residence, 1232 S.E. Belmont.

7. S.E. Belmont Street from the 1500 through the 3800 block is characterized by frequent clusters of older homes, apartment houses and commercial buildings of the late 19th and early 20th centuries. Many of these older structures have been preserved in contiguous blocks, providing a distinctive feeling for the architecture of this period. Further research and assessment of historic values may indicate the potential for special district designation. Some of the individual buildings and blocks within this area are identified in Appendix A.

8. Residence, 3043 S.E. Belmont, a Colonial Revival style featuring unique shingle patterns.

9. Blaine R. Smith Residence, 5219 S.E. Belmont. This fine example of Tudor architecture was built in 1910, and may have future potential for historic designation.

10. J. H. Cook Residence, 5631 S.E. Belmont, a classic Colonial Revival home, 1911, which may have future potential for recognition.

11. Mt. Tabor Presbyterian Church and Parish House, stone construction, 5441 S.E. Belmont.

12. Residences, 1200-1400 blocks of S.E. 60th, a portion of a designated Portland Scenic Drive.

13. Mt. Tabor Reservoir buildings, S.E. 60th and S.E. Division. These cast stone structures are unique and reminiscent of medieval architecture in miniature.

D. Division-Madison-Hawthorne-7th Route

1. Ladd's Addition Conservation District, a Portland Historical Landmarks designation, bounded on the south by S.E. Division, on the north by S.E. Hawthorne, on the west by S.E. 12th Avenue and on the east by S.E. 20th Avenue. Platted by William S. Ladd in 1891, this area has retained the livability and amenities inherent in the original design.

Historically, this was Portland's first planned residential community and one of the most successful on the West Coast. Bisected by diagonal streets and interspersed with landscaped areas, the addition contains an amazing and harmonius variety of homes in various sizes and styles of the era from 1910 to 1925.

The district includes approximately 128 acres and 648 buildings of which 32 are regarded as historically significant and 561 as compatible with the architectural character of the area. Homes are well maintained and nicely landscaped, sharing the benefits of large street trees, many of which arch over the adjacent streets.

Two of the several churches in Ladd's Addition are in the immediate vicinity of the Division corridor: the modern St. Phillip Neri Church, 2411 S.E. Tamarack, designed by Pietro Belluschi, and the stick-style Bethel Church of East Portland (All People's Church), 2456 S.E. Tamarack. The Italianate style St. Phillip's Church, built in 1912 at 2408 S.E. 16th, the Rectory adjacent to St. Phillip Neri Church, and the First United Evangelical (1909 Cornerstone) Church, 1804 S.E. 16th, are within the addition but several blocks north of Division.

Among the district's homes adjacent to Division, most of the block of residences between 14th and 16th Avenues and those immediately north of Tamarack are considered compatible and historically significant to the district.

Ladd's Addition also has the potential for National Register district designation.

2. 19th Century Buildings, 1900 block of S.E. 7th Avenue. This impressive cluster of historically interesting structures includes a unique fire station (now residential), circa 1913, and a Queen Anne style home surrounded by four identical 1880's style Victorian residences.

3. Residence, 2518 S.E. 17th, Victorian architecture, circa 1880.

4. Residence, 2322 S.E. Division, a brick Queen Anne style, circa 1890.

5. Commercial Building, 3303-3305 S.E. Division, featuring western store front.

6. 3800 Block, south side, S.E. Division, a special treat in diversity of earlier period styles. An unusual 2½ story home of cast stone construction is a focal point at 3828, with adjacent structures of bungalow and Colonial Revival styles. The classic feeling of the home at 3848 is enhanced by garland detail, leaded glass windows and decorated bays and porch.

7. Altenheim Retirement Center and adjacent residence, 7901 S.E. Division. The Center is a Garrison Colonial style and the home Victorian circa 1880.

Archeological Resources

The Banfield Freeway and Low Cost Improvements Alternative Routes are all within areas where ground has been previously disturbed and development has taken place. Only areas of existing streets, parking strips and sidewalks are involved in the improvements. For these reasons no archeological surveys are necessary on this alternative.

III East Multnomah County

The Light Rail Transit Alternatives involve the Banfield Freeway, which has been previously described, in combination with one of three alternatives. Alternative 5-1a is routed from Gateway along I-205 to East Burnside and east on Burnside to Gresham. Alternative 5-2a traverses I-205 to Division and east on Division to Gresham. Alternative 5-3a remains on I-205 and terminates at Foster Road.

None of these routes have adjacent properties which are listed or eligible for the National Register nor on the Statewide Inventory of Historic Sites and Buildings. In addition, there are no Portland Historical Landmarks in these areas.

There are no properties of historic interest along I-205 or in the Lents vicinity, therefore, only the Burnside and Division routes are described. Appropriate park and ride lots and transit station areas are also included in the inventory. (See Table 5.)

A. S.E. Burnside from I-205 to Gresham.

1. Residence, 14301 S.E. Burnside.

2. Residence, 1710 212th Avenue, Colonial Revival style featuring veranda.

3. Residence, 817 N.W. Earl Avenue, Gresham.

4. Residence, 115 N.E. 10th Drive, Gresham.

5. Residence, 513 N.E. Cleveland, Gresham, unique cottage style with brick trim.

6. Residence, 508 N.E. Cleveland, Gresham.

7. Residence, 1304 E. Powell Blvd., Gresham, 19th Century Victorian.

8. Barn, S.E. Burnside (Mt. Hood Loop Rd.), at 1st Street, Gresham. The barn is unique in this commercially developed area and has been well maintained. It is definitely a focal point of interest and historic value in the

neighborhood and should be preserved, possibly in retail use.

B. S.E. Division from I-205 to Gresham.

1. Residence, 9811 S.E. Division, a 20th Century period style of brick construction with stone trim.

2. Residence, 12841 S.E. Division, a small and somewhat modernized version of an appealing Victorian style of the 1890's.

3. Residence, 13007 S.E. Division.

4. Barn, northeast corner of Division and S.E. 142nd Avenue intersection, a vintage structure with gambrel roof and cupola. Obviously a relic of earlier rural orientation in this area, old barns such as this example provide interest and can be remodeled for more currently compatible uses. The setback from the road and adjacent large trees provide a pleasing setting.

5. Residence, 15616 S.E. Division, a turn of the century box style with veranda. A natural stone garage and stone porch pillars are attractive features.

6. Lutheran High School, northeast corner of the Division-162nd Avenue intersection, Gresham, a brick structure with detailed ornamentation, constructed in 1927.

7. Church of Renewed Christians (formerly residential), southwest corner of Division-Birdsdale intersection, Gresham.

8. Residence, southeast corner of Division-Angeline intersection, Gresham.

The remainder of the Division route to the terminus at Burnside and N.E. 1st Street in Gresham is identical to the Burnside route and has been previously described.

Table 5

East Multnomah County
Light Rail Transit Alternatives

Historic Properties Adjacent To Alignment	National Register Listing	National Historic Landmark	Portland Historical Landmark	Category To Be Determined	National Register Potential	Portland Historical Landmark Potential	Statewide Inventory	Future Designation Potential	Historic Interest	Removed By Project
1. Residence, 14301 S.E. Burnside									X	
2. Residence, 1710 212th Ave.									X	
3. Residence, 817 N.W. Earl, Gresham									X	
4. Residence, 115 N.E. 10th, Gresham									X	
5. Residence, 513 N.E. Cleveland, Gresham									X	
6. Residence, 508 N.E. Cleveland Gresham									X	
7. Residence, 1304 E. Powell Blvd. Gresham									X	
8. Barn, S.E. Burnside @ 1st, Gresham									X	
9. Residence, 9811 S.E. Division									X	
10. Residence, 12841 S.E. Division									X	
11. Residence, 13007 S.E. Division									X	
12. Barn, N.E. corner, Division and 142nd.									X	
13. Residence, 15616 S.E. Division									X	
14. Lutheran High School									X	
15. Church of Renewed Christians									X	
16. Residence, S.E. corner Division and Angeline, Gresham									X	

Archeological Resources

Two of the three Light Rail Transit Alternatives may require an archeological reconnaissance survey. Alternative 5-3a is aligned along I-205 and the Lents area to Foster Road. All of this area has been extensively developed and previously surveyed.

Alternatives 5-1a and 5-2a east of S.E. 182nd Ave. and west of the Gresham city limits will traverse some areas of undeveloped land. Depending upon final design and extent of new alignment, an archeological reconnaissance survey may be required.

This general area was inhabited by the Cascades tribe of the Chinook Indian Family, prior to and during the time of the Lewis and Clark explorations. No archeological surveys have been done near Gresham; consequently, there is an opportunity for retrieval of cultural information and materials. This area, however, was formerly Columbia River floodplain, which decreases the potential for discovery of sites. Subsequent to selection of an alternative, a determination will be made, and, if necessary, archeological reconnaissance conducted.

IMPACTS - CULTURAL RESOURCES

I. Downtown Portland

A. Properties with National Register listing or Portland Historical Landmarks Designation, identifying only those structures located adjacent to the alignment of an alternative.

The impacts on National Register properties in the downtown area are related to changes in auto traffic and congestion under the various alternatives. No National Register properties will be removed by any alternative selected. Depending upon the type and use of the property and the alternative selected, a structure could be affected by increased air pollution and/or noise levels, alteration of aesthetic appearance or setting or a change in traffic patterns, parking and access.

1. Skidmore/Old Town and Yamhill Historic Districts.

Environmental concerns are particularly important in regard to the Skidmore/Old Town and Yamhill Historic Districts. Under the No-Build Alternative, increased auto usage can be expected to cause problems associated with congestion and traffic patterns, and therefore have an effect on future retail development. Removal of parking and the necessity to provide parking lots or structures could be a deterrent to further development.

Although predicted levels of air pollution for the year 1990 are insufficient to cause exterior surface damage to buildings, an increase in noise levels and parking availability could result in less patronage of the area.

Effects of the Low Cost Improvements Alternatives on the historic districts could be expected to be similar to the No Build, but alternatives 3a, b and c would provide more access to the districts via the west Banfield approach to the Steel Bridge. HOV lanes and the buses proposed under Alternatives 4a and 4b would give access to the districts, while reducing congestion through use of mass transit vehicles. An expanded bus system would, however, increase noise levels considerably above those associated with light rail transit vehicles, and would require more removal of parking than light rail, in order to provide adequate loading and unloading facilities. The higher noise levels and increased air pollution generated by frequent bus headings are further deterrents to establishment of this mode in the historic districts.

The Light Rail Transit alternatives are routed over the Steel Bridge, and from that location to the Transit Mall by three alternative alignments. (refer to Map, Figure 2.) The On Mall, Oak Street and the On Mall, Pioneer Square alternatives would allow for connections to the historic districts located a few blocks to the south. The Cross Mall alternative is routed south on First Ave. through portions of both historic districts.

Alternatives which provide easier access to the districts, and especially those with the added benefit of mass transit vehicles and less congestion, could prove an incentive for additional development. This is beneficial to the historic districts only if such development is compatible with district character. However, in the case of Skidmore/Old Town and Yamhill Historic Districts, the integrity of the areas is well protected by Federal regulations pertaining to historic districts and the City of Portland's Historical Landmarks Ordinance and amendments.

The National Council on Historic Preservation affords protection from the effects of Federally funded projects, and the Historical Landmarks Commission and Portland City Council are vested with design approval, a procedure now being revised to include additional features such as height restrictions.

The Planning Guidelines for the Portland Downtown Plan* state the goals on Historic Preservation as follows:

> General Goal:
>
> Identify, preserve, protect and dramatize historical structures and locations within Downtown.

*City of Portland, The Planning Guidelines for the Portland Downtown Plan, adopted by the City Council, December 28, 1972.

Specific Goals:

A. Define in clear and specific terms the criteria for the classification of historic structures.

B. Protect historic areas from incompatible development.

C. Provide incentives for rehabilitation of historic structures, i.e., establishment of local public funds.

D. Encourage coordination among those revitalizing historic structures to create a common atmosphere.

E. Restrict unnecessary auto traffic where possible in the historic areas.

F. Provide appropriate street furniture to dramatize historic areas.

A feasibility study for a trolley system in these districts was published in 1976 by the Portland Bureau of Planning and the Portland Historical Landmarks Commission. Although referring to an older type of transit vehicle, the report stated that such a system was "fully compatible with adopted City Council Policy regarding planning, circulation and environmental quality". This report further stated that the proposed trolley system would be "fully compatible for use by any future regional light rail system servicing the downtown area". The Historical Landmarks Commission has since gone on record as favoring Light Rail Transit through the historic districts.

Another consideration in installation of light rail through historic districts is aesthetics, not only of the vehicles themselves, but of the overhead electrical system required. Most of these buildings are two or more stories in height, but the architectural detail displayed on the entire facade is of utmost value both historically and visually. Currently there is a minimum of overhead wiring within the districts, and street lighting standards are of period style complimentary to the vintage buildings. In this type of setting, overhead contacts, span wires and feeder cables can be visually distracting and a detriment to the historical architecture of the area.

The Cross Mall alignment would make some changes in traffic patterns and curbside parking along First Avenue. The proposed LRT station between Ash and Pine would block through traffic except to the Firehouse. The First Ave. underpass beneath the Morrison Bridge would also be closed to vehicular traffic. Expansion of the LRT system, however, is expected to impact traffic flow less than increased use of buses because of fewer vehicles required and more efficient channelization of movement. The quieter and less polluting operation of LRT, as opposed to a bus system, would enhance the attraction of the districts.

Although location of trackage in the center of the street permits greater access to properties, a considerable number of parking spaces would be removed on First Ave. in order to provide track space and loading platforms. Four such platforms would be located in the Skidmore/Old Town District and two in the Yamhill District.

Removal of a substantial amount of parking would have an effect on the use and development of the historic districts. Motorists travelling by private car will have greater difficulty locating available parking spaces along First Ave. (Even without this removal of parking, available spaces will gradually decrease in relation to metropolitan growth and congestion in the area.)

Over the long term, light rail could prove beneficial to the districts by encouraging pedestrian use and travel by transit mode, thus facilitating the movement of larger numbers of patrons and employees in the area. Removal of parking may be offset by the increased availability of transit facilities. In the event that economic or environmental considerations require curtailment of private car travel in the city, the existence of an alternate mode already established in the districts could prove a valuable asset to greater use and development.

2. U.S. Courthouse and Custom House (Pioneer Post Office), 520 S.W. Morrison.

Although not directly impacted by any one of the alternatives, the Courthouse would be subject to secondary impacts relating to congestion and traffic flow. Under the No Build Alternative, increasing auto and bus travel in the downtown area will create additional problems in parking and access to the building. In this location the effects of the Low Cost Improvements Alternative will not vary discernibly from a No Build situation.

Alternatives which encourage greater bus usage in the vicinity of the Courthouse may cause some rise in noise levels, but since this building is of stone construction, the interior would not be as noticeably affected. Expansion of a bus system would also require removal of parking in appropriate locations.

The On Mall, Pioneer Square LRT Alternative encircles this block with a stop and loading platform on S.W. Yamhill. Because the platform location is on the south side of Yamhill, it will not affect the sidewalk adjacent to the Courthouse. The LRT stop would provide easy access to the building for transit users, but remove existing parking at that location. Greater use of mass transit will lessen the demand for additional parking spaces.

Since the transit mall encourages pedestrian and public transit use, the Courthouse at a focal point of the mall should benefit from the availability to more people. Mall pedestrians and transit users will have a better and more leisurely opportunity to view and appreciate this historic building.

The Cross Mall alternative differs somewhat from the On Mall, Pioneer Square in the resulting impacts on the Courthouse. The Cross Mall alignment does not use S.W. 5th, but it does place loading platforms on the sidewalks to the north and to the south of the building. Added congestion in sidewalk use and removal of parking on both sides of the building are impacts peculiar to this alternative. In this respect, and for aesthetic considerations, the Cross Mall alternative would have more effect on the Courthouse than the On Mall, Pioneer Square.

3. Old First National Bank, Oregon Pioneer Savings, 409 S.W. 5th.

Because of its location on the Transit Mall, the Old First National Bank will not be impacted as severely by the No Build and Low Cost Improvements alternatives which increase general congestion in the downtown area.

Alternatives which increase the use of transit vehicles will improve accessibility, particularly since both bus and LRT stops are located within two blocks of this building. No loading platforms or parking removals are proposed in this immediate vicinity under the On Mall, Pioneer Square Alternative. Other LRT alternatives are not located in this section of S.W. 5th.

Since LRT vehicles operate more quietly than buses, this alternative is not expected to increase noise levels appreciably.

4. Other properties with National Register or Historical Landmarks designations, as identified in the Existing Setting, are not located adjacent to the alignment of any alternative. Impacts on these buildings would be more general in nature; and since they are located in the downtown core area, they will be subject to the effects of increasing traffic congestion under the No Build and Low Cost Improvements alternatives.

The locations of these properties preclude specific impacts. Any effects of increased air pollution and noise levels would not vary appreciably with specific alternatives due to the distances from project alignments. Extensive use of high occupancy vehicles might have a beneficial effect on traffic volumes in the vicinities of some of these historic structures, and light rail transit, in addition, would offer less polluting operation.

B. Properties with Historic Interest or Future Potential for Designation.

Historic structures in this category were identified only on specific routes of the various mall alternatives.

1. Properties on S.W. Yamhill and S.W. Morrison between S.W. 1st and S.W. 6th will experience problems associated with increasing traffic congestion under the No Build alternative and to a similar degree with the Low Cost Improvements Alternative. Increased use of buses in the downtown core area should lessen the percentage of private cars, but will require parking removal for additional stops. Creation of bus lanes on Morrison and Yamhill would remove a considerable number of parking spaces. Existing parking is already somewhat limited, however.

Parking removal and some constriction of traffic can also be expected with the Cross Mall LRT alternative and the On Mall, Pioneer Square around the Courthouse block. Loading platforms are proposed on Yamhill and Morrison between S.W. 2nd and S.W. 3rd (Cross Mall) and the south side of S.W. Yamhill between S.W. 5th and S.W. 6th (On Mall, Pioneer Square).

The Cross Mall Yamhill and Morrison platforms will provide easy access to these buildings for transit customers. Existing parking is somewhat limited; consequently, parking removal is not a severe impact on retail business.

The On Mall, Pioneer Square, loading platform is located adjacent to the Pacific Building, 520 S.W. Yamhill. Since this area is a portion of the transit mall, it is transit and pedestrian oriented, and the LRT stop should provide easy access to the building.

2. The commercial buildings, adjacent to N.W. Hoyt and N.W. Glisan, with the exception of the block described below, will not be adversely affected by the No Build or Low Cost Improvements alternatives since they are in the northern portion of the CBD. Bus and LRT alternatives will alter traffic patterns, but will not impact these buildings.

3. The block of commercial buildings bounded by N.W. Glisan, N.W. Flanders, N.W. 4th and N.W. 5th, will not be affected by any of the alternatives except the LRT On Mall, Pioneer Square and the On Mall, Oak Street. Either of these alternatives removes the large, 3-story brick building at 406 N.W. Glisan and the one-story building adjacent to the west. According to the current design for this alignment, an LRT transit station would be located on the northern half of this block. Depending on final design, the two-story building south of the corner structure may also be required.

This report has identified these buildings as a contiguous block of nineteenth century construction in sound condition and with potential for designation as a portion of an Historic Oriental Community District. They do not currently have an official designation, but must be regarded as part of the resource from which historic designations could be made.

The severity of this impact must relate to the entire block, even though only two or three buildings would be removed. A contiguous group of historic structures is much more valuable to a district than a half block with an intrusion of a modern structure such as a transit station. Individually these buildings are not known to possess historic significance relating to events or prominent people in Portland history, with the possible exception of the structure at 401 N.W. 4th. Collectively, however, they relate to an early Oriental business district, which does have historic significance. Further research may reveal other useful information in regard to this block and its individual components.

Designation of an Oriental district would involve blocks to the east and south of this block to Burnside. It is evident that some of these blocks are being renovated and older structures restored for use as office buildings and retail businesses. Such rehabilitation of formerly deteriorating blocks is an indication of a trend similar to the effort which revived Skidmore/Old Town. This is a vital consideration in discussion of future district possibilities. Another factor of prime importance is the large number of late 19th Century buildings still existing in this area, many of which are in contiguous blocks and with a minimum of intrusion by modern structures. Removal of all or a part of this potential district is an impact on an historic resource which is irretrievable. (See Appendix B for explanation of procedural requirements and potential Section 4 (f) involvement.)

4. Properties adjacent to 5th Avenue

North of Burnside, properties on N.W. 5th will not be appreciably affected by the No Build and Low Cost Improvements alternatives. Expansion of the bus system would remove considerable parking and create some changes in traffic patterns.

The On-Mall LRT alternatives would also remove parking and require curb setbacks of approximately two feet, although property access would be maintained. The block between Couch and Burnside would be closed to auto traffic to permit LRT stops on either side of N.W. 5th. Transit patrons would thus have easy access to business buildings in this area. Future proposed expansion of the transit mall north of Burnside would compliment LRT use and encourage additional development.

South of Burnside in the transit mall area, properties adjacent to S.W. 5th would be affected primarily by bus and LRT alternatives. Since this area is transit and pedestrian oriented, improvement of transit service would be beneficial to business establishments. Operationally, the light rail vehicles are less noisy, but would require sidewalk widening for stops between Oak and Pine, and Alder and Washington.

5. Properties adjacent to 6th Avenue

These buildings would be affected in the same ways as those adjacent to 5th except that no street closures for auto traffic are proposed in this alignment of the On Mall, Oak Street alternative.

6. The Athens Hotel, a building of historic interest, would be removed by alternatives 3 a-c and 4 a-b, according to current design proposals. Although this building does not have eligibility for historic designation, it is much more compatible than a modern replacement in this neighborhood. Removal of this building would permit further intrusion into an area which is beginning to recognize and restore many of its historic structures.

II East Portland

Banfield Freeway

There will be no impacts on cultural resources in the Banfield Freeway corridor since no significant historic or archeological sites are located in this area. This also applies to the transit station locations at 60th and 82nd proposed under Alternative 4a and 4b, all Banfield Freeway sections of the LRT alternatives and Gateway on the LRT alternatives.

Low Cost Improvements Routes

The routes of the Low Cost Improvements Alternatives 2a and 2b would not require removal of any structures or sites of historical significance or interest. There are, however, some secondary impacts on such properties relating to aesthetics, removal of portions of parking strips and/or changes in street-side parking.

These impacts would be the same under either Alternative 2a or 2b. In this report, secondary impacts are addressed only on those properties which are listed, eligible or have potential for National Register or Portland Historical Landmarks designation. The following table lists these properties and the effects of the proposed project. (See Table 6.)

Changes from the current limited time restrictions to no parking only during peak hours would be moderately severe in the case of the theatre, the Laurelhurst area, Ladd's addition and S.E. 60th. This impact would be more severe in relation to the Burnside Streetcar Barns and the closely grouped businesses and residences on Belmont.

Removal of all parking would be a severe impact on all properties, and particularly critical for retail establishments and S.E. 60th, where all

TABLE 6

EAST PORTLAND
LOW COST IMPROVEMENTS ALTERNATIVES
IMPACTS

Properties Affected	Removal of All Parking	Removal of Parking Only During Peak Hours	Removal of Portions of Parking Strips	Aesthetic Impacts: Removal of Trees or Plantings
1. Hollywood Theatre	X*	X*		
2. Laurelhurst Neighborhood	X*	X*	X	X
3. Burnside Streetcar Barns	X*	X*		
4. S.E. Belmont from 25th to 60th		X*		X
5. S.E. 60th from Belmont to Division	X or X*-one side	X*-one side	X	X
6. Ladd's Addition	X*	X*		

*Proposed plans are for either removal of all parking or a change to removal of Parking During Peak Hours parking may be removed on both sides. The homes on 60th are also more subject to the aesthetic impact due to the Portland Scenic Drive designation of this area, and for this reason are included in Table 6.

III East Multnomah County

Light Rail Transit Routes

A. Properties with Historic Interest or Future Potential for Designation

Under the No Build alternative this area would eventually experience increased congestion and a noticeable increase in noise levels, particularly since some sections northwest of Gresham are more suburban in nature.

1. None of the structures identified in this report on Burnside or Division between I-205 and Gresham will be removed by alternative 5-2a or 5-2b. However, due to extensive right-of-way requirements along the south side of Division, some frontage and lawns will be required. Those properties include the residences at 15616 S.E. Division and on the southeast corner of Angeline and Division in Gresham and the Church of Renewed Christians on the southwest corner of Division and Birdsdale in Gresham. Each of these properties will be impacted by removal of portions of front lawn, trees and shrubs and alteration of access and parking.

The appearance of these structures will be considerably altered by removal of portions of the lot facing the roadway. Because these are older, period-style homes in an area which is primarily modern development, the aesthetic impact is an important consideration.

Impacts

Archeological Resources

Since the possibility exists for discovery of archeological materials in undeveloped land, an archeological reconnaissance survey may be required in the area northwest of Gresham. After final selection of an alternative, and before construction begins, the Museum of Natural History at the University of Oregon will conduct a survey of any sections of previously undisturbed land required by the project, if this is deemed necessary.

Cultural Resources

Record of Coordination and Mitigation

Mitigation

I Downtown Portland

A. Properties with National Register or Portland Historical Landmark listing, or potential.

1. Skidmore/Old Town and Yamhill Historic Districts.

Mitigation measures for the historic districts will be required primarily under the LRT Cross Mall alternative. Construction plans will be coordinated with the State Historic Preservation Office and the Portland Historical Landmarks Commission. This transit mode could be beneficial to the development of the districts. Precautions will be exercised to protect the integrity and cohesiveness of the districts.

Rail transit is a mode indigenous to the period architecture of this area; and the proposed alignment in the center of the street is not only compatible with property access, but is the same location used in the late 19th

Century. Refinements such as trackage with cobblestone infills and LRT loading platforms appropriate to the locality are design features which would enhance the cultural atmosphere of the area.

Overhead electrical systems pose a problem with regard to the appearance of the buildings in the districts. Integration of wire supports with light standards and traffic signal equipment is a means of reducing the aesthetic impact. Placement of span wires on poles or buildings must be carefully considered in order to prevent visual distraction and protect delicate facade ornamentation.

Since the LRT On Mall alternatives do not route through the districts, consideration should be given to future installation of a cross mall connection. An additional LRT spur could provide a transfer in the vicinity of the Steel Bridge and follow the Cross Mall alignment to the transit mall. Light rail vehicles operating on this spur could be either the modern variety or the vintage street cars suggested by the feasibility study, Old Town Downtown Streetcar Line. (Portland Bureau of Planning and Historical Landmarks Commission.)

2. U.S. Courthouse and Custom House (Pioneer Post Office), 520 S.W. Morrison.

The LRT Cross Mall alternative requires placement of loading platforms on the sidewalks both to the north and to the south of the Courthouse. Design of these facilities should be compatible with the period and style of this historic building and detract as little as possible from its appearance. Platforms should facilitate the patterns of transit patron and pedestrian travel in the vicinity.

B. Properties with Historic Interest or Future Potential for Designation.

1. Pacific Building, 520 S.W. Yamhill

Under the LRT On Mall, Pioneer Square alternative, a loading platform will be located in front of this structure. Placement and style of platform should allow for aesthetic effect and access to the building.

2. The Block of Commercial Buildings bounded by N.W. Glisan, N.W. Flanders, N.W. 4th and N.W. 5th.

The impact on these buildings is associated with the On Mall LRT alternatives, either of which requires removal of several buildings. Since the historic value of these structures relates to the entire block, the only possible mitigation is a change in alignment. Fortunately, this alteration is conceivable at the current stage of project planning. The blocks to the north have some vacant land adjacent to the alignment permitting widening of Glisan on the north side, as opposed to the current proposed location on the south side of the street. A change of design would eliminate the necessity for destruction of these buildings, alleviating both an historic and an economic impact.

The block to the east also has some vacant land, but is not as feasible for the transit station, due to existing and proposed traffic patterns and LRT routings in this area.

The engineering feasibility for a change in alignment and the curvature of the approach to this area will be explored thoroughly before plans for construction are finalized.

3. Properties adjacent to N.W. 5th and 6th north of Burnside.

Parking removal and closure of N.W. 5th between Burnside and N.W. Couch may impact some retail businesses in the area. If remaining spaces are insufficient, possibilities exist for acquiring some vacant lots for this purpose. Development of efficient transit in this area and eventually extension of the transit mall should more than compensate, however.

4. Design modifications will be studied for Alternatives 3 a-c and 4 a-b in the vicinity of the Athens Hotel before construction plans are finalized. Every effort will be made to change the alignment or lane placement in order to preserve the building.

II East Portland Low Cost Improvements Routes

A. National Register, Portland Historical Landmarks or Statewide Inventory Properties.

Proposals to remove all parking adjacent to any historic buildings are much less desirable than restricting to no parking during peak hours. Even though parking in some areas is now limited time, it is preferable to provide some curbside parking as a convenience primarily for businesses and institutions.

Removal of all parking on S.E. 60th should be avoided. Parking which is available except during peak hours is a much more acceptable alternative to residential property owners. Streetside parking in the Laurelhurst area should remain limited time or be changed to peak hour restriction rather than a removal of parking.

The widening of 60th Avenue between S.E. Belmont and Lincoln will require careful consideration in final design in order to protect the amenities of this scenic drive. Removal of parking strip areas should be minimized as much as possible, and trees and plantings replaced or added in appropriate locations. (This also applies to the Laurelhurst area.) Residences with minimum setbacks should be protected by realignment in order to alleviate damage to property frontage.

III East Multnomah County Light Rail Transit Routes

A. Properties with Historic Interest or Future Potential for Designation.

1. Residences at 15616 S.E. Division, and southeast corner of Division and Angeline (Gresham) and Church of Renewed Christians, southwest corner of Division and Birdsdale (Gresham).

Right-of-way requirements for widening of Division under alternatives 5-2a, b, c will remove portions of the front lawns of these properties. The church has a setback considerable distance from the road, but several large evergreen trees border the edge of the property. Every effort should be made to save as many trees as possible and to relocate or replant additional trees or vegetation. Any change to access of the property caused by construction should be corrected in a manner satisfactory to the owners.

The residence at Division and Angeline has adequate setback from the roadway and no trees which will be taken, but removal of parking strip or frontage should be minimized where possible and lawn replaced. The property at Division and Birdsdale also has evergreens which may be removed for right-of way. These and plantings should be preserved if feasible, or replaced in a style appropriate for this type of architecture and the needs of the residents.

Archeological Resources

Prior to initiation of any construction activities, an archeological reconnaissance survey may be performed at appropriate locations on both LRT routes in East Multnomah County. All mapping, evaluation of sites and any necessary salvage of archeological materials would be conducted by the Museum of Natural History at the University of Oregon. Protection of these sites or any other recommended mitigation measures will be completed before construction begins.

Record of Coordination

The State Historic Preservation Office and the Portland Historical Landmarks Commission Office were contacted to obtain information on properties which are listed, nominated or eligible for the National Register, Portland Historical Landmarks Designations or the Statewide Inventory. Interviews were conducted with George McMath, Chairman of the Historical Landmarks Commission and Alfred Staehli, Preservation Specialist for the Oregon Chapter, American Institute of Architects. The Oregon Historical Society was contacted for information regarding Portland structures and availability of appropriate photographs.

All proposed mitigation measures will be coordinated with the Historic Preservation Office. Archeological surveys and salvage or other mitigation procedures will be coordinated with the Historic Preservation Office and the State Archeologist.

Official historic records and publications were researched and a field survey conducted to assess properties with historic potential. Local organizations and individuals were contacted for information regarding community history and pioneers. Designation of significance and mitigation of adverse impacts were discussed with the Historic Preservation and Portland Historical Landmarks Commission Offices.

Appendix A

Buildings of Historic Interest

I East Portland, Low Cost Improvements Alternative

A. Broadway-Weidler-Sandy-Halsey Route

1. Commercial Building, 1440 N.E. Broadway.
2. Residence, 1801 N.E. Broadway.
3. Commercial Building (formerly residential), 1431 N.E. Weidler.
4. Residences, 1900, 2000 and 2100 blocks of N.E. Weidler.
5. Commercial Building, 4515 N.E. Sandy.

B. Burnside-Gilham-Thorburn-Stark Route

1. Commercial Buildings, 700 block, E. Burnside.
2. Commercial Building, 938 E. Burnside.
3. Residences, 2000 and 2300 blocks, E. Burnside.
4. Apartment House, 2604-2606 E. Burnside.
5. Residences, 3039 E. Burnside and 4 S.E. 30th Place.

C. Morrison-Belmont-60th Route

1. Residence, 1328 S.E. Morrison.
2. Residences, 1800 block, S.E. Morrison.
3. Residences, 2052 and 2104 S.E. Morrison.
4. Commercial Building, 800 S.E. 10th.
5. Residence, 905 S.E. 15th Avenue.
6. Residence, 2808 S.E. Belmont.
7. Residences, 3000 block, S.E. Belmont.

8. Residences, 3114, 3143 and 3149 S.E. Belmont.
9. Residences, 3244 S.E. Belmont and 915-919 S.E. 33rd Avenue, two Queen Anne style structures, circa 1890.
10. Commercial Buildings, 3300 block, south side of Belmont. The period styles of this business block include brick and frame construction, some with second story bays extending over the sidewalk. This latter style appears elsewhere on Belmont, but the structures at 3300-08 and 3356 are particularly good examples of two-story business and apartment combinations of an earlier period.
11. Residence, 3429 S.E. Belmont, Victorian style.
12. Brick Fire Station, Engine No. 9, 900 S.E. 35th Avenue.
13. Residences, 3500 through 3800 blocks, S.E. Belmont, with a good example of Victorian style at 3537.
14. Commercial Building, 3710 S.E. Belmont.
15. Irvington Masonic Lodge, 5500 S.E. Belmont.
16. Apartment House, 911 S.E. 60th.

D. Division-Madison-Hawthorne-7th Route

1. Residence, 1733 S.E. 7th.
2. Ford Motor Company Building, S.E. Division and 11th.
3. Residence, 2604 S.E. Division.
4. Residence, 5134 S.E. Division.
5. Residence, 7074 S.E. Division.

Appendix B

Potential 4(f) Involvement

Two of the Banfield Light Rail Transit alternatives may require removal of several buildings in the 400 block of N.W. Glisan, according to current design proposals. Although not officially designated at the present time, these properties are regarded as historically significant components of a future Oriental Community District being considered by the Portland Historical Landmarks Commission. (See Figure 3, letter from Urban Design Office, Portland Bureau of Planning.) This historic district designation would acknowledge the ethnic background and civic importance of this area as Portland's first Oriental business community.

Portland Historical Landmarks and districts are also listed in the Statewide Inventory of Historic Sites and Buildings and may be considered by the State Historic Preservation Office as eligible for the National Register of Historic Places. (See Figure 4, letter from Historic Preservation Office.)

Proposed plans for the On Mall, Pioneer Square and On Mall, Oak Street alignments indicate removal of the three-story Enterprise Building, a brick structure at 406 N. W. Glisan, and the small building adjacent and to the west. Depending upon final design, the two-story brick building at 431 N.W. 4th may also be required for the transit station at this location.

The impact on an historic resource, in this instance, relates to the individual buildings, but greater importance is attached to the integrity of the block as a whole. This contiguous grouping of 19th Century brick structures without the intrusion of incompatible styles, is a valuable contribution to the character and cohesiveness of the proposed district.

The degree of historic significance attributed to these structures implies a possible involvement with Section 4(f) of the Department of Transportation Act of 1966, in the event of removal for project construction.

This law requires certain procedures to be initiated when a Federally funded project has an adverse effect on historic resources of national, state or local significance, as determined by the official having jurisdiction. In this case, such officials would be the Landmarks Commission and the Historic Preservation Office.

If final design of either On Mall alternative necessitates removal of these buildings, Section 4(f) requires a documented determination that there are no prudent and feasible alternatives to the proposed alignment. Additional data must be provided to support a determination that the proposed action includes all possible planning to minimize harm to the affected property. All documentation and recommended procedures for mitigation must be coordinated with the agencies having jurisdiction.

At the current stage of project planning and before an alternative is chosen, it is possible and desirable to examine design variations. The engineering feasibility for changes in alignment should be thoroughly explored before construction plans are finalized.

Banfield Transitway
Cultural Resources Report

Bibliography

1. U.S. Department of the Interior. National Register of Historic Places. National Park Service. U.S. Government Printing Office, Washington, D.C.

2. Oregon State Parks Branch, Oregon Department of Transportation. Statewide Inventory of Historic Sites and Buildings. Oregon State Historic Preservation Office, Salem, Oregon.

3. Alfred Staehli, AIA. Preservation Options for Portland Neighborhoods, prepared for the 1974 City Options Program of the National Endowment for the Arts, 1974 Architecture & Environmental Acts City Options Program.

4. City of Portland Bureau of Planning. Portland Historical Landmarks Buildings and Sites. January, 1976, updated December 1976.

5. Joel V. Berreman. Tribal Distribution in Oregon. American Anthropological Association Memoirs, No. 47, 1937. Manasha.

6. Trolley Line Steering Committee, Portland Bureau of Planning and Portland Historical Landmarks Commission (Grant from the National Trust for Historic Preservation). The Oldtown Downtown Streetcar Line, Feasibility and The Bottom Line. Feasibility Study, August 1976.

7. Portland Historical Landmarks Commission and Portland City Planning Commission. A Proposal for Historic Conservation Zoning. A report to the Portland City Council, adopted August 17, 1977. Financed in part by Department of Housing and Urban Development grant.

8. Portland Historical Landmarks Commission, Proposed Historical Districts. City of Portland. February 1975.

9. U.S. Department of Transportation, Urban Mass Transit Authority. Final Environmental Impact Statement, Fifth and Sixth Avenues Transit Mall, Portland, Oregon. December 1975.

10. City of Portland. Planning Guidelines/Portland Downtown Plan. December 28, 1972.

11. DeLeuw Cather. Banfield Transitway Project, Downtown Circulation Alternatives, June 1977.

12. Terence O'Donnell and Thomas Vaughn. Portland, A Historical Sketch and Guide. Oregon Historical Society, 1976.

RIGHT-OF-WAY REPORT

TABLE OF CONTENTS

TABLE OF CONTENTS

RIGHT-OF-WAY IMPACTS

INTRODUCTION

Definition and Significance of Impact Area

Discussed in this report are only those areas within the proposed right-of-way for the various alternatives. These also include easements required, such as those along the Union Pacific right-of-way. At this stage of choosing alternatives, however, the proposed right-of-way boundaries can only be approximate. In any case, the accompanying maps are intended to present only a general pattern of right-of-way needs, rather than details of project design.

Right-of-way impacts are, of course, of major significance relative to other less direct effects occurring in adjacent areas. While adjacent property owners may adjust to the project in several ways, a person living within the needed right-of-way has only a limited choice; moving out or making do in a more cramped area. However, someone displaced by a highway project may often relocate in a more suitable spot.

Study Approach

Right-of-way impacts have been described and analyzed in terms of land acquisition, costs, and displacements. There are naturally numerous properties for which the impact is indefinite; generally the maximum amount of land which might be needed has been used. Thus, if the proposed right-of-way passes very close to a residence, the entire property would be shown in the listing of land required. During a study of this type, there can be no refining of alternative designs to permit precise figures for property needed. To some extent, design variations are included in the choice of alternatives, such as whether freeway shoulders shall be provided or not (e.g. Alternatives 3b and 3c).

The estimated costs associated with each alternative include purchase of land and buildings needed, and also expenses related to relocation and easements. Although in some cases unneeded portions of land parcels acquired may be resold, no allowance for this has been made in the figures used. Another type of monetary cost is the initial reduction in the tax base, when property is transferred from private to public ownership. Generally, there is no long-term reduction in the tax base, as the project, and the displacement of businesses stimulate growth nearby. Thus, using reduction of tax base is another example of assuming that the most adverse impact may occur. (For further discussion, see Appendix A).

Displacements of people, business, and non-profit organizations give a very meaningful comparison of right-of-way impacts. For certain groups, such as the handicapped and elderly, it may be very difficult to find a suitable house or apartment in another location. In an extreme case, it might be necessary to construct new housing specifically for those displaced by the project. The estimated numbers of people and businesses to be displaced give a readily grasped impression of the human impact of each alternative. They also are the basis for determining the need for housing and commercial sites caused by the project.

Data Sources

Right-of-way impacts were studied by using maps, photomosaics, and other information such as land use and property ownership. Large scale (1"=200 feet) maps showing existing streets and buildings were modified to include land use, proposed right-of-way lines, and names of businesses. In some cases, photomosaics were also used. In addition, data on displaced households and businesses came from the Right of Way and Design sections, in the form of lists, maps and tables. Acreages and values were taken from either assessor's maps or from lists assembled by the offices mentioned above.

In determining the difficulty of relocation, a review of classified advertising was done. Right of Way section personnel did almost all of the field work.

Reports by consultants and various governmental agencies were useful for some of the specific information on land use and planning. These are listed in the bibliography.

RIGHT-OF-WAY IMPACTS

Overview

A general summary of project impacts appears in Table I. It must be remembered that figures given are estimates in every case, and that they are based on maximum right-of-way needs for each alternative.

Property Requirements

While alternatives 1, 2, and 3a require no land, or only a very small amount, the other choices need between twenty and seventy acres. The largest parcels are generally needed for park-and-ride lots, and are mostly unimproved. A sizable portion of the acreage needed for alternatives 5-1 and 5-2 consists of land for maintenance and storage of transit cars (ten or fifteen acres). Most of the land needed for the project is vacant with some residential use, although the Division Street route (5-2) would affect many businesses.

Displacements

The number of residential properties required is highest for alternative 5-2b; almost two hundred households would be displaced. Many of the other options would affect one hundred or more. These figures include ninety tenants of a downtown hotel, where it may be possible to reduce the impact. Most of the multiple-family displacements relate to partial purchases of apartment buildings. In the case of alternatives 1 and 2, no one would need to relocate. In all cases, the actual number of people affected would be higher than the number of households; probably over twice as many. Thus certain options might force over four hundred persons to look for another place to live, whether as homeowners or tenants.

Using the number of businesses affected is somewhat less valid as a measure of impact, because of the great variation in size. Nevertheless, Table I shows that only two options (5-2a and 5-2b) would displace more than a dozen business operations. Because of the well-established commercial nature of Division Street, and the need for considerable widening, about sixty firms would be forced to move. Only a few of these are in the Banfield and downtown areas. Businesses serving a sizable region would generally have fewer problems in finding another location, than those which depend on a neighborhood clientele built up over time. The medical clinic on 47th Avenue might have a problem in relocating near the hospital with which it is now associated.

Among the three non-profit organizations being displaced by various project alternatives are two churches and a federal agency. Although more details appear under the specific alternatives, it should be mentioned that a church has difficulty in finding another suitable facility. This would be especially true for one serving a localized congregation; and in any case, the church must avoid overlapping into another church's "territory" (in the same demonination). The federal agency would probably have little difficulty in finding a building within the general area it serves.

Cost Estimates

These figures, as shown in Table I, include the costs of buying property and helping with relocation. No construction costs appear under this heading. The property costs do include the purchase of easements where necessary.

Alternative 1 needs no land and therefore no purchases; and alternative 2 involves little expense. Option 3a would require over $1 million, while all the other options would cost between $10 million (5-3a) and $33 million (5-2b). The largest single cost would be $6 million for any of the options affecting the Union Pacific Railroad right-of-way (3b, 3c, 4a, 4b, 5a, and 5b). This figure is mostly related to the higher costs of constructing a future second track to the north of the present one, rather than to the south.

Reduction in the Tax Base

Any transfer of property from private to public ownership may affect the property tax base. Usually these effects are negligible, unless there is a sizable project within a small tax district. To determine whether or not the Banfield project would have a significant impact on the tax base, the following procedures were used (see Appendix A for a general summary as applied to a typical case).

Estimates of the reduction in the tax base were made for each affected parcel, based on 1977 assessed values (obtained from the Multnomah County tax rolls). To determine the tax base reduction would require an increase in the tax rates, the worst case--the Division LRT alignment--was examined. It was found that in this alignment, the largest percentage reduction for the fourteen taxing agencies along this alignment would be less than 0.4 percent of the total tax base. It was determined on this basis that no increase in the tax rate would be required as a result of the reduction in the tax base from right-of-way acquisition.

The tax base reduction with an LRT alignment would be offset by the future savings in the public sector by having concentrated development around the transit stations rather than sprawl in East County.

Alternatives

Alternative 1

No additional property would be acquired for the no-build option.

Alternative 2

The low-cost improvements plan would basically involve only a handful of small land strips. Those along the Banfield route are shown on Map 1, near 23rd and 39th avenues. The most significant effect would be to reduce the backyard area for three homes west of 39th Avenue. Another area of impact is the intersection of 60th Avenue and Belmont Street, where small slivers of land would be needed.

It is quite likely that a larger parcel (1.6 acres) at the former county fairgrounds in Gresham would be developed as a bus station, with a sizable park-and-ride lot. This area might be used jointly with patrons of the planned development there. This proposed transit node is now unimproved land, but it would probably develop regardless of whether bus or light rail transit is chosen.

Alternative 3

In the downtown area, it is clear that an apartment hotel would be affected. The Athens Hotel and its associated restaurant would need to be modified or removed, to permit construction of bus turning lanes and a relocated sidewalk. The maximum displacement would be the entire hotel and its ninety tenants. Most of the residents are retired men with low incomes; they would have a hard time finding similar low-cost housing. A 1974 report (Lord/Leblanc) explained that only subsidized housing could meet the need for rental units in the downtown area. In any case, the actual impact on the hotel cannot be described accurately at this stage of the project.

Right-of-way purchases for Alternative 3a would involve a few single-family homes for a new exit west of 33rd Avenue. In addition, a new bus access to Lloyd Center would require vacant land east of 11th Avenue.

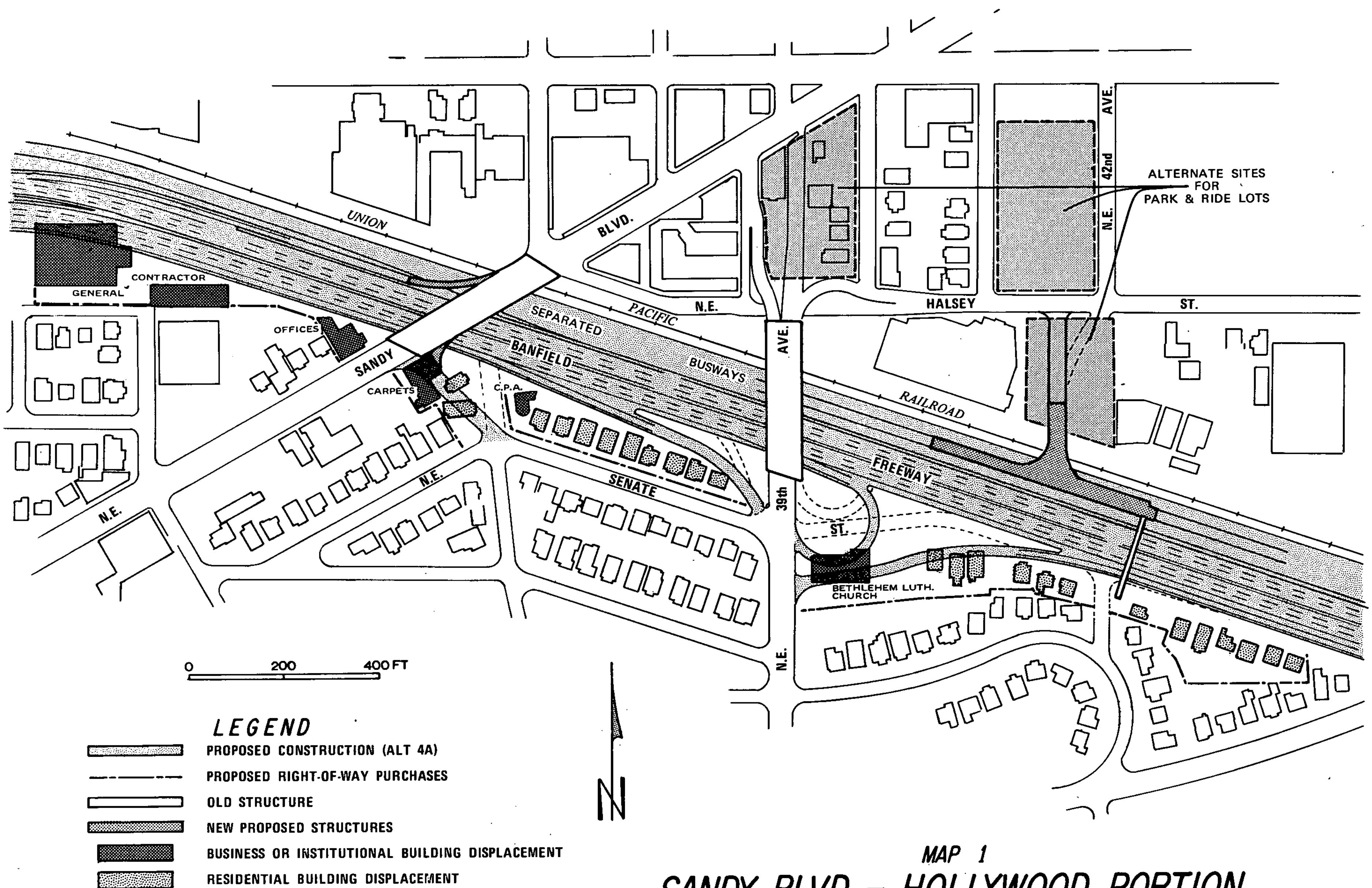
Several alternative sites have been identified for bus stations and park-and-ride lots in the Hollywood area (See Map 1). The location on the 39th Avenue overpass would require no additional right-of-way. Choosing the facility just north of this would displace a restaurant, a car wash, and a hair-styling shop, as well as two houses and a few small parking lots. Farther east, a park-and-ride lot could be built between 41st and 42nd avenues, requiring a large furniture store and parking lot to relocate. A fourth site lies south of this, now occupied by a freeway exit ramp and vacant land. If this location is chosen for a bus transit node, the present off-ramp would be removed, and bus access would be via a new two-way ramp, or from Halsey Street and a new 45th Avenue exit.

As mentioned under alternative 2, a fairgrounds station site would probably be acquired for any of the build options.

Right-of-way impacts for the other HOV lanes options, 3b and 3c, are quite similar. They include the above-mentioned properties, and also important acquisition of Union Pacific land and single-family residences. At present, the railroad could construct a second track south of the existing one. However, for options 3b and 3c, and for others involving widening north of the freeway, the second track would have to be laid to the north of the main line. This change is more expensive to the Union Pacific Railroad, involving costly retaining walls and other structures to allow the northside alignment. To avoid critical damage to Barker Manufacturing Company's plant near 28th, central traffic control would be installed. This would make possible an efficient single-track section in this area. The net additional cost of avoiding Barker Manufacturing would be more than $700,000. However, it would be much more expensive to continue a double track in this location, with the resultant impact on the Barker facilities. The total cost of the project's impact on the Union Pacific has been estimated at $6,000,000; only $400,000 of this is needed for the land itself.

Forty-five houses would be displaced by Alternative 3b, most of them between 31st and 64th avenues. Alternative 3c would need sixty-five residences. Many of these houses required are not physically within the right-of-way, but would lose their street access because of the project. Examples are along Senate and Willow streets. In these cases, houses remaining adjacent to the Banfield project would be farther from traffic than existing homes are. Map 1 shows the pattern of displacements in the 39th Avenue-Hollywood area. Although the map relates specifically to Alternative 4a, the impacts are very similar to those for 3b and 3c.

Businesses which would need to relocate include a general contractor, insurance offices, recruiting office, carpet store, and an accounting firm. Some business operations could continue after losing a portion of their building. These include a bottling plant, a bag factory, a pipe producer, and a utilities and construction firm. For some, this would be the second time



MAP 1

SANDY BLVD. - HOLLYWOOD PORTION

OF THE BANFIELD CORRIDOR

ALTERNATIVE 4a

of getting their buildings shaved down by the Banfield Freeway. A medical clinic on 47th Avenue might also need to relocate, because of losing a portion of the building and property at the rear. This would be a problem of finding a location close by, so that the clinic could keep its association with Providence Hospital.

The Bethlehem Lutheran Church might find it difficult to find another suitable site, although its congregation comes from a fairly large area. The present location is favorable in its freeway access, but church members would not like to stay in the same site if traffic noise became worse. It would be very expensive to buy improved land in order to build another church nearby. The church has not started looking for another location, but anticipates having problems in finding what it needs.

Alternatives 3b and 3c would only have a minor difference in cost ($12 million compared to $13 million); and half of this is associated with the impact on the Union Pacific.

Alternative 4

These separated busway options involve almost the same right-of-way impacts as does alternative 3c (See Map 1; Table 3). Major areas of impact are the Athens Hotel, the Union Pacific Railroad, and numerous residences along the southside of the Banfield Freeway. Several industrial and business operations would have to relocate, as well as the Bethlehem Lutheran Church and the clinic. As with most of the build options, land for transit stations would be acquired in the Hollywood area and in Gresham. The cost of purchasing property and relocating those displaced would be $13 million, with half of this covering railroad impacts.

Alternative 5

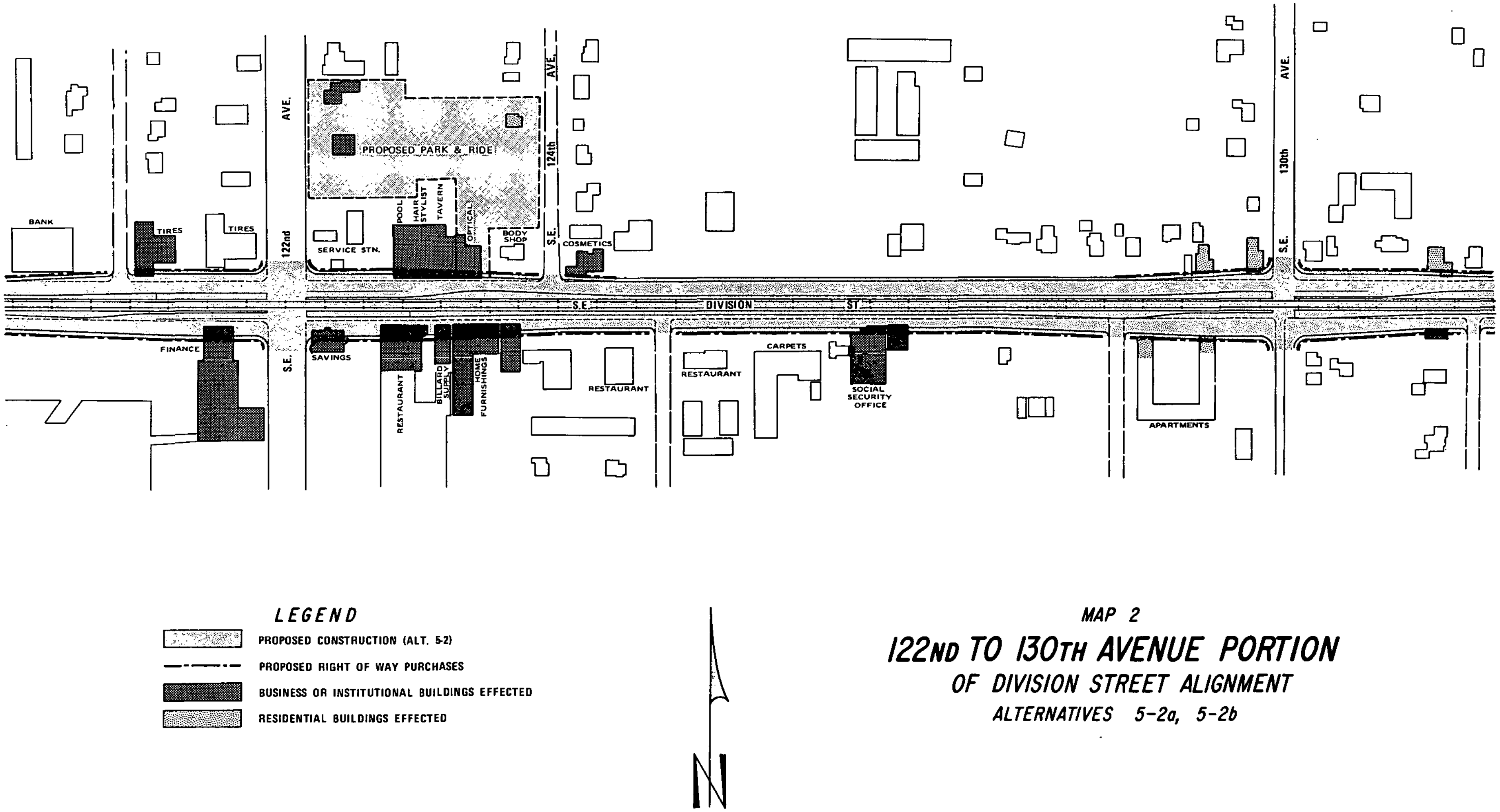
There are three major light rail alignments, each having two variations. All extend from downtown to I-205 along the Banfield Freeway. Alternative 5-1 follows Burnside Street to Gresham; 5-2 takes Division Street, and 5-3 extends south to the Lents area. The two variations concern the lack of shoulders (a) or presence of shoulders (b) east of 37th Avenue, along the Banfield corridor. The amount of impact thus relates principally to the alignment in east Multnomah County, between I-205 and Gresham. Impacts are summarized in Tables 4 and 5.

Options 5-1a and 5-1b (Burnside) involve considerable land for park-and-ride lots, as well as for the storage and maintenance of light rail vehicles. Most of these sites are unimproved, so that the number of households displaced is not high for the length of the route. The 5-1a variation displaces a dozen households along the Banfield freeway, and a similar number scattered along Burnside Street (half of these for park-and-ride lots). Map 2 shows the area between 122nd and 130th avenues, as an example of Burnside right-of-way needs. Option 5-1b has a greater impact east of 37th Avenue; houses affected are at proposed exits near 57th Avenue, in addition to properties required by 5-1a.

Impacts of the light rail transit alternative on the downtown area consist of one-half block, needed for a terminal and substation. Almost half of this parcel is now a parking lot, but there is a ship supply company owning two buildings on the east portion. These buildings are close to the distinctive area of Old Town, and should be preserved if possible, although they are not yet classified as "historically significant."

The businesses and non-profit organizations affected along the Banfield corridor are roughly the same as described under option 3b.

The section from I-205 to Gresham, following Burnside Street, has an existing right-of-way wide enough for the proposed LRT in most cases. Only occasionally does local widening affect property. The general pattern is that, the major acquisitions would occur in the locations chosen for park-and-ride lots.



LEGEND

- PROPOSED CONSTRUCTION (ALT. 5-2)
- PROPOSED RIGHT OF WAY PURCHASES
- BUSINESS OR INSTITUTIONAL BUILDINGS EFFECTED
- RESIDENTIAL BUILDINGS EFFECTED

MAP 2

122ND TO 130TH AVENUE PORTION

OF DIVISION STREET ALIGNMENT

ALTERNATIVES 5-2a, 5-2b

Exceptions are the maintenance area east of Birdsdale Avenue, and the auto body shop at 199th Avenue. The site shown in East Gresham is an alternative location for an LRT terminal, if the route should be extended that far.

The cost of options 5-1a and 5-1b would be approximately $12 million and $15 million, respectively. As with some of the other alternatives, this includes the cost of the encroachment on the Union Pacific Railroad. It also includes an easement on the Portland Traction Company's right-of-way east of 196th Avenue. The LRT operation would have only a minor impact on the PTC, which runs two trains a week to Gresham. Costs for the Burnside segment alone would be $3 million.

The Division Street alignment (5-2a and 5-2b) would have a different impact from the other LRT options, but only in the area east of I-205. Thus there is no need to repeat the discussion of downtown and Banfield corridor impacts for this, or for the 5-3a and 5-3b alternatives. Tables 4 and 5 show that the 5-2 options create the greatest right-of-way impacts, as measured by acreage, number of displacements, and costs. Reasons for this are that the proposed width along Division is 110 feet, (100 feet on Burnside); and that commercial buildings line up close to the present right-of-way on Division Street. Between 150 and 200 households would be displaced (the difference would be found along the Banfield freeway, east of 37th).

Over 50 businesses would need to relocate, including 10 service stations, a half dozen restaurants, and numerous small retail stores and offices. Much of the additional right-of-way needed is on the south side of the street, because this minimizes relocation of the water main. Thus, over twice as many of the affected buildings are on this side, compared to the north side. The south side expansion dominates between 98th and 195th avenues, and north side widening farther east. The East Hill Church would lose the part of its building that houses classrooms and offices. This impact is not as severe as it might seem, since the church already owns land (at the old fairgrounds) on which it plans to build a new church.

The proposed park-and-ride lots are now mostly vacant. A large parcel west of the PTC track would be used as maintenance and storage for light rail vehicles.

The Division Street alignment would cost approximately $30 million or more, depending on which of the two variations would be chosen. Of this amount, $21 million is for the segment east of I-205.

The third route under Alternative 5 is the LRT connection between downtown and the Lents area. This is of course identical to the Burnside and Division Street options east to I-205. Almost all necessary transit stations and park-and-ride lots needed for the Lents route, along I-205, can be constructed without additional right-of-way. However, a three-acre parcel would need to be purchased for the Gateway park-and-ride lot. A few businesses and a dwelling may be needed for access to a park-and-ride lot near Foster Road. Alternatives 5-3a and 5-3b, serving the Lents area, would involve expenses of $10 million and $13 million, respectively, of which $1 million is for the I-205 portion alone.

Relatively few households (16) and businesses (4) would be forced to move, with option 5-3a. The number is considerably higher for 5-3b; approximately 60 family units and 5 businesses. All of the families affected live along the Banfield freeway. The impact on the Union Pacific is the largest single one for this alternative.

MITIGATION MEASURES

The impacts of right-of-way purchases have been discussed, in most cases, in terms of maximum needs. However, several procedures can be used to reduce the severity of these adverse effects.

Acquisition Process

The Oregon State Highway Division follows an orderly procedure in acquiring land. This involves public hearings, professional appraisals, personal contacts, and allowance for appeals. Persons forced to sell their property can expect to obtain the market price, or compensation for any change in value if a portion is taken. (See Appendix B, Acquiring Land for Highways.)

Relocation Assistance Program

This program aids all those who must move; the assistance is expecially valuable for those with special problems, such as churches, businesses, and low-income tenants. Although monetary help is given, other types of assistance are important. A relocation agent can explain the types of help available and provide lists of suitable facilities. The Housing Authority of Portland manages 4,000 residential units, for low income persons. This agency can be of help for a large project, although there is always a waiting list (See Appendix B for more information on relocation assistance.)

Availability of Replacement Housing

A review of classified ads shows that there is no shortage of homes, rental units, or business sites in the general area of the project. This refers to properties in average price ranges, but the picture is different for low-cost rentals. The supply of these is limited and is likely to decrease. Thus, finding suitable housing for those in the Athens Hotel would be more difficult than for other displaced groups. Probably subsidized housing under some federal program would be needed. If no other housing were available, "housing replacement as last resort" (Section 206) might be needed. In this case, suitable housing would be constructed with federal aid.

In general, finding replacement housing is easier in an urban area like Portland, than in an isolated small community. In a single month, almost 2,000 houses were advertised in the eastern suburban areas of Portland. And advertised rental units were also plentiful.

Relocation of Businesses and Non-Profit Organizations

Businesses and non-profit organizations are eligible to receive moving expenses, as well as reimbursement for the cost of finding another location. In addition, relocation agents and the Portland Economic Development Committee have lists of commercial facilities available. Similar lists of properties suitable for a church or a government office (which might be displaced by this project) are also available.

Partial Acquisitions

In many cases, it has been assumed that an entire property would be acquired, because of the need for a small part of the land or building. Some of these purchases could no doubt be avoided by slight design changes. This is probably more likely to be feasible with commercial buildings, which are often built with no setback. Residences, on the other hand, generally need a setback from the property line.

SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Although many types of environmental effects can be listed here, only certain ones take place within the right-of-way itself. Over the short-term, problems of selling property and finding a new location would adversely affect those in the right-of-way. Uncertainty would tend to cause delays or halts to normal maintenance and expansion of commercial enterprises. However, in the early stages of the project, there would be favorable effects as some of the displaced persons and businesses obtained replacement housing payments. These would help them in being established in new surroundings. Economic benefit may also include payment for small uneconomic remainder parcels in cases where the existing land use is badly impaired. People who were already planning to move will be reimbursed for their moving expenses.

Many of the long-term impacts on the human environment can only be considered as harmful. Many people have no wish to move, and will have great difficulty in adjusting to a new location. This is especially true of long-established elderly persons. And in the case of a church, the members might have to join another congregation instead of retaining their own unity. Another adverse impact is the removal of serviceable homes, business facilities, church structures, and other buildings. In most cases this involves a sizeable economic loss as well, because the properties are no longer on the tax roll.

In some cases there would be long-term benefits, such as the elimination of substandard or unsafe buildings. In addition, in a few areas there may be more open space next to the freeway than before. These spaces could be used for recreation.

Overall, the balance between human environmental benefits and losses in the right-of-way is clearly negative. In other words, such a project is usually justified in terms of benefits to a wider area, but not on the basis of the gains within the proposed right-of-way itself.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

There are few irreversible effects associated with construction of the project. Although highway and rail facilities involve a long-term commitment, these could revert back to their earlier state, or be modified as conditions require. For example, quite a few of the roads and railroads of fifty years ago are no longer used for their original purpose. In some cases, the former railroad grades have proven to make excellent low-gradient bike paths. Naturally, the high cost of relocating major transit facilities makes it unlikely that this will take place for the Banfield project.

A good example of an irreversible commitment of resources is the removal of an older building. Whether it is of historical value or not, it can hardly be replaced; materials, skills, and technology to duplicate it would probably be lacking. This could apply to the older downtown buildings affected by the project, as well as to others, such as old wood frame houses along the various alternatives.

BIBLIOGRAPHY

Lord/Leblanc, Associated Consulting Economists. "Economic Analysis of the Portland Downtown Guidelines Plan: Outlook and Recommendations for Implementation." Portland, OR: 1974.

Portland City Council. "Planning Guidelines/Portland Downtown Plan." Portland, OR: 1972.

Tri-County Metropolitan Transportation District of Oregon. "Banfield Transitway Project: East Side Transit Operations Study." Portland, OR: 1977.

Oregon Department of Transportation. "The Banfield Transitway Project." (no date)

TABLE 1

BANFIELD TRANSITWAY PROJECT RIGHT OF WAY

	1	2		3			4		5					
		a	b	a	b	c	a	b	1a	2a	3a	1b	2b	3b
New Right of Way Property (in acres)	-	0.4	0.4	2.4	20.5	20.5	22.7	22.7	43.6	67.8	18.4	47.0	71.2	21.8
Displacements:														
Residential														
Single Family Units	-	-	-	8	45	65	57	65	23	73	12	51	101	40
Multiple Family Units	-	-	-	90	100	110	111	110	4	78	4	19	93	19
TOTAL Residential Displacement #	-	-	-	98	145	175	168	175	27	151	16	70	194	59
Businesses	-	-	-	4	13	13	12	13	5	57	4	11	63	10
Non-Profit Organizations	-	-	-	-	1	1	1	1	-	2	-	1	3	1
Right-of-Way Costs														
Property Acquisition ($1,000,000)	-	.01	.01	1.0	11.4	12.4	12.1	12.4	11.7	29.3	9.9	14.2	31.8	12.4
Relocation	-	-	-	.4	.6	.8	.8	.8	.2	1.3	.1	.5	1.6	.4
TOTAL Estimated Cost ($1,000,000)	-	.01	.01	1.4	12.0	13.2	12.9	13.2	11.9	30.6	10.0	14.7	33.4	12.8
Estimated Tax Base Reduction ($1,000,000)	-	-	-	0.1	2.4	4.1	4.2	4.3	ND	ND	ND	5.0	8.0	ND

SOURCE: Metro Office Design and Right-of-Way Sections, ODOT

#Includes both partial and entire acquisitions.

ND - No Data

TABLE 2

RIGHT OF WAY: ALTERNATIVE 3

	Alternative 3a				Alternative 3b				Alternative 3c			
	Downtown	East Portland	East County	Total	Downtown	East Portland	East County	Total	Downtown	East Portland	East County	Total
New Property (Acres)	0.2	0.6	1.6	2.4	0.2	18.7	1.6	20.5	0.2	18.7	1.6	20.5
Partial Acquisitions(#)												
Single Family Units	-	-	-	-	-	-	-	-	-	-	-	-
Multiple Family Units	-	-	-	-	-	10	-	10	-	11	-	11
Total Housing Units	-	-	-	-	-	10	-	10	-	11	-	11
Business	-	-	-	-	-	-	-	-	-	-	-	-
Non-Profit Organiz.	-	-	-	-	-	-	-	-	-	-	-	-
Entire Acquisition Requiring Relocation (#)												
Single Family Units	-	8	-	8	-	45	-	45	-	65	-	65
Multiple Family Units	90	-	-	90	90	-	-	90	90	-	-	99
Total Resid. Units	90	8	-	98	90	45	-	135	90	74	-	164
Business	4	-	-	4	4	9	-	13	4	9	-	13
Non-Profit Organiz.	-	-	-	-	-	1	-	1	-	1	-	1
Right of Way Costs ($1,000,000)												
Property	.4	.6	-*	1.0	.4	11.0	-*	11.4	.4	12.0	-*	12.4
Relocation	.3	.03	-	.4	.3	.3	-	.6	.3	.5	-	.8
TOTAL ($1,000,000)	.7	.6	-	1.4	.7	11.3	-	12.0	.7	12.5	-	13.2
Estimated Tax Base Reduction ($1,000,000)				.1				2.4				4.1

SOURCE: Metro Office Design and Right-of-Way Sections, ODOT
*Excluding fairgrounds site.

TABLE 3

RIGHT OF WAY: ALTERNATIVE 4

	Alternative 4a				Alternative 4b			
	Downtown	East Portland	East County	Total	Downtown	East Portland	East County	Total
New Property (Acres)	0.2	20.9	1.6	22.7	0.2	20.9	1.6	22.7
Partial Acquisitions (No.)								
Single Family Units	-	-	-	-	-	-	-	-
Multiple Family Units	-	10	-	10	-	11	-	11
Total Housing Units	-	10	-	10	-	11	-	11
Business	-	-	-	-	-	-	-	-
Non-Profit Organization	-	-	-	-	-	-	-	-
Entire Acquisition Requiring Relocation (No.)								
Single Family Units	-	57	-	57	-	65	-	65
Multiple Family Units	90	11	-	101	90	9	-	99
Total Residential Units	90	68	-	158	90	74	-	164
Business	4	8	-	12	4	9	-	13
Non-Profit Organization	-	1	-	1	-	1	-	1
Right of Way Costs ($1,000,000)								
Property	.4	11.7	-*	12.1	.4	12.0	-*	12.4
Relocation	.3	.5	-	.8	.3	.5	-	.8
TOTAL ($1,000,000)	.7	12.2	-*	12.9	.7	12.5	-*	13.2
Estimated Tax Base Reduction ($1,000,000)				4.2				ND

SOURCE: Metro Office Design and Right of Way Sections, ODOT

*excluding fairgrounds site

TABLE 4

RIGHT OF WAY: ALTERNATIVE 5a

	Alternative 5-1a				Alternative 5-2a				Alternative 5-3a			
	Downtown	East Portland	East County	Total	Downtown	East Portland	East County	Total	Downtown	East Portland	East County	Total
New Property (Acres)	0.5	14.9	28.2	43.6	0.5	14.9	52.4	67.8	0.5	14.9	3.0	18.4
Partial Acquisitions (No.) Single Family Units	-	-	-	-	-	-	-	-	-	-	-	-
Multiple Family Units	-	4	-	4	-	4	-	4	-	4	-	4
Total Housing Units	-	4	-	4	-	4	-	4	-	4	-	4
Business	-	-	-	-	-	-	90	90	-	-	-	-
Non-Profit Organization	-	-	-	-	-	-	4	4	-	-	-	-
Entire Acquisition Requiring Relocation (No.) Single Family Units	-	12	11	23	-	12	61	73	-	12	-	12
Multiple Family Units	-	-	-	-	-	-	74	74	-	-	-	-
Total Residential Units	-	12	11	23	-	12	135	147	-	12	-	12
Business	2	2	1	5	2	2	53	57	2	2	-	4
Non-Profit Organization	-	-	-	-	-	-	2	2	-	-	-	-
Right of Way Costs ($1,000,000)												
Property	.8	8.2	2.7*	11.7*	.8	8.2	20.2*	29.3*	.8	8.2	.8	9.9
Relocation	.02	.1	.1	.2	.02	.1	1.1	1.2	.02	.1	-	.1
TOTAL ($1,000,000)	.8	8.3	2.8*	11.9*	.8	8.3	21.3*	30.5*	.8	8.3	.8	10.0
Estimated Tax Base Reduction				ND				ND				ND

SOURCE: Metro Office Design and Right of Way Sections, ODOT

*excluding fairgrounds site

ND - No Data

TABLE 5

RIGHT OF WAY: ALTERNATIVE 5b

	Alternative 5-1b				Alternative 5-2b				Alternative 5-3b			
	Downtown	East Portland	East County	Total	Downtown	East Portland	East County	Total	Downtown	East Portland	East County	Total
New Property (Acres)	0.5	18.3	28.2	47.0	0.5	18.3	52.4	71.2	0.5	18.3	3.0	21.8
Partial Acquisitions (No.)												
Single Family Units	-	-	-	-	-	-	-	-	-	-	-	-
Multiple Family Units	-	10	-	10	-	10	-	10	-	10	-	10
Total Housing Units	-	10	-	10	-	10	-	10	-	10	-	10
Business	-	-	-	-	-	-	90	90	-	-	-	-
Non-Profit Organization	-	-	-	-	-	-	4	4	-	-	-	-
Entire Acquisition Requiring Relocation (No.)												
Single Family Units	-	40	11	51	-	40	61	101	-	40	-	40
Multiple Family Units	-	9	-	9	-	9	74	83	-	9	-	9
Total Residential Units	-	49	11	60	-	49	135	184	-	49	-	49
Business	2	8	1	11	2	8	53	63	2	8	-	10
Non-Profit Organization	-	1	0	1	-	1	2	3	-	1	-	1
Right of Way Costs($1,000,000)												
Property	.8	10.7	2.7*	14.2	.8	10.7	20.2*	31.8	.8	10.7	.8	12.4
Relocation	.02	.4	.1	.5	.02	.4	1.1	1.5	.02	.4	-	.4
TOTAL ($1,000,000)	.8	11.1	2.8*	14.7	.8	11.1	21.3*	33.3	.8	11.1	.8	12.8
Estimated Tax Base Reduction ($1,000,000)		3.8	1.1	4.9		3.8	4.2	8.0				no data

SOURCE: Metro Office Design and Right of Way Sections, ODOT

*excluding fairgrounds site

APPENDIX A

PROCEDURE USED TO ANALYZE TAX BASE REDUCTION

One of the unfortunate but inevitable consequences of right-of-way acquisition is the immediate reduction in the tax base as land is passed from private (taxable) to public (non-taxable) status. If the tax base reduction is large enough relative to the total tax base then the tax rate may need to be increased to maintain the same level of service.

For example, assume the tax base for the Oaktown Fire District is five million dollars ($5,000,000). They levy a rate of 0.07 percent or $0.70 per $1,000 of assessed value. This yields the fire district $3500 per year ($5,000,000 times 0.0007). Suppose the transportation project takes out the widget factory in the district, which has an assessed value of $1,000,000. Now the fire district receives only $2800 per year (($5,000,000 - $1,000,000) times 0.0007). To obtain the same level of service at $3500 per year, they will have to increase the tax rate from $7 per $1,000 to $8.75 per $10,000. This means that the homeowner, whose assessed property value is $25,000 and whose taxes for the fire district before the project were $17.50 annually, will have fire district taxes increased to $21.88 annually because of the project. In addition, taxes to other districts may increase.

As all homeowners know, this is clearly an adverse impact.

This is the worst possible case. The widget factory may locate in the tax district, thus keeping the tax base constant (or even increasing it). At the same time, there may be stimulus for development from the transportation project, increasing the tax base. If the widget factory does not rebuild then the fire district may be able to reduce expenditures, causing little or no increase in the tax rate.

One reason the tax rate increased was because the tax base reduction was so great ($1,000,000 divided by $5,000,000 equals 20 percent). A very small percentage reduction in the tax base will cause little or not immediate increase in the tax rate.

Tax Levies, Tax Losses and Tax Loss as Percent of Total Levies
(Example only; data are not for the Banfield Transitway)

TAXING DISTRICTS	Levy Used to Compute Tax Rate	Alternative 2 Revenue Loss	Alternative 2 % Tax Loss	Alternative 3 Revenue Loss	Alternative 3 % Tax Loss
Counties					
Clackamas County	$ 2,443,212.97	$ 37.12	.002%	---	---
Washington County	3,198,148.35	195.05	.006%	$ 12.78	.0004%
Multnomah County	29,083,352.25	1,729.15	.006%	1,310.81	. 005%
Educational Districts					
Portland Community College	4,931,338.88	362.58	.007%	198.57	. 004%
Clackamas Intermediate Education Dist.	6,147,190.55	95.68	.002%	---	---
Clackamas County School District #7	5,416,689.99	563.10	.010%	---	---
Washington Intermediate Education Dist.	1,094,232.26	68.16	.006%	4.47	.0004%
Washington School District #23	5,312,114.49	1,925.07	.036%	126.05	. 002%
Multnomah Intermediate Education Dist.	27,480,317.34	1,632.62	.006%	1,218.98	. 004%
Multnomah School District #1	42,174,999.73	3,219.77	.008%	2,424.81	. 006%
Fire Districts					
Clackamas Fire Dist. #57	64,786.96	37.10	.057%	---	---
Tualatin Rural Fire Protection Dist.	1,186,939.57	344.18	.029%	22.57	. 002%
Other Taxing Agencies					
Port of Portland	4,795,640.96	347.17	.007%	261.14	. 005%
City of Tigard	258,576.68	126.52	.049%	16.71	. 007%
Clackamas County Park Dist. #1	27,630.99	5.42	.020%	---	---
Clackamas Vector Control #1	69,332.91	1.28	.002%	---	---
Metzger Water District	15,464.48	21.16	.137%	1.39	. 009%
Capital Highway Water District	161,065.52	1,381.48	.858%	1,039.40	. 645%
TOTALS:	---	$12,092.61	---	6,637.68	---

APPENDIX A

APPENDIX B

SUMMARY OF THE ACQUISITION OF PROPERTY AND RELOCATION ASSISTANCE PROGRAMS

For this project, the acquisition and relocation assistance procedures are governed by the U.S. Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-646), appropriate State relocation legislation, and U.S. Department of Transportation Order 5620.1.

The right-of-way program for this project is under the supervision of Louis C. Grothaus, Metro Right of Way Office. Specific questions on right-of-way can be obtained by contacting the region office at the following address:

Metro Right of Way Office
Oregon Department of Transportation
5821 N.E. Glisan Street
Portland, Oregon 97213
Telephone No. 238-8215

Any person, family or business displaced by a transportation project is offered relocation assistance services for the purpose of locating a suitable replacement property. Relocation services are provided by qualified personnel in the regional right-of-way office. A relocation agent, assigned to the highway project, will contact personnally each displacee and explain the services and benefits available in accordance with the displacee's eligibility. The agent can provide a current listing of comparable replacement properties which are within the financial means of the displacee, available on the open market, and "decent, safe and sanitary." Information is also available on Federal and State housing programs, loan programs, and other State and Federal agencies offering assistance to displaced individuals. The agent will assist in completing applications or claim forms for payments. All pertinent financial information concerning replacement housing will be explained.

In addition, the Metro office maintains considerable data which may be of assistance to the displacee. Such data including local housing ordinances, open housing, building codes, social services, information on costs such as security deposits, closing costs, typical downpayments, interest rates and terms, VA and FHA insured loan requirements, real property taxes, consumer education literature on housing and various other subjects are available on request.

It is the goal of the right of way personnel to be of service to the displacee and to assist in anyway possible to make the relocation easy and successful.

Summary information on the acquisition process and the relocation benefits is contained in two Oregon Department of Transportation leaflets: "Acquiring Lands for Highways" (Form No. 81-734-3373, Rev. April 1977) and "Moving Because of the Highway?" (Form No. 81-734-3372, Rev. March 1977). These leaflets are reproduced herein.

ACQUIRING LAND FOR HIGHWAYS

A description of the Highway Division's land acquisition program

OREGON STATE HIGHWAY DIVISION

When expanding or improving highway facilities in Oregon, the Highway Division has the task of acquiring rights-of-way. It is the aim and desire of the Division to obtain these necessary rights-of-way with fairness and equity to all.

The State is empowered to acquire private property for public use in order to provide the greatest good for the greatest number. With this power goes the obligation to protect the rights of the individual property owner. The Highway Division thus has a dual responsibility—recognition and protection of the individuals who are affected by acquisition of land and competent and efficient service to the public.

PUBLIC HEARINGS

Public hearings, when requested, are held during the location and design stages of a project. Such hearings afford each person or agency full opportunity for effective public participation to ensure that highway locations and designs are consistent with Federal, State, and local goals and objectives.

The first hearing is held after preliminary studies have been made on several possible corridor routes. The data gathered in the studies is presented at a "Corridor Hearing". During the course of the hearing, testimony from interested persons is recorded for study by Highway Division personnel and the Oregon Transportation Commission.

Upon selection of a corridor location by the Transportation Commission, a detailed survey within that corridor is made and a preliminary design plan developed for later presentation at a "Design Hearing". During the course of the survey, a Liaison Agent attempts to interview all property owners affected concerning the effect the proposed highway has on their ownerships.

The holding of "Design Hearings" provides all interested persons and public agencies an opportunity to present testimony for consideration of final highway design.

In an instance where a choice of corridors is not involved, such as in the case of an improvement project on an existing highway, a single "Combination Corridor - Design Hearing" may be held.

After all data and testimony have been studied, a final design is adopted by the Transportation Commission and the acquisition of necessary rights-of-way is authorized. The parcels of property needed for the improvement will be described, and the right-of-way acquisition activities can commence.

APPRAISAL PROCEDURE

Highway Division appraisal procedures, which are designed to protect both the property owner and the taxpayer's dollar, call for an appraisal of every parcel of right-of-way. These appraisals are performed by a staff appraiser, a professional fee appraiser, or both. When business and commercial properties are involved, more appraisers may be assigned. The property owner or his designated representative will be given an opportunity to accompany the appraiser during his inspection of the property.

The appraisers consider every indicator of value. Their differences in findings, if any, are studied and reconciled. The results are checked by the Highway Division Right of Way officials and then approved for acquisition.

This thoroughness, plus the busy work schedules of the professional fee appraisers, explains the occasional delays between the time of the appraisal and the arrival of the Right of Way Agent.

THE RIGHT OF WAY AGENT

The Right of Way Agent who calls on the property owner has studied the appraisal and can illustrate with maps and other data how the right-of-way will affect the property. The Agent has been authorized to recommend a price and obtain an option to purchase the property, which option is subject to approval of his supervisors and the Oregon Transportation Commission. It should be noted that the Agent is unable, under the procedures governing him, to engage in "horse trading"; he is confined to those monetary values indicated by appraisal.

It is desirable to complete acquisition and transfer as soon as possible, but not at the expense of the owner's thoughtful consideration of the State's proposal.

MARKET VALUE

Before the initiation of negotiations for real property, the Highway Division will establish an amount which is believed to be just compensation and will make a prompt offer to acquire the property for the full amount so established. In no event will the amount be less than the approved appraisal of the fair cash market value of the property. Fair cash market value may be defined as the price a willing buyer would pay for a property offered by a willing seller with neither party having any obligation to either buy or sell. This is known as the "willing buyer - willing seller" concept and is the basis for "market value".

In instances in which only a portion of a property is to be acquired, the compensation is based on either the value of the land taken and damages to the remainder, if any, or the "before-and-after" method. This means that the owner's loss is equal to the difference in the market value of his property before the State's acquisition and its market value immediately thereafter.

Any decrease or increase in the fair cash market value of the real property prior to the date of valuation caused by the public improvement for which the property is acquired, or by the likelihood that the property would be acquired for such improvement other than that due to physical deterioration within the reasonable control of the owner, will be disregarded in determining the compensation for the property.

Property damage payments, under Oregon law, can be made only to those persons whose property is actually purchased or used by the State Highway Division.

MOVING IMPROVEMENTS

The law states that the property owner is entitled to money for his property; however, if he wishes to have his house or buildings moved, this may be done provided certain conditions are met.

The property owner must agree to such a move, and the total cost to the State must be less than a cash purchase.

The property owner must make his own arrangements for moving the building. The State is not able to undertake the work nor to contract the work for the owner.

PAYMENT

An understanding of the processing of a signed agreement and the payment by check will alleviate some of the concern about a seemingly delayed payment.

The option agreement must be approved by the Oregon Transportation Commission. After approval has been received, the property owner is notified of acceptance and conveyance of the title and payment may proceed. No payment of State funds may be made until a warranty deed conveying clear title has been recorded in the appropriate County records.

Any encumbrances to the title, such as unpaid taxes, assesments, mortgages, outstanding leases, or the like, must be cleared by releases prior to preparation of a voucher. At the time the deed is available for recording, a voucher is prepared and forwarded to the Highway Division Controller for preparation of a check in payment for the property. Under normal circumstances, in which no cloud obscures the title, about four weeks elapse between the time a deed is received from the property owner and the time a check is mailed to him.

No person lawfully occupying real property shall be required to move from his home, farm or business location without at least 90 days' written notice. This notice will not be issued prior to the State's dispersement of payment for the property. In the event the property owner is unable to convey and clear title satisfactorily to the State, or in the event the State and the property owner cannot reach a mutually-satisfactory agreement, a condemnation action will be filed and the amount established by the State as just compensation will be deposited with the court for distribution in accordance with the order of the court.

POSSESSION

At the time negotiations are commenced with a property owner, all tenants on the property as well as the owner will be notified in writing that it is the intent of the Highway Division to acquire the property and give the requirements for eligibility for relocation benefits.

The Division is aware of the need of a reasonable time for relocation. If a property is not needed for several months, continued occupancy may be permitted at a reasonable rental through the Regional Property Agent.

EMINENT DOMAIN

The property owner need not accept the State's offer or enter into an agreement he feels to be unfair. A refusal is simply a case of disagreement between the two parties on the value of the property. The Highway Division, in the expenditure of public funds, is restricted to competent appraisals in ascertaining fair cash market value.

The Division is ready and willing to reconsider its position in light of any new evidence of value presented by the owner, including a documented professional appraisal procured by the owner.

Only in the event the parties are unable to agree as to the compensation to be paid, or the owner cannot clear title, will a condemnation suit be filed. Time for an extended discussion on some projects may not be available if the State and the highway users are to avoid the loss of considerable money due to any delay in a project. Discussions can, of course, continue even after a suit is filed. The filing of the suit permits the State, under Oregon law, to authorize the contractor to enter on the property.

RIGHT OF WAY OFFICES

For the service and convenience of those affected by highway activities, the State Highway Division maintains fully-staffed Regional Right of Way Offices at the following locations:

5821 NE Glisan Street Portland 97213 Telephone No. 238-8215	9200 McLoughlin Blvd. Milwaukie 97202 Telephone No. 653-3113
2960 State Street Salem 97310 Telephone No. 378-2641	1523 SE Cobb Street Roseburg 97470 Telephone No. 672-6541, Ext. 226
North The Dalles- California Highway Bend 97701 Telephone No. 382-1911, Ext. 38	1102 "K" Street LaGrande 97850 Telephone No. 963-8446

Persons having questions concerning right-of-way matters are encouraged to contact the nearest Regional Office.

QUESTIONS AND ANSWERS

ACQUISITION

1. What authority does the Right of Way Agent have in acquiring the property?

   The Agent has authority to attempt to agree as to price and to submit his recommendation for presentation to the Oregon Transportation Commission.

2. Can the Right of Way Agent make a formal offer for the property?

   No, he cannot. Only the Transportation Commission or its designated representative has authority to make an offer. The Agent may recommend a price for the necessary parcel.

3. Is earnest money received if an option is signed?

   No. If the option is accepted by the Commission, the amount involved is mailed after the processing of the option.

4. What courses does the property owner have if negotiations fail?

   He has the right to have a jury hear the case and make an award.

PAYMENT

1. Who prepares the deed and clears the title?

   The Salem Right of Way Office of the State Highway Division prepares and records most of the documents necessary to convey clear title; however, it is the property owner's obligation to secure signatures on any documents which may be necessary to provide clear title.

   The State orders and pays for title insurance unless other arrangements are made.

2. How does the property owner know the State will fulfill its obligation?

   The option approved by the Transportation Commission remains a binding contract even after the deed is signed. The State is bound by this agreement as to its own obligations; and, by the same token, it cannot exceed the authority contained therein.

3. Can the property owner rent or buy buildings?

   Unless other specific arrangements are made, buildings will be sold at public auction after proper notification in the newspapers. All sales and rentals are handled by the Regional Property Agent.

CONSTRUCTION FEATURES

1. Why is new right-of-way necessary? Why can't the present highway be rebuilt?

   The standards of the new Federal-aid highways, as established by the State and the Federal Highway Administration, are such that rebuilding many of the present highways to meet these standards is not economically sound. In addition, most of these existing highways will be needed to assist the freeways in carrying the heavy volume of traffic. In some cases, the present improved highway is to be used as two of the four lanes of the new freeway.

2. Who determines the necessity, location, width of rights-of-way, access control, and schedule of construction for new State highways?

   The Oregon Transportation Commission, upon recommendation of the Administrator and State Highway Engineer, and the Federal Highway Administration when required.

VALUE

1. How does the State arrive at the value of the property?

   Real estate appraisals are prepared and submitted by staff or fee appraisers, or both.

   A staff appraisal is one which is prepared by an employee of the Highway Division who is qualified by education, training, and experience to make property appraisals.

   A fee appraisal is one prepared by a professional appraiser who is employed for a particular job. He is not a State employee, but an independent appraiser whose services are generally available to anyone wishing to retain him.

2. How about the appraiser the property owner hires?

   The Division will gladly examine with open mind the appraisal prepared for the owner. If it is a fully-documented appraisal, the State review staff is authorized to give it the same consideration as those prepared for the State.

81-734-3773
Rev. 4-77

MOVING BECAUSE OF THE HIGHWAY?

A DESCRIPTION OF THE HIGHWAY DIVISION'S RELOCATION ASSISTANCE PROGRAM

State Highway Division policy requires that no family or individual will be required to vacate any dwelling until such displacee has found or been offered adequate replacement housing.

All replacement housing offered will be fair housing open to all persons regardless of race, color, religion, sex, or national origin. Fair housing will be available to all affected persons regardless of race, color, religion, sex, or national origin.

Federal Department of Transportation Order No. 5620.1 sets forth the same requirement for Federally-assisted projects.

Relocation legislation, because of its wide scope, is somewhat complicated and difficult to read and interpret. For the benefit of those who are affected by the State Highway Division property acquisitions, this leaflet summarizes the principal provisions of relocation services and benefits. However, persons reading this leaflet are urged not to form advance opinions as to the benefits and amounts to which they may be entitled. The right of way agent assigned to purchase a property will have detailed information for displaced persons.

OREGON STATE HIGHWAY DIVISION

GENERAL MOVING EXPENSES

Service charges for reconnecting utilities are reimbursable, except under "Schedule Move Procedures".

INDIVIDUAL AND FAMILY MOVING EXPENSES

Any individual or family displaced by a State Highway Division project is entitled to receive a payment for reasonable expenses of moving personal property a distance not to exceed a 50-mile radius or to the nearest available and adequate site.

In order to obtain a moving expense payment, a displaced person must file, within 18 months after moving, a written claim with the State Highway Division on a form provided for that purpose. In some cases, where it is to the benefit of the displaced person, a written arrangement with the State Highway Division will allow the displaced person to present an unpaid commercial moving bill and the State Highway Division will make payment directly to the mover. Residential moving costs may also be claimed according to a set schedule based upon the number of rooms of furniture to be moved.

RESIDENTIAL MOVING SCHEDULE

Unfurnished
[Relocatee owns furniture]

\$ 60 [1 rm]	\$140 [3 rm]	\$220 [5 rm]
\$100 [2 rm]	\$180 [4 rm]	\$260 [6 rm]

Seven or more rooms - \$300

Furnished
[Relocatee does not own furniture]

\$15 per room up to a maximum of \$300

MOBILE HOME MOVING SCHEDULE
[Based upon total floor area]

Amount of Payment	Square Foot Area
\$100	Up to 200 sq. ft.
\$200	201 sq. ft. – 600 sq. ft.
\$300	More than 600 sq. ft.

In addition to the moving payment based on a room count or mobile home square–foot area, a dislocation allowance of \$200 will be paid.

BUSINESS, FARM & NONPROFIT ORGANIZATION MOVING EXPENSES

Displaced businesses, farm operations and nonprofit organizations are entitled to receive actual reasonable moving expenses for moving personal property a distance not to exceed a 50-mile radius or to the nearest available and adequate site. The actual and reasonable cost of searching for a replacement location may be claimed up to \$500 for a farm or business and up to \$100 for advertising sign companies. Such payments must be supported by receipted bills or other evidence of expenses incurred.

As an alternate moving expense procedure, in the case of a self move, the business, farm operation or nonprofit organization may be paid an amount not to exceed the lower of two estimates secured by the State Highway Division from competent moving companies.

Under certain conditions, businesses, farms, and nonprofit organizations may receive payments for direct losses of tangible personal property resulting from the necessity to relocate.

In lieu of moving expense payments, a displaced or discontinued business or farm operation, except advertising sign owners, may, under certain conditions, elect to receive an amount equal to the average annual net earnings of the business or farm operation during the two tax years immediately preceding the year in which such business or farm operation is displaced. The payment cannot exceed \$10,000 and will not be less than \$2,500. Those who choose the "in lieu" payment are not eligible for any other relocation benefit payment.

STORAGE OF PERSONAL PROPERTY

Occasionally, unusual circumstances may make the storage of personal property mutually beneficial to the displaced owner and the State. The cost of such storage may qualify for a payment in addition to the actual moving expense payments. It should be clearly understood that those dislocatees accepting the schedule or in lieu moving expense payment are not eligible to receive the storage expense benefit. This additional benefit requires the written approval from the State Highway Division and may not exceed twelve months.

REPLACEMENT HOUSING

A displaced owner-occupant of a dwelling actually owned and occupied by the owner for 180 days or more immediately prior to the initiation of negotiation for such property may be eligible for additional payments, the combined total of which may not exceed \$15,000.

The replacement housing payment is the amount, if any, when added to the amount for which the State acquired his dwelling, equals the actual cost which the owner is required to pay for a decent, safe and sanitary replacement dwelling or the amount determined by the State as necessary to purchase a comparable dwelling, whichever is less. Also, to compensate the owner for increased interest costs he is required to pay for financing the replacement dwelling and for the actual closing costs incidental to the purchase of replacement housing.

A displaced owner-occupant of a dwelling actually owned and occupied by the owner for 90 days or more but less than 180 days or a tenant-occupant of 90 days or more immediately prior to initiation of negotiation for such property may be eligible for additional payments, the combined total of which may not exceed \$4,000. This payment is the amount necessary to make a down payment on the purchase of a replacement dwelling and to reimburse the relocatee for the actual closing costs incidental to the purchase of the replacement dwelling. Necessary deposits for taxes and insurance are not considered as closing costs. In those cases where an owner-occupant of 90 days or more but less than 180 days or the tenant-occupant of 90 days or more chooses to rent instead of purchasing a replacement dwelling, he may, under certain conditions, become eligible for a payment up to \$4,000 to enable him to rent a decent, safe and sanitary replacement dwelling.

The rent payment is the increase in rent necessary to rent a comparable dwelling for 48 months or the amount determined by the State as necessary to rent a comparable dwelling for 48 months, whichever is less.

To be eligible for these benefits, the displaced occupant must occupy a decent, safe and sanitary replacement dwelling within one year subsequent to the required date of displacement from the dwelling unit acquired by the State Highway Division.

Upon request by the displacee a preliminary determination of any of the above benefits will be calculated and presented to the displacee.

Claims for housing additives and rent supplements must be made in writing on a State Highway Division form supplied for this purpose and must be filed with the State Highway Division no later than 18 months after the date of displacement or six months after final adjudication of a condemnation case.

Before payments for any replacement dwelling benefits can be made, the replacement dwelling must be checked by State Highway Division personnel to ascertain that it meets the decent, safe and sanitary standards established by the Federal Department of Transportation. We advise that you have this determination made prior to making a commitment to rent or buy. Please understand that the replacement dwelling decent, safe and sanitary inspection that will be conducted by agency personnel is for the sole purpose of determining a relocatee's eligibility for a relocation payment.

POSSESSION

No person lawfully occupying real property shall be required to move from his home, farm or business location without at least 90 days written notice. This notice will not be issued prior to the State having the right to legal possession of the property.

APPEALS

Any relocatee who is dissatisfied with any ruling on his eligibility or claim for any relocation benefit payment shall have the right of appeal. Appeal forms can be secured from the right of way agent who is handling the property acquisition. The Chief Administrative Officer of the Highway Division has delegated his review authority to a two-member board. Appeals must be filed with the board within 90 days after the State acts on a claim or denies eligibility for a benefit.

Any person making such an appeal will be given full opportunity to be heard at an appeal hearing arranged to examine his complaint. A prompt decision will be provided giving reasons in support of the result reached. The decision by the board will be considered as final.

RIGHT OF WAY AGENT

Relocatees will be given detailed information regarding their eligibility and possible benefits by the right of way agent assigned to acquire the property.

OREGON STATE HIGHWAY

1970 RELOCATION ACT – MONETARY BENEFITS

RESIDENTIAL				BUSINESS & FARM	
Owner-occupant of 180 days or more prior to initiation of negotiations for the parcel.		Owner-occupant of 90 days or more but less than 180 days and tenant-occupants of 90 days or more occupancy prior to initiation of negotiations for the parcel.		Owner-occupants and tenant-occupants entitled to same benefits. Must occupy at initiation of negotiations for the parcel.	
Housing Additive	$15,000 maximum	Rent Supplement	$4,000 maximum	Actual reasonable moving costs	Actual
Including		Or		Or	
Costs incidental to purchase of replacement dwelling		Down payment benefit and costs incidental to purchase of replacement dwelling	$4,000 maximum	Negotiated moving cost payment not to exceed lower of two estimates secured by agency	No more than low estimate
And Including		Plus		Plus	
Increased interest cost on replacement dwelling		Actual reasonable moving costs	Actual	Tangible personal property loss due to relocation	Actual value or estimated cost to move, whichever is lower
Or		Or		Plus	
Rent Supplement	$4,000 maximum	Moving costs based upon schedule	$ 500 maximum	Reasonable cost of search for new site	$500 maximum $100 maximum for sign companies
Plus		Or		Plus	
Actual reasonable moving costs	Actual	Storage of personal property up to twelve months, if necessary	Actual	Storage of personal property up to twelve months, when necessary	Actual
Or				Or	
Moving costs based upon schedule	$ 500 maximum			Payment "in lieu" of all other benefits-requires approval of agency	Average of net earnings for two years prior to year of relocation $2,500 minimum $10,000 maximum
Or					
Storage of personal property up to twelve months, when necessary	Actual				

81-734-3772
Rev. 3-4-77

AIR QUALILTY RESEARCH REPORT

TABLE OF CONTENTS

AIR QUALITY RESEARCH REPORT

LIST OF FIGURES

LIST OF TABLES

AIR QUALITY

Methodology

The purpose of this report is to assess the changes in air quality which may result from the selection of one of five transportation alternatives as discussed in Chapter 1 of the Draft Environmental Impact Statement.[1] There are two major topics of concern associated with such an assessment: ambient air quality data collection and analysis; and air quality impact prediction on both a local and regional level. Since the project deals with modifications and improvements to the existing Banfield Freeway, a facility with traffic volumes presently exceeding 20,000 vehicles per day, the Oregon State Highway Division (OSHD) will apply to the Department of Environmental Quality (DEQ) for an Indirect Source Construction Permit in accordance with OAR 20-115(2)(a)(B), summarized as follows:

> "All Indirect Sources meeting the criteria of this subsection relative to type, location, size and operation are required to apply for an Indirect Source Construction Permit:
>
> "The following sources in or within five (5) miles of the municipal boundaries of ...Portland:
>
> "Any Highway Section being proposed for construction with an anticipated annual average daily traffic volume of 20,000 or more motor vehicles per day within ten years after completion, or being modified so

[1]These alternatives include the Do-Nothing proposal, two variations of an alternative dealing with TSM improvements, a high occupancy vehicle lane alternative, an alternative for a separated busway in the Banfield corridor and a Light Rail Transit alternative which considers three corridor options.

> that the annual average daily traffic on that Highway Section will be increased to 20,000 or more motor vehicles per day or will be increased by 10,000 or more motor vehicles per day within ten years after completion."

As required in subsections 340-20-129(1)(d)(E) and (F), it was determined that the year 1983 would be the year in which the potential maximum air quality impact would occur. This determination was based on a computer analysis of carbon monoxide, hydrocarbons and lead for all study years from the estimated year of completion through the year 2003. Details of this determination are presented in the text.

Due to the complexity of future air quality predictions and the enormous quantity of supporting traffic data, substantial emphasis has been placed on the use of the computer. Pollutant emission factors from motor vehicles, a basic input to all computer models, were calculated using the computer programs EFSTOR and ALIGN8[2]. These programs employ the methodology outlined by the U.S. Environmental Protection Agency (EPA) in their publication, Supplement No. 8 for Compilation of Air Pollutant Emission Factors, AP-42; Interim Document; June, 1977. The determination of the year of potential maximum air quality impact was made using the computer program, EMCAL8[3].

[2] R. M. Wood, Oregon Department of Transportation, EFSTOR and ALIGN8; 1977. These programs are adapted from the EFACT8 program, c. R. M. Wood; EFACT8; Salem, Oregon; 1977.

[3] R. M. Wood, Oregon Department of Transportation, EMCAL8; 1977. Adaptation of EFACT8, ibid.

An assessment of regional air quality was made using the computer program TOTLEM8[4]. This program calculates total annual emissions of the three major automotive pollutants: carbon monoxide, hydrocarbons and nitrogen oxides, based on the total vehicle miles of travel in the study area and the respective pollutant emission factors obtained from ALIGN8. Additional information on data input can be found in the Total Emissions Summary section.

The structure of the air quality analysis begins with general discussions of those parameters common to all alternatives including methodology, study area, existing conditions and regulations. These discussions are followed by the analysis of regional air quality and the relative effects which the selection of particular alternatives will have on the Portland metropolitan area in general. Local impacts will be emphasized in the Final Environmental Impact Statement in order to incorporate the results of an ongoing ambient air quality monitoring program.

Study Area

Three study areas have been considered in this analysis. These areas include the Central Business District (CBD), East Portland and East Multnomah County. A more detailed description of these areas and their boundaries can be found in Volume I, Chapter I of the Draft Environmental Impact Statement. Land use in these areas varies from predominantly

[4] R. M. Wood, Oregon Department of Transportation, TOTLEM8; 1977.

industrial and commercial in the CBD to primarily residential (with commercial development along major arterials) in the easterly portion. It should be noted that wherein these study areas would be the primary areas subject to potential local air quality impacts, regional impacts could extend outside their boundaries.

Existing Air Quality

a. Regional Meteorology

The Portland area climate is fairly typical of conditions in the Willamette Valley. The weather is usually mild during both the summer and winter months. This climate, according to the study for I-205[5], is produced by marine air from the Pacific Ocean and the effects of the Coast Range 30 miles to the west. The Coast Range extracts much of the moisture from the marine air. This air is much drier by the time it reaches Portland. The Coast Range also protects the city from the more severe effects of winter storms moving in from the Pacific. The Cascade Range to the east acts as a barrier to the continental air masses of the interior Columbia Basin.

The average rainfall in the Portland area is 44 inches per year, with the greatest amount of precipitation occurring during the winter months. Approximately 88 percent of the annual rainfall occurs from October through May while the months of June and September account for

[5] I-205 Draft Environmental Impact Statement, Oregon State Highway Division, October, 1972.

nine percent and July through August receives three percent. Precipitation is primarily light and heavy rains are infrequent. Violent storms and measurable snowfall are also infrequent.

The marine air mass produces a mild climate with few temperature extremes in winter or summer. The few extremes of hot or cold temperatures that do occur are associated with an occasional push of continental air from the east through the Columbia Gorge. Winter temperatures generally range from highs in the upper 40's to lows in the mid-30's. Summer temperatures range from highs in the upper 70's to lows in the mid-50's. On the average, four days a year have temperatures below freezing, and only nine days have temperatures of 90 degrees or higher.

The Coast and Cascade Ranges effectively act as walls for the Willamette Basin. These walls prohibit low level wind movements and occasionally have a channeling effect on winds, which is an important mechanism for dispersing pollutants. These gorge winds at times bring pollutants up the Willamette Valley. Inversions act as a lid on the lower valley air resulting in a build up of pollutants. The inversions occur as frequently as nine out of ten nights during the late summer, fall and winter, and usually last half of the day. Topography and climate combine to produce a high air pollution potential in the Portland area.

b. Ambient Air Quality Monitoring

The Oregon State Highway Division is currently conducting a study to determine local meteorology and pollutant levels in the Banfield Transitway study area. A monitoring site initiated for the I-205 study is located in the eastern section of the study area and provides for continuous monitoring of all major automotive pollutants and complete meteorological conditions. This site at 89th and Main Street is considered by the DEQ to be the most reliable source of background data in the Portland area.[6] An additional continuous monitoring station has been located near the Lloyd Center complex adjacent to the Banfield corridor.

Three monitors have begun operation to collect information on background carbon monoxide in the study area. Located at 44th and Royal Ct., 54th and Multnomah, and 24th and Davis, the sites collect hourly samples from 12 noon to 12 midnight. Additional meteorological information on wind speed and direction is also being obtained from a portable weather station at 21st and Sandy.

Work is currently underway on processing and analyzing the data being collected. The results will be incorporated into the more comprehensive air quality analysis to be completed for the EIS and Indirect Source Permit application.

c. Ambient Air Pollution

Based on data compiled by the DEQ, the Portland area is experiencing violations of the 8-hour average standard for carbon monoxide, photochemical oxidants, and total suspended particulates. The levels of oxides of nitrogen and lead are both below standards and no violations are predicted.

[6] Reported in a letter from DEQ dated September 3, 1975; and in subsequent telephone conversations.

Clean Air Act Implementation Plan

After the Environmental Protection Agency's issuance of primary and secondary national ambient air quality standards for a pollutant (Table 1) each state was required to formulate an "implementation plan" to meet, maintain and enforce those standards in each air quality control region within its jurisdiction. The State of Oregon, through the Department of Environmental Quality, Environmental Quality Commission, adopted such an Implementation Plan at its January 24, 1972, meeting in Portland, after considering testimony submitted at public hearings conducted in Portland, Medford, and Eugene. Following the discussion in the Total Emissions section of this report, the basis for a determination of consistency will be discussed along with the Oregon State Highway Division's findings with regard to this issue.

Derivation of Vehicle Pollutant Emissions Factors

As stated, pollutant emission factors used in this analysis are based on the methodology presented by EPA in Supplement No. 8 (AP-42). The emission standards used have been revised to reflect the most recent values included in the Clean Air Act Amendments of 1977. Vehicle age distribution and the percent of light duty trucks were determined for Multnomah County based on data from the Department of Motor Vehicles and the Oregon Department of Transportation (ODOT), Planning Section.

Adjustments to emission factors were made in accordance with EPA methodology using ODOT Planning Section data for vehicles operating in a cold or hot transient condition.

TABLE 1

NATIONAL AIR QUALITY STANDARDS

POLLUTANT	DESCRIPTION	SAMPLING PERIOD	LOWEST CONCENTRATION FOUND TO PRODUCE ADVERSE HEALTH EFFECTS	PRIMARY STANDARD	MARGIN OF SAFETY	SECONDARY STANDARD
Sulfer Oxides	Result primarily from the combustion of sulfer containing fossil fuels. Their presence has been associated with the increased incidence of respiratory diseases, increased death rates and property damage.	Annual arithmetic mean 24-hour maximum* 3-hour maximum*	115 ug/m^3 300-1500 ug/m^3 occuring for three to four days** ---	80 ug/m^3 365 ug/m^3 ---	30% 0 to 76% ---	60 ug/m^3 260 ug/m^3 1,300 ug/m^3
Particulate Matter	Particulate matter, either solid or liquid, may originate in nature or as a result of industrial processes and other human activities. By itself or in association with other pollutants, particulate matter may injure the lungs or cause adverse effects elsewhere in the body. Particulates also reduce visibility and contribute to property damage and soiling.	Annual geometric mean 24-hour maximum*	80-100 ug/m^3** 300 ug/m^3**	75 ug/m^3 (DEQ) 60 ug/m^3 260 ug/m^3	6 to 25% 25 to 40% 13%	60 ug/m^3 150 ug/m^3
Carbon Monoxide	Carbon monoxide is a byproduct of the incomplete burning of carbon-containing fuels and of some industrial processes. The most abundant source of this pollutant is the internal combustion engine. It decreases the oxygen-carrying ability of the blood and, at levels often found in city air, may impair mental processes.	8-hour maximum* 1-hour maximum*	12-17 mg/m^3 58 mg/m^3	10 mg/m^3 40 mg/m^3	17 to 41% 31%	Same as Primary Same as Primary
Photochemical Oxidants	Photochemical oxidants are produced in the atmosphere when reactive organic substances, chiefly hydrocarbons, and nitrogen oxides are exposed to sunlight. Photochemical oxidants irritate mucous membranes, reduce resistance to respiratory infection, damage plants and contribute to the deterioration of materials.	1-hour maximum*	200 ug/m^3 (maximum daily value)	160 ug/m^3	20%	Same as Primary
Hydrocarbons	Hydrocarbons in the air come mainly from the processing, marketing and use of petroleum products. Some of the hydrocarbons combine with nitrogen oxides in the air to form photochemical oxidants. The hydrocarbons standard therefore, is for use as a guide in devising implementation plans to achieve the oxidant standard.	3-hour maximum* (measured between 6 and 9 a.m.)	Adverse health effects noted only after reaction to form photochemical oxidant.	160 ug/m^3	---	Same as Primary
NITROGEN DIOXIDE	Nitrogen oxides ususally originate in high-temperature combustion processes. The presence of nitrogen dioxide in the air has been associated with a variety of respiratory diseases. Nitrogen dioxide is essential in the natural production of photochemical oxidant.	Annual arithmetic mean	118-156 ug/m^3 (mean 24-hour concentration over six month period)	100 ug/m^3	15 to 36%	Same as Primary
Lead***	Airborne lead results primarily from automotive emissions. Symptons of mild lead intoxication include loss of appetite, drowsiness and abdominal pain. Ingestion is the prime method leading to elevated blood-lead levels. Airborne lead, by settling out, may contaminate dirt and dust thus becoming potentially harmful.	One Month Average*	---	3 ug/m^3	---	---

* Not to be exceeded more than once annually.

** Combined effect of both gaseous phase and particulate.

*** No National Standard for this pollutant exists, however DEQ has adopted a lead standard for projects in Oregon.

ug/m^3 = micrograms per cubic meter

mg/m^3 = milligrams per cubic meter

Note: EPA is at present, considering the adoption of a 1.5 ug/m^3 monthly average lead standard to be effective June, 1978.

Total Emissions Summary

Predictions of total pollutant emissions from motor vehicles for all project alternatives were made using an Oregon Department of Transportation computer program. Input data for this program included traffic data compiled for all roadways in the study area which would experience traffic volume changes due to the selection of any project alternative. In order to facilitate the operation of the program each of the three study areas were considered separately. The results for the central business district are presented in Figure 1. A link-by-link analysis of total pollutant emissions was conducted for the East Portland and East Multnomah County study areas. Moore than 125 miles of highway facilities were incorporated into the analysis. The results for these two study areas, and the composite of all the study areas, are presented in Tables 2 through 4.

Regional Air Quality Impacts

All project alternatives are associated with significant future decreases in carbon monoxide, hydrocarbons and nitrogen oxides. This is primarily due to the enforcement of the Federal Motor Vehicle Emission Control Strategy. The reduction of pollutants with time is many times greater than the differences between alternatives.

If all sources of pollution in the Portland metropolitan area are controlled to the degree that automobiles will be, under the Federal Motor Vehicle Control Strategy, existing violations of ambient air quality standards will be eliminated for the foreseeable future. All of the build alternatives are associated with fewer vehicle miles of travel than would

TABLE 2
BANFIELD TRANSITWAY STUDY
TRANSIT MALL - 102nd AVENUE

TOTAL EMISSIONS
ALL FACILITIES

PROJECT ALTERNATIVES	STUDY YEAR	CARBON MONOXIDE TONS/YR	CARBON MONOXIDE PERCENT	HYDROCARBONS TONS/YR	HYDROCARBONS PERCENT	NITROGEN OXIDES TONS/YR	NITROGEN OXIDES PERCENT
#1 DO NOTHING	1975	33227.58	100.0	4168.24	100.0	2521.32	100.0
	1983	22576.72	67.9	2435.67	58.4	2489.01	98.7
	1990	16208.80	48.8	1415.79	34.0	2325.42	92.2
#2A LCI	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	22047.82	66.4	2374.75	57.0	2443.97	96.9
	1990	15218.76	45.8	1319.80	31.7	2235.21	88.7
#2B LCI - 6 LANE	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	21644.54	65.1	2344.72	56.3	2512.56	99.7
	1990	14899.90	44.8	1289.44	30.9	2308.07	91.5
#3A EXTEND EXTG.HO	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	21928.01	66.0	2364.12	56.7	2452.80	97.3
	1990	15310.65	46.1	1329.91	31.9	2291.71	90.9
#3B SIX LANE W/HOV	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	21859.84	65.8	2372.34	56.9	2569.20	101.9
	1990	14976.78	45.1	1289.34	30.9	2373.82	94.1
#4 SEPARATED BUSWAY	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	23191.81	65.8	2446.51	56.9	2526.42	100.2
	1990	15897.93	45.1	1373.82	32.0	2317.01	91.9
#5-1 LRT	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	22952.46	65.1	2422.86	56.4	2521.75	100.0
	1990	15936.05	45.2	1377.58	32.0	2325.55	92.2
#5-2 LRT	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	21880.34	62.0	2297.69	53.5	2411.44	95.6
	1990	15596.30	44.2	1352.80	31.5	2272.28	90.1
#5-3 LRT	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	23024.92	65.3	2429.03	56.5	2541.64	100.8
	1990	16017.96	45.4	1383.26	32.2	2336.54	92.7

PERCENT SHOWS EACH POLLUTANT RELATIVE TO THE FOLLOWING
ALTERNATIVE AND YEAR #1 DO NOTHING 1975

Figure 1
Banfield Transitway
Central Business District
1990 Emissions as a Percent
of Existing Levels

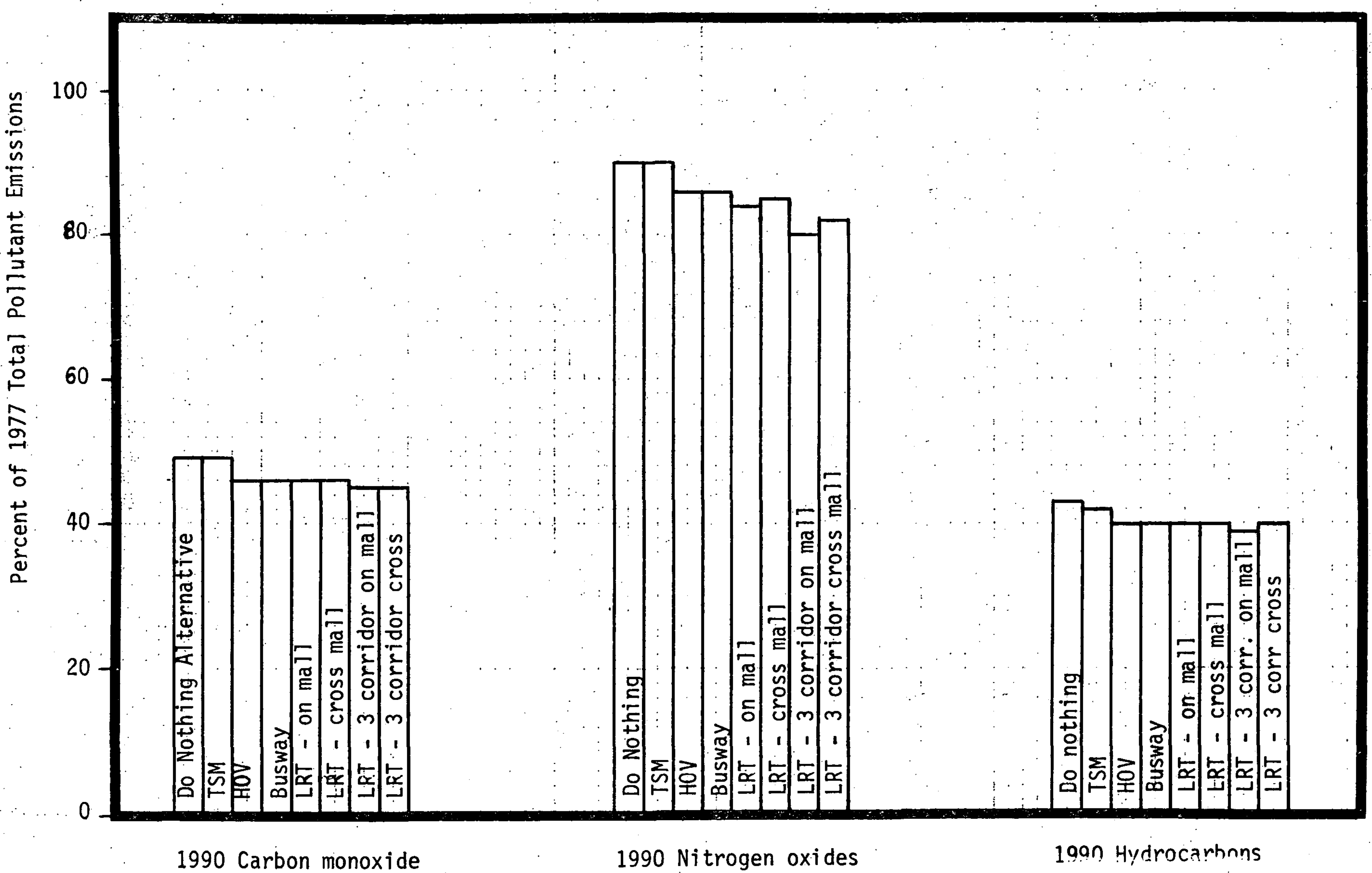


TABLE 3

BANFIELD TRANSITWAY STUDY
I-205 MAIN ST. (E. MULT)
TOTAL EMISSIONS
ALL FACILITIES

PROJECT ALTERNATIVES	STUDY YEAR	CARBON MONOXIDE TONS/YR	CARBON MONOXIDE PERCENT	HYDROCARBONS TONS/YR	HYDROCARBONS PERCENT	NITROGEN OXIDES TONS/YR	NITROGEN OXIDES PERCENT
#1 DO NOTHING	1975	26667.04	100.0	3248.27	100.0	1885.18	100.0
	1983	23982.54	89.9	2516.55	77.5	2509.99	133.1
	1990	18926.33	71.0	1659.48	51.1	2450.56	130.0
#2A LCI	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	23182.79	86.9	2440.22	75.1	2479.57	131.5
	1990	18088.88	67.8	1582.42	48.7	2416.22	128.8
#2B LCI - 6 LANE	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	23154.29	86.8	2440.11	75.1	2500.77	132.7
	1990	17864.02	67.0	1561.58	48.1	2413.29	128.0
#3A EXTEND EXTG HOV	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	23146.54	86.8	2437.92	75.1	2493.36	132.3
	1990	17948.82	67.3	1569.80	48.3	2423.90	128.6
#3B 6 LANE W/HOV	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	22985.18	86.2	2423.42	74.6	2487.49	131.9
	1990	17772.70	66.6	1554.59	47.9	2406.55	127.7
#4 SEPARATED BUSWAY	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	23562.78	88.4	2477.62	76.3	2508.47	133.1
	1990	17835.24	66.9	1559.28	48.0	2417.87	128.3
#5-1 LRT	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	23576.54	88.4	2480.30	76.4	2508.92	133.1
	1990	18032.31	67.6	1575.87	48.5	2397.87	127.2
#5-2 LRT	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	22764.64	85.4	2396.34	73.8	2455.58	130.3
	1990	17545.02	75.8	1532.63	47.2	2365.55	125.5
#5-3 LRT	1975	0.0	0.0	0.0	0.0	0.0	0.0
	1983	23803.38	89.3	24499.56	77.0	2514.14	133.4
	1990	18720.68	70.2	1640.19	50.5	2434.21	129.1

PERCENT SHOWS EACH POLLUTANT RELATIVE TO THE FOLLOWING
ALTERNATIVE AND YEAR #1 DO NOTHING 1975

TABLE 4

BANFIELD TRANSITWAY STUDY

TOTAL EMISSIONS SUMMARY
ALL FACILITIES

PROJECT ALTERNATIVES	STUDY YEAR	CARBON MONOXIDE TONS/YR	CARBON MONOXIDE PERCENT	HYDROCARBONS TONS/YR	HYDROCARBONS PERCENT	NITROGEN OXIDES TONS/YR	NITROGEN OXIDES PERCENT
#1 DO NOTHING	1975	59894.62	100.0	7416.51	100.0	4406.50	100.0
	1983	46559.26	77.7	4952.22	66.8	4999.00	113.4
	1990	35135.13	58.7	3075.27	41.5	4776.10	108.4
#2A LCI	1975	0.00	0.0	0.00	0.0	0.00	0.0
	1983	45230.61	75.5	4814.97	64.9	4923.54	111.7
	1990	33307.64	55.6	2902.22	39.1	4651.43	105.6
#2B LCI - 6 LANE	1975	0.00	0.0	0.00	0.0	0.00	0.0
	1983	44798.83	74.8	4784.83	64.5	5013.33	113.8
	1990	32763.92	54.7	2851.02	38.4	4721.36	107.1
#3A EXTEND EXTG HOV	1975	0.00	0.0	0.0	0.0	0.00	0.0
	1983	45074.55	75.3	4802.04	64.7	4946.16	112.2
	1990	33259.47	55.5	2899.71	39.1	4715.61	107.0
#3B 6 LANE W/HOV	1975	0.00	0.0	0.0	0.0	0.00	0.0
	1983	44845.02	74.9	4795.76	64.7	5056.69	114.8
	1990	32749.48	54.7	2843.93	38.3	4780.37	108.5
#4 SEPARATED BUSWAY	1975	0.00	0.0	0.0	0.0	0.00	0.0
	1983	46754.59	78.1	4924.13	66.4	5034.89	114.3
	1990	33733.17	56.3	2933.10	39.5	4734.88	107.5
#5-1 LRT	1975	0.00	0.0	0.0	0.0	0.0	0.0
	1983	46592.00	77.7	4903.16	66.1	5030.67	114.2
	1990	33968.36	56.7	2953.45	39.8	4723.42	107.2
#5-2 LRT	1975	0.00	0.0	0.0	0.0	0.0	0.0
	1983	44644.98	74.5	4694.03	63.3	4867.02	110.5
	1990	33215.86	55/5	2885.43	38.9	4637.83	105.2
#5-3 LRT	1975	0.00	0.0	0.0	0.0	0.0	0.0
	1983	46828.30	78.2	4928.70	66.5	5055.78	114.7
	1990	34738.64	58.0	3023.45	40.8	4770.75	108.3

PERCENT SHOWS EACH POLLUTANT RELATIVE TO THE FOLLOWING
ALTERNATIVE AND YEAR #1 DO NOTHING 1975

be predicted under the "Do-Nothing" alternative.[7] Reduction in vehicle travel is the key to the future assurance of clean air. At this point in time there is no hard and fast technological solution to air quality problems which would provide for an unlimited increase in gasoline powered vehicle usage. Continued enforcement of exhaust emission standards together with proper vehicle maintenance will of course mitigate air quality problems until which time increases in vehicle travel overshadow the gains made through such control strategies.

Photochemical Oxidant

Photochemical oxidant is the name generally applied to any of a considerable number of secondary pollutants, the most abundant of which is ozone. This pollutant, as well as the primary pollutants, nitrogen dioxide and certain hydrocarbons are extremely reactive and their respective concentrations are thus a function of residence time in the atmosphere, available ultraviolet energy from the sun and the presence of other air contaminants. These dependencies are in addition to source strength and meteorological conditions which affect the dispersion characteristics of all pollutants, independent of their reactivity. Although technology is improving to the point where accurate computer modeling of the photochemical

[7] Vehicle miles of travel are based on private automobile and truck usage. Transit vehicle trips were not included in this study, however, the effects of a reduction in the number of private vehicle trips resulting from increased use of public transit, are reflected in the analysis.

oxidant process may soon be possible, the most reliable method to date is the comparative evaluation of photochemical oxidant formation potential based on an assessment of total emissions.

Table 5 indicates what reduction may occur in oxidant formation potential based on reductions of the primary pollutants. Application of the results of the total emissions analysis would indicate that any project alternative may result in better than a 70 percent decrease in the oxidant potential by 1990. A slight reversal in this trend would be expected in later years assuming no additional Federal or State control measures.

In that photochemical oxidant is a regional phenomena it is difficult, if at all possible, to isolate the proposed project in the assessment of oxidant. If the control strategy for the entire Portland metropolitan area results in an equal or greater reduction in the formation potential of secondary pollutants, violations of the ambient air quality standard for oxidant will be eliminated.

TABLE 5

DECREASE IN HYDROCARBON
OXIDATION RATE

Percent Decrease in Atmospheric Hydrocarbon Concentration	Percent Decrease in Atmospheric Nitric Oxide Concentration			
	0	25	50	75
0	--	--	--	18
50	64	58	52	56
75	82	80	78	7[illegible]

SOURCE: Caplan, J.D., "Smog Chemistry Points Way to Rational Vehicle Emission Control," SAE Transactions; Vol. 74; 1966.
Results shown are based on an experimental propylene system using hydrocarbon oxidation rate as an index of smog formation, however similar trends have been noted when the ozone formation rate was used as an index.

Effects of Transit Vehicles on Regional Air Quality

Presently the emissions of carbon monoxide and hydrocarbons from diesel-powered vehicles (i.e., buses) are less than one-half those for automobiles. Since diesel fuel contains no lead, the emission of this pollutant from buses is nonexistent. Total oxides of nitrogen is the only pollutant for which 1977 factors indicate substantially higher emissions for buses. In 1977 the emissions of nitrogen oxides from buses are approximately seven times as great as automobile emissions for this pollutant.

By 1990, assuming no future controls on diesel-powered vehicles, little, if any, differences in emissions of hydrocarbons and carbon monoxide will be noted between buses and automobiles. Because of the controls on automotive emissions of nitrogen oxides, 1990 emissions of this pollutant from buses will be about ten times as great as those from automobiles. Obviously when considering pollutant emissions per vehicle mile automobiles would appear to have the upper hand in 1990; however it should be noted that buses are expected to replace automobiles on a greater than one-to-one ratio.

Transit vehicles, if powered by electricity, would have none of the gaseous pollutants attributed to diesel vehicles. If the electric power is furnished by an external source, some ozone may be generated in transmission. Electric vehicles may also emit ozone from their traction motors. Neither of these sources are believed to be significant on a local or regional level. Pollutants emitted from the power source (i.e., generating station, etc.) have not been considered in this analysis.

Determination of Worst Air Quality Year

The ten tables in Appendix A were generated by the computer program EMCAL8[8]. Traffic data was input for study years 1975, 1983, 1990 and 2000 for each alternative except light rail transit.[9] Two locations were studied to determine the potential worst year: the Banfield Freeway east of 42nd and Burnside Street east of 42nd. Numerous other locations were studied prior to the release of the latest EPA emission factors (Supplement 8) with the results forwarded to DEQ for concurrence as to the worst year. The new emission factors did not alter the previous conclusion as to the selection of 1983 as the year of maximum potential impact. Program EMCAL8 interpolates traffic parameters for each year from 1975 through 2003 and using the respective emission value, calculates pollutant source strength. This source strength is then normalized with respect to the estimated year of completion.

In that emission values for lead were not affected by the change in EPA factors, this pollutant was not included in this analysis. Due to EPA's phasedown in lead as a gasoline additive and the continued use of

[8] R. M. Wood, Oregon Department of Transportation, op. cit.

[9] Data for the LRT alternatives was not available for this phase of the air quality study. The results, to be presented in the Final Environmental Impact Statement should be about the same as Alternative 4 at the locations studied.

the catalytic convertor with unleaded gasoline, lead emissions will undergo a dramatic reduction in all future years.[10]

Figure 2 depicts the relationship of carbon-monoxide source strength to selected calendar year and alternative using the year of completion as the base year. Both locations are also identified. The relationships of hydrocarbons are similar to carbon monoxide. The source strength of nitrogen oxides in most instances shows a slight initial reduction but returns to 1983 levels or higher by the year 2000.

Local Carbon-Monoxide Predictions

Changes in specific local concentrations in the critical year, 1983, and in 1990 have been derived from the total emissions data using the computer program COSCAN[10-1]. This program uses AP-42, Supplement 8 emission factors and average daily traffic volumes reported for each link in the system to compute both the percent change in pollutant source strength and the estimated change in 8-hour carbon-monoxide concentrations. Changes in source strength for each link are shown in the output with all links exceeding a minimum confidence level noted. The roadway links noted by this process are then analyzed using a modified subroutine version of

[10] The assessment of lead emissions (or the emissions of any other pollutant) is not intended to specifically address ambient air quality standards for pollutant concentrations, but merely to give an indication of trends or relative impact potential. In the case of lead, the reduction in total emissions may not improve the relationship between predicted concentrations and the air quality standard due to the proposed adoption of a new lead standard of 1.5 ug/m^3 (monthly average). This new standard, scheduled for adoption in June, 1978, is one-half the DEQ standard presently in force. (Federal Register; Vol. 42, No. 240; Wednesday, December 14, 1977.)

[10-1] R. M. Wood, Oregon Department of Transportation; COSCAN; 1978.

AIRPOL4A[10-2]. The results of the AIRPOL4A analysis are given for a 1.2 mph wind, both parallel and at right angles to, the roadway under the influence of Pasquill atmospheric stability classes D and E. The resulting carbon-monoxide concentrations are reported at each of seven receptor locations from 10 to 160 feet from the edge of the roadway. These concentrations represent projected increases over that which would be predicted for the No-Build alternative. The results of this analysis are summarized in Table 6 for study year 1983. All values reported in this table are for an assumed receptor at 10 feet from the edge of roadway. It would appear unlikely that the selection of any alternative would result in a violation of the air quality standard for carbon monoxide at a site not expected to be in violation under the Do-Nothing alternative in 1983. Specific local impacts will be discussed after the completion of the ongoing field study.

Determination of Consistency

In a document released by the Columbia Region Association of Governments (CRAG) in June of 1975[11], the following five criteria were suggested for use in assessing the impacts of individual projects in the Transportation Improvement Program:

[10-2] Wm. A. Carpenter, et. al., Virginia Highway & Transportation Research Council; The Theory and Mathematical Development of AIRPOL-4; February, 1976.

[11] "First Annual Determination of Consistency...", Columbia Region Association of Governments; Portland, Oregon; June, 1975.

TABLE 6

COMPARISON OF 8-HOUR AVERAGE
CARBON-MONOXIDE CONCENTRATIONS
1983

		PROJECT ALTERNATIVE							
		2A	2B	3A	3B	4	5-1	5-2	5-3
East Portland	Number of Street Segments Impacted								
	Increase	40	51	41	49	47	52	51	53
	No Change	21	22	30	26	27	24	16	20
	Decrease	101	89	91	87	88	86	95	89
	Significant Increase[1]	3	10	5	13	13	8	10	7
	Maximum Predicted Increase (mg/m^3)[2]	0.8	0.7	1.0	2.9	0.7	2.0	2.0	2.0
	Location of Maximum Impact	Broadway	Broadway	Sandy	I-205	Multnomah St. & Holladay Ramp	I-205	I-205	I-205
East Multnomah County	Number of Street Segments Impacted								
	Increase	2	7	1	5	4	11	45	22
	No Change	49	42	53	44	45	21	13	42
	Decrease	37	39	34	39	39	56	30	24
	Significant Increase[1]	0	0	0	0	1	3	8	1
	Maximum Predicted Increase (mg/m^3)[2]	--------Less than 1 mg/m^3 at 10'--------				2.7	1.0	0.9	0.3
	Location of Maximum Impact	-	-	-	-	Halsey	Halsey	Halsey	NE 181st

[1] Increase in source strength is greater than 20 percent.

[2] Using a 1.2 mph wind and Pasquill D stability for a receptor at 10 feet from edge of roadway. Changes in concentrations along I-205 will be less than 1 mg/m^3 at right-of-way.

(a) "Projects must not exacerbate any existing violations of air quality standards. This does not mean that new highways or highway modifications cannot be completed until air quality standards are attained, only that proposed facilities should not increase pollutant concentrations beyond the levels that already exist.

(b) "Projects must not contribute to a violation of air quality standards for a pollutant for which no concentrations in violation of standards have been measured.

(c) "Projects must not delay the attainment of air quality standards.

(d) "Projects must not interfere with maintenance of air quality standards, once the standards are attained.

(e) "Projects must include all appropriate portions of State plans to implement air quality standards, including transportation control measures to reduce vehicle miles traveled. Other transportation control measures (such as mandatory inspection and maintenance of vehicles) to reduce pollutant emissions should be reflected in the estimation of emissions as part of the air quality analysis."

In that total pollutant emissions will be greatly reduced by the selection of any alternative, existing concentrations will not be increased beyond the levels that presently exist. Concentrations of pollutants at any particular receptor site may vary as a function of altered source-receptor geometry[12] resulting from implementation of any

[12] The relative location of a receptor site with respect to the highway pollutant source, considering height, distance, etc.

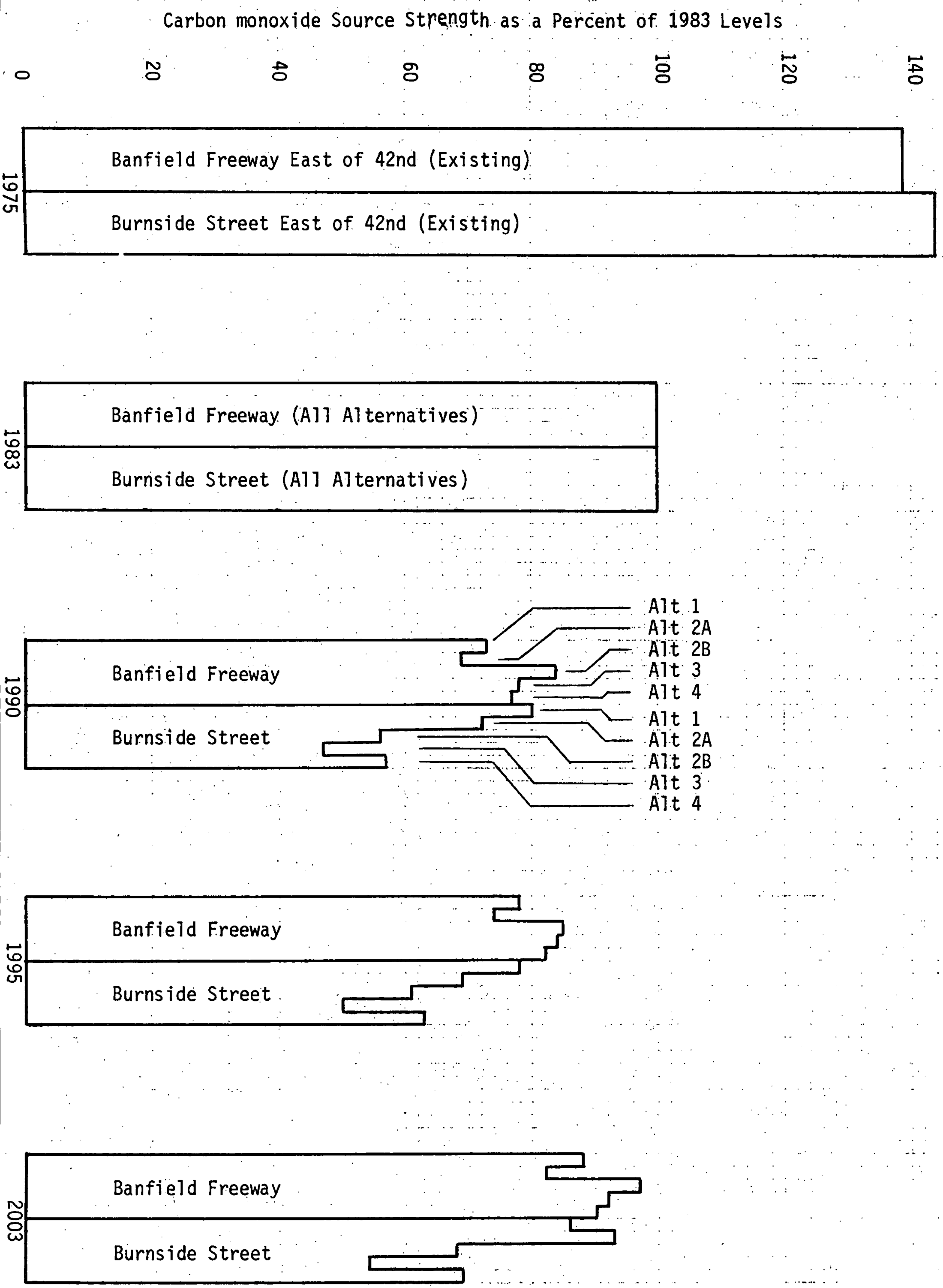


Figure 2
Carbon monoxide Source Strength at
Selected Locations

"build" alternative, but in no case is it anticipated that such alteration will result in actual pollutant concentrations exceeding those at such sites in 1977.

It is not expected that any alternative will contribute to a violation of an air quality standard for which no current violations have been measured. Based on the data from the determination of the critical air pollution year, substantial reductions in the source strength of carbon monoxide and lead have been noted at all locations studied. Due to the continued use of unleaded gasoline required by vehicles equipped with catalytic convertors and the EPA required phase-down of lead additives in gasoline, lead concentrations will be considerably below the DEQ standard of 3.0 ug/m^3 and should be less than the proposed Federal standard of 1.5 ug/m^3 (monthly averages).

All proposed alternatives, except the "Do-Nothing" alternative emphasize alternate transit forms which are effective to some degree in reducing future growth in total vehicle travel. Mandatory inspection and maintenance of vehicles was not considered in this analysis since it is not presently known how effective such a program may be in reducing emissions. Data does, however, indicate that such programs will have some positive effect on air quality.

All proposed alternatives are, in general, consistent with the CRAG criteria stated above. The ongoing monitoring program in conjunction with computer prediction modeling may indicate isolated locations with results contrary to those anticipated in this analysis. Such locations, if any, will be discussed in detail in the Final Environmental Impact

Statement. The Oregon State Highway Division has determined that all transportation systems proposed herein are consistent with the State of Oregon, Clean Air Act Implementation Plan.

Summary and Conclusions

The air quality assessment performed in conjunction with the Banfield Transitway Study consisted of two discrete comparative analyses. The comparisons included the derivation of air pollution potential as a function of calendar year and as a function of project alternative. Difficulties in assessing such relationships were noted depending on whether focus was placed on all, or only a part of the total study area; and whether particular facilities or groups of facilities were isolated in the determination of air quality impact potential. None of the alternatives considered resulted in a totally adverse nor totally beneficial change in air quality in comparison to the Do-Nothing proposal. In general, the following results were noted:

1. The future levels of air pollutants will be most notably a function of existing and proposed motor vehicle emission controls and not one of alternative selection.

2. Within the foreseeable future, the selection of any alternative, other than the Do-Nothing proposal, will lead to an additional reduction in pollution potential at receptors adjacent to arterial and local streets in the East Portland area.

3. The selection of Alternative 2A will result in an additional reduction in potential pollutant concentrations at receptors adjacent to the Banfield Freeway. All other alternatives can be associated with a lesser reduction in pollution potential along the Banfield Freeway than would be achieved with the Do-Nothing proposal.

4. Pollutant levels in the Central Business District (CBD), based on an analysis of total annual vehicle emissions, will decrease significantly by 1990. Carbon-monoxide (CO) emissions are expected to be less than one-half of present 1977 levels. A slightly larger reduction is predicted in hydrocarbon (HC) emission. All construction alternatives have emission levels for CO and HC equal to or less than the Do-Nothing proposal in 1990, however, little difference between alternatives was noted in the predictions. (All alternatives were within 5 percent for emissions of CO and HC.) Reductions from 1977 to 1990 in total annual nitrogen-oxide emissions are expected to range between 10 and 20 percent for all alternatives. The greatest reduction in this pollutant is associated with the Light Rail Transit alternatives.

5. As a result of the predicted reductions in hydrocarbon and nitrogen-oxide emissions within the CBD, a 70-percent reduction in photochemical oxidant formation potential could be realized.

6. Of the 250 highway segments analyzed for changes in local carbon-monoxide concentrations, all alternatives resulted in significantly more reductions than increases over the Do-Nothing alternative. Alternatives 2A,

3A and 5-1 resulted in the greatest number of beneficial impacts while Alternatives 5-2 and 5-3 resulted in the greatest number of adverse impacts as based on the number of street segments affected. Adverse impacts as used in this discussion do not necessarily correspond to violations of ambient air quality standards. The relationship of predicted concentrations to standards will be discussed in the Final Environmental Impact Statement after the assessment of ambient field data presently being obtained.

BANFIELD TRANSITWAY

AIR QUALITY ANALYSIS

APPENDIX A

OREGON STATE HIGHWAY DIVISION
ENVIRONMENTAL SECTION
EMCALB VERSION OF PROGRAM EFACT8
USED BY PERMISSION OF AUTHOR

TABLE 1

DETERMINATION OF CRITICAL YEAR FOR
MAXIMUM AIR QUALITY IMPACT POTENTIAL

COUNTY: MULTNOMAH
PROJECT: BANFIELD TRANSITWAY STUDY
SCREENLINE EAST OF 42ND
LOCATION: BANFIELD
ALTERNATIVE: DO NOTHING

AIR TEMPERATURE (F): 45.
HUMIDITY (GRAINS): 75.
COLD START PERCENT: 28.00
HOT START PERCENT: 27.00

YEAR	VOLUME	SPEED LD	HD	FRACTIONAL COMPONENT BY VEHICLE TYPE LDV	LDT	HDVG	HDVD	CYCLE	POLLUTANT EMISSION FACTORS HC	CO	NOX	PB	RATIO OF EMISSIONS HC	CO	NOX	PB
1975	82300.	49	49	0.7640	0.1800	0.0280	0.0280	0.0	7.40	54.95	5.82	0.0	1.71	1.39	1.04	0.0
1976	83388.	49	49	0.7631	0.1800	0.0284	0.0284	0.0	7.08	52.95	5.77	0.0	1.66	1.36	1.05	0.0
1977	84475.	48	48	0.7623	0.1800	0.0289	0.0289	0.0	6.81	51.28	5.65	0.0	1.62	1.33	1.04	0.0
1978	85563.	48	48	0.7614	0.1800	0.0293	0.0293	0.0	6.52	49.81	5.58	0.0	1.57	1.31	1.04	0.0
1979	86650.	48	48	0.7605	0.1800	0.0297	0.0297	0.0	5.69	45.45	5.75	0.0	1.38	1.21	1.08	0.0
1980	87738.	47	47	0.7596	0.1800	0.0302	0.0302	0.0	5.29	42.66	5.56	0.0	1.30	1.15	1.06	0.0
1981	88825.	47	47	0.7588	0.1800	0.0306	0.0306	0.0	4.86	39.58	5.42	0.0	1.21	1.08	1.05	0.0
1982	89913.	46	46	0.7579	0.1800	0.0311	0.0311	0.0	4.29	37.27	5.13	0.0	1.08	1.03	1.00	0.0
1983	91000.	46	46	0.7570	0.1800	0.0315	0.0315	0.0	3.91	35.72	5.06	0.0	1.00	1.00	1.00	0.0
1984	91943.	46	46	0.7561	0.1800	0.0319	0.0319	0.0	3.45	33.18	4.63	0.0	0.89	0.94	0.92	0.0
1985	92886.	45	45	0.7553	0.1800	0.0324	0.0324	0.0	3.21	31.52	4.50	0.0	0.84	0.90	0.91	0.0
1986	93828.	45	45	0.7544	0.1800	0.0328	0.0328	0.0	2.63	26.96	4.65	0.0	0.69	0.78	0.95	0.0
1987	94771.	44	44	0.7536	0.1800	0.0332	0.0332	0.0	2.51	26.22	4.54	0.0	0.67	0.76	0.93	0.0
1988	95714.	44	44	0.7527	0.1800	0.0336	0.0336	0.0	2.39	25.40	4.44	0.0	0.64	0.75	0.92	0.0
1989	96657.	43	43	0.7519	0.1800	0.0341	0.0341	0.0	2.13	24.89	4.39	0.0	0.58	0.74	0.92	0.0
1990	97600.	43	43	0.7510	0.1800	0.0345	0.0345	0.0	2.01	24.34	4.32	0.0	0.55	0.73	0.92	0.0
1991	98440.	43	43	0.7504	0.1800	0.0348	0.0348	0.0	2.01	24.37	4.33	0.0	0.56	0.74	0.93	0.0
1992	99280.	42	42	0.7498	0.1800	0.0351	0.0351	0.0	2.04	24.64	4.29	0.0	0.57	0.75	0.93	0.0
1993	100120.	42	42	0.7492	0.1800	0.0354	0.0354	0.0	2.04	24.68	4.30	0.0	0.57	0.76	0.94	0.0
1994	100960.	41	41	0.7486	0.1800	0.0357	0.0357	0.0	2.07	24.99	4.27	0.0	0.59	0.78	0.94	0.0
1995	101800.	41	41	0.7480	0.1800	0.0360	0.0360	0.0	2.07	25.03	4.28	0.0	0.59	0.78	0.95	0.0
1996	102640.	41	41	0.7474	0.1800	0.0363	0.0363	0.0	2.07	25.07	4.28	0.0	0.60	0.79	0.96	0.0
1997	103480.	40	40	0.7468	0.1800	0.0366	0.0366	0.0	2.11	25.44	4.25	0.0	0.61	0.81	0.96	0.0
1998	104320.	40	40	0.7462	0.1800	0.0369	0.0369	0.0	2.11	25.47	4.26	0.0	0.62	0.82	0.97	0.0
1999	105160.	39	39	0.7456	0.1800	0.0372	0.0372	0.0	2.14	25.89	4.23	0.0	0.63	0.84	0.97	0.0
2000	106000.	39	39	0.7450	0.1800	0.0375	0.0375	0.0	2.15	25.93	4.24	0.0	0.64	0.85	0.98	0.0
2001	106840.	39	39	0.7444	0.1800	0.0378	0.0378	0.0	2.15	25.97	4.25	0.0	0.64	0.85	0.99	0.0
2002	107680.	38	38	0.7438	0.1800	0.0381	0.0381	0.0	2.19	26.45	4.22	0.0	0.66	0.88	0.99	0.0
2003	108520.	38	38	0.7432	0.1800	0.0384	0.0384	0.0	2.19	26.48	4.22	0.0	0.67	0.88	1.00	0.0

RATIOS ARE BASED ON EMISSIONS DURING THE FIRST YEAR OF OPERATION (1983) FOR DO NOTHING
EMISSION FACTORS ARE CALCULATED USING AP-42 SUPPLEMENT 8 AND ARE EXPRESSED IN GRAMS PER MILE.

OREGON STATE HIGHWAY DIVISION
ENVIRONMENTAL SECTION
EMCALB VERSION OF PROGRAM EFACT8
USED BY PERMISSION OF AUTHOR

TABLE 2

DETERMINATION OF CRITICAL YEAR FOR
MAXIMUM AIR QUALITY IMPACT POTENTIAL

COUNTY: MULTNOMAH
PROJECT: BANFIELD TRANSITWAY STUDY
SCREENLINE EAST OF 42ND
LOCATION: BANFIELD
ALTERNATIVE: LOW COST IMPROVEMENTS

AIR TEMPERATURE (F): 45.
HUMIDITY (GRAINS): 75.
COLD START PERCENT: 28.00
HOT START PERCENT: 27.00

		SPEED		FRACTIONAL COMPONENT BY VEHICLE TYPE					POLLUTANT EMISSION FACTORS				RATIO OF EMISSIONS			
YEAR	VOLUME	LD	HD	LDV	LDT	HDVG	HDVD	CYCLE	HC	CO	NOX	PB	HC	CO	NOX	PB
1975	82300.	49	49	0.7640	0.1800	0.0280	0.0280	0.0	7.40	54.95	5.82	0.0	1.71	1.39	1.04	0.0
1976	82925.	49	49	0.7628	0.1800	0.0286	0.0286	0.0	7.08	52.96	5.77	0.0	1.65	1.35	1.04	0.0
1977	83550.	49	49	0.7615	0.1800	0.0293	0.0292	0.0	6.79	51.06	5.73	0.0	1.59	1.31	1.04	0.0
1978	84175.	48	48	0.7603	0.1800	0.0299	0.0299	0.0	6.52	49.84	5.60	0.0	1.54	1.29	1.02	0.0
1979	84800.	48	48	0.7590	0.1800	0.0305	0.0305	0.0	5.69	45.50	5.77	0.0	1.36	1.19	1.06	0.0
1980	85425.	48	48	0.7578	0.1800	0.0311	0.0311	0.0	5.27	42.47	5.66	0.0	1.26	1.12	1.05	0.0
1981	86050.	48	48	0.7565	0.1800	0.0317	0.0317	0.0	4.84	39.41	5.52	0.0	1.17	1.04	1.03	0.0
1982	86675.	47	47	0.7553	0.1800	0.0324	0.0324	0.0	4.27	37.12	5.23	0.0	1.04	0.99	0.99	0.0
1983	87300.	47	47	0.7540	0.1800	0.0330	0.0330	0.0	3.89	35.63	5.17	0.0	0.95	0.96	0.98	0.0
1984	88000.	47	47	0.7530	0.1800	0.0335	0.0335	0.0	3.43	33.13	4.74	0.0	0.85	0.90	0.91	0.0
1985	88700.	46	46	0.7520	0.1800	0.0340	0.0340	0.0	3.19	31.46	4.61	0.0	0.79	0.86	0.89	0.0
1986	89400.	46	46	0.7510	0.1800	0.0345	0.0345	0.0	2.61	27.00	4.76	0.0	0.66	0.74	0.93	0.0
1987	90100.	45	45	0.7500	0.1800	0.0350	0.0350	0.0	2.49	26.24	4.65	0.0	0.63	0.73	0.91	0.0
1988	90800.	45	45	0.7490	0.1800	0.0355	0.0355	0.0	2.38	25.44	4.55	0.0	0.61	0.71	0.90	0.0
1989	91500.	44	44	0.7480	0.1800	0.0360	0.0360	0.0	2.11	24.91	4.50	0.0	0.54	0.70	0.89	0.0
1990	92200.	44	44	0.7470	0.1800	0.0365	0.0365	0.0	1.99	24.38	4.43	0.0	0.52	0.69	0.89	0.0
1991	92980.	44	44	0.7463	0.1800	0.0368	0.0368	0.0	1.99	24.43	4.44	0.0	0.52	0.70	0.90	0.0
1992	93760.	43	43	0.7456	0.1800	0.0372	0.0372	0.0	2.02	24.66	4.40	0.0	0.53	0.71	0.90	0.0
1993	94540.	43	43	0.7449	0.1800	0.0375	0.0375	0.0	2.02	24.70	4.41	0.0	0.54	0.72	0.91	0.0
1994	95320.	43	43	0.7442	0.1800	0.0379	0.0379	0.0	2.02	24.74	4.42	0.0	0.54	0.73	0.92	0.0
1995	96100.	42	42	0.7435	0.1800	0.0382	0.0382	0.0	2.04	25.01	4.39	0.0	0.55	0.74	0.92	0.0
1996	96880.	42	42	0.7428	0.1800	0.0386	0.0386	0.0	2.04	25.06	4.40	0.0	0.56	0.75	0.93	0.0
1997	97660.	42	42	0.7421	0.1800	0.0389	0.0389	0.0	2.04	25.10	4.41	0.0	0.56	0.75	0.94	0.0
1998	98440.	42	42	0.7414	0.1800	0.0393	0.0393	0.0	2.05	25.14	4.42	0.0	0.57	0.76	0.95	0.0
1999	99220.	41	41	0.7407	0.1800	0.0396	0.0396	0.0	2.08	25.46	4.38	0.0	0.58	0.78	0.95	0.0
2000	100000.	41	41	0.7400	0.1800	0.0400	0.0400	0.0	2.08	25.51	4.39	0.0	0.58	0.78	0.95	0.0
2001	100780.	41	41	0.7393	0.1800	0.0403	0.0403	0.0	2.08	25.55	4.40	0.0	0.59	0.79	0.96	0.0
2002	101560.	40	40	0.7386	0.1800	0.0407	0.0407	0.0	2.11	25.93	4.37	0.0	0.60	0.81	0.96	0.0
2003	102340.	40	40	0.7379	0.1800	0.0410	0.0410	0.0	2.11	25.97	4.38	0.0	0.61	0.82	0.97	0.0

RATIOS ARE BASED ON EMISSIONS DURING THE FIRST YEAR OF OPERATION (1983) FOR DO NOTHING
EMISSION FACTORS ARE CALCULATED USING AP-42 SUPPLEMENT 8 AND ARE EXPRESSED IN GRAMS PER MILE.

OREGON STATE HIGHWAY DIVISION
ENVIRONMENTAL SECTION
EMCALB VERSION OF PROGRAM EFACTB
USED BY PERMISSION OF AUTHOR

TABLE 3

DETERMINATION OF CRITICAL YEAR FOR
MAXIMUM AIR QUALITY IMPACT POTENTIAL

COUNTY: MULTNOMAH
PROJECT: BANFIELD TRANSITWAY STUDY
SCREENLINE EAST OF 42ND
LOCATION: BANFIELD
ALTERNATIVE: LCI WITH MINIMUM HOV

AIR TEMPERATURE (F): 45.
HUMIDITY (GRAINS): 75.
COLD START PERCENT: 28.00
HOT START PERCENT: 27.00

		SPEED		FRACTIONAL COMPONENT BY VEHICLE TYPE					POLLUTANT EMISSION FACTORS				RATIO OF EMISSIONS			
YEAR	VOLUME	LD	HD	LDV	LDT	HDVG	HDVD	CYCLE	HC	CO	NOX	PB	HC	CO	NOX	PB
1975	82300.	49	49	0.7640	0.1800	0.0280	0.0280	0.0	7.40	54.95	5.82	0.0	1.71	1.39	1.04	0.0
1976	84013.	49	49	0.7635	0.1800	0.0282	0.0282	0.0	7.08	52.94	5.76	0.0	1.67	1.37	1.05	0.0
1977	85725.	50	50	0.7630	0.1800	0.0285	0.0285	0.0	6.76	50.78	5.77	0.0	1.63	1.34	1.07	0.0
1978	87438.	50	50	0.7625	0.1800	0.0287	0.0287	0.0	6.47	49.32	5.69	0.0	1.59	1.33	1.08	0.0
1979	89150.	51	51	0.7620	0.1800	0.0290	0.0290	0.0	5.61	44.74	5.94	0.0	1.41	1.23	1.15	0.0
1980	90863.	51	51	0.7615	0.1800	0.0292	0.0292	0.0	5.19	41.68	5.82	0.0	1.33	1.17	1.15	0.0
1981	92575.	51	51	0.7610	0.1800	0.0295	0.0295	0.0	4.77	38.58	5.68	0.0	1.24	1.10	1.14	0.0
1982	94288.	52	52	0.7605	0.1800	0.0297	0.0297	0.0	4.16	35.84	5.54	0.0	1.10	1.04	1.13	0.0
1983	96000.	52	52	0.7600	0.1800	0.0300	0.0300	0.0	3.79	34.56	5.47	0.0	1.02	1.02	1.14	0.0
1984	99057.	52	52	0.7596	0.1800	0.0302	0.0302	0.0	3.32	32.03	5.02	0.0	0.92	0.98	1.08	0.0
1985	102114.	51	51	0.7591	0.1800	0.0304	0.0304	0.0	3.08	30.43	4.84	0.0	0.88	0.96	1.07	0.0
1986	105171.	51	51	0.7587	0.1800	0.0306	0.0306	0.0	2.54	26.19	5.00	0.0	0.75	0.85	1.14	0.0
1987	108229.	51	51	0.7583	0.1800	0.0309	0.0309	0.0	2.39	25.28	4.93	0.0	0.73	0.84	1.16	0.0
1988	111286.	51	51	0.7579	0.1800	0.0311	0.0311	0.0	2.28	24.45	4.83	0.0	0.71	0.84	1.17	0.0
1989	114343.	50	50	0.7574	0.1800	0.0313	0.0313	0.0	2.01	23.83	4.73	0.0	0.64	0.84	1.17	0.0
1990	117400.	50	50	0.7570	0.1800	0.0315	0.0315	0.0	1.90	23.25	4.65	0.0	0.63	0.84	1.19	0.0
1991	117460.	50	50	0.7565	0.1800	0.0317	0.0317	0.0	1.90	23.28	4.66	0.0	0.63	0.84	1.19	0.0
1992	117520.	50	50	0.7560	0.1800	0.0320	0.0320	0.0	1.90	23.30	4.67	0.0	0.63	0.84	1.19	0.0
1993	117580.	49	49	0.7555	0.1800	0.0322	0.0322	0.0	1.91	23.40	4.60	0.0	0.63	0.85	1.17	0.0
1994	117640.	49	49	0.7550	0.1800	0.0325	0.0325	0.0	1.91	23.43	4.61	0.0	0.63	0.85	1.18	0.0
1995	117700.	49	49	0.7545	0.1800	0.0327	0.0327	0.0	1.91	23.46	4.62	0.0	0.63	0.85	1.18	0.0
1996	117760.	49	49	0.7540	0.1800	0.0330	0.0330	0.0	1.91	23.49	4.62	0.0	0.63	0.85	1.18	0.0
1997	117820.	49	49	0.7535	0.1800	0.0332	0.0332	0.0	1.91	23.52	4.63	0.0	0.63	0.85	1.19	0.0
1998	117880.	48	48	0.7530	0.1800	0.0335	0.0335	0.0	1.92	23.61	4.57	0.0	0.64	0.86	1.17	0.0
1999	117940.	48	48	0.7525	0.1800	0.0337	0.0337	0.0	1.92	23.64	4.58	0.0	0.64	0.86	1.17	0.0
2000	118000.	48	48	0.7520	0.1800	0.0340	0.0340	0.0	1.92	23.67	4.59	0.0	0.64	0.86	1.18	0.0
2001	118060.	48	48	0.7515	0.1800	0.0342	0.0342	0.0	1.92	23.70	4.60	0.0	0.64	0.86	1.18	0.0
2002	118120.	48	48	0.7510	0.1800	0.0345	0.0345	0.0	1.92	23.73	4.60	0.0	0.64	0.86	1.18	0.0
2003	118180.	47	47	0.7505	0.1800	0.0347	0.0347	0.0	1.94	23.83	4.54	0.0	0.64	0.87	1.17	0.0

RATIOS ARE BASED ON EMISSIONS DURING THE FIRST YEAR OF OPERATION (1983) FOR DO NOTHING
EMISSION FACTORS ARE CALCULATED USING AP-42 SUPPLEMENT 8 AND ARE EXPRESSED IN GRAMS PER MILE.

OREGON STATE HIGHWAY DIVISION
ENVIRONMENTAL SECTION
EMCALR VERSION OF PROGRAM EFACTR
USED BY PERMISSION OF AUTHOR

TABLE 4

DETERMINATION OF CRITICAL YEAR FOR
MAXIMUM AIR QUALITY IMPACT POTENTIAL

COUNTY: MULTNOMAH
PROJECT: BANFIELD TRANSITWAY STUDY
SCREENLINE EAST OF 42ND
LOCATION: BANFIELD
ALTERNATIVE: PREFERENTIAL HOV LANES

AIR TEMPERATURE (F): 45.
HUMIDITY (GRAINS): 75.
COLD START PERCENT: 28.00
HOT START PERCENT: 27.00

		SPEED		FRACTIONAL COMPONENT BY VEHICLE TYPE					POLLUTANT EMISSION FACTORS				RATIO OF EMISSIONS			
YEAR	VOLUME	LD	HD	LDV	LDT	HDVG	HDVD	CYCLE	HC	CO	NOX	PB	HC	CO	NOX	PB
1975	82300.	49	49	0.7640	0.1800	0.0280	0.0280	0.0	7.40	54.95	5.82	0.0	1.71	1.39	1.04	0.0
1976	84138.	49	49	0.7636	0.1800	0.0282	0.0282	0.0	7.08	52.94	5.76	0.0	1.67	1.37	1.05	0.0
1977	85975.	50	50	0.7633	0.1800	0.0284	0.0284	0.0	6.76	50.78	5.76	0.0	1.63	1.34	1.08	0.0
1978	87813.	50	50	0.7629	0.1800	0.0286	0.0286	0.0	6.47	49.31	5.68	0.0	1.59	1.33	1.08	0.0
1979	89650.	51	51	0.7625	0.1800	0.0287	0.0287	0.0	5.61	44.72	5.93	0.0	1.41	1.23	1.16	0.0
1980	91488.	51	51	0.7621	0.1800	0.0289	0.0289	0.0	5.19	41.66	5.81	0.0	1.34	1.17	1.15	0.0
1981	93325.	51	51	0.7618	0.1800	0.0291	0.0291	0.0	4.77	38.56	5.67	0.0	1.25	1.11	1.15	0.0
1982	95163.	52	52	0.7614	0.1800	0.0293	0.0293	0.0	4.16	35.81	5.52	0.0	1.11	1.05	1.14	0.0
1983	97000.	52	52	0.7610	0.1800	0.0295	0.0295	0.0	3.79	34.52	5.45	0.0	1.03	1.03	1.15	0.0
1984	99000.	52	52	0.7609	0.1800	0.0296	0.0296	0.0	3.32	31.98	4.99	0.0	0.92	0.97	1.07	0.0
1985	101000.	52	52	0.7607	0.1800	0.0296	0.0296	0.0	3.06	30.16	4.91	0.0	0.87	0.94	1.08	0.0
1986	103000.	52	52	0.7606	0.1800	0.0297	0.0297	0.0	2.52	25.94	5.06	0.0	0.73	0.82	1.13	0.0
1987	105000.	51	51	0.7604	0.1800	0.0298	0.0298	0.0	2.39	25.17	4.89	0.0	0.71	0.81	1.12	0.0
1988	107000.	51	51	0.7603	0.1800	0.0299	0.0299	0.0	2.28	24.32	4.78	0.0	0.68	0.80	1.11	0.0
1989	109000.	51	51	0.7601	0.1800	0.0299	0.0299	0.0	1.99	23.59	4.76	0.0	0.61	0.79	1.13	0.0
1990	111000.	51	51	0.7600	0.1800	0.0300	0.0300	0.0	1.88	22.98	4.68	0.0	0.59	0.78	1.13	0.0
1991	112300.	51	51	0.7596	0.1800	0.0302	0.0302	0.0	1.88	23.00	4.69	0.0	0.59	0.79	1.14	0.0
1992	113600.	51	51	0.7592	0.1800	0.0304	0.0304	0.0	1.88	23.03	4.70	0.0	0.60	0.80	1.16	0.0
1993	114900.	50	50	0.7588	0.1800	0.0306	0.0306	0.0	1.90	23.14	4.61	0.0	0.61	0.82	1.15	0.0
1994	116200.	50	50	0.7584	0.1800	0.0308	0.0308	0.0	1.90	23.17	4.62	0.0	0.62	0.83	1.17	0.0
1995	117500.	50	50	0.7580	0.1800	0.0310	0.0310	0.0	1.90	23.19	4.63	0.0	0.63	0.84	1.18	0.0
1996	118800.	50	50	0.7576	0.1800	0.0312	0.0312	0.0	1.90	23.21	4.64	0.0	0.63	0.85	1.20	0.0
1997	120100.	50	50	0.7572	0.1800	0.0314	0.0314	0.0	1.90	23.24	4.65	0.0	0.64	0.86	1.21	0.0
1998	121400.	49	49	0.7568	0.1800	0.0316	0.0316	0.0	1.91	23.33	4.57	0.0	0.65	0.87	1.21	0.0
1999	122700.	49	49	0.7564	0.1800	0.0318	0.0318	0.0	1.91	23.35	4.58	0.0	0.66	0.88	1.22	0.0
2000	124000.	49	49	0.7560	0.1800	0.0320	0.0320	0.0	1.91	23.38	4.59	0.0	0.67	0.89	1.24	0.0
2001	125300.	49	49	0.7556	0.1800	0.0322	0.0322	0.0	1.91	23.40	4.59	0.0	0.67	0.90	1.25	0.0
2002	126600.	49	49	0.7552	0.1800	0.0324	0.0324	0.0	1.91	23.42	4.60	0.0	0.68	0.91	1.27	0.0
2003	127900.	48	48	0.7548	0.1800	0.0326	0.0326	0.0	1.92	23.51	4.54	0.0	0.69	0.92	1.26	0.0

RATIOS ARE BASED ON EMISSIONS DURING THE FIRST YEAR OF OPERATION (1983) FOR DO NOTHING
EMISSION FACTORS ARE CALCULATED USING AP-42 SUPPLEMENT 8 AND ARE EXPRESSED IN GRAMS PER MILE.

TABLE 5

DETERMINATION OF CRITICAL YEAR FOR
MAXIMUM AIR QUALITY IMPACT POTENTIAL

COUNTY: MULTNOMAH
PROJECT: BANFIELD TRANSITWAY STUDY
SCREENLINE EAST OF 42ND
LOCATION: BANFIELD
ALTERNATIVE: SEPERATED BUSWAY

AIR TEMPERATURE (F): 45.
HUMIDITY (GRAINS): 75.
COLD START PERCENT: 28.00
HOT START PERCENT: 27.00

		SPEED		FRACTIONAL COMPONENT BY VEHICLE TYPE					POLLUTANT EMISSION FACTORS				RATIO OF EMISSIONS			
YEAR	VOLUME	LD	HD	LDV	LDT	HDVG	HDVD	CYCLE	HC	CO	NOX	PB	HC	CO	NOX	PB
1975	82300.	49	49	0.7640	0.1800	0.0280	0.0280	0.0	7.40	54.95	5.82	0.0	1.71	1.39	1.04	0.0
1976	84013.	50	50	0.7635	0.1800	0.0282	0.0282	0.0	7.05	52.71	5.83	0.0	1.66	1.36	1.06	0.0
1977	85725.	50	50	0.7630	0.1800	0.0285	0.0285	0.0	6.76	50.78	5.77	0.0	1.63	1.34	1.07	0.0
1978	87438.	51	51	0.7625	0.1800	0.0287	0.0287	0.0	6.44	49.09	5.77	0.0	1.58	1.32	1.10	0.0
1979	89150.	51	51	0.7620	0.1800	0.0290	0.0290	0.0	5.61	44.74	5.94	0.0	1.41	1.23	1.15	0.0
1980	90863.	52	52	0.7615	0.1800	0.0292	0.0292	0.0	5.17	41.43	5.91	0.0	1.32	1.16	1.17	0.0
1981	92575.	52	52	0.7610	0.1800	0.0295	0.0295	0.0	4.75	38.31	5.78	0.0	1.24	1.09	1.16	0.0
1982	94288.	53	53	0.7605	0.1800	0.0297	0.0297	0.0	4.13	35.51	5.65	0.0	1.09	1.03	1.16	0.0
1983	96000.	53	53	0.7600	0.1800	0.0300	0.0300	0.0	3.76	34.29	5.58	0.0	1.01	1.01	1.17	0.0
1984	97714.	53	53	0.7597	0.1800	0.0301	0.0301	0.0	3.30	31.74	5.12	0.0	0.90	0.95	1.09	0.0
1985	99429.	52	52	0.7594	0.1800	0.0303	0.0303	0.0	3.06	30.21	4.93	0.0	0.86	0.92	1.07	0.0
1986	101143.	52	52	0.7591	0.1800	0.0304	0.0304	0.0	2.52	26.01	5.09	0.0	0.72	0.81	1.12	0.0
1987	102857.	51	51	0.7589	0.1800	0.0306	0.0306	0.0	2.39	25.25	4.92	0.0	0.69	0.80	1.10	0.0
1988	104571.	51	51	0.7586	0.1800	0.0307	0.0307	0.0	2.28	24.42	4.81	0.0	0.67	0.79	1.09	0.0
1989	106286.	50	50	0.7583	0.1800	0.0309	0.0309	0.0	2.01	23.79	4.71	0.0	0.60	0.78	1.09	0.0
1990	108000.	50	50	0.7580	0.1800	0.0310	0.0310	0.0	1.90	23.19	4.63	0.0	0.58	0.77	1.09	0.0
1991	109080.	50	50	0.7575	0.1800	0.0312	0.0312	0.0	1.90	23.22	4.64	0.0	0.58	0.78	1.10	0.0
1992	110160.	49	49	0.7570	0.1800	0.0315	0.0315	0.0	1.91	23.32	4.57	0.0	0.59	0.79	1.09	0.0
1993	111240.	49	49	0.7565	0.1800	0.0317	0.0317	0.0	1.91	23.35	4.58	0.0	0.60	0.80	1.11	0.0
1994	112320.	49	49	0.7560	0.1800	0.0320	0.0320	0.0	1.91	23.38	4.59	0.0	0.60	0.81	1.12	0.0
1995	113400.	48	48	0.7555	0.1800	0.0322	0.0322	0.0	1.92	23.47	4.52	0.0	0.61	0.82	1.11	0.0
1996	114480.	48	48	0.7550	0.1800	0.0325	0.0325	0.0	1.92	23.50	4.53	0.0	0.62	0.83	1.13	0.0
1997	115560.	48	48	0.7545	0.1800	0.0327	0.0327	0.0	1.92	23.53	4.54	0.0	0.62	0.84	1.14	0.0
1998	116640.	48	48	0.7540	0.1800	0.0330	0.0330	0.0	1.92	23.56	4.55	0.0	0.63	0.85	1.15	0.0
1999	117720.	47	47	0.7535	0.1800	0.0332	0.0332	0.0	1.94	23.65	4.49	0.0	0.64	0.86	1.15	0.0
2000	118800.	47	47	0.7530	0.1800	0.0335	0.0335	0.0	1.94	23.68	4.50	0.0	0.65	0.87	1.16	0.0
2001	119880.	47	47	0.7525	0.1800	0.0337	0.0337	0.0	1.94	23.71	4.51	0.0	0.65	0.87	1.17	0.0
2002	120960.	46	46	0.7520	0.1800	0.0340	0.0340	0.0	1.95	23.83	4.46	0.0	0.66	0.89	1.17	0.0
2003	122040.	46	46	0.7515	0.1800	0.0342	0.0342	0.0	1.95	23.86	4.46	0.0	0.67	0.90	1.18	0.0

RATIOS ARE BASED ON EMISSIONS DURING THE FIRST YEAR OF OPERATION (1983) FOR DO NOTHING
EMISSION FACTORS ARE CALCULATED USING AP-42 SUPPLEMENT 8 AND ARE EXPRESSED IN GRAMS PER MILE.

OREGON STATE HIGHWAY DIVISION
ENVIRONMENTAL SECTION
EMCAL8 VERSION OF PROGRAM EFACTR
USED BY PERMISSION OF AUTHOR

TABLE 6

DETERMINATION OF CRITICAL YEAR FOR
MAXIMUM AIR QUALITY IMPACT POTENTIAL

COUNTY: MULTNOMAH
PROJECT: BANFIELD TRANSITWAY STUDY
SCREENLINE EAST OF 42ND
LOCATION: BURNSIDE
ALTERNATIVE: DO NOTHING

AIR TEMPERATURE (F): 45.
HUMIDITY (GRAINS): 75.
COLD START PERCENT: 28.00
HOT START PERCENT: 27.00

YEAR	VOLUME	SPEED LD	SPEED HD	FRACTIONAL COMPONENT BY VEHICLE TYPE LDV	LDT	HDVG	HDVD	CYCLE	POLLUTANT EMISSION FACTORS HC	CO	NOX	PB	RATIO OF EMISSIONS HC	CO	NOX	PB
1975	17000.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	9.07	74.85	4.78	0.0	1.67	1.44	1.15	0.0
1976	17150.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	8.68	72.23	4.68	0.0	1.61	1.40	1.13	0.0
1977	17300.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	8.32	69.67	4.58	0.0	1.56	1.36	1.12	0.0
1978	17450.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	7.98	67.75	4.47	0.0	1.51	1.33	1.10	0.0
1979	17600.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	7.10	61.99	4.61	0.0	1.35	1.23	1.14	0.0
1980	17750.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	6.73	60.19	4.42	0.0	1.30	1.21	1.11	0.0
1981	17900.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	6.18	55.88	4.24	0.0	1.20	1.13	1.07	0.0
1982	18050.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	5.51	51.79	4.01	0.0	1.08	1.05	1.02	0.0
1983	18200.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	5.07	48.69	3.90	0.0	1.00	1.00	1.00	0.0
1984	18786.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	4.59	45.17	3.51	0.0	0.94	0.96	0.93	0.0
1985	19371.	28	28	0.7900	0.1800	0.0150	0.0150	0.0	4.37	43.63	3.39	0.0	0.92	0.95	0.93	0.0
1986	19957.	28	28	0.7900	0.1800	0.0150	0.0150	0.0	3.50	35.98	3.49	0.0	0.76	0.81	0.98	0.0
1987	20543.	28	28	0.7900	0.1800	0.0150	0.0150	0.0	3.33	34.49	3.43	0.0	0.74	0.80	0.99	0.0
1988	21129.	28	28	0.7900	0.1800	0.0150	0.0150	0.0	3.20	33.13	3.33	0.0	0.73	0.79	0.99	0.0
1989	21714.	27	27	0.7900	0.1800	0.0150	0.0150	0.0	2.98	32.98	3.27	0.0	0.70	0.81	1.00	0.0
1990	22300.	27	27	0.7900	0.1800	0.0150	0.0150	0.0	2.86	31.73	3.20	0.0	0.69	0.80	1.01	0.0
1991	22580.	27	27	0.7900	0.1800	0.0150	0.0150	0.0	2.86	31.73	3.20	0.0	0.70	0.81	1.02	0.0
1992	22860.	27	27	0.7900	0.1800	0.0150	0.0150	0.0	2.86	31.73	3.20	0.0	0.71	0.82	1.03	0.0
1993	23140.	27	27	0.7900	0.1800	0.0150	0.0150	0.0	2.86	31.73	3.20	0.0	0.72	0.83	1.04	0.0
1994	23420.	27	27	0.7900	0.1800	0.0150	0.0150	0.0	2.86	31.73	3.20	0.0	0.73	0.84	1.06	0.0
1995	23700.	26	26	0.7900	0.1800	0.0150	0.0150	0.0	2.96	32.74	3.15	0.0	0.76	0.88	1.05	0.0
1996	23980.	26	26	0.7900	0.1800	0.0150	0.0150	0.0	2.96	32.74	3.15	0.0	0.77	0.89	1.07	0.0
1997	24260.	26	26	0.7900	0.1800	0.0150	0.0150	0.0	2.96	32.74	3.15	0.0	0.78	0.90	1.08	0.0
1998	24540.	26	26	0.7900	0.1800	0.0150	0.0150	0.0	2.96	32.74	3.15	0.0	0.79	0.91	1.09	0.0
1999	24820.	26	26	0.7900	0.1800	0.0150	0.0150	0.0	2.96	32.74	3.15	0.0	0.80	0.92	1.10	0.0
2000	25100.	26	26	0.7900	0.1800	0.0150	0.0150	0.0	2.96	32.74	3.15	0.0	0.80	0.93	1.12	0.0
2001	25380.	26	26	0.7900	0.1800	0.0150	0.0150	0.0	2.96	32.74	3.15	0.0	0.81	0.94	1.13	0.0
2002	25660.	26	26	0.7900	0.1800	0.0150	0.0150	0.0	2.96	32.74	3.15	0.0	0.82	0.95	1.14	0.0
2003	25940.	26	26	0.7900	0.1800	0.0150	0.0150	0.0	2.96	32.74	3.15	0.0	0.83	0.96	1.15	0.0

RATIOS ARE BASED ON EMISSIONS DURING THE FIRST YEAR OF OPERATION (1983) FOR DO NOTHING
EMISSION FACTORS ARE CALCULATED USING AP-42 SUPPLEMENT 8 AND ARE EXPRESSED IN GRAMS PER MILE.

OREGON STATE HIGHWAY DIVISION
ENVIRONMENTAL SECTION
EMCALB VERSION OF PROGRAM EFACTB
USED BY PERMISSION OF AUTHOR

TABLE 7

DETERMINATION OF CRITICAL YEAR FOR
MAXIMUM AIR QUALITY IMPACT POTENTIAL

COUNTY: MULTNOMAH
PROJECT: BANFIELD TRANSITWAY STUDY
SCREENLINE EAST OF 42ND
LOCATION: BURNSIDE
ALTERNATIVE: LOW COST IMPROVEMENTS

AIR TEMPERATURE (F): 45.
HUMIDITY (GRAINS): 75.
COLD START PERCENT: 28.00
HOT START PERCENT: 27.00

		SPEED		FRACTIONAL COMPONENT BY VEHICLE TYPE					POLLUTANT EMISSION FACTORS				RATIO OF EMISSIONS			
YEAR	VOLUME	LD	HD	LDV	LDT	HDVG	HDVD	CYCLE	HC	CO	NOX	PB	HC	CO	NOX	PB
1975	17000.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	9.07	74.85	4.78	0.0	1.67	1.44	1.15	0.0
1976	17150.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	8.68	72.23	4.68	0.0	1.61	1.40	1.13	0.0
1977	17300.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	8.32	69.67	4.58	0.0	1.56	1.36	1.12	0.0
1978	17450.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	7.98	67.75	4.47	0.0	1.51	1.33	1.10	0.0
1979	17600.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	7.10	61.99	4.61	0.0	1.35	1.23	1.14	0.0
1980	17750.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	6.73	60.19	4.42	0.0	1.30	1.21	1.11	0.0
1981	17900.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	6.18	55.88	4.24	0.0	1.20	1.13	1.07	0.0
1982	18050.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	5.51	51.79	4.01	0.0	1.08	1.05	1.02	0.0
1983	18200.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	5.07	48.69	3.90	0.0	1.00	1.00	1.00	0.0
1984	18557.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	4.59	45.17	3.51	0.0	0.92	0.95	0.92	0.0
1985	18914.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	4.25	42.25	3.43	0.0	0.87	0.90	0.92	0.0
1986	19271.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	3.41	34.86	3.54	0.0	0.71	0.76	0.96	0.0
1987	19629.	28	28	0.7900	0.1800	0.0150	0.0150	0.0	3.33	34.49	3.43	0.0	0.71	0.76	0.95	0.0
1988	19986.	28	28	0.7900	0.1800	0.0150	0.0150	0.0	3.20	33.13	3.33	0.0	0.69	0.75	0.94	0.0
1989	20343.	28	28	0.7900	0.1800	0.0150	0.0150	0.0	2.89	31.95	3.31	0.0	0.64	0.73	0.95	0.0
1990	20700.	28	28	0.7900	0.1800	0.0150	0.0150	0.0	2.78	30.76	3.24	0.0	0.62	0.72	0.95	0.0
1991	20990.	28	28	0.7900	0.1800	0.0150	0.0150	0.0	2.78	30.76	3.24	0.0	0.63	0.73	0.96	0.0
1992	21280.	28	28	0.7900	0.1800	0.0150	0.0150	0.0	2.78	30.76	3.24	0.0	0.64	0.74	0.97	0.0
1993	21570.	27	27	0.7900	0.1800	0.0150	0.0150	0.0	2.86	31.73	3.20	0.0	0.67	0.77	0.97	0.0
1994	21860.	27	27	0.7900	0.1800	0.0150	0.0150	0.0	2.86	31.73	3.20	0.0	0.68	0.78	0.99	0.0
1995	22150.	27	27	0.7900	0.1800	0.0150	0.0150	0.0	2.86	31.73	3.20	0.0	0.69	0.79	1.00	0.0
1996	22440.	27	27	0.7900	0.1800	0.0150	0.0150	0.0	2.86	31.73	3.20	0.0	0.70	0.80	1.01	0.0
1997	22730.	27	27	0.7900	0.1800	0.0150	0.0150	0.0	2.86	31.73	3.20	0.0	0.71	0.81	1.02	0.0
1998	23020.	26	26	0.7900	0.1800	0.0150	0.0150	0.0	2.96	32.74	3.15	0.0	0.74	0.85	1.02	0.0
1999	23310.	26	26	0.7900	0.1800	0.0150	0.0150	0.0	2.96	32.74	3.15	0.0	0.75	0.86	1.04	0.0
2000	23600.	26	26	0.7900	0.1800	0.0150	0.0150	0.0	2.96	32.74	3.15	0.0	0.76	0.87	1.05	0.0
2001	23890.	26	26	0.7900	0.1800	0.0150	0.0150	0.0	2.96	32.74	3.15	0.0	0.77	0.88	1.06	0.0
2002	24180.	26	26	0.7900	0.1800	0.0150	0.0150	0.0	2.96	32.74	3.15	0.0	0.78	0.89	1.08	0.0
2003	24470.	25	25	0.7900	0.1800	0.0150	0.0150	0.0	3.05	33.79	3.11	0.0	0.81	0.93	1.07	0.0

RATIOS ARE BASED ON EMISSIONS DURING THE FIRST YEAR OF OPERATION (1983) FOR DO NOTHING
EMISSION FACTORS ARE CALCULATED USING AP-42 SUPPLEMENT 8 AND ARE EXPRESSED IN GRAMS PER MILE.

TABLE 8

DETERMINATION OF CRITICAL YEAR FOR
MAXIMUM AIR QUALITY IMPACT POTENTIAL

COUNTY: MULTNOMAH
PROJECT: BANFIELD TRANSITWAY STUDY
SCREENLINE EAST OF 42ND
LOCATION: BURNSIDE
ALTERNATIVE: LCI WITH MINIMUM HOV

AIR TEMPERATURE (F): 45.
HUMIDITY (GRAINS): 75.
COLD START PERCENT: 28.00
HOT START PERCENT: 27.00

		SPEED		FRACTIONAL COMPONENT BY VEHICLE TYPE					POLLUTANT EMISSION FACTORS				RATIO OF EMISSIONS			
YEAR	VOLUME	LD	HD	LDV	LDT	HDVG	HDVD	CYCLE	HC	CO	NOX	PB	HC	CO	NOX	PB
1975	17000.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	9.07	74.85	4.78	0.0	1.67	1.44	1.15	0.0
1976	16975.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	8.68	72.23	4.68	0.0	1.60	1.38	1.12	0.0
1977	16950.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	8.32	69.67	4.58	0.0	1.53	1.33	1.10	0.0
1978	16925.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	7.98	67.75	4.47	0.0	1.47	1.29	1.07	0.0
1979	16900.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	7.10	61.99	4.61	0.0	1.30	1.18	1.10	0.0
1980	16875.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	6.59	58.34	4.47	0.0	1.21	1.11	1.06	0.0
1981	16850.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	6.05	54.15	4.29	0.0	1.11	1.03	1.02	0.0
1982	16825.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	5.39	50.18	4.05	0.0	0.98	0.95	0.96	0.0
1983	16800.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	4.95	47.22	3.94	0.0	0.90	0.90	0.93	0.0
1984	16843.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	4.47	43.75	3.55	0.0	0.82	0.83	0.84	0.0
1985	16886.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	4.14	40.94	3.47	0.0	0.76	0.78	0.83	0.0
1986	16929.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	3.32	33.79	3.58	0.0	0.61	0.65	0.85	0.0
1987	16971.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	3.16	32.39	3.51	0.0	0.58	0.62	0.84	0.0
1988	17014.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	3.03	31.13	3.41	0.0	0.56	0.60	0.82	0.0
1989	17057.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	2.72	30.02	3.39	0.0	0.50	0.58	0.82	0.0
1990	17100.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	2.62	28.94	3.32	0.0	0.49	0.56	0.80	0.0
1991	17330.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	2.62	28.94	3.32	0.0	0.49	0.57	0.81	0.0
1992	17560.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	2.62	28.94	3.32	0.0	0.50	0.57	0.82	0.0
1993	17790.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	2.62	28.94	3.32	0.0	0.51	0.58	0.83	0.0
1994	18020.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	2.62	28.94	3.32	0.0	0.51	0.59	0.84	0.0
1995	18250.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.53	0.61	0.84	0.0
1996	18480.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.54	0.62	0.85	0.0
1997	18710.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.55	0.63	0.87	0.0
1998	18940.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.55	0.64	0.88	0.0
1999	19170.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.56	0.65	0.89	0.0
2000	19400.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.57	0.65	0.90	0.0
2001	19630.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.57	0.66	0.91	0.0
2002	19860.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.58	0.67	0.92	0.0
2003	20090.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.59	0.68	0.93	0.0

RATIOS ARE BASED ON EMISSIONS DURING THE FIRST YEAR OF OPERATION (1983) FOR DO NOTHING
EMISSION FACTORS ARE CALCULATED USING AP-42 SUPPLEMENT 8 AND ARE EXPRESSED IN GRAMS PER MILE.

TABLE 9

DETERMINATION OF CRITICAL YEAR FOR MAXIMUM AIR QUALITY IMPACT POTENTIAL

COUNTY: MULTNOMAH
PROJECT: BANFIELD TRANSITWAY STUDY
SCREENLINE EAST OF 42ND
LOCATION: BURNSIDE
ALTERNATIVE: PREFERENTIAL HOV LANES

AIR TEMPERATURE (F): 45.
HUMIDITY (GRAINS): 75.
COLD START PERCENT: 28.00
HOT START PERCENT: 27.00

		SPEED		FRACTIONAL COMPONENT BY VEHICLE TYPE					POLLUTANT EMISSION FACTORS				RATIO OF EMISSIONS			
YEAR	VOLUME	LD	HD	LDV	LDT	HDVG	HDVD	CYCLE	HC	CO	NOX	PB	HC	CO	NOX	PB
1975	17000.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	9.07	74.85	4.78	0.0	1.67	1.44	1.15	0.0
1976	16775.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	8.68	72.23	4.68	0.0	1.58	1.37	1.11	0.0
1977	16550.	31	31	0.7900	0.1800	0.0150	0.0150	0.0	8.17	67.70	4.62	0.0	1.47	1.26	1.08	0.0
1978	16325.	31	31	0.7900	0.1800	0.0150	0.0150	0.0	7.83	65.82	4.52	0.0	1.39	1.21	1.04	0.0
1979	16100.	31	31	0.7900	0.1800	0.0150	0.0150	0.0	6.95	60.18	4.66	0.0	1.21	1.09	1.06	0.0
1980	15875.	31	31	0.7900	0.1800	0.0150	0.0150	0.0	6.45	56.58	4.51	0.0	1.11	1.01	1.01	0.0
1981	15650.	32	32	0.7900	0.1800	0.0150	0.0150	0.0	5.81	50.95	4.37	0.0	0.99	0.90	0.96	0.0
1982	15425.	32	32	0.7900	0.1800	0.0150	0.0150	0.0	5.16	47.21	4.13	0.0	0.86	0.82	0.90	0.0
1983	15200.	32	32	0.7900	0.1800	0.0150	0.0150	0.0	4.73	44.49	4.03	0.0	0.78	0.76	0.86	0.0
1984	15200.	32	32	0.7900	0.1800	0.0150	0.0150	0.0	4.26	41.15	3.62	0.0	0.70	0.71	0.78	0.0
1985	15200.	32	32	0.7900	0.1800	0.0150	0.0150	0.0	3.94	38.52	3.54	0.0	0.65	0.66	0.76	0.0
1986	15200.	32	32	0.7900	0.1800	0.0150	0.0150	0.0	3.16	31.82	3.66	0.0	0.52	0.55	0.78	0.0
1987	15200.	32	32	0.7900	0.1800	0.0150	0.0150	0.0	3.01	30.51	3.59	0.0	0.50	0.52	0.77	0.0
1988	15200.	32	32	0.7900	0.1800	0.0150	0.0150	0.0	2.88	29.33	3.49	0.0	0.47	0.50	0.75	0.0
1989	15200.	32	32	0.7900	0.1800	0.0150	0.0150	0.0	2.58	28.29	3.47	0.0	0.42	0.49	0.74	0.0
1990	15200.	32	32	0.7900	0.1800	0.0150	0.0150	0.0	2.47	27.31	3.39	0.0	0.41	0.47	0.73	0.0
1991	15340.	32	32	0.7900	0.1800	0.0150	0.0150	0.0	2.47	27.31	3.39	0.0	0.41	0.47	0.73	0.0
1992	15480.	32	32	0.7900	0.1800	0.0150	0.0150	0.0	2.47	27.31	3.39	0.0	0.42	0.48	0.74	0.0
1993	15620.	32	32	0.7900	0.1800	0.0150	0.0150	0.0	2.47	27.31	3.39	0.0	0.42	0.48	0.75	0.0
1994	15760.	32	32	0.7900	0.1800	0.0150	0.0150	0.0	2.47	27.31	3.39	0.0	0.42	0.49	0.75	0.0
1995	15900.	31	31	0.7900	0.1800	0.0150	0.0150	0.0	2.54	28.10	3.35	0.0	0.44	0.50	0.75	0.0
1996	16040.	31	31	0.7900	0.1800	0.0150	0.0150	0.0	2.54	28.10	3.35	0.0	0.44	0.51	0.76	0.0
1997	16180.	31	31	0.7900	0.1800	0.0150	0.0150	0.0	2.54	28.10	3.35	0.0	0.45	0.51	0.77	0.0
1998	16320.	31	31	0.7900	0.1800	0.0150	0.0150	0.0	2.54	28.10	3.35	0.0	0.45	0.52	0.77	0.0
1999	16460.	31	31	0.7900	0.1800	0.0150	0.0150	0.0	2.54	28.10	3.35	0.0	0.45	0.52	0.78	0.0
2000	16600.	31	31	0.7900	0.1800	0.0150	0.0150	0.0	2.54	28.10	3.35	0.0	0.46	0.53	0.79	0.0
2001	16740.	31	31	0.7900	0.1800	0.0150	0.0150	0.0	2.54	28.10	3.35	0.0	0.46	0.53	0.79	0.0
2002	16880.	31	31	0.7900	0.1800	0.0150	0.0150	0.0	2.54	28.10	3.35	0.0	0.47	0.54	0.80	0.0
2003	17020.	31	31	0.7900	0.1800	0.0150	0.0150	0.0	2.54	28.10	3.35	0.0	0.47	0.54	0.81	0.0

RATIOS ARE BASED ON EMISSIONS DURING THE FIRST YEAR OF OPERATION (1983) FOR DO NOTHING
EMISSION FACTORS ARE CALCULATED USING AP-42 SUPPLEMENT 8 AND ARE EXPRESSED IN GRAMS PER MILE.

OREGON STATE HIGHWAY DIVISION
ENVIRONMENTAL SECTION
EMCAL8 VERSION OF PROGRAM EFACT8
USED BY PERMISSION OF AUTHOR

TABLE 10

DETERMINATION OF CRITICAL YEAR FOR
MAXIMUM AIR QUALITY IMPACT POTENTIAL

COUNTY: MULTNOMAH
PROJECT: BANFIELD TRANSITWAY STUDY
SCREENLINE EAST OF 42ND
LOCATION: BURNSIDE
ALTERNATIVE: SEPERATED BUSWAY

AIR TEMPERATURE (F): 45.
HUMIDITY (GRAINS): 75.
COLD START PERCENT: 28.00
HOT START PERCENT: 27.00

		SPEED		FRACTIONAL COMPONENT BY VEHICLE TYPE					POLLUTANT EMISSION FACTORS				RATIO OF EMISSIONS			
YEAR	VOLUME	LD	HD	LDV	LDT	HDVG	HDVD	CYCLE	HC	CO	NOX	PB	HC	CO	NOX	PB
1975	17000.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	9.07	74.85	4.78	0.0	1.67	1.44	1.15	0.0
1976	16975.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	8.68	72.23	4.68	0.0	1.60	1.38	1.12	0.0
1977	16950.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	8.32	69.67	4.58	0.0	1.53	1.33	1.10	0.0
1978	16925.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	7.98	67.75	4.47	0.0	1.47	1.29	1.07	0.0
1979	16900.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	7.10	61.99	4.61	0.0	1.30	1.18	1.10	0.0
1980	16875.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	6.59	58.34	4.47	0.0	1.21	1.11	1.06	0.0
1981	16850.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	6.05	54.15	4.29	0.0	1.11	1.03	1.02	0.0
1982	16825.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	5.39	50.18	4.05	0.0	0.98	0.95	0.96	0.0
1983	16800.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	4.95	47.22	3.94	0.0	0.90	0.90	0.93	0.0
1984	16900.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	4.47	43.75	3.55	0.0	0.82	0.83	0.85	0.0
1985	17000.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	4.14	40.94	3.47	0.0	0.76	0.79	0.83	0.0
1986	17100.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	3.32	33.79	3.58	0.0	0.62	0.65	0.86	0.0
1987	17200.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	3.16	32.39	3.51	0.0	0.59	0.63	0.85	0.0
1988	17300.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	3.03	31.13	3.41	0.0	0.57	0.61	0.83	0.0
1989	17400.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	2.72	30.02	3.39	0.0	0.51	0.59	0.83	0.0
1990	17500.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	2.62	28.94	3.32	0.0	0.50	0.57	0.82	0.0
1991	17720.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	2.62	28.94	3.32	0.0	0.50	0.58	0.83	0.0
1992	17940.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	2.62	28.94	3.32	0.0	0.51	0.59	0.84	0.0
1993	18160.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	2.62	28.94	3.32	0.0	0.52	0.59	0.85	0.0
1994	18380.	30	30	0.7900	0.1800	0.0150	0.0150	0.0	2.62	28.94	3.32	0.0	0.52	0.60	0.86	0.0
1995	18600.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.54	0.63	0.86	0.0
1996	18820.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.55	0.63	0.87	0.0
1997	19040.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.56	0.64	0.88	0.0
1998	19260.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.56	0.65	0.89	0.0
1999	19480.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.57	0.66	0.90	0.0
2000	19700.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.58	0.66	0.91	0.0
2001	19920.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.58	0.67	0.92	0.0
2002	20140.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.59	0.68	0.93	0.0
2003	20360.	29	29	0.7900	0.1800	0.0150	0.0150	0.0	2.70	29.83	3.28	0.0	0.60	0.69	0.94	0.0

RATIOS ARE BASED ON EMISSIONS DURING THE FIRST YEAR OF OPERATION (1983) FOR DO NOTHING
EMISSION FACTORS ARE CALCULATED USING AP-42 SUPPLEMENT 8 AND ARE EXPRESSED IN GRAMS PER MILE.

NOISE RESEARCH REPORT

TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

LIST OF TABLES

LIST OF FIGURES

Introduction

This report discusses the existing and future noise levels of the study areas as measured in the field and predicted through computer models. Noise generated by public transit vehicles, roadway realignment or changes, and changes in traffic is analyzed herein and potential noise mitigation for critical receptors is suggested.

Methodology

The term environmental noise denotes the sound climate in which a person lives, eats, sleeps and works. As he moves between these, from home to work or a place of relaxation/entertainment, the noise environment is continually changing. As long as this environment accommodates his needs to communicate, listen, sleep, etc. he will usually be content. Noise being defined as "unwanted sound," is subject to human response. What may be considered as pleasing to one person may be noise to another; a rock concert or an opera: the cheering at a football game or the resident next to the football field.

Noise is designated by one of a number of descriptors such as L_{10} or L_{eq}. These terms are used to describe the amount of sound present during a period of time. The statistical descriptor L_{10} pertains to the amount or level of sound exceeded 10 percent of the time. Environmental noise is not a steady level, it fluctuates up and down, as in a vehicle pass-by. The L_{eq} descriptor averages the sound over a period of time and indicates what the steady level would be if the sound has been held constant. The descriptor used in this report is the L_{10}, unless otherwise specified.

The numerical value associated with a standard or design level is presented in terms of dBA's (decibels-A weighted). The decibel is a logarithm of the ratio of the sound intensity to a minimal reference level. The A weighting presents the value in a manner to which people can associate. The A weighting filters the sound to approximate the human ear's response to sound. The human ear normally will not detect a sound level change of less than 3 dBA outside of laboratory conditions. A 5 dBA change is normally required before a noticeable difference is experienced. A 10 dBA increase is perceived as an approximate doubling of loudness.

Descriptively a change between 0 and 5 dBA is referred to as a slight noise impact. A change from 6 to 10 dBA is a moderate impact and a change in excess of 10 dBA is considered a severe impact.

Two methods of evaluating noise generated effects and influence are employed in this report. One is the analysis of all vehicle use of the facility, the total roadway traffic. This method is used to analyze that portion of the project east of the Willamette River where the terrain, facility configuration and traffic flow characteristics facilitate this type of analysis.

The second approach is to determine and define the additive effect of vehicles by their type and volumes without a precisely known ambient. The number of vehicles by type, i.e., buses, light rail, are analyzed and their individual contribution to an ambient noise level determined. This method is used for the Downtown (CBD) evaluation where the effect of multi-storied buildings, stop and go traffic patterns and other factors make an accurate projection of a total composite noise condition impossible.

Field measurements were obtained at numerous locations as indications of the existing noise condition and where possible as a means of validating computed projections. A discussion of the field measurement methodology is included as Appendix A.

Noise Levels

The noise levels discussed in this report are the Federal Highway Administration's (FHWA) design levels from the Federal Highway Program Manual (FHPM) 7-7-3. These design levels represent a balance between the most desirable level for a particular land use and one that is economically achievable. The two design levels normally applicable to this project's study areas are the 70 dBA residential level and the 75 dBA commercial/industrial level. In areas of mixed land uses the more stringent level is normally the controlling level. Table 1 shows the relationship of the FHWA design levels to activity categories and land use.

The future noise levels of proposed project alternatives are derived from traffic data for a future design year of the facility. On this project the design year for local or city streets is 1990; for the roads on the federally-aided system (I-80N) a year 2000 figure is the projection base.

Project Alternatives and Study Areas

The Banfield Transitway project has a number of alternatives designed to improve transit between downtown Portland and east Multnomah County.

The "do-nothing" or "no-build" alternative, designated Alternative 1, is the basis for comparing the various build alternatives.

A low cost improvement (Alternative 2) is designed to improve bus line use through minimal modifications to city streets. These modifications occur in the east city area (Willamette River to I-205). The Banfield Freeway is also affected. One Alternative (2a) converts the roadway to the pre-1976 configuration, with the HOV lanes removed. The other Alternative (2b) reconstructs the freeway into a continuous six lane facility from I-5 to I-205.

TABLE 1

DESIGN NOISE LEVEL / ACTIVITY RELATIONSHIPS

Activity Category	Design Noise Levels - dBA L_{eq}	L_{10}	Description of Activity Category
A	57 (Exterior)	60 (Exterior)	Tracts of land which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, open spaces, or historic districts which are dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, and parks which are not included in Category A and residences, motels, hotels, public meeting rooms, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties or activities not included in Categories A or B above.
D	--	--	Undeveloped lands.
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: Federal-Aid Highway Program Manual
Vol. 7, Ch. 7
Sec. 3, Figure 3-1

The HOV system, Alternative 3a, uses the existing Banfield with minimum improvements. Alternative 3b reconstructs the freeway to a continuous six lane facility, two of which are for HOV use. Alternative 3c is the same as Alternative 3b but with the addition of eight-foot shoulders.

The Separated Busway (Alternative 4) requires reconstructing the Banfield Freeway facility to six lanes with shoulders and exclusive lanes for bus travel. Location of the bus lanes differs between subalternatives. Alternative 4a locates the busway between the roadway and the Union Pacific railroad line, and 4b, within the roadway median.

The Light Rail alternatives are designated as Alternative 5. The major differences are the East County termini and routes. The 5-1 alternative terminates in Gresham and uses Burnside as the route. Alternative 5-2 also ends in Gresham but uses Division Street. Alternative 5-3 terminates in the Lents district and is routed via I-205. In each alternative the Banfield Freeway is used as the "radial connector" between I-205 and destinations to the west. This requires a modification to the existing facility. Thus, a subalternative is designated--"a," a continuous six lane with no shoulders, and "b" six lanes with shoulders.

The analysis is divided into three regional areas of investigation: (1) Downtown, (2) East Portland (Willamette River to I-205) and (3) East Multnomah County (I-205 to Gresham).

The Downtown portion of the study report (the Central Business District) discusses the existing vehicle use noise condition and the effect of the proposed bus and light rail systems on those conditions.

The East Portland portion of the study discusses the various alternatives in the Banfield Freeway corridor and major city streets. Using the existing noise environment as the basis for comparison, projected noise levels resulting from each of the proposed alternatives is evaluated.

The East Multnomah County portion of the study, analyzes the effects of proposed light rail routes east of I-205 on Burnside and Division, and a light rail route from the Banfield via I-205, south to the Lents area.

Downtown Portland Study Area

Introduction

The Portland downtown area is typical of an urban central business district (CBD) with tall buildings having various uses; retail outlets, offices, hotels, apartments, and municipal functions. Roadways in the area are narrow and heavily travelled.

The City of Portland and Tri-Met have constructed a transit mall on 5th and 6th streets. To best utilize and adapt this facility for the proposed alternatives, various downtown routing schemes have been studied. These schemes function according to the type of transit mode proposed i.e., bus or a combination of buses and light rail transit. For the LRT system, the CBD approach is either on the mall or crossing the mall. On-mall routes will use Fifth Street. In the Cross-Mall option, vehicles would travel on First Street then cross the mall on Morrison and Yamhill streets.

Also considered under the LRT alternative is the effect of a three corridor transit system, Banfield, Sunset, and Oregon City. For the three corridor systems, only the downtown area is analyzed. The no-build (existing transit system) is analyzed and used as a basis for comparison.

Downtown urban noise is generally characterized by high, widely fluctuating levels. The major source of this noise is the number of types of vehicles, but other such as, ventilation or air conditioning equipment, construction and/or maintenance equipment, business activity and pedestrian activity also combine and contribute to the area's noise environment. The fluctuations are due to activities such as stop and go traffic, loading and unloading of delivery trucks, and other intermittent type operations.

Additional factors which also have an affect on the ambient downtown noise level are:

1) the combining components of source generated sound waves,

2) the effect of convection on radiation patterns,

3) the influence of directivity,

4) the reflective and/or absorbtive characteristic of adjacent structures.

Because of these variables and the complexity of the environment the analysis for the downtown deals only with the contributive effect of the number and type of the transit vehicles.

Field data was gathered and analyzed for six downtown reference sites, shown in Figure N-1. The sites were selected on the basis of their proximity to routes of, or locations affected by, the various project alternatives. While the site data is, of course, specific only to a particular point in downtown Portland, no unusual or extreme locations were included. The six locations are considered to be representative of much of the affected project area downtown.

Existing Downtown Noise Environment

Numerous attempts have been made to determine and establish the existing ambient noise environment of the downtown (CBD) area. A study was conducted prior to the construction of the Portland Mall. The Department of Environmental Quality and Oregon Department of Transportation have taken noise measurements at various locations. Figure N-2 shows the location of twenty-six measurement sites representative of typical downtown noise conditions, such as mid-block, near or between high buildings, buildings close to the streets, and at street intersections.

The measured values shown in Table 2 are indicative of the noise environment in the downtown area prior to the construction of the Portland Mall. Due to

TABLE 2

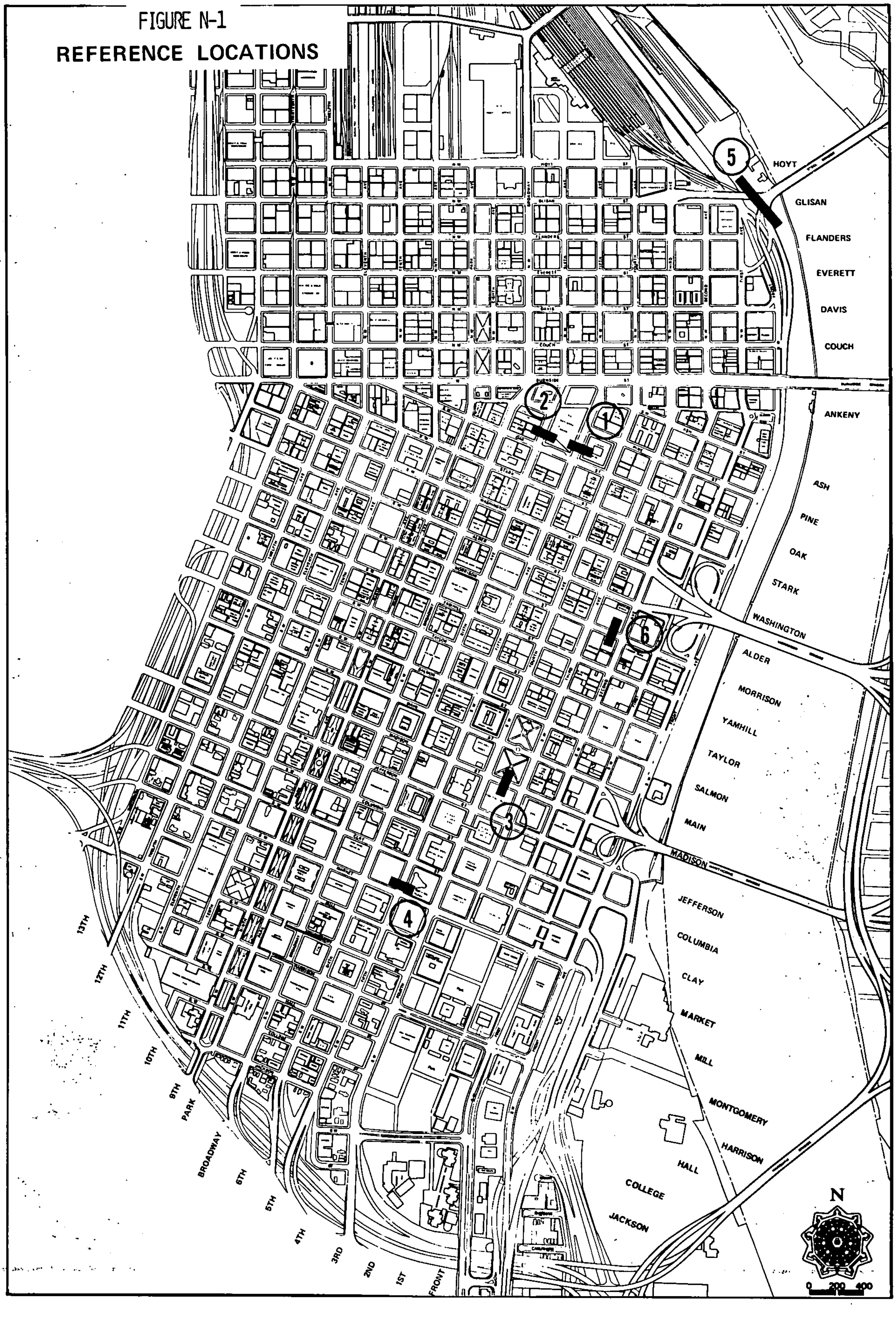
PORTLAND-DOWNTOWN MEASUREMENT SITES & VALUES

Site #		L-10
1	3rd floor fire escape on 6th between Morrison and Alder	77 dBA
2	3rd floor fire escape on 5th between Washington and Alder	79 dBA
3	3rd floor fire escape on 6th between Morrison and Alder	81 dBA
4	3rd floor fire escape on 5th between Main and Salmon	82 dBA
5	On 5th between Alder and Morrison	74 dBA
6	On 5th between Yamhill and Morrison	83 dBA
7	S.E. Corner 6th and Morrison	71 dBA
8	On 5th between Main and Salmon	78 dBA
9	On Stark between 4th and 5th	74 dBA
10	Corner of 4th and Washington	80 dBA
11	Corner of 4th and Morrison	74 dBA
12	On 4th between Main and Salmon	73 dBA
13	Corner of Broadway and Main	74 dBA
14	Corner of Broadway and Morrison	76 dBA
15	Corner of Park and Alder	74 dBA
16	On Stark between 6th and Broadway	78 dBA
17	On Flanders between 5th and 6th	65 dBA
18	On 6th between Davis and Couch	68 dBA
19	On 5th between Davis and Couch	70 dBA
20	Corner of Oak and 6th	71 dBA
21	Corner of 2nd and Morrison	70 dBA
22	Yamhill between Broadway and Park	68 dBA
23	On Yamhill between 4th and 5th	68 dBA
24	On Front between Yamhill and Taylor	72 dBA
25	On Eleventh between Main and Jefferson	70 dBA
26	On 5th between Hall and College	73 dBA

the type, number and the activity of noise sources during the measuring period, these levels vary from 68 dBA to 82 dBA. It can be assumed though, an average downtown area ambient noise level of approximately 78 occurs during the noisiest period.

The analysis of the downtown area is based on noise generated by the transit vehicles as a contribution to the average 78 dBA worst case ambient.

FIGURE N-1
REFERENCE LOCATIONS



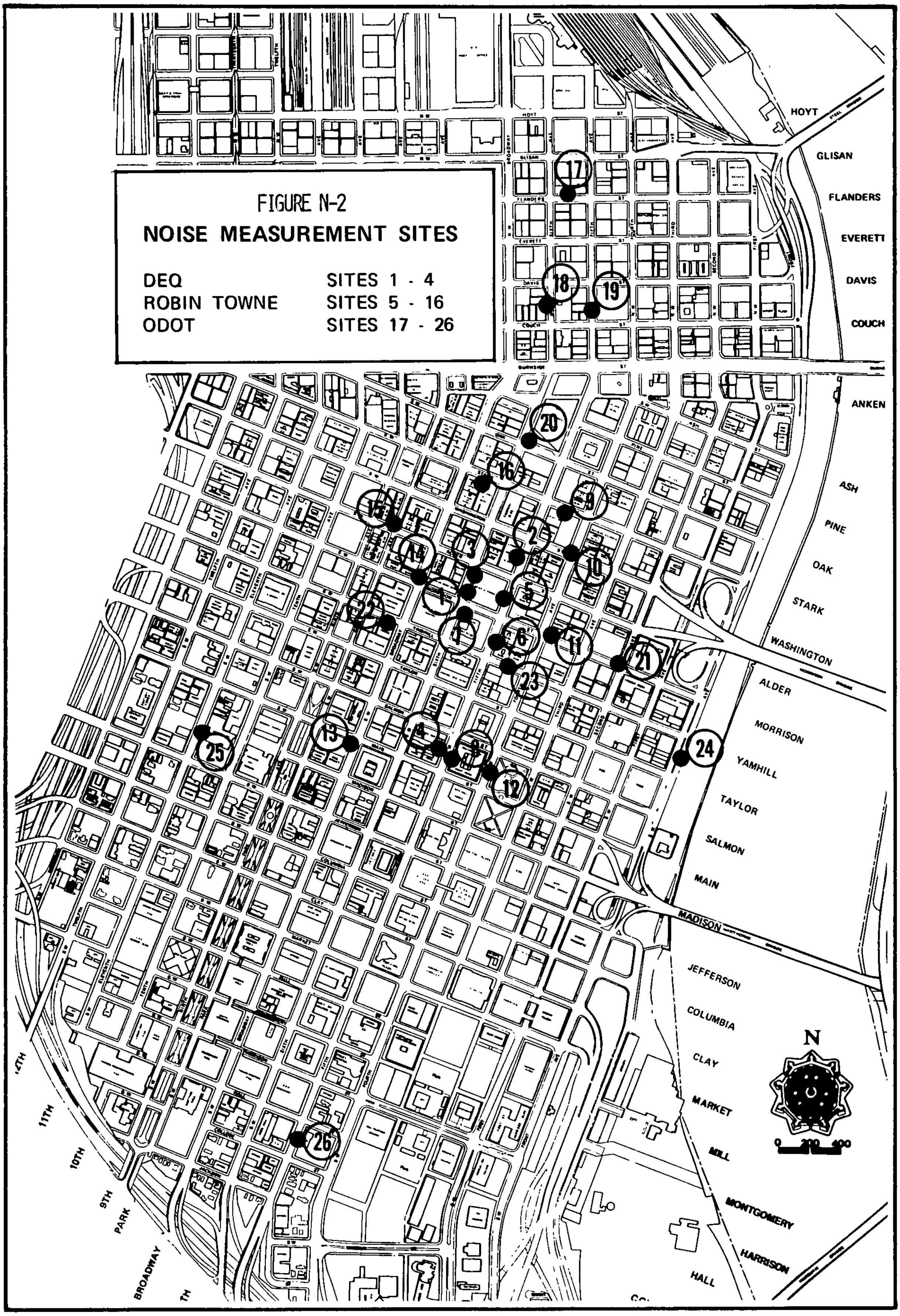


FIGURE N-2
NOISE MEASUREMENT SITES

DEQ	SITES 1 - 4
ROBIN TOWNE	SITES 5 - 16
ODOT	SITES 17 - 26

At the present (1977) noise levels directly attributable to the existing transit system at the six reference sites are:

- -Location #1 (Fifth Street near Oak) - 74 dBA
- -Location #2 (Sixth near Oak) - 70 dBA
- -Location #3 (Madison near Fourth) - 66 dBA
- -Location #4 (Fifth near Market) - 69 dBA
- -Location #5 (West end of Steel Bridge) - 66 dBA
- -Location #6 (Morrison near Second) - 68 dBA

It should be noted, again, these values represent existing bus noise, not the total ambient.

Projected Downtown Noise Levels

Using the criteria assessing only the effect of the transit vehicles, the projected (Year 1990) levels were determined for each of the alternatives at the six reference locations. These levels are shown in Table 3.

TABLE 3

L_{10} dBA NOISE LEVELS ATTRIBUTABLE TO TRANSIT VEHICLES ONLY (1990)

	REFERENCE SITE NUMBER					
FUTURE 1990 TRANSIT SYSTEM	#1	#2	#3	#4	#5	#6
No-Build	75	73	67	70	66	69
Low Cost Improvement	75	74	72	72	66	73
Busway	75	75	71	70	74	73
LRT-On Mall (Banfield)	73	72	68	72	66	70
LRT-Cross Mall (Banfield)	75	75	69	72	66	67
LRT-On Mall (3 Corridor)	44*	78	65	72	66	69
LRT-Cross Mall (3 Corridor)	74	73	64	72	66	67
EXISTING 1977 TRANSIT SYSTEM	74	70	66	69	66	68

*LRT vehicles only.

No-Build (Alternative 1). Should the existing system continue, by 1990 there would be approximately 400 buses entering and leaving the downtown area; an increase of nearly 55 buses over 1977 numbers. The noise level directly attributed to the bus volume at Location #1 is L_{10} of 75 dBA. Compared to the present level, this indicates a 1 dBA increase. Location #2 shows a 3 dBA increase. Locations 3, 4 and 6 show a 1 dBA increase and Location #5, no-change. Thus, it can be anticipated if the current transit trend continues, the downtown area will experience a 1-3 dBA increase, which is but a slight impact and often not perceptible.

Low Cost Improvements (Alternative 2a and 2b). Under the Low Cost Improvements alternative there would be about 585 buses entering and leaving the CBD, an increase of 240. The transit routing would have to be changed to handle these additional units. Using the same reference locations, levels of 1990 were obtained. These are:

- -Location #1 - Projected level of 75 dBA an increase of 1 dBA
- -Location #2 - Projected level of 74 dBA an increase of 4 dBA
- -Location #3 - Projected level of 72 dBA an increase of 5 dBA
- -Location #4 - Projected level of 72 dBA an increase of 3 dBA
- -Location #5 - Projected level of 66 dBA no change
- -Location #6 - Projected level of 73 dBA an increase of 5 dBA

These values are transit levels only. The downtown area would experience a slight noise increase of 2 to 3 dBA due to the additional buses introduced by the Low Cost Improvements alternative.

Separated Busway: (Alternative 4a and 4b). Vehicle use under the proposed busway alternative in the downtown area assumes a three corridor bus transit system, resulting in a routing pattern capable of handling about 650 buses. Therefore, the values of the six reference locations do not depict those of a Banfield only configuration. Levels projected for the six downtown locations are:

-Location #1 - Projected level of 75 dBA - an increase of 1 dBA

-Location #2 - Projected level of 75 dBA - an increase of 5 dBA

-Location #3 - Projected level of 71 dBA - an increase of 5 dBA

-Location #4 - Projected level of 70 dBA - an increase of 1 dBA

-Location #5 - Projected level of 74 dBA - an increase of 8 dBA

-Location #6 - Projected level of 73 dBA - an increase of 5 dBA

The additional buses for this system (185) will result in an average increase of 3-5 dBA for the overall area, a slight impact.

LRT (Alternative 5). The downtown impacts vary according to a number of downtown options. Under one option the Banfield corridor is the only LRT line. The second option is a three corridor LRT system which includes the Banfield as well as the Sunset and Oregon City corridors. In addition, impacts vary by the two basically different approaches to the CBD, the on-mall and the cross-mall routes. Projected vehicle noise levels are given below for each option.

1. LRT--On Mall-Banfield Corridor. Vehicle loading in the downtown area for this projection is based on the Banfield/LRT only option. Vehicle noise levels at the six reference locations are as follows:

- Location #1 - Projected level of 73 dBA - a decrease of 1 dBA
- Location #2 - Projected level of 72 dBA - an increase of 2 dBA
- Location #3 - Projected level of 68 dBA - an increase of 2 dBA
- Location #4 - Projected level of 72 dBA - an increase of 3 dBA

- Location #5 - Projected level of 66 dBA - No change
- Location #6 - Projected level of 70 dBA - an increase of 2 dBA

The general area should experience no change or an imperceptible increase of 2 dBA over existing levels.

2. LRT-Cross Mall-Banfield Corridor. Values derived are based on use of the Banfield system only. Anticipated transit vehicle levels at the six locations are:

- Location #1 - Projected level of 75 dBA - an increase of 1 dBA
- Location #2 - Projected level of 75 dBA - an increase of 5 dBA
- Location #3 - Projected level of 69 dBA - an increase of 3 dBA
- Location #4 - Projected level of 72 dBA - an increase of 3 dBA
- Location #5 - Projected level of 66 dBA - No change
- Location #6 - Projected level of 67 dBA - a decrease of 1 dBA

As in the LRT On-Mall alternative the area in general will experience only imperceptible increases of approximately 2 dBA.

3. LRT--On Mall-Three Corridor System. Vehicle routing and loadings are for a three corridor LRT system. LRT lines would run to Oregon City, in addition to using the Sunset and the Banfield Corridors

Using the same six reference locations, future levels were calculated. At Location #1 there would be a significant reduction to 44 dBA level, (projection of an approximate level is difficult since all contributing noise sources in the area have not been identified). But, when comparing the existing use of bus vehicles to the exclusive use of light rail vehicles, there is a projected reduction of approximately 30 dBA. Location #2 should experience an increase of 8 dBA, an L_{10} of 78 dBA results from the increased use and two-way bus volumes. At the other locations, levels and increase or decreases are:

- Location #3 - Projected level of 65 dBA - a decrease of 1 dBA
- Location #4 - Projected level of 72 dBA - an increase of 3 dBA
- Location #5 - Projected level of 66 dBA - No change
- Location #6 - Projected level of 69 dBA - an increase of 1 dBA.

The area in general should experience a slight 1-2 dBA reduction in noise due to the reduced number of buses and the increase of light rail vehicles.

4. <u>LRT--Cross Mall-Three Corridor System</u>. Noise levels in the immediate downtown area and the six locations will not experience a significant change. Projected level (based on vehicle type and volumes) at the six locations are:

- Location #1 - Projected level of 74 dBA - No change from existing
- Location #2 - Projected level of 73 dBA - an increase of 3 dBA
- Location #3 - Projected level of 64 dBA - a decrease of 2 dBA
- Location #4 - Projected level of 72 dBA - an increase of 3 dBA
- Location #5 - Projected level of 66 dBA - No change
- Location #6 - Projected level of 67 dBA - a decrease of 1 dBA

There should be a slight reduction in the downtown area noise of 1 dBA due to fewer buses.

Summary of Impacts and Mitigation

Presently, the noise environment in the downtown area exceeds the L_{10} 70 dBA FHWA design level in certain locations where residential types of receptors such as hotels, apartments, hospitals and schools are found. In some locations the commercial/industrial level of L_{10} 75 dBA is also exceeded. However, the projected levels, regardless of the alternative selected, will not significantly change the existing ambient noise of downtown Portland. Only a few specific locations will experience moderate to severe changes.

The configuration of the downtown does not lend itself to mitigation of noise impacts by barriers or walls. Access, pedestrian movement, delivery of goods and merchandise simply prevents this type noise attenuation. Architectural abatement (such as insulation and double-glazed windows) is the only feasible method in such a highly developed, congested area. The treatment of these buildings reduces the noise within, but does nothing for the outside, pedestrian environment. Therefore, the application of noise mitigating techniques downtown, can only be applied in very specific and special circumstances.

Mitigation may be provided for critical receptors such as schools and hospitals where excessive ambient noise exists or severe impacts are produced by a project alternative. Specific mitigation will be addressed in the final EIS for the selected alternative when more detailed design information is available.

East Portland Study Area

Introduction

The East Portland study area focuses on the project section between the Willamette River and Interstate 205. This connecting link between the Downtown and the East County area involves alternatives of the Banfield Freeway and the city streets involved in the Low Cost Improvements (LCI) alternative.

In this area the complexity of the downtown noise environment is absent and normal highway noise evaluation techniques can be applied. Guidelines approved by Federal Highway Administration require analysis of two types of noise impacts. The first is conformance to a maximum design noise level for specific land use and activity categories. The second type is an identification of the amount of increase to an existing noise environment.

The methodology of projecting and determining a noise environment used herein is the National Cooperative Highway Research Program Report (NCHRPR) 117/144 prediction model. This model computes noise levels using vehicular volumes, percent trucks, vehicular speed by type, distance from the roadway and the topography of the area.

Although, light rail vehicle noise emission levels increase with an increase in speed (Table 4), they do not exceed those of a standard auto. Therefore, the light rail vehicles are incorporated into the auto volumes when analyzing the total noise emission of the East Portland and East County areas.

TABLE 4

LIGHT RAIL VEHICLE WAYSIDE PASSBY NOISE*

Rail Car Speed (mph)	Sound Level (dBA)
0	58
10	60
20	64
30	68
40	70
50	73

*50 feet from track centerline on welded rail-ballast and tie track

SOURCE: Robert Spencer. Noise Control of the Standard Light Rail Vehicle. Boeing Vertol Co.

TABLE 5

BUS EXTERIOR NOISE LEVELS

Test Description	Distance to Measurement Point	Sound Level (dBA) Curbside of Vehicle	Sound Level (dBA) Streetside of Vehicle
Curb Idle	- 5 ft	77	--
0-5 mph, Wide Open Throttle, Rear Corner	- 5 ft	88	--
0-5 mph, Wide Open Throttle, Rear Door	- 5 ft	90	--
10 mph, Drive By	- 50 ft	66	73
30 mph, Drive By	- 50 ft	72	78
55 mph, Drive By	- 50 ft	78	87
25 mph, Acceleration	- 50 ft	75	81
50 mph, Acceleration	- 50 ft	78	86
30 mph, Deceleration	- 50 ft	71	77
55 mph, Deceleration	- 50 ft	77	84
55 mph, Coast By	- 50 ft	77	84

SOURCE: Proposed Bus Noise Emission Regulation. EPA 550/9-77-201. August, 1977.

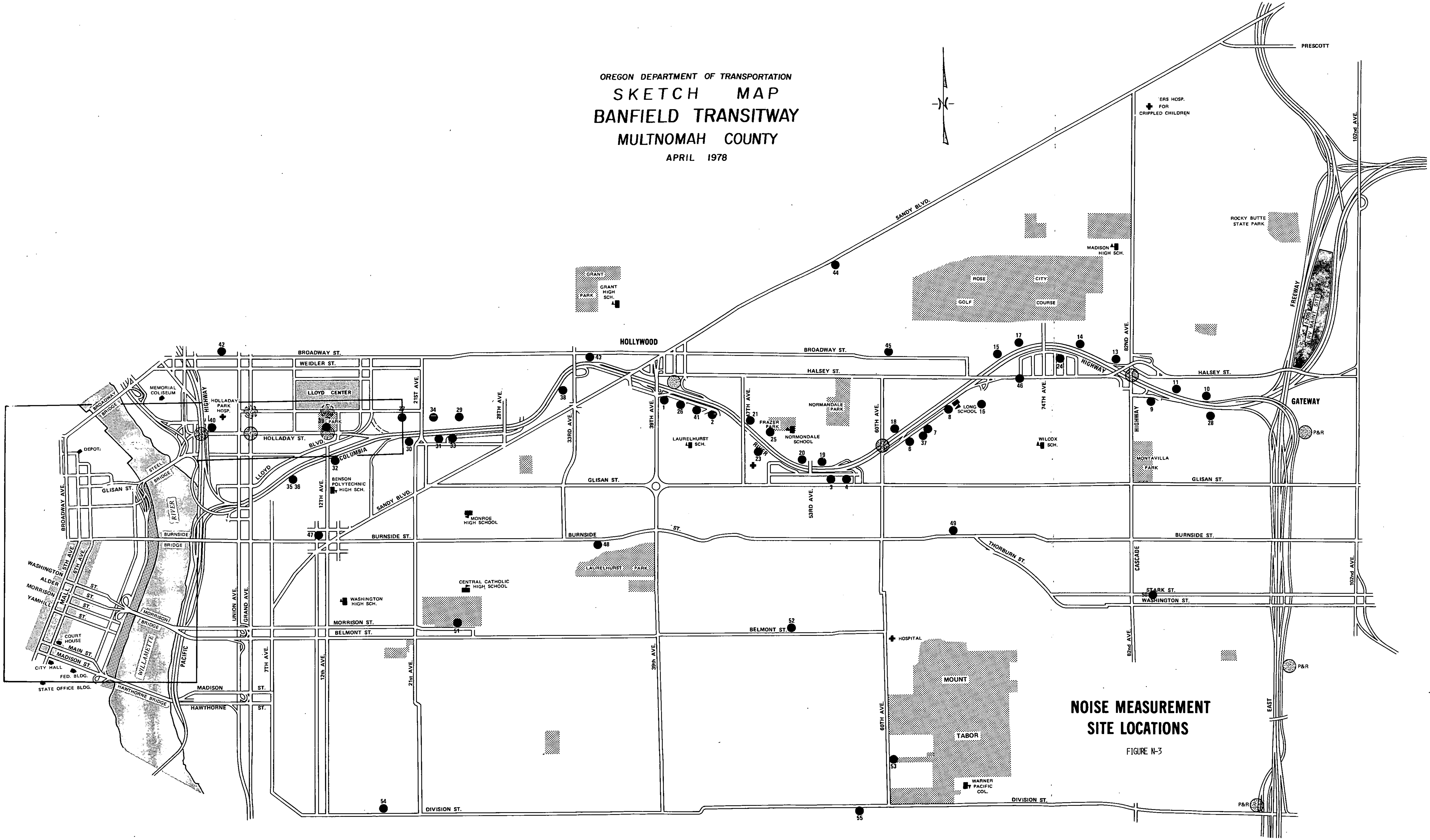
OREGON DEPARTMENT OF TRANSPORTATION

SKETCH MAP

BANFIELD TRANSITWAY

MULTNOMAH COUNTY

APRIL 1978



NOISE MEASUREMENT SITE LOCATIONS

FIGURE N-3

The bus influence in the East Portland area presents a different situation. Where bus travel is on city streets, higher emission levels are used, similar to that of trucks. On a highway, buses are somewhat quieter than trucks but due to the small percentage of buses to trucks, any noise difference would be minimal. Thus the truck emission level is also used in the Banfield corridor analysis. Bus noise emission levels are shown in Table 5.

Banfield Corridor Alternatives

The Banfield freeway meanders through varied topography, changing from a depressed section in Sullivan's Gulch to an at-grade facility near Senate Street.

Land use along the freeway varies from heavy industrial (nearer the city) to residential neighborhoods. In addition to residential properties, there are schools, churches and hospitals directly adjacent to the roadway. These are the sensitive receptors of special interest and are in turn governed by the FHWA L_{10} 70 dBA design level criteria. A generalized land use map showing areas of residential use as well as commercial and industrial use can be found in the Land Use Report (Chapter 2) as Figure P-17. Critical receptors in the East Portland and East County areas are mapped on strip charts in the Sociology Report (Chapter 3) as Figure S-15.

Existing Setting (Banfield). To establish the existing noise conditions, actual noise measurements were taken at 41 locations along the Banfield corridor. These measurement sites are mapped on Figure N-3. Measured noise levels do not always show the highest possible (worst case) levels due to the vehicular use and mix during the actual field measurement times. To convert the field measurements to worst-case conditions, a computer program is utilized along with calculated peak hour traffic.

The measured 1975 noise levels ranged from L_{10} 55 to 77 dBA. The calculated worst case levels range from 63 to 80 dBA. Both sets of noise levels are given in Table 6, along with projected (year 2000) levels. In addition levels at selected locations are graphically displayed on the map as Figure N-4.

In order to derive data on impacted receptors and the need for noise mitigation, the analysis of the existing noise levels included a determination of the L_{10} 70 dBA penetrating distance from the roadway. This value shows the distance from the outside travel lane to the location of the L_{10} 70 dBA level for present and future years.

Due to the many changes in the roadway alignment/topography, the shielding and reflecting affects of adjacent buildings, only a generalized indication of the penetrating distance is possible for the entire length of the project.

Table 7 shows the L_{10} 70 dBA penetrating distance for a number of the field measurement sites.

Projected Noise Levels (Banfield). Future (year 2000) noise level projections were made for each of the alternatives using the NCHRP 117/144 prediction method. For ease of comparison, values were calculated for the measurement site locations.

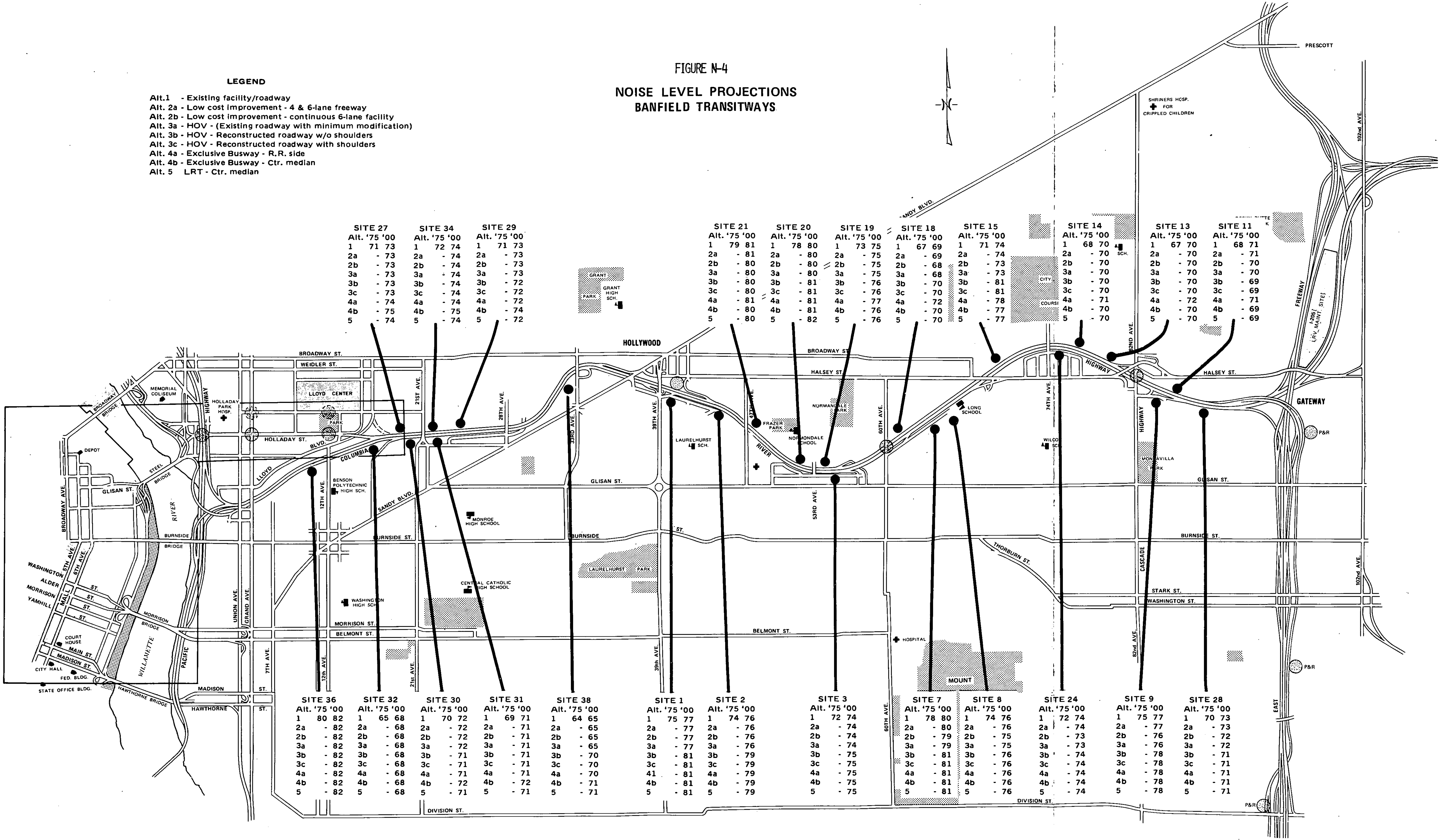
1. No Build (Alternative 1). The Banfield Freeway under the no-build (Alternative 1) reverts back to the pre-HOV configuration. Projected noise levels for the Year 2000, vary from a 68 dBA at site 32, to 82 at site 36. This data is presented in Table 6. On the average, the existing, present-day noise level will increase 2 dBA by the Year 2000. The distance from the road to the acceptable L_{10} 70 dBA level differs from 200 to 360 feet (Table 7). This

FIGURE N-4

NOISE LEVEL PROJECTIONS
BANFIELD TRANSITWAYS

LEGEND

Alt.1 - Existing facility/roadway
Alt. 2a - Low cost improvement - 4 & 6-lane freeway
Alt. 2b - Low cost improvement - continuous 6-lane facility
Alt. 3a - HOV - (Existing roadway with minimum modification)
Alt. 3b - HOV - Reconstructed roadway w/o shoulders
Alt. 3c - HOV - Reconstructed roadway with shoulders
Alt. 4a - Exclusive Busway - R.R. side
Alt. 4b - Exclusive Busway - Ctr. median
Alt. 5 LRT - Ctr. median



Alt.	SITE 27 '75 '00	SITE 34 '75 '00	SITE 29 '75 '00	SITE 21 '75 '00	SITE 20 '75 '00	SITE 19 '75 '00	SITE 18 '75 '00	SITE 15 '75 '00	SITE 14 '75 '00	SITE 13 '75 '00	SITE 11 '75 '00
1	71 73	72 74	71 73	79 81	78 80	73 75	67 69	71 74	68 70	67 70	68 71
2a	- 73	- 74	- 73	- 81	- 80	- 75	- 69	- 74	- 70	- 70	- 71
2b	- 73	- 74	- 73	- 80	- 80	- 75	- 68	- 73	- 70	- 70	- 70
3a	- 73	- 74	- 73	- 80	- 80	- 75	- 68	- 73	- 70	- 70	- 70
3b	- 73	- 74	- 72	- 80	- 81	- 76	- 70	- 81	- 70	- 70	- 69
3c	- 73	- 74	- 72	- 80	- 81	- 76	- 70	- 81	- 70	- 70	- 69
4a	- 74	- 74	- 72	- 81	- 81	- 77	- 72	- 78	- 71	- 72	- 71
4b	- 75	- 75	- 74	- 80	- 81	- 76	- 70	- 77	- 70	- 70	- 69
5	- 74	- 74	- 72	- 80	- 82	- 76	- 70	- 77	- 70	- 70	- 69

Alt.	SITE 36 '75 '00	SITE 32 '75 '00	SITE 30 '75 '00	SITE 31 '75 '00	SITE 38 '75 '00	SITE 1 '75 '00	SITE 2 '75 '00	SITE 3 '75 '00	SITE 7 '75 '00	SITE 8 '75 '00	SITE 24 '75 '00	SITE 9 '75 '00	SITE 28 '75 '00
1	80 82	65 68	70 72	69 71	64 65	75 77	74 76	72 74	78 80	74 76	72 74	75 77	70 73
2a	- 82	- 68	- 72	- 71	- 65	- 77	- 76	- 74	- 80	- 76	- 74	- 77	- 73
2b	- 82	- 68	- 72	- 71	- 65	- 77	- 76	- 74	- 79	- 75	- 73	- 76	- 72
3a	- 82	- 68	- 72	- 71	- 65	- 77	- 76	- 74	- 79	- 75	- 73	- 76	- 72
3b	- 82	- 68	- 71	- 71	- 70	- 81	- 79	- 75	- 81	- 76	- 74	- 78	- 71
3c	- 82	- 68	- 71	- 71	- 70	- 81	- 79	- 75	- 81	- 76	- 74	- 78	- 71
4a	- 82	- 68	- 71	- 71	- 70	- 81	- 79	- 75	- 81	- 76	- 74	- 78	- 71
4b	- 82	- 68	- 72	- 72	- 71	- 81	- 79	- 75	- 81	- 76	- 74	- 78	- 71
5	- 82	- 68	- 71	- 71	- 71	- 81	- 79	- 75	- 81	- 76	- 74	- 78	- 71

TABLE 6

BANFIELD CORRIDOR
EXISTING AND PROJECTED NOISE LEVELS

Site Number	Location	Measured L10 level	Calculated Worst Case Hourly L10 1975	Calculated Worst Case Hourly L10 2000
# 1	Church Parking Lot 39th and Senate	71 dBA	75 dBA	77 dBA
# 2	Hasslo and Senate 125' W. of 44th	69 dBA	74 dBA	76 dBA
# 3	55th and Hoyt	69 dBA	72 dBA	74 dBA
# 4	Hoyt Street 100 ft. W. of 57th	71 dBA	74 dBA	76 dBA
# 6	Willow Street 450 ft. E. of 60th	75 dBA	79 dBA	81 dBA
# 7	Willow Street 200 ft. W. of 64th	75 dBA	78 dBA	80 dBA
# 8	Corner of Willow and 65th	70 dBA	74 dBA	76 dBA
# 9	Wasco Street 200 ft. W. of 84th	69 dBA	75 dBA	77 dBA
#10	Corner of Wasco and 88th	69 dBA	74 dBA	77 dBA
#11	Near Clackamas and 85th	66 dBA	67 dBA	70 dBA
#13	1634 80th Street	62 dBA	67 dBA	70 dBA
#14	1908 77th Street	64 dBA	68 dBA	70 dBA
#15	Lanai Apts. - On Broadway	68 dBA	71 dBA	74 dBA
#16	Rose Marie Apts.	68 dBA	71 dBA	74 dBA
#17	72nd and Broadway	59 dBA	63 dBA	65 dBA
#18	61st Street 85 ft. N. of Holliday Street	62 dBA	67 dBA	69 dBA
#19	55th 125 ft. S. of Irving	70 dBA	73 dBA	75 dBA

Site Number	Location	Measured L10 level	Calculated Worst Case Hourly L10 1975	Calculated Worst Case Hourly L10 2000
#20	52nd Avenue	73 dBA	78 dBA	80 dBA
#21	4724 Multnomah	75 dBA	79 dBA	81 dBA
#23	Providence Hospital	72 dBA	75 dBA	76 dBA
#24	Corner of 75th and Broadway	68 dBA	72 dBA	74 dBA
#25	Pacific-450 ft. W. of 52nd	55 dBA	63 dBA	66 dBA
#26	Senate and 42nd Street	71 dBA		
#27	S. Edge of Parking Lot 2 Blocks E. of Lloyd Center	67 dBA	71 dBA	73 dBA
#28	Hasslo Street-110 ft. W. of 90th	66 dBA	70 dBA	73 dBA
#29	2318 Multnomah	70 dBA	71 dBA	73 dBA
#30	Corner of Pacific and 20th	67 dBA	70 dBA	72 dBA
#31	928 22nd Street	63 dBA	69 dBA	71 dBA
#32	Sweet Tibbie Dunbar Restaurant	62 dBA	65 dBA	68 dBA
#33	23rd and Holliday	74 dBA	78 dBA	79 dBA
#34	2136 Multnomah	69 dBA	72 dBA	74 dBA
#35	W. Side of Banfield between 9th and 10th	64 dBA		
#36	W. Side of Banfield between 9th and 10th	77 dBA	80 dBA	82 dBA
#37	63rd and Hasslo	64 dBA		
#38	3135 N.E. Wasco	60 dBA	64 dBA	65 dBA
#39	Holliday Park on Holliday between 11th and 12th	61 dBA	70 dBA	73 dBA
#40	Holliday between 1st and 2nd	70 dBA	71 dBA	74 dBA
#41	Senate and Hasslo	69 dBA		

TABLE 7

L_{10} 70 dBA Distance - Existing Facility
(Alternatives 1 and 2a)

Measurement Site Number	Distance in feet from centerline of nearest lane		Increase in feet from 1975 to 2000
	Year 1975	Year 2000	
1	240	300	60
2	320	460	140
3	300	320	20
7	250	360	90
8	220	270	50
11	120	160	40
18	130	180	50
19	230	270	40
20	190	230	40
21	180	200	20
23	90	110	20
27	260	320	60
28	90	110	20
29	310	360	50
30	140	180	40
31	180	200	20
32	180	210	30
34	270	310	40
36	200	260	60

variation is due to the many changes in the topography and alignment relationship. On the average, by the Year 2000 the L_{10} 70 dBA distance will increase 50 feet.

2. Low Cost Improvement Alternative 2a. The low cost improvement Alternative 2a is also based on the existing roadway and its pre-HOV use. These are the same conditions specified for the no-build, Alternative 1. Although there are differences in traffic use and loadings, the resultant noise levels (LCI and no-build) are the same. Therefore, the projected values discussed for the no-build also apply.

3. LCI-Alternative 2b. The Low Cost Improvement alternative (2b) specifies a continuous six-lane Banfield. Since the existing facility is six lanes from the river to 37th Street, levels calculated for Alternatives 1 and 2a still apply for this section. The portion requiring additional analysis is from 37th to the I-205 interchange. Projected noise levels were determined for measurement sites located east of 37th. Levels along this section of the Banfield varied from 68 to 80 dBA, again depending on the topography. Table 8 shows the predicted noise levels for Alternatives 2b through 5. Table 9 shows the amount of change in dBA over the 1975 levels. This results in slight noise increases over the existing condition, of 1 to 2 dBA from 37th Street to I-205, and 2dBA from the river to 37th Street.

TABLE 8

Banfield Corridor - Existing and Projected Noise Levels L_{10} dBA

Site No.	Existing 1975 Levels	Projected (Year 2000) Levels				
		Alt. 2b	Alt. 3a	Alt. 3b & 3c	Alt. 4a & 4b	Alt. 5
1	75	77	77	81	81	81
2	74	76	76	79	80	79
3	72	74	74	75	75	75
7	78	79	79	81	81	81
8	74	75	75	76	76	76
9	75	76	76	78	78	78
11	68	70	70	69	71	69
13	67	70	70	70	71	70
14	68	70	70	70	71	70
15	71	73	73	77	78	77
18	67	68	68	70	72	70
19	73	75	75	76	77	76
20	78	80	80	81	82	81
21	79	80	80	80	81	80
24	72	73	73	74	74	74
27	71	73	73	74	75	74
28	70	72	72	71	71	71
29	71	73	73	72	74	72
30	70	72	72	71	72	71
31	69	71	71	71	72	71
32	65	68	68	68	68	68
34	72	74	74	74	75	75
36	80	82	82	82	82	82
38	64	65	65	70	71	70

TABLE 9

Banfield Corridor - Change in
L_{10} dBA's from 1975 to 2000

Site No.	Existing 1975 Levels	dBA Changes by Alternative				
		Alt. 2b	Alt. 3a	Alt. 3b & 3c	Alt. 4a & 4b	Alt. 5
1	75	+2	+2	+6	+6	+6
2	74	+2	+2	+5	+6	+5
3	72	+2	+2	+3	+3	+3
7	78	+1	+1	+3	+3	+3
8	74	+1	+1	+2	+2	+2
9	75	+1	+1	+3	+3	+3
11	68	+2	+2	+1	+3	+1
13	67	+3	+3	+3	+4	+3
14	68	+2	+2	+2	+3	+2
15	71	+2	+2	+6	+7	+6
18	67	+1	+1	+3	+5	+3
19	73	+2	+2	+3	+4	+3
20	78	+2	+2	+3	+4	+3
21	79	+1	+1	+1	+2	+1
24	72	+1	+1	+2	+2	+2
27	71	+2	+2	+3	+4	+3
28	70	+2	+2	+1	+1	+1
29	71	+2	+2	+1	+3	+1
30	70	+2	+2	+1	+2	+1
31	69	+2	+2	+2	+3	+2
32	65	+3	+3	+3	+3	+3
34	72	+2	+2	+2	+3	+3
36	80	+2	+2	+2	+2	+2
38	64	+1	+1	+6	+7	+6

Design levels (L_{10} 70 dBA) will extend from 110 to about 360 feet by the year 2000. This again depends on the roadway/topography/site relationship. An average 50-foot increase to the existing L_{10} 70 dBA contour is expected as a result of this alternative.

4. HOV-Alternative 3a. Although designated as a six-lane facility, the Banfield with the additional two lanes (HOV) must be analyzed as an eight-lane facility west of 37th Avenue. East of 37th, to I-205, it is considered a six-lane facility, four lanes traffic and two lanes HOV.

Noise level projections, based on anticipated traffic loadings are presented in Tables 8 and 9. Projected levels range from 65 to 83 dBA at the measurement site locations. A slight increase of 1 to 2 dBA is expected. Distance from the roadway to the anticipated L_{10} 70 dBA noise level varies from 110 feet to 450 feet. On an average the L_{10} 70 dBA distance is expected to extend an additional 40 feet west of 37th Avenue and 55 feet east of 37th.

5. HOV-Alternatives 3b and 3c. These alternatives require an eight lane facility from the river to I-205. Two of these lanes are for HOV. Using anticipated traffic loading, projected noise levels at the measurement sites are expected to be from 68 to 82 dBA as shown in Tables 8 and 9. This shows an increase of 1-6 dBA, depending on changes to the roadway-measurement site

relationship. In the area near Sandy Boulevard, the roadway's new alignment is closer to measurement sites 1, 2 and 38; thus, this area will experience a 5 to 6 dBA increase.

Calculated L_{10} 70 dBA penetrating distances from the road range from 110 feet to 410 feet. The 110 feet is in the area of the high bank near 47th Avenue and the 410 feet in the level terrain near 43rd Avenue. The average L_{10} 70 dBA distance will increase about 35 feet over the existing condition.

6. Separated Busway-Alternative 4a and 4b. These alternatives are analyzed as two separated models. The location of the additional busway lanes provides the only difference. Under Alternative 4b the busway is contained within the roadway median. Under Alternative 4a the busway is located between the roadway and the Union Pacific railroad lines.

a. Busway-Alternative 4a. Alternate 4a proposed two exclusive bus lanes, to be constructed between the freeway and the railroad lines.

Calculated levels as shown in Tables 8 and 9 for the year 2000 indicate an average increase of 3 to 4 dBA to the existing condition. The range of increase is from 1-7, with the side adjacent to the railroad experiencing from 3 to 7 dBA. The area along Senate Street will have an increase of about 6-7 dBA due to the roadway realignment. The L_{10} penetrating distance along the roadway including the busway lane varies from 130 to 450 feet. The 450-foot distance is the area of level terrain near Senate Street.

b. Busway-Alternative 4b. With the exclusive busway lanes located in the median, noise is distributed equally on both sides of the roadway. Levels at the measurement site are expected to range from 68 to 82 dBA, an average increase of 3 dBA, see Tables 8 and 9. The acceptable L_{10} 70 dBA level is expected to extend between 130 and 420 feet from the roadway by the year 2000.

7. Light Rail Transit-Alternative 5. The proposed light rail transit use of the Banfield corridor is the same for all LRT alternatives (5-1 and 2, a, b and c). The LRT tracks would be located adjacent to the railroad.

Noise levels at the measurement site locations are projected to range from 68 to 82 dBA as shown in Table 8 and 9. The average increase over the existing is approximately 2 dBA.

Due to the topographic variations along the route, L_{10} 70 dBA distance from the roadway varies from 110 to 360 feet. The greater penetrating distance occurs where the terrain is flat and level with the roadway alignment.

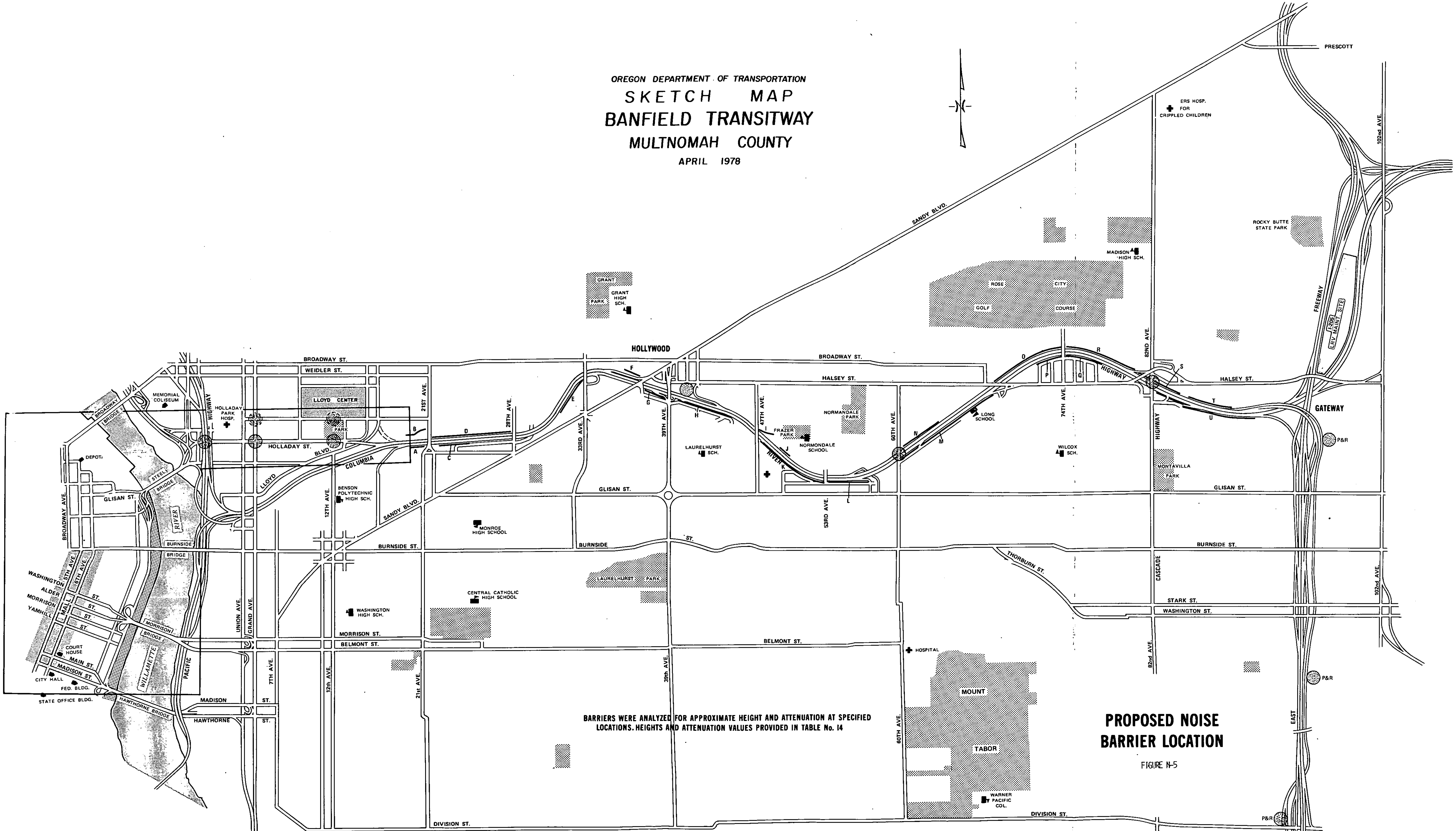
Summary of Impacts and Mitigation. All residential type structures directly adjacent to the Banfield Freeway are adversely affected by noise as they are subjected to noise in excess of the L_{10} 70 dBA design level. Although the proposed alternatives specify numerous changes in roadway configuration and use, the general resultant noise environment is not expected to change significantly. The differences in vehicle type will not significantly contribute to nor reduce the existing Banfield noise condition. Some specific areas, such as the Senate Street area, will experience a significant increase due mainly to the shift in alignment and the level terrain. Areas adjacent to the railroad under the busway Alternative 4a will also note an increase.

Mitigation of adverse noise through barrier construction or architectural mitigation of critical public receptors is possible where moderate and severe impacts occur or where receptors are in excess of design noise levels. Table 10 and Figure N-5 illustrate by alternative areas where mitigation through noise barrier (berms, walls and berm-wall combinations) construction may be desirable and feasible. The critical public receptors shown in Figure S-15, of Chapter 3, Volume Two will require specified field measurement of levels and analysis for mitigation depending on the selected alternative. In some instances, mitigation may also reduce railroad generated noise along with freeway noise. Each impacted area will be investigated when an alternative is selected and design details are available.

Low Cost Improvement Alternative

The Low Cost Improvement alternative proposed more intensive use of buses through new or additional routings and minimal modifications to some city streets. Major arterials, Burnside, Sandy, Division and portions of Broadway are to be modified for improved bus use. Belmont, 60th and Broadway, east of Sandy are designated for improved auto routes and also require some modification.

Being typical of a city urban area, land use along these streets range from commercial to residential. Properties adjacent the major arterials are mainly commercial/retail establishments requiring direct access to the roadway for customer service, access, deliveries, and supplies. Directly behind most of these properties are older residential neighborhoods. Land use along the auto improvement routes is primarily residential. More detailed land use data can be found in



OREGON DEPARTMENT OF TRANSPORTATION
SKETCH MAP
BANFIELD TRANSITWAY
MULTNOMAH COUNTY
APRIL 1978
PROPOSED NOISE
BARRIER LOCATION
FIGURE N-5
BARRIERS WERE ANALYZED FOR APPROXIMATE HEIGHT AND ATTENUATION AT SPECIFIED LOCATIONS. HEIGHTS AND ATTENUATION VALUES PROVIDED IN TABLE No. 14
PRESCOTT
SANDY BLVD.
ERS HOSP. FOR CRIPPLED CHILDREN
102nd AVE.
ROCKY BUTTE STATE PARK
MADISON HIGH SCH.
ROSE CITY GOLF COURSE
FREEWAY
I-205 R/W MAINT SITE
GRANT PARK
GRANT HIGH SCH.
HOLLYWOOD
BROADWAY ST.
WEIDLER ST.
HALSEY ST.
82ND AVE.
HIGHWAY
GATEWAY
P&R
MEMORIAL COLISEUM
HOLLADAY PARK HOSP.
LLOYD CENTER
21ST AVE.
28TH AVE.
33RD AVE.
39TH AVE.
47TH AVE.
60TH AVE.
74TH AVE.
NORMANDALE PARK
LONG SCHOOL
HOLLADAY ST.
HOLLADAY PARK
LLOYD BLVD.
COLUMBIA
DEPOT
LAURELHURST SCH.
FRAZER PARK
NORMONDALE SCHOOL
WILCOX SCH.
MONTAVILLA PARK
STEEL BRIDGE
GLISAN ST.
BENSON POLYTECHNIC HIGH SCH.
BROADWAY AVE.
RIVER
53RD AVE.
MONROE HIGH SCHOOL
BURNSIDE
BURNSIDE BRIDGE
BURNSIDE ST.
THORBURN ST.
CASCADE
WASHINGTON
5TH AVE.
6TH AVE.
ALDER ST.
MORRISON ST.
YAMHILL ST.
MALL
LAURELHURST PARK
CENTRAL CATHOLIC HIGH SCHOOL
STARK ST.
WASHINGTON ST.
UNION AVE.
GRAND AVE.
WASHINGTON HIGH SCH.
MORRISON BRIDGE
BELMONT ST.
COURT HOUSE
MAIN ST.
MADISON ST.
CITY HALL
FED. BLDG.
STATE OFFICE BLDG.
WILLAMETTE
PACIFIC
7TH AVE.
12th AVE.
21st AVE.
39th AVE.
HOSPITAL
MOUNT TABOR
EAST
HAWTHORNE BRIDGE
HAWTHORNE ST.
WARNER PACIFIC COL.
DIVISION ST.

TABLE 10

TENTATIVE NOISE BARRIERS

Barrier No.*	Position	Affected Alternatives	Approx. Barrier Length	Possible Noise Reduction
A	Top Cut Bank	1,2,3,4,5	250 ft.	4 dBA
B	Along Fwy	1,2,5	1000	6
		3,4	1000	6
	Top Cut Bank	1,2,3,4,5	600	6
C	Top Cut Bank	1,2,3,4,5	600	7
D	Along Fwy	1,2,3,5	1950	6
		4	1950	6
E	Top Cut Bank	1,2,3,4,5	950	6
F	Top Cut Bank	1,2,3,4,5	250	6
	Along Fwy	1,2,3,4	600	6
		5	600	6
G	Top Cut Bank	1,2,3,4,5	500	9
H	Along Fwy	1,2,3,4,5	1250	10-11
I	Top Cut Bank	1,2,3,4,5	500	11
	Along Fwy	1,2,3,4	500	11
		5	500	11
J	Along Fwy	1,2,3,4	350	6
		5	350	6
K	Top Cut Bank	1,2,3,4,5	1600	4-12
L	Top Cut Bank	1,2,3,4,5	1000	7
M	Top Cut Bank	1,2,3,4,5	2700	12
N	Top Cut Bank	1,2,3,4,5	950	6
	Along Fwy	1,2,3,4,5	950	6
O	Along Fwy	1,2,3	1650	8
		4,5	1650	8
P	Top Cut Bank	1,2,3,4,5	700	7
Q	Top Cut Bank	1,2,3,4,5	1100	6
R	Top Cut Bank	1,2,3,4,5	1600	7
	Along Fwy	1,2,3,4,5	1600	7
S	Top Cut Bank	1,2,3,4,5	1100	6
	Along Fwy	1,2,3,4,5	1100	6
T	Top Cut Bank	1,2,3,4,5	1250	8
	Along Fwy	1,2,3,4,5	1250	8
	Along Fwy	1,2,3,4,5	2650	7

*See Figure N-5 for location.

the Sociology, Economics and Land Use Reports of Volume Two. General land use is shown in Figure P-16, Chapter 2 and public and institutional receptors are located on Figure S-15, Chapter 3.

Existing Noise Levels. Measurement sites were located near receptors experiencing an adverse noise environment or near those which might be affected at a future date. Fourteen field measurement sites were selected and recordings of the existing noise condition made. The locations of the fourteen sites (numbers 42 through 55) are shown in Figure N-3.

The measured L_{10} noise levels ranged from 62 to 75 dBA as shown in Table 11. Using peak-hour traffic volumes, the measured levels were converted to calculated worst noise hour levels. These calculated levels ranged from L_{10} 62 to 75 dBA.

Projected Levels - Existing Facility and Use (No-Build). To maintain the basis for comparison, the existing facility's projected use and anticipated noise levels must be determined. This represents the noise environment anticipated should the LCI alternative not be implemented.

Projected noise levels (1990) based on anticipated vehicle use were determined for the measurement site locations. These calculated levels ranged from L_{10} 62 to 80 dBA. See Figure N-6. This means that the normal traffic increase under the no-build alone results in an average increase of approximately 3 dBA.

Projected Levels - LCI (Alternative 2a and 2b). Projected noise levels resulting from the implementation of an LCI alternative range from 72-83 dBA. This is based on the new routings and projected year usage. Increases along the major arterials vary from 1 to 6 dBA. Along the auto improvement routes the

FIGURE N-6

NOISE LEVEL PROJECTIONS
LOW COST IMPROVEMENTS

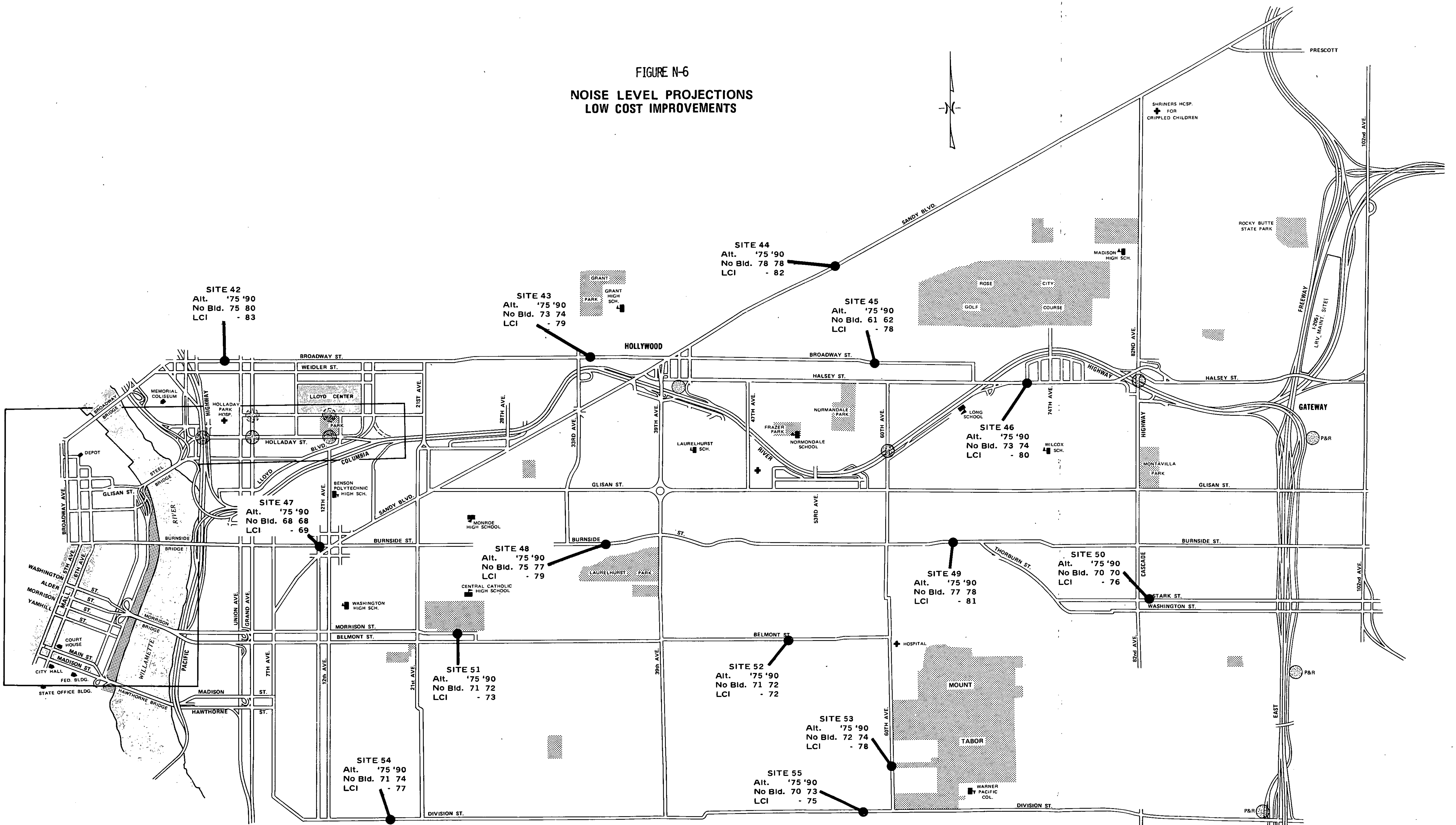


TABLE 11

LCI Corridor
Existing and Projected Noise L_{10} Levels

Site Number and Location	1975 Measured	1975 Calculated Worst Case HR	1990 No Build Calculated Worst Case HR	1990 LCI Calculated Worst Case HR	Change 1975 to 1990
#42 Broadway and 2nd Ave.	75 dBA	75 dBA	80 dBA	83 dBA	+8 dBA
#43 3353 Broadway	72	73	74	79	+6
#44 Sandy and 54th Ave.	75	78	78	82	+4
#45 Braodway and 59th Ave.	62	61	62	78	+17
#46 Halsey and 71st Ave.	72	73	74	80	+7
#47 Burnside and 11th Ave.	65	68	68	69	+1
#48 Burnside and Floral	69	75	77	79	+4
#49 Burnside and 66th Ave.	71	77	78	81	+4
#50 Stark and 84th Ave.	70	70	70	76	+6
#51 Morrison and 23rd Ave.	71	71	72	73	+2
#52 Belmont and 51st Ave.	67	71	72	72	+1
#53 60th Ave. and Harrison	71	72	74	78	+6
#54 Division and 17th Ave.	71	71	74	77	+6
#55 Division and 58th Ave.	67	70	73	75	+5

range is from 2 to 17 dBA. The auto improvement routes are primarily through residential neighborhoods. Therefore, the noise increases will constitute a significant change to the existing environment.

Impacts and Mitigation. All receptors along the major arterials are exposed to a noise environment in excess of the FHWA design noise level. Noise along the auto routes vary from an acceptable level (below L_{10} 70 dBA) near Broadway and 59th, to an extremely noisy condition along Belmont. By the year 1990 under the no-build, receptors along these routes should experience a slight increase, about 1 dBA along the local streets and 2-3 dBA from the major arterials. The proposed low cost improvement plan will result in significant noise increases along the auto routes and some increases along major arterials.

Under the LCI, all receptors along all affected roadways will be exposed to excessive noise and thus are impacted. The increases may be slight but the number of impacted receptors indicate that mitigation measures must be explored in detail if this alternative is chosen.

Unfortunately, most impacted receptors can not be protected by barriers or berms because of their required roadway access or inadequate space for wall construction. In some cases public institutions such as Atkinson and Glencoe schools may be architecturally treated to reduce the noise impact. Specific measures can be identified and analyzed after the alternative is selected and a design study begun.

East County Study Area

Introduction

This portion of the noise research report covers the area from I-205 to Lents or the Gresham area. The build alternative in East County is the LRT, Alternative 5, with proposed routes via Burnside or Division terminating in Gresham or a route via I-205 terminating in Lents.

Land use and activity in most of the East County area along the LRT routes is residential with commercial uses near major intersections. A generalized land use map of the area can be found in Chapter Two as Figure P-17. A specific strip map of adjacent public and institutional receptors is included in Chapter Three as Figure S-15.

East County LRT is analyzed through both the NCHRP 117/144 prediction technique and the vehicle source level method. On-site measurements were taken and used to describe the existing noise environment and verify the projected levels. Measurement sites in East County are mapped and shown on Figure N-7.

LRT Burnside Route (Alternative 5-1)

This alternative proposed a light rail system utilizing the center median of Burnside Street from I-205 to 199th. From 199th it follows the Portland Traction Line into Gresham. Present land use along this route is largely residential with commercial properties at the major intersections.

Existing Noise. On-site noise measurements were taken on the proposed route at eleven locations. Levels obtained varied from 54 to 71 dBA. The 54 level is along the Traction Lines and the 71 roughly 30 feet from Burnside. The specific measurements are shown in Table 12.

TABLE 12

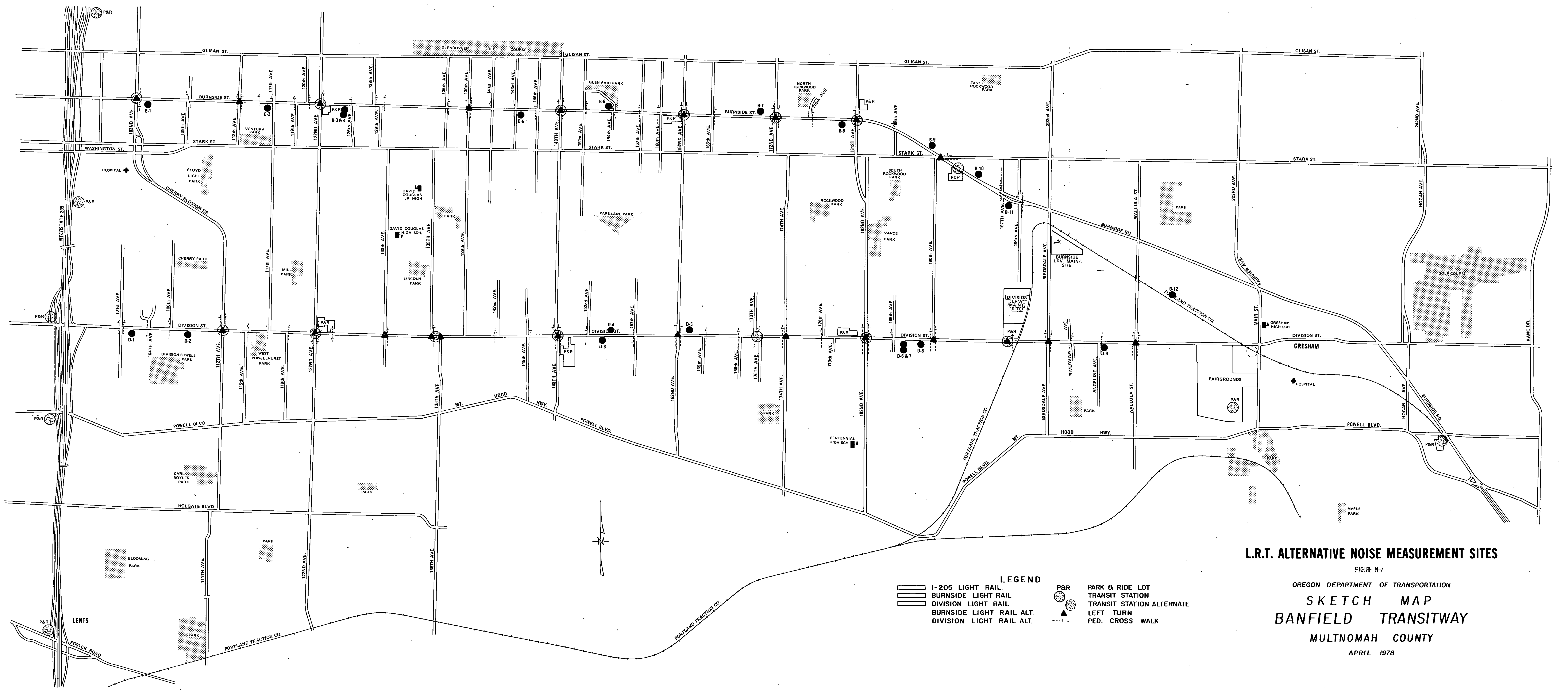
NOISE MEASUREMENTS FOR BURNSIDE LRT EAST OF I-205

Site #	Location	Distance from C_L of Near Lane	L_{10} dBA
B-1	East of 102nd - Fence line of school playground	50'	70
B-2	Corner of Burnside & 117th - In line with front edge of school.	275'	57
B-3	East end of Faith Baptist Church	30'	71
B-4	East end of Faith Baptist Church	75'	58*
B-5	Corner of Burnside and 143rd	70'	65
B-6	Corner of Burnside and 154th	45'	69
B-7	In line with front edge of Rockwood Christian Church	80'	67
B-8	1 Block W. of 181st - In front of Briarwood Apts.	56'	69
B-9	In line with front edge of Burnside Baptist Church	70'	68
B-10	1 Block E. of Stark on Burnside	75'	71
B-11	On Burnside Court St., where LRT leaves Burnside	150'	64
B-12	Top of R.R. cutbank in open fields	NA	54

*"Mic" blocked from Line of Sight by Cutbank

Projected Levels - Existing Facility and Use (No-Build). In order to maintain a basis for comparison, noise levels for the existing facility were projected to 1990. Noise resulting from increased traffic use of Burnside is expected to increase the noise level by 1-2 dBA as shown in Figure N-8. Along the Traction Line there is no traffic induced noise increase.

Projected LRT Noise Levels (Alternative 5-1). Noise resulting from Burnside, modified for LRT, indicates an increase of 1-2 dBA over the existing noise condition. This results primarily from the increased traffic use of



L.R.T. ALTERNATIVE NOISE MEASUREMENT SITES

FIGURE N-7

OREGON DEPARTMENT OF TRANSPORTATION

SKETCH MAP

BANFIELD TRANSITWAY

MULTNOMAH COUNTY

APRIL 1978

Burnside Street. The noise influence of the light rail operations is insignificant. Along the Traction Line, an increase to the L_{10} of 5 dBA is expected. The projected levels are below the FHWA standard of L_{10} 70 dBA. This area at present, experiences no traffic induced noise, so the increase is strictly the result of the light rail system.

LRT Division Route (Alternative 5-2)

The LRT alternative to Gresham via Division travels the entire length of Division from I-205 to Gresham. The light rail vehicle tracks are located in the center of the roadway.

The present land use along this route is primarily residential with local commercial establishments at busy intersections. Three schools are also located along this route.

Existing Levels. To establish the existing noise environment, measurement sites representative of the area were selected at eight locations and noise recording made. See Figure 7. Values measured range from 69 to 79 dBA and are presented in Table 13.

TABLE 13

NOISE MEASUREMENTS FOR DIVISION LRT E. OF I-205

Site #	Location	Distance from C_L of Near Lane	L_{10} dBA
D-1	Corner of Division and 103rd - In line with front edge Assembly of God Church	50'	70
D-2	Corner of Division and 109th	50'	69
D-3	Corner of Division and 153rd	50'	72
D-4	Corner of Division and 154th	35'	75
D-5	East end of and in line with front edge Lutheran High School (164th and Division)	36'	73
D-6	Parking lot of Covenant Presbyterian Church	50'	76
D-7	Parking lot of Covenant Presbyterian Church	100'	70
D-8	Corner of Division and 187th	38'	76
D-9	Corner of Division and Angeline	50'	72

Projected - Existing Facility (No-Build). Levels resulting from the increased use of the existing roadway configuration is expected to increase approximately 2 dBA by the year 1990. Figure N-8 presents the calculated values for each of the measurement site locations.

Projected LRT Noise Levels (Alternative 5-2). With the Division Street light rail system operational, project noise levels were calculated. Values are based on project use for the year 1990 and are for the measurement site locations.

Levels will vary from 69 to 73 dBA (Figure N-8). Measurement sites 3, 4, 6 and 7 are expected to experience a 1-3 dBA reduction due to a reduction of vehicle use, while sites 1, 2 and 8 will have an increase of 1 to 3 dBA.

LRT Lents Route (Alternative 5-3)

The Lents area LRT system uses the I-205 facility from the Banfield Freeway to Foster Road. A noise analyses of this system and its effect on adjacent structures indicates that no change will result from the LRT operation. The influencing effect of the light rail vehicles when combined with the freeway generated noise is imperceptible. The only noise affecting adjacent structures would be that of the normal freeway traffic. As indicated in the I-205 Environmental Impact Statement, all impacted receptors would be afforded attenuation sufficient to reduce the noise environment to an acceptable level of L_{10} 70 dBA or lower.

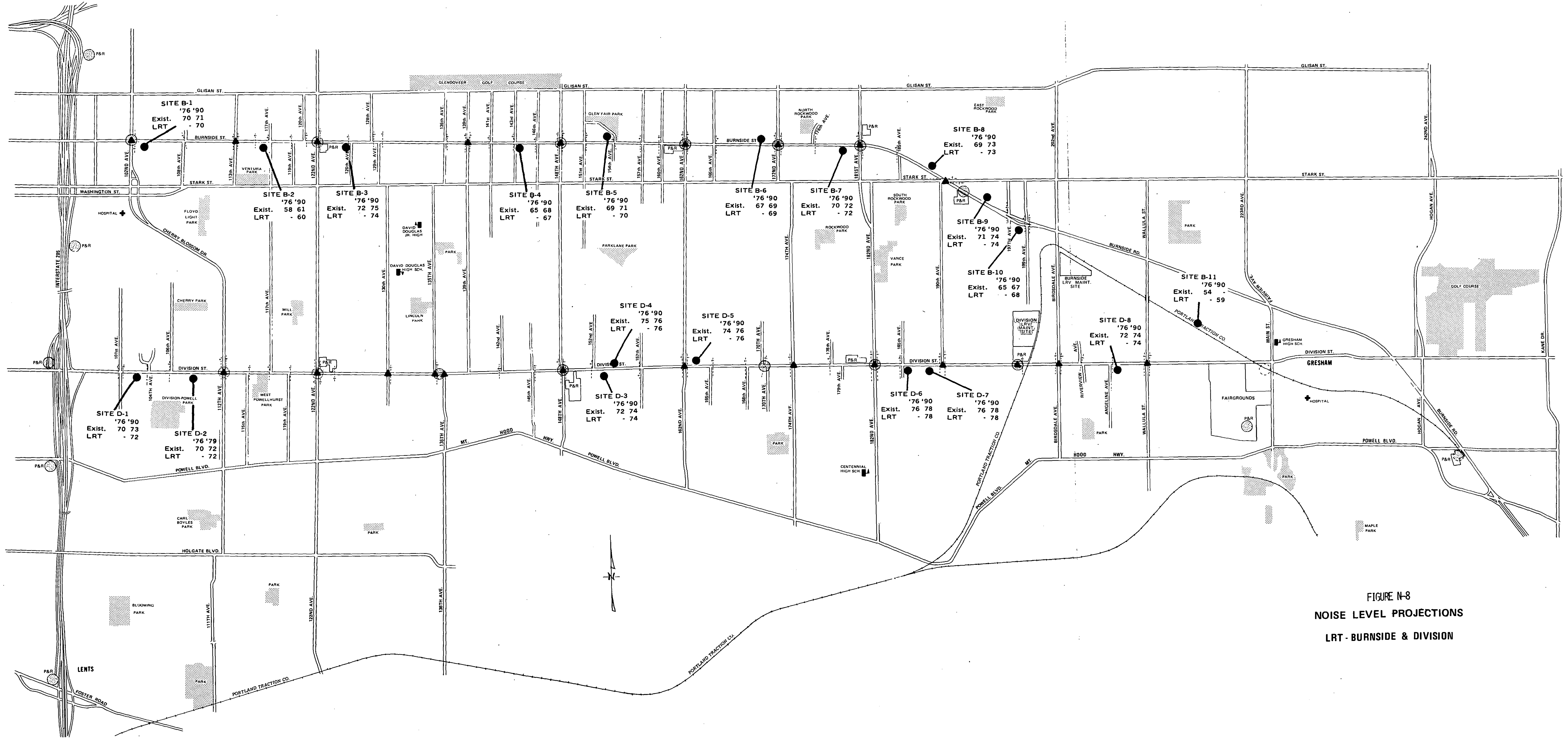


FIGURE N-8
NOISE LEVEL PROJECTIONS
LRT - BURNSIDE & DIVISION

Summary

This noise analysis is presented for consideration in the selection of a preferred alternative in compliance with the Federal Highway Administration's Federal-Aid Program Manual 7-7-3.

Since the various alternatives to the proposed transit system have specific effects on three regional areas, Downtown, East Portland, and East County, they will be summarized separately.

Downtown

Existing noise levels in the downtown area (CBD) exceed the FHWA designated design level of L_{10} 70 dBA for residential type receptors and at times the L_{10} 75 dBA level for commercial/industrial receptors. The project alternatives affect specific receptors in different ways, while general areawide noise levels do not significantly increase or decrease (see Table 14). Of those proposed, the light rail cross-mall system for three corridors offers the best noise environment, a general area reduction of approximately 1 dBA with significant spot reductions. The LRT alternatives also tend to reverse the trend of a rising urban noise environment. The low cost improvements and the exclusive busway have the greatest areawide increase, a plus 2-3 dBA change.

In the downtown, noise mitigation techniques such as walls or barriers are not practical. Architectural treatment of buildings does nothing for exterior noise levels, but could be applied if interior noise impacts did occur in public or institutions receptors.

East Portland

The East Portland analysis focuses on the Banfield corridor and streets designated under the Low Cost Improvements alternative.

TABLE 14

PROJECTED (1990) AMOUNT OF CHANGE TO EXISTING NOISE LEVELS DOWNTOWN IN dBA

Transit Mode	Reference Locations 1	2	3	4	5	6	AREA	Potential Mitigation
No-Build	+1	+3	+1	+1	-0-	+1	+1	None
LCI	+1	+4	+5	+3	-0-	+5	+3	Public or Institutional Structures.
Busway (3 Corridor)	+1	+5	+5	+1	+8	+5	+3	
LRT-Banfield-On Mall	+1	+2	+2	+3	-0-	+1	+2	
Banfield-Cross Mall	-1	-5	-3	-3	-0-	-1	-2	
3-Corridor-On Mall	-30*	+8	-1	+3	-0-	+1	+1	
3-Corridor-Cross Mall	-0-	+3	-2	+3	-0-	-1	-1	

*LRT vehicles only-no bus traffic.

Noise levels presently resulting from use of the Banfield Freeway is in excess of the L_{10} 70 dBA design level. This level extends to and generally encompasses all structures adjacent to the roadway. This condition will exist for each of the proposed transit alternatives in the year 2000. The projected levels for the no-build, the LCI, the existing HOV and the light rail system result in an average area increase of 2 dBA. The others--HOV and busway show an average of 3 to 4 dBA increase.

The receptor/roadway relationship lends itself to mitigation in areas along the entire length. Noise levels at impacted receptors can be reduced to L_{10} 70 dBA or lower. Noise attenuation may be afforded impacted receptors along the Banfield Freeway where technically and economically practicable.

The low cost improvements proposed for city streets affect major arterial and some local neighborhood roadways. Noise along the major arterials exceed the L_{10} 70 dBA federal design level, therefore adjacent structures are already exposed to excessive noise. Increased levels of 3 dBA result under the no-build by the year 1990. With the low cost improvements implemented, this will increase 1 to 6 dBA.

The local neighborhood streets are generally below the 70 dBA level. No-build growth will raise the existing noise environment 2 dBA by 1990, but will still remain below the 70 dBA level. Should the LCI be selected, all receptors along these streets will be impacted, some experiencing increases of up to 16 dBA. Impacted receptors along these roads vary from single-family residential properties to schools. No practical mitigation can be afforded the residential areas due to their required roadway access. The schools along the LCI routes can be provided mitigation by either noise barriers or architectural treatment. The analysis of the East Portland area indicates that any of the alternatives using the Banfield corridor could result in an acceptable noise environment with extensive mitigation.

East County

The light rail travel routes in the East County area are the Burnside/ Portland Traction line route, Division Street, and I-205 to Lents.

At present, receptors within 45 feet of Burnside are subjected to adverse noise. This condition is expected to expand to 65 feet by the year 1990. The implementation of the light rail system will not add to the projected noise level, since the increase is due to additional auto-truck traffic. Along the traction line, the existing noise level is well below the L_{10} 70 dBA level. The addition of light rail will raise the existing condition approximately 5 dBA, but the resultant level will still be well below 70 dBA.

The receptors exposed to levels of L_{10} 70 or greater require direct roadway access, therefore, mitigation is not feasible except for public and institutional receptors.

A similar condition exists for the Division Street route. The existing L_{10} 70 dBA levels extend nearly 50 feet from the road and there will be an increase to approximately 90 feet by 1990 under the no-build. The light rail system will have little effect on the projected noise level which result from the roadway use. Receptors along this roadway also require direct roadway access. Except for the schools and other institutional receptors no mitigation can be provided. The schools could be afforded barrier or architectural type mitigation.

In comparing the Division Street route to that of the Burnside/Portland traction line, the Burnside route would have the least offensive noise environment.

The Lents LRT route uses the I-205 Freeway. The influencing affect of LRT vehicles on the anticipated freeway traffic noise will be negligible. All noise impacts to receptors are being mitigated as part of the I-205 project.

APPENDIX A / SOUND LEVEL MEASUREMENTS

Sound level measurements are taken in two phases, data acquisition and data reduction. The equipment used for data acquisition includes a sound level meter, microphone and cable, wind screen, calibrator, tripod, and tape recorder. The tripod holds the microphone in position, typically at 5 feet above the ground. The wind screen is used to reduce wind turbulence noise. To maintain a high degree of accuracy, the sound level meter is adjusted with the calibrator before every measurement. The calibrator emits a constant standardized tone. A sample of this tone is recorded to allow for instrument adjustment during the data reduction phase. A 10-20 minute recording of existing sound levels is taken, along with a simultaneous traffic count of autos and trucks. Other sources of sound affecting the readings are also noted. A complete description of the measurement site is made. Such a description includes distance from the roadway, number of traffic lanes, angular exposure to the roadway, topography, buildings, vegetation, location, date, and time.

Data reduction is done in the office. The equipment set-up consists of a sound level meter, tape recorder, and graphic level recorder. The recorded calibration tone permits the graphic level recorder to be properly adjusted. The graphic level recorder produces a strip chart with a plot of the measured sound levels. The output speed of the strip chart allows readings to be taken every 6 seconds. These readings are tabulated on a data sheet and divided into 1 dBA increments. The final form is a sound level vs. time distribution graph. The sound level increment separating the highest 10 percentile is then noted and recorded as the L_{10} level.

NATURAL ENVIRONMENT REPORTS

BIOLOGICAL RESEARCH REPORT

Table of Contents

Banfield Freeway Biologists Report

Introduction

Methods

Lists of fauna (Table 1) were prepared from the county inventory supplied by the Oregon Department of Fish and Wildlife. Species observed but not appearing on the inventory were added to the list. Species on the inventory for which a reasonable amount of suitable habitat does not occur in the study area were not placed on the list. Species shown on the list are those which are common and numerous in the study area. The list is not intended to show every species which has even been observed but rather to list those species which have the greatest potential effect on their respective communities.

Ground surface cover was the primary criteria for delineating habitat. Delineation of habitat was made on aerial photo mosaics varying in scale from 1:2400 to 1:1980. Type classes were ground truthed. Habitat distribution was estimated from analyzing 181 circular one acre quadrats located at random intervals along the major alternative alignments.

An equal level of design information was not available for all the alternatives. Where reasonable, design information was extrapolated. In cases where extrapolation was not prudent, data was culled so that quantitative comparisons between alternatives would not be unduly biased.

Because the number of alternatives is complex and the existing habitat conditions have been highly modified, subjective analysis was required to a great extent.

Data were analyzed with regard to the magnitude of expected change, the degree of change, and the duration of change resulting from construction and operation of any of the alternative facilities. These changes were then used to predict the nature, relative magnitude, and significance of biological impacts caused by the alternatives.

An attempt was made to compare the alternatives of the project on the basis of both their magnitude and their biological and cultural significance (Table 3).

Biological significance was evaluated on the basis of four considerations: 1) the biologic level of organization which would be impacted 2) the proportion within that level of organization which would probably be impacted 3) the scale of the geographic limits of the impact and 4) the expected duration of the impact. Specific categories considered, and the numerical values assigned each hierarchy are shown in the key to Table 3.

Four aspects of cultural significance were assessed; 1) the effect on aesthetics or passive recreation 2) the effects on public health or safety, 3) the effects on economic values or commercial enterprise, and 4) the effects on sport or active recreation. The numerical values assigned to each aspect are additive.

The total significance value for each impact multiplied by the magnitude in acres of habitat loss resulted in a value (the "impact value" in Table 3) by which comparison could be made between the alternatives.

The Study Areas

Three separate study areas were chosen because of significant dissimilarities which exist in their wildlife resource characteristics. However, the three areas when considered as a whole completely enclose any and all of the proposed alternatives.

1. The "Downtown" area is bounded by Broadway on the west and north, Taylor on the south, and the Willamette River on the east.
2. The "East Portland" area is bounded by the Willamette River on the west, Division Street on the south, I-205 alignment on the east, and Broadway/Sandy on the north.
3. The "East County" area is bounded by the alignment of Interstate 205 on the west, Hogan Avenue in Gresham on the east, Burnside on the north, and a line from 102nd and Foster in Portland to the Fairgrounds in Gresham.

Organization of Report

The body of the report discusses impacts categories as they occur in each of the three study areas.

The report summary is organized so that the differences between alternatives and the relation of each to the "no build" option can be compared.

Existing Environmental Setting

The Region

On a regional scale the entire study area has been classified as "urban" habitat. Characteristic influences and restrictions of an urban area are applicable to varying degrees in each of the three study areas. Many of the 31 species reported to be at least moderately abundant in the county are absent from the study area. Opportunities for wildlife related recreation and commerce, although abundant a short distance away, are very limited within the study areas. Wildlife values are largely related to neighborhood aesthetics and land values, and to property damage and public health considerations.

There is a significant difference in the degree of urbanization which generally decreases going from west to east. Consequently, the habitat and dominant fauna of the three study areas is different.

There are no "Threatened or Endangered Species" nor is there critical habitat protected under the Endangered Species Act found in the study areas. There are no wetlands in the study areas. There are presently no Champion Trees reported growing in the study areas.

Man is the ecologically dominant species; vegetation, soils characteristics, hydrology, microclimate, and fauna are largely the result of past modification of the environment. Future land use decisions will further effect these resources by controlling the degree and the rate at which future environmental modification takes place.

Wildlife Habitat

Habitat types found within the three study areas are few in number, physically simple and tend to be maintained in their present state rather than being allowed to develop through natural processes into more complex wildlife resources. There are some exceptions to these conditions, but they are relatively minor.

The following categories of habitat are found in the three study areas.

1. "Barrens": this category is the least valuable of the types found in the study area. Any surface which prohibits plant growth on a portion of the land was classified as "Barren." All buildings, paved surfaces, sterilized surfaces, or areas where use is so frequent that nothing can grow, are included in this type. Since no food is produced in such areas, all food for wildlife is carried into the area by one means or another. Scavengers tend to be common, many being classed

as pests or in the case of black and norway rats, hazards to public health. Non-scavaging animals do use such areas but their presence depends on other habitat types nearby.

2. Grassland: Included in this category are weedfields, lawns, and a small percentage of broadleafed ground cover, frequently english ivy. The greatest portion of this type occurs within lawns. The predominance of frequent mowing for aesthetic reasons severely limits the value of this type for all but a few species of wildlife since seed for food is seldom produced, and the effective cover height is seldom greater than a few inches. On the beneficial side, most residential lawns also have trees and shrubs nearby so that much more use of the grassy areas is possible.

3 & 4. Trees, shrubs and Woodlands: Throughout most of the study areas trees and shrubs are closely intermingled, being the product of residential landscaping. Consequently, the two habitat types are only arbitrarily separated except in the East County study area where the types are more typical of natural growth.

Throughout most of the area species of trees are a mixture of naturally occurring remant individuals (predominantly Douglas Fir and Bigleaf Maple) and introduced species, elm, birch, Liquid Amber, Cherry and various maples, and chestnuts being the most popular.

The Downtown Area

This area is intensely urbanized. Only a few species of fauna are to be found here (Table 1.A.)

Food production is almost completely lacking because the ground cover is overwhelmingly barren. Artificial structures are the only source of cover for roosting, nesting and other necessary faunal activities. The characteristic fauna are mainly scavengers whose food is supplied by man's refuse or by the Willamette River. Only species tolerant of a high degree of human activity and which live mutualistically with man are able to sustain themselves.

The East Portland Area

Although this area is also intensely urbanized the distribution of habitat is more beneficial to wildlife.

In wildlife resource characteristics this area tends to be transitional between the Downtown area on the west and the East County area on the east. The westernmost portion of the East Portland area is similar in habitat distribution and wildlife restrictions to the Downtown area.

Woodland, shrub and grass habitat occur in small units having a high degree of interspersion. Trees tend to be a mixture of both native and introduced species. Shrubs tend almost entirely to be introduced. The preponderance of grassed areas are mowed short and frequently. Although the absence of deadwood, and litter act to reduce the amount of food and cover available, many of the buildings, power lines and poles, bridges, culverts and sewers supplement the natural cover available for wildlife.

The fauna of the area are more diverse than those of the Downtown area, and less diverse than those found in the East County Area.

The greatest significance of wildlife resources of the East Portland area lies in neighborhood aesthetic values, and public health and property damage considerations.

TABLE 1

Common Fauna of the Three Study Areas

Common & Scientific Name	A Common Downtown	B Common East Portland Area	C Common East County Area
Western Gray Squirrel, *Scirus griseus*			X
Eastern Gray Squirrel, *Scirus carolinensis*		X	
Short-tailed Weasel, *Mustela erminea*		X	X
Raccoon, *Procyon lotor*			X
Striped Skunk, *Mephitis mephitis*			X
California Ground Squirrel, *Citellus beecheyi*			X
Chickaree, *Tamiasciurus douglasi*			X
Brush Rabbit, *Sylvilagus bachmani*			X
Eastern Cottontail, *Sylvilagus floridanus*			X
Opossum, *Didelphis marsupialis*		X	
Deer Mouse, *Peromyscus maniculatus*			X
Oregon Vole, *Microtus oregoni*		X	X
Black Rat, *Rattus rattus*	X	X	
Norway Rat, *Rattus norvegicus*	X	X	
House Mouse, *Mus musculus*	X	X	X
Ring-necked Pheasant, *Phasianus colchicus*			X
Mourning Dove, *Zenaidura macroura*		X	X
Red-tailed Hawk, *Buteo jamaicensis*			X
Kestrel, *Falco sparverius*		X	X
Screech Owl, *Otus asio*			X
Rufous Hummingbird, *Selasphorus rufus*		X	X
Hairy Woodpecker, *Denrocopus villosus*		X	X
Downy Woodpecker, *Dendrocopos pubescens*			X
Flicker, *Colaptes cafer*		X	X
Yellow-bellied Sapsucker, *Sphyrapicus varius*			X
Tree Swallow, *Iridoprocne bicolor*			X
Violet-green Swallow, *Tachycineta thalassina*		X	X
Robin, *Turdus migratorius*		X	X
Steller's Jay, *Cyanocitta stelleri*			X
Scrub Jay, *Aphelocoma coerulescens*		X	X
Common Crow, *Corvus brachyrhynchos*	X	X	X
Starling, *Sturnus vulgaris*	X	X	X
Bewick's Wren, *Thryomanes bewickii*			X
Brown Creeper, *Certhia familiaris*			X
Meadowlark, *Sturnella neglecta*		X	X
Red-winged Blackbird, *Agelaius phoeniceus*			X
Brewer's Blackbird, *Euphagus cyanocephalus*		X	X
Goldfinch, *Spinus tristis*		X	X
House Finch, *Carpodacus mexicanus*		X	X
Junco, *Junco oreganus*		X	X
Rufous-sided Towhee, *Pipilo erythrophthalmus*			X
House Sparrow, *Passer domesticus*	X	X	X
Rock Dove	X	X	X
Gulls, *Larus spp.*	X	X	
Garter Snake, *Thamnophis spp.*		X	X

The East County Area

This area is the least urbanized of the three study areas. The proportion of biologically productive habitat to non-productive (barren) habitat is much higher. Habitat units tend to be larger and more clearly defined while the influence of periodic maintenance is less prevalent. Consequently, the number of habitat units having a complex physical and biological structure are more numerous.

The fauna of the East County area are more diverse than in the remainder of the study areas but are also less tolerant of change (Table 1.C.). However, there is still a great difference between the number of species to be found here and those present in Multnomah County as a whole.

Impacts

Adverse Environmental Impacts

The two most important effects resulting from any of the alternatives but the no-build alternative (Alternative 1) would be; 1) a loss of habitat and 2) a loss of productivity with respect to plant growth (net primary production). These two effects cause one impact upon wildlife, a reduction in faunal production*. Under the conditions existing in the study area, decreased faunal production is most likely to result in fewer individuals of existing species. The density of individuals in areas of adjacent unaffected habitat will not change.

Because transportation alternatives are expected to reduce the quantity of habitat with little direct effect on the quality of remaining urban habitat, the species of wildlife of the study areas should not change.

*Changes in production in a biotic community can result in a number of effects other than a change in the number of individuals supported by the community. However, if the species composition remains unchanged, then a change in production will very probably result in a similar change in the numbers of individuals.

The Loss of Existing Productive Wildlife Habitat

There is a strong tendency to downgrade the value of urban wildlife habitat by the general public and by many biologists as well. This situation arises from the fact that a high degree of cultural modification and the very limited faunal characteristic of urban settings lack the qualities we traditionally associate with the term "wildlife." However, the very features which are intolerable for many wildlife species, are advantageous to the survival of urban adapted fauna.

"Habitat" is a very general term. In one sense indicating the set of conditions which are necessary for the survival of a particular species, and in another sense indicating the place or places where these conditions are located. A "loss of habitat" occurs when conditions change so that the species in question can no longer survive. The loss may result from a range of activities from complete clearing of a particular "place," to changing the availability of a single necessary feature (a source of water, a particular food, or a needed behavorial site for instance). "Habitat" can also be lost by the addition of a feature, a new competitor, a toxic plant, or disease for examples.

Wildlife are not only dependent upon habitat in the sense of the "features" they are dependent as it relates to "location or locations." A loss of habitat "places" results in decreased numbers of wildlife in a given area. Although it is true that individuals may seek other suitable habitat locations if their habitat is destroyed, the result of their survival is of short duration. Eventually competition for food, nests, and other resources reduces the population to a density which can be sustained. Since all known species of wildlife produce many more young than will survive to maturity, it is generally assumed that any given parcel of habitat maintains the maximum density of fauna and that additional individuals of similar species cannot be absorbed successfully for any length of time.

The Loss of Net Primary Production

Net primary production (Pn) is the quantity of energy which is stored annually in new plant growth. It is the energy base from which all higher organisms must sustain themselves, either directly or indirectly.

All alternatives but the "no-build" alternative (1) will result in converting some land which presently supports plant life into various surfaces which will not support plant life. This conversion is a long term, irreversible impact which can be minimized but which is extremely difficult to mitigate without converting existing barren land into productive land.

The Downtown Area

As described in the existing environmental section the Downtown Area where changes would take place is almost exclusively barren, buildings or pavement continuously cover the ground. As a result the limited fauna of the Downtown area rely on a food supply which is imported (largely by man or by the Willamette River). Whatever change is brought about by any of the alternatives will only replace one type of cultural barren with another. For this reason neither the numbers nor the species composition of existing fauna (Table 1.a.) is expected to be impacted either adversely or beneficially.

The East Portland Area

Table 2 shows the magnitude of expected loss of habitat and of net primary production associated with each alternative. It will be noted that Alternative 1 has no impacts while all the LRT alternatives have identical impacts within the East Portland Area. The impact significance values (explained in the Methods section) are lowest for Alternatives 3a, 3b, 3c, 4a and 4b and slightly higher for the other alternatives. This difference is due to the different aesthetic potential in the affected land.

The East County Area

Table 2 shows the magnitude of habitat loss of net primary production caused by any of the alternatives. Only the LRT alternatives have any effect in the East County Area. The impact significance values for the LRT alternatives differ according to corridor. The impacts occurring on the Division corridor (Alternatives 5-2a, and 5-2b) are considered to be the least significant because of the greater degree of existing urban development.

Secondary Impacts

Selection of an alternative will influence the future urban growth pattern and rate. As this growth occurs, additional habitat will undergo varying degrees of urbanization. Increased urbanization will extend the impacts of the project throughout a much greater area. The influence of the alternatives on urban growth is discussed fully in the sections of this report devoted to economics.

TABLE 2

Habitat Losses and Losses of Net Primary Production (Pn)
Caused by the Alternatives by Study Area

Alternative	Downtown Habitat Loss (Acres)	Downtown Pn Loss Kcal.x10^6/year	East Portland Habitat Loss (Acres)	East Portland Pn Loss * Kcal.x10^6/year	East County Habitat Loss (Acres)	East County Pn Loss * Kcal.x10^6/year	Totals Habitat Loss (Acres)	Totals Pn Loss * Kcal.x10^6/year
1	0	0	0	0	0	0	0	0
2a	0	0	1.8	16.7	0	0	1.8	16.7
2b	0	0	1.8	16.7	0	0	1.8	16.7
3a	0	0	1.8	16.7	0	0	1.8	16.7
3b	0	0	7.5	64.9	0	0	7.5	64.7
3c	0	0	11.2	95.6	0	0	11.2	95.6
4a	0	0	7.6	66.4	0	0	7.6	66.4
4b	0	0	7.6	66.4	0	0	7.6	66.4
5-1a	0	0	6.0	52.4	31.3	293.9	37.3	346.3
5-2a	0	0	6.0	52.4	26.7	231.4	32.7	283.8
5-3a	0	0	6.0	52.4	23.4	199.9	29.4	252.3
5-1b	0	0	6.0	52.4	39.0	360.8	45.0	412.7
5-2b	0	0	6.0	52.4	34.3	297.8	40.3	350.2
5-3b	0	0	6.0	52.4	31.1	266.3	37.1	318.7

* For comparative purposes the Worldmean Pn of Marsh is 38 x 10^6 Kcal/acre/year.

Irreversible Impacts

Loss of wildlife habitat because of cultural development is possible to reverse, however, the probability that such reversal will occur is remote if the past can be used to predict the future.

The loss of primary production is irreversible. If solar energy is not used or stored when it is available, it is lost.

Decreased faunal production can be considered from two points of view. If the quantity of suitable habitat is increased, then the species with which we are dealing can be expected to increase once again, and the impact is in a sense reversed. However, when one considers that individual organisms and the genetic combinations which they carry would have been lost, then the impact is one which is irreversible.

Minimization of Adverse Wildlife Impacts

Minimization of either the loss of habitat or the loss of net primary production is possible only through the selection of the lowest ranked alternative (Table 3).

The Significance of Impacts

The impact significance values (Table 3) are comparatively low with values for individual alternatives ranging from a low of 23% to a high of 33% of the possible maximum significance rating (i.e. 96 value points total).

There are relatively small differences in the significance ratings of the alternatives and these are due to the presence or absence of aesthetic potential and the scale of anticipated secondary impacts.

The rating as presented represents the investigators assessment that in each case a small proportion of a locally common community type will be lost; the primary impacts will be confined to the zone of construction but the loss will be of long-term duration.

Key to Table 3

Key: Impact Significance Codes and Numerical Values

I. Biological Significance

A. Level of biological organization impacted.

(a) Individual organisms (value 2)
(b) Populations (value 4)
(c) Community (value 8)
(d) Ecosystem (value 16)

B. Scope: approximate proportion of "A" actually impacted.

(a) 25% or less (value 2)
(b) 25% to 50% (value 4)
(c) 50% to 75% (value 8)
(d) 75% to 100% (value 16)

C. Scale: geographic limits of impact.

(a) Restricted to construction zone (value 2)
(b) Restricted to study area. (value 4)
(c) Limited to an area approximating several counties. (value 8)
(d) Widespread: may effect other continents. (value 16)

D. Duration of impact.

(a) Short duration: less than three years. (value 2)
(b) Moderate duration: three to twenty years. (value 4)
(c) Long duration: greater than twenty years. (value 8)
(d) Impact is irreversible. (value 16)

II. Cultural Concerns (values are cumulative)

(a) Effects aesthetics or passive recreation (value 4)

(b) Effects public health or safety. (value 4)

(c) Effects economic values or has commercial significance. (value 4)

(d) Effects sport or active recreation. (value 4)

Table 3

Biological and Cultural Significance of Impacts
by Alternative, Impact Values, and a Comparison of Alternatives

1. Codes and values given in attached key.
2. Based only on changes in wildlife.

Significance Classification/Numeric Value [1]	ALTERNATIVES 1	2a	2b	3a	3b	3c	4a	4b	5-1a	5-2a	5-3a	5-1b	5-2b	5-3b
I. Biological Effect	N/A													
A. Level of Impact		a/2	a/2	a/2	c/8	c/8	c/8	c/8	c/8	c/8	c/8	c/8	c/8	c/8
B. Scope of Impact		a/2	a/2	a/2	a/2	a/2	a/2	a/2	a/2	a/2	a/2	a/2	a/2	a/2
C. Scale of Impact		a/2	a/2	a/2	a/2	a/2	a/2	a/2	a/2	a/2	a/2	a/2	a/2	a/2
D. Scale of Secondary Impact		a/2	a/2	a/2	a/2	a/2	c/8	c/8	c/8	c/8	c/8	c/8	c/8	c/8
E. Duration of Impact		c/8	c/8	c/8	c/8	c/8	c/8	c/8	c/8	c/8	c/8	c/8	c/8	c/8
II. Cultural Concerns [2]														
A. Aesthetics-Passive Rec.		yes/4	yes/4	no/0	no/0	no/0	no/0	no/0	yes/4	no/0	yes/4	yes/4	no/0	yes/4
B. Public Health or Safety		no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0
C. Economic Values-Commerce		no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0
D. Sport or Active Rec.		no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0	no/0
Total Numeric Value	0	20	20	16	22	22	28	28	32	28	32	32	28	32
% of Maximum Signif. Value (96)	0	21%	21%	17%	23%	23%	29%	29%	33%	29%	33%	33%	29%	33%
Habitat Loss (Magnitude in acres)	0	1.8	1.8	1.8	7.5	11.2	7.6	7.6	37.3	32.7	29.4	45.0	40.3	37.1
Impact Value (Magnitude x Significance)	0	36	36	29	165	246	213	213	1194	916	941	1440	1128	1187
Percent of Largest Impact Value (Alt. 5-1b, 1440)	0%	2%	2%	2%	11%	17%	15%	15%	83%	64%	65%	100%	78%	82%

WATER QUALITY RESEARCH REPORT

Banfield Transitway
Water Quality Technical Report

Table of Contents

BANFIELD TRANSITWAY
WATER QUALITY

I. INTRODUCTION

A. Methodology

Discussion in this report was obtained from U.S. Geologic Survey mapping, aerial stereo photographs, STORET (national water quality data bank), and field investigations. Chemical analysis was conducted in conformance with methods stipulated in "Standard Methods for the Analysis of Water and Wastewater" (1971) and "Manual of Methods for Chemical Analysis of Water and Wastes," (1974) with the exception of turbidity and hardness measurements. These measurements were made with a Hach DR-EL field kit.

B. Study Area

Primary focus is on the East Portland-East County area. Brief consideration only is given to the Downtown area, since no water quality impacts are expected there.

In the East Portland area where there are no defined surface drainages, study is focused on the Banfield corridor only, i.e., the existing freeway between the Willamette River and I-205. The area considered extends approximately 50 feet on each side of the existing facility.

In East County, with Fairview Creek crossing two of the corridor alternatives, Fairview Creek basin was considered in addition to approximately 50 feet on each side of existing road and rail facilities extending between I-205 and Gresham. For the Lents alternative, the I-205 corridor was included where relevant between Banfield freeway and Foster Road.

Regional consideration included the above general areas and the Willamette River at Portland Harbor.

C. Discussion of Format

The format used includes an Existing Setting discussed by area grouping (Regional, Downtown, East Portland, East County), and in East County by LRT corridor alternatives. Impacts are discussed by alternative and are grouped where appropriate. The summary lists impacts by impact category.

II. EXISTING SETTING

A. Region

The study area is located between the Willamette River at Portland Harbor, and the Sandy River from Gresham north. Drainage is generally to the north, although west of I-205 drainage is routed west to the Willamette River via storm sewers.

Background water quality in Portland Harbor is good on the average, based on comparison of data collected by the Department of Environmental Quality (DEQ) from 1958 through 1975 with standards established for the main stem Willamette River (see Table I). However, for almost all parameters, established standards were violated at some time during the collection period, although a clear trend of improving water quality over time is evident from the record. Present water quality limitations (seasonal) as determined by DEQ are low flow, turbidity, and coliforms (DEQ, 1976).

The most important biological feature of the harbor is that it is a passage area for spring and fall chinook salmon, coho salmon, steelhead trout and some shad and cutthroat trout (ODFW, 1964). It is not a spawning area for these fish, however. High populations of rough fish and warm-water game fish exist in the Willamette River below Willamette Falls. Trap nets placed in Portland Harbor in the summer of 1961 caught shad, white sturgeon, brown bullhead, black crappie, white crappie, yellow perch, bluegill sunfish, warmouth, carp,

Table 1

Willamette River @ Steel Bridge

(Data Collected by Department of Environmental Quality)

Parameter	Date Starting/ Ending	# measurements	Mean Value	Standard Error	Maximum Value	Minimum Value	Standard
Water Temp (^oC)	580411 751215	1452	15.4	0.1	26.0	0	
Stream flow (cfs)*	710602 730611	181	23,850		138,000	6700	
Turbidity (JTU)	650817 701216	3	15.7	1.2	18.0	14.0	
Conductivity umhos (@ 25^{o}C.)	590727 730124	1176	65.9	0.5	451	21.0	50-1100
DO (mg/l)	580411 751215	1461	7.68	0.07	15.10	1.00	5
pH	580411 751215	1379	6.73	0.006	7.40	6.10	6.5-8.5
Total alkalinity as $CaCO_3$ (mg/l)	650817 701216	3	11.67	5.24	20.00	2.00	
Nflt. Residue (mg/l)	650817 701216	3	14.33	6.69	25.00	2.00	
NH_3-N (mg/l)	650817 701216	3	0.36	0.27	0.79	0.03	
NO_3-N (mg/l)	650817 701216	3	0.43	0.19	0.80	0.15	1.0
$PO_4^{\equiv}$ (mg/l)	650817 701216	3	0.05	0.009	0.07	0.04	0.1
Tot'l Hardness as $CaCO_3$ (mg/l)	650817 701216	3	28.0	0.58	29.0	27.0	
Zn, diss (ug/l)	690216 741023	37	18.6	1.7	40.0	9.999	100
Zn, total (ug/l)	720418 720418	1	0.01	-	0.01	0.01	-
Total coliform MPN/ (100 ml)	580728 751215	645	9775	646	70,000	45.00	
Fec. coliform (MPN/ 100 ml)	671107 751215	311	749	86	12,000	2	1000
Fecstrep (MPN/100 ml)	681112 700616	4	366	192	700	6	
Total heavy metals (Pb, Zn, Cu etc.) mg/l							500

*Estimated by DEQ

chiselmouth, squawfish, Columbia River chub, coarsescale sucker and Pacific lamprey. Recent increases in minimum summer dissolved oxygen levels have improved the fisheries resource in the river.

Fairview Creek, which flows north into Fairview Lake next to the Columbia River, and Burlingame Creek, which flows north into the Sandy River, are the only two clearly defined drainages in this study area.

B. Downtown

The west side of Portland lies at the foot of the Tualatin Mountains. The downtown area affected by this project has no significant water features.

C. East Portland

Banfield Freeway is aligned through an old dry drainage channel called Sullivan Gulch. Surface runoff from the freeway and adjacent properties is carried to the Willamette River via a storm sewer which runs down the center of the freeway. The 24" sewer pipe outfalls underneath the Burnside Bridge, and has a capacity of approximately 27 cfs (cubic feet per second). The effluent water contains a variety of pollutants including oils, greases, trace metals like lead, manganese and zinc, bits of asbestos and rubber, sediments and other debris. Volume of the Willamette River in Portland Harbor ranges from several thousand to over 100,000 cfs throughout the year (see Table I). The 27 cfs capacity of the existing storm sewer is very small when compared to the volume of receiving water. Dilution of the effluent pollutants ranges from a minimum of about 250 times to a maximum of about 5,000.

Drainage is poor in places within the Union Pacific Railroad right-of-way, which runs along the north side of the freeway. Ponding of water has been observed in the right-of-way where drainage pipes have not been provided. Since the clayey silt and siltly sand soils in the area are underlain by uncemeted gravels, drainage is not considered a major problem here. No perched water (ground water trapped near the surface by underlying impermeable layers) has been observed near the project area.

Minor erosion has been observed at various points along the existing alignment. However, the soils through this section are considered to be of low erodability. For a detailed discussion of soil erosion and its effects on the project area, see the Geology section of this environmental impact statement.

D. East County

1. Burnside (Alternatives 5-1a and b)

The Burnside corridor contains one surface drainage called Fairview Creek at its east end. Additionally, a small draw crosses Burnside between 160th and 162nd Avenue. Dry when observed in October and November of 1977, the draw probably conveys local drainage to the north during the rainy season. At the extreme east end of the corridor, where the Division and Burnside corridors merge, lies Burlingame Creek (see Figure 1) which flows north and east into the Sandy River.

Fairview Creek flows north to Fairview Lake, which is located in a discharge area adjacent to the Columbia River at McGuire Island. The Oregon Department of Fisheries and Wildlife (1977) reports that there are a few warm water fish species in Fairview Lake, primarily brown bullheads and crappie, with some non-game species as carp, suckers and killifish present also. Some of these fish make their way up the creek. There are some largemouth black bass in several small ponds on Fairview Creek located between Burnside Avenue and Glisan, and some of these probably make their way up the creek.

Department of Environmental Quality measurements made in July, 1973 (see Table II) show Fairview Creek at 223rd Avenue (Site 1 - see Figure 1) as having suitable conditions for fish habitation: high dissolved oxygen, low

FIGURE 1
SURFACE WATER FEATURES

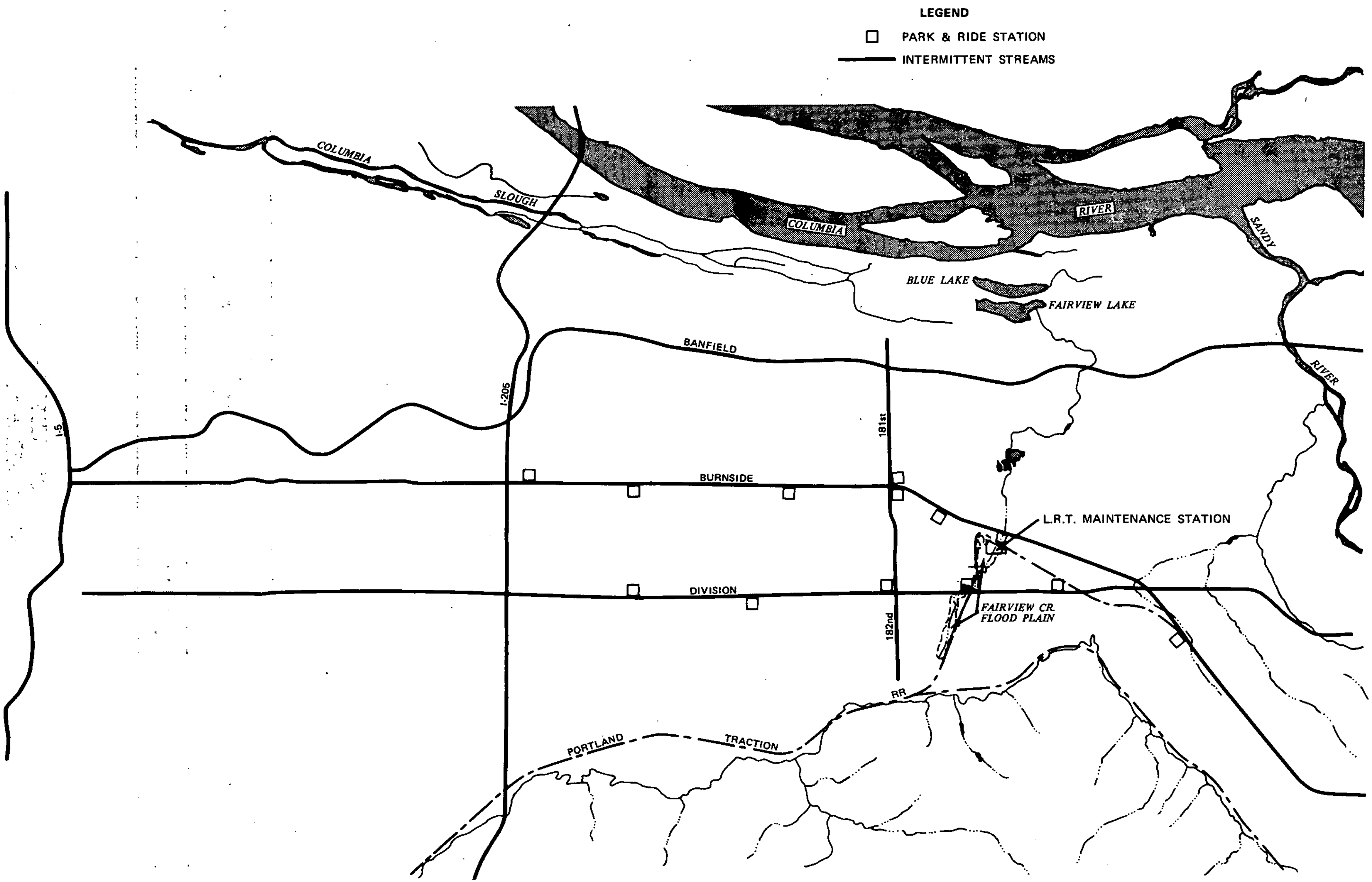


TABLE II. FAIRVIEW CREEK
WATER CHEMISTRY DATA

PARAMETER	LOCATION	
	Site 1* - 223rd Avenue July 5-6, 1973	Site 2** - Portland Traction Line October 26, 1977
Flow (cfs)	--	3
Water Temperature (^{o}C)	17.0 14.0	13.2
Conductivity (umho/cm) at 25^{o} C	--	155
pH	--	6.8
Turbidity (NTU)	--	410
Dissolved oxygen (mg/l)	9.0 9.2	5.9
Total Alkalinity (mg/l as $CaCO_3$)	--	106
Total Hardness (mg/l as $CaCO_3$)	--	62
Orthophosphate (mg/l)	0.23	0.54
Nitrate nitrogen (mg/l)	--	1.85

*DEQ data

** ODOT

temperatures and moderate phosphate levels. Measurements made more recently (October, 1977--see Table II) at Site 2, where the corridor crosses, show less favorable conditions: high turbidity, slightly elevated phosphate and nitrate levels, and lower but still acceptable oxygen levels. Temperature, conductivity, pH, alkalinity and hardness levels all fall within acceptable ranges. West of 202nd, Fairview Creek is badly silted up, to the point where the existing culvert is almost entirely occluded, with water passing through the culvert only by seepage.

A brief examination of microflora and fauna in the creek showed sparse populations of phytoplankton and zooplankton, the former being primarily diatoms and the latter being comprised of a few ostracods.

A preliminary flood hazard study done on Fairview Creek by the Portland District U.S. Army Corps of Engineers in 1976 (see Figure 2) indicates the approximate boundaries of the 100-year flood plain.

Drainage patterns of Burlingame Creek, especially near 1st and Burnside in Gresham, have been increasingly altered as development in the area continues. In the area where the Burnside/Division corridor ends, much of the creek is in culvert, with no open channel area evident near the corridor alternatives.

2. Division (Alternatives 5-2a and b)

The Division corridor crosses Fairview Creek approximately two-thirds of a mile upstream of the Burnside corridor, and is considered intermittent through this section. It presently passes under Division Street via a 175-foot culvert. Water quality conditions at this point of Fairview Creek are similar to those described above under the Burnside alignment for downstream sections of the creek.

Approximate 100-year flood plain boundaries in the vicinity of this corridor can be seen in Figure 2.

3. Lents (Alternatives 5-3a and b)

The Lents corridor extends between the existing Banfield Freeway and Foster Road, along 92nd Avenue inside the I-205 right-of-way. Drainage from the west side of Kelly Butte crosses the Lents corridor at two points just north and just south of Powell Boulevard. Otherwise, there are no major water features crossing the corridor.

III. IMPACTS

A. Regional Impacts

1. No Build (Alternative 1)

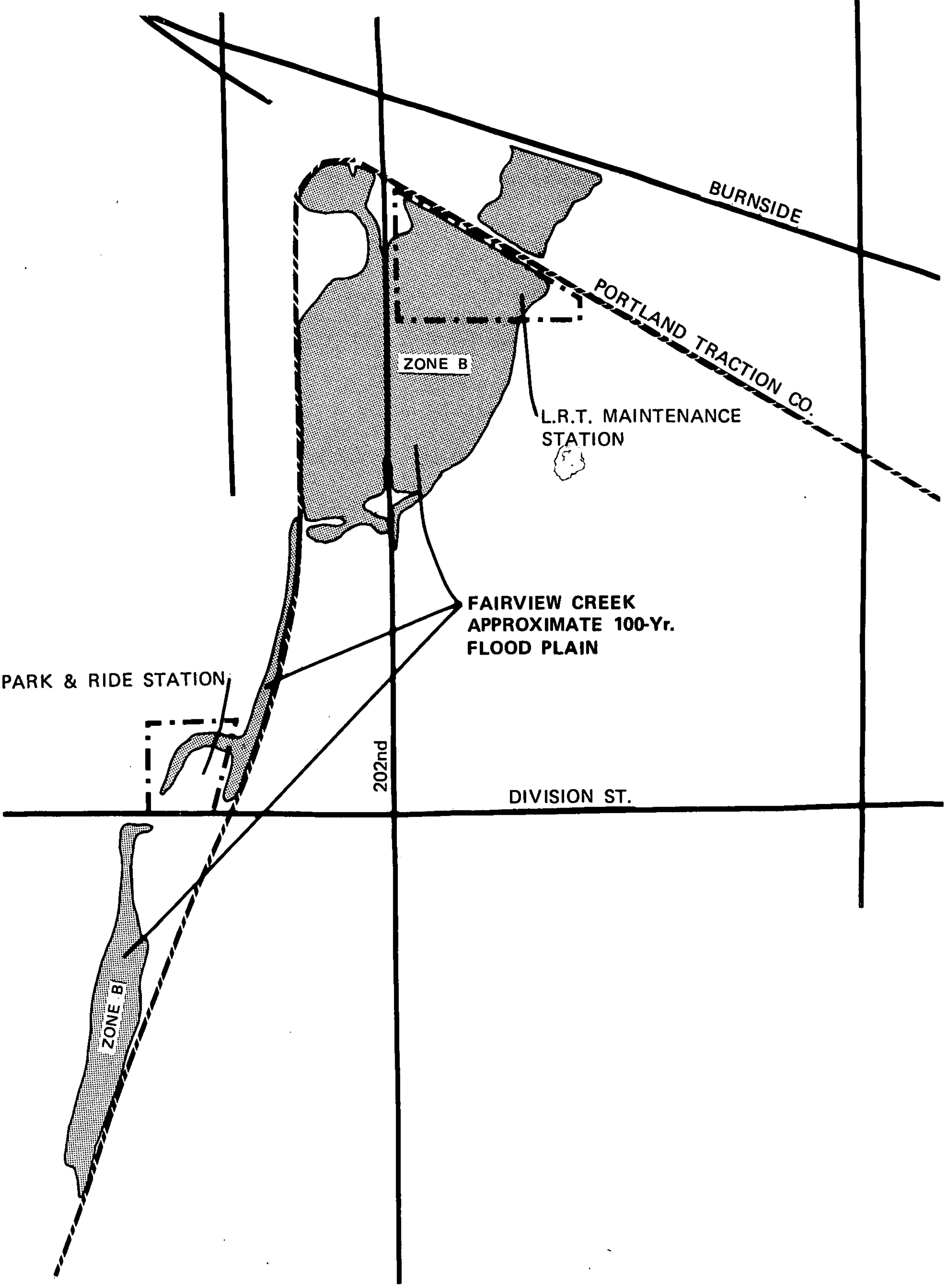
This alternative will result in few regional or specific water quality impacts. No new pavement will be laid under this alternative. Thus, hydrologic conditions now existing in the area will not be altered.

Some air pollutants emitted from vehicles are particulate and settle to the ground a short distance from the transportation facility. These particles can be washed into storm sewers and nearby surface waters and thus become part of the pollutant load. Other air pollutants are easily adsorbed to the surfaces of sediment particles and are washed into waterways in that state. Expected operational air pollutant emissions will probably be similar for all alternatives, including No Build. The maximum difference between alternatives, with numerous factors taken into consideration, will probably fall between 1 and 5 percent for all parameters (see Air Quality report for further details).

The change in air pollutant emissions through time for any of the alternatives will be much larger than differences between alternatives. The trend to be expected over the short term (through the 1980's) is that vehicular air pollutants, such as lead, as a source of water pollutants will decrease

FIGURE 2

FAIRVIEW CREEK FLOOD PLAIN



as a result of changes in fuel composition and increased combustion efficiency. These changes are expected to obscure emissions increases due to increases in traffic volume projected for this project. Over the long term (1990's on), however, traffic volumes will probably become large enough and deposit enough settleable particles in waterways to obscure benefits brought about by decreases in individual vehicle emissions. Adverse impacts will be felt in the Willamette River, the Columbia River, the Sandy River and their tributaries.

2. Build Alternatives

The above discussion of operational air pollutant emissions as a source of water pollutants, and the regional impact over time applies for all build alternatives as well.

A secondary operational impact on a regional level resulting from all build alternatives is alteration of the hydrologic character of the urban watershed over time. As impermeable surface area gradually increases from this project and other public and private development, an overall change in the surface water/ground water recharge ratio occurs. Volumes of water contacting greater impermeable surface area are diverted to surface drainages and so are prevented from entering water reserves. High water and flood peak heights and times of occurrence can become dramatically altered through this process, especially on smaller streams. Lower ground water recharge rates also create problems, as reduced dilution of near-surface contaminants and reduced well use.

B. Downtown Impacts

Since there are no significant water features in the downtown study area, no significant water quality impacts in excess of those described above under <u>Regional Impacts</u> are anticipated.

C. East Portland Impacts

1. Low Cost Improvements (Alternatives 2a-b)

The low cost improvements (LCI), which cover a relatively large portion of the East Portland study area, are discussed as a unit in this report. The LCI will entail only a minimal (1.2 acres) increase in pavement area. Therefore, the hydrologic consequences of LCI alternative selection will be very small. Precipitation presently falling onto ground surface and into the ground water table will go through the existing peripheral street storm sewer to the Willamette River. This volume of water will have minimal effect on both the local ground water table and on the Willamette River. The storm sewer effluent from the peripheral street system will be carrying a short-term lower, long-term higher load of settled air pollutants as a result of increases in traffic volume, described under the No-Build alternative. This increase alone will probably not result in observable negative effects on existing aquatic life in the harbor, although in addition to and in combination with other effluents entering the harbor, such discharges present a cumulative water quality problem. Storm sewer effluent from the peripheral street system will, with its trace metal load and its oxygen-demanding properties, cause indirect and sublethal degradation of the aquatic environment. The toxic trace metals, even if not present in lethal quantities, can present a low-level but chronic street on the growth and reproductive functions of aquatic organisms in the river. The effect will probably be small, but is presently unquantifiable. It is not expected that the fisheries resource will suffer as a consequence of these road improvements.

2. Existing HOV extended (Alternative 3a)

The selection of this alternative will entail an increase of 2.3 acres of pavement over that existing. The additional pavement will generate a small quantity of surface runoff which will travel via the existing storm sewer to the Willamette River. The hydrologic consequences of diverting precipitation which percolates into the ground water table to surface runoff will be minimal, considering the small area to be paved. Adverse effects of the storm sewer effluent entering the Willamette River are similar to those described for Alternative 2 a-b above.

3. Full HOV - without shoulders (Alternative 3b)

This alternative will require 20.9 acres of new pavement. A new 39-inch storm sewer of 60 cfs capacity will be constructed to accommodate the additional runoff generated by this alternative. The sewer will run generally down the northerly side of the existing facility and will outfall into the Willamette north of the Burnside Bridge. Effects of pollutants in runoff water have been discussed above. It is not expected that the fisheries resource will be significantly affected by this effluent. The hydrologic consequences of diverting water falling on 20.9 acres from ground water to surface water flow will be of minor but probably measurable significance.

Less dilution of existing pollutants in the ground water table will occur; further, increased surface water runoff into the lower Willamette River from a variety of urban sources is gradually altering the hydrologic character of the watershed towards flashy, sudden storm peaks. However, at the same time, the increased surface runoff generated from the increased pavement area will act to dilute any additional pollutants entering the sewer system.

4. Full HOV with shoulders (Alternative 3c)

This alternative will generate impacts similar to those described for 3b above. Approximately 27.6 acres of new pavement will be generated if this alternative is selected, the largest area taken of all the alternatives under consideration. As with Alternative 3b above, the runoff generated by the additional surface area will travel to the Willamette River via the new 39-inch storm sewer.

The impact of this alternative, which requires the most new pavement surface, is expected to be minor in its effect on aquatic life in and passing through the harbor.

5. Separated busway (Alternative 4a and 4b)

The separated busway will require approximately 25.8 acres of new pavement, an area intermediate between Alternatives 3b and c. The busway will run along the northerly side of the existing freeway, as will the new storm sewer. Impacts resulting from the selection of this alternative will be intermediate between those described for Alternatives 3b and c and have been described above.

D. East County Impacts

1. Burnside (Alternatives 5-1a and b)

Primary construction impacts resulting from selection of this corridor include (1) degradation of fish habitat in Fairview Creek, (2) degradation of water quality conditions in the creek, (3) Fairview Creek flood plain encroachment, and (4) erosion from exposed construction areas. The magnitude of the first two impacts is expected to be small. Conditions in the creek, as described previously, are poor. Construction activities will temporarily further aggravate fish habitat and water quality conditions. However, if provisions are made to facilitate water passage through the construction area, long term fish habitat/water quality conditions could improve, although upstream conditions would have to improve also before significant upgrading of the creek could occur. The maximum expected increase in pavement are in East County under this alternative. The hydrologic consequences of the resulting increased surface runoff and decreased ground water recharge have been discussed under East Portland Impacts. This increase will be the smallest of the three LRT alternatives in East County. Floodplain encroachment at Fairview Creek along this corridor would be significant if the proposed maintenance and storage area is constructed; the area of encroachment would be about 10.5 acres. Erosion of soils into the creek could be a problem during construction, as local soils are moderately erodable. Mitigative measures will minimize this, however. See Geology report for further details. If mitigative measures are effective, operational impacts of this corridor on water quality should be minimal.

A primary operational impact which could occur at the proposed park and ride station between 160th and 162nd Avenue on this corridor is obstruction or diversion of overflow waters which flow down the draw during periods of high rainfall. This could be largely alleviated by the use of proper mitigative measures, however.

Burlingame Creek, at the extreme east end of the Burnside/Division corridor, should not be adversely affected by construction of LRT facilities.

2. Division (Alternatives 5-2a and b)

Impacts described above for Fairview Creek in terms of water quality changes would be similar for this corridor also, but to a lesser extent since the creek is already in culvert across S.E. Division Street. Fish habitat degradation would not be a problem since it is doubtful that fish proceed this far up the creek. Maximum increase in pavement area would be 24.3 acres. Flood plain encroachment would occur on this corridor also, since a park and ride station is proposed just north of Division at the Fairview Creek crossing. The extent of encroachment would be smaller, however, 1.5 acres. Erosion considerations would be similar to the Burnside corridor. Burlingame Creek has already been mentioned in the preceding section.

3. Lents (Alternatives 5-3a and b)

The only aquatic consideration of note in this corridor is drainage flowing west off Kelly Butte in the vicinity of Powell Boulevard. No impedance of this drainage should occur as a result of LRT construction on the Lents corridor, since any diversion would have already occurred and been accommodated by the I-205 storm sewer system. Any additional flow generated by increased surface area on the Lents corridor (pavement area increases to the extent of 28.3 acres) will also be directed into the I-205 storm sewer system.

IV. CONSEQUENCES OF ENVIRONMENTAL IMPACTS

A. Short-term vs. Long-term Productivity

Short-term effects on water quality resulting from installation of the new storm sewer under Alternatives 4a, 4b, and 5 will be balanced by improvement of drainage facilities through the project area. Otherwise, adverse water quality effects will be balanced by long-term socioeconomic advantages.

B. Irreversible and Irretrievable Commitment of Resources

Alteration of local drainage patterns, as the diversion of groundwater flow into surface runoff, while not completely irreversible, does represent a fairly permanent action, and is one of many acts which contributes further to the increasing urbanization of the City of Portland and of the lower Willamette watershed. The land area taken for the new storm sewer under Alternatives 4a, 4b and 5 will also be removed from its natural state for a long period.

V. MINIMIZATION OF ENVIRONMENTAL CONSEQUENCES

The usual procedures will be followed during and after construction to minimize erosion and disruption of the landscape. See <u>Geology</u> section for further details.

Minimization of most drainage problems in the project area will be effected by the installation of the new storm sewer system. Reduction of pollutant loads entering the storm sewer system is best effected at the source. For example, improved street cleaning procedures are preferable to construction of catch basins and the like, since the latter are rather inefficient at removing the highly loaded small size fraction ($<43u$) of the particulate pollutant load (EPA, 1972).

Drainage of surface and overflow waters will be maintained by installation of culverts or other structures of large enough capacity to contain peak flows.

Surface area paved will be kept to a minimum wherever possible.

GEOLOGICAL RESEARCH REPORT

BANFIELD TRANSITWAY PROJECT

Research Report
GEOLOGY
Gordon W. Olcott

OUTLINE

INTRODUCTION

Methodology
Study Areas
Discussion of Format

EXISTING SETTING

Region
Downtown
East Portland (Willamette River to I-205)

Banfield Corridor

1. Topography
2. Geology
3. Ground Water
4. Soils
5. Erosion
6. Foundations
7. Rock Sources--Table 1

East County (I-205 Eastward)

Portland Traction Co. roadbed (East Burnside Street alignment)

IMPACTS

Regional
Downtown
East Portland (Willamette River to I-205)

Banfield Corridor (with Mitigations)

1. Geologic Hazards
2. Ground Water
3. Protection of Survey Monuments
4. Erosion--Table 2
5. Excavation, Embankment, Surplus, and Aggregate
6. Short-Term vs Long-Term Productivity
7. Irreversible and Irretrievable Commitment of Resources--Table 3

East County (I-205 Eastward)

E. Burnside Street alignment--Table 4
S.E. Division Street alignment--Table 5

REPORT SUMMARY

Existing Setting

Region
Downtown
East Portland (Willamette River to I-205)

1. Banfield Corridor

East County (I-205 Eastward)

1. Portland Traction Co. roadbed (East Burnside Street alignment)
2. East Burnside Street alignment
3. S.E. Division Street alignment

Impacts

All alternatives
Alternative 1 (No-Build)
Alternative 2a, 2b (Low Cost Improvements)
Alternative 3a, 3b, 3c (High Occupancy Vehicle Lanes)
Alternative 4a, 4b (Separated Busway)
Alternative 5-1a and 5-1b (Burnside)
Alternative 5-2a and 5-2b (Division)
Alternative 5-3a and 5-3b (Lents)

Geologic Impact and Mitigation Summary--Table 6

BANFIELD TRANSITWAY PROJECT

Research Report
GEOLOGY
Gordon W. Olcott

Introduction

Methodology

This geologic report is based on several field trips to the project area during which times the Banfield Freeway and the Union Pacific Railroad maintenance road were driven and in many places walked. Exposed banks were examined for rock identification and stability determination. A similar inspection was given the S.E. Burnside Street-Portland Traction Co. route to Gresham. The S.E. Division Street and the I-205 (Lents) alternative routes were driven (the latter via adjacent streets), as well as the Portland downtown area.

Construction and water well logs were examined to determine the stratigraphy of the subsurface rock and the depth to the ground water table. Pertinent geologic literature and maps were studied, as were soil reports supplied by the U.S. Soil Conservation Service. Private and municipal agencies were contacted concerning drainage. The Portland Metropolitan office of the Oregon Department of Transportation (ODOT) furnished construction data in the form of maps, cross-sections, profiles, aggregate and cut and fill quantities, and clearing and grubbing acreages. Core-drill records and geotechnical reports produced by the Region 1 Soils and Geology Section of ODOT were also used.

Study Area

Banfield Corridor. This route winds eastward through Sullivan Gulch from near the Willamette River to I-205, a road distance of approximately 5 miles. The gulch is occupied by the existing Banfield Freeway and the Union Pacific Railroad.

E. Burnside Street-Portland Traction Co. alignment. This route is along business-residential Burnside Street eastward from I-205 to the former Portland Traction Company's roadbed and continues along it to Gresham.

N.E. Sandy Boulevard alignment. This route extends northeasterly from the junction of N.E. Broadway Street and 39th Avenue to I-205.

S.E. Division Street alignment. This route jogs near the Willamette River and continues east on this business-residential street to Gresham.

Lents alignment. This route uses I-205 southward from the Banfield Freeway to S.E. Foster Road.

Note:

The geology of the project area is such that no unusual or difficult construction problems are anticipated. Except for core drilling for reconstructed or new structures at some sites, the following parts of the project area require little or no subsurface geologic work and are therefore not discussed in the text:

a. The downtown area.

b. N.E. Sandy Boulevard alignment

c. I-205 (Lents) alignment.

Discussion of Format

The order of presentation of material in this report is shown in the introductory outline. The methodology and limits of each of the study areas are presented, and then the existing geologic setting is discussed. The geologic impacts caused by new construction along with possible mitigations are presented, and then an alternative-by-alternative comparison of positive and negative aspects where applicable are discussed. A summary matrix and a geologic impact and mitigation summary table conclude the report.

Alternatives 2a and 2b, and 5-3a and 5-3b are not discussed because they entail minimal geologic work. The alternatives discussed in this report are:

Alternative 1	No-Build
Alternative 3a Alternative 3b Alternative 3c	High Occupancy Vehicle (HOV) Lanes
Alternative 4a Alternative 4b	Separated Busway
Alternative 5-1a, 2a Alternative 5-1b, 2b	Light Rail Transit

Existing Setting

Region

The relevant geologic setting is described under the East Portland (Willamette River to I-205) and East County (I-205 Eastward) headings below.

Downtown

There are no geologic concerns in the downtown area.

East Portland (Willamette River to I-205)

Banfield Corridor

1. Topography. The Banfield Freeway corridor is a natural drainage depression known as Sullivan Gulch that trends westerly about seven miles from just east of Rocky Butte through the extensive terraces of northeast Portland to the Willamette River. The average bottom width of the gulch, measured near the structures between Grand to 82nd Avenues inclusive, is approximately 160 feet;

the top width approximates 300 feet. The gulch attains its maximum depth of about 60 feet near the N.E. 16th Avenue on-ramp to the existing freeway, from where the gradient eastward is relatively constant. A rise in elevation of about 200 feet occurs from N.E. Grand Avenue eastward to where the off-ramp to I-205 begins at N.E. 86th Avenue. This 4 3/4 miles of freeway has a gradient of 0.8 percent.

2. Geology. The Sullivan Gulch area is made up of a widespread veneer of semi-consolidated gravel, sand, silt and clay (the latter two in minor quantities) overlying in part a larger sand unit. The gravels, consisting of basalt, andesite, and occasional erratic (originating elsewhere) quartzite and granitic rocks, range in size up to one foot in diameter. In westward progression the gravels appear to phase out in the vicinity of the S.E. 47th Avenue overpass, where the predominant rock unit changes from sand and gravel to sand.

This change may represent the contact between the two units, collectively named the Portland Sand by Baldwin* to emphasize the much thicker sand unit to that of the relatively thin overlying sand and gravel unit. The units were formerly termed the Portland Delta Gravels or the Portland Gravels. Well logs show the combined units to be at least 116 feet thick near the gulch.

Baldwin states that the sand unit was deposited during a ponding episode which occurred during the third interglacial period of time in the late Pleistocene geologic epoch. The presence of the erratic rocks within the sand and gravel unit indicates that its components were transported and deposited much later, by either the great Lake Missoula flood of approximately 20,000 years ago, or by later major floods.

Logs of wells located in the vicinity of the project reveal the following geologic formations, in stratigraphic sequence downward:

*Baldwin, Geology of Oregon, 1976, page 45

a. The Portland Sand, of late Pleistocene age and having a maximum thickness of about 400 feet, consists of dissected terraces composed of sand having a veneer of later-deposited gravels mixed in the upper part.

b. The Troutdale Formation, of early Pliocene age and several hundred feet thick, is made up of conglomerate, gravel, and sandstone, with minor beds of sand and clay. Quartzite pebbles characterize the formation.

c. The Sandy River Mudstone, also of early Pliocene age, consists of several hundred feet of mudstone and claystone having scattered lenses of sandstone and conglomerate.

d. The Columbia River Basalt, of middle to late Miocene age, is a thick series of accordantly layered dark gray to black lava flows.

e. Sedimentary and volcanic rocks, of marine and continental origin, underlie the Columbia River Basalt.

3. Ground Water. Water well logs of the project area indicate that the regional water table lies well below the transitway construction zone. A Providence Hospital industrial well log showed the static water level to have been 116 feet below land surface in February, 1963. There is no reason to believe the level has risen during the intervening years.

Ponded water was observed at various places along the Union Pacific Railroad's graveled maintenance road in December 1976, and January 1977, an unusually dry winter. The road is adjacent to and parallels the bottom of the freeway bank. Although no seepage was observed from the bank (in many places covered by thick brush), it is believed that the water is a combination of seepage, possibly from perched ground water aquifers, and precipitation held temporarily in place by clay hardpan conditions abetted by compaction of the road.

The most extensive ponding occurred intermittently for approximately one-quarter mile between the N.E. 28th Avenue and N.E. 33rd Avenue overpasses. Minor ponding was observed at the east side of the N.E. 21st Avenue overpass, near the east side of the N.E. 39th Avenue overpass, east of the 42nd Avenue off-ramp, and just west of the 47th Avenue overpass. Ponding was also observed at N.E. 54th Street, below the N.E. 60th Street overpass, at N.E. 62nd Street, and below the N.E. Halsey Street overpass.

Another extensive ponding along the railroad maintenance road was observed just east of the project end at I-205 and north of the N.E. Halsey Street overpass.

Long reaches of the gulch (within the railroad right-of-way) have no drainage facilities, except that provided by the moderately permeable gravels. Ditching is used for drainage east of N.E. 82nd Avenue, but westward to the Willamette River only five catch inlets are installed. These are connected to the combination sewer system at N.E. 70th Avenue (has two inlets), N.E. 49th Avenue, N.E. 45th Avenue, and at N.E. 28th Avenue.

As stated above, the pondings are temporary occurrences produced by localized hardpan conditions and have caused no problems.

4. Soils. The soils underlying the project area are silty sands and sandy silts mixed with gravels and minor quantities of clay. They are well-drained, moderately permeable, essentially nonplastic, slightly acidic, moderately corrosive to concrete, and slightly to highly corrosive to steel. They have low shrink-swell, slight erosion, and moderately low runoff potentials; and overlie a water table greater than 100 feet below land surface. Gravel and sand are predominant in the eastern part of the project; sand is predominant in the

western part.

The soils are classified by the U.S. Soil Conservation Service (SCS) as Latourell loam in the western part of the project area and as Multnomah silt loam in the eastern part. The Latourell loam is rated A-4 to A-1 in the American Association of State Highway and Transportation Officials' (AASHTO) classification, whereas the Multnomah silt loam ranges from A-4 to A-2, in downward progression to the maximum test depth of five feet (the SCS generally limits its soils tests to five feet): The AASHTO rating ranges from A-1 through A-7, with the lower numbers designating the soils best suited for highway embankment, subgrade, subbase, and base use. These soils therefore rate as good to fair on a scale of good-fair-poor.

5. Erosion. Slopes along the existing freeway and railroad tracks are stable at steep ratios of 1:1 and 1½:1 (the latter ratio designates a slope cut 1½ feet horizontally to 1 foot vertically).

The bank north of the railroad tracks shows evidence of a possible small slide and slump, respectively located just east of N.E. Grand Avenue, and where the N.E. Holladay Street off-ramp leaves the freeway. Both are minor and have little if any import. No others were observed in the gulch.

Only minor erosion has occurred along the freeway banks, and that principally on the south side between N.E. 25th and 28th Avenues. The vegetative cover there is sparce in places and needs to be replanted. Slopes behind retaining walls are standing well, with little or no evidence of erosion.

6. Foundations. No foundation problems are known to occur along the existing freeway from the N.E. 21st Avenue overpass eastward to the end of the project. Core log data for the gulch west from the above overpass to the Willamette River, however, indicate the presence of compressible material of natural

and man-made origin. Although not in the transitway project, it is noted that the construction of the N.E. Union and Grand Avenue structures required extensive excavation of these materials.

Present structures and retaining walls are in good condition. Thorough subsurface foundation investigation by drilling, however, will be necessary wherever present structures or retaining walls are rebuilt or new ones are constructed. Any compressible materials must be determined and removed.

7. Rock Sources. As no state-owned rock source exists in the project area, it is the responsibility of the contractors to choose suitable sources. General requirements concerning sources of borrow and aggregate materials are stated in Subsection 106.05 (as supplemented) of the Oregon Transportation Commission Standard Specifications for Highway Construction, 1974. These requirements insure proper treatment and reclamation of the source sites.

At least six qualified commercial aggregate sources are located within economic hauling distance of the project. These potential sources are listed in Table 1 by company name, plant location, available facilities, and rock source.

East County (I-205 Eastward)

Portland Traction Co. Roadbed, from near S.E. 198th Avenue southeast to Gresham. (E. Burnside Street alignment)

1. Topography. The terrain is flat to gently sloping, with a hilly area to the south. A long cut about 35 feet deep extends east-west from the 212th Avenue structure. No additional cuts are anticipated. Some fill areas of minor extent occur east of 212th Avenue to Gresham.

Several minor fills on E. Burnside Street may be required between 122nd to 136th, and 160th to 167th avenues.

No topographic problems are foreseen.

Table 1

POTENTIAL ROCK SOURCES

Company Name	Plant Location	Available Facilities	Rock Source
Rivergate Rock Products Co. (Columbia West)	Just south of west end of St. Johns Bridge.	Portable crusher, asphaltic concrete batch plant.	Basalt quarry at plant site.
Willamette Hi-Grade Concrete Co.	Near east end of Fremont Bridge and west end of Ross Island Bridge.	Crusher, several Portland cement concrete batch plants in area.	Willamette River gravels in Portland area.
Cascade Construction Co. (Santosh)	Near west end of Ross Island Bridge.	Crusher, asphaltic concrete batch plant. Aggregate is barged to plant.	Gravel pits about 4 miles N.E. of Scappoose.
Ross Island Sand and Gravel Co.	Near east end of Ross Island Bridge.	Crusher, asphaltic concrete batch plant, and several Portland cement concrete batch plants.	Willamette River Hardtack Island gravels.
Porter Yett Sand and Gravel Co.	N.E. Portland Highway near 65th Avenue.	Crusher, asphaltic concrete batch plant.	Gravel pit, limited quantities.
Rogers Construction Co.	S.E. 190th Avenue near Mill Street.	Crusher, asphaltic concrete batch plant.	Gravel pits at S.E. 155th N.E. 190th, and N.E. 205th Avenues.

2. <u>Geology.</u> Portland Sand flood deposits made up of gravel, sand, silt, and clay underlie the area. The 35-foot-deep cut at the 212th Avenue structure is standing well at about 1:1.

3. <u>Ground Water.</u> Water well logs of the project area indicate that the regional water table here also lies deep below the proposed transitway construction zone. No perched water bodies were observed to issue seepage from the long cut at the S.E. 212th Avenue structure.

4. <u>Soils.</u> The soils exposed in the cuts along the tracks consist principally of clayey, silty sand mixed with gravels. The fines in the surface material tend to settle out to form an impermeable layer, causing small, temporary pools along the tracks.

5. <u>Erosion.</u> Some gullying was observed in the north bank east of the 212th Avenue structure. This appeared to be caused by free-flowing drainage and the use of the route by motorcyclists. All other banks appeared to be standing well.

6. <u>Foundations.</u> Bridge foundation exploration work will be necessary for the replacement of the 212th Avenue structure.

7. <u>Rock Sources.</u> Potential rock sources for the project have been listed in Table 1 in the above section on the Banfield Freeway corridor.

Impacts

Regional Impacts

The relevant geologic impacts are described under the East Portland (Willamette River to I-205) and East County (I-205 Eastward) headings below.

Downtown

No geologic impacts are foreseen in the downtown area.

East Portland (Willamette River to I-205)

Banfield Corridor

1. Geologic Hazards. No geologic hazard impacts exist except possibly west from the N.E. 21st Avenue overpass where compressible materials occur. Some of the construction area may be subject to subsidence impacts.

Mitigation would entail a drilling program to determine potential subsidence areas and, where necessary, excavating to bedrock for piers or excavating and backfilling with rock for lesser structures and roadways.

2. Ground Water. No ground water impacts exist except the possibility of random perched ground water bodies.

Mitigation would be by grouting or by providing drainageways.

3. Protection of Survey Monuments. Oregon State Highway Division procedures (Technical Bulletin 19, Sections 2.2.11 and 4.5.16) insure that all vertical and horizontal survey monuments endangered by a proposed road project be relocated. In the case of U.S. Geodetic Survey monuments, notification is made directly to the Survey's mark maintenance engineer. The Survey funds the relocation costs of its monuments.

It has been determined that the only such survey monuments requiring relocation in the Banfield Corridor are the bench marks (elevation designation) on those parts of overpass structures to be rebuilt.

4. Erosion. No erosion impacts are expected provided proper temporary and permanent erosion control methods are promptly implemented as construction work progresses. This includes a contingency fund in the contract to pay for unforeseen conditions.

Table 2 shows the slope areas subject to potential erosion:

TABLE 2

POTENTIAL EROSION AREAS

Alternatives		Slope Areas (approximately) (square feet)	(acres)
1	No Build	None	None
2a	Low Cost Improvements	Negligible	Negligible
2b	Low Cost Improvements	Negligible	Negligible
3a	High Occupancy Vehicle	118,000	2.71
3b	High Occupancy Vehicle	420,000	9.64
3c	High Occupancy Vehicle	366,000	8.40
4a	Separated Busway	340,000	7.81
4b*	Separated Busway	366,000	8.40
5-1a, 2a, 3a	Light Rail Transit	367,300	8.43
5-1b, 2b, 3b	Light Rail Transit	340,000	7.81

*Essentially the same as 3c.

Mitigation is preferably prevention rather than correction. Some mitigative/preventative measures that might be used are designing cut and fill slopes to best accommodate the type of rock or soil, tamping straw into bare slopes, placing straw bales along and in drainage ditches, erecting earth berms above cut slopes to direct runoff laterally, ditching and culverting; grass seeding, fertilizing, and mulching; and planting other stabilizing and protective vegetation.

5. Excavation, Embankment, Surplus, and Aggregate. Table 3 indicates the quantity impacts respectively involved in excavation, embankment, surplus, and aggregate materials.

Mitigation for the excavation and embankment impacts would mainly be through reclaiming the quarry and pit sites as required by law, including contouring slopes and planting vegetation where needed.

No mitigation to date (November 1977) has been determined as to how or where to dispose of the surplus material. This will be resolved as specific design plans of the chosen alternative are made, and in accord with local rules and regulations if off the project.

TABLE 3

ROCK QUANTITIES
(approximate)

Alternatives	Excavation (cu. yds.)	Embankment (cu. yds.)	Surplus (cu. yds.)	Aggregate (tons)*
1	None	None	None	None
3a	35,800	7,300	28,500	8,320
3b	215,900	103,000	112,900	89,500
3c	254,400	78,100	176,300	105,600
4a	265,800	71,200	194,600	154,400
5-1a, 2a, 3a	203,900	47,500	156,400	56,400
5-1b, 2b, 3b	258,600	79,300	179,300	75,130

*Aggregate is shown in tons because it is bought by weight.

Note: Alternatives 2a and 2b (Low Cost Improvements) are not applicable to this table because they have no geologic impacts.

Alternative 4b is essentially the same as 3c.

6. Short-Term Use vs Long-Term Productivity. Short-term erosion potential will be succeeded by long-term cover if properly applied. Table 2 showing the slope areas to be subject to potential erosion lists the differences between the alternatives.

7. Irreversible and Irretrievable Commitment of Resources. Resources permanently committed are the rock quantities listed in Table 3.

The use of the land as ground water recharge areas will be lost wherever it is impermeably surfaced.

East County (I-205 Eastward)

East Burnside Street Alignment

1. Geologic Hazards. No geologic hazard impacts have been noted.

2. Ground Water. No ground water impacts have been noted.

3. Protection of Survey Monuments. The following City of Portland bench marks located at intersections along E. Burnside Street may have to be relocated due to proposed street widening.

NW corner at 108th Avenue.
SE corner at 113th Avenue
SW corner at 117th Avenue
NE corner at 122nd Avenue
SW corner at 128th Avenue
NW corner at 154th Avenue
SE corner at 162nd Avenue
SW corner at 167th Avenue
NW corner at 176th Avenue
NW corner at 181st Avenue

4. Erosion. No erosion impacts are expected provided proper temporary and permanent erosion control methods are promptly implemented on the excavated and fill areas as construction work progresses. Erosion-control requirements will be written into the appropriate contracts which will also provide for contingency funds to pay for unforeseen conditions.

5. Excavation, Embankment, Surplus and Aggregate. Excavation and aggregate quantities for the Light Rail Transit alternatives are shown in Table 4. Embankment and surplus quantities are yet to be determined (November 1977).

Specific data for the former Portland Traction Company's roadbed extension to Gresham will be developed if that route is chosen. Work anticipated on it entails only minor grading or excavation.

TABLE 4

ROCK QUANTITIES
(approximate)

Rock	96th Ave. to 181st Ave.	181st Ave. to Stark St.	Total
Excavation	111,500 c.y.	2,700 c.y.	114,200 c.y.
Embankment	-----	----	Minor quantity
Surplus	-----	----	Not determined
Base	97,400 tons	2,500 tons	99,900 tons
Asphaltic Concrete	25,700 tons	2,000 tons	27,700 tons

6. <u>Short-Term Use vs Long-Term Productivity</u>. The excavated areas present a short-term erosion potential that will be succeeded by long-term cover, likely in the form of impermeable surfaces.

7. <u>Irreversible and Irretrievable Commitment of Resources.</u> Resources permanently committed are the rock quantities listed in Table 4.

The use of the land as ground water recharge areas will be lost wherever it is impermeably surfaced.

S.E. Division Street Alignment. (From I-205 eastward to the county fairgrounds in Gresham).

1. Geologic Hazards. No geologic hazard impacts have been noted.

2. Ground Water. No ground water impacts have been noted.

3. Protection of Survey Monuments. The following City of Portland bench marks located at intersections along S.E. Division Street may have to be relocated due to proposed street widening:

SE corner at 98th Ave.	SE corner of 145th Ave.
SE corner at 105th Ave.	SE corner of 153rd Ave.
NE corner at 112th Ave.	SE corner of 162nd Ave.
(Not listed) 122nd Ave.	SW corner of 167th Ave.
NE corner at 130th Ave.	SE corner of 174th Ave.
SW corner at 136th Ave.	SW corner of 182nd Ave.
East curb of 141st Ave.	SW corner of 190th Ave.

Section and quarter corners of the Government Survey along which S.E. Division Street is aligned will be relocated if the proposed Light Rail Transit alternative is chosen.

4. Erosion. No erosion impacts are expected provided proper temporary and permanent erosion control methods are promptly implemented on the excavated and fill areas as construction work progresses. Erosion-control requirements will be written into the appropriate contracts which will also provide for contingency funds to pay for unforeseen conditions.

5. Excavation, Embankment, Surplus, and Aggregate. Excavation, embankment, surplus, and aggregate quantities for widening the alignment are shown in Table 5. Embankment quantities are minor and, because of the large surplus quantity, have not been totaled.

TABLE 5

ROCK QUANTITIES
(approximate)

Rock	S.E. Division Street
Excavation	234,000 cu. yd.
Embankment	Minor quantity
Surplus	230,000 cu. yd.
Base	64,000 tons
Asphaltic Concrete	29,000 tons

6. Short-Term Use vs Long-Term Productivity. The excavated areas present a short-term erosion potential that will be succeeded by long-term cover, likely in the form of impermeable surfaces.

7. Irreversible and Irretrievable Commitment of Resources. Resources permanently committed are the rock quantities listed in Table 5.

The use of the land as ground water recharge areas will be lost wherever it is impermeably surfaced.

TABLE 6

GEOLOGIC IMPACT AND MITIGATION SUMMARY
(Lower-case letters signify mitigative measures)

Alternatives	Geologic Hazards	Ground Water	Suitability for Foundations	Potential Slope Erosion (sq. ft.)-(acres)	Excavation Material (cu. yds.)	Embankment Material (cu. yds.)	Surplus Material (cu. yds.)	Aggregate Material (tons)
No-Build 1	None	None	Not applicable	None	None	None	None	None
Low Cost Improvements 2a	None	None	Not applicable	Negligible	None	None	None	None
2b	None	None	Not applicable	Negligible	None	None	None	None
High Occupancy Vehicle 3a	None	None	Not applicable	118,000 - 2.71 a. Prompt implementation of erosion control methods. b. See bottom of table for methods.*	35,800 a. Reclaim quarry or pit sites as required by law. b. Design slopes to accommodate rock or soil type.	7,300 a. Design slopes to accommodate rock or soil type. b. Contour slopes and plant flora.	28,500 (Use of surplus or location of waste storage site not determined.) a. Determine use of surplus or location of waste storage site.	8,320 a. Reclaim quarry or pit sites as required by law.
3b	Compressible soils west of 21st Ave. a. Subsurface investigation. b. Excavation. c. Backfill with rock.	Perched a. Grout aquifer. b. Provide drainageways.	(See Geologic Hazards)	420,000 - 9.64 (See a. and b. above)	215,900 (See a. and b. above)	103,000 (See a. and b. above)	112,900 (See a. above)	89,500 (See a. above)
3c	None	None	None	366,000 - 8.40 (See a. and b. above)	254,400 (See a. and b. above)	78,100 (See a. and b. above)	176,300 (See a. above)	105,600 (See a. above)
Separated Busway 4a	(See a., b., and c. above)	None	(See Geologic Hazards)	340,000 - 7.81 (See a. and b. above)	265,800 (See a. and b. above)	71,200 (See a. and b. above)	194,600 (See a. above)	154,400 (See a. above)
4b	(See a., b., and c. above)	None	(See Geologic Hazards)	(Essentially same as 3c) (See a. and b. above)	(Essentially same as 3c) (See a. and b. above)	(Essentially same as 3c) (See a. and b. above)	(Essentially same as 3c) (See a. above)	(Essentially same as as 3c) (See a. above)
Light Rail Transit 5-1a or 2a or 3a	(See a., b., and c. above)	None	(See Geologic Hazards)	367,300 - 8.43 (See a. and b. above)	203,900 (See a. and b. above)	47,500 (See a. and b. above)	156,400 (See a. above)	56,400 (See a. above)
5-1b or 2b or 3b	(See a., b., and c. above)	None	(See Geologic Hazards)	340,000 - 7.81 (See a. and b. above)	258,600 (See a. and b. above)	79,300 (See a. and b. above)	179,300 (See a. above)	75,130 (See a. above)

Note: 1. Above data pertains to the Banfield Corridor.

*2. Some erosion mitigation methods that might be used are:

a. Design cut and fill slopes to accommodate type of rock or soil, b. Tamp straw into bare slopes with sheepsfoot roller, c. Place straw bales along or in drainage ditches, d. Provide adequate ditches and culverts, e. Erect earth berms above cuts to direct runoff laterally; f. Plant grass seed, fertilize, and mulch in time for germination, g. Plant other stabilizing and protective vegetation.

b. It is imperative that pertinent erosion control methods cited above be implemented as soon as construction activities permit. Potential erosion, although considered slight; is the principal geologic impact known in the project at this time.

3. Rock data for widening L.R.T. alignments east of I-205 are:

E. Burnside Street (96th Ave. to Stark St.)	Rock	S.E. Division Street (96th Ave. to Fairgrounds)
114,200 cu. yds.	Excavation	234,000 cu. yds.
Minor quantity	Embankment	Minor quantity
Not determined	Surplus	230,000 cu. yds.
99,900 tons	Base Rock	64,000 tons
27,700 tons	Rock in Asphaltic Concrete	29,000 tons

4. Total ballast for entire L.R.T. alignments is:

Burnside - 58,000 cu. yds.
Division - 95,000 cu. yds.
Lents - 55,000 cu. yds.

5. All quantities listed in this table are approximate.

BIBLIOGRAPHY

Abrams, Leroy. Illustrated Flora of the Pacific States, Volumes I through IV. Stanford University Press, Stanford, California. 1968.

American Association of State Highway and Transportation Officials. Standard Specifications for Highway Materials and Methods of Sampling and Testing, Part 1, Specifications. Washington D.C. 1970.

American Public Health Association. Standard Methods for the Examination of Water and Wastewater. Thirteenth Edition. Washington, D.C. 1971.

Baldwin, Ewart M. Geology of Oregon. Eugene, Oregon. 1976.

Bardsley and Haslacher, Inc. The Community Looks at Tri-Met, An Opinion Survey. Portland. 1973.

Beranek, L. L. Noise and Vibration Control. McGraw-Hill. 1971.

Berreman, Joes V. Tribal Distribution in Oregon. American Anthropological Association Memoirs, No. 47, Manasha. 1937.

Boror, D. J. and R. E. White. A Field Guide to the Insects of America North of Mexico. Houghton-Mifflin Co., Boston. 1970.

Brodine, Virginia. Air Pollution. Harcourt Brace Jovanovich, Inc. 1973.

Caplan, J. D. "Smog Chemistry Points Way to Rational Vehicle Emmission Controls," SAE Transactions; Volume 74. 1966.

Carpenter, Wm. A., et al. The Theory and Mathematical Development of AIRPOL-4; Virginia Highway and Transportation Research Council. 1976.

Carter, Stephan A. Joint Development Potential for Light Rail Systems. Light Rail Conference, Transportation Research Board. Date unknown.

City of Portland. Downtown Parking and Circulation Policy. Adopted by City Council. 1975.

______________. Overview: Planning in the City of Portland. 1977.

______________. Planning Guidelines/Portland Downtown Plan. 1972.

______________. Bureau of Planning. Draft Hollywood Transportation Study Report. 1977.

______________. Bureau of Planning. Downtown Employment Projections; Survey and Synthesis. Portland. 1976.

______________, Bureau of Planning. Housing Market Analysis, Portland SMSA Area. Portland. 1976.

______________, Bureau of Planning. Portland Historical Landmarks, Buildings, and Sites. 1976.

______________, Bureau of Planning. Summary of the Proposed Arterial Streets Policy. 1976.

______________, Bureau of Planning. Transit Station Location and Bus Routings Through Hollywood. Project Informative #12. 1977.

______________, Department of Public Works. Draft Environmental Impact Statement. East Burnside/Sandy Boulevard Traffic Improvements Project M-1113(1)

______________, Bureau of Planning and Portland Historical Landmarks Commission. The Oldtown Downtown Streetcar Line, Feasibility and the Bottom Line. 1976.

______________, Department of Public Works. Draft Environmental Impact Statement. East Burnside/Sandy Boulevard Traffic Improvements Project M-1113(1).

______________, Human Resources Bureau. Project Mobility: Access to the City. Portland. 1973.

______________, Portland City Planning Commission. Arterial Streets Classification Policy. Portland. 1977.

______________, Portland City Planning Commission and Porland Historical Landmarks Commission. A Proposal for Historical Conservation Zoning. Adopted by City Council. 1977.

______________, Portland Development Commission. Skidmore Old Town Historic District--Development Program, Implementation Schedule, Development Standards. 1976.

______________, Portland Historical Landmarks Commission. Proposed Historical Districts. 1975.

Columbia Region Association of Governments. First Annual Determination of Consistency.... 1975.

______________________________. General Planning Data and Projections: Population, Employment and Land Use for the CRAG Region. Portland. 1976.

______________________________. Goals and Objectives and Implementing Rules. Portland. 1976.

______________________________. Interim Transportation Plan for the Portland-Vancouver Metropolitan Area. Portland. 1975.

______________________. Land Use Framework Element of the CRAG Regional Plan. Portland. 1977.

______________________. Planning and Adoption Process of the Land Use Framework Element of the CRAG Region Plan. Portland. 1977.

CH_2M-Hill. Transportation Control Strategy Plan for Lloyd Corporation, Ltd. Prepared for the Lloyd Corporation, Ltd., Portland. 1974.

Crain Associates. Incidence Rates and Travel Characteristics of the Transportation Handicapped in Portland, Oregon. Prepared for the Urban Mass Transportation Administration. Menlo Park, California. 1977.

Dabberdt, W. F. Experimental Studies of Near-Roadway Dispersion. Stanford Research Institute. 1976.

DeLeuw, Cather and Company. Banfield Transitway Project, Downtown Circulation Alternatives. 1977.

______________. Light Rail Transit: State of the Art Review. Prepared for the Department of Transportation. 1976.

______________. Portland Downtown Plan Inventory and Analysis. Portland. 1971.

Department of Environmental Quality. Proposed Water Quality Management Plan. Willamette River Basin. State of Oregon. 1976.

______________. Regulations Relating to Water Quality Control in Oregon. 1974.

Diemoz, Frances. "The Transportation Problem." P. 1 in 1000 Friends of Oregon Newsletter. Vol. II. No. 8 (May). Portland. 1977.

Environmental Protection Agency. "Air Program Strategy for Attainment and Maintenance of Ambient Air Quality Standards and Control of Other Pollutants". Draft Report. 1976.

______________. Compilation of Air Pollutant Emmission Factors; AP-42, Supplement 8; Interim Document. 1977.

______________. Meteorology. Air Pollution Control Orientation Course - 422-A. Office of Air Programs. Air Pollution Training Institute. 1972.

______________. Methods for Chemical Analysis of Water and Wastes. Office of Technology Transfer. Washington, D.C. 1974.

__________. Proposed Bus Noise Emission Regulation, Parts 1 and 2, EPA 550/9-77-201. 1977.

__________. Water Pollution Aspects of Street Surface Contaminants. Office of Research and Monitoring. Washington, D.C. 1972.

Franklin, J. F. and C. T. Dyrness. Natural Vegetation of Oregon and Washington. Pacific Northwest Forest and Range Experiment Station. U.S.D.A. Forest Service General Technical Report PNW-8. 1973.

Gabrielson, I. N. and S. G. Jewett. Birds of the Pacific Northwest with Special Reference to Oregon. Dover Publications Inc., New York. 1970.

Gilkey, Helen M. and LaRea J. Dennis. Handbook of Northwestern Plants. Oregon State University Bookstores, Inc., Corvallis, Oregon. 1967.

Hogenson, G. M., and Foxworthy, B. L., Ground Water in the East Portland Area, Oregon; U. S. Geological Survey, Water-Supply Paper, 1793. 1965.

Holzworth, G. C. Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution, Throughout the Contiguous United States. Environmental Protection Agency. 1972.

Highway Research Board. Highway Capacity Manual. National Academy of Sciences, National Research Council. Special Report 87. 1965.

__________. National Cooperation Highway Research Program Reports 117 and 144. 1973.

__________. National Cooperation Highway Research Program Report 173. 1976.

Kain, J. B. The Journey-to-Work as a Determinant of Residential Location Behavior. The Rand Corporation. 1961.

Land Conservation and Development Commission. LCDC Facts. (Date unknown.)

Lillis, E. J. and D. R. Dunbar. Impact of Automotive Particle Exhaust Emissions on Air Quality. U. S. Environmental Protection Agency. Unpublished report. 1975.

Lord/Leblanc. Economic Analysis of the Portland Downtown Guidelines Plan: Outlook and Recommendations for Implementation. Prepared for the City of Portland. 1974.

Martin, A. C., H. S. Zim, and A. L. Nelson. American Wildlife and Plants. A Guide to Wildlife Food Habits. Dover Publications, Inc., New York. 1951.

McPhillips, L. C., and P. Toth. Handbook for Demonstration of Emission Factor Calculations; U. S. Ervironmental Protection Agency, Region X, Air Programs Branch; Seattle, Washington. 1976.

Multnomah County Planning Commission. Draft Comprehensive Framework Plan. Multnomah County, Oregon. 1977.

Multnomah County Planning Department. Citizen's Bikeway Report: East Multnomah County. Portland. 1974.

______________________________. Multnomah County Framework Plan, Inventory Section, Draft I. Portland. 1977.

Natural Air Conservation Commission. Air Pollution Primer. National Tuberculosis and Respiratory Disease Association. Second Edition. 1971.

National Research Council. Highways and Air Quality. National Academy of Sciences, Highway Research Board. Special Report 141. 1973.

O'Donnell, Terence and Thomas Vaughn. Portland, A Historical Sketch and Guide. Oregon Historical Society. 1976.

Oregon Department of Human Resources. Older Oregonians Universe: Facts on Older Oregonians. Salem. 1974.

Oregon Department of Transportation. I-205 Environmental Impact Statement. 1975.

______________________________. Statewide Inventory of Historic Sites and Buildings. Oregon State Historic Preservation Office, Salem.

______________________________. "The Banfield Transitway Project." (No date.)

______________________________. The Transportation Disadvantaged in Oregon. Salem. 1977.

______________________________. Traffic Analysis, Banfield Transitway Study. 1978.

______________________________. "Transitway News." Issue No. 14. 1977.

Oregon Land Use and Development Commission. Statewide Planning Goals and Guidelines.

Oregon State Game Commission. The Fish and Wildlife Resources of the Lower Willamette Basin, Oregon, and Their Water Use Requirements. 1964.

Oregon State Highway Division. Standard Specifications for Highway Construction. Salem. 1974.

______________________________. Technical Bulletin 19, Construction Division Manual. Salem. 1966.

______________________________. Technical Bulletin 29, Inspector's Manual. Salem. Undated.

Oregon Wildlife Commission. Data Catalog, Oregon Fish and Wildlife Plan - Wildlife. Oregon Wildlife Commission, advanced copy, Portland. 1974.

Pasquill, F. Atmospheric Diffusion. D. Van Nostrand Company, Ltd., London. 1962.

Portland Cement Association. PCA Soil Primer. Skokie, Illinois. 1973.

Robbins, Steven M. Planning and Adoption Process of the Land Use Framework Element of the CRAG Regional Plan. Prepared for the Columbia Region Association of Governments. 1977.

Shaw, S. P. and C. G. Fredine. Wetlands of the United States--Their Extent and Their Value to Waterfowl and Other Wildlife. U.S.D.I. Fish and Wildlife Service, Circular 39.

Shelford, Victor E. Animal Communities in Temperate America as Illustrated in the Chicago Region. Bulletin No. 5. Geographical Society, Chicago. University of Chicago Press, Chicago. 1913.

Slade, D. H. Meteorology and Atomic Energy. U. S. Atomic Energy Commission; 1968.

Spencer, Robert. Noise Control of the Standard Light Rail Vehicle. Boeing Vertrol Company, Philadelphia, Pennsylvania.

Staehli, Alfred. Preservation Options for Portland Neighborhoods, A Report on the History of Portland's Neighborhoods and Their Historic Centers. The Portland Neighborhood History Project. 1975.

Town, R. M. and Associates. Environmental Noise Study - Portland Transit Mall. 1975.

Tri-County Metropolitan Transportation District of Oregon. Banfield Transitway Project: Banfield Transitway Station Analysis. Portland. 1977.

__________________________. Banfield Transitway Project: Downtown Circulation Alternatives. Portland. 1977.

__________________________. Banfield Transitway Project: East Side Transit Operations Study. Portland. 1977.

__________________________. Banfield Transitway Project: Engineering Description and Operations - Light Rail. Portland. 1977.

U. S. Army Corps of Engineers. Flood Insurance Work Map. Fairview Creek. Gresham, Oregon. U. S. Army Engineer District, Portland. 1976.

U. S. Bureau of the Census. Census of Housing: 1970 Block Statistics, Portland, Oregon-Washington Urbanized Area, Final Report HC(3)-195, Washington, D.C. 1971.

__________________________. Census of Population and Housing: 1960 Census Tracts, Portland, Oregon-Washington SMSA, Final Report PHC(1)-121, Washington, D.C. 1962.

__________________________. Census of Population and Housing: 1970 Census Tracts, Portland, Oregon-Washington SMSA, Final Report PHC(1)-1965, Washington, D.C. 1972.

__________________________. U.S. Census of Population: 1970 Number of Inhabitants, Oregon, Final Report PC(1)-A39, Washington, D.C. 1971.

U. S. Bureau of the Census and Manpower Administration. Urban Atlas, Portland, Oregon-Washington, SMSA. Washington, D.C. 1974.

U. S. Department of the Interior. National Register of Historic Places. National Park Service. U. S. Government Printing Office, Washington, D.C.

__________________________, Fish and Wildlife Service. United States List of Endangered Fauna. U.S.D.I., Fish and Wildlife Service, Washington, D.C. 1977.

U. S. Department of Transportation. Notebook 2, Social Impacts. In Environmental Assessment Notebook Series. Washington, D.C. 1975.

__________________________. Notebook 3, Economic Impacts. In Environmental Assessment Notebook Series. Washington, D.C. 1975.

__________________________, Federal Highway Administration. Federal Aid Highway Program Manual, Vol. 7, Chapter 7, Section 3. 1976.

______________________________, Federal Highway Administration, and Washington State Department of Highways. _Final Environmental Impact Statement, I-205, Lewis and Clark Highway, Clark County, Washington to S.E. Foster Road, Multnomah County/Portland, Oregon._ Vol. I and II. Salem. 1976.

______________________________, Federal Highway Administration, Offices of Research and Development, _Highway Air Quality_, Fundamentals of Air Quality Implementation Package No. 76-5. 1976.

______________________________, Federal Highway Administration. _Highway Air Quality_, Volume 1. Design of Air Monitoring Surveys, Implementation Package No. 75-1, Volume 2. Monitoring Manual.

______________________________, Federal Highway Administration. _Social and Economic Effects of Highways._ Washington, D.C. 1976.

______________________________, Urban Mass Transit Authority. _Final Environmental Impact Statement, Fifth and Sixth Avenues Transit Mall_, Portland. 1975.

U. S. General Services Administration. _Federal Register._ Volume 36, Number 128. Washington, D.C. 1971.

U. S. Forest Service. _Wildlife Habitat Improvement Handbook._ FSH 2609.11. U.S.D.A. Forest Service, Washington, D.C. 1969.

U. S. Soil Conservation Service. _Soils Interpretations for Oregon._ 1973.

Wilsey and Ham. _An Analysis of Land Use Planning, Population Projections and Alternative Futures in the Portland-Vancouver Metropolitan Area._ Prepared for the Metro Water Resources Study, Portland District, Corps of Engineers. 1977.

The Oregon Department of Transportation

Highway Division