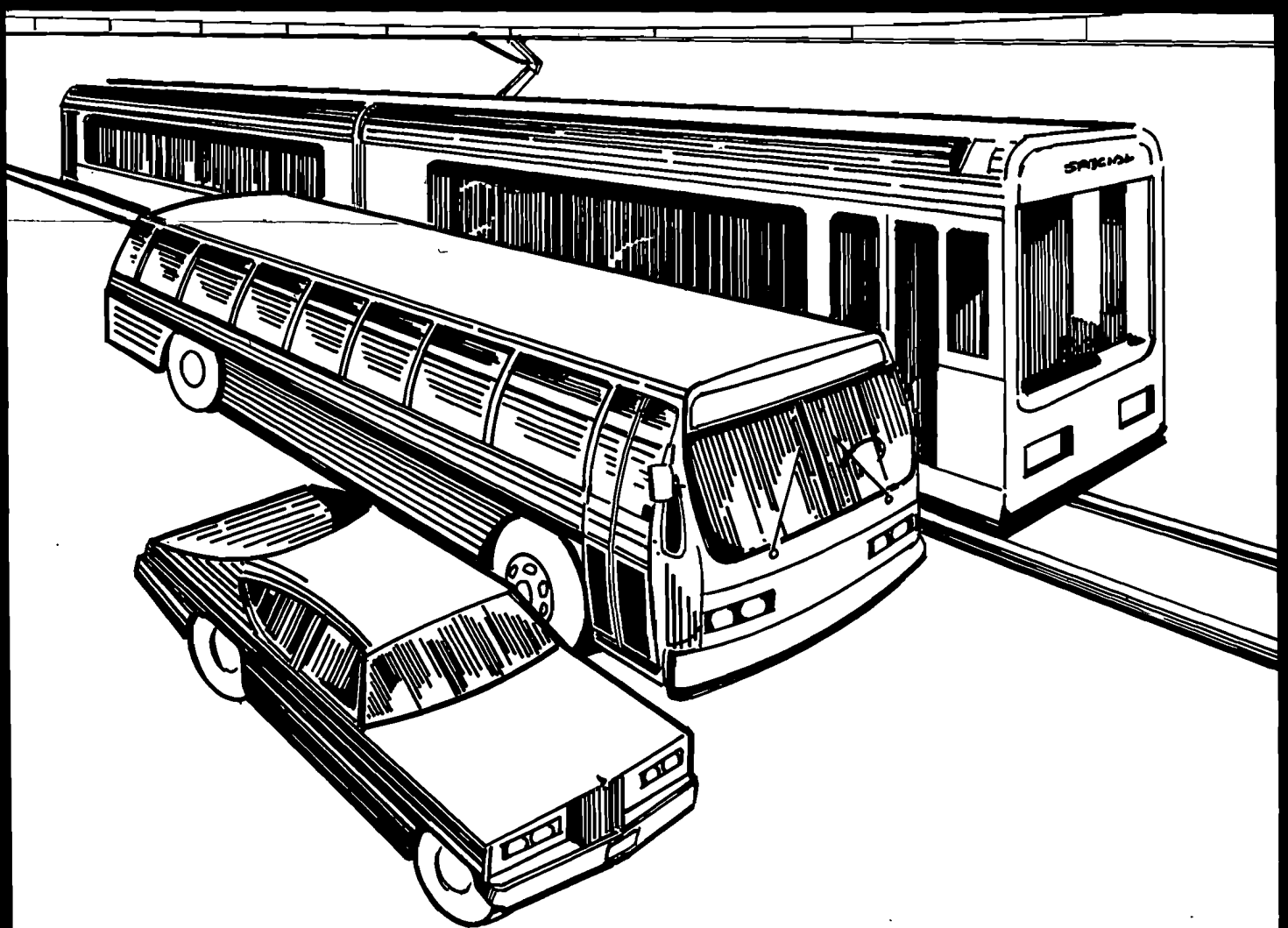


# BANFIELD TRANSITWAY

**DRAFT ENVIRONMENTAL IMPACT STATEMENT**



**Volume 1**

**OREGON DEPARTMENT OF TRANSPORTATION**



U. S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION

Region 10

FHWA-OR-EIS-78-3-D

BANFIELD TRANSITWAY PROJECT

MULTNOMAH COUNTY, OREGON

ADMINISTRATIVE ACTION

DRAFT  
ENVIRONMENTAL IMPACT STATEMENT

U.S. DEPARTMENT OF TRANSPORTATION

Federal Highway Administration  
and  
Oregon State Highway Division

Submitted pursuant to 42 U.S.C. 4332 (2)(c)  
and 23 U.S.C. 128 (a).

2-13-78  
Date

*J. J. Klabe*  
Assistant Director of Operations

2-13-78  
Date

*A. L. Green*  
Division Administrator, FHWA

i

SUMMARY

(a) Federal Highway Administration Administrative Action Environmental Statement

Draft  Final

Section 4(f) Statement attached

- (b) This Environmental Impact Statement (DEIS) has been prepared under the lead agency concept. The Federal Highway Administration (FHWA) is the agency with prime responsibility for the preparation of the DEIS and associated project development responsibilities.

The Project is being advanced under consultation and coordination with the Urban Mass Transportation Administration (UMTA). At the local level the Oregon Department of Transportation has primary responsibility for project advancement. Assistance and technical data have been supplied by the Tri-County Metropolitan Transportation District (Tri-Met), the City of Portland, Multnomah County, and the Columbia Region Association of Governments (CRAG).

- (c) The following individuals can be contacted for additional information concerning the proposed project and environmental statement:

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(d) General Project Statement

The purpose of the Banfield Transitway Project is to provide a multi-modal facility to accommodate projected increases in commuter trips originating in the Central East Portland - East Multnomah County area, with emphasis on improved public transit service. The intent is to provide such a facility within the environmental constraints that are consistent with local and regional goals, while having a minimum disruption on local communities.

Various solutions to accommodate this increased travel demand have been suggested over the past few years. Five basic transportation alternatives have been selected for evaluation in this Draft Environmental Impact Statement. They range in complexity from the base condition of a "No-Build" to a full-scale Light Rail Transit system, operating on both city arterials and in exclusive rights-of-way.

(e) List of Alternatives

The five project alternatives, and their various design and location suboptions, are listed below:

- 1) No Build - the condition where the Banfield freeway reverts to its original design (the current High Occupancy Vehicle-HOV demonstration project lanes are removed).

- 2) **Low Cost Improvements (LCI)** - provision for express bus lanes on selected city arterials and selected traffic improvements on arterial streets. Suboption (a) provides for a reversion of the Banfield Freeway to its original 6 and 4 lane configuration with full shoulders; suboption (b) provides for a 6 lane section the entire length of the Banfield Freeway, but with narrow lanes and without shoulders east of 37th Avenue.
- 3) **High Occupancy Vehicle Lanes (HOV)** - the HOV alternative and its three design variations provide two preferential lanes for use by high occupancy autos and other mass transit vehicles from the downtown transit mall to I-205. The current HOV lanes on the freeway would be extended; to 16th Avenue on the west, and to the I-205 transitway connection on the east. The three subalternatives differ in respect to the number of freeway lanes, widths and shoulders constructed on the Banfield Freeway between I-5 and I-205. Suboption (a) would maintain a substandard 6 and 4 lane configuration on the Banfield. Suboption (b) would provide 6 standard-width freeway lanes without shoulders. Suboption (c) would provide 6 standard lanes with full shoulders the length of the facility.
- 4) **Separated Busway** - this alternative provides an exclusive two-way busway from the downtown Portland Mall to the I-205 busway, with six standard freeway lanes plus full shoulders on the Banfield. Suboption (a) would place the busway on the north side of the

existing facility (between the freeway and the Union Pacific Railroad), while suboption (b) would place the bus lanes in the median of the freeway.

- 5) Light Rail Transit (LRT) - the LRT mode would provide electrically-powered vehicles on a fixed rail facility between East Multnomah County and the downtown Portland Mall. From the mall to I-205 the alignment is on the north side of the existing freeway (between the freeway and the Union Pacific Railroad). Service east of I-205 would be on one of three alternate routings: (1) from the Banfield south in the I-205 corridor to East Burnside Street, then east, in the median of East Burnside to the Old Portland Traction Company rail alignment, to Gresham; (2) from the Banfield south in the I-205 corridor to Division Street, then east on Division to Gresham; (3) from the Banfield south in the I-205 corridor, to Foster Road.

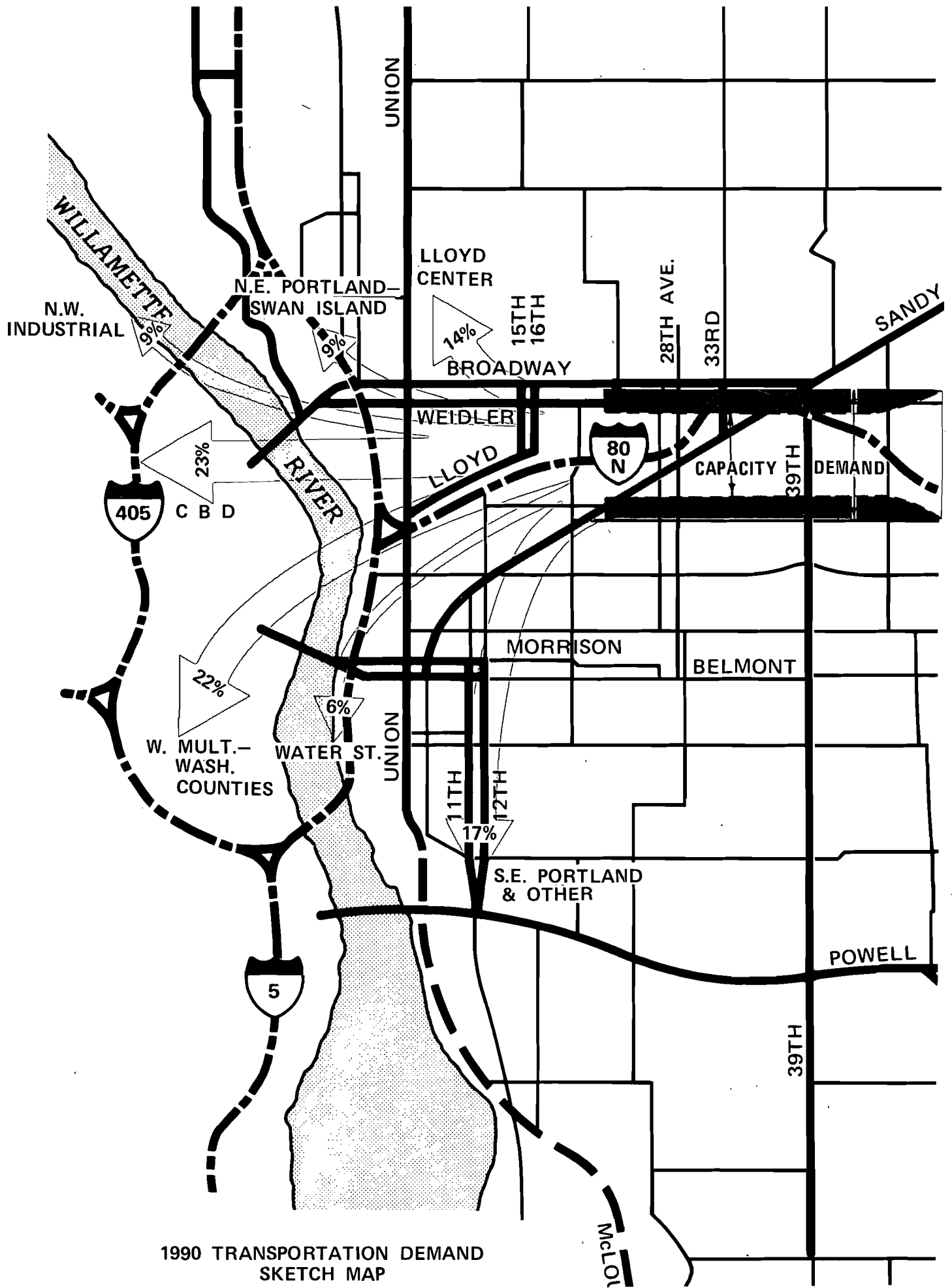
The (a) and (b) suboptions, which could be provided under each of the three alternate LRT routings in the East County, are primarily design variations on the common LRT Section within the Banfield Freeway.

Suboption (a) would provide six minimum freeway lanes with no shoulders east of 37th Avenue, while (b) would provide six standard freeway lanes on the Banfield with full shoulders.

(f) Summary of Impacts

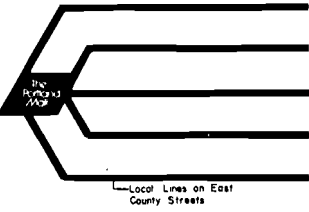

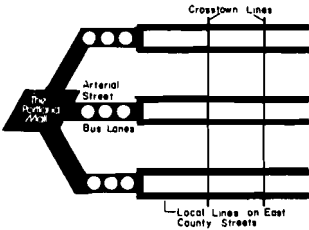
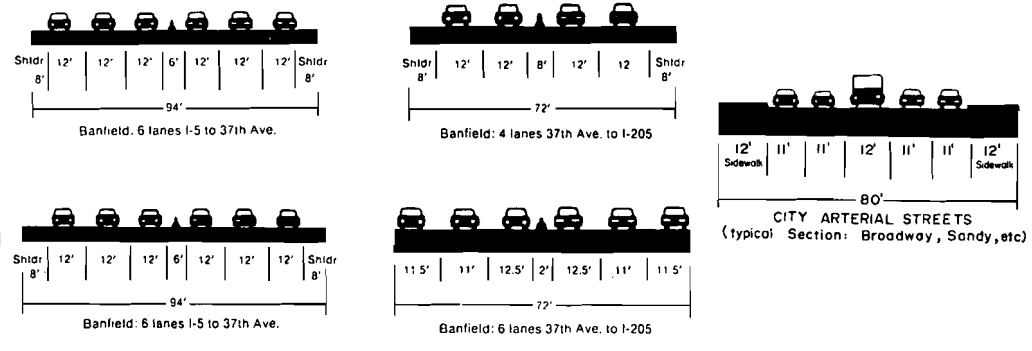
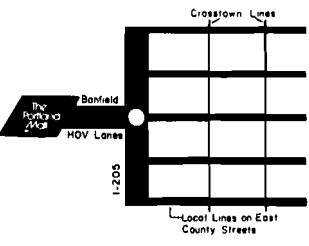
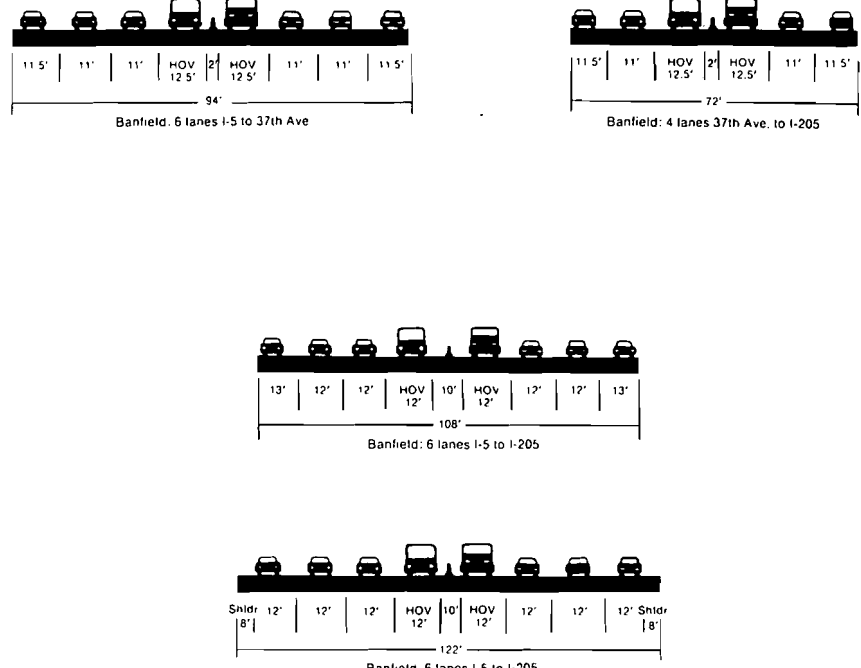
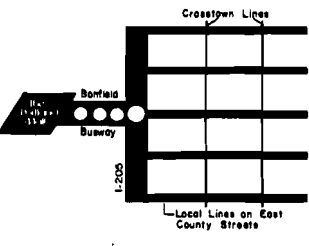
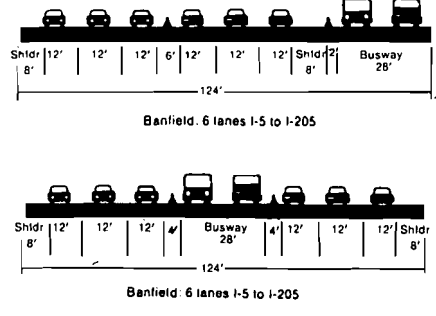
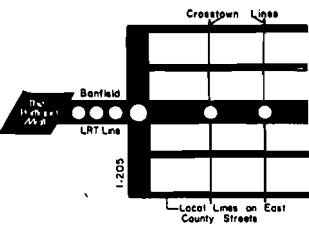
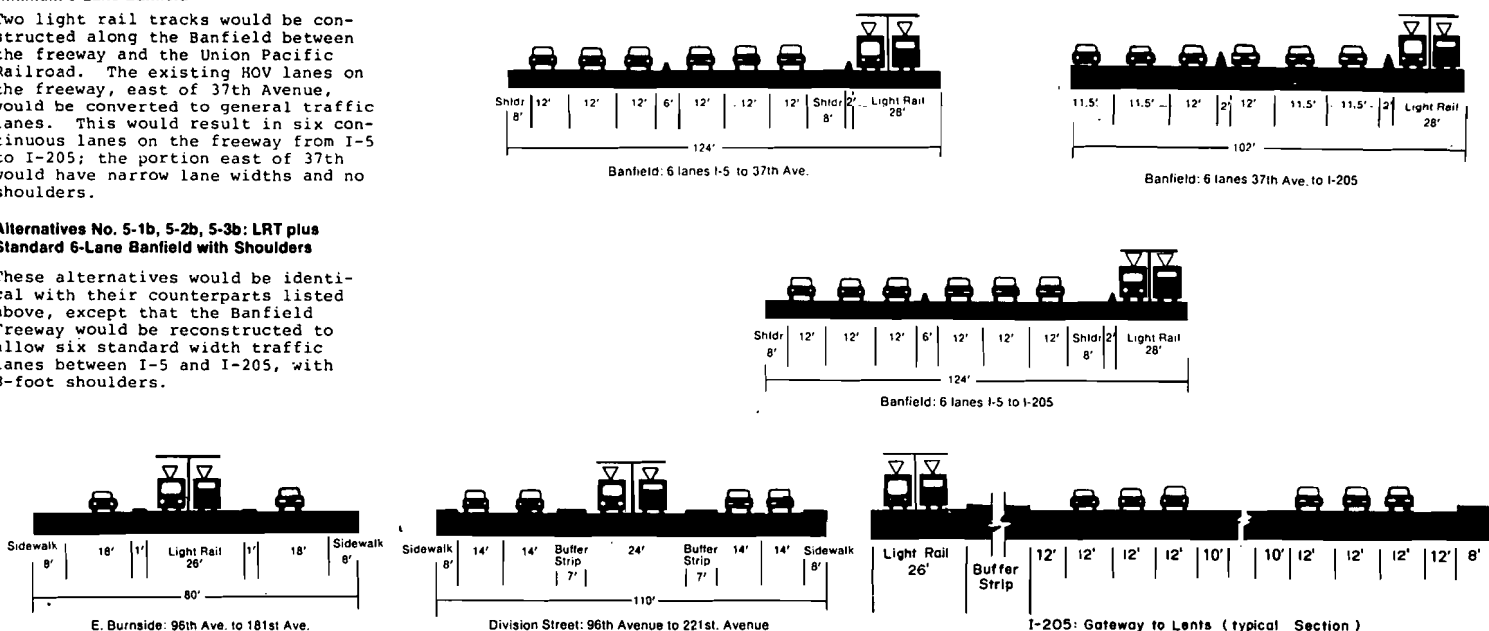
Introduction

Potential impacts on the natural and human environment resulting from the various project alternatives are summarized in the "Matrix of

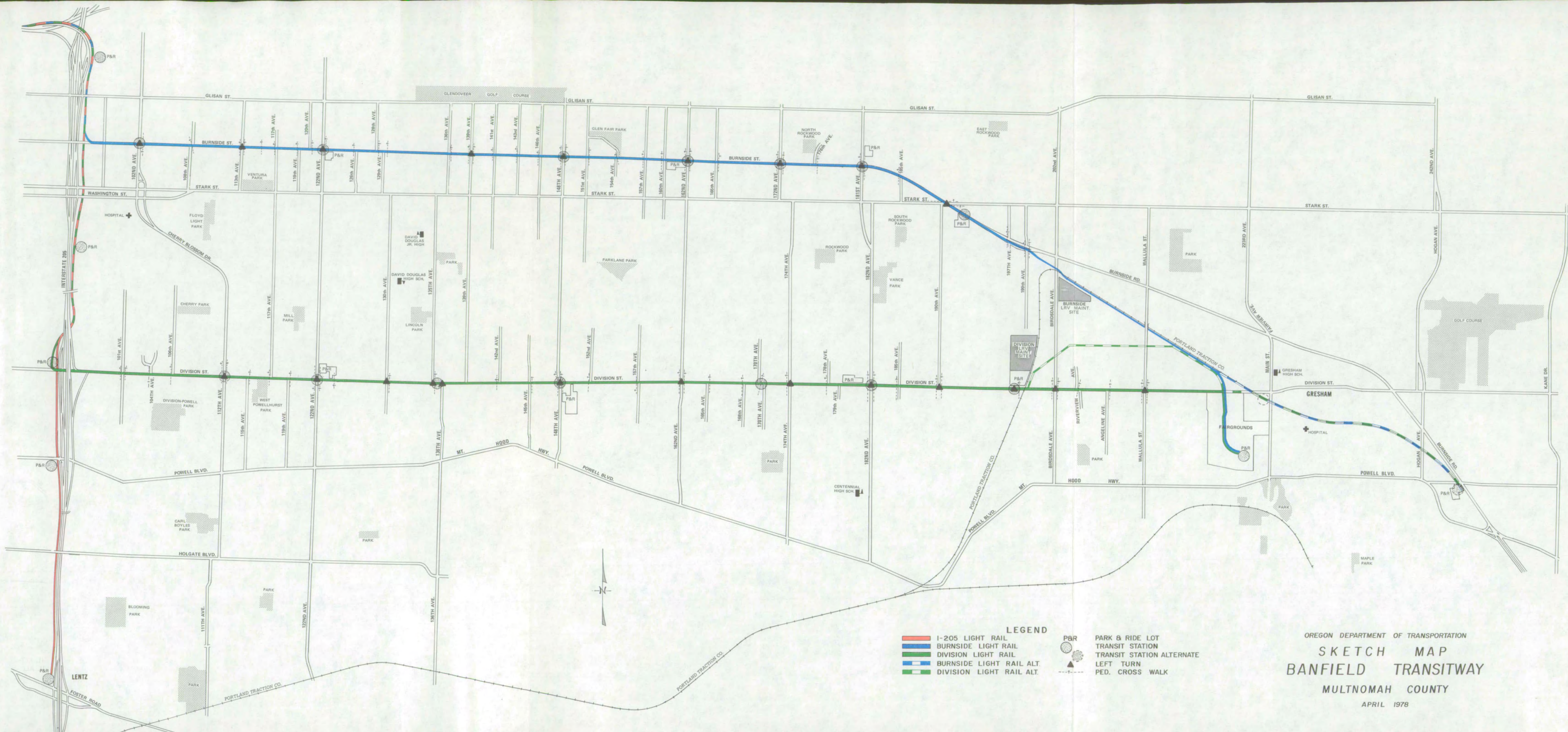


1990 TRANSPORTATION DEMAND  
SKETCH MAP

# BANFIELD TRANSITWAY PROJECT ALTERNATIVES

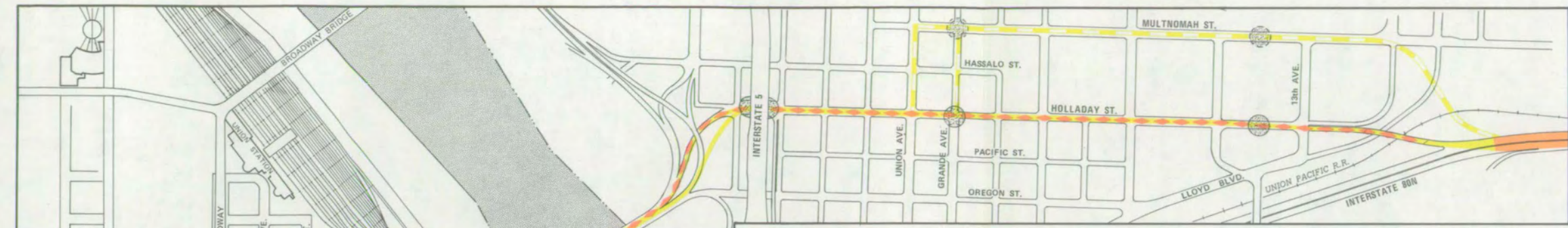
Transit System Concept	Name and Description of Alternative	Cross-Sections of Alternative
<p><b>NO-BUILD</b></p> 	<p><b>Alternative No. 1: No-Build</b></p> <p>The Banfield Freeway would be operated the way it was prior to 1976, with six traffic lanes west of 37th Avenue and four lanes east of 37th.</p>	
<p><b>LOW COST IMPROVEMENTS</b></p> 	<p><b>Alternative No. 2a: Low Cost Improvements</b></p> <p>A series of reserved bus lanes would be established on city streets; in addition, traffic improvements would be made at the Burnside/Sandy/12th and the Broadway/Sandy intersections. The Banfield Freeway would revert to its pre-1976 condition, with the HOV lanes removed and four traffic lanes reestablished east of Hollywood.</p> <p><b>Alternative No. 2b: Low Cost Improvements plus Minimum 6-Lane Banfield</b></p> <p>In addition to the bus lanes on city streets, the existing HOV lanes on the Banfield Freeway which are east of 37th Avenue, would be converted to general traffic lanes. This would result in six continuous lanes on the freeway from I-5 to I-205; the portion east of 37th would have narrow lane widths and no shoulders.</p>	
<p><b>HOV LANES</b></p> 	<p><b>Alternative No. 3a: HOV Lanes plus 6/4 Lane Banfield</b></p> <p>This is a minimum improvement option in which the present eastbound HOV lane would be extended back to the new ramp at Lloyd Center, and both HOV lanes would be extended easterly to the new ramp at I-205. General traffic would continue to use only four freeway lanes east of Hollywood during peak hours; there would be minimum lane widths and no shoulders in this section. Improvements at the Burnside/Sandy/12th and Broadway/Sandy intersections would also be required to improve the flow of traffic on city streets.</p> <p><b>Alternative No. 3b: HOV Lanes plus 6-Lane Banfield</b></p> <p>Under this scheme, the Banfield Freeway would be rebuilt to allow 6 standard width traffic lanes between I-5 and I-205 with two additional HOV lanes in the center. Provisions would be made for converting these HOV lanes to a separated busway or a light rail line with stations at some future date. There would be no shoulders on the freeway in this section, only emergency turn-outs.</p> <p><b>Alternative No. 3c: HOV Lanes plus 6-Lane Banfield with shoulders</b></p> <p>This alternative is identical to 3b above, with the addition of 8-foot shoulders for the full length of the Banfield to improve operational safety.</p>	
<p><b>BUSWAY</b></p> 	<p><b>Alternative No. 4a: Northside Busway plus 6-Lane Banfield with shoulders</b></p> <p>The busway would be constructed between the freeway and the Union Pacific Railroad. The Banfield would be rebuilt to allow six standard width traffic lanes between I-5 and I-205, with 8-foot shoulders for its full length.</p> <p><b>Alternative No. 4b: Median Busway plus 6-Lane Banfield with shoulders</b></p> <p>The busway would be constructed in the center of the freeway where existing HOV lanes are located. The Banfield would be rebuilt to allow six standard width traffic lanes with 8-foot shoulders.</p>	
<p><b>LIGHT RAIL TRANSIT</b></p> 	<p><b>Alternatives No. 5-1a, 5-2a, 5-3a: LRT plus Minimum 6-Lane Banfield</b></p> <p>Two light rail tracks would be constructed along the Banfield between the freeway and the Union Pacific Railroad. The existing HOV lanes on the freeway, east of 37th Avenue, would be converted to general traffic lanes. This would result in six continuous lanes on the freeway from I-5 to I-205; the portion east of 37th would have narrow lane widths and no shoulders.</p> <p><b>Alternatives No. 5-1b, 5-2b, 5-3b: LRT plus Standard 6-Lane Banfield with Shoulders</b></p> <p>These alternatives would be identical with their counterparts listed above, except that the Banfield Freeway would be reconstructed to allow six standard width traffic lanes between I-5 and I-205, with 8-foot shoulders.</p>	 <p>In Alternative 5-1a and 5-1b, the light rail line would continue south from Gateway along I-205 to E. Burnside Street and then east to Gresham in a reservation in the center of E. Burnside Street. Burnside would be constructed to provide one traffic lane and shoulder on each side of the light rail reservation.</p> <p>In Alternative 5-2a and 5-2b, the light rail line would follow I-205 to Division Street, then continue to Gresham in a reservation in the center of Division Street. Division would be modified to provide two traffic lanes and a buffer strip on each side of the light rail reservation.</p> <p>In Alternatives 5-3a and 5-3b, the light rail line would continue south from Gateway in a reserved right-of-way along I-205, terminating at Poster Road.</p>





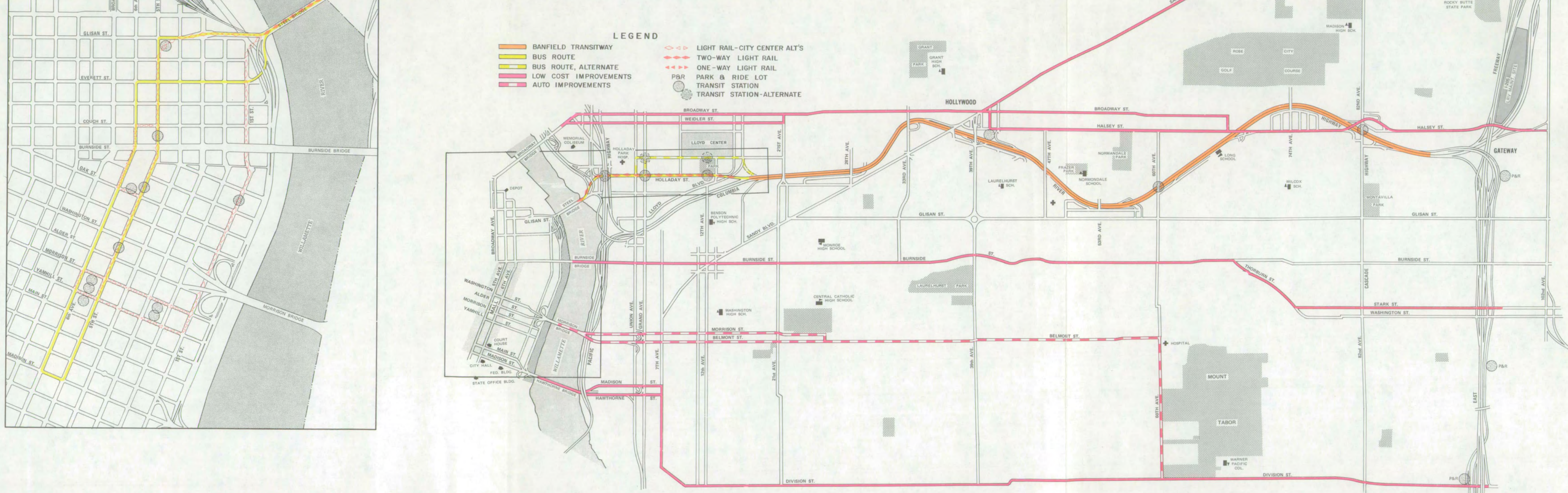
- LEGEND**
- I-205 LIGHT RAIL
  - BURNSIDE LIGHT RAIL
  - DIVISION LIGHT RAIL
  - - - BURNSIDE LIGHT RAIL ALT.
  - - - DIVISION LIGHT RAIL ALT.
  - P&R PARK & RIDE LOT
  - P&R TRANSIT STATION
  - P&R TRANSIT STATION ALTERNATE
  - ▲ LEFT TURN
  - - - PED. CROSS WALK

OREGON DEPARTMENT OF TRANSPORTATION  
**SKETCH MAP**  
**BANFIELD TRANSITWAY**  
 MULTNOMAH COUNTY  
 APRIL 1978



OREGON DEPARTMENT OF TRANSPORTATION  
**SKETCH MAP**  
**BANFIELD TRANSITWAY**  
 MULTNOMAH COUNTY  
 APRIL 1978

- LEGEND**
- BANFIELD TRANSITWAY
  - BUS ROUTE
  - - - BUS ROUTE, ALTERNATE
  - LOW COST IMPROVEMENTS
  - - - AUTO IMPROVEMENTS
  - ◁ ▷ LIGHT RAIL-CITY CENTER ALT'S
  - ◄ ► TWO-WAY LIGHT RAIL
  - ◄ ◄ ONE-WAY LIGHT RAIL
  - P&R
  - TRANSIT STATION
  - TRANSIT STATION-ALTERNATE



Impacts" which follows page xiv. These impacts are summarized by subject matter as follows: Economics; Traffic and Transit; Land Use; Socioculture; and Natural and Environmental Resources. Each of the impact groups are discussed in more detail in Part C of this statement. This summary addresses only the major similarities and differences of project alternatives.

### Economics

In general all of the alternatives except the No-Build and 2a would support employment growth forecast for the study area. In this respect there is little difference between these alternatives through 1990, although Light Rail options 5-2 and 5-2 offer the greatest long-term potential. The No-Build alternative and Alternative 2a pose potential constraints to long-term employment growth in the study areas.

Total project costs (construction, transit vehicles and I-205 related costs) are greatest with the Light Rail alternatives and least with the No-Build and Low Cost Improvements. The LRT-Division option is significantly more costly than other options, as are all Light Rail alternatives compared with the Bus or Bus/Carpool options. The Separated Busway alternatives are approximately 6 to 10 million dollars (5-7 percent) more expensive than the comparable HOV option, 3c.

In contrast, 1990 annual transit operating costs for build alternatives are least among the LRT options (13.8-14.4 million dollars) and greatest with a Separated Busway. The Low Cost and

HOV options fall in between at 15.3 million dollars and 15.9 million dollars, respectively. Light Rail is less expensive to operate because of lower labor, energy and maintenance requirements.

Net operating costs in 1990 (cost minus farebox revenue) for build alternatives are least with the LRT options, being only slightly higher than the No-Build (\$8.2 million-\$8.6 million versus \$8.0 million). The comparatively low net operating costs of the No-Build item is a product of fuller utilization of the existing service potential. The Separated Busway alternatives have the highest net operating costs since transit ridership (and revenue) is approximately equal to the LRT options, but operating costs are substantially higher. The LCI and HOV options have similar net operating costs at \$10.7 million and \$10.4 million, respectively.

On the basis of 1990 total annual costs, which includes capital costs amortized over a 40-year service life, the LRT-Burnside Street (5-1) and HOV options 3b and 3c have the highest cost-effectiveness (lowest cost per passenger served) of alternatives which include a transitway between downtown Portland and I-205 (\$1.40 and \$1.41, respectively). The No-Build and LCI alternatives are most cost-effective, but have significantly lower transit and traffic service levels.

#### Traffic and Transit Operations

The No-Build alternative would provide the least opportunity to improve traffic mobility in the study area. 1990 peak-hour traffic volumes under no-build conditions would be approximately 23

percent higher than 1975 levels. Other alternatives offer some relief to increased traffic due to the combined effects of reduced auto-trips from increased use of public transit, and/or increased capacity on the Banfield Freeway. Alternatives 2a and 3a, which do not include additional traffic lanes on the Banfield Freeway, would offer comparatively poorer traffic service due to severe capacity deficiencies on the Banfield and greater use of arterials in East Portland. HOV options 3b and 3c offer the greatest potential to improve peak-hour traffic mobility, due to the use of carpools in HOV lanes and the attendant increase in auto-capacity on the Banfield.

The Separated Busway options and LRT-Burnside option are predicted to generate the same 1990 annual transit ridership (19.2 million passengers). The least effective transit-trip generator would be the LCI alternatives, among the build options (15.3 million passengers). No-Build transit service would attract approximately 70 percent (13.5 million passengers) of the highest patronage alternatives. HOV options would generate somewhat less transit patronage than other options (18.3 million passengers) which include a transitway, since service to East Portland is somewhat less. The least effective transitway option would be LRT:I-205, with 17.5 million 1990 annual passengers.

Changes in traffic circulation would occur with each of the alternatives. With the No-Build greater use of east-west streets in East Portland would result from insufficient capacity on the

Banfield Freeway. The HOV and Separated Busway options would affect present traffic patterns in the Lloyd Center area more than other alternatives.

Accident potential and safety relationships also vary between the alternatives. The greatest accident potential exists under the No-Build for both auto traffic and transit vehicles, due to increased auto use and exclusive transit operation on streets in mixed traffic. Projected accident levels under the LCI are four to five percent less than the No-Build for auto traffic, though transit vehicles operating in exclusive on-street bus lanes are considered generally safer. The HOV and Busway options are similar in this respect with transit safety on the Banfield itself very good. The LRT option presents a good operational safety picture in its separated right-of-way on the Banfield Burnside Street or Division Street in East Multnomah County. The street segments are considered less safe due to the decreased maneuverability of the fixed rail vehicles.

#### Land Use

All project alternatives, with the exception of the No-Build and Low Cost Improvement options, generally conform with local plans and policies regarding land use and transportation. The Light Rail Transit alternatives on either Burnside Street (5-1) or Division Street (5-2) offer the greatest potential for secondary land use changes which concentrate population and employment in East Multnomah County in support of a more efficient public transit network. This stems from the extension of fixed rail service into Gresham and

associated developmental potentials around the transit stations.

Similar developmental opportunities exist in the I-205 segment of the transit route, and to a similar degree among the HOV, Busway and Light Rail Transit options. Separated Realization of more concentrated land use would require application of land use controls in the vicinity of transit stations. Secondary land use changes in downtown Portland and East Portland would be minor due to the type and extent of existing development.

#### Sociocultural

Population change in the various study areas is assessed for each alternative. The No-Build and LCI options are consistent with CRAG population forecasts. Under the HOV and Separated Busway options, some population redistribution in the immediate vicinity of the proposed transit stations, principally along I-205, could take place as minor land conversions occur. With the LRT alternative a redistribution of some of the forecasted increase in population would also occur, particularly around the major transit station locations in the East County area. Fixed rail facilities contribute to higher density, more compact development along these routes, and adjacent to stations servicing them.

The effects of the various alternatives on neighborhoods is varied. Under the No-Build, increased congestion would create some traffic spillover onto neighborhood streets. Under the LCI minor proximity impacts would affect residents and institutions along its

routes from operational changes in the transit traffic system. The major build alternatives would beneficially affect the vitality of the East Portland neighborhood by funneling more traffic through the Banfield corridor and not along city arterials. LRT construction in the East County could adversely affect the Burnside and Division Streets residential and institutional areas, primarily through restricted access, out-of-direction travel and on-street parking removals.

Right-of-way requirements are nonexistent under the No-Build. The LCI necessitates very minor acquisitions, totaling less than one acre. A wide range of right-of-way needs are present in the HOV options, as a result of design variations in the reconstruction of the Banfield Freeway. Option 3a would displace 98 households and 4 businesses, requiring 2.4 acres at a cost of 1.3 million dollars. Options 3b and 3c require the removal of between 145 and 164 households, 4 to 12 businesses, involving 20.5 acres at a cost of 11.9 to 13.1 million dollars. This greater impact is attributable to the extra widths necessary to accommodate the widening of the Banfield Freeway to a full six-lane facility.

The Busway alternative, would displace between 168 to 175 households and 11 to 12 businesses, occupying 22.7 acres at a cost of between 12.9 and 13.1 million dollars. The LRT routes share the same alignments in the Banfield Freeway corridor. The wide variation in right-of-way impacts occur in the different alignments in the East County area. The Burnside Street route, Option 5-1, would remove



between 27 to 70 households, 5 to 10 businesses and 43.6 to 47 acres at a cost of 13.1 to 14.7 million dollars. The Division Street alignment (Option 5-2), would remove between 147 to 194 households, 57 to 62 businesses and 67.8 to 71.2 acres at a total cost of 30.4 to 33.2 million dollars. The primary reason for the greater cost of this route over the Burnside route is due to a greater right-of-way width (110 feet) required along Division where there presently exists a great deal of commercial and residential development. Option 5-3, the Lents LRT route, would require only a minimum additional right-of-way outside the Banfield Freeway corridor, since the majority of the alignment exists within the boundaries of the I-205 Freeway. Some 16 to 59 households would be displaced, 4 to 9 businesses affected on 18.4 to 21.8 acres at a cost of 9.9 to 12.7 million dollars.

Impacts to cultural resources are primarily concentrated in the downtown area. Under the No-Build and LCI options, no major historic impacts have been identified. Alternatives 3, 4 and 5 would require the removal of some historic buildings. The most significant removal is that of several 19th century brick structures in the block bounded by NW Glisan, Flanders, 4th and 5th. Though not currently listed in the Federal Register, they are considered of local historic significance.

The LRT alternative will have the most significant visual impact with its overhead power system. The wires are conspicuous only in silhouette to the pedestrian on the sidewalk, or to auto occupants on the street. The impact can be minimized through design consideration.

### Natural Elements

The natural or physical impacts of the transitway project are minimal. Geological impacts are concerned primarily with soil erosion potential in areas where large amounts of earth would be disturbed during project construction. In the Summary Matrix, this is defined as "acres of potential slope erosion." In general, the major build alternatives are nearly equivalent in their erosion potential, with the exception of the HOV option which would extend the existing HOV lanes (3a). The maximum projected acreage of slope disturbance for any alternative is only 9.6 acres under Alternative 3b.

Impacts on water quality are also considered to be minor. Some floodplain encroachment would occur under the Light Rail options (5-1 and 5-2). Between 1.5 and 10.8 acres in the Fairview Creek floodplain would be impacted under these two options. The alteration of the hydrological character of the urban watershed would result from implementation of any of the build options. Increases in pavement area create additional impermeable surfaces, which in turn change the amounts of water which percolate to the groundwater table. A minimum of 1.2 acres of pavement surface would be added under the LCI alternative. From 2.3 to 27.6 acres of additional paved surface would be added under the HOV options. The Busway alternative would require 25.8 acres, while the LRT alternatives would add 15.9 to 29.8 acres of added pavement surface.

### Noise

With the exception of a few isolated locations, it can be stated that there are no significant noise impacts with any of the alternatives. The few isolated noise impacts identified with the LCI or LRT options can not be mitigated because of constraints at those immediate locations. Some reduction in noise will occur along the Banfield Freeway as a result of barrier and berm construction incorporated in the project design.

### Air Quality

Air quality changes resulting from implementation of the transitway project on the regional level are the function of the projected decrease in vehicle miles traveled (VMT) under all of the build options. Reduction of VMT is a key to cleaner air quality in the overall region. For this reason, slightly decreased pollutant levels in relation to the No-Build, would occur under all of the build alternatives with the LRT options exhibiting perhaps the greatest reduction. The only significant reduction in air pollutants will be the result of existing and future clean air strategies including motor vehicle emission controls. Some of these strategies are already in effect at the local level.

The selection of any alternative, other than the "No-Build," will lend to additional reduction in pollution potential in East Portland and areas adjacent to the Banfield Freeway, as well as the Central Business District. Concentrations of emissions for local

impact areas should not result in future violations of ambient air quality standards. None of the alternatives show a significant impact on air quality.

### Energy

Energy requirements for the project have been summarized, by alternative, under the two subject headings: 1990 Total Fuel Consumption and 1990 Total Energy Requirements. As can be seen from the Summary Matrix, total energy requirements only vary by 6% between the alternatives. The No-Build is the most fuel consumptive of all alternatives, while the Burnside alignment of the LRT option represents the best alternative with regard to the amount of 1990 energy required and fuel consumed.

(g) Impact Summary Matrix follows:

SUMMARY IMPACT MATRIX

		ECONOMICS								TRAFFIC AND TRANSIT											
		PROJECT CONSTRUCTION COSTS (\$ MILLIONS)	TOTAL SYSTEM COSTS (MILLION \$)	1990 ANNUAL OPERATING COST (MILLION \$)	1990 NET OPERATING COST (MILLION \$)	1990 TOTAL TRANSIT ANNUAL COST (MILLION \$)	1990 TOTAL TRAFFIC SAVINGS (MILLION \$)	1990 TOTAL ANNUAL TRANSIT COST PER PASSENGER (\$)	1990 NET OPERATING COST PER PASSENGER (\$)	GENERAL ECONOMIC CONDITIONS	1990 PEAK-HOUR TRAFFIC CHARACTERISTICS	1990 VEHICLE MILES TRAVELED (MILLIONS)	1990 PREDICTED TRAFFIC ACCIDENTS	1990 EAST SIDE TRANSIT PASSENGERS (MILLIONS)	TRANSIT SAFETY	TRANSIT ADAPTABILITY	DOWNTOWN TRANSIT OPERATIONS	TRANSIT SERVICE QUALITY			
ALTERNATIVES	No-Build	1	0.0	13.0	12.1	8.0	13.7	0	0.59	1.01	Would not support area economy	Greatest increases on Banfield Freeway and arterial streets. Greatest number of overcapacity lane miles.	985.0	Greatest number of traffic and transit accidents	13.5	Street operation subject to traffic accidents	Flexible to changes in operations Not a long-term transit investment	Up to 400 buses downtown in peak hour Up to 55 buses routed off mall in peak hour	Good area coverage, but low connectivity, much duplication of routing		
	Low Cost Improvements	2a	7.1	27.0	15.3	10.7	18.1	6.4	0.70	1.18	2a would generally not encourage economic activity	Most arterial traffic of build alternatives in East Portland.	942.0	4 to 5% less accidents than no-build but similar to HOV(3a)	15.3	Generally safe in exclusive bus lanes	Flexible to changes in operations Not convertible Cannot insure long-term transit use	Up to 585 buses downtown in peak hour Up to 215 buses routed off mall in peak hour	Improved connectivity and schedule frequency Possible delay to non-peak suburban buses		
		2b	9.7	29.4				8.7				Similar to bus alternatives 4a, 4b and LRT options 5-1 and 5-2.	942.1								
	High Occupancy Vehicle Lanes	3a	13.7	71.8	15.9	10.4	21.1	7.4	0.57	1.21	3a would support area economy but not as well as 3b or 3c	More arterial street traffic in E. Portland than 3b or 3c.	942.9	Slightly higher than (3c) or (3d)	18.3	Generally safe on Banfield segment	Not flexible to changes in operations Possible convertibility to busway or LRT (3b and 3c) Cannot insure long-term transit use	Up to 609 buses downtown in peak hour Up to 230 buses routed off mall in peak hour	Improved connectivity and schedule frequency Much duplication of service on Banfield		
		3b	67.1	125.2			25.8	9.2				1.41	Would support area economy	Least increase in traffic of all alternatives on Banfield Freeway and city arterials.						945.4	Lowest of all bus options
		3c	75.4	133.5			28.6	8.3				0.63	1.48	Would support area economy						Would reduce growth in traffic slightly more than LCI and LRT options.	947.7
	4b	79.6	139.6	28.3	1.47																
	Separated Busway	4a	83.3	143.3	17.9	12.1	28.6	8.3	0.63	1.48	Would support area economy	Would reduce growth in traffic slightly more than LCI and LRT options.	947.7	Similar to HOV (3b) and (3c)	19.2	Very safe on Banfield, but high annual mileage increases chance of accidents	Flexible to changes in operations Possible convertibility to LRT Good assurance of long-term transit use	Up to 630 buses downtown in peak hour Up to 230 buses routed off mall in peak hour	Improved connectivity High schedule frequency Much duplication of service on Banfield		
		4b	79.6	139.6																28.3	1.47
	Light Rail Transit	5-1a,b	119.7	159.0	14.4	8.6	27.0	10.1	0.45	1.40	Would support area economy	Would reduce growth in traffic. Approximately as effective as LCI and Separated Busway options.	927.5	Lowest accident level of all alternatives	19.2	Rail system high in safety Feeder buses safe due to low annual mileage	Rail lines limited in flexibility Feeder buses very flexible to changes in operations High assurance of long-term transit use	Up to 500 buses downtown in peak hour	High level of passenger comfort, but more peak-hour standees		
			129.9	169.2																	
		5-2a,b	144.6	188.3	14.4	8.8	29.3	8.5	0.47	1.57		940.7	Higher than (5-1)	18.6	Up to 150 buses routed off mall in peak hour (as few as 345 buses would be routed downtown if LRT lines are developed in two additional corridors)		Transfers required for many downtown trips High connectivity				
			154.8	198.5																	
		5-3a,b	108.5	151.7	13.8	8.2	25.8	6.3	0.49	1.48		971.4	Highest accident level of all build alternatives	17.4	Least effective of build options in reducing traffic growth.		Good travel speeds				
			118.7	161.9																	

**SUMMARY IMPACT MATRIX**

ALTERNATIVES	LAND USE		SOCIO-CULTURAL									NATURAL AND ENVIRONMENTAL RESOURCES										
	LAND DEVELOPMENT POTENTIAL	CONFORMANCE WITH PLANS AND POLICIES	POPULATION CHANGE	NEIGHBORHOOD CHANGES	ACCESS TO COMMUNITY INSTITUTIONS	ACCESS FOR TRANSPORTATION DISADVANTAGED	RIGHT-OF-WAY COST (MILLION \$)	ACRES REQUIRED	HOUSEHOLD UNITS RELOCATED	BUSINESSES RELOCATED	HISTORIC PROPERTIES & VISUAL IMPACTS	PRODUCTIVE HABITAT LOST (ACRES)	POTENTIAL SLOPE EROSION (ACRES)	INCREASED RUNOFF AREA (ACRES)	FLOOD PLAIN ENCROACHMENT (ACRES)	1990 AIR QUALITY	NOISE LEVEL CHANGE	1990 TOTAL EAST SIDE FUEL CONSUMPTION (1000 GALLONS)	1990 TOTAL EAST SIDE ENERGY REQUIREMENT (BTUS x 10 <sup>9</sup> )			
No-Build	1	Continuation of suburban development trends	Does not conform to area plans.	Consistent with CRAG projections	Some traffic intrusion into neighborhoods	Some reduction in access	No change in access to transportation options	—	—	—	—	No major historic impacts identified No visual impacts	—	—	—	—	Significant total emission reduction over 1975 levels	+1 to 2dBA	42,800	5,400		
Low Cost Improvements	2a	Continuation of suburban development trends	Does not conform to area plans.	Consistent with CRAG projections	Some traffic and greater transit intrusions into neighborhoods	Some improvement in access	Improvement in access to transportation options	0.01	0.4	—	—	No major historic impacts identified No visual impacts	1.8	—	1.2	—	Total emissions slightly decreased over no-build	+1 to 16dBA	40,800	5,200		
	2b																					
High Occupancy Vehicle Lanes	3a	Higher density clustering possible around I-205 transit stations	Conforms to all area plans.	Opportunity to concentrate population around transit stations	Generally beneficial to neighborhoods	Some improvement in access	Improvement in access to transportation options	1.3	2.4	98	4	Some historic property removal required Minor visual impacts	1.8	2.7	2.3	—	Total emissions slightly decreased over no-build	+1 to 4dBA	41,200	5,200		
	3b							11.9	20.5	145	13		7.5	9.6	20.9				41,300	5,200		
	3c							13.1	20.5	175	13		11.2	8.4	27.6				41,300	5,200		
Separated Busway	4a	Higher density clustering possible around I-205 transit stations	Conforms to all area plans	Opportunity to concentrate population around transit stations	Generally beneficial to neighborhoods	Some improvement in access	Improvement in access to transportation options	12.9	22.7	168	12	Some historic property removal required Minor visual impacts	7.6	7.8	25.8	—	Total emissions slightly decreased over no-build	+2 to 3dBA	41,800	5,300		
	4b							13.1	22.7	175	13			8.4								
Light Rail Transit	5-1a,b	Higher density clustering possible in central East County and Gresham around transit stations	Conforms to all area plans	Opportunity to concentrate population around transit stations	No severe impacts. Potential neighborhood division.	Some improvement in access	Improvement in access to transportation options	13.1(a)	43.6(a)	27(a)	5(a)	Some historic property removal required Visual impacts from overhead power lines	38(a)	7.8(a)	10.8	1.5	Total emissions decreased more than any other alternative over no-build	+2 to 5dBA	39,700	5,100		
								14.7(b)	47.0(b)	70(b)	11(b)		45(b)						26(a)	40,300	5,200	
	5-2a,b				30.4(a)			67.8(a)	151(a)	57(a)	33(a)		30(b)						16(a)	—	41,500	5,300
					33.2(b)			71.2(b)	194(b)	63(b)	40(b)											
5-3a,b	High density clustering possible around I-205 transit stations	No severe impacts	9.9(a)	18.4(a)	16(a)	4(a)	29(a)	8.4(b)	30(b)	—	41,500	5,300										
			12.7(b)	21.8(b)	59(b)	10(b)	37(b)															

## (h) Agencies Invited to Comment

## Federal Agencies

- U. S. Department of Agriculture
  - Soil Conservation Service
  - Washington USDA, Soil Conservation Service
  - National Forest Service
  - U.S. Forest Service, Region 6
- U. S. Department of the Army
  - Washington Department of Army, Corps of Engineers
  - Vancouver Barracks
- U. S. Department of Commerce
  - National Oceanic and Atmospheric Administration
  - National Marine Fisheries Service
  - Northwest Regional National Marine Fisheries Service
- U. S. Department of Housing and Urban Development
- U. S. Department of the Interior
  - Environmental Project Review
  - Assistant Secretary, Program Policy
  - Deputy Assistant Secretary, Environmental Affairs
  - National Park Service
  - Fort Vancouver National Park Service
  - Bureau of Sport Fisheries and Wildlife
  - Bureau of Indian Affairs
  - Bureau of Land Management
  - Bureau of Outdoor Recreation, Pacific Northwest Office
  - Geological Survey
  - Bureau of Mines
  - Bureau of Reclamation
  - Bonneville Power Administration
- U. S. Department of Transportation
  - Federal Aviation Administration
  - Federal Aviation Agency, Seattle Office
  - Coast Guard Commander (OAN)
  - Urban Mass Transportation Administration
- U. S. Environmental Protection Agency

## State Agencies

Department of Transportation  
 State Department of Agriculture  
 Budget Division, Executive Department

Assistant to Governor, Natural Resources  
 Columbia River Gorge Commission  
 Economic Development  
 State Engineer  
 Department of Environmental Quality  
 Federal Cooperative Extension Service  
 Fish Commission of Oregon  
 Department of Forestry  
 Oregon Wildlife Commission  
 Geology and Mineral Industries  
 Health Division, Department of Human Resources  
 Housing Division, Department of Commerce  
 Division of State Lands  
 Local Government Relations Division, Executive Department  
 State Marine Board  
 Nuclear and Thermal Energy Council  
 State Soil and Water Conservation Commission  
 Traffic Safety Commission  
 State Water Resources Board  
 Willamette River Park System Committee  
 Oregon Coastal Conservation and Development Commission  
 Governor's Committee for a Livable Oregon  
 Oregon Roadside Council  
 Oregon State Library  
 District Courts  
 Public Utilities Commission

#### Other Agencies

City of Portland  
   Public Works Department  
   Public Works Administration  
   Planning Commission  
   Portland School District No. 1J  
   City Council  
   City Engineer  
   City Traffic Engineer  
   City Planning Bureau  
   Fire Bureau  
   Office of Neighborhood Association

Multnomah County  
   Planning Commission  
   Education Department  
   County Libraries  
   County Commissioners  
   Fire District No. 10  
   Division of Engineering Services  
   Department of Environmental Services



**Clackamas County**

Public Works Department  
Planning Department  
Intermediate Education District  
David Douglas District No. 40  
Planning Commission  
County Commissioners

Centennial School District No. 28JT  
David Douglas School District No. 40  
Gresham Union Highway School District No. 2J  
North Clackamas School District No. 12  
Reynolds School District No. 7  
Park Rose School District No. 3

**Port of Portland**

Portland International Airport

**City of Fairview**

City of Troutdale

City of Maywood Park

City of Wood Village

City of Happy Valley

City of Johnson City

City of Sandy

City of Gresham

**Columbia Region Association of Governments**

Tri-County Metropolitan Transit District of Oregon  
(Tri-Met): Board of Directors  
Planning and Development Department

**Oregon Environmental Council**

**Oregon Student Public Interest Research Group**

**Pacific Northwest River Basins Commission**

**Private Schools**

Judson Baptist College

Multnomah School of the Bible

Columbia Christian College

Portland Christian High School

Portland Christian School

Portland Adventist Academy

Warner Pacific College

Lutheran High School

Central Catholic High School

Hospitals

Woodland Park Hospital  
Shriners Hospital for Crippled Children  
Providence Hospital  
Gresham Community Hospital  
Holladay Park Hospital  
Portland Adventist Medical Center  
Providence Child Care Center

Churches

Bethlehem Lutheran  
East Hill Church

Utility Districts

Powell Valley Road Water District  
Portland General Electric Company  
Pacific Power & Light Company  
City of Portland Water Bureau  
Northwest Natural Gas Company  
Pacific Northwest Bell  
Hazelwood Water District  
General Telephone  
Rockwood Water District

Miscellaneous Groups

League of Women Voters of Portland  
Oregon Roadside Council  
Gateway Boosters  
Lents Booster Club  
STOP  
Northwest Steelhead Council  
Union Pacific Railroad

Neighborhood Associations

Alameda Neighborhood Association  
Boise Citizens Improvement Association  
Brooklyn Action Corp  
Buckman Community Association  
C. E. N. T. E. R.  
Burnside Community Council  
Columbia Neighborhood Association  
Concordia Community Association  
Creston Neighborhood Association  
Downtown Community Association  
Eliot Neighborhood Development Association  
Errol Heights Improvement Association

Foster-Powell Neighborhood Association  
Grant Park Neighborhood Association  
Hollywood Boosters  
Hosford-Abernathy Neighborhood Development  
Humboldt Neighborhood Improvement Organization  
Irvington Community Association  
Kenilworth Neighborhood Association  
Kerns Neighborhood Association  
King Improvement Association  
Laurelhurst Neighborhood Association  
Linnton Community Center  
Montavilla Community Association  
Mt. Scott-Arleta Neighborhood Association  
Mt. Tabor Neighborhood Association  
Piedmont Neighborhood Association  
Powell Butte Area  
Reed Neighborhood Association  
Richmond Neighborhood Association  
Rose City Park Citizens Association  
Sabin Community Association  
Sellwood-Moreland Improvement League  
South Tabor Community Association  
Sunnyside Neighborhood Association  
Woodstock Neighborhood Association  
Northeast Coalition  
Inner Southeast Coalition  
Southeast Uplift Advisory Board, Inc.

- (i) This Draft Environmental Impact Statement was made available to the Environmental Protection Agency, other agencies, and the public on \_\_\_\_\_ . Review comments should be received no later than forty-five days from the date above to insure their inclusion in the Final Environmental Impact Statement.

PREFACEEnvironmental Impact Statement Focus

Section 102 (2) (c) of the National Environmental Policy Act (NEPA), enacted into law in January 1970, explicitly states that all agencies of the Federal Government shall include in every proposal or recommendation for major federal actions which have the potential of significantly affecting the quality of human environment, a detailed statement of alternatives to the proposed action. The Environmental Impact Statement (EIS) has become the accepted form in which such a description and analysis of projects requiring federal approval and/or funding has been offered for approval, modification or rejection by concerned agencies and the public. This Draft EIS is prepared in conformance with the NEPA and appropriate policy and procedural memorandums of the Federal Highway Administration. Its purpose is to present in an objective manner a description of the proposed Banfield project, an examination of relevant and feasible alternatives to the project, and an analysis of the anticipated effects of the project on the natural and human environment.

The Banfield Transitway EIS represents a concerted effort to provide the reader with an easily understandable document. The report format responds to the unique nature of the project. Physically it is divided into two separate volumes.

The first volume summarizes the major findings of the environmental study. It is divided into three parts. Part A provides the reader with an overview of the planning and study process which has

preceded the present volume, emphasizing the principal problems and concerns giving rise to the Banfield project. Part B focuses attention on the project alternatives more specifically. Part C proceeds to identify and analyze the impacts unique to each of the project alternatives, set in context of an existing environmental setting.

The second volume of the document contains the individual technical reports, which represent the primary base material for the analysis presented in Volume One. These are arranged under individual topic headings corresponding to the major impact categories summarized in the preceding volume. The reports are based primarily on support documents prepared specifically for the Banfield Transitway EIS by Multnomah County, The City of Portland, Tri-Met and ODOT. All of these agencies have actively participated in some phase of the current Transitway study.

Volume Two of this study and additional support documents may be reviewed at the Metropolitan Division Office of ODOT at 5821 N.E. Glisan Street, Portland, Oregon, 97213.

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**PART A**

**BACKGROUND INFORMATION**

## INTRODUCTION

### The Region

The Portland Metropolitan Area is one characterized by a strong regional economy. Situated at the juncture of the Willamette and Columbia Rivers, the region has developed into a major finance and trade center servicing a vast tributary area of the Columbia Basin. Settled within 4,400 square miles (4,700 square kilometers) of the five-county Columbia-Willamette region, the area is serviced by 375 units of local government including all or portions of thirty-six cities, five counties, and two states. (see Figure 1).

Based on data derived from the 1970 census, approximately 97 percent of the population of the State of Oregon resides in urban regions. Of this total some 81 percent (or 1,840,000 people) maintain residence in the state's 13 most populous urban areas. Nearly half of Oregon's two million residents live in the city of Portland, or in its immediate fringes. In 1975, the urbanized portion of the region extended over a land base of 620 square miles (1600 square kilometers). The population of the urbanized area effectively doubled from 1940 to 1970, while the area devoted to urban activity quadrupled during that period.

Approximately 360,000 people comprised the region's work force in 1970, of which 55 percent (200,000) were employed within the city limits of Portland. Forty-five percent of those working in the city of Portland do not reside there. Employment levels are expected to nearly double from

360,000 to 700,000 between the years 1970 and 2000. A corresponding increase in the region's population, ranging from 70 to 100 percent, would raise the Portland urban area total to nearly 2,000,000 people.

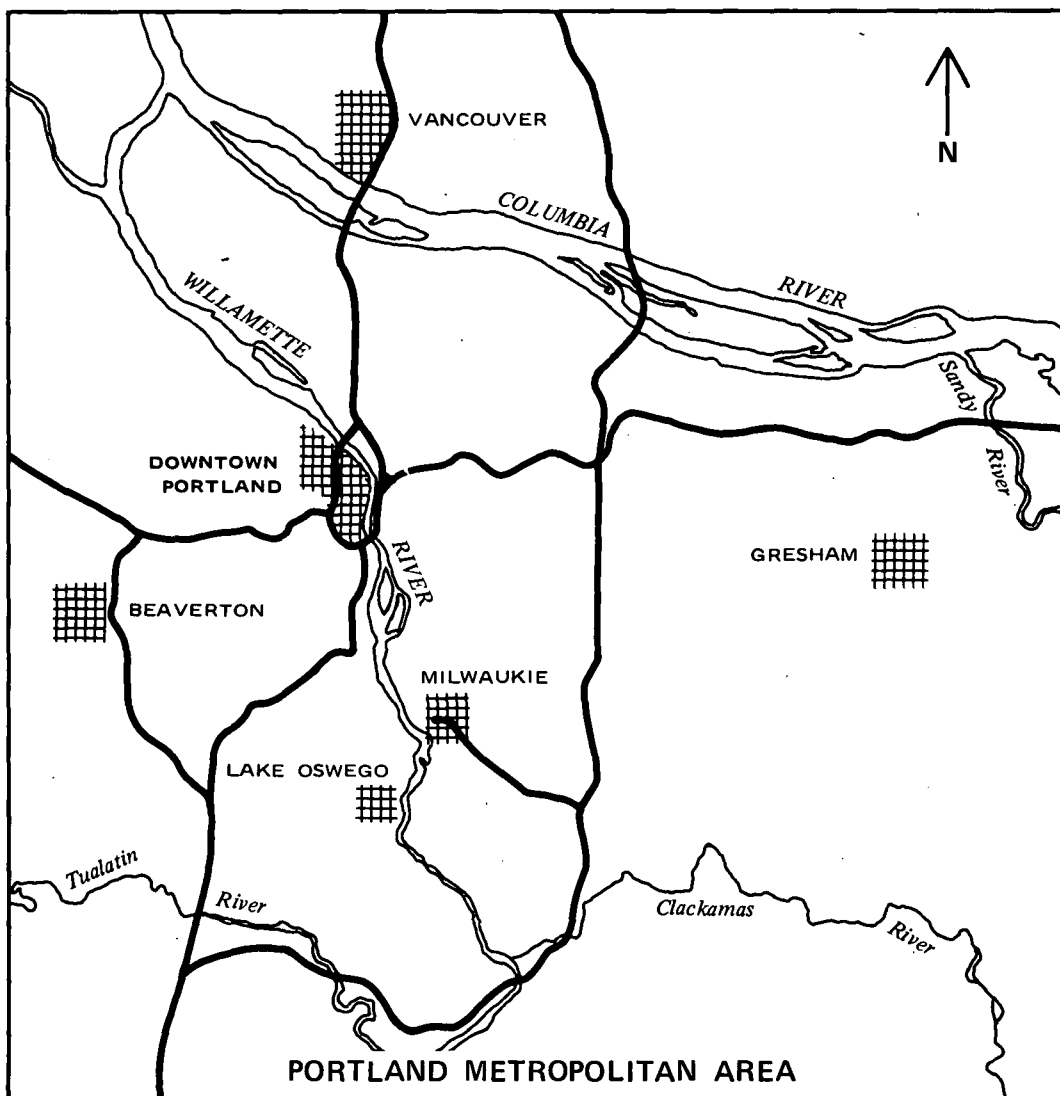
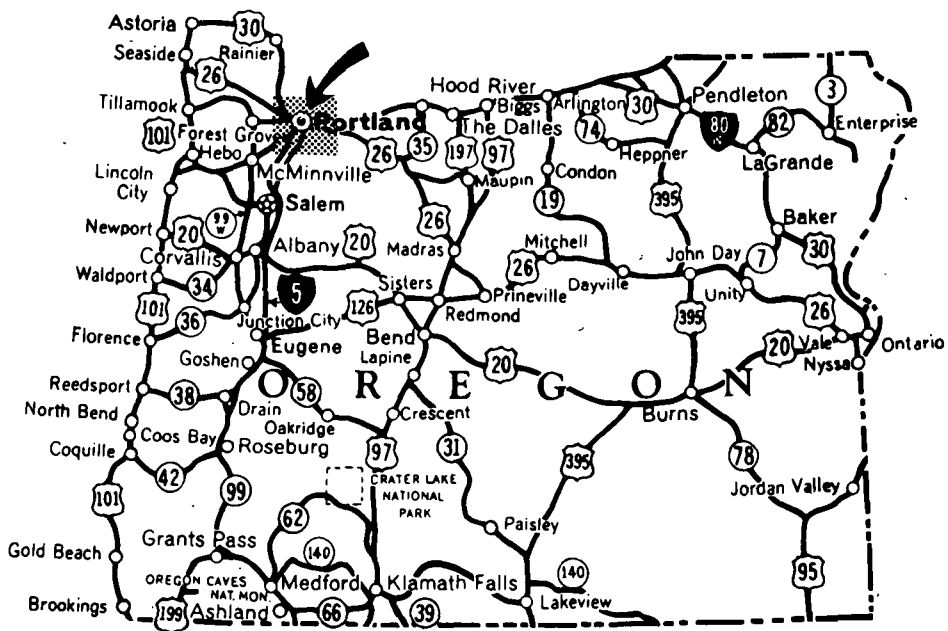
Physically, the region is dominated by the riverine environment created by the Columbia and Willamette Rivers and their associated basins. The city of Portland is bounded on the west by the Tualatin Mountains (West Portland Hills) which rise to heights of over 1,000 feet. To the east of the Willamette River, a broad alluvial terrace, dotted by numerous small wooded hills of volcanic origin, is the predominant geographic feature.

Land use patterns in the immediate Metropolitan Area are characterized by their diversity. They range from fully developed urban patterns in the central core, to rural non-farm and agricultural in the outlying regions.

The existing transportation network in the Portland metropolitan area reflects an evolution of transportation modes. The majority of Portland's city arterial streets were planned and built during a period when public transportation dominated the Portland scene. These facilities formed the basis of Portland's current land development and transportation patterns. The majority of the existing neighborhood commercial centers within the city grew up around the early streetcar lines. These streetcar lines were later replaced by city buses and larger volumes of automobile traffic, but the majority of the arterial streets retain the width and alignment characteristics they exhibited during the streetcar era.

Continuing suburban growth, pressing outward from the central city, has brought with it the requirement of greater mobility. Suburban

FIGURE 1  
REGIONAL LOCATION MAP





streets have been laid out for accommodation of the private automobile; neighborhood commercial growth and development continue, greater distances are traveled and larger portions of land are brought within a theoretically acceptable commuter range.

The regional transportation pattern has at its heart an inner-city freeway loop which encircles the Portland core area. A network of radial routes tie together the city core with an outer belt of circumferential freeways. The two major east and west radials are the Banfield Freeway and Sunset Highway, respectively (see Figure 2).

#### The Banfield Corridor

The Banfield Freeway corridor occupies a natural drainage depression through East Portland, locally referred to as Sullivan's Gulch. The Gulch itself, which begins at-grade on its easterly extremity near Rocky Butte, winds through East Portland before reaching the Willamette River between the present sites of the Burnside and Steel Bridges. The depression attains a maximum depth of 20 to 30 feet below the adjacent terrain in the vicinity of the Lloyd Center area.

This natural depression has long been utilized as a natural, gentle-grade transportation route from the Columbia River floodplain west to the Willamette River. For practical purposes, the Banfield corridor can be described as extending from the Willamette River, in the vicinity of its juncture with Interstate 5 on the west, to the I-205 corridor in the east; a distance of roughly 6 miles. This primary radial artery presently

connects the downtown Portland area with the easterly portion of the Metropolitan Region. It services the greater East Multnomah County area, one of the fastest growing residential sections of the Portland region.

Sullivan's Gulch, as a distinct natural feature on the Portland scene, can be viewed as an effective physical barrier between the northeast and southeast portions of the city. Presently, the Gulch is occupied jointly by the Banfield Freeway and the Union Pacific Railroad. The Union Pacific right-of-way consists of a single, well maintained, signalized track with numerous sidings servicing adjacent industries, with space available for a second track without requiring major structural revisions. There are no at-grade crossings of public streets or roads east of the East Portland yards. Approximately 5 to 8 westbound and 2 eastbound freight train movements currently operate over this track daily. In May of 1977, Amtrak began daily operation of its Salt Lake City - Portland run utilizing the Sullivan's Gulch route.

The Banfield Freeway, from N.E. Union Avenue to N.E. 82nd Avenue currently consists of a 6- and 4-lane controlled-accessed facility, including a pair of high-occupancy vehicle (HOV) lanes. The addition of two HOV lanes on the Banfield are the result of a demonstration project initiated in 1974, and opened to the public in December, 1975 (see Figure 3).

In the westbound direction, the facility operates with two traffic lanes and a single HOV lane west of 82nd Avenue to N.E. 37th Avenue, where a fourth lane is developed. The fourth lane continues to a point just west of the Holladay (Lloyd Center) exit, where the facility reverts to three lanes.

FIGURE 2  
PORTLAND TRANSPORTATION CORRIDORS

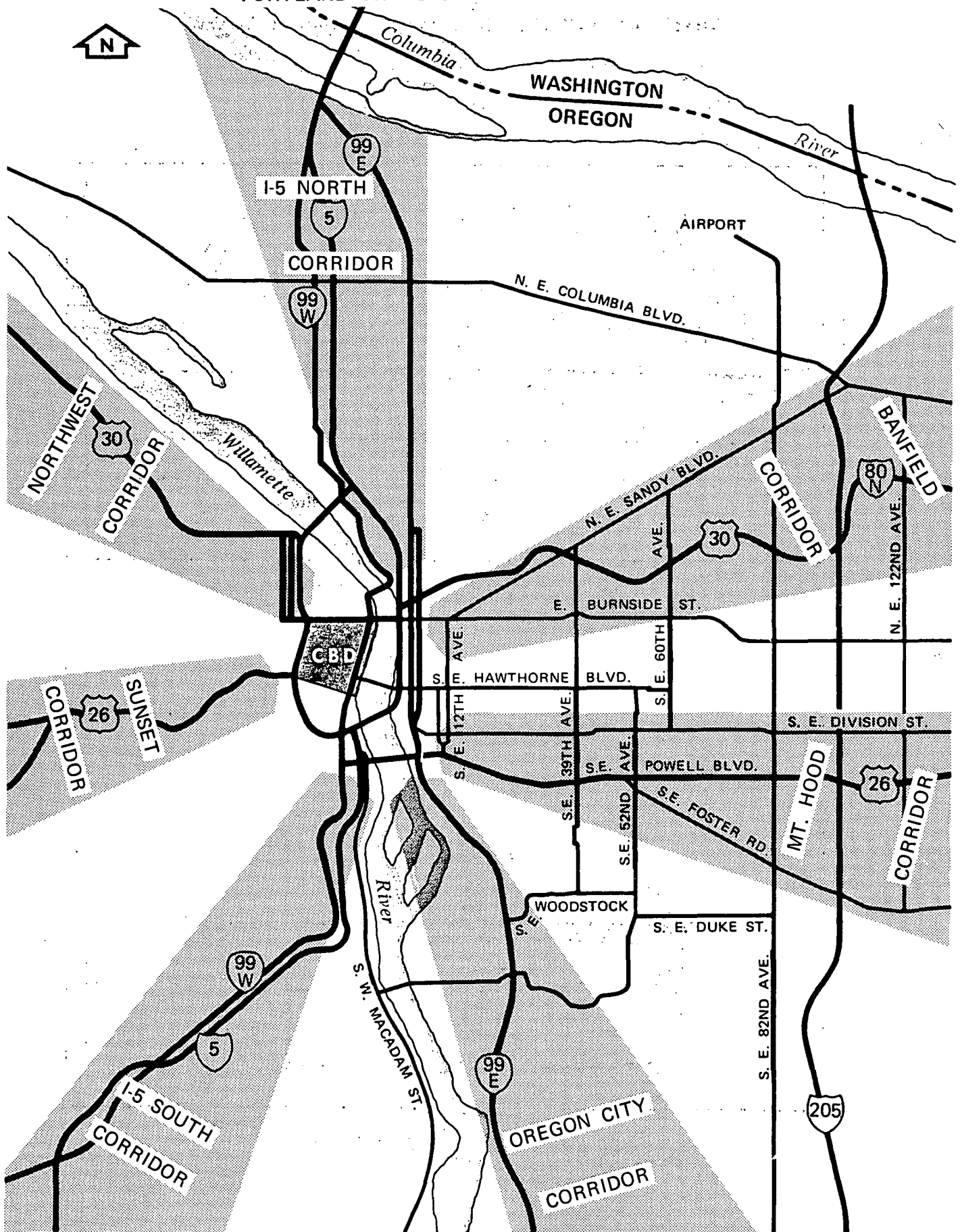
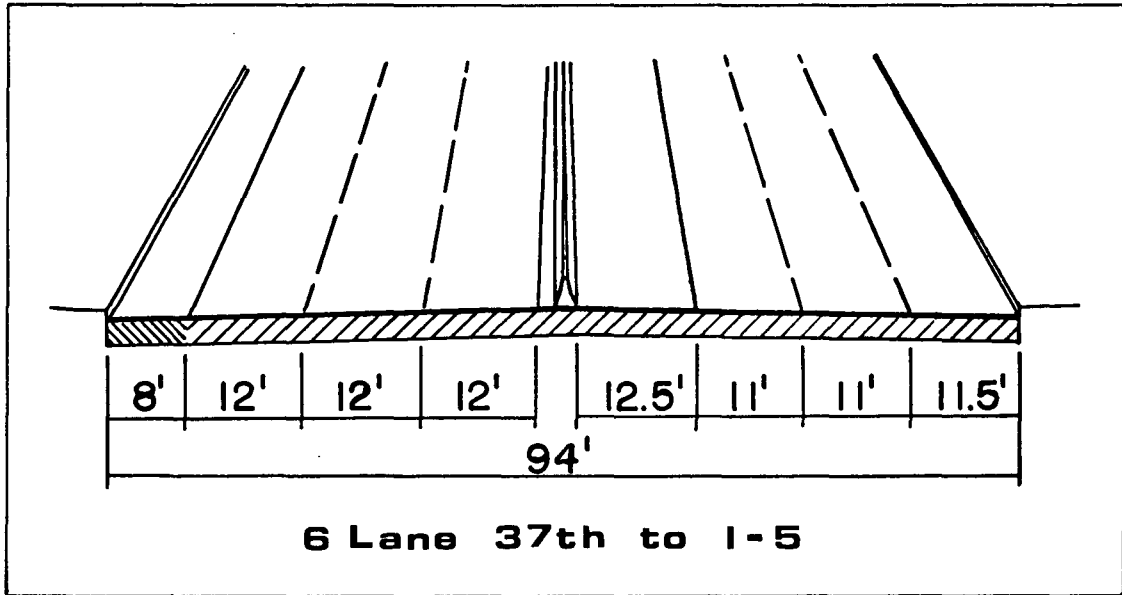
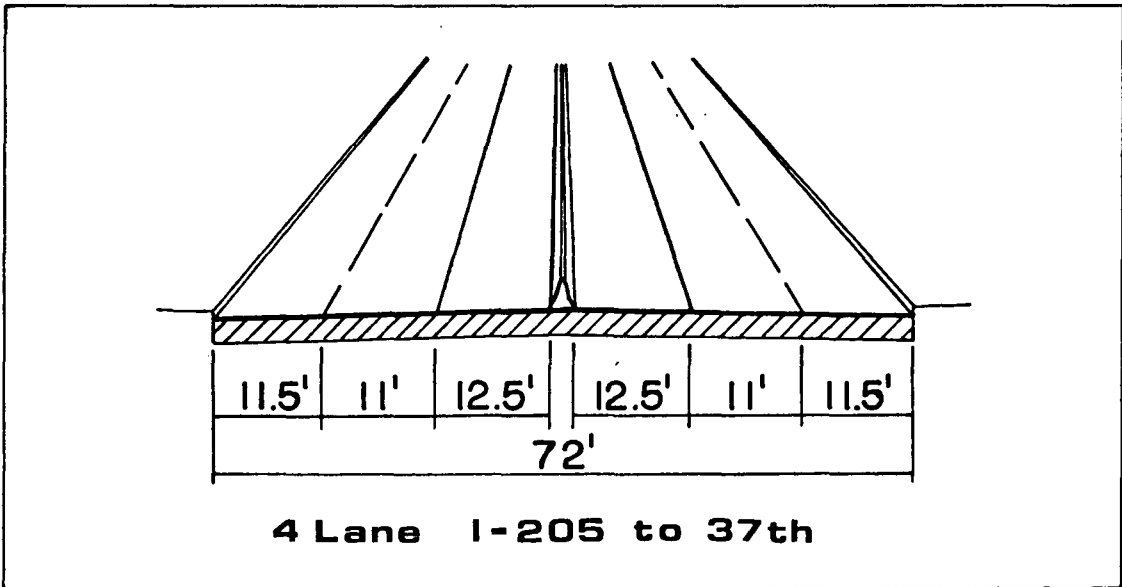


FIGURE 3  
EXISTING BANFIELD FREEWAY: TYPICAL SECTIONS



BANFIELD FWY.: WEST OF 39TH



BANFIELD FWY.: EAST OF 39TH

Eastbound, the lane configuration on the Banfield consists of three lanes from Union Avenue to a point east of the 39th Avenue entrance to the freeway, where a fourth lane is developed. This fourth lane, continued to approximately the 47th Avenue overcrossing, permits the development of a HOV lane next to the median barrier. The HOV lane, in turn, continues east to a point beyond the 82nd Avenue on-ramp, where the third lane is dropped and the HOV designation is terminated.

### The Study Areas

The Banfield Transitway project has been physically separated into four rather distinct study areas (see Figure 4):

- the Downtown
- the East Portland area (inclusive of the Banfield Corridor)
- the East Multnomah County area, and
- the region.

The downtown study area is primarily coincident with the central core of the city, between I-405 on the west and the Willamette River on the east. It is the principal terminus for all of the proposed transit facilities.

The East Portland study area is bounded by the Willamette River on the west and the Portland city limits (or, the I-205 corridor) on the east.\* This study area encompasses that portion of the city which provides the immediate service area for the Banfield freeway as well as those major arterials which presently carry a large share of the current east-west commute traffic.

\*Holgate Boulevard and Foster Road on the south, Thompson, Fremont and Prescott Streets on the north.

The East County study area takes in that land area between East Portland and the adopted urban growth boundary.\*\* It is a major drawing area for the suburban transit lines and for much of the traffic on the Banfield Freeway.

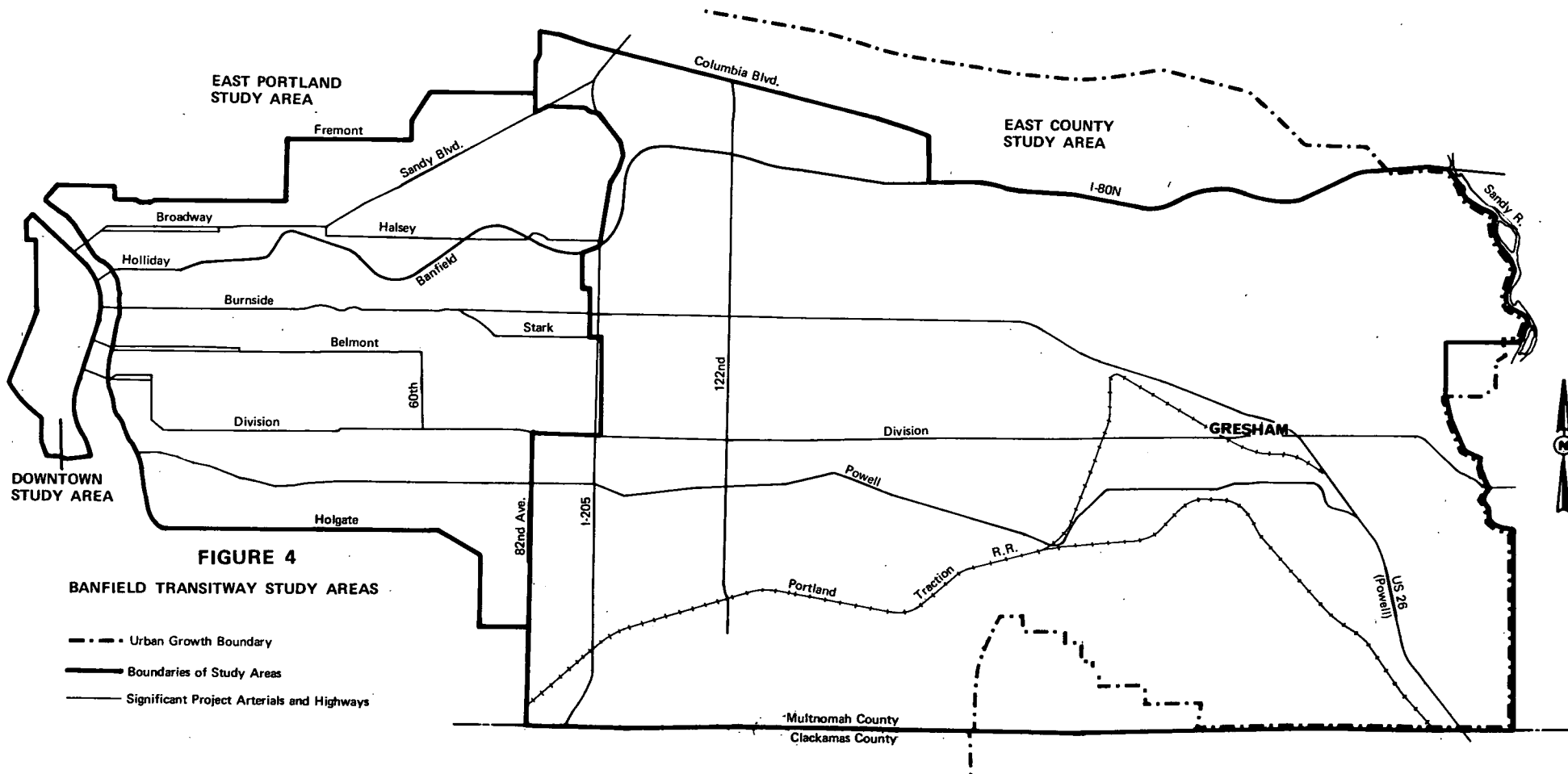
The region itself is the four-county area of Multnomah, Clackamas and Washington Counties in Oregon, and Clark County in the State of Washington.

### The Project

An improved transportation facility including a transitway, operating within the Banfield Corridor has been part of areawide transportation planning since at least the early 1970's. The final report of the Governor's Task Force on Transportation, released in 1975, discusses the potential for both busway and light-rail options in the Banfield. The regional Interim Transportation Plan (ITP), adopted by the Columbia Region Association of Governments (CRAG) in June of 1975, describes the proposed 1990 transportation system for the greater Portland area as being one in which public transit will play a major role. One of four principal transit facilities recommended for early implementation is the Banfield Corridor project.

The Banfield Transitway would essentially consist of an exclusive pathway for some form of high-occupancy vehicles (HOV's), bus, auto, or light rail, which would permit fast, relatively congestion free travel through the corridor. The existing Banfield Freeway presently serves the East Portland and East Multnomah County areas as a primary commuter arterial to and from

\*\*Bounded by Columbia Blvd. and I-80N on the north, and the Multnomah County/ Clackamas County line on the south.



EAST PORTLAND  
STUDY AREA

EAST COUNTY  
STUDY AREA

DOWNTOWN  
STUDY AREA

**FIGURE 4**

**BANFIELD TRANSITWAY STUDY AREAS**

- - - Urban Growth Boundary
- Boundaries of Study Areas
- Significant Project Arterials and Highways

Multnomah County  
Clackamas County



the major employment centers of downtown Portland and the north Portland business/industrial complex. Completed in 1958, the facility presently experiences the heaviest volumes of concentrated traffic in the Metropolitan Region.

The Oregon Department of Transportation (ODOT), in conjunction with the Tri-County Metropolitan Transportation District of Oregon (Tri-Met) began initial inquiries into the feasibility of locating a transitway in the Banfield Corridor in the summer of 1975. Direction for the project study came from the Interim Transportation Plan formulated by CRAG.

At its inception, project studies investigated numerous concepts, including alternative locations within the corridor, and various modal options. Many of these original choices were found, through the process of systematic development, to be too expensive relative to the benefits anticipated, impractical from an engineering standpoint, or environmentally unacceptable. These were dropped from further consideration. Five major alternatives were retained for further study. The present study investigates those five major alternatives.

One alternative would improve the existing HOV lanes on the Banfield. Another option proposes the construction of an exclusive, separated busway adjacent to, or in the median of, the existing freeway. Light Rail Transit is employed in several different arrangements including extending a rail line directly to Gresham. Still another alternative examines the potential for utilizing major city arterials, in lieu of improving the freeway, to handle the projected travel demand in the East Portland and East County area. In addition to these build alternatives, a base condition illustrating the consequences of providing no major transportation improvements in the corridor is explored. the "No-Build" alternative.



A detailed discussion of each of these alternatives, their physical features, operational characteristics and relative costs, is presented in Part B of this volume of the Transitway Report.

CHAPTER ONE / REGIONAL TRANSPORTATION CONCERNS

Any attempt to view transportation in relation to the pattern of regional growth and development must first highlight the major problems brought about by a traditionally heavy reliance on the automobile. The pattern of land development in the CRAG region, an expanding population base, and the construction of an extensive highway network have all served to foster this dependence upon the auto to meet the vast majority of transportation needs. The movement of people and goods by private vehicle was the primary concern of many earlier transportation planning efforts in the Portland area.

By 1970, a large majority of all households owned one or more cars, with a significantly rising percentage owning two or more cars. Automobile ownership since that time has continued to rise. Investments in auto support facilities, such as highways, roads, streets, and parking facilities have substantially outstripped investments in transit facilities. Massive commitments of public and private expenditures to the automobile and its support facilities have contributed to many of the growing problems recognizable in the metropolitan region today.

Perhaps the most critical concern is evidenced in the area of land use and growth. In the past, a rapid growth rate, coupled to healthy economic expansion, has brought more land area under suburban development. The opening up of these new lands has created a reciprocal demand for more extensive transportation facilities. This in turn has fostered more suburbanization and has

accelerated the effects of urban sprawl. As more transportation facilities are built in the outlying areas, accessibility is increased. The subsequently improved level of service has attracted more and more people to these new fringes of development. Increases in population require support services where none had previously existed. Thus, the course of urbanization in formerly underdeveloped areas takes place, compounding the process of orderly growth, while necessitating more services and facilities to support it.

Such developments in the past have encouraged a public policy which has responded by projecting future demands for urban and suburban transportation needs based on this low-density growth pattern, and then planning an arterial and freeway system to support them. One effect of such a system is the continued dispersion of housing, employment, and services throughout the region.

A second area of concern which directly affects the planning and implementation of a regional transportation facility is that of air quality. The Willamette Valley is a natural basin with a high tendency to trap air pollutants. The quality of the ambient air at any give time is primarily a function of specific pollutant emission levels, and a combination of physiographic and meteorological conditions. The local atmospheric capacity to either disperse or assimilate air pollutants is very limited. The combination of frequent temperature inversions and low wind movement is the major contributor to this restricted natural ventilation. It has been found that 30 percent of all summer hours are conducive to inversion conditions; an identical figure to that found in the Los Angeles basin.

Air quality problems in the CRAG region are largely dependent upon the level of automobile use. Based on recent studies by the Oregon Department of Environmental Quality, it is estimated that, of the four major pollutant categories, transportation ranks as the number one offender in two, and ranks third in the others, as a principal contributor. Transportation sources account for 90 percent of the carbon monoxide emitted and 72 percent of the nitrous oxides emitted in the region

#### MAJOR POLLUTANT SOURCES

Nitrous Oxides	1. transportation 2. industrial 3. space heating
Carbon Monoxide	1. transportation 2. slash and field burning 3. off-highway field use
Sulfurous Oxides	1. space heating 2. industrial 3. transportation
Total Particulates	1. agriculture and field burning 2. industrial 3. transportation

While total emission levels are expected to decline in the remaining decades of the century due to the implementation of currently authorized control measures, it must be noted that a doubling of population in the Willamette Valley by the Year 2000 would effectively negate most of this improvement. Continued improvement in existing conditions will potentially require even more strict controls in the future. One method of assisting in

this process is through the planning and development of a total transportation system, which emphasizes a reduction in the amount of projected vehicle trips attributable to the private automobile; a current goal of the CRAG ITP.

A third major problem in this area, which holds significant importance in the design and implementation of a transportation system, is that of energy supply and utilization. Specifically, energy conservation has become an important issue in the process of selecting an efficient transportation mode for use by Portland area residents. While there are several modal choices currently being considered, with varying degrees of energy efficiency, it is a stated goal of CRAG that any future regional transportation system will encourage the use of public transportation.

The existing transportation system in the Portland area, not unlike many other large urban centers across the nation, has resulted in an inefficient use of energy. As in the case of air quality, this has been brought about largely by the inefficient use of the private automobile. Notwithstanding the recent nationwide experience of petroleum scarcity in 1973-1974, a significant rate of increase in private vehicle gasoline consumption has been evidenced in the Portland Metropolitan region, in excess of the increase in number of automobiles in use. A recent CRAG report, entitled Critical Energy Issues for the CRAG Region, documents that, between 1970 and 1974, automobile registration increased 13 percent, while gasoline consumption rose by 19 percent during the same period. This same report states that energy per vehicle-mile-traveled increased by a factor of 2.6 percent over the same time frame. This continued increase in the number of autos and

auto trips, and gasoline consumption, can result in an ever increasing energy use trend, particularly if highway congestion tends to decrease overall vehicle operating efficiencies.

An additional factor which must be considered when taking account of the future transportation network for the Portland Metropolitan area is that of the overall funding picture. One of the principal difficulties of providing an adequate transportation system is that there are limited revenues to fund all the proposed projects. Thus, transportation agencies can not carry out all desired highway improvements, and transit agencies are constrained by the lack of sufficient operating revenues.

The problem of equity in transportation funding allocations is an historic fact. Transit improvements have historically received a smaller share of public dollars earmarked for transportation expenditures. Previous Federal investment in transportation (1956 to 1971) in Oregon has provided \$521 per capita for highways and \$1 per capita for transit.<sup>1</sup> Since 1964, however, the federal government through the Urban Mass Transportation Administration (UMTA), has begun to assist metropolitan areas in the financing of public transit. Though public expenditures for transportation are made possible through a variety of sources in all levels of government, most are provided by the federal government. Traditionally, both public and private investments in highway facilities have outweighed alternative forms of transportation investments by a wide margin.

<sup>1</sup>From the C.R.A.G. Interim Transportation Plan (ITP).

In summary, it can be said that the continued expansion of land development, the growth of the urban population base, and the construction of an extensive highway system has resulted in almost total dependence upon the automobile to meet the majority of regional transportation needs. The difficulty created by the imbalance between auto use and use of other modes of travel, indicates the need for the development of plans and policies which take into account alternative modes of transportation.

The current regional transportation plan (Iterim Transportation Plan - ITP) calls for the use of four major corridors focusing on the CBD to serve future traffic demand with a much greater proportion of transit trips than in the past. These four major corridors are: (1) Banfield; (2) Oregon City-Johnson Creek; (3) Sunset; and (4) I-5 North. Implementation of this policy will result in anticipated improved environmental conditions in the greater metropolitan area, and a land use pattern which avoids future urban sprawl and the rapid depletion of energy resources.

CHAPTER TWO / REGIONAL TRANSPORTATION

PLANNING AND CORRIDOR DEFINITION

Pre-1900 to the Interstate System

A notable characteristic of the urban transportation scene in recent decades has been the nearly insatiable growth in demand for services, coupled with the relative inability of transportation supply to keep pace. Visible expression of this malady is daily evidenced throughout the major metropolitan areas of the country. Congestion, particularly in the peak-hour periods, clogs urban freeways and arterials. Increasing delays, greater travel time loss, and an associated decline in the quality of the urban life style are common problems associated with contemporary urban transportation systems.

Today, perhaps more than at any other point in the history of U.S. transportation, planners and responsible policy makers are faced with crucial decisions concerning the future direction of urban transportation networks. Community and public attitudes toward transportation are in an evolutionary process of change. Standardized solutions once considered adequate or appropriate are no longer held in high esteem. An examination of the process contributing to these and other changes offers valuable insight into the status of the current effort at providing an effective solution to the congestion problem presently experienced in the Portland metropolitan area.



Historically, Portland has been a city whose name was synonymous with progressive forms of transportation. Prior to the turn of the century, city streets were regularly plied by such innovative transit forms as the horse-drawn streetcar, steam-powered transit, cablecars, and electrically operated trolleys. By the early 1900's, trolley lines and highways radiated out in all directions from the rapidly developing downtown area. Many of the City's neighborhoods were platted along the extensions of these transit lines, and many of the existing commercial centers within the City had their origins, and owe their physical characteristics, to the early transit lines.

The "golden age" of public transportation in the Portland area was enjoyed in the decades between 1910 and 1930, reaching its zenith around 1920. In this period, Portland could boast of one of the country's leading interurban electric rail systems which tied the downtown with many outlying communities.

With the introduction of the automobile, public forms of transportation began to decline. By the end of World War II, the transit lines were overtaken by the auto as the basic transportation mode in the Portland region. This, coupled to the shift in residential locating patterns brought about by increasing incomes and federally assisted housing funds, fostered the growth of the suburbs around the City of Portland. The new auto-dependent land use pattern reflected the fact that residents were no longer bound to a location within easy access of fixed-route transit lines.

During this post-war period, the diesel bus replaced the earlier streetcar system. While it offered the public a more flexible and convenient operational mode, its inability to attract or recapture a significant

volume of ridership in the Portland area is attributed in the main to the rising dominance of the private automobile. Public funding and subsidies for automobile related needs began to increase dramatically, while little or no funding was made available to maintain the transit system. The relationship between freeway development and auto dependency is well-documented, as is the concurrent decline in the use of public transit. Urban growth and the suburban residential boom have combined to tax the transportation system beyond its capacity to efficiently serve travel demand. The congested conditions which characterize these periods not only handicap the commuter (through prolonged travel times, and more hazardous driving conditions), but degrade the urban environment, with eroding air quality and rising noise levels, as well.

The chronology of events which ties together much of the background for area transportation planning begins in 1943 with publication of the Moses report. The report, entitled Portland Improvement, recommended many of the major transportation facilities which presently exist in the Portland vicinity. The emphasis throughout the document was one of freeway planning.

#### PVMATS

The year 1956 saw the federal government initiate the Interstate Highway System. Large scale investment of dollars was earmarked for the nation's most ambitious freeway building program to date, with over 90% of total project cost borne by the federal government. The decision to advance the interstate program represented a high water mark in roadway transportation finance; capital investments for a major upgrading of the nation's

highway system began to reflect the relative economic growth and prosperity of the country in the immediately preceding years. Such a high percentage of funding for one program (up to 75% of all federal dollars spent on highway construction during this time) was indicative of the new federal commitment to roadway improvement on a nationwide basis.

With the substantial amounts of federal funds flowing toward freeway construction came an increasing awareness of the need for careful and coordinated planning for such investments. As a result, the 1962 Federal-Aid Highway Act specified that a "continuous, comprehensive transportation planning process carried on cooperatively by states and local communities" be adhered to if such programs and projects in urban areas were to qualify for federal funding. This "3-C" process gave recognition (but no funding support) to the fact that there was a role for public transportation to play in recognized urban areas with 50,000 or more population.

The first Comprehensive Transportation Study for the Portland Metropolitan Area was initiated prior to the "3-C" requirement. The Portland-Vancouver Metropolitan Area Transportation Study (PVMATS) was begun in 1959, but it was not officially adopted until 1971. As originally conceived, the study attempted to identify, and offer solutions for, the more basic transportation problems in the Portland-Vancouver area. The improvements suggested were considered necessary to achieve an adequate system of roads, streets, and highways to handle the projected 1990 level of traffic in the greater Portland region. The network proposed was extensive, requiring large annual investments in an effort to reach completion by 1990. The plan, as released in map form in 1970, proposed some 54 individual projects, including seven new freeways, at an

estimated cost of over \$600,000,000 (1969 dollars). Already committed freeways (at that time), such as the Mt. Hood (I-80N), I-205, and I-505, were taken as given and the costs are not included in the above estimates.

A principal assumption under which the plan was conceived was that the level of transit ridership would remain relatively static, or at worst - continue its then current decline. The plan foresaw no major investments in additional transit equipment or operation.

The initial travel projections in the PVMATS were made with existing land use and zoning information, while assuming an extension of current development trends. Thus, new development was anticipated to occur, as it had in the past, constrained only by the availability of public services. Completion of the already planned Interstate System for the metropolitan area was also considered as given. The composite effect of these assumptions upon the recommended PVMATS plan was one which emphasized a transportation system relying almost exclusively upon the private automobile to play the dominant role in the future commuter transportation picture of the Portland area.

#### The Re-Emergence of Transit

In 1969, the Oregon State Legislature, responding to the need to reverse the downward trend of statewide public transportation use, passed enabling legislation which provided a public tax subsidy for transit use within specified transit districts in the major urban areas of the state. In response to this action, the Tri-County Metropolitan Transportation District (Tri-Met) was formed in the Portland area. Tri-Met, having purchased the private bus companies then offering service to area residents,

began an improvement program with the intent to increase ridership throughout the three-county (Multnomah, Clackamas, and Washington) service area.

The regional planning organization - Columbia Region Association of Governments (CRAG) - also began to pay increasing attention to the needs of transit within the region, at approximately the same time. As part of a continuing effort to foster a more intelligent atmosphere in which to guide area growth, CRAG initiated a comprehensive long-range regional planning process.

An important element in this plan was transportation and, in order to provide some balance to the PVMATS plan, the CRAG Board hired, in 1970, a consultant to conduct an analysis for both a short-range and a long-range transit improvement study. Part II of this study, entitled The 1990 Public Transportation Master Plan, concluded that the metropolitan area should greatly expand its public transportation network through the following elements: exclusive transitways, reserved lanes for buses, and an extensive system of park-and-ride stations. The system was to include 75 express bus stations, and 13 major park-and-ride stations, designed to accommodate a weekday ridership of nearly 300,000 trips by 1990. Major assumptions incorporated into this analysis included: the completion of the area's committed Interstate Highway System; public ownership of the metropolitan transportation system in association with large public investments in transit system improvements; and a future land use policy reflecting no significant change from that currently in effect. Perhaps the major recommendation of the study centered on the development of the express bus system to be placed in operation by 1990; one that could easily be converted to a newer technology as the situation demands or warrants.

The approved PVMATS had proposed a highway improvement system that was designed to handle the projected 1990 traffic volumes in the Portland area. These projections had been advanced under the supposition that there would be no drastic change in the scope and magnitude of area public transportation service. The Public Transportation Master Plan, on the other hand, while accepting as its base many of the assumptions in the PVMATS, raised questions concerning the capital resources required to accomplish the PVMATS plan. As a result, the consultants' report recommended that the approved 1990 PVMATS plan be re-evaluated, in view of the proposed transit improvements, and modification to the highway system be made, accordingly. A system which included only those major existing highways and those for which funds were then committed (I-505, I-205, and the Mt. Hood Freeway) was utilized in developing the Public Transportation Master Plan.

#### Changes in Direction

During the early 1970's a strong desire for change began to find surface expression concerning the direction that area transportation planning should take. While the PVMATS remained the officially adopted plan for the region (it was never adopted by local jurisdictions), many of its underlying assumptions had come under increasing criticism by decision-makers and the public, alike. Major determinants responsible for changes in policy direction centered on the recognition that prevailing planning practices were becoming insensitive to both citizen concerns and apparent environmental problems.

### Land Use Planning

Foremost among these changes was the concern on the part of responsible agencies and many citizens about the continuing expansion of the urban area. Concerns about the impacts of unrestrained growth on surrounding rural land, and upon the ability of the community to effectively provide public services to such an area, led to actions aimed at stronger land use planning. The 1973 Oregon State Legislature passed legislation (SB 100) which established strong land use planning requirements throughout the state, established the Oregon Land Conservation and Development Commission to administer such requirements and regulations, and required that local jurisdictions and urban regions accomplish comprehensive planning procedures which would assure that the relationships between urban growth and service delivery were accounted for.

### Environment

The 1969 National Environmental Policy Act provided the cornerstone of federal government involvement in the protection of the environment - both natural and man-made - by requiring that all projects utilizing federal funds accomplish an Environmental Impact Statement (EIS). It was the intention of the law that the EIS would provide for a compilation of information describing the environmental impacts of the proposed project - as well as any reasonable alternatives to the project - which could then be used by decision-makers in their deliberations. Subsequent court decisions not only supported the original intentions of the NEPA, but actually expanded its breadth of concern. As such, the NEPA, and the documentation which it required, became an important

tool for citizens concerned about environmental impact of major capital projects, and the focus of considerable attention on the part of decision-makers in their discussions of such projects.

In 1969, the Federal Environmental Protection Agency was established (also by the NEPA) and began the task of defining and establishing regulations pertaining to the environmental impacts of many sources, including the automobile. In response to this federal initiative, the State of Oregon established the Department of Environmental Quality (DEQ), charged with the responsibility of accomplishing similar actions within the state and with administering federal performance standards.

#### Transportation

In 1964, the federal government made the first significant steps toward effectively supporting mass transportation, when the Mass Transportation Act was passed, establishing federal funds for mass transit. In 1969, Congress went a step further by providing legislation which allowed for the withdrawal of an Interstate segment and the use of the (Interstate mileage) funds on a freeway segment elsewhere. This legislation allowed local jurisdictions and states the opportunity to withdraw Interstate segments, including those which had encountered formidable opposition from the community on the basis of their environmental impacts.

In 1973, a Federal-Aid Highway Act was passed by Congress, and this legislation contained provisions which substantially expanded the Interstate withdrawal opportunities. For the first time, it became possible to withdraw an Interstate segment from the Interstate System and utilize the available



funds on "substitute" mass transportation projects. Thus, communities were given the option of investing the federal funds in a mass transit system rather than adding to the highway system. This legislation was to become a critical element in not only the Portland area decision to withdraw the Mt. Hood Freeway, but in the general direction of transportation planning and project development as well.

#### The Mt. Hood Freeway - Focus for Change

The Mt. Hood Freeway, one of the major highway projects proposed in the PVMATS plan, was initially conceived by the (then) Oregon Highway Department in 1955. With the initiation of the Federal Interstate System in 1956, interest increased in the possibility of the Mt. Hood Freeway, since the large capital cost could be largely borne by the federal government. Since the Banfield Freeway had been constructed prior to the establishment of the Interstate System, and had not been constructed to Interstate System standards, the opportunity existed to utilize the Interstate program by constructing another east-west freeway on the east side of the region in order to provide a link between I-5 and the (tentatively planned) I-205, which would be a continuance of I-80N, from eastern Oregon. (Although the Banfield remains signed as I-80N, it is not a formal segment of the Interstate System.)

The Oregon Highway Department and the City of Portland examined three alternative corridors in southeast Portland for the location of the proposed Mt. Hood Freeway. In May, 1969, a public hearing was held on the

three corridors, and based on the resulting decision, the federal government granted approval of the Division-Powell corridor later that same year. This opened the door for the development of specific designs for the proposed freeway, however, since the NEPA was passed the same year, the process to be followed in the development of such designs became the subject of the NEPA provisions.

In 1971, the Oregon Department of Transportation hired a team of consultants to conduct detailed investigations of the environmental impacts of both the proposed eight-lane freeway and five alternatives, to the full freeway design. These alternatives were: (1) the eight-lane freeway with transit; (2) a four-lane freeway with transit; (3) a depressed transit facility, with two location options; (4) a depressed transit facility with boulevard highway treatments, at two optional locations; and (5) a surface street transit system with no major construction. In December, 1973, the Oregon State Highway Division released the Draft Environmental Impact Statement for the Mt. Hood Freeway, and made preparations to hold a public hearing on the project. This process however was to be affected by several other activities underway at the same time.

#### Court Action

A group of citizens whose homes were to be affected by the construction of the Mt. Hood Freeway filed suit against the Federal and State Departments of Transportation in Federal District Court in Portland to halt the project.

The District Court, ruling on only one of many allegations of plaintiffs, held that the defendants were pre-committed to a particular route prior to the corridor hearing in violation of a federal regulation and statute. The defendants and the plaintiffs both appealed the Federal District Court decision to the U.S. Ninth Circuit Court of Appeals, primarily with respect to whether plaintiffs' attorneys were entitled to attorneys' fees. The state, however, also challenged the correctness of the Federal District Court's decision that the state was unlawfully pre-committed to a particular route. There has not yet been a final disposition of these appeals.

#### Governor's Task Force

While the study process proceeded on the Mt. Hood Freeway, political leadership within the region, reflecting the increasing concerns of many citizens about the impacts and presumed benefits of additional urban freeways, initiated a study process aimed at re-evaluating the region's transportation planning process and policy direction. In May, 1973, the Governor formed the Governor's Task Force (GTF) on Transportation, which was established in the Portland region as a formal subcommittee of the Columbia Region Association of Governments (CRAG) Board. The Task Force was composed of policy-level representatives from Multnomah, Clackamas, Washington, and Clark (Washington State) counties, the Oregon Department of Transportation, Tri-Met, the Port of Portland, and CRAG. The GTF was chaired by the Mayor of the City of Portland.

One of the principal charges to the Task Force was to identify and clarify the major transportation and land use policy issues which were currently facing the metropolitan area, and attempt to evaluate alternative solutions to them. This meant a careful re-evaluation of the PVMATS plan, which remained the region's adopted transportation plan. Additionally, the GTF was asked to assist in the reorganization of the transportation planning process within the region through an upgrading of the CRAG role. At the outset, the GTF indicated a new direction of transportation concern in the region which would be the subject of its work. The Task Force established its interest in the exploration of transit opportunities in the region, but in doing so reflected the increasing environmental concern by concentrating such exploration on existing right-of-way.

As a first step in this work, the GTF requested the Oregon Public Utilities Commission (PUC) to accomplish a preliminary examination of existing rail rights-of-way in the Portland region, in order to ascertain the feasibility of using such routes for transit facilities. This work was accomplished by the PUC, and a report produced in November, 1973.

However, in the same year, the Congress had passed the 1973 Federal-Aid Highway Act, inclusive of the expansion of the Interstate withdrawal provisions, and the Task Force realized that its efforts should at least partially focus on the potential opportunities provided by the new legislation. Accordingly, the Task Force directed that "sketch planning" work be undertaken to examine the feasibility of responding to future travel demand in the region through transit investments which might in part be funded with Mt. Hood Freeway withdrawal funds. To accomplish

this, the Task Force staff - consisting of consultants and the staffs of involved local jurisdictions and agencies - began a sketch planning work program which deleted the Mt. Hood Freeway as an assumed facility, and instead focused on the identified rights-of-way which might respond to the Mt. Hood-related travel demand. These corridors were two: The Banfield to its intersection with the I-205 corridor and then eastward toward Gresham on local arterials; and, the Johnson Creek right-of-way, which led from Gresham to downtown Portland via the rail line adjacent to Johnson Creek and then along existing rail lines to the Portland CBD.

The GTF study effort, which began in earnest in December, 1973, attempted through the sketch planning work to determine the general feasibility of a new transportation system in the region, placing emphasis upon transit investments in existing rights-of-way. The Highway Division conducted engineering reconnaissance of the rights-of-way, in order to produce capital cost estimates. Utilizing these corridor opportunities which appeared most appropriate from the standpoint of the re-evaluated population and employment forecasts (which were also developed by the Task Force effort), ridership forecasts were developed, and operating costs assigned. Additionally, research was conducted on the more detailed provisions and mechanics of the withdrawal provisions of the 1973 Act, in order that local decision-makers be fully informed. Task Force work examined a range of possible transit modes which might be employed in the region, including light rail transit.

The Mt. Hood Freeway - Withdrawal Decision

Although the District Court decision regarding the Division-Powell corridor greatly complicated the Mt. Hood Freeway decision-making process (for example, the Multnomah County Board of Commissioners had voted to withdraw its support of the corridor immediately after the Court decision), the City of Portland chose to go ahead and hold a hearing on the freeway matter. The first hearing was held in June, 1974, and the Council heard a range of comments, including a report from the Citizens Advisory Committee on the freeway (appointed by the Council) and the Governor's Task Force. The Citizens Committee recommended against the freeway construction, and the Council heard the GTF report about the possible alternatives to the freeway. Unable to reach a decision, but expressing interest in the withdrawal opportunities, the Council recessed after passing a resolution asking the Governor's Task Force to return in a month with more detailed analysis of transit investment alternatives to the Mt. Hood Freeway.

On June 23, 24, and 25, 1974, the Portland City Council reconvened to hear testimony and discuss the Mt. Hood Freeway situation. For the first time, fairly complete documentation existed for the Council to consider. The extremely detailed DEIS covering the seven freeway alternatives had been the subject of study for some time, and the GTF staff had completed the requested additional analyses of transit investment opportunities utilizing a withdrawal process. The Task Force studies indicated that transit opportunities, of a regional nature, existed in both the Banfield and Johnson Creek rights-of-way, and that these transit facilities (assumed to be high

volume facilities - either LRT or exclusive bus lanes) could provide a high level of service for the forecast travel demand from East Multnomah County. Additionally, Tri-Met provided a report outlining a plan for improved transit service within the southeast area of the City, which would also assist in alleviating future traffic congestion and related impacts. Finally, the Council heard from many citizens and special interest groups representing various points of view.

Given the understanding of the social and environmental impacts of the proposed freeway, and having examined the work of the GTF, the City Council voted to request withdrawal of the segment from the Interstate System, with the formal understanding that the funds would be used to address the transportation needs of the City's southeast through transit investments.

Less than a month later, on August 15, the Multnomah County Commissioners held a hearing on the Mt. Hood Freeway, and following through on their February disapproval of the corridor, took an action similar to the City's, requesting withdrawal of the freeway, again with the understanding that the transportation needs of East Multnomah County would be addressed through future transit investments, utilizing the withdrawal funds and following the recommendations of Task Force study. The same day, the CRAG Board of Directors passed a resolution concurring with the County and City actions, and passing the withdrawal request on to the Office of the Governor for his consideration, as required by federal regulation.

While regional planning efforts changed direction on the basis of the GTF work and the decision to withdraw the freeway segment, the actual completion of the withdrawal process took somewhat longer. In the fall of

1973, then Governor McCall submitted a letter to the Secretary of Transportation indicating his intention to concur with the requests of the local jurisdictions and request formal withdrawal of the freeway, given resolution of details on the mechanics of the withdrawal process. Governor Straub took office in January, 1975, and on July 1, 1975, in accordance with federal guidelines, formally requested the withdrawal of the Mt. Hood Freeway. Subsequent to this date, a series of discussions and reviews by federal agencies took place, including discussions with Portland area officials. Finally, in May, 1976, the withdrawal request was approved by the Administrators of the Urban Mass Transportation Administration (UMTA) and the Federal Highway Administration (FHWA), and approximately \$200 million was set aside for substitute transportation investments. The 1976 Federal-Aid Highway Act, which contained a further expansion of the withdrawal provisions including the provision for a continuance of the inflationary effect on the withdrawal amount after the time of U.S. DOT approval, and the allowance of the use of the withdrawal funds on highway projects administered by the FHWA, as well as on transit projects administered by the UMTA.

#### A New Direction

The completion of the full work program of the Governor's Task Force, in the Fall of 1974, and the local decision on the Mt. Hood Freeway withdrawal, set the Portland region on a new course in regional transportation planning, with a new and strong policy direction. Through the Mt. Hood decision, and the subsequent acceptance of the GTF work, the region had turned away from the emphasis upon freeway planning and had instead



chosen a direction which called for renewed emphasis upon transit system development balanced against concerns of environmental impact, land use control, citizen involvement, preservation of existing resources, and energy conservation and efficiency.

### The Interim Transportation Plan

As was intended at its creation, the Governor's Task Force, upon completing its work program, was integrated back into the CRAG work program and organization, with the responsibilities of the Task Force becoming those of the CRAG staff and other local agencies. The first task of the CRAG effort was the recommendation of a new regional transportation plan, to be submitted for certification by the federal government, and to replace the PVMATS plan which was now obsolete. Taking up where the GTF had stopped and relying heavily upon the sketch planning work accomplished by the Task Force effort, the CRAG staff set about the task of developing a new plan and associated goals and objectives statement. Further examination of regional corridor opportunities was undertaken, aiming at a refinement of the work accomplished by the Task Force.

Drafts of plan goals and objectives were also drawn and provided to the public, local jurisdictions, and the CRAG Board for review and comment. The regional highway system was examined and all highways were classified, with new highways or improvements limited to those which were either programmed for construction or committed in terms of a six-year capital program. The regional transit corridors examined by the Task Force on the east side of the region were further examined, and both Johnson

Creek and the Banfield were retained in the transit element of the plan. The completed plan document, entitled the Interim Transportation Plan, was formally adopted by the CRAG Board in June, 1975.

### I-205

For some time, controversy had surrounded and delayed the completion of the final segment of I-205, due to differences over the specific design of the segment from Foster-Woodstock in southeast Portland to the Washington State side of the Columbia River. The new Interim Transportation Plan (ITP) under development at CRAG indicated a change in emphasis for Transportation Planning in the Portland Area. Lengthy negotiations between the City, County, ODOT and FHWA resulted in a re-design of the freeway segment. Several elements of the re-design were particularly significant to regional transportation concerns:

- (1) The freeway was reduced from eight lanes to six lanes, reflective of the diminished travel volume forecasts which resulted from revised land use plans and projected growth in Multnomah County.
- (2) Provision was made in the I-205 design for the future inclusion of an exclusive transitway, which would link to downtown via a connecting radial facility.
- (3) The number of interchanges on the freeway was reduced from previous designs, and the specific design of the interchanges was modified in an attempt to facilitate the arterial street policies of the City and the plans of Multnomah County.

- (4) Revisions were made to the design in order to mitigate the environmental impacts of the freeway. The most notable of these revisions are the sound barriers and berms to diminish the noise impact.

With these changes, agreement was reached with Multnomah County and the City of Portland, and the I-205 segment proceeded to construction, beginning in December, 1976.

### City, County and CRAG Planning

#### City Planning

The years of procedure and discussion on the Mt. Hood Freeway had, by its very nature, delayed transportation planning and other project development in the southeast neighborhoods of the City. The Portland City Council recognized this during its deliberations over the Mt. Hood Freeway. The Council also recognized that the City's transportation planning and implementation processes were not responsive to many of the same concerns which had characterized the region's transportation planning during the early 1970's (environmental and social impacts, transit needs, energy, etc.). Consequently, in order to provide a re-evaluation of and give new direction to the City's planning efforts, the Council authorized the City Planning Bureau to begin, in April, 1974, a study of the City's street system, pursuant to the development of a new planning approach for City transportation activities. Called the Arterial Streets Program, the study was undertaken with the assistance of a consultant and staff from other agencies in the City and in the region (Tri-Met and CRAG).

The first stages of the study accomplished comprehensive data collection and an historical review of the City's transportation system. The study also examined existing land uses and considered the regional transportation planning context. In the fall of 1974, City staff began the first of what became a continuous and extensive process of citizen communication and participation, by conducting a series of public meetings with neighborhood associations, interest groups, and the general public, throughout the City. The purpose of this meeting process was to explain the information which had been gathered regarding the City's transportation system, and to acquire additional information in the form of citizen perceptions of transportation problems and needs. By the spring of 1975, this process was completed and the staff was ready to move forward to planning stages.

Over the following two years, City staff developed - with the close assistance of the community - the recommended Arterial Streets Classification Policies. The intent of these recommendations was not the adoption of a transportation plan in the traditional sense of the term, but rather the adoption of policies which would guide future operational and capital investment decisions affecting the City's transportation system. This was accomplished by assigning each street (and some rights-of-way) in the City two policy classifications - one having to do with the use of the street by automobile traffic, and one having to do with the use of the street by transit vehicles. Thus transit and traffic classifications were developed for each street, for the purpose of prescribing the future intended use of the street. The draft classification

policies were examined, using ODOT analysis, in terms of forecast traffic and transit movement, and policies were developed regarding land use considerations, special problem areas, the regional transportation system, and specific policies for truck movements within the City. After lengthy review by the community, review by the other City staff, and approval by the City Planning Commission, the proposed Classification Policies were formally adopted by the City Council in June, 1977.

It is noteworthy what the Arterial Streets Program concluded regarding Division Street and Powell Boulevard, the locations of the previous Mt. Hood Corridor. Powell was found to be somewhat exceptional among streets in the southeast, having both excess capacity in certain segments, and unused right-of-way in other sections, as well as many land uses which are automobile-oriented. Consequently, Powell was classified as a Major City Traffic Street, or the major southeast arterial (east-west) intended to accommodate efficient movement of automobiles having at least one trip-end (origin or destination) within the southeast neighborhoods. In keeping with this definition in the policies, it was indicated that Powell should link with I-205. Powell was also classified as a Minor City Transit Street, which meant that although transit movement should be provided for, the automobile movement should have the more predominant importance in operations.

Division, however, was found to have very little capacity, no excess right-of-way, and land uses (both residential and commercial) which had historically been developed in relation to transit, and even more recently were oriented toward transit (e.g., many medium density residential developments, and many relatively dense commercial centers). Consequently,

Division was classified as a Major City Transit Street, a prescription for future use which would utilize Division for an important transit route serving transit trips with at least one trip-end within the City's Southeast neighborhoods. At the same time, Division was classified as a Neighborhood Collector for automobile movement, which meant, in contrast to Powell, that the predominant future transportation use on Division should be for local transit movement, per the definitions provided in the City's adopted classification policies.

In reaching these conclusions, the Arterial Streets Program reinforced an earlier - 1974 - decision of City Council to seek funding to accomplish capacity improvements on Powell Boulevard (from State Bond financing). With the adoption of the Arterial Street Classification Policies, City efforts turned to the Powell project, as well as others in the southeast. The Powell Boulevard project, undertaken in two stages, was expedited, with the first stage, from the River to S.E. 52nd, receiving Council approval in early 1977. At that time, preliminary engineering work was initiated on the second stage of the project, from S.E. 52nd to I-205.

Other work was also undertaken, including the development of neighborhood-level traffic, transit, and pedestrian projects on Federal Aid Urban System (FAUS) routes which would utilize \$5 million in Interstate withdrawal funds set aside for such projects throughout the southeast part of the City. Late in 1977, initial planning work was begun on a series of projects on Division Street which would have the objective of improving the street for locating transit movements. Finally, in early 1977, a

transportation planning study was begun in the Hollywood District, adjacent to the Banfield corridor, which in part was aimed at providing the Hollywood community an opportunity to coordinate local transportation improvements with the Banfield project improvements.

#### City Planning

In 1975, the Multnomah County Planning and Development Division began preparation of a Comprehensive Framework Plan to replace the outdated 1959 County Plan and to address the land use issues, goals and guidelines of the Oregon Land Conservation and Development Commission. The County Comprehensive Framework Plan was adopted in September, 1977 by the County Board of Commissioners.

The Comprehensive Framework Plan includes a Transportation element. The previous Comprehensive Plan was based on the assumption of the now defunct regional PVMATS and called for an extensive road system involving substantial capital expenditures. The implementation of such a system was not feasible from economic, social or environmental standpoints. The new transportation element utilized work done in previous studies, such as the Governor's Task Force Report and the CRAG Interim Transportation Plan. A study was undertaken of the East Multnomah County transportation system by the County staff with the assistance of a transportation consultant. The study utilized the previously mentioned sources plus on-going land use and transportation planning of the region and a number of Multnomah County cities. A committee was established to involve the five East County cities in the planning process. This work is described in two technical appendices to the County Plan -- East Multnomah County Transit Corridors and East Multnomah County Road System.

The transit corridor work completed since the adoption of CRAG Interim Transportation Plan in 1975 was reviewed by the County. The current planning efforts included the adopted CRAG Goals and Objectives and CRAG Land Use Framework Element, the I-205 design policies and subsequent I-205 Environmental Impact Statement, the Gresham subarea Transportation Analysis and the on-going County and Cities' planning work.\*

Four transit corridors were examined east of I-205: the corridor paralleling I-80N, the corridor paralleling the Portland Traction Company right-of-way, the Division Street corridor and the Burnside Street corridor. The conclusions drawn were:

A transitway in the Portland Traction Company Corridor paralleling Johnson Creek is in conflict with adopted CRAG Goals and Objectives and the CRAG Land Use Framework Element. There are severe and worsening flood problems of Johnson Creek. There is a lack of urban services in the area and since a transitway requires supportive development it would call for an extensive capital outlay in services. The corridor borders land designated Rural in the CRAG and County Plans. The area has the lowest population density of the four corridors.

The I-80N Corridor has sparse population patterns in its eastern portion and access problems due to the I-80N freeway.

\*CRAG. Goals & Objectives and Implementing Rules. Portland, 1976.  
CRAG. Landuse Framework Element ... Portland, 1977.



Both the Portland Traction Company Corridor and the I-80N Corridor are geographically located away from the built-up and developing Central County are between Halsey Street and Powell Boulevard.

The Division Corridor has the highest 1975 population levels and is centrally located. Since Division Street will interchange with I-205, it will carry high volumes of traffic and be the major traffic street serving the Southeast County. A transitway along Division Street would need to be intimately coordinated with traffic movement due to the type of land use development and existing use of the streets.

The Burnside Corridor is centrally located and has the second highest 1975 population density. Burnside Street will not interchange with I-205. Traffic projections indicate very little increase in traffic volumes on the section west of 181st Ave. There is unutilized right-of-way in this corridor. There are parallel arterials within about 1/4 mile to the north and south of Burnside Street.

From the transitway and road system analyses done by the County, an Arterial Transportation Plan was prepared as part of the Comprehensive Framework Plan. It designates Division Street as a "Principal Arterial", that is, an arterial which can carry more than 25,000 vehicles per day including "through" trips between I-205 and the Mt. Hood Highway east of Gresham. Burnside Street is designated as a "Transitway", that is,

providing an exclusive right-of-way segment for transit use between I-205 and 200th Avenue with the Portland Traction right-of-way designated a "transitway" from 200th Avenue to the Fairgrounds site in Gresham.

#### CRAG Planning Actions

By late 1975 and early 1976, planning work at CRAG was providing support to the increasing level of preliminary engineering work being undertaken on the Banfield project. Utilizing the technical and policy base provided by the Interim Transportation Plan, the CRAG planning activities and actions were responsive to the planning efforts of local jurisdictions and agencies. The resolution of the I-205 design controversy, and the resulting inclusion of a potential transitway in the I-205 corridor pointed to the need for the previously analyzed east-west radial transit corridor. Based on the comments and work by the City, County, and Tri-Met during the I-205 work, plus the information provided by the City from the Arterial Streets Program the Banfield became the focus of the transitway effort. Given Multnomah County's comments on land use plans in East Multnomah County, and the City's findings regarding both its arterial street system and development forecasts, it became clear that the Johnson Creek right-of-way did not have the advantages of the Banfield as a potential transit route. This conclusion was recognized by both the Inter-Agency Coordinating Committee (ICC) and the Transportation Technical Advisory Committee (TTAC) at CRAG, when it was determined in November 1976 that the Johnson Creek transitway assumption would be deleted from future system planning analysis, in the sense that it was not considered to be a viable corridor opportunity for the 1990 forecast year. The CRAG Board

approved the action. For system planning purposes, other regional transit corridors identified in the Interim Plan were similarly deleted, or carefully defined, pending a more complete re-evaluation in future Plan revision activities.

### Transit Corridor Selection

The residents of the southeast neighborhoods indicated general opposition to a Regional transportation facility that would likely cause added noise, congestion and major disruption in this area. Because of these concerns, and since an alternative corridor existed, local governmental agencies determined that transportation improvements in southeast Portland (between Downtown and I-205) would be directed toward providing service for people who were living or doing business within that area. It was further determined that no east-west arterial in the southeast would serve as a route for regional automobile or transit movement.

Because of these determinations, the local government planning agencies elected not to invest time or manpower resources in further technical study of a "Division-Powell" transportation facility in the southeast, between Downtown and I-205.

The Johnson Creek alignment, indicated as a transit corridor in the ITP, was dropped from further consideration, because of non-supportive land use and development densities projected for the design year. The out-of-direction travel and type of development expected along Johnson Creek were considered non-responsive to the major East County transportation problem.

As a result of these decisions, only one location corridor between Downtown and I-205 is carried forward for detailed study in this Draft EIS. Sullivan's Gulch (Banfield) forms the single connecting link in all options except for the low cost alternative.

The controversy resulting in withdrawal of the Mt. Hood Freeway was due in part to the disruption and displacement which would have occurred to residents in Southeast Portland.

As the Arterial Streets Program of the City of Portland progressed, additional information was either generated or taken into consideration. This effort further assisted in defining Transportation planning within the southeast part of the City.

An examination of the physical characteristic of southeast streets revealed very few opportunities for significant capacity improvements necessary for a regional transit facility. These improvements could not be made without major disruption of adjacent neighborhood areas, due primarily to the severe limitations of rights-of-way, and the proximity of adjacent land use.

There are, however, numerous opportunities to improve local streets for the purpose of increasing the efficiency of traffic and transit movements serving local trip purposes. Much of this unused capacity will be needed to serve future traffic and transit volumes with origin or destinations within the Southeast.

Futher studies by Tri-Met and the City indicated that projected transit trips between the southeast and Portland downtown could be served efficiently with conventional bus service improvements.

The extensive citizen participation program undertaken by the Arterial Streets study also assisted in providing directions for transportation planning in the southeast, by allowing a forum for citizen and neighborhood organization views. There were several opportunities for extensive citizen comment during the development of the Classification Policy, and the following summaries present important viewpoints which were set forth throughout the process:

1. With the exception of congestion problems on Powell Blvd. and at several other locations, the predominant problems in the southeast were characterized by many isolated, neighborhood level problems having to do with speeding, pedestrian safety, parking difficulties in commercial areas, auto short-cutting through neighborhoods, and other comparatively minor problems.
2. Transit problems were characteristically identified as inadequate service levels to various locations, including the downtown, as well as the lack of transit-related amenities, such as shelters.
3. There was a clear indication, particularly from the neighborhood organizations, that transportation improvements which would result in displacement or disruption to existing land uses would not be supported.

4. Other than the need for improved transit service throughout nearly all areas of the southeast, the only wide-spread "system" transportation problem identified was the movement of regional or through trips on local streets and arterials, resulting in congestion and environmental impacts to existing neighborhoods.

5. There was general support for the transportation plan concept which called for improvements to I-205 and the Banfield, providing for the movement of regional trip around the southeast neighborhoods; and conversely, there was very little, if any, advocacy for the development of a fixed-guideway transit facility to serve East Multnomah County, which would utilize southeast streets.

The outgrowth of the foregoing planning process, with its multitude of interagency and citizen inputs, has yielded the following set of routes and alignments which have been carried through the environmental impact statement reporting process.

The central link in the project is the Banfield Freeway itself. Extending from the Holladay ramp connection on the west to the I-205 connection on the east, the Banfield would be utilized under three of the four build alternatives through the East Portland area. The Low Cost Improvements option, the fourth build alternative, would utilize three major East Portland arterial corridors, in lieu of the Banfield, to improve traffic and transit flow between the East County and the Central Business District (CBD). These corridors are: 1) N.E. Broadway/N.E. Weilder/N.E. Halsey/N.E. Sandy. 2) S.E. Burnside/S.E. Stark; and 3) S.E. Division

In the East County area, three different alignments were investigated under the Light Rail Transit scheme. These are: 1) the Burnside-Gresham route; 2) the Division to Gresham route; and 3) the I-205 to Lents alignment. Each route configuration would connect with the Banfield Freeway through special ramps provided on the I-205 - Banfield interchange.

The Downtown Portland area is to be accessed from the Banfield Freeway via the Holladay Street off-ramp, on either Holladay Street, or a Multnomah/Holladay combination, then over the Steel Bridge into the CBD.

Several options are available in the Downtown alignment for the LRT lines. A Cross-Mall alternative would employ a new ramp from the Steel Bridge to the intersection of Everett and N.W. 1st Avenue. A loop would continue along 1st to Morrison, Yamhill and the west side of 6th Avenue. The second option is the On-Mall/Pioneer Square route, which would descend from the Steel Bridge in a double track, turn south on 5th Avenue, and return via Yamhill, 6th Avenue and Morrison Street. The third option, the On-Mall/Oak Street route, is essentially the same as the previous option, with the exception that, at Davis Street, a single track would continue on 5th to Oak, west to 6th, and return to Davis to close the loop.

**CHAPTER THREE**

**NEEDS, GOALS AND OBJECTIVES**



CHAPTER THREE / NEEDS, GOALS AND OBJECTIVES.

Population projections for the East Multnomah County area reflect a forecasted increase of 47,000 in the 20-year period 1970-1990. Economic projections over the same time period indicate that an estimated 37,000 new jobs will be available in the downtown Portland area. These increases will contribute to a total demand for 18,200 person trips in the peak hour commuter period, through the East Portland Study area by 1990.

The existing Banfield Freeway and other parallel arterials at 28th Avenue, including existing transit service, have the capacity to handle a total of 16,400 person trips per hour. Study of traffic flow on the existing system indicates that it is currently being used at near capacity (see Figure 5 ).

The Portland "Downtown Parking and Circulation Policy," adopted February 26, 1975, establishes a limit on downtown parking of 39,683 spaces. This action is part of the strategy developed to meet the requirements of the Federal Clean Air Act of 1970, and has the concurrence of the State Department of Environmental Quality as the recognized control agency. Current assessment of the downtown indicates that utilization of existing parking is rapidly approaching this established limit.

Approximately 4,200 of the 1990 forecasted peak demand of 18,200 person trips per hour are expected to commute to the downtown Portland area. Travel through East Portland to other destinations is expected to have a nominal increase.

The purpose of the Banfield Transitway Project is to provide a multimodal facility that will accommodate the projected increases in predominantly auto trips to non-CBD destinations, and accommodate the CBD-oriented commuter trips with a higher level of transit service. The intent is to provide such a facility, within the environmental constraints, that is consistent with local and regional goals while having a minimum disruption to local communities.

Various solutions to accommodate this increased travel demand have been suggested over the years. Most of these would have imposed severe impacts upon the neighborhoods of East Portland by requiring extensive demolition of homes, as well as increased noise and air pollution. Yet the consequences of doing nothing are serious by themselves. Traffic congestion on city streets is leading to additional environmental problems for the community, with a subsequent decline in its economic, social and environmental viability. Rising use of the automobile has also compounded region-wide problems of fuel availability, air quality, and the development of efficient patterns of urban growth.

Plans to accommodate anticipated increases in travel must contend with a number of specific constraints. Proposed solutions should have minimal adverse impact on the local communities which they serve, in terms of landtaking, community disruption, visual, traffic volumes, air quality, and noise levels. Modes of transportation other than the single occupant automobile are being encouraged. For the transit operating agency, an additional constraint must be dealt with: the continuing problem of

minimizing day-to-day operating costs of the transit system while still providing a level of service appropriate to the needs of the community at large.

It is these problems and constraints which have led to a study of transportation alternatives in the East Side. The opportunity exists to refocus future growth and travel patterns in this region through a more efficient network of public transportation. Service can be redesigned to encourage increases in transit ridership and subsequent decreases in auto-related environmental impacts, energy consumption, and urban sprawl. The Banfield Transitway Project is the first in a series of major development proposals that seeks to redirect the course of transportation investments throughout Portland. The overall aim is to develop region-wide solutions in a consistent and coordinated manner commensurate with the resources of the metropolitan area.

A comprehensive statement of goals and objectives was formulated by the project Technical Advisory Committee (TAC) outlining three principal purposes: to guide the continuing development of service concepts and facility designs; to insure that the project conforms with local and regional goals and desires; and to provide a mechanism for evaluating the various alternatives under study. These elements are outlined in Table 1 under headings described as follows:

Goals are idealized statements about desired future conditions. These conditions are rarely completely achievable in reality.

Objectives are more specific statements which describe how the project would attempt to achieve the goals.

Constraints are factors which inhibit goal achievement. The list of constraints generally refers to undesirable aspects of the project which should be minimized.

Evaluation Criteria are those measures which can be used to gauge the achievement of objectives and the minimization of undesirable factors.

TABLE 1

GOALS AND OBJECTIVES OF THE BANFIELD TRANSITWAY

GOALS	OBJECTIVES	EVALUATION CRITERIA <sup>1</sup>
I. Pursue regional and local planning objectives and policies	1. Encourage citizen participation in project planning	
	2. Conform with appropriate policies and objectives of LCDC, CRAG, Tri-Met, City of Portland, and other relevant agencies	
II. Provide the capacity for projected travel demands in a safe and efficient manner	3. Reduce peak-hour congestion on the Banfield Freeway	1990 PM pk-hr V/C ratio on Banfield Fwy. 1990 PM pk-hr overcapacity lane mi. on Banfield
	4. Increase the proportion of East-side trips using transit through:	1990 orig. ES transit pass (daily/annual) 1990 mode split (ES total daily/ES pk-hr/downtown-ES pk-hr) <sup>2</sup> 1990 ES auto VMT
	a. Shorter transit travel times	1990 PM pk-hr aggregate travel time among selected ES zones (composite/downtown)
	b. More extensive transit service	ES system line miles 1990-ES-transit VMT (daily/annual)
	c. More diverse transit system orientation	ES system connectivity (cyclomatic no.)
	5. Reduce the growth of transportation-related accidents in the East Side	1990 annual ES traffic accidents
	6. Maximize the efficiency of the East Side transportation system	1990 annual auto travel cost savings Transit capital cost per 1990 transit pass. 1990 annual ES transit oper. cost per pass. (gross/net) 1990 total ES transit annual cost per pass. 1990 annual originating ES transit pass. per transit VMT
	7. Reduce through auto and transit traffic on E. Portland arterials	1990 annual auto VMT on E. Portland arterials 1990 annual through transit VMT on E. Portland arterials 1990 PM pk-hr overcapacity lane mi. on E. Portland arterials
	8. Reduce transportation-related air pollution in the East Side	1990 annual ES emissions (CO/HC/NO <sub>x</sub> )
	III. Improve the quality of the environment	9. Support urban activity centers in E. Portland through increased transit access
10. Encourage the development of transit supportive land uses in central E. County and along I-205		1990 pk-hr ES transit trips to travel zones in affected areas <sup>2</sup>
IV. Coordinate transportation with land development	11. Reduce transportation-related energy consumption in the East Side	1990 annual ES energy consumption (BTU/gal. gasoline/KWH) by autos and transit
	CONSTRAINTS	
V. Reduce energy consumption	12. Minimize project costs	Capital cost (project/transit) Cost of transit vehicles required in 1990
	13. Minimize long-term public costs	1990 annual ES transit oper. cost (gross/net) 1990 total ES total annual cost
	14. Minimize property acquisition	Properties affected (number/acres) No. displacements (families/businesses) Right-of-Way Costs
	15. Minimize air quality impacts	1990 Total Emissions Summary (CO, HC & NO <sub>x</sub> ) 1990 significant local increases in CO concentrations
	16. Minimize noise impacts	Average change in L <sub>10</sub> dBA for selected ES receptor sites (Banfield/arterial streets) Average CBD L <sub>10</sub> dBA levels attributable to transit vehicles in 1990 for selected receptor sites
	17. Minimize transit energy consumption	
	18. Minimize off-Mall transit operation downtown	1990 PM pk-hr movements above Mall capacity
	19. Minimize loss of neighborhood parking spaces	No. on-street parking spaces removed
	20. Minimize impact on land and water resources	Loss of productive habitat (acres) Potential slope erosion (acres) Rock quantities (excavation/surplus/aggregate) Increased runoff area (acres) Flood plain encroachment (acres)

NOTES: <sup>1</sup> ES-East Side  
<sup>2</sup> To be included in Final EIS

CHAPTER FOUR / EXISTING BANFIELD CORRIDOR CONDITIONS

Summary Traffic Experience

The rapid growth of the East Portland Metropolitan Region, in conjunction with increased employment opportunities in the downtown, has increased the demand for travel to and from these areas. With this tremendous increase in demand has come little additional increase in capacity. Existing facilities have become overcrowded, while average travel times are on the rise.

The most heavily traveled roadway in and through the East Portland area is the Banfield Freeway, which presently handles almost one-half of the east-west oriented vehicular trips. In 1975, the Banfield Freeway carried 102,000 vehicles per day on an average weekday on its most heavily traveled section (Holladay Street to 33rd Avenue).

If one were to draw an imaginary line across the freeway in the vicinity of 28th Avenue, and count the number of vehicles crossing this line in any given time period, a better picture of the volumes and capacities on the facility can be drawn. The hourly capacities for westbound traffic, where three unrestricted lanes are currently in operation, is 4,950 vehicles at a service level "D" condition.<sup>1</sup> The three unrestricted eastbound travel lanes, at the 28th Avenue location, have an hourly capacity of 4,580 vehicles\* at a service level "D" condition.

<sup>1</sup>A "D" level of service means that the flow of traffic is approaching an unstable condition with average speeds of around 40 mph. Fluctuations in volumes may occur with temporary restrictions to flow causing a drop in the average operating speeds.

\*This eastbound capacity for three lanes is less than the westbound capacity, due to a restriction at 39th Avenue where the number of unrestricted auto lanes reduces from three to two lanes.

From an imaginary line at 47th Avenue where the freeway has narrowed to a two-lane section the hourly capacity in the westbound lanes is only 3,300 vehicles at the same "D" level of service. The capacity of the eastbound lanes just east of 47th Avenue is also 3,300 at the same service level.

The preceding represents a picture of what traffic the Banfield Freeway is capable of handling at a specific level of service. In actuality, the situation is even more congested. 1975 volumes at the 28th Avenue line for the westbound lanes during the morning (a.m.) peak rush hour period were 5,320. The eastbound lanes registered 4,980 vehicles during the afternoon (p.m.) peak rush hour. Referring again to the relative capacity of this section (4,950 and 4,580, respectively), it can be seen that the actual volume of traffic exceeds the rated capacity. Translated in a different way, the volume exceeds the rated capacity at a "D" service level, providing a volume-to-capacity ratio of 1.07 in the a.m. peak hour and 1.09 in the p.m. peak hour. This relative excess volume in turn reduces the service of the facility to an "E" level.<sup>2</sup>

East of the 47th Avenue line in the four-lane portion of the Banfield, the a.m. peak hour volume in the westbound lanes averaged 3,990 vehicles, while p.m. peak hour volume of 4,060 was recorded on the eastbound lanes. The relative hourly capacity of this section, under "D" service level conditions in both directions, was 3,300 vehicles.

<sup>2</sup>An "E" level of service is one characterized by an unstable flow of traffic, with average speeds between 30 and 35 mph. Short periods of stop-and-go traffic are experienced.

Therefore, the actual volume of traffic during these peak hour periods again exceeds the rated capacity at "D" service level. A volume-to-capacity ratio of 1.21 and 1.23 is experienced respectively, bringing the actual level of service to an "F" condition.<sup>3</sup>

As can be seen from the above description, traffic on the Banfield can be said to be "over capacity" during both the a.m. and p.m. peak hour periods. In general, the freeway operates at a level of service of "E" or "F" from 60th Avenue to the Eastbank Freeway (Interstate 5) in the morning. In the evening rush hours, it is "over capacity" from the Eastbank Freeway to 82nd Avenue.



Traffic congestion in the peak hour periods, however, is not restricted to the Banfield Freeway alone. The major paralleling arterial streets also carry heavy volumes of vehicles through the East Portland region. Principal east-west streets on the East Side which currently handle a combined 51 to 57 percent of the peak hour traffic are: Broadway, Weidler and Morrison (all one-way facilities), and Sandy Boulevard, Glisan, Burnside, and Stark Streets. The other 49 to 43 percent of the peak hour traffic is carried by the Banfield Freeway itself (See Figure 5).

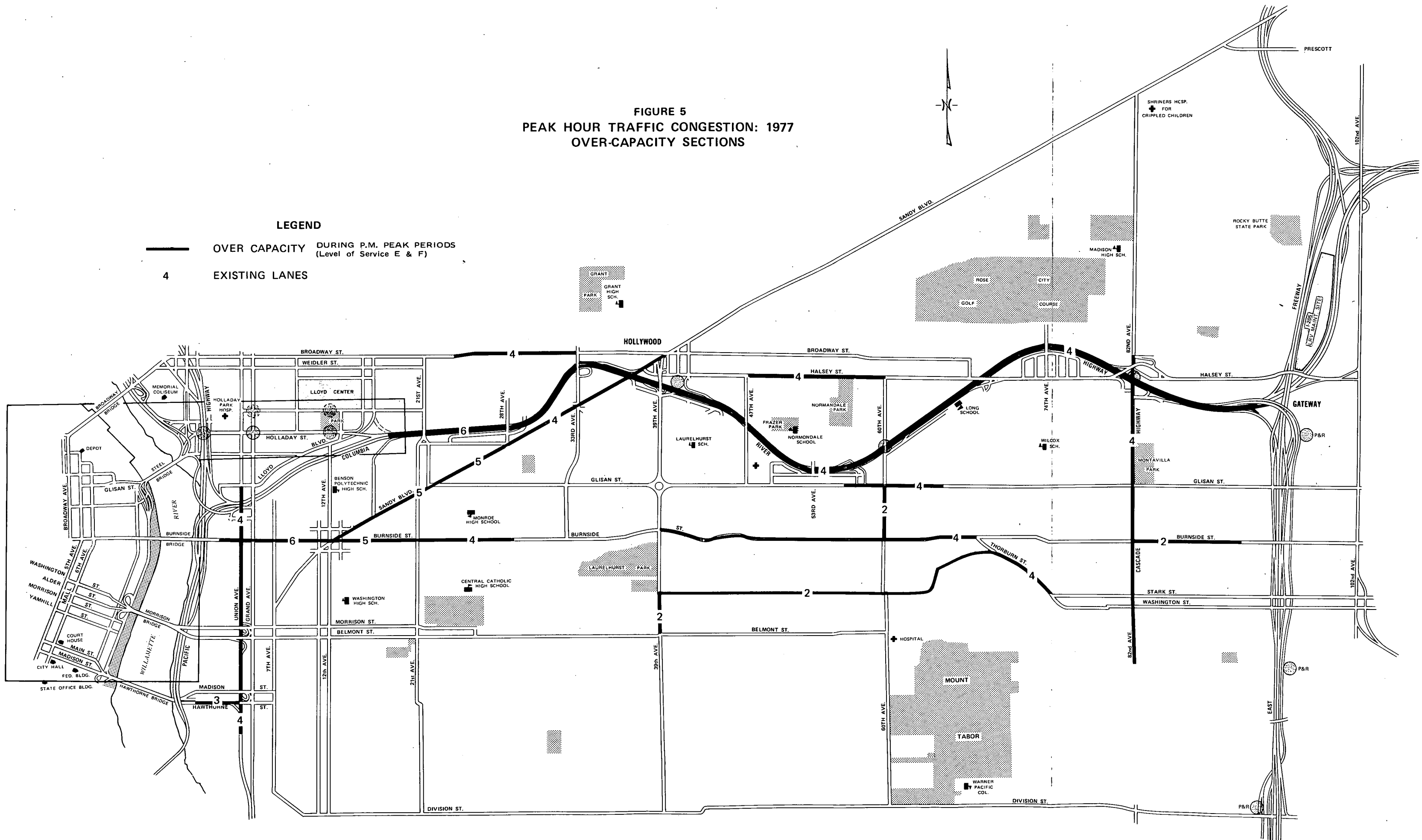
<sup>3</sup>An "F" service level is one in which the traffic is operating at a forced-flow, commonly referred to as a stop-and-go condition. Average speeds vary from below 30 mph to 0 mph, with widely fluctuating volumes.



FIGURE 5  
 PEAK HOUR TRAFFIC CONGESTION: 1977  
 OVER-CAPACITY SECTIONS

LEGEND

-  OVER CAPACITY DURING P.M. PEAK PERIODS (Level of Service E & F)
-  4 EXISTING LANES



### HOV Experiment

The increasing congestion problem on the Banfield Freeway and associated east-west oriented arterials, led to an effort to improve the traffic flow on the facility itself. The fall and winter of 1973-1974 temporarily relieved this congestion problem when the gasoline shortage struck the nation. But by late 1974, traffic volumes had again risen to their previous levels of 102,000 average weekday traffic (AWD). Current AWD on the facility is exceeding 110,000.

The Banfield Freeway HOV lanes project was conceived in January of 1975. Initially proposed by OSHD to the City of Portland and Tri-Met, the project was an experiment designed with the principal intent of reducing the peak-hour congestion problem. Upon receiving approval from the CRAG Board of Directors, the demonstration project was designed, and subsequently contracted in July of 1975, with the lanes opened for operation in December of that year.

The project itself consisted of a restriping of the newly paved roadway surface to provide both a 4-lane and 6-lane section which would be opened to all traffic, plus the addition of two median lanes to be utilized exclusively by buses and autos carrying three or more persons. An important element of the project was that the HOV lanes were constructed without the elimination of any of the currently utilized unrestricted lanes; the median lanes were created by eliminating the shoulders on the freeway and narrowing each lane. To compensate for the loss of shoulders along the facility, emergency parking bays were built at approximately 2,000-foot intervals.

Operationally, the HOV lanes were initially reserved 24 hours a day for high occupancy vehicular use, though they remained heavily underutilized in off-peak hours and on weekends. In March of 1976 the operating hours were adjusted on the facility, providing exclusive HOV use between the hours of 6 and 10 a.m. in the westbound (inbound) direction and between 3 and 7 p.m. in the eastbound (outbound) direction. The speed limit was also raised at this time for the facility, from 45 mph to 55 mph. The hours of restricted use were further reduced in October in 1976, from 6:30 to 9:30 a.m. in the westbound lane and from 3:30 to 6:30 p.m. in the eastbound lane.

The effectiveness of the HOV lanes on the Banfield Freeway has been mixed. Records maintained by the ODOT show that a higher percentage of persons using the facility in 1976 were commuting by carpool and bus. Six percent of the peak-hour vehicles were carrying 20 percent of the peak-hour travelers. Though the number of persons traveling the freeway during the peak-hour periods increased by 20 percent in 1976, overall vehicular use increased by only 8 percent. In this first full year of operation, vehicle occupancy rates in the westbound lanes varied from 1.24 to 1.29, while in the eastbound lanes they varied from 1.28 to 1.40. Prior to implementation of the demonstration project these rates were 1.22 and 1.28, respectively.

During the first year of operation the average weekday peak-hour traffic increased by a factor of 8 percent. In contrast, the peak-hour volume of traffic on three major parallel arterial streets (NE Broadway, E. Burnside, and NE Sandy) registered a 3 percent decrease for

the same period. Thus the Banfield Freeway has absorbed some of the traffic from nearby arterials during the peak hours, an occurrence consistent with local transportation planning goals as well as the Banfield HOV project goals and objectives.

Overall, levels of service on the Freeway were operating unsatisfactorily during peak-hour conditions for the year immediately preceding the HOV project. These levels ranged from a forced "F" to an unstable "E" flow, resulting in much stop-and-go traffic. While it cannot be shown that the HOV lanes have been able to attract enough traffic from the unrestricted lanes to greatly improve these unsatisfactory levels of service, it can be stated that during the peak-hour periods the HOV lanes do provide a considerably better level of service than in the adjacent travel lanes.

As one would expect under conditions of better service levels, average peak-hour speeds in the HOV lanes during 1976 were higher than the speeds in the unrestricted lanes. Westbound speeds averaged 48.8 mph in the HOV lane and 37.4 mph in the other lanes. Eastbound, average HOV speeds were 37.0 mph, while the other lanes exhibited a combined average of 33.6 mph. The higher HOV average speeds in the westbound direction, in comparison to the eastbound HOV lane, are thought to be the result of its greater length: it is approximately twice as long as the eastbound lane. This condition seemingly permits drivers to travel at a higher sustained speed for a relatively long period of time. Speeds in the HOV lanes have continued to average between 3 to 13 miles per hour faster than traffic in adjacent lanes.

The higher levels of service in the HOV lanes have also contributed to a greater travel time savings for carpools and buses. In 1976 it took an average of 5-1/2 minutes in the westbound HOV lane, to travel from NE 82nd Avenue to NE Grand in the a.m. peak-hour period. Over the same distance in an unrestricted lane, the average total travel time was approximately 7.2 minutes. In the eastbound direction, a p.m. peak-hour trip in the HOV lane required 7.5 minutes, while a total of 8.3 minutes for the average time recorded in the non-HOV lanes. The HOV demonstration project evidences no discernable adverse impact on accident experience.

In summary, the Banfield HOV demonstration project has been able to fulfill many of its objectives, though perhaps not to the level or extent originally anticipated. It has provided a measure of short-term relief for the peak-hour congestion problems at a relatively low capital cost, while giving area commuters an initial exposure to an exclusive lane system.

## APPENDIX ONE / CHRONOLOGY OF EVENTS

### Introduction

This appendix documents the chronological events leading to the selection of the Banfield Transitway corridor by the CRAG Board of Directors as the priority transit project in the Portland Metropolitan Area. Included are a listing of events and a separate expansion of selected events emphasizing the importance of each in relation to the corridor selection process.

During the process by which the Banfield Transitway corridor was selected, many alternate transit corridors in the Portland area were analyzed. In addition, the current Banfield project has been established through the analysis of approximately 30 Banfield corridor-related options. Five milestones of importance occurred during the chronology of events and exerted influence on the selection of the Banfield Transitway corridor. These were: (1) PVMATS Study (1959-1972), (2) the DeLeuw, Cather, Public Transportation Study for CRAG (1970-1973), (3) The Governor's Task Force (GTF) on Transportation formed in May, 1973, (4) The CRAG Board adopted the Interim Transportation Plan (ITP) in June 1975, and (5) the formal withdrawal of the Mt. Hood Freeway (I-80N) from the Interstate Highway System by U.S. Department of Transportation (DOT), finalized in May, 1976.

### Chronology of Major Events

1956	Federal-Aid Highway Act passed
1959	Portland-Vancouver Metropolitan Area Transportation Study (PVMATS) initiated

1959/1960 Origin - Destination Studies of the Portland Region undertaken by Oregon State Highway Department (OSHD) and Portland Metropolitan Planning Commission

1960 Land Use Analysis and Forecast Studies initiated by OSHD

1963 PVMATS Factual Data Report published by Oregon State Highway Commission

1964 Urban Mass Transportation Act passed

1966 Columbia Region Association of Governments (CRAG) formed on a voluntary membership basis

July 1968 Planning Analysis and Projections - PVMATS published by OSHD and Wilbur Smith and Associates

1969 National Environmental Policy Act (NEPA) passed

1969 Circular No. A-95 issued by the Federal Office of Management and Budget (OMB)

1969 Tri-County Metropolitan Transportation District of Oregon (Tri-Met) formed

July 1969 PVMATS 1990 Transportation Plan published by OSHD

1970 Federal Clean Air Act passed

1970 Urban Mass Transit Assistance Act passed

October 1970 DeLeuw, Cather & Company began long-range 1990 transportation studies for CRAG

March 1971 PVMATS 1990 Transportation Plan (interim report) published and adopted by CRAG

February 1972 Planning Guidelines/Portland Downtown Plan finalized by City of Portland (adopted December 1972)

1972 Oregon's Clean Air Act passed

January 1973 Mt. Hood Park-and-Ride Draft Environmental Impact Statement published by Oregon Department of Transportation (ODOT) and Federal Highway Administration (FHWA)

May 1973 Governor's Task Force (GTF) on Transportation formed

1973 Portland Transportation Control Strategy of 1973  
produced by the Oregon Department of Environmental  
Quality (DEQ)

August 1973 Federal Aid Highways Act passed

Fall 1973 Mt. Hood Park & Ride DEIS published by ODOT

October 1973 Arab Oil Embargo occurred

October 1973 PVMATS 1990 Public Transportation Master Plan  
published by CRAG and DeLeuw, Cather & Company

November 1973 CRAG officially given authority by Oregon and  
Washington Legislatures

November 1973 Light Rail Transit - Portland Area Rail Corridor Study  
released by Oregon Public Utility Commissioner

December 1973 I-80N Draft Environmental Impact Statement (Mt. Hood  
Freeway) was published by ODOT and FHWA

February 1974 U.S. District Court ruled I-80N Mt. Hood Freeway was  
not selected in accordance with Federal requirements

April 1974 Arterial Streets Classification Study begun by City of  
Portland

July, August  
1974 Portland City Council, Multnomah County Commission,  
and CRAG Board formally withdrew support for Mt. Hood  
Freeway (I-80N)

November 1974 Oregon Governor's letter to U.S. Secretary of Trans-  
portation which indicated Oregon's intent to withdraw  
Mt. Hood Freeway from the Interstate System

January 1975 The Cooperative Transportation Planning Process in the  
Portland Metropolitan Area (final report) published by  
GTF and Systems Design Concepts, Inc.

January 1975 Public Discussion Materials for Developing an Interim  
Transportation Plan (ITP) published and distributed  
by CRAG

January,  
February 1975 Fareless Square opened in Portland and City Council  
adopts Downtown Parking and Circulation Plan

June 1975 CRAG Board adopted ITP



July 1975 Governor officially requested U.S. DOT to withdraw Mt. Hood Freeway (I-80N) from Federal Interstate Highway System

August 1975 ICC determined ODOT as lead agency on Banfield Transitway Project and survey began

October 1975 ODOT organized Citizen Advisory Committee (CAC) Banfield Transitway Project

December 1975 Banfield HOV lanes opened to the public

February 1976 Construction began on Portland Downtown Transit Mall

March 1976 ODOT and Tri-Met developed materials for first public meeting on Banfield Transitway corridor

May 1976 Federal-Aid Highway Act passed

May 1976 U.S. DOT officially withdrew Mt. Hood Freeway (I-80N) from Interstate Highway System

May 1976 CRAG established Interstate Transfer Committee (ITC)

September 1976 ICC sent Banfield resolution to CRAG Board for approval

September 1976 CRAG adopted CRAG Regional Land Use Planning Goals and Objectives

January 1977 U.S. Secretary of Transportation approved transfer funds (E-4) for Preliminary Engineering on Banfield Transitway corridor

February 1977 Interim Report - Light Rail Transit Feasibility Banfield Transitway released by Tri-Met with consultants

February 1977 CRAG Board approved inclusion of light rail transit (LRT) as an alternative to Banfield Transitway Environmental Impact Study (EIS)

<sup>1</sup>May 1977 Transportation Technical Appendix: East Multnomah County Transit Corridors completed by Multnomah County Planning & Development Division

<sup>1</sup>Document reviewed transit corridor work from public policy, land use and traffic circulation standpoints.

- May 1977 ODOT compiled Documentation of Range of Alternatives (Banfield Transitway Project) for UMTA, U.S. DOT
- June 1977 Tri-Met published 1990 A Report on Long-Range Public Transit Decisions
- June 1977 Arterial Streets Classification Policy adopted by City of Portland
- August 1977 Tri-Met with Wilbur Smith and Associates published Regional Transit Development Alternatives (A Sketch Planning Analysis)
- August 1977 CRAG Board (per FHWA and UMTA request) added two additional alternatives with LRT to Banfield Transitway Project Draft EIS
- August 1977 CRAG Board assigned number 1 priority to Banfield Transitway Project for purposes of FHWA/UMTA planning activities
- <sup>2</sup>September 1977 Multnomah County Comprehensive Framework Plan adopted by Board of Commissioners
- December 1977 Portland Mall opened

Details of Selected Events

1956 - The Federal-Aid Highway Act of 1956 began the Interstate Highway System and initiated a sharing program wherein the State of Oregon assumed 8 percent and the Federal Government assumed 92 percent of the shared cost of building Federal Highways.

1959 - The Portland-Vancouver Metropolitan Area Transportation Study (PVMATS) was the first transportation study in the Portland area after the Highway Act of 1959. The study contemplated a transportation plan necessary to accommodate the transportation needs of the region by the year 1990. It

<sup>2</sup>Document includes an Arterial Transportation Plan Map designating transitways. A transitway is shown on I-205/Burnside St. to Gresham.

was basically a "freeway building and street improving" plan without mass transit being considered. The study was a cooperative effort by: The Federal Bureau of Public Roads, States of Oregon and Washington, Counties of Multnomah, Washington, Clackamas, Clark (Washington), and Cities of Portland and Vancouver (Washington).

1964 - The Urban Mass Transit Act created the Urban Mass Transportation Administration (UMTA).

1969 - The National Environmental Policy Act (NEPA) dictated that the Environmental Protection Agency (EPA) must require federally funded programs which significantly affect the quality of human environment to be accompanied by an Environmental Impact Statement (EIS).

1969 - Circular No. A-95 issued by the Federal Office of Management and Budget (OMB) created "clearinghouses" to review federally assisted projects and to foster a "climate of cooperation" among local, State and Federal agencies to assure that metropolitan areas are treated as a whole and that the urban cores are not fragmented. CRAG is the designated "clearinghouse" for the Portland-Vancouver metropolitan area.

July 1969 - The PVMATS 1990 Transportation Plan was published and adopted by OSHD as the official transportation plan. It was entirely a highway project plan advocating 54 new freeway and arterial construction projects without high speed transit considerations or transportation system management alternatives.

1970 - The Federal Clean Air Act set air quality standards to be met by 1975, and became the fundamental constraining factor in transportation planning.

March 1971 - The PVMATS 1990 Transportation Plan (Interim Report) was published and adopted by CRAG as the official transportation plan and was completely highway-oriented and contained no proposals for transit-related improvements.

1972 - Oregon's Clean Air Act (a spin-off requirement of the 1970 Federal Act) adopted a State Air Quality Implementation Plan which required DEQ to consider maximum number of industries located within a given area. In 1973 this plan was amended to include the Portland Transportation Control Strategy. Components of the plan critical to transportation planning were: Motor vehicle inspection and maintenance program, traffic flow patterns, public transportation improvements and reorganization and management of parking. Additionally in 1973, the Federal Clean Air Act was amended to require that all state clean air implementation plans are to identify areas which potentially exceed air standards following 1975. DEQ identified Portland as an area exceeding in four pollutants: Suspended particulates, sulfur dioxide, carbon monoxide and photochemical oxidants.

May 1973 - The Governor's Task Force (GTF) on transportation consisted of officials from City of Portland, Counties of Multnomah, Clackamas, Washington and Clark, Chairman of the CRAG Executive Board, the Oregon State Highway Commission, the Board of the Port of Portland, and the Board of Tri-Met. Initially the GTF goal was to reorganize CRAG to function better as the area's regional planning agency. As the study progressed, an additional goal was defined which

was to examine transportation alternatives to the Mt. Hood Freeway (I-80N) that might be developed under transfer provisions of 1973 Federal Aid to Highways Act.

August 1973 - The Federal-Aid Highway Act of 1973 permitted States to trade Interstate Highway funds for funds to build urban mass transit systems. The Act provided means for the State to "redefine" its Interstate Highway System by adding new routes and eliminating previously selected ones. Busways were added to the options for new routes. Federal Funds could be traded from the old routes to the new ones. In accordance with this 1973 act, pressure was exerted on the Portland area to complete supporting transportation studies by June 30, 1974.

October 1973 - The PVMATS 1990 Public Transportation Master Plan prepared by DeLeuw, Cather and Company, for CRAG redefined long-term transportation needs with a view of systems alternate to highways. The analysis included reviewing current and proposed transportation equipment technologies. As a result, the previously proposed 1990 highway improvement network was greatly reduced and express bus lines were added to the network including exclusive bus roadways in six major corridors. The plan recommended that CRAG re-evaluate previous street and highway plans in the light of the new bus rapid transit plan. This public transportation plan was never adopted.

Fall 1973 - The Mt. Hood Park-and-Ride Draft Environmental Impact Statement published by ODOT presented a low-capital cost bus and auto-oriented transit corridor to East Portland employing basically Powell and Division Streets with a parking facility east of I-205. This project met strong public opposition and was never adopted.

November 1973 - CRAG became an official regional planning district by passage of Oregon SB 796 (ORS 197.705-795). The State of Washington gave Clark County and cities authority to engage in regional planning in a previous Washington statute (RCW 39.34).

November 1973 - The Public Utilities Commission (PUC) report Light Rail Transit - Portland Area Rail Corridor Study was published and established feasibility of three rail corridors for mass transit on existing or abandoned rights-of-ways. The three corridors were: Portland to Lake Oswego, Portland via Johnson Creek to Gresham, and Portland to Oregon City. The report also determined that further examination of Banfield route might be useful.

December 1973 - The I-80N Draft Environmental Impact Statement (Mt. Hood Freeway) was published by ODOT and FHWA and presented a new freeway extending from the Portland CBD through Southeast Portland to East Multnomah County basically in the Division/Powell Streets area. This freeway was designated I-80N between I-5 and I-205. A range of alternatives to a full freeway were presented but not in great detail.

February 1974 - The U.S. District Court ruled that the Mt. Hood Freeway (I-80N) corridor was not selected in accordance with Federal requirements. The ruling forced cancellation of a public hearing scheduled for February 1974 and provided the initiative for regional planning authorities to withdraw support for the program. As a result, the Governor of Oregon in 1975 formally requested withdrawal of the Mt. Hood Freeway from the Federal Interstate Highway System.

January 1975 - The final GTF report The Cooperative Transportation Planning Process in the Portland Metropolitan Area was published and it drew together previous reports and presented information on a systems basis. The systems analyzed by the report were: LRT corridors, bus corridors, and LRT and bus corridor combined. The specific corridors analyzed were documented in a supplement of the final report entitled: Analyses of Transit Corridors Studied prepared by System Design Concepts, Inc., in January, 1975.

These corridors documented by the supplement are as follows:

1. Portland Central Business District (CBD) to Lake Oswego
2. CBD to Gresham
3. CBD to Oregon City
4. CBD to Troutdale
5. CBD to Beaverton and Hillsboro
6. CBD via Sunset Highway to Route 217
7. CBD to Gresham
8. CBD via I-5 to Vancouver
9. Oregon City via I-205 to Clark County, Washington
10. CBD via Mt. Hood corridor to Kelly Butte
11. Downtown circulation

Recommendations of the supplement were to continue the preliminary transit program with emphasis on examining the following:

1. Banfield corridor
2. I-5 to Vancouver corridor
3. Sunset corridor
4. Oregon City corridor
5. Downtown circulation

January 1975 - CRAG released the Public Discussion Material for Developing an Interim Transportation Plan (ITP) as a spin-off of the GTF final report. This document, serving as a vehicle for public involvement, outlined goals and evaluation criteria for producing a regional transportation plan.

June 1975 - CRAG adopted the draft plan for a 1990 ITP which contained five major transit projects with four major corridors involved. Those five projects are: Banfield, Oregon City, Sunset, I-5 North, and the Downtown Portland Transit connections. By adoption of the ITP, CRAG officially rescinded the PVMATS 1990 Transportation Plan which was strictly highway-oriented.

July 1975 - The Governor of Oregon officially requested withdrawal of the Mt. Hood Freeway (I-80N) from the Federal Interstate Highway System. This action stimulated the regional transportation planning effort to develop plans that would warrant transfer of funds under regulations of 1973 Federal Aid to Highways Act.

August 1975 - CRAG established the ICC to manage further study on the transit corridors based on the ITP. Priority status based on the culmination of previous studies was assigned to the Banfield and Sunset corridors and the Downtown CBD Circulation and Feeder Transit Systems. The Oregon City corridor was added to the list in September 1975. ODOT was made the lead agency on the Banfield and Sunset projects with Tri-Met assigned the Oregon City project and the City of Portland assigned the downtown study.

Fall 1975 - The Oregon Action Plan required organization of the Citizen Advisory Committee (CAC) for the Banfield Transitway Project. ODOT and Tri-Met organized the CAC to represent a wide variety of citizen backgrounds. It became the public involvement forum on the Banfield project.

May 1976 - The Federal-Aid Highway Act of 1976 increased the level of withdrawal funds available from Interstate projects and expanded the manner



in which funds could be used by modifying the percentages of shared costs for construction, and by redefining types of construction which could use transfer funds, and by adding inflation clauses.

May 1976 - The U.S. Department of Transportation officially withdrew the Mt. Hood Freeway (I-80N) from the Interstate Highway System making available a source of funds for transfer. CRAG established the Interstate Transfer Committee (ITC) for the purpose of directing use of available withdrawal funds. On recommendations from the ITC, CRAG affirmed priority funding for the Banfield, Sunset and Oregon City corridors.

September 1976 - The ICC sent a resolution, establishing the Banfield as the priority corridor, which included a list of alternatives to be studied and proposed a method to address LRT to the CRAG Board for approval. The resolution was based on ICC evaluation of development studies which had been performed to date.

January 1977 - The U.S. Secretary of Transportation approved Interstate Highway transfer funds (E-4) for preliminary engineering to begin on the Banfield Transitway corridor under the direction of regulations which control transfer funds established by FHWA.

February 1977 - The Interim Report - Light Rail Transit Feasibility - Banfield Transitway was prepared for Tri-Met by consultants, and concluded that the LRT mode compared favorably enough to other alternatives being considered to warrant inclusion in Banfield Transitway Draft EIS.

February 1977 - The CRAG Board approved LRT as an alternative to be included in the Banfield Transitway Study and Environmental Impact Statement (EIS) based on the conclusions of the Tri-Met report.

June 1977 - The Tri-Met Board recommended an expanded regional transit system, relying on a multi-destination bus network, with LRT in the major corridors.

August 1977 - Tri-Met with Wilbur Smith and Associates published a report entitled: Regional Transit Development Alternatives (A Sketch Planning Analysis). The report identified some important trade-offs for consideration in developing long-term transit development strategy and for selecting a preferred project in the Banfield corridor.

August 1977 - The CRAG Board, on request from FHWA and UMTA, included two additional LRT alternatives in the Banfield Transitway Project.

August 1977 - The CRAG Board assigned the Banfield Transitway Project first priority for purposes of FHWA/UMTA planning activities and the Sunset and Oregon City corridors were referred back to CRAG for additional analysis alternatives prior to initiating further project development in these corridors.

## APPENDIX TWO / ALTERNATIVE MODES AND DESIGNS

### Introduction

The content of this appendix is the chronological documentation of the mode and design alternatives which were reviewed, analyzed, and finally led to the selection of the present set of alternatives. The list of mode identification begins with the GTF studies published in January 1975. This point of departure was selected because the GTF studies were the first to emphasize the use of existing highway and railroad rights-of-way for transit projects, such as along the Banfield Freeway, rather than relying on new construction projects on new routes which were primarily automobile-oriented with the inclusion of some mode of mass transit added on. Prior to the GTF studies, the 1990 Public Transportation Master Plan published in 1973 did suggest reserved lanes for express buses on surface streets in the Banfield corridor, but the plan relied heavily on construction of the Mt. Hood Freeway (I-80N) with related busway to serve as the means of mass transportation for east Multnomah County. The plan was never adopted.

### Chronology of Alternative Modes and Design

January 1975 - The final report with supplement of the Governor's Task Force (GTF) drew together the findings of several earlier studies and presented the results in a systems context. The three basic systems analyzed by the report were: Busways, Light Rail Transit (LRT) and a combination of the two. The "Sullivan Gulch Transit Corridor" (Banfield Corridor)

was analyzed by two separate studies, the combined results of which are below.

Although the GTF final report indicated bus and LRT modes were both feasible in Sullivan Gulch, it emphasized that NEPA required "Equal and unbiased consideration" of all alternatives including "no build" in further project studies. Rationalization for selection of the bus and LRT modes was based on using reasonable existing technology. Some other modes studied by the GTF, but eliminated from consideration due to excessive cost or unproved technology, included: Heavy rail, Monorail, Jitneys and Personal Rapid Transit Vehicles.

The alternative modes selected for further study in the Sullivan Gulch Corridor (Portland Central Business District (CBD) to East Multnomah County via Troutdale or Gresham) by the GTF were:

- (1) Express Bus Service: Two-lane busway from CBD to I-205, north or south on I-205, east on I-80N to Troutdale, or on major arterial streets to Gresham.  
Option A - East from I-205 on one or two-lane busway along south side of East Burnside to Gresham.  
Option B - East from I-205 on one or two-lane busway in median of East Burnside to Gresham.
- (2) LRT: Two-track LRT from CBD to I-205, one track from I-205 to Troutdale or to Gresham.  
Option A - One or two tracks south along I-205 to East Burnside, one or two tracks east along south side of East Burnside to Gresham.  
Option B - One or two tracks south along I-205 to East Burnside, one or two tracks in median of East Burnside to Gresham.

June 1975 - As a result of evaluating several alternatives studied by the GTF, the Columbia Region Association of Governments (CRAG) Board

adopted the Interim Transportation Plan (ITP) which included a description of mode and design preferences in the Banfield (Sullivan Gulch) Transitway corridor.

The construction of a busway east of I-205 along I-80N to Troutdale was deleted from the study for several reasons. Land use considerations indicated a transit facility would be better located closer to the center of population. The suburban area could be better served by local buses or express buses on suburban streets. The need to tie in a radial connection to I-205 was satisfied by the transitway into the downtown. The link east to Troutdale could be constructed in the future if transit demand so warrants. A separated busway could be constructed later as demand grows.

The LRT alternative along I-80N to Troutdale was not included in this study for the same reasons the busway alternative was dropped; i.e., the land use/population density does not favor this high level mode of transit service.

The resultant list of preferences is as follows:

Alternative Proposals

- (1) (Preferred mode) two, grade-separated, exclusive lanes for buses and High Occupancy Vehicles (HOV) from I-5 to I-205.
- (2) One-lane, separate, reversible busway next to Banfield Freeway from I-5 to I-205.
- (3) One or two-lane busway in median of rebuilt freeway from I-5 to I-205.
- (4) Any one of first three modes plus redesign of freeway to six lanes east of 39th Street to I-205.

- (5) Light Rail Transit (LRT) two tracks along freeway from I-5 to I-205, extended south via I-205 to East Burnside Street or Division Street, east to Gresham via one of those streets.

#### Alternative Modes/Designs

- Buses:
1. Conventional buses (diesel)
  2. Mini buses
  3. Transbuses
  4. Combination of all three

Light Rail Vehicles are rail vehicles with overhead electrical pickups made by various North American and foreign designers. The trolley-bus was an additional mode discussed in the ITP, though a detailed analysis was not made at this time. The ITP, while selecting preferred modes, recognized that further consideration would be given to other alternative modes, and that related facilities and extended corridors for selected modes would probably be funded by other means.

November 1975 - CRAG upon the recommendation of the Interagency Coordination Committee (ICC) and the Technical Advisory Committee (TAC), selected five alternatives to pursue. The five recommended alternatives were derived from examination by ICC and TAC of 21 initial alternative modes/designs suggested by the GTF, the ITP, and the Technical Advisory Committee. The five recommended alternatives represented the broadest range of alternative mode/designs practical for development and environmental impact study in the time available under the 1973 Federal-Aid Act as it pertained to Interstate transfer funding.

The initial 21 alternatives modes/designs considered by CRAG are as follows:

(These modes extend eastward from the Portland Central Business District (CBD) through the Banfield corridor to I-205 unless otherwise noted.)

Diesel Bus

- (1) Separated, two-lane, two-way busway with stations
- (2) Separated, two-lane, two-way busway with terminal stations only
- (3) Separated, one-lane, reversible busway with stations
- (4) Separated, one-lane, reversible busway with terminal stations only
- (5) Contraflow freeway lanes for buses, no stations
- (6) Reversible (moveable) two freeway lanes
- (7) Low Capital Improvement, improve city streets only
- (8) One lane reserved for buses

HOV Lanes

- (9) Separated, two-lane, two-way HOV lane with stations
- (10) Separated, two-lane, two-way HOV lane with terminal stations only
- (11) Separated, one-lane, reversible HOV lane with terminal station only
- (12) Reversible (moveable) two freeway lanes for HOV
- (13) Two preferential freeway lanes for HOV
- (14) Separated, two-lane, reversible HOV lane with stations

LRT

- (15) Separated, two tracks with stations

- (16) Separated, one track with terminal stations only

Trolleybus

- (17) Separated, two-lane, two-way busway with stations
- (18) Separated, two-lane, two-way busway with terminal stations only
- (19) Separated, one-lane, reversible busway with stations
- (20) Separated, one-lane, reversible busway with terminal stations only
- (21) One freeway lane, reserved busway.

All but two of the diesel bus alternatives were eliminated from further study for the following reasons:

(2)\* Intermediate stations between I-5 and I-205 were considered necessary for efficient systemwide bus operation in East Portland. Stations would link crosstown routes with the transitway. Terminal stations alone were not considered adequate.

(3)(4) These alternatives were determined to be operationally unfeasible early in the study. Buses would have to operate in the off peak on arterial streets, and continuity of bus routes would be lost. Incremental cost of a two-lane bus route is small compared to operational benefits.

(5) Contraflow lanes were briefly considered in an effort to reduce construction requirements by using the existing roadway. This alternative presented severe operational problems that would have been extremely

\*The numbers correspond to the specific alternative in the preceding discussion.



difficult to design safely. More critically was the safety hazard that would have been imposed on freeway traffic operating adjacent to opposing direction buses without a median barrier or a safe distance between opposing lanes of traffic. Based on this concern for safety the alternative was dropped.

(6) This reversible (moveable) lanes concept would have removed the median barriers; in their place, moveable pylons would have been placed twice daily to provide peak-hour traffic with an additional lane at the expense of off-peak traffic. Operational costs and reduction in safety due to removal of the median barrier eliminated this option from further study.

(8) This busway alternative is comparable to the current HOV alternatives. Allowing carpools to use this lane increases the capacity of the facility. Assigning HOV initially to this lane does not foreclose future use for buses only.

All but two of the HOV alternatives were eliminated from further study for the following reasons:

(9)(10) These alternatives require a 48' wide cross section, 20' wider than the other proposed build alternatives, to accommodate the mixture of buses and autos. This additional width escalated the costs and impacts to property along the route to an unacceptable level. The joint-use facility also imposes severe cost increases for construction of the I-205/I-80N interchange.

(11) This proposal has all the problems associated with the discussion of alternatives (3) and (4) for the buses, with the added operational complexities of HOV's. Because of the need to improve the transit

operation and the operational problems inherent in that concept, this option was dropped.

(12) Reversible (moveable) freeway lanes for HOV impose the same reduction in safety as described in (6) above. In addition, there would be additional operational problems imposed by the need to sort out HOV's on the "moveable" lanes. Preference treatments at terminals would be minimal and would not be attractive to HOV's.

The LRT alternatives were combined into one. Initially, a single track LRT with passing bays posed operational uncertainties that indicated it was probably not the best choice for LRT. The need for future potential expansion to double track, warranted that alternative over the single track option. Later study indicated that some limited sections of the LRT line west of I-205 would be feasible.

The trolleybus alternatives were under separate study by a consultant (DeLeuw, Cather & Company) to Tri-Met during the process of refining alternatives. Their final report was published in March 1976. As a result of that independent study effort, trolleybuses were tentatively dropped from the list of alternatives.

The March 1976 study report on trolleybuses indicates that such a system would result in a reduction of diesel oil consumption of approximately 850,000 gallons per year. Introduction of such a system would have a beneficial impact on noise and air quality while showing a marginal increase in community acceptance. Conversely, there would be less operational flexibility and higher operating costs as compared to the diesel bus system.

The trolleybus mode was not returned to the list of alternatives to be carried forward in the EIS.

The five alternatives selected by CRAG are as follows:

- (1) Busway, separated, two-lane, two-way
- (2) HOV roadway, separated, two-lane, reversible
- (3) HOV, two preferential freeway lanes
- (4) LRT, separated, two tracks
- (5) No-Build.

December 1975 - CRAG adopted a revision to the November 1975 list of alternative modes upon urging from the Federal Highway Administration (FHWA). As a new alternative, a 48-foot wide, two-lane, separated HOV in the median of the freeway was added. The two-lane separated reversible HOV was not supported as a functional alternative on the Banfield Freeway because the directional traffic split does not support its use. Peak direction traffic is 55 percent of the total traffic on the freeway. For advantage to be gained, a directional split should be 65 percent or more to assure that the off-peak direction of traffic will not exceed capacity. The split on the Banfield would result in the off-peak traffic directions breaking down operationally.

The set of alternatives was adjusted to reflect these changes:

- (1) Busway, separated, two-lane, two-way
- (2) HOV, separated, two-lane, two-way freeway median
- (3) HOV, two preferential freeway lanes
- (4) LRT, separated, two tracks
- (5) No Build.

June 1976 - CRAG, after a reevaluation, approved modifications to the set of alternatives. This was partly necessitated by new information and conditions available upon passage of the Federal-Aid Highway Act of 1976. Modifications made were the addition of a low cost improvement alternative, the deletion of the separated HOV corridor in the freeway median as being too costly, deletion of the two track LRT mode because preliminary patronage use estimates were too low, and addition of six-lane freeway improvement from 39th Avenue to I-205 to handle estimated traffic increase generated by I-205 completion.

Revised Alternatives of June 1976

- (1) Do nothing
- (2) Low Cost Improvement (transit oriented)  
(Transportation System Management - TSM)
- (3) Existing HOV lanes extended through Lloyd Center to CBD and to I-205
- (4) HOV - preferential lanes
  - (4a) HOV-two preferential freeway lanes, plus six lanes for autos without shoulders
  - (4b) HOV-two preferential freeway lanes, plus six lanes for autos with shoulders
- (5) Busway, separated, two-lane, two-way, including six-lane freeway from I-5 to I-205.

October 1976 - The ICC of CRAG, as the result of a Citizen Advisory Committee (CAC) suggestion, approved an additional TSM alternative which also would improve the Banfield to a minimum six-lane freeway from I-5 to I-205. This new alternative became identified as Alternative No. 2b, and the original TSM became Alternative No. 2a.

February 1977 - CRAG reinstated LRT as an alternative mode based on results of a preliminary report from Tri-Met consultants indicating LRT from CBD to Gresham to be viable. The new alternative became Alternative No. 6, and included two LRT tracks from the CBD to I-205, with track continuing south along I-205 to East Burnside, east in the center of Burnside Street to Gresham. Alternative 6 also includes six lanes on Banfield Freeway, with turnouts, but no shoulders, from I-5 to I-205.

April 1977 - CRAG approved addition of a variation of the LRT alternative on the recommendation of the ICC and TAC, incorporating information generated by CAC to provide safer highway conditions. The new alternative included six standard freeway lanes plus shoulders along the Banfield; it was designated Alternative No. 6b, and the February 1977 LRT alternative became No. 6a.

Alternatives as of April, 1977

- (1) Do Nothing
- (2) Low Cost Improvements
  - (2a) Improve arterial streets for transit
  - (2b) Construct six-lane minimum freeway from I-5 to I-205 as well as improve arterial streets
- (3) HOV, existing lanes extended to Lloyd Center and I-205
- (4) HOV, preferential lanes
  - (4a) HOV, two preferential freeway lanes, plus six-lane freeway without shoulders from I-5 to I-205
  - (4b) HOV, two preferential freeway lanes, plus six-lane freeway with shoulders from I-5 to I-205

- (5) Busway, separated, two-lane, two-way including six-lane freeway from I-5 to I-205
- (6) LRT, CBD to Gresham
  - (6a) LRT, two tracks CBD to I-205, one track south along I-205 to East Burnside, east in Burnside median to Gresham, including six-lane minimum freeway, with turnouts, no shoulders from I-5 to I-205
  - (6b) LRT, two tracks CBD to I-205, one track south along I-205 to East Burnside, east in Burnside median to Gresham, including six-lane full width freeway, with shoulders from I-5 to I-205.

August 1977 - CRAG broadened and renumbered the list of selected alternatives for the Banfield Transitway corridor on a request from the FHWA and the Urban Mass Transportation Administration (UMTA). A separated median busway alternative and two additional LRT alternatives were added. The new LRT alternatives were Banfield to Lents via I-205 and Banfield to Gresham via Division Street. The current list of alternatives under consideration is as follows:

Current Alternatives - Banfield Transitway Corridor

- (1) No-Build (Freeway in pre-1976 condition)
- (2) Low Cost Improvements
  - (2a) Improve arterial streets for transit, freeway put back to pre-1976 conditions.
  - (2b) Construct six-lane minimum freeway from I-5 to I-205, plus improve arterial streets for transit.
- (3) HOV Lanes
  - (3a) HOV lanes, center of freeway, CBD to I-205, plus six-lane freeway from I-5 to 37th Avenue, four-lane freeway from 37th to I-205
  - (3b) HOV lanes, center of freeway, CBD to I-205, plus six-lane freeway with no shoulders from I-5 to I-205

(3c) HOV lanes, center of freeway, CBC to I-205, plus six-lane freeway with shoulders from I-5 to I-205

(4) Separated Busway

(4a) Busway, separated, north side of freeway, plus six-lane freeway with shoulders from I-5 to I-205

(4b) Busway, separated, median of freeway, plus six-lane freeway with shoulders from I-5 to I-205

(5) LRT

(5-1a) LRT, two track CBD to I-205, two tracks south along I-205 to East Burnside, east in Burnside median to Gresham, including six-lane minimum width freeway from I-5 to I-205

(5-1b) Same as 5-1a with addition of standard lane widths and shoulders along freeway from I-5 to I-205

(5-2a) LRT, two tracks CBD to I-205, two tracks south along I-205 to Division Street, east in Division median to Gresham, including six-lane minimum width freeway from I-5 to I-205

(5-2b) Same as 5-2a with addition of standard lane widths and shoulders along freeway from I-5 to I-205

(5-3a) LRT, two tracks CBD to I-205, two tracks south along I-205 to Foster Road including six-lane minimum width freeway from I-5 to I-205

(5-3b) Same as 5-3a with addition of standard lane widths and shoulders along freeway from I-5 to I-205.

APPENDIX THREE / CITIZEN PARTICIPATION PROCESS

Introduction

This appendix chronologically documents the efforts and achievements of the Citizen Advisory Committee (CAC) for the Banfield Transitway Project. Although citizen participation in the project, as mentioned below, has not been limited to the activities of the CAC, the prime vehicle for citizen involvement has been and will continue to be the CAC through the scheduled hearing in April 1978.

The CAC organized by ODOT in October 1975, based on guidelines established by the Oregon Action Plan for Transportation dated 1974, became the official citizen's advisory element of the project in December 1975. Organizational information, efforts and achievements follow in the chronology below. Prior to the information of CAC, public involvement in the project had begun in January 1975 when CRAG released materials for developing an Interim Transportation Plan (ITP). Approximately 80 neighborhood briefings and 8 public hearings were held between April and June 1975 to discuss regional transit developments including the Banfield corridor. As a result of public input from those meetings, several modifications were made to the ITP before it was officially adopted by CRAG in June 1975. Between June 1975 and September 1976 citizen participation continued in determining CRAG's transportation goals and objectives in the form of meetings and special working sessions held by CRAG with local jurisdictions, special interest groups, neighborhood associations,



and community planning organizations. In September 1976 CRAG Board adopted CRAG Regional Land Use Planning Goals and Objectives reflecting substantial changes resulting from public input obtained from those meetings. Citizen participation continued in the Banfield project in October 1976 by involvement in a Tri-Met program in addition to the official CAC. The program, to determine long-range transit development in the region through 1990, was established to study limited and expansive transit development with public information prepared for each approach. Between October 1976 and May 1977 approximately 120 public meetings and briefings were held by Tri-Met with the press, elected officials, planning commissions, civic groups, businessmen, and homeowners to discuss the 1990 program which included the Banfield Transitway Project as part of that program. In May 1977, four public forums on the 1990 program were held to hear public testimony, distribute questionnaires, and encourage public correspondence regarding the program. As a result of continuing public input from this program, responsible agencies will have some regional public interest guidelines to follow when selecting future transit alternatives.

#### Chronology of CAC Efforts and Achievements

October, November 1975 - In October ODOT and Tri-Met solicited members for creation of the CAC by preparing and distributing information materials about the Banfield Transitway Project to local neighborhoods and the news media. Two meetings were held in November to organize the CAC with limited results. Additional public information material requesting citizen involvement in the program was released near the end of November.

December 1975 - The official Banfield Project CAC, consisting of 15 members, was formed on December 18, 1975. Meeting frequency was established to be every other week and 9 program goals and objectives were established to:

- (1) Identify specific impacts and problems.
- (2) Define important public attitudes and concerns.
- (3) Suggest improvements and public information feedback programs.
- (4) Suggest additional ways of involving the public in the studies of alternatives.
- (5) Assist ODOT and Tri-Met in contact with affected groups and individuals.
- (6) Advise in the development of alternatives.
- (7) Aid in project development through: (a) Frequent and frank communications with ODOT at an early stage regarding the project and planning, (b) Continuing exchange of all information, with notification of citizens about available information, (c) Continuous process for participation and review.

January 1976 - The CAC selected a chairperson on January 15, 1976 and appointed a CAC member to sit on the Banfield Technical Advisory Committee (TAC) as liaison between TAC and the citizens. Project involvement for the CAC began on January 29, 1976 when the subject of systems planning was intensely examined. As a direct result of the CAC examination, ODOT prepared a public information slide show program presenting the scope of the Banfield Transitway Project.

March 1976 - The result of the March 4, 1976 meeting was a CAC suggestion to investigate the inclusion of the project of a city street improvement alternative (the subject had been discussed in January as well). The official inclusion of the Low Cost Alternative No. 2 by CRAG in June 1976 was a direct result of this CAC involvement. In March the CAC reviewed CRAG's goals and objectives and suggested more emphasis should be given to auto transportation. The CAC reviewed the agenda and supplied the chairperson for the public meetings, ODOT and Tri-Met had arranged, to begin in March.

June 1976 - The CAC agreed to an ICC proposed removal of LRT as an alternative in view of possible reinstatement upon conclusion of the Tri-Met study of LRT.

July 1976 - The CAC suggested that the Banfield corridor be extended to Gresham to afford a longer route for LRT, but because of the June decision no action was taken. Tri-Met's consultant studied and found the LRT mode to be viable. It officially became Alternative No. 6 when CRAG reinstated LRT in February 1977. During July the CAC suggested that the ODOT Banfield slide program was weak. The ODOT staff recognized this problem and revamped the program to better fit public concerns.

September, October 1976 - A reorganization plan was presented to the CAC by ODOT and Tri-Met in September as a result of dwindling citizen participation during the summer and increasing project complexity. The CAC agreed reorganization was necessary and made positive suggestions to accomplish it. The reorganization goal was January 1977. In October

an announcement was sent to approximately 30 local groups, including city, county, and state officials describing the Banfield Project and soliciting new members for the CAC.

November 1976 - The first meeting under the new plan was held November 4, 1976 at which time subcommittees were formed. As the project became more complex, it became more difficult for all subjects of interest to be discussed at CAC meetings. Under the reorganized plan subcommittees consisting of special interest groups were formed and these subcommittees made status reports at CAC meetings. The subcommittees formed were:

- (1) Low Cost Improvement
- (2) Homeowners
- (3) East County
- (4) General Interest
- (5) Holladay Street/Lloyd Center
- (6) Hollywood

Recruitment of new members to fill out the subcommittees by January 1977 goal became necessary. Later in November the CAC expressed concerns about the system planning and alternatives selection process. ODOT reiterated that alternative selection was to be made by the State and CRAG, but the CAC could influence the content of the alternative selected. The CAC reviewed and approved a new ODOT public information slide program.

December 1976 - The CAC reviewed the Low Cost Improvement Alternative for the first time and suggested that express buses on city streets would cause problems. The review was assigned to the subcommittee on Low Cost Improvements. A new meeting format adopted in December consisted of the CAC general meeting to be held at the first part of evening then subcommittee meetings to be held at the later part.

January 1977 - At the January 4 meeting the CAC agreed to the content of finalized ODOT public information slide program. Recruitment of subcommittee members continued. On January 20, 1977, 36 members were present to attend the first subcommittee meetings which were held after the CAC meeting. The Homeowner's subcommittee was adverse to alternatives which entailed a great deal of new building, and suggested the LRT route should be from CBD to Lents via Johnson Creek then to Gresham at the south end of the county. As a result, ODOT and Tri-Met developed facts to show the reasons why such an alternative was undesirable.

February 1977 - The CAC expressed concern about the safety of narrow Banfield lanes and the lack of shoulders as a result of the existing HOV lanes. The Homeowner's subcommittee presented a plan to save houses on Senate Street. The CAC did not take action on the plan. The East County subcommittee suggested lighting for the entire length of the Banfield freeway. Nearly 60 members and guests were present at the February 17 meeting to review the Tri-Met consultant's presentation of LRT.

March 1977 - The CAC meeting format was changed at the March 3 meeting. The CAC decided to meet once a month, and subcommittees to meet on the second meeting date each month. The Homeowner's subcommittee recommended that the interchange at 37th and Sandy should remain as is. The General Interest subcommittee proposed a full-width freeway option in the LRT alternative.

April 1977 - The CAC made a resolution for addition of a six lane freeway with shoulders to be included in the LRT alternative. The TAC and ICC agreed to the resolution and Alternative No. 6(b) was adopted by CRAG. The CAC indicated that they were uncertain about the effectiveness of the present HOV lanes and questioned the design of the proposed HOVs.

May 1977 - At the May 5 meeting the CAC suggested some additional ways to improve citizen involvement in the Banfield program. Suggestions were to:

- (1) Submit notices to community calendars of newspapers, and radio stations.
- (2) Put notices in local newspapers instead of large newspapers.
- (3) Use more maps and sensational headlines in hand-out pamphlets.

June 1977 - The CAC discussed several LRT modes. No motion for action was made. ODOT informed the CAC that the Banfield Transitway Project Public Hearing was delayed to February 1978 in order to complete study for the Banfield/I-205 Lents District LRT Alternative.

September 1977 - The first CAC meeting after the summer recess was held on September 6, 1977. The CAC decided meetings were to be of a general nature for a while until the subcommittees could meet and prepare information for the general meeting. ODOT informed the CAC that the Public Hearing was scheduled for April 1978. The CAC was informed that Tri-Met was examining three LRT routes in the Banfield corridor from Gateway to the CBD in order to meet FHWA requirements. CAC input was solicited on the LRT study. The CAC determined items for continued study were:

- (1) Tri-Met alternatives analysis report.
- (2) Downtown Circulation Plan.
- (3) CAC subcommittee reports.
- (4) Citizen involvement activity.
- (5) DEIS outline.
- (6) East County LRT issues presented by Burnside residents.

At the September 22 meeting the Tri-Met 1990 Transportation Alternative Analysis Report was submitted to the CAC for review. The three systems the 1990 report analyzed were:

- (1) TSM (Low Cost Improvement on city streets)
- (2) HOV and busways
- (3) LRT

The CAC was to review the 1990 report and comment on it based on the criteria Tri-Met used. Each system was to be examined to determine:

- (1) Quality of service to customers
- (2) Cost
- (3) Environmental impacts
- (4) Cost effectiveness
- (5) Energy requirements
- (6) Social impacts
- (7) Opportunities for urban development

October 1977 - The CAC was given the Tri-Met Downtown Circulation Alternative report for analysis and comment on October 6. The CAC decided to meet through the April 1978 Public Hearing date and continue to assist in getting information to the public. The CAC recommendation of a specific alternative is to come after the public hearing.

November 1977 - On November 3, the CAC viewed a new ODOT public slide presentation and were in general agreement with the content. Three subcommittee reports were presented. The Low Cost subcommittee were in consensus that the LCI alternative (#2) was only a temporary solution for the region and that one of the Banfield build alternatives would better serve the region on a long-term basis. The Holladay Street/Lloyd Center subcommittee indicated their group believed that an alternative should be selected that did not drastically change traffic patterns in the Holladay/Lloyd Center area. The Homeowners subcommittee reported that regardless of which alternative was selected, walls should be used to protect homes and absorb noise. They recommended that a noise study be made prior to project construction and after project completion to



identify and correct any noise deficiencies. The subcommittee made some specific recommendations about bus and LRT alternatives as they affect particular areas along the Banfield Freeway.

December 1977 - The CAC was presented a preliminary tabulation of right-of-way costs and impacts for the project alternatives on December 1 by ODOT. Tri-Met presented preview information on operating costs of various alternatives and indicated a formal summary of East Side Operations was to be presented to the CAC at the next meeting. Discussion was held on the ODOT and Tri-Met information.

January 1978 - At the January 5 meeting the CAC was given Tri-Met's East Side Transit Operations report to review. Tri-Met outlined the report contents and cautioned the CAC that the report was not the only report containing Operation information. A suggestion was made to the CAC to review this report along with other reports in order to get a better understanding for total operations of the proposed alternatives. Volunteers were enlisted for a new subcommittee to help get more project information to the public before the formal hearing in April 1978. At the January 19 meeting the new subcommittee named the Public Information subcommittee met and established goals. Their primary task was determined to be to assist ODOT and Tri-Met in preparing appropriate methods of getting project information to the public.

PART B

ALTERNATIVES DESCRIPTIONS

## ALTERNATIVES DESCRIPTIONS

### Introduction

The Banfield Transitway project investigates four basic transit schemes and associated improvements to the Banfield Freeway to improve transportation accessibility between the Portland Central Business District (CBD), and the area served by the Banfield Freeway in East Portland (between Interstate 5 and Interstate 205) and East Multnomah County (between I-205 and Gresham, Oregon). Options involve a variety of design proposals for the construction of new transit and roadway facilities. Most of the transit improvement proposals would also widen the Banfield Freeway to six lanes out to I-205. Of the four schemes, three would rely exclusively upon the bus mode to carry public transit trips where the fourth would use a Light Rail Transit (LRT) mode supported by an extensive network of "feeder" buses serving LRT stations. The option of doing nothing to improve traffic and transit operations is also evaluated and is called the "No-Build" alternative.

The bus alternatives range from "Low Cost Improvements" (2a and 2b), which restrict public transit improvements to city streets (avoiding the higher cost of constructing a "transitway" within the Banfield Freeway right-of-way) to a "Separated Busway" (4a and 4b) in the Banfield Freeway Corridor. The remaining bus transit proposal would establish High Occupancy Vehicle (HOV) lanes (3a, 3b and 3c) in the Banfield corridor. HOV lanes would allow the operation of both buses and carpools in restricted use lanes located in the middle of the freeway.

Both the busway and HOV options are very similar with respect to routing and operations. The HOV alternatives offer a broader range of alternatives for the Banfield Freeway lanes proper, but fewer options with respect to transit service.

Light Rail Transit (LRT) routing and operation along and west of I-205 is essentially the same as the Separated Busway. Unlike the bus or bus/carpool options, however, the LRT options (5-1 and 5-2) would extend exclusive transit lines into East Multnomah County to Gresham via either East Burnside Street or Division Street; an LRT line (5-3) alongside the I-205 Freeway to the Lents district (Foster Road) is also proposed.

All of the project build alternatives would provide grid bus service in East Portland and East Multnomah County. In the HOV, Separated Busway and LRT/I-205 options, major east-west city streets would be connected to an I-205 busway with a series of transit stations located between Gateway and Foster Road.

The description of alternatives has been organized to give reviewers insight into the general nature of each option in addition to specific information regarding routing, operations and transit stations. The intent is to keep the narrative as brief as possible without sacrificing important detail. For those desiring more information, appropriate supporting documents have been referenced.

## Alternative 1: No-Build

### General Description

By definition, the No-Build case involves no traffic capacity or operational improvements to the street and freeway network. The Banfield Freeway would return to its pre-1976 configuration (see Figure 6). This would entail

elimination of the high occupancy vehicle lanes, some relocation of the concrete median barrier and restriping the section for six travel lanes with shoulders between I-5 and 37th Avenue and four lanes with shoulders between 37th Avenue and I-205 would be required. The I-205 busway would not be constructed if this alternative is selected.

No transit improvements would be implemented under No-Build conditions. Transit vehicles would be required to operate on the existing street and freeway system in mixed traffic with no preferential treatment, except in the Portland Mall. In essence, the system as operated today would be continued through the 1990 study year. This would allow for the replacement of buses whose service life is spent and the addition of buses as necessary to meet increased demand.

The No-Build alternative serves as the basis of comparison for the four basic "build" options. It illustrates the consequences of no major transportation improvements being undertaken in the area served by the Banfield Freeway between downtown Portland and Gresham, in East Multnomah County.

#### Alternatives 2a and 2b: Low Cost Improvements

##### General Description

The Low Cost Improvements alternatives are offered as options to a transitway in the Banfield Freeway corridor. These alternatives would confine transit improvements to the city arterial street system in East Portland, avoiding the higher costs of comparable service in the Banfield Freeway corridor. The existing High Occupancy Vehicle lanes on the Banfield Freeway would be removed. Further, a busway on I-205 would not be completed because no provision for express bus service on the Banfield would be made.

The Low Cost Improvements alternative is based upon a systemwide network of radially-oriented transit corridors for the metropolitan area. These corridors would consist of several different bus routes funneled together onto the same street. Various "Transportation Systems Management" (TSM) techniques would be used on these streets to improve operational efficiency, including exclusive bus lanes, traffic signal preemption, and regulation of curb parking. These techniques would provide preferential treatment for transit, with a minimum of actual construction required.

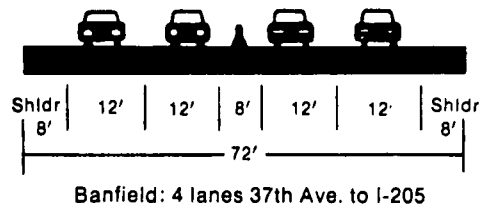
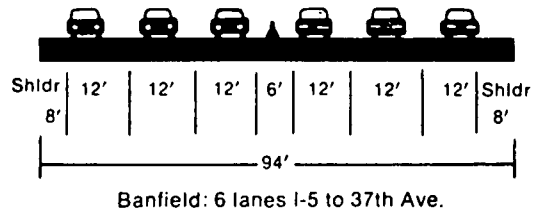
In East Portland, three transit corridors would be established: (1) along Broadway and Weidler Streets, forking in the Hollywood District to Sandy Boulevard and Halsey Street; (2) along Burnside and Stark Streets; and (3) along Division Street. In most cases, the roadway in question would be restriped to create one lane at or near the center of the street to be reserved for buses during peak traffic periods. At other times, the lane would revert back to use for regular traffic or for left turns. In street segments where no traffic congestion is forecast, express buses would not need a reserved lane and could operate in mixed traffic.

In the operation of this system, suburban buses would make local stops in East County on the arterial streets. As they approached the more congested urban area (west of I-205), they would be channeled together onto the corridor streets with reserved bus lanes. They would then operate as "limiteds" directly into downtown Portland. A system of local buses would operate on the arterial streets in East Portland to serve the urban area.

Since the exclusive lanes are designed to cope with traffic congestion, they would be used by buses only during peak traffic hours in the peak direction

FIGURE 6

**BANFIELD NO-BUILD  
TYPICAL SECTIONS**



of travel (toward downtown Portland in the morning, away from it in the evening). Only the suburban limited buses would utilize the reserved lanes. Local buses on the same street would operate in regular traffic lanes so as not to block the limiteds. The suburban limiteds would make stops only at transfer points as they traveled through East Portland; special passenger waiting islands would be constructed along the median bus lanes at these transfer points.

Suburban limited service would be operated throughout the day, not just during peak periods. This would provide the metropolitan area with a full-time network of rapid transportation comparable to that in the other build alternatives. During off-peak hours (and during peak hours in the nonpeak direction), both the suburban limited and urban local buses would be operated in ordinary mixed traffic lanes.

Auto-capacity on the select transit streets would be maintained at approximately current levels by removing parking and operating buses in mixed flow during the nonpeak hours. In most cases the reserved bus lanes would function as turning refuges for autos during off-peak periods.

The only difference between Alternatives 2a and 2b is in the number of freeway lanes on the Banfield Freeway east of 37th Avenue (see Figures 7 and 8). Alternative 2a would restore the Banfield Freeway to its original 6/4 freeway lane configuration, with shoulders, that existed prior to 1976 (six standard lanes west of 37th Avenue and four standard lanes east of 37th). Alternative 2b would develop six minimum freeway lanes without shoulders between 37th Avenue and I-205 (with shoulders from I-5 to 37th Ave.) by converting the existing HOV lanes to unrestricted use. Traffic operation on the Banfield Freeway could be facilitated through ramp metering as a low cost measure. Ramp metering is discussed in detail in the following section.



### Ramp Metering

Ramp metering is a control strategy to improve traffic flow on a congested freeway. The primary objective is to optimize freeway capacity through control of entering traffic. This results in uniform traffic flow on the facility and reduced travel time. Metering limits the amount of traffic entering the freeway so that free flow is maintained at all times. This has a tendency to lengthen the peak traffic period.

In addition to a reduction in travel time, cities that have instituted ramp metering have experienced substantial reduction in accidents--as high as fifty percent on some freeways. This is due to fewer rear-end collisions because stop-and-go traffic conditions are reduced, and decreases in rear-end collisions on ramps at the "bridging" point because vehicles are released one at a time.

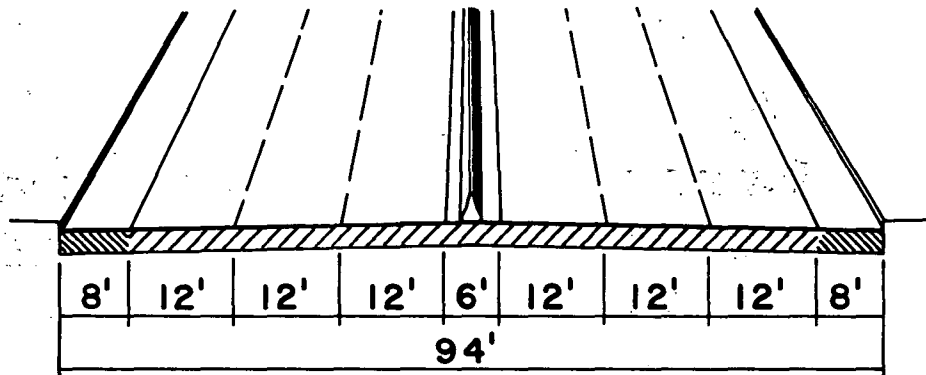
Another advantage of ramp metering is that mass transit and carpool operations can be greatly improved. Many ramp control systems have included bypass lanes on metered ramps so that bus and/or carpools can bypass queues of waiting vehicles without stopping.

Ramp metering will usually encourage the use of a freeway for longer trips rather than shorter trips. Faced with the prospect of a short delay at a ramp signal, a driver who intends to use the freeway for a short trip will usually decide to use a surface street instead. On the other hand, through vehicles and trucks entering from outside the city are not delayed by ramp signals and benefit from reduced congestion.

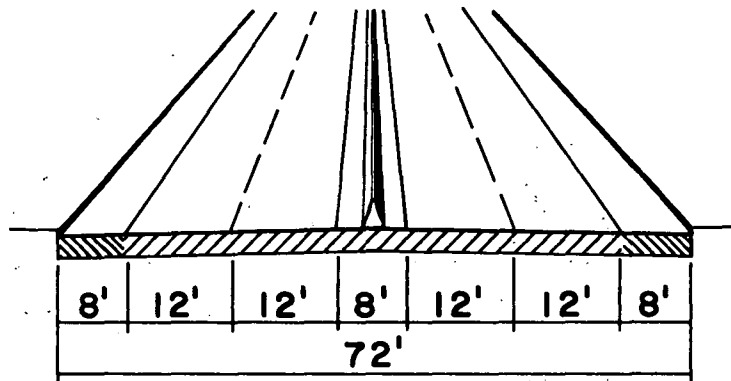
Several different levels of ramp control can be installed on a freeway. The simplest and most expensive level is a pre-timed ramp metering signal on all entrance ramps. The signs are controlled by time clocks and meter traffic based

FIGURE 7

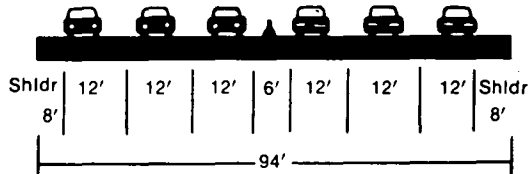
### 2a. Std. Fwy. Lanes Plus Shldrs.



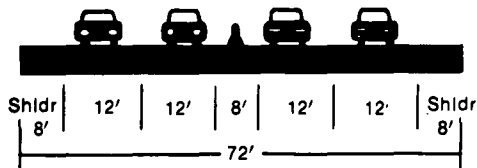
6 Lane 37th to I-5



4 Lane I-205 to 37th



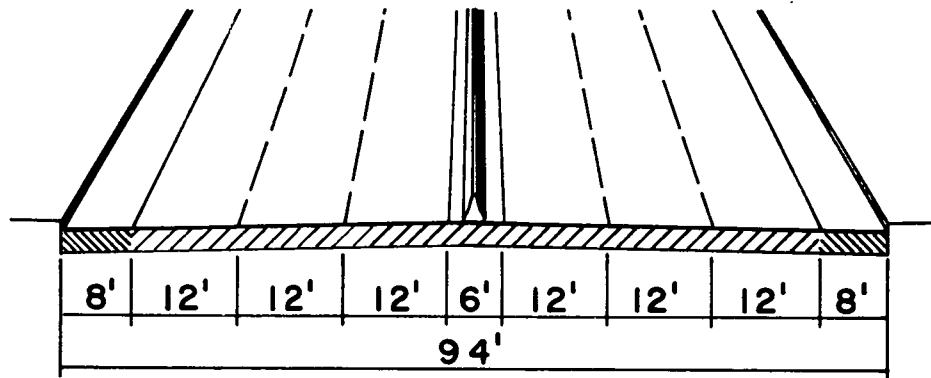
Banfield: 6 lanes I-5 to 37th Ave.



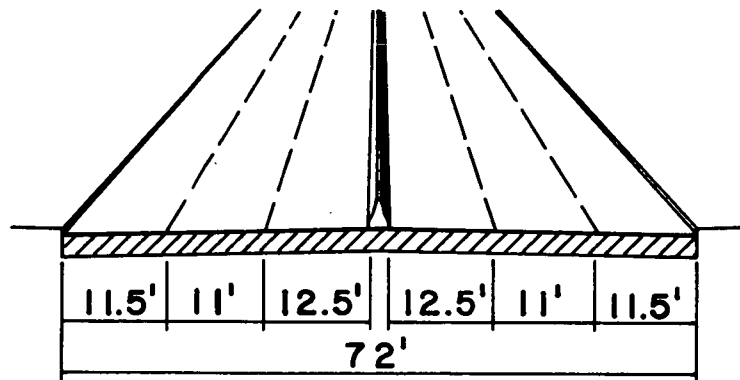
Banfield: 4 lanes 37th Ave. to I-205

FIGURE 8

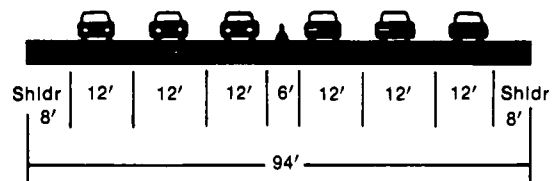
**2b. Min. Fwy. Lanes**



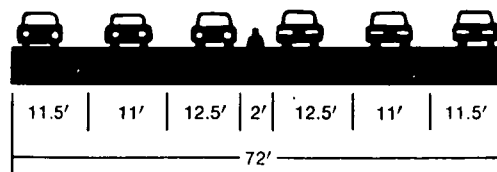
**6 Lane 37th to I-5**



**6 Lane I-205 to 37th**



Banfield: 6 lanes I-5 to 37th Ave.



Banfield: 6 lanes 37th Ave. to I-205

on historical volume data. These meters can be installed for about \$15,000 per entrance ramp. The disadvantage to this type of system is that metering rates cannot be adjusted to handle special situations such as freeway accidents which block traffic lanes.

A higher level of ramp control would use an actuated signal controller which would select a metering rate based on freeway volumes in the vicinity of the ramp. This would require a system of loop detectors located in the freeway lanes at each interchange. This system would be capable of detecting some freeway bottlenecks but could not divert vehicles which are already on the freeway. This system is estimated to cost \$25,000 per ramp.

The most sophisticated level of ramp control would be an actuated signal control and freeway mainline detectors. Detectors located on the freeway and on the interchange ramps would transmit data to a headquarters where computer analysis of the data would determine the optimal rates. The cost of this type of system would be several million dollars depending on the level used.

Banfield Freeway ramp metering with transit bypass capability was not included as part of the alternatives. It can, however, be implemented initially as a future management strategy with any selected alternative. Arterial routes investigated for the Low-Cost Improvement alternatives are described below.

#### The Broadway/Sandy/Halsey Corridor

Route Description. This route runs from the Broadway Bridge, along the N.E. Broadway-N.E. Weidler one-way couplet to N.E. 21st Avenue, then east on Broadway to the Sandy Boulevard-Broadway intersection. At this point the route branches--one leg proceeding northeast on Sandy Boulevard to the I-205 Freeway intersection, the second leg continuing on Broadway to 41st Avenue. N.E.

Broadway and N.E. Halsey would form a one-way couplet between 41st and 67th Avenues. The route would then continue east from 67th, on Halsey, to the I-205 intersection (see Figure 9).

Proposed Operation. Westbound buses would operate in mixed traffic lanes on Broadway between the Broadway Bridge and 24th Avenue. Eastbound buses would operate in mixed traffic lanes on Weidler to 21st Avenue, then on 21st to Broadway where they would operate in a contraflow lane along the south side of Broadway to 24th Avenue.

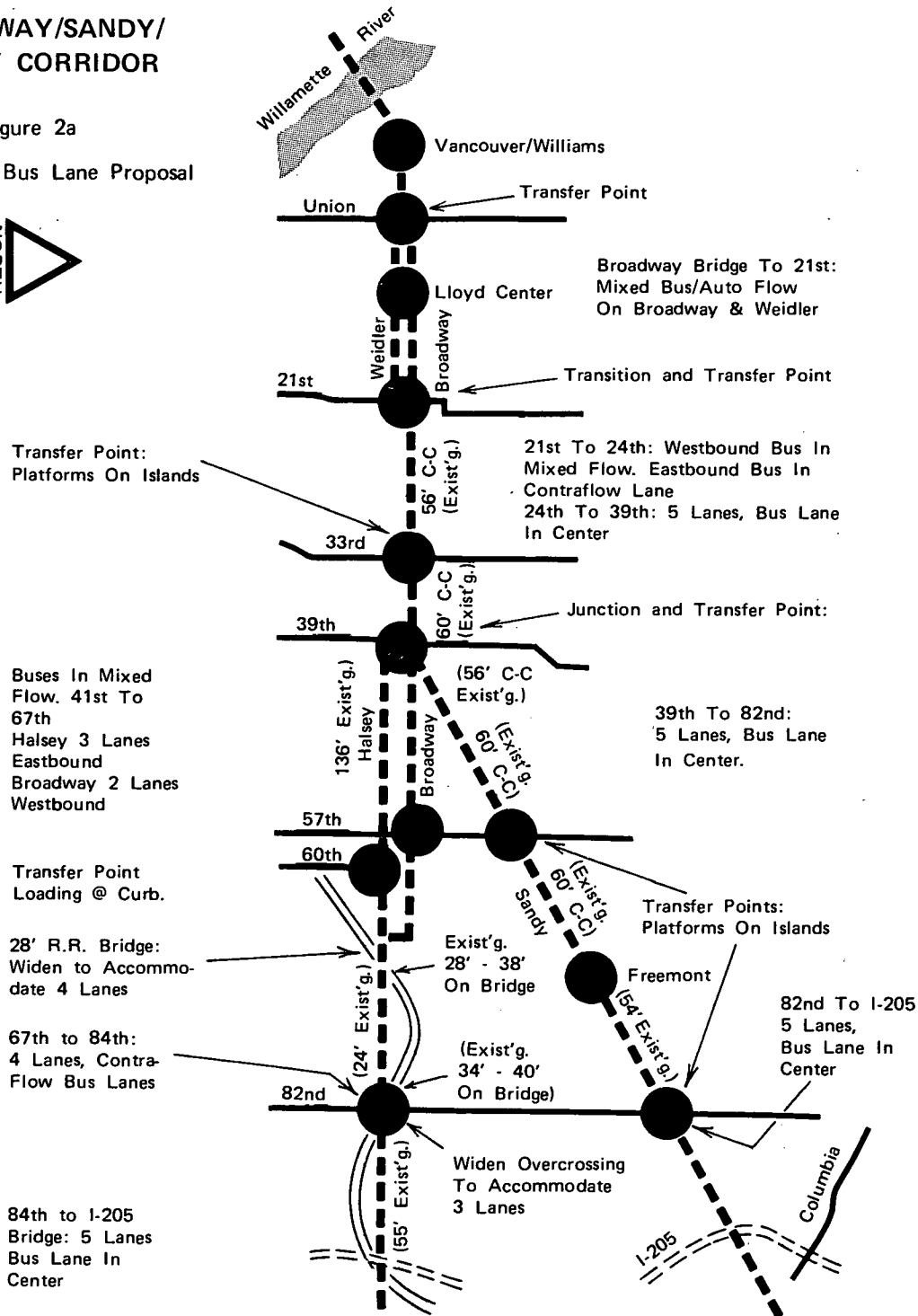
From 24th and Broadway, an exclusive bus lane would operate in the center of the street. Broadway would be striped for five lanes (two auto lanes in each direction and a reversible, center bus lane). This five-lane configuration would continue east on Broadway to the Sandy Boulevard intersection. The northeast branch would follow Sandy in a five-lane configuration out to the I-205 Freeway junction. Pedestrian loading islands would be used at transfer points at 33rd and Broadway and 40th, 57th, Fremont, and 82nd on Sandy. All parking would be removed on Broadway between 24th and Sandy Boulevard and on Sandy from Broadway to the I-205 Freeway junction. During off-peak periods, the center lane could be used as a continuous left-turn lane or another traffic lane.

The east branch continues on Broadway to 41st Avenue, with the preferential bus lane using the north curb lane during the inbound a.m. peak and the south curb lane during the outbound p.m. peak. The outbound peak lane would turn right into a preferential lane on the west side of 41st Avenue and proceed to Halsey. A one-way couplet of Broadway and Halsey, from 41st to 67th, would be established with Broadway two lanes westbound, and Halsey three lanes eastbound. Buses would operate in mixed traffic. Parking on the couplet would be removed.

FIGURE 9

**BROADWAY/SANDY/  
HALSEY CORRIDOR**

Figure 2a  
Key Map To Bus Lane Proposal



A four-lane unbalanced flow pattern would be used on Halsey, between 67th and 84th Avenues, and would provide three lanes in the peak direction. Parking would be removed during peak periods only from 67th to 80th. No parking would be allowed between 80th and 84th at any time.

Buses would use a reversible, median lane on N.E. Halsey, from 84th Avenue to the I-205 Freeway. The street would be striped for five lanes of traffic from 82nd to I-205. Autos would operate in two lanes each way from 84th to I-205. An island station would be used for transfers at 82nd and Halsey. From 84th to I-205, parking would not be permitted at any time. The bus lane would revert to a continuous left-turn lane during the off-peak periods.

#### Burnside/Stark Corridor

Route Description. This corridor extends from the Burnside Bridge, east on Burnside to Gilham Street, southeast on Gilham to Thorburn, southeast on Thorburn to Stark, and east on Stark to the proposed I-205 Freeway junction (see Figure 10).

Proposed Operation. Under the proposal, Burnside, from Union to 32nd Avenue, would be striped for five lanes of traffic--two lanes of mixed auto/bus traffic in each direction, and a reversible, exclusive bus lane in the center. The express buses would use the lane inbound in the morning and outbound in the evening. During the off-peak periods, the bus lane could be used as a continuous left-turn lane or as a traffic lane. On-street parking would be prohibited during the peak periods, and probably at all times.

From 32nd and East Burnside to Gilham Street and along Thorburn to 74th and Stark Street, the route would be striped for four lanes and would provide an unbalanced flow of traffic in the peak direction. The two center lanes would serve as limited-stop bus lanes, their position being shifted so as to provide

three lanes of traffic in the peak direction. Parking would be prohibited during peak periods only. During the off-peak periods, the streets would function as two-lane, two-way routes, with parking permitted.

On S.E. Stark, from 74th Avenue to the I-205 junction, buses would use a preferential north curb lane in the morning and a south curb contraflow lane in the evening. From 74th to 92nd, Stark would have three lanes during peak periods (including the bus lane) with parking permitted on the opposite side of the bus lane. From 92nd to the I-205 junction, Stark would have four lanes of traffic (including the bus lane) with parking permitted.

#### Division Corridor

Route Description. The Division Street corridor begins at the Hawthorne Bridge and utilizes the one-way Madison and Hawthorne ramps and streets to 7th Avenue. The route proceeds in a southerly direction on 7th Avenue to Division Street. The route then follows Division to the I-205 Freeway junction (see Figure 11).

The lack of additional traffic capacity on S.E. Division Street west of 60th Avenue would require traffic operational improvements on 60th Avenue and Belmont Street with Alternative 2a. One westbound lane of auto traffic would be routed from S.E. Division to Belmont Street via 60th Avenue. The rerouting would continue on Belmont Street to the Morrison Bridge. Eastbound travel off the Morrison Bridge would use Morrison Street to 25th Street, then proceeding on Belmont Street to 60th Avenue (Morrison Street and Belmont Street form a one-way couplet between 25th Street and the Morrison Bridge).

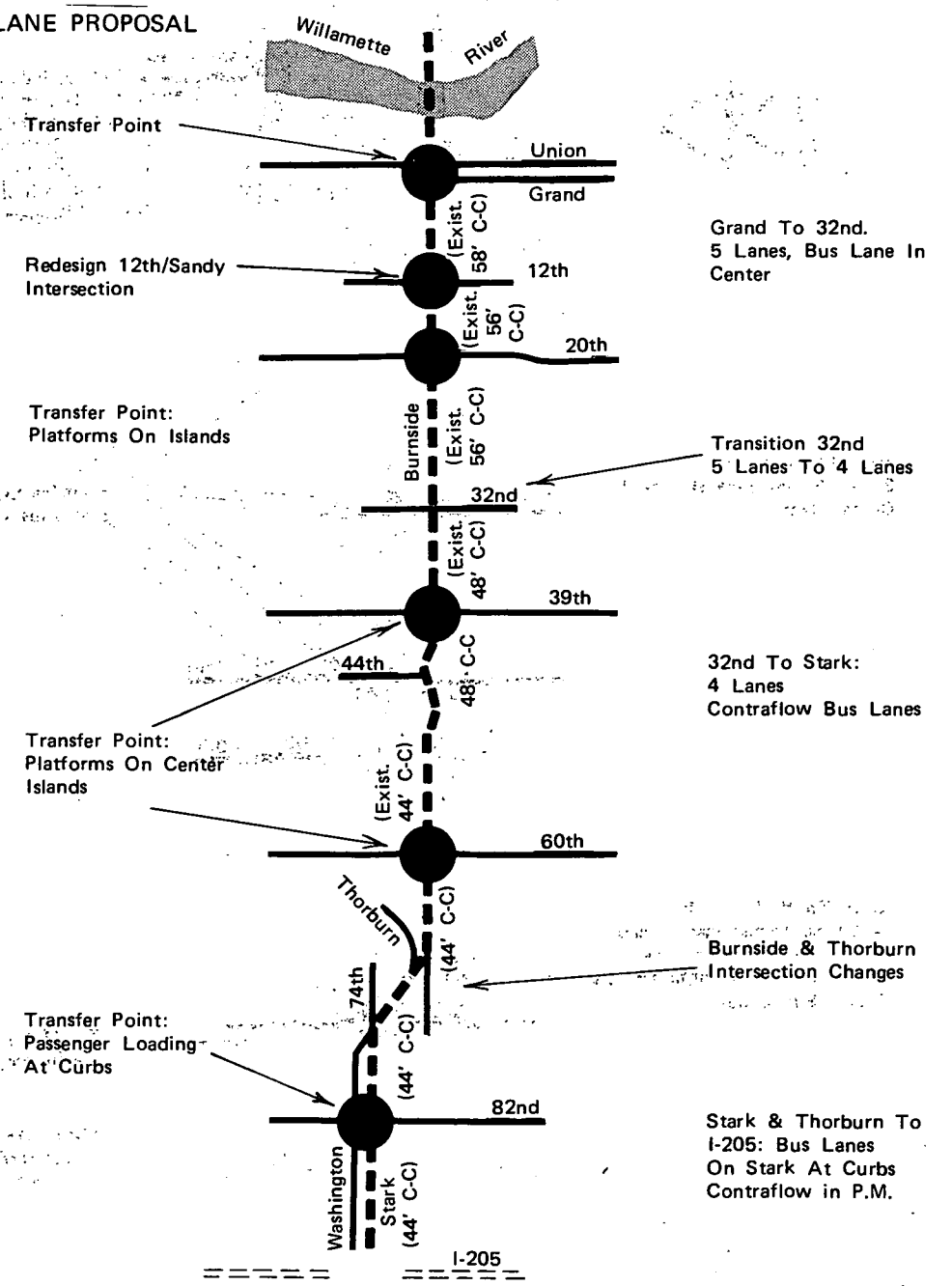
Proposed Operation. The preferential bus route would begin on the Hawthorne Bridge, utilizing one or both of the bridge's center lanes. Buses



FIGURE 10

BURNSIDE/STARK CORRIDOR

FIGURE 3a  
KEY MAP TO  
BUS LANE PROPOSAL



Grand To 32nd.  
5 Lanes, Bus Lane In Center

Transition 32nd  
5 Lanes To 4 Lanes

32nd To Stark:  
4 Lanes  
Contraflow Bus Lanes

Burnside & Thorburn  
Intersection Changes

Stark & Thorburn To  
I-205: Bus Lanes  
On Stark At Curbs  
Contraflow in P.M.

Transfer Point

Redesign 12th/Sandy  
Intersection

Transfer Point:  
Platforms On Islands

Transfer Point:  
Platforms On Center  
Islands

Transfer Point:  
Passenger Loading  
At Curbs

Willamette River

Union

Grand

12th

20th

Burnside

32nd

39th

44th

60th

Thorburn

74th

82nd

Washington

Stark

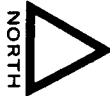
I-205

FIGURE 11

DIVISION CORRIDOR

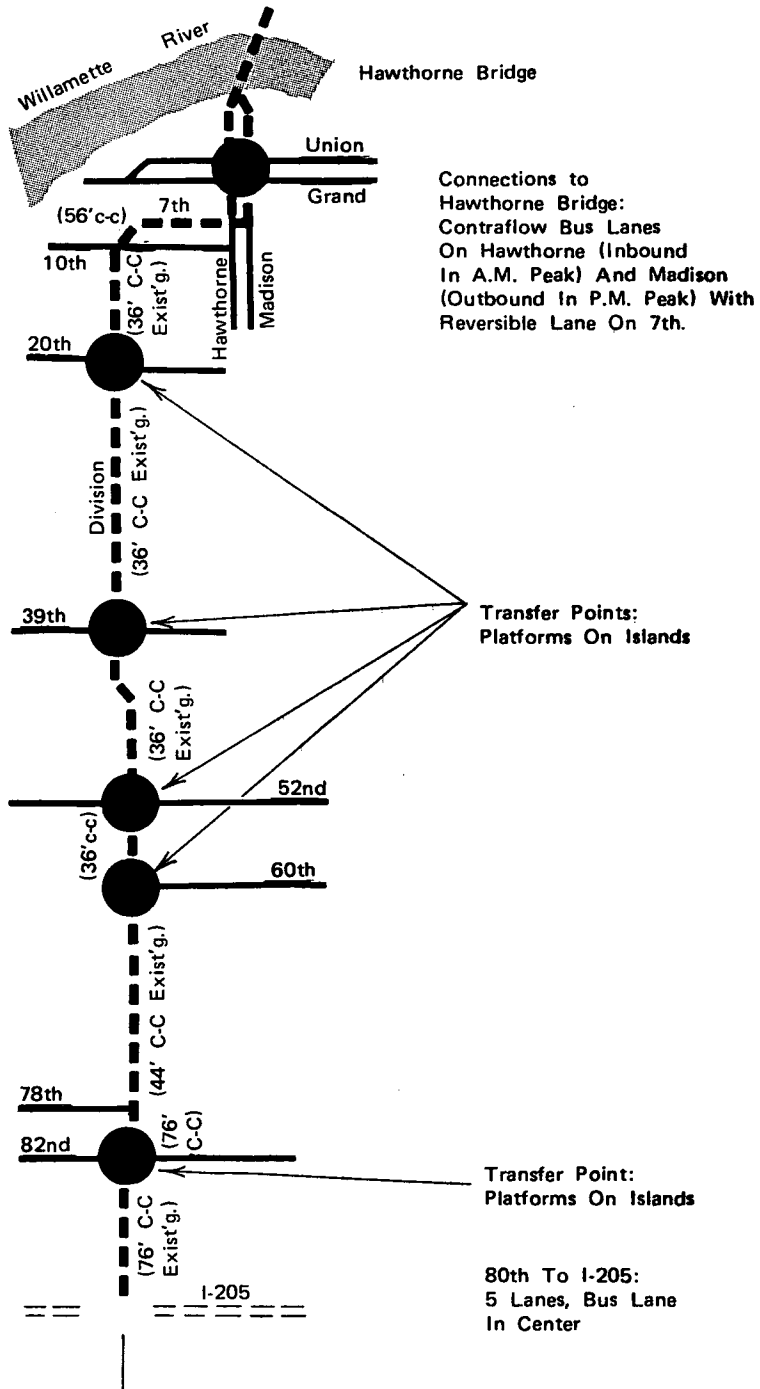
FIGURE 4A

KEY MAP TO  
BUS LANE PROPOSAL



10th To 60th:  
3 Lanes, Bus Lane In  
Center

60th To 80th:  
4 Lanes, Imbalanced  
Flow During Peak  
Hours With Contraflow  
Bus Lanes



would operate in contraflow lanes on Madison and Hawthorne to 7th Avenue. During the inbound peak, the buses would use a preferential north curb lane on Hawthorne between 7th Avenue and the Hawthorne Bridge (contraflow). In the outbound peak, buses would operate in the south curb lane on Madison between 7th Avenue and the Hawthorne Bridge (contraflow). During off-peak periods, Madison and Hawthorne would revert to their normal operation, serving as a one-way couplet. No new parking restrictions would be made on Madison and Hawthorne.

On 7th Avenue, between Madison and Division, buses would run in a reversible lane using the second lane from the west curb. Parking along the west curb would be prohibited during the peak hours. 7th Avenue would operate with two lanes of traffic in each direction during off-peak hours.

Division Street, from 7th Avenue to 60th, would be striped for three lanes, with the preferential bus lane in the center. There would be one lane of auto traffic in each direction. All street parking would be removed on Division from 10th to 60th Avenues. The center bus lane could become a continuous left-turn lane during the off-peak periods, or parking could be restored to one side of the street.

From 60th to 80th Avenue, Division would be striped for four lanes, providing an unbalanced flow in the peak direction (three lanes inbound in the a.m. peak and one opposed, and the opposite configuration during the p.m. peak). The bus lane would operate to the left of the street center line in each case. All street parking would continue to be prohibited at all times.

From 80th Avenue to the I-205 Freeway junction, Division would be striped for a five-lane pattern (reversible median bus lane and two lanes of

mixed traffic in each direction). The center bus lane could be used as a continuous left-turn lane or traffic lane during the off-peak periods. All street parking would be permitted.

Sixtieth Avenue (between Belmont and Division) and Belmont (between 25th and 60th) would be restriped for three lanes, providing an unbalanced flow in the peak direction (see Figure 12).

Parking would be removed on Belmont from 25th to 60th during the peak hours. Parking would probably be permitted on one side of 60th (between Belmont and Division) during off-peak hours. Sixtieth Avenue would require widening from Lincoln to Belmont. The streets would revert to their normal two-lane, two-way configuration during the off-peak period.

Belmont, from Grand to 25th, now operates with two lanes in the eastbound direction, with parking. It is proposed to operate this street with three eastbound lanes during the p.m. peak period by removing parking from 4:00 to 6:00 p.m. Morrison is now operating with three lanes westbound and one lane eastbound from Grand to 12th, and two lanes westbound from 12th to 25th, with parking. It is proposed that parking be removed in the section from 12th to 25th during the a.m. peak hour to allow three westbound lanes in that segment.

The Morrison and Belmont ramps would each carry three lanes of one-way traffic between Grand and the Morrison Bridge. The Morrison Bridge would be striped for four lanes in the peak direction. The Morrison Bridge normally functions with six lanes of traffic (three lanes in each direction).

FIGURE 12

BELMONT STREET/60TH AVENUE

FIGURE 5A

KEY MAP TO AUTO IMPROVEMENT PROPOSAL

Morrison (Grand To 12th):  
 3 Lanes Westbound  
 1 Lane Eastbound

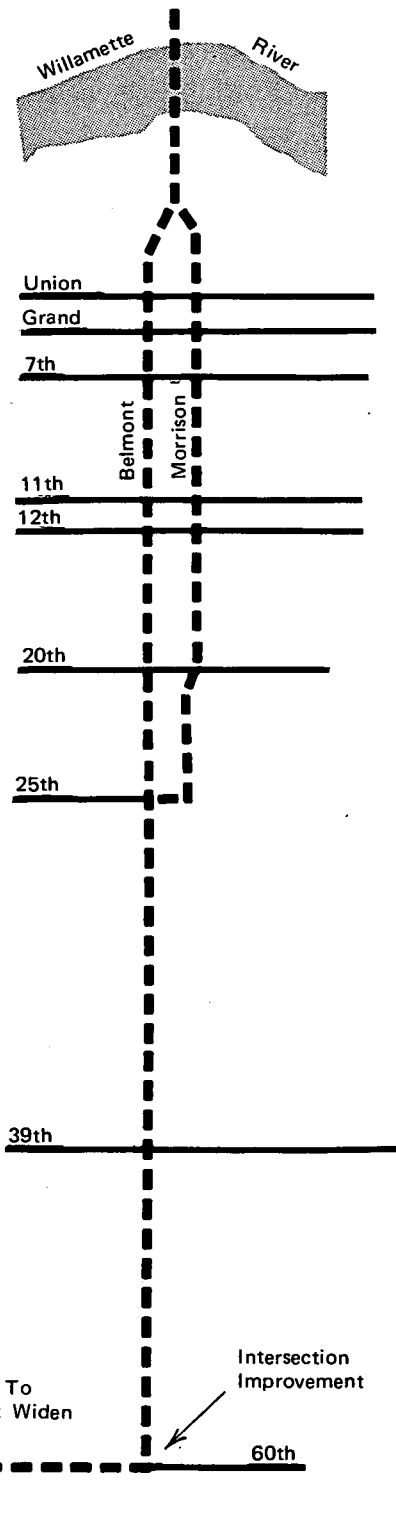
Belmont (Grand to 25):  
 P.M. Peak: 3 Lanes, Eastbound,  
 No Parking  
 Off Peak: 2 Lanes,  
 Eastbound, Parking  
 On One Side

Morrison Bridge:  
 Peak: 6 Lanes, 4 In  
 Peak Direction  
 Off Peak: 6 Lanes, 3  
 In Each Direction

Morrison (12th to 25th):  
 A.M. Peak: 3 Lanes  
 Westbound  
 No Parking  
 Off Peak: 2 Lanes,  
 Parking On One Side

Belmont (25th To 60th):  
 Peak: 3 Lanes, 2 In  
 Peak Direction, No  
 Parking  
 Off Peak: 2 Lanes  
 Parking On One Side

60th/Division  
 To Belmont:  
 Peak: 3 Lanes  
 2 In Peak Direction,  
 No Park'g.  
 Off Peak: 2 Lanes,  
 Parking On One  
 Side



Division

Lincoln To  
 Belmont Widen  
 To 34'

Intersection  
 Improvement

60th

Alternatives 3a, 3b, and 3c: High Occupancy Vehicle (HOV) Lanes

General Description

These alternatives are the same with respect to bus transit service and carpools. On the Banfield Freeway the existing HOV lanes would be extended westerly to 16th Avenue (Lloyd Center exit) and easterly to the Interstate 205 busway; connections at each end would be made via liftout ramps.\* Exclusive bus lanes would continue between the Steel Bridge and the Banfield Freeway ("Downtown Connection") on either Holladay Street or a Multnomah/Holladay combination. Carpools would have the option of continuing westerly on the Banfield Freeway in mixed traffic or exiting at 16th Avenue and continuing on city streets in mixed traffic. Inbound buses would enter the downtown via the Steel Bridge in mixed traffic, using N.W. Glisan Street and Fifth Avenue to access the Portland Mall. Outbound buses would use 6th Avenue and N.W. Everett to the eastbound Steel Bridge approaches.

The HOV alternatives differ with respect to the number and design of freeway lanes on the Banfield Freeway between 37th Avenue and I-205 (see Figures 13 and 14). Alternative 3a would leave the freeway between 37th and I-205 with four minimum lanes and no shoulders; Alternative 3b would add two additional lanes with no shoulders; and Alternative 3c would add two lanes plus paved shoulders. Emergency turnouts would be provided in lieu of shoulders under Alternatives 3a and 3b. In all cases the HOV traffic would be open to general traffic during off-peak hours.

\*Liftouts are elevated off ramps which permit traffic to exit the freeway without weaving across adjacent travel lanes.

### Route Description

Each of the "HOV" alternatives would use the same route (see "Project Sketch Map"). The bus route commences at its western terminus in the Portland Mall and proceeds outbound along 6th Avenue to N.W. Everett Street and then across the Steel Bridge. Inbound buses would enter the Portland Mall from the Steel Bridge via N.W. Glisan Street and 5th Avenue.

From the Steel Bridge eastward the inbound and outbound bus routes would use either N.E. Holladay Street exclusively to 13th Avenue, or a combination of N.E. Holladay Street and N.E. Multnomah Street to 16th Avenue. With the latter option buses would be routed from N.E. Holladay Street to N.E. Multnomah Street via Grand Avenue, with buses proceeding eastward on N.E. Multnomah to 16th Avenue.

A bus/carpool liftout ramp and its approach would be constructed to connect the bus route along either N.E. Holladay Street or N.E. Multnomah Street with the Banfield HOV lanes. From the liftout ramp eastward both buses and carpools would use the HOV lanes to the transitway terminus at Interstate 205.\* Access to and from the HOV lanes at the proposed I-205 busway would be by a bus-only liftout ramp. The I-205 busway would serve to connect local bus service in East Multnomah County with express service north and south along I-205 between the Airport Interchange and Foster Road and west to the Portland CBD via the Banfield Transitway.

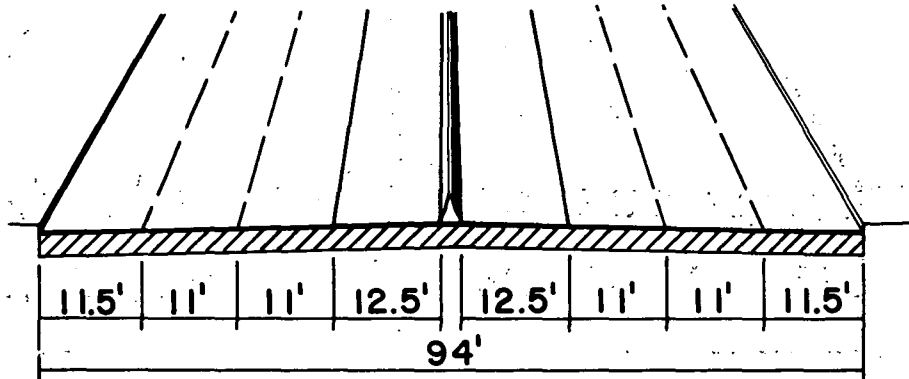
### Proposed Operations

Outbound buses on N.W. 6th Avenue would use the far right traffic lane in the P.M. peak hour. This would require P.M. peak-hour parking restrictions on the east side of 6th Avenue between N.W. Burnside and N.W. Everett (three blocks) and

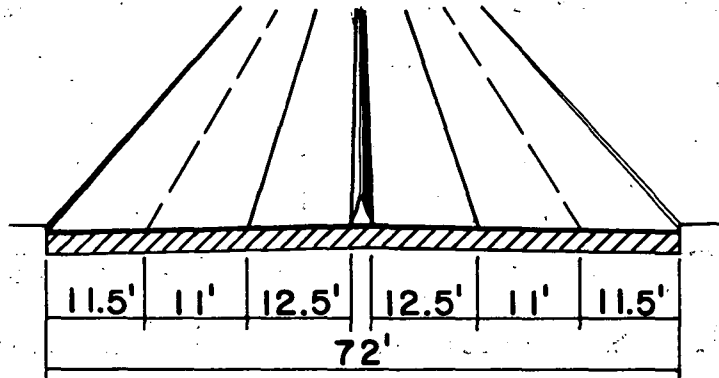
\*Carpools would not be given preferential treatment once they leave the Banfield Freeway HOV lanes.

FIGURE 13

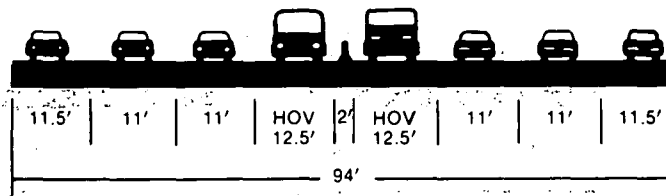
### 3a. HOV/ Min. Fwy. Lanes



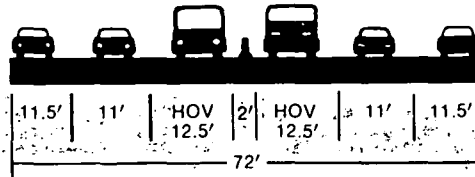
6 Lane 37th to I-5



4 Lane I-205 to 37th



Banfield: 6 lanes I-5 to 37th Ave.

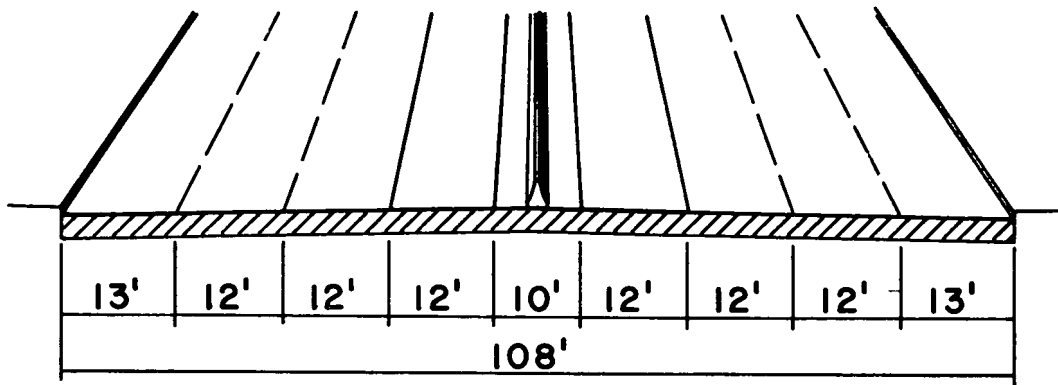


Banfield: 4 lanes 37th Ave. to I-205



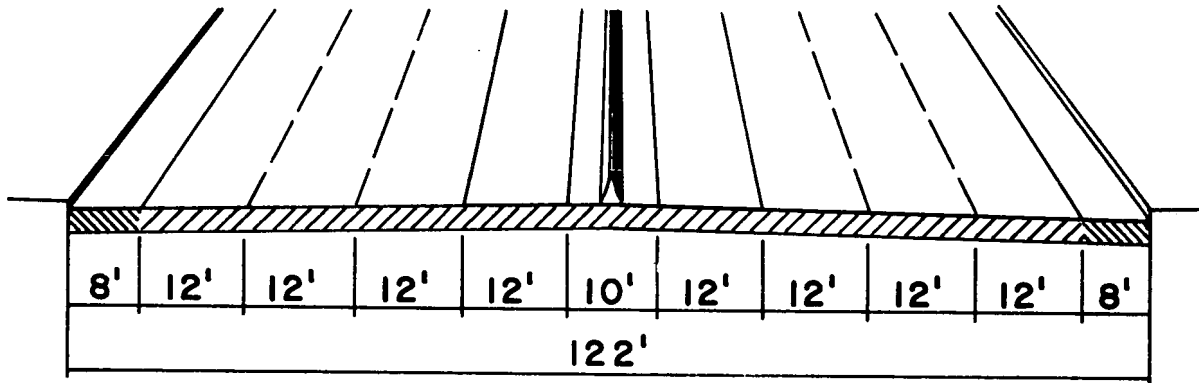
FIGURE 14

### 3b. HOV/ Std. Fwy. Lanes

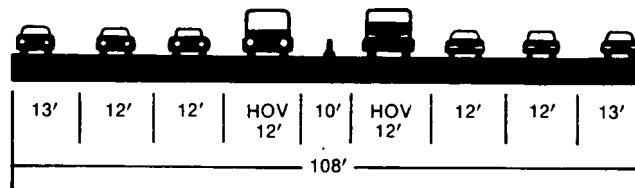


6 Lane I-205 to I-5

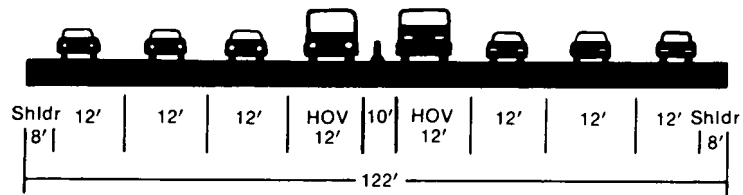
### 3c. HOV/ Std. Fwy. Lanes Plus Shldrs.



6 Lane I-205 to I-5



Banfield: 6 lanes I-5 to I-205



Banfield: 6 lanes I-5 to I-205

on the west side of the block between N.W. Davis and N.W. Everett; autos would use the left-hand lane. Turning restrictions during the peak hours would prohibit right turns across the bus lane between N.W. Burnside and N.W. Everett.

On N.W. Everett Street between 6th Avenue and 1st Avenue, parking would be prohibited during the peak hours to allow exclusive bus use of the far right lane; autos would use the remaining two lanes.

Inbound buses would use the left lane of N.W. Glisan between 3rd and 5th Avenues; parking on both sides of N.W. Glisan during the peak hour would be prohibited between 4th and 5th Avenues.

On 5th Avenue parking would be prohibited on the west side between N.W. Glisan Street and W. Burnside (5 blocks); buses would use the right lane and autos the remaining left lane. Short sections of restricted parking would also be required on the east side of 5th Avenue between N.W. Glisan and N.W. Burnside to permit left turns at Burnside and N.W. Everett.

Buses would use the Steel Bridge under mixed traffic flow; ramp metering could be used to control auto access to the bridge. Another ramp would be constructed at the east end of the Steel Bridge to give outbound buses exclusive access to N.E. Holladay Street at N.E. Occident Street; autos would use the existing routing to N.E. Oregon Street. Inbound buses would share the Holladay-Steel Bridge ramp with autos.

East of the intersection of Holladay Street/Occident Street to N.E. Union Avenue, buses would operate two-way in the northernmost two lanes (one-lane in each direction) of Holladay; westbound auto traffic would occupy the remaining two southerly lanes. Auto access to Holladay from local streets intersecting from the north would be prohibited between 1st and Grand Avenues as would free

right turns from Holladay to these streets. A three-phase signal would probably be necessary at Occident Avenue to partially compensate for these restrictions. At Union Avenue the Holladay-only route would add an additional bus lane to develop both inbound and outbound bus-loading facilities between Union and 6th. From 6th Avenue to 11th Avenue only two bus lanes are required. Between 11th and 13th Avenue the bus lanes would be expanded to two lanes in each direction; this two-block section is to provide bus transfer facilities. Two replacement auto lanes would be constructed between 11th and 13th to accommodate westbound auto travel.

At N.E. 16th Avenue the bus lanes merge with the approach to the Banfield Freeway HOV lanes; carpools would also be allowed use of the HOV ramp.

With the N.E. Multnomah Street route buses would be routed between Holladay and Multnomah via N.E. Grand Avenue (northbound) and N.E. Union Avenue (southbound); the far right lane would be used on these streets. The southerly two lanes of N.E. Multnomah would be reserved for bus use between Grand and 16th Avenues; eastbound buses would use the south curb lane and westbound buses would use the second lane from the curb. Multnomah would be widened to the south between 11th and 13th Avenues and Union and 6th Avenue provide a transfer station and bus bypass lanes. Access to the Banfield Freeway HOV lanes to and from N.E. Multnomah would commence at N.E. 16th Drive, curving southeasterly on structure to the freeway median HOV lanes. N.E. 16th Drive is the point where carpool traffic would be separated from bus traffic (westbound) and given the option of proceeding north on 16th Avenue or turning east to N.E. Multnomah Street.

Upon entering the Banfield HOV lanes, buses would operate express, with no transfers planned until the Gateway Station at I-205 is reached. At this point

a liftout structure would provide a connection between the HOV lanes and the I-205 busway for buses only. Carpools would be required to use regular exit/entrance ramps. Transit trips with origin and/or destinations in East Multnomah County would be made via the I-205 busway and station access points at Foster Road, Powell Boulevard, Division Street, Mall 205, the Gateway Shopping Center, and Sandy Blvd.

### Transit Stations

Transit stations in the Banfield HOV system (all alternatives) are proposed for the downtown connection portion only. On-street stations would be located on N.E. Holladay between 1st Avenue and Occident Street (Coliseum Station), 6th and Union (Union/Grand Station) and between 11th and 13th (Lloyd Center). The Lloyd Center Station and the Grand/Union Station would be located on N.E. Multnomah Street under the N.E. Multnomah Street alternate; otherwise the stations are identical (see Figure 15).

Provisions would be made under HOV options 3b and 3c for the future potential development of additional stations to serve the Hollywood District, N.E. 60th Avenue and N.E. 82nd Avenue. The Hollywood and 60th Avenue stations would be developed as either a liftout ramp to a station above the HOV lanes or a median station at freeway grade. The station at 82nd would be developed in the median at freeway grade.

Transit operations between East Multnomah County and the Banfield HOV facility would be connected by the proposed I-205 busway, which would operate between the Airport Interchange and Foster Road. Transfer stations would be located off I-205 at Columbia/Sandy, Gateway, Mall 205, Division Street, Powell Boulevard and Foster Roads (Lents). Gateway would serve as the major transfer station, being at the juncture of the Banfield and I-205 (see Figure 15).

Studies have not yet been undertaken to ascertain the design and operation of bus transit stations along I-205. Studies would be conducted as part of final project design if a bus option is selected. At this earlier stage of project development it is therefore possible to describe I-205 stations in general terms only.

To varying degrees all I-205 busway stations would have provisions for park-and-ride facilities, auto passenger transfers ("kiss and ride") and bicycle and pedestrian access. The Gateway Station would be most intensively developed due to its pivotal location. Local feeder buses from Halsey and Glisan Streets would connect at Gateway with express buses destined for the Portland CBD. I-205 busway connections would also join with Multnomah Street and 99th Avenue, providing access to the arterial street system.

The Mall 205 Station, which would be located east of I-205 near Mall 205, would be less extensively developed than Gateway but would similarly provide for auto and pedestrian transfers, only on a smaller scale. This station would access local bus routes running on E. Burnside, S.E. Stark, and S.E. Market Streets, creating a major transit link between East Multnomah County and the Portland CBD.

The Division Street station would provide an important transfer function between Division Street and the I-205 busway. Several park-and-ride lots, other than one of moderate size at the station itself (immediately west of I-205 at Division), would also be established along Division in the Division LRT Alternative (5-2). Proposed locations for these lots would be at 122nd, 136th, 148th, 170th, 182nd, 199th and the fairgrounds or at 1st and Burnside in Gresham.

\* STATION LOCATIONS

FIGURE 15

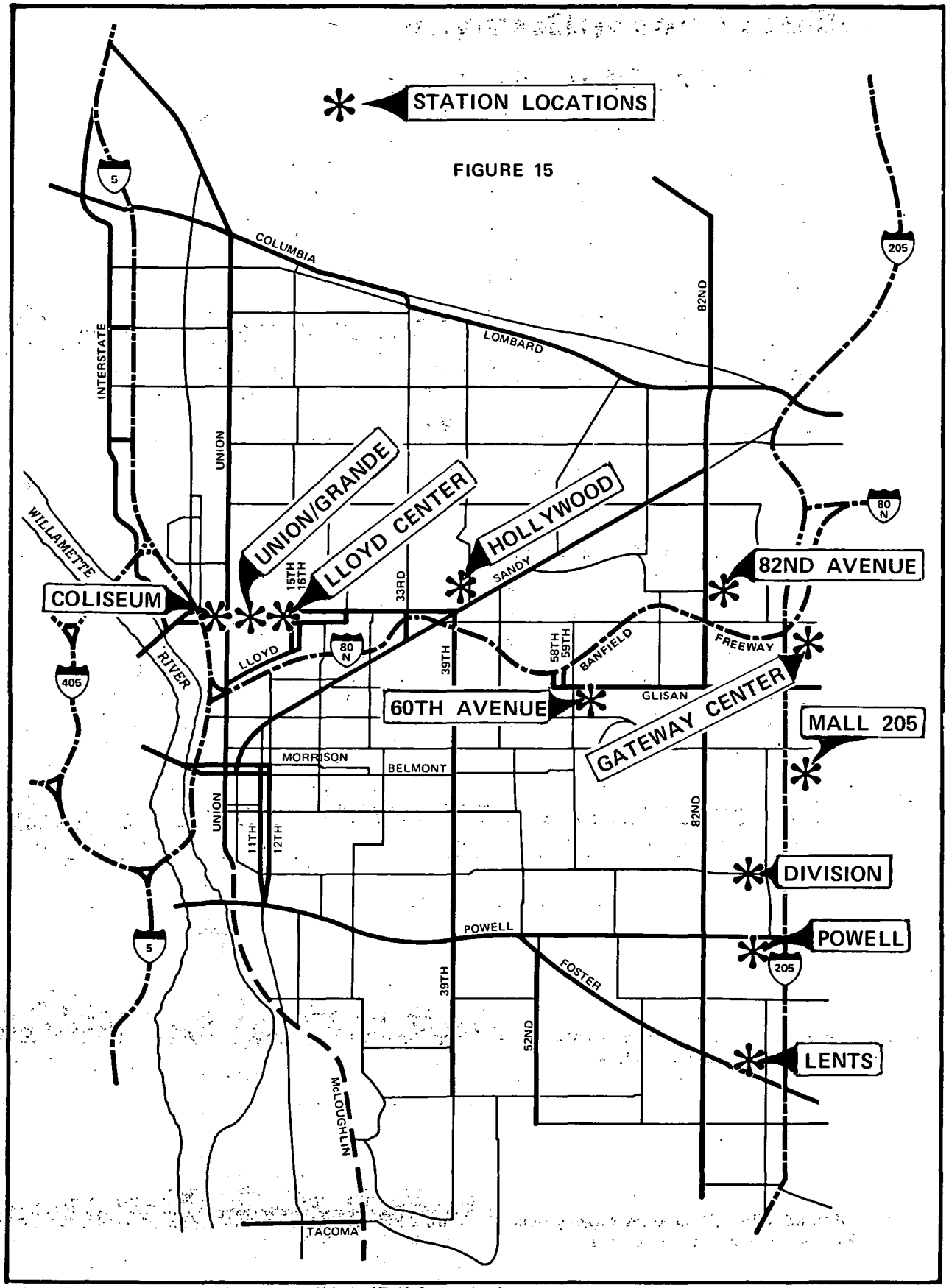
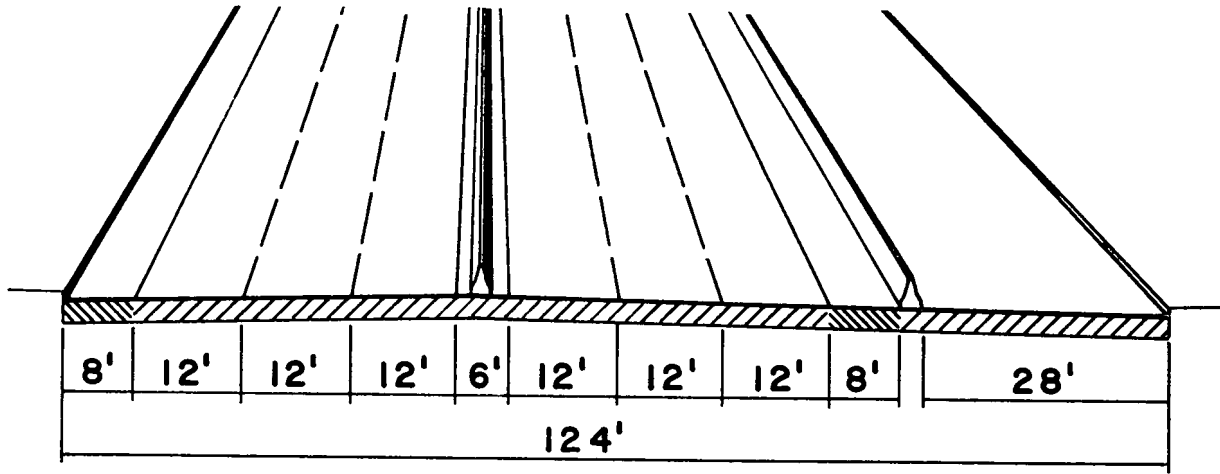


FIGURE 16

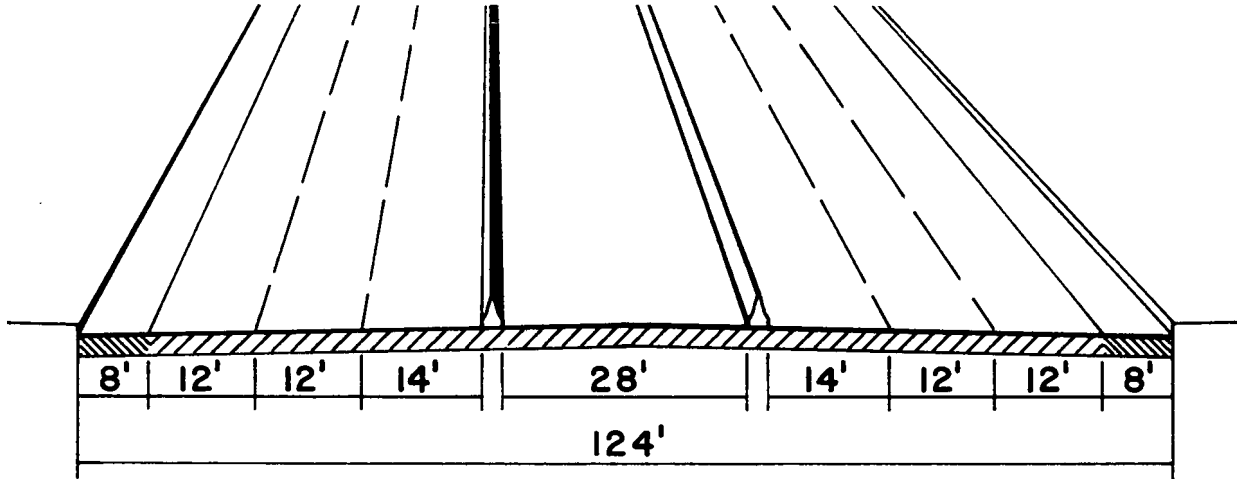
# Separated Busway

## 4a North Side

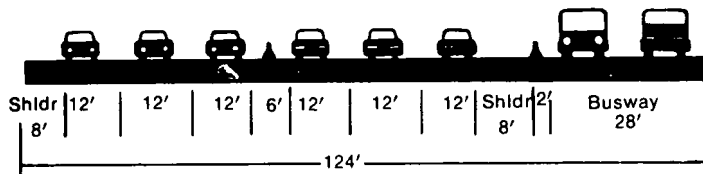


6 Lane I-205 to I-5

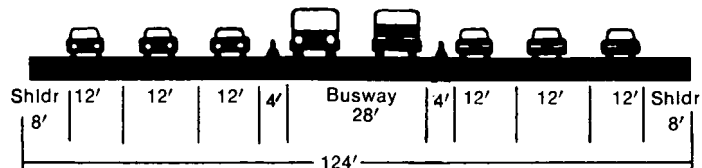
## 4b Median



Alternative No. 4a: Northside Busway plus 6-Lane Banfield with shoulders



Alternative No. 4b: Median Busway plus 6-Lane Banfield with shoulders



A transit station west of I-205 serving Powell Boulevard and Holgate Street would be located east of 92nd Avenue and south of Powell. Powell Boulevard is not planned for major improvement by Multnomah County, which limits its capacity as a traffic artery. For this reason, the Powell Station is expected to function as an integral transfer point to the I-205 busway.

The busway would terminate in the Lents District west of I-205 at Foster Road. This terminal station would primarily serve as a transfer point between local buses from Foster Road, Woodstock Boulevard and 92nd Avenue and I-205. The station would also connect express buses to the I-205 Freeway southbound.

#### Alternatives 4a and 4b: Separated Busway

##### General Description

These alternatives would establish an exclusive, Separated Busway either parallel to the north side of the freeway (Alternative 4a) or in the median between freeway traffic lanes (Alternative 4b); carpools would not be allowed use of the bus lanes (see Figure 16). The busway would operate two-way with two fourteen-foot travel lanes.

The termini and routing of the Separated Busway are that of the high occupancy vehicle lanes (Alternatives 3a, 3b and 3c). The Banfield Freeway would have two standard lanes added between N.E. 37th Avenue and I-205 with both alternatives. This improvement would provide the Banfield Freeway with six standard lanes and shoulders between Interstate 5 and Interstate 205. Unlike HOV Alternatives 3b and 3c, which would also have six standard freeway lanes, the busway options do not have the flexibility of using the bus lanes for general traffic in nonpeak hours (see Figure 16).



### Route Description

The route used by the busway alternatives is the same as described for the HOV alternatives (see "Project Sketch Map").

### Proposed Operations

Buses would operate in essentially the same fashion as described for the HOV alternatives. The operationally significant differences between the busway and HOV proposals are that the busway would have transit stations initially constructed in the Banfield portion (Hollywood, 60th and 82nd Avenues) whereas the HOV option would not. A final more subtle operational distinction between the busway and HOV concepts is that in the off-peak the HOV option would provide eight freeway lanes for general traffic east of 37th Avenue on the Banfield whereas the Separated Busway would provide only six lanes. This difference results from the non-separated character of HOV lanes which allows their use by general traffic in the nonpeak hours.

### Transit Stations

Transit stations (platform transfer areas) in the downtown connection portion of the project (between 16th Avenue and the Steel Bridge) are identical to those already described for the HOV alternatives as are the proposed stations along I-205 (see Figure 15). Unlike the HOV options, however, the busway would have stations located in the Banfield corridor at Hollywood, 60th Avenue (lift-out ramp to station at street level above busway) and 82nd Avenue (station at busway grade). Crosstown bus lines would serve each of the areas. These stations would allow a wider variety of destinations in East Portland to be accessible more directly to suburban passengers. By the same token, more urban residents in East Portland would have access to this exclusive transit link than would with the HOV alternative.

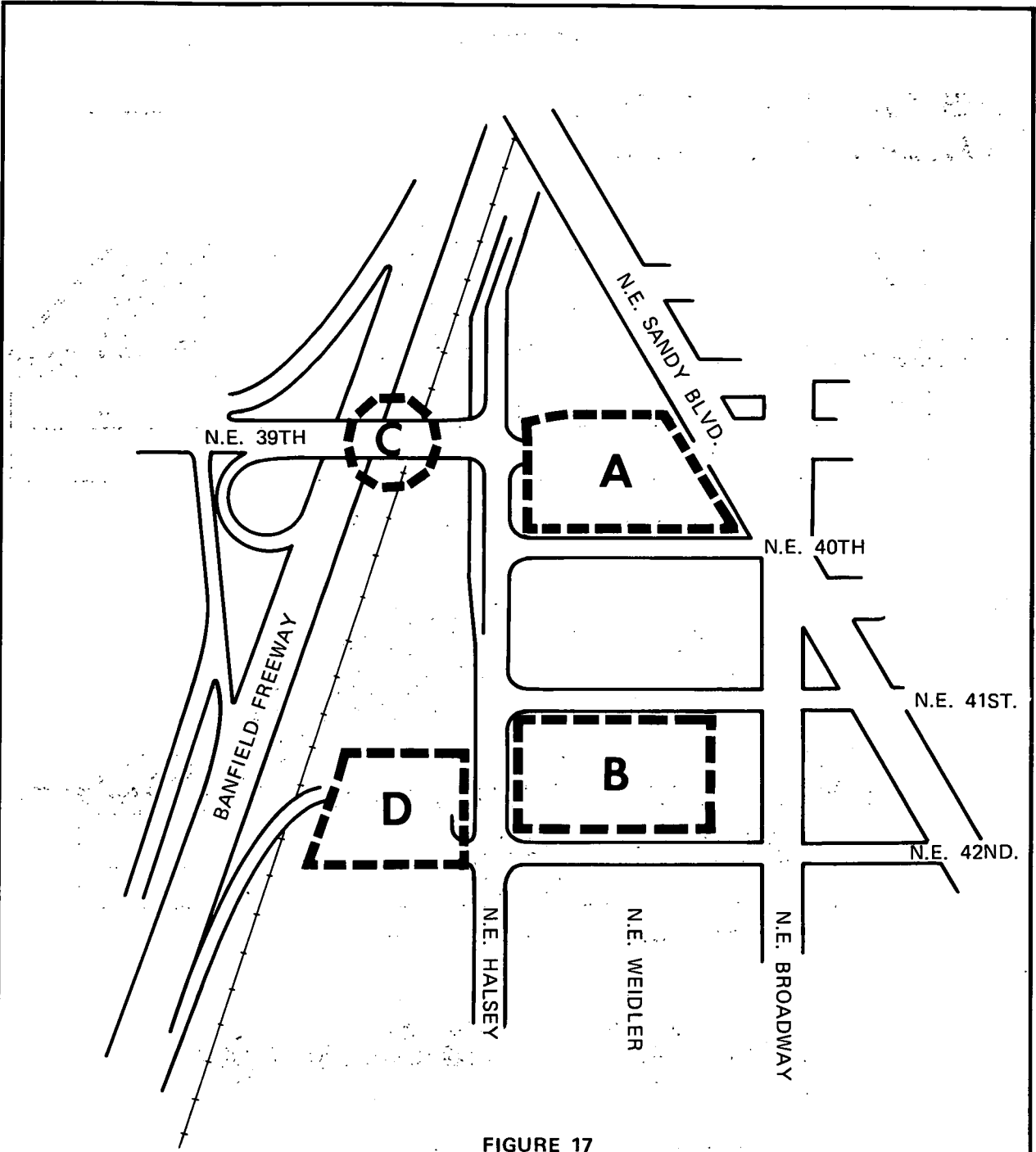
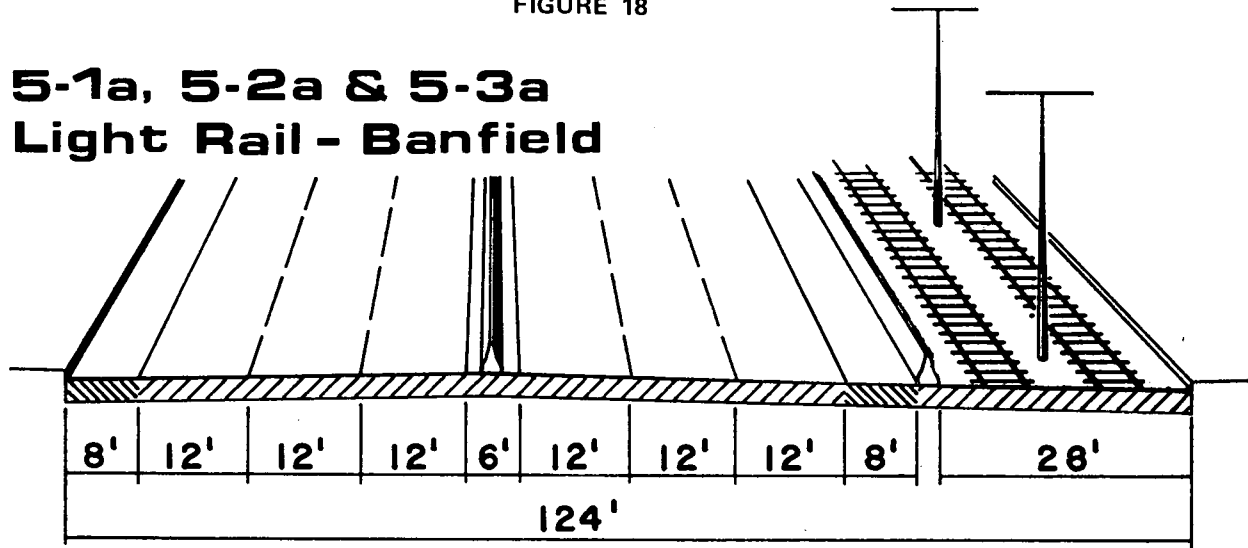


FIGURE 17

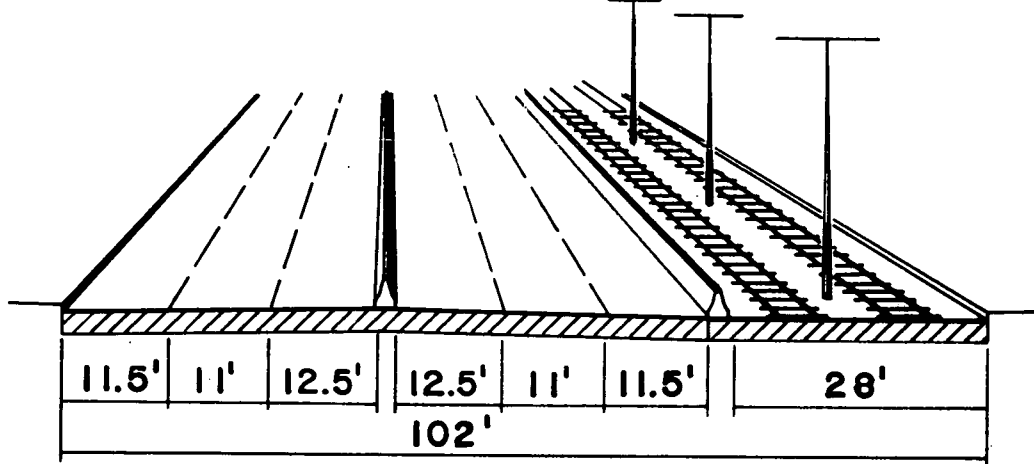
HOLLYWOOD TRANSIT STATION ALTERNATIVES

FIGURE 18

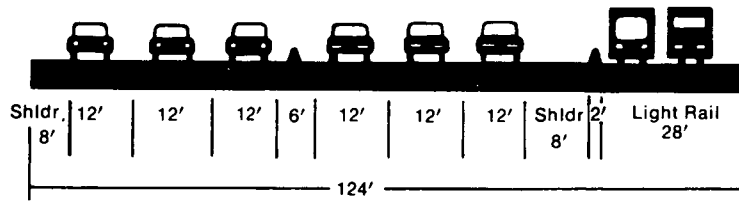
**5-1a, 5-2a & 5-3a  
Light Rail - Banfield**



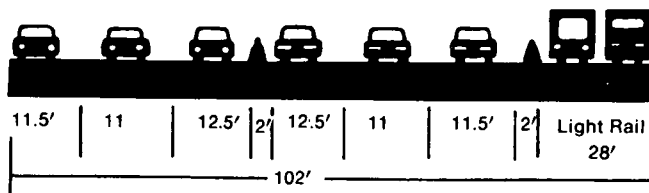
**6 Lane 37th to I-5**



**6 Lane I-205 to 37th**



Banfield: 6 lanes 37th Ave. to I-5



Banfield: 6 lanes I-205 to 37th Ave.

In the Hollywood area four sites are the subject of an ongoing study by Tri-Met and the City of Portland, since it is felt that the ultimate location will strongly influence the commercial vitality of the area. Sites under consideration include a location on the 39th Avenue overpass; an "off-line" site on the south side of Sandy and immediately east of 39th Avenue (Sandy/39th); an "off-line" site located north of Halsey and west of 42nd (Halsey/42nd) and an "off-line" site located south of Halsey between 41st and 42nd Avenues (42nd ramp). Access to the 39th site and Sandy/39th sites would be by a liftout ramp from the busway to the 39th Avenue overcrossing, whereas the Halsey/42nd sites would require construction of a separate bus ramp and relocation of the existing 42nd Avenue auto ramp to 45th Avenue (see Figure 17).

#### Alternatives 5-1a, 5-2a and 5-3a and 5-1b, 5-2b and 5-3b Light Rail Transit

##### General Description

These alternatives would utilize electrically powered light rail vehicles to serve transit trips between East Multnomah County, East Portland and downtown Portland. The Banfield Freeway would have six traffic lanes and no HOV lanes between I-5 and I-205. The only difference between "a" and "b" options is that the Banfield Freeway between 37th Avenue and I-205 would have minimum lane widths and no shoulders under "a" and standard lane widths with shoulders under "b" (see Figures 18 and 19).

All the alternatives would use the same routing between the Portland Mall and I-205. This routing is that described for the Separated Busway alternative using N.E. Holladay Street only between the Banfield and the Steel Bridge. Three options are proposed for accessing the Portland Mall; they are explained in detail under "routing." Unlike the other alternatives, the LRT options extend construction into East Multnomah County with alternate routes proposed to Gresham (Alternatives 5-1 and

5-2) and a LRT connection proposed to the Lents District (Alternative 5-3) (see Figures 20, 21 and 22).

### Route Description

Three downtown alignment options are being studied for LRT. The first alternative (On-Mall/Oak Street) would descend from the Steel Bridge on the south side of the Glisan ramp in a double track arrangement, turning south on 5th Avenue to Davis Street. At Davis, a single track would continue on 5th to Oak, turning west to 6th Avenue and returning to Davis to close the loop\* (see Figure 23).

The second alternative (on-Mall/Pioneer Square) is the same as first except that the double track on 5th Avenue would be extended to a turnaround loop using Morrison, Yamhill and 6th Avenue (see Figure 24).

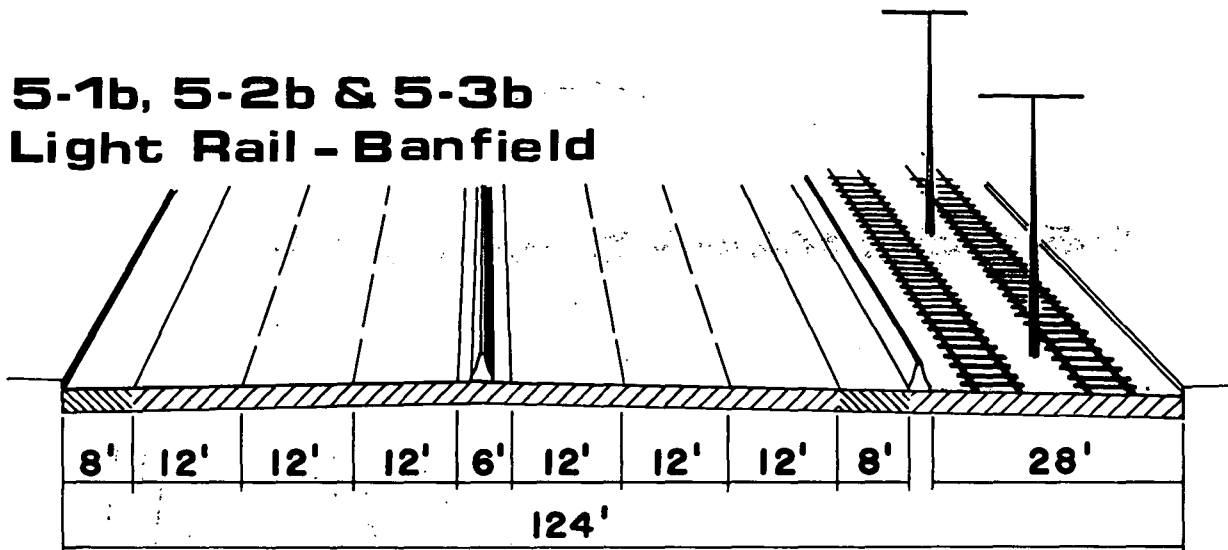
The third alternative (Cross-Mall) would employ a new ramp from the Steel Bridge descending to the intersection of Everett and N.W. 1st Avenue. Double track would continue along 1st to a loop closing on Morrison, Yamhill and the west side of 6th Avenue (see Figure 25).

N.E. Holladay Street between the Steel Bridge and the Banfield Freeway would serve as the downtown connection for LRT. Two options for the location of the LRT line on Holladay are proposed. Option 1 would locate the LRT tracks on the north side of Holladay Street from Occident Avenue to the Banfield Freeway. Option 2 would locate the tracks on the south side of Holladay Street as far as Union Avenue; at Union, the tracks would cross over to the north side of Holladay Street and continue to the Banfield Freeway. For both options, two west-bound travel lanes for autos and trucks would remain on Holladay Street.

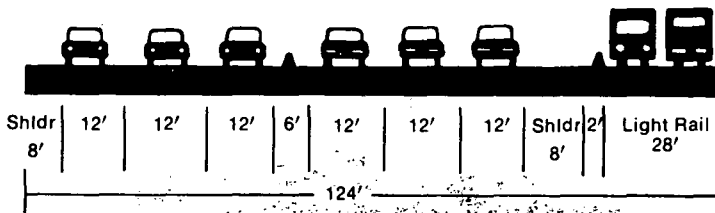
\*Downtown LRT alignments are described in "Banfield Transitway Project: Downtown Circulation Alternatives" (DeLew, Cather, June 1977, pp. 65-76).

FIGURE 19

**5-1b, 5-2b & 5-3b  
Light Rail - Banfield**



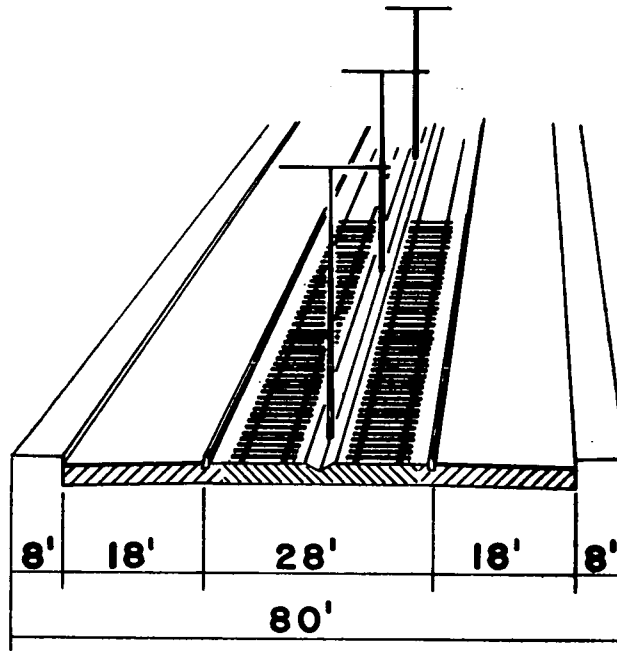
**6 Lane I-205 to I-5**



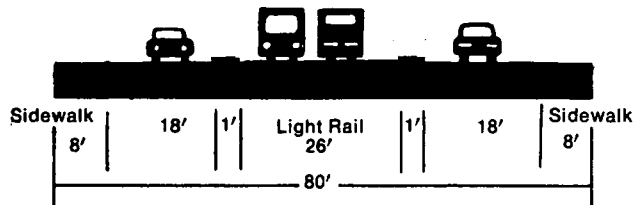
**Banfield: 6 lanes I-205 to I-5**

FIGURE 20

### 5-1 Light Rail - Burnside St.



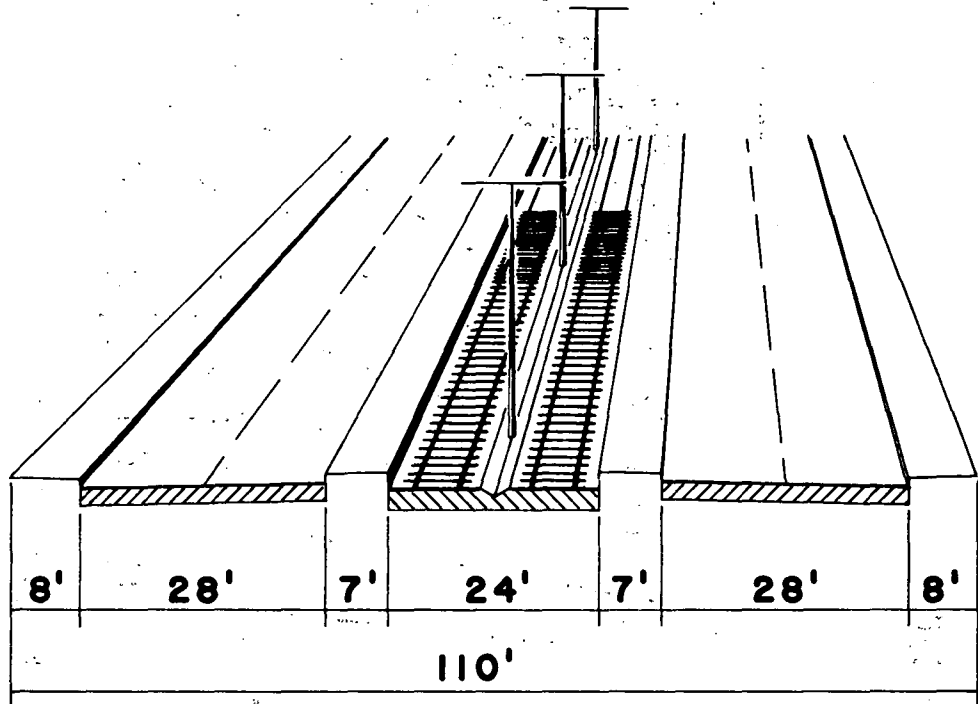
I - 205 to 181st St.



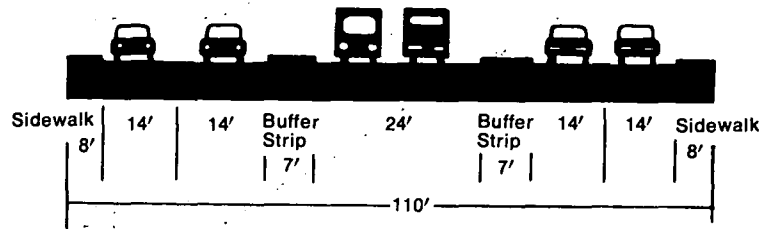
E. Burnside: 96th Ave. to 181st Ave.

FIGURE 21

# 5-2 Light Rail - Division St.



I-205 to Gresham

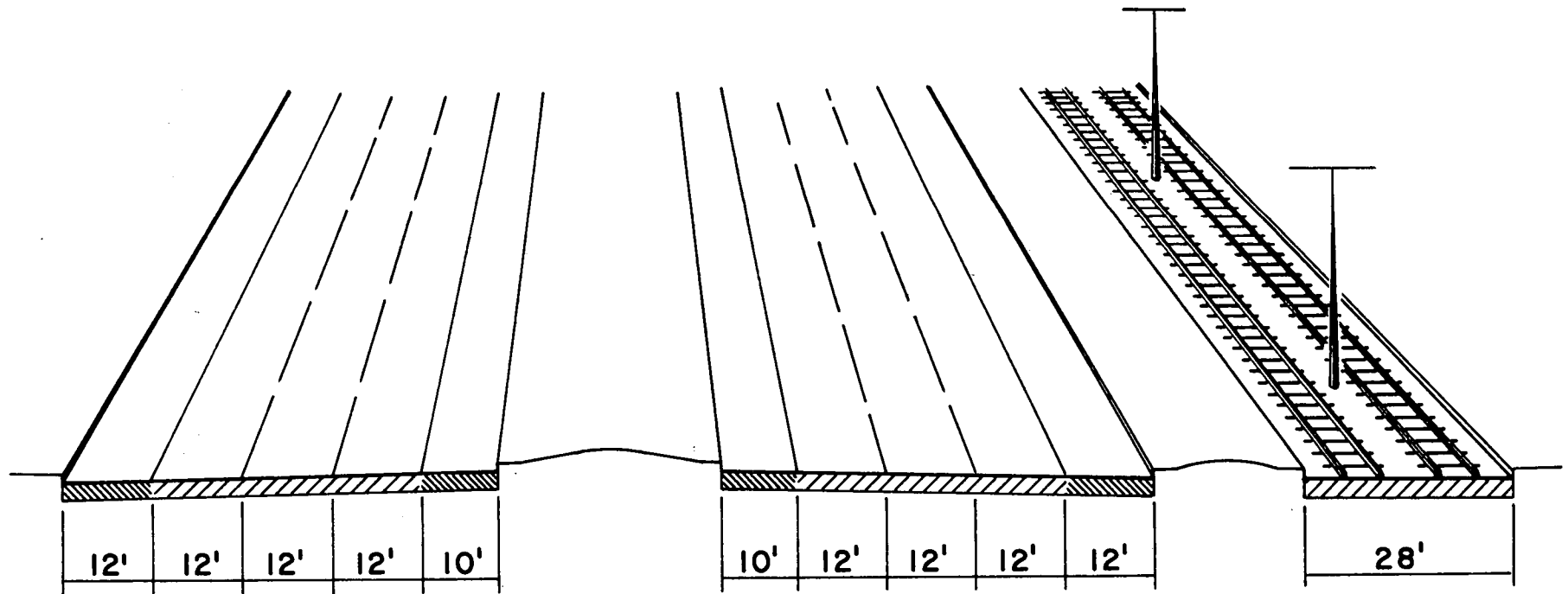


Division Street: 96th Avenue to 221st. Avenue

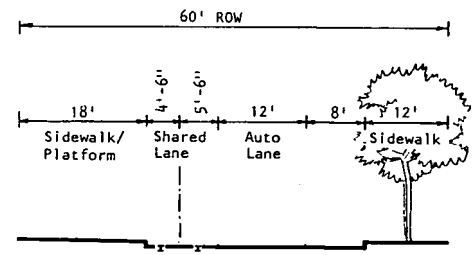
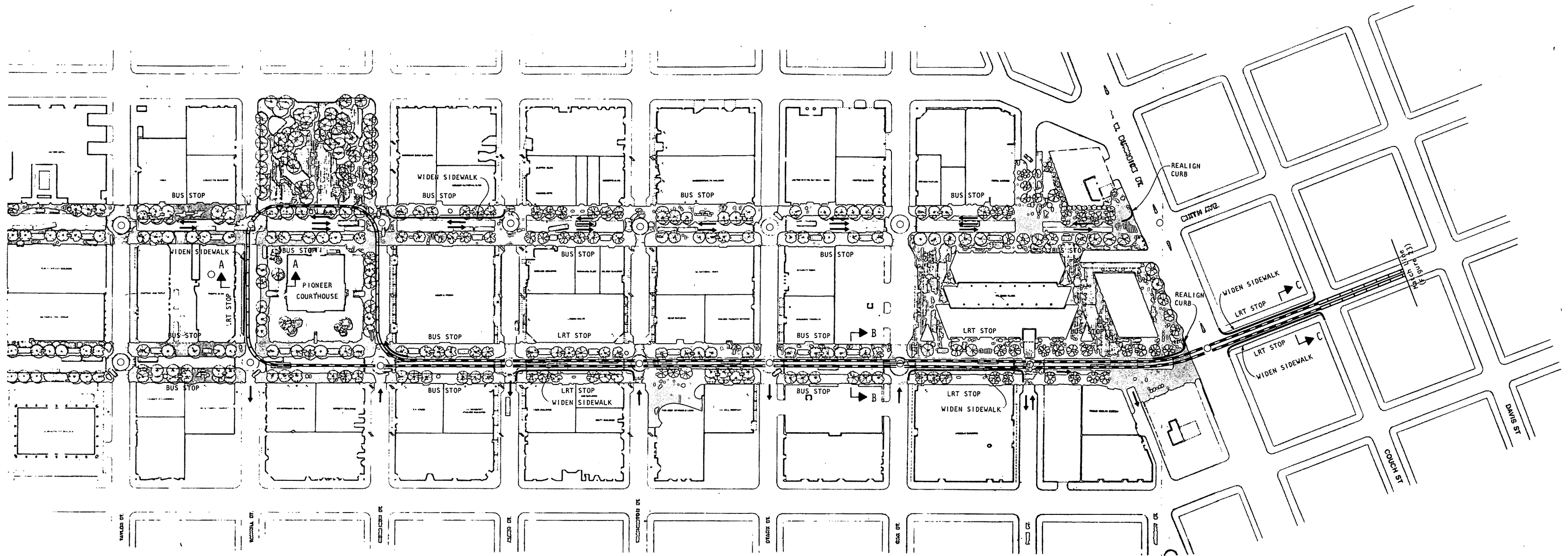


FIGURE 22

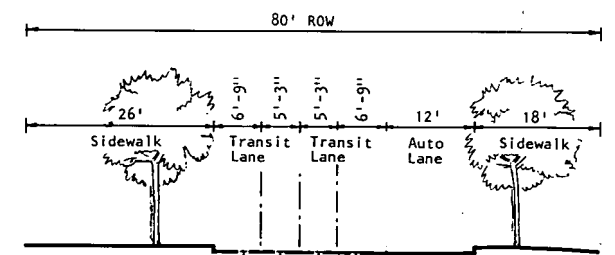
**5-3  
Light Rail, Banfield - I-205**



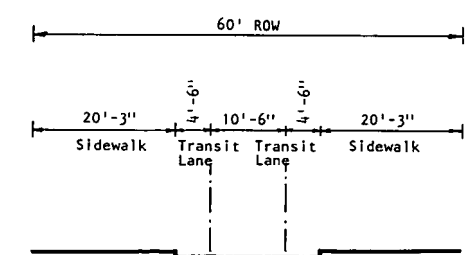
**Holgate to Steele**



SECTION A - A



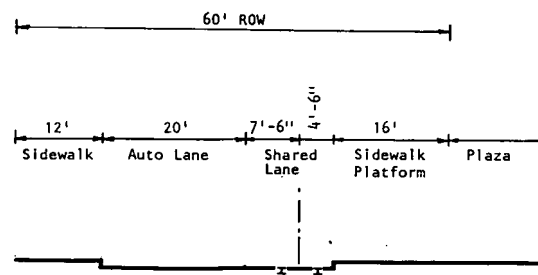
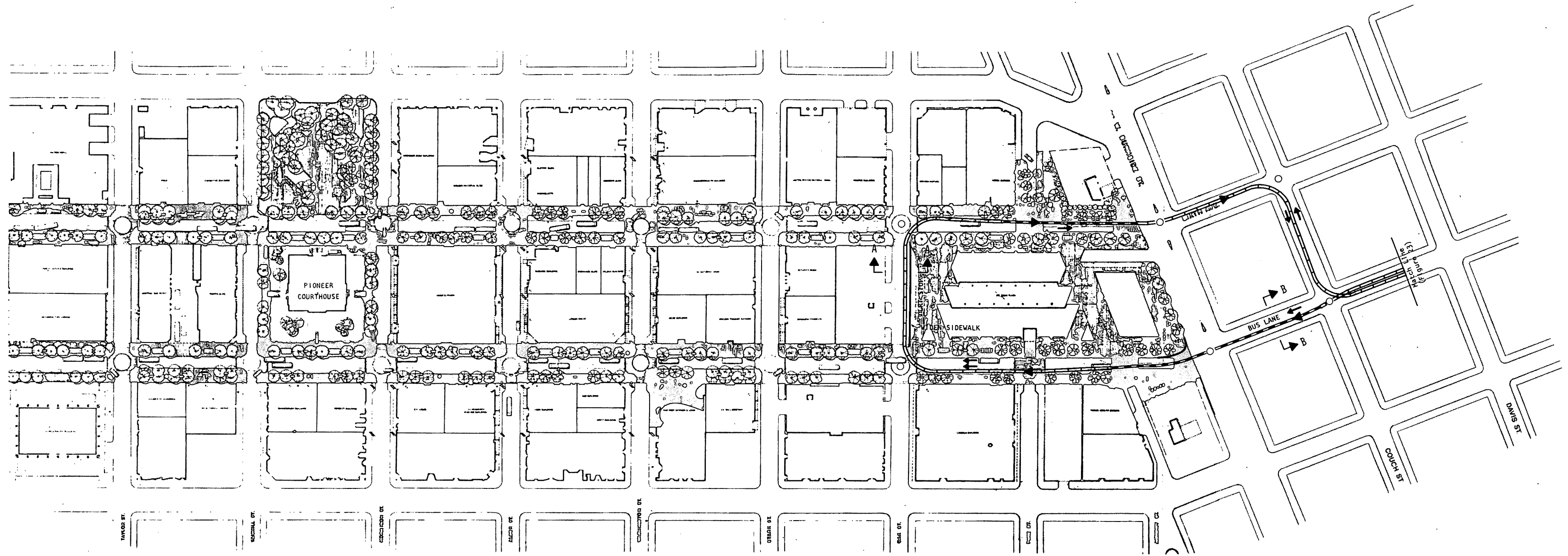
SECTION B - B



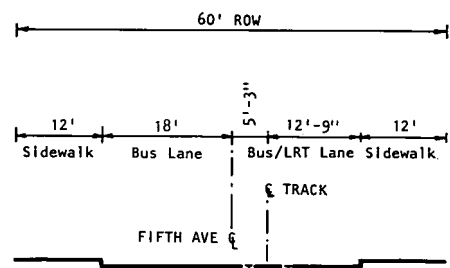
SECTION C - C

- EXCLUSIVE LRT (including that shared with buses during Phase I)
- LRT SHARED WITH TRAFFIC
- TRAFFIC SIGNAL
- NEW CURB

**FIGURE 23**  
LRT ALTERNATIVE - ON-MALL ALIGNMENT  
PHASE I (BAHNFELD LINE ONLY) TO  
PIONEER SQUARE LOOP



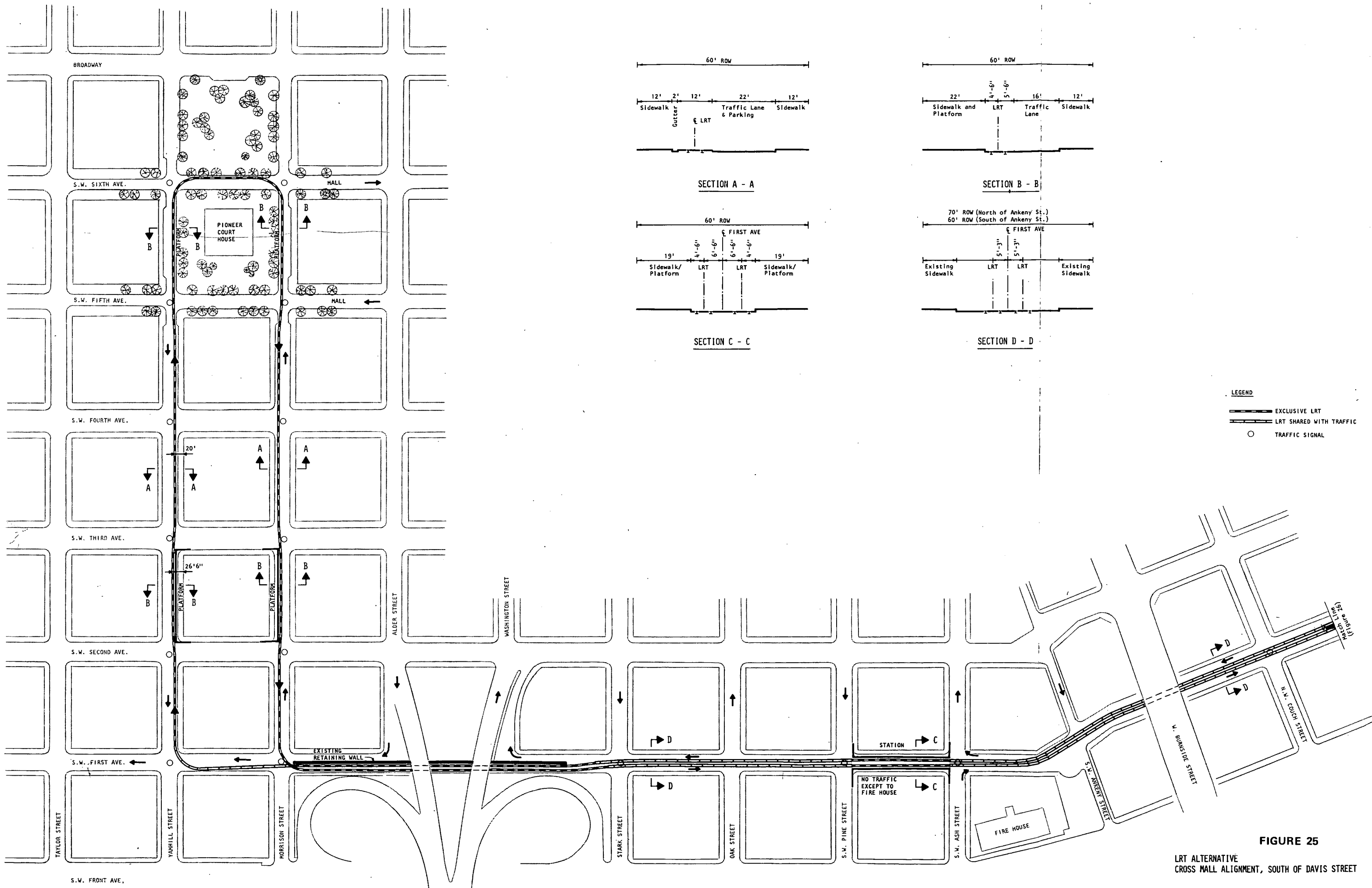
SECTION A - A



SECTION B - B

- EXCLUSIVE LRT (Including shared with buses)
- LRT SHARED WITH TRAFFIC
- TRAFFIC SIGNAL
- NEW CURB

FIGURE 24  
LRT ALTERNATIVE - ON-MALL ALIGNMENT  
PHASE I (BANFIELD LINE ONLY) TO  
OAK STREET LOOP



A new ramp would be constructed to connect the N.E. Holladay route at 13th Avenue with the Banfield LRT alignment, which would lie between the freeway and Union Pacific Railroad tracks. The LRT alternative would parallel the north side of the Banfield Freeway to I-205, where a "liftout" ramp would be constructed to provide access to the Gateway Station. The line would continue running to either E. Burnside Street, Division Street, or Lents.

The LRT line paralleling I-205 would likely take the place of the planned I-205 busway. If the busway on I-205 is constructed, however, a future LRT line could be installed between it and the freeway right-of-way boundary.

Under Alternative 5-1 the LRT line would leave the I-205 right-of-way at East Burnside Street and proceed east on Burnside in a reserved median right-of-way to 199th Avenue, where the alignment would enter the Portland Traction Company (PTC) right-of-way. The alignment would follow the north side of the existing track until crossing over to the south at 202nd Avenue. The alignment then turns into the median of 221st Avenue to enter the old Fairgrounds area. Access to an alternate site at 1st and Burnside near Powell Boulevard would continue along the PTC alignment.

Alternative 5-2, the Division Street route, would leave the Gateway area and also follow the I-205 busway alignment to Division. In a median track on Division the route would proceed east to the Fairgrounds site in Gresham identified for Alternative 5-1. The alternate site in the vicinity of 1st and Burnside near Powell Boulevard would be accessed by the LRT alignment turning southeasterly off Division at approximately 223rd, then following the PTC rail line in the same fashion as Alternative 5-1.

Alternative 5-3 would operate along the I-205 freeway between Gateway and the Lents district. The line would follow the busway previously planned as a

component of the I-205 Freeway. That alignment parallels the east side of the freeway north of Division Street, and on the west side between Division and Foster Road, passing below the freeway and a short tunnel near Lincoln Street.

#### Proposed Operations

Light Rail Transit is a form of electric rail transit that evolved from the streetcar. It uses relatively large vehicles, powered by an overhead wire, that can operate singly or in short trains of two or more cars. While Heavy Rail Transit (such as BART or the subway systems of East Coast cities) has power collection and train characteristics that require a fully grade-separated trackway, LRT systems do not need to be grade separated. Consequently, they can operate on city streets, transit malls, and street medians as well as grade-separated rights-of-way. As a result of this versatility, LRT systems can be built for far less cost than other forms of rail rapid transit.

The maximum speed of a typical light rail car is about 62 mph; however, 55 mph is more realistic given the spacing of stations on the Banfield. On arterial street segments, the posted speed limit could be used as the maximum. The average speed from Gresham to CBD would be about 25 mph under both the Burnside and Division alternatives; the running time would be about 35 minutes. On the I-205 alternative the average speed would be about 26 mph with a running time from Lents to CBD of 25 minutes. Service levels would require 30 LRT vehicles (including spares) in the Burnside and Division alternatives, and 22 LRT vehicles (including spares) in the I-205 alternative.

The LRT line running from the downtown to Gresham via E. Burnside, is about 14.4 miles long. It would have 15 stations east of the Willamette River and 2 to 6 stations in downtown Portland. The line would include double-track operation

to Gateway and single-track operation from Gateway to Gresham. The Banfield/Burnside LRT line (5-1) assumes a main repair and storage facility located just east of S.E. 202nd Avenue and south of the Portland Traction Company's Bull Run line. The Banfield/Division alternative (5-2) is 15.2 miles long with 16 stations east of the Willamette River. Like Alternative 5-1, there would be double-track operation to Gateway and single-track operation from Gateway to Gresham. A repair and storage facility would be located at about 199th Avenue, just west of the PTC crossing of Division Street.

The Banfield/I-205 LRT line (5-3) is 10.2 miles long with 11 stations east of the Willamette River. It would be double-tracked for its full length. A maintenance facility would be located north of Gateway, in the vicinity of the present Rocky Butte Jail.

All LRT alternatives would have 5-minute peak period frequency of service on the Banfield segment and 10-minute service beyond Gateway. Midday frequency would be 10 minutes to Gresham (or 15 minutes to Lents). Automatic train protection and speed control would be achieved through use of a signal system on grade-separated segments of the system. Substations spaced approximately two miles (3.2 km) apart supply high voltage DC power to the overhead electrical system. Crossing protection and signal preemption would be provided at all grade crossings and intersections.

### Transit Stations

The three downtown alignments have been described previously. For the On-Mall/Oak Street alternative, two platforms are located at Oak Street between 5th and 6th Avenues, and at Glisan between 4th and 5th Avenue (inbound). For the On-Mall/Pioneer Square alternative the platforms are located between 5th and 6th Avenues at the Mall on both sides of the Morrison-Yamhill loop, on 5th Avenue

between Alder and Washington, Oak and Pine, and Burnside and Couch, as well as on Glisan between 4th and 5th.

For the Cross-Mall alternative the Morrison-Yamhill loop would cross the Mall and platforms would be on both Morrison and Yamhill between the Mall avenues and similarly between 2nd and 3rd Avenues. There would be two stops on 1st Avenue, the first between Ash and Pine, the other between Davis and Everett.

On Holladay, platforms would be between Occident and First Avenues (Coliseum), between Union and Grand, and at Lloyd Center at Holladay Park.

Platforms on the Banfield segment would be at Hollywood near 37th Avenue, at 60th and just east of 82nd Avenue. There would be a multiple platform developed east of I-205 in the Gateway area.

On the Burnside segment, stations are planned at 102nd, 122nd, 148th, 162nd, 172nd, 181st and 192nd; the terminal would be in the Fairground or at 1st and Burnside. The average spacing between stations for the entire line is .76 mile.

On the Division route, stations would be located at Mall 205 and Division Street on the I-205 portion and at 122nd, 135th, 148th, 170th, 182nd and 195th on Division with the terminal at either the Fairgrounds or at 1st and Burnside.

On the I-205 segment, stations are proposed at Gateway, Mall 205, Division Street, Powell Boulevard and Lents (Foster Road). A terminal for bus lines would also be constructed at either the Fairgrounds or at 1st and Burnside.

If the alternate station site at 1st and Burnside is developed, an additional line station at the P.T.C./Main Street intersection would be provided.

In the downtown area, loading areas would be similar to the bus-loading areas now used on the Mall. On Holladay the stations would be center island platforms. Design details of the platforms have not been determined. The Banfield



segment stations at Hollywood, 60th and 82nd are functionally similar to those on Holladay Street with the principal exceptions being that all are located at freeway level. Vertical access would be provided to overpasses by means of stairs and elevators for the handicapped. Station platforms would be 240 feet long to accommodate the vertical access structures at one end.

On Burnside and Division the inbound and outbound station platforms would be split between the two sides of each major intersection to facilitate traffic flow. This type of platform arrangement has side loading instead of island platforms. In other respects the station platform design is comparable to an island platform design. The terminal stations at the Gresham Fairgrounds site would have single island platform.

The following tabulation of station locations and platform types indicates the level of development proposed for each platform area. Distinction between types of platforms is based on ridership potential, with consideration of existing and potential transit supportive developments. A broad classification of platform types is described below.

- Type A: Major Activity Node - Platform areas which will accommodate high volume and intermodal transfers.
- Type B: Minor Activity Node - Platform areas which will accommodate moderate volume and some intermodal transfers with adequate provision for high-peak demands.
- Type C: Local Area Service - Platform areas should accommodate moderate volume patronage and little or no transfer traffic.

A type A platform design would include such physical elements as shelters with enclosed waiting area, expanded transit information (including Tri-Met information in addition to basic transit information regarding routes and schedules), and

full facilities, lavatories, water fountains, in addition to such facilities as aids for handicapped, telephones, benches, waste receptacles, clocks, ticket dispenser, signing, landscaping). Type B platforms would be less elaborate; partial shelters with protective walls are sufficient, as are limited transit information and limited facilities. Type C requirements call for still less elaborate facilities, with partial or no shelters, also only requiring limited information and facilities.

Three downtown alternative routes with platform areas are included in the following tabulation. They have all been designated as Type A, based on the understanding that they would have high-volume patronage, especially at peak hours. However, certain Type A platform facilities may not be necessary at some of the downtown station locations (i.e., lavatories, enclosures and landscaping).

Table 2 summarizes the station locations for the LRT alternatives.

TABLE 2

STATION LOCATION AND PLATFORM TYPES  
DOWNTOWN

<u>Designation</u>	<u>Location</u>	<u>Type</u>
<u>On-Mall (Oak Street)</u>		
Oak	Oak Street between 5th and 6th Avenue	A*
Glisan	On Glisan between 4th and 5th Avenue	A*
<u>On-Mall (Pioneer Square)</u>		
Mall	Yamhill Street between 5th and 6th Avenue	A*
Mall	Morrison Street between 5th and 6th Avenue	A*
Fifth	5th Avenue between Alder and Washington Streets	A*
Fifth	5th Avenue between Oak and Pine Street	A*
Fifth	5th Avenue between Burnside and Couch Streets	A*
Glisan	Glisan Street between 4th and 5th Avenue	A*
<u>Cross-Mall</u>		
Morrison	Morrison Street between 2nd and 3rd Avenue	A*
Mall	Morrison Street between 5th and 6th Avenue	A*
Mall	Yamhill Street between 5th and 6th Avenue	A*
Yamhill	Yamhill Street between 2nd and 3rd Avenue	A*
First	First Avenue between S.W. Pine and Ash Street	A*
First	First Avenue between David and Everett Streets	A*

\*Certain platform design features not required (see preceding text).

TABLE 2 (continued)

<u>Designation</u>	<u>Location</u>	<u>Type</u>
<u>Stations East of Steel Bridge (Burnside Option)</u>		
Coliseum	Holladay Street between Occident and First Avenues	C
Union/Grand	Holladay Street between Union and Grand Avenue	B
Lloyd Center	Holladay Street at Holladay Park	A
Hollywood	Banfield r.o.w. at 39th Avenue	A
60th	Banfield r.o.w. at 60th Avenue	C
82nd	Banfield r.o.w. at 82nd Avenue	C
Gateway	Gateway Center 97th Avenue and Multnomah	A (with park-and-ride facilities for 418 spaces)
<u>East Burnside Street-Gresham</u>		
102nd	Burnside Street at 102nd Avenue	C
122nd	Burnside Street at 122nd Avenue	B (park-and-ride facilities for 250 spaces)
148th	Burnside Street at 148th Avenue	C
162nd	Burnside Street at 162nd Avenue	B (with park-and-ride facilities for 250 spaces)
172nd	Burnside Street at 172nd Avenue	C
181st	Burnside Street at 181st Avenue	A (with park-and-ride facilities for 250 spaces)
192nd	Burnside Street at 192nd Avenue	B (with park-and-ride facilities for 250 spaces)
Fairgrounds	Central Fairgrounds	A (with park-and-ride facilities for 625 spaces)

TABLE 2 (continued)

<u>Designation</u>	<u>Location</u>	<u>Type</u>
Gresham Alternative	Burnside/Hogan Street	B
	<u>Division Street-Gresham</u>	
Mall 205	East of I-205 at Mall 205	A (250 park-and-ride spaces)
Division	Division Street at I-205	B (with 250 park-and-ride spaces)
122nd	Division Street at 122nd	C (with 250 park-and-ride spaces)
136th	136th Avenue and Division	C
148th	148th Avenue and Division	C (200 park-and-ride spaces)
170th	170th Avenue and Division	C
182nd	182nd Avenue and Division	C (250 park-and-ride spaces)
199th	199th Avenue and Division	C (200 park-and-ride spaces)
Fairgrounds Alternative	Central Fairgrounds	A (625 park-and-ride spaces)
Gresham Alternative	1st and Burnside	B (Unspecified number of park-and-ride spaces)

**PART C**

**ENVIRONMENTAL IMPACT DISCUSSION**

**CHAPTER ONE**

**TRAFFIC AND PUBLIC TRANSIT IMPACTS**

CHAPTER ONE / TRAFFIC AND PUBLIC TRANSIT IMPACTS

Introduction

The Banfield Freeway is the main transportation artery for east-west movement between the Willamette River and East Portland and East Multnomah County. Because of this, changes in the Banfield corridor potentially have far-reaching effects on transportation in the Portland region.

In this section, the proposed traffic and public transit improvements will be evaluated from the standpoint of existing transportation conditions, forecast travel demand and future transportation conditions with the given project alternatives.

Future transportation conditions are evaluated for the year 1990, to be consistent with areawide land-use planning forecasts of population and employment. Existing conditions will normally pertain to the years 1975 or 1976, unless otherwise indicated.

Most of the information used to evaluate project transportation impacts was derived from four major studies conducted during project development. These reports are referenced where additional information may be of value to reviewers.

Study Areas

Study areas for the analysis of traffic and public transit impacts are similar to those identified for other socioeconomic impact categories: Downtown Portland, East Portland, and East Multnomah County. East Portland and East Multnomah County together are referred to as the "East Side." The discussion of impacts is organized by impact categories and project alternatives with impacts



pertinent to a given study area called-out in the text. This format was chosen because of the interrelated nature of the study areas with regard to traffic and public transit impacts.

### Existing Conditions

#### Downtown Portland

Most traffic entering the downtown from points east of the Willamette River cross one of seven bridges: Broadway, Steel, Burnside, Morrison, Hawthorne, Marquam or Ross Island (see Figure 26). The downtown street system is basically a one-way grid of east-west and north-south streets.

Traffic circulation and parking is guided by the "Downtown Parking and Circulation Policy," adopted in February, 1975.\* The policy designated downtown streets according to their intended function--either traffic access, local service, or non-automobile-oriented streets (see Figure 27).\*\* Traffic access streets are to become the principal routes for autos, providing direct access to parking, especially off-street and public-use parking.\*\*\* Local service streets would primarily serve local circulation needs and access to retail outlets, loading facilities, and some off-street parking; these streets may also provide pedestrian and bicycle access.\*\*\*\* Non-automobile-oriented streets are intended to be used primarily as existing or future public transit, pedestrian and bicycle routes.

\*Downtown Parking and Circulation Policy (City Council of Portland, February 26, 1975).

\*\*Ibid., p. 24.

\*\*\*Ibid., p. 17.

\*\*\*\*Ibid., p. 23.

Towards this end, auto-oriented facilities potentially served by these streets would be discouraged.\*

Downtown Portland is subject to a Transportation Control Strategy (TCS), developed in response to the regulatory requirements of the Oregon Department of Environmental Quality (DEQ), which is charged with the responsibility of administering the clean air standards of the U.S. Environmental Protection Agency. The Downtown Parking and Circulation Policy is part of the TCS. The TCS sets forth a broad range of actions on the part of the City, Tri-Met, and other agencies, which would lead to conformance with the clean air standards, several of these actions are noteworthy.

First, a ceiling on downtown parking spaces (exclusive of hotels and residences) was established, with about 40,000 spaces as the maximum number allowable in the downtown. Secondly, a series of steps were taken to modify parking operations, including increases in the cost of on-street parking, coordination of shorter term on-street parking with locations where such demand exists, and initiation of an on-street carpool permit program. The over-all objectives are to discourage long-term on-street parking, make available on-street spaces for short-term needs (thus reducing circulation congestion), and encourage the use of transit trips to the downtown.

Other important elements of the TCS included synchronized signalization, increases in transit service, and the Portland Mall, the combination of which has already realized significant air quality improvements.

\*Ibid, p. 20.

FIGURE 26  
MAJOR POINTS OF DOWNTOWN ACCESS  
FROM EAST PORTLAND

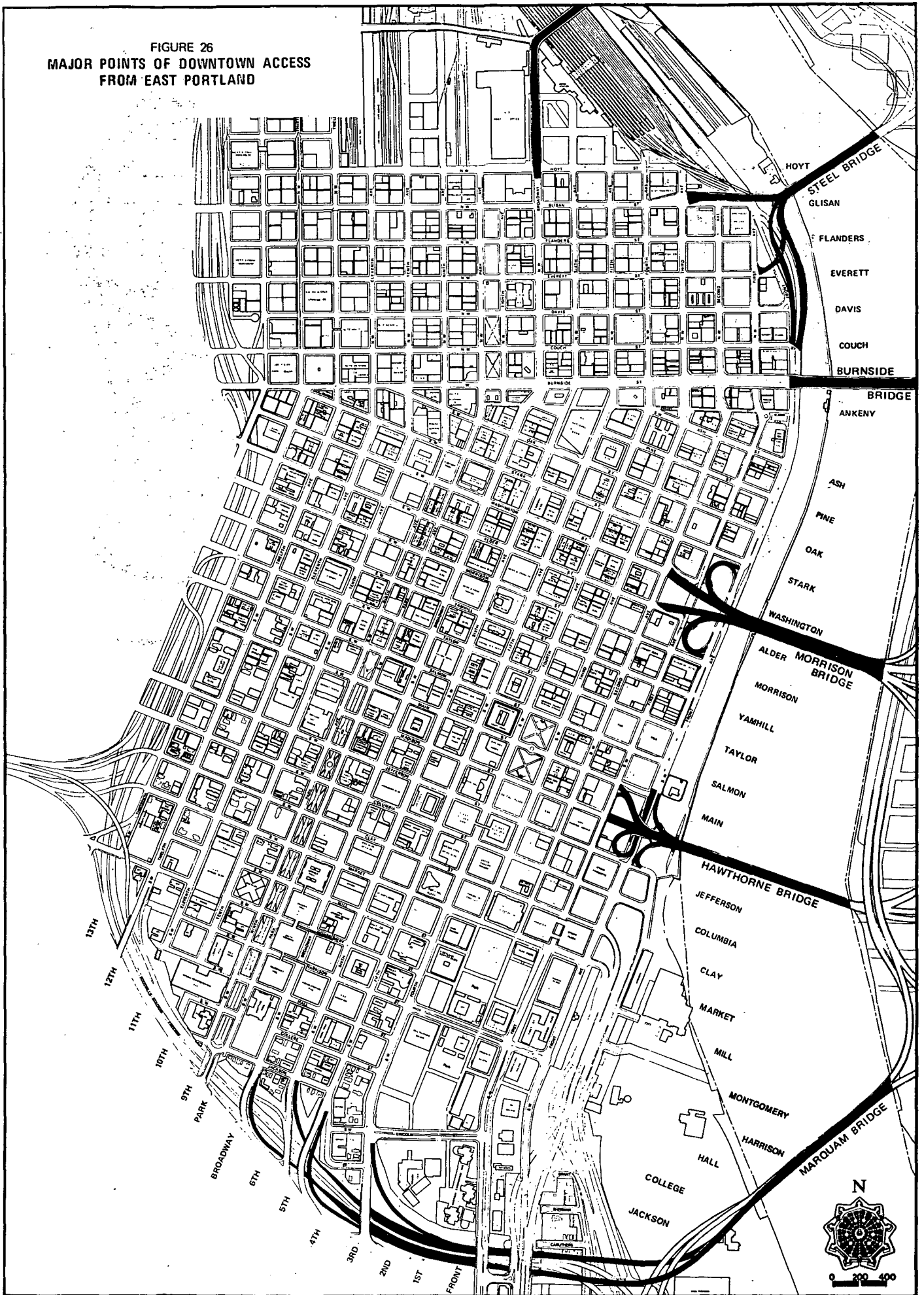
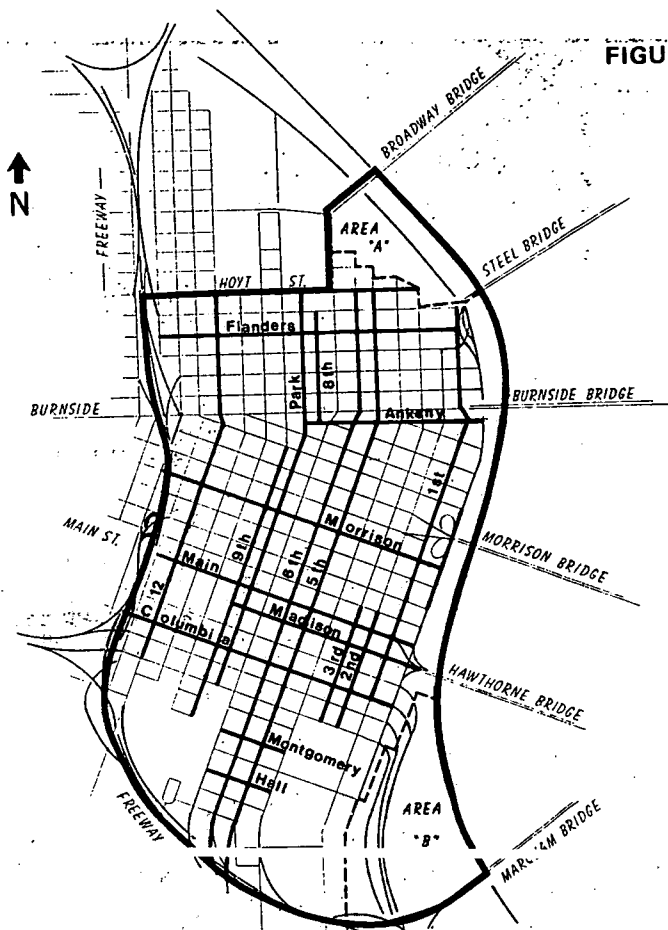
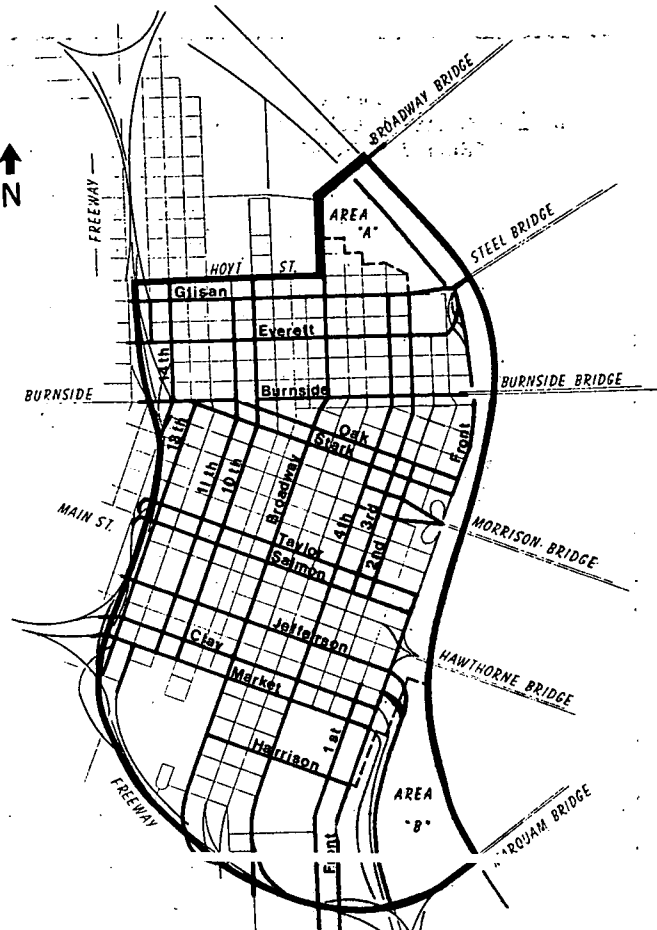


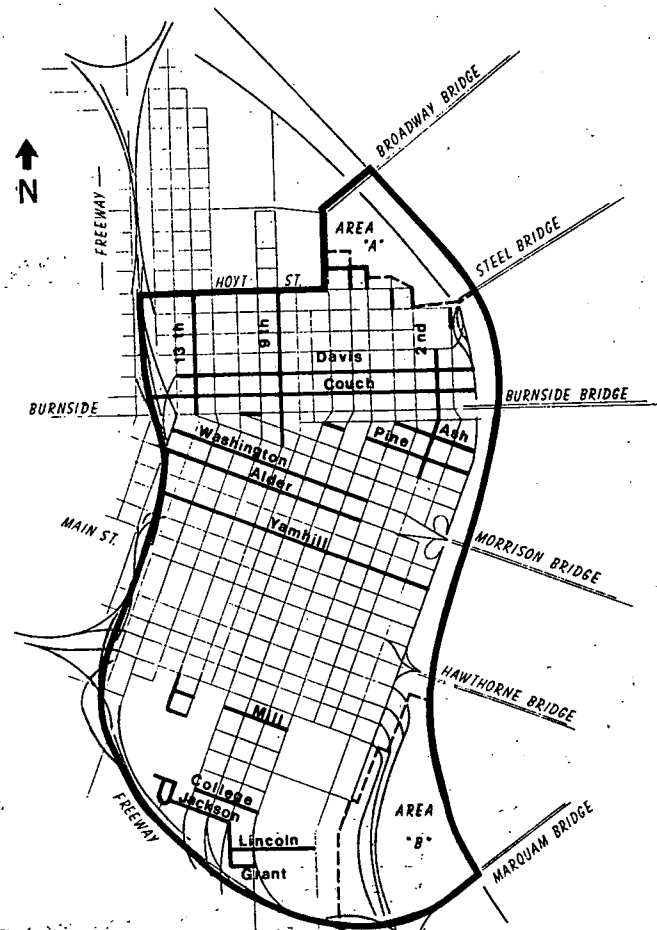
FIGURE 27



NON-AUTOMOBILE ORIENTED STREETS



TRAFFIC ACCESS STREETS



LOCAL SERVICE STREETS

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

The City's policies, the TCS, and other downtown planning efforts, have resulted in significant changes in downtown transportation. There has been a dramatic decline in through traffic (the completion of I-405 contributed substantially to this), a significant decline in auto circulation, and significant increases in the use of transit. Future traffic increases in the downtown will be moderated by these policies and associated actions.

Downtown Portland is the focus of the current Tri-Met transit system since the greatest percentage of transit trips have downtown destinations. It is estimated that eighty-five percent of regional transit trips terminate in or pass through the downtown area.\* In December, 1977, the Portland Mall on Fifth and Sixth Avenues between Madison and Burnside Streets opened. Operation of the mall will improve the efficiency of transit by concentrating bus volumes on the mall streets and several intersecting east-west streets, relieving congestion on streets no longer needed for downtown transit circulation. Most buses entering the downtown will pass through the mall. A detailed description of bus circulation impacts of the Portland Mall is contained in the "Final Environmental Impact Statement: Fifth and Sixth Street Transit Mall," pages (1-d) 22-25.

\*Banfield Transitway Project: Downtown Circulation Alternatives (DeLeuw/Cather, June 1977) p. 23.

### East Portland

The Banfield Freeway section passing through East Portland is the most heavily-traveled east-west route in Oregon. In 1974, over 102,000 average daily vehicles were recorded in the most heavily-traveled section: Holladay Street to 33rd Avenue. Peak-hour volumes on this section averaged 5300 vehicles per hour (vph) in the morning (westbound) and 5000 vph in the evening (eastbound) in 1975. These volumes are in excess of the freeway "D" level design capacity (5000 westbound, 4600 eastbound) which means travel is normally slow and interrupted.

Traffic volumes east of 33rd Avenue decline, but so does freeway capacity past 39th Avenue since the Banfield is reduced from six to four lanes. The P.M. peak-hour "D" level capacity of 3300 vph is exceeded by more than 20 percent with existing traffic averaging about 4000 vehicles per hour.

East-west arterials in the study area include Broadway and Weidler, Halsey, Glisan, Burnside, Stark, Belmont and Morrison Streets. These streets interconnect the downtown employment core with residential areas east of the Willamette River and carry the majority of peak-hour traffic, although only slightly more than the Banfield Freeway (51 percent versus 49 percent in the morning and 57 percent versus 43 percent in the evening).

At 21st Avenue major east-west arterials carried about 5600 vph westbound during the A.M. rush and 6600 eastbound during the P.M. peak in 1975. These volumes operate at low levels of service on many of the arterials, although peak-period on-street parking restrictions on some streets facilitate flow.

In sum, approximately 9.4 lane-miles of the Banfield Freeway and 24.5 lane-miles of arterial streets currently operate over capacity during the rush hours in East Portland.

### East Multnomah County Study Area

In suburban East Multnomah County traffic volumes on the Banfield drop off sharply from the urbanized area to the west. 1975 weekday volumes averaged about 28,000 just west of 122nd Avenue. Evening peak-hour volumes averaged 2000 vph eastbound (two lanes) in the vicinity of 122nd, with traffic volumes dropping steadily to the east.

Major east-west arterial streets in the East County are Halsey, Glisan, Burnside, Stark, Market-Main, Division and Powell. Major north-south arterials are 102nd, 122nd, 148th, 162nd and 181st Avenues. These routes are used by commuters traveling between the suburban residential areas in and around Gresham and employment centers in and around Portland. With the exception of East Burnside Street and Market-Main, 148th and 162nd, all the arterials have access to the Banfield Freeway or are proposed to connect with the I-205 Freeway. All are four-lane except East Burnside Street, Market-Main Streets, Powell Boulevard and 148th, which are two-lane arterials.

Total traffic volumes on the east-west arterials west of 122nd (Halsey to Stark Street) averaged 117,000 per day in 1975 and 6600 vph eastbound during the evening rush. At 181st Avenue 1975 arterial traffic dropped to about 76,000 average weekday (AWD) and 3800 vph eastbound. Further east in the vicinity of 202nd Avenue 1975 arterial travel declined to 66,000 AWD and 3400 vph eastbound during the P.M. rush.

Halsey Street, with its direct connection to the Banfield, serves large volumes of East County commuter traffic. The evening peak-hour design capacity of Halsey street is exceeded. Other arterials at or near peak-hour capacity are Stark, Glisan, Burnside and Division Streets.

In total, approximately 10.2 lane-miles of arterial streets are capacity deficient. On the other hand, the Banfield Freeway currently operates at a relatively high level of service ("C" or better) east of the I-205 corridor.

#### East Side Public Transit

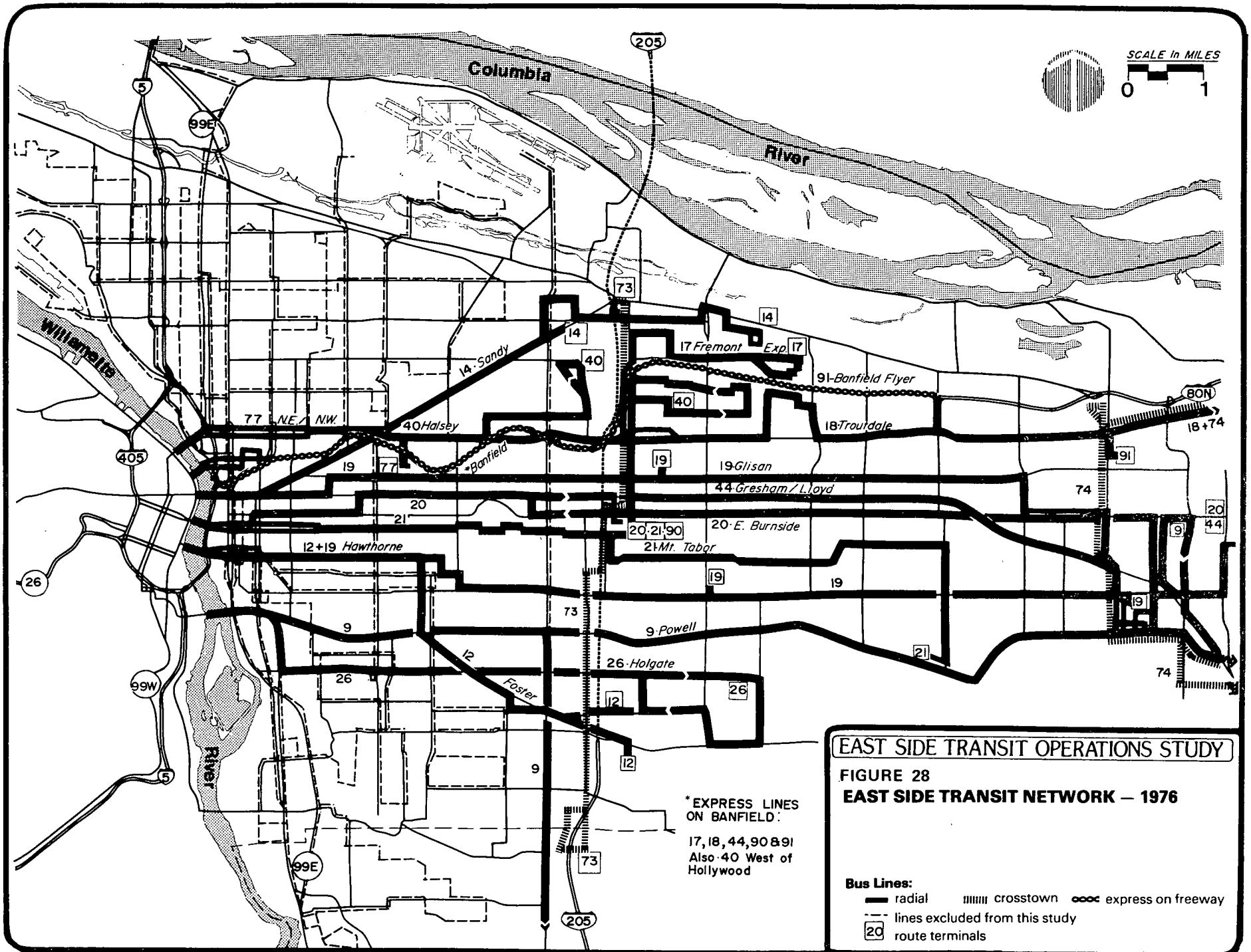
The material in this section is taken from the "East Side Transit Operations" report, pp. 13-16.

The East Side Study Area used for transit analysis encompasses portions of more than 30 Tri-Met routes. These follow the grid pattern of the arterial street system, forming an interwoven network of north-south and east-west routes. Fourteen radial routes and three crosstown lines comprise the core of the existing East Side transit network (see Figure 28.

Most of these routes provide service to both East Portland and East County. However, certain trips on each route are "short lined" in order to give extra service to the urban portion of the area. These trips operate from downtown Portland to points near the edge of the City, such as Mall 205 or 92nd Avenue. "Long line" trips continue eastward to destinations such as Gresham or Mt. Hood Community College. During peak hours, most of the long line trips operate as "limiteds" in the peak direction of travel in that they make regular local stops in East County, but stop only to let passengers off (inbound) or pick passengers up (outbound) as they pass through East Portland. In addition, the limiteds stop at all transfer points in East Portland, where urban residents can board or alight.

A few of the lines provide service only within the urban area (such as #12 - Foster), while others operate basically as suburban expresses (such as





#18 - Troutdale). The latter utilize the Banfield Freeway and offer suburban residents a rapid trip through East Portland. The two Banfield Flyer routes (#90 and #91) were added when the Banfield High Occupancy Vehicle (HOV) lanes were opened late in 1975. These routes operate express from suburban park-and-ride lots to downtown Portland during peak hours. The HOV lanes are also utilized by four other Tri-Met routes, but the shortness of the eastbound lane and the weaving movements necessary to enter and leave the lanes have limited their effectiveness to date.

The routes listed in Table 3 basically reflect East Side transit services as they existed during 1976. They constitute existing service with the exception of a few minor changes in routing which were too recent to be included in this study. This exclusion does not significantly alter the comparisons of future transit alternatives, however.

### Impacts

#### 1990 Peak-Hour Traffic Volumes and Capacity Deficiencies

Overview. Traffic volumes on the Banfield Freeway and city arterial streets are expected to increase 10 - 14 percent over existing levels through the 1990 project design year. These increases, as summarized in Table 4, stem from forecast growth in population and employment in the Portland region and continued use of the automobile as the principal travel mode.

All the build alternatives would reduce traffic volumes compared to no-build conditions in 1990. These alternatives would result in similar traffic reductions, as shown in Table 4.

In spite of these relative reductions in traffic volumes, traffic associated with each build alternative would still exceed the capacity of the Banfield

SUMMARY OF EXISTING EAST SIDE TRANSIT SERVICE TABLE 3

RADIAL (DOWNTOWN-ORIENTED) LINES

Route No. & Name	Outbound Terminal		No Daily Bus Trips <sup>1</sup>	Days of Operation	PM Peak Hour Outbound Riders <sup>2</sup>		Total Daily Line Riders
	Urban	Suburban			21st Ave.	105th Ave.	
	9 - Powell	Harmony Rd.			Gresham	78	
12 - Foster	105th Ave. <sup>3</sup>	--	63	Ev. Day	300	---	3630
14 - Sandy Blvd.	86th Ave.	Parkrose	82	Ev. Day	390	10	5260
17 - Fremont Express	--	145th Ave.	26	Mon-Sat	80	70	580
18 - Troutdale	--	Troutdale	25	Mon-Sat	150	140	1080
19 - E. Glisan	110th Ave.	Gresham	73	Ev. Day	400	200	4350
19 - Hawthorne	122nd Ave.	Gresham	73	Ev. Day	600	280	4050
20 - E. Burnside	Mall 205	Mt. Hood C.C.	65	Ev. Day <sup>4</sup>	370	170	4350
21 - Mt. Tabor	Mall 205	182nd Ave.	72	Ev. Day <sup>4</sup>	310	90	4650
26 - Holgate	--	136th Ave.	62	Ev. Day	340	100	2840
40 - Halsey	92nd Ave.	132nd Ave.	50	Ev. Day <sup>4</sup>	340	40	2070
44 - Gresham/Lloyd	--	Gresham	32	Mon-Sat	130	130	1320
90 - Banfield Flyer	--	Mall 205 <sup>5</sup>	3	Mon-Fri <sup>6</sup>	50	---	100
91 - Banfield Flyer	--	Mult.Ken.Club	7	Mon-Fri <sup>6</sup>	160	160	320

CROSSTOWN LINES

Route No. & Name	Terminals		No. Daily Bus Trips <sup>1</sup>	Days of Operation	Total Daily Line Riders
73 - 92nd/102nd Avenue	Sandy Blvd.	Hinkley St.	12	Mon-Fri	170
74 - Boring/Sandy/Troutdale	Troutdale <sup>7</sup>	Boring, <sup>7</sup> Sandy <sup>7</sup>	20	Mon-Fri	140
77 - Northeast/Northwest <sup>8</sup>	NW 25th Ave.	NE 47th Ave.	25	Mon-Fri	570

- NOTES: <sup>1</sup>Number of round trips per weekday;  
<sup>2</sup>Number of riders crossing these points outbound during PM peak hour;  
<sup>3</sup>Route splits at 84th Ave.; one terminal at 105th & Harold, the other at 103rd & Foster;  
<sup>4</sup>Suburban trips operate Mon-Sat only;  
<sup>5</sup>Mall 205 listed as "suburban" terminal because route caters to suburban park-and-ride passengers;  
<sup>6</sup>Operates peak hours only (A.M. = inbound, P.M. = outbound);  
<sup>7</sup>Some trips operate directly to downtown Portland via E. Glisan, E. Burnside, Hawthorne, and Powell routes;  
<sup>8</sup>This route treated as a radial line in subsequent analyses because of its east-west orientation.

SOURCE: Tri-Met Operations & Scheduling Study, April 1976

TABLE 4  
1990 PEAK-HOUR TRAFFIC VOLUMES: EAST SIDE

Alternatives	East Portland Study Area Screenlines						East Multnomah County Study Area Screenlines						TOTALS		
	Freeway	28th Ave. Arterials	Combined Subtotal	Freeway	47th Ave. Arterials	Combined Subtotal	Freeway	122nd Ave. Arterials	Combined Subtotal	Freeway	181st Ave. Arterials	Combined Subtotal	Freeways	Arterials	Combined
Existing (1975)	4,980	6,080	11,060	4,060	4,270	8,330	2,000	6,630	8,630	1,720	3,750	5,470	12,760	20,730	33,490
1 No-Build	5,850	6,750	12,600	4,400	4,720	9,120	2,820	8,480	11,300	2,540	5,740	8,280	15,610	25,690	41,300
2a LCI	5,530	6,370	11,900	4,290	4,430	8,700	2,760	8,160	10,920	2,490	5,550	8,040	15,070	24,510	39,580
2b LCI	6,030	5,970	12,000	5,190	3,530	8,720	3,000	7,840	10,840	2,590	5,440	8,030	16,810	22,780	39,590
3a HOV	5,420+ (620CP)*	5,680	11,100+ (620CP)*	4,100+ (570CP)*	3,730	7,830+ (510CP)*	2,810	8,110	10,920	2,530	5,510	8,040	15,860+ (1190CP)*	23,030	38,890+ (1190CP)*
3b HOV	5,950+ (630CP)*	5,270	11,220+ (630CP)*	4,900+ (580CP)*	2,920	7,820+ (580CP)*	3,030	7,790	10,820	2,610	5,410	8,020	16,490+ (1210CP)*	21,390	37,880+ (1200CP)*
3c HOV	5,950+ (630CP)*	5,270	11,220+ (630CP)*	4,900+ (580CP)*	2,920	7,820+ (580CP)*	3,030	7,790	10,820	2,610	5,410	8,020	16,490+ (1210CP)*	21,390	37,880+ (1200CP)*
4a Bus	6,200	5,870	12,070	5,210	3,370	8,580	3,010	7,810	10,820	2,600	5,420	8,020	17,020	22,470	39,490-
4b Bus	6,200	5,870	12,070	5,210	3,370	8,580	3,010	7,810	10,820	2,600	5,420	8,020	17,020	22,470	39,490
5-1a & b LRT	6,240	5,980	12,220	5,340	3,420	8,760	2,900	7,610	10,510	2,510	5,220	7,730	16,990	22,230	39,220
5-2a & b LRT	6,110	5,860	11,970	5,390	3,460	8,850	2,990	7,810	10,800	2,610	5,320	7,930	17,100	22,450	39,550
5-3a & b LRT	6,300	6,000	12,300	5,550	3,560	9,110	2,970	8,320	11,290	2,560	5,800	8,360	17,380	23,680	41,060

\* CP denotes carpools

Freeway between 16th and 33rd Avenues, since additional freeway lanes are not proposed in this section. The ratios of traffic volumes to capacity are summarized in Table 5. On the other hand, the Banfield Freeway capacity east of 37th Avenue would be increased by 50 percent with the proposed additions of two lanes (all alternatives except 1, 2a and 3a). This additional traffic capacity would improve 1990 travel conditions between 37th Avenue and I-205 compared to existing conditions. Volume to capacity ratios on this freeway section are still high, however, indicating that poor travel conditions will become increasingly more frequent in future years beyond 1990.

As shown in Table 5, traffic service east of I-205 on the Banfield will remain satisfactory beyond 1990, regardless of the alternative selected. The proposed project would have a negligible influence on Banfield traffic conditions outside the Portland urban area (east of 181st Avenue).

All the build alternatives would improve travel conditions on East Portland arterials compared to no-build conditions in 1990 (see Tables 5 and 6). The HOV options which include six-laning the Banfield east of 37th (3b and 3c) would benefit arterial travel the most.

East of I-205, in Multnomah County, arterial travel would be more congested than today, but slightly less congested than under no-build conditions. There is little difference in the quality of arterial travel between the alternatives which include widening the Banfield Freeway (Table 5). This is due to the strong influence of Interstate 205 in attracting auto trips and the similar effectiveness of each alternative in attracting transit trips in suburban East County.

TABLE 5

PEAK HOUR VOLUME/CAPACITY RATIOS  
EXISTING AND 1990 CONDITIONS

	Screenline Location							
	28th Ave.		47th Ave.		122nd Ave.		181st Ave.	
	Freeway	Arterials	Freeway	Arterials	Freeway	Arterials	Freeway	Arterials
Existing	1.09	0.91	1.23	1.11	0.61	1.01	0.52	0.60
1990 No-Build	1.28	1.04	1.33	1.23	0.85	1.24	0.77	0.91
Alternative								
2a	1.21	0.93	1.30	1.09	0.84	1.19	0.75	0.88
2b	1.22	0.87	1.05	0.87	0.91	1.15	0.78	0.86
3a	1.18	0.85	1.24	0.97	0.85	1.19	0.77	0.87
3b	1.20	0.79	0.99	0.76	0.92	1.14	0.79	0.86
3c	1.20	0.79	0.99	0.76	0.92	1.14	0.79	0.86
4a	1.25	0.88	1.05	0.88	0.91	1.14	0.79	0.86
4b	1.25	0.88	1.05	0.88	0.91	1.14	0.79	0.86
5-1	1.26	0.89	1.08	0.89	0.88	1.11	0.76	0.83
5-2	1.23	0.87	1.09	0.90	0.91	1.14	0.79	0.84
5-3	1.27	0.90	1.12	0.92	0.90	1.22	0.78	0.92

NOTE: Capacity was measured at "D" level of traffic service.

TABLE 6

## OVERCAPACITY LANE MILES: BANFIELD FREEWAY AND ARTERIALS

Alternative	East Portland Study Area			East Multnomah County Study Area			Total
	Banfield Freeway	East-West Arterials	North-South Arterials	Banfield Freeway	East-West Arterials	North-South Arterials	
Existing (1975)	9.4	16.9	7.6	0	5.0	5.2	44.1
Alternative (1990)							
1	19.8	25.0	8.2	0	18.4	2.7	74.1
2a	18.7	13.9	7.1	0	11.7	2.7	54.1
2b	11.1	8.2	6.8	0	10.7	2.7	39.5
3a	12.8	9.8	7.2	0	11.7	2.7	44.2
3b	5.6	2.7	6.9	0	10.7	2.7	28.6
3c	5.6	2.7	6.9	0	10.7	2.7	28.6
4a	13.2	9.2	7.2	0	10.7	2.7	43.0
4b	13.2	9.2	7.2	0	10.7	2.7	43.0
5-1	17.1	8.8	6.8	0	10.7	2.7	46.1
5-2	17.1	8.8	6.8	0	22.1	4.7	59.5
5-3	17.1	8.8	6.8	0	14.4	2.7	49.8

Future traffic volumes in the downtown Portland study area would increase the most under no-build conditions since increased reliance on the public transit mode is not encouraged. However, future traffic increases during peak hours would be limited by the current downtown\* parking policy which places a ceiling on parking at approximately 40,000 spaces.

Alternative 1 (No-Build). Doing nothing to improve the quantity and quality of east-west transportation in the areas served by the Banfield corridor would result in the largest increase in peak-hour traffic volumes and vehicle miles traveled of all options under consideration (Table 4). Since major traffic improvements would not be constructed to accommodate the increased traffic volumes, levels of traffic service would decline, being characterized by slow travel speeds and interrupted flow during peak hours. Capacity deficiencies would be most pronounced west of I-205, although congestion east of I-205 in East Multnomah County would be significantly greater by 1990, compared to 1975 conditions. Major peak-hour congestion is predicted on east-west arterials between I-205 and 122nd Avenue due to the attraction of I-205. Traffic congestion east of 122nd would be less, although traffic would increase substantially over 1975 volumes. Additional information on these impacts is contained in the "Banfield Transitway Study: Traffic Analysis" (Oregon Department of Transportation).

Peak-hour traffic entering the downtown would be greatest under no-build conditions because fewer trips would be via public transit or carpools. Major congestion is not expected during rush hours, because of the ceiling on parking spaces. Downtown employment levels do indicate a 20-22 percent increase in downtown auto trips, which means a deficiency would exist in 1990 between auto trips predictable

\*The area enclosed by the west bank of the Willamette River, the Broadway Bridge and Broadway ramp, Hoyt Street, Stadium Freeway and the Marquam Bridge.



from forecast employment levels and available parking. It is probable that public transit service would be insufficient under no-build conditions to offset this deficiency.

Alternatives 2a and 2b: Low Cost Improvements. Both Low Cost Improvement (LCI) alternatives would result in lower 1990 traffic volumes on the Banfield Freeway and city arterials compared to no-build conditions (Alternative 1). Differences between Alternative 2b and other options are small in percentage terms, however, and 1990 peak-hour volumes and volume/capacity ratios are similar to the busway options (4a and 4b), LRT Burnside or Division options, and HOV Alternative 3a.

The most significant differences between Alternative 2a and Alternative 2b occur between 37th Avenue and I-205 as measured at the 47th Avenue screenline, since 2a would not increase the Banfield Freeway capacity. As a result, volume/capacity ratios are considerably higher for Alternative 2a, indicating substantial peak-hour traffic congestion.

As with other alternatives, traffic on East Multnomah County arterials generated by I-205, would increase traffic congestion, although not as greatly as the no-build (Table 4). Otherwise, traffic conditions in the East County area would be satisfactory through 1990 with either LCI alternative.

A notable difference between the two LCI alternatives is the significantly greater number of overcapacity lane-miles on the Banfield Freeway and east-west arterials with 2a versus 2b (Table 6). This stems from the lack of additional freeway lanes on the Banfield east of 37th Avenue with Alternative 2a, a deficiency which causes diversion of traffic to several east-west arterials paralleling the freeway.

Traffic volumes entering the downtown are predicted to increase, although not as much as the no-build. The LCI transit service level should be adequate to accommodate transit trips induced by parking restrictions.

Alternatives 3a, 3b and 3c: High-Occupancy Vehicle (HOV) Lanes.

Perhaps the most significant traffic impact of these options is their comparative effectiveness in reducing auto traffic on the Banfield Freeway and city arterials. As shown in Table 4, HOV alternatives would generate the least auto traffic in the lanes open to general traffic. Most noteworthy are volumes west of I-205 as measured at the 28th Avenue and 47th Avenue screenlines. At these locations 1990 traffic service is substantially improved compared with 1976 conditions. The primary reasons for the improved service are the additional freeway lanes and the carpooling encouraged by these options in conjunction with high public transit use. The availability of HOV lanes for carpool use attracts a number of person trips which would otherwise occur in single-occupant autos and shifts carpool traffic to HOV lanes.

In spite of these traffic service improvements, traffic service would still be very poor during peak hours on the Banfield Freeway west of 37th Avenue. (See Table 4). However, generally, peak-hour traffic service elsewhere would be best with the HOV alternatives, with the exception of Alternative 3a and conditions on east-west arterials in East Multnomah County which access I-205. In the East Portland area, arterial traffic service would improve compared to existing conditions, and more so than other build alternatives, except Alternative 3a at the 47th Avenue screenline (Table 4).

1990 auto traffic in the Portland downtown area is predicted to increase 10-15 percent compared to existing volumes. Given the assumed routes for bus operations, it is not expected that peak-hour downtown auto traffic would encounter major bottlenecks, although increased congestion is likely.

The most significant difference between the HOV options is shown in terms of overcapacity lane-miles in Table 6. The lack of additional freeway capacity east of 37th with Alternative 3a substantially increases the number of deficient lane-miles on both the Banfield Freeway and on east-west arterials. In contrast, Alternatives 3b and 3c cause the greatest reduction of all options under study.

Alternatives 4a and 4b: Separated Busway. Both "Separated Busway" alternatives are the same with respect to peak-hour auto traffic volumes. Since carpools would not be allowed use of the bus lanes, traffic volumes are somewhat higher than the HOV options (Table 4). Traffic volumes are lower than predicted for the No-Build condition and LCI alternatives, however. The busway would result in traffic volumes somewhat higher, but similar to Light Rail alternatives 5-1 and 5-2.

As shown in Table 5, peak-hour volume/capacity ratios are high for the Banfield section west of 37th Avenue (28th Avenue screenline). This poor peak-hour traffic condition is not significantly different from other options.

The increased capacity of the Banfield east of 37th would result in improved traffic flow compared to existing and 1990 no-build conditions. Freeway traffic conditions east of I-205 would be satisfactory through the 1990 design year.

The Separated Busway and increased Banfield traffic capacity would combine to reduce 1990 arterial traffic compared to existing and 1990 No-Build conditions,

except in East Multnomah County. East County arterial traffic service would deteriorate relative to existing conditions, but be somewhat improved in relation to the 1990 No-Build (Table 4).

The number of overcapacity lane-miles is somewhat higher than the HOV options 3b and 3c and slightly lower than LCI alternative 2b (Table 6). The Busway is similar to other build options in its effectiveness in reducing overcapacity lane-miles in East Multnomah County.

Downtown traffic would increase with the busway in operation, although the increase by 1990 would be lower than No-Build conditions. The level of public transit service possible with the busway should be sufficient to serve potential transit trips generated by 1990 downtown employment levels.

Alternatives 5-1, 5-2 and 5-3: Light Rail Transit (LRT). The Light Rail Transit alternatives using Burnside (5-1) or Division (5-2) would result in traffic conditions very similar to those already identified for a busway system. This stems from similar effectiveness in attracting transit trips.

In East Portland, traffic on arterials and the freeway approximate the peak-hour volumes predicted for the Separated Busway very closely, with the exception of freeway travel in the vicinity of 47th Avenue where traffic volumes are slightly higher for the LRT alternative. In East Multnomah County, the screenline traffic volumes for the Burnside or Division options are slightly lower (0-4 percent) than the Separated Busway, HOV and LCI alternative 2b. This similarity accentuates the dominant influence of I-205 as an attractor of peak-hour auto trips.

The Banfield/I-205 LRT alternative (5-3) would not reduce auto traffic in East Multnomah County as much as the other LRT options because its direct service

parallels I-205 and does not extend to Gresham. As a result, fewer transit trips are predicted which results in the higher auto traffic volumes.

1990 downtown traffic volumes would be similar to the HOV and Separated Busway options. With LRT in the Banfield corridor only, between 109 and 130 fewer P.M. peak-hour buses would depart from the downtown compared with the HOV and Separated Busway options, respectively. While this difference amounts to a 18-20 percent reduction, the absolute number is probably not great enough to cause a noticeable improvement in auto circulation. However, if LRT is eventually implemented in the three corridors serving the downtown (Sunset, Oregon City and Banfield), bus numbers would be reduced by 165. Less bus concentrations on streets outside the Portland Mall would create fewer conflicts with autos.

#### Traffic Patterns and Circulation

Overview. The pattern of traffic circulation largely depends on the capacity of city streets and the Banfield Freeway to accommodate future growth in auto traffic and transit demand. Alternatives which include widening the Banfield Freeway between 37th Avenue and I-205 to six lanes (all but Alternatives 1, 2a and 3a) result in fewer trips on east-west arterials in East Portland and more trips on the freeway. This change would generally benefit traffic circulation. Leaving the Banfield Freeway at its present traffic capacity (Alternatives 1, 2a and 3a) would basically maintain existing patterns of circulation since diversion to the freeway would not be encouraged.

Alternatives 2b, 3a and 3b and the "a" options for light rail transit would include a "minimum" six-lane Banfield facility only between 37th and I-205. As such, lane widths would be less than standard (with the exception of 3b) and periodic emergency turnouts would replace continuous shoulders. Traffic operations would generally

be satisfactory under this minimum design. However, restoring traffic flow on the freeway from bottlenecks caused by incidents such as accidents and stalled vehicles would be more difficult in the absence of shoulders for routing traffic.

Changes in future traffic circulation in East Multnomah County would be influenced primarily by the completion of I-205 and turning restrictions on Burnside Street (5-1) or Division Street (5-2) from operational requirements of light rail on these streets. Bus-only alternatives would not significantly change traffic circulation patterns. I-205 would distribute east-west traffic to the Banfield Freeway, Division Street, Stark/Washington Streets and Glisan Street.\* Park-and-ride stations along either Burnside Street (Alternative 5-1) or Division Street (Alternative 5-2) would attract traffic to streets serving the lots. Turning restrictions along the proposed LRT routes would introduce some out-of-direction travel as left turns would be allowed at only select intersections.

Traffic circulation in the downtown Portland area would not undergo major changes from existing conditions. However, operation of an expanded transit system (bus or bus/light rail) would require some lane use and turning restrictions which would divert auto and truck traffic to adjacent streets. These restrictions, which are limited in scale, should not significantly alter downtown circulation from the No-Build condition.

Alternative 1: No-Build. Peak-period travel patterns in 1990 would change slightly from those existing in 1975. In East Portland, the peak-hour capacity of the Banfield is already overtaxed, which means traffic which would otherwise use the

\*U.S. Department of Transportation, Federal Highway Administration and Oregon State Highway Division and Washington State Department of Highways, Volume 1, I-205 Final Environmental Impact Statement (July 1976), p. 111.

Banfield would use city streets. Traffic diversions that do occur would result in more travel on neighborhood streets, as vehicles seek alternate routes around the most congested intersections.

The completion of I-205 would be the principal cause of altered travel patterns in the East County area. North-south traffic would be diverted from 82nd, 102nd and 122nd Avenues to I-205. Downtown and regional traffic from East Multnomah County using the Banfield Freeway would no longer need to converge on Halsey Street, because Division, Stark and Glisan Streets would all interchange with I-205 and ultimately the Banfield Freeway. Thus, traffic on Halsey Street, 102nd Avenue and 122nd Avenue is expected to decline, while increasing on Division Street, Stark Street and Glisan Street.

Major impedece of auto circulation in the downtown is not expected because of existing surplus capacity. Moreover, retention of existing limits on downtown parking spaces imposed by the city of Portland should prevent major auto trip build-up in the downtown core.

Alternative 2a: Low Cost Improvement, Banfield Not Widened. Traffic patterns would be similar to the No-Build alternative concept since improvements to the Banfield would not be made. Less traffic would use city streets because of improved transit service. Operation of exclusive bus lanes on the designated arterials could result in some vehicle capacity reductions and diversion to other streets. However, the parking removal proposed with the transit improvements would largely maintain existing arterial street capacity.

The exclusive bus lane proposed on Division Street would require widening 60th Avenue and removal of peak-period parking on Belmont Street. Some traffic presently using Division Street west of 60th Avenue would divert to 60th Avenue and Belmont Street.

The proposed bus lane on Burnside Street would reduce the vehicle capacity of the critical 12th Avenue intersection west to the bridge. Much east-west traffic already avoids this intersection, increasing traffic on Ankeny Street, Stark Street and other nearby streets.

Another express bus route is proposed on Broadway to Sandy Boulevard and on Sandy Boulevard and Halsey Street to I-205. To maintain street capacity on the Halsey Street route, a Broadway/Halsey Street couplet is proposed from 42nd Avenue to 67th Avenue. This proposal would increase travel on this section of Broadway about five-fold.

Like the No-Build, travel patterns in East County would be affected most by the completion of I-205. Less travel would take place on the major north-south arterials than in 1975. Instead, traffic would use east-west streets to reach I-205 before traveling north or south. Also, as under the No-Build, Halsey Street west of 122nd Avenue would attract less traffic than today. Much of this traffic would disperse to or remain on Glisan, Stark and Division Streets.

Auto circulation in downtown Portland would be similar to that with the No-Build. However, with the Low-Cost Improvement (2b as well as 2a), more buses would enter the downtown which requires some modifications of bus operations and routes. Major changes include the establishment of contraflow bus lanes on Yamhill (eastbound) and Morrison (westbound) Streets. The auto capacity of the contraflow streets would be maintained since the bus lanes would use curbside space established by parking removal.

Alternative 2b: Low Cost Improvements, Widen Banfield. When compared to the No-Build alternative or Alternative 2a, there would be increased freeway travel, decreased travel on the parallel arterial streets and increased travel on the north-south arterials interchanging with the Banfield. This occurs because of the widening



of the Banfield between 37th Avenue and I-205. Added transit ridership also aids in decreasing arterial street travel in East Portland. As in Alternative 2a, traffic would divert from Division Street (west of 60th Avenue) to 60th Avenue and Belmont Street. Similarly, there would be an increase in travel on Broadway (42nd to 67th Avenues) but not as great as under Alternative 2a because of a diversion to the Banfield Freeway.

In East Multnomah County peak-period travel patterns would change slightly compared with the No-Build. Although the completion of I-205 would cause most traffic pattern changes, the widening of the Banfield Freeway would attract additional traffic. Some minor shifts in travel patterns would occur with greater use of the Banfield Freeway and the interchanges at 102nd Avenue, 122nd Avenue and 181st Avenue. Also, a minor shift to the I-205 and Division Street interchange should occur.

Traffic circulation in the downtown would be similar to Alternative 2a, since the number of buses and routings are the same.

Alternative 3a: Extend Existing HOV Lanes. When compared to No-Build conditions, 1990 travel patterns in the study area would generally be the same except in the Lloyd Center area, where travel patterns depend on the option selected for providing exclusive bus lanes between the Banfield Freeway and Steel Bridge. Because of increased transit ridership, there would be less arterial street congestion and less use of residential streets compared to the No-Build. However, not widening the Banfield Freeway east of 37th would increase traffic on east-west arterials accessing the downtown.

In 1990, peak-period travel patterns in East Multnomah County would be similar to those under Alternative 2a, being affected mainly by the completion of

I-205. The HOV lanes on the Banfield extending to I-205 would change travel patterns only slightly in East County.

The operation of an HOV system would result in fewer peak-hour auto trips to the downtown compared with either the No-Build or Low-Cost Improvement alternatives. Regarding downtown traffic circulation, changes are most critical outbound on 6th to the Steel Bridge, since the number of buses requires a reserved lane and restricted turning movements for autos. These impediments to auto circulation are similar to those that currently exist, which have caused some diversion to less congested streets outside the Portland Mall and its access streets.

Alternatives 3b and 3c: HOV Lanes. Widening the Banfield to six lanes would cause a diversion of some traffic from arterial streets to the freeway. Diversions would mainly occur on the arterial streets east of 39th. There would, however, be a slight increase in traffic, when compared to the No-Build, on the north-south arterials interchanging with the freeway.

Like the other alternatives, travel patterns in East County would be most influenced by the completion of I-205 and by the widening of the Banfield Freeway from 39th Avenue to I-205. These travel routes would be most similar to those described under Alternatives 2b, 4 and 5, in which the Banfield is also widened. Adding both freeway and HOV lanes to the Banfield would cause more vehicle travel to take place on the freeway than with any other build alternative.

Downtown traffic circulation would be as discussed for Alternative 3a, since the effectiveness of the alternatives in attracting public transit ridership and bus routings are equal.

Alternatives 4a and 4b: Separated Busway. When compared to the No-Build alternative, peak-hour travel on the arterial streets would generally decrease. Travel on the freeway would increase because of the freeway widening and connection to I-205. The increased capacity of the Banfield Freeway east of 39th Avenue would change traffic volumes on streets accessing the Banfield. Like Alternatives 2b, 3b and 3c, volumes northbound on 39th Avenue north of Glisan would increase, attracted to the eastbound on-ramp. Southbound traffic south of the on-ramp would decrease as it is diverted to the freeway. All of the parallel east-west arterial streets, especially east of 39th would have decreases in traffic. The north-south streets interchanging with the freeway would have slightly increased traffic. Future travel patterns in the Lloyd Center area will be similar to those under Alternatives 3a, 3b and 3c.

Downtown traffic circulation would be very similar to that described for the HOV alternatives because the bus routes are the same. In general, decreased auto capacity on several streets and turning restrictions at several intersections would divert a portion of auto traffic to streets with fewer bus/auto conflicts.

Alternatives 5-1, 5-2 and 5-3: Light Rail Transit. All the Light Rail Transit options would operate identically downtown. Differences in traffic circulation would depend upon which of the three alternative routing concepts is selected: On-Mall, Oak Street; On-Mall, Pioneer Square; and Cross Mall (see Figures 23, 24 and 25). In addition, whether or not the LRT mode is selected in the other transportation corridors accessing the Mall would also affect the volume of feeder buses, routings and subsequent impacts on traffic circulation.

In general, all the proposed downtown LRT routes would benefit traffic circulation in the downtown by reducing bus volumes and concentrating remaining buses on the Mall and a few cross streets. Buses would not be required on either Morrison or Yamhill Streets, although some east-west arterial streets would be utilized by certain routes. If turning movements across the LRT tracks are prohibited, traffic could be redistributed to parallel streets at either end of the Mall.

Unlike the On-Mall options which use Everett Street to 5th Avenue, the Cross Mall option would use First Avenue to Yamhill Street and share the street with auto traffic except at S.W. Ash and S.W. Stark Street. Traffic would have to make right-hand turns from the easternmost lane at these intersections.

The most significant improvement in future downtown traffic circulation would occur if LRT operated in all three transportation corridors serving the downtown (Sunset, Banfield and Oregon City). The number of buses in the downtown would be reduced by 165 during the P.M. peak-hour, requiring fewer streets for transit circulation. As a consequence, general traffic circulation would be eased relative to the bus-oriented options.

In East Multnomah County, out-of-direction travel with either the LRT-Burnside Street (5-1) or LRT-Division Street (5-2) alternatives is unavoidable. This stems from right-hand turn restrictions across the light rail tracks from abutting property and certain cross streets. These restrictions are necessary to provide maximum safety and operating conditions for the light rail facility.

On Burnside Street eleven north-south streets would remain open across the rail line: 102nd, 113th, 122nd, 139th, 148th, 162nd, 172nd, 181st, Stark,

199th and 202nd. Left-turn lanes on Burnside would be established where these streets intersect Burnside Street. Traffic diversions from Burnside Street would increase travel on these streets somewhat.

Vehicles leaving and entering abutting properties could make right turns only onto Burnside Street; on the north side of the street, westbound turns would be permitted and on the south side of the street, eastbound turns would be permitted.

Vehicular crossings of Burnside would be signalized with U-turns allowed at each select intersection during the left-turn signal phase. Northside traffic which is eastbound and southside traffic which is westbound would have three options:

- 1) Proceed to the nearest street which extends north to Glisan or south to Stark and make the necessary turn onto those streets.
- 2) Proceed to the nearest vehicular crossing of Burnside and make a U-turn and continue on Burnside.
- 3) Proceed to the nearest vehicular crossing of Burnside and turn southward to Stark or northward to Glisan.

There are 541 property ownerships abutting Burnside Street 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.

On Division Street thirteen cross streets would remain open across the light rail line. These include the seven streets serving proposed transit stations (122nd, 135th-136th, 148th, 169th-170th, 182nd and 196th) and six additional streets (130th, 162nd, 174th, 190th, 202nd and 212th). Turning refuges would be provided where Division intersects these streets as a means of facilitating traffic flow and minimizing out-of-direction travel on Division Street. These streets would experience somewhat higher traffic volumes due to diversions from Division Street.

Most streets that intersect Division also connect to collectors or arterials parallel to Division. However, most of these parallel routes are one-half to one mile away from Division. Traffic from the area between Division and parallel routes would have a choice between free movement on the parallel routes, or possible out-of-direction travel on Division. Streets that connect only to Division would require that traffic turn right onto Division and then select a route in their desired direction of travel.

There are 1700 properties and 2950 housing units on Division and adjacent streets that would be affected by out-of-direction travel. Depending on the direction of travel, 26-36 percent of all properties and 32-55 percent of all housing units in the corridor would have out-of-direction trips of one-half mile or more.

#### Accidents

Overview. Traffic accidents predicted for each alternative were estimated on the basis of vehicle miles of travel (VMT) in 1990 and 1975 accident rates for freeways and arterials in the Portland area. The reportable rate for freeways was 1.5 per million vehicle miles (MVM) and 8.0 per MVM for arterials. With this large difference in accident rates, alternatives which most effectively reduce arterial travel will correspondingly have the lowest potential for accidents. Accident potential is also diminished by increased public transit use.

Alternatives which include minimum freeway lane widths and no shoulders on the Banfield Freeway between 37th Avenue and I-205 (Alternatives 2b, 3a, 3b, and "a" LRT options) should generally experience more accidents than options with standard designs. Table 7 does not reflect this accident risk potential due to the methodology used and lack of empirical evidence which would allow a prediction

TABLE 7  
VEHICLE MILES OF TRAVEL AND TRAFFIC ACCIDENTS

	East Portland Study Area				East Multnomah County Study Area				Study Area Totals			
	Vehicle Miles of Travel			Accidents	Vehicle Miles of Travel			Accidents	Vehicle Miles of Travel			Accidents
	Freeways	Arterials	Total		Freeways	Arterials	Total		Freeways	Arterials	Total	
Existing Conditions (1975)	199	218	417	2040	40	285	325	2342	239	503	742	4382
Alternative												
1	276	225	501	2212	118	366	484	3109	394	591	985	5321
2a	259	212	471	2088	117	354	471	3005	376	566	942	5093
2b	281	193	474	1964	118	350	468	2978	399	543	942	4942
3a	266	206	472	2045	118	353	471	3000	384	559	943	5045
3b	292	187	479	1934	118	348	466	2963	410	535	945	4897
3c	292	187	479	1934	118	348	466	2963	410	535	945	4897
4a	287	194	481	1984	118	349	467	2967	405	543	948	4951
4b	287	194	481	1984	118	349	467	2967	405	543	948	4951
5-1	282	189	471	1936	113	343	456	2912	395	532	927	4848
5-2	282	189	471	1936	115	354	469	3004	397	543	940	4940
5-3	293	197	490	2015	117	365	482	3095	410	562	972	5110

to be made. For example, accidents on the Banfield Freeway "HOV" section subject to these conditions today are not appreciably different from prior accident levels under standard design conditions. Nevertheless, the assumption is made that the accident rate would be somewhat higher under these less safe "minimum" conditions.

Table 8 lists the alternatives according to their effectiveness in reducing accidents relative to the No-Build alternative. The Light Rail alternative on Burnside Street (5-1) would be most effective in reducing traffic accidents, although all options which improve the Banfield Freeway have similar rates, varying by only two percent. Table 7, summarizes both vehicle miles of travel (VMT) and accidents for both arterials and freeways.

Alternative 1: No-Build. As shown in Table 8, not improving public transit or traffic service on the East Side would result in the highest number of accidents of the alternatives under consideration. Compared to existing conditions, the 1990 annual accident total would increase by approximately 170 in the East Portland Study Area and 770 in the East Multnomah County Study Area. Total 1990 accidents amount to an estimated 5320, 940 more than occurred in 1975. The large increase in East Multnomah County is largely from the opening of I-205, which diverts substantial traffic to east-west arterials accessing the freeway; this diversion would occur regardless of the option selected.

Alternatives 2a and 2b: Low Cost Improvements. Alternative 2b would be more effective than Alternative 2a in reducing traffic accidents since fewer would be traveled on the arterial street system. Both alternatives, however, would reduce traffic accidents compared to No-Build conditions because of greater public transit use which produces fewer vehicle miles of travel.



TABLE 8

1990 TRAFFIC ACCIDENT PREDICTIONS: BUILD ALTERNATIVES

<u>Alternative</u>	<u>Accidents</u>	<u>Difference from No-Build</u>
LRT - Burnside (5-1)	4850	-470 (8.9%)
HOV - 3b or 3c	4900	-420 (-8.0%)
Low Cost - 2b	4940	-380 (-7.1%)
LRT - Division (5-2)	4940	-380 (-7.1%)
Separated Busway	4950	-370 (-7.0%)
HOV - 3a	5050	-270 (-5.2%)
Low Cost - 2a	5090	-230 (-4.3%)
LRT - Lents (5-3)	5110	-210 (-3.9%)

Alternative 2b, with 4940 1990 traffic accidents estimated, is very similar to HOV alternatives 3b and 3c (4900), both busway options (4950) and the Burnside Street (4850) LRT options. Traffic accidents estimated for 2a, however, are only exceeded by the No-Build (5320) but approximately equal to Alternative 3a (5050) and Alternative 5-3 (5110).

Alternatives 3a, 3b and 3c: HOV Lanes. Alternatives 3b and 3c are exceeded only by the LRT-Burnside alternative in accident reduction effectiveness. The effectiveness of 3b and 3c stem from the combined effects of significantly greater transit ridership, increased freeway travel and the operation of carpools.

On the other hand, Alternative 3a is only better than Alternatives 2a and 5-3 of the build options being studied. Arterial street travel is greatest with these build options, which explains their comparatively poor traffic safety standing.

Alternatives 4a and 4b: Separated Busway. These options, which include widening the Banfield between 37th and I-205, would improve traffic safety relative to the No-Build and Alternatives 2a, 3a and 5-3, but with slightly less effectiveness than LCI Alternative 2b, LRT Alternatives 5-1 and 5-2 and HOV Alternatives 3b and 3c.

Alternatives 5-1, 5-2 and 5-3. Extending light rail service into Gresham via Burnside Street is predicted to benefit traffic safety most greatly of the alternatives under consideration. As explained previously, this stems from fewer vehicle miles traveled in East Multnomah County, as the number of accidents in East Portland equal HOV options 3b and 3c. The LRT/I-205 option is less effective because of fewer trips by transit and higher vehicle miles of travel in East Multnomah County.

## Public Transit Ridership

Overview. 1990 transit ridership levels are summarized in Table 9. Ridership forecasts were derived by using the U.S. Department of Transportation "UTPS" model to predict travel demand in the target year, 1990. A description of the modeling process is contained in the "East Side Transit Operations" report, pages 26-44. An analysis of these forecasts in relation to capital and operating costs is contained in Chapter Two/Economics of this statement. Ridership forecasts are not strictly comparable because each alternative would serve a slightly different segment of the transit market.\* The Low-Cost Improvements and HOV alternatives are oriented towards the peak-hour, downtown commuter. In the case of the HOV alternative, limited stopping points along the Banfield would reduce transfer opportunities in East Portland. This would affect both the suburban resident destined for East Portland and the urban resident destined for East County. This limitation is especially significant during nonpeak hours, when a greater variety of nondowntown travel occurs.

Under the Low-Cost Improvements alternative, there would be numerous transfer possibilities between urban and suburban lines in East Portland, but the quality of service for nonpeak riders would be poor in several corridors.

The Busway and LRT alternatives would accommodate a broader market of travelers. Passengers could access a wide variety of intermediate destinations in East Portland. In addition, transit riders in the Banfield would experience the speed and reliability of a right-of-way reserved exclusively for transit during off-peak as well as peak hours.

\*"East Side Transit Operations" (Tri-Met, December, 1977), page 58.

TABLE 9

EAST SIDE PUBLIC TRANSIT RIDERSHIP AND  
RELATED ANNUAL OPERATIONS DATA (IN MILLIONS)

<u>Alternative</u>	<u>Originating Trips</u>	<u>1990 Trips/ 1976 Trips</u>	<u>Transit Veh. Miles</u>	<u>Passenger Miles Per Passenger</u>	<u>Passengers Per Veh. Mile</u>
1976 Existing	10.016	-	5.784	5.22	1.73
1990 No-Build	13.518	1.35	7.263	5.76	1.86
1990 LCI	15.316	1.53	9.799	7.20	1.56
1990 HOV	18.323	1.83	10.988	6.83	1.67
1990 BUS	19.238	1.92	12.572	7.53	1.53
1990 LRT Burnside	19.223	1.92	8.781	7.16	2.19
1990 LRT Division	18.634	1.86	8.908	7.69	2.09
1990 LRT Lents (I-205)	17.430	1.74	8.356	6.78	2.09

SOURCE: "East Side Transit Operations" (Tri-Met), January, 1978.

In the urban portion of the study area (i.e., East Portland), the same local bus network is utilized by the build alternatives. Differences between these options arise in how express travel through the area is handled.

In the Low Cost Improvements alternative, East Portland residents would have a high degree of access to suburban limited buses. Some 25 stops would be located in the three basic express corridors in East Portland. Frequent service would be available at these stops, with one bus every two or three minutes during peak hours.

The HOV, Busway, and LRT alternatives provide fewer locations for urban residents to reach express transit service. This is most extreme in the case of the HOV lanes, but is a common element among all the Banfield-oriented alternatives. The frequency of service at the stations in East Portland would be excellent, however. The three stations served by the HOV alternative in the Lloyd Center area would be served by one bus every 43 seconds during the peak. Under the Busway alternative, there would be six stations in East Portland; those served by all lines (such as Lloyd Center) would have one bus every 33 seconds, while those bypassed by certain trips (such as 60th Avenue) would have frequencies of about one or two minutes. The LRT alternative would offer the lowest frequencies with peak-hour service of about four minutes under the Burnside and Division alternatives and five minutes under the I-205 alternative.

In the suburban portion of the study area, almost identical coverage is provided by each of the build alternatives. Once east of I-205, buses would fan out to cover all the major east-west arterials. The addition of north-south crosstown lines is an important feature not found in the No-Build alternative. Bus frequencies on east-west lines are greatest with the Busway alternative; this

is necessary in order to accommodate forecast ridership for this option. Peak-hour north-south bus frequencies are greatest in the LRT alternatives which utilize a Burnside or Division alignment, since the north-south lines act as feeders to light rail stations in East County.

The most significant differences in suburban area service are between the bus-oriented and the LRT-oriented alternatives. The former offer direct, bus service to those traveling to downtown Portland. With the LRT alternative, however, many bus riders in East County would have to transfer to a light rail car for through trips to downtown Portland.

The Burnside and Division LRT alignments are the only project alternatives which extend a transitway facility east of I-205. Either route would attract more auto drivers than the other alternatives by providing more sites for park-and-ride lots in East County. If a transit-supportive land development strategy is pursued, with apartments and offices planned around stations areas, there would be greater potential for increased transit use compared to that possible with other alternatives.

Alternative 1: No-Build. The No-Build transit system would be essentially the same as it is today. As shown in Table 9, passenger miles per passenger would be somewhat higher in 1990 than in 1976 due to ridership increases from the forecast increases of population and employment on the East Side. In other words, the 1990 No-Build system would be utilized more efficiently due to higher ridership and approximately static service levels, as shown in column 5 of Table 9.

Alternatives 2a and 2b: Low Cost Improvements. The Low Cost Improvement alternatives would increase 1990 transit ridership approximately 13 percent more than the 1990 No-Build alternative, with 35 percent more annual transit vehicle

miles on the East Side. The 9.799 million annual passenger trips is least of all build alternatives. A lower quality of service, in terms of travel time and reliability, largely explains the lower patronage level.

Alternatives 3a, 3b and 3c. Transit ridership does not vary among these alternatives. 18.323 million passenger trips are predicted for 1990, which is 4.8 percent less than the Separated Busway and Light Rail-Burnside (5-1) alternatives, which have the highest ridership of all options. This estimate does not include the estimated 600 peak-hour carpool trips on the HOV facility. These trips account for approximately 1800 peak-hour passenger trips in autos, which represent a reduction of about 1400 peak-hour auto trips, assuming passengers would otherwise drive in autos at the average occupancy level (1.3 persons/vehicle).

Alternatives 4a and 4b. Both Separated Busway alternatives would be equally effective in generating public transit trips. The predicted 1990 annual originating transit passenger level of 19.238 million is the highest of all alternatives, being approximately equal to the Light Rail-Burnside option with 19.223 trips predicted. The 19.238 million trips constitutes a 42 percent increase over the 1990 No-Build level, excluding carpool riders.

Alternatives 5-1, 5-2 and 5-3. The Light Rail alternative on Burnside Street would attract 3.2 percent more 1990 passenger trips than the Division option and 10.3 percent more trips than the I-205 alternative.

The I-205 line generates significantly fewer trips because of reduced service east of I-205, and additional transfers from buses to the light rail mode.

### Public Transit System Coverage, Frequency, and Connectivity

#### Introduction

All the "build" alternatives are based upon the same overall network configuration, and are therefore quite similar in terms of coverage, connectivity,

travel time, and many of the other network-related elements that affect the convenience of a transit system to its users. While differences among the Build alternatives are subtle, **the differences between the Build alternatives and the No-Build are not.** What follows highlights some of these network-related differences to illustrate some of the advantages of improved transit facilities in the East Side.

#### Areawide Coverage

The least difference among all the alternatives is in their areawide coverage. The coverage of the Build alternatives is better than of the No-Build mainly in the northern and eastern sections of East County. In other areas of the East Side, all the alternatives are similar in the areas they serve. This is because most of the east-west streets suitable for transit operation were first served long ago by previous transit companies. Much of the north-south service added in the build options for connectivity tends to overlap the coverage of the east-west lines, resulting in little net increase in the area served.

#### Service Frequency

The frequency of scheduled trips is greatly improved with the Build alternatives. The Busway alternative has the most frequent service, with many east-west lines in East County receiving five-minute service during peak hours. The LRT options with alignments on Burnside or Division have the best north-south bus frequency, with ten-minute service on most lines. Otherwise, the Build alternatives all have similar bus headways (5 to 10 minutes for urban lines, 10 minutes for most suburban east-west lines, and 20 minutes for suburban north-south lines, during peak hours).



### System Connectivity

Perhaps the most significant network advantage of the Build alternatives over the No-Build is in their degree of connectivity. The build options are more highly "connected" in the sense that they have a more elaborate network of crosstown routes, as well as more locations where routes converge. Thus, more transfers are possible, opening up a greater variety of travel opportunities. One measure of network connectivity is known as the "cyclomatic number." This is simply the number of interchange points in a network subtracted from the number of lines between these points. The higher the cyclomatic number, the more highly connected--and, hence, more versatile--the network. As indicated in Table 10, all the build networks are superior in connectivity to the No-Build alternative. The Division and I-205 LRT alignments have a slight advantage over the other build options in this respect.

TABLE 10

#### DEGREE OF CONNECTIVITY OF PROJECT ALTERNATIVES

<u>Alternative</u>	<u>Cyclomatic Number</u>
No-Build	26
Low-Cost Improvements	51
HOV Lanes	51
Separated Busway	53
LRT: Banfield/Burnside	53
LRT: Banfield/Division	54
LRT: Banfield/I-205	54

### Travel Time

Transit travel times for the proposed improvements were calculated as part of transit network modeling. These times are shown in Table 11. All times are based on trips from downtown Portland to the destination shown, during

TABLE 11

TRANSITWAY TRAVEL TIMES  
(P.M. peak hour, Outbound)

Alternative	Time from Downtown Portland, in Minutes			
	Hollywood	Gateway	Lents	Gresham
1976 Existing	19 <sup>a</sup>	26 <sup>a</sup>	42 <sup>a</sup>	56 <sup>a</sup>
1990 No-Build	21 <sup>a</sup>	29 <sup>a</sup>	46 <sup>a</sup>	62 <sup>a</sup>
1990 Low Cost Improvements	17 <sup>b</sup>	24 <sup>b</sup>	40 <sup>b</sup>	39 <sup>b</sup>
1990 HOV Lanes	21 <sup>a</sup>	14	21	34 <sup>c</sup>
1990 Separated Busway	11	18	25	38 <sup>c</sup>
1990 LRT: Burnside	13	18	30 <sup>c</sup>	34
1990 LRT: Division	13	18	25 <sup>c</sup>	36
1990 LRT: I-205	13	18	24	40 <sup>c</sup>

Notes: <sup>a</sup>No transitway used for this trip.  
<sup>b</sup>Arterial street exclusive bus lanes used for all or part of this trip.  
<sup>c</sup>Transitway used for a portion of this trip.  
 (Numbers without footnotes are for trips made entirely on the transitway system.)

the P.M. peak hour. These estimates allow for transfer times necessary to reach the given destination.

To compare the effectiveness of the alternatives on a broader scale, travel times were analyzed among a number of selected zones in the East Side, plus downtown Portland. These zones consisted of neighborhoods within the Study Area, such as Mt. Tabor, Lents, Rockwood, and Gresham. In addition, two neighborhoods in the East Side, but outside the Study Area, were included: Woodlawn, in upper Northeast, and Woodstock, in lower Southeast. Travel to areas in other parts of the region (such as Washington or Clackamas Counties) would involve transfers to lines outside the domain of this study and were therefore considered constant for all alternatives. Travel times utilized in the analyses were the in-vehicle plus transfer times that would be experienced during a typical peak hour in 1990.

Table 12 data reflects the similarity in the network configurations of the different Build alternatives. The significant travel time differences are between the No-Build and the Build alternatives only. The column labeled "Composite" illustrates the overall time difference for travel among the seven analysis zones. The travel times for trips between all 49 interzonal combinations in the No-Build alternative were added together to give one aggregate figure. Similar aggregations were calculated for each of the Build alternatives and compared with the No-Build. As indicated, travel times with the Build alternatives would range from 80% to 88% of those experienced in the No-Build. The Banfield/Burnside and Banfield/Division LRT alternatives would be most effective in reducing overall transit travel times.

TABLE 12

TRAVEL TIME COMPARISON FOR SEVEN SELECTED ZONES  
(% of time incurred compared to No-Build)

<u>Alternative</u>	<u>Composite</u>	<u>Downtown</u>
No-Build	100%	100%
Low Cost Improvements	88%	90%
Separated Busway	83%	84%
LRT: Burnside	80%	81%
LRT: Division	80%	83%
LRT: I-205	86%	87%

Note: An HOV alternative was not tested as part of the computer modeling process. It would be approximately equal to the Separated Busway, except for greater time between East Portland and East Multnomah County.

The column labeled "Downtown" summarizes a similar analysis, in which travel times from downtown Portland to each of the six East Side neighborhoods was aggregated and compared to the No-Build. The Burnside LRT alignment was the most effective in this case. It should be noted that the effectiveness of all the Build alternatives are understated by this technique, since the No-Build network model utilized 1976 transit travel speeds. The use of 1990 transit travel speeds, which were not available at the time of analysis, would have resulted in slightly longer travel times in the No-Build due to increased congestion.

Individual trip times were also analyzed between certain pairs of the seven zones to highlight those trips which entailed particular high or low travel times. There were few instances in which the effectiveness of the No-Build was not exceeded by the Build alternatives. In some cases, a Build alternative saved

up to 40% (up to 28 minutes) of the travel time between two zones. The only exception was for certain trips between central East Portland and central East County; the requirements of transferring between urban and suburban routes at I-205 would result in a time loss of one to six minutes for certain of the build options.

The Low Cost Improvements alternative was most effective of the build options in serving the aforementioned East Portland-East County travel. It was somewhat less effective in accommodating several other trip patterns, particularly those to and from Gresham. The Separated Busway alternative was about average in travel times as compared to the other Build alternatives. An HOV alternative was not tested as part of the computer modeling process. It is anticipated to be equal to the Separated Busway alternative, except for East Portland-East County travel, where it would be less effective.

The Burnside and Division LRT alternatives were superior in serving trips between Gresham and many of the other six zones. The I-205 LRT alternative was least effective of the build options in accommodating trips to and from the zones in East County, since a bus/rail transfer would be required for most suburban passengers.

#### Schedule Reliability

Transit schedule reliability is considered critical in maximizing ridership. People with a choice normally prefer their own car if transit does not provide a regular, predictable day-to-day performance.

#### No-Build

The No-Build alternative would subject transit riders to peak-hour delay and congestion on city streets. According to traffic studies, the level of congestion

in this alternative is expected to be greater than in any of the others, since there is less incentive for motorists to use transit than with other alternatives.

#### Low Cost Improvements

Schedule reliability in the Low Cost Improvements alternative would be somewhat better than in the No-Build, as congestion levels would be lower and the bus lanes on arterial streets would provide potential free-flow conditions. Arterial streets are, however, subject to haphazard events which can cause a slow-down or blockage of movement, such as traffic accidents, street repair, and fires in adjacent buildings. Illegal use of the lanes by motorists or crossing of them for left turns may also cause problems. Finally, non-peak limited buses may be blocked by local buses and general traffic in one-lane street segments. While the actual incidence of these conditions is difficult to forecast, more frequent operational problems could be expected, which would tend to inhibit future ridership increases on the system.

#### HOV Lanes

The HOV lanes offer a higher level of reliability, since the Banfield Freeway would not be subject to the same kinds of haphazard situations as surface streets. Use of the lanes by carpools would introduce some uncertainty into transit operations during peak hours. A carpool accident or breakdown could disrupt bus operations, especially when adjacent lanes become too crowded to allow buses to bypass the blockage. Weaving maneuvers would also delay buses as carpools merge into and out of the HOV lanes. An additional source of problems is possible congestion upstream from the lane drop at the Holladay Street exit; carpools affected by this congestion could back up buses on the HOV lanes. During off-peak hours, buses traveling on the Banfield would not have the benefit of preferential lanes, but reliability would still be higher than on city streets.

### Separated Busway

This alternative would provide a very high level of reliability on the Banfield segment. An accident or breakdown on the busway would be rare and would only affect passengers on the buses involved. Since the busway would consist of two lanes, other buses would be able to pass disabled vehicles. Delays due to merging would be non-existent because ramps at either end of the facility (as well as at station areas) would be used by buses only.

### Light Rail Transit

The light rail line would, for the most part, operate in its own right-of-way, free from interference by other traffic. Equipment failures are not common on electrically-powered vehicles, assuming a reasonable level of maintenance. Even if a motor failure occurs, other motors in the vehicle (or in the other vehicle of a two-car train) have the capability of powering the car temporarily. Because of its fixed guideway, however, LRT would be less flexible than the bus in adjusting to blockages of the right-of-way. Switchback tracks and bypasses can be added at regular intervals along the line to allow operation to be maintained on either side of such blockages. Nevertheless, the dependence of LRT on fixed rails and an off-vehicle source of power leave this mode more vulnerable to interruptions. Experience with existing LRT lines in other areas suggests that major interruptions of service are rare but tend to be more severe than interruptions of bus service.

### Transit Operational Safety

Overview. The traffic accident potential of each project alternative has already been discussed. Transit operational safety is concerned with the day-to-day safety hazards posed by different methods of operation. The frequency of transit/auto accidents is largely related to the density of traffic and, hence,

the frequency of potential conflict between vehicles. The severity of these accidents is related to differences in the speed, size, and weight of the vehicles involved. Thus, any alternative which separates transit vehicles from the general flow of traffic will, by its nature, contribute to an increase in operational safety.

Alternative 1: No-Build. The No-Build alternative is not expected to create safety advantages compared to existing conditions. The transit accident rate for the Tri-Met system in 1976 was 55.62 traffic accidents per million bus miles of travel and 12.91 passenger accidents per million passenger trips served. These rates include all reported accidents, regardless of whether or not an injury or claim resulted. The accident rate in 1990 could be higher under the No-Build alternative, due to the increased East Side traffic volumes.

Alternatives 2a and 2b: Low Cost Improvements. The Low Cost Improvements would extensively use exclusive transit lanes on arterial streets. In general, such lanes elsewhere have resulted in decreased accident rates, since the vehicular mix is more uniform and a low volume of vehicles is operated in the bus lanes. Nonetheless, arterial street operation does face particular problems, especially at intersections, where conflicts can occur with both general traffic and pedestrians. Transit patrons walking to and from the transit islands planned for the center of certain streets would be subject to the hazards of automotive traffic, although this would be mitigated to some extent by pedestrian signalization. Cars crossing the transit lane unexpectedly would pose an additional safety hazard.

Alternatives 3a, 3b and 3c: HOV Lanes. The HOV alternative would mix carpools and buses in a generally free-flowing lane. The present Banfield HOV lanes have a good safety record, in part because of low volumes in the lanes (160-250 vehicles per hour, of which 10-15 are buses). The Banfield lanes pass only



the 42nd Avenue and Holladay Street exit ramps westbound and the 58th, Halsey/67th, and 82nd Avenue exit ramps eastbound. With increasing HOV lane volumes and the westerly extension of the eastbound HOV lane past the 33rd and 39th Avenue exits, the transit accident rate on the Banfield can be expected to increase. **Ramp metering could help mitigate this problem.**

Alternatives 4a and 4b: Separated Busway. Because there are few separated busways currently in operation, little data are available on the safety records of these facilities. The Busway alternative would potentially provide a high level of operational safety due to its complete separation from all other traffic. The busway would also provide full-time separation, as opposed to the HOV and arterial transit lanes which would only be used in the peak hours for the peak direction of travel. Busway accidents would be rare events due to driver training, good vehicle maintenance, uniformity of vehicle mix, and low vehicle volume. Accidents would be most likely to occur on the street-running portions of the lines. The ramp areas at 60th Avenue and Hollywood stations would also be potential accident areas; special signal and design measures would be incorporated at certain locations.

Alternatives 5-1, 5-2 and 5-3: Light Rail Transit. Light rail accidents rates vary considerably given the experience in other cities. An analysis was conducted of six systems from which data were available to compare the accident rates of LRT and buses. The accident rate of light rail transit ranged from a low of one-tenth that of buses to a high of two and one-half times the bus rate. This variance seems to depend largely upon the degree of separation of LRT from automotive traffic. The three alternative LRT alignments being considered in the

East Side each have over 90 percent of their rights-of-way separated from auto traffic, leading to a high probability of good operational safety.

However, conflicts with auto traffic or pedestrians could occur in the downtown and at grade crossings along Holladay, Burnside, and Division Streets. The likelihood of rear-end peak-hour collisions between LRT vehicles would be quite low because of the low frequency of vehicles (a maximum of one train every 4.3 minutes versus one bus on the busway every 33 seconds) and because of the added protection of signals and automatic train stops.

#### Downtown Transit Operations

Overview. Downtown transit operations is the topic of a separate report entitled: "Downtown Circulation Alternatives." This report describes and evaluates bus operation and possible light rail alignments in the core area. Several major conclusions can be derived from the reported results.

First, the evaluation of the transit operations in the downtown must consider the entire regional system, not just operations from the Banfield portion. This is because the downtown functions as a transit terminal and interceptor of transit trips from other transportation corridors in the region.

Table 13 shows the importance of systemwide impacts. Namely, peak-hour bus departures to the East Side only would not overtax the capacity of the Portland Mall; nor would systemwide departures if transit improvements in other corridors are not made (column 2). However, bus-oriented improvements systemwide would exceed the peak-hour Mall capacity, requiring substantial bus circulation off the Mall (column 5). This would require revision of the existing downtown circulation plan, which attempts to minimize off-Mall transit circulation.

TABLE 13

P.M. PEAK-HOUR BUSES ON AND OFF THE PORTLAND MALL

	Mall Capacity (Buses Per Hour)	No Systemwide Improvements		Systemwide Improvements	
		Buses On-Mall	Buses Off-Mall	Buses On-Mall	Buses Off-Mall
Existing System	400	295	50	295	50
1990 No-Build	400	299	50	345	55
1990 Low-Cost Improvements	400	335	50	370 <sup>a</sup>	215
1990 HOV Lanes	400	350	50	379 <sup>a</sup>	230
1990 Busway	400	371	50	400	230
1990 LRT (Banfield Corridor Only)					
On-Mall Alignment	350 <sup>b</sup>	265	50	350	150
Cross-Mall Alignment	400	266	50	400	100
1990 LRT (3-Corridor System)					
On-Mall Alignment	225 <sup>c</sup>	---	--	225	120
Cross-Mall Alignment	400	---	--	325	20

NOTE: <sup>a</sup> Mall capacity is exceeded in southbound direction; certain bus lines must therefore be routed onto other streets, even though some excess capacity still exists northbound on Mall.

<sup>b</sup> Approximate bus capacity of Mall if buses run two-way on 6th Avenue and one-way (southbound) on 5th Avenue, and LRT cars run two-way on 5th Avenue.

<sup>c</sup> Approximate bus capacity of Mall if buses run two-way on 6th Avenue and LRT cars run two-way on 5th Avenue.

A second conclusion emerges upon evaluation of Table 14. As shown in column 5, total bus departures increase sharply with all Build alternatives except the three corridor light rail transit system, which would keep bus departures at approximately existing levels. This is possible because light rail vehicles are able to accommodate approximately three times as many passengers as buses.

Alternative 1: No-Build. Since the No-Build alternative would basically maintain the present level of transit service, significant differences from current downtown bus operations and volumes would not occur. During the 1990 P.M. peak hour, approximately 315 buses would circulate on the Mall and 50 off the Mall if no system improvements are made. These numbers would increase to 365 and 55, respectively, if systemwide bus-oriented improvements are made.

Alternatives 2a and 3b: Low Cost Improvements. The higher level of transit service provided with the low cost improvements would require approximately 20 additional buses on the Portland Mall and the same number (50) off the Mall as 1990 no-build conditions with no systemwide improvements. Low cost improvements systemwide would slightly increase the number of buses on the Mall relative to the 1990 Banfield No-Build with transit improvements made in other corridors. Systemwide low cost improvements would substantially increase the number of buses off the Mall (215 versus 55 with the No-Build). This level of off-Mall transit use of city streets is not compatible with existing downtown transit circulation policies, which are aimed at minimizing off Mall bus use of city streets. In this respect, however, the LCI alternatives are no different than the HOV and Separated Busway options.

TABLE 14  
P.M. PEAK-HOUR BUS DEPARTURES FROM DOWNTOWN PORTLAND

	Buses to East Side Study Area	No Systemwide Improvements		Systemwide Improvements	
		Buses to Other Areas	Total Bus Departures	Buses to Other Areas	Total Bus Departures
Existing System	107	238	345	238	345
1990 No-Build	111	238	349	289	400
1990 Low-Cost Improvements	147	238	385	438	585
1990 HOV Lanes	162	238	400	447	609
1990 Busway	183	238	421	447	630
1990 LRT (Banfield Corridor Only)	78 <sup>a</sup>	238	316	422	500
1990 LRT (3-Corridor System)	78 <sup>a</sup>	---	---	267 <sup>b</sup>	345

NOTES: <sup>a</sup>In addition, up to 16 LRT departures would be scheduled to the East Side.

<sup>b</sup>In addition, up to 18 LRT departures would be scheduled to other areas.

Alternatives 3a, 3b and 3c: HOV Lanes. Downtown bus circulation requirements with an HOV lane system are essentially the same as those described for the LCI alternatives. The only difference is in the number of buses on-Mall given systemwide improvements, as 9 additional peak-hour buses are required with the HOV operation (379 versus 370).

Alternatives 4a and 4b: Separated Busway. The Separated Busway options require the most intensive use of buses in the downtown of any alternative under study. With no transit improvements made in other corridors serving the downtown, approximately 20 additional buses would be required on-Mall compared with the HOV option and 35 more than the LCI alternatives. This relationship remains about the same with systemwide improvements are assumed. The busway system would require the same number of buses off the Mall in 1990 as the HOV options (230) and about 15 more than the Low Cost alternatives.

Alternatives 5-1, 5-2 and 5-3: Light Rail Transit. Downtown transit operations are the same regardless of the light rail option selected. Of the three basic light rail routes being considered (two on-Mall and one cross-Mall), the cross-Mall option would require the fewest buses off the Mall under both the "no systemwide" and "systemwide" improvement conditions. The most striking contrast between route options would occur under the condition of a systemwide light rail network. Under this case the cross-Mall route would require fewer peak-hour buses operating off the Mall than do today (20 versus 50) and fewer buses on-Mall than 1990 No-Build conditions. In these respects the cross Mall routing concept is superior to on Mall routes which require greater bus usage of off Mall streets.

Short-term Uses Versus the Maintenance  
and Enhancement of Long-term Productivity

Alternative 1: No-Build

By definition, the No-Build alternative would "do nothing" to improve transportation service in the study area. In this sense, the no-build establishes benchmark conditions from which transportation gains associated with build options can be compared and evaluated.

While the no-build does nothing in terms of construction to facilitate travel, it does allow the present level of transit services to be maintained. This results in greater utilization of the existing transit system since transit demand is assumed to increase proportionately with future population and employment growth.

Alternatives 2a and 2b: Low Cost Improvements

These improvements supplement the no-build system by employing reserved bus lanes on city arterials in East Portland. The proximity of bus service to the more densely populated urban area west of I-205 provides excellent service. However, poorer connections east of I-205 and the lack of express service on the Banfield downgrades the low cost improvements in terms of transit productivity and daily ridership.

Of the two low cost options, 2b would perform best in terms of overall transportation service since the Banfield Freeway would be widened to six lanes between 37th Avenue and I-205. The additional freeway capacity provides traffic service on the freeway and city arterials in East Portland at levels similar to the Separated Busway and Light Rail alternatives.

Alternatives 3a, 3b and 3c: High-Occupancy Vehicle (HOV) Lanes

Unlike Alternatives 3b and 3c, Alternative 3a would not increase the capacity of the Banfield east of 37th Avenue. As a consequence, traffic service on the Banfield and east-west city arterials would continue to deteriorate in the long-term. Conversely, traffic service possible with Alternatives 3b and 3c is highest of all build options. This stems from the allowance of carpools in the HOV lanes and the additional travel lanes, a condition which eases traffic flow in the general traffic lanes during peak hours.

The ease of converting the HOV lanes to general traffic use, and their comparatively freer-flowing condition during peak hours, may generate a public action for the conversion of these lanes to general traffic use during all hours. In this regard, the HOV options are more vulnerable than other options, which threaten their effectiveness in the long-term. On the other hand, if carpooling and public transit use become increasingly more popular as alternates to the private auto, maintaining the lanes is more probable.

Alternatives 4a and 4b: Separated Busway

These alternatives would generate the most daily passenger transit trips of bus-oriented alternatives. However, since carpools would not be allowed use of the lanes at any time, a busway would produce somewhat lower traffic service on the Banfield Freeway and city arterials in East Portland.

Public pressure to convert the bus lanes to general traffic use could emerge since the lanes would appear underused at all times, especially during off-peak periods. In this respect the north side option (Alternative 4a) may be least vulnerable since it would be less visible due to its physical separation from the freeway.



Alternatives 5-1, 5-2 and 5-3: Light Rail Transit (LRT)

The Light Rail alternatives are similar to the Separated Busway options with respect to 1990 transit ridership and potential conversion to use by general traffic. A major difference between the Light Rail options and bus-oriented options in terms of long-term transportation productivity is in the downtown. As previously discussed under downtown operational impacts, a light rail network systemwide (Banfield, Oregon City and Sunset corridors) would substantially reduce the number of buses operating both on and off the Portland Mall in 1990. This would improve overall transportation circulation downtown and would allow for further system expansion without major construction. Light rail operating only in the Banfield corridor would also benefit downtown circulation by reducing off-Mall bus circulation, but the Mall's capacity would be exceeded as with the bus-oriented options.

Irreversible and Irretrievable Commitments of Resources

Neither the No-Build alternative or Low Cost Improvement Alternative 2a involve major commitments of transportation resources. Additional traffic lanes on the Banfield Freeway would not be constructed nor would an exclusive busway on I-205. These transportation options and others could be implemented at a later date.

Alternative 2b would widen the Banfield Freeway from four to six lanes between 37th Avenue and I-205. This improvement in auto-capacity would not preclude the future development of a transitway in the Banfield corridor, since freeway lanes could be converted to an exclusive busway, light rail facility or HOV lanes. However, with the exception of HOV lanes with a minimum Banfield

Freeway facility, the conversion would be costly, as witnessed by the expenditures necessary for alternatives which would implement such facilities in the present.

Alternative 3a is flexible with respect to adding future freeway lanes on the Banfield and potential conversion of HOV lanes to either general traffic use or conversely, exclusive bus lanes on light rail. Some public pressure already exists to revert the existing Banfield HOV lanes back to general traffic use.

Alternative 3b and 3c would include additional freeway lanes initially. The HOV lanes are technically convertible to either traffic use or other public transit use as discussed for Alternative 3a. However, the desirability of doing so would be the subject of future decision-making, as reversion to traffic use or conversion to exclusive bus use or light rail is not assumed in this proposal.

Separated Busway Alternative 4b would be positioned in the center of the Banfield Freeway, being separated from traffic lanes by concrete barriers. It is physically very similar to the HOV alternatives and is therefore potentially convertible to either general traffic use, HOV use or light rail transit. Some materials committed to the busway facility are "sunk" and would be irretrievably lost in conversion efforts, and additional materials would be required to complete conversion, especially to a light rail facility.

On the other hand, Separated Busway Alternative 4a would be positioned on the northside of the Banfield Freeway, making it considerably less convertible to general traffic use because of limited access and major operational and safety deficiencies. The busway, however, is convertible to the light rail mode, although doing so at a future date may be confounded by the required disruption of transit

service. In addition, some land development opportunities in East Multnomah County would be lost in the interim period before conversion takes place, decreasing the light rail transit service potential.

The light rail alternatives are less vulnerable to conversion to general traffic than other options. The line along the Banfield Freeway would be separated from general traffic and is designed for potential use by general traffic (for the same reasons as stated for Alternative 4b). Moreover, the higher cost of implementing a light rail system would represent a major commitment on the part of local government to the rail mode, making conversion politically infeasible. This also holds true for other transitway options, although to a lesser degree.

CHAPTER TWO

ECONOMICS

CHAPTER TWO/ECONOMICS

The Existing Setting

The Study Areas

The Region, also known as the Portland-Vancouver Standard Metropolitan Statistical Area (SMSA), consists of Clackamas, Multnomah, Washington Counties in Oregon and Clark County in Washington State. Located at the junction of the Columbia and Willamette Rivers, the Region has grown into a major port and distribution center for much of the Pacific Northwest, and presently has a higher proportion of trade and service employment than many other SMSA's of its size.

The Region's population and employment growth has been fairly rapid in the past few years. This growth is expected to slow down in the next few decades.\*

As in most urban areas, substantial growth has been in the suburbs. Much of the population growth in the Oregon portion of the SMSA has occurred on the east side of the Willamette River, where there are few geographical obstacles to development. This development has created transportation problems east of the Willamette River as described in the impacts section.

Portland's Downtown consists of the Central Business District (CBD) with numerous high-rise office buildings, both a campus of the state university and an urban renewal area south of the CBD, and a less developed area to the north. This northern portion of the Downtown contains some industry as well as housing, retail and wholesale trade.

\*See the Economic and Social Environment Research Reports for a more detailed discussion of employment and population trends.

In the past few years Portland's CBD has been enjoying an economic renaissance. The seventies have witnessed a boom in office development with several new high-rises, and Downtown has regained some of the retail activity it lost during the sixties. There is an ongoing effort to develop select older portions of the Downtown, including the waterfront area and the Old Town historical area. The recently completed Portland Mall through the CBD has improved Downtown transit service, encouraging further development. Downtown population is expected to increase slightly by the end of the century as additional housing is provided; employment is expected to increase by about 80 percent between 1970 and 1990.

The East Portland Study area has many characteristics of "inner-city" portions of urban areas. Population in this area dropped during the first half of the seventies, but has stabilized and is expected to remain so for the last quarter of the century. In contrast, employment is projected to grow over fifty percent by 1990, compared with 1970 levels. Existing single-family residential areas, particularly along arterials, should continue to gradually convert to a combination of multi-family residential and commercial uses. This trend will augment similar uses, which already exist along arterials.

There are two major retail centers in the East Portland Study Area: Lloyd Center and Hollywood. Lloyd Center is a regional shopping center with several high rise offices and condominiums. It is the second largest concentration of office and commercial activity in the Region. Hollywood is an older, less developed retail and office center. In contrast to Lloyd Center, which has a service area encompassing most

of the urban area, Hollywood's service area draws principally from East Portland.

The East County Study Area is one of the fastest growing areas in the Region. Population and employment densities are lower than the areas west of the I-205 corridor and a steady infilling of people and jobs is projected. Population is expected to grow from a 1975 level of less than 150,000 to over 200,000 by the end of the century. Employment is expected to more than double (26,000 to 53,000) by 1990 compared with 1970 levels. Much of the employment is industrial, and is located near the I-80N freeway.

#### Economic Conditions of the Corridors and Transit Station Areas

Downtown. Plans call for most transit routes now through 1990 to terminate or pass through the Portland Mall. The Mall runs through the high-density office area of the central business district (CBD). Several large retail outlets, such as the Meier and Frank store, are also located on the Mall.

The proposed "On-Mall" bus and LRT alignments between N.W. 5th and 6th avenues and N.W. Glisan and N.W. Everett streets pass through an older area with shops, wholesale outlets and low income residential hotels in the northern part of the Downtown. The proposed "Cross-Mall" LRT alignment on N.W. and S.W. First Avenue and S.W. Morrison and Yamhill streets passes through a lower density area with numerous parking lots, and includes the eastern part of the Old Town historical area north of the City's core.

East Portland. In the East Portland Study area there are two proposed transit alignments: (a) the Downtown Connection and the Banfield Corridor and (b) the Low Cost Improvements routes.

1. Downtown Connection and Banfield Corridor. The economic characteristics of the three transit stations of the Downtown Connection in the Lloyd Center Area, as well as the three station areas in the Banfield corridor, are summarized in Figure 30.

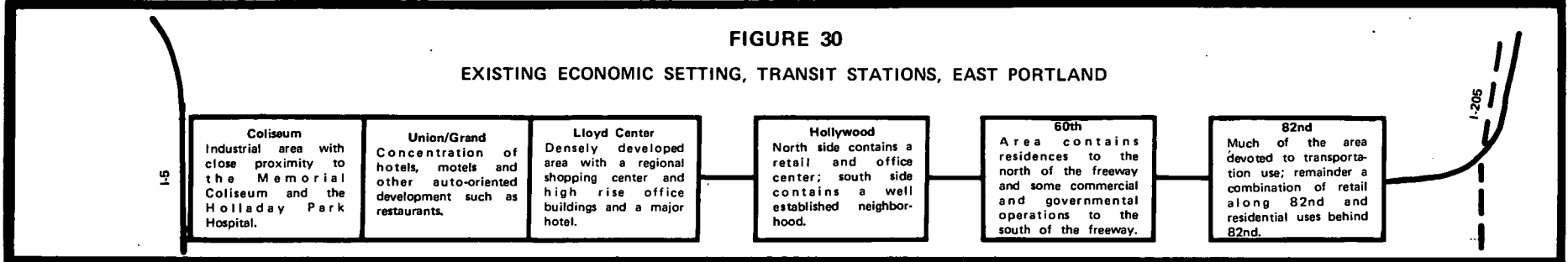
The Banfield corridor presently consists of the Banfield freeway and the Union Pacific rail line. This rail line is one of the main routes for the Union Pacific railroad, handling about eleven percent of their total freight as well as serving over forty industries on the north side of the corridor. The Union Pacific Company has long-range plans to install an addition mainline track within their existing right of way. The addition would increase present movement capacity over four times.

2. Low Cost Improvement Routes. The low cost improvement (LCI) routes would increase transit capacity on three routes and auto capacity on one route. These routes are delineated on the project sketch map which follows page (iii). All the routes are on established arterials, except for N.E. Broadway Street between N.E. 41st Avenue and N.E. 67th Avenue, which is a local street. Generally, the routes are lined with a combination of retail and residential activities, with some wholesale and industrial

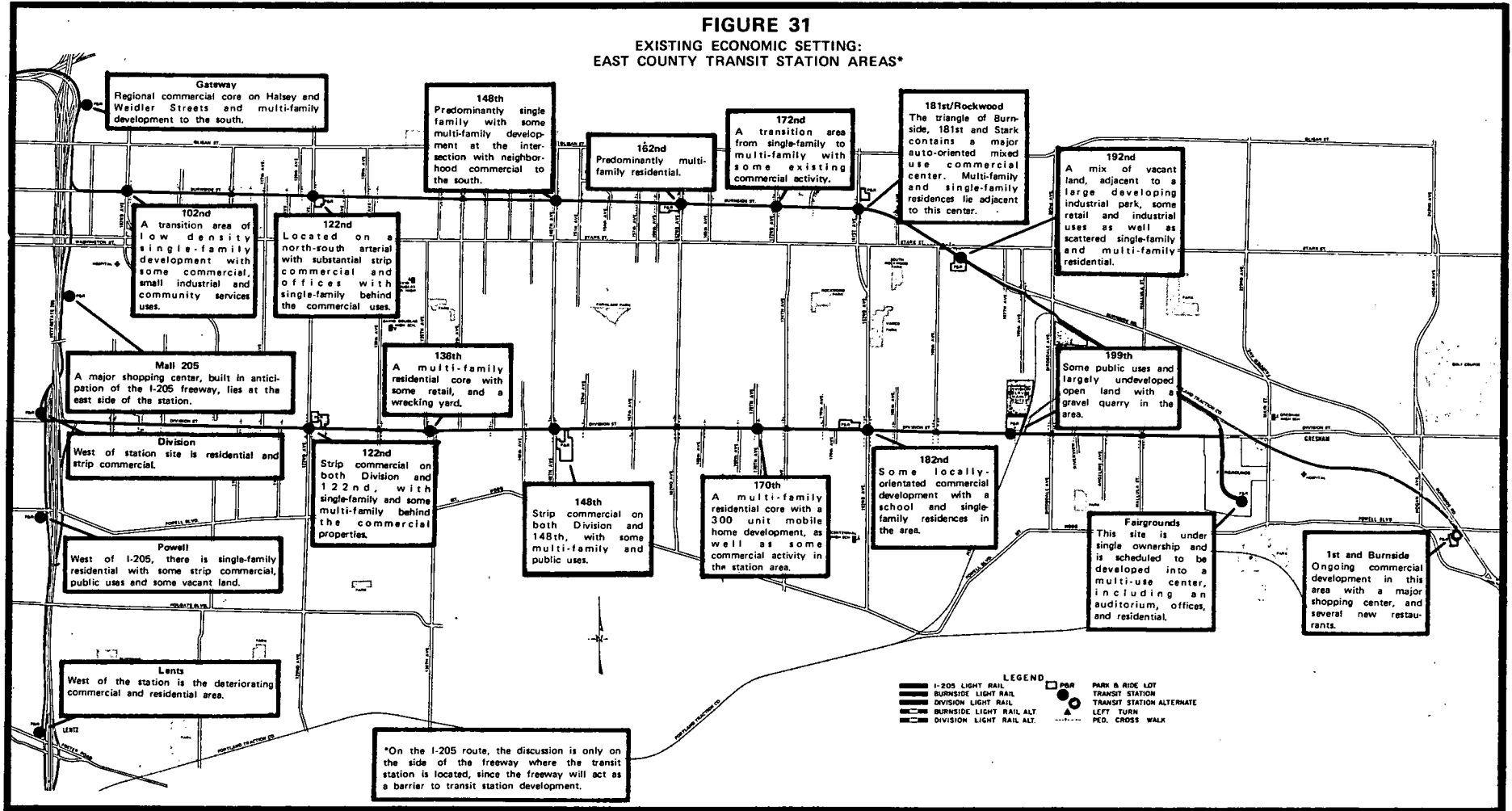


**FIGURE 30**

**EXISTING ECONOMIC SETTING, TRANSIT STATIONS, EAST PORTLAND**



**FIGURE 31**  
**EXISTING ECONOMIC SETTING:**  
**EAST COUNTY TRANSIT STATION AREAS\***



activities at the west end of the routes near the Willamette River. The routes tend to have higher density concentrations of both business and residential near the Downtown, becoming less intensive further away from the core of the city.

East County Study Area. The build alternatives offer several transit alignment alternatives in East County. Light rail alignment alternatives include the following three routes: Burnside Street (alternative 5-1); Division Street (alternative 5-2); and I-205 (alternative 5-3). The HOV Lanes or Separated Busway alternatives would include a busway along the I-205 route. In addition, all the build alternatives would have a transit station in Gresham, either at the Fairgrounds site or at the First and Burnside site.

The I-205 route is within the I-205 freeway corridor. There are two major shopping centers--Gateway and Mall 205--as well as the Adventist Hospital within this corridor. The character of the corridor is changing as I-205 is being built. Currently there is pressure for highway-orientated development near the soon-to-be-constructed I-205 interchanges.

The Burnside Street route is a low density corridor, predominately single-family and multi-family residential with some commercial and multi-family development at the major intersections. The Rockwood shopping center, a major retail area, is located at the intersection of S.E. 181st. The eastern end of this route runs along an existing rail line.

In contrast to the Burnside Street route, the Division Street route would be located within a four lane arterial lined by auto-orientated

commercial activity. This commercial activity is more intense at the western end and the major intersections of the route.

A summary of the characteristics of the transit station areas in East County is shown in Figure 31.

## Impacts

### Introduction

This section consists of two parts: the General Economic Impacts and the Costs and Measures of Economic Performance or Effectiveness. The General Economic Impacts are discussed by region and by alternative, and include parking removal, access changes and developmental impacts. The Costs and Measures of Economic Performance or Effectiveness consists of summaries of two technical studies, one analyzing the 1990 ridership, costs, and revenues of the transit portion of the alternatives and the other analyzing the 1990 monetary benefits to the private vehicle user.\* A complete discussion of the impacts is found in the Economic Research Report of Volume

### General Economic Impacts

#### Region

1. No-Build. Under this alternative, few or no transit improvements would be made in the Region. The Banfield Freeway, and East Portland in general, is one of the more congested areas in the Region. Increased congestion,

\*The studies are "East Side Transit Operations" by Tri-Met and "Traffic Analysis: Banfield Transitway" ODOT.

particularly during rush hours, could cause employment to become more diffuse as employers would tend to locate in places closer to their workers and customers, and at the same time, workers would live closer to their workplaces. In the long-term, overall productivity in the Region would suffer.

2. Low Cost Improvements. If this alternative is chosen for the Banfield Transitway, it is possible that low cost improvements would be implemented elsewhere in the region. In comparison with the no-build, there would be slightly better transportation at a relatively low implementation cost, employment would be more concentrated particularly in the CBD, and productivity in the Region would be higher.

3. Busway and High Occupancy Vehicle Lanes Alternatives. At the regional level, the economic impacts of these two alternatives would be similar, although the HOV lanes would provide greater auto capacity and encourage the use of carpools elsewhere in the Region.

Exclusive bus lanes elsewhere in the Region, particularly in the Sunset and Oregon City corridors, would involve higher construction costs than the No-Build or LCI alternatives but would substantially increase the overall level of service.

4. Light Rail Transit. The selection of the LRT option for the Banfield Transitway would make LRT more attractive in other parts of the Region. If extended to other parts of the Region,

it could, with Supportive Land Use Policies, concentrate some suburban population and employment around the transit stations, decreasing traffic and costs of providing public services.

Downtown

1. No-Build. This option 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, causing added congestion. Over time, congestion could discourage the influx of shoppers, and more importantly, the influx of office-type activity. By making the Downtown less attractive than with the other build options, it would also be more difficult to obtain the desired residential demand in the downtown. 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.
2. Low Cost Improvement. In Downtown, the impacts of this alternative would be similar to those of the HOV and the Separated Busway alternatives. Approximately the same number of buses would travel to the Downtown with Alternative 2 as with Alternatives 3 and 4. Since the Portland Mall would be at capacity, many of these buses would be required to use cross-mall streets, particularly S.W. Morrison and S.W. Yamhill streets. These streets

would experience more bus traffic providing greater access and exposure to adjacent businesses. This alternative would also remove about 30 on-street parking spaces, located between the Steel Bridge and the Portland Mall. The Downtown parking removal with any of the build alternatives would not be a net loss in total Downtown parking since the parking would be replaced elsewhere until the designated maximum parking is reached.

3. HOV and Busway Alternatives. In the Downtown, these two alternatives would have virtually the same economic impacts. Buses would be routed between the Portland Mall and the Steel Bridge via N.W. 5th and 6th avenues and N.W. Glisan Streets. This could encourage development along these streets, and would support the use of the proposed Union Station Transportation Center. At the same time, the influx of transitway buses would exceed the capacity of the Mall and would require increased routing of buses on non-Mall streets. As with LCI alternative, this could moderately increase economic activity along S.W. Yamhill and S.W. Morrison streets with much the same impacts on these streets as with Alternative 2.

The HOV and Busway alternatives would require exclusive bus lanes on N.W. 5th and 6th avenues and N.W. Glisan. To provide the bus lanes, approximately 150 parking spaces would be removed. Parking removal might cause a loss in sales for some businesses as shoppers go elsewhere where parking would be more available.

4. LRT. In contrast to the bus alternatives, the light rail alternatives would allow more transit usage in Downtown, since

the light rail vehicles would handle more passengers than buses. One light rail vehicle can carry as many passengers as three buses. Further, the LRT alternatives could bring more riders into the downtown area at lower noise levels. An advantage of the LRT alternative would be the reduction in the number of buses in the Downtown which would lower noise, diesel fumes and congestion created by buses, making the Downtown more attractive for businessmen, employees and shoppers.

There are three routes for the LRT in the Downtown: the Oak Street (On-Mall), the Pioneer Square (On-Mall) and the Cross Mall alignments, each is examined in turn.

a. Oak Street. This route would increase the number of riders onto the Mall and decrease the noise levels by decreasing the number of buses on the Mall. These conditions would enable economic development along the north of the Mall to continue, which otherwise would be constrained by lack of access. This option would also remove about 100 parking spaces.

b. Pioneer Square. The impacts of this alignment would be similar to those of the Oak Street alignment. By extending the route an additional five blocks into the Mall, this alignment would better service the activities adjacent to the Mall. This option would remove about 100 parking spaces.

c. Cross-Mall. In contrast with the other two LRT alignments, this route would impose a major transportation corridor onto N.W. and S.W. First Avenue and S.W. Morrison and S.W.

Yamhill streets. By doing so it could, in the long run, encourage development along this route, particularly along N.W. and S.W. First Avenue. In particular, the planned development of Old Town and the west end of the Morrison Bridge probably could occur more rapidly with this alternative.

As with the other LRT alternatives, access would be increased into the Downtown. Fewer buses than the other LRT options would be placed on non-Mall streets, although about the same number buses would be on the Mall as today. This alternative would not serve the full length of the Mall and the area north of the Mall including the Union Station Transportation Center, and these areas might not grow as rapidly as with the other two LRT alternatives. This option would remove about 235 parking spaces along the route.

#### East Portland

1. No-Build. With this option the existing transit system in this area would remain about the same. No new bus routes would be created; transit demand would increase only slightly since there would be no additional incentives to utilize transit. With increased congestion on both arterial and local streets, many parts of East Portland would experience deterioration and lower land values. Some households would likely choose a residence in the central city areas such as East Portland because of the high costs of reaching the Downtown and other close-in employment centers. With



improved transportation this tendency could be discouraged since access to outer areas would be eased.

Other impacts associated with the build alternative, such as right-of-way acquisition and extensive parking removal, would not occur with this alternative, although some on-street parking may be removed to improve traffic flow.

2. Low Cost Improvement. This alternative 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 could reduce the sales levels of numerous businesses along the routes as customers may shop elsewhere where parking and access is better.

Access via transit would improve for travellers along the LCI routes. Because of the increased access, some multi-family development could be encouraged along these routes.

3. High Occupancy Vehicle Lanes. By widening the Banfield Freeway to six lanes during the peak hours (Alternatives 3b and 3c) and possibly eight lanes during the non-peak hours for general traffic, a greater volume of traffic could be accommodated on the Banfield than any other option, and through traffic would be reduced on East Portland streets. This could make the area a more attractive place to live and shop and should raise its overall quality and economic well-being.

This option would include the Coliseum, Union/Grand, and Lloyd Center transit stations. By making these areas more accessible, they would be tied more closely to Downtown. In particular, it would be much easier to travel between the employment, retail, and hotel concentrations in the Lloyd Center area to Downtown.

4. Busway. 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 would make transit very attractive, especially to those near the Transitway and feeder bus routes. Activity would tend to concentrate near the transit stations. This area would be tied more closely to the Downtown, than with the HOV option because of better service afforded by the additional stations at Hollywood, 60th and 82nd.

5. Light Rail Transit. In East Portland, the LRT alternative is similar in many respects to the Busway option, having the same transit stations and routing. This option would tie the station sites more closely to other parts of the Region, than the other alternatives, particularly East County. For example, if the Burnside or Division LRT alignment is chosen, commuting to employment centers near the East Portland transit stations would become more convenient. Commuting would enhance these

centers, particularly the Lloyd Center Area. As with Alternatives 3 and 4, it would tie the Lloyd Center area more closely to the Downtown.

### East County

1. No-Build. With this option there would be only minor transit improvements in East County. The existing system of transit would remain the same with a slight increase in transit route mileage. The heavy dependence on the auto in East County would continue with few incentives to ride the bus.

Because of the costs resulting from congestion in traveling 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.

2. Low Cost Improvement. None of the arterial street bus lanes of the low cost improvement alignments would extend into East County. However, this alternative would provide better transit service and relieve congestion slightly more than the no-build alternative. The only major construction in East County would be for a transit station near the center of Gresham. This would encourage development around the station.

3. HOV Lanes and Busway. The impacts of these two alternatives in East County would be virtually the same. The major difference

between these alternatives and the low cost improvements is that the I-205 busway would not be constructed with the low cost option. As noted in the section on transit stations, there would be major transit stations along I-205 at Sandy Blvd., Gateway, Mall 205, Division, Powell and Lents. In addition, a transit station would be built in Gresham. This station would have express bus service to the I-205 busway.

Development of business and residences would concentrate around the transit stations. In the absence of land use controls which support transit-oriented development, this development would likely be auto-oriented. The potential is discussed in more detail in the following chapter on Planning on Land Use.

With the I-205 busway, better transit service would also be provided to the customer and employees in and around the Portland International Airport.

4. Light Rail Transit. The LRT alternative would provide the most substantial economic impacts in East County. It is the only alternative which includes a fixed transit facility east of I-205. The extension of light rail to Gresham via Burnside or Division would encourage the focusing of more intensive economic activity, such as multi-family housing and commercial clusters, around transit stations rather than dispersed along East County arterials.

With this type of development, the cost of public services should be considerably reduced in East County. As shown in the work, The Costs of Sprawl (Real Estate Research Corporation, 1974), the cost of providing public services to more concentrated development is less than for providing the same level of service to lower density land use.

In the comparison between higher density development around transit stations and lower density urban sprawl, The Costs of Sprawl concluded that capital costs of public services can be reduced approximately one-third. In addition, it was concluded that more land can be made available for open space--requiring less public expenditure for open space and park land. Based on these results, it can be assumed that the more concentrated development around transit stations in East Multnomah County possible with LRT options 5-1 and 5-2 would lower the cost of providing future public services--compared to the cost of serving lower density development associated with the non-LRT options.

Because of a different alignment, each route in East County is addressed in turn.

a. Burnside Route. Most of the economic impacts of this route would occur along E. Burnside Street between I-205 and the Portland Traction Line segment. East Burnside Street would be changed from an arterial which is primarily residential to a minor arterial route with extensive development around the

stations. All on-street parking would be removed on E. Burnside Street to avoid more extensive right-of-way requirements.

Of the three East County LRT routes (including I-205) this route would have the greatest potential for concentrating population and employment around transit stations.

b. Division Route. This alignment would run along S.E. Division, one of the most extensively developed east-west arterials in East County. Additional development would not be as great as with the Burnside route. While there would be a similar clustering of population and employment at the transit stations, much of the increased trade from the transitway would accrue to existing businesses.

All parking would be removed along S.E. Division between I-205 and Gresham, and access to the remaining business would become more difficult because of the separated LRT facility along the median of this arterial. The combination of parking removal and reduced accessibility could lower the sales of many businesses along this section of S.E. Division Street.

c. I-205 Route. The overall economic impacts of this alignment would be less than with either the Burnside or Division routes. The route lies within an existing transportation corridor, separated from adjacent activities by fencing and in many places by sound berms. Developmental impacts around the transit stations would, in general, be smaller than the other two routes because the transit station area would

have the I-205 Freeway on one side, serving as a barrier to economic development. Developmental potential would be greatest at the Division and Powell stations, and would be enhanced at the existing retail centers at Gateway and Mall 205.

Unlike the I-205 busway, there would be no extension (at this stage) of the transitway in the I-205 corridor north of Gateway. Those areas between Gateway transit station and the Columbia River, particularly the Portland International Airport, would be served in a manner similar to the I-205 busway.

#### 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 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.

The information in this section is useful for those interested in evaluating major tradeoffs between project alternatives in terms of

costs. For these comparisons refer to the "Summary Matrix" which follows page (xiv). This matrix contains the major cost categories in addition to summaries of other project impacts.

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.
4. CRAG 1990 forecasts of population and employment distribution are 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

\*Time intervals between buses.



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 15 and 16 show major results of this analysis. Column (1) of Table 15 gives the direct construction and right-of-way costs of the various alternatives. 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 for all the build alternatives.
2. \$39.9 million for the I-205 busway which would be built with alternatives 3 and 4.
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.

TABLE 15

SUMMARY OF PROJECT COSTS  
(In Millions of Dollars)

		(1)	(2)	(3)	(4)	(5)
		Project Constr. Costs	Related Transit Costs	Total Constr. Costs (1) & (2)	Transit Vehicle Costs (1990)	Total Project Costs (3) & (4)
No Build		-	-	-	13.0	13.0
LCI	2a	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

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 north side (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. The construction cost (53.6 million dollars) of HOV Alternative 3a would be about one-half that of Alternatives 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 through 1990. These costs reflect the 125 transit vehicles required with the No-Build alternative, 223 transit vehicles with the Separated Busway alternatives, and fewer but more costly vehicles with the LRT alternatives.

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 total capital 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 equip, 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 16 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. 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.

TABLE 16  
SUMMARY OF 1990 ANNUAL RIDERSHIP COSTS AND REVENUES  
AND PER PASSENGER COSTS

	(1) Annual Originating Passenger Trips (Millions)	(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 Improve.	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	19.273	14.369	5.767	8.602	.75	.45
1990 LRT: Division	18.639	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 children and 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 undoubtedly 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 16.

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% 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 light rail vehicles 25 years. This procedure is similar to the manner a businessman amortizes the costs of his capital equipment over time. The discount rate of 7 percent was used to reflect the opportunity cost of the money invested.

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 17. 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).

Columns (2) and (3) of Table 17 show the TAC per passenger and TAC per passenger mile. "TAC per Passenger" is a cost effectiveness measure which 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 have cost effectiveness ratios 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.)

Evaluation of Traffic Operations. In addition to the benefits of additional transit, the build alternatives would improve traffic flow,

TABLE 17  
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



particularly in East Portland, either by diverting travelers to transit, improving capacity on the Banfield, or both. An analysis was done to determine the monetary benefits accruing to the private vehicle user in the target year, 1990. The results are summarized in Table 18. The benefits consist of time savings, vehicle operating savings and accident savings over the No-Build option. 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 at 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.

TABLE 18  
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,c)	4.9	3.9	1.272	9.2
1990 Separated Busway (4a,b)	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

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 added transit trips due to more concentrated population and employment levels around the transit stations. In other words, those living and/or working in the transit station areas would make somewhat fewer auto trips, which would reduce annual auto operating costs. 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 the associated cost savings. These factors combine to give the LRT-Burnside Street alternative the greatest auto-related savings.

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 and traffic benefits) to the community.

The total project costs are highest for the LRT alternatives, particularly the Division LRT alignment at almost \$200 million. On the other hand, the 1990 annual operating costs are lowest for the LRT alternatives, particularly the Burnside LRT alignment.

The total annual costs (including TAC per passenger and TAC per passenger mile) are lowest for the No-Build and LCI alternatives, but

these options also provide a lower level of transit service and less ridership. The total annual costs for the other alternatives are roughly equivalent, with the highest transit ridership provided by the Burnside LRT alignment and the Separated Busway options.

The 1990 private vehicle user savings, computed as the increase in savings compared to the No-Build, are highest for the Burnside LRT alignment, followed by the HOV option.

The comparative costs presented in this economic section are developed from models which in turn are based upon the assumptions previously listed. It is important to remember that if one or more of the assumptions change, such as a change in transit service which in turn changes ridership, then the comparative costs change. An addition, in the event of a drastic decrease in the availability of fuel and an increase in its cost, transit ridership could substantially increase, making the more costly alternatives economically more attractive.

#### Short-Term Use Versus Long-Term Productivity

For a public investment of this cost, size and complexity, the short-term impacts would be relatively small, compared to many other public investments of similar cost, size and complexity. The build impacts would cause some disruption during construction but all build options, with the exception of the Division LRT, would have relatively small right-of-way impacts.

The long-term consequences of this project would be substantial. Whichever alternative is chosen (and built) will determine the type and

level of public transportation and level of service on roadways in East Portland and East County for several decades. It will also set a precedent for transportation projects, particularly transit projects, in the Region.

No-Build. If this alternative is chosen, virtually none of the construction and right-of-way impacts associated with the Transitway would occur.\* In the long-term, congestion costs would increase in the Downtown, East Portland and East County and regional productivity would be less because of higher transportation costs.

Low Cost Improvement. The major short-term economic impacts would be the removal of on-street parking and the impact on those businesses which rely on this parking. There would be no major construction or right-of-way impacts with this alternative.

In the long-term, productivity would increase with this alternative as transportation costs are lowered and goods and people move more efficiently throughout the urban area.

HOV Lanes and Busway. Both the HOV Lanes and the Busway would involve right-of-way acquisition and major modifications on the Banfield Freeway and the structures above the freeway.

Productivity in the long-term would increase substantially. Travellers in East Portland and East County would have better transit

\*Several minor projects, such as the repair of the Steel Bridge would be undertaken.

access and the area's streets and roads would be less congested, increasing the Region's productivity.

Light Rail Transit. In the short-term, this alternative would involve fairly extensive modifications of the Banfield Freeway and some right-of-way acquisition. In addition, extensive facilities would be constructed in East County, including transit stations.

With the proper development controls, the transit stations could attract population and employment, concentrating development around the transit stations. These concentrations would be achieved largely by land use controls. This would decrease traffic in East County, as well as reduce the costs of public services.

In addition, the use of transit would reduce traffic on the area's streets and roads. This traffic reduction, in conjunction with the reduced requirements of public services, would increase the Region's productivity.

#### Irreversible and Irretrievable Commitment of Resources

The funds for this project are mainly from the monies formerly earmarked for the Mt. Hood Freeway. If these funds are not used on the Banfield Transitway they will probably be used on other transportation projects in the Region. Hence, in terms of the Region, the resource commitment, measured in monetary terms, will either be on the Banfield Transitway or on other transportation projects.

There are differences in types of resource commitment between the various alternatives. The no-build and LCI alternatives would free

up funds which could very likely go to auto-oriented improvements, giving the Region a greater commitment to auto and other private vehicle use. The other alternatives would commit the Region more heavily to public transit and less toward auto usage.

The HOV Lanes and Busway options would commit much of the eastern part of the Region to bus transit; the LRT alternative would involve a commitment to light rail. In addition, the Burnside or Division LRT would commit the East County to a land use pattern which could concentrate population and employment around transit stations.

It would be difficult to convert the LRT line to private auto usage. Conversion would be easier with HOV lanes or a busway and easiest with the LCI options. In this sense, the LRT option is more of an "irreversible commitment" than the other options.

**CHAPTER THREE**

**LAND USE**



CHAPTER THREE / LAND USE

Introduction

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 Chapter 5 ("Right-of-Way"). 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 inter-related 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.

This chapter is divided into six major sections for the description and assessment of land use impacts. Section one describes the planning responsibilities of local governments and the status of current planning efforts as background for evaluating the conformance of project alternatives with current plans and policies. Existing land use and land use trends are discussed in section two to provide the basis for and insight to the evaluation of developmental impacts, which are discussed in section three, "Land

Use Impacts." Section four, "Steps Taken To Minimize Adverse Land Use Impacts," describes means of assuring that positive steps are taken between the proposed project to accentuate beneficial land use impacts (namely those which lend direct support to public transit) and that adverse consequences are minimized. The remaining two sections address the temporal nature of the major land use impacts, and are entitled: "Short-Term Use versus Long-Term Productivity" (section five) and "Irreversible and Irretrievable Commitments of Resources."

### Planning Responsibilities and Plan Status

#### Regional Area

The Columbia Region Association of Governments (CRAG) was designated in 1973 as the agency responsible to coordinate planning efforts in the Portland metropolitan area. CRAG's Regional Plan which is estimated to be completed by mid 1981, will be used as a basis for regional decisions relating to land use. In the interim, CRAG has adopted a set of regional Goals and Objectives (September 1976), and a Regional Land Use Framework Element (December 1976), which 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.\* Among

\*The Land Conservation and Development Commission (LCDC) was created in 1973 by the Oregon legislature. Its basic responsibility is making statewide comprehensive planning policy decisions. In January 1975 the statewide planning goals were enacted. In association with LCDC, local jurisdictions have arrived at schedules to bring local comprehensive plans into conformance with these goals and guidelines.

other things, the Goals and Objectives emphasize the need for compact, efficient and orderly land use development and improvement in the ratio of public transit trips to auto trips.

The Land Use Framework Element establishes land development policies and designates urban, rural and natural resource areas. This plan element has legal authority to direct conformance of local planning, zoning and extension of services. Compatible planning and zoning has been adopted by Multnomah County. The land use designations of the framework element, as well as local jurisdictional boundaries, are graphically presented in Figure 32. Policies call for staging growth through an orderly extension of services; in-filling of partially developed urban and suburban areas; and urban development which would enhance the efficiency of existing transportation resources and the feasibility of public transit. Further refinement of the framework element will identify urbanizable land forecasted to meet urban population needs for a minimum of twenty years. Within a year from the adoption of the framework element, urbanizable lands are to be specifically categorized by local jurisdictions as immediate growth areas or future urbanizable lands. Areas relevant to the subject project are presently designated urban.

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. The Interim Transportation Plan (ITP) was adopted by CRAG in 1975 to guide long-range transit and highway development decisions within the region until a complete transportation plan is

developed. The plan, which is geared to 1990, emphasizes the role of public transit in providing mobility in the urban area.

The ITP identifies four major transit corridors which radiate from the downtown area: the Banfield, Oregon City-Johnson Creek, Sunset and I-5 North. The location of these corridors is shown in Figure 2 of "Part A." 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 I-205 and 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.

#### Downtown Portland





The Downtown Study Area is under the political jurisdiction of the City of Portland. The City is currently preparing a comprehensive plan which conforms to LCDC goals and guidelines. It is estimated that the plan

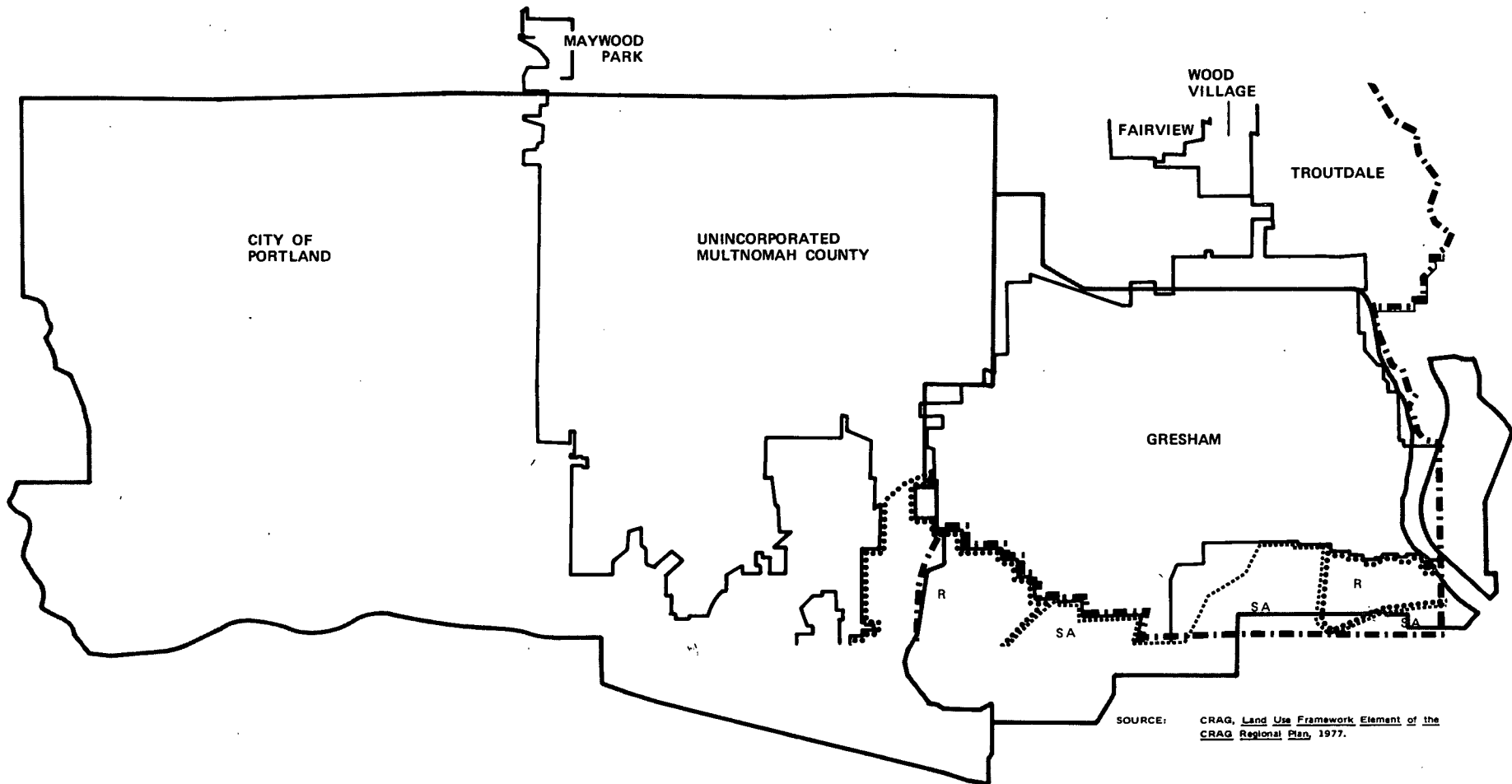
\*Interim Transportation Plan for the Portland-Vancouver Metropolitan Area (Columbia Region Association of Governments, June 18, 1975), p. 5.

FIGURE 32

JURISDICTIONAL BOUNDARIES  
LAND USE FRAMEWORK ELEMENT  
DESIGNATIONS IN PROJECT STUDY AREAS

LEGEND

-  URBAN AREA
-  RURAL AREA
-  STUDY AREA
-  URBAN GROWTH BOUNDARY



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

will be adopted in 1980.

Although Portland does not have a comprehensive plan, the 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.

In essence, these goals emphasize enhancement of the downtown as the retail, office, cultural and entertainment center of the metropolitan area. The plan also calls for the provision of open space; utilization of the river as a community focus; and an increase in the number of residential units in the downtown area.

The transportation goal in the Portland Downtown Plan includes emphasis on a balanced transportation system which is supportive of the other downtown goals; provision for more efficient use of right-of-way and vehicles; and reduction in reliance on the automobile with corresponding increase in transit ridership. The goal also specifies development of a mass transit system which is fast, economical, convenient, comfortable, quiet and non-polluting. Improvement of pedestrian access and increased use of bicycles are also emphasized.

In the absence of an adopted comprehensive plan, the City of Portland's Arterial Streets Classification Policy, adopted in June 1977, functions as the basic transportation policy instrument for the City, guiding investments in transportation improvements within the City of Portland and designing specific solutions to transportation-related problems as they arise. It is also intended to guide certain aspects

of private development as it occurs adjacent to arterial streets within the City.

For the purposes of the Arterial Streets Classification Policy, city streets have been grouped into two basic classifications: traffic streets and transit streets. Separate facilities are designated for trips of different speed, volume and length. Ideally, high speed, through traffic would be discouraged from using local neighborhood streets, and local traffic would be discouraged from using expressway facilities. This would not only add to the overall efficiency of the system, but also be the liveability of the city neighborhoods. The Arterial Streets Classification Policy also provides for pedestrian, bicycle, or trucking classifications for streets.

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 Downtown Parking and Circulation Policy was adopted in February 1975, and provides the necessary parking and circulation elements to the Downtown Plan. The 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 encourages desirable land use, zoning goals and policies. The following policies are emphasized for the downtown: improvement of

public transportation services to downtown; separation of public transportation routes and pedestrian bicycle ways from automobile traffic to the extent feasible; and reduction in the need for parking. A limit is placed on the total number of parking spaces available for use in the downtown area. This "lid" 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.

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. 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.

#### East Portland Study Area

The East Portland Area is predominantly under the local political jurisdiction of the City of Portland. Planning activities for the City of Portland were discussed above. In terms of the Banfield corridor planning activity, however, a City planning effort which affects the Hollywood commercial district is significant. This commercial center is an older, sub-regional shopping area located adjacent to the Banfield at the intersection of Sandy Boulevard and N.E. 39th. It has declined economically since the opening of the



Lloyd Center in 1960. Transportation problems such as traffic congestion, pedestrian safety and parking difficulties have been recognized by both Hollywood businessmen and the city as serious impediments to the continued vitality of the commercial activity. To help reverse this trend, the city initiated detailed study activities in the Hollywood area in January 1977, for the purpose of determining the exact nature of the problems facing the area, and recommending specific methods by which the problems could be ameliorated. Recommendations for solving some of the traffic problems in this area concentrate on transit-related improvements. According to the Draft Hollywood Transportation Study Report the highest transit priority is the transitway project in the Banfield and the associated transit station in the district. Improvement of pedestrian safety and reduction of traffic congestion are considered essential.

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.

Another objective of the Arterial Streets Classification Policy is to reduce traffic volumes by emphasizing transit service improvements to the Downtown, Lloyd Center, the Hollywood business district, and within inner-city neighborhoods.

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. 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."

The Arterial Streets Classification Policy also 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 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.

#### East County Study Area

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 jurisdiction responsibilities in the eastern portion of 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, adopted in July 1977 established an urban growth boundary; defines urban, rural and natural resource areas; and designates goals, policies, strategies and standards to be applied in the development and operations plans.

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."

A refinement of the urban growth boundary is to be completed by February 1978. Immediate and future growth areas will be identified, and a plan for staging growth through the orderly provision of urban services will be defined. 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 supporting increased public transit usage through proper exercise of land use policies and controls.

Adoption of the eastern urban growth boundary removes a vast acreage from potential suburban low-density sprawl. It also provides the framework to proceed with higher density land use development within a contained area.

Upon completion of urban area planning, which will identify the location of more intense development areas, appropriate water, sanitary sewer, lighting and road improvements will be programmed to support the priorities set forth in the plans.

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 neighborhoods 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.

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

Local Jurisdictions. 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 is as follows:

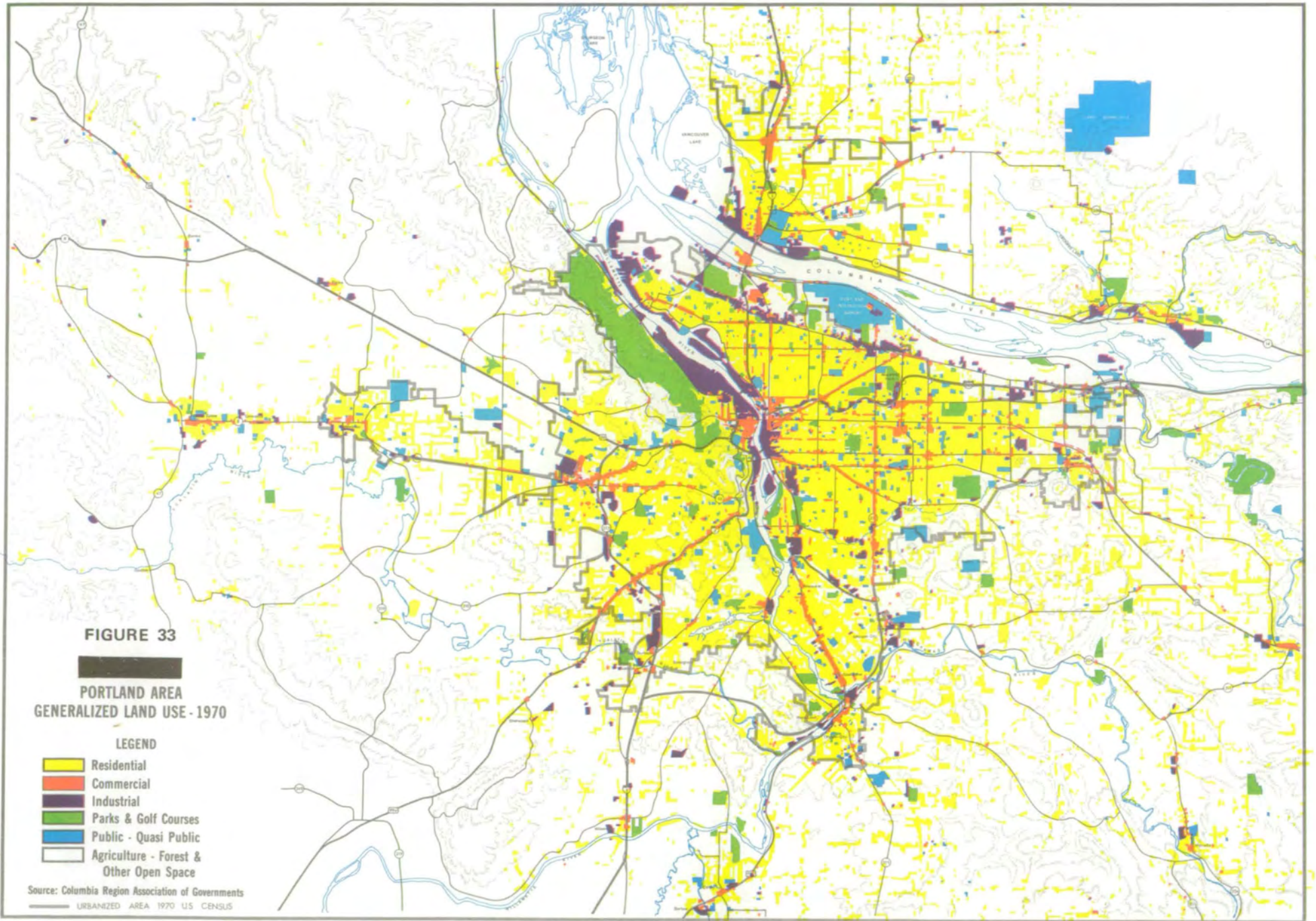
Maywood Park	November 1977
Gresham	June 1980
Fairview	June 1977
Wood Village	June 1980
Troutdale	June 1978

Preliminary work on the transportation sections of the plans by key jurisdictions, such as Gresham and Multnomah County, has emphasized an increased role for transit.

#### Existing Land Use and Land Use Trends

##### Regional Study Area

Generalized land use on a regional scale is shown in Figure 33. The pattern of existing land use is typical of most urban regions. 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 much 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.



Current trends indicate continued employment growth and possible residential decrease in the downtown area. 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

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. The majority of urban renewal and redevelopment investment has occurred in this area.

Existing land use in the downtown area is shown in Figure 34. Office development has become the dominant land use in this area. Retail activity throughout the downtown area is concentrated in the retail core, bounded by Third, Tenth, Stark and Yamhill Streets.

The increasing cost of property in the downtown area has led to a gradual decline in residential land use. More intensive use has 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 35.

Figure 35 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. 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.

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 waterfront area (between Front Street and the Willamette River) is open space. Park Avenue is also lined with park blocks. The other major park/open space land uses in the CBD are the park blocks along 3rd and 4th Avenues, east of City Hall and the County Courthouse.

Figure 36 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 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 the Portland Mall, together with medium density office development adjacent to major access points to downtown and related to



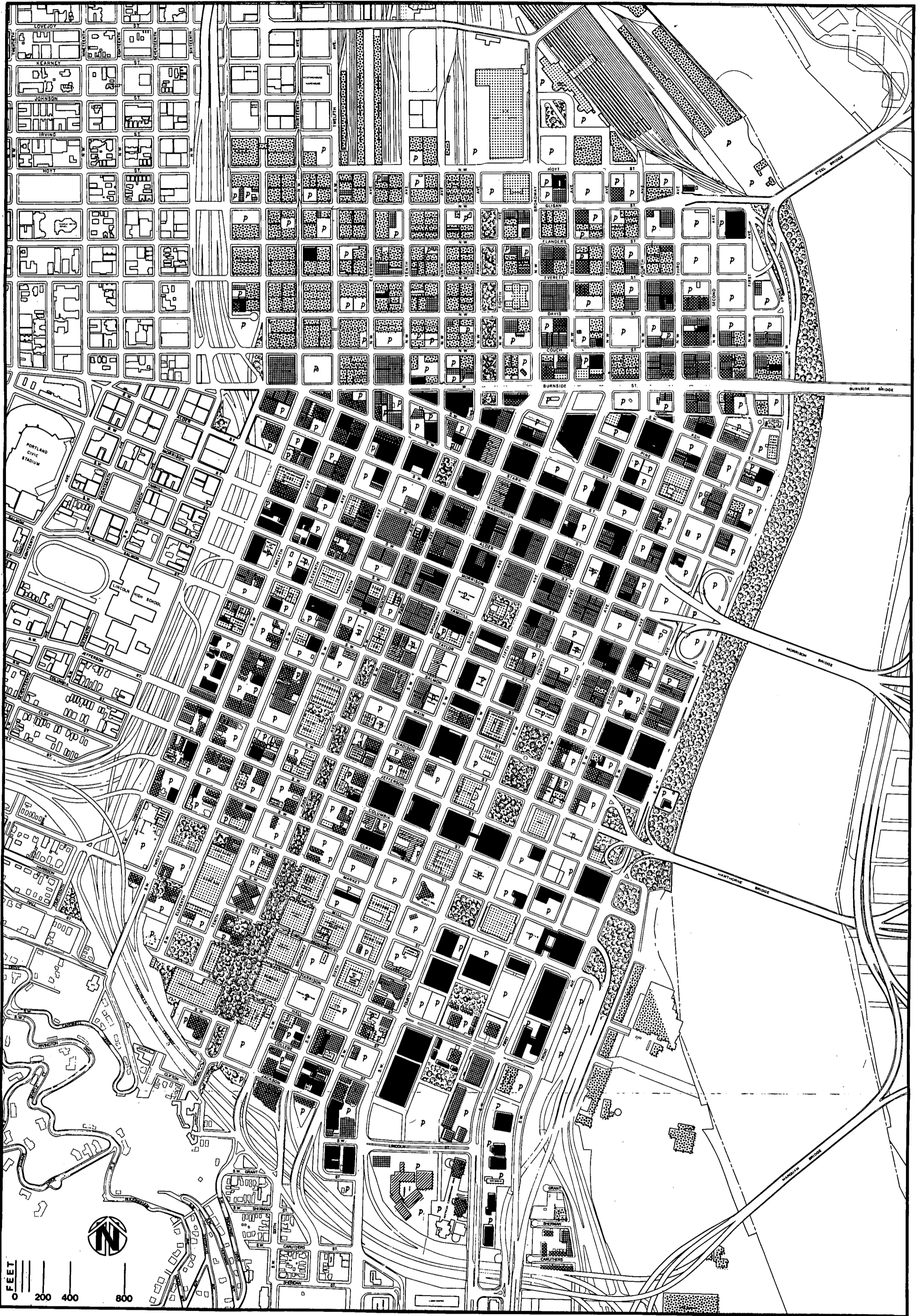













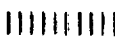
FIGURE 34  
**EXISTING LAND USE:  
 DOWNTOWN STUDY AREA**

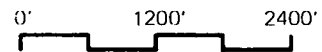
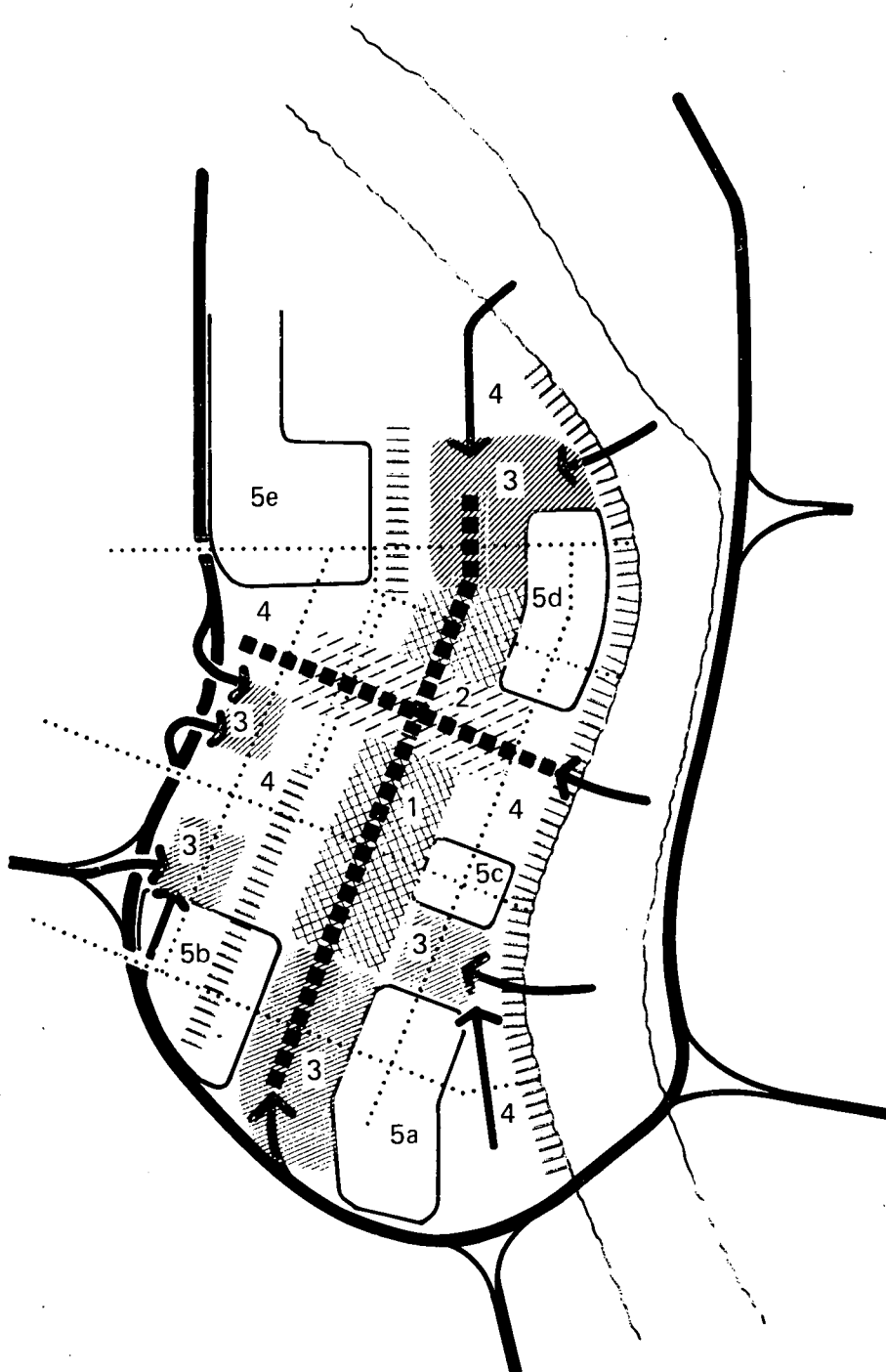
- |  |   |
|--|---|
|  Open Space |  Retail              |
|  Parking    |  Hotel, Motel        |
|  Housing    |  Public, Semi-public |
|  Office     |  Mfg., Warehouse     |

**FIGURE 35**

**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
  - e. FOUNTAIN/OLD TOWN INDUSTRIAL

-  MAJOR VEHICLE ACCESS
-  MASS TRANSIT
-  MAJOR PEDESTIANWAYS
-  MAJOR OPEN SPACE



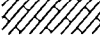


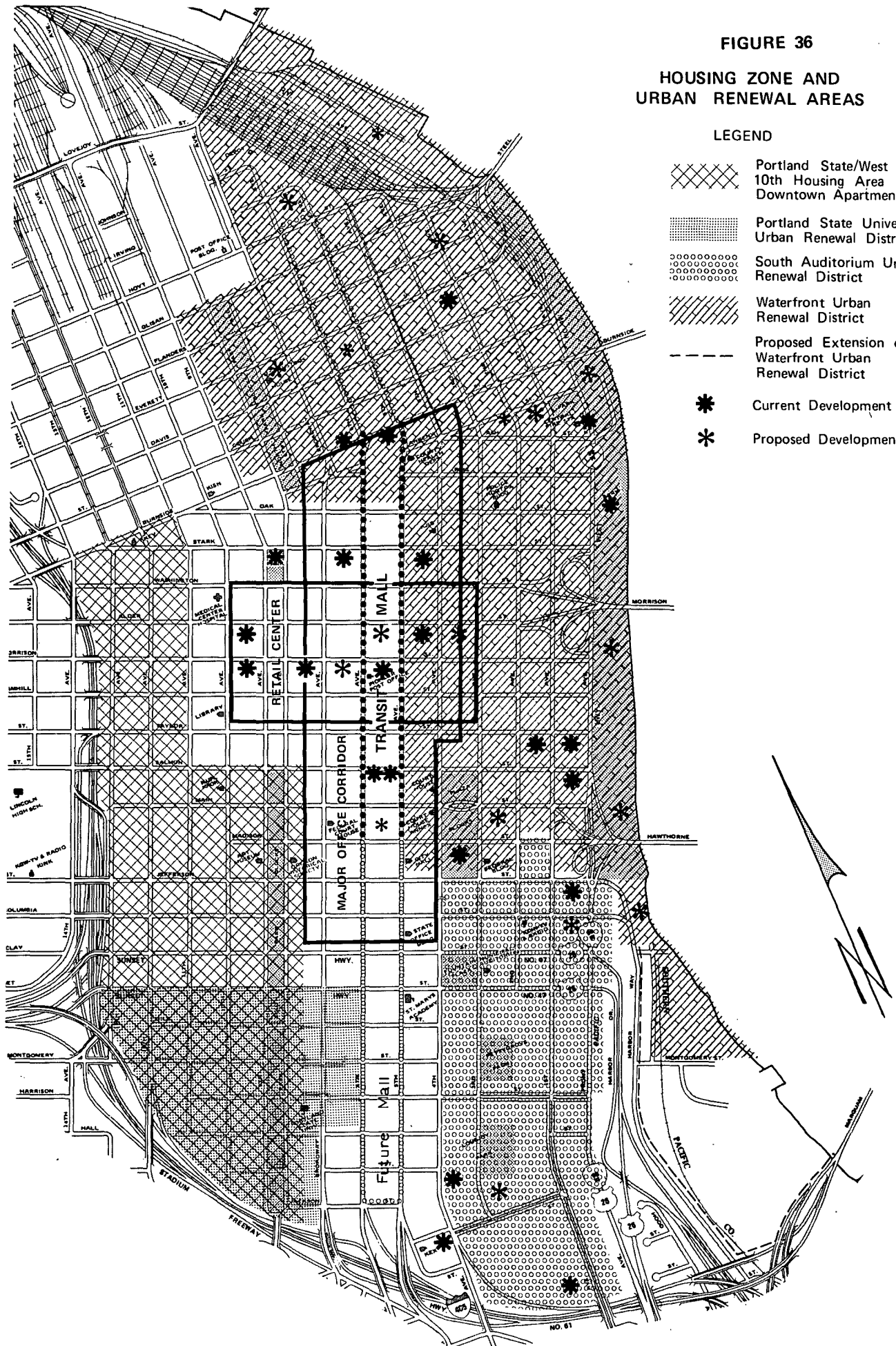
SOURCE: Delouw-Cather Banfield Transitway Project, Downtown Circulation Alternatives Portland, 1977. (P. 20).

FIGURE 36

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



peripheral parking structures. Office development is specifically discouraged adjacent to the waterfront and the south park blocks.

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.

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 goals in the downtown plan, although high density uses could be allowed.

Development regulations specifying height restrictions on the downtown area should go to 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.

#### East Portland Study Area

Existing land use for the various transit routes in the East Portland study area is shown in Figure 37, Parts A, B, C and D (Part D also shows the I-205 corridor, which is in East Multnomah County). 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, 82nd and Foster. Industrial activity basically occurs along the Willamette River, while public services/institutions and parks/open space are dispersed.

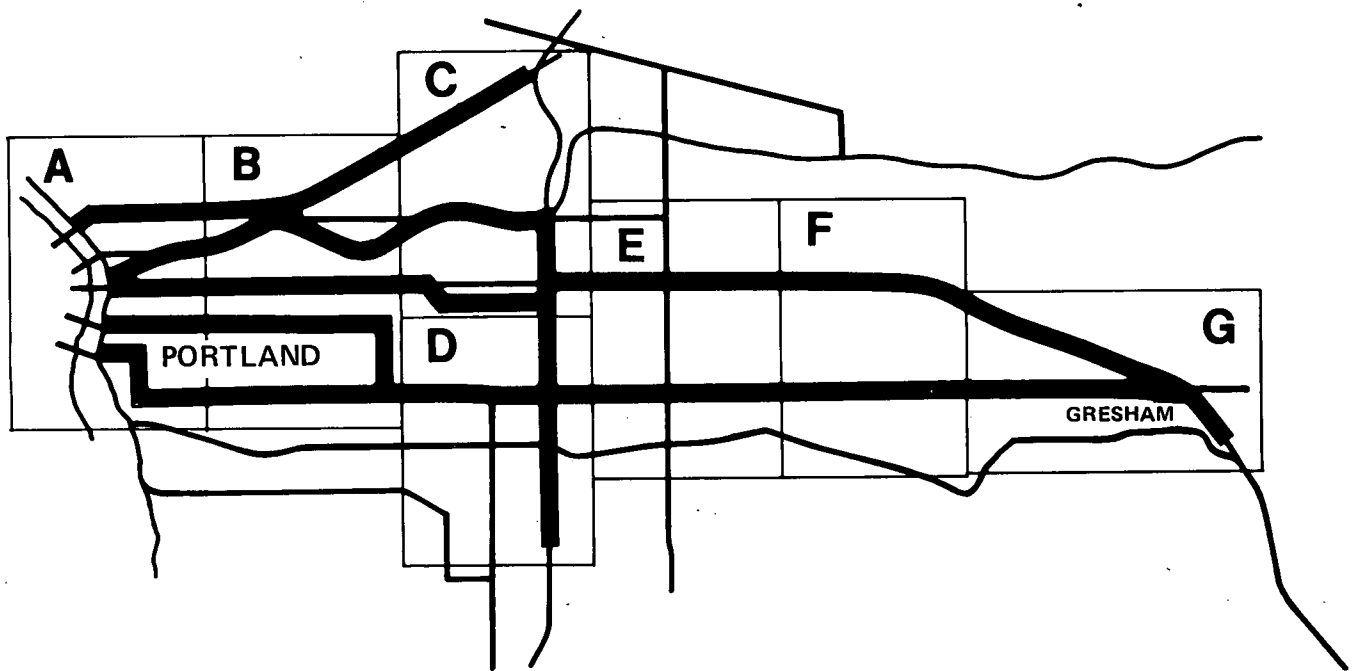
Banfield Corridor. Land use throughout Sullivan's Gulch is strongly oriented towards the freeway and railroad facilities. Both the railroad and the Banfield Freeway have historically attracted businesses and industry because of the superior transportation access afforded. This influence is seen by the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

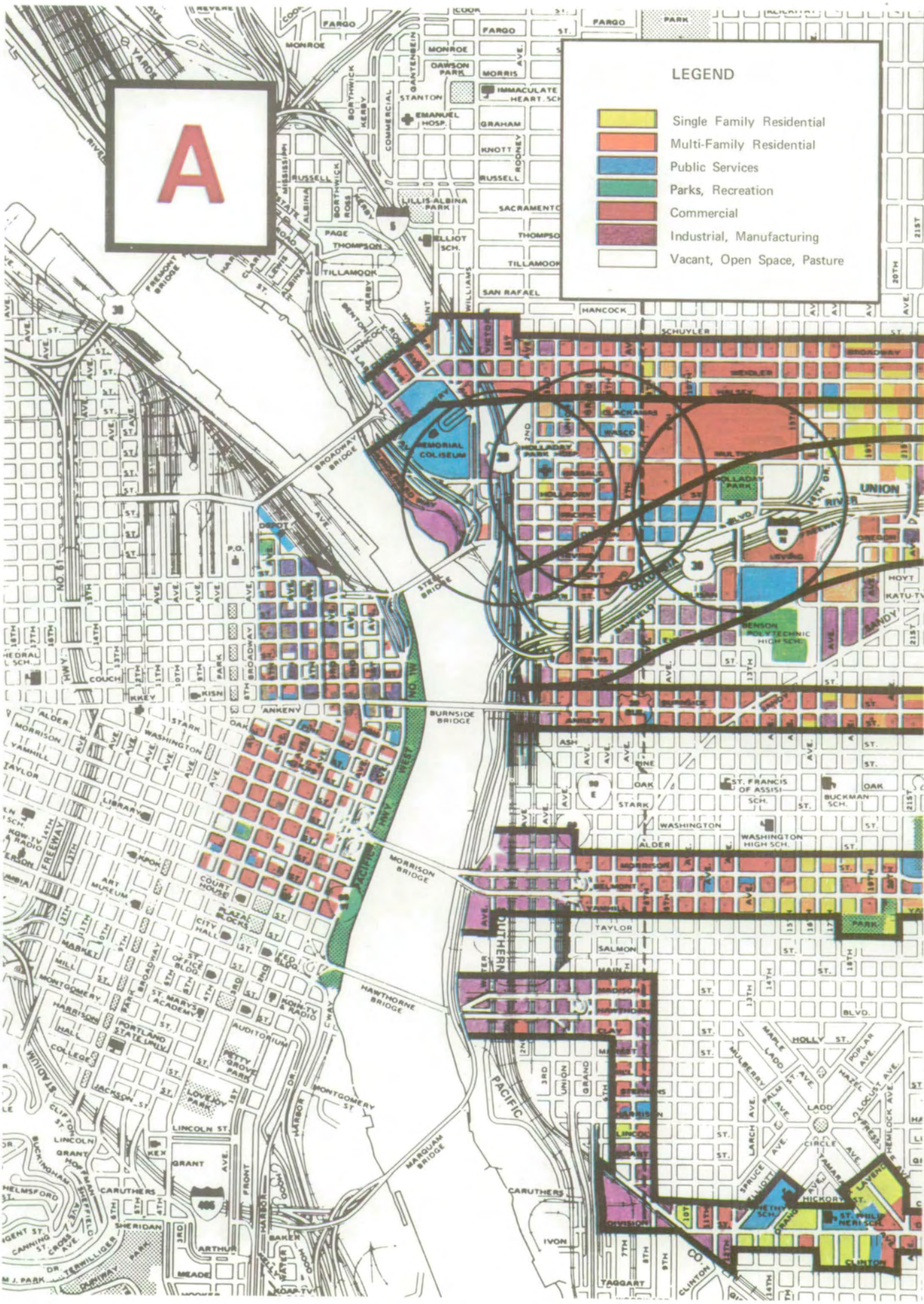
Commercial uses in the vicinity of the Banfield corridor tend to concentrate west of 15th Avenue and along Sandy Boulevard. Of particular significance is the Lloyd Center, located along Multnomah between 9th-15th. It is a regional shopping center containing numerous private and public office buildings 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.

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 19 and shown in Parts A, B and C of Figure 37. Land use becomes less intensive and more mixed (residential, commercial and industrial) as one proceeds eastward through the Banfield corridor. Most of the area within one-fourth

FIGURE 37  
EXISTING LAND USE:  
BANFIELD LCI/LRT CORRIDORS

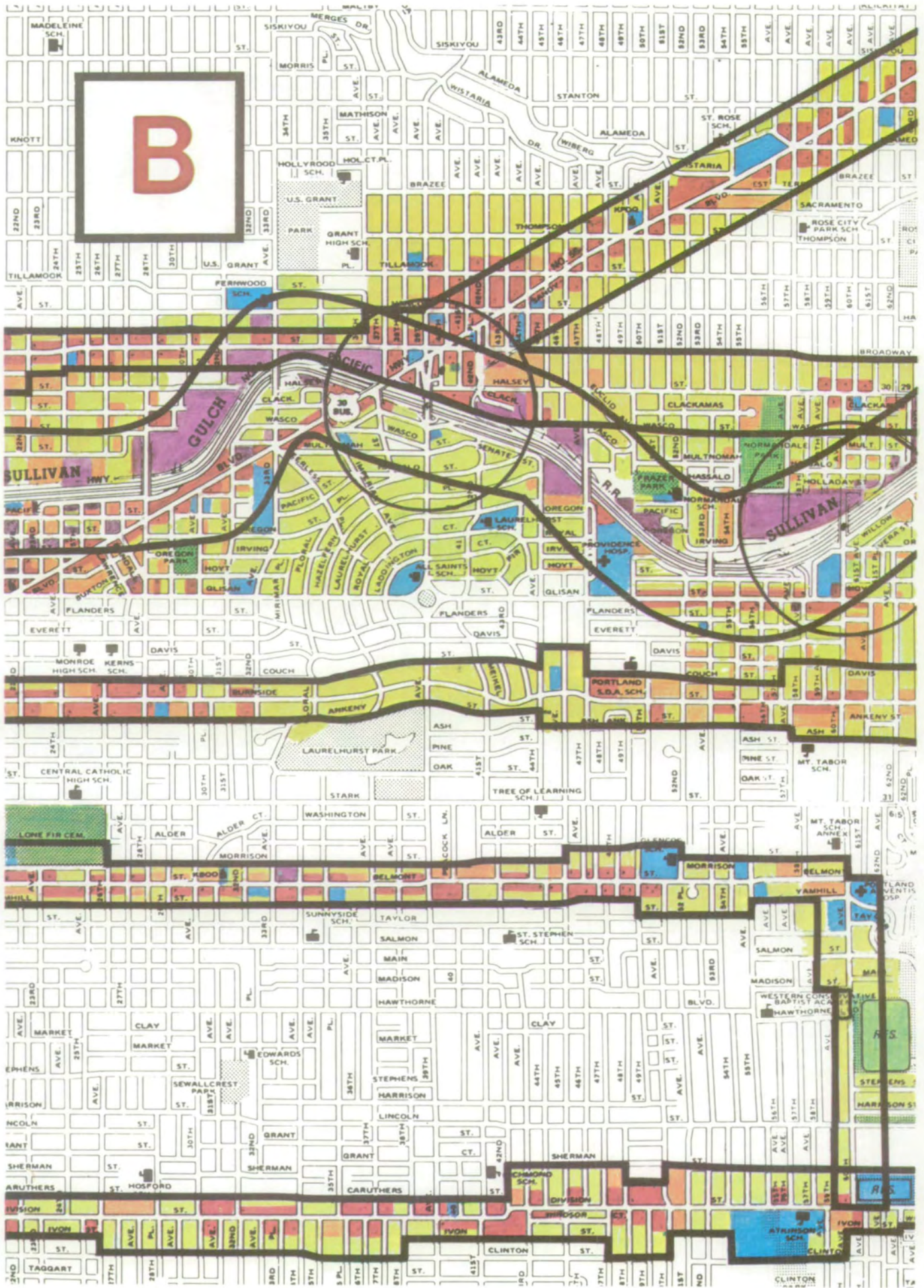




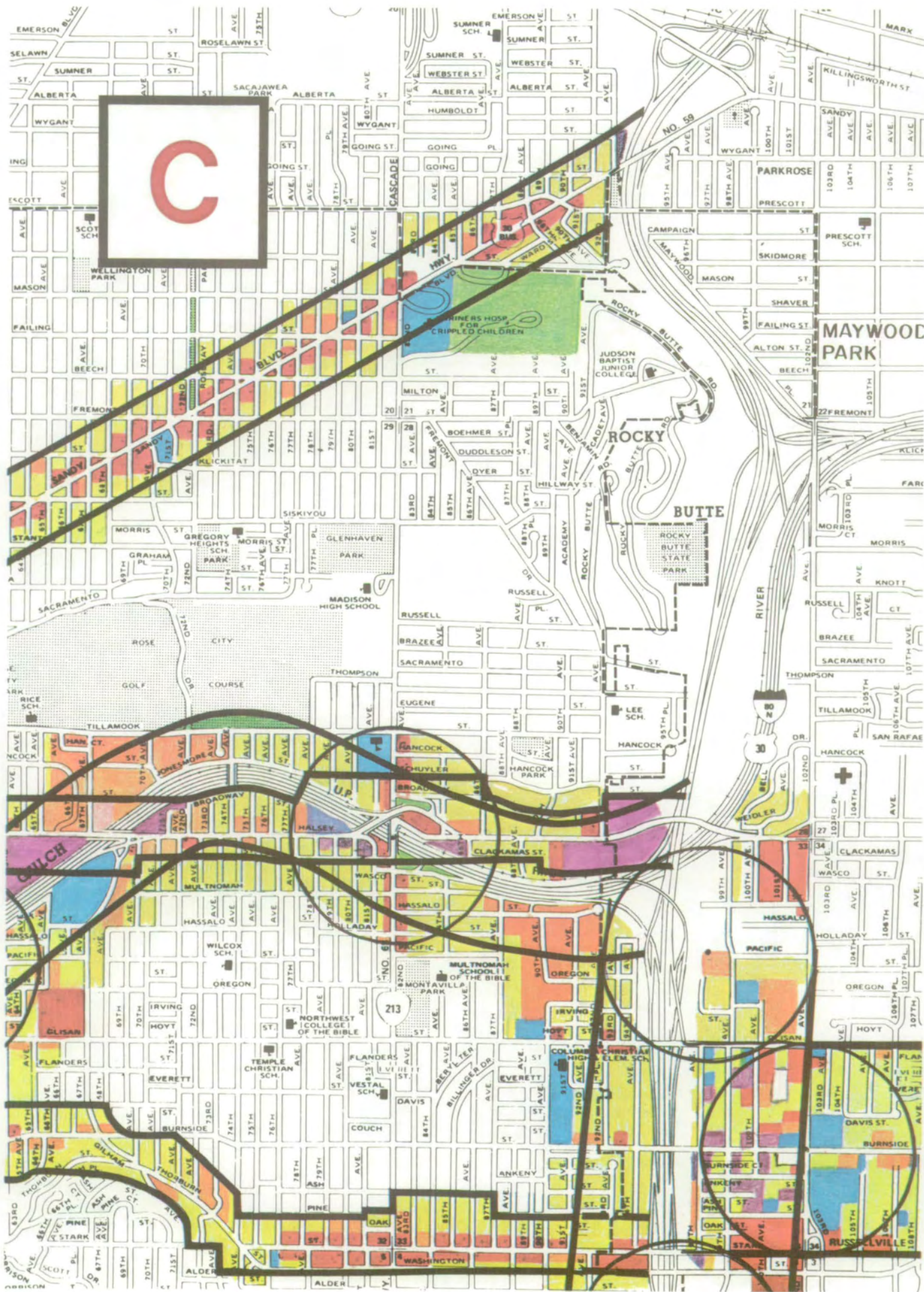
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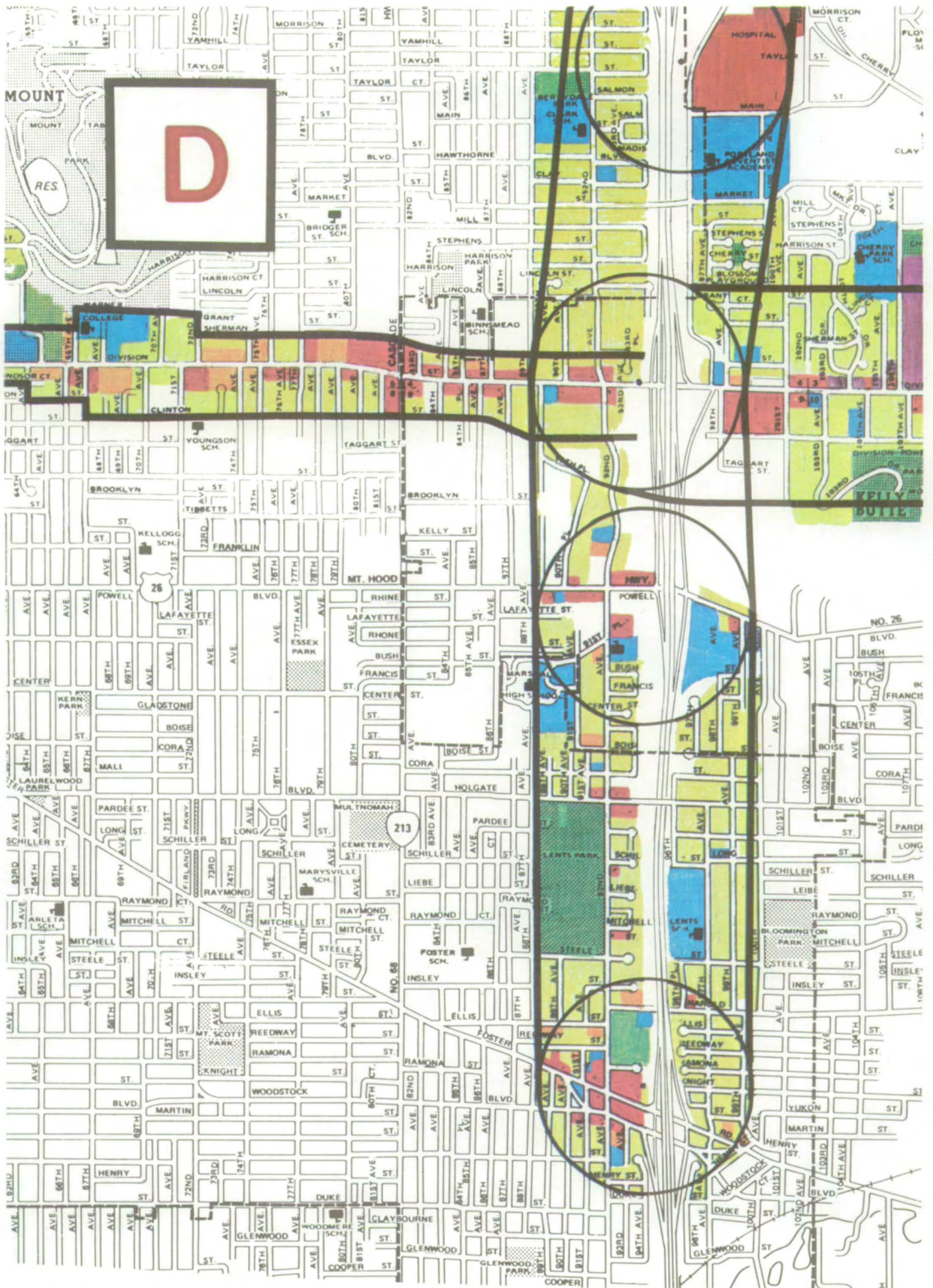
### LEGEND

	Single Family Residential
	Multi-Family Residential
	Public Services
	Parks, Recreation
	Commercial
	Industrial, Manufacturing
	Vacant, Open Space, Pasture









D

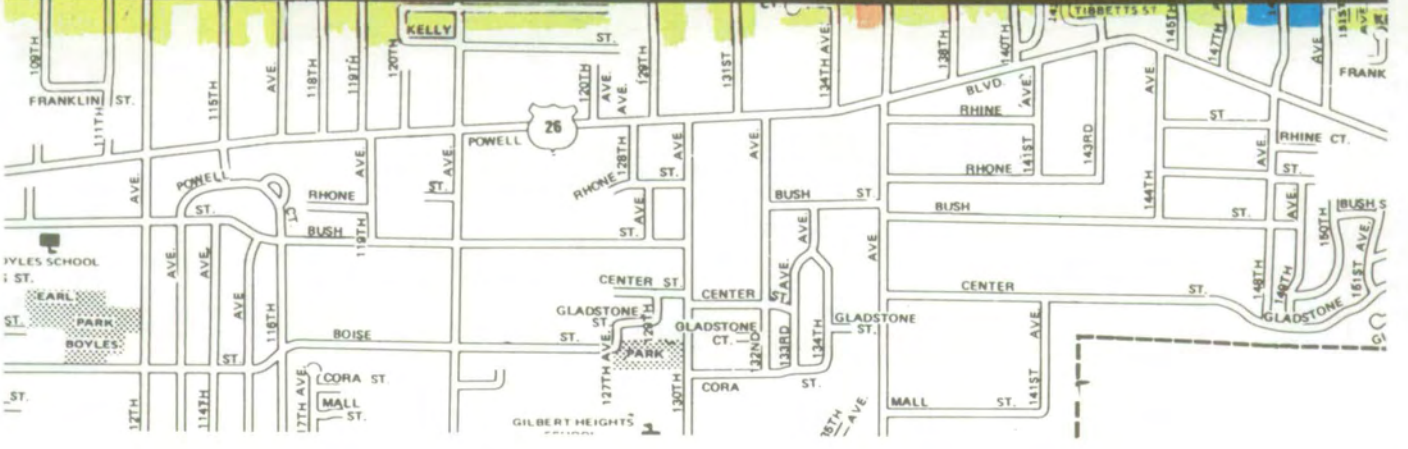
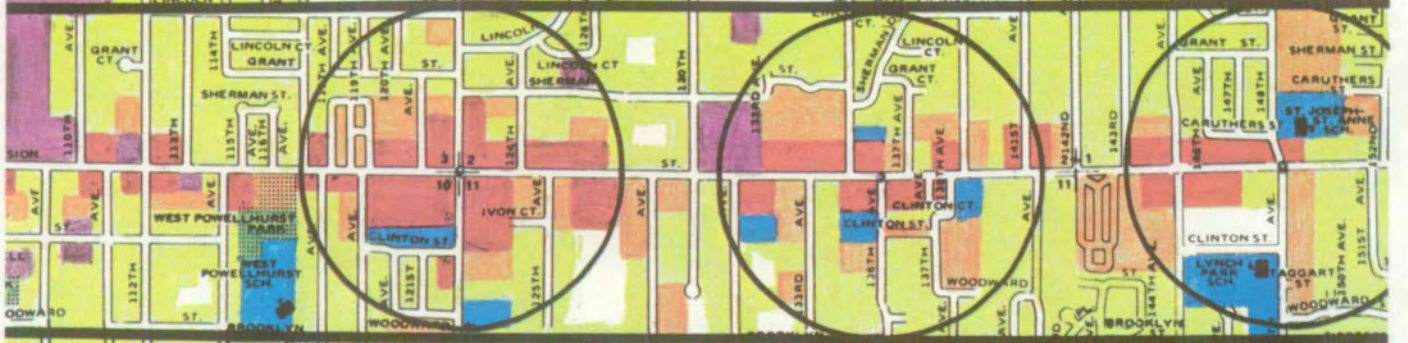
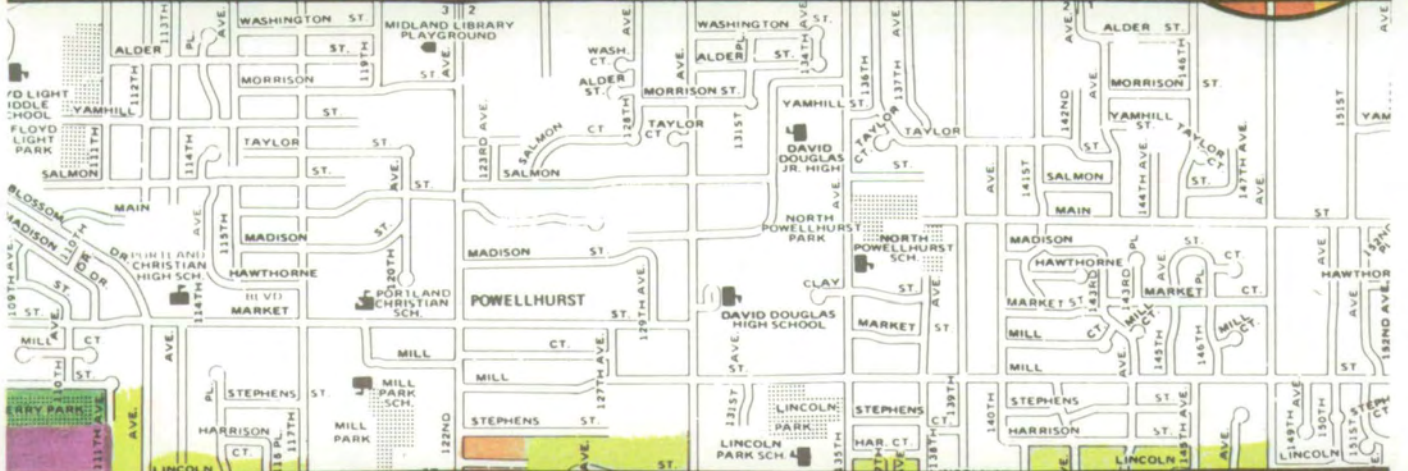
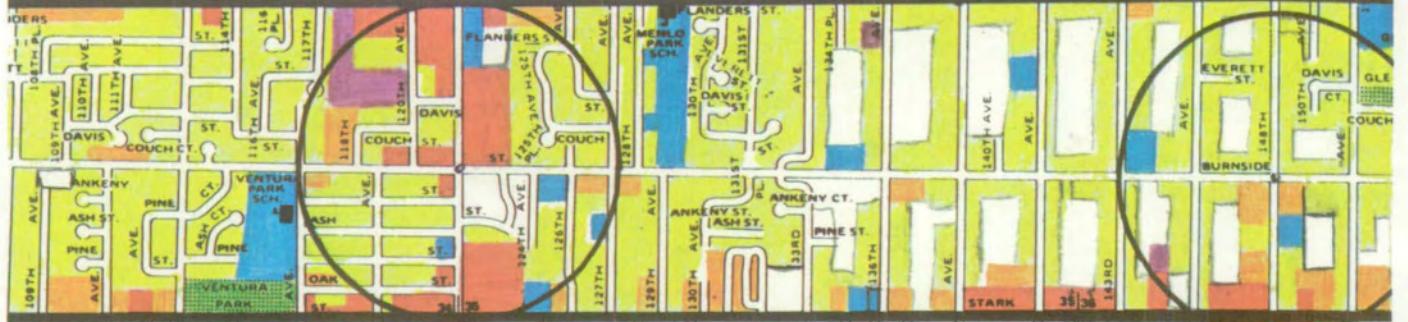
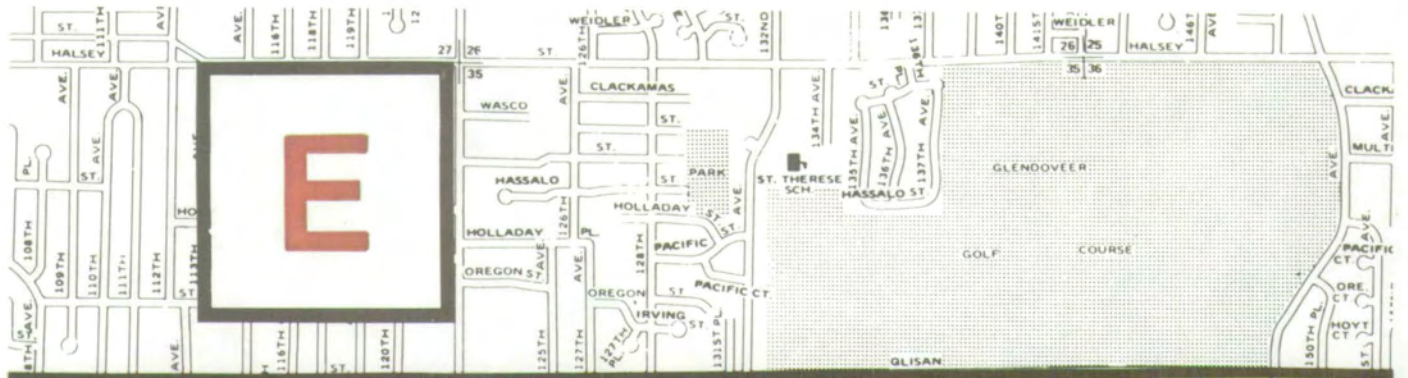
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**GRESHAM**  
Pop. 21,000

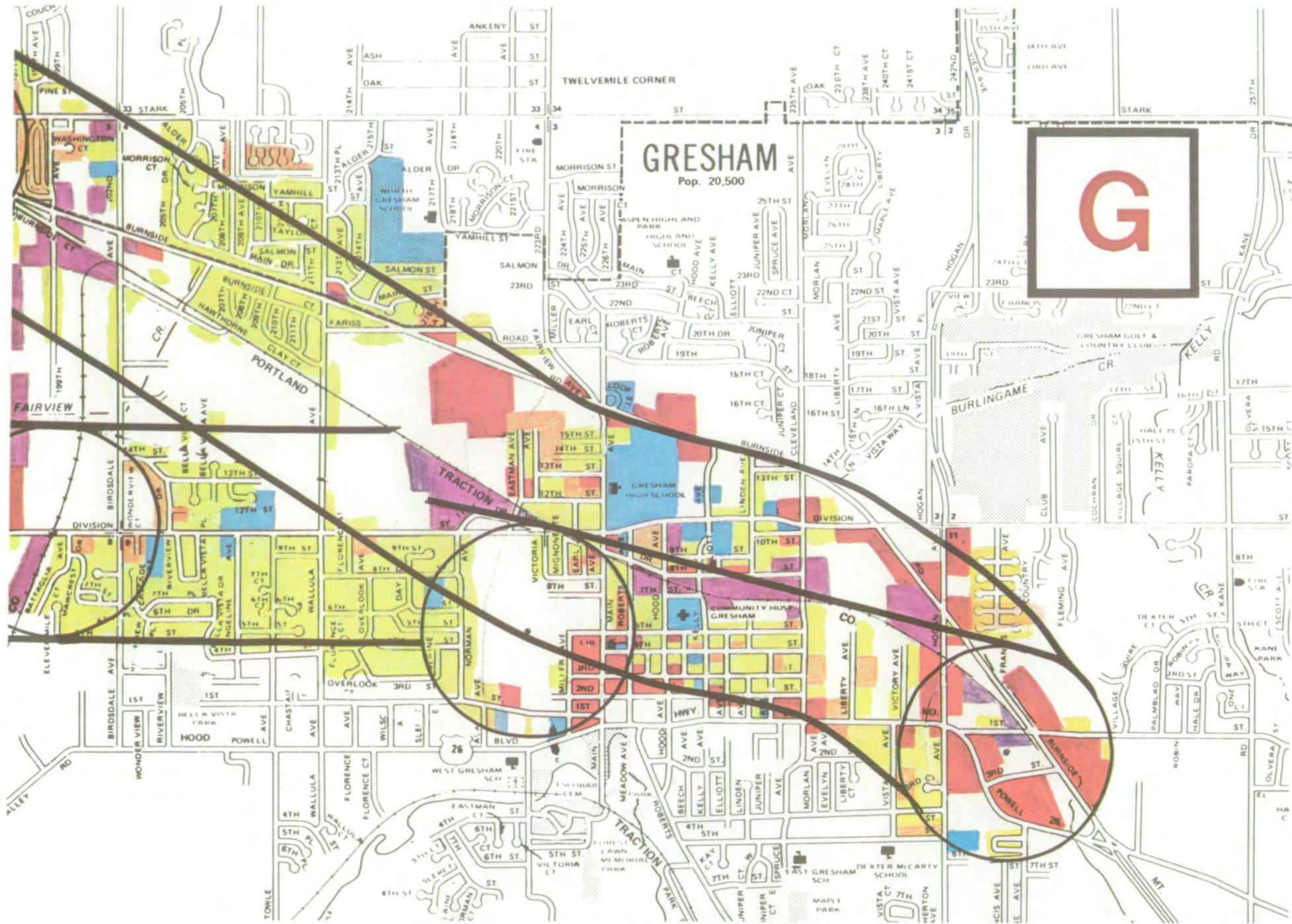


TABLE 19

EXISTING LAND USE SUMMARY: BANFIELD TRANSIT STATION AREAS

<u>TRANSIT STATION</u>	<u>LAND USE DESCRIPTION (1/4 MILE RADIUS)</u>
Coliseum	Located in an industrial and commercial area. The Memorial Coliseum and Holladay Park Hospital are located in this area. Residential use is minimal.
Union-Grand	Retail and commercial office use predominates. Area contains Holladay Park Hospital and high rise office buildings. Residential use is minimal.
Lloyd Center	Densely developed site with regional shopping center, high rise office buildings, Holladay Park, Benson Polytechnic and parking lots.
Hollywood	Located near an older retail and office center. Pedestrian-oriented commercial uses predominant north of the Banfield and along Sandy Blvd. South of the Banfield, single-family residential land use is prevalent.
60th Avenue	Large industrial complexes north of the Banfield. Normandale Park and a mixture of single and multiple family residential uses located north of the industrial uses. Single and multiple family residential state office facilities and commercial activity along Glisan located south of the Banfield.
82nd Avenue	Concentrated commercial development along 82nd, backed by single-family residences. Light industrial uses along the Banfield. An elementary school is located in the northwest quadrant.

mile of the stations is developed, which limits redevelopment opportunities oriented towards increased public transit use.

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 these routes.

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 also 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 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. 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.

The East Portland study area is urbanized and is already extensively developed. Population projections for the year 1990 indicate only a slight increase in population, however, while employment is forecast to increase approximately 53 percent 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 the trend. 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-- a trend which is 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. Neighborhood plans which have been completed to date have emphasized protection of single-family dwellings from commercial/multi-family encroachment.

#### East County Study Area

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, especially along major arterials. Most of the concentrated commercial land use in the East County study area is located along Halsey, Stark, Division, Powell, 102nd, 122nd and 182nd. Gresham, the largest city in East Multnomah County, is a growing commercial center.

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 County 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



remote southeast portion of the study area.

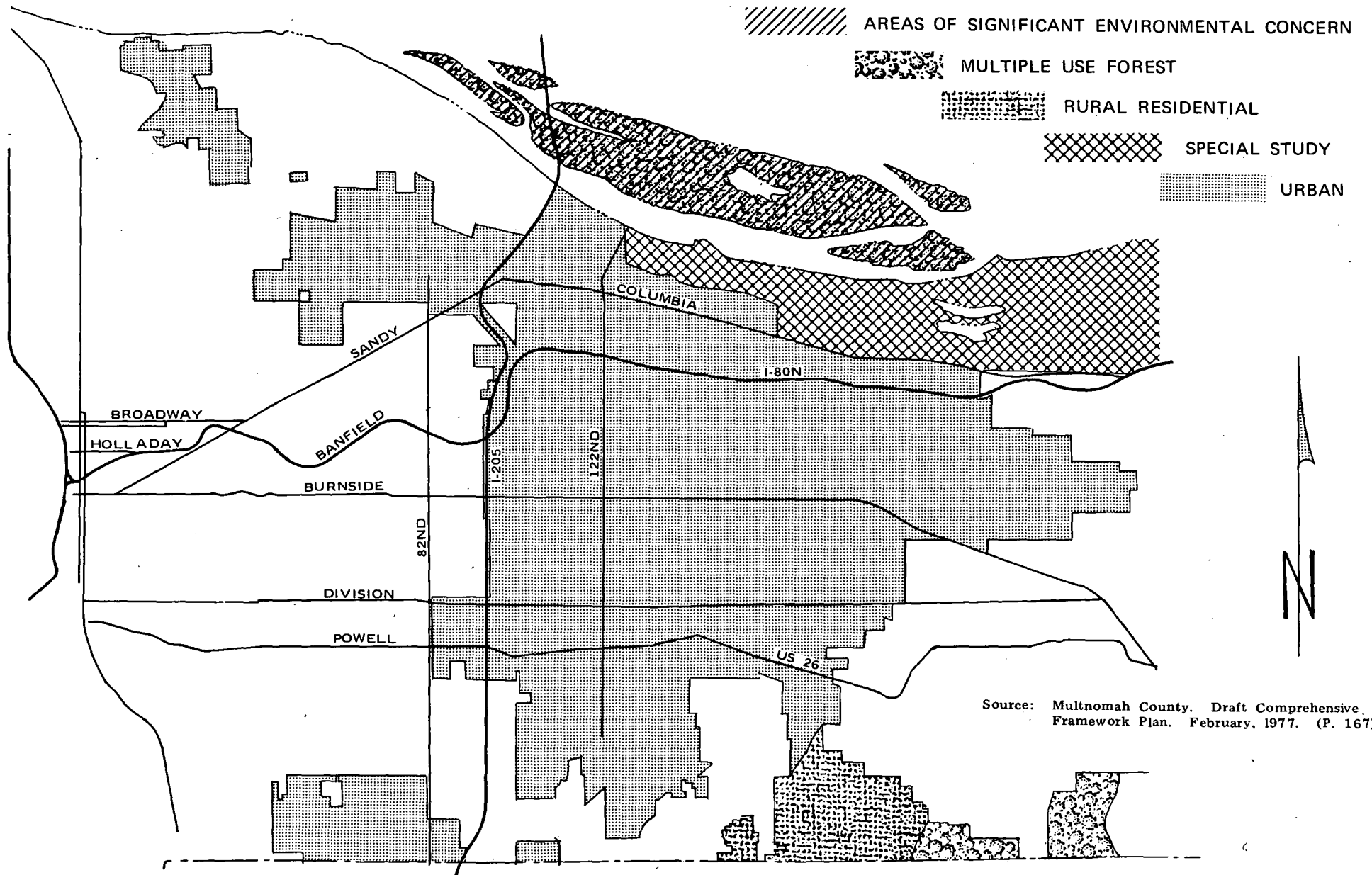
East County study area growth has been steady for many years, taking the form of leap-frog development since the early 1960's. Development in East Multnomah County is presently continuing at a stable rate. There is a substantial amount of vacant and redevelopable land proximate to existing urban services which continues to be converted to residential, commercial and industrial uses. Population forecasts for the Portland metropolitan area indicate that most future residential development in the East Side will occur east of I-205.

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 percent of the housing was in multiple-family units. The increase in multiple-family units accounted for 53 percent of the growth in housing units. This multiple-family unit increase accounted for 57 percent of the multiple-family unit increase in the East County study area.

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 38. 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 southeastern portion of the study area.

FIGURE 38

MULTNOMAH COUNTY DRAFT FRAMEWORK MAP



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

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 southeast portion of the East County study area.

Burnside Corridor. Parts D, E, F and G of Figure 37 show existing land uses in the Burnside corridor. Burnside Street is largely single-family residential, although 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 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.

Community services are located intermittently along the corridors. Recreational area is provided in this corridor by open space connected with school properties.

Vacant properties are almost exclusively located east of the Stark/Burnside intersection, along the Portland Traction Line. Other vacant properties are widely dispersed.

Burnside Street Transit Station Areas. The predominant land uses in the vicinity of the proposed transit stations are summarized in Table 20.

These uses are graphically shown in Figure 37, Parts D, E, F and G.

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 Use Development Opportunities."

Division Corridor. (Alternatives 5-2a, 5-2b) Land use in the Division corridor is mapped in Figure 37, Parts D, E, F and G. The existing land use pattern along Division is highly auto-oriented. 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 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. Commercial use in the corridor consist of a spatter of strip commercial development which intensifies somewhat in the vicinity of major intersections.

TABLE 20

EXISTING LAND USE SUMMARY: BURNSIDE  
STREET TRANSIT STATION AREAS

TRANSIT STATION LOCATION	LAND USE DESCRIPTION
102nd	Low density single-family develop- ment with some commercial, small industrial and community service uses.
122nd	Located on a north-south arterial. Substantial strip commercial with single-family behind the commer- cial uses. Some vacant land.
148th	Predominately low density single- family with some multi-family development at the intersection. Large amounts of vacant land scattered throughout area.
162nd	Predominately multi-family resi- dential. Some single-family residential and open space and community service. Commercial uses along Glisan and Stark.
172nd	A transition area from single- family to multi-family with some commercial activity along Stark.
181st/ Rockwood	The triangle of Burnside, 181st and Stark contains major auto- oriented mixed uses. Multi- family and single-family resi- dences lay adjacent to this center.
192nd	A mix of vacant land, commercial and industrial uses, as well as scattered single-family and multi- family residential.
Fairgrounds	This site is under single owner- ship and is scheduled to be developed into a multi-use center, including an auditorium, offices, and multi-family residential use.
1st & Burnside (Alternative to Fairgrounds)	Ongoing commercial development in this area with a major shopping center, several new restaurants, and multiple family development. Large amounts of undeveloped land.

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 are located intermittently along the Division Street corridor. There is less vacant property in the Division corridor than in the Burnside corridor. Most of it is located east of 182nd Avenue and is often located in the center of large residential blocks.

Division Street Transit Station Areas. Table 21 describes existing land use around proposed Division Street transit station areas. These uses are mapped in Figure 37, Parts D, E, F and G.

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 lesser extent, single-family residences.

I-205 - Lents Corridor. (portions of Alternatives 5-1a, 5-1b, 5-2a, and 5-2b; all of Alternatives 5-3a and 5-3b) A generalized land use map for the I-205 corridor is shown in Figure 37, Parts C and D. As evidenced by the maps, 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). Existing land use in the vicinity of the proposed transit stations is summarized in Table 22.

TABLE 21  
EXISTING LAND USE SUMMARY: DIVISION STREET  
TRANSIT STATIONS

TRANSIT STATION LOCATION	LAND USE DESCRIPTION
122nd	Strip commercial on both division and 122nd, with single family and some multi-family behind the commercial properties.
136th	A multi-family residential core with some retail, and a wrecking yard.
148th	Strip commercial on both Division and 148th, with some multi-family uses.
170th	A multi-family residential core with a 300-unit trailer park, as well as some commercial activity in the station area.
182nd	Some locally-orientated commercial development with a school and single-family residences in the area.
199th	Largely undeveloped open land with a gravel quarry in the area.
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.
1st & Burnside (Alternative to Fairgrounds)	Ongoing commercial development in this area with a Fred Meyers Shopping Center, several new restaurants, and multiple family development. Large amount of vacant land.

TABLE 22

EXISTING LAND USE SUMMARY:  
I-205-LENTS CORRIDOR: TRANSIT STATION AREAS

TRANSIT STATION LOCATION	LAND USE DESCRIPTION
Gateway (East side of freeway)	Commercial core on Halsey and Weidler Streets and single and multiple family development to the south.
Mall 204 (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.
Division (West side of freeway)	Residential and strip commercial along Division. There are also several areas of vacant land.
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.
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.



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 non-supportive 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."

### Probable Land Use Impacts of Project Alternatives

#### Introduction

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 local 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....."\* These policies provide the framework from which mutually reinforcing land use and transportation plans can be implemented.

\*Multnomah County, Comprehensive Framework Plan, (Portland, Oregon: Multnomah County, 1977), pp. 300-316.

What follows evaluates the conformance of proposed alternatives with adopted plans and policies and probably changes in land development opportunities given past trends and the present context of plans and policies.

#### Conformance With Plans and Policies

This section covers the project alternatives as they relate to state, regional, county and city planning goals and objectives. When evaluating conformance with transportation plans, it is necessary to consider the fact that planning is an ongoing process and that alternations 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), only are 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.

Alternative 1 - No-Build. The no-build alternative does not encourage greater use of public transit and, by implication, reinforces the existing principal reliance on the automobile. In this respect, the no-build is inconsistent with all of the current planning documents, which emphasize reliance on various modes of transportation and the increased use of transit. In addition, traffic 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.

Further, the no-build alternative is not in conformance with the ITP transit corridor system designations. Contrary to the ITP, congestion associated

with the no-build would force increased future traffic onto existing auto and local bus facilities. This alternative could also generate regional trips on Major City Traffic Streets and Neighborhood Collector Streets, which is in conflict with the Arterial Streets Classification Policy.

County policies call for orderly growth and increased density in the urban areas, and for locating population concentrations, commercial and employment centers and public facilities where they can be served by public transit. The incentives necessary to promote this growth and location policy would not be fostered by the no-build alternative.

Alternatives 2a and 2b - Low Cost Improvements. The LCI alternatives conform with planning policies of increasing reliance on public transit and improving traffic flow because 2a would not improve the Banfield Freeway east of 37th. This would force increased future traffic onto existing auto and local bus routes, conflicting with the ITP and the Arterial Streets Classification Policy.

The LCI alternatives are generally consistent with the city's land use and transit policies in downtown Portland. In this regard, the LCI options are similar to the HOV and Separated Busway options, which would have similar bus routes and numbers in the downtown area.

The Arterial Streets Classification Policy (ASCP) calls for the construction of exclusive transitways in the Banfield corridor. LCI Alternative 2a does not conform with this designation. Alternative 2b is in partial conformance with this policy, however, in that traffic movement on the Banfield, east of 37th, would improve. Both alternatives are inconsistent with the ASCP regarding prohibiting the reservation of lanes on city streets for express transit trips.

Alternatives 3a, 3b, and 3c - HOV Lanes. The HOV alternatives are in conformance with planning policies emphasizing multi-modal transportation and improvement of the flow of goods and services with resultant strengthening of the local and regional economy. Alternative 3a would be the least effective in improving travel because it does not provide for widening the Banfield east of 37th.

The HOV alternatives are not in conformance with 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. This future conversion would result in additional costs and construction delays. In addition, the land use intensification envisioned with the LRT option in East County may not be possible in the short-term due to lost developmental opportunities. Therefore, if implementation of an LRT system is postponed, the transit-supportive land use response to it would be more difficult to develop.

The HOV alternatives are in partial conformance with the Arterial Streets Classification Policy in that improved transit and traffic movement on the Banfield, east of 37th, would result if these alternatives were initiated.

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. Neither the No-Build or Low Cost Improvement options have this opportunity, although the Separated Busway, and LRT options do.

Alternatives 4a and 4b - Separated Busway. The Separated Busway alternatives are in conformance with planning goals emphasizing multi-modal transportation and improvement of the flow of goods and services. The Busway alternatives are predicted to be comparatively more effective in attracting public ridership and in improving traffic and transit than the other bus alternatives. The Busway alternative, however, is in strict conformance with the Banfield exclusive transitway designation in the ITP. In addition, 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.

Alternatives 5-1, 5-2, and 5-3 - Light Rail Transit. The LRT alternatives are similar to the busway alternatives in conforming with planning documents. However, 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. The LRT options would also create the greatest opportunities for compliance with state, regional and local 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. 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.

#### 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. Continuation of present trends in land use in conformance with existing plans.
2. Reorient 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 Portland. None of the proposed alternatives are expected to generate developmental opportunities significantly different than no-build conditions through 1990. 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. What follows is a brief description of developmental opportunities, by like alternatives, which was taken from the Banfield Transitway:

\*Banfield Transitway Project: Light Rail Transit: Land Use Considerations (Tri-Met, November 1977), unpagged.

Downtown Circulation Alternatives study.\*

1. No-Build. 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.
2. Low Cost Improvements, High Occupancy Vehicle Lane and Separated Busway. While these alternatives would not by themselves generate redevelopment opportunities, they might become the impetus for future extensions of 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.
3. Light Rail Transit. The On-Mall LRT alignment alternatives (Oak Street and Pioneer Square) 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 require the displacement of a building of historic significance potential, however. The location of this station, together with other supportive developments, could also affect redevelopment opportunities in the area between the Transportation Terminals and Burnside.

\*Banfield Transitway: Downtown Circulation Alternatives (Deleuw, Cather, June 1977), pp. 95-96.

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 National Gas blocks, and along First Avenue between the Steel Bridge and Morrison and Yamhill Streets. 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. Developmental opportunities possible with the proposed alternatives are limited in this largely built-up urban area.\* 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. Transit stations in the Banfield corridor would be constructed only with a Separated Busway or Light Rail lane, however.

1. No-Build. Doing-nothing to improve traffic or public transit service in East Portland would decrease developmental opportunities since mobility in the area would be restricted as traffic congestion grows worse.

2. Low Cost Improvements. 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.

\*Tri-Met, op. cit., Section IIID.



3. High Occupancy Vehicle Lanes. 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.

4. Separated Busway and Light Rail Transit. 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 possibly with these options would be consistent with promoting general development trends in the area.

East Multnomah County

1. Introduction. 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 poor 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 "Light Rail Transit: Land Use Considerations," prepared by Tri-Met in cooperation with Multnomah County.

2. No-Build and Low Cost Improvements. 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 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.

### 3. High Occupancy Vehicle Lanes 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 23 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.

\*Ibid., unpagged.

TABLE 23

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.

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.

It is important to note that the problems and opportunities for devising and implementing transit-supportive land development in this corridor are much different than 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 the fact 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 Light Rail 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 lie 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 "up zoning" 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 commercially which are undergoing abandonment. Such uses would not only be compatible with public transit service, but would also blend with surrounding residential neighborhoods.

4. Light Rail Transit - Burnside Street. A light rail facility fixed in the center of East 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/102nd, 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 24 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



TABLE 24

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.

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 susceptibility in the area is 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 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 of 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 through-out the station service area.

Current plan designations reflect existing conditions. Medium density residential development would be necessary to support a station, however. This would require 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 be 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 rezoning of existing single-family areas would be necessary to realize full developmental potential.

e. 172nd Station Areas. The station is located in the center of a proposed high intensive 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 integrated 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 with 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 potentials from transit-supportive development.

5. Light Rail Transit: Division Street. 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.

The realization of future development potential on the Division Street LRT Branch 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 development oriented primarily to the automobile. Table 25 summarizes developmental opportunities that do exist at transit station sites.

a. 122nd Station Area. Future development options are limited by the 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

**TABLE 25**  
**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.

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. 136th Station Area. The transit station is situated in the mid-block as a means to encourage the development of a transit node with 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 an enlargement somewhat of multiple-family into single-family areas is an observable trend which has already begun to occur.

d. 170th Station Area. 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 station location. Redevelopment would require considerable property 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. 182nd Station Area. 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 the undeveloped single-family areas and the elimination of strip commercial zones.

g. Gresham Station Area. See Section on "Light Rail Transit-Burnside Street."

#### Land Use Implementation Mechanisms

Developmental opportunities discussed in the previous section require a concerted effort on the part of local government and the citizenry if the maximum transit-supportive potential is to be realized. In this regard the Oregon Department of Transportation or the Federal Highway Administration have only indirect involvement. As discussed previously, the areas of greatest potential are in the vicinity of transit stations in the I-205 corridor and along either Burnside Street or Division Street in East Multnomah County. While some of the area surrounding these stations have existing or proposed plan designations which are compatible with uses supporting increased public transit ridership, much area is left vulnerable to future development of non-supportive uses. The mere fact that these uses would be inconsistent with county policies which call for "increasing density and intensity of development to reinforce transit corridors and employment and commercial centers"\* is not sufficient to preclude such uses. Instead, positive guidance through public involvement and the mechanism of land use planning and control is required.

The Tri-County Metropolitan Transportation District of Oregon (Tri-Met) in conjunction with Multnomah County and the City of Portland have comprehensively studied means of encouraging transit-supportive development.\* What follows describes the general nature of these alternative land use control mechanisms.

\*Op. Cit. Multnomah County, p. 305

\*Ibid., Section III.D.5.

### Interim Development Controls

These controls can 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 the contemplated plan is to implement could proceed. These controls are therefore a short-term means of minimizing the intrusion of nonconforming uses in proposed transit station zones.

### Long-term Controls

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 local 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 and if supported by the public. These include such entities as a "Transportation Corridor Development Corporation;"

(an agency which would have a board of directors drawn from both the public and private sector, as a means of centralizing planning, funding and administration) or powers enabled by urban renewal programs, "Urban Development Action Grants," site value taxation incentives and joint development/value capture techniques. Further information on these concepts and others is contained in the Volume II Land Use Report and in the technical report entitled Light Rail Transit: Land Use Considerations (Tri-Met, November, 1977).

While some of the aforementioned means of implementing desirable land development in the vicinity of transit stations may be provocative, local units of government feel 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 statutory powers of local jurisdictions, which enhances the feasibility of their use and acceptance of the general public. Others such as transportation corridor development corporations would require special cooperative agreements between governments if not new enabling legislation possibly at the State level. In any event, a range of tools are currently or potentially available to better guarantee the success of transit-supportive development in the study areas.

#### Unavoidable Adverse Land Use Impacts

Project alternatives are largely free of adverse land use impacts. The exception to this general conclusion are land use conversions required for project right-of-way. These losses of existing uses are normally considered adverse since other private uses are precluded as long as the transportation facility is serviceable and in public ownership. It is generally recognized,

however, that such unavoidable conversions are for the good of the general public, and are therefore justified.

The light rail options which would extend service into East Multnomah County on Burnside Street or Division Street, would require the greatest conversion of private land uses. LRT-Burnside requires approximately 45 acres of additional right-of-way compared to about 70 acres with the Division option. The Separated Busway, HOV and LRT:I-205 alternatives each require about 20 acreages of new right-of-way. The LCI alternatives would require very little new right-of-way, since a transitway in the Banfield corridor would not be constructed. The social-economic implications of these conversions, including mitigation stemming from relocation payments and assistance, are discussed in Chapter 4, "Right-of-Way."

Secondary land use change from the implementation of any one of the alternatives has the potential to be adverse, although not unavoidably so. In the sense intended here, adverse secondary land use change would be that which is inconsistent with the goals, policies and plans for land use in the affected areas. While this potential exist, it is felt to be comparatively insignificant given the positive framework from which local government intends to approach land use decisions brought about by the project.

Nevertheless, some existing plan designations and developmental pressures (especially in the I-205 corridor) could be counter-productive in terms of creating transit-supportive land uses. This potential, while real, is avoidable given the commitment to transit-supportive development witnessed in local policies and current cooperative planning efforts between Multnomah County, the City of Portland and the Tri-Metropolitan Transportation District of Oregon (Tri-Met).

To a large extent the No-Build and Low Cost Improvement alternatives do not support the policy direction for land use in the study areas. This stems from their comparative lack of transportation capacity and services and associated elements, such as major transit stations, which are necessary to attract higher density, transit-supportive land uses in future years. The comparative inability of these alternatives to support land use intensification, especially along the major transportation routes, is an unavoidable outcome.

#### Mitigation of Adverse Impacts

Land use impacts were discussed previously in two categories: (1) conformance with land use plans and policies and (2) land development opportunities. Adverse land use consequences are those caused by non-conformance with plans and policies and/or the lack of developmental opportunities which support public transit.

The selection of either the No-Build alternative or a Low Cost Improvement option would result in both of these adverse impacts. Mitigational measures per se are not available since the impacts are tied to unrealized plans and policies or developmental potentials. Selecting an alternative which conforms with plans, policies and developmental objectives would avoid these adverse consequences. In this regard the HOV, Separated Busway and LRT options largely conform, with the light rail options on Burnside Street (5-1) or Division Street (5-2) having the greatest developmental opportunities.

#### 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 the chapter entitled "Socio-Cultural Resources," under the heading of "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

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 opportunities to intensify future land use to allow the provision of more efficient public transit service would be largely foreclosed. This stems from the high probability that areas were higher density transit supportive uses could be developed (especially around proposed transit stations) would be converted to less intensive 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.

#### Low Cost Improvements

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 provide improved transit service would be lacking due to the overall improvement in traffic circulation and absence of major transit stations along the LCI routes.



### High Occupancy Vehicle Lanes

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 improve traffic mobility in East Portland due to the combined effect of additional lanes on the Banfield Freeway and improved transit service. In general these improvements in traffic service would tend to support past land trends in land use which have been auto-oriented.

### Separated Busway

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 alternatives in the East Portland study area and the I-205 corridor with respect to transit station location and developmental potential. However, in East County, the transit-supportive developmental 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

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.

Mass transportation services per se, and bus services in particular, are somewhat transitory in nature and vary widely in their potential to influence land use. Transit stations, on the other hand, are visible, fixed facilities; as such, they have the air of permanence necessary to influence developers to make investments which depend upon greater reliance of continuity in the future.

Transit stations increase the attractiveness of adjacent parcels of land by improving their accessibility. This, in turn, tends to increase the value of

these parcels. Higher land values and good accessibility, in turn attract higher density activities, such as multi-family residential, retail, commercial, and office developments. These higher density activities provide the transit system with a steady market of riders. Equally important, high density facilities have been shown to be more efficient in terms of resource and energy consumption (especially through decreased per capita auto usage). Transit station area development, if planned and coordinated in advance, can thus become a mechanism for assuring future transit patronage as well as a powerful tool which local communities can use to influence more compact and efficient land development configurations.

In the case of both bus and light rail transit stations, the positive land development effects (i.e., encouragement of denser, more efficient, transit-oriented activities) can be fully realized only with a concerted local program of development management, as outlined previously under "Land Use Implementation Mechanisms." Without this kind of public guidance system, growth is likely to occur on a more haphazard and less effective basis. Some high-density development would probably be attracted to station areas through normal market forces, but the full developmental potential would be lost. Increased auto-oriented development may, in fact, proliferate in order to take advantage of both the auto and transit markets available at certain station sites. It therefore benefits both the transit system and the community at large to couple the construction of mass transit facilities to a balanced program of land management, especially if a rail alternative is chosen for the East Side.

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

**CHAPTER FOUR**

**SOCIO-CULTURAL RESOURCES**

## CHAPTER FOUR / SOCIO-CULTURAL RESOURCES

### Introduction

The socio-cultural section of this environmental study examines the various effects that project implementation and operation would have on the social and cultural fabric of the Portland metropolitan area. The numerous alternatives under consideration would create a wide range of diversified impacts upon the existing socio-cultural environment. Major areas of concern which this chapter treats are: population, accessibility, proximity and the neighborhoods, cultural resources, and right-of-way acquisition and displacement. Additional impacts of social consequence, those which foster change in the social environment but which are perhaps considered secondary effects, are discussed under separate headings included in this document (i.e., Economic, Land Use, etc.).

### Existing Setting

#### Population Change and Forecasts

Between 1960 and 1975 the population of the Portland Standard Metropolitan Statistical Area (SMSA) increased from 821,897 to 1,090,700, an increase of 32.7 percent. Specific growth rates, however, have differed in the various counties of the the SMSA. Multnomah County, which contained about half of the SMSA population in 1975, experienced the slowest rate of population change. Washington County has the largest increase in population in the SMSA, followed in order by Clackamas and Clark counties. Between 1970 and 1975, both Multnomah County and the City of Portland had small losses of population (see Table 26).

**TABLE 26**

**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.

CRAG population forecasts for the Portland SMSA anticipate an increase of 307,300 persons between 1975 and 1990, a 28.2 percent change. By year 2000, the SMSA is expected to have a population of 1,608,400, a 47.5 percent increase over the 1975 population. Multnomah County's growth rate would be well below the total SMSA growth rate. Population in Multnomah County is expected to increase by 12.3 percent from 1975 to 1990, 18.4 percent from 1975 to 2000.

The City of Portland has maintained a near static population in recent years. Between 1960 and 1970 the City's population increased from 372,298 to 380,060; a change of 2.1 percent. Portland's present population is estimated to be 384,500.

The Downtown Study Area contains a very small population. This decreased by 34.3 percent between 1960 and 1970 and continued a declining rate through 1975. 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 the Old Town area. Population forecasts for the downtown to 1990 and 2000 show a reversal in the population trend. Population is expected to increase slightly as new housing is added in the south and western portions of the downtown.

The well-established inner-city area of East Portland has a stable population. Little anticipated population fluctuation from the current figure is expected in East Portland. Suburbanization trends in the East County Study Area, however, are expected to continue. Population in this study area is expected to increase by 37,264 between 1975 and 1990 (25.2 percent) and 62,264 by the year 2000 (42.1 percent change).



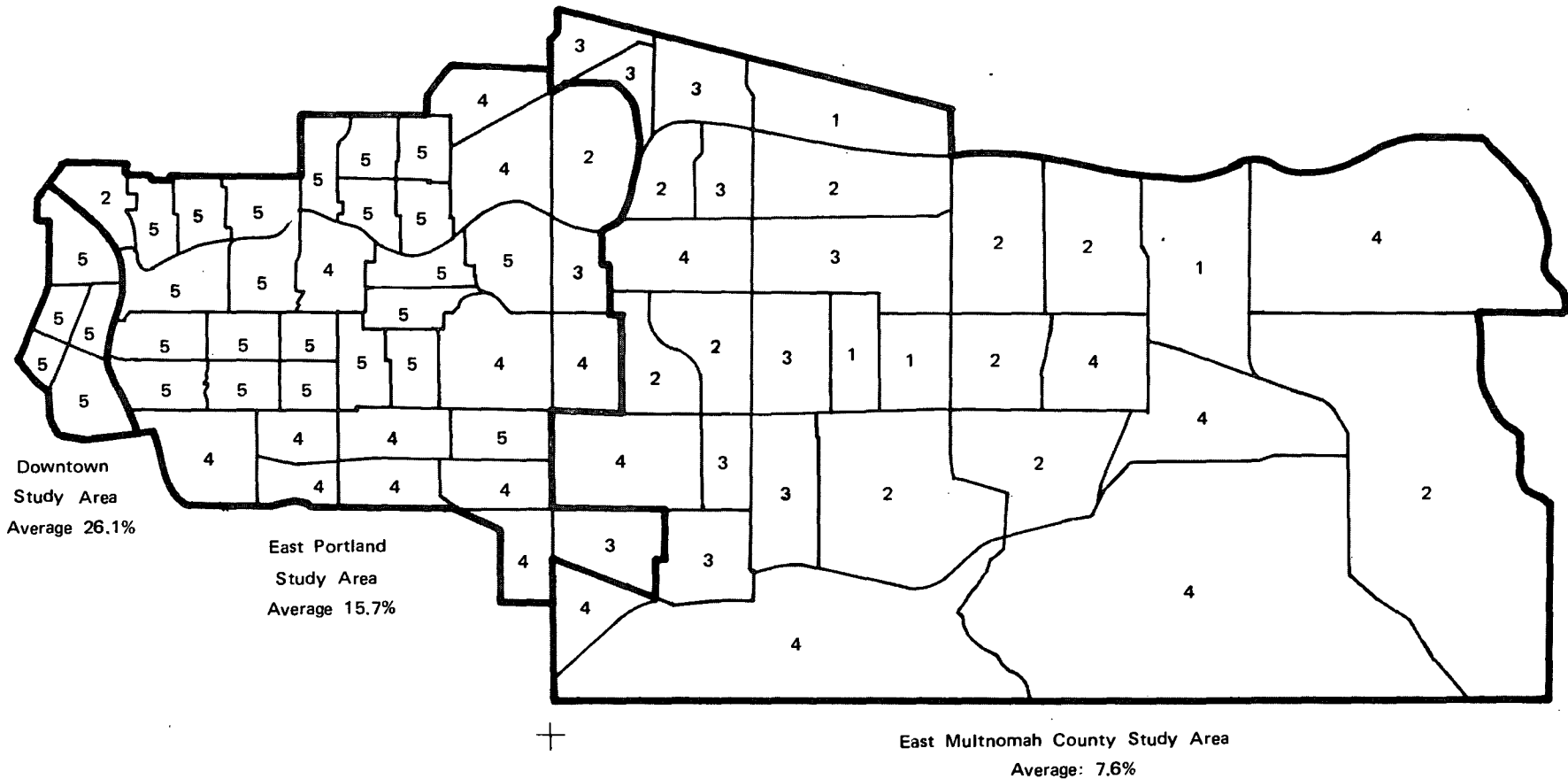
The highest rate of growth would occur in the incorporated cities of Gresham, Troutdale, Fairview, and Wood Village.

#### Socio-Economic Characteristics

American population is increasing in age with the trend toward smaller family and increased life-expectancy. Figure 39 indicates the distribution of person aged 65 and older within the project study areas. The highest percentage of senior citizens live in the downtown, with a proportionately lower percentage as one moves through the East Portland Study Area and into the East County. Conversely, the largest percentage of persons under 18 years of age is present in the East County Study Area; this percentage decreases as one moves toward the Downtown.

The Portland SMSA has a small percentage of blacks and other minority populations. The highest percentage of blacks is in the Downtown area 3.0 percent. Figures of 1.2 percent and 0.3 percent have been recorded and 0.3 percent have been recorded for the East Portland and East County areas, respectively.

Figure 40 reveals the median family incomes for the census tracts in the study areas. In 1970, the median family income in the Portland SMSA was \$10,458. Only the East Portland Study Area of the three study areas contained a median family income (\$10,846) higher than the SMSA. Income is lowest in the Downtown Study Area. The highest percentage of poverty level persons and families reside in the Downtown Study Area, and in the older parts of the inner-city, near the Willamette, in the East Portland Study Area.



PERCENT

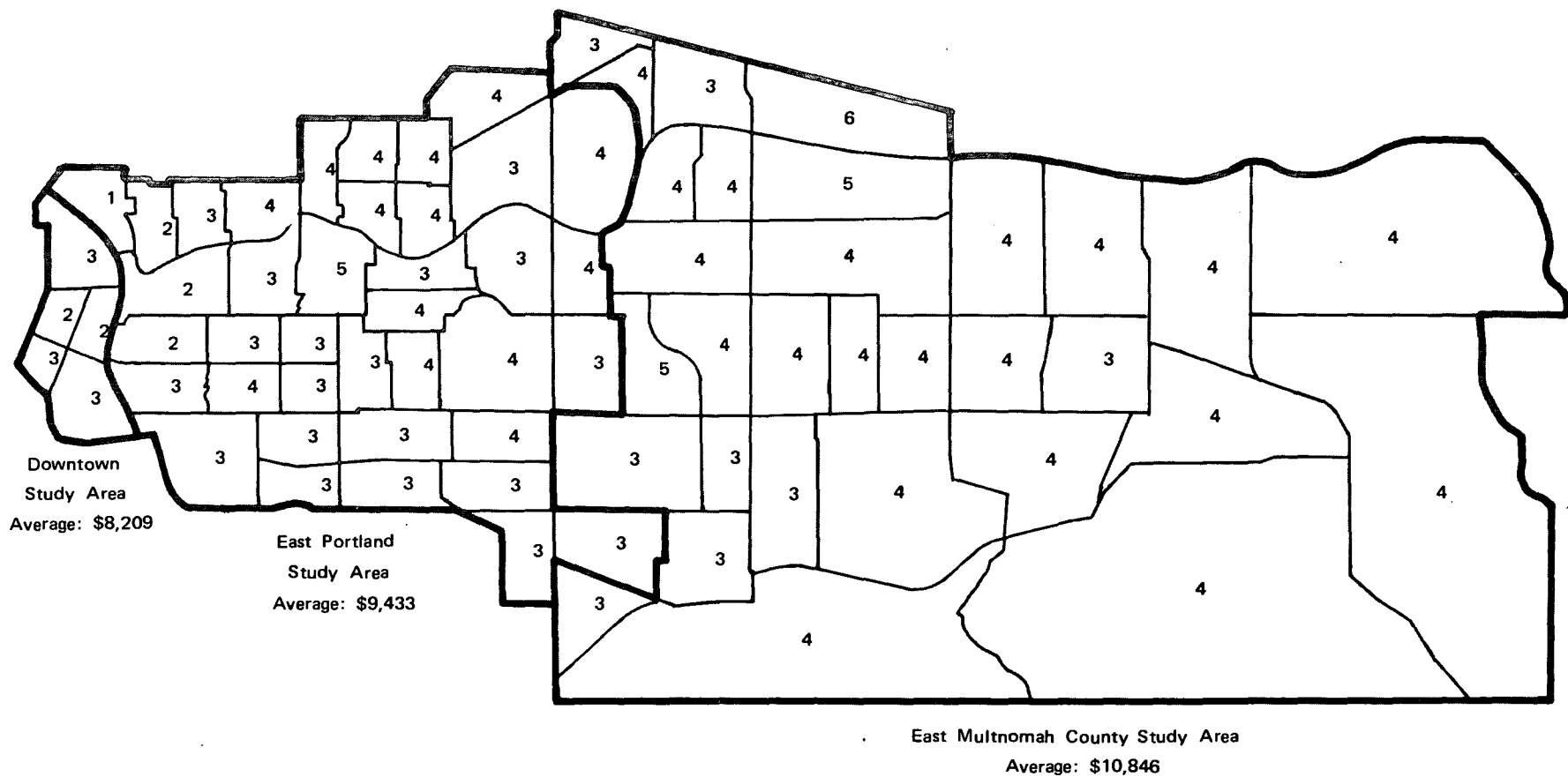
- 5 15.0 or Over
- 4 10.0 - 14.9
- 3 7.0 - 9.9
- 2 4.0 - 6.9
- 1 0.0 - 3.9

SMSA Average: 10.9%

FIGURE 39

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.



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 40

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

Educational attainment, like income, tends to increase outward from the Downtown, but not as evenly as income levels. The lowest percentage of high school graduates is in the north end of the Downtown and in the near-river portion of the East Portland Study Area.

Figure 41 indicates the change from 1960 to 1970 in the proportion of owner-occupied and renter-occupied housing units in the Portland SMSA and the study areas. Housing in the Downtown is almost exclusively renter-occupied. The East County is predominantly owner-occupied, while the East Portland Study Area contains a mixture of approximately 50 percent owner-occupied and 50 percent renter-occupied dwellings. Between 1960 and 1970, the proportion of owner-occupied housing decreased in East Portland and East County due to increases in rental apartments and townhouses. Between 1970 and 1976, 11,405 new dwelling units were added to the housing stock of the East County Study Area. Multiple family units made up 53 percent of this number.

#### Neighborhood Associations

In recent years, CRAG, the City of Portland, and the residents of Portland have shown renewed interest in preserving, restoring, and enhancing the established neighborhoods. Currently, sixty-one neighborhood associations 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 neighborhood associations have developed neighborhood plans that were adopted by the City Council.

The neighborhood associations in the three study areas are shown in Figure 42. Neighborhood associations are developing in the East County area. In the interim, community planning groups have been formed in unincorporated East County.

#### Community Institutions

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

Six public school districts are represented: Portland School District 1, Parkrose District 3, David Douglas District 40, Lynch District 28, Reynolds District 7, and Gresham District 4. The location of all public or private schools, as well as the colleges and universities, is shown in Figure 43.

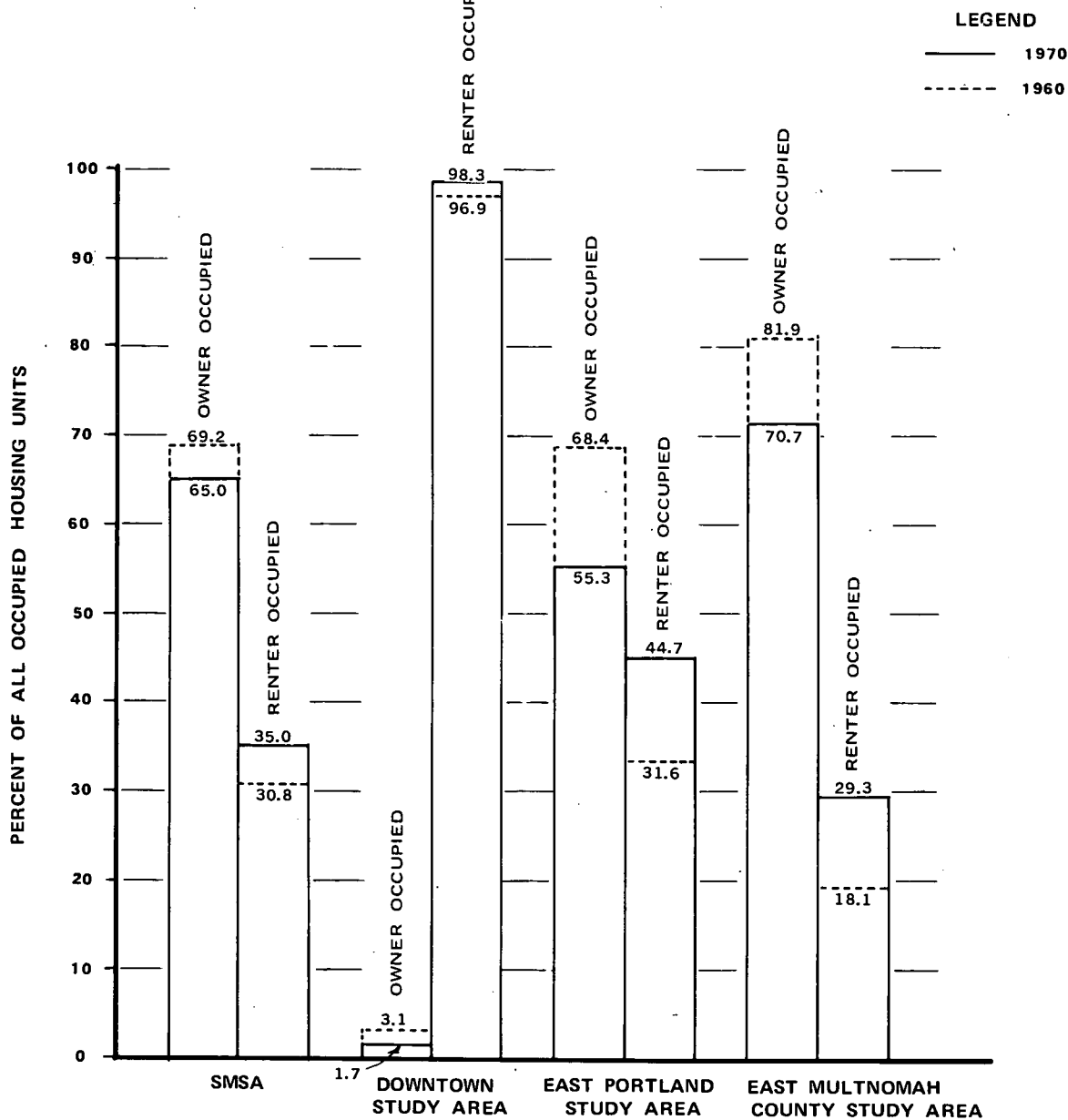
The study area contains many small neighborhood parks, used largely by local residents (Figure 44). The regional parks with broader service areas include the Downtown Waterfront Park (under development), Laurelhurst Park, Mt. Tabor Park, and Rocky Butte Park.

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 to Sunnyside Road in Clackamas County.

Emergency services in the study area include hospitals, ambulances, fire departments, and police protection. Seven hospitals are

FIGURE 41

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



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.

FIGURE 42

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.

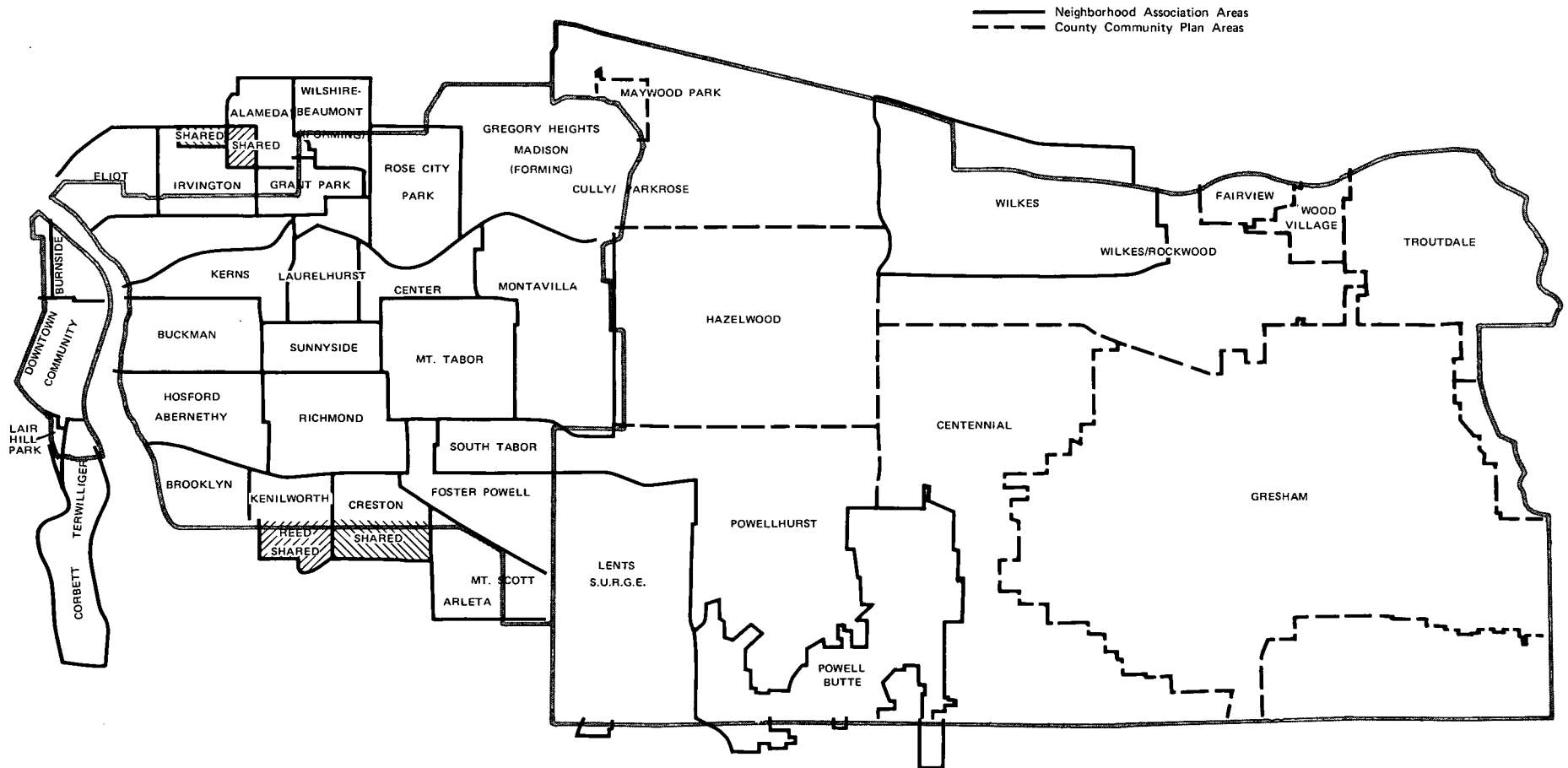
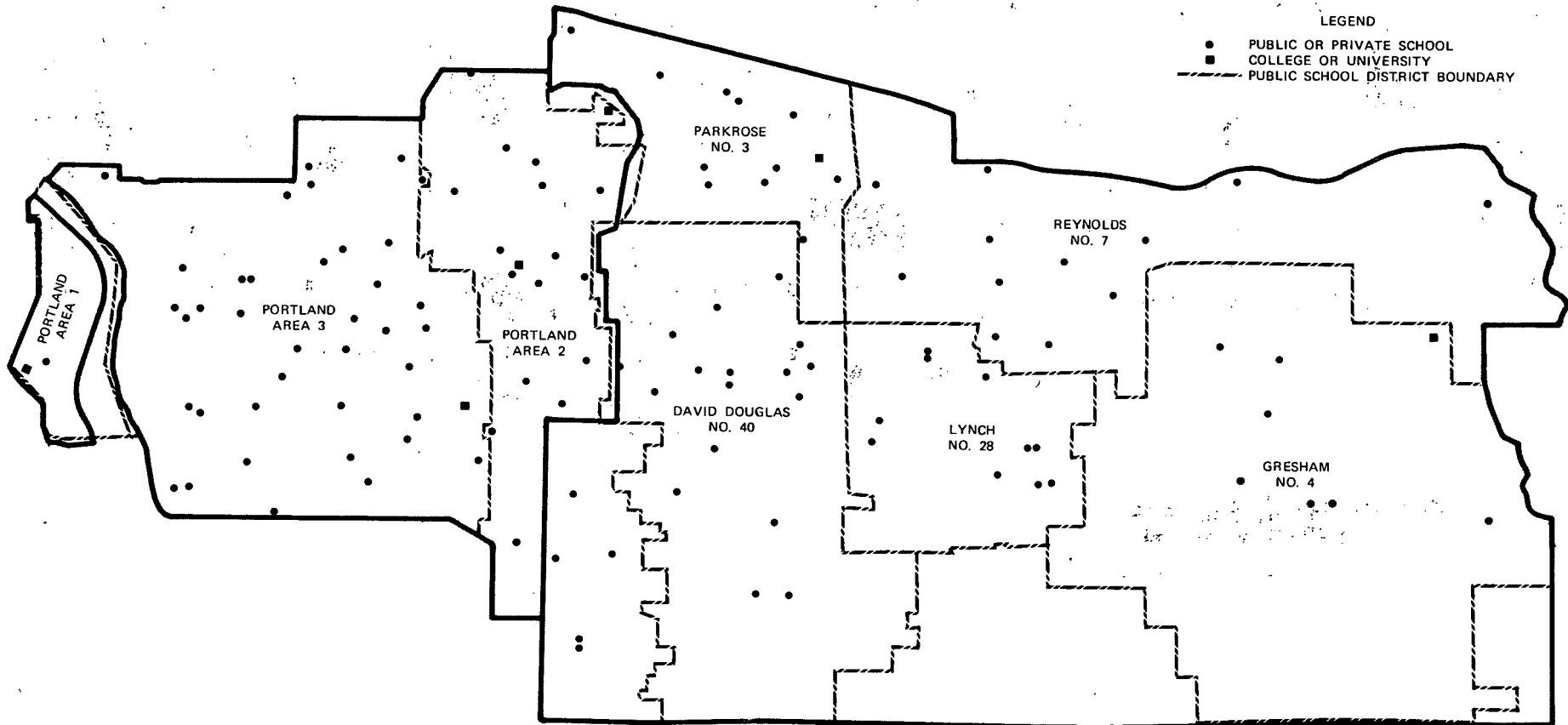


FIGURE 43

SCHOOLS, COLLEGES AND UNIVERSITIES  
IN THE PROJECT STUDY AREAS



LEGEND

- PUBLIC OR PRIVATE SCHOOL
- COLLEGE OR UNIVERSITY
- - - PUBLIC SCHOOL DISTRICT BOUNDARY

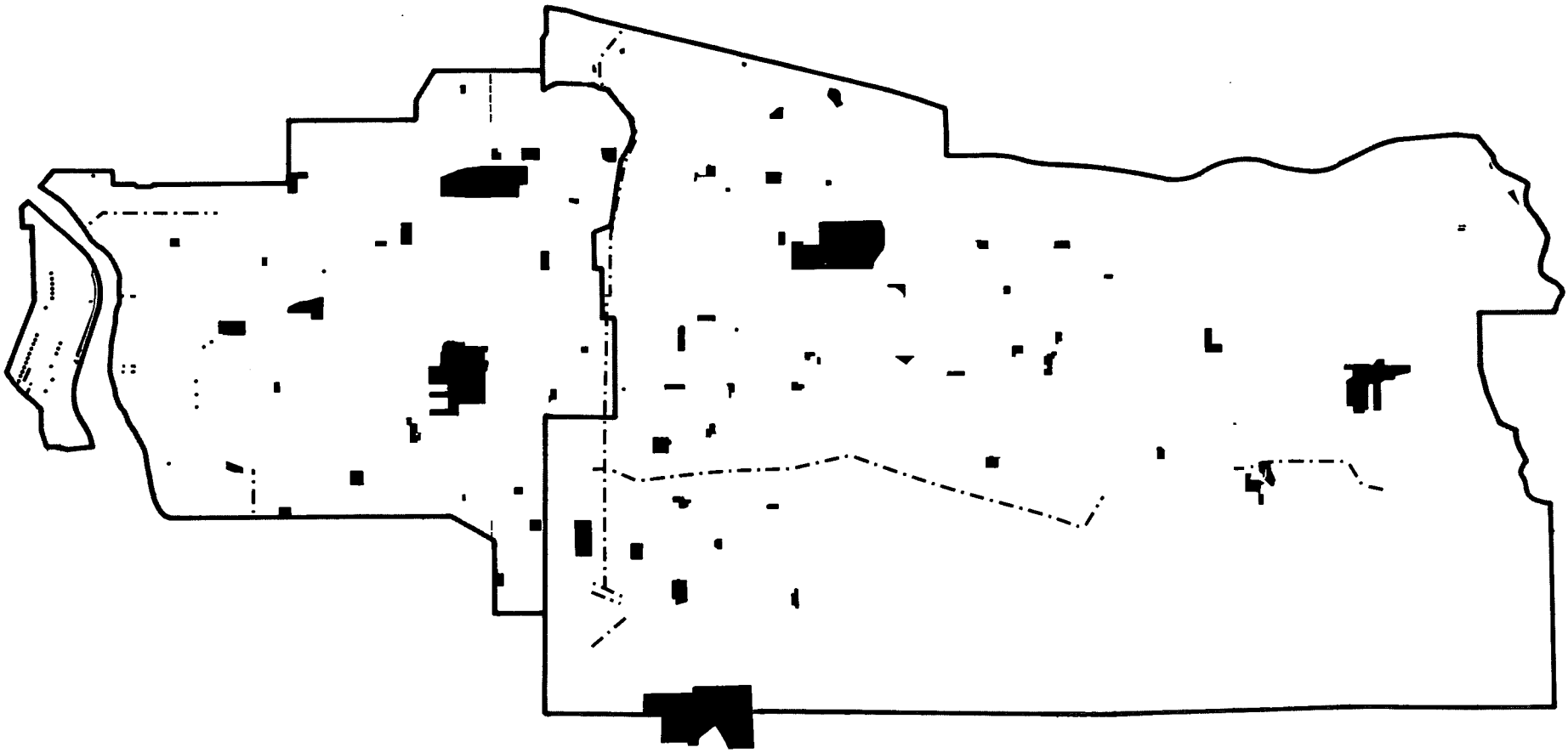


**FIGURE 44**

**PUBLIC PARKS, OPEN SPACE, AND  
EXISTING BICYCLE ROUTES**

**LEGEND**

- PARK OR OPEN SPACE
- · - · -** EXISTING BIKE ROUTE OR
- - - - -** BIKE ROUTE UNDER CONSTRUCTION



located in the project study areas. All of the hospitals, with the exception of Shriner's Hospital for Crippled Children and Portland Adventist Hospital, at 60th and Belmont, have emergency room facilities. The location of hospitals is shown in Figure 45. Holladay Park Hospital, Providence Medical Center, Woodland Park Hospital, and Portland Adventist Medical Center are located near the Banfield Freeway or I-205 and benefit from the accessibility provided by these transportation facilities. Several private ambulance services operate in the study areas and provide emergency transport and care.

Fire protection is provided by the Portland Fire Department, Multnomah County Rural Fire District 10, and Gresham Fire Department. Figure 45 delineates the boundaries of these fire departments and locates the fire stations. Fire stations are distributed rather evenly in the study area and fire response times to any point is short.

Police protection is the responsibility of the Portland Police Department, Multnomah County Sheriff's Office, Gresham Police Department and the Oregon State Police.

Population growth, particularly in the East County Study Area, will necessitate the expansion of emergency services in that area.

#### Transportation Modes and the Transportation Disadvantaged

The primary modes of travel within the metropolitan area are: private auto, bus, taxi, bicycle and walking. The 1970 U.S. Census indicated that 83.4 percent of the workers in the Portland SMSA used the automobile to get to work. The Downtown Study Area had the lowest percent

of workers using automobiles (24.7 percent). East Portland Study area had 77.2 percent and East County the highest rate of automobile work use, 88.1 percent. It is currently estimated that over 96 percent of all person trips (to work, shopping, entertainment, etc.) in the Portland region are made by automobile.

The 1970 Census also estimated that 5.8 percent of the workers in the SMSA used Tri-Met bus transit for getting to work. The highest rate of bus use was in the Downtown (19 percent) with the East Portland Study Area next at 12 percent. Only 4.8 percent of the East County Study Area residents used the bus to get to work in 1970.

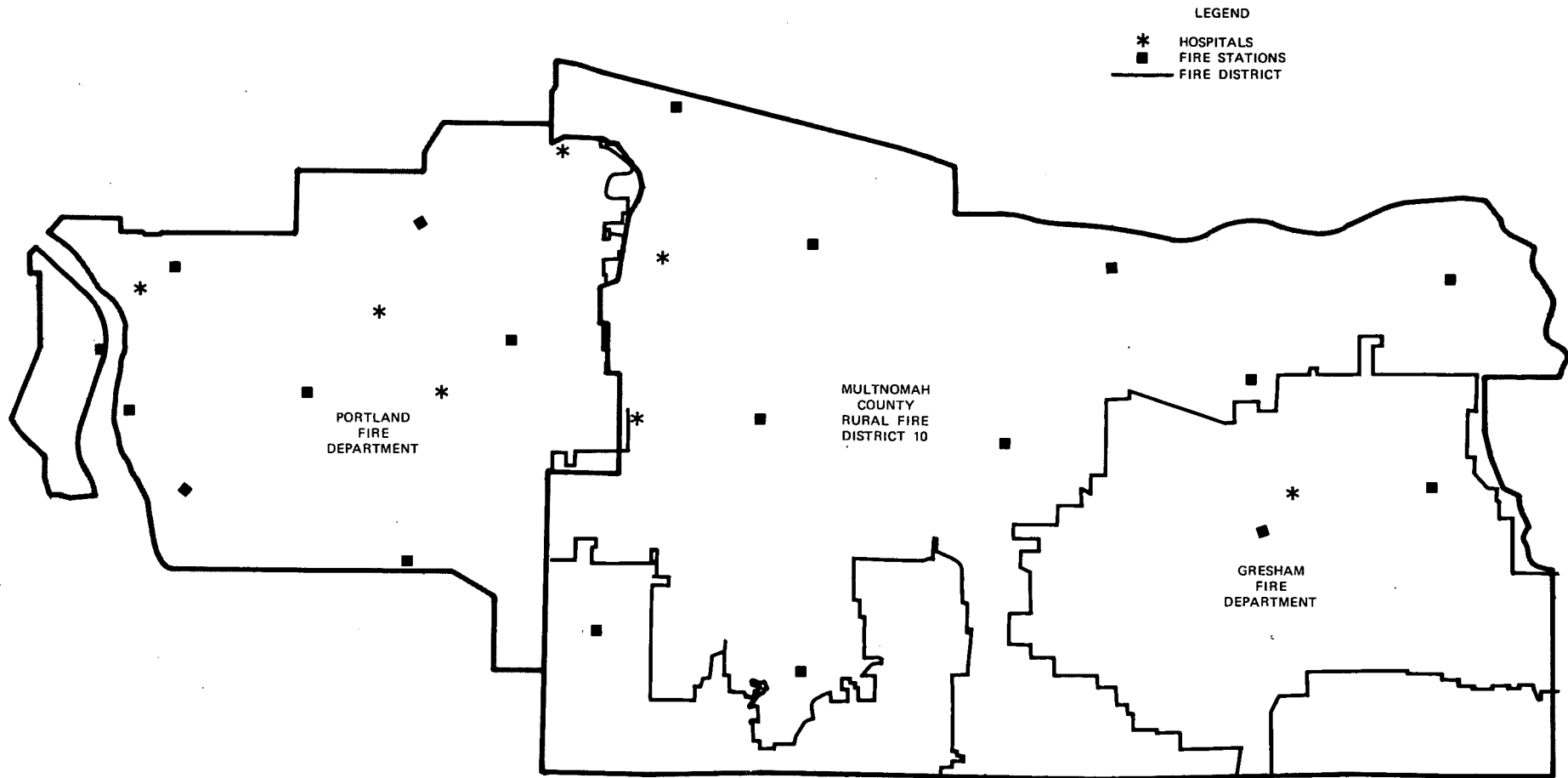
In 1970, Tri-Met carried about 60,000 passengers on the average weekday. By 1976, that figure had nearly doubled, 110,000 passengers. Tri-Met, in conducting sample surveys of its ridership, has found that the largest percentage of ridership are women, young adults (18 to 29 years of age) and older adults (50 and over), persons without a car, and white collar employees with middle to lower family incomes. About ten percent of Tri-Met's passengers are over 65 years of age.

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 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 nearly 39 percent of Oregon's population is included in this group. That study identified

FIGURE 45

EMERGENCY SERVICES IN THE STUDY AREA



29.5 percent of Multnomah County's population is transportation disadvantaged due to age, income and physical disability.

Tri-Met is currently taking part in an Urban Mass Transportation Administration, U.S. Department of Transportation, demonstrations project which will test some special transportation services for physically handicapped persons. In conjunction with the demonstration project, it was found from a household survey that 5.75 percent of Portland citizens are transportation handicapped. The number is divided between those who are severely handicapped (3.2 percent) and those who are moderately handicapped (2.55 percent).

#### Cultural Resources

The Portland Metropolitan area has a wealth of historic buildings and structures which are components of the city's cultural heritage. Many of these properties have been given national recognition through being listed, nominated or declared eligible for the Nation Register of Historic Places, an official record of each state's most important historic and archeological resources.

At the state level, the State Historic Preservation Office compiles the Statewide Inventory of Historic Sites and Buildings, a continually updated listing of historic and archeological properties in each county. In the Portland area, significant historic places are further identified by the Portland Historical Landmarks Commission (established by the City Council and administered by the City Bureau of Planning).

An additional category in the identification of historic resources lists those properties which have no current official recognition, but which may have future potential or which are of local historic interest in the community.

Properties which have been given official historic designations are afforded protection by Federal laws and implementing regulations, including the National Historic Preservation Act of 1966 and Section 4(f) of the Department of Transportation Act of 1966. Compliance with these laws requires agencies to consider the effects of any Federally funded project on those historic and archeological resources involved.

The following list of historic structures in the three major study areas identifies only those properties which are adjacent to any given alternative and which have been given official recognition.

Downtown Portland

1. Skidmore/Old Town Historic District
  - a. Listed in National Register and designated National Historic Landmark.
  - b. Sixteen buildings within the district are Portland Historic Landmarks and included in the Statewide Inventory.
2. Yamhill Historic District
  - a. Listed in National Register.
  - b. Eleven buildings within the district are Portland Historical Landmark and included in the Statewide Inventory.

3. U.S. Courthouse and Custom House, (Pioneer Post Office),  
520 S.W. Morrison.

a. Listed in National Register and designated National  
Historic Landmark.

b. Portland Historical Landmark.

c. Statewide Inventory.

4. Old First National Bank, Oregon Pioneer Savings,  
409 S.W. 5th Avenue.

a. Listed in National Register.

b. Portland Historical Landmark.

c. Statewide Inventory.

A number of buildings in the Downtown and East Portland areas are regarded as having future potential for historic recognition. Some of these properties are directly adjacent to project alternatives (as described in the Cultural Resources Report, in Volume II).

The urban nature of both these areas precludes the necessity for an archeological reconnaissance survey. The land has been extensively developed, eliminating the potential for discovery of undisturbed archeological sites.

#### East Portland

1. Lone Fir Cemetery, bounded by S.E. Stark, S.E. Morrison,  
S.E. 20th and 26th Avenues.

a. Portland Historical Landmark.

b. Statewide Inventory.

2. Ladd's Addition, bounded by S.E. Division, S.E. Hawthorne,  
S.E. 12th and 20th.

a. Portland Historical Landmark Conservation District.

b. Statewide Inventory.

East Multnomah County

No properties in the vicinity of the alignments have been given historic designation as of this date.

Depending upon the alternative chosen and the final design, an archeological reconnaissance survey may be required northwest of the Gresham city limits. A portion of this land is undeveloped and may have the potential for discovery of archeological materials. Although formerly in the Columbia River floodplain, the area was known to have been inhabited by the Cascade tribe of the Chinook Indians prior to, and during, the time of the Lewis and Clark expeditions.

Socio-Cultural Impacts

Population

Population growth or decline in any given area is caused by a multitude of factors, including the health of the economy, demographic characteristics (fertility, mortality, and migration), available land and services, accessibility, and governmental controls on land use. 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 reviewed continuously because of the multitude of influencing factors.



Alternative 1 - No-Build. The population forecasts in the existing setting for the Portland metropolitan area were prepared by CRAG in 1976 (CRAG 208 Forecasts) and are based on the Interim Transportation Plan and available land use information. These 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 forecasts, as such, do not reflect the no-build condition. If the no-build were selected, CRAG would be required to adjust the forecasts based on the economic and land use patterns anticipated to result from a no-build.

1. Region. Alternative 1 would have a small influence on reducing the total SMSA forecasted population. Decreased accessibility between the downtown and East Multnomah County would tend to retard some of the residential development slated for East County. Nonetheless, completion of I-205 will exert its influence in contributing to growth in East County. Without the Banfield project, the magnitude of total forecasted population growth for Multnomah County may not be realized. Multnomah County's portion of the forecasted SMSA growth may be reduced while other areas of the metropolitan region (Washington, Clark or Clackamas Counties) with better relative access would experience growth currently planned for the East County portion of Multnomah County.

2. Downtown. CRAG forecasts for the downtown population showed only a small increase to 1990 and 2000. The no-build would have an insignificant effect on population in this area. By decreasing the

economic vitality of the downtown, the no-build may not facilitate downtown apartment development. The no-build could contribute to reduced population growth (already forecasted as small) in the downtown.

3. East Portland. The East Portland Study Area has experienced and is forecasted to have only a small change in population. The no-build would not change the population amounts in this study area. Increased traffic volumes and congestion along the major arterials in East Portland would create pressures for conversion of single-family residential land use to multiple-family or commercial along these arterials. Land use within the established neighborhoods not bordering the major arterials would remain single-family residential. The area is developed to urban densities now, and the no-build would not affect the population magnitude nor distribution of the area.

4. East County. Population increase for this area may be less than forecasted by CRAG. East County's growth is based on convenient and attractive access to the central city. A no-build condition would reduce the interdependence of the two areas. Population in the East County would experience a slower rate of change with somewhat lower population long-term magnitudes.

Build Alternatives. The Banfield Transitway project includes four build alternatives and each of these alternatives have two or more subalternatives which involve design variations in the Banfield Freeway. These design variations pose no significance differences in the social analysis of population change and accessibility.

1. Region. 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. The effect on downtown population from 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 which would change the population. However, those population increases would not appear to be dramatic.

3. East Portland. Development of this inner-city area can be considered in population magnitude over and above what now exists. The build alternatives would contribute only to moderate increases near the transit stations established in the Banfield corridor (Alternatives 3, 4, and 5), particularly where conversions from single-family to multiple-family housing can occur. There is no discernible difference between alternatives, except that Alternatives 4 and 5 contain more stations than Alternative 3. Small population increases may occur around transfer points on the LCI alternative (Alternative 2), if the points function as major accessibility nodes for express transit service.

4. East County. Alternatives 2, 3, and 4 assume a system of collector and feeder buses in the East County, which tie into express buses service through East Portland. This is consistent with CRAG population forecast assumptions which provide for dispersed growth and scattered development along the major arterials in East County. The population increases associated with these alternatives would facilitate the forecasted distribution and magnitude of growth for East County. No busway or transit stations would be constructed on I-205 with Alternative 2. Alternatives 3 and 4 would interconnect with a separated busway and stations on I-205. Population increases would occur within the drawing areas of these stations.

Alternative 5 (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 route and station areas. To a lesser degree, higher densities would also occur along feeder bus routes leading to major stations on the transit route. Population increases above and beyond CRAG ITP forecasts would occur along LRT routes and major station areas. Tables 27 and 28 compare CRAG ITP forecasts with preliminary population forecasts prepared by Multnomah County, City of Portland, and Tri-Met. These LRT forecasts assume that rail would affect development patterns and that progressive land use policies would be required to shape and direct development oriented toward rail. As noted, population increases at station areas and in the corridors with LRT's influence are much higher than the forecasts for dispersed growth

TABLE 27  
LRT STATION AREA POPULATION INCREASE

Corridor	Number of Stations	1975 Population	1990 Population (Relocation) Forecast	Population Increase No.	Population Difference %	Average 1990 Population By Station (Reallocated)
Banfield	6	5,042	5,063	21	0.4%	843
Burnside <sup>a</sup>	9	7,789	24,023	16,234	208%	2,669
Division <sup>b</sup>	10	6,588	22,128	15,540	236%	2,212
I-205 to Lents	6	3,788	12,428	8,640	228%	2,485

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

NOTE: The population forecasts are for the areas within 1/4 mile of the stations, with the exception of the Gresham stations which are 1/2 mile.

<sup>a</sup>Includes Gateway Station

<sup>b</sup>Includes Gateway, Mall 205 and Division Street Sections

TABLE 28

LRT CORRIDOR POPULATION  
INCREASE IN EAST COUNTY

Corridor	- - - Population - - -		1990 (Reallocation Forecast to Revised Land Use)	- - Change - - 1976-1990	
	1976 (CRAG 208 Forecast)	1990 (ITP Forecast)		(No Reallocation)	(Reallocation)
Burnside	64,983	81,550	88,0195	25.5%	35.4%
Division	73,301	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 census are contained in the referenced report located in Volume 3 of this DEIS.

and development. Growth outside the LRT corridors would occur at slower rates than CRAG forecasts indicate. Selection of LRT would require a major new effort to forecast population distribution and magnitudes in East County due to the population effects of fixed rail.

### 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 for different modes of travel.

#### Alternative 1 - The No-Build

1. Region. Traffic conditions in 1990 under the no-build indicate that most of East Portland's streets will become increasingly congested. Transit traffic would be forced to compete in this congestion. With increased congestion and lower levels of traffic service, there would be an adverse effect on accessibility in the East Portland Study Area. Without major improvements in transit opportunities, there would be no increase in transportation options for the transportation disadvantaged in the region, downtown, East Portland, or East County Study Areas.

2. Downtown. Access into and within the Downtown would decrease with the no-build. Pedestrian travel would have to compete with increasing volumes of automobile traffic, which would in turn reduce the ease and safety of pedestrian travel.

3. East Portland. The no-build condition would have an adverse effect on accessibility in the East Portland Study Area. Increases in through-traffic, when coupled with local traffic, would lessen access to major community institutions. Particularly significant for the people dwelling there would be the reduced accessibility to emergency services-- hospital, ambulance, police and fire protection. Congestion and increased traffic on major East Portland arterials traversing elementary school attendance areas would tend to decrease student safety and necessitate the readjustment of some school attendance boundaries. Increased auto traffic congestion would conflict with mass transit use and thereby reduce potential transit gains. Bicycle and pedestrian movements would not function safely in traffic congestion.

4. East County . The no-build would have a small adverse effect on local access, but would have a severe impact on access between the East County and Downtown. The East County is heavily auto-oriented, and the no-build would tend to increase the dependency on the automobile.

#### Build Alternatives

1. Region. All of the build alternatives would improve regional accessibility by increasing transit options, as well as increasing vehicular traffic flow. There is no discernable difference in accessibility on the SMSA region for the various build alternatives.

2. Downtown. Accessibility to the various institutions in the Downtown and pedestrian travel would be beneficially affected by the build alternatives. The differences among alternatives in the Downtown



would be small and indistinguishable. Alternatives with higher levels of transit use would result in slightly higher levels of accessibility.

3. East Portland. The multiple express bus routes with Alternative 2, and the numerous transfer points, would provide a beneficial improvement to accessibility in the East Portland Study Area. Those residents near the transfer points would have better access to the downtown. Alternative 2 would affect those residents more favorably than the other build alternatives.

The access improvements on Alternatives 3, 4, and 5 would benefit those residents along the Banfield Corridor and the station locations. Alternatives 4 and 5 would provide the best access due to the larger number of stations than Alternative 3.

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 (such as ramps and lifts) would assist the handicapped transit user.

Alternative 2 would bisect several school attendance areas in East Portland. However, the impact of this alternative on school traffic safety would be less than in the no-build condition. By reducing traffic on arterials in East Portland, Alternatives 3, 4, and 5 would reinforce the Portland School attendance areas and not interfere with its current boundaries.

The numerous transfer points under Alternative 2 would provide convenient pedestrian use of Tri-Met buses. All of the build alternatives would be compatible with the existing and proposed bicycle routes in East Portland. Bike storage facilities at some of the stations in the Banfield (Alternatives 3, 4, and 5) would facilitate combination bike/transit commuting trips.

4. East County. Alternative 2 would make only a minor change in access in the East County Study Area due to the lack of a busway and stations on I-205, except in Gresham. This alternative would afford the least benefits of the build alternatives.

Alternatives 3 and 4 would include a busway and stations on I-205. The collector and feeder bus system in East County would facilitate greater access to the institutions and neighborhoods in the area.

Alternative 5 would make a very beneficial change in access from the East County to the Downtown. The numerous stations proposed on the LRT routes under considerations would provide convenient access to this transit mode.

The restricted number of north-south crossings of the Burnside and Division LRT routes would have a minor adverse impact on local accessibility since some out-of-direction travel would result. 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 and other pedestrians. Bicycle travel would be required to adjust to new crossing locations.

The delivery of emergency services would be adversely affected by the degree of out-of-direction travel. Several fire stations are located near the LRT corridors. However, out-of-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 corridors would change enough to influence its rating nor consequently the fire insurance rates of individual property owners.

#### Proximity and Neighborhoods

##### Alternative 1 - No-Build

1. Downtown. Proximity and neighborhood effects would be minimal.
2. East Portland - The no-build alternative would increase the volume of traffic on the east-west arterials in the East Portland Study area. With increased congestion on these major arterials, traffic spill-over onto neighborhood streets can be expected, as less congested routes are sought by drivers. Increased traffic within the neighborhoods, and on arterials which cross neighborhood association boundaries, would adversely affect them and would not be compatible with neighborhood association goals of enhancing liveability in these areas.

Increased traffic would have adverse proximal effects (noise, vibration, localized air pollution) on those institutions and residences

bordering the major arterials. Proximity effects in the Banfield corridor would be minor since the corridor is largely separated from sensitive land uses by the nature of its topography and current use as a freeway and major rail line.

3. East County. Proximity and neighborhood impacts would be negligible in the East County area. Since traffic increases would be less.

#### Build Alternatives

1. Downtown. Alternatives 2, 3, and 4 would have minor proximity impacts on the Downtown. The introduction of more buses and autos in the Downtown area would create increased noise levels on those institutions bordering the Downtown Connection Routes. The LRT, on the other hand, would be less intrusive on bordering institutions during operation, though its construction would constitute a prolonged, if temporary, adverse impact. The laying of fixed rail, erection of overhead wiring, building of stations and removal of traffic would temporarily interfere with normal activities along the route.

Alternatives 3 and 4 would displace the Athens Hotel, a low-income residential hotel in the Burnside area. This displacement is discussed more fully under the sub-heading of Right-of-Way in another section of this Report. Relocation of the hotel's residents would be difficult.

2. East Portland. The LCI Alternative would cause minor proximity impacts on the institutions and residences bordering its routes. These impacts would not accrue because of the construction of the facility,

but rather from its operation. Tri-Met estimates that about 30 to 50 buses per hour would operate on the exclusive bus lanes during peak hours. This increase in bus traffic and its associated noise would interfere with normal activities at bordering institutions and residences.

Alternative 2 could contribute in the long-term to the severance of established neighborhood boundaries in East Portland. However, the no-build impacts on neighborhood severance would be greater than in Alternative 2. Table 29 lists the neighborhood associations that are separated by the LCI routes. As previously indicated, the Banfield Freeway is a logical neighborhood boundary. If in the long-term the LCI routes would tend to separate neighborhood populations, it may be necessary to readjust boundaries or to adapt to part of the neighborhood population being so estranged. However, the extent of the impact would be significantly less than the No-Build Alternatives.

Alternatives 3, 4, and 5 would contribute beneficially to the health and vitality of the neighborhood of East Portland by funneling traffic through the Banfield Corridor and not along city arterial streets. A detrimental impact of these alternatives would be the residential and non-profit institutional displacements caused by the widening of the Banfield Corridor.

3. East County. Alternatives 2, 3, and 4 would have insignificant neighborhood and proximity effects on the East County Study Area.

Alternative 5, the LRT Alternative, would have the greatest adverse neighborhood and proximal impacts of the build alternatives in

TABLE 29  
 EAST PORTLAND STUDY ROUTES  
 AND THE NEIGHBORHOOD ASSOCIATIONS

Study Route	Bordering Neighborhoods	Dividing/Separating
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.

the East County area. The LRT construction period would adversely affect the Burnside and Division Street residential areas and institutions, whichever route is selected. Residential displacement would be very severe on the Division Street route. Restricted access, out-of-direction travel, and on-street parking removal on the Burnside or Division route would decrease the liveability of those single-family residences near the route. Single-family housing would tend to be replaced with multiple-family housing or commercial land uses at station areas.

None of the build alternatives would require right-of-way from public park, open space or recreational facilities. Consequently, the project requires no Section 4(f) involvement for park property.

Cultural Resources. The impacts on National Register, Historical Landmark and Statewide Inventory properties are principally related to auto traffic and congestion under the various alternatives. None of these officially designated structures will be removed by any of the alternatives selected.

Because of the specific nature of these cultural resources, and their geographic concentration in the Downtown, the following treatment is oriented to a discussion of impacts by study area, rather than by project alternative.

Depending upon the location and use, properties could be affected by increased air pollution and/or noise levels, alternation of aesthetic appearance or setting, or a change in traffic patterns,

parking and access. (Topics such as Air Quality, Noise, Traffic Analysis, etc., are more fully treated under their respective sub-headings in the Impact Section of this EIS.)

Downtown Portland

1. Skidmore/Old Town and Yamhill Historic Districts. Under the No Build and Low Cost Improvements alternatives, increased auto usage can be expected to cause problems due to increased congestion, and therefore have an effect on future development (see Figure 46).

Alternatives 3a-c and 4a-c would decrease congestion through the use of mass transit vehicles, although an expanded bus system (4a-c) is expected to raise noise levels and necessitate some removal of streetside parking.

The On-Mall LRT alternatives would facilitate some development of these districts, but the Cross-Mall option would provide the greatest opportunity by providing direct access through the area. Since compatible development and restoration of historic buildings is well protected by Federal regulation and city ordinances, the Portland Landmarks Commission has endorsed proposals for light rail transit by a means of revitalizing the districts.

Effects of trackage and overhead electrical systems along First Avenue are important considerations in proposed construction of the LRT alternative. Changes in traffic patterns and curbside parking would be compensated for by increased transit use and access to adjacent buildings. Since light rail requires fewer vehicles and permits more efficient channelization of traffic, this transit mode has an obvious advantage over an



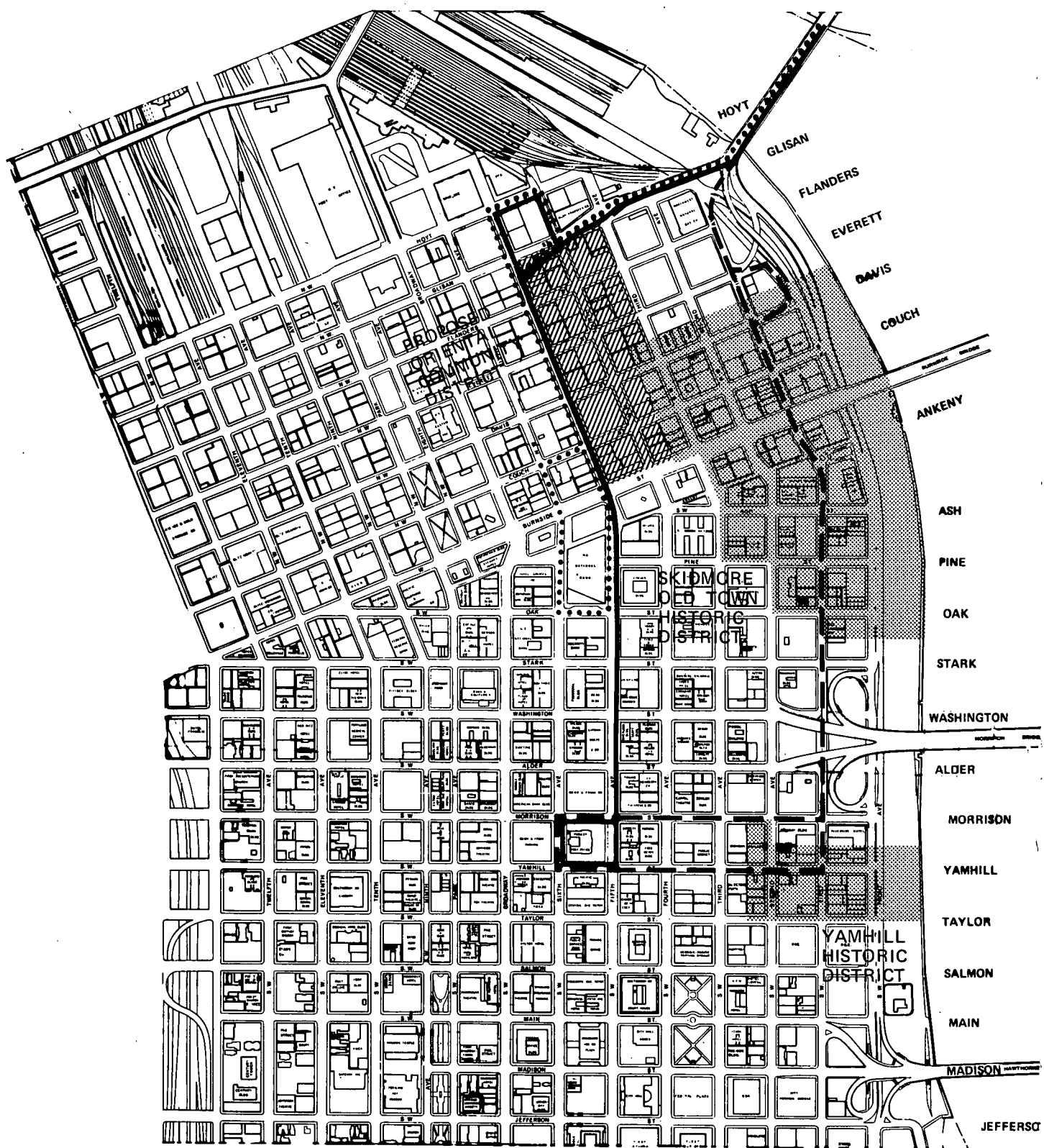


FIGURE 46

PORTLAND DOWNTOWN STUDY AREA

DOWNTOWN ALIGNMENT ALTERNATIVES

ON MALL, OAK STREET ..... (dotted line)

ON MALL, PIONEER SQUIRE ————— (solid line)

CROSS MALL - - - - - (dashed line)

expanded bus system. The quieter and less polluting operation of light rail transit would also enhance the attraction of the districts. In the event that economic or environmental factors require curtailment of private auto travel in the city, the existence of an established alternative mode would prove a valuable asset to district development.

2. U. S. Courthouse and Custom House (Pioneer Post Office) and the Old First National Bank. Since these two historic structures are located on the transit mall, they would benefit from the construction of any of the LRT alternatives. Light rail vehicles would provide better access than the No-Build or bus alternatives, which would increase congestion and foster adverse air quality changes.

Other, less critical, concerns relating to effects of the LRT alternatives are those which involve changes in traffic patterns, parking availability, and the installation of loading platforms near the courthouse.

3. Most Downtown buildings which have future potential for historic recognition will not be severely affected by the Banfield Transitway Project. The one exception is the block of structures bounded by N. W. Glisan, N. W. Flanders, N. W. 4th and N. W. 5th. These buildings do not presently have official historic recognition. Due to the possibility of future recognition, greater emphasis is placed on this impact, which would result from construction of either On-Mall LRT alternative. The Portland Historical Landmarks Commission is currently considering designation of this block and approximately eight additional blocks to the

east and south as an Oriental Community District, a designation of historic significance and possible National Register potential.

Both the On-Mall, Pioneer Square and the On-Mall, Oak Street alignments would require removal of at least two of the seven 19th Century brick structures in this block. The severity of this impact relates to the entire block, however, since its historic significance depends primarily on its value as a contiguous grouping of buildings, without the intrusion of modern architecture.

The historic value of these buildings is based upon their origin as a portion of Portland's first Oriental Business District, established in the late 19th Century in the area just north of Burnside Street. This block and others adjacent and to the south and east, contain most of the structures of the original district, some of which are now being restored and developed for use as offices and retail outlets.

Future historic district designation depends upon preservation of these blocks of buildings while they still exist and have the capacity for rehabilitation. Removal of any portion of the district is an impact on an historic resource which cannot be replaced or retrieved.

Specific mitigation measures in the historic districts will be required primarily under the LRT Cross-Mall alternative. Construction plans must be coordinated with the State Historic Preservation Office and the Portland Historical Landmarks Commission. Under this transit mode, every precaution will be taken to protect the integrity and cohesiveness of the historical districts.

Location of trackage in the center of the street protects property access, but such refinements as cobblestone track infills and appropriately designed loading platforms would enhance the period quality of the area.

The required overhead electrical systems pose an aesthetic problem in regard to historic buildings with finely detailed facades. Integration of wire supports with light standards and traffic signal equipment is a means of reducing the aesthetic impact. Placement of span wires and distributors on poles or buildings must be carefully considered in order to prevent visual distraction and protect delicate ornamentation.

Since the LRT On-Mall alternatives do not route through the districts, consideration should be given to subsequent 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.

Increased congestion under the No-Build and Low Cost Improvements alternatives will require more efficient routing of traffic and necessitate additional parking lots and/or structures.

Loading platforms, required by the Cross-Mall alternative in the Courthouse vicinity, should be carefully located and designed to be compatible with the building's architectural style.

Since the historic value of the buildings in the block bounded by N. W. Glisan, N. W. Flanders, N. W. 4th and N. W. 5th relates to the entire block, the only possible mitigation under either On-Mall alternative is a change of alignment.

The blocks to the north contain some vacant land adjacent to the alignment which may permit widening of Glisan on the north rather than the south side of the street. Engineering feasibility and design for a change in alignment would be thoroughly explored before construction plans are finalized.

East Portland

1. 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 the area. This applies to all ramps and transit stations associated with Banfield Freeway construction under any of the proposed alternatives.

2. Low Cost Improvements Routes. The historic Ladd's Addition district would not be appreciably affected by construction of Alternatives 2a or 2b. The possible removal of parking on Division in the vicinity of the two churches would decrease the available spaces which are now restricted to limited time. The proposal to remove parking only during peak hours would not affect use of these facilities.

Under the Low Cost Improvements alternative, final design preference should be given to retention of parking except during peak hours adjacent to Ladd's Addition.

East Multnomah County. Since no officially designated or significant historic properties are located adjacent to alignments in this area, construction of either LRT alternative will not affect such resources.

Construction of any LRT alternative may affect potential archeological sites northwest of Gresham if final design alignment traverses

sections of previously undisturbed land. In this event, an archeological reconnaissance survey will be scheduled by the Museum of Natural History at the University of Oregon.

Prior to initiation of construction activities, any required archeological reconnaissance surveys will be performed at appropriate locations on either LRT alternative selected. All mapping, evaluation of sites and necessary salvage or 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 names of 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 (A.I.A.). The Oregon Historical Society was contacted for information regarding Portland structures and availability of appropriate photographs.

All proposed mitigation measures involving National Register properties or other buildings considered eligible for listing 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 Office.

### Visual Considerations

Alternatives 1, 2a, 2b will have little direct visual impact on city streets.

Alternatives 3 and 4 will have a visual impact only insofar as an increased number of vehicles. The streets north of Burnside will change somewhat as they are adapted to permit the efficient passage of large numbers of buses, while the construction of counter flow lanes on Morrison and Yamhill will also change the nature and pace of those streets.

The principal visual effect of LRT will be the requirement for an overhead power supply. The care taken in designing this overhead system can significantly influence its visual appearance. So too the location, visual background and observer's position will markedly affect perception of the overhead. Since wires are conspicuous only in silhouette, in many places, such as on much of the mall and on other streets, the wires will be conspicuous only to pedestrians standing close to the curb line and looking upwards. At street intersections, the LRT overhead will be somewhat more noticeable, in the absence of buildings or trees.

At locations where the tracks change direction, additional "pull off" wires are required to keep the contact wire within reach of the pantograph. Since LRT overhead has only single polarity, and no switches, it is only at the changes of direction that significant visual impact is anticipated.

The appearance of LRT overhead is susceptible to good design techniques. Possible methods of mitigation include:

- o Integration of visual design into the technical design process for the power system.
- o Planting of street trees and other techniques to "manage" wire silhouette in sensitive locations.
- o Use of eye bolts in buildings rather than poles, where possible, for span wire support.
- o Integration of poles, where required, with poles needed for street lighting and traffic signals.
- o Development of system-wide design standards for important design elements such as overhead, which consider both technical and aesthetic requirements.
- o Use of underground feeder cables, and the avoidance of dual wire catenary on city streets.

#### Right-of-Way, Acquisitions and Displacement

Right-of-Way impacts were described and analyzed on the basis of maps and data from the Metro office of the Oregon Department of Transportation. Measures utilized to assess impacts include estimated: acreage needs; displacements of people, businesses, and institutions; costs of purchase and relocation; and tax base reduction (See Table 30).

Alternative 1 (the No-Build) requires no additional land. In the case of Alternative 2, only a minor amount of small land strips would be needed, along the Banfield Freeway and at 60th Avenue and Belmont Street. Two or three houses at 39th Avenue would lose some yard area.

Alternative 3 would displace, or modify, a low-rent apartment hotel, presently housing ninety people, at 6th Avenue and Everett Street. These tenants might conceivably find it difficult to find other dwellings



**TABLE 30**

**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 Dis- placement #	-	-	-	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

within their means. Few other residential or business properties would be affected by the 3a option. Both of the other HOV lane options (3b and 3c) would involve considerable impacts from right-of-way purchases. These would require 20 acres and displace as many as 175 households and a dozen businesses. These preliminary estimates are generally based on the maximum amount of property which might be needed; in some cases only a portion of a building or parcel would be required.

The most important single impact for these, and for several other alternatives, is the need to acquire Union Pacific Railroad land. Forcing the company to shift its proposed second track to the north side of its existing alignment would cost approximately \$6 million. A great percentage of this money is for special construction of walls and structures to permit a northside alignment. Non-profit organizations affected are the Bethlehem Lutheran Church at 39th Avenue, and a medical clinic on 47th. Both of these facilities would have some difficulty in finding another site while maintaining their present ties (to congregation or to hospital).

The single-family houses needed are generally in locations where street access would be cut off. The largest business affected is a contractor east of 33rd Avenue. Other firms include a bottling plant, a pipe manufacturer, and a construction company. Costs of land and relocation for options 3b and 3c are estimated at \$12 million or more.

Impacts from Alternatives 4a and 4b are nearly the same as for 3c. Option 4a would have a slightly lower cost and associated displacements.

Alternative 5 has three main alignments east of I-205: 5-1 (Burnside Street), 5-2 (Division Street) and 5-3 (Lents area). All these LRT variations share the same route along the Banfield Freeway from downtown. Purchase of the downtown parcel needed for a terminal would take away a parking lot and two substantial buildings at Glisan Street and 4th Avenue. Relatively few households and businesses would need to relocate under the no-shoulder (a) option along the Banfield Freeway. However, 50 families could be affected under the plan which include full shoulders (b). Impacts to the Union Pacific Railroad are the same as under Alternative 3b and 3c.

The Burnside extension to Gresham would need few relocations, because the present 80-foot right-of-way is sufficient in most cases. Several parcels of land, mostly unimproved, would be purchased for park-and-ride lots. The eastern terminal would probably be on the old fairgrounds in Gresham, as part of a planned development. Total cost for the Burnside alignment from downtown to Gresham is estimated at \$12 million or more. This includes the \$6 million cost of the Union Pacific relocation.

Alternative 5-2 along Division Street requires a 110-foot right-of-way, where there is now much commercial and residential development. Thus, the number of displacements is much higher; a total of almost 200 households and 60 businesses might have to relocate. Among those displaced would be the East Hill Church in Gresham and a Social Security office. The church already owns a site on which to build a new facility. Most of the businesses affected are fairly small; including restaurants, service

stations, offices, and retail stores. Necessary purchases along Alternative 5-2 could amount to \$33 million.

Option 5-3, the Lents connection, would need only one parcel outside the I-205 right-of-way, in Gateway area. Total displacements would approximate 60 family units and 5 businesses, with a cost of \$13 million or less.

Established procedures would assist anyone displaced by right-of-way purchases: especially information and monetary assistance. Relocation is handled by right-of-way and relocation specialists, and local groups also aid in business relocations. Variations in design can reduce the amount of property needed, especially in critical situations where suitable housing is scarce.

Monetary assistance to those displaced should have a favorable impact on the housing market. In some cases substandard buildings will be removed, upgrading overall living conditions somewhat.

The impacts of right-of-way acquisition for the Banfield Transitway Project range from negligible (Alternatives 1 and 2), to a displacement of nearly 200 family units and over 60 businesses with an estimated cost of \$33 million (Alternative 5-2b). Most of the options within the Banfield corridor will have considerable impact on both sides of the freeway. Relatively few purchases would cause severe relocation problems.

#### 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 47). 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 48).

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 its removal for

## 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.

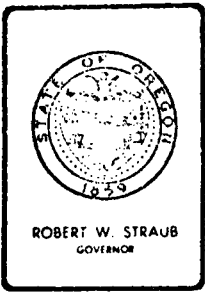
Sincerely,



L. Rudolph Barton  
Urban Design

LRB:ww  
Enclosure

cc: George McMath



*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

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 officials maintaining jurisdiction over the area. 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.

#### Mitigational Measures For Adverse Impacts

The Build alternatives of the Banfield Transitway project are anticipated to create several adverse socio-cultural impacts. Final design of the selected alternative will incorporate positive measures to reduce to the extent possible, many of the adverse 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 goals the form and timing of these effects are beyond the control of this projects. 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 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.

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.

Although right-of-way for this project would not remove any of the officially designated cultural resources, the properties could be affected by increased air pollution and/or noise levels, alteration of aesthetic appearance or a change in traffic patterns, parking and access. Mitigation of many of those impacts are discussed elsewhere in this statement under the appropriate topic. Specific mitigation measures in the historic districts will be required primarily under the LRT Cross-Mall alternative in the downtown. Under this transit mode, every precaution will be taken to protect the integrity and cohesiveness of the historical districts.

Appropriate archeological surveys will be made prior to implementing the selected alternatives.

One of the unfortunate, but unavoidable consequences of a transportation project is the displacement of a comparatively small percentage of the area population. These displacements limit the residential "freedom of choice" for the affected displacees since they are required to relocate. Also, for those persons directly affected by the facility, there is often a prolonged period of uncertainty as to when displacement will occur. It is the policy of the Oregon Department of Transportation that displaced persons should receive fair and human treatment, and should not suffer unnecessarily as a result of such highway improvement programs designed for the benefit of the whole. Property required for the project is purchased at fair market value, and no family or individual is required to vacate any dwelling until adequate replacement housing has been found and offered. Those displacees affected by the project would also be eligible for relocation benefits and assistance. A summary of the procedures for the acquisition of property and the services and benefits of the relocation assistance program is contained in the Right-of-Way Appendix.

#### Relationship Between Short-Term Use Versus Long-Term Productivity

In the short-term, this project would require the acquisition of additional right-of-way causing some displacement of residences, business 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.

#### Irreversible and Irretrievable Commitments of Resources

This transportation improvement would require the conversion of private property to publicly-owned right-of-way. The acquisition amount varies by alternative and subalternative with a minimum of 2.4 acres to a maximum of 7.2 acres. The land acquired would be committed to transportation use, thereby closing the options for other uses of this urban space.

The persons, businesses and non-profit organizations displaced by this project would be required to relocate elsewhere, possibly outside their present neighborhood areas. Their contribution to the local area would be lost.

**CHAPTER FIVE**

**AIR QUALITY**

## CHAPTER FIVE / AIR QUALITY

### Introduction

There are two major parts to the Banfield Transitway Project air quality analysis: collection and analysis of data on ambient air quality; 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 110,000 vehicles per day, application will be made to the Department of Environmental Quality (DEQ) for an Indirect Source Construction Permit in accordance with OAR 20-115(2)(a)(B).

### Air Quality Analysis and Impacts

#### Worst Year Determination

An analysis of carbon monoxide, hydrocarbons and lead was conducted for all study years from the estimated year of completion through the year 2003. It was determined that 1983 would be the year that potential maximum air quality impact would occur.

#### 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.\* 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 Final Environmental Impact Statement and Indirect Source Permit application.

#### Ambient Air Quality

Based on data supplied by DEQ, the Portland area is experiencing violations of the 8-hour average standards for carbon monoxide, photochemical oxidants, and total suspended particulates. The levels of oxides of nitrogen and lead are below standards and no violations are being reported.

#### Total Emission Summary

Predictions of total pollutant emission from motor vehicles for all project alternatives were made using EPA Supplement No. 8 (AP-42) factors for all roadways in the study areas which would experience traffic volume changes under any project alternative. Three study areas were analyzed: 1) central business district, 2) East Portland (link-by-link analysis), and 3) East Multnomah County (link-by-link analysis).

\*Reported in a letter from DEQ dated September 3, 1975; and in subsequent telephone conversations.

The results of the total emissions analysis for the CBD, East Portland and East Multnomah County are shown in Figure 49 and Tables 31 through 33, respectively.

With respect to Regional air quality impacts, all the build alternatives reduce total vehicle miles traveled as compared to the no-build, which is one of the keys to reducing violations of standards and assuring cleaner air for the future.<sup>2</sup>

While modeling of photochemical oxidants for the region was not done, total emissions analysis indicates a possible decrease in oxidant potential by 1990, with a slight reversal of this trend expected in later years with no additional Federal or State control measures. If the control strategy for the entire Portland Metro area results in an equal or greater reduction in formation of secondary pollutants, violations of the ambient air quality standard for oxidant would be eliminated.

#### Transit Vehicle Emissions

Presently the emissions of carbon monoxide and hydrocarbons from diesel-powered vehicles (i.e., buses) are less than one-half those for automobiles. Also, diesel fuel contains no lead, so no emission of lead result from buses. Total oxides of nitrogen is the only pollutant factor substantially higher for buses.

By 1990, there will be little difference in emissions between buses and automobiles, except for nitrogen oxides, when bus emissions will be 10 times as great as those from automobiles.

Transit vehicles powered by electricity eliminate gaseous pollutant emissions except for some insignificant amounts of ozone generated by transmission and

<sup>2</sup>Vehicle miles of travel area 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.

**TABLE 31**  
**BANFIELD TRANSITWAY STUDY**  
**TRANSIT MALL - 102nd AVENUE**  
**TOTAL EMISSIONS**  
**ALL FACILITIES**

PROJECT ALTERNATIVES	STUDY YEAR	CARBON MONOXIDE		HYDROCARBONS		NITROGEN OXIDES	
		TONS/YR	PERCENT	TONS/YR	PERCENT	TONS/YR	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



Percent of 1977 Total Pollutant Emissions

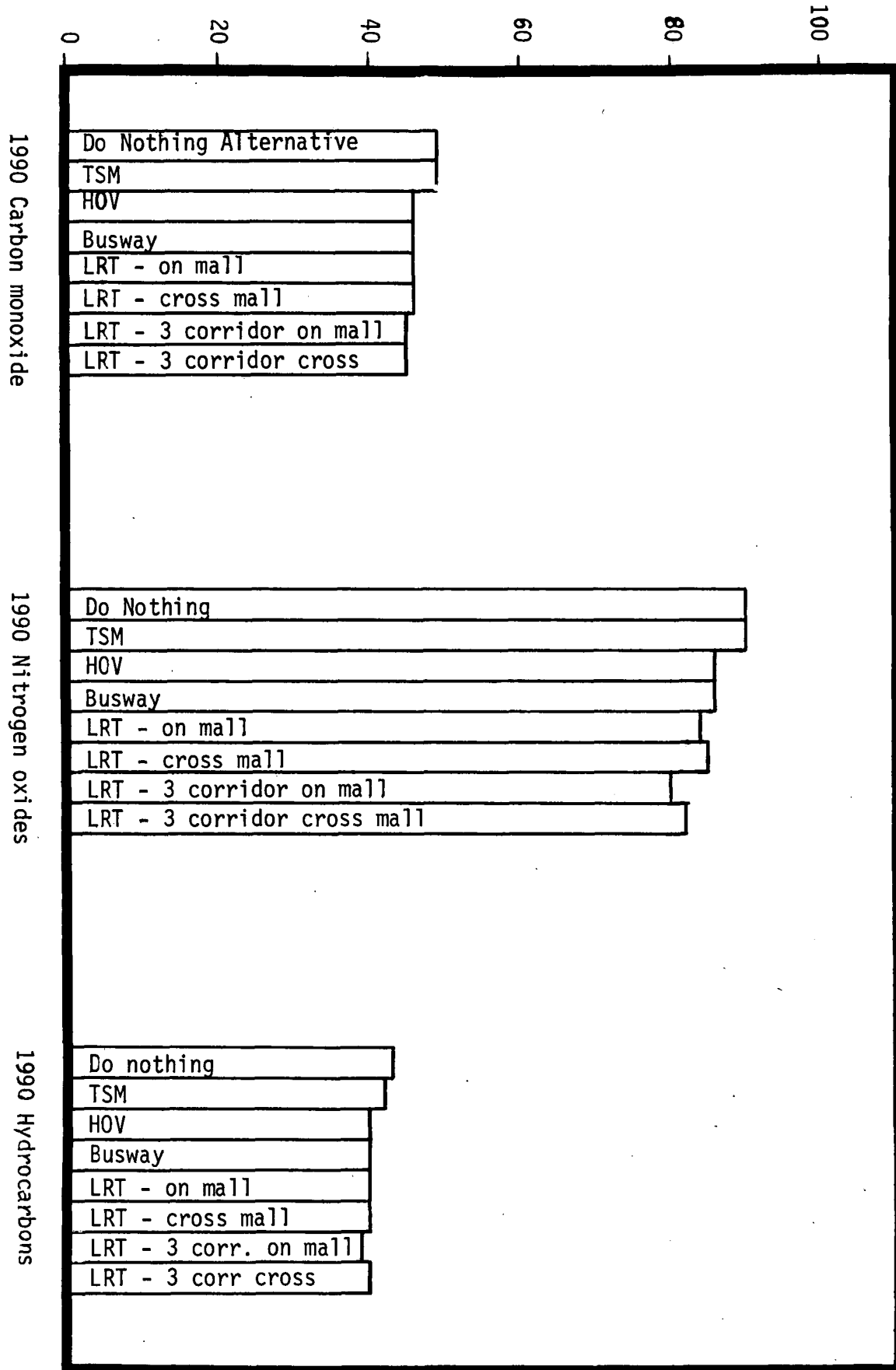


FIGURE 49  
 Banfield Transitway  
 Central Business District  
 1990 Emissions as a Percent  
 of Existing Levels

TABLE 32

 BANFIELD TRANSITWAY STUDY  
 I-205 MAIN ST. (E. MULT)

 TOTAL EMISSIONS  
 ALL FACILITIES

PROJECT ALTERNATIVES	STUDY YEAR	CARBON MONOXIDE		HYDROCARBONS		NITROGEN OXIDES	
		TONS/YR	PERCENT	TONS/YR	PERCENT	TONS/YR	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	128.2
#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 33

## BANFIELD TRANSITWAY STUDY

TOTAL EMISSIONS SUMMARY  
ALL FACILITIES

PROJECT ALTERNATIVES	STUDY YEAR	CARBON MONOXIDE		HYDROCARBONS		NITROGEN OXIDES	
		TONS/YR	PERCENT	TONS/YR	PERCENT	TONS/YR	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

**TABLE 34**

**COMPARISON OF 8-HOUR AVERAGE  
CARBON-MONOXIDE CONCENTRATIONS  
1983**

		PROJECT ALTERNATIVE							
		<u>2A</u>	<u>2B</u>	<u>3A</u>	<u>3B</u>	<u>4</u>	<u>5-1</u>	<u>5-2</u>	<u>5-3</u>
East Portland	<u>Number of Street Segments Impacted</u>								
	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 <sup>1</sup>	3	10	5	13	13	8	10	7
	Maximum Predicted Increase (mg/m <sup>3</sup> ) <sup>2</sup>	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	<u>Number of Street Segments Impacted</u>								
	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 <sup>1</sup>	0	0	0	0	1	3	8	1
	Maximum Predicted Increase (mg/m <sup>3</sup> ) <sup>2</sup>	-----Less than 1 mg/m <sup>3</sup> at 10'-----				2.7	1.0	0.9	0.3
Location of Maximum Impact	-	-	-	-	Halsey	Halsey	Halsey	NE 181st	

<sup>1</sup> Increase in source strength is greater than 20 percent.

<sup>2</sup> 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<sup>3</sup> at right-of-way.

emission from traction motors. Pollutants emitted by the power source (i.e., generating station), have not been considered in this analysis.

#### Local Carbon-Monoxide Concentration

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<sup>3</sup>. 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 AIRPOL4A.<sup>4</sup> 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 34 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

<sup>3</sup>R. M. Wood, Oregon Department of Transportation; COSCAN; 1978.

<sup>4</sup>Wm. A. Carpenter, et. al., Virginia Highway & Transportation Research Council; The Theory and Mathematical Development of AIRPOL-4; February, 1976.

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<sup>5</sup>, the following five criteria were suggested for use in assessing the impacts of individual projects in the Transportation Improvement Program:

- (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

<sup>5</sup>"First Annual Determination of Consistency...", Columbia Region Association of Governments; Portland, Oregon; June, 1975.

levels that presently exist. Concentrations of pollutants at any particular receptor site may vary as a function of altered source-receptor geometry<sup>6</sup> resulting from implementation of any "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 converters and the EPA required phasedown of lead additives in gasoline, lead concentrations will be considerably below the DEQ standard of 3.0 ug/m<sup>3</sup> and should be less than the proposed Federal standard of 1.5 ug/m<sup>3</sup> (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

<sup>6</sup>The relative location of a receptor site with respect to the highway pollutant source, considering height, distance, etc.

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 build 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.

**CHAPTER SIX**

**NATURAL SCIENCES**

## CHAPTER SIX / NATURAL SCIENCES

### Introduction

The Physical Science portion of the Impact Discussion treats the principal areas of Geological, Biological and Water Quality concerns. The Banfield Transitway project, occurring as it does in a largely urbanized portion of the metropolitan region, is devoid of any major physical impacts. The corridors under investigation have been primarily devoted to transportation use for many years. In addition, no large scale physical changes to these existing alignments are anticipated with any of the proposed alternatives.

### Study Areas

Of the four identified study areas, only East Portland and East Multnomah County are considered of especial significance relative to the occurrence of physical impacts. The downtown area, because of its overwhelming commitment to man-made features, has little, if any, natural features left to be impacted. The region, on the other hand, while less urbanized than the other study areas, will be the recipient of very few impacts as a consequence of project construction.

The following discussion of the existing natural system in the metropolitan region is presented in a format which highlights those features by individual study area.

### Existing Setting

#### The Region

The physical attributes of the metropolitan region are characterized by their diversity. The majority of land within the immediate

confines of the project are primarily lowlands of the Willamette and Columbia rivers. These lands are made up of alluvial bottomlands and the somewhat higher, gently rolling, riverine terraces which rise to elevations of 200-400 feet. Numerous isolated hills exist in the East Portland and East Multnomah County area, at elevations of between 400-800 feet. These hills, such as Rocky Butte and Kelly Butte, are composed of sedimentary and volcanic materials, and represent pertinent features of the Portland landscape.

In general terms, the metropolitan area can be separated into two physical sections with the Willamette River serving as a dividing line. To the east of the Willamette River rise the gentle slopes of these riverine terraces. On the west, fronting the alluvial terraces upon which the Central Business District lies, rise the Tualatin Mountains.

Climatologically speaking, the Portland metropolitan area has a reputation for moderate temperatures, moderate to heavy rainfall amounts, and wind patterns dominated by a strong marine influence. Much of the project area, from the Willamette River to the East Portland city limits, experiences average precipitation totals of less than 40 inches per year, while areas near the eastern limits of the project, near Gresham, average greater than 40 inches per year.

Water resources in the metropolitan region are largely dominated by the influence of the Columbia and Willamette rivers. Natural drainage patterns in and through the East Portland-East Multnomah County areas are wholly tributary to these two principle water sources.

With the exception of the Willamette River, there are no major natural drainageways within the project areas. Drainage patterns are generally to the north, although to the west of I-205 water is channeled to the Willamette River via storm sewer systems.

The only clearly defined drainage systems present, are Fairview Creek and Burlingame Creek, which exist in the easternmost portion of the study areas. Fairview Creek flows north into Fairview Lake adjacent to the Columbia River at McGuire Island, while Burlingame Creek flows north into the Sandy River.

In biological terms, the broadly defined region can be classified as "urban" habitat. The existing natural environment has been largely determined by the nature and extent of mans' utilization of the land; not by any inherent physical differences unique to the project areas. However, there does exist a significant difference in the relative degree of urbanization which has, and is, occurring throughout the metropolitan region. This intensity of urbanization generally decreases from west to east, thus creating a difference in the amount and variety of dominant habitat and fauna which occur.

Man is everywhere the ecologically dominant species. The existent pattern of vegetation, soils, water features and fauna are largely the result of his past modification to the local and regional environment.

Habitat types in the regional study area are few. Three principle categories are present: barren lands, grasslands, and trees-shrubs-woodlands. Barren lands are the least valuable. They are defined as those lands which prohibit plant growth. Examples are; lands with buildings, paved surfaces,

or otherwise sterilized surfaces. No food for area wildlife is produced on these lands, and only scavengers are able to exist there.

Grassland habitat includes such common surface features as lawns, weedfields and other broadleaf ground cover. Since seed, for food, is seldom produced from these lands, the value of this type of ground cover is severely limited for wildlife use.

Trees and shrubs are closely intermingled throughout the residential portion of the region, since they are a product of residential landscaping. Indigenous species of trees are a mixture of naturally occurring remnant individuals along with numerous introduced species.

#### The Downtown

The Portland downtown area is intensively urbanized. Little, if any, outstanding physical features are present in the downtown, with the exception of various parkland blocks and the riverfront areas along the Willamette. Though some fauna are present, they are predominantly of the scavenger variety, subsisting largely on the refuse of the urban area. The numerous park blocks offer an aesthetic respite from the dominant urban environment, as well as providing a means of cover for birds.

#### The East Portland Area

Though still intensively urbanized, East Portland is a more varied and diverse area in terms of its physical features. Wildlife habitat and faunal species are available in greater abundance and number than in the downtown, although they are transitional between the urban environment of the CBD and the less urbanized East County area. Woodland, shrub and grass habitat occur in relatively small units. Trees are a mixture of both native and introduced species.

The most significant topographic feature in the East Portland study area is the natural drainage depression known as Sullivan Gulch. Covering a distance of nearly 7 miles from near Rocky Butte to the Willamette River, the Gulch crosses the extensive terraces of northeast Portland in a sinuous fashion. With an average width of approximately 160 feet at the bottom and approximately 300 feet at the top, this depression attains a maximum depth of nearly 60 feet near the northeast 16th Avenue on-ramp to the Banfield Freeway. With an overall gradient of just under 1%, Sullivan Gulch rises some 200 feet from its western extremity eastward to the I-205 alignment.

Geologically, the Gulch is composed of a widespread veneer of gravel, sand, silt and clays. No geologic hazards are apparent in these deposits. Evidence available from well logs in the project vicinity indicate that the regional water table currently lies well below the anticipated transitway construction zone. Some ponded water has been observed at various locations along the Union Pacific Railroad which parallels the Banfield Freeway on the north. Long sections of the Gulch adjacent to the railroad have no drainage facilities because of the permeable soils. What ponding that does occur appears to be the result of localized hardpan soil conditions.

Drainage of the Banfield Freeway itself is carried to the Willamette River through a storm sewer located in the center of the facility. This runoff outfalls via a 24-inch sewer line beneath the Burnside Bridge, and maintains a capacity of 27 cubic feet per second (cfs).

Since the volume of the Willamette in this reach approximates over 1000,000 cfs, the minor outfall from the Banfield runoff contributes very little to the rivers total.



For the most part, the soils which underlie the project area are composed of silty sands and sandy silt, mixed with gravels and minor amounts of clay. These are well drained and have a moderate permeability. The gravel and sand are predominant in the eastern portion, while sand predominates in the western part.

Though minor erosion has been observed at various points along the alignment in the Banfield corridor, the soils are generally considered to be of low erodability. Slopes along the freeway and the Union Pacific Railroad are stable, even though steep ratios of 1-1/2:1 or even 1:1 in evidence.

#### East County

The topography in the East County study area is composed of a generally flat to generally rolling surface. Soils consist of clayey, silty sands mixed with some gravels. Some evidence of gullying was observed along the Portland Traction Company roadbed in the vicinity of 212th Avenue, though nowhere are these problems serious.

Natural drainageways which traverse this study area are Fairview Creek and Burlingame Creek. Fairview Creek, which occurs along the east end of the Burnside corridor, discharges into Fairview Lake near the Columbia River. Several warm water fish species are present in this lake. Some fish are known to make their way up the creek within the project area. State Department of Environmental Quality (DEQ) measurements in 1973 indicated that the creek maintained suitable conditions for fish habitation. In recent years, however, increases in turbidity and slightly elevated phosphate levels make the creek less favorable as a fish habitat. The Division Street alignment crosses Fairview Creek two-thirds of a mile upstream of the Burnside

corridor. It is an intermittent stream through this section, passing under Division Street in a 175-foot culvert.

The Burlingame Creek drainage, near 1st Street and Burnside Road in Gresham, has undergone a great degree of modification as development in the area has increased. Much of the creek is in culvert in the project vicinity, with no open channel present in any of the corridors under consideration.

In biological terms, the East County region represents the most productive habitat of any of the study areas. The area is the least urbanized of the study areas through which the proposed alignments would cross. Specific habitat units, while more complex in a physical or biological sense, are larger and more clearly defined here.

Fauna present in the area are also more diverse, but less tolerant of change.

### Impacts

The anticipated impacts to the physical system attributable to the transitway project are discussed in this section. The format utilized attempts to arrange each major subject category separately (i.e., Geology, Water Quality and Biology) and identify impacts first by the individual alternative, and then by specific study areas. Where no known topical impact is believed to occur under a given alternative, or in a given study area, no heading is presented in the discussion.

Each of the major subject categories presented in Volume I is further treated in Volume II - Technical Report, under topical headings devoted to that specific category.

Geological Impacts

No major geologic impacts of any magnitude are expected to occur anywhere throughout the extent of the project. This includes the absence of geologic hazards, ground water problems and slide areas. A potential exists for some minor soil erosion impact in areas where large amounts of earth will be disturbed as a result of project construction. The amount of slope area subject to possible erosion ranges from 2.71 acres in Alternative 3a (HOV) to 8.43 acres under Alternative 5a (LRT). Proper erosion control methods, to be implemented during project construction, should mitigate any major problems. This includes a contingency fund in the contract to pay for unforeseen conditions.

Estimated rock quantities required for the various alternatives are given in tables 35 and 36. Mitigation of excavation and embankment impacts consists primarily of reclamation efforts to the quarry and pit sites, as required by law.

TABLE 35  
ROCK QUANTITIES\*

Alternatives	Excavation (cu.yds.)	Embankment (cu.yds.)	Surplus (cu.yds.)	Aggregate (tons)*
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	72,200	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

\* In Banfield Freeway Corridor only.

TABLE 36

L.R.T. (Alternative 5): East Multnomah County

Rock	96th Av. to 181st Av.	181st Av. to Stark St.	Total
Excavation	111,500 c.y.	2,700 c.y.	114,200 c.y.
Base	97,400 tons	2,500 tons	99,900 tons
Asphaltic Concrete	25,700 tons	2,000 tons	27,700 tons

Excavated areas present an immediate short-term erosion impact that will be succeeded by long-term cover. Permanent commitments of resources are those rock quantities utilized in the construction of the facility. Land used for actual construction represents a permanent loss of ground recharge area, if paved.

Water Quality Impacts

General impacts which apply to all of the build alternatives center on the operational air pollutant emissions which settle to the ground and are subsequently worked into surface waters and storm sewers. Some minor impacts will be felt in the Willamette, Columbia and Sandy rivers and their tributaries from these air pollutants, though the combined effect is minimal.

An additional operational impact resulting from all of the build alternatives is the alteration of the hydrologic character of the urban watershed over a period of time. As impermeable surfaces are increased in the project study areas, an overall change in the surface water to ground water recharge ratio will occur. Volumes of water which would have percolated into the ground will be diverted to surface drainages,

thus representing a net loss to ground water reserves. As a further consequence, high water and flood heights can become altered, especially in smaller streams. Lower ground-water recharge rates can reduce dilution of near-surface contaminants as well as reduce septic tank and well use.

LCI. The Low Cost Improvement option (Alternatives 2a-b) will entail minor increases in pavement area. Hydrologic consequences will therefore be small, having minimal effect in the Willamette River. Storm sewer effluents will conceivably carry a higher load of settled air pollutants as a result of projected traffic increases. Although the effects of this increase on existing aquatic life in the Portland Harbor are not immediately observable, such discharges present a cumulative water quality problem. Toxic trace metals, though not present in lethal quantities, can present a low level, chronic, stress on the ground and reproductive functions of aquatic organisms in the river.

HOV. Additional pavement surfaces under the various HOV alternative (ranging from 2.3 to 27.6 acres) will generate larger quantities of surface runoff, traveling by storm sewers, to the Willamette River. New pavement under Alternatives 3a and 3b (20.9 and 27.6 acres respectively) will necessitate the construction of a new 39-inch storm sewer in the Banfield Freeway. This sewer, with a 60 cfs capacity, will be built along the north side of the new facility and will outfall into the Willamette River north of the Burnside Bridge. Fishery resources in the river will not be significantly affected by the increased effluent. Hydrologic consequences of diverting this water from the ground water supply will be of minor but probably measurable, significance.

As with the LCI alternatives, less dilution of existing pollutants in the ground water table will occur.

Separated Busway (Alternatives 4a and 4b). Approximately 25.3 acres of new pavement will be required under the busway alternative. Specific impacts are nearly identical to those under Alternatives 3b and 3c.

L.R.T. (5-1, 5-2, 5-3). Construction on the Burnside alignment (5-1) would result in minor degradation of fish habitat and general water quality conditions in Fairview Creek. These impacts are considered small and of a temporary nature. A more significant concern is the flood plain encroachment on Fairview Creek. This would occur only if a proposed maintenance and storage area is constructed; actual encroachment would be approximately 10.8 acres. The proposed park and ride station, to be built between 160th and 162nd Avenues, would obstruct or divert overflow waters which currently flow down a shallow draw during periods of high rainfall. Proper mitigative measures, designed to handle this flow, will largely alleviate this potential impact.

Flood plain encroachment on Fairview Creek of approximately 1.5 acres would also occur in the Division Street corridor (Alternative 5-2). This is a result of a proposed park and ride station just north of the Fairview Creek crossing. Mitigative measures, as described above, will be built on this alignment as well.

#### Biological Impacts

Impacts of a strictly biological nature are relatively small when compared to the size and extent of project construction. No major impacts have been identified. The two most important effects on the areas biological

resources are a potential loss of habitat, and a loss of plant growth productivity. These two effects combine to cause a net reduction in area faunal production.

Loss of habitat occurs when conditions change so that individual species can no longer survive. A particular loss of habitat, though small, can result in decreased number of wildlife in a given area. Competition for food, nests, and other necessary resources reduces the number within a species to a new sustainable density.

The impact of habitat loss is a minor one, ranging from 1.8 acres under the LCI (Alternative 2), to a maximum of 45 acres under the LRT-Burnside alignment (Alternative 5-1b). Specific amounts of habitat loss are estimated in table 37.

TABLE 37

HABITAT LOSS IN ACRES

<u>Alternative</u>	<u>East Portland</u>	<u>East County</u>	<u>Totals</u>
1	0	0	0
2a	1.8	0	1.8
2b	1.8	0	1.8
3a	1.8	0	1.8
3b	7.5	0	7.5
3c	11.2	0	11.2
4a	7.6	0	7.6
4b	7.6	0	7.6
5-1a	6.0	31.3	37.3
5-2a	6.0	26.7	32.7
5-3a	6.0	23.4	29.4
5-1b	6.0	39.0	45.0
5-2b	6.0	34.3	40.3
5-3b	6.0	31.1	37.1

Net primary production losses occur under all of the build alternatives, where some land which presently supports plant life is converted into land which will not support plant life. This production potential is defined as that quantity of energy which is annually stored in new plant growth. This conversion is considered to be a long-term, irreversible impact, though not of major significance.

A more complete analysis of the impacts on the physical system as a result of the anticipated transitway project construction can be found in Volume II under the respective headings of geology, water quality, and biologic resources.

Based on a field reconnaissance there were no wetlands identified in conjunction with the proposed alternatives. A re-evaluation will be made prior to final design of the selected alternative.



**CHAPTER SEVEN**

**ENERGY**

## CHAPTER SEVEN / ENERGY

### Introduction

Energy use in transportation is primarily for vehicle propulsion. The principal source of supply is oil used for the refinement of gasoline and diesel fuel. The projected high cost of fuel and the uncertainty regarding its future availability combine to make fuel consumption, from an operation's standpoint, a major transportation issue. This chapter evaluates the affects of the proposed project alternatives in terms of their energy consumption impacts.

The Columbia Region Association of Governments (CRAG) has made several policy statements supportive of more efficient regional energy use. These include the following objectives:

- 1) "that the transportation system will use each available mode of travel as appropriate for efficiency and energy conservation." (Interim Transportation Plan, 1975.)
- 2) "that the development of energy-consuming activities shall minimize the use of nonrenewable resources and encourage the use of energy from renewable energy sources, based on sound economic principles." (Goals and Objectives, 1976.)
- 3) "that plans for the construction or improvement of major transportation facilities shall identify the positive and negative impacts of such facilities on energy use and resources." (Goals and Objectives, 1976.)

### Existing Transportation Energy Use

In August 1976 a CRAG study was released addressing critical energy issues in the CRAG region. The transport element of this report summarized the current situation in the region. "The region's transportation system is totally petroleum dependent, with patterns of urban sprawl constraining reductions in private car use or shifts to other transit forms powered by alternative fuels. The region has experienced a significant rate of increase in private vehicle petroleum consumption, in excess of increases in the number of cars in use."

In 1970, 572,000 pickups and autos were registered in the region, which consumed 331 million gallons of gasoline. By 1974, 645,000 vehicles were consuming 393 million gallons. In the same period, transit ridership increased from 16.6 million passenger trips to 24 million passenger trips. Although by 1974 this was only about 4% of the regional travel, it represented a saving of over 3 million gallons of fuel, compared to the same trips being made by auto. In terms of efficiency, in 1975 autos required an average of 5,900 British thermal units (BTU) per passenger mile, while Tri-Met busses required an average of 3,700 BTU per passenger mile. During peak periods, bus efficiency was several times greater. Improving the average bus occupancy from its present figure of 7 passengers offers scope for substantially increasing bus efficiency.

### Alternative Transportation Futures

A series of transportation alternatives were developed to analyze both the Banfield corridor and the broader regional alternatives, in terms of vehicle miles traveled (VMT) for both autos and transit vehicles in 1990. For the CRAG (four county) region, data was developed for the following alternatives:

- o No-build
- o Low cost improvements
- o 3-corridor busway system
- o 3-corridor LRT system
- o 2-corridor busway system, with LRT in the Banfield corridor.

Table 38 summarizes the estimated transit and auto VMT for 1990 and derives fuel requirements. It should be noted that auto fuel efficiency is expected to improve from 13.81 miles per gallon average in 1975 to 22.09 miles per gallon in 1990 in accordance with the current federal vehicle efficiency laws. Bus fuel consumption will stay unchanged, with any reduction due to express running being balanced by increases due to noise reduction measures, as well as additional stops due to increased ridership and traffic congestion in some locations.

From this table it can be seen that fuel for autos does, and will continue to dominate transportation energy consumption in the region and is projected to increase between 12% and 15% by 1990. One major conservation measure, increasing auto gas mileage, is already mandated and is unlikely to be further reinforced within the 12-year time horizon. This measure will save some 277 million gallons of gas annually in 1990 in the CRAG region. In addition, transit use would save up to a further 10 million gallons; the use of LRT on three corridors would save an additional 2.7 million gallons, by substituting electrical power not derived from oil.

In the Banfield corridor, energy requirements for each of the corridor alternatives were developed (as shown in Table 39). The total energy requirements estimate varies only 6% between the alternatives. Again, auto use dominates the fuel consumption picture, but because the increase in VMT is less than in the region as a whole, improvements in auto mileage per gallon result in a fall in fuel needs in the East Side by 1990 (with a projected savings of about 22 million

TABLE 38

## ESTIMATED 1990 PASSENGERS TRANSPORT ENERGY REQUIREMENTS IN THE CRAG REGION

<u>Alternative</u>	<u>VMT (million)</u>	<u>Bus Miles (million)</u>	<u>LRV Miles million</u>	<u>Fuel million gallons</u>	<u>Power million kwh</u>	<u>Transit Energy billion Btu</u>	<u>Total Energy billion Btu</u>
Existing (1974)	5,404	14.5	- -	396	- -	471	50,292
No Build	10,003	19.8	- -	459	- -	643	58,293
Low Cost Improvements	9,601	38.3	- -	444	- -	1245	56,388
3-Corridor Busway	9,606	45.0	- -	446	- -	1463	56,642
3-Corridor LRT	9,667	34.3	2.8	446	28.3	1211	56,739
2-Corridor Busway) 1-Corridor LRT )	9,621	42.0	1.06	446	10.7	1401	56,679

Note: Average auto feet fuel consumption assumed 22.09 mpg in 1990.  
Average bus consumption 4 mpg.  
LRV assumed Type B car.  
1 gallon of fuel has a heat equivalent of 127,000 Btu.  
1 gallon of diesel has a heat equivalent of 130,000 Btu.  
1 kwh has a heat equivalent of 3413 Btu.

TABLE 39

## ESTIMATED 1990 PASSENGER TRANSPORT ENERGY REQUIREMENTS IN THE BANFIELD CORRIDOR

Alternative	Annual Auto VMT (million)(1)	Annual Bus VMT (million)	Annual LRT VMT (million)	Auto Fuel thousand gal.(2)	Bus Fuel thousand gal.(3)	Total Fuel thousand gal.	LRT Power million KWH	Total Energy BTUs x 10 <sup>9</sup> (5)
Existing (1975)	669	5.8	- -	48,443	1,450	49,893	- -	6,336
1 No Build	887	7.3	- -	49,957 <sup>(4)</sup>	1,820	42,777	- -	5,433
2a Low Cost Impr.	848	9.8	- -	38,388	2,450	40,838	- -	5,186
2b Low Cost and widen Banfield	848	9.8	- -	38,388	2,450	40,838	- -	5,186
3a Extend HOV	849	11.0	- -	38,434	2,750	41,184	- -	5,230
3b,c Extend HOV and widen Banfield	851	11.0	- -	38,524	2,750	41,274	- -	5,242
4a,b Busway and widen Banfield	853	12.6	- -	38,615	3,150	41,765	- -	5,304
5-1 Burnside LRT	835	7.7	1.0	37,800	1,920	39,720	10.7	5,081
5-2 Division LRT	847	7.8	1.1	38,343	1,950	40,293	11.3	5,156
5-3 I-204 LRT	874	7.7	0.7	39,565	1,920	41,485	7.0	5,292

(1) Annual Auto VMT = Annual VMT less annual truck VMT.

(2) Average Auto Fleet - 13.81 mpg in 1975. 22.09 mpg in 1990.

(3) Average Bus mpg - 4.

(4) 2% added to auto fuel in "No Build" for congestion.

(5) 1 gallon fuel has a heat equivalent of 127,000 BTU. 1kwh - 3,413 BTU.

gallons annually in the corridor). Transit use will save up to a further 4.5 million gallons (compared to all trips by auto) and LRT would save a further 1.2 million gallons annually.

#### Fuel Saving Considerations

While improvements in auto fuel consumption offer an initial dramatic saving, it cannot be greatly accelerated (since it is related to the auto fleet replacement rate), nor can further savings of comparable magnitude be expected beyond 1990. Fuel savings beyond 1990 must therefore come from reductions in auto-trip making and greater use of public transit.

This situation occurred briefly in the period 1973/74, as a result of the Arab oil embargo. In the event that fuel rationing becomes necessary in the future, the availability of transit for certain types of trips in the region will preserve for many the freedom of choice between using fuel for trips for which a transport alternative exists or for trips for which no alternative mode exists.

#### Comparison of Transit Vehicle Energy Needs

The energy requirements of all vehicles are a function, primarily, of efficiency, weight, speed and frequency of stops. Efficiency and weight are vehicle characteristics. Speed and stop frequency are system characteristics.

The standard 40-foot bus, as used on Tri-Met, produces about 4 miles to the gallon, systemwide. It has a nominal capacity of 50, a crush capacity of 70. Express operation reduces stop frequency and enhances fuel efficiency. However, increased top speed between stops reduces fuel efficiency. It is unlikely that bus fuel consumption would improve beyond 5 mpg for those runs using a transitway with limited stops. There are no technical changes that are likely to improve bus performance significantly.

The initial LRT analysis in the Banfield corridor was based on the Duwag Type B car, estimated to require an average of about 10 kwh of power per mile on the Banfield alternatives. This car has a design capacity of 183 and a crush capacity of 222.

The energy requirements for the alternate vehicles are compared, with each other and with automobiles, in terms of passenger capacity, in Table 40.

This table illustrates the comparative efficiency of autos, buses and LRT vehicles under various levels of occupancy. It can be seen that a Light Rail Vehicle is potentially some two and a half times as efficient as a 40-foot bus, measured in terms of BTU per passenger mile at 50% of nominal capacity. LRT vehicle average occupancy is expected to exceed 80 passengers by 1990.

#### Total Energy Concepts

Although propulsion energy is by far the largest aspect of transportation energy use, other aspects, particularly energy required for construction, are also considerations. As a general rule, construction energy should be roughly proportioned to construction cost. The elements of the project construction energy can be estimated approximately for the Banfield alternatives, using unit rates for highway lanes, structures and track construction. Inevitably, lack of accurate unit rates for construction energy limits the accuracy of such an analysis.



TABLE 40

## COMPARISON OF TRANSIT VEHICLE ENERGY NEEDS

	<u>Average 1975 Auto</u>	<u>Average 1990 Auto</u>	<u>40-Foot Bus Systemwide Average</u>	<u>40-Foot Bus on Transitway part trip</u>	<u>LRT Duwag B Car</u>	<u>LRT Boeing Car</u>
Energy Consumption	13.81 mpg	22.09 mpg	4 mpg	5 mpg	10 kwh/mi.	8 kwh/mi.
Energy Equivalent Btu/vehicle mile	9,124	5,704	32,300	26,000	34,130	27,304
Nominal Capacity	1.3	1.5	50	50	183	148
Crush Capacity	6	4	70	70	222	170
Btu/unit capacity mi. (nominal capacity)	7,018	3,803	650	520	187	184
Btu/unit capacity mi. (crush capacity)	1,521	1,426	464	371	154	161
Btu/passenger mi. at 50% nom.capacity*	n/a	n/a	1,300	1,040	374	296

Note: Diesel equivalent = 13,000 Btu/gallon  
 1 kwh = 3,413 Btu  
 Gas equivalent = 126,000 Btu/gallon

\*Since the characteristics of a transit system make it difficult to operate at above 50% capacity, and since peak service is designed around nominal capacity, Btu per passenger mile at 50% capacity is the most relevant comparison.

TABLE 41  
CONSTRUCTION ENERGY ESTIMATE

Alternative	Construction Element	Total Energy Billion BTU
3 HOV Lanes	Structures: 16 @ 130 billion BTU ea.	2777
	Lane miles: 41 @ 17 " " "	
4 Busway	Structures: 17 @ 130 " " "	2907
	Lane miles: 41 @ 17 " " "	
5a LRT/Burnside	Structures: 12 @ 130 " " "	2459
	Lane miles: 31 @ 17 " " "	
	Track miles: 31 @ 12 " " "	
5b LRT/Division	Structures: 12 @ 130 " " "	2411
	Lane miles: 31 @ 17 " " "	
	Track miles: 22 @ 12 " " "	

Note: Average energy/structure 130 billion (6 lanes)  
 Average energy/lane mile 17 billion  
 Average energy/track mile 12 billion

Source: Deleuw, Cather and Company "Indirect Energy Consumption for Transportation Projects."

The simple analysis summarized in Table 41 indicates the relative order of magnitude of the Banfield alternates. Of necessity, the minor elements, such as low cost improvements, bus pull-outs, yards, and LRT stops cannot be readily evaluated, but are assumed not to vary significantly between modes. It can be deduced that reconstructing the Banfield Freeway is the major energy consuming activity, primarily because of the relatively high energy requirements for bridge construction.

## Conclusions

Transportation now uses 40% of the total energy consumed in Oregon. All of this is derived from petroleum. 70% of the state's petroleum is used for transportation.

The energy use pattern in the corridor is dominated by auto demand, which has been estimated on the assumption that fuel will continue to be freely available. Improving vehicle fuel economy is already mandated, and will lead to savings of over 22 million gallons annually in the corridor. Transit use will save 4.5 million gallons. At some point, a reduction in fuel consumption could likely be mandated by considerations exterior to this region, leading to reduced auto trips and increased transit use. Many area residents may find they will be faced with a choice of using fuel available to them for work trips, or saving it for other pursuits.

The use of electricity to power LRT in the Banfield Corridor will replace about 1.25 million gallons of oil annually. Perhaps more significantly, the LRT system will use a largely renewable energy source susceptible to local control, and will, therefore, be the only alternative to further the national goal of reduced-dependency on foreign oil. Nevertheless, the feeder bus systems which are integral to the transit efficiency of a light rail system, will leave the LRT system tied to the availability of petroleum fuel supplies.

CHAPTER EIGHT

NOISE

## CHAPTER EIGHT / NOISE

### Introduction

The noise descriptor  $L_{10}$  indicates the level of sound exceeded 10 percent of the time. This descriptor will be used throughout this report; unreferenced dBA readings are  $L_{10}$  levels. The numerical value associated with a standard level is the dBA. The "dB" portion indicates decibel which is a logarithm of the ratio of the sound intensity to a minimal reference level. The "A" portion indicates sound filtered to approximately the human ear's response to sound.

The human ear usually will not detect a sound level change of less than 3 dBA, therefore, a change of 5 dBA is usually required before a noticeable difference is experienced. Changes between 0 and 5 dBA are considered slight, between 6 and 10 dBA moderate, and in excess of 10 dBA severe.

The Federal Highway Administration (FHWA) has determined a level of 70 dBA to be the design noise level for residential areas and 75 dBA to be the design level for commercial/industrial areas.

Existing noise was measured at numerous locations in the project study areas and noise levels have been predicted for the year 1990 for city streets and 2000 for the federal highway system by use of computer models. Existing and future noise levels, and predicted impacts are outlined in this chapter and discussed in detail in the Noise Research Report in Volume II of this EIS.

### Noise Analysis Techniques

The noise analysis for the Banfield Transitway project employs two different techniques. The usual technique for analyzing existing and future noise levels is that found in NCHRP 117/144. Noise levels are measured at a number of locations

to determine the general ambient levels caused by traffic. Traffic is counted by vehicle type during the measurement period and unusual noise sources identified and recorded. This data is reduced in the laboratory and reconciled to average, worst case traffic conditions determined by long-term traffic data.

Future traffic noise levels are estimated through computer prediction models which utilize the present and projected traffic level, speeds and composition, along with data on present noise levels, roadway configuration and topography as input data. The output of these models are future noise levels for a series of discrete points and represent the total traffic induced noise for a given location.

The second technique used in this project is necessitated by the complexity of the downtown environment. Downtown Portland has many high-rise buildings with dissimilar surfaces and acoustical properties--some reflective, others absorptive. The traffic speeds, volumes and composition vary significantly from street to street. On-street parking exists in many blocks. All of these variables prevent the accurate calculation of general downtown ambient noise levels. Moreover, fluctuations occurring on a short-term basis, plus the wide variation in day and night levels, leave the usual statistical noise descriptors inadequate and misleading for describing the downtown noise environment.

Rather than attempting a prediction of a specific noise level for the downtown based on highly generalized ambient levels, a technique was developed to show the change in noise levels produced by the various project alternatives. The actual existing noise produced by differing types and numbers of transit vehicles was calculated for each of six downtown locations, without regard for background levels caused by other sources. The future numbers and types of transit vehicles under the different alternatives were obtained for each of these locations and the future year

transit induced noise was calculated. The difference between the existing and future noise levels is the impact of the given alternative at the specific reference location. This results in comparative data for use in weighing the noise impact of the various alternatives. It does not specify future ambient noise levels in downtown Portland.

### Study Areas

The Banfield Transitway project is divided into three study areas: (1) Downtown, (2) East Portland (Willamette River to I-205), and (3) East Multnomah County (I-205 to Gresham).

#### Downtown

Downtown urban noise is generally characterized by high, widely fluctuating levels. The major source of this noise is auto, truck and bus traffic, but, other sources 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. Major noise fluctuations are due largely to the speed, volume and composition of traffic. Random activities such as street repair, construction and the business routine do, however, contribute significantly to the downtown ambient noise level.

The noise second measurement technique described in the Introduction is utilized in the downtown study area.

#### East Portland

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.

### East County

The East County study area extends from I-205 to the 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.

The noise environment in this area differs from the previous two in that the downtown noise is absent and most highway noise such as in East Portland is also absent. Noise analysis was made for the East County LRT by using the same methods as described in East Portland.

### Existing Conditions

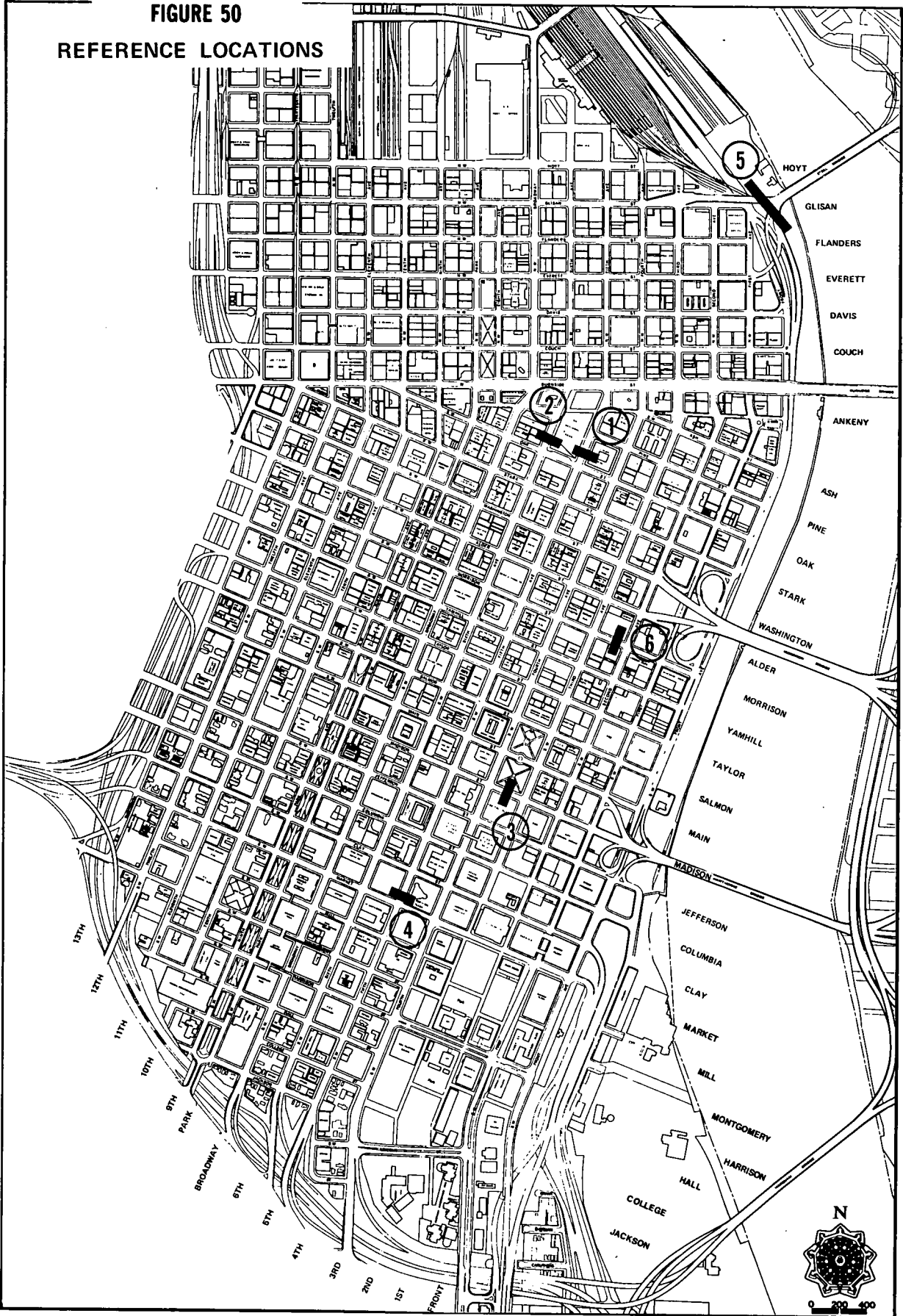
#### Downtown

Noise data was gathered and analyzed for six downtown reference sites, shown in Figure 50. The sites were selected on the basis of their proximity to routes of, or locations affected by, the various project alternatives. The site data is 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.

Numerous studies have been made to determine the existing ambient noise environment in the downtown (CBD) area. As a result of studies made prior to opening



**FIGURE 50**  
**REFERENCE LOCATIONS**



of the downtown Mall, a range of noise levels from 68 dBA to 82 dBA has been established. From these studies, 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 then, is based on noise generated by the transit vehicles as a contribution to the average 78 dBA worst case ambient. 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 transit noise, not the total ambient.

### East Portland

To establish the existing noise conditions, actual noise measurements were taken at 41 locations along the Banfield corridor. 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 was utilized along with calculated peak-hour traffic.

The measured 1975 noise levels along the freeway range from 55 to 77 dBA. The calculated worst-case levels range from 63 to 80 dBA.

In order to determine 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. 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 within the study area. This value for 1975 indicates a penetrating distance ranging from 90 feet to 320 feet away from the roadway for a number of sites.

Noise measurements were also made at 14 locations along the LCI alternative routes. The calculated worst noise hour levels ranged from levels as low as 62 dBA in low traffic residential areas to 75 dBA along the major LCI arterials.

### East County

Noise measurements in East County were made on the three proposed LRT routes. Burnside alignment noise measurements were taken on the proposed route at eleven locations. Levels obtained varied from 54 to 71 dBA. The 54 dBA level was along the Traction Lines and the 71 dBA was roughly 30 feet from Burnside. Division Street alignment noise level measurement sites were selected at eight locations representative of the area. Noise levels measured range from 69 to 79 dBA. The Lents area

alignment (along I-205 facility) noise levels will not change as a result of the Banfield Transitway project. A discussion of levels can be found in the I-205 EIS.

Projected Noise Levels and Mitigation

Downtown

Using the criteria assessing only the effects 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 below:

TRANSIT ALTERNATIVES	REFERENCE SITE NUMBER					
	#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

\*LRT vehicles only.

EXISTING 1977 TRANSIT SYSTEM	74	70	66	69	66	68
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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. The light rail cross-mall system (3 corridor) offers the better

noise environment, a general area reduction of approximately 1 dBA with significant spot reductions. The LRT alternatives 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 used to mitigate interior noise impacts in public or institutional buildings.

East Portland

Future noise level projects (Year 2000) were made for each of the alternatives. The results are shown in Table 42 below.

TABLE 42  
FUTURE NOISE LEVEL PROJECTIONS

<u>Alternatives</u>	<u>2000 Projected Noise Level Range</u>	<u>2000 Average Difference from 1975</u>	<u>2000 L<sub>10</sub>70 dBA Distance from Road Range</u>	<u>2000 Average Difference from Road in 1975</u>
#1 No-Build	62-82 dBA	+2 dBA	200-360 ft.	+50 ft.
#2a LCI	62-82 dBA	+2 dBA	200-360 ft.	+50 ft.
#2b LCI (W. 39th St.)	62-82 dBA	+2 dBA	200-360 ft.	+50 ft.
(E. 37th St.)	68-80 dBA	+1-2 dBA	110-360 ft.	+50 ft.
#3a HOV	65-83 dBA	+1-2 dBA	110-450 ft.	+48 ft.
#3b, 3c HOV	68-82 dBA	+1-6 dBA	110-410 ft.	+35 ft.
#4a Busway		+1-7 dBA	130-450 ft.	
#4b Busway	68-82 dBA	+3 dBA	130-420 ft.	
#5-1, 2, a, b, & c, LRT	68-82 dBA	+2 dBA	110-360 ft.	

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 provided along the Banfield Freeway where technically and economically practicable. Table 10 and Figure N-5 of the Noise Research Report in Volume Two illustrate by alternative areas where mitigation through noise barrier (berms, walls and berm-wall combinations) construction may be desirable and feasible. The critical public and institutional receptors 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.

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.

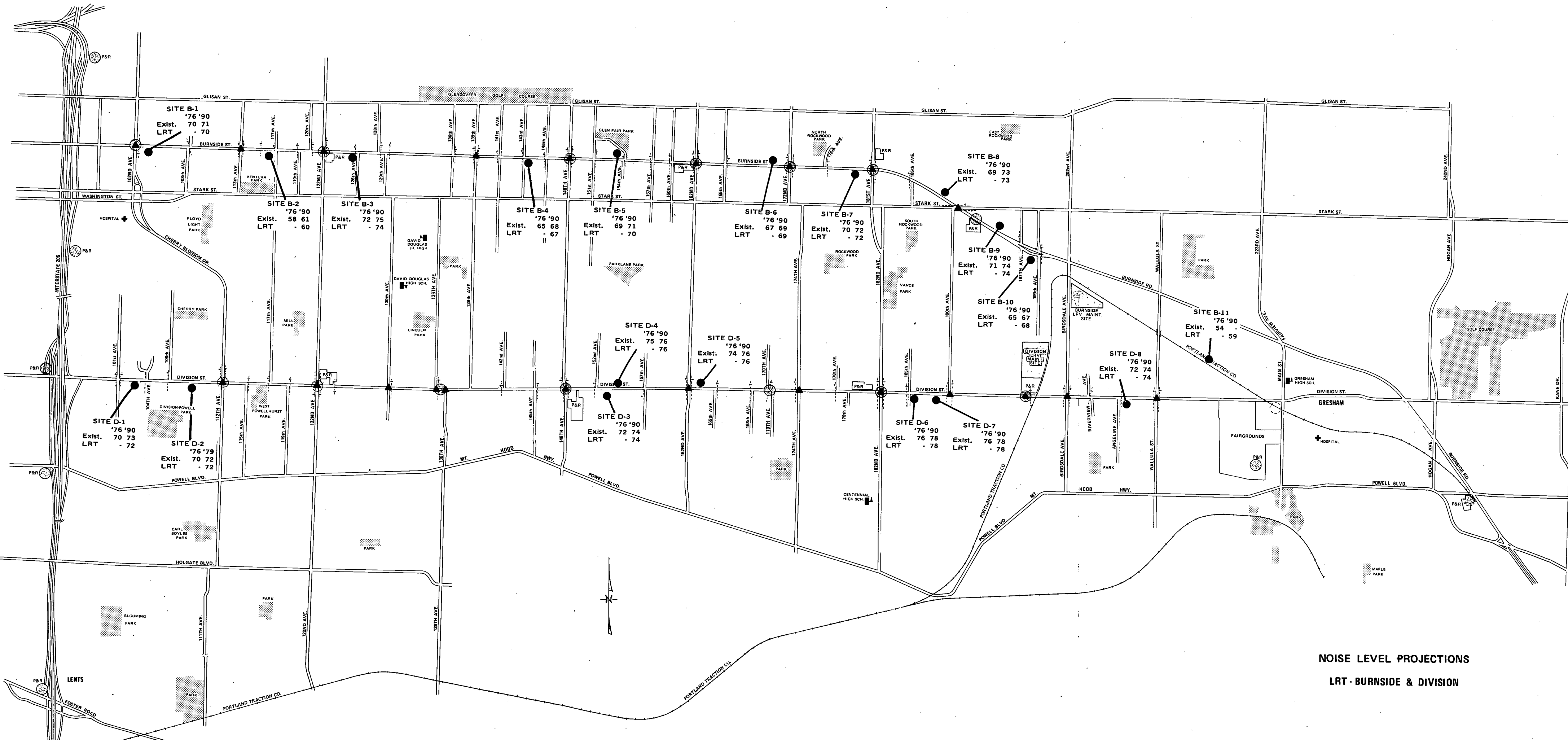
The local neighborhood streets are generally below the 70 dBA level. No-build growth will raise the existing noise environment 2 dBA by 1990, but will still remain below the 70 dBA level. Should the LCI be selected, all receptors along these streets will be impacted. At some isolated locations increases of up to 16 dBA will be experienced. 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 and the street environment. 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 would result in an acceptable noise environment with extensive mitigation.

#### East County

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 projected levels are shown in Figure 51.

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.

On-site noise measurements were taken on the proposed route at eleven locations. Levels varied from 54 to 71 dBA. The low levels were found along the Traction Lines and the 71 level about 30 feet from Burnside.



NOISE LEVEL PROJECTIONS  
LRT - BURNSIDE & DIVISION



Noise levels for the existing facility, projected to 1990 with increased traffic, showed noise increases of 1 to 2 dBA. Along the Traction Line there is no traffic related noise increase.

Noise from Burnside with an LRT system indicates, likewise, a 1 to 2 dBA increase over the existing noise condition. This results primarily from the increased traffic use of 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 major intersections. Three schools are also located along this route.

Measurements representative of the ambient noise of the area were taken at eight locations. Levels ranged from 69 to 79 dBA.

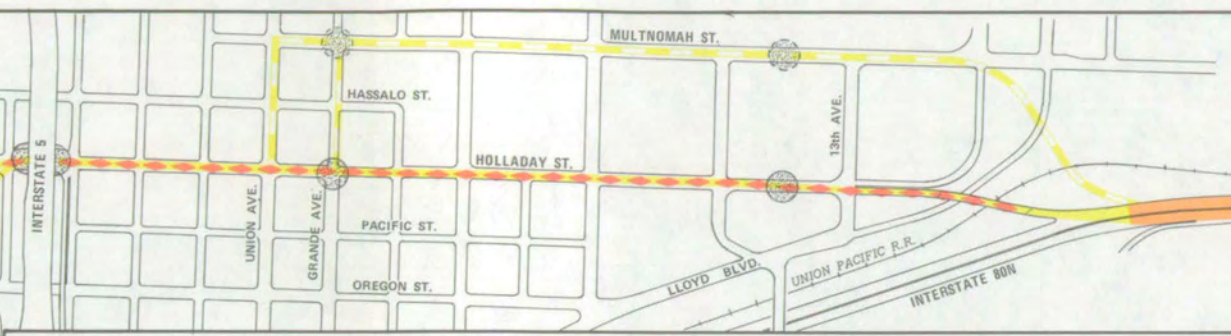
Noise levels for the existing facility with traffic increases to 1990 are expected to increase approximately 2 dBA. Figure N-8 of the Volume Two Noise Report shows the calculated values for each location.

Noise from the Division Street alternative with an LRT system show 1990 levels from 69 to 73 dBA. A number of sites show reductions of 1 to 3 dBA due to a reduction in vehicle use while other sites indicate an increase of 1 to 3 dBA over the present levels.

LRT I-205 Route (Alternative 5-3). The I-205 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.

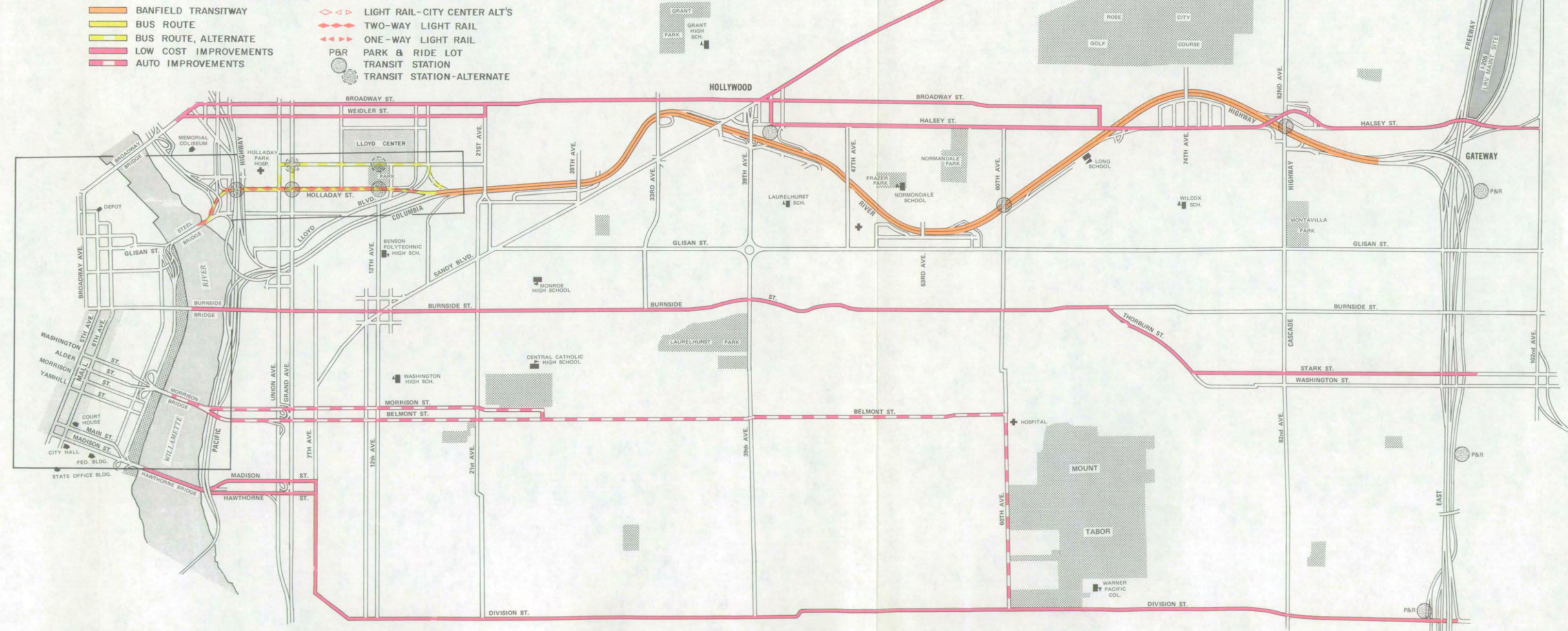
In comparing the Division Street route to that of the Burnside/Portland Traction Line, the Burnside route would have the least offensive noise environment. Most receptors with noise levels in excess of  $L_{10}$  70 dBA along Burnside and Division cannot be mitigated because they require direct road access. Barriers could not be constructed where frequent gaps in the wall or berm are needed. Therefore, except for the schools and other institutional receptors no mitigation can be provided. The schools could be afforded barrier or architectural type mitigation.

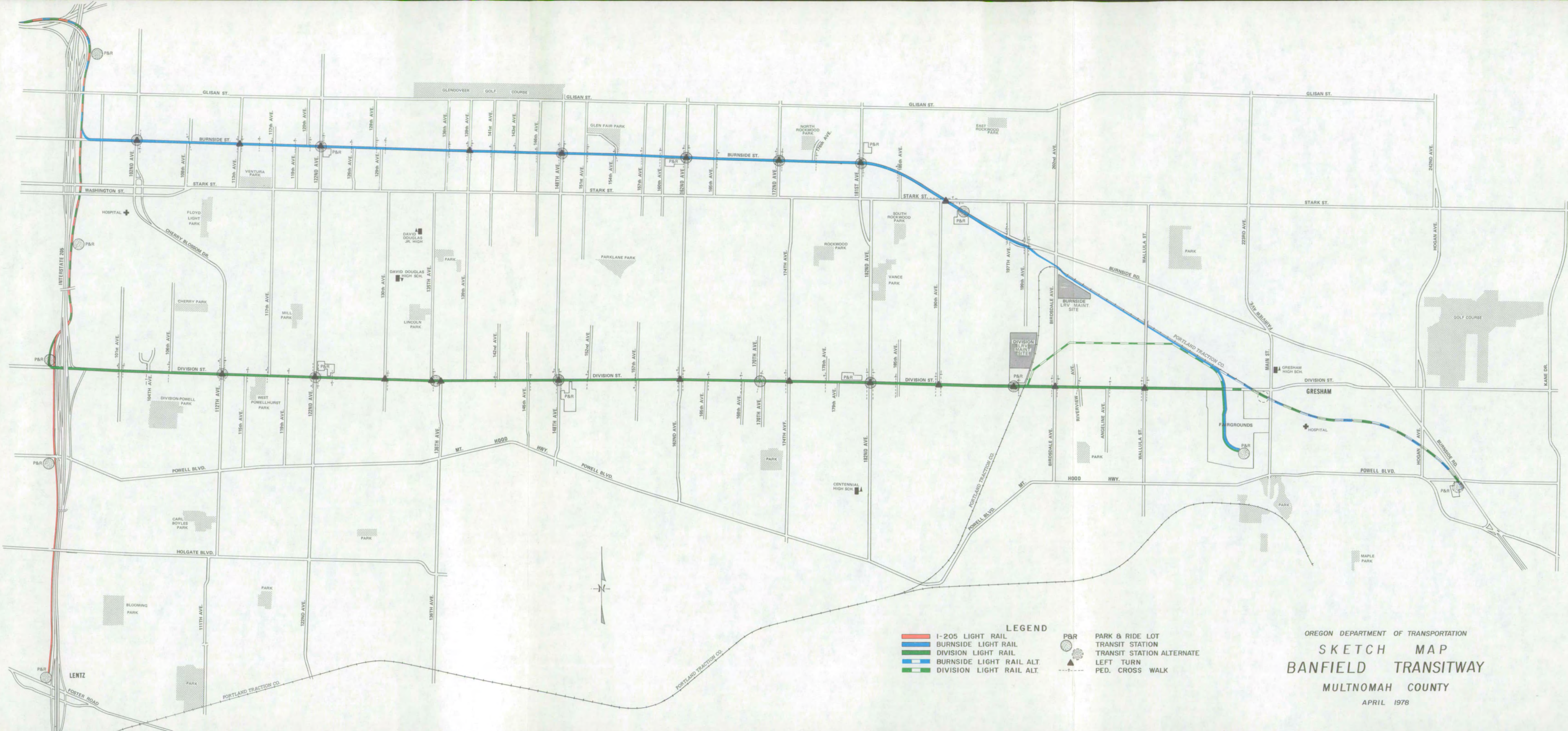
In conclusion, it can be stated that there are no significant adverse noise impacts resulting from the project alternatives except for a few isolated locations.



OREGON DEPARTMENT OF TRANSPORTATION  
**SKETCH MAP**  
**BANFIELD TRANSITWAY**  
 MULTNOMAH COUNTY  
 APRIL 1978

- LEGEND**
- BANFIELD TRANSITWAY
  - BUS ROUTE
  - - - BUS ROUTE, ALTERNATE
  - LOW COST IMPROVEMENTS
  - - - AUTO IMPROVEMENTS
  - ◁ ▷ LIGHT RAIL-CITY CENTER ALT'S
  - ⇄ TWO-WAY LIGHT RAIL
  - ⇄ ONE-WAY LIGHT RAIL
  - P&R PARK & RIDE LOT
  - TRANSIT STATION
  - TRANSIT STATION - ALTERNATE





- LEGEND**
- I-205 LIGHT RAIL
  - BURNSIDE LIGHT RAIL
  - DIVISION LIGHT RAIL
  - - - BURNSIDE LIGHT RAIL ALT.
  - - - DIVISION LIGHT RAIL ALT.
  - P&R PARK & RIDE LOT
  - TRANSIT STATION
  - TRANSIT STATION ALTERNATE
  - ▲ LEFT TURN
  - - - PED. CROSS WALK

OREGON DEPARTMENT OF TRANSPORTATION  
**SKETCH MAP**  
**BANFIELD TRANSITWAY**  
 MULTNOMAH COUNTY  
 APRIL 1978

***The Oregon Department of Transportation***

 *Highway Division*

