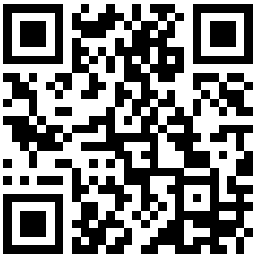
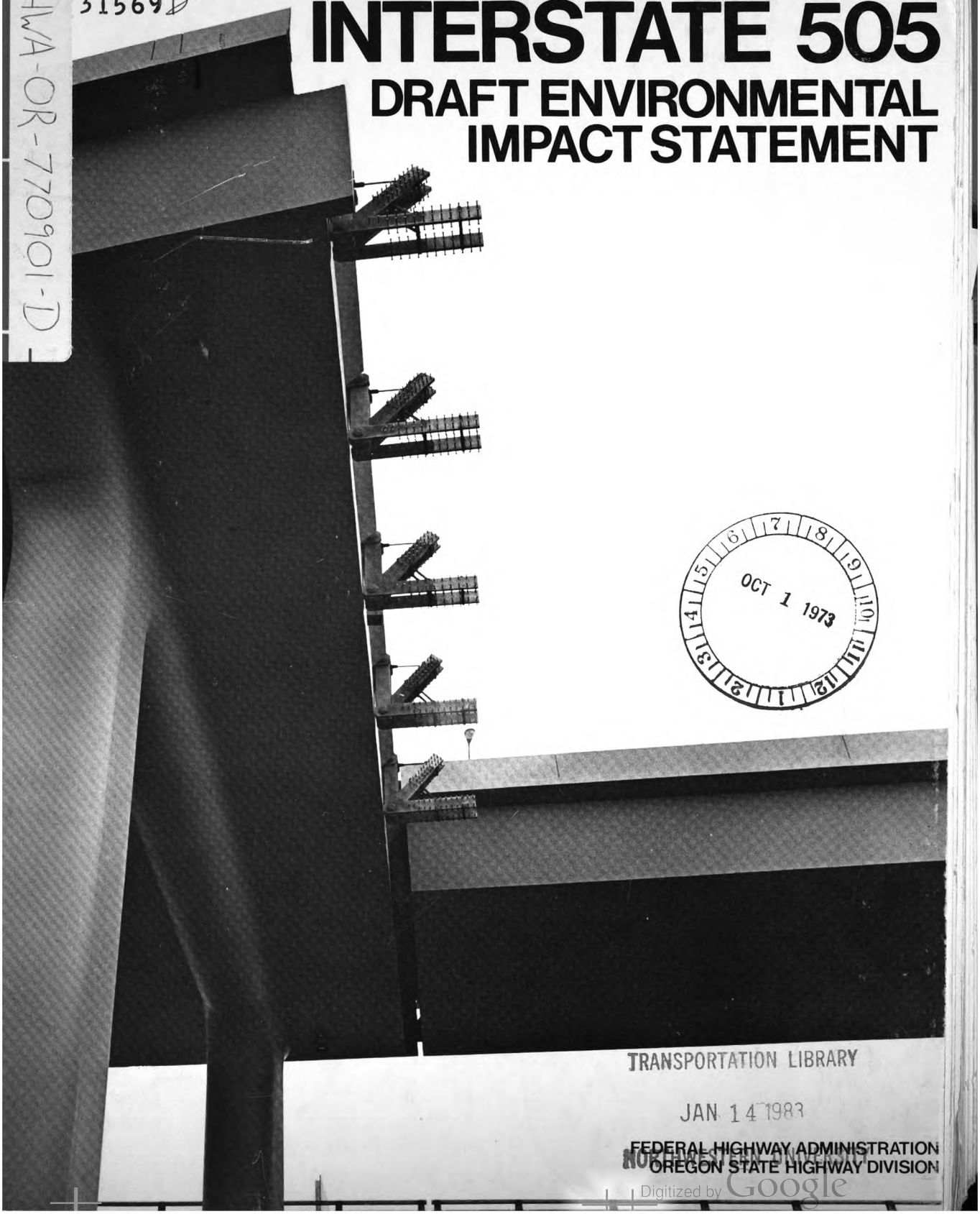


INTERSTATE 505
DRAFT ENVIRONMENTAL IMPACT STATEMENT



FEDERAL HIGHWAY ADMINISTRATION
OREGON STATE HIGHWAY DIVISION

FHWA-OR-EIS-73-08-D

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

ADMINISTRATIVE ACTION

for

ST. HELENS ROAD-21ST AVENUE SECTION
INTERSTATE 505
INDUSTRIAL FREEWAY

The project involves the adoption of an urban freeway location (I-505) in Northwest Portland in Multnomah County, Oregon. This facility would connect with the nearly completed Fremont Bridge and the Stadium Freeway (I-405) which combine with the Eastbank Freeway and the Marquam Bridge (I-5) to form an inner distributor loop serving downtown Portland. I-505 would also be part of the urban extension of U.S. 30, the Columbia River Highway.

THIS HIGHWAY IMPROVEMENT IS PROPOSED FOR FUNDING UNDER TITLE 23, U.S.C. THIS STATEMENT FOR THE IMPROVEMENT WAS DEVELOPED IN CONSULTATION WITH THE FEDERAL HIGHWAY ADMINISTRATION AND IS SUBMITTED PURSUANT TO:

SECTION 102(2) (C)
PUBLIC LAW 91-190

9-5-73
Date

Administrator of Highways

APPROVED AND ADOPTED BY THE FHWA

9-5-73
Date

Division Engineer FHWA

STUDY PARTICIPANTS

CITY OF PORTLAND

William S. Dirker, Transportation Coordinator

OREGON STATE HIGHWAY DIVISION

Edward Hardt, Project Engineer

FEDERAL HIGHWAY ADMINISTRATION, OREGON DIVISION

I-505 CONTACT COMMITTEE

Edd Crawford, Friendly House
William A. Deming, Jr., Northwest District Association
James D. Galligan, ESCO Corporation
Dennis J. McLaughlin, Willamette Heights Association
Joseph J. Schoen, Jr., Consolidated Freightways

CONSULTANTS

CH2M HILL
Alan M. Voorhees & Associates, Inc.
Economics Research Associates
The Burke Associates
ESL, Incorporated

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SUMMARY

SUMMARY

A. Administrative Action Draft Environmental Statement.

B. The project involves the adoption of an urban freeway location in Northwest Portland in Multnomah County, Oregon, to connect with Interstate I-405 and serve as an extension of U.S. 30, the Columbia River Highway.

C. Alternatives studied:

1. Take no action (No-build)
2. Public Transit
3. Five Freeway and Arterial Road Systems

D. Major findings and environmental impacts are summarized in the following section.

E. The following agencies and public organizations have received the draft statement and are invited to comment:

FEDERAL AGENCIES

U.S. Department of Agriculture
Soil Conservation Service
U.S. Department of the Army
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
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
Bureau of Outdoor Recreation, Pacific Northwest Office
Geological Survey
U.S. Department of Transportation
Coast Guard Commander (OAN)
Federal Highway Administration
Oregon Federal Aid Coordination Unit
U.S. Environmental Protection Agency

OREGON STATE AGENCIES

Public Utilities Commission
Department of Transportation
Economic Development Division
Department of Environmental Quality

Geology and Mineral Industries
Health Division, Department of Human Resources
Housing Division, Department of Commerce
Local Government Relations Division, Executive Department
State Marine Board
State Soil and Water Conservation Commission
Traffic Safety Commission
Governor's Committee for a Livable Oregon
Oregon Roadside Council
Oregon State Library
U.S. District Court, Oregon District
Oregon State Game Commission
Fish Commission of Oregon
Budget Division, Executive Department
Department of Forestry
Division of State Lands
State Water Resources Board

OTHER AGENCIES

City of Portland
- Public Works Department
- Planning Commission
- City Council
- City Transportation Director
- Park Bureau
- City Engineer
- City Traffic Engineer
- Water Bureau
- Fire Marshall
- City Planning Director
- Community Development Director

School District No. 1
- Chapman School

Multnomah County
- Public Works Department
- Planning Commission
- Education Department
- County Libraries
- County Commissioners

Tri-Met
Pacific Northwest River Basins Commission
Port of Portland
Columbia Region Association of Governments

MISCELLANEOUS GROUPS

Oregon Truckers Association
League of Women Voters in Portland
Oregon Environmental Council
Oregon Council of Architects
Portland Chapter, American Institute of Architects
Northwest District Association
Friendly House

STOP
Willamette Heights Neighborhood Association
Northwest Improvement Committee
I-505 Concerned Citizens
Western Environmental Trade Association
Portland Chamber of Commerce
The Urban League
PACT
Southeast Uplift
Associated General Contractors
Associated Oregon Industries
Oregon State Motor Association

PUBLIC UTILITIES AND CORPORATIONS

Portland General Electric Company
Northwest Natural Gas
Pacific Northwest Bell
Portland Terminal Railroad Company
Burlington Northern, Inc.
Automobile Club of Oregon
Good Samaritan Hospital
Physicians and Surgeons Hospital

NEWSPAPERS

The Oregonian - Portland (Multnomah County daily paper)
Oregon Journal - Portland (Multnomah County daily paper)
Daily Journal of Commerce - Portland (Multnomah County daily paper)
The Community Press - Portland (Multnomah County weekly paper)
Oregon Labor Press
"Oregon Voter"
"Oregon Times," Portland
Portland Observer

TV

KATU-TV - Portland
KGW-TV - Portland
KPTV - Portland
KOIN-TV - Portland
KOAP-TV (Ed.) - Portland

F. This Draft Environmental Statement was made available to Council on Environmental Quality and the Public on _____.

SEP 27 1973

MAJOR FINDINGS

MAJOR FINDINGS

Major findings of this study are summarized below:

Existing and Projected Traffic

1. The street system in Northwest Portland is already congested. There is little or no street capacity to absorb future traffic growth. The closure of Harbor Drive alone is expected to increase traffic on the I-405 ramps into Northwest Portland by 50 percent.

2. Traffic projections to 1990, even with much improved public transit, will require more than the upgrading of existing streets to provide an acceptable level of service and to avoid severe impacts on land use in the study area.

3. One-third of the traffic north of Pettygrove Street is through traffic, having its origin or destination north and west of Kittridge Avenue. This is mainly U.S. 30 traffic to or from locations on the Lower Columbia River. Most of the rest of the traffic has its origin or destination in the industrial district.

4. Improved transit as proposed in the 1990 Public Transportation Master Plan does not appear to replace enough vehicle trips to make a significant impact on the need for major street improvements in Northwest Portland.

Alternatives

Five alternatives were selected for study:

Alternative 1 is a depressed freeway between Vaughn and Upshur streets, connecting the West Fremont Interchange and St. Helens Road.

Alternative 2 is a depressed freeway between Vaughn and Upshur streets connecting the West Fremont Interchange and St. Helens Road, and an elevated freeway connecting the West Fremont Interchange and Yeon Avenue at 26th Avenue.

Alternative 3 is a freeway connecting the West Fremont Interchange with St. Helens Road at Kittridge Avenue on an alignment parallel to Yeon Avenue. The freeway is elevated to approximately 26th Avenue and runs at-grade to an overpass at Kittridge.

Alternative 4 is a shorter length of elevated freeway between the West Fremont Interchange and the intersection of Yeon Avenue and an extension of Industrial Street. Yeon, Nicolai and St. Helens Road are improved as arterials.

Alternative 5 is an elevated freeway over its entire length, leading north from the West Fremont Interchange to Industrial Street, then along Industrial to St. Helens Road.

The study also investigates a No-build Alternative. It assumes the gradual upgrading of the existing surface street system, with no major capital investment. A one-way couplet system carries westbound traffic on Nicolai and eastbound traffic on Vaughn. Vehicles exit from the ramps at 21st and Vaughn, continue north on 21st, and then turn west on Nicolai. Vehicles eastbound toward the Fremont Bridge and the Stadium Freeway use Vaughn, go south on 22nd, and east on Thurman. Curb parking is removed in some locations.

All traffic projections take into account the reduction in volumes expected as a result of the 1990 Public Transportation Master Plan. In the Northwest District the plan calls for improved headways on the existing buslines and their re-routing as through lines.

Cost

Total project cost of the "build" alternatives is estimated to range from $29 million for Alternative 1 to $72 million for Alternative 3. Estimated project costs[1] are summarized below:

[1] Each "build" alternative includes the cost of the planned Front Avenue overcrossing estimated at just over $2 million.

	Constr. Cost	ROW and Relocation	Total
Alternative 1	$22,400,000	$ 7,300,000	$29,700,000
Alternative 2	42,900,000	10,100,000	53,000,000
Alternative 3	60,600,000	11,800,000	72,400,000
Alternative 4	39,600,000	7,700,000	47,300,000
Alternative 5	57,500,000	9,300,000	66,800,000
No-build Alternative	730,000	0	730,000

Air Quality

Construction of any of the alternatives will not cause a degradation of present air quality in Northwest Portland, or a degradation of future air quality over what is expected if none of the alternatives are built. In some locations, some of the freeway alternatives will result in lower concentrations of pollutants than the no-build alternative.

This finding does not imply that there is no air pollution problem in Northwest Portland, but rather that the major components of such a problem are the effectiveness of the national emission control regulations, and to a lesser extent, the pollutants emitted by industrial plants in the area and those transported into the area by the southeast winds blowing across the Central Business District.

Noise

Noise levels in the Northwest District are already high, approaching or exceeding Federal Highway Administration standards in many locations. Predicted noise levels exceed federal standards whether or not a freeway is built. None of the "build" alternatives will increase noise levels more than 5 decibels (dBA) in the residential or industrial areas.

Traffic Service

1. The "user economics" of the alternatives are remarkably similar, with estimated savings over the no-build alternative in the range of just over $6 million yearly.

2. Each of the "build" alternatives provides an acceptable level of service. The capacity of Alternative 4 is reduced by rail conflicts on Yeon Avenue. The service level would be improved if restrictions were placed on rail movement during peak hours.

3. The no-build alternative has the poorest safety potential, and Alternative 3 has the best, with only 79 percent as many accidents. Alternative 4 has the potential for 90 percent as many accidents as the no-build.

4. Alternatives 2 and 4 have the most flexibility. The design of these alternatives can be modified more easily if, for example, future land use or traffic patterns should change from present forecasts.

5. Alternatives 2 and 3 appear to provide the best overall accessibility to the general area.

6. Alternatives 2 and 3 best separate through traffic and local industrial traffic.

Housing and Community Facilities

1. There is a shortage of housing in the Northwest District in relation to the demand. There is a severe shortage of low-cost houses for rent or purchase.

2. The population living in the affected corridors can be characterized generally as low-income, lacking in economic and social mobility, with a high proportion of young persons and single-person households.

3. Housing in the affected area is old, much of it is run down, and the majority of the units (68 percent) are in multi-family dwellings.

4. Alternative 1 removes 303 dwelling units; Alternative 2, 334 dwelling units; and Alternatives 3, 4, and 5, 65 dwelling units.

5. A total of 629 persons living in the area will be displaced by Alternative 1; 732 persons by Alternative 2; and 180 persons by Alternatives 3, 4, and 5.

6. Relocation will largely affect those families and individuals least able to manage for themselves--the very low-income and the elderly. More than ordinary relocation assistance, including case-work counseling, can ease the impact of dislocation.

7. Roughly half of the households displaced by any of the alternatives have incomes too low to take advantage of public housing programs beyond the four-year period of supplemental payments under the Uniform Relocation Act.

8. The capacity of the existing housing stock in the Northwest District to absorb those families displaced - especially the larger numbers involved in Alternatives 1 and 2 -- is doubtful.

9. Except as it avoids a sudden impact and permits a gradual adaption by residents to steadily worsening traffic conditions, the no-build alternative appears to offer no advantage over the "build" alternatives in any respect.

10. None of the alternatives will displace or otherwise have a significant impact on major public facilities (schools, parks, etc.) or impact buildings of historical or architectural significance.

11. There are 180 persons living north of Vaughn Street who will be "isolated" by Alternative 1 and largely displaced by the other alternatives. The homes north of Vaughn are already severely impacted by industry and industrial traffic and sooner or later will most likely be displaced by expanding industry. The area south of Vaughn partly taken by Alternatives 1 and 2 has been designated by the Northwest Comprehensive Plan as having the potential for renewal as a residential area.

12. Alternatives 1 and 2 have an impact on a larger number of residents because the freeway corridor borders a residential neighborhood between 23rd Avenue and 32nd Avenue. Alternatives, 3, 4, and 5 have an impact on fewer people, but for those indirectly affected the impact is stronger because the freeway is closer.

Economics

1. The Guilds Lake area is the largest concentration of industry in the metropolitan area, with good access to truck, rail, and water transportation. Business and industrial firms located in Guilds Lake are understandably dismayed at the prospect of possible dislocation and interruption associated with freeway construction. Responses to a survey questionnaire indicated Guilds Lake is an optimum location for most of the industries located there. There is a high degree of interdependence among businesses, relationships that have been established over time and which are significant in day-to-day operations.

2. Alternatives 1, 2, and 3 result in the acquisition of entire properties more often than Alternatives 4 and 5, which utilize existing rights-of-way to a greater extent.

3. Employment in Northwest Portland, now estimated at 22,300, is expected to increase to approximately 27,000 by 1980 and to 30,500 by 1990. These employment estimates were used to forecast traffic volumes for the same years.

4. Total employment in the area between Thurman and Kittridge is estimated at 13,634. Alternative 5 would result in the greatest number of jobs displaced or lost, 1,820, or 13.5 percent. Alternative 1 would result in the least job loss or displacement, 927, or 6.8 percent. Alternative 2 would displace or eliminate 1,451 jobs (10.6 percent); Alternative 3, 1,313 jobs (9.6 percent); and Alternative 4, 1,127 jobs (8.3 percent). These are estimates based largely on responses from affected firms.

5. Almost no firms affected by any of the alternatives indicated they would go out of business. The estimated number of jobs that would actually be lost compared to total employment is small in all cases, ranging from 24 in Alternative 1 to 150 in Alternative 3.

6. Owners of business firms facing the possibility of displacement questioned whether "fair market value" and the payments they could expect for moving are adequate compensation.

7. Relocation costs paid to displaced residents and firms account for a relatively small part of the total cost of any of the alternatives, ranging from an estimated high of $1,942,000 in Alternative 2 to $934,000 in Alternative 4.

8. Taxable value "lost" ranges from an estimated $4,912,000 in Alternative 1 to $9,407,000 in Alternative 3. Alternatives 2 and 5 would take from the tax rolls about $7 million; Alternative 4, nearly $6 million. Whether this value is lost permanently to the City of Portland depends on where the displaced firms relocate. There is presently little vacant industrial land available within the City of Portland. The most probable sites available for relocation are in Rivergate (which is in Multnomah County and School District No. 1), east Multnomah County, Washington County, and Clackamas County.

9. The overall effect on land values of a freeway through the Guilds Lake industrial area is expected to be negligible. A freeway along Upshur may cause some short-term loss in the

value of nearby residential properties. Unless the City takes strong steps to stop the intrusion of industrial uses there, a freeway along Upshur is likely to stimulate further industrial and commercial expansion into the residential area.

10. Properties in the Northwest District with the greatest potential for redevelopment lie mainly in the corridor between Thurman and Vaughn streets. The corridor is characterized by sizable vacant parcels, conflicting land uses, and housing in poor condition. The long time designation of this area as a freeway corridor has contributed to this condition. Land values in the area are speculative, discouraging the development of new housing without public intervention.

Physical Conditions

1. Subsurface soils are irregular. Silt, clay and fine sand are found in scattered patterns overlying coarser sand and gravel. The Guilds Lake area was filled with fine sands and silt. Buried logs, stumps, and large deposits of sawdust together with the loose state of the fill material combine to produce extremely poor foundation material.

2. The water table approximates river levels and is too high to permit a depressed freeway below the 30-foot elevation without excessive cost.

3. Although the evidence to date is indirect and inconclusive, the eastern front of the West Hills may constitute a major fault. Estimates of construction costs for each alternative have taken into account the need to design for the possibility of seismic activity.

4. Two small landslide areas affect Alternatives 1 and 2. They are not active now and appear shallow. A stable design can be developed for either alternative without excessive cost.

5. Modifications to the design of each alternative to compensate for poor subsurface conditions and the assumed fault add 15 to 20 percent to the cost of conventional foundations.

I. INTRODUCTION

I. INTRODUCTION

Plans to improve the local street system in Northwest Portland to handle the increased car and truck traffic generated by the Fremont Bridge and the Stadium Freeway (Interstate 405) were first announced by the Oregon State Highway Division in 1963. The Highway Division at that time proposed a couplet, using Thurman Street eastbound and Upshur Street westbound, to carry U.S. Highway 30 traffic between the West Fremont Interchange and St. Helens Road.

The Highway Division held a public hearing on the plan in January, 1964. The Portland City Council approved the plan in January, 1965, and the Federal Highway Administration approved the acquisition of additional right-of-way to improve Upshur Street in November, 1965.

The Highway Division subsequently purchased the right-of-way to extend Upshur Street between 22nd and 25th avenues; the extension was not completed, however, since later projections had indicated that the couplet would not have enough capacity to carry 1972 traffic. Instead, the Highway Division requested the "extension of the West Fremont interchange" from N.W. 21st Avenue to N.W. 31st Avenue.

In 1968, Congress authorized additional mileage to the Interstate Highway System, and on this basis the Federal Highway Administration, in December, 1968, approved the extension as an interstate spur, which was designated Interstate 505.

On March 25, 1969, the Highway Division received federal authorization to begin preliminary engineering for I-505 "including preliminary relocation studies up to and including the location hearing."

On April 15, 1969, the Highway Division requested federal location approval for I-505 on the basis of prior right-of-way authorizations. The Division said it hoped for early location approval "in order that a design hearing may be held at an early date." A design hearing had become necessary only as a result of revisions to federal regulations in January, 1969.

The Federal Division Engineer responded in April, 1969, that he was of the opinion that "tacit location approval" had already been given "based on the fact that the location of a major highway facility through this corridor has not changed from that presented at the previous public hearing (in January, 1964)."

In October, 1969, the State Highway Division contracted with the City of Portland to undertake a "Multiple Use and Joint Development" study of I-505. The Planning Commission study, which was completed in October, 1970, recommended a depressed freeway from N.W. 21st Avenue to N.W. 28th Avenue aligned along the center line of Upshur Street, with a major interchange between 21st and 24th avenues, and off-ramps from both the east and west at N.W. 29th Avenue to serve the Guilds Lake Industrial District. The report also recommended the development of multi-family housing on the south side of Thurman Street between 24th and 28th avenues. Other recommendations were designed to avoid conflicts between residential and industrial uses and to stabilize land use patterns.

In the spring of 1969, the Northwest District Association (NWDA) had been formed around the issue of the planned expansion of Good Samaritan Hospital. In December, 1969, NWDA asked the Portland City Council to prepare a neighborhood comprehensive plan. The City Planning Commission staff began work on the plan in October, 1970.

In the same month publication of the Planning Commission report Multiple Use and Joint Development of the I-405, I-505 Freeway Corridor for the first time focused public attention on I-505. One consequence was the formation of the Willamette Heights Neighborhood Association, which prepared a report critical of the freeway and proposed instead a surface street solution.

At a public hearing on March 10, 1971, the Portland City Council "approved in principle" the Planning Commission's Multiple Use and Joint Development report. Mayor Schrunk, transmitting the Council's action to the Highway Division in a letter dated April 19, 1971, stated as follows:

> "In taking this action, the Council took particular note of the four recommendations made by the Northwest District Association and the ideas of other organizations and individuals which should be given consideration. The recommendations of the Northwest District Association were:
>
> (1) that the multiple use of the corridor concept be retained, to minimize the impact of the freeway and enhance the existing neighborhood;
>
> (2) that replacement housing equal in number and rent structure to that destroyed, be built in the Northwest neighborhood, possibly on the freeway corridor;

(3) that the citizens displaced by the freeway be given all of the rights that they have under recent federal legislation, particularly recognizing their right to relocate in the neighborhood of their choice; and

(4) that the I-505 traffic, both coming onto and leaving the freeway, be routed to the north side to avoid use of any north-south streets as arterials for the movement of traffic through the neighborhood to the Northwest Industrial District.

Council emphasized that it would expect the Northwest District Association, the City, and the State to work together in resolving and implementing the points raised at the hearing."

In August, 1971, the Northwest District Association withdrew its earlier support of the Upshur corridor and issued a joint policy statement with the Willamette Heights Neighborhood Association. The statement urged the City Council to request the Highway Division to adhere to federal environmental guidelines in planning for I-505. NWDA members explained that they took this action because the Highway Division was not able to assure them that there would be an adequate replacement housing program.

One month later, the two neighborhood organizations, joined by the Oregon Environmental Council, filed suit against the Highway Division in Federal District Court, asking that work on I-405 and I-505 be halted until the Highway Division prepared a draft environmental impact statement as required by the National Environmental Policy Act and held a location hearing.

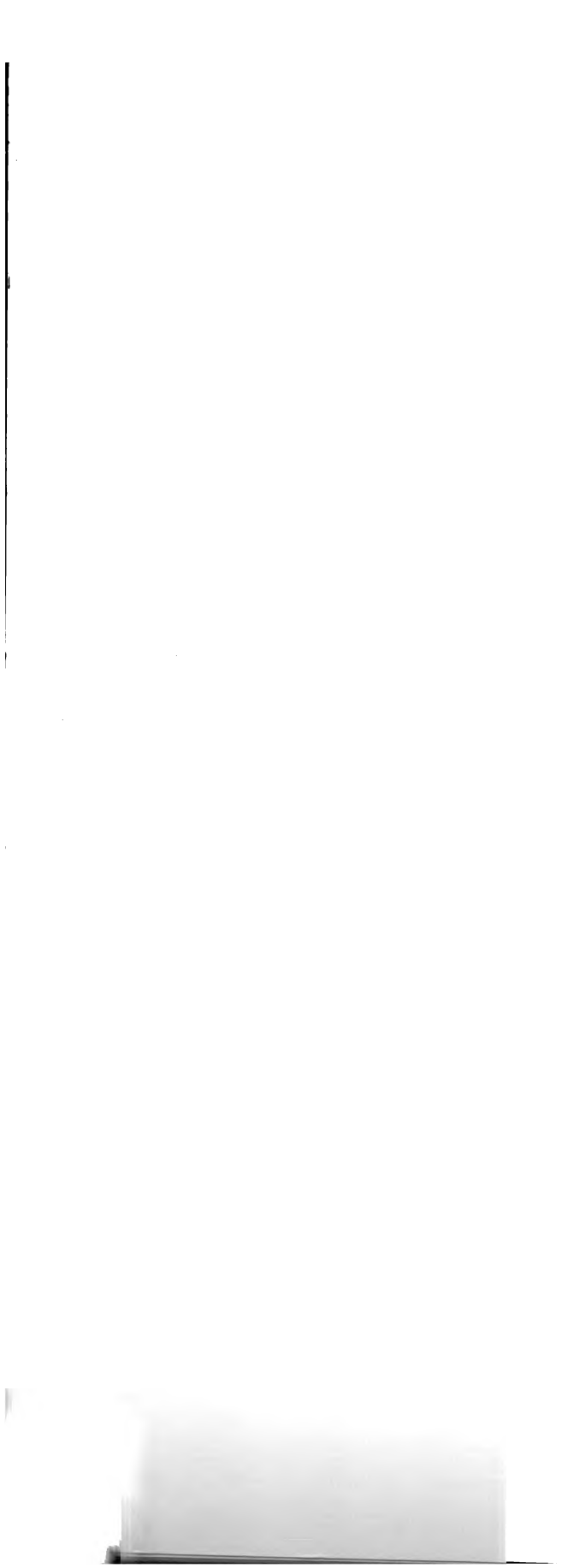
The court, on December 3, 1971, ruled that the Highway Division had met all procedural requirements for I-405 and that the construction of ramps in Northwest Portland could be completed. The court further held that the "change in type of highway facility planned and its changed economic, social, and environmental impact" required a location hearing in accordance with federal guidelines that became effective in January, 1969 (PPM 20-8). The court ordered the Highway Division to prepare a draft environmental statement within 30 days and to hold a location hearing one month later.

The Highway Division completed its environmental impact statement in January and scheduled a location hearing for February 10, 1972. On February 9, the Portland City Council held a public hearing to provide an opportunity for public

discussion before the Council presented its recommendation on I-505. Following public testimony, the Council adopted a resolution asking the Highway Division for a more thorough study of alternate corridors. The City Council indicated it would then recommend a corridor on the basis of the study.

Following the location hearing on February 10, 1972, the State Highway Division agreed to the City Council's request. The Highway Division subsequently contracted for the present study, undertaken on August 10, 1972.

II. PURPOSE AND METHOD



II. PURPOSE AND METHOD

The purpose of this study is to provide a comparative analysis of possible alternatives for I-505, the proposed "Industrial Freeway" in Northwest Portland. The study (1) identifies the need for improved traffic facilities in Northwest Portland, based on population and land use forecasts; (2) identifies alternative solutions; and (3) describes each alternative according to its environmental impact.

The study team included eight complementing disciplines: civil engineering (including air quality and noise specialists), transportation planning, traffic engineering, land use planning, economics, sociology, architecture, and urban design.

The study has been conducted in phases. In Phase I team members collected information about existing conditions in the study area--its natural features, how the land is being used, the characteristics of the people who live and work in the area and of business and industry located there, and how the existing transportation system works.

The study team identified significant relationships in the patterns of land uses. They examined the relationship between housing patterns and the location of community facilities. They looked at business and industry in terms of their employment and their dependence on other business and industry within and outside the district. They examined the relationship between land use, utility service, and transportation--car and truck, rail, and water. Based on these relationships the team made forecasts of traffic demand in the future.

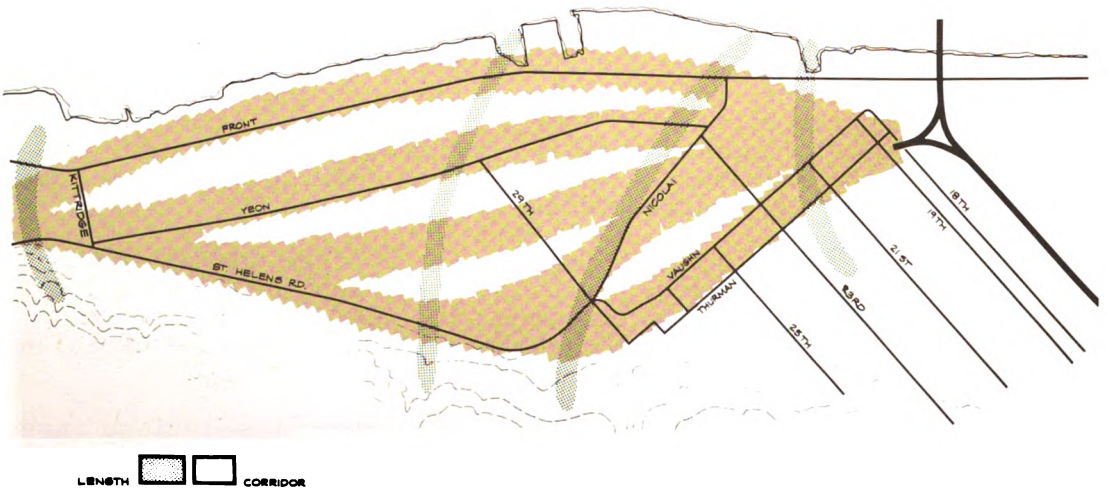
In examining natural conditions the study team looked at the influence of topographic features on the land use patterns, plant and animal life in the area, and the condition of the soils and other subsurface conditions. They measured existing noise levels and the quality of the air.

In Phase II possible alternative transportation solutions were identified and analyzed. The team developed the matrix shown on the next page as a basis for its initial analysis of alternatives. The five corridors in the matrix are based on requirements for distributing traffic and on existing physical restraints and development patterns. Categories of freeway length were then developed, resulting in 19 possible alternatives. These

were narrowed down by determining their engineering feasibility, their cost, and how well they handled traffic forecasts. For example, a freeway along Front Avenue was ruled out because a grade level route would cut off rail access to the port, an elevated freeway would be unsightly and would cost too much, and a freeway below ground level would be difficult and costly to build and maintain because of the high water level. In fact any depressed freeway design was considered infeasible in the Guilds Lake area.

By the end of Phase II the possible alternatives had been narrowed to five freeway routes. The study team also developed a "no-build" alternative, which assumed only the upgrading of the existing street system. They also considered what impact a much improved mass transit system would have on reducing traffic volumes through the study area. The selection process and the preliminary conclusions of the study team were presented in detail in public meetings and reviewed by city, state and federal agency officials.

In the final phase of the project each of the alternatives was designed in sufficient detail to estimate construction costs and to assess impacts on the environment. The design of each alternative is described in Section IV of this report, and their transportation benefits and environmental impacts are analyzed in subsequent sections.



INITIAL ANALYSIS MATRIX

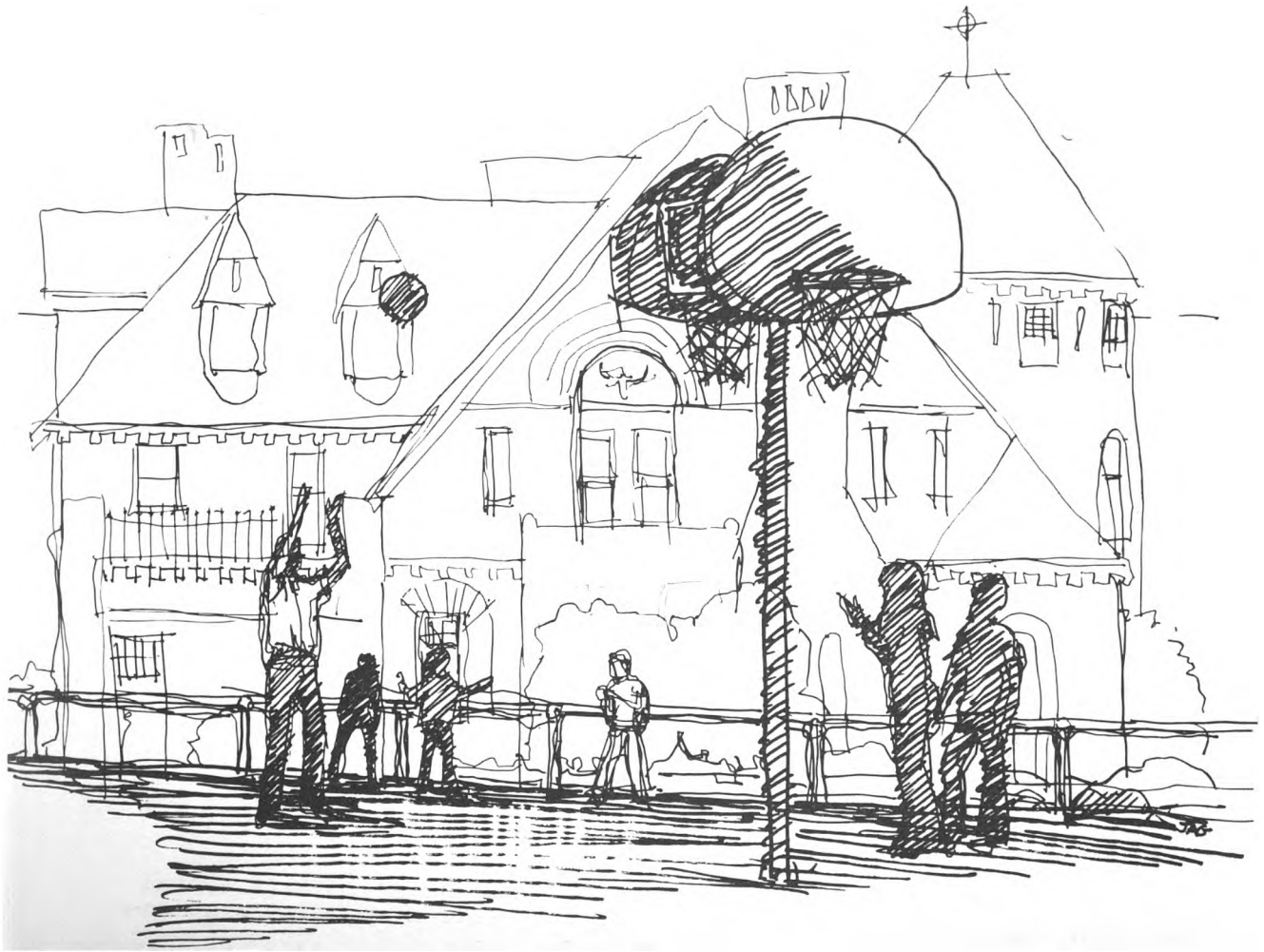
Through all phases of the study, the consulting team has opened the planning process to broad public participation. Public meetings were held at the outset to describe the study and provide an opportunity for the consultants to hear the concerns of affected residents and business firms. Later meetings described the progress of the study and offerred an opportunity for continuing citizen participation. During Phase 2, a "do-it-yourself" information packet was made available containing basic information about the area (traffic patterns, land use, housing patterns, etc.), and people were asked to "design their own" facility using the same data available to the study team. Two team members were assigned specifically to citizen contact activities and all team members participated in public meetings.

A "Contact Committee" was appointed by the City with representatives from neighborhood organizations, business firms, and social service agencies in the area. Members of the committee worked closely with the study team, attending work sessions and staff meetings. Additional information was obtained from affected business firms late in the study after the final roadway alternatives were selected and geometric designs were completed. Interviewers contacted over 200 business firms and property owners in order to better assess the economic impact of each of the alternative routes. (See Appendix E.)

An information office was opened in the affected residential neighborhood and the study was conducted from an office in the industrial area. These locations enabled interested persons to obtain information more easily and made the project visible in the community. Newsletters describing the progress of the study were mailed to over 9,000 homes and businesses in the study area.

This report on the study is a comparative analysis of the alternatives in terms of their relative environmental impacts. The term "environmental" is used broadly to encompass all significant concerns, including the economic and social impacts that can be expected.

The study has generated a large amount of background data and support material. Information not included in the Appendix is available in separate technical reports. This report on the study includes such information and analysis as is useful in making comparisons among the alternatives and assessing environmental impacts.



III. ENVIRONMENTAL SETTING

III. ENVIRONMENTAL SETTING

A. REGIONAL SETTING

1. Natural Features

The northwest quadrant of Portland lies north of West Burnside Street, west of the Willamette River. Within the city limits the northwest quadrant takes in just over 12 square miles. The Tualatin Mountains (Portland's West Hills) run diagonally through the quadrant north and south, more or less parallel to the river.

The area described in this study as the "Northwest District" is a smaller area, about four square miles, from West Burnside Street north to Kittridge Avenue and from near the base of the West Hills east to the Willamette River. As the river bends to the west, the Northwest District narrows, from 1.5 miles wide at Burnside to less than half a mile wide at Kittridge.

The reach of the Willamette bordering the Northwest District varies from a quarter to half a mile wide and is dredged to a depth of 40 feet to provide a channel and turning basin for ocean ships.

The West Hills rise to an elevation of 1,100 feet and the hills and the river are the dominant natural features. Balch Creek is the only natural channel of significant size that drains the east face of the hills. The creek is diverted into a closed conduit that empties into the Willamette River. Much of the West Hills north of Burnside is in park land. Forest Park alone is 1.5 miles wide and 7.5 miles long and contains over 4,000 acres--the largest natural reserve in any city in the United States.

2. Land Use Patterns

The land use patterns in the built-up areas of Northwest Portland are rich and varied, influenced by natural features, the city's early history, and the proximity of the Central Business District. Land uses of regional significance are described below.

a. Commercial and Industrial. In early Portland, sawmills were located along the lower river and ships were berthed further upstream, near the business district. More

recently, the waterfront land in Northwest Portland has been used largely for shipping, warehousing, freight handling, and manufacturing and, further downstream, for oil and natural gas storage. The major petroleum storage facilities in the region are located just north of Kittridge Avenue. Northwest Natural Gas Company is planning a major synthetic plant just south of the St. Johns Bridge.

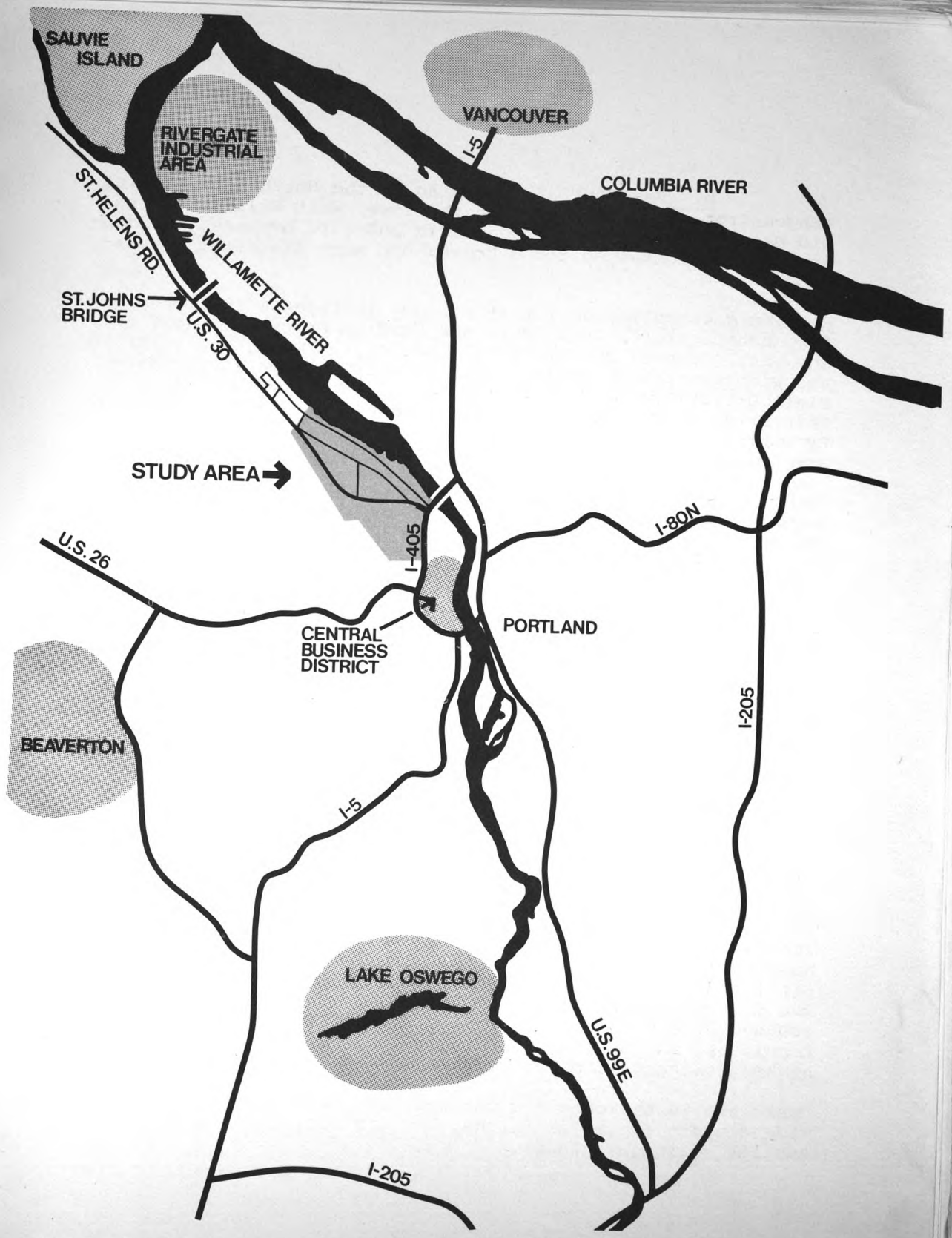
When Terminal 6 opens at Rivergate in the summer of 1974, much of the containerized shipping will be shifted to the east side of the river. Some containerized shipping and most or all of the break-in-bulk or general cargo will continue to arrive and depart at Terminals 1 and 2 on the west side. Port officials expect activity at Terminals 1 and 2 to drop sharply when Terminal 6 is opened and gradually to build back to its present levels. Despite the growing importance of Rivergate, westside terminals will remain essential port facilities.

Two major rail yards were located many years ago just west of Front Avenue. Their location was determined by the flat land there and the proximity to harbor activities. The present Guilds Lake yard is a classification and holding yard and the major point of interchange between the Burlington Northern, Southern Pacific and Union Pacific railroads.

Immediately west of the port and the railroads is the largest concentration of industry in the metropolitan area. Industrial development in the Guilds Lake area has been rapid and extensive since World War II, and most of the available land there is built up.

A number of heavy manufacturing firms are located in the northwest industrial area, including the Gunderson Division of FMC (manufacturer of rail cars and oil tankships) and ESCO (manufacturer of construction cranes, logging equipment, and other heavy machinery). A larger portion of this area, however, is utilized by trucking firms and by warehousing and wholesaling operations. Most of the larger businesses are located north of Vaughn Street, as well as east and immediately west of I-405. Most are located in this area because of their proximity to good rail and truck service, suppliers and downtown clients.

The only major commercial use north of Vaughn Street is Montgomery Ward, which serves both as a wholesale distribution center and as a retail and mail order outlet. Commercial uses south of Vaughn Street of area-wide significance are limited largely to the automotive and service uses close to the central business district.



INTERSTATE 505 ENVIRONMENTAL IMPACT STATEMENT OREGON STATE HIGHWAY DIVISION

REGIONAL SETTING

PLATE 1

b. Residential. Housing in the Northwest District ranges from expensive homes on the lower West Hills, to fine old masonry apartments between 17th and 23rd avenues, to downtown hotels converted for a poorer and more transient population.

Housing data collected for this study includes a smaller area of five census tracts bounded by the Stadium Freeway (I-405) on the east, Cornell and Westover roads on the west, and Burnside and Nicolai streets on the south and north respectively (see Plate D-1). The data show that over 13,000 people live in this area; approximately 3.6 percent of the city's population. By contrast, just over 11 percent of the city's rental units are located here.

Rental units characteristically provide housing for certain segments of the population--retired persons, young persons, and others of low income. In fact, 22.7 percent of the people in these five census tracts are over 65, the highest concentration of elderly in the city. Another 14.3 percent fall in the 20-24 year age group. Forty to forty-five percent of Northwest households do not have cars, and shopping and socializing are done on foot or bus.

Residents of the area appreciate the closeness to downtown, the very good public transit facilities, and the many neighborhood services. To the elderly and the poor, these features can be essentials of life. In sum, the Northwest District provides economic and social advantages to a significant population. The unique range of services maximizes their mobility and hence, their independence.

c. Institutional. Northwest Portland has a wide variety of institutional uses serving the entire metropolitan area.

The district is a city-wide center for medical services. Three hospitals are located on Lovejoy Street: Good Samaritan Hospital and Medical Center, Physicians and Surgeons Hospital, and Lovejoy Specialty Hospital. The hospital area is surrounded by a number of medical office buildings, convalescent hospitals, and nursing homes, giving this neighborhood the highest concentration of private physicians in the region.

There are 10 churches and temples, several of which are city-wide centers for major faiths, and a number of centers for smaller religious groups.

The oldest established day care center in Portland--Fruit & Flower Day Nursery--is located in a new building at 24th Avenue and Irving Street. There are also special day care centers for emotionally disturbed and epileptic children. Other institutions of regional importance include the William Temple House, Boys and Girls Aid Society and the White Shield Home.

Grade schools serving the area are Couch, Chapman, and Cathedral. The Metropolitan Learning Center, an innovative education program, is housed at Couch School and draws students from all parts of the city. Three arts and crafts centers of regional importance offer classes and exhibits.

3. Transportation

a. Water and Rail. The Port of Portland operates facilities on both sides of the Willamette. Goods received in 1972 totalled 7.2 million tons comapred with 4.1 million tons shipped. Of the total, 6.2 million tons were dry cargo and 5.1 million tons were petroleum products. This commerce is about equally divided between domestic and international trade.

The Port is clearly important to the economy of the entire Columbia Basin and the Willamette Valley. None of the Port facilities have direct access to a freeway. However, both the Port and nearby industries are well served by direct rail connections. Four major trunk lines provide service--Burlington Northern, Southern Pacific, the Milwaukee Road, and Union Pacific. Portland Terminal Railroad owns and operates the rail yard at Guilds Lake, including a new Trailer-on-Flat-Car (TOFC) facility put in operation two years ago.

The Hoyt Street Yard, east of I-405, is the location of the passenger station in Portland. The passenger coach yard at Guilds Lake is no longer in use. Amtrak uses service facilities in Seattle.

The Willbridge Yard, switching facilities for Burlington Northern, lies just north of Kittridge Avenue. Willbridge is connected to the Hoyt Street Yard by tracks through Guilds Lake and by a track which parallels St. Helens Road, runs along Nicolai Street, turns south on 22nd Avenue and east on Pettygrove Street. These three rail yards are the only switching yards on the west side of the city.

b. Highways. The highway system in Portland is illustrated in Plate 1. In the core of the city I-5 (the main north-south highway) and I-405 form an inner-city

loop that provides direct access to the central business district, the Northwest industrial area, and the Sunset Highway (U.S. 26). On the east side of the river, I-5 connects to Interstate 80-N (the main east-west highway) and to McLoughlin Boulevard (U.S. 99E).

U.S. 30 traffic to Lower Columbia River communities uses Vaughn Street, Nicolai Street, and St. Helens Road within the Northwest District.

The ramps from the Fremont Bridge and the Stadium Freeway presently come to ground at 21st Avenue--six blocks from Terminal 1 and 10 blocks from St. Helens Road. The congestion on Vaughn Street has been reduced by the interim truck route on Nicolai Street.

The closure of Harbor Drive and the opening of the Fremont Bridge will approximately double the number of vehicles using the Vaughn and Thurman ramps.

Transportation studies indicate that the proposed I-505 facility is only moderately affected by regional land use changes affecting through traffic. In 1990, only about one-third of Northwest area traffic north of Pettygrove Street will be through traffic.

c. Transit. The Northwest District is served by three bus lines--the 23rd Avenue (the most heavily used line in the city), the 21st Avenue and the Linnton-Raleigh Hills line.

B. THE NORTHWEST DISTRICT

1. Natural Features (See Plate 4)

a. Topography and Geology. The West Hills are composed of Columbia River basalt, a gray, dense rock, which is known to underlie the area south of Nicolai. The east face of the hills drops sharply from an elevation of over 1,000 feet to 50 feet at St. Helens Road.

The U.S. Army Corps of Engineers has established the elevation of 26 feet as the line of probability for a flood once every 100 years. In December, 1964, the observed flood level in the Northwest industrial district was 32 feet. Much of the Guilds Lake area was inundated by the 1964 flood.

INTERSTATE 505 STUDY AREA NORTHWEST DISTRICT

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

PLATE 2

South of Nicolai, the deep basalt bedrock is overlain by Sandy River mudstone, then layers of claystone, siltstone, and sandstone, and a layer known as the Troutdale formation, a compacted gravel and sandstone rock ranging from 20 to 300 feet deep.

North of Nicolai and east of St. Helens Road is a relatively flat floodplain. Borings as deep as 100 feet show clay at that level; the clay is covered by layers of gravel, loose sand, and silt deposited by the Willamette and Columbia rivers in an irregular manner. The ground water level lies at approximately the same elevation as the river and matches its fluctuations.

Guilds Lake was filled when the Port of Portland dredged a deeper river channel in 1922. The fill material is mostly sand and silt. Logs and other wood waste dumped into the lake from a sawmill on the southeast shore were not removed. Other waterfront locations and old stream beds have also been filled. The debris and the loose condition of the fill create poor foundation conditions.

The configuration of the West Hills and the 1962 earthquake measurements suggest that there may be a fault along the base of the hills. Although the evidence is not conclusive, the presence of a fault has been assumed in the preparation of this study.

Two small slide areas are known to exist, at approximately 30th and Vaughn and 31st and St. Helens Road. They are only 10 to 15 feet deep, are not presently active, and can be contained without excessive cost.

b. Plant and Animal Life. The West Hills that border the district are notable for their natural tree cover and the habitat they provide for birds and other wildlife. Forest Park is covered largely by second growth fir, cedar, and hemlock and a variety of broadleaf hardwoods, shrubs, and ferns. Wildlife includes blacktailed deer, mountain beaver, racoon, grey fox, and smaller species, with occasional sightings of black bear and the rare Roosevelt elk. Bird life abounds.

There is no significant natural habitat elsewhere in the study area. Vegetation in the industrial areas is sparse. South of Vaughn Street many of the residential streets are lined with trees, and over 600 young street trees were planted by the City and the District Association early in 1973. Open

spaces include Wallace and Couch parks, the site of the Old Forestry Building at 28th and Upshur, and smaller park areas on the site of the old St. Vincent Hospital.

Wallace Park covers the block between Pettygrove and Raleigh streets just east of Chapman School. Most of the park is planted in grass, with trees at the edges; a ball field for Little League is in the southwest corner. Couch Park, originally planted as an arboretum, covers the block just east of Couch School and north of the fine, heavily treed grounds of Temple Beth Israel.

2. Air Quality

The quality of the air in Northwest Portland depends on the season of the year, wind direction, and inversion conditions. When the wind is from the south and east (usually in the winter), it carries pollutants from downtown sources over the Northwest District. When the wind is from the north, it blows industrial pollutants over the area. The worst conditions occur during inversions, when a sinking mass of warm air traps a layer of pollutant-laden cold air close to the ground. In Portland these conditions are more likely to occur in the fall and winter.

Four main types of pollutants were investigated: measurements were taken during November 1972 through January 1973 for carbon monoxide (CO), nitrogen oxides (NO_x), and particulates (including lead), and estimates for hydrocarbons (HC) were based on CO levels. Additional data was obtained from readings taken by the Department of Environmental Quality (DEQ) and the Columbia-Willamette Air Pollution Authority (CWAPA).

Carbon monoxide results from motor vehicle emissions. This colorless, odorless, and tasteless gas has no effect on vegetation at levels measured in the urban environment, but it reduces the ability of blood to distribute oxygen to the body. CO levels in the Northwest do not exceed federal standards except on the roadways themselves, but at least two industrial sources put over 100 tons of CO into the air every year.

Oxides of nitrogen are produced by combustion engines. Nitric oxide (NO) is the most plentiful in automobile exhaust. It combines with oxygen to produce nitrogen dioxide (NO_2), which is the most harmful to human health and vegetation. Exposure to NO_2 over two to three years' time has increased the incidence of bronchitis in children, and it is known to cause leaf deterioration and growth retardation in vegetation. It

is also one of the ingredients of smog. The NO_2 levels in the Northwest are in no danger of exceeding the federal standards, but nitrogen oxide levels are high due to industrial sources and home heating (which accounts for 30 to 50 percent of the measured levels).

Particulate matter is composed of particles of varying size, mostly from industrial sources and lead from gasoline. The particulate levels in the Northwest, measured at stations monitored by the Columbia-Willamette Air Pollution Authority, are among the highest in the city. There are three industrial sources emitting more than 100 tons a year in or near the study area. On at least one occasion during this study the secondary federal standard was exceeded at 12th and Lovejoy. Lead content was found to be quite high although there is presently no federal ambient air quality standard for lead. Proposed federal standards will require reduced lead content in all gasoline.

Hydrocarbon emissions from vehicles can be inferred from CO levels. HC combines with NO_2 in the presence of sunlight to produce smog. It is inferred from existing data that the levels of hydrocarbons in the Northwest District regularly exceed the federal standards, and that much of the emission is due to industrial sources.

3. Noise

Existing noise levels in some parts of Northwest Portland approach or exceed standards set by the Federal Highway Administration.

People who are living along Vaughn and Wardway and in the scattered pockets of housing north of Vaughn are subject daily to noise levels that exceed the federal standard for residential areas (70 decibels on the A scale (dBA) for more than 10 percent of the time). The residential standards are also exceeded along many of the arterial streets through the Northwest District, including Lovejoy which is bordered by two hospitals. Noise contours describing existing levels are shown in Plates 16 through 21, Section V.

Most of the noise can be attributed to traffic, mainly truck traffic, and to the railroads, although other loud intermittent noises emanate from the industrial area. The only relief expected in the near future is the possible design of a "quiet truck."

4. Land Use

a. Commercial and Industrial. Within the study area, commercial and industrial properties vary in type, size, and value from north to south in a clear relationship to their distance from the downtown business district. Large scale, low-density, manufacturing, and wholesaling firms are located farther north on land of lower value in the Guilds Lake area, while smaller, more valuable properties have been developed more intensively on land closer to downtown.

Land values range from $1.11 per square foot in Guilds Lake, which is the most expensive industrial land in Portland, to $6.00 per square foot near Good Samaritan Hospital. By comparison, downtown commercial land is often valued at $20 to $25 per square foot.

Land values in the Guilds Lake area have doubled since 1956, and land values south of Thurman have increased even more.

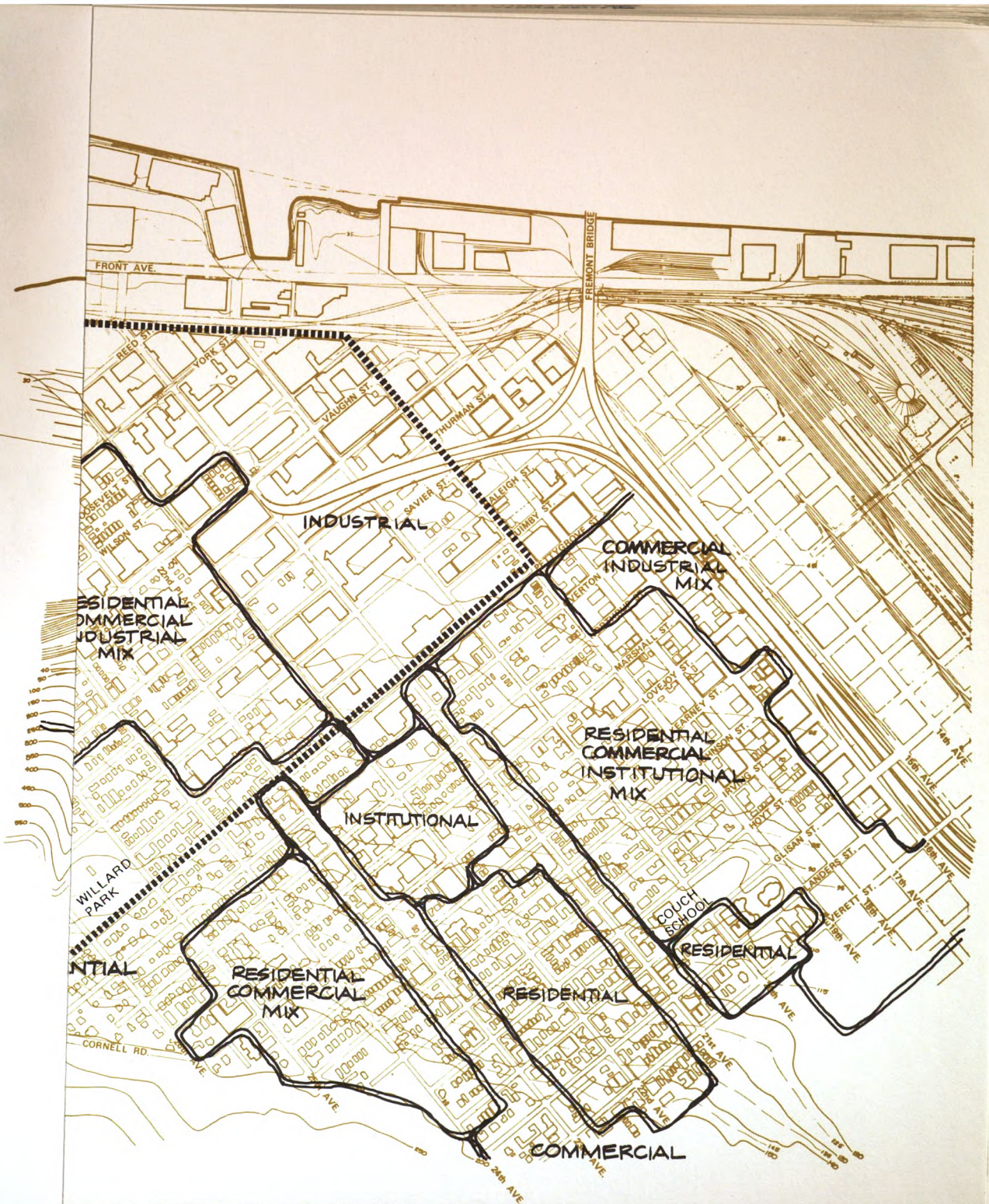
Altogether there are 1,125 business firms in the study area. Total employment in 1972 was 22,330.

Table 1 shows the difference in the types of firms located north and south of Thurman Street. Wholesaling and manufacturing are the two main types of business in the north part of the district, while service firms followed by retailing predominate further south. Neighborhood-oriented businesses are located along 21st and 23rd avenues and one retail center spreads to both sides of Burnside at 23rd.

TABLE 1

BUSINESS FIRMS, BY TYPE AND LOCATION
NORTHWEST DISTRICT

Type of Business	Percent of Firms North of Thurman	Percent of Firms South of Thurman
Manufacturing	18.9	6.5
Retailing	14.2	18.8
Services	7.7	45.6
Transportation, Communication, Utilities	8.4	3.3
Wholesaling	39.4	14.4
Other	11.4	11.4
Total	100.0	100.0



INTERSTATE 505

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

GENERAL LAND USE

PLATE 5

1200'

Parcels south of Lovejoy zoned for high-density apartment use (AO) have attracted professional office buildings mainly for medical and related uses. In the area close to Good Samaritan Hospital, there are now 22 medical office buildings, and 18 buildings for medical-related uses.

On the east side of the area south of Thurman, properties are used by distributors of small, high value goods and by such service businesses as printing firms which need locations near the central business district. Land values in the area have risen sharply. Commercial properties which averaged $1.00 per square foot in 1956 averaged $5.20 in 1969.

A similar distinction can be made in terms of employment. In both areas, small firms predominate, but nearly twice as many south of Thurman employ fewer than 10 persons. While many more wholesaling than manufacturing businesses are located north of Thurman, the larger firms tend to be manufacturers. Of the 26 firms north of Thurman with more than 150 employes, 13 are manufacturers and six are wholesalers.

TABLE 2

SIZE OF FIRMS BY EMPLOYMENT
NORTHWEST DISTRICT

Number of Employes	North of Thurman Percent of Firms	South of Thurman Percent of Firms
Less than 10	44.3	84.8
More than 150	6.3	1.5

A sample of 73 firms was studied in order to measure growth in employment. Between 1960 and 1972, the average annual increase in employment was 1.3 percent. The growth rate for manufacturing firms was 1.7 percent and for wholesale businesses, 1.2 percent. Freight and warehousing operations sampled showed no increase at all.

Land available for industrial growth north of Thurman is very limited. Most of the vacant parcels are held by Portland Terminal Railroad or by existing industries for expansion purposes.

Judging by building permits, the trend in the area is toward more wholesaling and distribution operations, businesses for

which transportation time and distances are critical cost factors. Firms which are more sensitive to the cost of land and taxes rather than location, and those with space needs that can no longer be met, will as circumstances permit move to Rivergate or other outlying areas where land is priced from 40 to 60 cents per square foot. This change in the type of firm in the area will affect the employment figures in the long run.

Since Burnside has been widened to four lanes and the parking removed, small shops and auto showrooms are being converted to uses less dependent on curb parking. A number of the vacant commercial properties on 21st and 23rd avenues have been put to a series of interim or short-term uses since the retirement of the business people who owned or operated them for many years. The remains of the old Slabtown shopping area near 23rd and Thurman have been revived by young people who have opened craft shops. Businesses on Vaughn, however, have suffered a loss of patronage since the on-street parking was removed to provide additional interim capacity for vehicles using Route 30.

In the southern part of the district, three federally subsidized high-rise apartment buildings have been put up, along with a number of private office buildings. At the east and north edges, however, there has been little new construction; the more intensive uses are mostly locating in existing buildings.

Given the values of land, warehousing may replace less intensive manufacturing uses in the north part of the district, while south of Thurman warehousing can be expected to give way to more intensive commercial uses.

b. Housing and Social Patterns

(1) The Residential Neighborhood. Northwest Portland is among the oldest neighborhoods in the city; it was opened for development by Captain John Couch in the 1870's. Nineteenth Avenue was once the finest boulevard in Portland, and the area was known as Nob Hill. To the north, Irish and Scandinavian workers were attracted by the opportunity to work in the mills along the waterfront. The neighborhood around St. Patrick's Church was known as Slabtown, the name taken from the neat stacks of slabwood fuel that lined the city streets. As the working class families prospered, they built large frame houses in the Chapman School area and their places in Slabtown were filled by newcomers from Eastern Europe. After the timber in Willamette Heights was sluiced down Balch Canyon, homes were constructed on the hill.

As a result of these successive layers of history, the study area is characterized by a great variety of architectural styles--from Georgian brick mansions to elegant Carpenter Gothic and American Victorian dwellings with their vertical accents, to small frame houses built by millwrights. Many of the older homes still exist, and some have been converted to commercial uses. Just before and after World War I, some of the oldest homes in the Nob Hill area were torn down to build the six and eight-story masonry apartment buildings that now characterize the southern portions of the district.

Following World War II, an emigration from the north end of the neighborhood occurred as the second generation was assimilated. In Census Tract 45*, at the north end of the neighborhood, homes were replaced by industrial and commercial buildings and parking lots, separating the remaining homes and apartments. Then in the early 1960's, the Stadium Freeway was constructed along the east edge of the neighborhood, and another outflow of people resulted. The three census tracts in the south part of the district--47, 48, and 49--held their own in terms of population between 1960 and 1970, but the number of housing units increased, indicating the construction of apartments and the conversion of larger older homes to rooming houses.

The announcement of expansion plans by Good Samaritan Hospital in 1969 and the prospect of the destruction of yet more housing brought protests by the residents. In response, the city appropriated $75,000 for the City Planning Commission staff to work with the citizens in the area to draw up a comprehensive plan for the Northwest District. This plan will be reviewed by the City Planning Commission and City Council later this year. The main goal of the plan as approved by the District Association is the rehabilitation of existing housing and the construction of new dwellings.

The future of the transitional zones at the north and east edge of the neighborhood will be influenced by the size of the remaining pockets of housing, their proximity to other residential areas, and the nature of the industrial and commercial uses around them. Those residential groupings which are larger, not too far removed from other housing, and not impacted by noisy or truck-oriented industries, may survive even without the construction of new housing. Given the cost of land, new housing will necessarily have a relatively high density.

*See Plate D-1 for location of Census Tracts.

The total population of Census Tracts 45, 47, 48, 49, and 50 was 13,588, according to the 1970 census. Table 3 compares the age distribution of the population in the district and the Portland-Vancouver metropolitan area as a whole. The Northwest District has double the proportion of adults 65 and over, and less than half the proportion of children. It also contains a much larger proportion of young adults, age 20 to 24. The population is 96 percent white, and 55 percent are women.

Residents in the district differ significantly from the region in marital status. Of those older than 14, only 38 percent are married compared to 64 percent in the region. A large proportion are single (33 percent), 14 percent are widowed, and 15 percent are divorced.

The number of larger apartment dwellings is shown by the proportion (62 percent) of the available housing units located in buildings of 10 units or more. Fully 90 percent of all the housing units are renter-occupied and half of all the households comprise a single person living alone.

Since so many residents are renters, it is surprising to find one-third of them living in the same place in 1970 as they occupied in 1965.

The rental rates seem quite low (half of the units rented for $75 or less per month), but many of the housing units are small. One-sixth of the residents have rented only one room. The median income is quite low compared to the city, reflecting the high proportion of elderly persons.

TABLE 3

DISTRIBUTION OF THE POPULATION, BY AGE

Age Distribution	Northwest District (Percent)	Metropolitan Area (Percent)
Under 20	16.7	36.3
20-24	14.3	7.8
25-34	12.1	12.7
35-44	7.9	10.8
45-64	26.2	21.5
65 and over	22.8	10.8

TABLE 4

HOUSING CHARACTERISTICS

	Northwest District	City of Portland	Metropolitan Area
Percent One-person Households	49.3	29.5	20.9
Percent Owner-occupancy	9.5	53.9	61.8
Percent with Same Residence Five Years or More	32.3	48.8	46.9
Median Monthly Rent	$ 75	$ 91	$ 97
Median Annual Income	$3,815	$6,701	$8,378

One-third of the individuals living alone and 13 percent of the families are below the government poverty level. Of the families, three-fourths do not receive any kind of public assistance.

(2) Census Tract 45. The area which would be most affected by construction of a freeway (north of Thurman and east of 35th Avenue) lies in Census Tract 45, which includes Willamette Heights and all the housing between Thurman Street and Nicolai Street below the hill.

In 1970, Tract 45 contained 2,044 people. Of these, 31 were black, 26 were Spanish-speaking, and 109 were born outside the United States. Unlike the general study area, the age distribution is nearly identical to that of the city. Unemployment in this area was a little higher (9.1 percent), and a much higher proportion of the workers were employed in manufacturing and transportation firms.

The proportion of people at the lowest end of the income scale (under $2,000) was 9.7 percent as compared to 4.4 percent for the whole city. Fifteen percent of the residents there are below the federal poverty level, but only three in 10 of them receive public assistance. The median social security income is higher than in the city ($2,040 compared to $1,812), probably because of the higher percentage in Tract 45 receiving survivors' benefits.

This smaller area contains a higher proportion of families with children under six, living in houses (43.6 percent of the units are single-family dwellings) which they own (29 percent).

c. Institutional

(1) The Residential Neighborhood. "Neighboring patterns" in apartment districts differ from those where single-family residences predominate. Instead of child-rearing families socializing in backyards or homes, neighborhood residents meet in shops, restaurants, and on the street. Shopkeepers encourage this trend by offering personalized service--delivering goods to customers who are ill and encouraging socializing on their premises. Small stores, particularly grocery stores, commonly offer credit. The nearness and variety of stores and shops make it easy to walk.

In favorable weather, Wallace Park and Couch Park attract children and the elderly. For the latter, the parks seem to serve as a surrogate living room, with the obvious added attractions of a view and fresh air.

The variety of institutions contributes to the social life of the area. Several of the churches have lunch and study groups, many of them have choirs. All of the churches draw on the entire West Side of Portland for their congregations, if not the city, but their programs are an important resource for neighborhood residents, particularly women.

Friendly House provides emergency assistance to those residents living close by, and the diversification of their programs in recent years has contributed to the richness of the social patterns in the entire district. Folkdancing, yoga classes, a crafts fair, and Slabtown Stop Theatre are all part of the activities at Friendly House. Both the Northwest Pilot Project (for elderly citizens) and the Northwest Hotline (for young adults) offer alternative places to meet and socialize. Lutheran Family Services also offers group programs of this sort.

For retired persons, the "Loaves and Fishes" program offers a midday meal and companionship at Williams Plaza, and another site is being sought. "Meals on Wheels" volunteers take an average of 60 hot meals to shut-ins three times a week. Craft programs and a drama workshop are available for older adults.

The Northwest District Association sponsors events that contribute to socializing patterns--meetings on topics of current interest such as tree planting, health care planning, and Forest Park. NWDA cooperates with the Chapman School PTA, Friendly House, and other neighborhood associations to hold an annual fair in Wallace Park.

Smaller groups have formed to achieve specific goals--the Committee to Restore St. Patrick's Church, the Tenants Advisory Council in the public housing buildings, the Captain John Brown House Association, and the Neighborhood Improvement Committee, a business group concerned with the goals of the Northwest Comprehensive Plan.

(2) Census Tract 45. With a higher proportion of families and children in this census tract than in the district, socializing tends to differ. Social life is more likely to involve school and church activities, and Wallace Park is a fair-weather haven for mothers and children.

The very low-income people in the neighborhood seem to have evolved a mutual support system that transcends formal service programs. The family that takes in its neighbors when their utilities are shut off, the storekeeper who extends a cash loan to a customer, the elderly pensioner who babysits free for a mother on welfare, and the sharing of food stamps are examples.

Such practices help the poor to subsist. The system evolves over time and depends on face-to-face relationships that are not easy to re-establish in a new neighborhood.

5. Transportation Patterns (See Plate 8)

a. Water and Rail. In 1970, just over 1,400 deep draft vessels called at the Port of Portland. The development of containerization has speeded the loading and unloading process. The Port has expanded the container storage and transfer area at Terminal 2 to 26 acres and plans to relocate a section of Front Avenue to make more room. Rapid movement of containers is necessary to keep turnaround time short for large ships. The amount of petroleum coming in by ship is declining, as much of it now moves by pipeline from Seattle.

An average of 1,600 rail cars arrive and leave the Guilds Lake rail yard daily, plus an additional 100 cars which are switched into and out of the adjoining industrial area. The trailer-on-flatcar facility averages 30 car movements a day.

Rail movements through the industrial area cause traffic interruptions, particularly at the crossings along Front Avenue.

This is one reason for the planned Front Avenue overpass. Six trains a day use the Nicolai-22nd Avenue-Pettygrove rail line; these interruptions are usually short except at night.

The estimated frequency of rail crossings on Yeon Avenue is indicated below:

Frequency of Crossing	Number of Spurs
Four times daily	1
Three times daily	1
Twice daily	2
Once daily	4
Three times a week	2
Twice a week	2
Once a week	1

The length of the interruption varies according to the number of cars to be delivered along each spur, and whether or not the switching itself involves back-and-forth movements across Yeon Avenue.

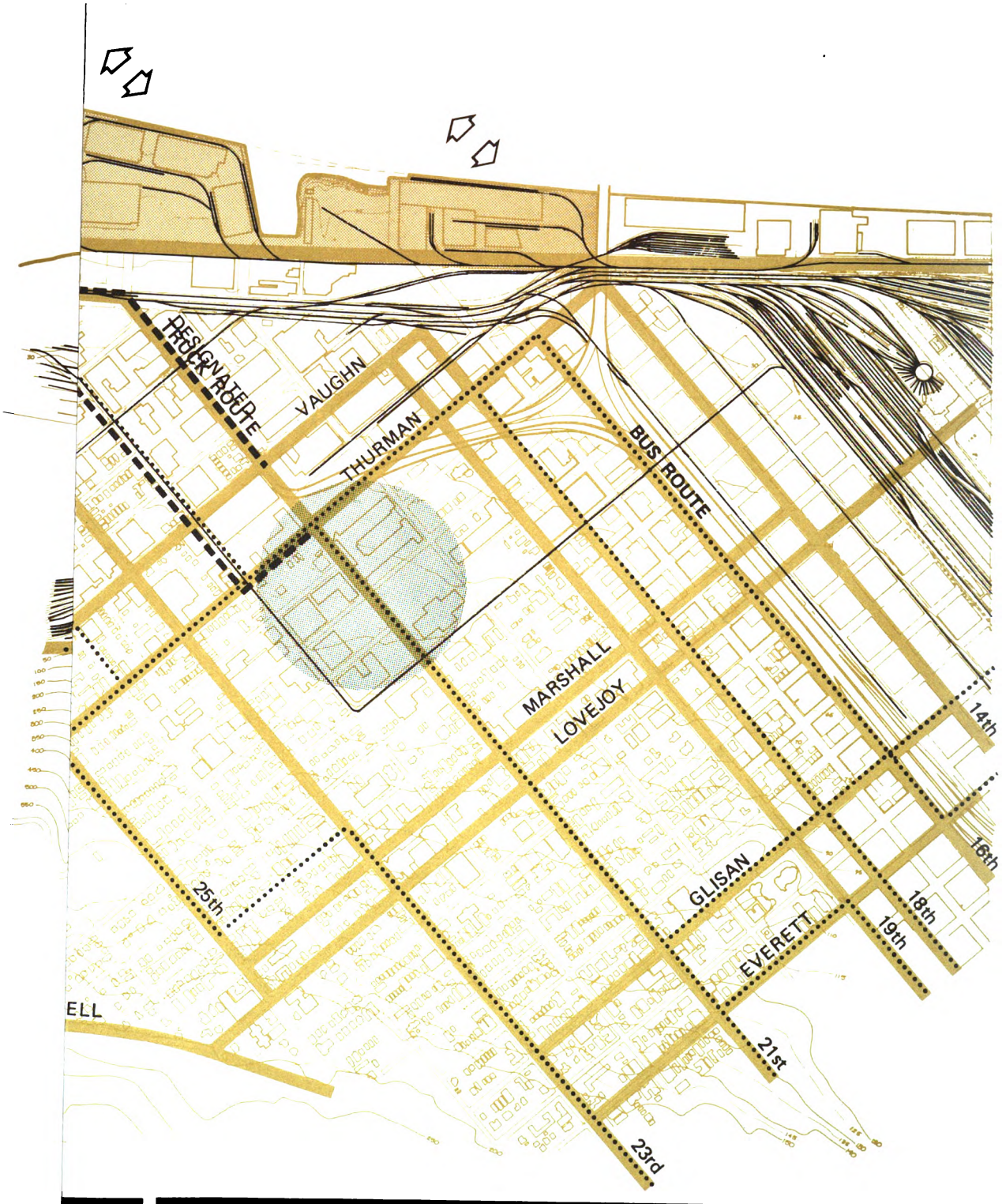
b. Automobile and Truck

(1) Existing Traffic. The traffic patterns discussed here are based on data for the period 1971-72 before the I-405 ramps were opened.

Traffic through the Northwest industrial area has been steadily increasing. Heavy volumes during 1971 were recorded on Front Avenue (19,000 vehicles per day at the intersection with Nicolai) and on Vaughn Street (16,700 vehicles per day near 21st Avenue). The heaviest volume occurred just south of the St. Johns Bridge (21,800 vehicles per day in February, 1972). Plate 9 indicates traffic counts in the Northwest District.

In general, traffic flows into the area during the morning from both the north and south, and flows out again in the afternoon. Weekend traffic amounts to less than half the weekday traffic. It is estimated that one-third of the traffic on the I-405 ramps is through traffic having neither an origin nor a destination in the Northwest District.

Given the industrial nature of the north end of the district, it is not surprising that the percentage of trucks in the area is higher than the regional average. In 1971, the percentage of multi-axle vehicles varied from 8 percent on 19th Avenue to just over 20 percent on Nicolai and Yeon. The proportion of large trucks is low during the morning peak hour, but the proportion in the evening peak hour ranges from 8 to 16 percent.



INTERSTATE 505 EXISTING TRANSPORTATION SYSTEM

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

PLATE 8

1200'

During the morning peak hour, the average speed of vehicles on Vaughn Street (U.S. 30) travelling east from 19th to 29th avenues was 19 miles per hour before the recent interim changes were made. Westbound traffic over the same street in the afternoon peak hour averaged 22 miles per hour.

The accident rate at intersections is high. In 1971, there were four pedestrian accidents, 89 personal-injury accidents, and 263 non-injury accidents. The largest number of accidents occurred at 22nd and Vaughn (12), 25th and Thurman (11), 23rd and Vaughn (11), and 29th and Nicolai (11). Intersections with the highest accident rates per million vehicles entering the intersection were:

27th and Thurman - 2.88
25th and Thurman - 2.84
24th and Thurman - 2.60

These rates are among the top 25 percent in the city.

When accident rates are weighted to reflect severity (a factor of 2.7 for personal injury, 0.5 for property damage), the rates were highest at the following intersections:

25th and Thurman - 4.83
27th and Thurman - 3.97
23rd and Thurman - 3.31
22nd and Vaughn - 3.22

None of the neighborhood streets south of Thurman except the Lovejoy ramp have traffic counts exceeding 10,000 vehicles per day. Traffic volumes on 18th and 19th (U.S. 30 until the West Fremont ramps opened) have dropped from 10,200 and 11,800 vehicles per day respectively to little more than half that amount as traffic has diverted to the I-405 Freeway.

The area around the hospitals is heavily congested. Lovejoy Street and 23rd Avenue are approaching their capacity. Congestion around Good Samaritan Hospital is increased by motorists who circle the area looking for a parking space.

Many residents express concern over the traffic and noise on busy streets and feel that they affect the attractiveness of the area as a place to live. These feelings tend to further the isolation of the less mobile.

(2) Future Traffic. The traffic projections assume only those facilities planned for the very near future--such as the Mt. Hood Freeway and I-205. They are

adjusted to reflect the 1990 Public Transportation Master Plan for transit. If the Public Transportation Master Plan is implemented by 1990, approximately 63,000 vehicles per day will enter and leave the Northwest District by the West Fremont Interchange and I-505. Without the Transportation Plan, about 8,000 additional vehicles will use the West Fremont Interchange.

c. Transit. Bus ridership in the Northwest District is high compared to other parts of the city.

The 23rd Avenue line runs between Willamette Heights and the central business district and loops through the industrial district at peak hours. Headways average 15 minutes, and ridership is currently averaging 4,200 passengers a day. Tri-Met has selected the 23rd Avenue line as one of three lines in the city for the first installation of bus shelters.

The 21st Avenue line carries 1,600 passengers a day, running from the industrial area to downtown and out East Burnside to S.E. 80th Avenue. Every other run continues out to Mt. Hood Community College in east Multnomah County.

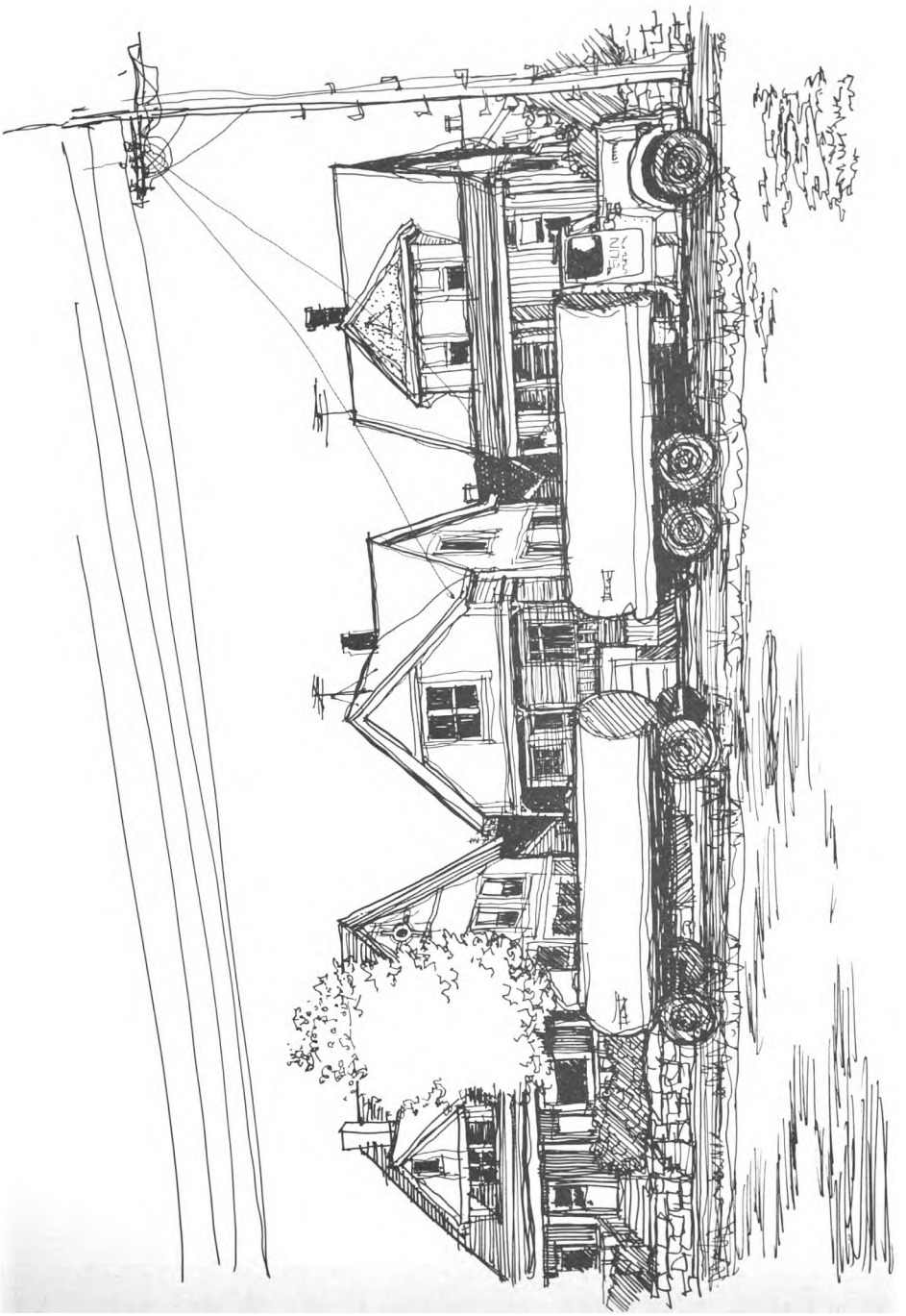
The Linnton-Raleigh Hills line carries 600 passengers per day from near the St. Johns Bridge to Raleigh Hills, using 16th and 18th avenues through the Northwest District and passing Portland State University in downtown Portland.

The Arlington Heights-Westover Road-Kings Heights line carries 200 passengers per day. It runs from 23rd and Burnside up through the West Hills residential areas, connecting with the 23rd Avenue line for downtown.

d. Pedestrian and Bicycle. While there is no data, one can observe that the neighborhood has the most active pedestrian life outside the central business district. Much of this activity is directed toward the shopping areas on upper Burnside which are reached by walking along Everett and on 21st and 23rd avenues. A common sight is the struggle of an elderly person lifting a shopping cart up a curb. Curb ramps for wheeled carts and wheelchairs on main shopping routes will soon be installed by the city.

Stairways connect Cornell Road on the hill to lower Northwest streets; an unusual urban feature mainly used by children on their way to Chapman School and Wallace Park.

Bicycles are common in the Northwest District. The Northwest Comprehensive Plan recommends that 20th, 22nd and 24th avenues, and Overton and Flanders streets be signed as bikeways. The land under the Stadium Freeway next to 16th Avenue is also planned as a bikeway, connecting Thurman to the North Park Blocks and the central business district by passing under the freeway at Johnson Street.

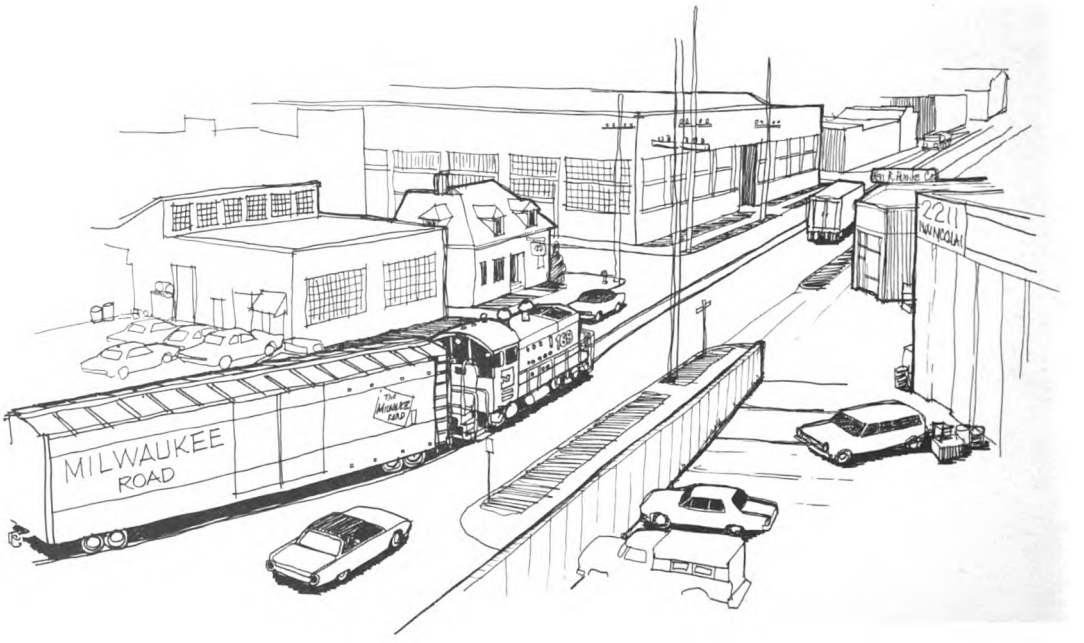


IV. DESCRIPTION OF ALTERNATIVES

IV. DESCRIPTION OF ALTERNATIVES

Five alternative highway plans have been developed to carry through traffic between the West Fremont Interchange and U.S. 30 at Kittridge Avenue and to collect and distribute local traffic. These alternatives are described in this section and compared in the following sections of this report with regard to level of service and environmental impact.

The analysis also includes an evaluation of a "no-build" alternative and examines the potential of public transit to meet part of the traffic demand.



A. NO-BUILD ALTERNATIVE

The no-build alternative is defined as follows:

(1) the ramps from the Stadium Freeway and the Fremont Bridge come to ground at N.W. 21st Avenue;

(2) no major new right-of-way is acquired;

(3) capital improvements will be limited to street widening and other minor construction; and

(4) removal of parking on some streets will be required.

A one-way couplet system carries westbound traffic on Nicolai and eastbound traffic on Vaughn. Vehicles exit from the ramps at 21st and Vaughn, continue north on 21st, and then turn west on Nicolai. Vehicles eastbound toward the Fremont Bridge and the Stadium Freeway use Vaughn, go south on 22nd, and east on Thurman. Curb parking is removed from Nicolai, Vaughn, and other streets along the route. Twenty-second, 23rd, and 24th avenues from Thurman Street north are also one-way streets. These changes will be made gradually, as they become necessary to handle the increasing traffic.

INTERSTATE 505

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

NO BUILD

PLATE 10

B. PUBLIC TRANSIT

Traffic forecasts have assumed the implementation of the transit plan developed for Tri-Met by the Columbia Region Association of Governments. In addition, the potential for further improvement in service level was examined.

The analysis of the further potential for public transit was developed along two lines. First, the Portland-Vancouver Metropolitan Area 1990 Public Transportation Master Plan was analyzed and two modifications were developed and evaluated for their potential to further reduce I-505 traffic volumes. Next, a very high level regional public transit system was assumed to determine what the range of transit capability would be for reducing the I-505 facility itself. These are discussed below.

Two modifications in the 1990 Master Plan were examined:

(1) a park-ride facility on I-505 right-of-way, with headways of two to two and one-half minutes through the N.W. District to the CBD provided by the three bus lines serving the district; and

(2) a demand responsive portal-to-portal transit system oriented to four activity nodes--the Northwest District residential community, the industrial district, the medical center, and the proposed Downtown Transfer Terminal.

After examining these possible modifications, the following was concluded. A park-and-ride lot, because of the excellent service it could provide, would attract a substantial number of users. It would not, however, reduce the projected traffic volumes on I-505. In fact, it could have the opposite effect--increasing auto trips by attracting commuters who might otherwise have used park-and-ride lots nearer their homes.

A demand responsive, portal-to-portal system, while more expensive than the proposed fixed route of the 23rd Avenue bus line which it would replace, would more effectively meet the needs of the area's low-income and elderly population. It would not, however, more effectively reduce trips on an I-505 facility than the 1990 Master Plan.

If the goals and constraints which guided development of the 1990 Master Plan were altered, any number of systems could be developed which would dramatically affect the present dependency on auto travel. Fixed guideway, personal-rapid-transit (PRT),

and demand-responsive systems were examined as examples of alternatives yet to be developed but which could conceivably be operating by 1990.

In discussing the potential of public transportation, it is important to first define the goals of the system. Traditional systems are primarily concerned with efficient, economical operation, and this goal usually determines the design of the system. Other goals, such as minimizing auto vehicle travel and providing service to less mobile residents, are usually subordinate to cost considerations.

Yet, many citizens have expressed a strong desire for an evaluation of transit potential in which concern for maximizing transit ridership has priority over the system's cost effectiveness. Unfortunately, conventional transportation planning models are too tempered by existing behavior characteristics to provide a reliable guide to the consequences of radical changes in travel habits. A system designed to accommodate as a primary goal "a great reduction in the need for automobile travel" would likely be accompanied by severe restraints on parking and vehicle operation. Such public controls are not assumed by the model calibrations used in the 1990 Master Plan.

In the Northwest District commuter traffic through the I-505 corridor amounts to about 22 percent of total traffic. Virtually all of the remaining travel is related to purposes which have little propensity to public transportation, such as trucking and business trips. Assignment of the non-commuter trips demonstrated that serious congestion in the study area could not be eliminated by the presence of even a very sophisticated transit system.

Transit as an alternative to an improved highway facility will not adequately meet the projected need. Transit should, however, be considered as an important supplement to whatever transportation alternative is selected.

C. HIGHWAY ALTERNATIVES

Roadway designs are based on adjusted 1990 traffic projections and assume the implementation of the 1990 Public Transportation Master Plan. The analysis of traffic need is described in Appendix A.

For reference, each of the "build" alternatives are named after the existing streets that most closely correspond with the right-of-way, as follows:

Alternative	
1	Upshur
2	Upshur-Yeon
3	Long Yeon
4	Short Yeon
5	Industrial

All of the alternatives require the widening of Vaughn Street to four lanes. All except Alternative 3 (Long Yeon) require the widening of St. Helens Road to five lanes; two lanes each direction and a left-turn lane.

Other existing streets will also need widening, and new streets are opened where necessary. New improvements and right-of-way are explained in the description of each alternative.

All of the alternatives (except the no-build) show the planned overpass between Yeon Avenue and Front Avenue. The design of the overpass is not altered except in Alternatives 3 and 4, in which the overpass is incorporated into the design of the interchange. The cost of the overpass is included in the total cost of each alternative for comparison.

All of the alternatives in some degree disrupt rail service to individual properties. The spur line serving properties west of St. Helens Road is severed in Alternatives 1, 2, 4, and 5. In most other cases, service can be restored.

The designs and right-of-way locations indicated in the illustrations are approximate. Each alternative has been designed in sufficient detail to compare level of service, cost, and environmental impact. Changes in the roadway and ramp configurations and minor changes in the right-of-way can be expected as final designs are developed for a selected alternative.

1. Alternative 1, Upshur

a. Freeway. The freeway section of Alternative 1 extends west from the West Fremont Interchange (I-405) to St. Helens Road at 34th Avenue. The freeway is depressed 25 to 40 feet and confined between Vaughn and Upshur streets from I-405 to 28th Avenue. The corridor varies in width between 28th and 34th avenues as it surfaces and bends to align with St. Helens Road.

The freeway is eight lanes wide from I-405 to 23rd Avenue. It narrows to four lanes at 26th Avenue and remains four lanes wide to 34th Avenue.

An off-ramp from the Fremont Bridge touches down at 21st and Vaughn; an off-ramp from the Stadium Freeway touches down on Vaughn at 22nd Place. The on-ramp for the Fremont Bridge is at 23rd and Upshur; the on-ramp to the Stadium Freeway begins at 22nd and Thurman.

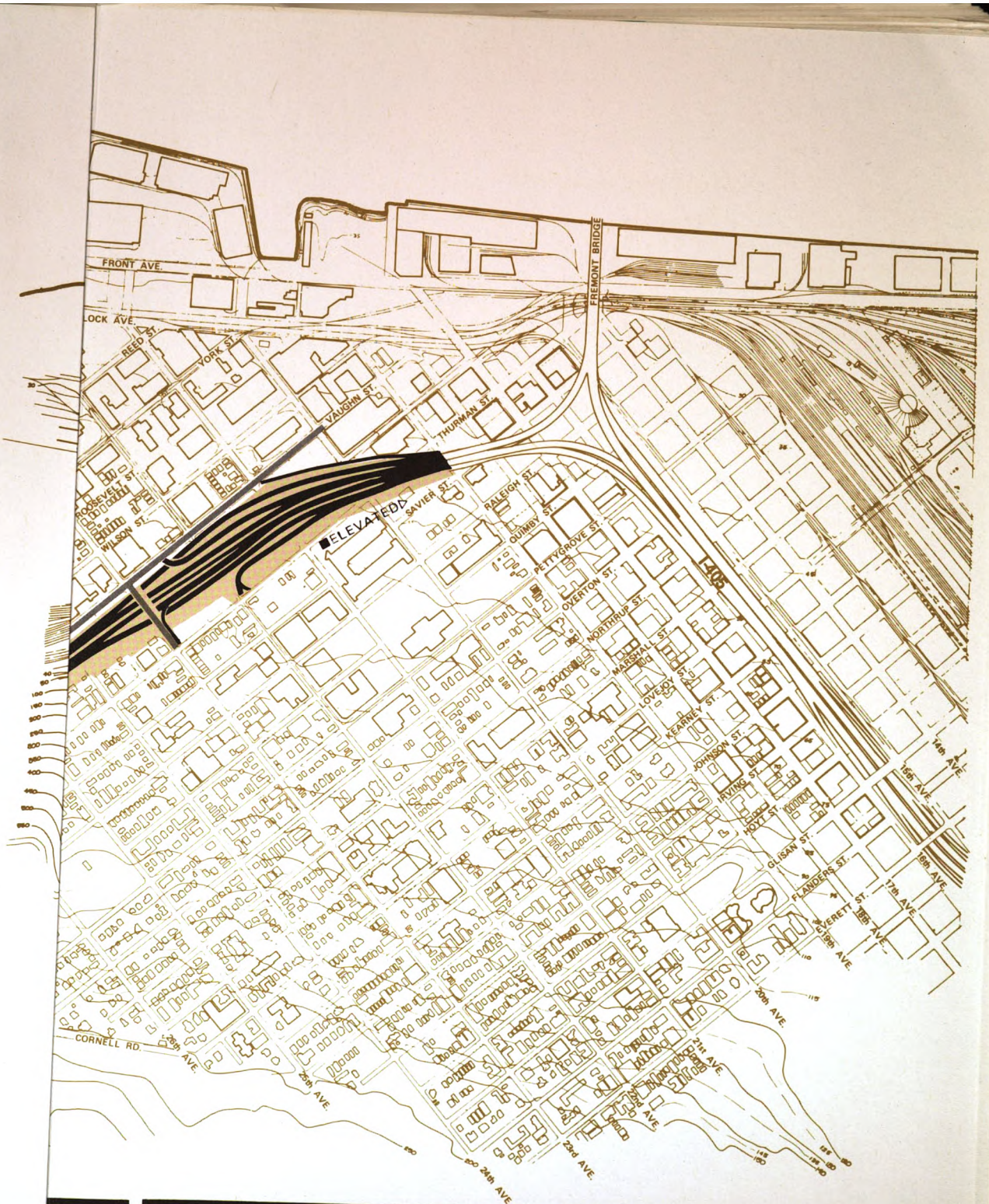
Ramps connect St. Helens Road to Nicolai Street between 30th and 34th avenues at the end of the freeway. The north ramp is at grade. Vehicles travelling southeast on St. Helens Road and bound for destinations in the northwest area can exit by a ramp which passes under the freeway and connects to Nicolai at 30th Avenue. Vehicles can continue east on Nicolai or travel up Wardway to Vaughn.

The depressed freeway is crossed by 23rd and 27th avenues. The 23rd Avenue crossing also provides access to the Fremont Bridge on-ramp.

b. Streets. St. Helens Road (U.S. 30) is improved to four lanes and a left-turn lane from the end of the freeway to west of Kittridge Avenue. Left-turns to and from Industrial Street are not permitted. Wardway is realigned to the east. Vaughn Street is widened to four lanes.

c. Rail. One rail track is severed on 22nd Avenue between Vaughn and Thurman streets. A new rail connection is made from the line in Nicolai Street east to the main line paralleling Front Avenue. Rail service is severed to properties west of St. Helens Road.

d. Estimated Cost: $29,700,000



INTERSTATE 505

ALTERNATIVE 1

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

PLATE 11

2. Alternative 2, Upshur-Yeon

a. Freeway. This freeway combines features of Alternatives 1 and 3. Four lanes of depressed freeway are built in the block between Upshur and Vaughn, while four elevated lanes swing north into the industrial area.

From the West Fremont Interchange vehicles bound for St. Helens Road take the depressed portion of the I-505 freeway. As in Alternative 1, this part of the freeway is crossed by 23rd and 27th avenues.

A single two-lane off-ramp provides an exit to Vaughn Street at 21st Place.

The vehicles bound for the industrial area swing north on an elevated structure that crosses Nicolai, passes over Yeon Avenue, and then slopes down to ground level and intersects with an extension of Industrial Street. The overpass to Front Avenue connects to this intersection.

Vehicles going south and east may enter the freeway from St. Helens Road, Yeon Avenue, the Industrial Street extension, and from an on-ramp at 24th and Vaughn. Ramps connect St. Helens Road to Nicolai Street between 30th and 34th avenues as in Alternative 1.

b. Streets. St. Helens Road (U.S. 30) is improved to four lanes and a left-turn lane from the end of the freeway to west of Kittridge Avenue. Left turns to and from Industrial Street are not permitted. Wardway is realigned to the east.

Yeon is improved to five lanes including a left-turn lane from the Front Avenue overpass to 29th Avenue. A new street connects Industrial Street with the Front Avenue overpass. An access street from 26th Avenue leads under the Front Avenue overpass to serve the properties south of the overpass that have lost their access to Yeon.

Vaughn Street is widened to four lanes.

c. Rail. As in Alternative 1, the rail line on 22nd Avenue is severed and service restored as previously described. Rail service is severed west of St. Helens Road.

d. Estimated Cost: $53,000,000

INTERSTATE 505

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

ALTERNATIVE 2

PLATE 12

1200'

3. Alternative 3, Long Yeon

a. Freeway. Two lanes of traffic each leave the Fremont Bridge and the Stadium Freeway. Vehicles from the bridge may exit at 21st and Vaughn, while vehicles from the Stadium Freeway may exit at 23rd and Vaughn. The remaining traffic merges together as it swings north toward Yeon Avenue on a structure elevated to just west of 26th Avenue. East of 26th an interchange connects Yeon, the Front Avenue Overpass, the Industrial Street extension and the freeway.

The freeway comes to grade near 29th Avenue. The roadway parallels Yeon Avenue and continues on the ground to Express Avenue where it rises again to cross over rail lines, an access road to the rail yard, Kittridge Avenue, and St. Helens Road.

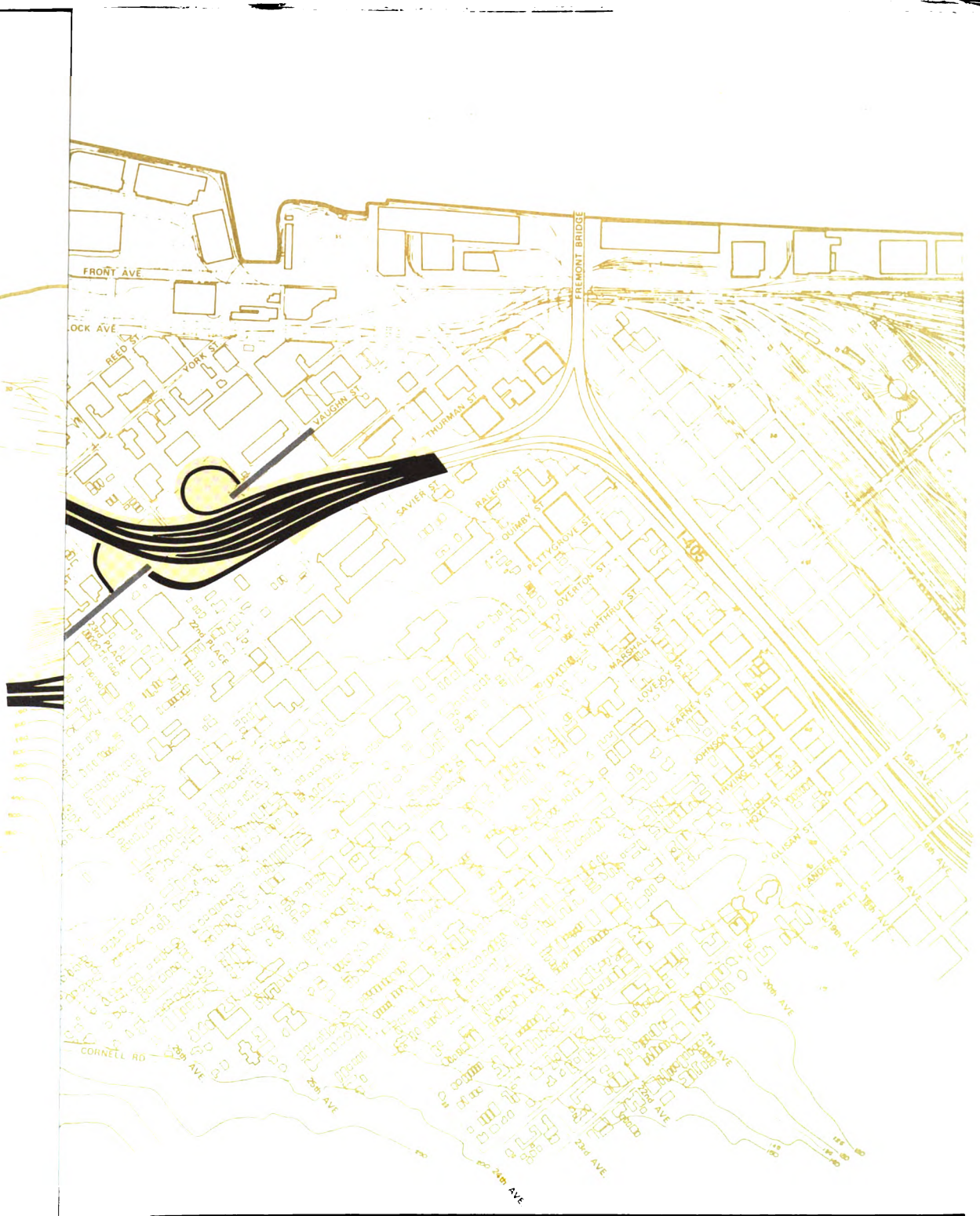
Vehicles travelling southeast on St. Helens Road must enter the freeway, but may return to St. Helens Road by a ramp if they wish. Eastbound vehicles on the freeway may also exit at the Industrial-Yeon interchange.

b. Streets. A new street from 26th Avenue serves the Guilds Lake Rail Yard and other properties that have lost their access along Yeon. A second access road is provided to the TOFC facility. Vaughn Street is widened to four lanes.

c. Rail. Retention of the rail line paralleling and within the Yeon Avenue right-of-way on the north side is required to preserve rail service to the industries fronting Yeon Avenue on the south side. It is necessary to maintain access to this main feeder track from the rail yards.

Rail access to one property north of Yeon will require a new rail connection from the line along Front Avenue. Only one property on Yeon Avenue, just east of Express Avenue, cannot have rail service restored without extensive modifications to the building. The 22nd Avenue rail line is again severed by this alternative, with service restored as previously described.

d. Estimated Cost: $72,400,000



INTERSTATE 505

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

ALTERNATIVE 3

PLATE 13

1200'

4. Alternative 4, Short Yeon

a. Freeway. Two lanes of traffic each exit from the Fremont Bridge and from the Stadium Freeway. Vehicles from the bridge may exit at 21st and Vaughn, while the vehicles from the Stadium Freeway may exit at 23rd and Vaughn. The freeway swings north on an elevated structure and slopes down to grade on Yeon Avenue near 26th Avenue. An elevated off-ramp exits to the Front Avenue overpass and the Industrial Street extension.

b. Streets. Yeon Avenue is designated as U.S. 30 for westbound through traffic and is widened to six lanes; three westbound and two eastbound with a median lane for left turns.

St. Helens Road is designated as U.S. 30 for eastbound through traffic with two lanes eastbound and two lanes westbound; a median is provided for left turns. Through traffic from St. Helens Road continues east on Nicolai and onto the extension of Industrial Street to reach the freeway or the Front Avenue overpass. Vehicles may also enter I-505 by a ramp at Yeon Avenue or use ramps on Vaughn at 22nd Avenue and 22nd Place to continue to the bridge and south. Nicolai is realigned to connect with the extension of Industrial. Wardway is realigned to the east and Vaughn Street is widened to four lanes.

c. Rail. Rail operations on 22nd Avenue are affected as in Alternative 3. The at-grade rail spurs crossing Yeon Avenue will continue in use, possibly restricted to off-peak hours in order to minimize traffic conflicts. Rail service is severed west of St. Helens Road.

d. Estimated Cost: $47,300,000

INTERSTATE 505

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

ALTERNATIVE 4

PLATE 14

1200'

5. Alternative 5, Industrial

a. Freeway. Two lanes from the Fremont Bridge and two lanes from the Stadium Freeway swing north. Traffic from the bridge may exit to Thurman Street at 18th Avenue, while traffic from the Stadium Freeway may exit at 21st and Vaughn.

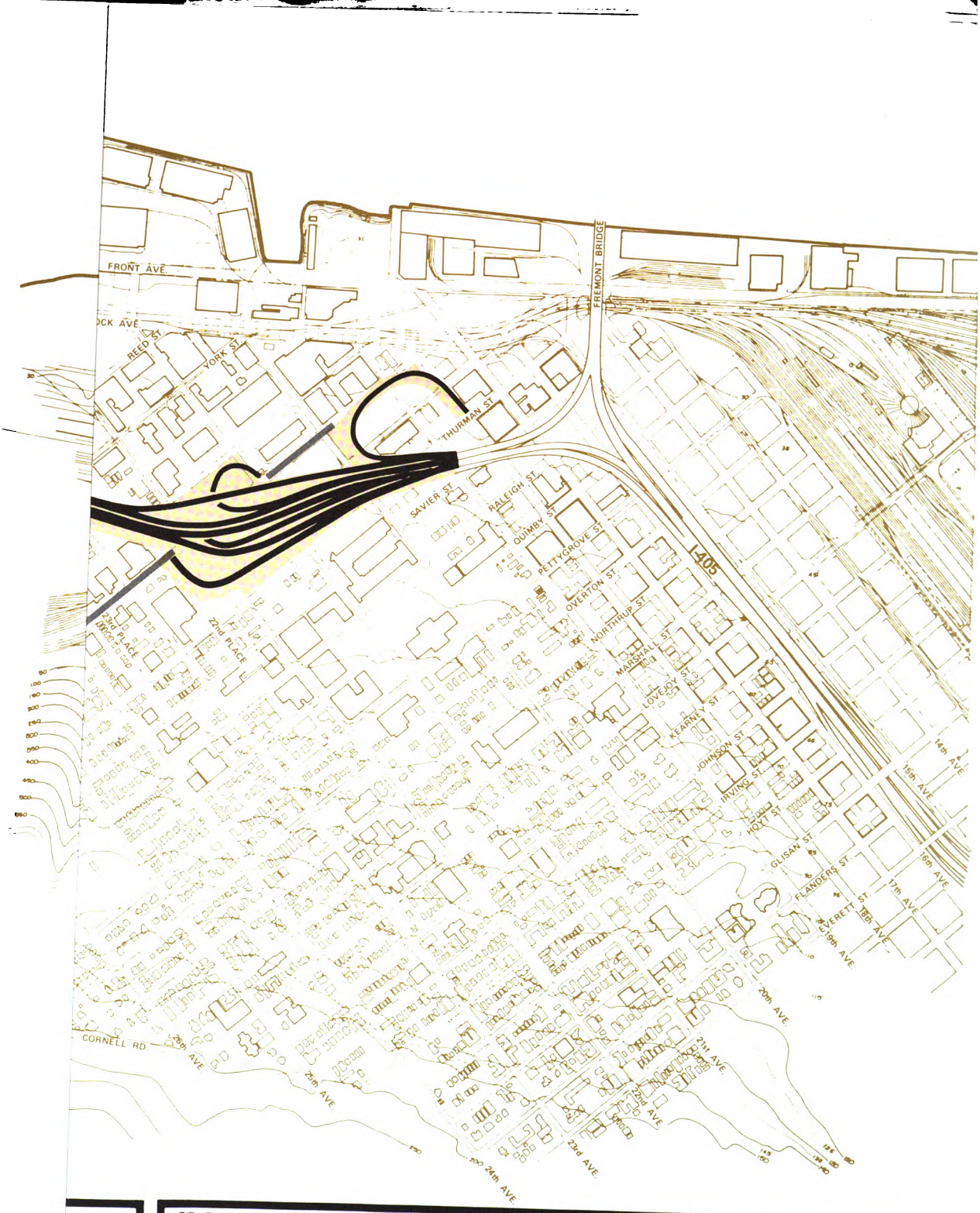
The entire length of the freeway is an elevated structure. It swings west over Industrial Street, leaving the street at grade level for local access. Vehicles may exit to Yeon Avenue and the overpass to Front Avenue or may continue to an exit at 29th Avenue. The structure finally comes to ground at St. Helens Road.

South and eastbound vehicles may enter the freeway from St. Helens Road, from 29th Avenue, from Yeon, and from Vaughn at 22nd Avenue and 22nd Place.

b. Streets. St. Helens Road (U.S. 30) is improved to four lanes and a left-turn lane from the end of the freeway to Kittridge Avenue. Vaughn Street is widened to four lanes.

c. Rail. Rail conflicts are limited to the severed lines on 22nd Avenue and west of St. Helens Road, as previously described. Rail lines adjacent to Industrial Street may require minor relocations within the interchange area east of 29th Avenue.

d. Estimated Cost: $66,800,000



INTERSTATE 505

ALTERNATIVE 5

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

PLATE 15

V. PROBABLE ENVIRONMENTAL IMPACTS

V. PROBABLE ENVIRONMENTAL IMPACTS

A. AIR QUALITY

None of the "build" alternatives will cause a degradation of air quality over what presently exists, either in Northwest Portland or in the metropolitan area. Nor will any of the alternatives cause a degradation of future air quality over what can be expected if I-505 is not built. Some of the "build" alternatives will result in lower concentrations of pollutants than the no-build in some locations.

This rather strong finding does not imply that there is no air pollution problem in Northwest Portland or that there will be no problem. The major components of such a problem are the effectiveness of the national emission control regulations, and, to a lesser extent, the pollutants transported into the area by the southeast winds blowing across the Central Business District.

The future character of the air quality in Portland depends most strongly upon the future of vehicle emission control technology and, secondarily, upon population growth as reflected in increases in vehicle miles travelled in the city. The combination of these two factors is presently projected, in such studies as The Transportation Control Strategy for Downtown Portland, to result in the improvement of Portland's air quality. Changes in EPA regulation of emission controls or in population trends may cause this picture to change significantly.

This study indicates that the contribution of Northwest Portland traffic to Northwest Portland air quality is generally between 20 and 80 percent; specific projections depend upon the pollutant and standard addressed. In no case does this traffic alone cause the federal ambient air quality standards to be exceeded.

These results may intuitively appear inconsistent with present thinking about pollutants emitted from vehicular traffic. It should be understood that the following points have influenced the findings of the air quality analysis.

1. The alternative designs for I-505 (mostly elevated and in cut) tend to reduce pollutant levels received at residential locations below the concentrations from an at-grade facility.

2. The maximum projected pollutant concentrations will occur on and near St. Helens Road, where traffic will also be moving more slowly. In general, the higher levels seen for some portions of the no-build result from lower traffic speeds.

3. The comparisons carried out in this study do not include a future where a significant amount (more than 25 percent) of travel in the city is replaced by public transit.

The pollutants measured were carbon monoxide (CO), nitrogen oxides (NO_x), and both weight and lead content of particulate matter. In addition, an overview of total oxidant levels was calculated based on the measured NO_x levels and archival hydrocarbon (HC) and meteorological data[1]. Other facets of the analysis included meteorological monitoring (wind speed and direction), and a program of simultaneous pollutant measurements near heavy traffic sources designed to demonstrate the validity of the mathematical prediction techniques employed.

Emission factors were derived for the analysis years 1980, 1985, and 1990 using the Oregon vehicle age mix and the U.S. Environmental Protection Agency (EPA) data regarding the deterioration of emission control devices.

On April 11, 1973 the U.S. Environmental Protection Agency granted automakers a one-year extension of the deadline to meet the 1975 auto emission standards required by the Clean Air Act and established less restrictive interim standards. This action occurred after the completion of the air quality study and during the preparation of this draft statement.

A review of the EPA action determined that there was a probability of an increase in predicted pollutant concentrations in Northwest Portland to the point of creating impacts where none are now expected. As a result, a re-analysis and update of air quality impacts is now under way.

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[1]Archival air pollution data employed in this study was obtained from the Oregon Department of Environmental Quality (DEQ) and the Columbia Willamette Air Pollution Authority (CWAPA).

Preliminary review indicates that impacts will not be increased significantly. The information presented here and in Appendix B will provide an understanding of the relative magnitude and distribution of pollutants, allow a comparison of alternatives and show the importance of air quality impacts relative to other environmental considerations.

The experimental procedure, monitoring schedule, sampling locations, data summaries, prediction methodology, and pollutant contour predictions are summarized in Appendix B.

A complete description of the air quality study, including the re-analysis of impacts will be published in a separate technical report shortly after the release of this document.

B. NOISE

Noise levels in Northwest Portland are already high, approaching or exceeding the standards set by the Federal Highway Administration (FHWA) in many locations. People who live in or near the industrial areas or along other busy streets and people who live in parts of Willamette Heights are already subjected to comparatively high noise levels that are caused by heavy truck traffic, railroad switching and the occasional loud noises that emanate from industrial plants. These background or ambient noise levels are in the range of 60 to 70 decibles (dB) in many parts of the district.

Since people perceive noise differently, the impact of changes in noise levels is subjective. Experience indicates that an increase of 5 decibels or less is not an objectionable increase for most people. For many people it is not a noticeable change. Of course, for people already subjected to high background noise the idea of any increase at all is unwelcome.

Predicted no-build noise levels based on 1990 traffic projections are from 0 to 5 decibels higher than the existing levels except for an area along Savier Street where the prediction is for an increase of up to 7 decibels (see Plates 16 and 22). None of the "build" alternatives will increase noise levels more than 5 decibels (see Plates 17 through 21).

From the noise contour maps it can be seen that predicted 1990 noise levels will exceed the federal standard of 70 dBA at some residential locations whether or not a freeway is built. The maps show that Alternative 3 has the least impact on residential areas and that the no-build alternative has the most impact. The difference in impacts, however, is small.

Increased noise levels from the no-build and all of the "build" alternatives will exceed the federal standards of 60 dBA in the lower slopes of Forest Park generally parallel to St. Helens Road. Only Alternative 3 reduces levels in a portion of the park as 1990 through traffic is routed away from the park south of Express Avenue.

The slight differences indicated in the noise contour maps do not show a significant change in noise levels in Alternatives 1 and 2 over the no-build alternative in Willamette Heights. In other residential areas the no-build alternative results in higher levels than all of the "build" alternatives.

C. WATER

All surface and subsurface storm runoff will eventually find its way into the Willamette River.

An extensive storm sewer network extends throughout the area, connecting to five major and numerous minor outfalls. Surface ditches are limited to the west side of St. Helens Road. They collect storm water from the adjacent hills as well as from the roadway and divert it to the storm sewers.

Balch Creek is the only large natural drainage channel. The creek is diverted from its natural channel to a closed conduit that traverses the study area and empties into the Willamette River. The inlet is located under the Thurman Street Bridge well south of any of the alternative alignments, precluding the possibility that pollutants might enter the conduit from construction and operation.

1. During Construction

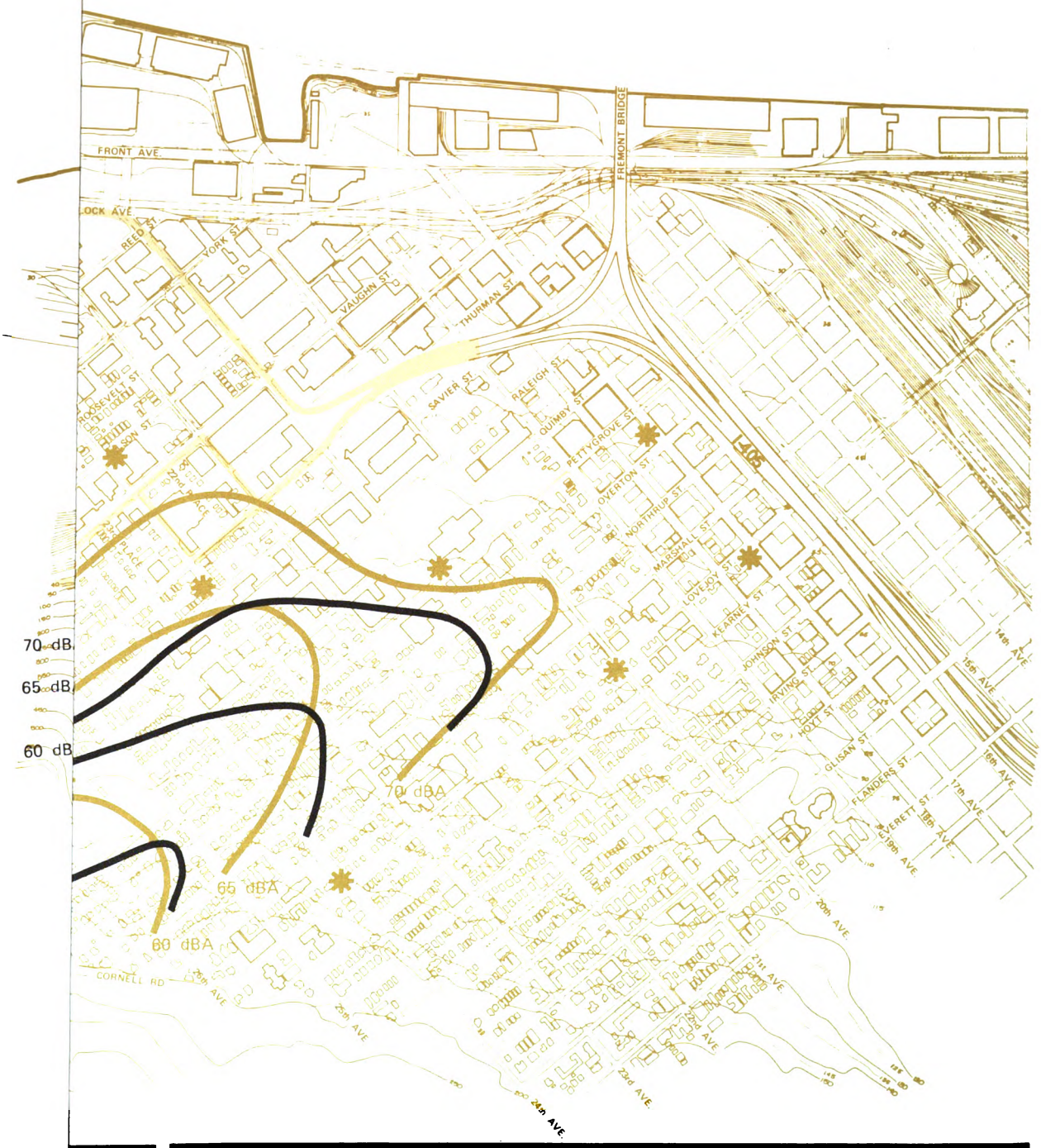
The construction activities will affect the water quality of storm runoff. Excavation will contribute contaminants to the storm water system by exposing the soils to the weather. The absence of protective cover will cause rain, snow melt, and construction water to carry off quantities of soil by either solution or suspension.

Oil, grease, and other petroleum derivatives used for construction equipment are other types of pollutants that may enter the storm water system.

Siltation and sedimentation from the suspended waterborne materials can be avoided or substantially reduced. The contractor responsible for construction is subject to Highway Division specifications and ORS Chapter 449 which establishes requirements for the prevention, control, and abatement of water and air pollution.

2. After Construction

Contamination of the water system after construction will be limited to those pollutants resulting from operation and



INTERSTATE 505
NOISE
NO BUILD

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

PLATE
16

maintenance activities. All alternatives will use a storm sewer system to collect surface runoff. A separate outfall will be needed to carry the runoff to the Willamette River.

D. TRAFFIC

To assess the impacts of the alternatives, the following assumptions are made:

1. Only those additional regional highway facilities planned for the very near future are assumed.

2. The Front Avenue overpass will be built.

3. Harbor Drive will be closed and the Fremont Bridge opened in December, 1973.

4. The Public Transportation Master Plan will be in effect by 1990. In the Northwest District, the plan is similar to the existing system but with improved headways.

In the course of the study, it was further found that:

1. The closure of Harbor Drive and the opening of the Fremont Bridge could raise volumes of traffic on the Vaughn and Thurman Street ramps from 16,000 vehicles per day to from 33,000 to 38,000 per day in 1974.

2. Employment in the area north of Pettygrove will increase from 16,180 (1972) to 21,360 (1990) with growth occurring at the rate of 2.4 percent through 1980 and 1.2 percent to 1990.

3. Retail sales will stay about the same in the area north of Pettygrove or slightly decrease.

4. As a result of the operation of the regional transit plan as presently developed, 26 percent of the computer-based and 12 percent of other home-based trip ends (one-way trips) will use transit; total traffic volumes will be reduced 9 percent from the 1990 projected figures for trips which begin or end in the district (ie., these trip ends do not include through traffic which does not stop in the district).

5. The 1990 volumes on I-505 at the West Fremont Interchange will be approximately 60,000 vehicles a day, regardless of which alternative is built. If the no-build alternative is adopted, then (1) 9,000 vehicles a day will seek other means of entering and leaving the district, such as the Broadway Bridge, and (2) approximately four to five thousand vehicles a day will divert around the district. Hence, if no freeway is built, the volumes on the Vaughn and Thurman street ramps in 1990 will be about 49,000 vehicles per day.

Given these assumptions and findings, the no-build alternative is considered inadequate to accommodate expected traffic.

1. Impact of the No-build Alternative

In 1990, around 49,000 vehicles a day will use the Vaughn and Thurman street ramps, about evenly divided between north and southbound traffic. Westbound traffic using Nicolai will encounter level of service D in the morning peak hour.* Eastbound traffic on Vaughn in the afternoon peak hour will encounter level of service F at 26th Avenue and Vaughn, and level of service E at the intersections of 23rd and Vaughn, 22nd and Thurman, and 21st and Thurman along the route to the ramps. If trucks were banned during the afternoon peak hour, then the no-build alternative would function at level of service D everywhere except at 26th and Vaughn.

The removal of parking near 23rd and Thurman will affect several businesses, and the street widenings will affect access to the industrial laundry there. The removal of parking on Vaughn has already been felt in decreased patronage by the businesses along the street.

At the present time, only trucks making local deliveries are permitted to use Vaughn; through trucks use a truck route on Nicolai. As the no-build alternative is now designed (one-way for cars and trucks on Vaughn), the noise levels and the additional air pollution will help to make the remaining small businesses and residences unviable. The properties there are mostly built to the sidewalk. No relocation benefits would be available. The properties would probably be sold for industrial use or auto-oriented commercial uses. Conversion to auto-oriented uses will increase congestion at intersections.

*Levels of service A, B, and C are free-flowing; D indicates some delay but with all legs of the intersection usually clearing on one cycle; E and F indicate varying degrees of failure (See Table A-5).

Volumes of traffic on north-south arterials through the district south of Thurman will increase. Parking will probably be removed on arterials where the volumes exceed 10,000 vehicles per day. The affected streets are 21st Avenue between Lovejoy and Overton, 23rd and 25th avenues, and Lovejoy Street. On the other hand, volumes on 18th and 19th avenues are estimated to fall to 7,000 or below. Traffic on Cornell Road will increase from 4,200 to 6,700 vehicles per day. Over 400 accidents a year are projected on this system.

2. Impact of the 1990 Public Transportation Master Plan

In 1990, around 73,000 trips will begin and end in the district north of Pettygrove Street. Table 5 shows this traffic by type of trip, both with and without the implementation of the 1990 Public Transportation Master Plan. Note that these figures include both traffic from the Stadium Freeway which starts or ends in the Northwest District but not the through trips, and trips starting or ending in the Northwest District which do not use the freeway system.

The 1990 Master Plan proposes to use the existing bus lines in the district with improved headways, routing them through the transit mall downtown for speedier transfer. The 21st Avenue bus will continue on to the University of Oregon Medical Center, and the 23rd Avenue bus will be routed through the Portland State University area.

These improvements would result in a 9 percent reduction in auto trips within the district north of Pettygrove because 26 percent of commuter trips and 12 percent of other home-based trips would switch to transit.

The potential of a park-and-ride station under the West Fremont interchange was examined. This site would serve people going downtown if the Northwest bus lines were to pass by, or it could serve persons bound for destinations in the Northwest District through a shuttle to hospitals, other places of employment, and shopping areas. It was determined that this station would be successful in reducing the amount of arterial traffic through the district; however, it might also increase traffic on the Fremont Bridge and the freeway system in the district.

In order to reduce I-505 traffic, park-and-ride stations would need to be located at points of interception such as the St. Johns Bridge, the east side of the Fremont Bridge, and sites closer to the homes of commuters bound for the district itself or downtown.

The 1990 Master Plan, as proposed, is not expected to bring any change in two types of trips--those by commercial vehicles and the category known as "other," which includes service calls, long-distance trips which begin or end in the district, and "miscellaneous." In the overall metropolitan area, home-based trips to work and other places usually account for approximately half of all trips, and the Master Plan system is expected to produce a greater reduction in these. However, in the district north of Pettygrove, non-home-based trips account for 61 percent of the 1990 trips without the 1990 Master Plan, and 67 percent if the plan is instituted. In other words, in order to reduce the number of trips significantly, commercial and business trips would have to use modes other than private vehicles.

3. Impacts of the Highway Alternatives

If an I-505 facility is built, 1990 traffic volumes to and from the West Fremont Interchange will be approximately 59,000 to 61,000 vehicles per day. (See Plates A-3 through A-11 in Appendix A to obtain volumes and levels of service.) Levels of service will vary on the freeway segment from A to E (see Table 6).

TABLE 6

LEVEL OF SERVICE BY ALTERNATIVE

1990 Peak Hour Volumes

Alternative	Freeway Portion	Non-freeway Portion
1	C	C
2	Upshur Leg C Yeon Leg A	C
3	B	-
4	B	St. Helens Road East-C Yeon West-D (if rail conflicts)
5	B	C

I-505 traffic merging southbound onto the Stadium Freeway with Fremont Bridge traffic will encounter level of service E because of weaving problems associated with the mixing of the two traffic streams.

Traffic volumes on arterials through the district would increase by one to two thousand over 1972 volumes. Thus 23rd and 21st avenues would still require the removal of parking in certain

TABLE 5

1990 AUTO TRIP ENDS

Area	WITHOUT PUBLIC TRANSPORTATION Type of Trip					WITH PUBLIC TRANSPORTATION Type of Trip				
	Home-Work	Home-Other	Commercial Vehicles	Other	Total	Home-Work	Home-Other	Commercial Vehicles	Other	Total
Nicolai-Kittridge	11,208	606	6,388	13,820	32,022	9,565 (85)*	590 (97)	6,388 (100)	13,820 (100)	30,363 (95)
Thurman-Nicolai	5,992	2,460	4,638	10,112	23,202	3,598 (60)	2,137 (87)	4,638 (100)	10,112 (100)	20,485 (88)
Pettygrove-Thurman	4,622	4,113	2,784	6,990	18,509	2,968 (64)	3,589 (87)	2,784 (100)	6,990 (100)	16,331 (88)
Total	21,822	7,179	13,810	30,922	73,733	16,131 (74)	6,136 (88)	13,810 (100)	30,922 (100)	67,179 (91)

Definitions:

Trip End: Trips which start or end in the area. Does not include through trips.

Home--Work: Commuter trips.

Home--Other: Shopping, etc.

Commercial Vehicles: Trips concerned with the delivery of goods.

Other: Service calls, long distance trips which start or end in the district, business trips, etc.

*Percentage of each type of trip which continues to use private vehicles after the 1990 Public Transportation Master Plan is in effect.

sections. Volumes on 18th and 19th avenues will range from 3,000 to 6,000 north of Marshall, and 4,000 to 7,000 on the segments from Burnside to Glisan. Volume on Cornell Road increases from 4,200 to 5,600. Projected accident rates range from 329 per year (Alternative 5) to 370 per year (Alternative 4).

E. VISUAL IMPACT

The comparatively large scale of a freeway results in a significant visual impact. The visual impact of the alternatives varies according to the scale of adjacent structures and the design of the freeway itself--the number of lanes and whether it is elevated, depressed, or at grade.

In general, a freeway has less visual impact when the neighboring buildings are large. Smaller buildings are overwhelmed visually by the mass of the freeway and the visual quality of the immediate neighborhood may be adversely affected.

An added consideration in Northwest Portland is the view from the West Hills. Whether the visual impact is good or bad depends on a person's point of view. For many people, the heavy traffic they associate with a freeway is a threat to the tranquility they associate with a residential neighborhood. People who live on the lower hills may view the freeway adversely because of the intrusion it suggests on the peace and quiet of their neighborhood. Others who associate the freeway with better access to their neighborhood may have a more positive image.

Alternatives 1 and 2, both depressed along the Upshur corridor, are visually the least obtrusive, while the residential land uses on the south side of the corridor are the most sensitive to visual impact. Section VI of the report describes ways to further minimize the visual impact of a freeway on this alignment.

Alternatives 3 and 4, following a Yeon Avenue alignment over much of their length, have a scale relationship more compatible with adjoining land uses. Yeon is bounded by larger industrial buildings on the west and the railroad yards on the east, both relatively compatible neighbors from the standpoint of visual impact and activity.

Alternative 5, an elevated route along Industrial Street, is visually the most obtrusive. Again, however, the nature of the land uses along Industrial Street are less sensitive to visual impact and are more in scale with the structure of the freeway than in the case of the uses bordering the Upshur

corridor. Viewed from residential areas in the West Hills, Alternative 5 is visually more compatible with neighboring structures than Alternatives 1 and 2 simply because the structures are larger.

The gradual build-up of traffic on surface streets in the case of the no-build alternative will create an increasingly adverse visual impact on adjacent land uses.

F. SOCIAL AND COMMUNITY IMPACTS

1. Housing

This analysis views impacted housing in the context of existing public policy and expressed community and neighborhood goals.

The number of units and the number of persons displaced by each alternative are indicated in the table below, along with significant characteristics of the dwelling units affected.

TABLE 7

HOUSING CHARACTERISTICS BY ALTERNATIVE CORRIDOR

	ALTERNATIVE			
	1	2	3 & 4	5
Persons displaced	629	732	180	182
Dwelling units displaced	303	334	65	66
Owner-occupied dwelling units	30	43	20	19
Renter-occupied dwelling units	272	288	41	43
Single-family dwellings	68	99	43	44
Average assessed value of single-family dwellings	$10,633	$10,370	$8,698	$8,508
Median rent	$ 69	$ 70	$ 62	$ 62
Units in good condition	173	184	32	33
Units in fair or worse condition	130	150	33	32

Housing goals expressed in the Northwest Comprehensive Plan, prepared by the City Planning Commission staff with participation by citizens in the neighborhood through the Northwest

District Association, emphasize the need to improve the housing supply in the district. The plan urges that people displaced by highway projects through the neighborhood be given the opportunity to relocate in the same part of the city.

The supply of housing in the Northwest District is already limited in relation to the demand. There is virtually no housing available in the district with a rent structure comparable to what is lost in any of the alternatives. The supply of single-family dwellings is especially limited in this regard, and the supply of apartment units is only slightly better. An analysis of the housing supply in the Northwest District and relocation requirements is contained in Appendix D.

In terms of housing displaced, Alternatives 1 and 2 have the greatest impact, 3, 4, 5, and no-build the least. The no-build alternative has the least impact of all because the increase of traffic on surface streets and the displacement of residential by commercial and industrial uses will be gradual, allowing residents time to adapt gradually to changing conditions.

Alternatives 1 and 2 displace 33 units of low-rent housing leased by the Housing Authority of Portland. The capability of HAP to build new low-rent units is restricted by current guidelines and funding. HAP is not likely to be able to replace this amount of leased housing in the Northwest District in the immediate future.

Relocation of displaced persons is discussed in Section VI.

Other social impacts have to do with the disruption of living habits and "neighboring patterns" that have a special value for low-income people. Poor families depend more on their neighbors. Local shopkeepers in low-income neighborhoods will often extend credit on a personal basis. The varied social services of such institutions as Friendly House are important in the day-to-day lives of the poor and the elderly. These relationships are developed over a period of time and are not easily re-established in a new neighborhood.

2. Community Facilities

a. Schools and Parks. Chapman School and Wallace Park lie along S.W. Raleigh Street, approximately 800 feet south of the right-of-way of Alternatives 1 and 2.

There will be no perceptible increase in noise levels over existing levels as a result of a freeway in the Upshur corridor. Nor will a freeway in the Upshur corridor cause any degradation in air quality. (See A and B of this Section.)

Chapman School has an average enrollment of approximately 600. Between 35 and 50 youngsters live north of Thurman Street. The homes in this area are largely displaced by Alternatives 2, 3, 4, and 5. If Alternative 1 is built, the children will reach school and Wallace Park by crossing the freeway at 23rd Avenue.

Forest Park contains over 4,000 acres of largely wooded terrain on the west margin of the Northwest District. Alternative 3 takes 1.38 acres of land along St. Helens Road just inside the park boundaries, north of the intersection of Yeon Avenue and St. Helens Road. The parcel lies immediately north of a private parcel occupied by a trucking firm in an area characterized largely by mixed industrial and heavy commercial uses. The taking is necessary to accommodate the configuration of the interchange with St. Helens Road.

While any taking of park land for highway purposes is properly the subject of careful consideration, the size of the taking in this case is insignificant in relation to the total size of the park. About half the parcel is flat at roughly the grade of St. Helens Road. The remaining portion is steep. Nearly all of it is wooded. There is no special quality or recreation value associated with the parcel.

If Alternative 3 is selected and any portion of Forest Park is taken, regardless of the size of the taking, a determination statement will be needed pursuant to Section 4 (f) of the Department of Transportation Act of 1966. This statement will provide a detailed analysis of the involvement of the park and will include specific proposals for lessening any adverse impacts that might be identified.

The effect of all alternatives on noise levels in Forest Park is discussed in B of this Section and in Appendix C. The east side of Forest Park is already subject to high noise levels. There is no evidence that increased noise as described in this study will have an adverse effect on wildlife, or on the use of the park for public recreation.

b. Emergency Vehicles. Within the Northwest District fire stations are located at 17th and Johnson, on Front Avenue just north of Terminal 2, and near the intersection of Yeon Avenue and St. Helens Road. The district is also served from a station at S.W. Spring and Vista and from the main station on Front Avenue in downtown Portland.

None of the alternatives will block effective access to properties or otherwise adversely affect fire-fighting operations.

Alternative 4 may require the relocation of the station at Yeon Avenue and St. Helens Road, depending on final design and right-of-way location. This is a one-engine station, of masonry construction, built in 1944. The station can be rebuilt on the same property, with bays opening onto N.W. 44th Avenue to provide direct access onto Yeon and St. Helens Road.

City Police Bureau officials do not anticipate that their access to the district will be adversely affected by any of the alternatives.

In general, all of the "build" alternatives are expected to have a positive effect with regard to access by emergency vehicles. The no-build alternative will have an increasingly negative impact as congestion continues to build on surface streets.

Alternative routes will need to be developed for emergency vehicles during construction, when temporary detours and street closures can be expected to block access to properties.

c. Utilities. The Northwest industrial district is served by a complex pattern of utilities. Water, gas, telephone, and power lines and sanitary and storm sewers will require relocation. In addition to the systems that serve the district, a number of major transmission lines run through the district.

The City of Portland is responsible for water, sanitary sewers, and storm drains. Private utilities serving the area are Northwest Natural Gas Company, Pacific Northwest Bell, and Portland General Electric.

Current Oregon State Highway Division policy is to relocate all utilities outside of the access control lines of freeways and other high-volume facilities unless no other location is available, except at crossing points.

Private utility companies bear their own relocation costs when their facility is located within a public right-of-way. They are reimbursed by the Highway Division when utilities are located on private property. Water and sewer lines are usually relocated and paid for by the Highway Division.

All affected utility companies have provided relocation plans and costs for each of the alternatives that included major relocations. Relocation costs for minor lines and individual sewer connections were counted only when their cost was of some significance. Relocation costs are only preliminary estimates, but are in sufficient detail to allow a comparative analysis.

(1) Natural Gas. Several major transmission lines traverse the area. The most critical is an 8-inch pressure line on Yeon Avenue that requires relocation to some degree in all alternatives and is most severely affected by Alternative 4. Other major transmission lines affected in some way by all of the alternatives are the 24-inch line on St. Helens Road, Nicolai Street, and Reed Street; the 16-inch line on St. Helens Road, 31st Avenue, Industrial Street, 26th Avenue, and Nicolai Street; the 12-inch line along 26th Avenue; and the 10-inch line along 22nd Avenue.

In addition to the major transmission lines, many distribution lines and service connections will require some degree of adjustment. Relocation costs for major gas transmission lines are as follows:

Alternative	Cost
1	$175,000
2	200,000
3	75,000
4	150,000
5	175,000
no-build	---

(2) Power. Major power transmission lines are defined as 115,000 volts (115 KV) and the distribution lines as 12.5 KV or less. There are two 115 KV lines along Yeon Avenue, one along 26th Avenue between Yeon Avenue and Front Avenue, one along Front Avenue from 26th Avenue to the PGE substation "E," and one line along 21st Avenue.

The 12.5 KV distribution lines are usually present on most streets and in some alternatives their occurrence contributes significantly to relocation costs. The following is extracted from a letter to the consultants from PGE dated January 31, 1973.

> "The figures in Table I are shown with transmission (115 KV) and distribution (12.5 KV or less) given as percentages of the total estimated cost. The 'Base Price Ratio' shows a ratio of the cost of plans two through five compared with those of plan one (plan one is considered the base cost).
>
> "It is apparent that (Alternative 1) is the least expensive. All plans involve about the same investment in relocation of distribution (12.5 KV or less) facilities (see base cost ratio). The transmission relocation expense varies rather widely for each route plan. The largest transmission expense was found with Alternative 5

even though the total cost was not estimated to be as great as Alternative 2. Transmission cost ratios are significant. It is desirable to keep this ratio to a minimum when considering total cost... .

TABLE I

(ALTERNATIVE)	PERCENT OF ESTIMATED COST		BASE COST RATIO*	
	TRANSMISSION	DISTRIBUTION	TRANSMISSION	DISTRIBUTION
1	6.8	93.2	1.0	1.0
2	27.2	72.8	10.8	2.1
3	47.5	52.5	8.7	0.7
4	62.2	37.8	24.5	1.1
5	23.8	76.2	6.2	1.5

*Base costs are those estimated costs for Plan (Alternative) 1.

Relocation costs for power lines are as follows:

Alternative	Cost
1	$147,000
2	397,000
3	183,000
4	394,000
5	261,000
no-build	4,000"

(3) Telephone. Major costs of relocation incurred by Pacific Northwest Bell are usually associated with the relocation of underground lines. Subsurface telephone lines are located within the study area along Front, Yeon, and 22nd avenues, and Industrial and Nicolai streets. Other major lines are over head, usually occupying joint-use poles with the power lines, and are not as costly to relocate.

The cost to relocate telephone facilities is as follows:

Alternative	Cost
1	$200,000
2	230,000
3	15,000
4	15,000
5	60,000
no-build	2,300

It should be noted that although the relocation costs for Alternatives 1 and 2 are high, the existing facilities to be replaced are "very old and would be replaced in a very few years in the course of our normal business." (From letter to the Consultants from Pacific Northwest Bell, January 24, 1973.)

(4) Sewers. Most of the sewers in the Northwest District are combination sewers, and storm water is channeled along with sanitary sewage to the treatment plant. When combined flows exceed the design limit, overflows occur and varying amounts of wastewater along with storm water are discharged to surface streams--in this case the Willamette River. When storm water is moved with wastewater to the treatment plant, pumping and treatment costs are increased.

The major sewer lines in the study area are the Johnson Creek Sewer, the Balch Creek Sewer, and the Yeon Avenue Sewer.

The Johnson Creek Sewer is a 48 by 72-inch brick tunnel along 21st Avenue and Sherlock Street, discharging into a 60-inch outfall to the river. This sewer will probably require reconstruction if fill material is placed over 21st Avenue as indicated in all of the alternatives.

The Balch Creek Sewer is primarily a storm sewer that carries the drainage from Balch Creek through the industrial area. The sewer is a new 84-inch pressure pipe that begins in Balch Gulch just south of Thurman Street with a large intake structure. It extends down 30th Avenue and after crossing Nicolai Street, transitions to the old 66-inch pipe. This pipe continues down 30th Avenue, Industrial, and 29th Avenue to a 90-inch outfall to the river.

No major relocation of the Balch Creek Sewer will be required; minor revisions may be needed if bridge foundations cannot be adjusted.

The Yeon Avenue sewer drains both ways from the lift station at Yeon Avenue and 29th Avenue. A 48-inch line on 29th Avenue from Industrial Street and St. Helens Road leads into the lift station while the line to the north goes down Yeon, Kittridge, and Front avenues to a treatment plant downstream. The sewer line running southeast on Yeon Avenue is a 38 by 66-inch tunnel.

Except for the tunnel, none of the alternatives will affect the Yeon Avenue sewer unless it is required that sewer maintenance activities be confined off the traveled way; widened Yeon Avenue as proposed in Alternative 4 would then require relocation along its entire length. Alternatives 2, 3, and 4 require the relocation of the tunnel.

The following sewer relocation costs for each alternative include an estimated lump sum amount for adjusting secondary sewers:

Alternative	Cost
1	$227,000
2	320,000
3	191,000
4	191,000
5	659,000
no-build	27,000

The substantially higher cost for Alternative 5 is caused by the need to replace and reroute an old trunk line.

In some instances drainage from the new highway facility will exceed the capacity of existing storm sewers and will require larger pipe and outfalls to the river. The cost of reconstructing these facilities to accommodate highway drainage was included in the cost estimates for draining the particular alternative.

(5) Water. Major water mains 14 inches in diameter or larger were considered in the utility relocation analysis. The major water lines are on 22nd, 26th, and 29th avenues, Wilson and Nicolai streets, Yeon Avenue and St. Helens Road. Relocation of water lines on these streets was not considered as significant since water lines are not limited to grade restrictions as encountered with gravity flow. The costs of relocating only those water mains required by freeway access restrictions are as follows:

Alternative	Cost
1	$36,000
2	60,000
3	10,000
4	10,000
5	30,000
no-build	10,000

G. ECONOMIC IMPACTS

1. Business Firms and Employment Displaced

The number of separate commercial and industrial property ownerships affected by each alternative is indicated in Table 8. The table also indicates the number of parcels that would be acquired in full, the number that would be partially acquired, and the number of owners who indicated a desire to retain the unacquired portion of their properties. This latter figure is significant in that most of the owners of properties that would only be partially acquired indicated they would rather have the State take the whole parcel. However, very few firms indicated they would go out of business.

Alternative 2 affects the largest number of separate ownerships, 69; Alternative 3 affects the smallest number, 35.

TABLE 8

PARCELS AFFECTED, BY ALTERNATIVE

Alternative	Total Affected Parcels #	Total Acquisition Required #	Total Acquisition Required %	Partial Acquisition Required #	Partial Acquisition Required %	Desire to Retain Unacquired Portion #	Desire to Retain Unacquired Portion %
1	49	32	65.3	17	34.7	5	10.2
2	69	48	69.6	21	30.4	8	11.6
3	35	23	65.7	12	34.3	4	11.4
4	51	24	47.1	27	52.9	10	19.6
5	57	27	47.4	30	52.6	11	19.3

The number of separate business firms affected by each alternative is somewhat higher, as indicated below in Table 9. Again, Alternative 2 affects the largest number of firms, and Alternative 3 the least. Table 9 also indicates the type of firm affected.

TABLE 9

BUSINESS FIRMS AFFECTED, BY ALTERNATIVE

Alternative	Tot. Firms	Mfr. #	Trans. #	Whs./ Dist. #	Wholesale #	Commercial* #	Construction #	Total** Responses
1	58	6	6	22	15	31	3	83
2	75	12	12	35	20	36	5	120
3	45	16	6	23	19	11	1	76
4	57	12	10	27	20	24	4	97
5	68	13	10	40	26	20	3	112

*retail and services

**total responses exceed total firms due to firms involved in more than one type of operation.

The number of employees affected by each alternative is indicated in Table 10. Estimates are based largely on responses to a questionnaire by affected business firms, and indicate that a very small proportion of total jobs would actually be lost in any of the alternatives.

TABLE 10

ESTIMATED EMPLOYMENT DISPLACED OR LOST, BY ALTERNATIVE

Alternative	Number Displaced[1]	Number Lost[2]	Total Displaced or Lost	Total Displaced or Lost Jobs as % of Total Study Area Employment[3]
1	903	24	927	6.8%
2	1,356	95	1,451	10.6
3	1,163	150	1,313	9.6
4	1,011	116	1,127	8.3
5	1,738	82	1,820	13.5

[1] assuming relocation in Portland-Vancouver SMSA

[2] due to liquidation or relocation out of the region

[3] based on 13,634 as estimated 1972 employment for area north of Thurman and west of Fremont Bridge to Kittridge

Firms which have properties and improvements having an assessed value of more than $100,000 and which appear to face significant relocation are listed below by alternative:

ALTERNATIVE 1

Firm	Employees
Ralph A. Baer Company	11
Builders Appliance Supply Company	13
Consolidated Electrical Distributors, Inc.	26
Darnielle's Supper Club	20
Electrical Construction Company	60
New York Merchandise Company, Inc.	88
Rentex Services Corporation (Northwest Industrial Laundry)	150

ALTERNATIVE 2

Firm	
Ralph A. Baer Company	11
Builders Appliance Supply Company	13
Consolidated Electrical Distributors, Inc.	26
Cummins Oregon Diesel, Inc.	100
Darnielle's Supper Club	20
Electrical Construction Company	60
Monarch Machine Company	85
New York Merchandise Company, Inc.	88
O.K. Delivery System, Inc. (Warehouse only)	12
O'Neill Transfer Company, Inc.	26
Port of Portland Warehouse	--
Rentex Services Corporation (Northwest Industrial Laundry)	150
Ringsby United	100
S & W Fine Foods, Inc.	22
Westco Products Northwest	9

ALTERNATIVE 3

Firm	Employees
Acme Trading and Supply Company	42
All West Container (Schnitzer)	--
American Cyanamid Company	54
Ralph A. Baer Company	11
Benaroya Company	--
Builders Appliance Supply Company	13
Consolidated Electrical Distributors, Inc.	26
Dulien Steel, Inc.	22
East Texas Motor Freight (ETMF)	67
Electrical Construction Company	60
Goodyear Rubber and Supply	26
(four small businesses)	19
Liquid Air, Inc.	70
McKesson Chemical Company	--
Mt. Hood Chemical Corporation	35
New York Merchandise Company, Inc.	88
Northwestern Drug Company	17
O'Neill Transfer Company, Inc.	26
Pacific Chain and Manufacturing Company	190
Charles Pope	--
Raybestos Division of Raybestos Manhattan, Inc.	--
Riddell Trailer and Equipment Company	25
Ringsby United	100
Schnitzer Steel	130
U.S. Steel	50
von Weidlein International, Inc.	--

ALTERNATIVE 4

Firm	Employees
All West Container	--
Ralph A. Baer Company	11
Builders Appliance Supply Company	13
Consolidated Electrical Distributors, Inc.	26
East Texas Motor Freight (ETMF)	67
Electrical Construction Company	60
New York Merchandise Company, Inc.	88
Northwestern Drug Company	17
O'Neill Transfer Company, Inc.	26
Charles Pope	--
Ringsby United	100
U.S. Steel	50
von Weidlein International, Inc.	--

ALTERNATIVE 5

Firm	
All West Container	--
Ralph A. Baer Company	11
Bearing Sales & Service Division of Bearings, Inc.	75
Berenson Hardware Company	35
Builders Appliance Supply Company	13
Consolidated Electrical Distributors, Inc.	26
Electrical Construction Company	60
Gardner and Beedon Company	55
The J. K. Gill Company (warehouse)	158
Green Transfer and Storage Company	--
Montgomery Ward and Company (warehouse)	40
New York Merchandise Company, Inc.	88
Portland Frozen Foods	21
Ringsby United	100
Norm Thompson Outfitters, Inc.	58
Westco Products Northwest	9

2. Changes in Taxable Value

Changes in the value of taxable property will result from (1) the removal of private property from the tax rolls and (2) changes in the value of remaining properties that are affected by any one of the alternatives.

Table II shows the 1972 assessed value of land and improvements directly affected by right-of-way requirements for Alternatives 1 through 5

TABLE 11

TAX VALUE "LOST"

Alternative	[1] Estimated Assessed Value of Property to be Acquired		[2] Estimated Assessed Value of Property to be Resold		Estimated Tax Value "Lost"
	Land	Improvements	Land	Improvements	
1	$3,084,393	$2,842,390	$ 497,780	$ 516,800	$4,912,203
2	5,033,753	4,268,560	1,444,310	743,580	7,114,423
3	6,070,450	6,645,030	1,917,110	1,391,770	9,406,600
4	4,243,225	4,093,050	1,364,710	1,102,870	5,868,695
5	4,553,765	5,410,250	1,759,220	1,122,900	7,081,895

Column 1 takes into account legal limitations on the amount of property that may be acquired, as well as the wishes for partial or total acquisition expressed by businessmen in the survey. (See Appendix E.) For example, in cases where only a few feet of frontage were required for right-of-way and the State would neither want nor be required to purchase the entire property, only those necessary few feet were included, even though the property owner might prefer to have his entire parcel acquired. In other cases where the State might not be required to purchase an entire property but the business would clearly be so impacted that relocation was certain, the whole parcel was included. Column 1, then, reflects some costs beyond the bare minimum required by law.

Column 2 counts partial properties included in Column 1 which will be vacant and unused after construction of the freeway. The industrial survey revealed a strong demand for sites in the study area to accommodate expansion or new firms. Displacement of present firms by a freeway corridor will make this demand even greater, since the majority of those interviewed indicated they would like to relocate within the northwest industrial area. Thus, while one firm might be displaced, another with

different space requirements certainly will find remaining partial properties useful. For example, the widening of St. Helens Road proposed in Alternatives 1, 2, 4, and 5 will limit rail service to some properties. For the purpose of estimating cost, it was assumed in such cases that the entire property would be acquired but resold to a company not requiring rail access.

The last column in Table 11 shows estimated taxable value "lost." Alternative 1 will take the least amount of taxable value, Alternative 3 the most. Whether or not the value is actually lost depends, of course, on whether a business relocates outside of its present taxing unit. Rivergate, for example, is presently outside the City of Portland but within Multnomah County and School District No. 1.

It can be assumed some business firms will relocate in other Oregon counties in the metropolitan area and some firms may relocate outside the state. No attempt was made to second guess those few businessmen who, faced with the possibility of moving, indicated they would relocate in Washington State.

Very few business firms indicated they would go out of business if displaced by a freeway.

Each of the alternatives may also affect the value of surrounding properties. Generally, the long-term trend of values in the Northwest District is increasing, simply because Portland is experiencing economic and population growth. As growth occurs, available land becomes increasingly scarce; well located, close-in parcels become more valuable and firms are forced to use their land more intensively.

Many factors determine the value of a specific property when it is offered for sale. These factors include current economic conditions, level of demand, supply of available land in the area, and property characteristics such as the size of the parcel, zoning, access, available services, and so forth. Desirable characteristics for residential and industrial properties are not generally the same. While rail access enhances the value of an industrial property, proximity to a railroad detracts from the value of a residential property.

Freeway development through an industrial area usually has very minor effects on property values except for specific properties whose access may be significantly improved or damaged, or in cases where the area was previously remote. This is not to deny that a freeway through an industrial area may produce temporary and severe dislocations for specific firms. However, the overall effect of the proposed I-505 Freeway on industrial property values is expected to be negligible. Other market forces will determine the future values of these properties.

Generally, the effect of a freeway through a residential area is to reduce land values. However, the degree of effect depends largely on the quality of the residential community. There is good evidence that a freeway will reduce property values significantly in higher-value neighborhoods. On the other hand, freeways built through low-value residential areas seem to have very little effect on land values. This may result from the fact that residents in such areas have fewer choices concerning their location than affluent homeowners. Further, the environmental quality of the area may already be so poor that the added noise and unsightliness of a freeway is relatively insignificant.

Within the I-505 study area many of the residences are old and in poor condition. Many are impacted by industrial concentration. Analysis of property values has indicated that many of these residential properties carry a value in excess of what would be expected. In these cases it seems clear that the properties are being held for future industrial or commercial use and that residential is only an interim use. In such cases, a nearby freeway would not be expected to reduce land values, although it might accelerate the transition from residential to some other use.

If Alternatives 1 and 2 are adopted, the maximum economic impact can be expected in the residential areas south of Thurman. While it is beyond the scope of this study to predict the impacts on values for specific properties, generally residential property values will not be significantly altered, at least not in the long term. Possibly in the short term, residential values will decline, since the freeway will produce a less desirable residential environment for nearby properties.

Alternatives 1 and 2 are not likely to be an effective barrier separating industrial and residential land uses. Scattered industry is already found south of Thurman. Alternatives 1 and 2 are likely to stimulate the substitution of industrial for residential use south of Thurman. Another likely effect will be an increasing shift from single-family to multi-family use in this area. In either case, however, land values should not decline as a result of freeway development.

Alternatives 1 and 2 are the only proposed routes which significantly affect commercial land uses. Most of the commercial uses in the Upshur corridor are economically marginal, and their removal is not expected to affect indirectly the values of commercial properties further south.

INTERSTATE 505

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

IMPACTS NO BUILD

PLATE 22

VI. STEPS TAKEN TO MINIMIZE ADVERSE IMPACTS

VI. STEPS TAKEN TO MINIMIZE ADVERSE IMPACTS

A. NEIGHBORHOOD AND COMMUNITY

1. Noise

Noise from the depressed sections of Alternatives 1 and 2 and from Vaughn Street would have the greatest impact on the remaining residential areas to the south. Noise barriers along both edges of the Alternative 1 and 2 right-of-way from 23rd to 28th avenues will reduce noise from the freeway and from truck traffic on Vaughn. These can be landscaped berms that will also serve as a visual buffer between homes to the south and the freeway and industry to the north. (Plates 28, 29, and 33.)

2. Landscaping

The visual impact of the freeway is softened by landscaping. The sketches of typical sections for Alternatives 1 and 2 (Plates 33 and 34) illustrate opportunities to landscape the protecting berms that separate the roadway from adjacent properties.

Effective landscape treatment will utilize dense massed plantings of evergreens that relate to the large scale of the freeway and that insure year-round screening.

3. Relocation

a. Housing. Federal policy, as expressed in the Uniform Relocation Act of 1970, is to relocate persons in housing as good or better than the housing displaced, with the least financial burden on the displaced persons.

Public Law 91-646 provides that an owner-occupant be paid up to $15,000 in addition to the amount paid for his real estate to relocate in comparable decent, safe, and sanitary housing. The law provides that up to $4,000 be paid to a renter-occupant for either a down payment on comparable decent, safe and sanitary housing or as a rent supplement over and above the rent he is now paying.

Public Law 91-646 further provides that an owner or renter occupant who cannot be provided with comparable decent, safe, and sanitary housing within the monetary limits stated above

be provided "last resort housing" by a Federal or State agency as replacement housing using funds authorized for this project. Oregon Senate Bill 395 became law on July 20, 1973. This law allows Oregon State agencies to comply with the Federal law.

The Oregon State Highway Division will provide "last resort housing" in full compliance with Federal law and Federal Highway Administration policies and procedures (PPM 81-1.5, dated July 18, 1973) whenever necessary. To quote from PPM 81-1.5,

> "No person shall be required to move from his dwelling...unless replacement housing... will be available in areas not generally less desirable in regard to public utilities and public and commercial facilities and at rents or prices within the financial means of the families and individuals displaced, decent, safe, and sanitary dwellings as defined by such Federal agency head, equal in number to the number of and available to such displaced persons who require such dwellings and reasonably accessible to their places of employment..."

If a "build" alternative is selected, a door-to-door personal interview will be conducted to determine the relocation requirements of each family, individual, and business. Based on the results of this study, a determination will be made of the requirements for "last resort housing."

There is a general shortage of low-income housing in the City as a whole. The City's Initial Housing Element, prepared by the mayor's Housing Task Force in 1972, describes two interrelated problems: (1) there is a substantial deficit of housing within the rent-paying ability of low-income households; and (2) much of the low and moderate-income housing supply is occupied by higher-income families who can afford to pay more.

> "Obtaining units renting between $63 and $145 is difficult because competition comes from two directions: from residents who desire inexpensive housing (...below 25 percent of their income) and from those earning less than $3,000 for whom there is a deficit of housing at satisfactory rates."[1]

[1] Initial Housing Element, City of Portland. December, 1972.

The impact of any of the alternatives can be minimized by a program of replacement housing that recognizes the individual needs of the people who are displaced. People who desire to move into rental housing need to find units which do not require a large rent subsidy so they may afford the full payments when the subsidy is withdrawn after four years. Many of these people have indicated a desire to remain in their neighborhood. Many of them have lived there for a long time and have family and social ties there. Many of them work nearby, many do not own a car. Many of the poor depend on the social services available through Northwest institutions.

One of the few promising areas for improving the housing stock in the Northwest District lies between Upshur and Thurman streets from 24th Place to 28th Avenue. The Northwest Comprehensive Plan has designated this area for residential redevelopment. The area is characterized now by a mixture of vacant land, small commercial and industrial uses, and a high proportion of substandard housing. The present condition of this area has resulted in large part from its long time designation as a freeway corridor. Opportunities to develop new housing sites there are indicated on the map below.

The map shows nine parcels, either vacant or owned by the State Highway Division, totaling five acres. Of these, only the site of the old Forestry Building (A), just under two acres, will be lost to Alternatives 1 and 2. The map also shows the location of substandard housing suitable for renewal totaling another 1.9 acres. Opportunities for rehabilitation of existing housing lie mainly between 23rd Avenue and 24th Place. There are some vacant sites in this latter area where good single-family dwellings in a corridor might be moved.

The Federal "Uniform Relocation Assistance and Land Acquisition Policies Act of 1970," Section 206 (a), allows project funds to be used for the construction of new housing when relocation needs cannot be met by the existing housing stock. The Highway Division will need to determine whether in fact replacement housing can be provided as described in FHWA Memorandum 81-1.5 which sets out criteria in terms of required space, accessibility to employment, etc. in order to determine the eligibility of the project for these funds.

Given the cost of land in this location, and without the application of Section 206 (a), it is unlikely that new housing units can be developed here without some other form of public subsidy. This is most likely to be in the form of urban renewal.

The Portland Development Commission administers various programs that can minimize the impact of freeway construction. Under new state legislation the City of Portland can designate the Development Commission as the agency to work with the State Highway Division in taking advantage of available federal, State, and local programs having to do with relocation housing and related assistance.

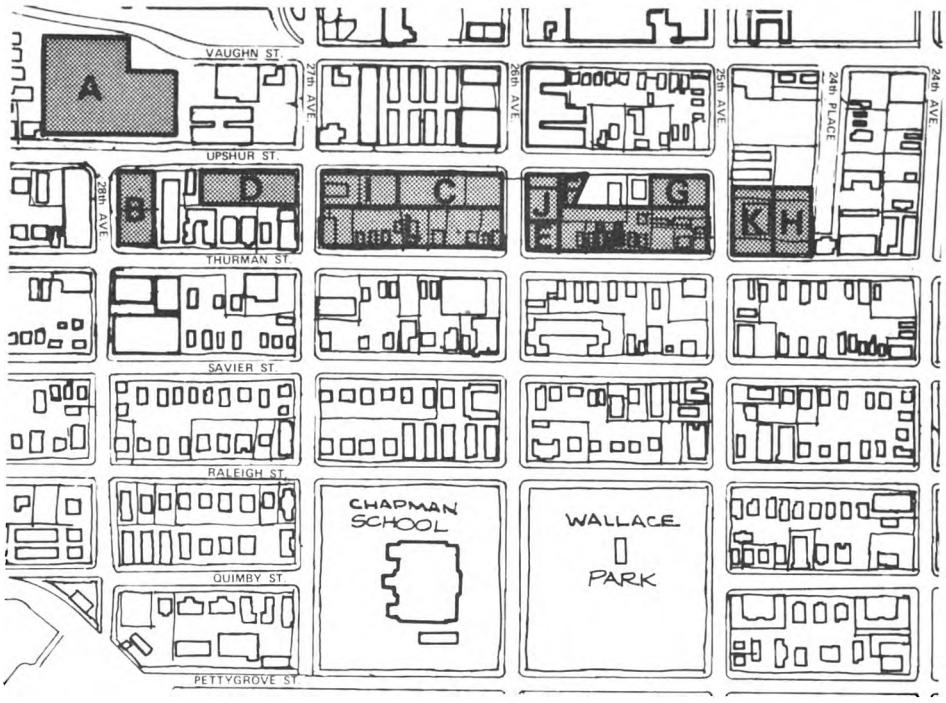
Moving can be an emotional burden, especially for the elderly and the poor. Their relocation can be eased by providing the assistance of personnel trained in social work or counseling or by contracting for such assistance with an appropriate agency. Friendly House, a UGN agency long established in the neighborhood, can provide professional resources in this connection, as can Family Counseling Service or the City Bureau of Human Resources.

Families with school-age children who will move outside the neighborhood will benefit if their relocation is arranged during the summer. It also appears that the elderly find it easier to reorient themselves to new surroundings during the spring and summer when they are able to be out-of-doors.

b. Business and Industry. The 1970 Uniform Relocation Act provides some important benefits to impacted businesses. The act stipulates that properties shall be purchased at fair market value, based when possible on recent comparable sales and the willing buyer-willing seller concept. Property owners may present appraisals they have commissioned if they feel State appraisals are low. Owners may also present arguments favoring total acquisition in cases where only part of their property is actually needed for right-of-way.

Federal law also provides relocation benefits to displaced businesses. Benefits are available equally to property owners and tenants. Actual moving costs will be paid by the State, up to a distance of 50 miles. Alternatively, a business may move itself and receive payment equal to the lower of two bids tendered by commercial movers to the State Highway Division.

Costs incurred by businesses in seeking and selecting a new location are reimbursable up to $500. Any tangible personal property which is not moved during relocation will be compensated for, either at actual value (depreciated rather than replacement value) or at estimated cost to move, whichever is lower. In cases where storage of personal property is mutually beneficial to both the State and the affected business, up to six months of storage fees may be paid directly by the State to the storage company. These payments are in addition to moving costs.



POTENTIAL RE-HOUSING SITES

VACANT PARCELS	AREA IN ACRES	NO. OF UNITS[1]
A. State Owned	1.93	38
B. Privately Owned – "for sale"	.46	9
C. Privately Owned – "for sale"	.60	12
D. Privately Owned – "for sale"	.53	10
E. Privately Owned	.15	3
F. Privately Owned	.16	3
G. Privately Owned	.34	6
H. Privately Owned	.39	8

NON-RESIDENTIAL USES	AREA IN ACRES[1]	NO. OF UNITS
I. State Owned	.46	9
J. Privately Owned	.31	6
K. Privately Owned	.39	8

HOUSING IN POOR CONDITION

L. Privately Owned	1.06	21
M. Privately Owned	.83	16

[1]@ 20 units/acre density

A small enterprise such as a neighborhood retail store may prefer the "in lieu" payment to the above benefits when it can be shown that moving will cause a substantial loss of patronage and dollar volume. This payment equals average net annual earnings calculated for the two years preceding relocation and may not exceed $10,000. The minimum in lieu payment is $2,500. The concept of this benefit is to compensate neighborhood businessmen whose moving costs might be minimal but who cannot, without a substantial loss of gross dollar volume, be successfully relocated. In effect, the in lieu payment offers an income source until patronage is reestablished in a new location.

Ways to minimize impacts not covered by relocation benefits are available to some extent under other public programs. Unemployment compensation can provide income to the displaced employee while he looks for a job. Manpower development training can give a worker new skills and help a dislocated firm train new employees. Chambers of commerce and industrial real estate developers and brokers can aid in the search for suitable sites, although the latter add to purchase prices through their fees and commissions.

Design elements for the various alternatives can sometimes reduce impacts on remaining business properties. Improved visibility and accessibility from off ramps, overpasses, underpasses or pedestrian walkways can aid patronage. Amenities such as landscaping and off-street parking may be provided in connection with the design of the freeway.

4. Multiple-Use and Joint Development

This section deals with opportunities to make multiple-use of the freeway right-of-way and to share the right-of-way with other public agencies or private development.

Plates 28 through 34 illustrate opportunities for landscapeing in the right-of-way, including footpaths and bicycle paths. Such paths along the right-of-way in the case of Alternatives 1 and 2 can connect with the trail system in MacLeary Park and Forest Park.

Alternatives 2, 3, 4, and 5 all provide space beneath their elevated structures that might be utilized by nearby industries for parking or storage. These areas are indicated in Plates 29 through 32.

Not all of the housing north of Vaughn Street is needed for right-of-way. The housing is already impacted by existing industry and traffic and will be further impacted by all of the alternatives. (Plates 23 through 27.) In general, residents in these locations would benefit if the State were authorized to acquire these properties for redevelopment for uses more compatible with the freeway.

5. Zoning

The Northwest Comprehensive Plan prepared by the staff of the City Planning Commission recommends that the properties along Thurman Street be rezoned, from C-2 and M-3 to a newly created zone in order to encourage their redevelopment for housing and compatible business uses.

Uses in this area are mixed. Over the years business and industry have moved into the older residential areas. Without public intervention, this trend can be expected to continue.

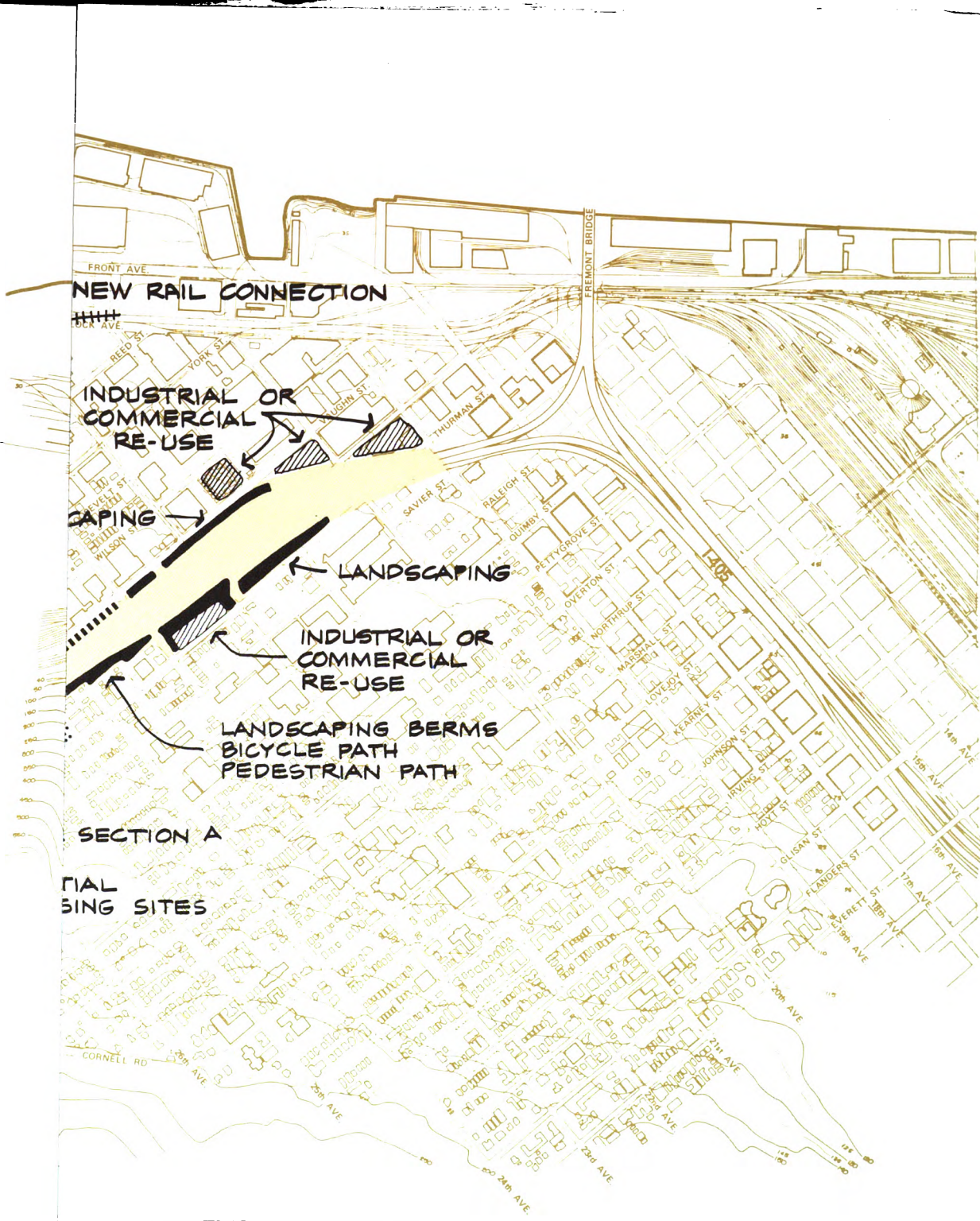
If the City Planning Commission and City Council determine that new housing should be encouraged in this part of the district, as indicated in the Northwest Comprehensive Plan, they should move to adopt the plan and amend the city zoning ordinance.

Property values in the area are high. A public subsidy program such as urban renewal may be necessary to make housing, especially moderate and low-rent housing, an attractive investment in this part of the city.

B. ROAD USER

Adverse impacts affecting the road user have mainly to do with cutting off access to adjacent properties. Access to properties is more likely to be affected when a freeway uses part of an existing right-of-way.

All of the alternatives affect the access to certain properties. In each case the design of the alternative has included new street access, as illustrated in Plates 28 through 32.

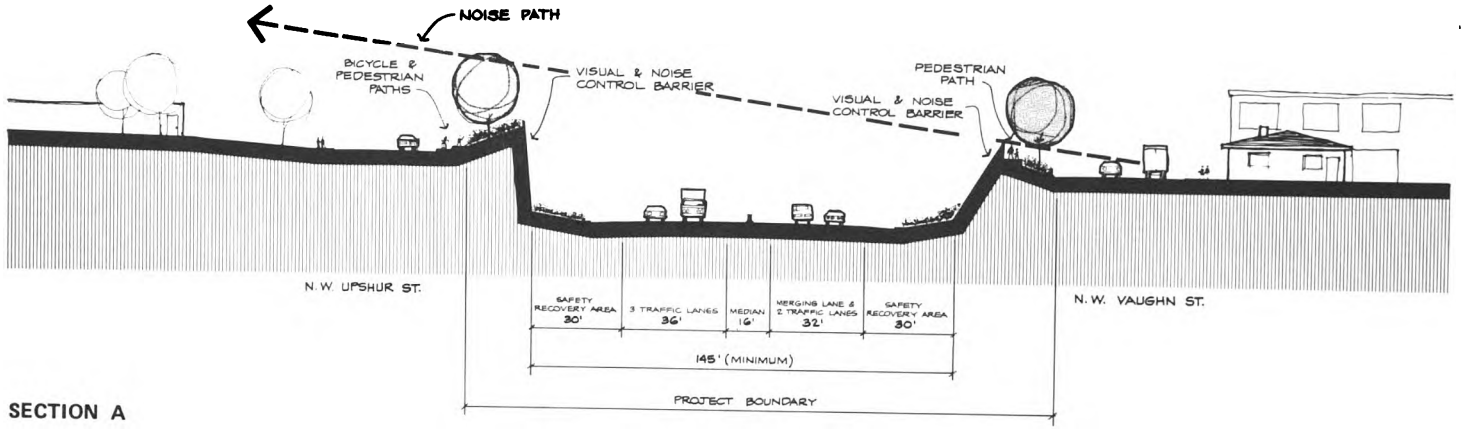


INTERSTATE 505 MINIMIZING IMPACTS ALTERNATIVE 1

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

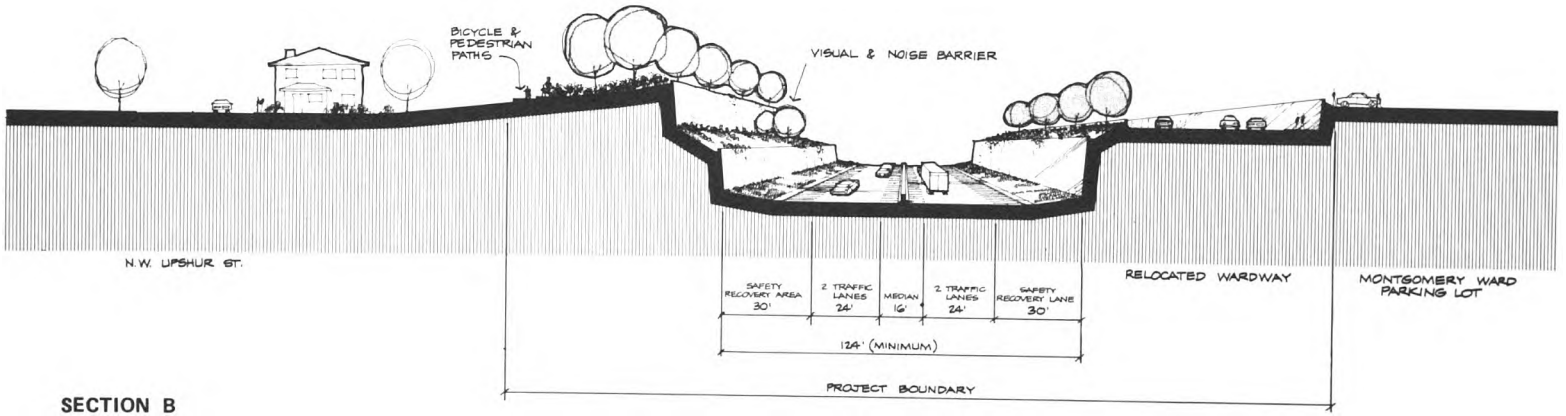
PLATE 28

1200'



SECTION A

SEE ALTERNATIVE 1, PLATE 28



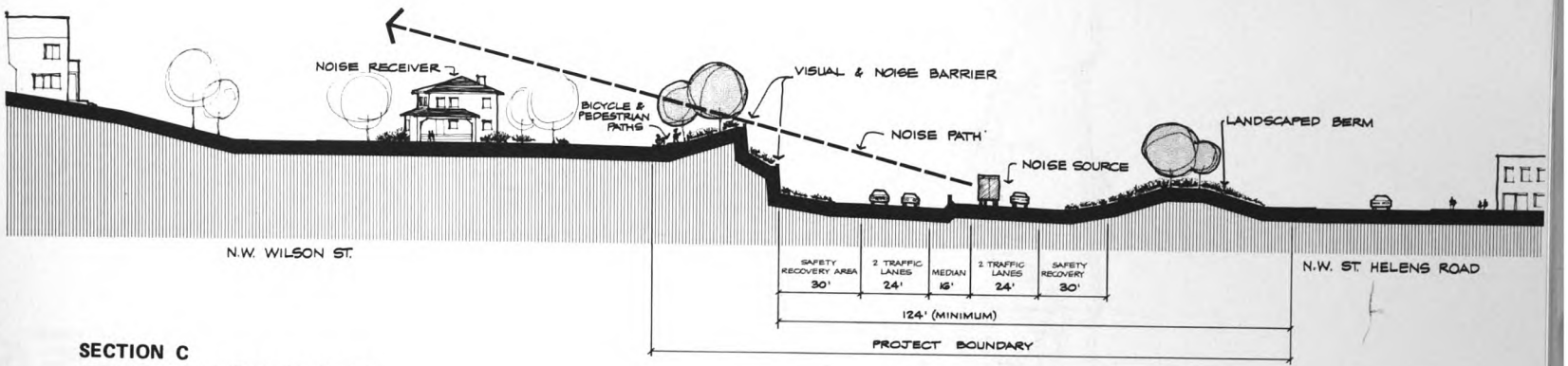
SECTION B

SEE ALTERNATIVES 1, PLATE 28 AND 2, PLATE 29

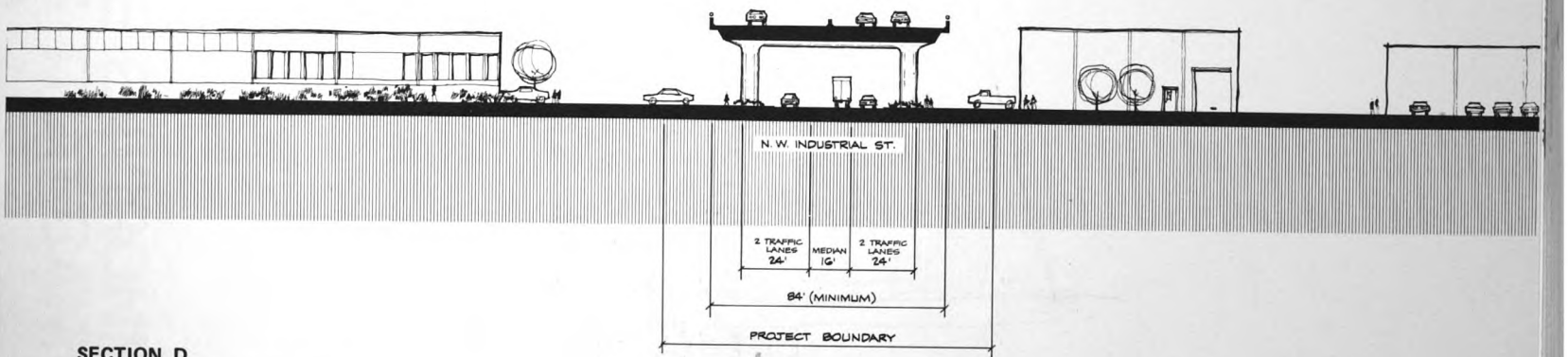
INTERSTATE 505 ENVIRONMENTAL IMPACT STATEMENT OREGON STATE HIGHWAY DIVISION

SECTIONS A & B

PLATE 33



SECTION C
SEE ALTERNATIVES 1, PLATE 28 AND 2, PLATE 29



SECTION D
SEE ALTERNATIVE 5, PLATE 32

INTERSTATE 505 ENVIRONMENTAL IMPACT STATEMENT OREGON STATE HIGHWAY DIVISION
SECTIONS C&D
PLATE 34

VII. ADVERSE ENVIRONMENTAL IMPACTS THAT CANNOT BE AVOIDED

VII. ADVERSE ENVIRONMENTAL IMPACTS THAT CANNOT BE AVOIDED

A. SOCIAL

Adverse social impacts of relocation are discussed in detail in Section VI, dealing with specific measures that can be taken by the State Highway Division, the City, and other public agencies. However, there are certain impacts that cannot be directly minimized by the actions of public agencies.

The money paid to a relocated renter-occupant as a rent supplement over and above the rent he is now paying will be withdrawn at the end of four years. In some cases the renter will not be able to afford the higher payments after the subsidy is lost and he will be forced to find suitable housing without assistance from the State. The likelihood of acquiring a comparable second decent, safe, and sanitary dwelling under these circumstances is remote.

All of the "build" alternatives leave a number of dwelling units close or adjacent to the freeway in the area north of Vaughn Street (Plates 23 through 27). The impact on these remaining residents cannot be lessened by relocation assistance programs if the properties are not needed for the freeway right-of-way.

Social impacts that cannot be avoided will depend, of course, on what programs and procedures can be brought to bear that minimize the trauma associated with dislocation. For many people, especially the elderly, any move will have certain negative aspects that cannot be wholly avoided.

B. ECONOMIC

Economic impacts that cannot be avoided are those costs or losses suffered by business firms or employees that remain uncompensated when their business is interrupted or terminated as a result of right-of-way acquisition or construction.

Relocation benefits available to business firms address only some of the costs that a business may anticipate.

A major cost for many will be "down time" or business interruption losses. Shut-down and start-up costs may be severe or even insuperable obstacles to the relocation of some industries.

For most companies the $500 search expense allowance is unrealistic. Responsible site selection involves extensive search time and feasibility analysis. Cost of such efforts by major companies can run into tens of thousands of dollars.

Unlike residential relocation benefits there are no "additives" to cover costs incidental to the purchase of replacement properties (such as higher interest rates on a mortgage, utilities deposits, closing costs, or title insurance) or rent supplements to cover higher lease rates for comparable property. Nor is there a proviso similar to the "decent, safe, and sanitary" requirement for residential relocation that suitable, comparable property be available to displaced businesses, either inside or outside the 50-mile limit for moving cost reimbursement.

There are no direct relocation benefits for employees. In cases where businesses will relocate at some distance from their present sites, employees may not be able to commute and receive no residential relocation assistance to follow their employers. Compared to the region, a high percentage of jobs in the study area is held by low-skilled long-term employees. In one firm facing possible acquisition the most junior employee has been with the company 16 years. His flexibility in terms of employment and residence appears limited. Further, the employer is faced with the costs of finding and training new workers. Interim efficiency will certainly be affected.

Lack of accessibility may be a problem in the Upshur alternative. There are no ramps between 23rd Avenue and the tie-in with St. Helens Road and only two north-south overpasses crossing the depressed roadway. Remaining commercial establishments along Vaughn Street may find their patronage from residential areas to the south reduced.

Another apparently unavoidable impact is the loss of regular patrons either through relocation or loss of accessibility. One local businessman reported that he paid $30,000 for "good will," i.e. an established clientele. He rents the property and can expect only moving cost reimbursement or a maximum $10,000 in lieu of payment. There appear to be similar instances throughout the study area. Many small businesses depend on the regular patronage of residents within walking distance and may suffer non-reimbursable losses as the result of changed access patterns or the displacement of their customers.

C. NOISE

Noise levels in Forest Park cannot be reduced by barriers along St. Helens Road. The limited right-of-way width and the numerous businesses with their access drives lining the arterial do not permit barrier construction. Noise from Vaughn Street traffic cannot be buffered in Alternatives 3, 4, and 5 for similar reasons.

D. DURING CONSTRUCTION

If a "build" alternative is selected, construction is estimated to begin in the fall of 1976. The duration of construction for Alternatives 1, 4, and 5 is estimated at three years, with completion in the fall of 1979; Alternatives 2 and 3 will take somewhat longer, three and a half years, with completion sometime in mid-1980.

Certain construction activities will undoubtedly cause an adverse impact in nearby residential, commercial, and industrial areas. All sectors of the community will be affected to some degree by changed traffic patterns, detours, and temporary increases in traffic volumes on some streets.

Preliminary construction staging plans have been developed to determine the duration and type of construction activities adjacent to sensitive areas. Generally these activities can be placed in three categories for evaluation: (1) clearing the right-of-way; (2) building structures; and (3) grading and paving.

1. Clearing the Right-of-way

Prior to construction activities, it will be necessary to clear all buildings from the right-of-way. It is conceivable some buildings could remain under elevated structures if sufficient clearances exist and occupant activities comply with State safety requirements; however, it is expected that these situations will be rare.

Large industrial buildings within the right-of-way probably cannot be salvaged due to their size and type of construction--usually masonry or reinforced concrete. Some of the smaller residential and commercial buildings within the Upshur corridor might possibly be moved.

Clearing the buildings within the right-of-way will produce large quantities of debris consisting of masonry and concrete rubble, wood, and asphalt pavement that must be hauled to disposal sites over the local street system. In addition to the truck traffic, noise and dust from building demolition cannot be entirely avoided.

Eliminating or reducing these adverse impacts is difficult and in some cases impossible. For those alternatives within the industrial area, the impact of clearing and demolition will not be severe and will be limited to the inconvenience of increased truck traffic and minor detours.

2. Building Structures

Major equipment required for the erection of structures consists of pile drivers, cranes, backhoes, bulldozers, loaders, compressors, pumps, and trucks. A large number of trucks will be needed for the delivery of concrete, reinforcing steel, piles, forming lumber, fuel, and other materials.

Percussion type pile drivers, if used, will cause severe noise pollution and vibration. Recent improvements in pile driving equipment such as hydraulic hammers and vibrators have eliminated or substantially reduced the noise and airborne pollutants associated with conventional steam and diesel hammers. Drilled-in-caissons may also be considered for structure foundations, thus eliminating much of the noise associated with pile driving.

A more detailed soils investigation will indicate the type of foundation required and the feasibility of using advanced pile driving equipment. Construction contracts can dictate the use of "quiet" pile drivers where suitable.

Most heavy construction equipment is powered by diesel engines. Noise and air pollutants from a particular piece of equipment will depend on how it is used at the time. Larger power requirements will cause higher noise levels and more air pollution.

Noise and air quality impacts in residential areas will be more severe if work is extended beyond the normal eight-hour workday. City codes already restrict the hours of the day a contractor may work. If necessary, construction contracts can further restrict working hours near residential areas.

3. Grading and Paving

Construction equipment employed in grading and paving operations includes scrapers, bulldozers, backhoes, loaders, compaction units, graders, paving machines, tractors, and trucks of various sizes for delivery of materials and the servicing of construction equipment.

The above discussion of construction equipment likewise applies to this section. However, heavy grading will be necessary only in Alternatives 1 and 2 adjacent to the residential area where operations will cause the greatest impact.

The depressed Alternatives 1 and 2 will produce approximately 500,000 cubic yards of excess excavation. It is unlikely that this large quantity of material can be incorporated into the project for such items as sound attenuation berms. Hauling the excavation material out of the area on the existing surface

streets precludes the use of large off-the-road earth movers. Highway-type hauling equipment must be used for transporting this material to disposal sites, with loads restricted to legal limits.

Current highway hauling units that are considered the most efficient within legal load limits have a capacity of 17 cubic yards. Using these units will require 60,000 one-way trips on existing streets to dispose of the excess excavation.

The destinations of these haul trips cannot be accurately determined, but they will most likely be north or downriver from the study area. Highway Division practice regarding disposal of excess excavation usually follows an order of priority:

1. Another highway project that requires borrow excavation.

2. Other public agencies needing fill material.

3. If neither of these opportunities is available, the contractor is required to locate his own disposal sites.

The right-of-way required for construction in Alternatives 1 and 2 can be used as a haul corridor. This will partially eliminate haul traffic from adjacent local streets and confine it to St. Helens Road if the haul is north or downriver.

Early excavation will have the most severe impact because equipment will be working at the same grade as the adjacent neighborhood. As work progresses the working elevation will gradually be lowered, partially shielding the residential area from objectionable noise and construction activity.

If highway hauling is unsatisfactory, another alternative presents itself with the proximity of the Willamette River. Excavation could be transported to the river by an elevated conveyor belt system and loaded directly onto barges for economical movement to riverside locations needing fill either along the Willamette or Columbia rivers. An electric-powered conveyor system would eliminate the noise and air pollution inherent with trucks.

Paving operations will again affect residential areas adjacent to the Vaughn-Upshur alignments in Alternatives 1 and 2.

The paving operation requires that redi-mixed concrete be transported to the placement site by concrete trucks from an outside commercial source or an on-site batch plant. Asphalt

concrete paving for shoulder areas would be placed by conventional means with a paving machine. Hot plant mix asphalt concrete will also be truck-hauled to the laying site from an outside commercial source or an on-site plant.

Adjacent residential areas will have some protection from the noise emanating from paving operations due to the depressed design of the facility. An unavoidable impact will be the increased truck traffic transporting materials to the construction site. The graded portions of the roadway can be used by trucks to minimize the use of surface streets.

VIII. COMMITMENT OF RESOURCES THAT CANNOT BE RECOVERED

VIII. COMMITMENT OF RESOURCES THAT CANNOT BE RECOVERED

Land and materials used in construction are the major resources committed to this project which constitute an irretrievable and irreversible loss.

A. LAND

In general, all of the alternatives use land that is already built up, or largely so, and is well suited to its present use.

Near-in industrial land is in short supply and its loss to freeway construction is a significant impact.

The amount of industrial land lost to freeway construction under each of the alternatives is estimated as follows:

Alternative	Acres
1	8
2	18
3	75
4	45
5	45

Alternative 3 encroaches on the Guilds Lake Yard, a major rail terminal described in Section III. Alternative 3 will take 150 feet (approximately 12 acres) along the western boundary of the railroad property. The property contains trackage that is not presently used but which reportedly figures in the long-range plans of the railroads to develop "a modern rail classification, receiving, departure, and holding yard to meet anticipated needs for both local and through rail service."

Land in commercial (as opposed to industrial) use is largely located in the corridor along Vaughn and Upshur streets affected by Alternatives 1 and 2. The commercial uses are mainly small retail and service establishments that serve the immediate neighborhood. Their social utility is significant in a neighborhood where many families have limited mobility.

Alternatives 1 and 2 will consume some 44 acres of land south of Vaughn Street, much of which is now used for housing. The Northwest Comprehensive Plan designates this area between 23rd and 28th avenues as one of the few locations in the district where new housing can be developed.

B. CONSTRUCTION MATERIALS

Materials used in construction have been estimated for each alternative and are shown below.

TABLE 12

MATERIALS USED IN CONSTRUCTION, BY ALTERNATIVE

ITEM	ALTERNATIVE 1	2	3	4	5	"no-build"
Sand and Gravel (Tons)	207,000	300,000	300,000	303,000	261,000	17,000
Portland Cement (Tons)	7,000	29,000	40,000	23,000	35,000	400
Petroleum Derivatives (Tons)	4,500	8,300	4,700	11,400	4,000	1,000
Structural Steel (Tons)	1,000	2,100	3,300	2,000	3,300	
Reinforcing Steel (Tons)	2,900	6,200	9,500	5,800	8,900	
Lumber (Thousand Board Feet)	460	1,058	1,622	970	1,607	

C. HUMAN EFFORT

The amount of human effort that will be expended may be useful to calculate when making choices among alternatives.

Human effort expressed as man-hours of labor can be categorized as:

(1) engineering effort for design and construction;

(2) construction effort to build the facility; and

(3) effort expended to maintain and operate the facility once completed.

1. Engineering Design

Engineering costs are usually proportionate to the construction costs of a project, with small projects using a higher percentage and larger projects a lesser percentage. In this analysis an average factor of 10 percent of construction costs was used to determine the cost of engineering for all alternatives. Approximately half of the engineering costs are paid in direct salaries with the remainder distributed among overhead items. The total cost of direct salaries can be divided by an average hourly rate of $6.00 to arrive at total man-hours required for engineering effort. This is shown in the following table for each alternative.

TABLE 13

MAN-HOURS OF LABOR
FOR ENGINEERING DESIGN,
BY ALTERNATIVE

Alternative	Engineering Cost* Direct Salaries)	Total Man-Hours	Total Man-Years**
1	$ 780,000	130,000	65
2	1,504,000	251,000	125
3	2,154,000	359,000	179
4	1,394,000	232,000	116
5	2,034,000	339,000	170
"no-build"	136,000	22,700	11

*1973 dollars; does not include contingencies.

**2000 man-hours per man-year average.

2. Construction

Using Department of Transportation national usage factors (1969) adjusted to Oregon and year 1973, an approximate on-site labor requirement can be determined. The on-site labor-usage factor in Oregon for major highway construction was estimated at 40,000 man-hours per $1 million of construction cost, excluding engineering and right-of-way costs. On-site labor requirements for the construction of each of the alternatives is estimated in the following table.

TABLE 14

MAN-YEARS OF LABOR FOR CONSTRUCTION,
BY ALTERNATIVE

Alternative	Construction Cost	Man-Hours	Man-Years*
1	$15,600,000	624,000	390
2	30,072,000	1,203,000	752
3	43,078,000	1,723,000	1,077
4	27,876,000	1,115,000	697
5	40,683,000	1,627,000	1,017

*1600 man-hours per man-year (average for the construction trades).

3. Operation and Maintenance

There is no significant difference in the cost of maintaining the alternative facilities.

IX. RELATIONSHIP BETWEEN SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

IX. RELATIONSHIP BETWEEN SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

In this section of the report the benefits of the alternatives are balanced against the long-term consequences for the environment. The first two sections deal with land use and transportation. The last section is a cost-effectiveness analysis.

A. LAND USE

1. No-build Alternative

The no-build alternative affects land uses very little in the short term. Street widenings and additional signing and signalization will not require the removal of homes or businesses. The loss of on-street parking will be an inconvenience, and a few small businesses may fail or relocate. The homes north of Vaughn Street, and eventually those on Vaughn Street itself, will be sold and the land converted to industrial or commercial uses.

In the long run, the congestion and delays in traffic which accompany the no-build will have several adverse effects. First, businesses for which transportation costs, including time, are a critical factor (trucking firms and firms dependent on them) will be adversely affected. Their costs of doing business will rise, and the trend toward more wholesaling and distribution in the area will be slowed.

Second, traffic spillover onto Thurman Street and streets immediately south will adversely affect the residential environment. More industrial and commercial use will develop, either of which will add to the traffic already in the area.

Third, the backup of traffic on north-south arterials through the neighborhood will reduce livability.

2. Public Transit

The 1990 Public Transportation Master Plan does not provide for a park-and-ride station in the Northwest, nor for exclusive transit lanes. Hence, public transit improvements which are proposed will not affect land use directly. Improved transit may slow the conversion of land for parking lots, but few existing parking lots are likely to be redeveloped for other uses.

If the 1990 Transportation Master Plan were amended and a park-and-ride station developed, a certain amount of land would be set aside for parking lots, and associated auto-oriented uses would spring up nearby. Shops would be expected to locate near the station. Judging by experiences in other cities, higher-density housing might eventually be constructed nearby to take advantage of the convenient transportation and shopping.

In the long run, the establishment of public transit stations results in development much like that around a highway interchange. Additional traffic is attracted, and a sequence of development occurs. The only long-term difference is that travel between activity centers by transit will increase the ratio of passengers per vehicle, slow down the rapid growth of traffic volumes, and improve the regional air quality.

3. Highway Alternatives

The highway alternatives remove from 50 to 80 acres of land from use for industrial or residential purposes, with varying impacts on the City's tax base.

Alternatives 1 and 2 will result in additional land use changes in the future as a freeway can be expected to accelerate a change to further industrial and commercial uses on Thurman and possibly further south unless the City adopts protective zoning.

If Alternative 3, 4, or 5 is chosen, the removal of uncertainty about the Upshur-Vaughn corridor may increase land values. This may bring land prices above what is usually paid by wholesale and warehousing firms. The most likely outcome may be commercial, office, or high-density residential use.

Alternative 3 will remove 12 acres of land from the rail yard. While an exchange for land acquired near Kittridge Avenue might be arranged, there is a question whether increasing the length of the rail yard can compensate for decreasing its width.

In the long run, these changes can be seen as an investment in the future of those businesses that will remain, encouraging the trend toward more warehousing, distribution, and trucking. Without this investment or some other investment in transportation facilities, the area may lose its value as a distribution center.

Alternative 3 may encourage the further development of land down river, owing to its length, ease of use, and its surplus capacity. However, very little land is available for development immediately down river except on Sauvie Island, where the County can be expected to limit development to low-density uses.

B. TRANSPORTATION PATTERNS

1. No-build Alternative

The closure of Harbor Drive and the opening of the Fremont Bridge will double the traffic now using the Vaughn and Thurman street ramps. In the short run, the street system can be made to accommodate projected volumes, although traffic will be slow and congested at peak hours.

In the long run, however, peak hour service will not be adequate. The no-build alternative will be unable to accommodate 9,000 of the projected daily vehicle trips, and these will consequently use such routes as the Broadway Bridge, and 23rd and 25th avenues.

2. Public Transit

In the short run, the 1990 Transportation Plan as proposed is expected to double Tri-Met ridership in the Northwest District. Vehicle trips beginning and ending in the district north of Pettygrove will be reduced by 9 percent. Additional improvements, such as park-and-ride stations and the use of freeways for express bus service could increase the capacity to accommodate new riders. Actual increases in ridership will depend on a number of factors, including changes in public attitudes and policies, which are too uncertain to build into traffic projections for 1990.

Two short-term factors may bring about some decrease in the use of the private automobile. First, the need to meet federal air quality standards may bring about changes in public policy that will reduce traffic volumes. Second, gasoline shortages and the increasing cost of transporting fuel will soon increase the cost of operating a private vehicle.

In the long run, two other factors may produce changes. First, federal transportation policy may change to permit increased investment in rail transport for both people and goods, as well as in other modes of public transportation. Second, the productivity of this type of investment depends on technological innovations in both existing and new modes of transportation. It is doubtful that such innovations will be available in time to reduce 1990 traffic volumes. In studying alternative investments in transportation, planners cannot easily build in factors when their impact is unknown. But public officials who make policy can be careful not to foreclose other possibilities and can maximize their opportunity to take advantage of new technology as it develops.

3. Highway Alternatives

When a freeway is opened, several effects can be observed immediately. First, traffic on nearby streets increases or decreases as travel patterns change. For example, the traffic on 23rd Avenue will increase, particularly north of Pettygrove, and traffic on 18th and 19th avenues is expected to drop. Other streets, such as 21st and 25th avenues, will have increasing volumes whether or not the freeway is built. The alternative freeway alignments vary only a little in the amount of traffic which they absorb from city streets. Alternative 3 lightens the arterial loadings only a few thousand more vehicles per day than Alternative 1. In all alternatives except 3, however, traffic volumes on St. Helens Road remain high or increase.

Another effect which is possible in the short run is the use of the freeway for express busses. No exclusive lanes have been included in plans up to now; even so, a bus can travel more swiftly on a freeway than on a surface street. Of the alternatives, only Alternatives 2 and 4 permit sufficient service for local transit lines.

The level of service on the freeway segments of the alternatives varies from A (north leg of Alternative 2) to C (Alternative 1). Non-freeway segments of each alternative generally have level of service C. On the south leg of the West Fremont Interchange, the level of service at 1990 peak hour volumes drops to E.

Other aspects of the alternatives are visible only in the long run. First, some facilities are more adaptable than others to growth in the area. For example, Alternative 2 leaves open two possibilities for improved future service. On the other hand, Alternative 3 limits the rail potential by using right-of-way inside the Guilds Lake Yard. This land is being reserved by the railroads for possible expansion and modernization. The short-term use of this land for freeway right-of-way may interfere with the long-term productivity of westside rail freight operations.

Second, the alternatives vary in their adaptability to changes in the regional highway network. For all the alternatives except 3, traffic volumes on St. Helens Road are projected to increase. It is possible that U.S. 30 serving the Lower Columbia communities may be further upgraded in the long run. If so, it may be economical to phase into such a possibility now and thereby bring about long-term savings in construction costs. Alternatives 3 and 4, and to a lesser extent, Alternative 2, seem most adaptable in this respect. Of these, Alternative 4

obviously allows for construction in stages. Alternative 3 may also be built in stages as needed; however, the construction of the first stage would increase traffic on St. Helens Road as much as Alternative 4.

Finally, any successful transportation facility will tend to generate its own demand. A highway that provides a high level of service may stimulate new development in the areas it serves and give a competitive edge to motor vehicles over other transportation modes. The short-term benefits of a transportation facility will continue to be realized only if the long-term consequences are understood and planned for. The public investment in transportation facilities can be protected if the cause and effect relationships between transportation and land use are reflected in a regional comprehensive plan--adopted, respected, and implemented by the local governments it serves.

C. COST EFFECTIVENESS

Cost effectiveness analysis provides a method for gauging the impact of a variable in relation to the same variable of other alternatives. For example, the acquisition cost of highway right-of-way can be compared among alternatives. The comparison is expressed as a ratio. The "cost" of each alternative is compared to the cost of a "base" alternative. Alternative 1 is used as the base because it has the least construction cost. This technique permits both quantitative and qualitative variables to be evaluated separately but in similar terms.

Cost effectiveness analysis results in sets of indices that help describe the effectiveness of the different alternatives in achieving quantitative and qualitative objectives. This analysis is one method to help describe the complex interrelationships of short-term versus long-term effects on the environment. The ratios derived from the analysis provide an index of relative "cost" among alternatives. Each variable should be considered separately or in groups of similar variables.

The cost effectiveness analysis consists of the following:

(1) a brief description or definition of the variables used, and

(2) a table showing the value of each variable and the cost effectiveness ratio.

The ratios are not ranked or weighted.

1. Effect on Economic Costs

Table 15 shows the dollar costs of construction (including relocating utilities), property acquisition, relocation of both residents and business, and an aggregate total.

The costs listed for the no-build alternative are only for street widenings and additional signaling. To this figure can be added $2.2 million for the Front Avenue overpass which is included in the total costs for all highway alternatives.

No costs are available for the 1990 Public Transportation Plan, nor are any funding levels known. Hence the cost of this "alternative" cannot be compared to the cost of the other alternatives.

2. Effect on Social Factors

Table 16 shows the effect of the various alternatives on social costs. The "costs" in this instance are dislocations of residents, housing units, business firms, and jobs. It is important to note that the numbers used in Table 16 only describe an initial dislocation with respect to the current conditions in the study area. Some relocation may occur within the study area. In addition, a majority of the other relocations will take place within the metropolitan area. For example, a "dislocated" industry may relocate in Rivergate, thereby remaining on the tax rolls of the county and the school district.

3. Effect on Transportation Benefits

Table 17 shows the relationship between the alternatives and the level of service provided by the facility, the annual savings to users, and the predicted reduction in number of accidents. The three variables listed relate only to the operation and use of the transportation facilities within the study area. (See Table A-5 for level of service characteristics.)

4. Achieving Qualitative Objectives

Table 18 lists four objectives that will be achieved to varying degrees depending on the alternative selected. These are qualitative variables and cannot be measured numerically. The first two listed, the degree of accessibility to the area and the degree of separation of through traffic from local traffic, relate more to short-term or immediate effects. The second two, the degree of surplus highway capacity and the adaptability of the facility to changes in the regional highway system, relate primarily to the long-term effects of the facility.

TABLE 15

ECONOMIC COSTS

ALTERNATIVES	1	2	3	4	5	no-build
Construction Cost	$22,400,000	$42,900,000	$60,600,000	$39,600,000	$57,500,000	$730,000
COST EFFECTIVENESS RATIO	1.00	1.92	2.70	1.77	2.57	0.03
Net Acquisition Cost	5,649,000	8,182,000	10,818,000	6,749,000	8,249,000	--
COST EFFECTIVENESS RATIO	1.00	1.45	1.92	1.19	1.46	--
Relocation Cost	1,680,500	1,941,700	989,000	934,100	1,050,300	--
COST EFFECTIVENESS RATIO	1.00	1.16	0.59	0.56	0.62	--
Total Cost	$29,700,000	$53,000,000	$72,400,000	$47,300,000	$66,800,000	$730,000
COST EFFECTIVENESS RATIO	1.00	1.79	2.44	1.59	2.25	0.02

TABLE 16

SOCIAL COSTS

ALTERNATIVES	1	2	3	4	5
People Relocated	629	732	180	180	182
COST EFFECTIVENESS RATIO	1.00	1.16	0.37	0.37	0.38
Housing Units Affected	303	334	65	65	66
COST EFFECTIVENESS RATIO	1.00	1.10	0.21	0.21	0.22
Businesses Affected	58	75	45	57	68
COST EFFECTIVENESS RATIO	1.00	1.29	0.70	0.98	1.17
Jobs Affected	927	1,451	1,313	1,127	1,820
COST EFFECTIVENESS RATIO	1.00	1.57	1.42	1.22	1.96

TABLE 17

TRANSPORTATION BENEFITS

ALTERNATIVES	1	2	3	4	5
Level of Service (1990 Peak Hour)					
Freeway Portion	C	Upshur Branch C Yeon Branch A	B	B	B
Non-freeway Portion	C	C	--	St. Helens Rd. East - C Yeon West - D (assuming rail conflicts)	C
Annual Savings for Users					
Total Amount (over no-build)	$6,130,000	$6,310,000	$6,310,000	$5,490,000	$6,390,000
As Percent of Total Cost	20.6	11.9	8.7	11.6	9.6
Annual Accidents	345	348	303	370	329
COST EFFECTIVENESS RATIO (compared to no-build 412 accidents)	0.84	0.84	0.74	0.90	0.80

TABLE 18

ACHIEVING QUALITATIVE OBJECTIVES

ALTERNATIVES	1	2	3	4	5	no-build
Accessibility to Area	Fair	Excellent	Excellent	Good	Very Good	Very Poor
Separation of Through Traffic	Fair	Good	Good	Poor	Fair	Very Poor
Degree of Surplus Capacity	Good-Fair	Fair	Very Good-Good	Good-Fair	Very Good-Good	Poor
Adaptability-Changes in Highway System	Fair	Fair	Poor	Good	Fair	Excellent

X. REVIEW COMMENTS

X. REVIEW COMMENTS

Comments received during the review period of the Draft Environmental Impact Statement from public agencies and private citizens and organizations will be included in this section in the Final Environmental Impact Statement with a description of the disposition of these comments. Appendix F will contain copies of letters received during the review period.

XI. APPENDIX

APPENDIX A

TRAFFIC STUDY

Section 1	Evaluation of Future Traffic Need
Section 2	Development of I-505 Study Trip Matrices
Section 3	Evaluation of Transit Potential
Section 4	Evaluation of the No-build
Section 5	Evaluation of Alternatives

SECTION 1

EVALUATION OF FUTURE TRAFFIC NEED

THE GENERAL PROBLEM OF NEEDS

The traditional transportation planning process goes into elaborate detail to establish a need for travel at some future date and then proposes facilities with the capacity to meet that need. Alternative versions of facilities are usually stipulated as having adequate capacity, and are evaluated on other factors such as cost. Recent developments have broadened the number of factors considered in such evaluation (the environmental impact statement), but the process is still subject to criticism for several reasons:

1. Transportation planning methodology can be very sophisticated, but input is often a single plan of future land use activity, sometimes developed with very simplistic techniques.

2. The transportation planning process is "one-way" in the sense that feedback seldom exists to modify trip patterns, generation, and mode use as a function of system congestion--and to modify land use based on the same type of problems.

3. Transportation planning is too auto-oriented, and does not take into account potential implementation that could change value scales and living patterns to the extent that travel needs are affected.

4. Transportation planning has its eye on the long-range future with its uncertainties, and does not give adequate consideration to short-range opportunities.

The first point (single land use plan) applies to the I-505 evaluation. In an attempt to recognize and mitigate this problem, study area land use has been updated and the sensitivity of travel demand in the I-505 area to potential regional changes has been assessed. As a result, the conclusions about need (and the details of evaluation) must keep in mind that I-505 is:

1. Strongly affected by land use activity in the study area. Around 60 percent of traffic is locally genated.

2. Moderately affected by regional land use changes affecting through travel (some 40 percent of travel).

3. Moderately affected by changes in the regional highway network, especially the proposed Rivergate, St. Helens, and Whitaker freeways, and the Edison Expressway.

The second problem (no feedback) applies, too. Feedback technology is emerging, and must be approached on a regional basis and not in a sub-area study such as this. As far as the fourth problem (too long-range) the I-505 alternatives (although analyzed for 1990) are really intended for early implementation and are related throughout to present problems and opportunities.

It is in the area of the third issue (broad policy changes) that special caution must be used. The I-505 need is established and evaluation undertaken within the present framework of living and habit patterns. Nevertheless, it must be recognized that there is a powerful force to avoid more highway construction, to rebuild cities along different lines, and to prevent or reduce growth.

If such events come to pass, the effect may be to eliminate any need for an I-505 or any new highway facility, and replace highways completely with other modes.

NEED BASED ON EXISTING PROBLEMS

From this basis, and within existing urban development ranges, the need for I-505 is established in several ways.

The study of existing traffic concluded that:

1. There is little or no capacity in the study area street system (except Front Avenue) to absorb future growth.

2. There are capacity restraints in the street system that reduce the level of service offered along the N.W. Vaughn corridor, and divert trips away from N.W. Vaughn to N.W. Thurman and N.W. Front.

In other words, steps can be taken now that will improve traffic flow for a short time, but additional measures must be taken if future growth is to occur without further deterioration of transportation in the study area.

NEED BASED ON INTERIM TRAFFIC

Implementation of the first phase interim traffic plan in October 1972 apparently improved traffic conditions in the N.W. Vaughn corridor, but not to the extent that congestion was entirely removed or capacity for future growth developed. Further, the

estimated effect of the proposed closing of Harbor Drive in downtown Portland would be to increase traffic pressure via the I-405 (Vaughn-Thurman Street) ramps as much as 50 percent. Unless something completely surprising occurs, this will not only worsen congestion in the study area but could impose a severe constraint on land development in the area.

NEED BASED ON 1990 CONDITIONS

The analysis of the No-build alternative provides a measure of need for a new facility in terms of the impact if relatively little is done to the street system and growth does occur to 1990 levels.

Minimum capital improvements were assumed with an extensive one-way system using N.W. Nicolai and N.W. Vaughn, deletion of parking along these routes, and widening within the present rights-of-way in critical spots. Even so, levels of service E, and even F, were calculated for evening peak hour in the N.W. Vaughn corridor with 1990 traffic volumes. Also, poor access is created for certain pockets isolated by congestion, and some traffic is diverted to other routes through the Northwest District by congestion at the I-405 ramp terminals. A new facility will be needed to avoid these adverse impacts.

SUMMARY

Unless travel habits change drastically, or unless no further traffic growth occurs in and through the study area, a new major facility is needed in the area for the following reasons:

1. The present street system is congested.

2. The closing of Harbor Drive will increase traffic.

3. Growth to 1990 levels will outstrip the potential to provide capacity through low-capital solutions.

SECTION 2

DEVELOPMENT OF I-505 STUDY TRIP MATRICES

BACKGROUND

An important influence on long-range planning in Portland has been the Portland-Vancouver Metropolitan Area Transportation Study (PVMATS). This study is on-going and is conducted under the auspices of the Columbia Region Association of Governments to provide PMVATS with land use and socio-economic data on which future travel demands could be based.[1] Their work was completed in 1968 and has been the foundation of all regional long-range transportation planning since that date.

In 1971 the Transportation Advisory Committee of the PVMATS recommended a plan of major highway construction projects to meet forecast travel demands through 1990.[2]

Of the many highway improvements in the PVMATS Plan, some have a direct bearing on I-505 while others have only an indirect impact. Still others make little difference to I-505 corridor travel.

The proposed improvements which most strongly affect I-505 are:

> Rivergate Freeway. This proposed facility would include a bridge across the Willamette River west of the St. Johns Bridge and an interstate crossing to the north of Vancouver, Washington. The facility would ultimately connect to the Sunset Highway at the terminus of the Beaverton-Tigard Freeway. The Rivergate Freeway would be four lanes and have a capacity of between 40 and 60,000 vehicles per day (vpd). The estimated forecast travel is about 37,000 vpd across the Columbia River.

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[1] Planning Analyses and Projections; Portland-Vancouver Metropolitan Transportation Study: Prepared for the Oregon State Highway Department by Wilbur Smith and Associates, July, 1968.

[2] Portland-Vancouver Metropolitan Area Transportation Study; 1990 Transportation Plan; Interim Report: Prepared by Transportation Advisory Committee of the Portland-Vancouver Metropolitan Area Transportation Study, March, 1971.

Presence of the Rivergate Freeway would tend to enhance urban development downriver from the crossing. This would in turn increase travel through the I-505 corridor. It would also tend to attract some trips through the I-505 corridor which find it a faster or more convenient route to Washington. If the Rivergate Freeway were connected to the Sunset Highway there would be a tendency to decrease the traffic on an I-505 facility because traffic otherwise bound through I-505 and I-405 south would have a more convenient route via the Rivergate Freeway. Overall, these effects could increase or decrease I-505 travel by 5,000-10,000 vehicles per day.

St. Helens Freeway. This would be a four-lane freeway extending from the terminus of I-505 to the Rivergate Freeway. This facility would have a capacity of about 50,000 vpd. Estimated 1990 volumes on the freeway range from about 14,000 vpd to about 38,000 vpd along various sections of the route.

The impact of the St. Helens Freeway on I-505 forecast traffic is two-fold. First, its existence would enhance land use development downriver from the Portland area and second, it would provide an attractive alternative route to certain types of traffic movements.

Whitaker Freeway and Cary-Edison Expressway. These improvements lie in North Portland but have a direct influence on I-505 travel. Specifically, the presence (or absence) of these facilities in conjunction with the St. Helens Freeway would affect travel between North Portland and the Central Business District (CBD).

Trips from the Rivergate Industrial Park and the St. Johns community could reach the CBD via Interstate 5 (the Minnesota Freeway and Fremont Bridge) or by I-505. In 1990 about 5,000 vpd could be effected in this way.

THE G-5 DISTRIBUTION

Associated with the recommended PVMATS Plan are forecasts of trips in and about the region for the year 1990. The 1990-G5 trip table forecast used in the early part of the study is based on assumption of the kind of extensive highway facilities represented by the recommended plan. This trip table also assumed the 1990 PVMATS demographic forecasts as modified by subsequent minor updates. One of these updates which is notable with respect to the I-505 study, includes an increase of industrial related trips to the Rivergate Industrial Park and a decrease in the growth rate of trips related to the Guilds Lake industrial area.

THE G2 DISTRIBUTION

The PVMATS has also investigated patterns of land use development and trip distribution based on assumption of less extensive highway development than proposed in the recommended 1990 plan. One of these alternative forecasts is the "1990 G2" distribution. The G2 distribution was the basis for the traffic forecasts used in the latter stages of the I-505 study. The major differences between the G5 distribution used in the early I-505 work and the G2 version used in analysis of the final alternatives were fourfold. The G2 version included:

1. Trip distribution assuming only those highway facilities which are planned for the very near future;

2. A higher level of CBD employment activity than in the G5 system;

3. A higher level of transit service throughout the region than in the G5 system. (The 1990 Public Transportation Master Plan which is currently being considered by CRAG and Tri-Met was assumed to be in existence.)

4. A detailed redevelopment of travel forecasts within the I-505 impact study area.

THE CONSULTANT'S MODIFICATION

Analysis of the G5 forecast indicated that 59 percent of all westbound I-505 traffic would be destined to the industrial area between Thurman and Kittridge (See Table A-3). This high density of trip concentration in an area of relatively homogeneous land use called for a detailed investigation of regional land use allocations within the study area. It is often the case that when regional data is applied to a sub-zonal scale there is a need to perform detailed re-evaluation of the data within the study area. This need arises because of several considerations. First, land use and OD (Origin-Destination) data inventories are often developed at a district scale and later disaggregated to the zonal level. This produces an averaging effect on the data. Secondly, there is a natural statistical variation likely to occur at each zone from the expected values given by regional forecasts. Finally, there is a certain amount of smoothing and balancing inherent in transportation planning models, particularly in the Gravity Model when attractions are balanced at the district scale.

At a regional level of analysis these problems are well within tolerance for meaningful understanding of transportation needs. Often the zonal level forecasts can be useful on a finer scale too, particularly when there is a good variety of land use activities within the study zones. A variety of activity tends

to cancel the effects of allocation, statistical and balancing variations. At the sub-zone scale of analysis, however, there is usually not enough magnitude or variety of activity to achieve these neutralizing effects particularly when the study area has very homogeneous activity such as in the I-505 corridor.

The economics consultant for the I-505 study inventoried several analysis zones in the I-505 corridor to assess current levels of activity of various types. (The standard PVMATS trip generation equations were used as a guide for selection of critical activities to be measured.) The economics consultant also developed forecasts of the levels of each activity for 1980 and 1990.

Some comparisons which were drawn between I-505 study and PVMATS estimates are detailed below. Most of these comparisons are keyed to the traffic analysis zone structure shown in Plate A-1. Table A-1 demonstrates the I-505 study and PVMATS allocations of retail sales activity in selected study area traffic analysis zones.

Generally, the PVMATS forecasts are higher than the I-505 study estimates. Table A-2 is a tabulation of I-505 study and PVMATS estimates of employment levels. Overall these estimates are close in total magnitude. There are, however, noticeable zonal variations when the 1990 forecasts are compared with the 1972 inventory of employment as shown in Figure A-1. The mean employment growth is about the same in both the I-505 study and PVMATS estimates. In zones of lower employment the PVMATS forecasts are generally higher than those of the I-505 study, and vice versa, the PVMATS forecasts are lower than the I-505 study forecasts in zones of relatively high employment.

Trip generation estimates for 1990 were developed by the transportation consultants using the economic consultant estimates of employment and commercial activity. Trip generation rates were based on the 1960 OD trips tabulated by PVMATS. Employment was back-cast from the 1972 inventory to 1960 and trip rates for work trips, commercial vehicle trips and non-home-connected trips were calculated as the ratio of OD trips to employee for each purpose. These generation rates were applied directly to the 1990 employment forecasts. Home-connected non-work trip ends were derived from the forecasts of commercial activity.

The G2 trip table was manipulated to produce the matrix used in assignment of volumes to the final set of I-505 alternatives. The G2 distribution was used rather than the G5 distribution because of several reasons. First the total G2 trip ends in the study area were nearly the same as the revised set. Secondly, the network assumed by the G2 distribution has a greater

probability of realization. Third, the G2 distribution has been commonly used in other regional studies. Finally, the G2 version which was used included the assumption of the "1990 Public Transportation Master Plan" as developed by De Leuw Cather for CRAG and Tri-Met.[1]

Tables A-3 and A-4 show 1960 vehicle trip ends and various 1990 forecasts for selected study area zones. The I-505 table has fewer home-connected non-work trips and more commercial vehicle trips than either the G5 or the G2 tables. Work trip ends in the I-505 table "Before Modal Split" are about the same as in the G5 distribution. After transit trips have been removed from the I-505 table the remaining work trips more nearly resemble the G2 distribution totals.

THE EFFECT OF MATRIX MODIFICATIONS ON THE I-505 ANALYSIS

The first analyses of traffic on I-505 were conducted using the G5 distribution trip tables. This distribution was helpful because it is based on the extensive PVMATS recommended highway network system and incorporates widespread impacts of transportation facilities on regional development patterns. These aspects of the G5 distribution make it an ideal starting point from which alternative patterns of transportation and land use configurations can be developed and evaluated. Unfortunately, however, the G5 distribution was not particularly suited to development of detailed traffic forecasts in the I-505 study area. This matrix tended to overstate home-connected non-work trips in the Thurman-Kittridge area and understate commercial vehicle movements. In addition, it did not include the high levels of transit patronage assumed by more recent transit studies.

The combination of these effects were such that when the revised trip tables were loaded on the network, I-505 trips declined by about 25 percent. It should be noted that about 40 percent of the difference is due to the effect of transit improvements and the remainder of the change is a result of forecast modifications. It is interesting also to note that if the G2 distribution had been used in the preliminary assignments, there would have been very little change in the overall level of traffic when the revised tables were developed.

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[1] Revised Draft Report; Public Transportation Plan; Portland-Vancouver Metropolitan Area; Part I; Immediate Improvement Plan: For the Columbia Region Association of Governments, by De Leuw, Cather & Company, May 25, 1972.

In terms of the I-505 study the net effect of the revised trip tables is that the facility has less of an orientation to local, industrial area distribution than was originally considered. Although the magnitude of through travel is about the same before and after modification, its contribution to total I-505 travel is magnified.

In terms of other transportation studies in the region it should be noted that the revisions described here should not exert a significant influence elsewhere. This is because the differences between the G2 distribution and the I-505 tables are of a local nature within the I-505 study area. Comparison of Tables A-3 and A-4 shows the magnitude of trips to be about the same for both matrices. As noted previously the decrease in trips between the G5 and G2 distributions is inherent in the regional activity allocations and the transit systems assumed by these distributions. So, because the I-505 table totals about the same as the G2 table there is little impact from the transportation consultant's trip table modifications on regional distributions.

INTERSTATE 505 ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

PVMATS
TRAFFIC ANALYSIS ZONES

PLATE
A1

FIGURE A-1

GRAPHIC COMPARISON OF EMPLOYMENT ESTIMATES

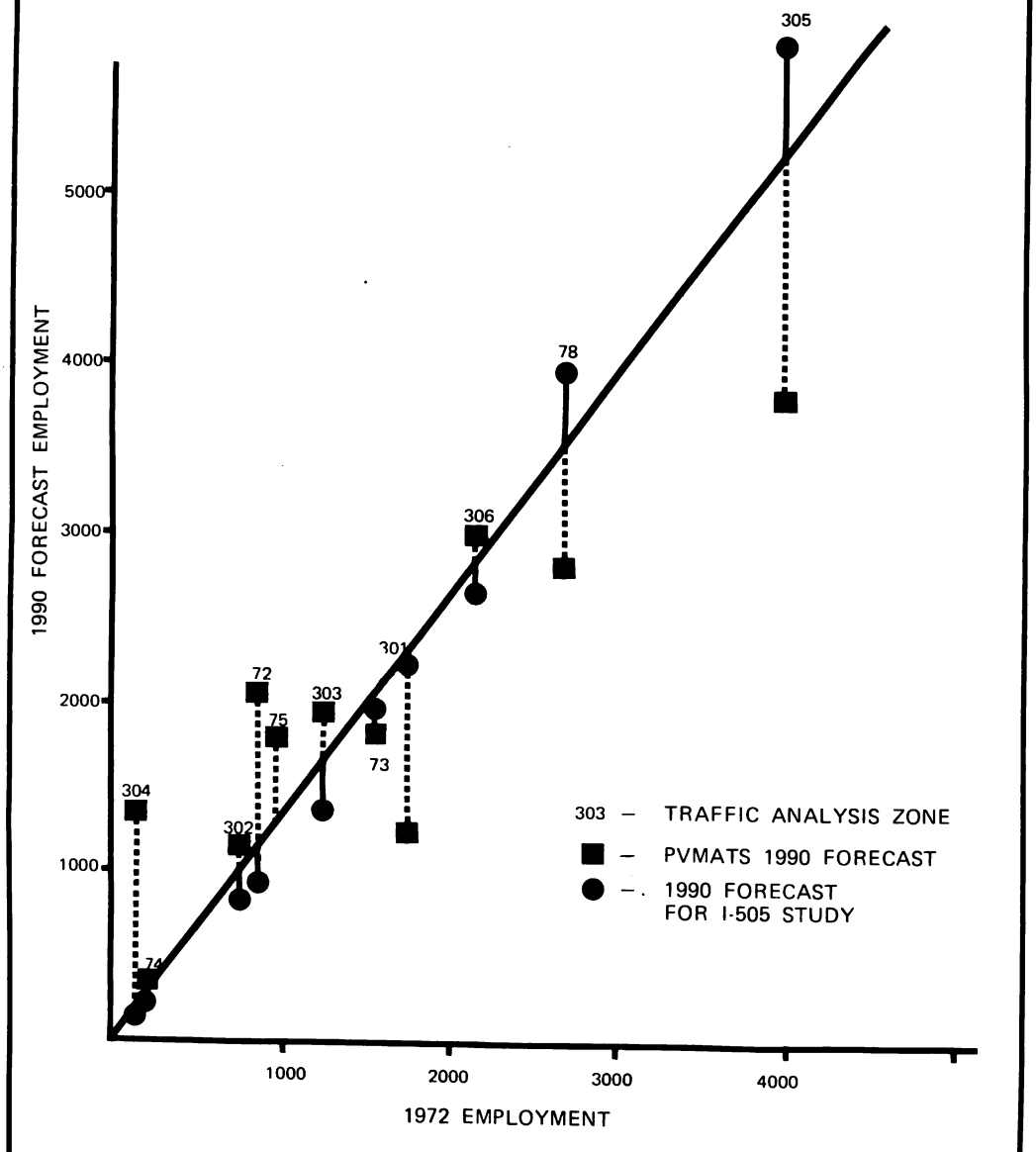


TABLE A-1

COMPARISON OF RETAIL SALES ESTIMATES FOR SELECTED TRAFFIC ANALYSIS ZONES

($ 1,000's)

Convenience Sales

Zone	PVMATS 1960	I-505 1970	I-505 1990	PVMATS 1990
75	5,060	1,602	1,567	1,528
78	251	380	362	779
301	1,407	594	567	4,321
302	1,123	445	424	3,449
303	1,245	177	169	3,823
304	959	18	17	2,975
305	220	24	23	683
306	951	--	--	2,950
Total	11,216	3,240	3,091	29,969

GAF Sales

Zone	PVMATS 1960	I-505 1970	I-505 1990	PVMATS 1990
75	13,782	8,826	8,420	30,940
78	554	--	--	1,400
301	3,835	--	--	10,147
302	3,056	94	90	8,085
303	3,390	350	334	8,696
304	2,612	--	--	6,981
305	460	12	11	1,229
306	1,983	125	119	5,300
Total	29,672	9,407	8,975	72,778

TABLE A-2

TABULAR COMPARISON OF TOTAL EMPLOYMENT ESTIMATES FOR SELECTED ZONES

(Blue Collar and White Collar)

Zone	PVMATS 1960	I-505 1972	I-505 1990	PVMATS 1990
78	2,490	2,680	3,960	2,790
305	3,320	3,980	5,860	3,770
306	2,490	2,150	2,630	2,990
75	1,300	970	1,330	1,780
301	960	1,740	2,200	1,260
302	850	760	840	1,120
303	1,920	1,240	1,360	1,920
304	1,250	120	180	1,330
72	1,570	850	920	2,050
73	1,390	1,540	1,910	1,820
74	220	150	170	280
Total	17,760	16,180	21,360	21,100

TABLE A-3

PVMATS VEHICLE TRIP ENDS FOR SELECTED TRAFFIC ANALYSIS ZONES

TRAFFIC ANALYSIS ZONE	1960 TRIP ENDS (Pre-Distribution)					1990 G5 TRIP ENDS (Pre-Distribution)					1990 G2 TRIP ENDS (Post Distribution-Unbalanced)				
	HB WORK	NON HB WORK	COM VEH	OTHER	TOTAL	HB WORK	NON HB WORK	COM VEH	OTHER	TOTAL	HB WORK	NON HB WORK	COM VEH	OTHER	TOTAL
78	2,140	138	1,408	1,972	5,658	2,456	915	1,314	2,047	6,732	1,569	606	1,159	2,043	5,377
305	2,859	170	1,782	2,821	7,632	4,113	1,344	1,726	3,902	11,085	1,949	1,131	1,276	3,584	7,940
306	2,140	216	1,504	2,728	6,588	3,264	2,258	1,536	4,328	11,386	2,597	1,807	1,476	3,987	9,867
Nicolai-Kittridge	7,139	524	4,694	7,521	19,878	9,833	4,517	4,576	10,277	29,203	6,115	3,544	3,911	9,614	23,184
75	1,470	1,310	1,381	4,075	8,236	736	3,211	1,372	4,171	9,490	892	2,094	1,214	1,911	6,111
301	1,233	361	746	1,112	3,452	1,261	1,595	818	2,001	5,675	934	1,273	634	1,815	4,656
302	1,080	498	560	1,338	3,476	1,189	1,584	686	1,871	5,330	864	1,305	703	1,730	4,602
303	888	580	1,047	2,038	4,553	1,970	2,021	914	3,024	7,929	1,365	1,569	898	2,747	6,579
304	1,068	282	1,034	1,528	3,912	1,239	1,250	622	1,936	5,047	898	981	623	1,411	3,913
Thurman-Nicolai	5,739	3,031	4,768	10,091	23,629	6,395	9,661	4,412	13,003	33,471	4,953	7,222	4,072	9,614	25,861
72	1,353	351	1,708	2,392	5,804	1,920	2,267	736	3,886	8,809	1,196	1,401	667	1,991	5,255
73	1,423	928	780	2,780	5,911	2,050	2,471	942	2,984	8,447	1,264	1,563	838	1,908	5,573
74	528	951	84	892	2,455	781	2,198	384	1,024	4,387	718	1,237	341	845	3,141
NWD IMPACT	3,304	2,230	2,572	6,064	14,170	4,751	6,936	2,062	7,894	21,643	3,178	4,201	1,846	4,744	13,969
TOTAL	16,182	5,785	12,034	23,676	57,677	20,979	21,114	11,050	31,174	84,317	14,246	14,967	9,829	23,972	63,014

TABLE A-4

I-505 STUDY 1990 VEHICLE TRIP ENDS

TRAFFIC ANALYSIS ZONE	BEFORE MODAL SPLIT					AFTER MODAL SPLIT				
	HB WORK	NON HB WORK	COM VEH	OTHER	TOTAL	HB WORK	NON HB WORK	COM VEH	OTHER	TOTAL
78	3,564	606	2,098	4,396	10,664	3,065	590	2,098	4,396	10,149
305	5,278	0	2,486	6,505	14,269	4,513	0	2,486	6,505	13,504
306	2,366	0	1,804	2,919	7,089	1,987	0	1,804	2,919	6,710
Nicolai/ Kittridge	11,208	606	6,388	13,820	32,022	9,565	590	6,388	13,820	30,363
75	1,674	2,084	1,534	6,743	12,035	1,026	1,805	1,534	6,743	11,108
301	2,012	46	1,030	1,143	4,231	1,223	40	1,030	1,143	3,436
302	832	166	677	932	2,607	503	147	677	932	2,259
303	1,314	164	986	1,094	3,558	759	145	986	1,094	2,984
304	160	0	411	200	771	87	0	411	200	689
Thurman/ Nicolai	5,992	2,460	4,638	10,112	23,202	3,598	2,137	4,638	10,112	20,485
72	1,126	1,402	903	2,144	5,575	626	1,235	903	2,144	4,908
73	2,664	1,619	1,569	4,450	10,302	1,582	1,327	1,569	4,450	8,928
74	832	1,092	312	396	2,632	760	1,027	312	396	2,495
NWD IMPACT	4,622	4,113	2,784	6,990	18,509	2,968	3,589	2,784	6,990	16,331
TOTAL	21,822	7,179	13,810	30,922	73,733	16,131	6,316	13,810	30,922	67,179

SECTION 3

EVALUATION OF TRANSIT POTENTIAL

INTRODUCTION

Traffic forecasts for the I-505 study assume the implementation of the extensive express bus system developed by De Leuw, Cather & Company for CRAG, Tri-Met, and Vancouver, Washington. This system is described in the De Leuw, Cather draft report "Portland-Vancouver Metropolitan Area 1990 Public Transportation Master Plan."

Transit potential in the I-505 corridor was evaluated from two points of view. First, the recommended plan was studied to determine if any modifications of the plan in the Northwest District might lead to further reductions in the level of travel on I-505. Second, various regional systems were hypothesized in an effort to determine the maximum potential for reductions of I-505 travel.

POSSIBLE MODIFICATIONS TO THE 1990 METROPOLITAN TRANSIT PLAN

The "1990 Public Transportation Master Plan" was developed to provide an extensive bus transit system throughout the region. It is a flexible, economically viable system which offers fast service over a "backbone" of express routes. Travel speed is enhanced by preferential and exclusive transit use of the road network, and by improvements in route coverage and headways throughout the system.

The recommended plan provides a very high level of bus transit service to the Northwest District. Plate A-2 illustrates the general service areas covered by routes in the plan. A Northwest District traveler can reach virtually any part of the region with a single transfer. In addition, each service area is connected directly to the CBD with express service, often on exclusive transit lanes. Frequent headways on most of the routes help to minimize access time to the transit system. (Access time includes time spent walking to the bus line, waiting for the bus, waiting at transfer points and walking from the bus to the destination.)

Plate A-2 also schematically represents the route system described in the "1990 Public Transportation Master Plan." Note the structure of the express system. Bus lines generally provide local service in a service area, then run express to and through the CBD, providing local service at the other end of the line and minimizing the number of transfers in the system.

Hypothetical modifications to the plan were generally formulated within the framework of the same goals and objectives which

guided development of the original plan. Modifications were confined to the I-505 study area; the remaining system was left intact.

None of the modifications which were developed by the transportation consultants resulted in a significant reduction of forecast I-505 auto travel demand from the levels predicted when the 1990 plan was assumed without modification. This is because of the high level of service already provided to the Northwest District in the 1990 plan.

Two of the hypothetical modifications are described here. The first scheme considers the use of a corridor area park-ride lot; the second examines a local area dial-a-ride service.

Modification Scheme 1: Use of I-505 Right-of-Way for Park-Ride Service

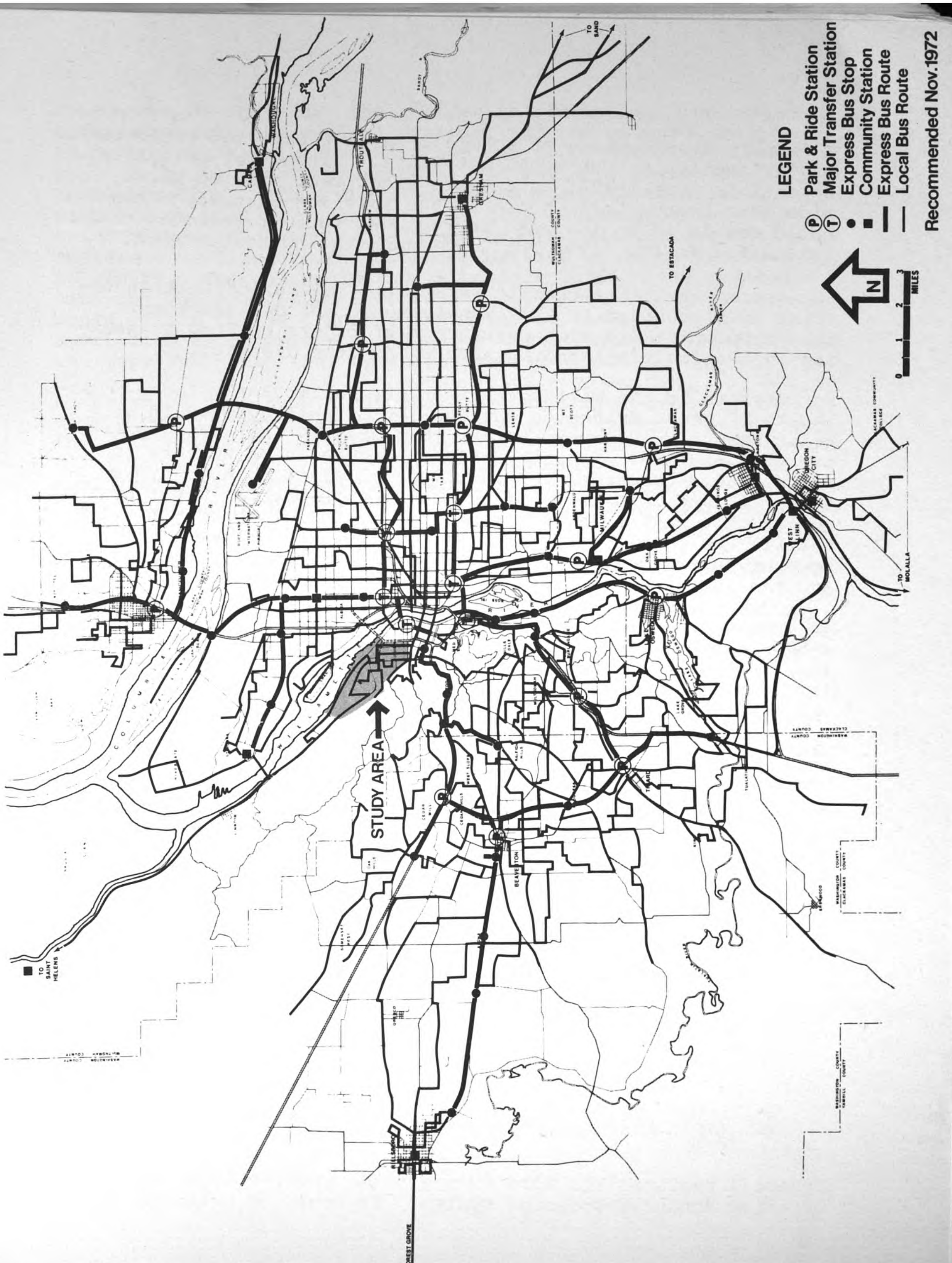
This scheme would add a park-ride facility on the I-505 right-of-way. All three of the Northwest District lines would serve the lot.

Travelers already on I-405, destined for the CBD could catch any of these three lines at the park-ride station. The average wait for a CBD bound bus would be two minutes during the peak hour, and two and one-half minutes during the off-peak. This high frequency of CBD service would make the lot quite attractive to downtown travelers.

The facility would also offer a convenient relief to the parking shortage in the Northwest District, particularly in the vicinity of Good Samaritan Hospital. The current parking problem in this area will be aggravated by future demand and by a possible need to remove curbside parking from the major arterials. The direct service and frequent headways of the 21st and 23rd avenue lines could provide a virtual shuttle service between the lot and the district. If the lot is to function efficiently, the fares between the lot and the district would, of course, have to be lower than parking cost in the district.

A park-ride lot in this corridor would also allow excellent service to the Guilds Lake industrial area. The through line to St. Johns could either be routed on local streets in the industrial area, or they could travel express on I-505 and US 30. Both the 21st and 23rd avenue lines could loop through the industrial area to the north of Vaughn, providing a high level of service to workers in that area.

A park-ride facility in the corridor would also be an asset to travelers coming into Portland from US 30, northwest of the St. Johns Bridge. For these people, an inexpensive lot with rapid service to the CBD would offer a strong inducement to make use of the transit system.



INTERSTATE 505 ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

1990 PUBLIC TRANSPORTATION MASTER PLAN

PLATE A2

A primary disadvantage of scheme 1 is that this lot could be too attractive to CBD-bound motorists. If the lot is easily accessible from I-405, auto users might well pass up park-ride lots nearer their homes to use this lot instead. This could result in an increase in regional auto travel over that calculated in the "1990 Public Transportation Master Plan."

It also appears that transit service to the Guilds Lake industrial area provided in this scheme would not be inducement enough to attract a high percentage of riders as long as parking is available and inexpensive within the district.

For workers in the Northwest District, particularly those crossing the Fremont Bridge, a parking lot of this type would be a great benefit. However, rather than greatly increasing patronage over the 1990 plan, it would encourage these workers to drive across the Fremont Bridge instead of catching a bus on the other side. One way of resolving this problem might be to construct a park-ride lot on the other side of the river, with shuttle bus service provided directly to the Northwest District. However, operating costs for this type of service would be high, and the increase in patronage over the 1990 plan would be slight.

In conclusion, it is felt that although a park-ride lot in the I-505 corridor would no doubt attract a substantial number of users, it would probably not reduce the level of I-505 vehicular traffic, and could, in fact, increase the number of auto trips on the facility.

Modification Scheme 2: I-505 Study Area Demand-Responsive System

During the course of the I-505 study, several suggestions were received that consideration should be given to a transit service tailored specifically to the needs of community residents. The overriding difference between Northwest District residents as a group and the Portland community at large is that the former is generally poorer and older. In terms of transit system development, some key effects of these differences are:

1. Access to transit is often burdened by physical handicaps or reduced stamina.

2. Travel is more oriented to shopping, health and welfare services and to social or recreational activities than to employment centers.

3. Travel time is generally less important than travel cost.

Scheme 2 replaces the 23rd Avenue fixed route with a Northwest District demand-responsive system. It would be oriented to

four nodes of activity; the residential community, the industrial district, the medical district and the proposed major transfer terminal located downtown, north of Burnside. Busses would be small (19-25 passengers) and would be equipped with two-way radios. A bus would leave the Burnside terminal and drop off or pick up passengers who live in the apartment district between the parking terminal and the medical district. Instead of a fixed route, doorstep service would be provided to riders. The bus would then circulate through the medical district and proceed to the residential area. Finally, it would return to the transfer terminal via the medical district. Similarly, another line would serve the industrial areas on the east and north side of the Northwest District.

A system of this type could meet the particular needs of the community in a way that fixed-route systems cannot. However, the cost of operation would undoubtedly be more than the fixed route service. In terms of I-505 travel, this system would not make a significant reduction in trips on the facility beyond the level forecast in the "1990 Public Transportation Master Plan."

SYSTEMS NOT BASED ON THE 1990 PUBLIC TRANSPORTATION MASTER PLAN

If the goals, objectives and constraints which guided development of the 1990 plan were altered, several other types of systems could be evolved. For instance, if an overriding objective were to improve air quality through minimization of auto travel, and if systems cost were a minor consideration, any number of exotic systems could be developed which would dramatically affect the present dependency on auto travel.

The number and variety of such hypothetical systems is, of course, infinite. For the sake of this discussion, however, a few generic types will be described which will highlight the range of transit systems that could conceivably be operating by 1990.

Fixed Guideway System

Perhaps the most frequently mentioned advance transit idea is the fixed guideway concept, usually in the form of rail rapid transit such as BART (Bay Area Rapid Transit) in the San Francisco Bay Area, or the monorail in Seattle. It is important to note, however, that a fixed guideway system does not have to be as large as the BART system, but can be scaled to the expected patronage. Fixed guideway systems are capable of high speed and low operating costs. Capital costs are high, but in many cities, particularly those with high density employment centers and sharply defined transportation corridors, the fixed guideway systems offer an economically viable alternative to bus transit.

Primary advantages of fixed guideways are the high speed and frequent service which can be provided at relatively low operating cost. They have good potential for attracting motorists to transit. Primary disadvantages of fixed guideway systems are the high initial cost, inflexibility to meet new technology or changing growth patterns, and the need to transfer to auto or bus at the start or end of a trip.

In terms of land use impact, fixed guideway systems tend to encourage high density employment and residential activity in the vicinity of major stations. They also tend to reinforce present trends in suburban development by providing outlying communities with high-speed access to the city core.

It is interesting to note that the "1990 Public Transportation Master Plan" bears a strong resemblance to a fixed guideway system. The arrangement of express lanes would offer the same kind of line haul service as a fixed guideway line. In fact, the bus systems offer an advantage over the fixed system in that the busses become local routes at the ends of express runs, allowing many riders to use the system without transfer.

Personal Rapid Transit System

Personal Rapid Transit Systems, or more commonly, "PRT" systems, are usually described as "horizontal elevation." They commonly operate on fixed guideways, but are different than the systems described above in the size of vehicle (usually less than 20 people), and in that patrons indicate their destinations (usually by push buttons), and the vehicle bypasses other stops as it moves about the network.

These systems have primarily been used to link major activity centers such as shopping centers, airports, etc. Some planners foresee the use of PRT systems on a city-wide scale, with coverage akin to or better than that provided by the existing bus systems. An advantage of this type of network is that passengers could be moved at high speeds along direct routes between origin and destination points.

Major disadvantages of this system are high development costs and lack of flexibility. PRT systems used as line haul routes require passengers to transfer to autos or busses in order to reach their ultimate destinations.

Demand-Responsive Systems

The concept of demand-responsive transit is more like taxi service than traditional public transit service. Demand-responsive systems usually function as feeder routes to major line-haul routes, or provide direct service to major activity

centers. As the vehicle, usually a mini-bus type, moves through the neighborhood toward its destination, the path it follows is controlled by a dispatch center. Residents in the target neighborhood call the dispatch center when they wish a ride, and the dispatcher orders the most appropriate vehicle to the home of the caller.

Portland's "Project Mobility" study is evaluating the potential of this type of system for serving the needs of the handicapped and others with limited mobility.

As part of a city-wide system, the demand-responsive mode is most efficiently used as a supplement to a line haul PRT, fixed guideway or express bus system.

A major advantage of the demand-responsive system is that passengers receive door-to-door service. Systems of this type which have been implemented were well accepted by area residents. Primary disadvantages of the system are the high labor and maintenance costs.

A typical demand-responsive system which might serve the Northwest District in conjunction with the recommended transit plan is discussed previously in this appendix.

Evaluation of Advance Transportation Systems With Respect to the I-505 Corridor:

Unfortunately, conventional transportation planning models are too tempered by existing behavior characteristics to provide a reliable guide to the consequences of radical changes in regional life styles and travel habits. A system designed to accommodate as a primary goal, "a great reduction in the need for auto travel" would likely be accompanied by severe parking and vehicle operation controls. Acceptance of such controls by the public at large would indicate a far different attitude toward transportation than that assumed by present model calibrations.

In order, therefore, to evaluate the maximum potential for transit in the I-505 corridor, a forecast of trips was developed which assumed that 100 percent of the regional home-to-work trips would be made on transit. It was considered that this evaluation would sufficiently represent even the most advanced transportation system which could be developed by 1990.

I-505 study figures show that commuter trips constitute approximately 23 percent of all I-505 travel; virtually all of the remaining travel is related to purposes which have little propensity to public transportation, such as trucking and business trips.

Assignment of the non-commuter trips demonstrated that serious congestion in the study area could not be eliminated by the presence of even a very sophisticated transit system.

SUMMARY OF CONCLUSIONS

It was concluded that transit as an alternative to an improved facility of some sort would not adequately meet the projected transportation need. Transit should, however, be considered as an important supplement to whatever roadway alternative is ultimately selected. It should be noted that roadway alternatives which provide lower levels of service will tend to slightly favor the use of transit.

Additionally, it is felt that the transit demand from the relatively low-density area north and northwest of the study area does not warrant provision of an exclusive lane on the I-505 facility for service to downtown Portland. It is, however, possible that if a regional mass transit "super system" were developed, and if greatly increased development downriver becomes a desirable regional goal, then provision of such service could be considered.

SECTION 4

EVALUATION OF THE NO-BUILD

INTRODUCTION

The No-build alternative is defined as:

> The I-405 ramps to N.W. 21st Avenue, with full development of four lanes in each direction.
>
> No major new rights-of-way are acquired.
>
> No capital improvements except for traffic control and street widenings within existing rights-of-way.

The analysis of this alternative consists of an assumption of a traffic-control system, development of the 1990 daily traffic loadings, analysis of capacity and level of service, and assessment of impact.

TRAFFIC CONTROL SCHEME

Recognizing that the present street system is at or close to capacity at key locations, a one-way street system was assumed as the best way to handle large volumes of traffic within present sixty foot rights-of-way. Also assumed was development of accessory traffic signals, pedestrian controls, channelization and widenings, lighting, directional signing, and parking prohibitions.

Plate 10 shows the assumed one-way network. This system was laid out to avoid as much as possible the routing of traffic south of N.W. Vaughn Street.

TRAFFIC ESTIMATE

The starting point for the traffic estimate was the assignment of 1990 G-2B volumes to the No-build alternative. The procedure followed was to manually reassign traffic in the following steps:

1. Northwest district travel, plus an estimate of internal and circulating traffic not accounted for by the computer assignment.

2. Traffic to and from St. Helens Road on the north. This traffic is relatively unaffected by alternatives.

3. Through trips. Northbound was via N.W. 21st, Nicolai, and St. Helens Road. Southbound followed St. Helens, Vaughn, 22nd and Thurman.

4. External traffic.

During the last steps, it was discovered that some 9,000 daily trips that would otherwise enter the Northwest District via I-405 and N.W. 21st Avenue would have to use an alternate route such as the Broadway Bridge. Also, access was sharply reduced (by one-way streets and high traffic volumes) to the area of Vaughn and Thurman east of 21st Avenue. Northwest 21st Avenue became virtually useless as an access route to Thurman Street and north.

Plate A-3 shows the assignment of traffic. Note the very heavy volumes on N.W. Thurman, Vaughn, Nicolai, 21st and 22nd.

CAPACITY ANALYSIS

Capacity analysis consisted of calculating a.m. and p.m. peak hour, assuming number of lanes, estimating the capacity (with adjustment for trucks), and making adjustments to maximize intersection operation.

Results are of two sorts. In terms of level of service, the following was found:

Intersection	Peak	Level of Service
N.W. Vaughn and 21st	A.M.	D
N.W. Nicolai and Yeon	A.M.	D*
N.W. Nicolai and 26th	A.M.	D*
N.W. Nicolai, 29th and St. Helens	A.M. and P.M.	D*
St. Helens and Kittridge	P.M.	D/E
St. Helens and Yeon		
N.W. Vaughn and 26th	P.M.	F
N.W. Vaughn and 25th	P.M.	C
N.W. Vaughn and 23rd	P.M.	E
N.W. Vaughn and 22nd	P.M.	C
N.W. Thurman and 25th	P.M.	C
N.W. Thurman and 23rd	P.M.	C
N.W. Thurman and 22nd	P.M.	E
N.W. Thurman and 21st	P.M.	E

*disregarding rail interference

It was noted that the prohibition of trucks during the peak hours would gain level of service "D" except at N.W. Vaughn and 26th Avenue.

In terms of cross-section required, complete parking prohibitions would be needed on the one-way sections of N.W. 21st Avenue, Nicolai, Wardway, Vaughn (east to N.W. 22nd), 22nd (Vaughn to Thurman), Thurman, and two blocks on 23rd on either side of Vaughn. A four lane, 48 foot curb-to-curb width would be needed on parts of N.W. 21st, Thurman, Nicolai, 22nd, 23rd and Vaughn. Wardway would have to be widened to at least 36 feet, with 40 feet desirable.

SECTION 5

EVALUATION OF ALTERNATIVES

INTRODUCTION

A major goal of the transportation analysis for I-505 was the evaluation of alternatives. Nineteen-ninety trip tables have been updated to reflect most current land use activity in the study area with latest future projections. The position of study area transportation as part of the Portland-Vancouver region has been assessed. Alternative highway plans have been conceived; been given preliminary evaluation; combined, deleted, or modified by analysis; and developed as detailed preliminary designs. The capacity characteristics have been estimated, as have probable future levels of transportation service for 1990 traffic volumes.

This section contains a description of the factors evaluated, an application of these factors to each alternative, and summarized conclusions.

DATA EVALUATED

Much of the data developed about each alternative is descriptive in nature, and is essentially input to the transportation evaluation process. This includes the 1990 daily and peak hour volumes and the basic layout and design of each alternative. Other data are evaluative in nature. They include the results of capacity analysis and user statistics. Still other data is subjective in nature. Following paragraphs describe the factors used in the transportation evaluation of the final freeway alternatives.

Daily Vehicle-Miles

Daily vehicle-miles of travel statistics (in 1990) are useful to compare one highway system to another. Generally the same total number of trips follow paths of different length through different alternatives. Therefore, different totals of vehicle-miles of travel are generated. Comparison among alternatives provide a measure of efficiency, with the lowest total being the best. The relationship between vehicle-miles on freeway and arterial indicates the scale of the freeway service and use.

Daily Vehicle-Hours

Daily vehicle-hours of travel provide the same sorts of measurements, but take into consideration the average speeds on

the alternatives. Again, the lowest total could be said to be the most efficient.

Daily Auto Running Cost

Daily auto running cost is related to out-of-pocket expenditures for auto travel. Items considered include gas, oil, tires and routine maintenance. Items such as insurance, depreciation and major repairs are not considered out-of-pocket expenses. Differences in the alternatives are primarily determined by congestion, roadway grades and curvature.

Daily User Cost

Daily user cost relates to the value of time spent by transportation system users. Time, even leisure time, is valuable. User time savings of one alternative over another (or over a common base such as the No-build) are used in cost benefit analysis.

Level of Service (see Table A-5)

Level of service tells how well each alternative performs its job of serving travel. Level of service is treated in several ways. A general assessment is made for each alternative based on the severity and number of potential congestion locations. Also considered is what portion of the alternative might be providing exceptionally good service (not necessarily a favorable attribute, since this might indicate supply exceeding demand).

Although each alternative has been laid out and designed to provide level of service "D," it must always be expected that particular conditions at specific locations might create worse than level "D," or require severe traffic restrictions (such as parking prohibitions or turn prohibitions) to achieve "D." These spots were used as a measure of disadvantage for any alternative.

Surface Street Impact

Here, the varying requirements of each alternative for modification of the surface street system are identified and classified as to how extensive the modification must be.

TABLE A-5

LEVEL OF SERVICE CHARACTERISTICS BY HIGHWAY TYPE

LEVEL OF SERVICE	URBAN ARTERIALS	CONTROLLED ACCESS HIGHWAYS (FREEWAY)
A	Average over-all travel speed of 30 mph or more. Free flowing.	Free flow. Operating speeds at or greater than 60 mph. Service volume of 1400 passenger cars per hour on 2-lanes, one direction.
B	Average over-all speeds drop due to intersection delay and intervehicular conflicts, but remain at 25 mph or above. Delay is not unreasonable. Volumes at 0.70 of capacity.	Higher speed range of stable flow. Operating speed at or greater than 55 mph. Service volume on 2-lanes in one direction not greater than 2000 passenger vehicles per hour.
C	Service volumes about 0.80 of capacity. Average over-all travel speeds of 20 mph. Traffic flow still stable with acceptable delays.	Operation still stable, but becoming more critical. Operating speed of 50 mph and service flow on 2-lanes in one direction at 75% of capacity or not more than 5 min. flow rate of 3000 passenger cars per hour.
D	Beginning to tax capabilities of street section. Approaching unstable flow. Service volumes approach 0.90 of capacity. Average over-all speeds down to 15 mph. Delays at intersections may become extensive with some cars waiting two or more cycles.	Lower speed range of stable flow. Operation approaches instability and is susceptible to changing conditions. Operating speeds approx. 40 mph & service flow rates at 90% of capacity. Peak 5 min. flow under ideal conditions cannot exceed 3600 vph for 2-lanes, one direction.
E	Service volumes at capacity. Average over-all traffic variable, but in area of 15 mph. Unstable flow. Continuous back-up on approaches to intersections.	Unstable flow. Over-all operating speeds of 30-35 mph. Volumes at capacity or about 2000 vph lane under ideal conditions. Traffic flow metered by design constrictions and bottlenecks, but long back-ups do not normally develop upstream.
F	Forced flow. Average over-all traffic speed below 15 mph. All intersections handling traffic in excess of capacity with storage distributed throughout the section. Vehicular back-ups extend back from signalized intersections, through unsignalized intersections.	Forced flow. Freeway acts as a storage for vehicles backed-up from downstream bottleneck. Operating speeds range from near 30 mph to stop-and-go operation.

Source: A Policy on Design of Urban Highways and Arterial Streets: American Association of State Highway Officials; Washington, D.C.; 1973.

Separation of Traffic

It is generally considered an attribute to provide for separation of:

- Through and local traffic;
- Trucks and autos, and;
- Vehicles and pedestrians.

How well this is accomplished by each alternative is assessed.

Flexibility

This is important from two aspects. First, it would be desirable for an alternative to be designed so that it could easily be modified to provide greater or less capacity if projected land uses and traffic generation in the study area change markedly from that forecast in this study. This flexibility could exist in terms of capacity (say, number of lanes) or the ability to add links to the system.

Similarly, flexibility to meet unforeseen changes in the surrounding highway network is desirable. For example, how well an alternative might fit in with conceivable expansion or reduction of long range highway system plans.

Stage Construction Potential

This factor is mainly important from the physical standpoint of building new facilities while maintaining transportation service. Some alternatives offer construction staging that is more favorable than others in terms of traffic service.

Transit

Like many of the factors previously discussed, transit is viewed from two standpoints. One is the potential of any alternative to provide for good transit service. This could be in terms of the degree of express access to the area via freeways, the potential for special transit lanes on surface streets, the ease of locating bus stops, or the lack of impediments to development of local bus service.

From the long-range aspect, would any of the alternatives particularly increase transit use and physically fit into a system larger in scope and impact than that now envisioned for Portland? If so, a degree of positive impact must be assigned.

General Accessibility

This factor is subjective, but attempts to describe how well any alternative serves the study area. Is access direct or circuitous? How easy would it be for the user to find his way through the system? This assessment relies upon the ability to imagine one's way through the interchanges and intersections and the reaction to guide-signing.

Scale

The physical scale of the project, in relation to surrounding development and topography, is an urban design matter. However, the scale also has transportation aspects. The concentration of traffic into a small area could be reflected by level of service analysis and in concentrations of noise and fumes. Visual and participatory impact on the user are considered as well. Conversely, too wide a diffusion of traffic would have mixed impacts of user freedom and facility oversupply.

Trips Not Served

Each alternative may not serve exactly the same number of trips. Due to capacity restrictions, presence or absence of ramps, or the relative speed provided by parts of alternative systems, trips may be diverted entirely off the highway network to routes outside of or through the study area. This possibility is not necessarily bad, but it should be identified and evaluated.

EVALUATION MATRIX

The above factors are used to compare and evaluate each alternative. The Evaluation Matrix, Table A-6, summarizes the impact of Alternatives 1 through 5 and the No-build as measured by the factors.

DESCRIPTIVE EVALUATION OF THE I-505 ROADWAY ALTERNATIVES

During the course of the I-505 study, many and various transportation solutions were proposed by the team, by interested citizens and by public agencies. As the various concepts were developed traffic operations suitability was a primary design criteria. Any alternatives which were greatly deficient from a traffic point of view were rejected from further consideration. This criteria was held important because it was considered unreasonable to build a facility if it did not provide relief to congestion in the corridor.

Therefore, it is important that a traffic evaluation of the five roadway alternatives should be presented in reference to the relief of critical obstructions to corridor travel. There are

TABLE A-6

I-505 STUDY - TRANSPORTATION MATRIX FOR EVALUATION OF ALTERNATIVES

		ALT. 1 UPSHUR	ALT. 2 UPSHUR-YEON	ALT. 3 LONG YEON	ALT. 4 SHORT YEON	ALT. 5 INDUSTRIAL	NO-BUILD
USER ECONOMICS							
DAILY VEHICLE-MILES	FREEWAY	39,000	56,000	96,000	37,000	56,000	5,000
	ARTERIAL	185,000	177,000	126,000	192,000	165,000	240,000
	TOTAL	224,000	233,000	222,000	224,000	221,000	245,000
DAILY VEHICLE-HOURS		8,400	8,200	8,400	8,800	8,300	11,600
DAILY							
AUTO RUNNING COST		$ 10,900	$ 11,500	$ 10,400	$ 10,600	$ 10,500	$ 11,700
DAILY USER COST		$ 41,600	$ 40,500	$ 41,600	$ 43,700	$ 41,300	$ 57,600
TOTAL DAILY COSTS		$ 52,500	$ 52,000	$ 52,000	$ 54,300	$ 51,800	$ 69,300
ANNUAL COST AND SAVINGS OVER NO-BUILD		$6,130,000	$6,310,000	$6,310,000	$5,490,000	$6,390,000	------
SAFETY POTENTIAL							
ANNUAL ACCIDENTS		345	348	303	370	329	412
ANNUAL ACCIDENT COSTS		$235,000	$236,000	$215,000	$256,000	$226,000	$283,000
LEVEL OF SERVICE							
FREEWAY OVERALL		Good	Good	Good	Good	Good	Good*
RESTRAINTS		Good	Good	Good	Good	Good	Good
WEAVES		Good	Fair	Fair	Fair	Fair	Good
SURPLUS CAPACITY		Fair	Fair	Very Good	Good	Very Good	Good
SURFACE OVERALL		Good	Good	Fair	Fair	Good	Poor
RESTRICTIVE INTERSECTIONS		Poor	Very Good	Good	Fair	Good	Poor
SURPLUS CAPACITY		Good	Fair	Good	Fair	Good	Poor
SURFACE STREET IMPACT		Good	Fair	Fair	Good	Fair	Poor
SEPARATION OF TRAFFIC							
THROUGH		Fair	Good	Good	Poor	Fair	Very Poor
TRUCKS		Poor	Good	Good	Fair	Fair	Very Poor
PEDESTRIANS		Fair	Good	Good	Good	Good	Very Poor
FLEXIBILITY							
STUDY AREA GROWTH		Fair	Excellent	Very Good	Good	Good	Poor
GENERAL REGIONAL LAND USE		Fair	Poor	Poor	Good	Fair	Good
TRIP GROWTH		Good	Good	Excellent	Very Good	Good	Poor
HIGHWAY SYSTEM		Fair	Fair	Poor	Good	Fair	Excellent
STAGE CONSTRUCTION POTENTIAL		Good	Fair	Good	Very Good	Fair	Poor
TRANSIT							
ENHANCEMENT		Poor	Good	Good	Good	Fair	Poor
LONG-RANGE		Fair	Fair	Fair	Good	Fair	Good
GENERAL ACCESSIBILITY							
TO STUDY AREA		Fair	Excellent	Excellent	Fair	Very Good	Very Poor
USER EASE		Good	Fair	Fair	Poor	Fair	Fair
SCALE (AVOID CONCENTRATION)		Fair	Good	Fair	Fair	Excellent	Poor
TRIPS NOT SERVED		Good	Good	Good	Good	Good	Poor

*When the term "Freeway" is applied to the No-build, it refers to the I-405 ramps between the Fremont Bridge, the Stadium Freeway, and 21st. Avenue at Vaughn and Thurman streets.

qualitative differences, however, between the alternatives especially as to how well they serve the regional community, the local residents and industry. These distinctions arise because traffic considerations were not the only criteria used in alternative design and selection. Other team consultants and lay advisors proposed modifications to "optimum" traffic solutions when their primary concerns were affected.

The following discussion of alternatives is intended to speak strictly from the transportation viewpoint and is a more-or-less subjective assessment of the alternative roadways by the team transportation planners. There is no intent here to recommend any alternative over another because it is recognized that any decision must include considerations other than functional utility.

Alternative 1, Upshur

With regard to traffic flow, the Upshur Alternative will adequately handle through traffic to St. Helens Road but less efficiently handle locally destined travelers. There will be a heavy burden on the arterial system serving the facility and a high potential for congestion at critical intersections. Travel on local streets would be higher under this roadway alternative than on any other. (Note: Alternative 4 has higher total vehicles miles of travel on arterials but this includes a greater arterial distance for through trip travel.)

Alternative 2, Upshur-Yeon

The Alternative 2 is similar to Alternative 1 with respect to through travel. Many of the difficulties regarding local distribution of traffic are overcome however by provision of the spur ramp north toward the Guilds Lake area. Because of the split nature of this facility, merging and weaving patterns on the freeway are more of a problem and movement on the surface arterials is considerably smoother than on Alternative 1.

Alternative 3, Long Yeon

This alternative provides good service to system users. Most notable is the high level of service to through travel and the potential to accommodate a variety of trip growth patterns. From the road user point of view, this alternative is probably the most desirable.

Alternative 4, Short Yeon

Throughout the I-505 study, the problem of rail crossing conflicts with the mainstream of U.S. 30 traffic was a difficult consideration. All of the other alternatives avoid rail-highway

conflicts by highway location or structural design. Only Alternative 4 accepts rail conflicts as an unavoidable consequence. The split routing of U.S. 30 traffic on Alternative 4 was established to minimize the amount of delay by allowing one direction of traffic to avoid conflicts.

This alternative will probably be confusing, circuitous and disruptive to the smooth flow of traffic. Westbound travelers will face road closure queues during rail-switching operations. Although this alternative meets the minimum requirements of traffic capacity, it is certainly the least desirable alternative for the motorist. In addition, from the traffic design perspective, it is more like a permanent "temporary detour" than a finished transportation solution.

Alternative 5, Industrial

This alternative provides good level of service to through traffic as well as good distribution to the local area.

Land Use Impact Considerations

The relationship of the freeway alternative to land use development impact is keyed to the travel time spent traveling through the study area by travelers from the region northwest of the study area. The No-build will cause greater travel time than the five roadway alternatives and will thereby tend to discourage development downriver. Each of the alternatives will shorten the travel time through the study area by various amounts depending on the length of the freeway segment and the smoothness of flow. Alternative 3 will, therefore, tend to encourage dispersed regional development patterns more than the others. The total difference in land use impact among the five roadway alternatives will be slight, however, because the total length of I-505 is too short to make a significant difference in travel time through the study area.

CONCLUSION

In view of the above considerations, it may be helpful to rate the alternatives in an order of preference from the traffic standpoint. There is danger in doing this because a casual reader may consider this rating process as a recommendation and it is not. Social, economic, urban design, pollution and a host of other concerns must be considered as well. Yet it may be helpful to summarize the traffic findings in a ranking format.

Thus, from strictly the traffic aspect, Alternative 3 is best, Alternatives 2 and 5 are on par behind 3, Alternative 1 is next, Alternative 4 is much below the others and the No-build is inadequate.

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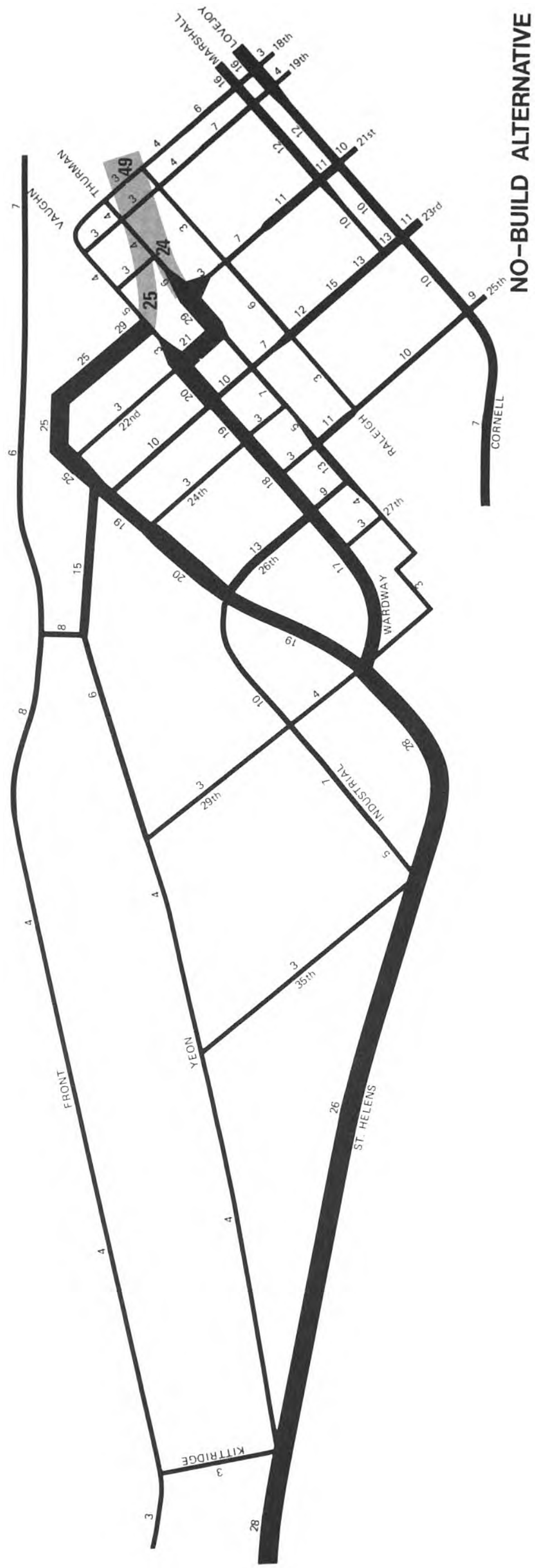
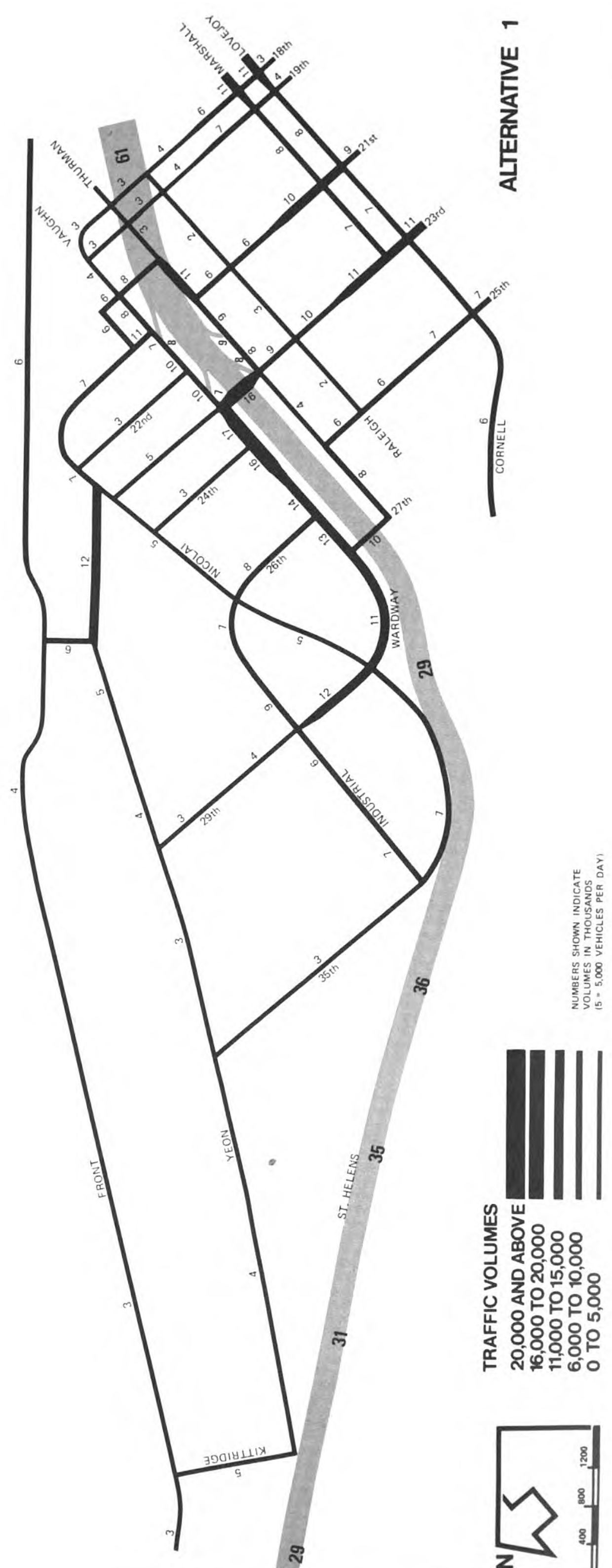
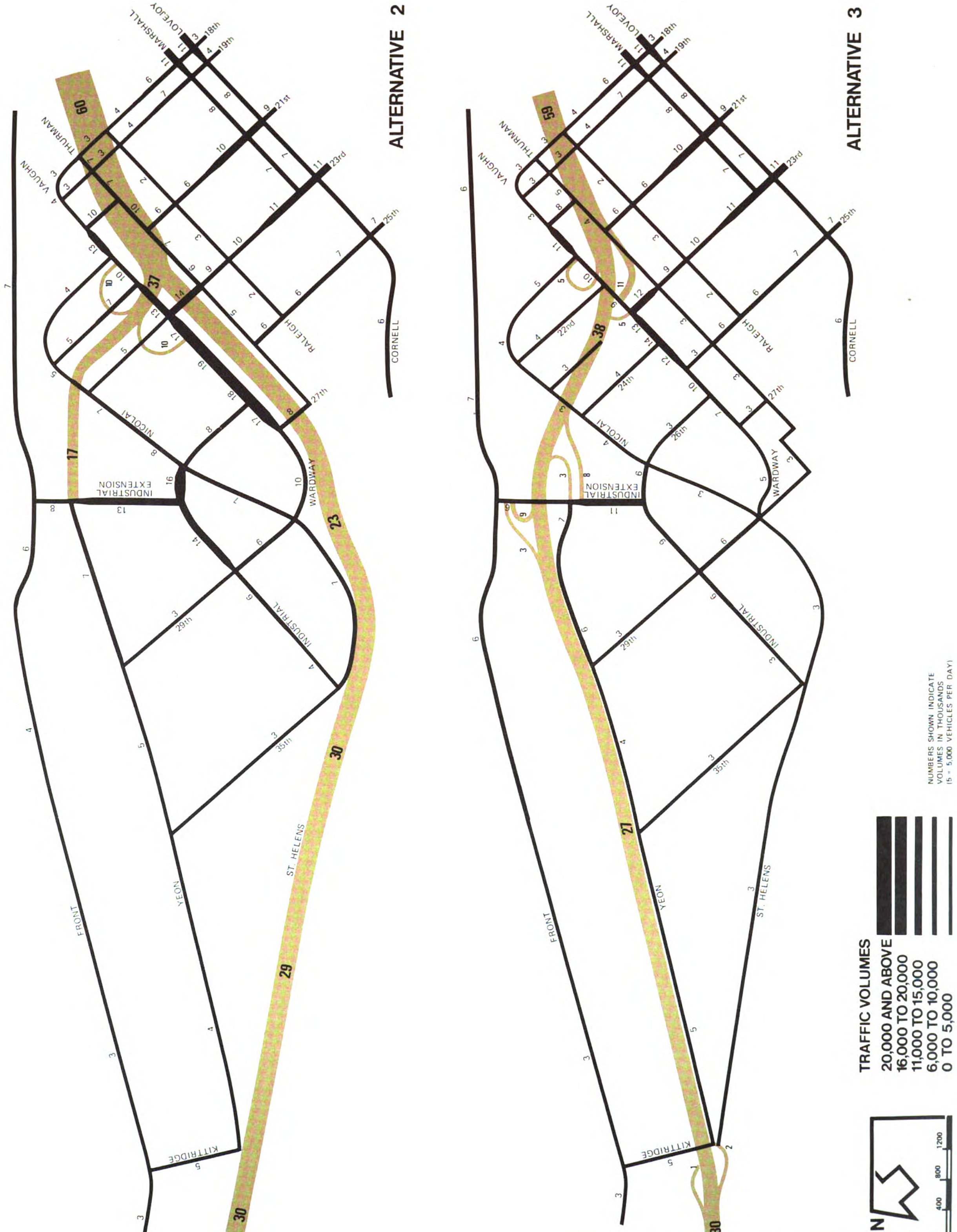




INTERSTATE 505 ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

1990 DAILY TRAFFIC VOLUMES
NO BUILD ALTERNATIVE
ALTERNATIVE 1

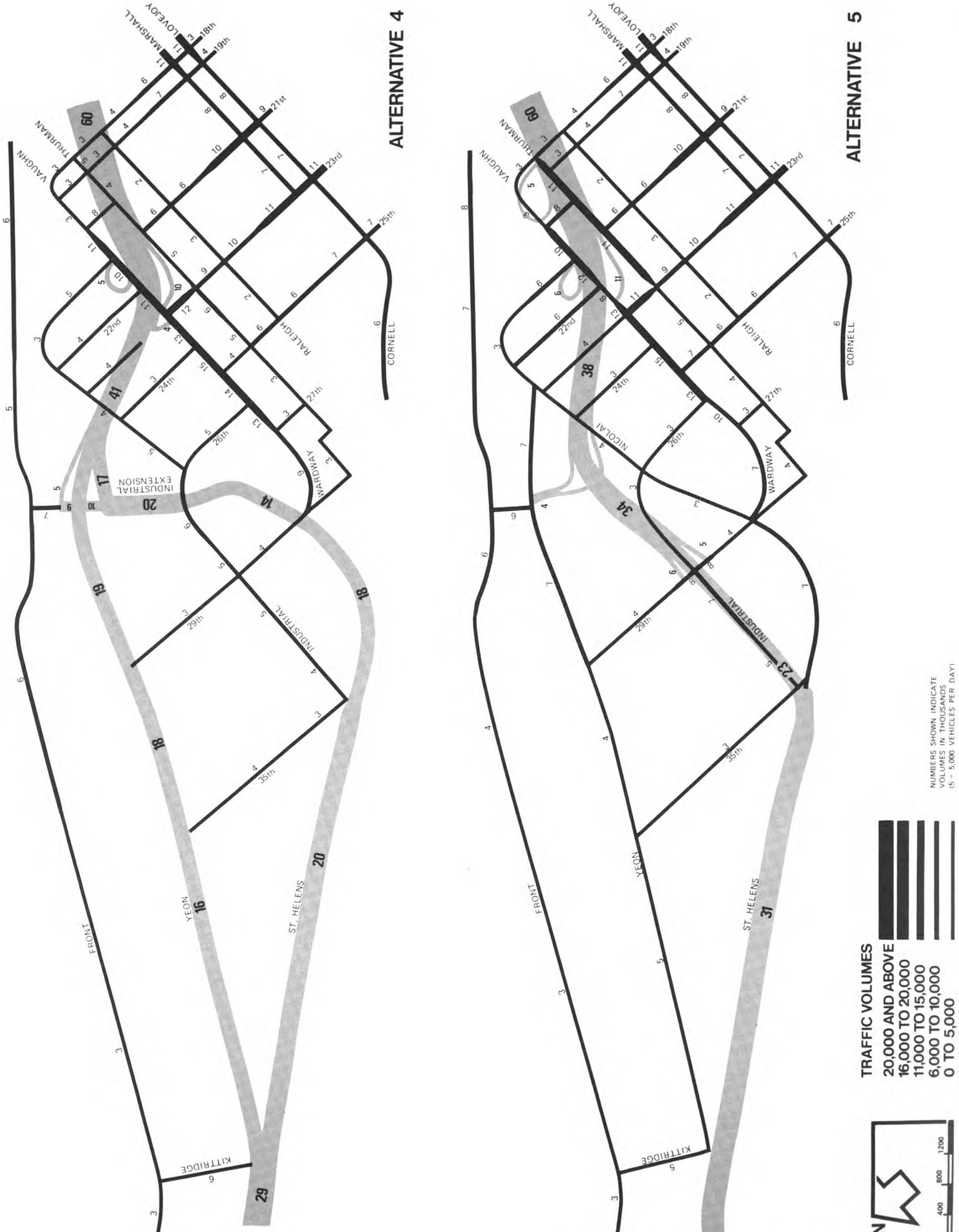
PLATE A3



INTERSTATE 505 ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

1990 DAILY TRAFFIC VOLUMES
ALTERNATIVE 2
ALTERNATIVE 3

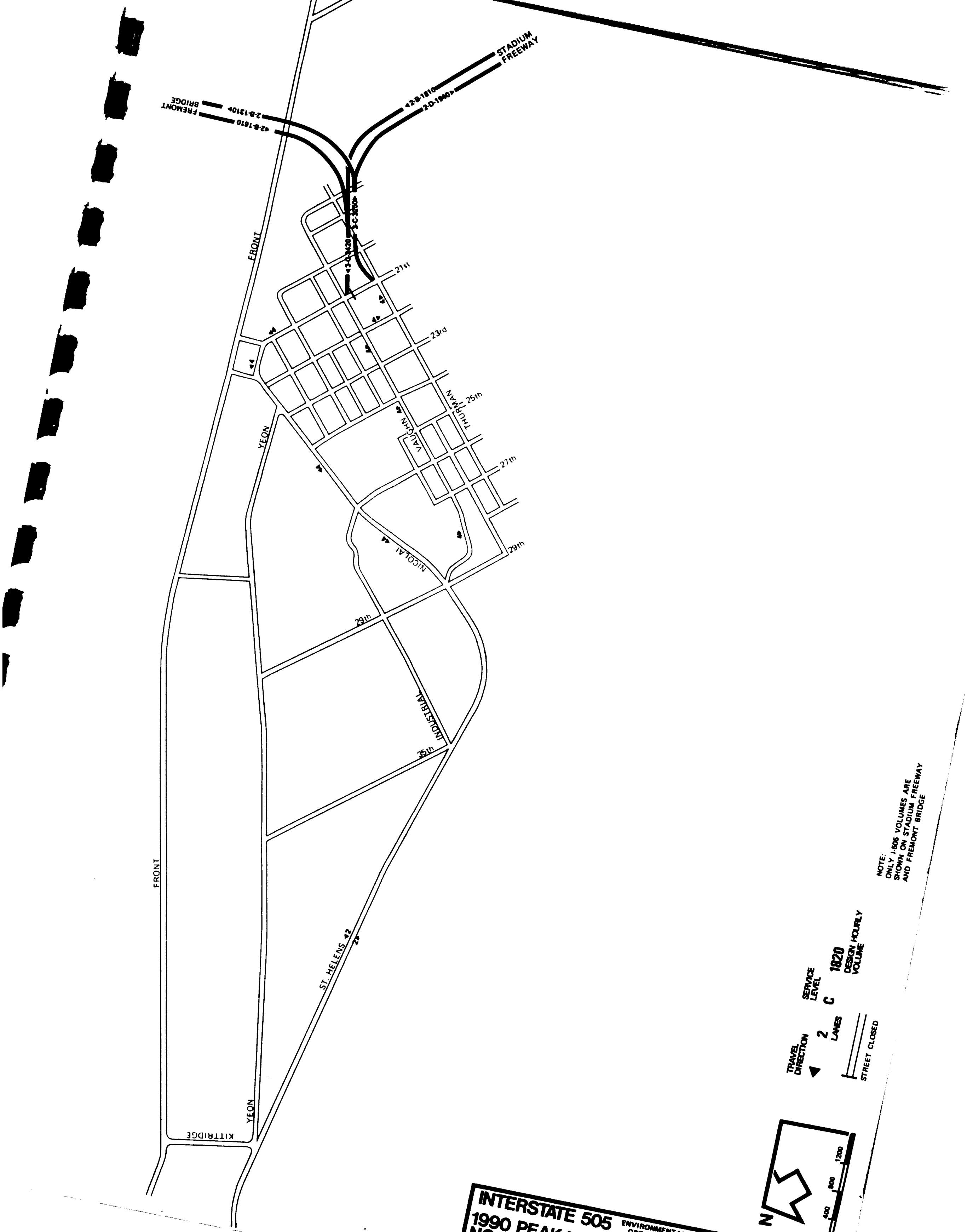
PLATE A4



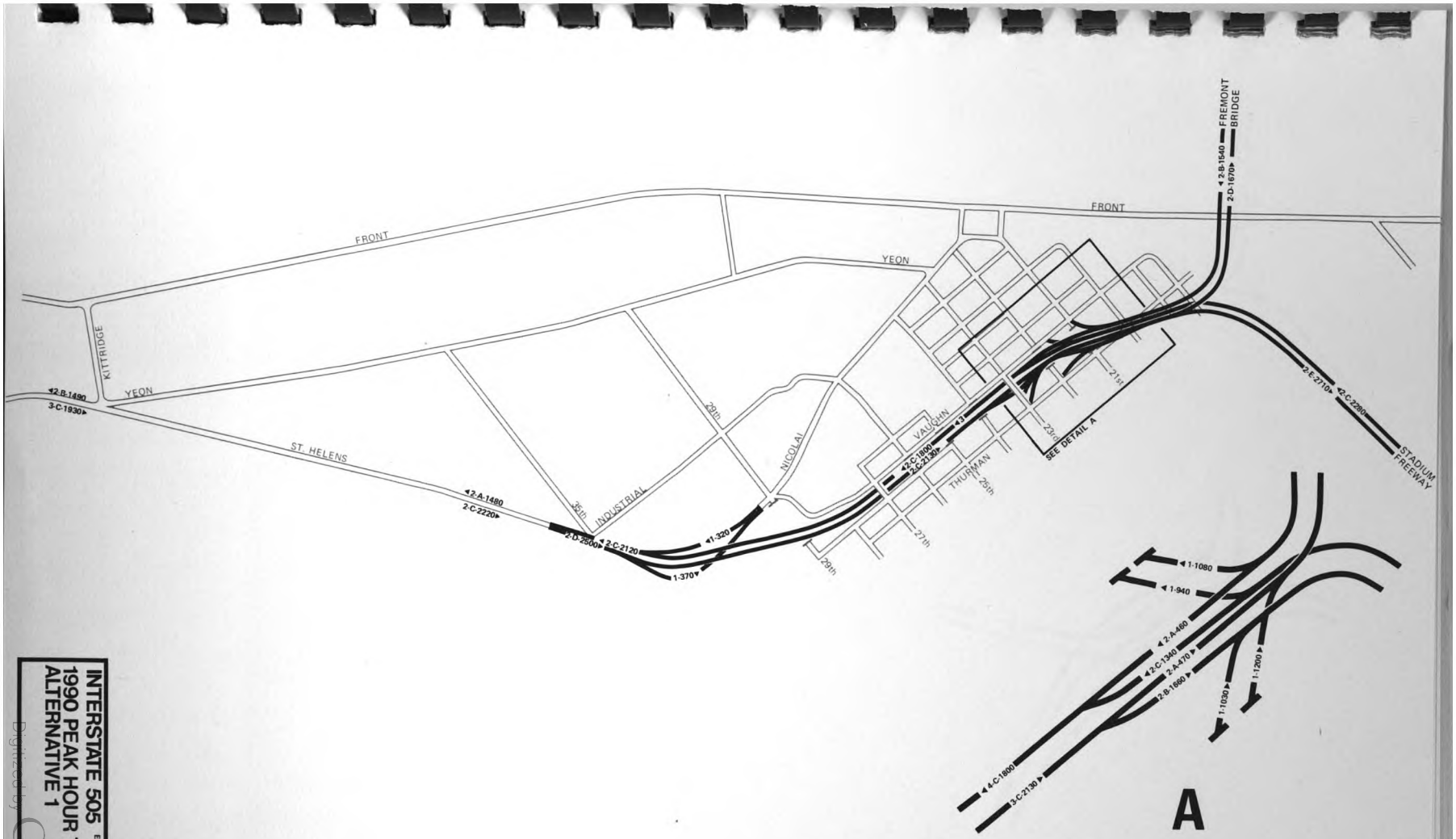
INTERSTATE 505 ENVIRONMENTAL IMPACT STATEMENT OREGON STATE HIGHWAY DIVISION

1990 DAILY TRAFFIC VOLUMES
ALTERNATIVE 4
ALTERNATIVE 5

PLATE A5



INTERSTATE 505 ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION
1990 PEAK HOUR TRAFFIC SERVIC[E]
NO BUILD ALTERNATIV[E]
PLATE



INTERSTATE 505
1990 PEAK HOUR TRAFFIC SERVICE
ALTERNATIVE 1

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

PLATE A7

N

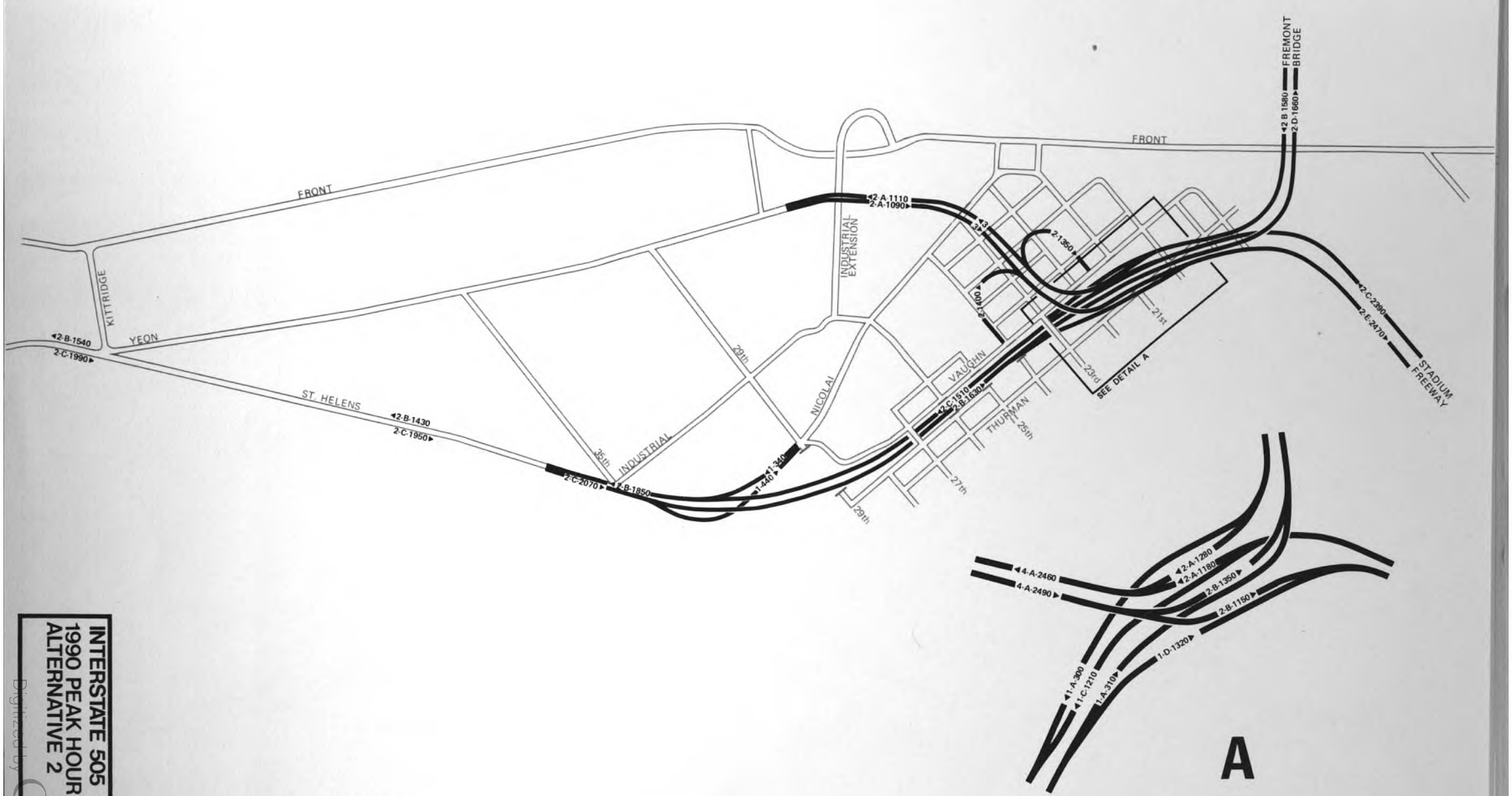
400 800 1200

TRAVEL DIRECTION ◀ 2 LANES

SERVICE LEVEL C 1820 DESIGN HOURLY VOLUME

STREET CLOSED

NOTE:
ONLY I-505 VOLUMES ARE SHOWN ON STADIUM FREEWAY AND FREMONT BRIDGE



INTERSTATE 505
1990 PEAK HOUR TRAFFIC SERVICE
ALTERNATIVE 2

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

PLATE A8

N

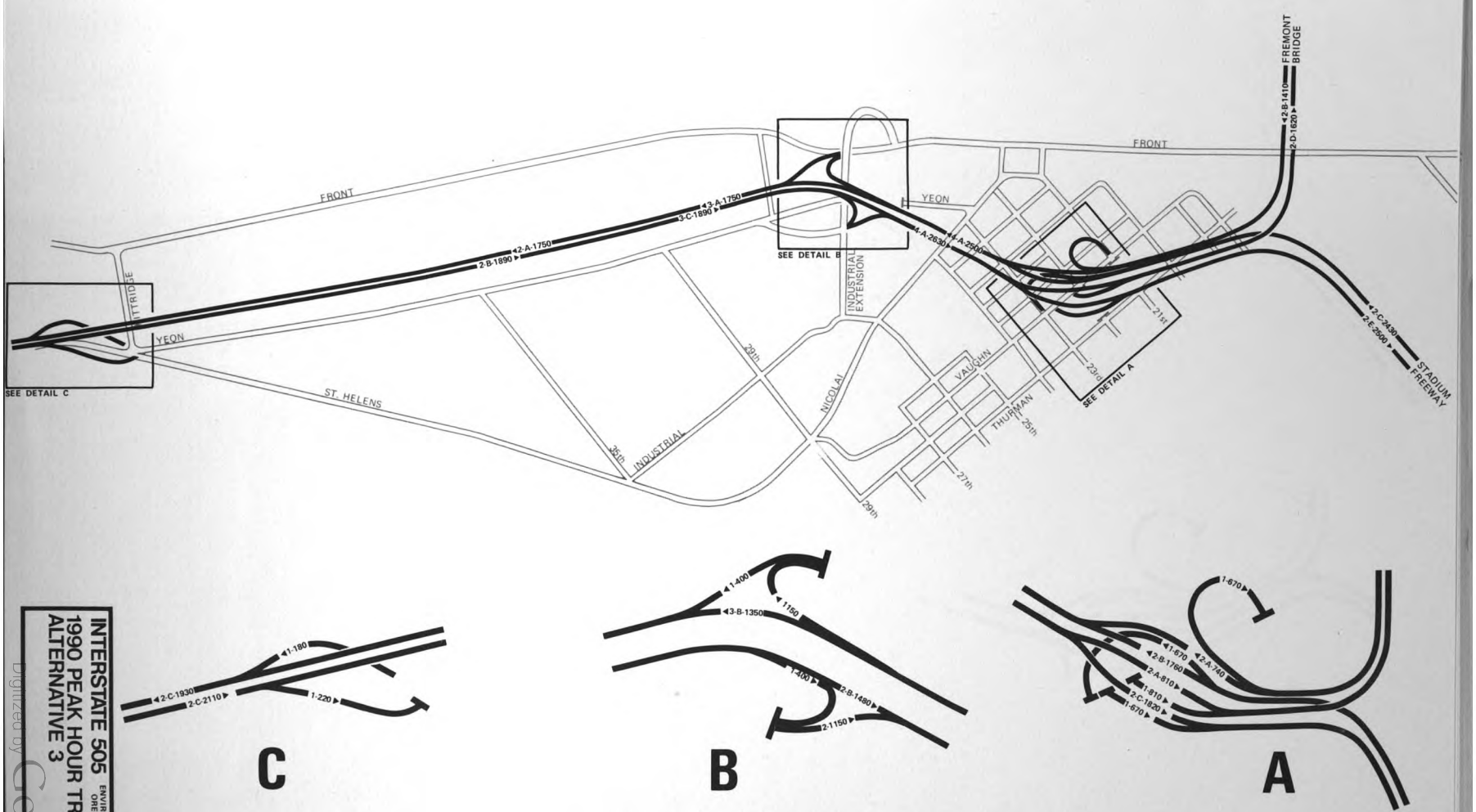
400 800 1200

TRAVEL DIRECTION ◀ 2 LANES

SERVICE LEVEL C 1820 DESIGN HOURLY VOLUME

STREET CLOSED

NOTE:
ONLY I-505 VOLUMES ARE SHOWN ON STADIUM FREEWAY AND FREMONT BRIDGE



INTERSTATE 505
1990 PEAK HOUR TRAFFIC SERVICE
ALTERNATIVE 3

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

PLATE A9

N

400 800 1200

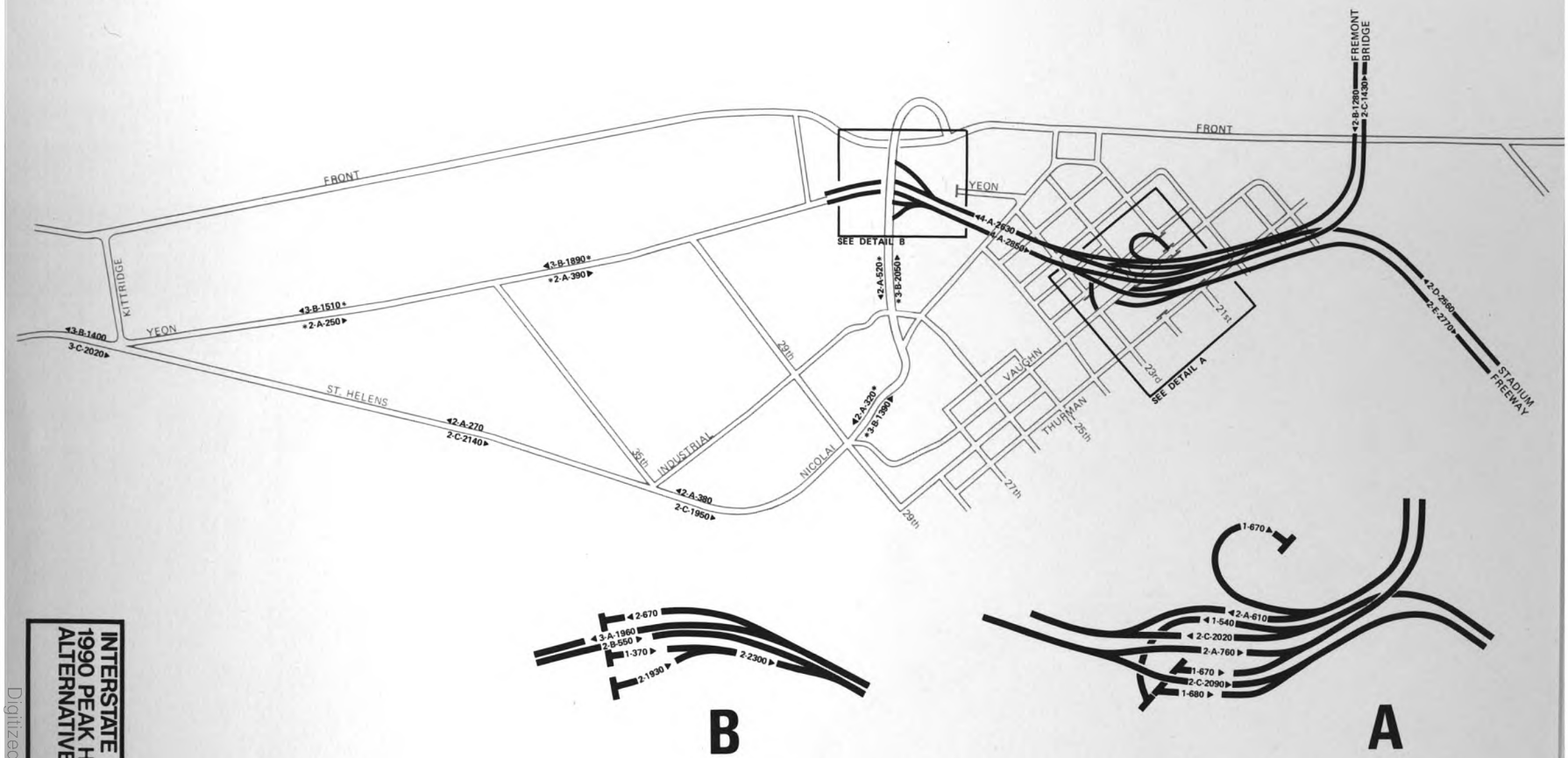
TRAVEL DIRECTION ◀ 2 LANES

SERVICE LEVEL C

1820 DESIGN HOURLY VOLUME

STREET CLOSED

NOTE:
ONLY I-505 VOLUMES ARE SHOWN ON STADIUM FREEWAY AND FREMONT BRIDGE



B

A

NOTE: *SERVICE LEVELS WITHOUT RAIL INTERRUPTIONS

TRAVEL DIRECTION ◀ 2 LANES

SERVICE LEVEL C 1820 DESIGN HOURLY VOLUME

STREET CLOSED

NOTE: ONLY I-505 VOLUMES ARE SHOWN ON STADIUM FREEWAY AND FREMONT BRIDGE

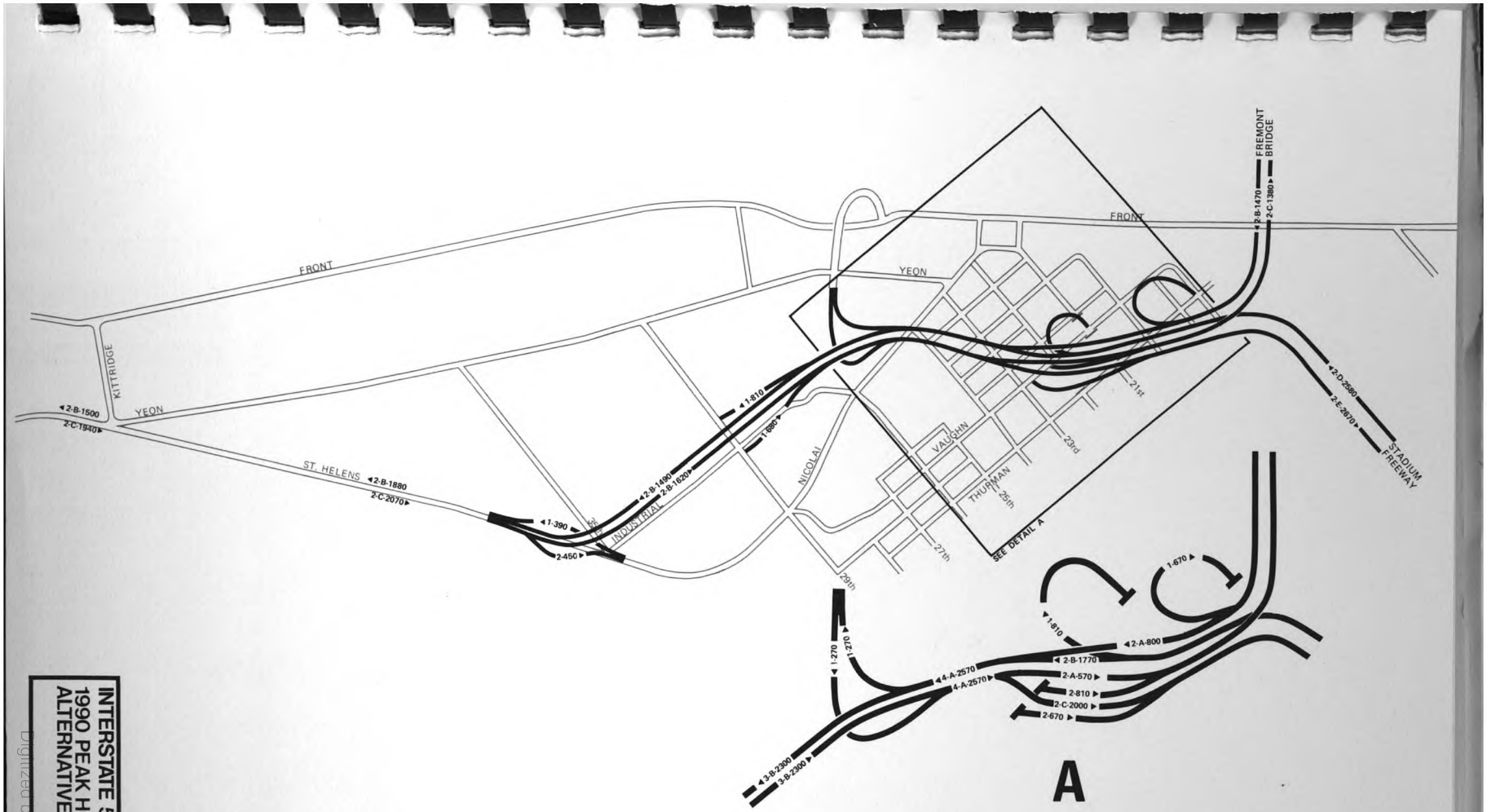
N

400 800 1200

INTERSTATE 505
1990 PEAK HOUR TRAFFIC SERVICE
ALTERNATIVE 4

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

PLATE A10



INTERSTATE 505
ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

1990 PEAK HOUR TRAFFIC SERVICE
ALTERNATIVE 5

PLATE A11

N

400 800 1200

TRAVEL DIRECTION ◀ 2 LANES

SERVICE LEVEL C

1820 DESIGN HOURLY VOLUME

STREET CLOSED

NOTE:
ONLY I-505 VOLUMES ARE SHOWN ON STADIUM FREEWAY AND FREMONT BRIDGE

APPENDIX B

AIR QUALITY

APPENDIX B

AIR QUALITY

BASIC INFORMATION ABOUT THE POLLUTANTS

The pollutants which have been addressed are those which are principal components of automotive exhaust: carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NO) and particulate. Nitrogen dioxide (NO_2), a reactive product of the nitric oxide (NO) produced in automotive emissions, and photochemical oxidant, a product of HC and NO, are also discussed. In this section, the U.S. Environmental Protection Agency (EPA) standards for these pollutants are presented and a short discussion of the health effects caused by concentrations seen in the urban atmosphere is given. All pollutant values are shown in the units in which the standards are expressed: micrograms per cubic meter (ug/m^3) for HC, particulates, oxidant and NO_x; milligrams per cubic meter (mg/m^3) for CO.

The air quality analysis performed for this study has employed the latest available information in estimating emissions in 1980, 1985, and 1990, in order to predict pollutant levels due to the proposed I-505.

The following three alternate sets of assumptions have been made regarding the federal 1975-1976 emission controls in computing the emissions used in this analysis. One: these controls will be imposed as presently (March 1973) required by law, and will operate as they are legally expected to. This is called the minimum emission strategy. Two: these controls will not be imposed until 1980, at which time they will operate as expected. This will be referred to as the delay emission strategy. Three: the 1975-1976 controls will be rescinded; this is the maximum emission calculation. Predictions of future air quality have been made for all three emission strategies wherever relevant.

The computation of the emission factors derived for this study employed all the points mentioned above, and the Oregon vehicle age mix. They are thought to be the best possible present estimates of future vehicle emissions which can be made at this time. The validity of these factors is also dependent on the successful implementation and operation of the Oregon Motor Vehicle Inspection Program; without that program estimated minimum emissions could be expected to be larger by a multiple of approximately five.

Carbon Monoxide

There are two EPA ambient air quality standards for CO; a maximum eight-hour average concentration of 10 mg/m^3 and a maximum one-hour average concentration of 40 mg/m^3; each to be exceeded no more than once per year. The eight-hour standard is the only one addressed in this study, since the one-hour level is not in danger of being exceeded in the study area under present conditions. (This concentration has been exceeded once during 1972 in downtown Portland.)

These standards are based upon effects on human health. Carbon monoxide reduces the ability of the blood to distribute oxygen to body tissue by displacing oxygen from hemoglobin (Hb) to form carboxyhemoglobin (COHb). The most important factor involving carbon monoxide effects on humans is the COHb level in the blood, which is directly related to the CO concentration in the surrounding air.

CO has no deleterious effect on vegetation at or near any level observed in urban development.

In 1968 it was estimated that approximately 60 percent of CO in the air in the United States resulted from motor vehicle emissions (the total emissions calculated in arriving at this figure included emissions from agricultural burning, forest fires, structural fires, and coal refuse fires). A recent study for the State of Oregon has set this percentage at 97 for Portland, in 1970.

Nitrogen Oxides

The oxides of nitrogen (NO_x) formed during high temperature combustion engine include nitric oxide (NO), nitrogen dioxide (NO_2), and several other compounds of lesser amount and importance. Of these two, NO is the most abundant; NO_2 the most harmful to human health and vegetation.

The federal ambient air quality standard, as written, calls for a maximum annual arithmetic mean of 100 ug/m^3 of NO_2. However, a complication in the measurement of NO_2 exists in that the NO which becomes oxidized to NO_2 does so in varying amounts and at varying rates. Especially near roadways, a given sample of air may contain NO which has not yet oxidized, but which should be accounted for so as not to underestimate the total NO_2 concentration. Some question also exists as to whether the standard should not indeed be an NO_x standard; it appears probable that the experiment on which the standard is based actually sampled NO_x, by converting the NO to NO_2 before providing NO_2 readings. Previous studies and archival data indicate that the percentage of NO_2 in the NO_x sampled in urban atmosphere may be between 90 and 30 percent.

In consideration of all these factors, this study has measured and predicted NO_x levels while background levels have been derived as both NO_x and NO_2.

In investigating the health effects on which the federal standard is based, one finds that the primary threat to human health is the presence of NO_2. The most important finding for the purpose of this report is the significantly increased bronchitis morbidity among elementary school children exposed for two and three years and infant cohorts exposed for three years to NO_2 levels as low as 117 ug/m^3.

In its effects on vegetation, levels of NO_2 less than 1880 ug/m^3 (1 ppm) have been shown to cause basal leaf chlorosis, growth retardation, impaired water uptake, and premature leaf abscission starting with basal leaves. These effects are more noticeable in fast-growing vegetation than slow-growing.

The percentage of national NO_x emissions due to motor vehicle exhaust was estimated as 35 percent in 1968. This percentage was recently computed to be 77 percent for Portland in 1970.

Hydrocarbons

The federal standard for hydrocarbons is a maximum average 6 to 9 a.m. concentration of 160 ug/m^3 to be exceeded no more than once per year. This standard has been set in order to achieve the oxidant standard, since the maximum oxidant levels follow from reactions among the morning HC and NO_x concentrations. The methane component of HC is excluded from the standard, since methane is not one of the determinants of smog.

Hydrocarbons emissions from motor vehicles were estimated in 1968 to account for 50 percent of the total national HC concentrations; this factor was calculated to be 70 percent for Portland in 1970.

Photochemical Oxidants (Smog)

Photochemical oxidants, a reactive product of NO_x, HC, and sunlight, is subject to a federal standard of 160 ug/m^3; a one-hour average to be exceeded no more than once per year. This designation actually encompasses several diverse chemical compounds; the principal components are ozone (O_3) and peroxyacetyl nitrate (PAN). It is generally this class of pollutant that is being discussed in studies referring to the generic term Air Pollution. (This is especially true on the West Coast; in the East, Air Pollution may refer to oxidant or sulfur dioxide.)

In humans, oxidants irritate mucous membranes in the respiratory tract and reduce resistance to respiratory infection. The effects of oxidants are intensified by the presence of particulates and by the incidence of smoking in the subject population.

Particulate

Particulate matter consists of particles of varying size and composition. These particles result in greatest quantity from industrial processes and in a smaller, but growing, proportion from vehicle usage. (Presently, approximately 10 percent of national particulate emissions are due to motor vehicles.) The primary federal ambient air quality standards call for a maximum annual geometric mean of 75 ug/m^3 and a maximum 24-hour concentration of 260 ug/m^3, not to be exceeded more than once a year. These primary standards are designed to protect the public health; in the case of particulates, there are also secondary standards which protect against effects on soil, water, vegetation, materials, animals, weather, visibility, and personal comfort and well being. The secondary standards require a maximum annual geometric mean of 60 ug/m^3 and a maximum 24-hour concentration of 260 ug/m^3.

Lead is probably the single most harmful component of particulate; sufficiently so that California has adopted a standard for this pollutant alone, requiring a maximum 30-day average of 1.5 ug/m^3. This reflects the growing ambient lead levels in all parts of the world.

AIR QUALITY ANALYSIS

The nature of vehicular air pollution in a community depends upon many factors: paramount among these are the local meteorology, the traffic characteristics, and the background levels. Assuming that no major climatological variations will occur, statistics of past and present meteorology can be applied to future conditions. Combining this information with estimates of future demography and vehicle emissions, the source strength and dispersal of pollutants can be predicted to future years. And, by combining these factors with a knowledge of present background levels and their sources (industrial, natural or vehicular), total future levels of atmospheric pollutants can be calculated.

Existing Air Quality in the Corridor

The Northwest Portland area is presently in compliance with the federal ambient air quality standards for CO and NO_x, and exceeds the secondary 24-hour standard for particulate; the

latter, however, is not primarily caused by automotive emissions. Based on archival data, it also appears that the HC and oxidant standards are exceeded, apparently due to industrial sources of hydrocarbons other than methane.

a. CO. The CO concentration levels are sensitive to wind direction, in that sites removed from heavy local traffic sources exhibited a 30 percent increase in CO levels when the wind was from the east and south compared to levels when the wind was from the north. For all wind directions, though, the CO levels measured during this study were generally low, averaging less than 2 mg/m^3.

These results were obtained through a measurement program covering parts of November 1972-January 1973; the season of worst air quality in Portland generally. The averages are probably good estimates of worst case conditions; and a statistical discussion of some of the possible errors involved may be found in the consultant's technical report.

b. NO_x. Viewed as an NO_x standard, the federal NO_2 standard is probably being approached or exceeded in the Northwest Portland area. However, assuming that the NO_2 component of NO_x is about 50 percent (as it is at the Portland CAMP Station), and considering the standard as addressing NO_2 only, the level of 100 ug/m^3 of NO_2 is in no danger of being exceeded.

Industrial sources of NO_x have not been listed by CWAPA (Columbia-Willamette Air Pollution Authority) or DEQ (Department of Environmental Quality), however, it is probable that 30 to 50 percent of the values measured during this study were caused by such sources and by home heating.

c. Particulate. During the air quality monitoring phase of this study, the secondary 24-hour standard for particulate (150 ug/m^3) was exceeded once at one site (12th Street and Lovejoy); the California lead standard (a maximum 30-day average of 1.5 ug/m^3) was also projected to be exceeded at this site. Both of the other continuous monitoring sites appeared to be in compliance with all particulate standards, but the consultant's two-week monitoring schedule is not sufficient to insure this.

Approximately 10 percent of the particulate concentrations and all of the lead are due to vehicular traffic; in the case of the site at 12th and Lovejoy this included diesel train traffic. There are three local industrial point sources (in or within 1500 feet of the study area) emitting more than 100 tons per year of particulate; these sources have contributed to the particulate concentrations measured in proportions depending on wind direction.

d. Hydrocarbons and Oxidant. HC was not measured in this study, but can be inferred from other data. Hydrocarbon levels generally disperse and can be measured in approximately the same ratio to CO as the ratio of HC to CO in automotive emissions. The applicable federal standard for comparison with concentrations derived is 160 ug/m^3 as a 6 to 9 a.m. average to be exceeded no more than once per year. This standard is in danger of being, or has been, exceeded in the southern portion of the corridor. However, it appears that the major component of these HC levels are due to industrial rather than vehicular emissions.

The HC standard has been set in order to insure compliance with the oxidant standard; a maximum one-hour average of 160 ug/m^3. This standard is presently exceeded at the DEQ Burnside Station, having measured levels above 160 ug/m^3 on six days in 1971 and 26 days in 1972. The results of the present study tend to show that present oxidant levels in Northwest Portland may be comparable to those downtown, since it is both the absolute values of HC and NO_x as well as the ratios of these two pollutants which determine the oxidant yield.

These results are indicative of present levels, but are only gross approximations. It should be noted also that oxidant occurs only in the presence of sunlight, and mainly during the summer. A measurement program aimed at detecting oxidant episodes should be conducted during that period.

Prediction Methodology

Air pollution levels for future years have been forecast using mathematical models developed and validated by the air quality consultant. The techniques of forecasting are based upon methodology of the U.S. Environmental Protection Agency, and the air quality consultant's completed models have been reviewed and accepted for validity for roadway sources by that agency. The models have been recently applied in a number of air pollution predictions from roadways in Virginia, Utah, California, Oregon, and Washington, D.C.

Air Quality Predictions

The computer model was applied to predict 1980, 1985, and 1990 concentrations of CO, NO_x and particulates, as they dispersed from I-505 and the major traffic carriers in Northwest Portland. These predictions were calculated for the minimum, delay and maximum emission strategies discussed earlier, for time averages responsive to the federal ambient air quality standards, and for five alternative routes for I-505 as well as for the No-build.

The predictions are displayed in the form of contour maps. (See Plates B-1 through B-12.) The points where the pollutant levels, as they decrease with distance from the roadway, pass through certain selected values (such as 1 mg/m^3 of CO) are shown as contour lines. The presence of air pollutants does not in itself define an impact; in fact, none of the federal standards are expected to be exceeded due to vehicular traffic alone. Those standards that may be exceeded (HC, oxidant and particulate) are sensitive to local industrial emissions of these pollutants. The one pollutant which is wholly due to vehicle emissions and is now at levels considered excessive, at least in California, is lead (there is no federal standard); this is also the one pollutant which will most definitely be reduced by proposed federal controls on gasoline.

Note that the area which will be subject to the highest automotive-generated pollutant levels is that near St. Helens Road. This road has high volumes in most alternatives and is at grade; the design feature allowing the highest concentrations to occur. Certain of the alternatives cause a reduction of levels here; however, none of them can reduce levels at Forest Park. The impacts on vegetation in Forest Park will be within 100 feet of the road; this analysis implies that, unless the federal emission control strategies are completely successful, extensive use of mass transit is the only way to reduce levels in this area.

a. Carbon Monoxide Predictions. Plates B-1 through B-6 show predicted 8-hour maximum levels for each alternative and the No-build, based on average daily traffic and the 1980 minimum emission strategy. Table B-1 gives guidelines for applying the contours on the maps to different years and emission strategies, based on average emissions in the area.

Since almost all of the CO in the area is generated by the local traffic, no background level is assumed; at most, 1 mg/m^3 could be added to account for pollutants introduced from the east and south and the industrial point source to the northwest.

TABLE B-1

FACTORS TO CHANGE CO CONTOUR CONCENTRATIONS, FOR 1980 MINIMUM EMISSIONS, TO OTHER CONTROL STRATEGIES AND YEARS

	1972	1980		1985	1990	
replace		delay	max.	delay	delay/min.	max.
1 by	1.8	1.3	1.4	0.9	0.6	1.2
4	7.1	5.0	5.8	3.7	2.3	4.9

b. NO_x Predictions. Plates B-7 through B-12 show predicted annual averages of NO_x for each alternative and the No-build, based on average daily traffic and the 1980 minimum emission strategy. Table B-2 gives guidelines for applying the contours on the maps to different years and emission strategies, based on average emissions in the area.

Approximately 50 ug/m^3 can be added to these values to predict total NO_x (20 to 45 ug/m^3 NO_2); this assumes no change in background over present conditions, which in turn assumes no increase in housing or industry for the area.

TABLE B-2

FACTORS TO CHANGE NO_x CONTOUR CONCENTRATIONS, FOR 1980 MINIMUM EMISSIONS, TO OTHER CONTROL STRATEGIES AND YEARS

	1972	1980		1985	1990	
replace		delay	max.	delay	delay/min.	max.
20	30	28	31	19	12	31
30 by	46	42	47	29	18	47
60	92	83	94	57	37	94

c. Particulate Predictions. Particulate levels from motor vehicles are not the major cause of the high particulate concentrations in Portland. They will increase from year to year due to increased traffic, but will still not play a major role in this aspect of the air quality of Northwest Portland. Lead concentrations, however, are high. Due to proposed EPA regulations setting limits on lead in gasoline these levels will decrease; in 1975 gas with only trace amounts of lead will be required at all stations, while all grades of gasoline will be limited in lead content, probably starting in 1974. The results of this program of restrictions will significantly lower lead levels in the Northwest Portland area.

d. Hydrocarbons and Oxidant. Projecting hydrocarbon levels by scaling the CO levels leads to projections of maximum 6 to 9 a.m. HC, corresponding to the CO contours of Plates B-1 through B-6 as shown in Table B-3. Both total hydrocarbon and an expected range of hydrocarbon less methane are shown. (The range represents the variation in the possible methane content of fuels.) As with the other pollutants, HC levels from motor vehicles are low, except near St. Helens Road, they will be well below standards in 1990 if the federal emission control regulations are met.

A possible background level of 100-500 ug/m^3 (HC less methane), equivalent to the estimated existing background level may be added to these figures to predict future HC levels in the Northwest Portland area. This level, as well as the NO_x, will be the major determinant of future oxidant concentrations in the area. Since these future concentrations depend heavily not only on future absolute levels of NO_x and HC but also upon their ratios, and since this dependence is not presently fully quantified, a definitive statement relating future oxidant to the federal standards cannot be made. It appears likely, extrapolating from present estimated conditions, that a decrease in oxidant levels in future years will require control of both motor vehicle and industrial emissions in and near Northwest Portland.

TABLE B-3

FACTORS TO CHANGE CO CONTOUR CONCENTRATIONS, FOR 1980 MINIMUM EMISSIONS, TO HC CONCENTRATIONS FOR OTHER CONTROL STRATEGIES AND YEARS

Replace CO contour line	Total Hydrocarbons (ug/m^3) 1980 min.	1980 delay	1980 max.	1985 delay	1990 delay/min.	1990 max.
1 by 4	130	170	180	120	80	160
	520	650	750	480	300	640

Replace CO contour line	Hydrocarbons less methane (ug/m^3) 1980 min.	1980 delay	1980 max.	1985 delay	1990 delay/min.	1990 max.
1 by 4	65-13	85-70	90-18	60-12	40-8	80-16
	260-52	325-65	375-75	240-48	150-30	320-64

Comparative Emissions

The average daily emissions of CO and NO_x were computed for traffic on all major streets for each alternative route for I-505 (including the No-build) based on average daily traffic counts, speeds, and vehicle mix. This calculation provides an estimate of the comparative contribution of each alternative to the total pollutant level in the Portland area.

Table B-4 presents these results for delay and minimum emission strategies and years, in kilograms per hour. Percentage differences on the order of 10 percent are not significant, since

variation of pollutant emissions with vehicle age and speed are not known more exactly than this.

CWAPA has developed a guide for estimating compliance of areas with the federal CO standard which indicates that this standard will be met if total annual CO emissions do not exceed 325 tons per year per .33 square mile grid. The 1980 CO emissions listed in Table B-4 represent about 2500 tons per year (approximately 285 kilograms per hour) for an area of about 3.3 square miles. The industrial CO sources in Northwest Portland large enough to bring this total over 325 tons per year are the Oregon Steel Mills (1700 tons/year) and ESCO (105 tons per year) which will affect all alternatives approximately equally.

TABLE B-4

TOTAL EMISSIONS, KILOGRAMS/HOUR

	CO				NO_x			
	1980		1985	1990	1980		1985	1990
Alternate	delay	min. delay		delay/min.	delay	min. delay		delay/min.
1	264	209	191	125	34	25	23	15
2	285	230	210	136	37	27	25	17
3	233	188	174	117	33	24	23	15
4	238	192	175	116	32	23	22	14
5	241	193	177	110	30	21	19	13
No-build	278	213	193	109	26	19	18	12

Effects of Construction Activities on Air Quality

Construction activities cause three types of effects upon air quality; increase in local emissions due to decreased through speeds and increased mileage travelled, increase in NO_x and particulate due to the high proportion of these pollutants emitted by heavy diesel construction machinery, and increase in particulate concentrations due to the dust, asphalt, etc. stirred up during the activities.

Since most of the detours will occur in the 1976-1979 period, vehicle emissions will still be strongly dependent on vehicle speeds. If the detour decreases average vehicle speed less than 5 miles per hour, and adds less than 5 percent to the number of miles travelled, this effect will not affect the

compliance of the area with the federal air quality standards. Likewise, it is assumed that the NO_x and particulate emissions of the diesel machinery will not be large enough to affect the annual average levels of these pollutants.

Increased particulate concentrations caused by the construction itself will be the largest component of the air quality impact of these activities. Suggested mitigating actions include wetting down of truck loads and staggering tasks which lead to high particulate concentrations (such as grading, paving, and demolition) on a daily or weekly basis.

INTERSTATE 505

ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

CARBON MONOXIDE PREDICTION NO BUILD ALTERNATIVE

PLATE
B1

1200'

APPENDIX C

NOISE STUDY

APPENDIX C

NOISE STUDY

INTRODUCTION

The following procedure was followed in this study.

1. A survey of the study area was made to establish existing ambient noise levels.
2. 1990 noise levels were predicted for each of the alternative systems.
3. Impact criteria were selected.
4. Impacts were described in terms of the selected criteria.
5. Findings were summarized.

GENERAL NOISE CHARACTERISTICS

The noise environment of an urban community has a base of rather steady background noise made up of many distant noise sources. Superimposed on the background noise is the noise of individual nearby events such as an occasional car or train, an aircraft, a lawnmower, and the continuing noise from traffic on a busy street.

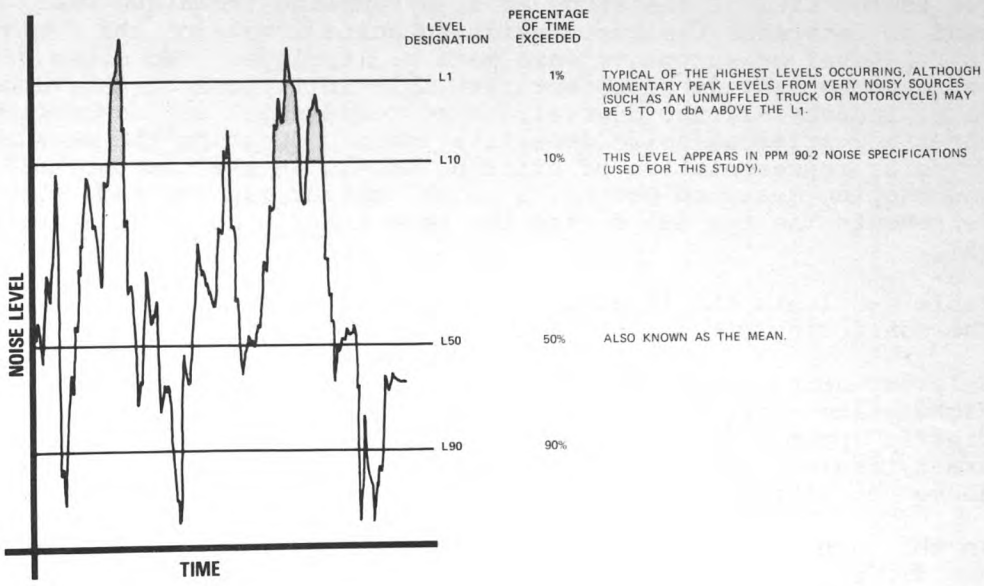
In order to describe a noise environment and to assess its impact, it is customary to select a measurement that reflects the poor sensitivity of the human ear to low frequencies. The A-weighted frequency scale of a standard sound level meter has such a response characteristic.

The A-weighted scale is used widely in environmental noise surveys and for noise specification purposes because it correlates well with human response to loudness or to annoying characteristics of a particular noise. The recently adopted Federal Highway Administration noise standards outlined in PPM 90-2 are based on the A-weighted system. A-scale noise levels are expressed in decibels--A or dBA. The measuring unit "decibel"

(written dB) is used to express the relative loudness of a sound.*

Knowing how much a noise fluctuates and the highest noise levels that may be experienced are both essential in order to determine the annoyance potential of the noise. A fluctuating noise may be described by determining levels (L) that are exceeded a certain percentage of the time (see Figure C-1 below).

FIGURE C-1



The L_{10} levels are an indication of the higher noise levels occurring in the noise environment. Where traffic noise is

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*Each time the intensity of a sound is doubled, there is an increase of 3 decibels and each time the intensity is multiplied by 10, there is an increase of 10 dB. Each increase of 10 dB is judged to be twice as loud by most people.

predominant, these levels are caused mostly by trucks. Since truck traffic often continues throughout the night, the L_{10} levels tend to remain fairly high even at times of minimum traffic. A high percentage of existing and projected traffic is trucks, so use of the L_{10} level for this study is appropriate.

Table C-1 presents various typical noise sources and their corresponding levels. The table can be used to judge what a given dBA level represents.

EXISTING AMBIENT NOISE LEVELS

Due to the size of the study area, a sampling technique was used to determine the basic existing noise levels on the A-scale (L_A). Level measurements were made at 18 sites. The sites were selected to provide representative L_A's in typical neighborhoods (i.e. industrial, residential, mixed residential and commercial, etc.) and critical noise-sensitive areas. By using the measured sites as representative of existing levels in the neighborhood and mapping measured points, a noise contour map was made which represents the L_{10} dBA during the peak traffic hours in November, 1972.

Table C-2 lists the locations and times that data were obtained. The monitoring sites are shown on Plates 16 through 21.

Existing noise levels in the district approach or exceed Federal Highway Administration (FHWA) noise standards in some locations. Traffic (primarily truck) is the predominant noise source. Aircraft, trains, and industrial activity can occasionally be heard above the traffic noise.

In the industrial neighborhood, the predominant noise sources are difficult to characterize more definitely than as industrial and truck. Foundries, steel fabricators, and other heavy manufacturing operations act as point sources that result in a complex noise field. In mixed neighborhoods that include some residences intermingled with businesses and warehousing firms, the peak noise levels are caused by trucks.

PREDICTING 1990 NOISE LEVELS

The procedure used to predict the 1990 noise contours was developed for the Highway Research Board. This methodology utilizes a mathematical model programmed for the consultant's modified IBM 1130 computer. The original program was prepared by the Michigan Department of State Highways.

TABLE C-1

SOUND LEVELS AND EFFECTS OF ILLUSTRATIVE NOISES*

Noise Range dBA**	Perception and Effects	Community Noise Sources	Industry and Home Noise Sources	Loudness - Subjective Judgment of Noise***
130 - 140	Near permanent damage level from short exposure	Military jet takeoff from carrier (50 ft.)	Hydraulic press (3 ft.)	135 dBA - 64 times as loud as 75 dBA
120 - 130	Pain to ears	Turbo-fan jet at takeoff power (100 ft.)	Oxygen torch Boiler shop	125 dBA - 32 times as loud as 75 dBA
110 - 120	Uncomfortably loud	Rock and roll band Unmuffled motorbike (2-3 ft.)	Scraper-loader Riveting machine	115 dBA - 16 times as loud as 75 dBA
100 - 110	Discomfort threshold	Jet fly over (1,000 ft.) Unmuffled cycle (25 ft.)	Textile loom Noisy newspaper press	105 dBA - 8 times as loud as 75 dBA
90 - 100	Very loud	Train whistle (500 ft.) Diesel truck (25 ft.)	Air compressor (20 ft.) Power lawnmower	95 dBA - 4 times as loud as 75 dBA
80 - 90	Intolerable for phone use Loud	10-hp outboard motor	Garbage disposal Food blender	85 dBA - 2 times as loud as 75 dBA
70 - 80 Reference Level	Moderately loud Prevention of extra auditory physiological effects	Passenger car 65 mph (25 ft.) Busy downtown area	Automatic dishwasher Vacuum cleaner	75 dBA - sought after maximum community level***
60 - 70		Large air conditioning unit (100 ft.) Ocean at edge of surf	Conversation Dishwasher - rinse (10 ft.)	65 dBA - 1/2 as loud as 75 dBA
50 - 60	Quiet	Large transformer (200 ft.)	Window air conditioner in room	55 dBA - 1/4 as loud as 75 dBA
40 - 50	Prevention of sleep interference	Occasional private auto (100 ft.) Bird calls	Quiet home during evening hours	45 dBA - 1/8 as loud as 75 dBA
30 - 40	Very quiet	Soft whisper (5 ft.)	Room in quiet house at midnight	35 dBA - 1/16 as loud as 75 dBA

*Data for this table were obtained from several references. Most decibel levels for specific noise sources were adapted from the data of Dr. Alexander Cohen.

**On the logarithmic decibel scale on the left, each increase of 10 dB represents a several-fold increase in sound pressure, but only an approximate doubling in a subjective assessment of loudness as the average human ear hears the noise or as it affects the nervous system. This subjective loudness range is shown in the column on the right. This column was adapted from one presented in the 1970 report by Branch.

***Seventy-five dBA is the level recommended, for example, in a recent Los Angeles study as the maximum permitted noise level to be achieved within three years for cars, motorcycles, and construction tools and equipment used in the urban setting as measured from a distance of 25 ft.

TABLE C-2

AMBIENT NOISE MONITORING LOCATIONS

(See Plates 16 Through 21 for Map of Locations)

Location	Time of Survey November, 1972
1. 21st and Pettygrove. Equipment storage lot on N.E. corner of intersection. Essentially trucking area.	6 to 8 a.m.; 10 to 12 a.m.; 3 to 6 p.m.; 10 to 12 p.m.
2. 23rd and Savier. Vacant lot N.W. corner of intersection. Light industry, commercial, residential area.	
3. 26th and Raleigh. N.W. corner of school yard. Residential area.	
4. Thurman and 30th. Center of bridge, east side. Residential area.	
5. 31st and Industrial. Parking lot N.E. corner of intersection. Light industrial area.	
6. Thurman approximately one block past Gordon intersection. East side of street, on sidewalk. Residential area.	
7. Corner of Nicolai and 28th Avenue. Industrial area - Montgomery Ward parking lot on south side of Nicolai.	2 to 8 a.m.; 3 to 6 p.m.; 10 to 12 p.m.
8. Vaughn at 33rd Avenue. Residential - between sidewalk and curb on west side.	
9. Corner of Wilson and 23rd Avenue. Residential - Commercial	6 to 8 a.m.; 3 to 6 p.m.; 10 to 12 p.m.
10. Upshur and 25th Avenue. Residential - Commercial Northeast corner of vacant lot at Upshur and 25th Avenue.	
11. Upshur and 28th Avenue. Residential - Commercial - on bank.	
12. Wilson and 30th Avenue. Residential - Commercial.	
13. On Leif Erikson Drive (extension of Aspen), right side of road, above storage tanks - 20 feet from third white post.	6 to 8 a.m.; 3 to 6 p.m.
14. 24th and Lovejoy. Lawn of Consulate Building.	
15. 20th and Lovejoy. Southwest corner of intersection on lawn.	
16. 17th and Lovejoy. Southwest corner of intersection in corner parking lot.	
17. 17th and Overton. Northwest corner of intersection in Fire Equipment Company parking lot.	
18. 3900 Yeon. In front of Convoy Company on lawn by flag pole.	

The 1990 L_{10} contours are a result of traffic noise sources at peak traffic hour. These contours are levels expected if there is no additional encroachment of industry to the south and if cars and trucks in 1990 have the same noise characteristics as they have today.

Traffic data for 1990 developed by the transportation consultants, consisted of design hourly traffic volume, design speed, average daily traffic, percent truck mix and percent hourly volume for daytime off-peak and nighttime off-peak.

Roadway design data, prepared by the engineering consultants, consisted of highway configurations (depressed, on-grade or elevated), roadway surface, and grades.

The computer utilizes all of these parameters plus a reduction for the presence of buildings between the source and point of prediction. The program also predicts the reduction caused by noise barriers incorporated into the design.

Climatic conditions are not considered by the model. Weather, wind velocity, humidity, and temperature gradients can have a pronounced effect on noise propagation over distances greater than about 500 feet. Shadow zones (lower levels than predicted) or zones of intensification (higher levels than predicted) are created during fluctuating and variable weather conditions and are therefore not reflected in the model.

This report assumes that 1990 vehicle noise levels will be the same as they are today. However, this assumption may be invalid if current research on truck noise level reduction and legislation to require quieter roadway equipment are effective.

Results of the computer program were mapped as lines of constant level or "noise contours." The predicted contours are shown superimposed over the existing 1972 ambient contours so comparison between them can be easily made (see Plates 16 through 21).

IMPACT CRITERIA

Two separate criteria were applied in evaluating the impact of the predicted noise in the study area. The first utilizes the methodology prescribed in Federal Highway Administration PPM 90-2. The second, developed by the consultant, is concerned more with impact caused by any change from existing ambient levels and is referred to here as the "increase" criteria.

Effective July 1, 1972, the Federal Highway Administration imposed interim noise standards for all Federal-aid highway projects. These standards are based on maximum permissible L_{10}

noise levels (that dBA exceeded 10 percent of the time) as measured on the A-Weighting network of a standard sound level meter for specified land uses and traffic conditions. A summary of these standards are shown in Table C-3. Forest Park is subject to the category A criterion (L_{10} of 60 dBA outside), residential areas are subject to category B (L_{10} of 70 dBA outside), and industrial areas to category C (L_{10} of 75 dBA outside). Category B was assigned for mixed residential and commercial use areas.

The "increase" criteria considers how predicted L_{10} noise compares to the existing L_{10} noise. Most people cannot perceive rapid changes in noise levels of about 3 dBA. If a noise increase is gradual over time (such as from gradually increasing traffic volumes) a change of up to about 5 dBA is not objectionable to most people.

Increases greater than 5 dBA may be objectionable, particularly if the increased levels are causing interference with certain activities. Increases above about 10 dBA are usually not acceptable and can be regarded as a serious impact. The "increase" criteria are summarized below and may be referred to for evaluation when reading the impact section that follows:

Up to 5 dBA	Minimal impact.
5 to 10 dBA	Moderate impact.
Greater than 10 dBA	Significant impact.

IMPACTS

The noise impact of the alternative transportation systems and the no-build may be evaluated by comparing the predicted L_{10} noise levels for 1990 with the FHWA PPM 90-2 standards and by applying the consultant's "increase" criteria.

The impacts described below are only for those general areas affected by the predicted levels as the noise contours vary considerably throughout the district.* Reference should be made to the noise contour maps and the impact maps (Plates 16 through 27) for illustrations of 1972 ambient and 1990 predicted conditions and for comparison of alternatives. (See Plate 5 for existing land use.)

*The contours describe approximate, not absolute, values at a location.

TABLE C-3

FHWA DESIGN NOISE LEVEL AND LAND USE RELATIONSHIPS

Land Use Category	Design Noise Level (L_{10})	Description of Land Use Category
A	60 dBA (exterior)	Tracts of land in which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, or open spaces dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B	70 dBA (exterior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic area, recreation areas, playgrounds, active sports areas, and parks.
C	75 dBA (exterior)	Developed lands, properties or activities not included in categories A and B above.
D	----------	For requirements on undeveloped lands, see paragraphs 5.a(5) and (6) of PPM 90-2.
E*	55 dBA (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

*Paragraph 1.c. of the attachment to PPM 90-2 explains the method of application.

SOURCE: Federal Highway Administration Policy and Procedure Memorandum 90-2, Table 1.

Industrial Area

The industrial district now has a 70 dBA or greater noise field. In many instances, industrial activities are generating noise above the existing and predicted traffic noise levels and are major contributors to the ambient levels. Nineteen-ninety traffic from any alternative is not predicted to increase noise levels in the industrial area above the FHWA standard (category C). Noise levels will generally increase less than 5 dBA in the industrial area.

Forest Park

FHWA standards (category A) will be exceeded in Forest Park by noise from all alternatives. Some lower sections of the park with 1972 ambient levels of less than 60 dBA will be impacted by levels greater than 60 dBA in 1990.

Forest Park will be affected similarly by the no-build and "build" alternatives 1, 2, 4, and 5. Sixty dBA levels will be found from 100 to 400 feet further into some areas of the park than they are today as levels increase up to 5 dBA.

Alternative 3 will only impact Forest Park northwest of Express Avenue where 60 dBA levels will be 400 feet further into the park as noise increases up to 5 dBA. Noise will be substantially reduced in the park southeast of Express Avenue where levels will decrease between 1 to 10 dBA and fall below the FHWA maximum standard.

Residential and Mixed Use Areas

The pockets of residential land use north of Vaughn Street and east of 24th Avenue in the industrial area are subjected today to levels greater than 70 dBA. Homes remaining in this area will be affected even more in 1990 as noise increases to levels near 75 dBA.

Federal standards will be exceeded in residential and mixed use areas south of Vaughn Street and St. Helens Road, and west of 23rd Avenue by increased noise from all of the alternatives.

a. No-build. Levels above 70 dBA will include more of the residential area east of 27th Avenue than any of the "build" alternatives. East of 35th Avenue, noise levels will generally increase up to 5 dBA.

The area near 25th and Savier Street will be impacted by a 5 to 7 dBA increase; the largest increase from any alternative in the residential areas.

Noise at Chapman School will increase from below to above 60 dBA (within FHWA standards). In all "build" alternatives, levels at Chapman will remain below 60 dBA.

b. Alternative 1. All remaining residences north of Thurman Street and east of 27th Avenue will be exposed to noise levels above 70 dBA. Homes north of Upshur between 27th and 29th avenues and in the Wilson and 31st avenue area will also have expected levels above federal standards with increases up to 5 dBA.

c. Alternative 2. Predicted noise levels are similar to Alternative 1 noise levels.

d. Alternative 3. Federal standards will only be exceeded in residential use areas north of Thurman Street and east of 28th Avenue. Levels will increase up to 5 dBA north of Savier and east of 28th and decrease up to 5 dBA in the Willamette Heights neighborhood and the area generally west of 28th Avenue.

e. Alternative 4. Noise levels will increase up to 5 dBA in small areas around 23rd and Savier, 27th and Savier, and north of Upshur east of 28th Avenue. Federal standards will be exceeded generally north of Upshur and at 29th Avenue at Wilson Street.

f. Alternative 5. More residential area will be included within the 1990 70 dBA contour than in any of the other "build" alternatives. The residential uses most impacted by levels exceeding federal standards are east of 26th Avenue.

Noise levels will increase up to 5 dBA east of 28th Avenue. West of 28th Avenue and south of Wilson Street, levels will generally decrease up to 5 dBA.

BARRIERS

When the predicted noise levels are compared to FHWA standards, the need for effective reduction is apparent if the residential areas south of Vaughn Street and St. Helens Road are to be maintained.

Predicted noise levels south of Vaughn Street between 23rd and 28th avenues are primarily caused by traffic on Vaughn in all cases. These levels are especially higher in Alternative 1 and 2 where all structures between Vaughn and Upshur are removed for freeway construction.

Barriers should be constructed along the south boundary of the depressed freeway to reduce traffic noise from the facility. A

second barrier should be constructed between Vaughn Street and the freeway from 23rd to 28th avenues to reduce noise from Vaughn.

The barriers north and south of the freeway should be about 10 feet high, have irregular surfaces to diffuse reflected sound waves and be built of materials that cause a transmission loss of approximately 20 dBA to attain the federal standard in the residential area to the south. (See Plates 28, 29, 33 and 34.)

Noise levels in the residential neighborhood south of the freeway alignments and St. Helens Road west of Balch Canyon may be reduced by an earth berm which is high enough to block the affected homes from line-of-sight to the roadway. A minimum of a 5 dBA reduction should be expected with this barrier.

All terraces in depressed sections, berms, and land not used for roadway should be heavily and densely planted with trees, shrubs, and grasses to provide some additional measure of sound attenuation.

NOISE STUDY BIBLIOGRAPHY

1. Alexander, Robert M., Noise Pollution, Oregon State University Extension Circular 807, May 1972.

2. Daly, Edward A., Ambient Sound Levels, Engineering Report, October 1972.

3. Highway Noise, A Design Guide for Highway Engineers, National Cooperative Highway Research Program, Report 117.

4. Kryter, K. R., The Effects of Noise on Man, Academic Press, 1970.

5. Miller, James D., Effects of Noise on People, National Technical Information Service, December 31, 1972.

6. Noise Standard and Procedures for Implementing Section 109 (i) Title 23 U.S.C., Federal Highway Administration, May 1972, EIS-AA-72-4559-D.

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Noise levels in the residential neighborhood south of the freeway alignments and St. Helens Road west of Balch Canyon may be reduced by an earth berm which is high enough to block the affected homes from line-of-sight to the roadway. A minimum of a 5 dBA reduction should be expected with this barrier.

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3. Highway Noise, A Design Guide for Highway Engineers, National Cooperative Highway Research Program, Report 117.

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6. Noise Standard and Procedures for Implementing Section 109 (i) Title 23 U.S.C., Federal Highway Administration, May 1972, EIS-AA-72-4559-D.

APPENDIX D

HOUSING

APPENDIX D

HOUSING ANALYSIS

RESIDENTIAL PROFILE

Housing patterns and characteristics are discussed here with emphasis on the area north of Thurman Street (Census Tract 45, Plate D-1).

Housing Units and Household Characteristics

a. Occupancy. Housing units in the Northwest District are predominantly rental units. The proportion of rental units is greater in Tracts 47 - 50 than in Tract 45.

TABLE D-1

PERCENT OWNER-OCCUPIED DWELLINGS

(See Plate D-1 for Census Tract Boundaries)

	Tract 45	Tracts 47 - 50	City
Owner-occupied	29.1%	7.3%	53.9%
Renter-occupied	64.5	86.5	41.6
Vacant	6.4	6.2	4.6
Total Units	876	7,513	151,869

b. Type and Age of Units. Housing in the Northwest District is diverse. Dwellings south of Marshall Street and east of 23rd Avenue are mainly large, tall, masonry apartments. The areas west of 23rd Avenue are mostly low-rise, small, wood frame structures. Census Tract 45 has a much higher percentage of single-family dwellings than the other four census tracts. West of 30th Avenue, the housing is single-family except for one eleven-unit apartment at the corner of 31st and Roosevelt.

TABLE D-2

HOUSING BY TYPE OF STRUCTURE

Type of Structure	Tract 45	Tracts 47 - 50	City
Single-family	43.6%	10.2%	66.7%
2 to 9 units	21.6%	23.4%	17.0%
10 units or more	34.8%	66.4%	16.3%
Total Units	876	7,513	151,869

Ninety-two dwelling units are concentrated in apartment complexes in the two blocks bounded by 29th, 30th, Upshur and Wilson. East of 29th Avenue the character of the residential area is dominated by wood frame, single-family dwellings. Only eight of 206 residential structures between 23rd, 29th, Thurman, and Vaughn have more than ten apartments.

There is very little new residential construction in the Northwest District. Three-quarters of the buildings are over thirty years old.

In Tract 45 east of 30th Avenue the units are modest, many dating from the turn of the century.

c. Housing Condition. Study of the pattern of units in "fair or worse condition" shows little correlation between occupancy, age of the structure, or transience of the occupants.

The predominant shared characteristic of all the blocks having a high proportion of housing in "fair or worse condition" is their location in the transitional edge between primarily residential and primarily industrial land use.

We can speculate that the owners' disinclination to maintain those properties is based on uncertainty about their continued use for housing. In every case, the blocks are zoned for manufacturing or commercial use. The Thurman-Vaughn blocks have faced the additional uncertainty of their designation as a major highway corridor from 1963 to 1971. It is surprising therefore that the housing in the blocks west of 27th Avenue is almost all in good condition and well maintained.

d. Unit Size and Family Size. Almost two-thirds of the dwelling units between Burnside and Thurman are occupied by two persons or less.

Census Tract 45 is closer to the city average in this regard but is weighted toward larger families by inclusion of the school-age population of Willamette Heights.

It follows from the numbers of single-family dwellings and older apartment buildings in Tract 45 that units will tend to be larger. The statistics on family size would suggest that there is little overcrowding. Table D-3 confirms this.

TABLE D-3

HOUSING BY NUMBER OF OCCUPANTS

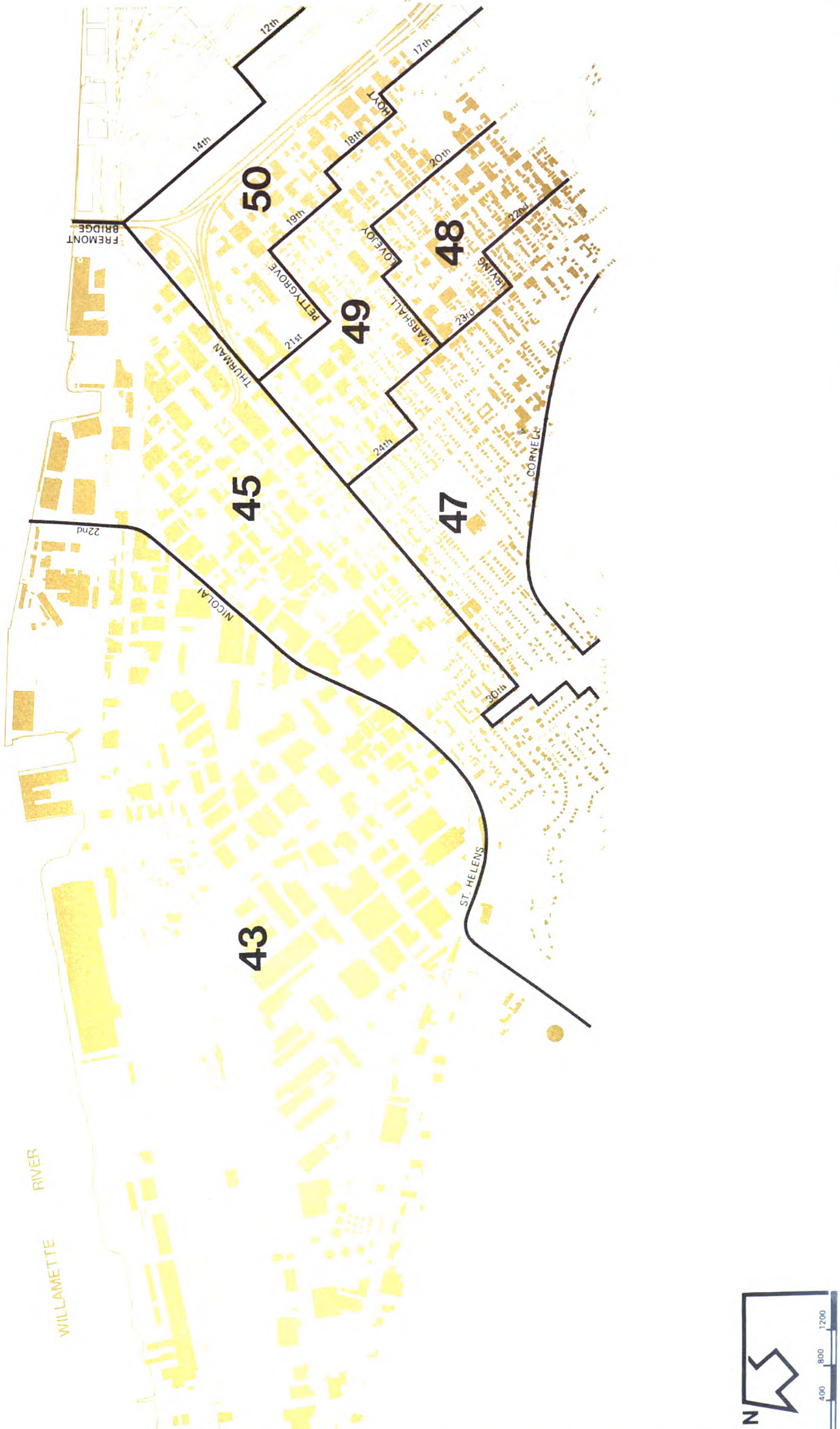
	Percent of Households		
Number of Occupants	Tract 45	Tracts 47 - 50	City
1	34.8%	64.3%	29.6%
2	32.1%	26.2%	32.8%
3	12.5%	5.4%	14.1%
4	9.7%	2.1%	10.8%
5	6.1%	1.4%	6.5%
Median persons/Unit (All occupied units)	2.0	1.3	2.1
Median rooms/Unit	4.0	2.7	4.8
Total Occupied Units	820	7,049	144,911

e. Rental Rates. Rents are low in the study area, especially in Census Tract 45. One-third of the units rent for under $60 per month and almost four-fifths for less than $100 per month.

TABLE D-4

RENT STRUCTURE

	Percent of Households		
Contract Rents	Tract 45	Tracts 47 - 50	City
$59 or less	31.2%	23.8%	18.4%
$60 - $99	47.9%	50.5%	39.4%
$100 - $149	16.5%	21.9%	31.4%
$150 or more	1.5%	2.5%	7.8%
Median Rent	$70	$80	$91
Total occupied rental units	564	6,496	62,972



INTERSTATE 505 ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

CENSUS TRACTS

PLATE
D1

f. Transience. The degree of transience in the Northwest District is greater than in the city as a whole. The degree of transience in Census Tract 45 is closer to that of the city as a whole than in Tracts 47 - 50, except for the category of families who have lived in their unit two years or less.

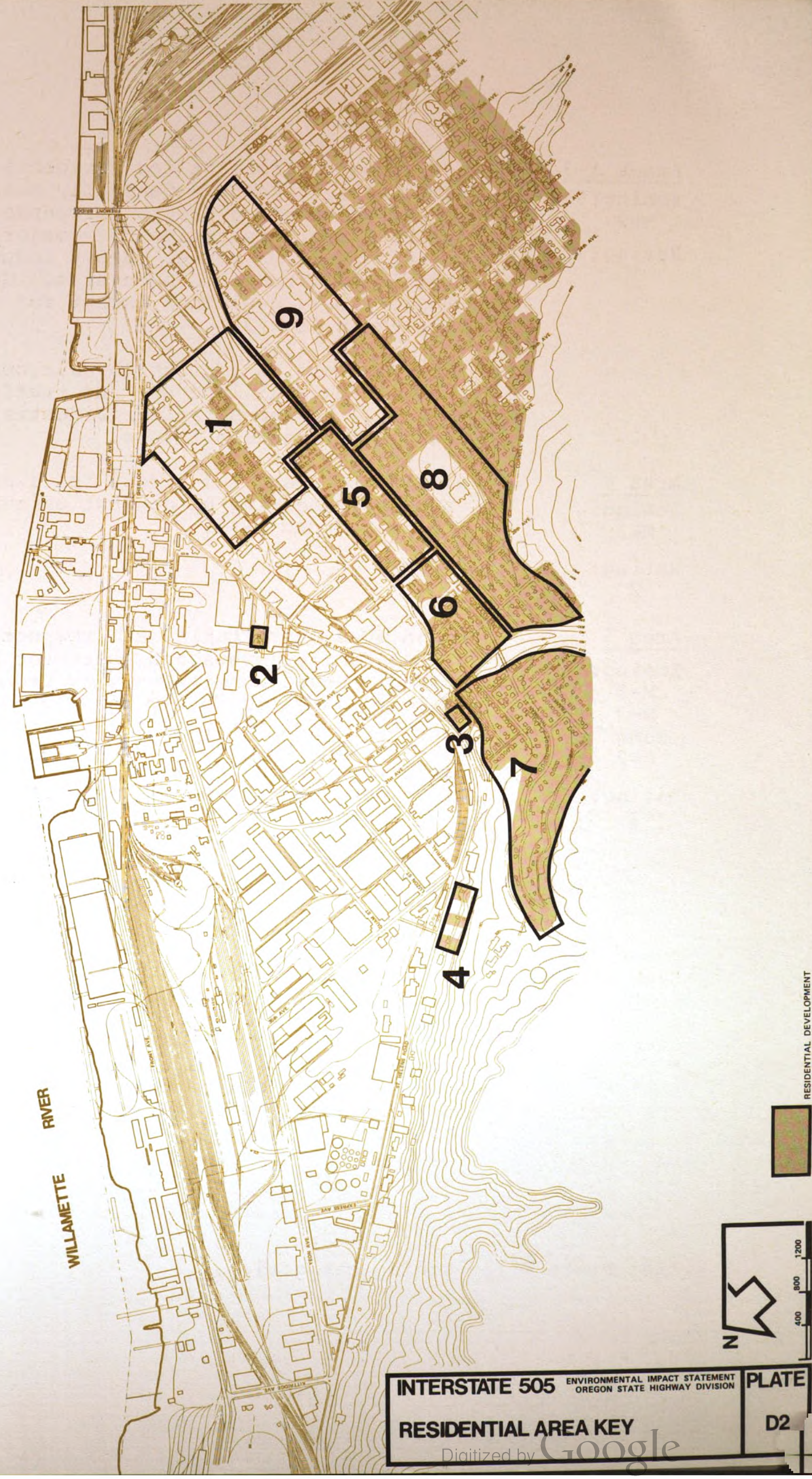
TABLE D-5

RESIDENTIAL MOBILITY

Years Lived in Same Unit	Percent of Households		
	Tract 45	Tracts 47 - 50	City
2 or less	54.3%	50.7%	35.7%
3 to 5	8.8	17.1	15.4
6 to 10	11.6	14.8	14.6
11 to 20	11.1	10.8	18.1
20 or more	14.4	6.7	16.1
Total occupied units	820	7,049	144,911

Neighborhood Context

Residential uses became separated from one another by non-residential land uses as homes were replaced by industrial and commercial buildings and parking lots after World War II. The larger groupings of residences have the best chance of holding their own. Tract 45 east of 27th Avenue displays all the characteristics of the fragmented neighboring groupings typical of the transitional edge. The following description of nine areas is based on environmental considerations for residential neighborhoods. Present zoning and a value judgment rating of the present residential quality of each area on a rating scale of 1 to 10 (10 highest) is indicated in the left column beside the analysis. (See Residential Area Key map, Plate D-2.)



INTERSTATE 505 ENVIRONMENTAL IMPACT STATEMENT
OREGON STATE HIGHWAY DIVISION

PLATE D2

RESIDENTIAL AREA KEY

Areas 1-3 Zoning:* M-2 Rating: 1	Very poor environment for residential use in almost all respects. Generally small, fragmented neighboring groups surrounded by industrial use. Condition of a majority of units is fair or worse. Heavy industrial traffic on streets through area. Generally single-family dwellings except for apartment complex in Area 3. Areas 1-3 are so impacted by surrounding heavy industrial land use and traffic that they will be undesirable residential areas for the foreseeable future.
Area 4 Zoning: M-2 Rating: 2	Similar to areas 1-3 except for a small advantage in backing up against unimproved publicly-owned land.
Area 5 Zoning: M-2 M-3 Some C-2 Rating: 3	Mixed area in virtually all respects. Both single-family houses and apartment houses abound. House conditions vary from excellent to poor. Area is fairly heavily impacted at this time, primarily by traffic on Vaughn and Thurman, and the light industrial/commercial facilities lining those streets. Neighboring groups are contiguous but fragmented by the long north-south blocks between 23rd and 25th and by the vacant land on the south side of Upshur Street between 25th and 27th avenues. Zoned M-2 and M-3 and following existing trends, the area would become predominantly light industrial/commercial. If a policy decision were made to strengthen the residential use of the area, it could probably be successful by virtue of the good contiguous residential use of the areas to the south and west and the proximity of Wallace Park and Chapman School. Selective demolition and new housing construction would be needed as well as measures to join the fragmented neighboring groups.

*See Plate 7 for zoning categories.

Area 6

Zoning:
A-1
C-2
Some
A-2.5

Rating:
5

A solid residential area of mixed housing (single-family homes and apartments) almost all of which are in good condition. The amount of traffic on Upshur and 29th Avenue cutting through the middle of the area is a problem. The degree of traffic congestion could affect existing trends which indicate the area should remain a good residential neighborhood.

Area 7

Zoning:
R-5
R-10
Some
A-2.5

Rating:
8

A solid residential area of single-family homes; likely to remain so in the foreseeable future.

Area 8

Zoning:
A-1
R-5
Some
A-2.5

Rating:
8

A solid residential area of mixed housing types (single-family homes and apartments). A good neighborhood for the future unless a poor development of industry to the north of Thurman or excessive through traffic impacts the area too greatly.

Area 9

Zoning:
M-2
Some
M-3

Rating:
2

A poor residential environment north of Pettygrove Street. Heavily impacted by industrial land use and the Fremont Bridge (I-405) ramps. The area north of Pettygrove and east of 22nd should probably be allowed to become entirely industrial/commercial as the parcels of residential use are too fragmented and impacted to ever be good neighborhood environments.

RELOCATION REQUIREMENTS

Characteristics of Displaced Housing

All of the housing units displaced or directly affected by Alternatives 1 and 2 have similar characteristics. The only differences are the number of units displaced--303 for Alternative 1 versus 334 for Alternative 2--and the number of units isolated north of Vaughn Street--84 for 1 versus 25 for 2.

Alternatives 3, 4, and 5 are quite different--fewer units are displaced (65-66), but a higher percentage are single-family dwellings. The housing units are anomalous in that they are both larger and lower in value or rent than those in Alternatives 1 and 2.

Housing characteristics by alternative are summarized in Tables D-6 through D-8. Table D-6 and Table D-7 come from 1970 Census data; Table D-8 is based on a detailed exterior visual survey.

Impact on Housing Which Remains

There are significant differences between some of the corridors with respect to the number of housing units which would be further separated from the residential area by freeway construction. In this respect there is a significant difference between Alternative 1 and the other alternatives. Alternative 1 separates 84 living units north of Vaughn from the residential area to the south. Alternative 2 separates 25 units and Alternatives 3, 4, and 5 each separate 7 units because the north leg of the freeway removes those units which were previously retained in Alternative 1.

In the case of the no-build alternative, the traffic build-up alone will further separate the living units north of Vaughn Street from the residential community to the south.

In the case of all alternatives, the number of units north of Vaughn Street is not sufficient to support the amenities required by a separate residential neighborhood. Although this condition exists now, the process of residential decay will be further speeded by the isolation created by any of the alternatives, including the no-build.

The residential impacts of Alternatives 3, 4, and 5 appear to be less than all other alternatives. Alternatives 3, 4, and 5 are farthest removed from the residential areas which have potential for continued residential use. (See Residential Area Key map; areas 5, 6, 7, and 8.)

Alternatives 3, 4, and 5 remove only one-fifth the number of housing units removed by Alternatives 1 and 2, and those removed by Alternatives 3, 4, and 5 are in areas not likely to remain in residential use. The smaller number of units removed, of course, means relocation housing will be easier to locate.

The elevated alignment of Alternative 5, and the proximity to the base of Willamette Heights creates potential visual impacts in residential area 7.

The impact of construction activity for Alternatives 3, 4, and 5 on residential areas 5, 6, 7, and 8 should be considerably less than that of Alternatives 1 and 2. The impact on the remaining housing in area 1, however, is severe. This is true for Alternative 2 as well. Higher noise levels and reduced access during construction will severely impact area 1.

Housing Preference and Needs

The Northwest District Association (NWDA) survey of March, 1971 was utilized in considering whether a family or an individual would like to continue to live in the same type of unit or in another type if relocated. The survey questionnaire was developed by the Portland City Planning Commission staff and administered by members of the Northwest District Association. The survey was conducted in the area between N. W. 22nd, N. W. 29th, and Vaughn and Thurman streets. Of 350 households in the area, 270 were contacted. A total of 147 interviews were completed and 43 were partially completed. The raw data was made available to the consultants and was found to correlate well with 1970 Census data. The data is used selectively here to estimate housing preference and need to remain in the Northwest District.

TABLE D-6

HOUSING CHARACTERISTICS BY
ALTERNATIVE CORRIDOR, CITY AND
PORTLAND-VANCOUVER METROPOLITAN AREA (SMSA)

	Alternative				City of Portland	SMSA
	1	2	3,4	5		
Total Housing Units.	303	334	65	66	152,064	358,920
Owner-occupied Houses.	30 (9.9%)	43 (12.9%)	20 (30.8%)	19 (28.8%)	81,930 (53.88%)	221,920 (61.81%)
Renter-occupied Houses.	38 (12.5%)	56 (16.8%)	22 (33.8%)	24 (36.4%)		
Total Single-family Houses.	68 (22.4%)	99 (26.9%)	43 (66.2%)	44 (66.7%)		
Average Assessed Value of Single-family Houses.	$10,633	$10,370	$8,698	$8,508		
Total Renter-occupied Units.	272 (89.8%)	288 (86.2%)	41 (63.1%)	43 (65.2%)	63.152 (41.5%)	119,654 (33.3%)

NOTE: Where subtotals do not add up to equal total number figures, the differences are attributable to suppressed U.S. Census data or vacant units.

TABLE D-7

HOUSING CHARACTERISTICS BY

ALTERNATIVE CORRIDOR, CITY AND SMSA

	Alternative				City of	
	1	2	3,4	5	Portland	SMSA
Units by Contract Rent						
$59 or less	92 (36.8%)	86 (33.7%)	18 (47.4%)	19 (47.5%)	11,580 (18.4%)	17,322 (14.8%)
$60 - 99	127 (50.8%)	137 (53.7%)	18 (47.4%)	19 (47.5%)	24,856 (39.5%)	41,758 (35.8%)
$100 - 149	29 (11.6%)	30 (11.8%)	2 (5.3%)	2 (5.0%)	19,783 (31.4%)	41,205 (35.3%)
$150 +	2 (0.8%)	2 (0.8%)	0 0	0 0	4,895 (7.8%)	12,135 (10.4%)
Median:	$69	$70	$62	$62	$91	$97
Units by Number of Rooms						
1	19 (6.1%)	18 (5.3%)	0 0	0 0	7,608 (5.0%)	9,657 (2.7%)
2	111 (36.5%)	103 (30.8%)	6 (9.2%)	6 (9.5%)	9,130 (6.0%)	14,355 (4.0%)
3	64 (21.3%)	61 (18.3%)	11 (16.9%)	8 (12.7%)	18,835 (12.4%)	35,206 (9.9%)
4	33 (11.0%)	48 (14.5%)	8 (12.3%)	9 (14.3%)	28,990 (19.1%)	71,737 (20.1%)
5	76 (25.2%)	104 (31.1%)	40 (61.5%)	42 (63.5%)	87,479 (57.5%)	226,364 (63.4%)
Median rooms:	3.4	3.8	5.2	5.2	4.8	5.1

NOTE: Where subtotals do not add up to equal total number figures, the differences are attributable to suppressed U.S. Census data or vacant units.

TABLE D-8

HOUSING UNIT CHARACTERISTICS BY

ALTERNATIVE CORRIDORS

Alternative	1	2	3,4	5
Units in Good Condition	173 (57.1%)	184 (55.1%)	32 (49.2%)	34 (51.5%)
Units in Fair or Worse Condition	130 (42.9%)	150 (44.9%)	33 (50.8%)	32 (48.5%)
Units Isolated North of Vaughn Street	84 (27.7%)	25 (7.5%)	7 (10.7%)	7 (10.6%)

TABLE D-9

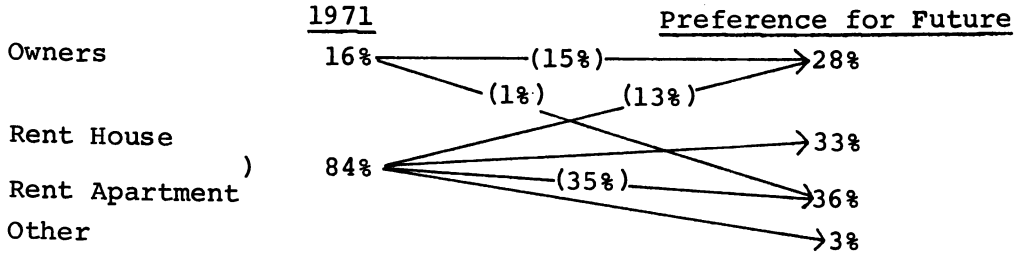
RELOCATION PREFERENCE

Area	Number	Percent
Northwest Portland	111	72
Other part of Portland	17	11
Portland suburb	6	4
Rural near Portland	7	5
Away from Portland	4	2
Don't know	9	6
TOTAL	154	100%

(From Item IV-A, NWDA Corridor Survey)

TABLE D-10

SUMMARY OF HOUSING PREFERENCES FROM NWDA SURVEY



(From Item IV-D, NWDA Corridor Survey)

TABLE D-11

LOCATION OF EMPLOYMENT

Location	Number Employed	Percent of Total
N.W. Industrial Area	47	47%
Other Northwest	13	13%
Downtown	14	14%
North Portland	2	2%
N.E. Portland	5	5%
S.E. Portland	1	1%
S.W. Portland	8	8%
Suburban	7	7%
Other	2	2%
TOTAL	99	99%

(From Item V-B, NWDA Corridor Survey)

The data indicate that a high percentage (60 percent) of job-holders surveyed work in the Northwest District, that 30 percent walk to work, and that 45 percent of the households have no car.

To estimate need to relocate in the Northwest District, the following criteria were adopted:

1. No households which have a car(s) and use it to reach their job or have no job-holders need to relocate in the area. (Total number of households in survey--48.)

2. All households which have a job-holder working in N.W. Portland and have no car available need to relocate in the area. (Total number of households in survey--18.)

3. Approximately one-third of the households in the following categories need to relocate in the area:

   a) work in N.W. Portland, have a car but walk, bus or car pool to work or,

   b) work outside the Northwest and have no car available, or,

   c) work outside the Northwest, have a car available, but bus or car pool to work.

   (Total number of households in survey--33.)

4. Approximately one-half of the households which have no job-holder and do not own a car need to relocate in the area. (Total number of households in survey--31.)

The estimate of households which have a need to relocate in the area based on the above assumptions is as follows:

1.	none of 48	=	0
2.	all of the 18	=	18
3.	one-third of 33	=	11
4.	one-half of 31	=	15
			44 households need to relocate in the area. (Thirty-four percent of the sample of 130 households.)

APPENDIX E

ECONOMIC SURVEY

APPENDIX E

ECONOMIC SURVEY

SURVEY METHODOLOGY

A commercial and industrial survey was conducted by the economics consultant during January and February, 1973. The purpose of the survey was to determine the economic impact on business firms whose property would be directly affected by one or more of the proposed alternatives.

To determine who should be surveyed, a map showing property lines was compiled from 1972 Multnomah County Department of Assessment and Taxation data and quarter section maps, and overlayed on maps showing the proposed freeway alternatives. Properties affected by the right-of-way were then noted and given a three-digit code number. A total of 119 commercial and industrial parcels were identified as directly affected.

Each parcel was then defined in terms of ownership and tenancy. This information was obtained from assessors' data, Contacts Influential, the telephone directory, and individual phone calls, and was added to the parcel code in the form of a two-digit number. Distinctions were made between owner/occupant, tenant/non-owner, and owner/non-occupant. A total of 195 owners and occupants were identified. The actual number of interviews conducted was lower because some persons or firms own more than one affected parcel.

A five-digit number was added to reflect which alternatives affected each parcel. Thus, the final code number, for example, 104-03-12945, identified the parcel, and supplied information concerning its location (parcel numbers were grouped in series bound by major arterials), occupancy (e.g. three tenants), and by which alternative would affect the parcel.

The questionnaires were developed according to four categories:

1. General information concerning size and type of business, location requirements, contiguous properties;

2. The effect of the alternative(s) on property and operations;

3. Response to that effect in terms of sale or retention of property, liquidation, continuation, or relocation of business operations; and

4. Anticipated relocation problems, both short and long range.

The respondent was also asked to express his attitude toward acquisition and toward the freeway in general.

Three separate questionnaires were designed. The owner/non-occupant was asked to address questions concerning his property: Who are his tenants and what is their lease agreement? How much of his property would be affected? How much property would he wish to sell, and at what price? The tenant/non-owner was asked questions concerning his business: The size (business license tax and number of employees) and type of operation; the extent of the alternative's effect on his operations. Would he relocate, to what area; how difficult would it be? The owner/occupant questionnaire was developed as a combination of these two concerning both his property and his business operations.

The survey was conducted on a person-to-person basis. The interviewers explained the purpose of the survey, and were able to answer questions concerning each of the proposed alternatives (ramp locations, elevations, interchanges, etc.). Each interviewer had a set of maps to illustrate the alternatives and was prepared to answer such questions as time schedules and relocation benefits.

Most all of the interviews were conducted at the I-505 project office or at the property in question. In a few cases interviews were by phone or mail. Instances of inability or unwillingness to answer questions were infrequent. The aggregate nature of the data analysis was stressed and respondents were advised that their answers to such questions as "Estimate fair market value" would be confidential.

DATA ANALYSIS

The interviews were concluded February 9, 1973. The lowest return of questionnaires for any alternative was 90.8 percent. indicating a high rate of response overall (Table E-1). In cases where questionnaires were not returned, data from other available sources (employment, type of business, amount of acquisition required, and assessed valuation) were used. Thus, all affected properties and business firms were included.

Not every question was answered. Those less frequently answered had to do with the city business license tax and estimated fair market value. Data analysis showed the insignificance of the business license tax for the purposes of this study, as a measure of either the size of the affected business or revenues accruing to the city. Estimates of fair market value ranged anywhere from 10 to 70 percent higher than assessed valuation.

The reasons given for operating in present locations were fairly evenly distributed between "proximity to customers and

associated businesses," and "access to truck terminals and rail," particularly for those in free or low-fee truck delivery or rail-switching zones. A substantial number considered their lease arrangement favorable, or were long-time owners of the property. Responses indicated a high degree of interdependence among businesses in the area and the importance of a location close to the central business district.

Where businesses considered their present site unsuitable, it was usually due to inadequate space for expansion or rising land values which their operations could not profitably sustain. Generally, however, responses indicated that this area optimally satisfies the locational requirements of its commercial and industrial occupants. This conclusion is substantiated by the high percentage of respondents preferring to relocate in Northwest Portland (Table E-5).

Table E-2 shows the total number of affected parcels now devoted to commercial and industrial use. These numbers gain significance as indicators or extent of acreage involved when the size of the parcels, where generalizations are possible, is taken into consideration. For example, the Upshur corridor (Alternatives 1 and 2) contains numerous relatively small parcels; whereas fewer, relatively large parcels comprise the more extensive area bound by Nicolai and Yeon avenues (Alternatives 2-5). Thus, while there is little variation in the number of parcels affected by each alternative the acreage involved may vary significantly.

Total acquisition was considered necessary in cases where more than half the property was taken, the on-site building was wholly affected or rendered unsuitable for its present use, or the parcel was bisected in such a way that the remainder would be less valuable (e.g. inaccessible or undesirable for development). Partial acquisition was considered appropriate for minimally affected properties; that is, where vacant land or parking lots were removed, or the freeway structure was elevated over corners of buildings.

Percentages of properties to be totally acquired were appreciably higher for Alternatives 1, 2, and 3. This is in part because these routes utilize little existing right-of-way. Sections of Alternatives 4 and 5, on the other hand, utilize existing streets (Nicolai Street, Yeon Avenue, and Industrial Street respectively) for highway construction.

The final column in Table E-2 reflects the frequently encountered attitude, "Take any, take all." Owners typically preferred to sell rather than retain portions of their property not acquired by the State. The desirability of retention appeared to be slightly higher, however, in alternatives involving less

expensive, less intensively used land on which partially disrupted operations might be consolidated and continued.

The total number of affected business entities and percentage breakdowns for various types of businesses are presented for each alternative in Table E-3. Warehousing, distribution, and wholesale functions are best represented in the area north and west of Vaughn Street and 18th. Affected commercial enterprises are located primarily in the Vaughn-Upshur corridor. The comparatively small percentage of manufacturing activity concurs with conclusions of current and projected land use trends for the area. Firms involved in transportation and construction appear to be evenly distributed in small numbers, though it should be noted that the widening of St. Helens Road in Alternatives 1, 2, 4, and 5 affects a substantial number of these types of businesses. The comparatively low percentage then for Alternative 3 does not adequately illustrate the fact that, for example, three trucking firms are disrupted in just one section (Yeon Avenue interchange) of that route.

Table E-4 reflects the determinations of affected businessmen as to the extent of the proposed route's effect on their operations; perceived total effect correlates to liquidation and relocation, partial effect to continued operations/no relocation. As in the case of property owners, businessmen tended to give "all or nothing" responses. Very few indicated they would continue or relocate only part of their operations.

It is estimated that these determinations would not, in all cases, coincide with what the State considers reasonable cause for relocation. Impaired access to loading docks and reduced parking space are examples of problems which might be adequately resolved so that relocation would not be necessary. Yet the high percentage of businessmen opting for relocation indicates more willingness to totally reestablish elsewhere than to make extensive modifications on the present site. The majority of those desiring to move anticipate short-distance moves within Northwest Portland, or the Portland-Vancouver SMSA (Table E-5).

Employment and relocation data were cross-referenced to show possible employment losses (Table E-6). The inclusion of Montgomery Ward's 800 employes heavily influences the total number of affected employes for Alternatives 1, 2, and 4 though this number does not appear in the displaced or lost columns, as Montgomery Ward would in no case be forced to relocate.

Comparison of total lost and displaced jobs to current study area employment produced a low and narrow percentage range (0.6 - 13.5). If the figures for jobs lost were compared to projected employment for the study area (which includes anticipated increases on unaffected parcels in the near future),

the percentage range would fall off considerably and indicate a minute effect by any alternative on relative employment

Responses to questionnaire items pertaining to anticipated relocation problems were conjectural and generally not conclusive for the purpose of making comparisons between alternative routes. The respondent was not asked to enumerate costs (moving or business interruption), a task requiring forethought and research, but merely to indicate whether or not he expected to encounter them. Predictably, all responded in the affirmative. The availability of a suitable site was another expected difficulty, and seemed to be the factor upon which anticipated long-term changes in revenues, business operation costs, and profits were contingent. In other words, most businessmen logically concluded that unless they could find an equally or more suitable site, their costs of doing business would increase while their revenues, and therefore their profits, would decline.

Respondents' opinions are broken down for each alternative by ownership/occupancy classifications to show significant percentage differences (Tables E-7 to E-10). It was felt in designing the questionnaires that this question might reveal a corridor that the majority of owners and occupants, for one reason or another, would favor or at least be indifferent to. Though a confluence of attitudes did not result, a high degree of indifference and even favor was expressed, particularly among owner/non-occupants.

The indifference of owner/non-occupants is understandable in that many negotiate in properties and would not find it difficult to acquire comparable parcels with the proceeds from sale of their property. The indifference of tenants and owner-occupants usually corresponded to a negligible effect on property and business operations. Those favoring the State's acquisition expressed a desire to relocate regardless of the freeway and had researched potential sites more suitable for their needs.

Opposition stemmed from such sources as (1) personal dislike for freeways from an aesthetic and ecological perspective, and (2) skepticism concerning the adequacy of fair market value, "in lieu," site-search, and moving-cost payments. Potentially displaced owners anticipated particular hardship in cases where improvements were depreciated substantially below replacement cost. Typically, respondents favored those alternative(s) which improved their access and reduced congested arterial traffic but did not disrupt their business operations.

Form DOT F 1320.1 (1-67)

UNITED STATES GOVERNMENT

Memorandum

DEPARTMENT OF TRANSPORTATION
OFFICE OF THE SECRETARY

FHWA.

DATE: DEC 11 1973

SUBJECT: Draft Environmental Impact Statement: Highway Project I-505-6(1)303, St. Helens Road - 21st Avenue Section, Industrial Freeway Multnomah County, Oregon (FHWA-OR-EIS-73-08-D)

In reply refer to: TES-70

FROM : Assistant Secretary for Environment, Safety, and Consumer Affairs

TO : Glen L. Green
Division Engineer
Salem, Oregon

31569-D

This office has reviewed the draft EIS for the proposed interstate extension of U. S. 30, connecting to I-405 in Northwest Portland. It is a well-presented comprehensive study that provides a good analysis of the various transportation alternatives under consideration.

As pointed out in the EIS, Northwest Portland contains the largest concentration of industry in the metropolitan area, with good access to truck, rail and water transportation. Northwest Portland also contains a diverse residential neighborhood, characterized by good neighborhood services, variety of architectural styles and good public transportation service.

However, as noted in the EIS, in addition to the steadily increasing traffic through the Northwest industrial area, the City's recent decision to close Harbor Drive to traffic in favor of parkland and other uses has underlined the need for traffic relief in the area.

The EIS indicates that each of the alternatives considered (except the "no build") will provide an acceptable level of service and will have a negligible effect on the industrial area. However, the various alternatives have distinctly different effects on the residential community, as well as widely different costs, as discussed below:

1. The No-Build Alternative - This alternative (a one-way couplet system - $730,000) would provide inadequate service levels at peak hours in the design year, unless energy

CONCLUSION

The survey enabled the consultant to more closely define economic impacts in terms of parcels affected, firms affected, relocation, employment, and attitude. Statistical analysis reveals few substantial quantitative distinctions between alternatives in terms of these specific economic impacts.

The qualitative information obtained supported useful distinctions between types of impacts and allowed for more accurate calculation of relocation and acquisition costs. Further, it pointed to problems with the interim traffic solution and adverse effects of freeway alternatives which could be modified; information which will be valuable to traffic and design engineers.

TABLE E-1

SURVEY RESPONSE

Alternative	Owner/ Occupants Tot.	Resp.	Owner/ Non-occup. Tot.	Resp.	Tenant Non-owner Tot.	Resp.	All Tot.	Resp.	Percent
1	19	19	31	28	39	35	89	82	93.1
2	25	25	44	41	50	46	119	112	94.1
3	13	13	22	22	32	27	67	62	92.5
4	23	22	30	27	34	30	87	79	90.8
5	29	29	29	27	39	34	97	90	92.8
TOTAL	109	108	156	145	194	172	459	425	92.6

TABLE E-2

AFFECTED PARCELS

Alternative	Total Affected Parcels #	Total Acquisition Required #	%	Partial Acquisition Required #	%	Des. to Retain Unacquired Portion #	%
1	49	32	65.3	17	34.7	5	29.4
2	69	48	69.6	21	30.4	8	38.1
3	35	23	65.7	12	34.3	4	33.3
4	51	24	47.1	27	52.9	10	37.0
5	57	27	47.4	30	52.6	11	36.7

TABLE E-3

BUSINESSES AFFECTED

Alternative	Tot. #	Mfr. %	Trans. %	Whs/ Dist. %	Wholesale %	Commercial* %	Construction %	Tot** %
1	58	10.4	10.4	37.9	25.9	53.5	5.2	143.3
2	75	16.0	16.0	46.7	26.7	48.0	6.7	160.1
3	45	35.6	13.3	51.1	42.2	24.5	2.2	168.9
4	57	21.1	17.6	47.4	35.1	42.1	7.0	170.3
5	68	19.2	14.7	58.8	38.2	29.4	4.4	164.7

* retail and services

**total percentages exceed 100 due to responses of firms involved in more than one type of operation.

TABLE E-4

RESPONSE TO ACQUISITION

Alternative	Liquidate #	Liquidate %	Continue Opns. No Relocation #	Continue Opns. No Relocation %	Relocate #	Relocate %
1	2	3.5	6	10.4	50	86.1
2	3	4.0	12	16.0	60	80.0
3	0	---	6	13.3	39	86.7
4	0	---	10	17.5	47	82.5
5	0	---	15	22.1	53	77.9

TABLE E-5

RELOCATION PREFERENCES

Alternative	N.W. Portland %	Portland-Van. SMSA %	Outside Oregón %	Percentage* %
1	72.0	26.0	4.0	102.0
2	65.0	18.3	6.7	90.0
3	43.6	41.0	17.9	102.5
4	46.8	27.7	6.4	80.9
5	56.6	26.4	5.6	88.6

*percentages do not total 100 percent due to multiple responses in some cases, no response in others.

TABLE E-6

CROSS-REFERENCED EMPLOYMENT AND RELOCATION RESPONSE

Alternative	Total Employes	Number Displaced[1]	Number Lost[2]	Total No. Displaced or lost	Total Displaced or Lost Jobs as % of Total Study Area Employment[3]
1	1,755	903	24	927	6.8
2	2,516	1,356	95	1,451	10.6
3	1,578	1,163	150	1,313	9.6
4	2,262	1,011	116	1,127	8.3
5	2,421	1,738	82	1,820	13.5

[1]assuming relocation in Portland-Vancouver SMSA

[2]due to liquidation or relocation out-of-state

[3]based on 13,634 as estimated 1972 employment for area north of Thurman and west of Fremont Bridge to Kittridge Avenue.

TABLE E-7

ATTITUDE TOWARD ACQUISITION, OWNER/NON-OCCUPANT

Alternative	Opposed		Indifferent		In Favor	
	#	%	#	%	#	%
1	9	31.0	12	41.4	8	27.6
2	12	31.6	18	47.4	8	21.0
3	9	45.0	10	50.0	1	5.0
4	7	28.0	14	56.0	4	16.0
5	10	40.0	12	48.0	3	12.0

TABLE E-8

ATTITUDE TOWARD ACQUISITION, OWNER/OCCUPANT

Alternative	Opposed		Indifferent		In Favor	
	#	%	#	%	#	%
1	10	52.6	6	31.6	3	15.8
2	14	56.0	7	28.0	4	16.0
3	7	58.3	1	8.3	4	33.4
4	13	59.1	4	18.2	5	22.7
5	14	48.3	10	34.5	5	17.2

TABLE E-9

ATTITUDE TOWARD ACQUISITION, TENANT/NON-OWNER

Alternative	Opposed #	Opposed %	Indifferent #	Indifferent %	In Favor #	In Favor %
1	18	50.0	10	27.8	8	22.2
2	24	52.2	13	28.3	9	19.5
3	19	63.3	8	26.7	3	10.0
4	15	50.0	10	33.3	5	16.7
5	23	63.9	10	27.8	3	8.3

TABLE E-10

ATTITUDE TOWARD ACQUISITION

A L L

Alternative	Opposed #	Opposed %	Indifferent #	Indifferent %	In Favor #	In Favor %
1	37	44.1	28	33.3	19	22.6
2	52	46.0	40	35.4	21	18.6
3	35	56.5	19	30.7	8	12.8
4	35	45.5	28	36.4	14	18.1
5	47	52.2	32	35.6	11	12.2

APPENDIX F

PUBLIC AND PRIVATE COMMENTS

(Copies of letters received during the review period of the Draft Environmental Impact Statement will be included in the Final Environmental Statement.)