ASTORIA TRANSPORTATION SYSTEM PLAN
VOLUME I

July 1999

Prepared for
City of Astoria, Clatsop County, and
The Oregon Department of Transportation

Prepared by
David Evans and Associates, Inc.
with Cogan Owens Cogan

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EXECUTIVE SUMMARY

BACKGROUND

This Transportation System Plan (TSP) has been completed to help provide direction for transportation systems in the Astoria urban area over the next 20 years, as well as to meet federal, state, and local transportation planning requirements. Other plans such as those previously prepared for the US 101 and US 30 corridor were considered to ensure compatibility. A majority of the funding for this plan was provided by the Oregon Department of Transportation (ODOT) with participation by the City of Astoria and Clatsop County. Direction for this planning effort was provided by a Transportation Advisory Committee (TAC) with representatives from the public, City of Astoria, Clatsop County, and ODOT. Goals and objectives were developed by the TAC and through the public involvement process with one of the goals being to assess the impacts of an Astoria Bypass. Data were collected on current conditions for transportation including information on all transportation mode systems. This information was used as the basis for projecting traffic conditions using a transportation model for 10-year (2006) and 20-year (2016) periods. The Transportation System Plan was prepared based on the results and findings.

KEY FINDINGS AND ASSUMPTIONS

Although the population has remained at about 10,000 people in the city since 1970, traffic volumes have grown considerably on the state highways in Astoria. This is partly due to the fact that there is not much area for residential growth in the City of Astoria. While there has not been much growth in population during the last 25 years, it is estimated that there will be some growth during the next 20 years. A population growth rate of 0.5 percent per year was assumed over the next 20 years. Vehicle occupancy in Astoria is high compared to most other cities in Oregon. On the state highway system in the Astoria area traffic volumes have increased approximately 40 percent from 1975 to 1995. Two areas that have traffic volume levels near capacity during summer PM peak periods are Smith Point (Highway 101 at Highway 202) and Highway 30 east from the existing one-way couplet (16th Street) to Franklin Street.

Traffic accident records show that, for the most part, there are no major safety problems in Astoria. There are several concerns for the future including safety in some of the areas that are either developing or expected to develop, such as at the west end of the existing one-way couplet on Marine Drive (Highway 30), and in the proposed Gateway Development Area east of the existing one-way couplet. The Smith Point intersection is also a location of concern. Bicycle safety is a concern especially on the Astoria-Megler and New Youngs Bay Bridges. Pedestrian safety is of concern particularly across Highway 30, Highway 101, and Highway 202 from the built-up areas to the waterfronts on the Columbia River and Youngs Bay. Two of these pedestrian safety concern areas also have high density access points (approximately 60 or more per mile). The section of Highway 30 from the west end of the one-way couplet (Eighth Street) to Highway 101 (Astoria-Megler Bridge) has 80 access points per mile and the section of Highway 30 from the east end of the one way couplet (16th Street) to 33rd street has 59 access points per mile.

Additional right-of-way for improvements to the existing highways will be difficult and expensive to obtain. This along with some historic buildings limited the street standards for providing any additional through traffic lanes in existing built-up areas. This limits the types of potential improvements except at Smith Point and south of Smith Point on Highway 202 where existing wide right-of-way is available.

TRANSPORTATION SYSTEM PLAN AND IMPROVEMENTS

The proposed Astoria Bypass, including the extended bypass alternative over Highway 101 Business from Highway 202, would alleviate the need for most of the major transportation system improvements to the existing street system. A separate report for the extended bypass alternative has been prepared. It was discovered that vehicle traffic, including truck traffic, would be substantially reduced on Highway 30 through downtown Astoria if the bypass were to be built. Without the bypass, major improvements would be required on Highway 30 such as widening to five lanes the areas east and west of the existing one-way couplet to provide for acceptable transportation operations. A wide (five-lane) highway requires additional right of way and adds to the pedestrian crossing concerns previously described. This also results in building removal and other negative impacts on the livability without the bypass. The bypass is necessary to retain a pedestrian friendly environment in downtown Astoria.

The constraints dictated that transportation improvement options be considered such as a roundabout versus a conventional intersection with a traffic signal at Smith Point. A list of transportation improvements with options is shown in Chapter 7. These projects address the concerns identified in this plan and involve different transportation modes.

INTRODUCTION

The City of Astoria is located in the northeastern corner of the State of Oregon. It is a city with a population of over 10,000 people. The city is served by two ports that bring in ship and barge traffic from both the Pacific Ocean and the Columbia River. In addition to the two ports (Port of Astoria and North Tongue Point), there is mooring at South Tongue Point. Astoria is at the junction of two major highways (US 101 and US 30) that both channel traffic through the city to the Astoria-Megler Bridge. These two highways carry the majority of the traffic through the city. Astoria also has a regional airport operated by the Port of Astoria with the potential for commercial air use.

This study is being conducted to develop a multimodal transportation system plan (TSP) for the next 20 years covering the Astoria urban area. A network of transportation facilities, transportation services, and land use controls are identified to meet transportation needs. The plan will serve as a guide to ensure that the development and operation of transportation facilities are coordinated to provide ease of movement between modes and efficient transportation.

The plan is being developed to satisfy long-range federal and state transportation requirements including the Intermodal Surface Transportation Efficiency Act (ISTEA), the Oregon Transportation Plan (OTP) and the Oregon Transportation Planning Rule (Goal 12). This will help ensure eligibility for future federal and state transportation funding. The plan is complementary and supplementary to the US 101 and Portland-Astoria (US 30) Corridor Plans. It is also intended to help meet the goals and objectives established as part of the study and to be a guide for future growth and development which impacts transportation facilities. Even though the population and employment in Astoria have remained approximately the same over the last 25 years, traffic volumes have continued to grow on the state highways. Local agency staff and the general public were asked for their input, and for their help in establishing goals and objectives and in providing direction in the development of the TSP. A Technical Advisory Committee (TAC) was also formed consisting of elected officials, government representatives, business representatives, and members of the general public. The TAC actively participated in the formation of this document by providing information, and reviewing drafts.

By chapter, this plan covers:

- Chapter 1 – Transportation System Plan Requirements
- Chapter 2 – Public Involvement/Goals and Objectives
- Chapter 3 – Current Conditions
- Chapter 4 – Transportation Safety
- Chapter 5 – Access Management
- Chapter 6 – Forecasting
- Chapter 7 – Transportation Systems Plan
- Chapter 8 – Financial Analysis

Due to the large size of this document, the appendices are in a separate document (Volume II).

CHAPTER 1: TRANSPORTATION SYSTEM PLANNING REQUIREMENTS

GENERAL REQUIREMENTS

The Astoria Transportation System Plan needs to meet federal, state, and local planning requirements. Federal transportation planning requirements are set forth in the Intermodal Surface Transportation Efficiency Act (ISTEA) for statewide and metropolitan area long-range planning. The act does not specify requirements for areas of less than 50,000 population. However, there are federal requirements establishing a National Highway System (NHS) which includes US 30. This federal legislation is also relevant in defining the federal highway funding program for transportation projects. The requirements of the Transportation Planning Rule Goal 12 (OAR Chapter 660), must be met. This rule affects all levels of government, and requires that transportation plans be coordinated among all jurisdictions, including Clatsop County and the state. The following section outlines state regulations that affect the Astoria Transportation System Plan.

STATE REQUIREMENTS

Goal 12

In the mid-1970s, Oregon adopted 19 statewide planning goals to be implemented in comprehensive plans. The aim of Goal 12 Transportation is "to provide and encourage a safe, convenient, and economic transportation system."

Each community, region, and metropolitan area is required to prepare a transportation element as part of its comprehensive plan that meets the guidelines set forth in Goal 12:

> "A transportation plan shall (1) consider all modes of transportation including mass transit, air, water, pipeline, rail, highway, bicycle and pedestrian; (2) be based upon an inventory of local, regional and state transportation needs; (3) consider the differences in social consequences that would result from utilizing differing combinations of transportation modes; (4) avoid principal reliance upon any one mode of transportation; (5) minimize adverse social, economic and environmental impacts and costs; (6) conserve energy; (7) meet the needs of the transportation disadvantaged by improving transportation services; (8) facilitate the flow of goods and services so as to strengthen the local and regional economy; and (9) conform with local and regional comprehensive land use plans."

In response to this, the City of Astoria adopted a comprehensive plan that included a transportation component in 1980.

The Transportation Planning Rule

The Transportation Planning Rule (TPR) was developed by the Oregon Department of Land Conservation and Development (DLCD) and the Oregon Department of Transportation (ODOT), and was adopted by the Land Conservation and Development Commission (LCDC) in April 1991 and amended in 1995. The TPR implements Goal 12.

Overview

Essentially, the Transportation Planning Rule requires that cities, counties, metropolitan planning organizations (MPOs), and state agencies prepare and adopt Transportation System Plans (TSPs). A Transportation System Plan is "a plan for one or more transportation facilities that is planned, developed, operated, and maintained in a coordinated manner to supply continuity of movement between modes, and within and between geographic and jurisdictional areas."

The rule is intended to encourage a multi-modal transportation network throughout the state that will provide for better modal balance and ensure that local, state, and regional transportation systems "support a pattern of travel and land use in urban areas which will avoid the air pollution, traffic and livability problems faced by other areas of the country."

Transportation Planning Rule Requirements Applicable to Astoria

TPR requirements vary based on a jurisdiction's population size and geographic location. The City of Astoria falls into the jurisdictional category of cities with a population between 2,500 and 25,000 that are located outside of a major urban area. In preparing its local transportation system plan, Astoria must "establish a system of transportation facilities and services adequate to meet identified local transportation needs and shall be consistent with regional Transportation System Plans and adopted elements of the State Transportation System Plan."

The following plan elements and system alternatives evaluations are required in order to satisfy the TPR.

1. A street system plan for a network of arterial and collector roadways.
2. A public transportation plan.
3. A bicycle and pedestrian plan.
4. An air, rail, water and pipeline plan.
5. Policies and land use regulations for implementing the Transportation System Plan.
6. A transportation financing program.

The transportation rule states that it is not its intent to cause duplication or to supplant existing applicable transportation plans and programs. Astoria may incorporate existing plans in its Transportation System Plan to meet TPR requirements.

The TPR also requires a goal exception for the Astoria Bypass which would be a new roadway in a rural area. This would primarily be the responsibility of Clatsop County and ODOT and not an Astoria Transportation System Plan requirement.

OREGON TRANSPORTATION PLAN

The Oregon Transportation Plan (OTP) was completed and adopted by the Oregon Transportation Commission in September 1992. Several alternative approaches to developing the transportation plan were evaluated as part of the OTP planning process. The preferred plan presented in the OTP followed the Livability Approach, which "depends heavily on the concept of minimum levels of service within each transportation mode to assure appropriate transportation alternatives to all areas of the state."

The Oregon Transportation Plan lays out planning and performance guidelines to help ensure city and county plans are consistent with the state plan.

Policy guidelines relevant to Astoria are listed in Appendix A.

Minimum Levels of Service by 2012

The Oregon Transportation Plan establishes minimum service standards, or as it calls them, levels of service standards for the year 2015 for each mode of travel for different size jurisdictions. The following service standards apply to Astoria.

- Market areas over 50,000 in population and over 70 miles from Portland should have at least three minimum round-trip connections to Portland available per day via intercity passenger modes. *The Astoria area was identified as one of these market areas. However, the Astoria area, including Clatsop County, is not expected to attain the required 50,000 population by 2012.*
- Local public transit services and elderly and disadvantaged service providers should regularly connect with intercity passenger service. Intercity passenger service should be available for an incorporated city or groups of cities within five miles of one another having a combined population of over 2,500 and located 20 miles or more from the nearest Oregon city with a larger population and economy. Service should allow a round-trip made within a day.
- Air service connections between Portland, or other West Coast hubs, and other areas of Oregon should be provided whenever commercially viable.
- Connections to deep draft port facilities should be available under open access terms to all major railroads and trucking lines in the nearby vicinity of maritime port terminals where feasible.
- Open access should be provided to and from all railroad facilities and to major ports.
- Bicycle and pedestrian networks should be developed and promoted in all urban areas to provide safe, direct, and convenient access to all major employment, shopping, educational, and recreational destinations in a manner that would double person trips by bicycle and walking.
- Secure and convenient bicycle storage available to the public should be provided at all major employment and shopping centers, park and ride lots, passenger terminals, and recreation destinations.

Inventory

In its inventory of existing facilities, the OTP identifies several transportation facilities of significance in Astoria. Both US 30 and US 101 are identified as highways of statewide significance. US 101 Business and OR 202 are listed as district highways, but certain sections could be redesignated if they become part of the US 30 Astoria Bypass.

Astoria Bypass

An ODOT policy paper on major improvements endorsed in May 1995 has requirements for identifying major improvements such as the Astoria Bypass in the Transportation System Plan. These requirements include the following, which are addressed in the Transportation System Plan:

- Protect and preserve the existing infrastructure;
- Improve the efficiency and capacity of the existing system, including transportation demand measures and operational improvements;
- Add capacity to the existing system;
- Provide new solutions, including bypasses or new facilities.

OREGON HIGHWAY PLAN

As defined in the 1991 Oregon Highway Plan, the principle function of a statewide highway is "to provide connections and links to larger urban areas, ports and major recreation areas that are not directly served by interstate highways."

Because US 30 through downtown Astoria is a road of statewide significance, ODOT expects traffic on it to move efficiently. Therefore, the Oregon Highway Plan establishes an operating level of service (LOS) of C (see Appendix A) for this highway in the Astoria area. This means that traffic on US 30 in downtown Astoria should operate with no more than a moderate level of congestion at peak hours. If a bypass is constructed as has been proposed, US 30 from the John Day River Bridge to the Astoria-Megler Bridge may no longer be considered a highway of statewide significance and a lower level of service may be acceptable. A level of service E for the downtown area would be acceptable as part of a Special Transportation Area if a bypass were to be built. This, and to allow for future growth, would be some of the reasons for a bypass. Depending on the bypass route selected, portions of US 101 business and OR 202 could be upgraded from a lower (district) classification to statewide significance.

Oregon Bicycle and Pedestrian Plan (June 1995)

The Oregon Bicycle and Pedestrian Plan is an element of the Oregon Transportation Plan, which requires that all modes of transportation be addressed. It provides direction for establishing good facilities on state, county, and city transportation systems. The plan is divided into two sections. Section one establishes policies and implementation strategies, while section two presents design, maintenance, and safety information.

The plan envisions Oregon developing "a transportation system where walking and bicycling are safe and convenient transportation modes for urban trips." The primary goal of the plan is "to provide safe, accessible, and convenient bicycling and walking facilities and to support and encourage increased levels of bicycling and walking."

Access Management

The OTP, Oregon Highway Plan and the Portland-Astoria (US 30) Corridor Plan establish policy requirements for access management on the state highway system and strategies for addressing needs on the state highway system. This information will be considered in preparing the access management section of the Astoria Transportation System Plan.

OREGON TRANSPORTATION SAFETY ACTION PLAN

The Oregon Transportation Safety Action Plan (OTSAP) is one of several more specific plans that further defines the OTP's near-term goals and actions.

Like the OTP, the OTSAP recognizes that Oregon's population is growing and changing, and that its transportation needs are also changing. As we begin the 21st century, improvements in highway design and aggressive application of new technologies will not only lead to more efficient use of our roadways, but also to increased driving safety. Because more people than ever are walking, bicycling, or riding public transportation, we must provide a transportation system that is not only "balanced, efficient, accessible, environmentally sound, and connective," but also safe and secure.

The OTSAP encourages development of partnerships among state and local governments, community groups, businesses, and the media to achieve a safer transportation system. With a shared commitment, the actions in the plan can be effectively implemented.

Eleven key actions are identified in Figure 2 of the *Oregon Transportation's Safety Action Plan (OTSAP)*. These actions have been determined to be the highest priority of 70 safety actions in the OTSAP and are listed as follows:

- Develop a Traffic Law Enforcement Strategic Plan.
- Seek a dedicated funding source for traffic law enforcement services and support needs.
- Continue a sustained research-based transportation safety public information/education program.
- Support the expansion of local transportation safety programs.
- Complete a Strategic Plan for Traffic Records Improvements and establish a traffic records system that will serve the needs of state and local agencies.
- Recognize the prevalence of driving under the influence of controlled substances and revise DUII statutes.
- Pass legislation to establish 0.04 percent BAC as the standard for measuring alcohol impairment for all Oregon drivers 21 years old and over. Continue the zero-tolerance law for persons under 21.
- Establish and fund a statewide incident management program designed to minimize traffic congestion and secondary crashes by clearing incidents as quickly as possible.
- Ensure access to child safety seats to all young children.
- Develop and implement a comprehensive Youth Transportation Safety Strategy for youth to age 21.
- Increase emphasis on programs that will encourage pedestrian travel and improve pedestrian safety.

PORTLAND-ASTORIA (US 30) INTERIM CORRIDOR STRATEGY

The Portland-Astoria US 30 Highway Corridor Interim Strategy was developed "to establish realistic performance objectives for transportation in the corridor and to make major transportation trade-off decisions." The Transportation System Plan for Astoria must meet performance objectives and conform with the intent of the US 30 Highway Corridor Strategy.

Applicable Assumptions

- Realignment of US 30 between Fernhill Road and the John Day River Bridge.
- All transportation projects will meet federal and state standards, including applicable Americans with Disabilities Act requirements.
- Highway improvements will meet federal, state, and local standards for construction of new highways.

Applicable Key Themes

- Minimizing additional long-haul truck use of US 30 by promoting increased bulk freight movement by rail and water.
- Deepening the Lower Columbia River navigation channel to accommodate deep draft ships.
- Construction of the Astoria Bypass, with route determination made through the project EIS or other appropriate process and in concurrence with Clatsop County and the City of Astoria.
- Reliance upon local access management and circulation plans to relieve localized congestion problems, to facilitate local trips crossing US 30 safely without unduly interfering with through traffic, to reduce the need for US 30 improvements, and to meet other local transportation system needs.
- Application of the most restrictive access management standards (regulating the number, spacing, type, and location of driveways, intersections and traffic signals), consistent with existing or planned adjacent land uses.
- Adoption of Transportation-efficient land use patterns that reduce vehicle miles traveled and promote a live/work balance.
- Targeting of realignment and widening to sections with above-average accident rates and to sections with high congestion rates.
- Prioritization of projects that enhance development of port properties and other existing industrial and commercial sites.
- Prioritization of projects that reduce automobile travel in urban areas through promotion of alternative transportation modes.
- Prioritization of projects that support increased recreation and tourism.
- Accommodation of increasing bicycle and pedestrian uses through bicycle facilities along the entire corridor length, and, in urban areas, sidewalks on both sides of the highway and convenient and safe pedestrian crossings.

Applicable transportation system strategies are included in Appendix B.

US 101 OREGON COAST CORRIDOR MASTER PLAN

This plan is the result of several state and federal policy directions and because of the great need to improve transportation service in the corridor. The plan covers the 363 mile US 101 route along the scenic Oregon coast and recognizes the natural and scenic resources. As with other corridor studies, the local plans such as the Astoria TSP must be compatible with the corridor study.

Following are policies and performance objectives from the US 101 Corridor Master Plan that are applicable for the Astoria TSP.

Intercity Passenger Services

- Commercial intercity bus service, provided primarily by private enterprise, should be available to a city with a population of 2,500 or more or a group of cities on the coast with a combined population of more than 2,500 and located within five miles of one another. Service should be available to other, similar cities or groups or cities. Service should allow the round-trip to be made within a day.

  Major population centers (market areas over 50,000 in population) in the corridor more than 70 miles from Portland should have at least three round-trip transit connections to Portland available per day.

- Commercial air service connecting to service in Portland and other hubs should be available in the major coastal cities of Astoria, Newport, and North Bend/Coos Bay. This service may substitute for surface intercity service described above, if operating assistance per passenger is more economical than assistance to surface modes.

Intermodal Improvements

- Connections to deep draft port facilities in Astoria, Newport, and North Bend/Coos Bay should be available, under open access terms, to all major railroads and trucking lines in the terminal vicinity.
- Intermodal reload facilities should be incorporated, where feasible, at coastal ports. These facilities should be publicly supported wherever they provide the most cost-effective and environmentally sound response to branch lines.
- Ports handling substantial quantities of international and national freight (more than 3,000,000 tons) should have multi-modal connections, as well as access to freight rail service, with adequate landside and waterside facilities and channels.
- Intercity passenger transit terminals should provide open access to all intercity carriers.
- Direct connections should be available between intercity bus and air service in the Corridor.

Rail Improvements

- Where branch rail lines are maintained, they should be designed to allow a minimum speed of 25 mph, when this is consistent with a favorable cost-benefit ratio.
- Abandoned rail rights-of-way should be preserved for potential public use or ownership.

Road Capacity Improvements

- Provide additional highway capacity where urban economic development or population growth requires maintaining or enhancing travel speeds to accommodate increasing traffic volumes. These areas are typically, but not exclusively, urban or urbanizing areas.
- Highway freight routes in the corridor should operate at level of service B or better during off-peak periods.
- Investigate options for implementing travel demand strategies in urban and developing areas.

  In conjunction with more detailed planning and project development within counties and cities, incorporate "least-cost" planning approach to the process to assess multimodal trade-offs.

Scenic Resources

- Structures and amenities such as guardrails, lighting, and retaining walls should be designed in a manner that is consistent with the quality of existing, historic structures. Designs should permit views of surrounding features in the landscape.
- To enhance the sense of entry and exit from the Coast's many communities, planning for future corridor projects should include the development of "gateways" introducing the traveler to each city. The design for these gateways should allow for diversity of style within a framework that reminds the traveler of the corridor's scenic status and character. The gateway should include appropriate structural features and landscape treatments.

Visual Features

- In addition to tourist information signage, develop and distribute tourist information maps, brochures and literature.

Economic Viability

- As part of the Corridor Master Plan, improvement activities should facilitate the timely movement of goods. These activities will be consistent with policies contained in the Oregon Transportation Plan.

  ODOT will work with local jurisdictions to improve and make the fullest possible use of local streets suitable for commerce and industry as part of local transportation system plans, preserving state facilities for commerce of statewide significance such as logging, through freight movements, and intercity freight and increasing the land available and suitable for economic development.

Improvement Activities - US 101 Astoria through Warrenton are included in Appendix C.

ASTORIA COMPREHENSIVE PLAN

The Astoria Comprehensive Plan was adopted in 1980. The plan calls for maintaining Astoria's existing character by encouraging a compact urban form, by strengthening the downtown core and waterfront areas, and by protecting the residential and historic character of the city's neighborhoods (CP.051.1). Specific transportation policies include encouraging access management along highways and arterial streets and discouraging land use that will result in commercial strip development. The plan also stipulates that improvements to Marine Drive must not separate the downtown area from the waterfront in terms of commercial development or public access. These goals support Astoria's policy regarding urban form.

Policy CP.360.3 requiring that new railroad crossings and maintenance of existing crossings will not disrupt businesses or public access no longer applies because the railroad has abandoned the service between Tongue Point and the Port of Astoria. This section of the railroad has been rail banked and part of it is being used by the city as a pedestrian pathway. Rail banking means that the rails and right-of-way remain intact in case the opportunity presents itself for future railroad operation. State law (ORS366.514) and the TPR require that bikeways and sidewalks be built as part of all new or reconstructed arterial and collector street projects, except in rare circumstances. Therefore, the city should strengthen Policy 365.7 stating that inclusion of bike lanes will be considered in the construction of major improvements of all arterial and collector streets where feasible.

US 30 Bypass

Policy CP.360.4 supports the efforts of the state to construct the US 30 bypass. Even though the US 30 bypass is a high priority for Astoria, it appears that it may be ten (and maybe as long as 20) years until construction is complete unless alternative funding is acquired. The comprehensive plan contains two other policies specific to the bypass, one involving its potential impact on public access to aquatic resources in Youngs Bay; the other regarding inclusion of the bypass within the urban growth boundary.

Construction of the bypass would assist Astoria in meeting its goal of supporting continued economic health of its downtown by getting through traffic, including trucks, out of the downtown area. The bypass would also provide the opportunity to review and revise traffic patterns and streets in the downtown area. This could include better access back and forth between the riverfront and the downtown area for pedestrians, bicycles, and cars. However, the development of a bypass would create the potential for strip development and relocation of businesses from downtown. The Astoria Bypass Draft Environmental Impact Study recommends a partial median to discourage strip development and other access management strategies to provide for traffic efficiency and safety along the bypass. The city should develop adequate land use and zoning regulations to meet plan goals of limiting strip development and maintaining downtown as the regional core.

EXISTING STUDIES

Astoria Bypass Draft Environmental Impact Statement (September 1993, ODOT)

This study assesses the impacts of a No Build and a Build Alternative for the approximately six-mile section of US 30 that would depart from the existing alignment. It would proceed from near the John Day River Bridge along a new alignment through Clatsop State Forest to the Nehalem Highway near Williamsport Road. The project would then follow the Nehalem Highway to US 101. Alternative alignments for an extended bypass are analyzed in this TSP including an alignment using the Old Youngs Bay and Lewis and Clark Bridges, and an alignment that intersects US 101 east of the Old Youngs Bay Bridge.

Astoria Bypass Hearing Study Report (June 1995, ODOT)

As a result of the public hearing in October 1993, and the comments received following the public hearing, a Revised Build Alternative has been adopted that follows the same route as the Build Alternative presented in the DEIS with modifications aimed at minimizing property and environmental impacts. The portion of the project from John Day River Bridge to Williamsport Road would remain unchanged. The Williamsport Interchange design has been modified to a jughandle configuration to minimize impacts to the heron rookery and residential properties. A non-traversable median was added to the section from Williamsport Road to Seventh Street. Sidewalks were added to the south side of the Nehalem Highway, and the shoulder/bikeway width was reduced from Smith Point to Seventh Street.

US 101-Warrenton Vicinity Planning Study (August 1992, Kittelson and Associates)

The report for this study lists a number of improvements required to handle traffic expected for both the short and long term. None of these improvements have been implemented. They are, however, based on the current bypass plan to intersect US 101 north of the New Youngs Bay Bridge. If another alternative is selected, the recommendations of this study will need to be revisited.

City of Astoria Bicycle Plan (October 1992, JRH Transportation Engineering)

The city adopted the City of Astoria Bicycle Plan in 1992. This plan identifies a combination of on-street lanes, designated routes, and independent bicycle paths. In response to plan recommendations, the state recently striped bike lanes on US 30. This plan will be included in the Transportation System Plan to meet the TPR's bicycle plan requirements.

This plan requires:

1. The strengthening of Policy CP 365.7 in the Comprehensive Plan by stating that the inclusion of bike lanes will be considered in the construction of major improvements of all arterial and collector streets where feasible.
2. The development of adequate city land use and zoning regulations along the US 30 bypass route to meet plan goals of limiting strip development and maintaining downtown as the regional core.

Master Development Plan for North Tongue Point (September 1995, Crestmont, Inc.)

In 1992, the Oregon Division of State Lands (DSL) contracted with Crestmont, Inc., to develop the North Tongue Point Site. The plan outlines the physical attributes of the site as well as transportation infrastructure. With regards to transportation, the plan outlines the rail, transit, sea, and road access, as well as specific access to existing uses on the site. The plan makes the following transportation recommendations:

1. Make Old Highway 30 a one-way street to provide access from US 30 to reduce sight distance limitations on US 30.
2. Restripe Maritime Road to provide an exclusive turn lane.
3. Provide an acceleration lane on US 30 west of Maritime Road.

South Tongue Point Master Plan (1991, David Evans and Associates, Inc.)

In 1991, the Oregon Division of State Lands contracted with David Evans and Associates, Inc., to conduct a five-phase master plan study for home port facilities and water-dependent industrial development at South Tongue Point. The adopted comprehensive plan called for re-establishing a 25-foot by 500-foot access channel to the south end of the South Tongue Point site. Several alternatives were prepared for the development of the South Tongue Point site as part of the master plan process. For transportation to the site a new access road connecting to Highway US 30 including a grade separation with the railroad was recommended.

CHAPTER 2: PUBLIC INVOLVEMENT/GOALS AND OBJECTIVES

PUBLIC AND AGENCY INVOLVEMENT

The Astoria Transportation System Plan has been developed with the active participation of city and county agencies, transportation and other stakeholder groups, and the general public. Key to this participation was the establishment, in spring 1995, of a Technical Advisory Committee (TAC) composed of city, county, and state representatives and local citizens. This 14-member group serves as a review and steering committee for development of the transportation plan. It has met 11 times since initiation of the planning process.

Public involvement has been solicited by the TAC at two key stages of the planning process. To guide development of the TSP, public input was initially solicited on issues to be addressed in the plan through a newsletter questionnaire, paid advertisement in *The Daily Astorian*, and a June 1995 open house. A report detailing the public input received is included as Appendix D.

In the autumn of 1996, public information was disseminated and input solicited on proposed street classifications and design standards, access management strategies, and key system improvements. Additionally, input was solicited on alternatives for an extended bypass. Newsletter questionnaires, a questionnaire included as a paid advertisement in *The Daily Astorian*, and an October open house were the primary input mechanisms utilized. Public input received through the open house and questionnaires is detailed in Appendix D.

Specific information and input mechanisms follow.

Project Newsletters

A June 1995 newsletter was distributed to the city's mailing list to announce the planning process and seek input, through a questionnaire, on issues to be addressed in the plan. The June 23, 1995, open house was also advertised.

An October 1996 newsletter provided an update on transportation planning in Astoria, including the TSP and Astoria extended bypass alternatives. An October 29, 1996, open house was advertised and input was solicited, through a questionnaire, on key strategies for access management, downtown circulation, highway and other system improvements, and on alternatives for an extended Astoria Bypass.

Open Houses

To obtain broad public input, open houses were conducted at two separate points in the planning process. A June 23, 1995, open house provided information about the planning process and solicited input on the key issues to be addressed in the plan. The open house was advertised through a project newsletter, press releases, news articles, and advertisements in *The Daily Astorian.*

An October 29, 1996, open house disseminated information on a preliminary draft of the TSP and on the alternatives for an extended Astoria Bypass. Public input was solicited on proposed TSP elements and preferred bypass extensions. The open house was advertised through the project newsletter, press releases, public service announcements, and paid advertisement in *The Daily Astorian*. Activities included:

- Live/work map—using dots, attendees indicated where they lived and worked;
- Storyboards on the transportation planning processes and schedule;
- Storyboards comparing current and projected traffic volumes;
- Proposed street classifications and standards;
- Access management strategies—using dots, participants indicated agreement or disagreement with proposed strategies;
- Transportation system improvements—participants commented on proposed improvement projects and identified site-specific transportation system improvements;
- Maps of alternatives for an extended Astoria Bypass, specifically two options for replacing Old Youngs Bay Bridge.
- Miscellaneous posted questions regarding bicycle, pedestrian and transit improvements and financing transportation improvements; and
- Questionnaire.

Other

Information on the planning process has also been distributed and input on draft plan products solicited through briefings with local government officials and interest groups such as the county's Economic Development Committee.

GOALS AND OBJECTIVES

The following goals and objectives are recommended by the TAC for the Astoria Transportation System Plan. These goals and objectives are derived from the public input obtained through questionnaires and an open house and issue/priorities identified by the TAC.

GOAL 1: **Improve traffic circulation and safety throughout the city.**

Objectives

- Evaluate improved circulation in the downtown area through measures such as alternative traffic patterns to the existing one-way circulation system; better synchronization of signals; updated/additional traffic controls; and other measures.
- Improve circulation between downtown and the riverfront.
- Improve cross-town (both north-south and east-west) circulation.
- Accommodate increased tourist traffic through better access to attractors, improved signage, and other measures.
- Assess effects on downtown parking with adjustments to the circulation system, e.g., changes in grid system.
- Investigate restricted parking zones and other parking measures to limit conflicts with freight deliveries and traffic.

- Identify transportation demand management measures that could reduce peak hour demand.
- Protect residential and commercial areas from air quality, noise, and visual impacts resulting from truck traffic.

GOAL 2: Identify roadway system needs to accommodate future population, economic and tourism growth.

Objectives

- Implement street improvements (versus constructing new streets) as the preferred means to accommodate additional growth.
- Target additional street improvements to the Williamsport area, including the area south of Irving and to the new county fairgrounds.
- Assess long-term access and capacity needs associated with the two Youngs Bay Bridges.
- Integrate new arterial and collector routes into the existing city grid system.

GOAL 3: Promote the increased use of alternative modes.

Objectives

- Identify measures to resolve physical impediments to circulation for alternative modes.
- Improve pedestrian circulation within and between neighborhoods and commercial centers.
- Ensure connections to the existing pedestrian system with new developments.
- Identify intersection improvements that enhance pedestrian safety.
- Provide additional sidewalks and improve existing sidewalk pavement for pedestrian safety and access.
- Ensure connections to bicycle paths with the new county fairgrounds.
- Improve bicycle and pedestrian crossings for US 30, 101 and OR 202.
- Improve bicycle and pedestrian facilities on the New Youngs Bay Bridge.
- Construct riverwalk/bicycle path around the city.
- Identify measures to maintain and increase transit usage, including coordination of existing transit services, extended service hours, more frequent service, transit connections to airport and cruise ships, and improved cross-town transit.
- Identify measures to address the lack of truck facilities.
- Utilize the abandoned Burlington Northern railroad right-of-way for pedestrian/bicycle uses and rail bank it for potential future rail use.
- In coordination with the Port of Astoria, identify measures to obtain and maintain regularly scheduled air service and to improve access to the airport.
- Assess opportunities and constraints associated with increased water transportation, including impacts of cruise ships, Lewis and Clark Greenway opportunities, lack of camping facilities for canoeists/kayakers, lack of transient moorages/overnight tie-ups, and reduced truck traffic to Port properties.
- Assess the role of telecommunications as a transportation mode.

GOAL 4: Utilize access management measures to reduce traffic impacts on arterial and collector streets.

Objectives

- Limit additional access points on US 30, US 101 and OR 202.
- Investigate restrictions on existing access.
- Assess the impacts of additional access points on highway capacity, particularly those associated with proposed Marine Drive developments, e.g., new waterfront hotel/conference facility/museum center complex.
- Investigate the potential for alternative routes in lieu of the arterials for local traffic.
- Assess the impacts of raised medians on traffic circulation and safety.

GOAL 5: Identify improvements needed to address site-specific transportation issues.

Specific areas to be addressed

- North and South Tongue Point areas.
- East Mooring Basin industrial area.
- Maritime Museum/Seafood Consumer Center/17th Street dock site.
- New waterfront hotel/conference facility/museum center complex.
- Astoria Bridge and Port of Astoria area.
- Tapiola Park and High School area.
- Large undeveloped parcels along West Marine Drive; PPL site, NWNG site.
- Intersection of Seventh Street and OR 202.
- Land use and development patterns from Seventh Street to Williamsport Road.
- Astoria Column.
- Aquatic Center.
- Smith Point intersection.
- Bridgeheads.
- Burgerson property (39th).
- Clatsop Community College (potential abandonment of existing campus).
- 45th Street left-turn movements.

GOAL 6: Assess the impacts of building and not building the proposed Astoria Bypass on the city's transportation system.

Objectives

- Identify needed improvements to US 30 between Astoria-Megler Bridge and Astoria with and without the Astoria Bypass.
- Compare the effects on OR 202 safety of constructing and not constructing the bypass.
  Evaluate the transfer of US 30 to the city and county if the bypass is constructed.

CHAPTER 3: CURRENT CONDITIONS

CAPITAL IMPROVEMENTS AND FUNDING

The preliminary 1996-1998 STIP included funding for only one Astoria area project on the state highway system. This state highway project was for improvements to US 30 from Fernhill to the John Day River Bridge. The funding for this project was required for emergency repair projects during 1996 and there is currently no funding identified in the STIP. Clatsop County has no planned projects in the Astoria area.

Astoria city staff developed a list of needed street improvements to be funded through the approximately $50,000 per year the city receives in federal ISTEA funds. 1996 projects include improving crosswalks in downtown. Recently, multiple-year funds were pooled to finance widening Klaskanine Street from Third Street to Seventh Street. The city has entered into an agreement with ODOT to exchange the federal dollars for state dollars. This gives the city more flexibility in how this money may be used.

Astoria maintains and paves its streets through a two-year serial levy of $200,000. The city receives about $500,000 in state gas tax, which supports annual street operations including patching, striping, signs and painting.

POPULATION, EMPLOYMENT, AND TRANSPORTATION DEMAND GROWTH

There have been conflicting forecasts for population and employment growth in the Astoria area with some forecasts projecting flat growth and others projecting substantial growth (30 to 40 percent). However, past history does not support projections for any substantial population growth. Furthermore, the topography and the lack of available vacant land zoned to allow new developments limits new growth. As a result of discussions with the Transportation Advisory Committee, an annual population growth rate of 0.5 percent is assumed for the next 20 years in the Astoria urban area. (The population has stayed at approximately 10,000 for the City of Astoria since 1970.)

Traffic volumes have been increasing on the state highways in the Astoria area and are expected to continue to grow in the future. Over the 20-year period from 1970 to 1990, average daily traffic volumes on US 101 and US 30 in Astoria grew by approximately 45 percent. The growth rates for external traffic on the US 101 Astoria-Megler Bridge and New Youngs Bay Bridge were considerably higher. This growth in transportation demand illustrates the need for long-term transportation system planning to meet future demands in and through the Astoria area.

Vehicle occupancy statistics in the 1996 ODOT Traffic Volume Tables showed that the average number of occupants per vehicle in Astoria is 1.62. This was high compared to most other cities with a population of 10,000 or more in Oregon. The only two cities with higher vehicle occupancy were Woodburn and Dallas.

STREET SYSTEM

Proposed street classifications, jurisdictions, and existing traffic signals are shown in Figure 3-1. A street inventory was performed in 1995 of all collector and arterial streets within the Astoria city limits. The inventory is located in

Appendix E. The inventory includes street jurisdictions and classifications; street and right-of-way width; number of travel lanes; on-street parking, sidewalk and bike lane provisions; and general pavement conditions and lengths.

Design Standards

Astoria currently has a five-tier street classification system, including local residential, minor and major collector, industrial and minor arterial streets.

Table 3-1 lists design standards by street classification. This table shows that Astoria allows narrow streets in residential areas, thus meeting one of the goals of Transportation Planning Rule. Current street standards have been reviewed as part of this study to determine effectiveness and needed revisions.

TABLE 3-1
STREET DESIGN STANDARDS

Street Classification	Design Speed (mph)	Travel Lanes	Travel Lanes Width (ft)	Parking Lanes	Parking Width (ft)	Pavement Width (ft)	Right-of-way (ft)
Local Residential	25	2	10	2	8	36	60
Parking One Side	25	2	10	1	8	28	50
Minor Collector	35	2	12	2	8	40	60
Major Collector	35	2 (turn lane)	12 & 14 (turn lane)	2	8	54	80
Industrial	25	2	14	2	8	44	60
Minor Arterial	35	4	12 & 14 (turn lane)	none	none	62	80

Astoria is an historic city served, for the most part, by an established street grid pattern. Grid patterns encourage walking, biking, and general ease of access throughout the community. However, Astoria's hilly terrain may discourage walking beyond the more flat downtown. While the city's Comprehensive Plan indicates most new development will be accommodated through infill, some new streets will be constructed. Section 13.440 of the Astoria Development Code states that "No block shall be more than 1,000 feet in length between street corner lines unless it is adjacent to an arterial street or unless the topography or the location of adjoining streets justifies an exception." Astoria should consider shortening this block length in keeping with historic development patterns.

TRAFFIC VOLUMES

Traffic volume information for the year 1995 in the Astoria area supplemented with a traffic count program was used to identify traffic volumes for the existing 1996 base year. Traffic volume information was collected along all designated arterial and collector streets in the study area. Manual turning movement counts were performed during the peak PM period in June 1995. A total of 22 counts were taken; nine at signalized intersections and 13 at other key intersections in the city. A total of 40 bi-directional road tube counts were taken at separate locations around the same time period.

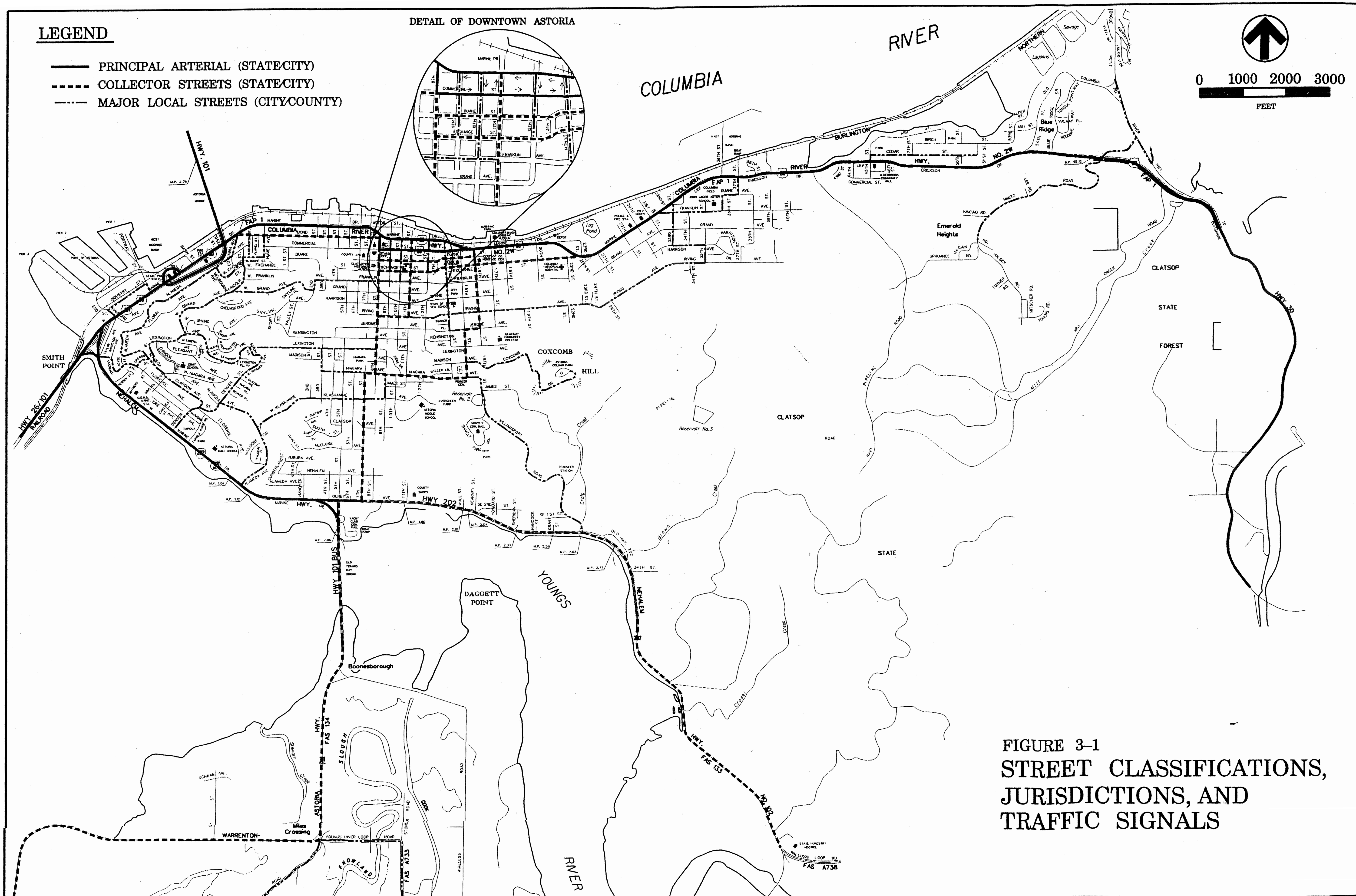

FIGURE 3–1
STREET CLASSIFICATIONS, JURISDICTIONS, AND TRAFFIC SIGNALS

Average Daily Traffic

The 1995 Average Daily Traffic (ADT) on the major streets in Astoria was collected from the following sources: The 1995 Oregon Department of Transportation's *Traffic Volume Tables*, 24-hour road tube counts, and PM peak hour turning movement counts. The PM peak hour turning movement traffic counts were translated into daily traffic volumes by using a peak hour percentage of 8.5 percent. The peak hour percentage is the ratio of PM peak hour traffic to total daily traffic. This percentage was determined from various 24-hour road tube counts taken in the city. Figure 3-2 displays the 1995 daily traffic volumes. These conditions are for an average weekday in June, which is one of the peak summer months when traffic volumes on the street system are at their greatest.

Traffic volumes in the Astoria area are highest on the state highways and lowest on the collector streets serving residential areas. Highways 30 and 26/101 carry the greatest amount of traffic in Astoria. In 1995, daily traffic volumes ranged between 13,500 and 18,000 vehicles per day (vpd) along Highway 26/101 from Warrenton to the Astoria-Megler Bridge. Traffic volumes along Highway 30 reached 18,100 vpd along Marine Drive, east of the Astoria-Megler Bridge, and around 12,800 to 13,800 vpd each way on the one-way couplet downtown. Traffic volumes then tapered off to 14,900 vpd east of the couplet and down to 8,800 vpd, east of Astoria's city limits. In 1995, Highway 202 and Highway 101-Business Route carried a lower but moderate amount of traffic. Volumes range between 3,170 and 8,280 vpd along these two highways.

Other streets which carry a considerable amount of local traffic are the minor arterial streets which form the primary routes for carrying traffic over the hills of Astoria; Seventh Street, Eighth Street, Irving Avenue, 11th Street, Niagara Avenue, 15th Street, Jerome Avenue, and 16th Street. Traffic volumes ranged between 2,780 and 5,810 vpd along these roads. Traffic volumes along Exchange Street, east of 16th Street, and along Bond Street, between Columbia Avenue and Eighth Street, reached 5,000 and 3,360 vpd, respectively. The two other minor arterial streets, Duane and Exchange Street, located in the downtown core, had traffic volumes ranging between 2,500 and 4,500 vpd.

Most collector streets in the study area had traffic volumes at or below 2,200 vpd.

Hourly Traffic Patterns

Generally, traffic volumes on Astoria roadways tend to have three peaks each day; an AM peak around 8:00-9:00 a.m., a peak around 12:00-1:00 p.m., and a PM peak in the late afternoon around 4:30-5:30 p.m.

Weekday PM Peak Hour Volumes

From the hourly traffic patterns observed from the road tube and manual turning movement counts, the period of highest activity for an average weekday can be discerned as occurring between 4:30 and 5:30 p.m.; therefore, testing and evaluation of the street system was based on PM peak hour volumes.

Directional PM peak hour volumes for 1995 are shown on Figure 3-3.

INTERSECTION OPERATIONS

Transportation engineers have established various standards for measuring traffic operations of intersections and roadways. Each standard is associated with a particular level of service (LOS). The LOS concept requires consideration of factors that include, traffic demand, capacity of intersection or street, delay, frequency of interruptions in traffic flow, relative freedom for traffic maneuvers, driving comfort, and convenience and operating cost. Six standards have been established ranging from LOS "A" where traffic flow is relatively free-flowing, to LOS "F," where the street system is totally saturated with traffic and movement is very difficult.

From the traffic volumes information collected in 1995, the existing (1996) operations were determined at selected signalized and unsignalized intersections in the Astoria planning area. Selected signalized intersections were analyzed using the Oregon Department of Transportation's SIGCAP-2 software. Selected unsignalized intersections were analyzed using ODOT's UNSIG10 software. Both programs describe the LOS of an intersection in terms of LOS "A" through "F" along with other pertinent information. Detailed results of the operations analyses are located in Appendix F.

Signalized Intersections

Theory developed for use in SIGCAP-2 tries to account for the concept that traffic conditions in a smaller area may be interpreted as being a worse LOS than the same conditions in a larger area. This concept assumes that drivers from each area are willing to tolerate different degrees of congestion. Level of Service can be defined by a sliding scale. The part of the scale to use depends upon the metropolitan (community) size. The maximum capacity level (E-F), is the same for all areas.

The LOS for a signalized intersection is determined by the Saturation Value (X), which is a measure of overall congestion at the intersection. Table 3-2 displays the Level-of-Service based on a range of Saturation Values and community sizes.

TABLE 3-2
LEVEL OF SERVICE, METRO SIZE, AND SATURATION VALUE (X)

Metro Size and Saturation Value (X)				(LOS)
>500,000	100,000-500,000	20,000-100,000	<20,000	Level of Service
0.00-0.55	0.00-0.52	0.00-0.50	0.00-0.48	A
0.56-0.66	0.53-0.64	0.51-0.61	0.49-0.59	B
0.67-0.75	0.65-0.73	0.62-0.71	0.60-0.69	C
0.76-0.79	0.74-0.77	0.72-0.75	0.70-0.73	C-D
0.80-0.86	0.78-0.85	0.76-0.84	0.74-0.83	D
0.87-0.90	0.86-0.89	0.85-0.88	0.84-0.87	D-E
0.91-0.97	0.90-0.97	0.89-0.97	0.88-0.97	E
0.98-0.99	0.98-0.99	0.98-0.99	0.98-0.99	E-F
>1.00	>1.00	>1.00	>1.00	F

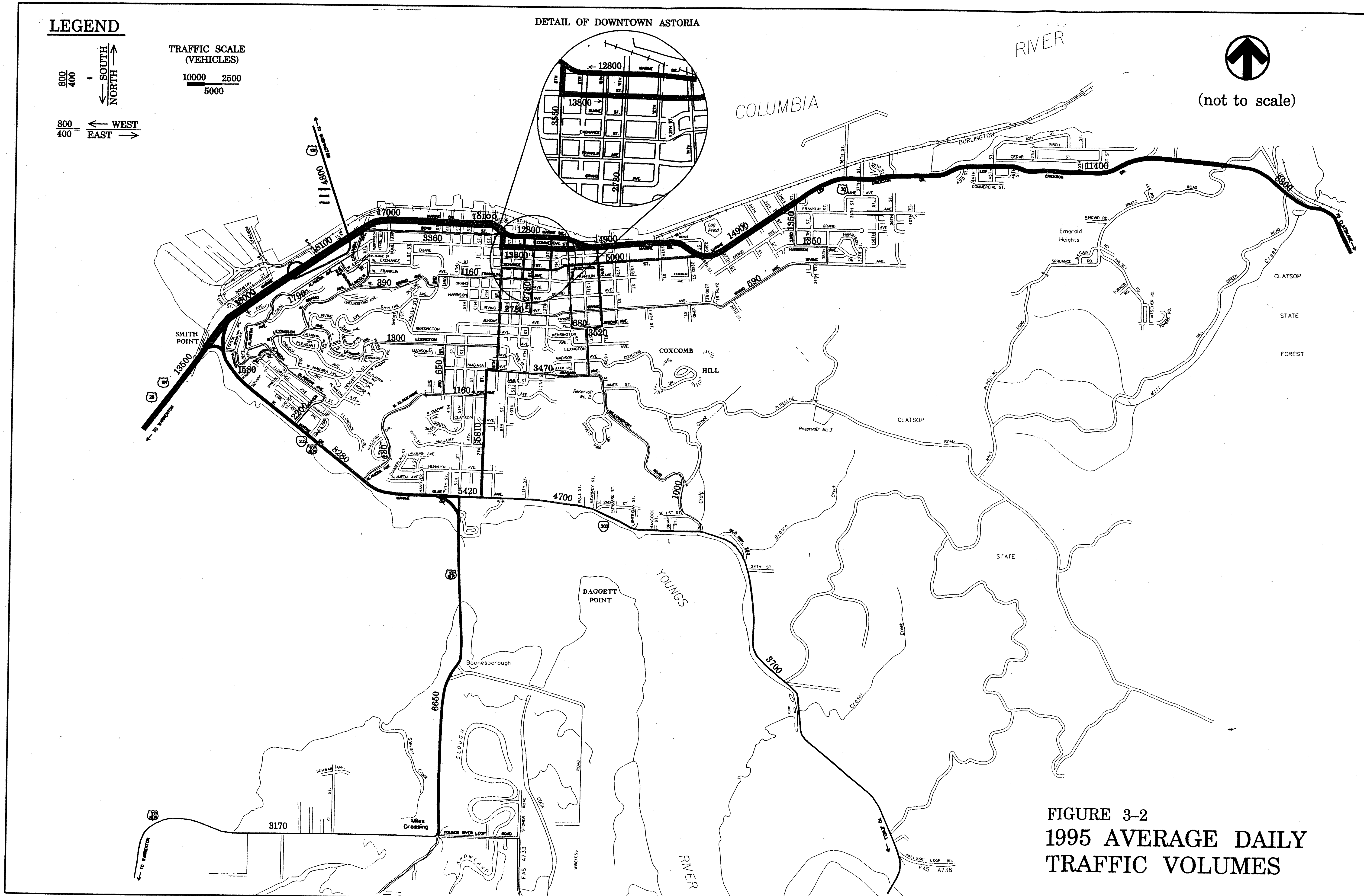

FIGURE 3-2
1995 AVERAGE DAILY TRAFFIC VOLUMES

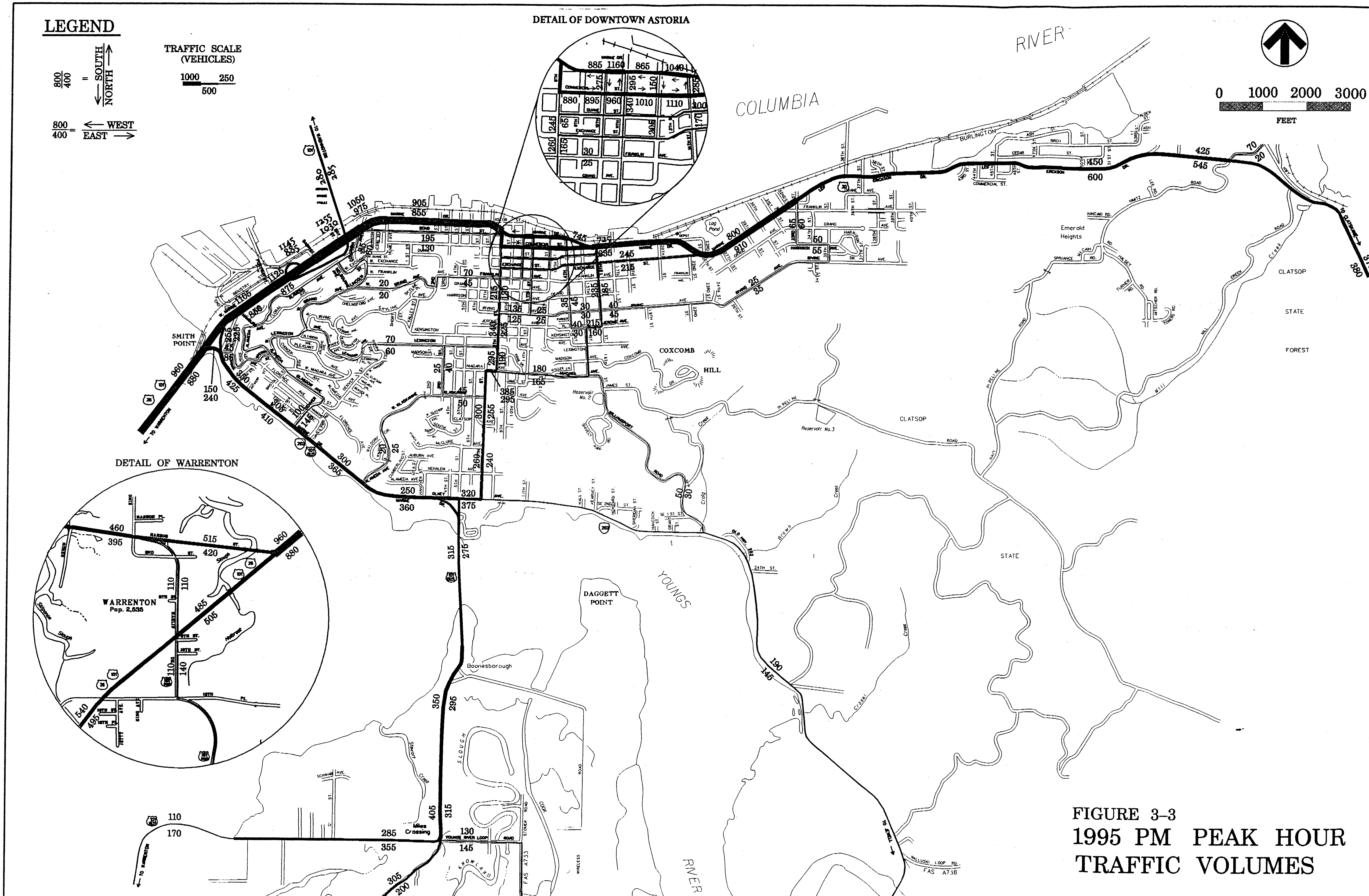

FIGURE 3-3
1995 PM PEAK HOUR TRAFFIC VOLUMES

approximately 40 bicycle parking racks at key destinations mostly in the downtown core of Astoria. On most collector and major local streets bicycles must share the roadway with auto traffic.

PEDESTRIAN SYSTEM

The City of Astoria has a fairly well integrated pedestrian system, especially along the urban portions of Highway 30 and 101, the downtown core, and many of the collector and major local streets in the area. Information was gathered on pedestrian volumes during the PM peak hour in the Astoria area in June 1995, to identify areas of high pedestrian activity. Figure 3-5 displays the locations where counts were taken along with pedestrian movements.

Most pedestrian activity is located in the downtown core of Astoria in the street blocks bound by Marine Drive, Exchange Street, Seventh Street, and 16th Street. Pedestrian volumes at street intersections can range between 30 and 130 pedestrians per hour. As seen in the Figure 3-5, pedestrian activity is low west of the downtown area along Highway 30, 101, and 202.

As part of the street system inventory of all arterial, collector, and most local streets, pedestrian facilities were recorded. The inventory indicates whether or not sidewalks are present, the location of sidewalks on one or both sides of the street, and whether they are continuous or intermittent along a street. There are places where sidewalks would be desirable but do not exist on several local streets. Topography is a major impediment to sidewalk installation in some areas of the city. The three major bridges discussed previously for bicycle lanes also don't have pedestrian sidewalks that meet current standards. The street inventory table showing sidewalk locations is located in Appendix E.

OTHER TRANSPORTATION MODES: TRANSIT, AIR, RAIL, PORT, AND PIPELINE FACILITIES

Public Transportation System

Astoria's public transportation service is coordinated through the Sunset Empire Transportation District. Service in the City of Astoria is currently contracted through a private company. Service is provided Monday through Saturday by wheelchair accessible minibuses. Figure 3-6 displays the local transit routes including bus stops and bus shelters. The current ridership is approximately 117 passengers per day. Astoria is also served by Pacific Transit's Route #6, a route based in Washington State, which serves the Astoria-Megler Bridge four times a day.

Sunset Empire Transportation currently operates a demand response shuttle or dial-a-ride throughout Clatsop County. This service is provided Monday through Friday from 8:00 AM to 5:00 PM and has approximately 17 passengers per day. Sunset Empire also provides services for special events including a shuttle for events at the fair grounds. Sunset Empire has started hourly fixed-route and fixed-schedule service between Astoria and Warrenton/Hammond, Cannon Beach and Seaside. This service provides six or seven runs a day between the cities six days a week. Sunset Empire anticipates future expansion as far south as Lincoln County and as far north as Columbia County. The ridership is approximately 38 passengers per day for Warrenton/Hammond, 24 passengers per day for Seaside/Cannon Beach and 58 passengers per day for Astoria/Seaside.

From August to December 1995, there was no intercity bus service from Astoria to Portland. A regional bus service, Dash-Hound, Inc., served the north Oregon coast communities until August 1995. Dash-Hound provided

TABLE 3-7
BRIDGES OF ASTORIA, OREGON

Bridge Name	Length (ft)	Sufficiency Rating	Owner
New Youngs Bay Bridge	4,209	54.0	ODOT
Lewis and Clark Bridge	828	53.0	ODOT
John Day Bridge	1,105	80.0	ODOT
Astoria - Megler Bridge	21,697	58.0	ODOT
Walluski River Bridge	485	89.8	ODOT
Old Youngs Bay Bridge	1,766	45.7	ODOT
Irving Ave (Steel)	200	27.7	Astoria
Irving Ave (Wood)	201	60.2	Astoria
Franklin Ave Bridge	217	48.1	Astoria

BIKEWAY SYSTEM

Like pedestrians, bicyclists are often overlooked when considering transportation facilities. Bicycles take up little space on the road or parked, do not contribute to air or noise pollution, and offer higher speeds than walking. Because of the small size of Astoria, a cyclist can travel to any destination in town within a matter of minutes. However, bicycling may be difficult in some areas of Astoria because of the hilly terrain and steep grades.

Bicycling should be encouraged to reduce the use of automobiles for short trips. Noise, air pollution, and traffic congestion could be mitigated if more short trips were taken by bicycle or on foot. Typically, a short trip that would be taken by bicycle is around two miles.

Bikeway Facilities

Currently, bike lanes are striped along Highway 30 and Highway 101 starting around 33rd Street proceeding west through the downtown area. Along the existing couplet, downtown bike lanes are present along the north side of Marine Drive and the south side of Commercial Street, moving in the same direction with traffic. Except for the section from Sixth Street to First Street which is four lanes without shoulders (44 feet), striped shoulders continue all the way out to Smith Point and proceed across the New Youngs Bay Bridge towards Warrenton. However the shoulder width on the New Youngs Bay Bridge (Highway 101) is narrower than desired for bicycles (only approximately three feet from the curb). The other two major bridges are also too narrow for shoulder bicycle lanes. The Astoria-Megler Bridge (Highway 101) and the Old Youngs Bay (Highway 101 Business) are both narrower than the New Youngs Bay Bridge. Improvements are proposed in Chapter 7 to mitigate the lack of bicycle lanes on the three major bridges.

Shoulders are wide enough for bicycles along Highway 30 from 33rd Street to 37th Street. There are intermittent areas with shoulders wide enough for bicycles along Highway 30 from 37h Street proceeding east past the city limits. Shoulders are wide enough for bicycles along Highway 202 from Smith Point extending south past the county shops to approximately Wall Street. Bikeway facilities along with bike volumes observed during the PM peak hour are displayed in Figure 3-4. In addition to the previously described bicycle facilities there are

Highway 202/101 Business Route and Seventh Street currently operates at a LOS of A. Operations at the intersection of Highway 101 Business Route and the Lewis and Clark Road are also adequate at a LOS B or better.

ROADWAY OPERATIONS

The 1991 Oregon Highway Plan (OHP) establishes operating level of service standards for the state highway system[1]. Highways of statewide importance, such as Highway 30 and Highway 26/101, should operate at LOS D or better (i.e., average speeds between 15 and 20 mph) in urban areas and LOS C or better in urbanizing areas (i.e., average speeds between 20 and 25 mph). Highways on a district level such as Highway 202 and Highway 101-Business Route, should operate at LOS E (i.e., average speeds between 10 an 15 mph) in urban areas and LOS D or better in urbanizing areas.

From the analysis of signalized and unsignalized intersections above, and from observed traffic volumes and assumed street capacities, it was determined that the current roadway operations of the highways in the Astoria area meet or exceed the required state of operation, except at the Smith Point intersection, where the northbound left-turn movement from Highway 202/101-Bus. to Highway 26/101 operates at a LOS of F.

Pavement Conditions

State Highway System

All of the state highways in Astoria had fair or better pavement condition ratings in 1995 except for the following sections:

1. US 30 east of Leif Erickson (MP 95.47).
2. US 30 eastbound one-way (Commercial Street).
3. OR 202 south of Hanover Street through Williamsport Road (MP 1.39-2.77).

Pavement ratings for the other collectors and major local streets are shown as part of the street inventory table located in Appendix E. Most of these streets also had fair or better pavement condition ratings.

Bridge Inventory in Astoria Study Area

The Astoria study area consists of a total of nine bridges (33,056 feet in length). The State of Oregon owns six bridges and the City of Astoria owns the remaining three bridges. Bridges that have sufficiency ratings of less than 60 percent are in need of repair and further evaluation. Two bridges are functionally obsolete. One bridge is structurally deficient. Maintenance type projects are being done to alleviate the structural deficiency rating. The remaining four bridges are not deficient. The sufficiency ratings (SR) of all nine bridges range from 27.7 percent to 83.0 percent.

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[1] 1991 Oregon Highway Plan, Appendix A, Table 1, *Operating Level of Service Standards for the State Highway System*

TABLE 3-6
1996 LEVEL OF SERVICE AT SELECTED UNSIGNALIZED INTERSECTIONS

Location	Traffic Movement	LOS
Hwy 30-Marine Drive		
16th Street	Northbound; All	F
	Southbound; All	E
	Eastbound; Left	A
	Westbound; Left	C
23rd Street	Northbound; Left, Through	E
	Southbound; Left, Through	E
	Eastbound; Left	A
	Westbound; Left	A
Franklin Street	Northbound; Left	E
	Westbound; Left	A
33rd Street	Northbound; All	C
	Southbound; All	C
	Eastbound; Left	A
	Westbound; Left	A
Hwy 26/101		
Hwy 202/101 Bus.	Northbound; Left	F
Hwy 101 Bus.	Northbound; Left, Through	E
	Southbound; Left, Through	E
	Eastbound; Left	A
	Westbound; Left	A
Fort Stevens Highway	Northbound; Left	A
	Southbound; Left	A
	Eastbound; Left, Through	D
	Westbound; Left, Through	D
Hwy 202		
Seventh Street	Southbound; Left	A
	Eastbound; Left	A
Hwy 101 Bus.		
Lewis and Clark Road	Northbound; Right	A
	Southbound; Left	A
	Westbound; Left	B

The results show that the minor approaches to Marine Drive at 16th Street, 23rd Street, and Franklin Street, experience a LOS of E or F, indicating excessive delays. However, all the approaches along Marine Drive at these intersections function with a LOS of C or better. The north and south approaches at 33rd Street and Marine Drive currently operate at a LOS of C with all major street movements at LOS A. At the intersection of Highway 26/101 and Highway 202/101 Business Route (Smith Point), the northbound left turn to proceed through the stop sign and across the Youngs Bay Bridge currently operates at a LOS of F. The combined left-through lanes on the minor approaches of the Highway 101-Business Route and the Fort Stevens Highway at Highway 26/101 at are at LOS of E and D, respectively, with major street traffic movements along Highway 26/101 at LOS A. The intersection of

TABLE 3-4
1996 LEVEL OF SERVICE AND SATURATION VALUES (X) AT SELECTED SIGNALIZED INTERSECTIONS

Location	Traffic Movement	LOS (X)
Hwy 26/101		
Harbor Street	All	C (67%)
Portway Street	All	B (55%)
Hwy 30-Marine Drive		
Astoria Bridge	All	C (69%)
Basin Street	All	B (56%)
9th Street	All	D (79%)
11th Street	All	D (78%)
14th Street	All	C-D (73%)
Hwy 30-Commercial Street		
9th Street	All	B (52%)
11th Street	All	B (55%)

Overall, the selected signalized intersections currently operate at a LOS of D or better. With all intersections located in the urban area of Astoria or the urbanizing area of Warrenton, these are acceptable levels of operation.

Unsignalized Intersections

Using UNSIG10, the LOS of an unsignalized intersection is determined by the amount of reserve capacity for each approach lane. Table 3-5 displays the level-of-service criteria for unsignalized intersections.

TABLE 3-5
LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

Reserve Capacity (pcph)	Level of Service	Expected Delay to Minor Street Traffic
$\geq$ 400	A	Little or no delay
300-399	B	Short traffic delays
200-299	C	Average traffic delays
100-199	D	Long traffic delays
0-99	E	Very long traffic delays
*	F	

A total of nine unsignalized intersections in the Astoria area were selected for operations analysis. Table 3-6 displays the results.

Theoretically, level of service "F" begins at a saturation value of 1.00. Due to the unpredictable operation conditions at this saturation level, the indicated E-F range has been included for report purposes. Also for report purposes, the saturation values provided on the SIGCAP-2 output have been multiplied by 100 and are reported as percentages.

In SIGCAP-2, the theory behind the concept of LOS is a quantitative measure of the ratio between the existing or projected volumes to the capacity of the roadway at a given location. This ratio is known as volume-to-capacity (V/C). The V/C ratios are broken down into six levels and each level is given a letter designation, from A through F, for identification purposes. Table 3-3 shows the LOS designations for signalized intersections using the SIGCAP2 software.

TABLE 3-3
LEVEL OF SERVICE DESIGNATIONS FOR SIGNALIZED INTERSECTIONS

Level of Service	Traffic Flow	Comments	Maneuverability
A Desirable	Free	Traffic flows freely with no delays.	Drivers can maneuver easily and find freedom in operation
B Desirable	Stable	Traffic still flows smoothly with few delays.	Some drivers feel somewhat restricted within groups of vehicles.
C Desirable	Stable	Traffic generally flows smoothly but occasionally vehicles may be delayed through one signal cycle. Desired urban area design level.	Backups may develop behind turning vehicles. Most drivers feel somewhat restricted.
D Acceptable	Approaching Unstable	Traffic delays may be more than one signal cycle during peak hours but excessive back-ups do not occur. Considered acceptable urban area design level.	Maneuverability is limited during short peak periods due to temporary back-ups.
E Unsatisfactory	Unstable	Delay may be great and up to several signal cycles. Short periods of this level may be tolerated during peak hours in lieu of the cost and disruption attributed to providing a higher level of service.	There are typically long queues of vehicles waiting upstream of the intersections.
F Unsatisfactory	Forced	Excessive delay causes reduced capacity. Always considered unsatisfactory. May be tolerated in recreational areas where occurrence is rare.	Traffic is backed up from other locations and may restrict or prevent movement of vehicles at the intersection.

A total of nine signalized intersections in the Astoria area were selected for operations analysis. Table 3-4 displays the existing (1996) operations at these intersections. Conditions are for the PM peak hour for an average weekday in June.

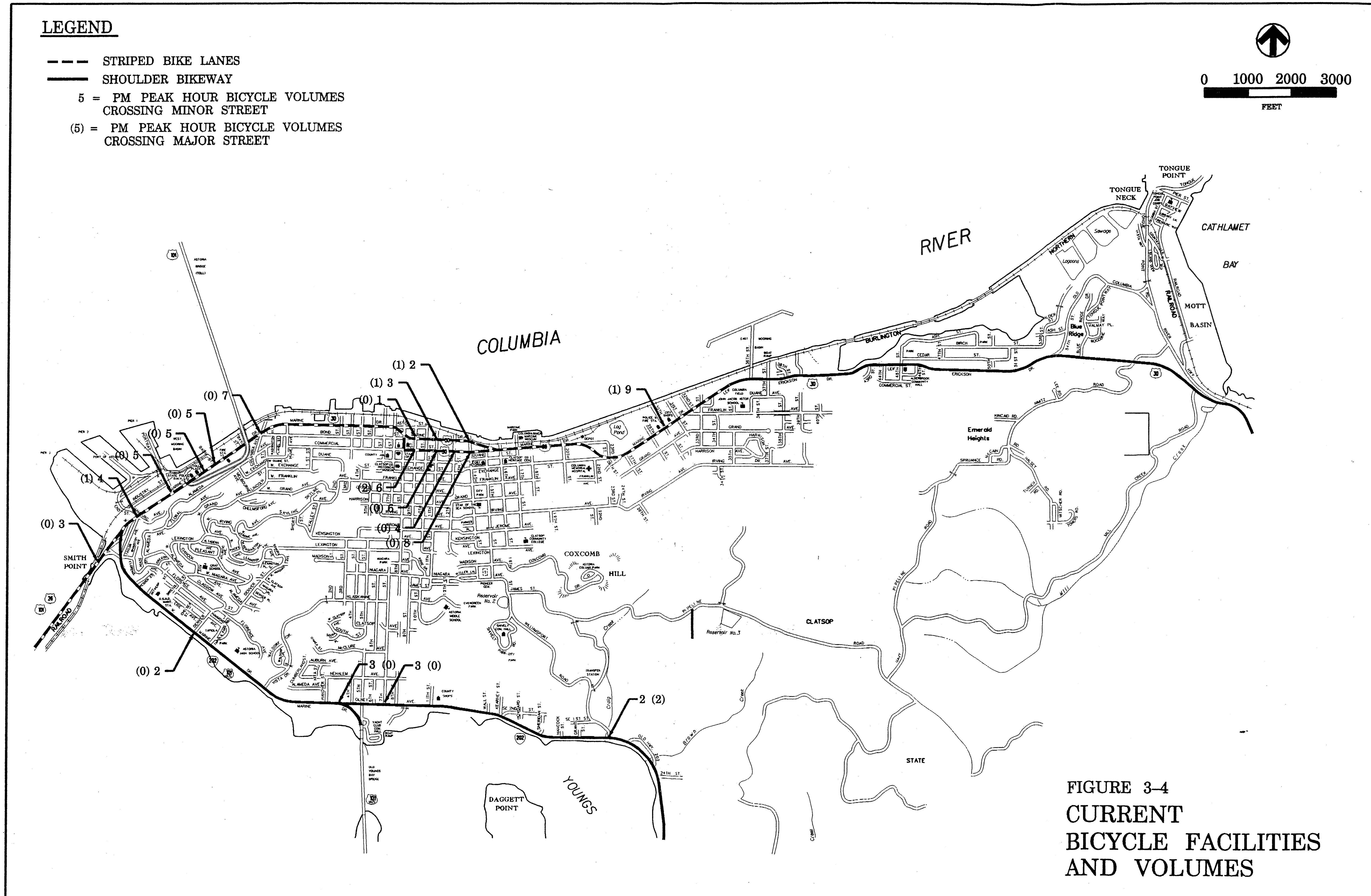


FIGURE 3–4
CURRENT
BICYCLE FACILITIES
AND VOLUMES

LEGEND

5 – PM PEAK HOUR PEDESTRIAN VOLUMES ALONG MAJOR STREET

(5) – PM PEAK HOUR PEDESTRIAN VOLUMES USING CROSSWALK OR CROSSING AT MINOR STREET

0 1000 2000 3000
FEET

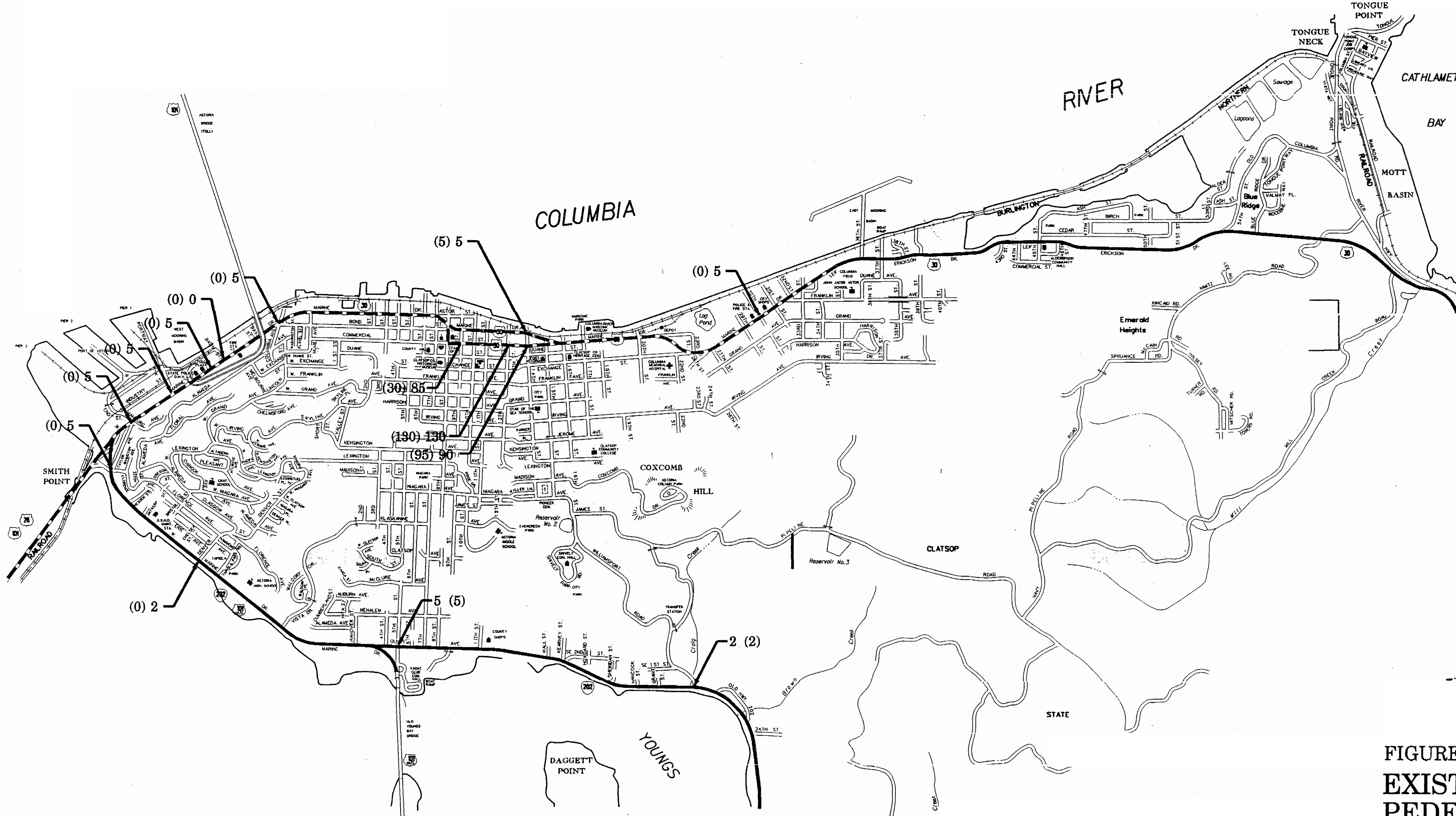


FIGURE 3–5
EXISTING PEDESTRIAN VOLUMES

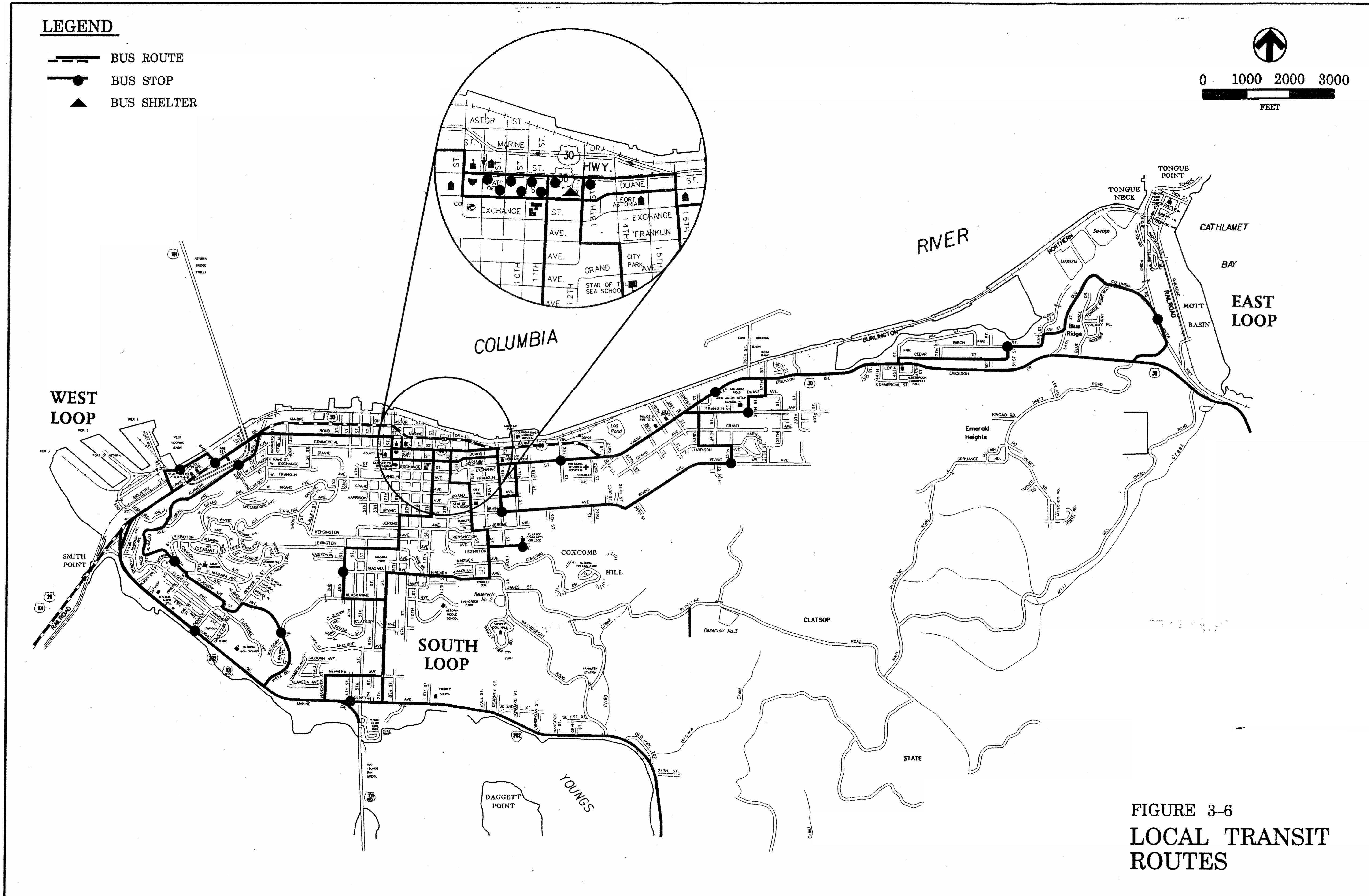


FIGURE 3-6
LOCAL TRANSIT ROUTES

two daily trips through Astoria. Dash-Hound's round-trip bus service originated in Seaside and terminated in Portland. The bus service operated six days a week with no service on Wednesdays.

Intercity bus service was restored in December 1995 when Pierce Pacific Stage Lines started service to and from Portland. They offer one trip from Astoria to Portland in the afternoon and one trip from Portland to Astoria in the morning, with an early afternoon arrival in Astoria.

With intercity bus service, Astoria's Public Transportation System meets the guidelines of the Oregon Transportation Plan (OTP). These guidelines are intended to help provide an integrated transportation system for regional and local agency transportation planning policies and programming. In the OTP under *The Planning and Performance Guidelines,* it states that for jurisdictions with a population under 25,000 such as Astoria, a minimum level of public transportation service should be provided. An example would be to connect intercity bus services to local transit including elderly and disadvantaged services. This does not mean that expansion and improvements are not needed or desired. A plan and projects are listed later in this document to address future public transit services in Astoria.

Taxi Service

Taxi service provides an important and flexible component to the transportation system in Astoria. This has recently become more evident with the uncertainty and changes in some of the other modes of transportation such as rail, air, and public transportation. Cruise ship passengers, senior citizens, and the mobility impaired are examples of transportation needs that can be served by taxi service. There are currently six taxi companies operating 20 taxis certified for operation in the City of Astoria. This is a ratio of approximately one taxi per 500 people in the City of Astoria. As a comparison the City of Portland has four taxi companies with over 300 taxis. In the Astoria area certain regulatory authority including regulating the number of taxis is vested with the city police for the taxi service and consideration of this is included in Chapter 7 of this transportation plan.

Air Service Facilities

Estimates of operations at non-towered airports reported in the 1996 ODOT Traffic Volume Tables showed that the Astoria airport had 42,647 operations in 1996. Commuter service is available to and from Portland and Seattle via Harbor Airlines. Harbor Airlines offers three flights a day from Astoria to Portland – two in the morning and one in the afternoon – and two flights – one in the morning, one in the afternoon – to Seattle. Flights from Seattle and Portland to Astoria are offered daily, with one flight from each city arriving in Astoria in the morning, and one flight arriving in the afternoon.

Rail Service Facilities

Freight service, provided by the Burlington Northern Railroad, has been discontinued in Astoria west of North Tongue Point to the Port of Astoria. The City of Astoria has rail banked this section of existing railway, using the right-of-way for a river bank trail. The city is also retaining the right-of-way in public ownership to keep options available for future rail service. Railway service is still provided east of North Tongue Point to Portland.

The nearest passenger rail service is in Kelso, Washington. From Kelso trains depart to Seattle, Portland, and points beyond.

Gas/Water/Oil Pipeline Facilities

Astoria is served by a natural gas distribution line, which parallels US 30 from Portland. The pipeline is operated by Northwest Natural Gas. There are no anticipated changes expected to be made in the future to this pipeline.

There are no major regional water or oil pipelines within the city limits of Astoria.

Port of Astoria

The Port of Astoria exported about 180,000 short tons of logs and imported 13,000 tons during 1995. Port staff expect an increase in import tonnage. To meet increased demand, the Port has rebuilt a dock for additional deep draft cargo.

Port staff is concerned that the recent loss of rail service will restrict access to potential markets. Since the city has rail banked the rail right-of-way using portions of it for a pedestrian trail, it may be possible to obtain service to the Port in the future if market demands warrant. Port staff was also concerned about the loss of commercial air service and was successful in restoring commercial air service to Astoria.

North Tongue Point

The Master Development Plan for North Tongue Point prepared in September 1995 described a three-phase development for the marine industrial site. Part of the work done in 1995 also included an access report that analyzed the transportation impacts of the proposed three-phase development. The recommended traffic mitigation measures are described in the project list in Chapter 7.

CHAPTER 4: TRANSPORTATION SAFETY

Transportation system plans address both functional and safety issues surrounding multimodal transportation networks. This chapter describes several different statewide and local safety plans and policies, high accident locations, and potential improvements to reduce accidents. Later chapters will discuss functional concerns such as capacity deficiencies or upgrading.

Typical safety concerns include sight distance restrictions, roads intersecting at oblique angles, slow moving vehicles entering roadways, bicycle turning movements, pedestrian access, or poorly signaled intersections. The issues can be exacerbated by several modes using the same right-of-way. Often these rights-of-way can be congested by a given mode or could be constricted by topography or the built environment.

Typically, these problem intersections or stretches of roadway will become apparent by the number and type of accidents logged over a year or period of years. ODOT and local jurisdictions keep track of accidents by location, type, weather condition, and time of day. These reports reveal accident trends which can lead to potential improvements to reduce accidents.

OREGON TRANSPORTATION SAFETY ACTION PLAN (OTSAP)

When considering safety issues for roadways in the State of Oregon, the Oregon Transportation Safety Action Plan (OTSAP) is a primary resource. The OTSAP is part of the 1992 Oregon Transportation Plan, which identifies major issues and agenda items for transportation improvements and policy statewide. The OTSAP was also adopted by the Oregon Transportation Committee in June 1995. The Safety Action Plan focuses on significant transportation related safety problems. It also provides guidance for investment directions.

A total of 70 actions in the OTSAP were chosen by the Transportation Safety Action Plan Advisory Committee. Eight key actions are associated with transportation-related deaths and injuries, and should be implemented by the year 2000. Three high priority key actions address the critical concerns in the area of traffic safety records, statewide incident management programs, and pedestrian safety and traveling. Local agencies are responsible for the following key actions:

- Support for Local Transportation Safety Program;
- Support for Pedestrian Safety; and
- Expansion of Public Information and Education.

OTSAP Reviews

Eleven high priority OTSAP key actions were reviewed by the Astoria Fire Department and Police Department respectively. Both departments approved the key action list with some additional recommendations. The following is a summary of their recommendations:

- Address potential conflicts between traffic flow and pedestrian safety;
- Establish specific requirements for taxi cabs as a form of public transportation;
- Encourage high school driver safety program;
- Investigate the possibility of heavy vehicle restrictions on selected routes; and
- Review license suspension hearing process and deterrent penalty.

Safety Summary

The Oregon Department of Transportation maintains a record of accidents along state highways as part of the Safety Priority Index System (SPIS). Accident rates are averaged for each highway class by accidents per million vehicle miles (MVM). Comparable 1993 statewide accident rates for the state highway system in Astoria were 3.55 accidents/MVM for US 30 and US 101 and 2.99 for OR 202 and US 101 Business Routes. With the exception of US 30, accident rates for the state highways in the Astoria area in 1993 were less than the statewide averages. The highest accident rates along US 30 were found in the one-way couplet through downtown Astoria. The section of US 30 from 32nd Street to the beginning of the one-way couplet at 16th Street also had a slightly higher than average accident rate in 1993 (3.77) but considerably lower than average rates in the previous four-year period (from 2.5 to 3). There were no highway sections with SPIS numbers high enough to warrant immediate action by ODOT.

Construction of the Astoria Bypass would be expected to take some of the traffic off of Commercial Street and Marine Drive, potentially reducing the number of accidents on these two streets. This would be a longer-term solution assuming the funding is obtained for transportation projects of this type. Longer-term solutions to help lower traffic volumes and accident numbers on Eighth Street include alternative traffic patterns and changes to the street network classifications. Improvements to the US 101–OR 202 (Smith Point) intersection and the OR 202 route from the Old Youngs Bay connection to Smith Point may also help draw some traffic from Eighth Street. These options will be reviewed in the transportation model and transportation analysis work tasks.

ODOT's US 30 Corridor Study (May 24, 1995, draft) identifies problems and needs along the US 30 corridor, including the section through Astoria. The plan identifies safety, capacity, and access issues for the entire corridor. The plan recommends the following safety measures to consider when making improvements in the corridor:

- Target resources to reduce accident potential in the top 10 percent of accident locations.
- Improve lighting at key locations along the corridor keeping pedestrian needs in mind and maintain fog lines to be highly visible.
- Consider realignment or other improvements of intersections with limited sight distances.
- Review and modify if needed, the current hazardous materials response program. Identify potentially unsafe locations (e.g., access/egress points to industrial sites) and develop necessary improvements to accommodate customary freight transport needs.

HIGHEST ACCIDENT INTERSECTIONS

This section describes fourteen intersections in the City of Astoria that have been identified as having six or more accidents in a four-year period. Four of these 14 higher accident intersections in Astoria were on Commercial Street and four were on Eighth Street. Using 1991 through 1994 data, the following descriptions catalogue the number of accidents, type of accidents, number of injuries, patterns of accidents, and potential improvements that could reduce accidents at the intersection. Table 4-1 provides a summary of accident data.

TABLE 4-1
HIGHEST ACCIDENT INTERSECTIONS

Location	Type	Injuries	Potential Improvements
Exchange and 16th Street	7 angle, 3 turning, 10 total	8	Stop signs and striping
Exchange and 17th Street	5 angle, 3 turning, 2 rear-end, 10 total	8	Upgrade 17th Street Stop signs and striping
Exchange and 17th Street	5 angle, 3 turning, 2 rear-end, 10 total	8	Upgrade 17th Street Stop signs and striping
Franklin and Eighth Street	4 angle, 1 turning, 1 rear-end, 6 total	3	Upgrade Franklin Street Stop signs and striping
Duane and Eighth Street	8 angle, 1 turning, 9 total	1	Upgrade Duane Street Stop signs and striping
Olney Avenue and Fifth Street	6 turning, 3 rear-end, 9 total	9	Stop Sign
Leif Erickson and Blue Ridge	8 rear-end	9	New Left Turn Lane from Leif Erickson
Marine Drive and Eighth Street	5 turning, 2 angle, 7 total	7	Access Management/Median & Ped. Island
Marine Drive and 14th Street	3 rear-end, 3 turning, 1 angle, 7 total	2	Improve Sight Distance
Marine Drive and Portway Street	9 rear-end, 3 turning, 12 total	10	New Signal, Rechannelization
Commercial and Eighth Street	12 turning, 1 angle, 1 pedestrian, 14 total	1	Channelization
Commercial and Ninth Street	3 angle, 1 rear-end, 1 pedestrian, 5 total	1	New signal
Commercial and 12th Street	7 angle, 2 rear-end, 1 turning, 10 total	3	New signal
Commercial and 14th Street	3 angle, 3 rear-end, 1 parking, 7 total	3	New Signal

POTENTIAL SAFETY RELATED TRANSPORTATION IMPROVEMENTS

The following potential improvements would reduce accidents by improving the operations of intersections or roadways. These projects are described in greater detail, with cost estimates, in Chapter 7.

Exchange Street at 16th Street

The intersection at Exchange and 16th Streets had 10 reported accidents, resulting in eight injuries. Of the ten accidents, seven were angle-type and three were turning-type accidents. All of the angle accidents involved eastbound vehicles not yielding to southbound traffic. This intersection is the east end of the one-way eastbound section of Exchange Street. Short-term improvements could include stop sign and pavement marking additions and or revisions.

Exchange Street at 17th Street

The intersection at Exchange and 17th Streets had 10 reported accidents, which resulted in eight injuries. Of the ten accidents, five were angle-type, three turning-type and two rear-end type accidents. All five of the angle-type accidents involved north-south traffic failing to yield to westbound traffic on Exchange Street. A short-term improvement at this location could be to upgrade the stop-signs and pavement markings at the intersection on the 17th Street approaches or to improve pedestrian crossing facilities.

Franklin Street at Eighth Street

The intersection of Franklin and Eighth Streets had six reported accidents, resulting in three injuries. Of the six accidents, four were angle-type, one was rear-end type, and one was a turning-type accident. Three of the four angle-type accidents involved westbound traffic on Franklin Street not yielding to Eighth Street traffic. Short-term improvements could include upgrading the stop-signs and pavement markings on the Franklin Street approaches to Eighth Street.

Duane Street at Eighth Street

The intersection of Duane and Eighth Streets had nine reported accidents, resulting in one injury. Of the nine accidents, eight were angle-type and one was a turning-type accident. Five of the accidents involved westbound traffic and five involved southbound traffic. The primary cause listed was failure to yield for east- or westbound traffic. Short-term improvements could include upgrading the stop-signs and pavement markings on the Duane Street approaches to Eighth Street.

OR 202 (Olney Avenue) at Fifth Street

The intersection of Olney and Fifth Streets had nine reported accidents, with nine injuries. Of the nine accidents, six were turning-type and three were rear-end type accidents. Five of the six turning accidents involved left turns with three making left turns from Fifth Street (eastbound to southbound) and two from the Old Youngs Bay Bridge approach (Westbound to Northbound). The rear-end accidents involved northbound traffic. Improper turns and failure to yield were the causes listed for the turning accidents. Stop sign improvements would be an appropriate short-term improvement. Increased stop sign visibility on the northbound approach from the Old Youngs Bay Bridge would reduce stop sign violation type accidents.

US 30 (Leif Erickson Drive) at Hasselman Drive (Blue Ridge Drive)

The intersection of Leif Erickson and Blue Ridge had eight reported rear-end accidents resulting in nine injuries. Seven of the accidents involved eastbound traffic and five involved traffic waiting to make a left turn. These accidents occurred in the summer and the primary cause was listed as following too close. Installation of a left-turn lane would be an appropriate short-term improvement.

US 30 (Marine Drive) at 14th Street

This intersection had seven reported resulting in two injuries. Of the seven accidents, three were rear-end type, three turning-type, and one was angle-type. Two of the accidents involved yield failures on left-turn movements. An appropriate short-term improvement would be to improve sight distance for the traffic signal on the Marine Drive westbound approach. This could involve removing some vegetation and/or relocating a traffic signal head.

US 30 (Marine Drive) at Eighth Street

The intersection of Marine Drive and Eighth Street had seven reported accidents resulting in two injuries. Five of the accidents were turning-type and two were angle-type. Three of the turning accidents involved southbound vehicles turning left. Improper turns and not yielding were the primary causes listed in two accidents. Access management may be an appropriate short-term improvement at this location. A raised median is one possible improvement. These improvements will enhance the operations of the one-way couplet.

US 101 (Marine Drive) at Portway Street (MP 3.96)

This intersection had 12 reported accidents resulting in 10 injuries. None of these accidents were rear-end type and three were turning-type. Five of the rear-end type accidents involved eastbound traffic and four involved westbound traffic on Marine Drive. The primary causes listed were following too close for the rear-end type accidents and improper turns for the turning-type accidents.

US 30 (Commercial Street) at Eighth Street

There were 14 reported accidents at this intersection resulting in one injury. Twelve of the 14 accidents were turning-type, one was angle-type, and one involved a pedestrian. The primary cause was improper turns. Eight of the accidents including the pedestrian accident involved the southbound to eastbound left-turn movement. Three of the accidents involved double left turns. Intersection channelization and or changes in traffic movements could be appropriate short-term improvements.

US 30 (Commercial Street) at Ninth Street

The intersection of Commercial and Ninth Streets had five reported accidents resulting in one injury. Three of the five accidents were angle-type, one was rear-end type and one was pedestrian-type. The primary cause was motorists disregarding the signal. A short-term improvement could be to install a new traffic signal.

US 30 (Commercial Street) at 12th Street

There were 10 reported accidents at this intersection resulting in three injuries. Seven of these accidents were angle-type, two were rear-end type, and one was a turning-type. All of the angle accidents involved the southbound and eastbound traffic movements with the primary cause listed in four of the accidents as disregarding the signal. A short-term improvement could be to install a new traffic signal.

US 30 (Commercial Street) at 14th Street

There were seven reported accidents at this intersection resulting in three injuries. Three of the accidents were angle-type, three rear-end type, and one parking-type. Two of the rear-end type and the parking-type accident involved left turns attributed to a disregarded signal. A new traffic signal could be a short-term improvement.

As was previously described, installing new modernized traffic signals in the downtown area would be expected to decrease the number of accidents attributed to disregarded signals. In addition to the previously described locations with safety concerns based on the ODOT accident records, the following locations are also of concern for safety.

US 30 (Marine Drive) and 17th Street

The area of Marine Drive from 16th Street to 18th Street is an area with the potential for much more future pedestrian crossing demand. A pedestrian crossing island improvement on Marine Drive (Highway 30) at 17th Street (Columbia River Maritime Museum) would allow pedestrians to more safely cross Marine Drive.

US 101 from OR 202 (Smith Point) to the New Youngs Bay Bridge

The area of US 101 from Smith Point to the New Youngs Bay Bridge was shown as an area of concern from the Astoria city police accident records. A possible traffic signal, or traffic roundabout of the Nehalem Highway (OR 202) and the Oregon Coast Highway (US 26/101) would reduce the number of angle and turning accidents at this location. A roundabout would not be expected to result in additional rear end type accidents like a traffic signal would while at the same time improving traffic flow without interruptions on US 101.

CHAPTER 5: ACCESS MANAGEMENT

MANAGEMENT STRATEGIES

Access management is a process of managing vehicular access to land development while simultaneously preserving the flow of traffic on the surrounding road system. This management is achieved by providing standards for accessing the roadway via driveways or curb cuts. On high capacity arterials or highways, frequent driveways can reduce the capacity and safety of the roadway.

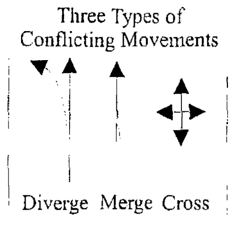
Access management is an important key to balanced urban growth. Lack of a prudent access management plan has led to strip commercial development along the arterial streets of many urban areas. Business activities along arterial streets lead to increased traffic demands which require roadway improvements to accommodate increasing traffic. Simply managing the access points to the roadway can increase capacity without necessitating high cost solutions like road-widening and new construction.

New roadway improvements and construction can also stimulate further business activity and traffic demands. This often perpetuates a cyclical increase of traffic and new construction to meet the demands of that traffic leading to extensive capital investments for roadway improvements and relocation. However, with Measure 47 and other budget tightening by federal, state, and local governments, the financial resources to pay for such solutions are becoming increasingly scarce.

Reducing capital expenditures is not the only argument for access management. Access management can also preserve the 'functional integrity' of the street system by reserving the high speed and high capacity roads for longer distance trips. These high speed corridors have the least number of direct accesses to local roads and driveways. Local streets, however, will have much less or no restrictions. This will ensure that local streets are not used by high speed traffic, keeping them safe for multi-modal use and businesses on them easy to access.

Access management is best implemented by incorporating it into the land use permitting process. The problem of applying access management to a developed major arterial poses a much greater challenge due to right-of-way limitations and concerns by the owners of the adjacent properties and affected businesses. In such cases, access management can be implemented as part of roadway improvement plans or as part of roadway retrofit plans.

ACCESS MANAGEMENT TOOLBOX



The primary goal of an access management program to enhance mobility and improve safety by limiting the number of potential traffic conflicts. A traffic conflict point occurs where the paths of two traffic movements intersect. Vehicle maneuvers on the street system in the order of increasing severity of conflict are diverge, merge, and cross. In each case, drivers of one or more vehicles may need to take appropriate action in order to avoid a collision.

Crossing conflicts are the most serious because of the potential for high speed head-on collisions, nearly head-on collisions, or right-angle collisions. Hence, these conflict points are often referred to as 'major conflict points.' Diverge and merge conflicts are potentially less severe and are often referred to as 'minor conflict points.' Diverge conflicts occur when a driver slows down in the through lane to execute a turning maneuver. Merge conflicts occur where a vehicle making a turn enters through traffic.

Figure 5-1 illustrates conflict points at a typical four-way unsignalized intersection consisting of a four-lane roadway intersecting a two-lane roadway. As shown, the traffic maneuvers at the intersection form 32 conflict points, 16 of which are major crossing-type conflicts and the other 16 are minor conflict points. The 16 minor conflict points consist eight merge- and diverge-type conflict points.

Traffic conflicts can be reduced with the help of the following strategies:

1. Limiting the number of conflict points that a vehicle experiences in its travel;
2. Separating conflict points as much as possible when they cannot be completely eliminated;
3. Limiting vehicle deceleration requirements; and
4. Removing slower turning vehicles that require access to adjacent sites from the traffic lanes of through vehicles.

Tools which can be used to implement these access management strategies are listed described in Appendix G. The applicability of access management strategies to arterial, collector and local streets in Astoria is illustrated in Table 5-1.

TABLE 5-1
APPLICATION OF ACCESS MANAGEMENT STRATEGIES TO ARTERIAL, COLLECTOR, AND LOCAL STREETS

Access Management Strategy for Astoria Transportation System Plan	Arterial Collector Local
Limit Conflict Points	
Install raised median divider with left-turn deceleration lane at key intersections	A
Install or expand one-way operations on the highway	A, C & L
Optimize traffic signal installation, spacing and coordination	A & C
Channelize median opening to restrict left-turn ingress or left-turn egress	A
Install curbs, fences, plantings, etc. to prevent uncontrolled access along property frontages and to better define accesses	A
Offset opposing driveways	A & C
Local driveway opposite a three-leg intersection or driveway and install traffic signals where warranted	A & C
Reconfigure driveways (two-way/one-way)	A & C
Install driveway divisional island to prevent driveway encroachment conflicts	A & C
Regulate the width of driveways (also total driveway widths per property frontage)	A, C & L
Separate Conflict Areas	
Regulate minimum spacing of driveways	A, C & L
Regulate minimum corner clearance	A, C & L
Regulate minimum from property line clearance	A
Provide feasibility standards to optimize driveway spacing in the permit authorizing stage	A, C & L
Regulate maximum number of driveways per property frontage	A, C & L
Consolidate access for adjacent properties	A, C & L
Buy abutting properties	A
Consolidate existing access whenever separate parcels are assembled under one purpose, plan, entity or usage	A, C & L
Designate the number of driveways to each existing property and deny additional driveways regardless of future subdivision of that property	A & C
Require access on adjacent cross-street (when available)	A & C
Reduce Deceleration Requirements	
Restrict parking on roadway adjacent to driveways to increase driveway turning speeds	A & C
Install visual cues of the driveway	A & C
Improve driveway sight distance	A, C & L
Establish minimum sight distance standards	A, C & L
Optimize driveway location in the permit authorization stage	A, C & L
Increase the effective approach width of the driveway	A & C
Improve the vertical geometrics of the driveway	A, C & L
Require driveway paving	A, C & L
Install right-turn acceleration lane	A
Remove Turning Vehicles	
Install continuous two-way left-turn lane	A & C
Install left-turn deceleration lane to remove turning vehicle from through lane	A & C
Install median storage for left-turn egress vehicles	A & C
Construct a bypass road	A
Provide direct access on lower functional class street when available	A & C
Install right-turn deceleration lane	A
Install additional exit lane on driveway	A
Encourage connections between adjacent properties	A & C
Require adequate internal design and circulation plan	A & C

CURRENT ACCESS CONDITIONS

Following is a table showing the current numbers of accesses for each direction of travel for different segments of the arterial highways in the study area. General descriptions of conditions for each highway section such as daily traffic volumes, roadway lengths, and access points per mile are included following the table. Figures 5-1 through 5-6 illustrate the locations of driveways and intersections along all highways in the Astoria study area. Access locations are shown in these figures for both sides of the roadway combined.

TABLE 5-2
CURRENT TRAFFIC VOLUME AND ACCESS CONDITIONS

Highway	Highway Segment		Current Average Daily Traffic Volume (ADT)	Segment Length (miles)	Number of Access Points		Access Points (per mile)
	From	To			Westbound	Eastbound	
Hwy 30	East City Limits	33rd St.	11,400	1.88	26 (9)	31 (8)	30
Hwy 30	33rd St.	16th St.	14,900	0.95	23 (9)	33 (11)	59
Hwy 30	16th St.	8th St.	12,800 WB 13,800 EB	0.43 WB 0.49 EB	9	15	21 WB 30 EB
Hwy 30	8th St.	US Hwy 101	18,000	0.92	30 (10)	44 (11)	80
Hwy 30	East City Limits	US Hwy 101	N/A	4.18	87 (35)	121 (38)	50
Hwy 101	US Hwy 30	US Hwy 202	18,100	1.20	24 (6)	16 (3)	33
Hwy 202	US Hwy 101	US Hwy 101 Bus. Loop	8,280	1.42	27 (5)	17 (5)	31
Hwy 202	US Hwy 101 Bus. Loop	7th St.	5,420	0.19	12 (4)	0 (0)	63
Hwy 202	7th St.	Williams-port Rd.	4,700	1.02	28 (7)	7 (0)	34
Hwy 202	Williams-port Rd	So. City Limits	3,700	0.14	3 (1)	0 (0)	21
Hwy 202	US Hwy 101	So. City Limits	N/A	2.77	70 (17)	24 (5)	34

Highway 30 Corridor

The Highway 30 corridor extends west from the John Day River Bridge at the eastern edge of the planning area to its terminus with Highway 101 at the Astoria Bridge across the Columbia River. The roadway is built on a rural cross section in the eastern portion of the study area, east of 39th Street. The pavement is 32 feet wide, consisting of two 12-foot travel lanes with four-foot-wide shoulders on each side. The surrounding land is mostly in forest and farm use. Bike lanes and sidewalks are not provided on either side.

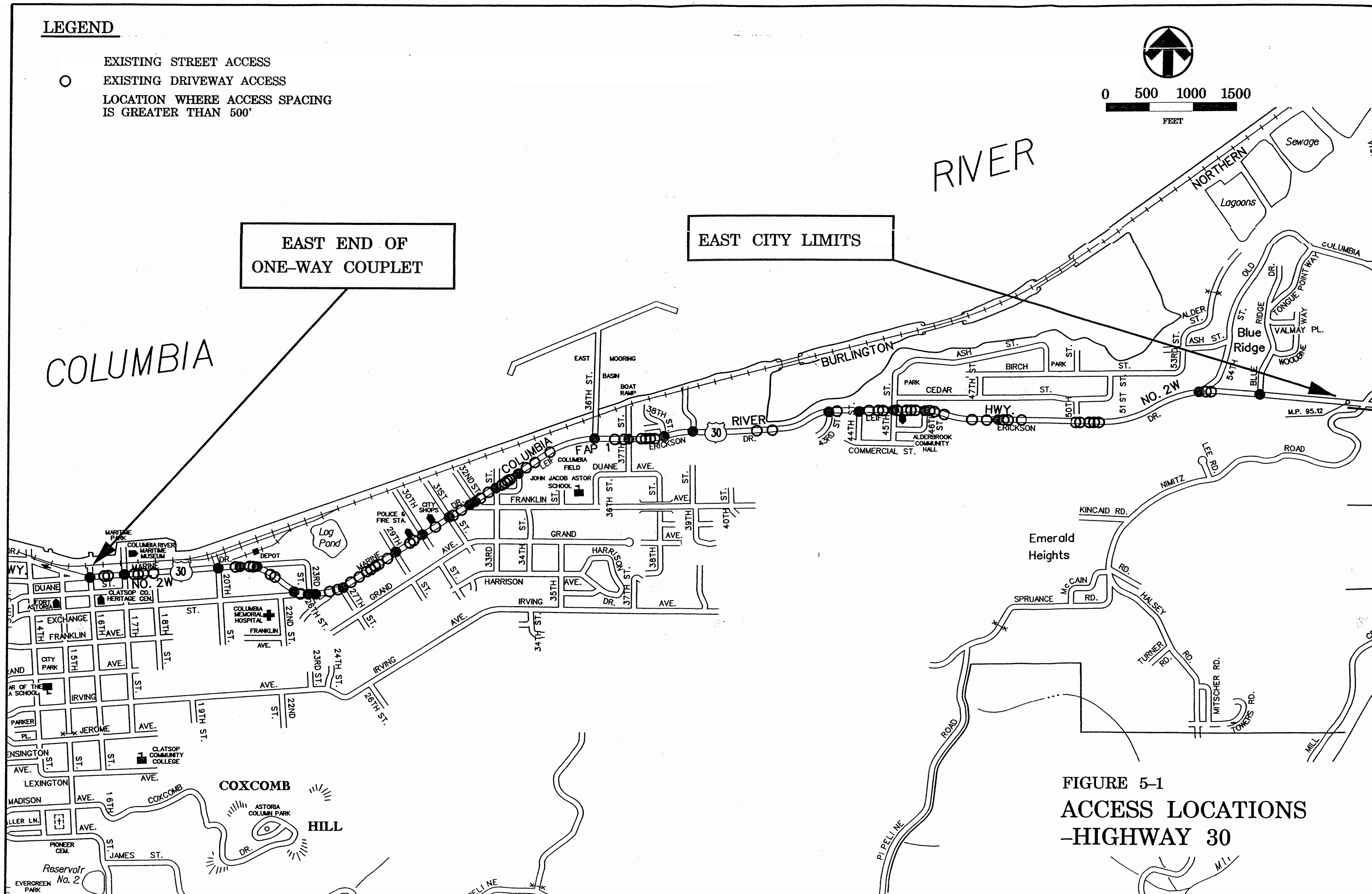


FIGURE 5-1
ACCESS LOCATIONS
-HIGHWAY 30

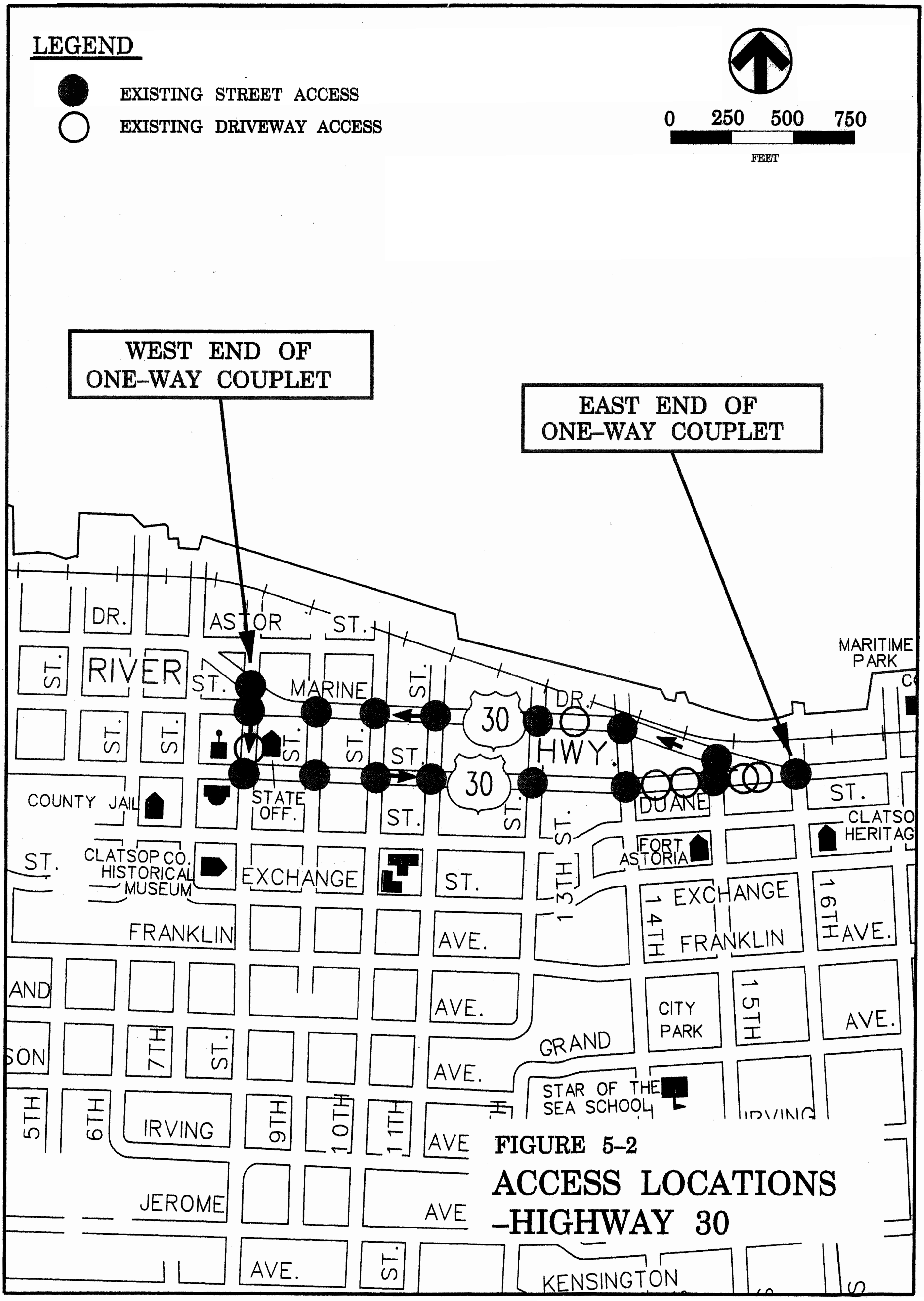


FIGURE 5-2

ACCESS LOCATIONS -HIGHWAY 30

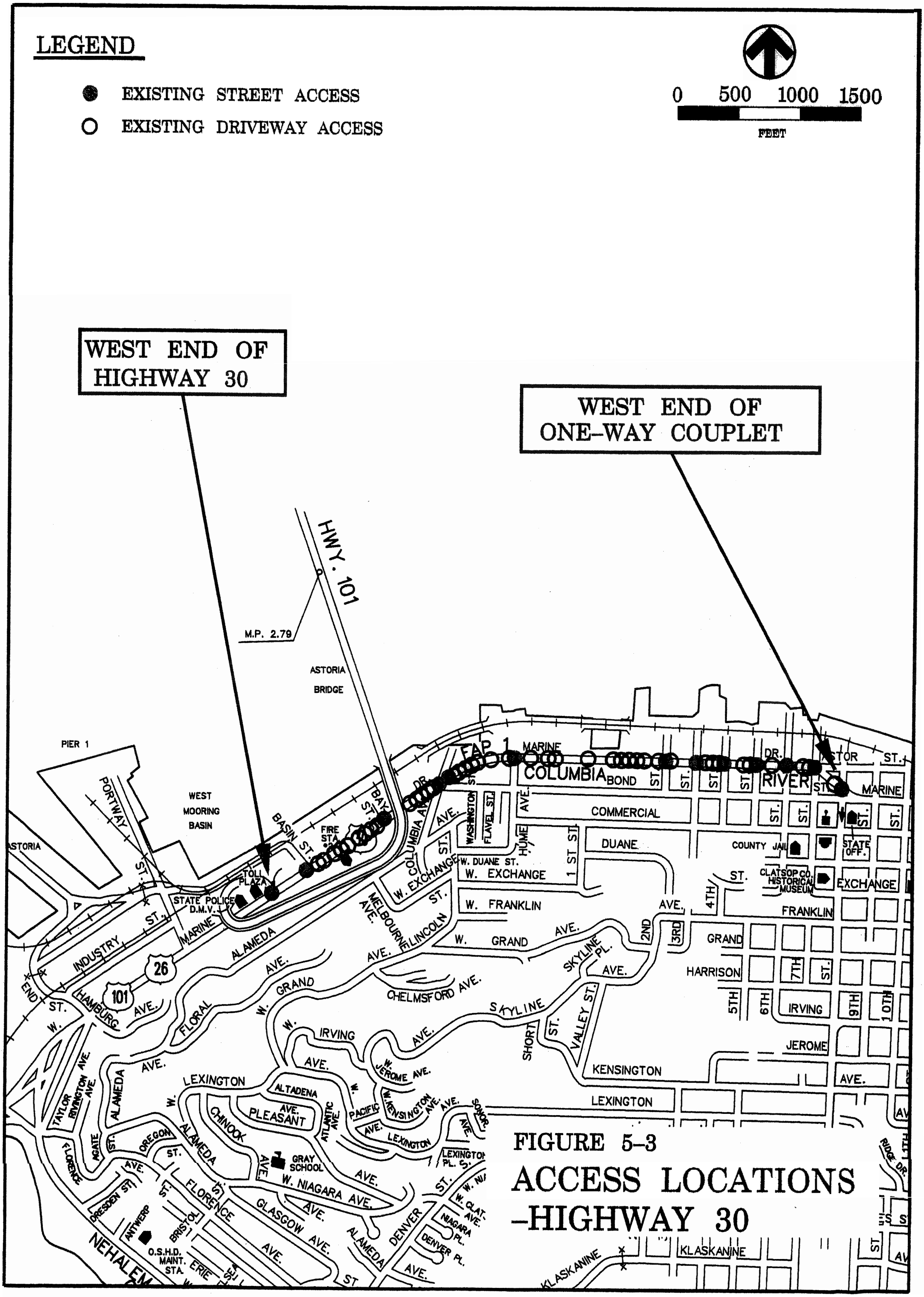


FIGURE 5-3
ACCESS LOCATIONS -HIGHWAY 30

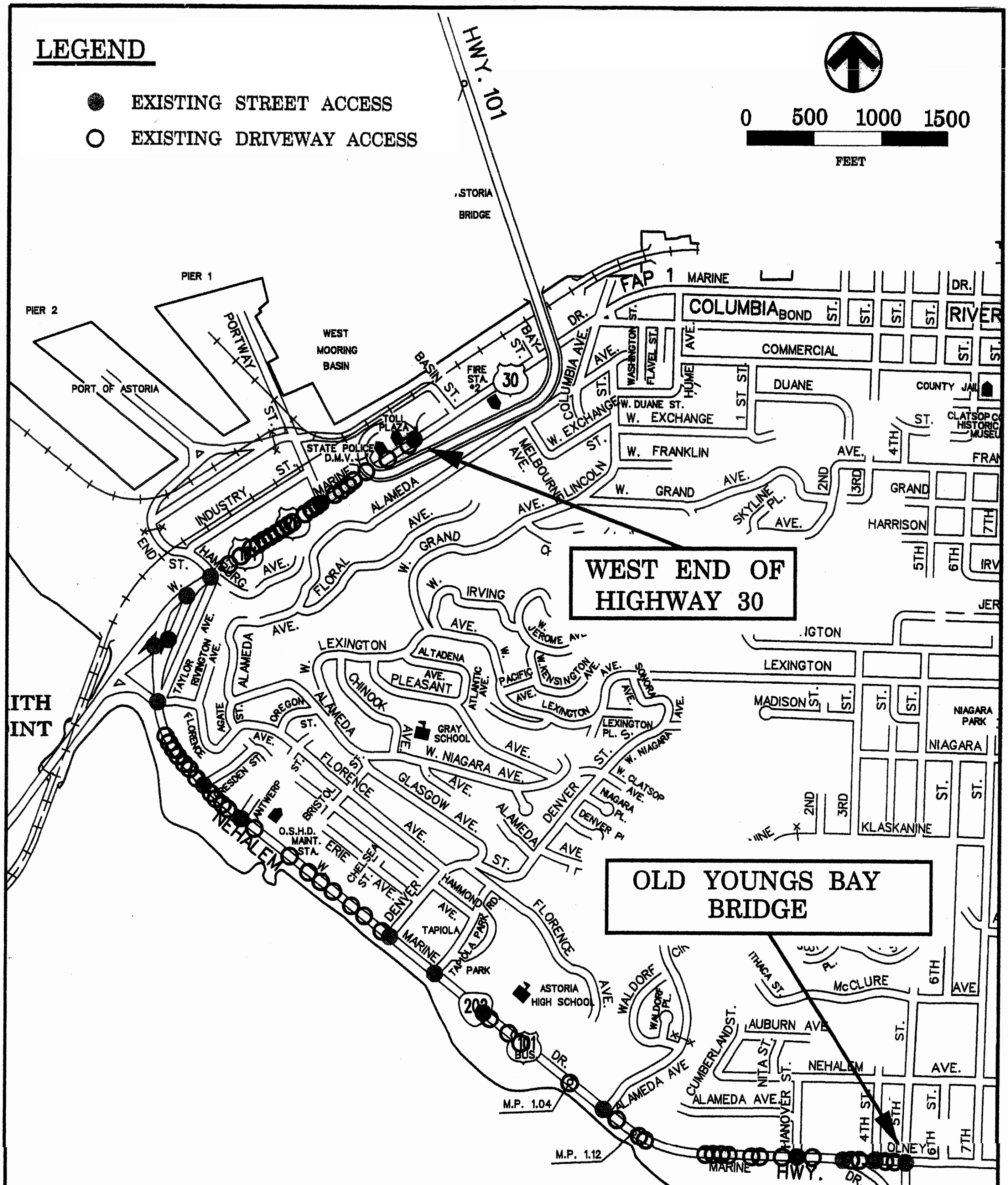


FIGURE 5-4

ACCESS LOCATIONS –HIGHWAY 101/26 AND HIGHWAY 101 BUS/202

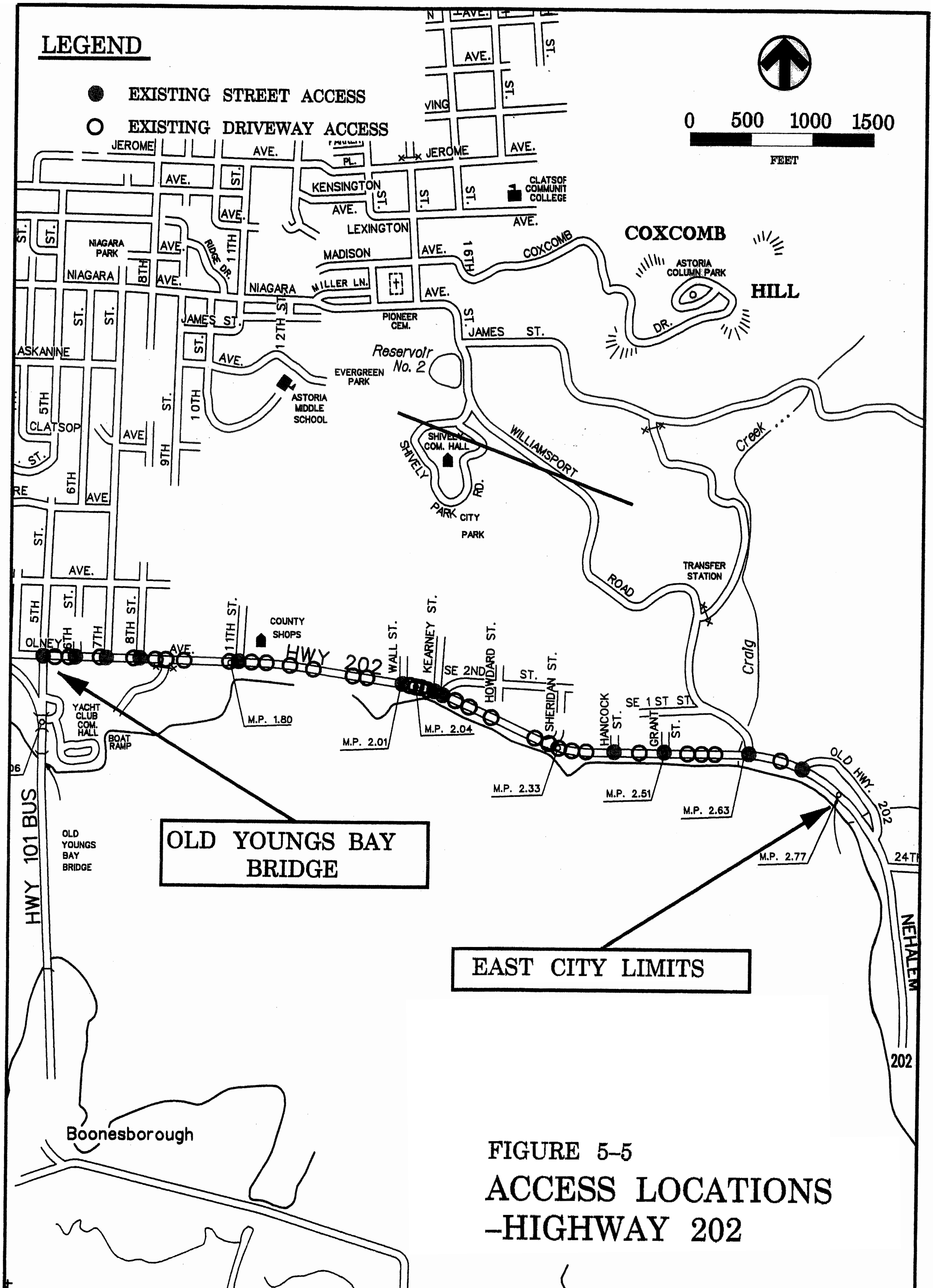


FIGURE 5-5
ACCESS LOCATIONS -HIGHWAY 202

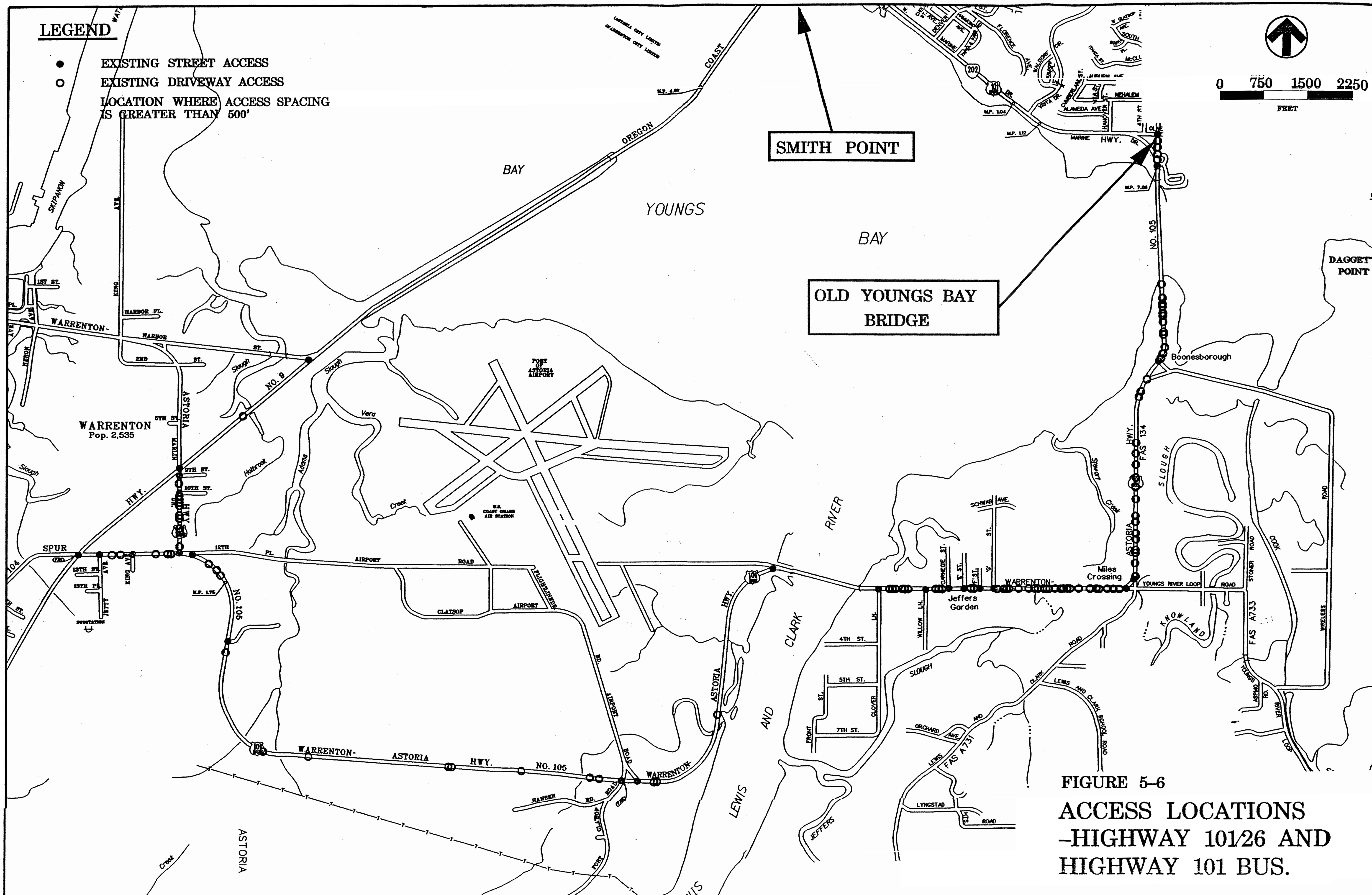


FIGURE 5–6

ACCESS LOCATIONS –HIGHWAY 101/26 AND HIGHWAY 101 BUS.

Development is present on the north side of the highway between Blue Ridge Drive and 43rd Street, with sidewalks provided on one or both sides in the west portion of this segment. Some of the residences in this segment have direct driveway access to the highway, with no other alternative access on to the surrounding street system. The posted speed along this section of Highway 30 is 35 mph.

Highway 30 is built on an urban cross-section west of 39th Street. The highway between 39th Street and 32nd Street/Franklin Avenue consists of three lanes, including a median left-turn lane. The highway has mostly strip commercial development provided on both sides, with intermittent residential development. Curbs and sidewalks are provided intermittently and mostly on the north side, and parking is not provided on either side of the highway.

Between 32nd Street/Franklin Avenue and the downtown Marine Drive/Commercial Street couplet, Highway 30 consists of two travel lanes with curbing, sidewalks, and on-street parking provided intermittently on one or both sides. The intersection with 29th Street is currently signalized.

Marine Drive carries westbound Highway 30 traffic and Commercial Street carries eastbound highway traffic through the downtown area. Both streets consist of two travel lanes with on-street parking, curbs, and sidewalks provided on both sides. Traffic signals are provided at the intersections of Marine Drive and Commercial Street with 14th Street, 12th Street, 11th Street, and Ninth Street in the downtown area. The posted speed along the Highway 30 couplet through the downtown area is 25 mph.

US Highway 30 consists of four travel lanes between the downtown couplet and its terminus with Highway 101. Curbs and sidewalks are provided on both sides of the highway. On-street parking is generally not provided except for two small segments, one segment between West Bond Street/Columbia Avenue and Bay with parking on both sides and another segment between Hume Street and First Street with parking on the south side only. Traffic Signals are provided at the intersections of Highway 30 with West Bond Street/Columbia Avenue, Fire Access (MP 99.22), and Basin.

Highway 101

Highway 101 in the study area extends westerly from the Astoria-Megler Bridge interchange (US 30) to the New Youngs Bay Bridge. For the most part, the highway has four travel lanes from the Astoria-Megler Bridge to OR 202 with a left-turn lane at the Astoria-Megler Bridge interchange. From the OR 202 intersection to the New Youngs Bay Bridge the highway has two travel lanes. There are no direct accesses to US 101 other than street connections west of Hamburg Street and no sidewalks west of Hamburg Street. Most of the development along US 101 is business/commercial type with no development immediately adjacent to the highway west of Hamburg Street. Highway 101 is signed for a 30 mph speed inside the planning area.

Highway 202

Highway 202 extends east and south from US 101 at Smith Point. For the most part highway 202 has two travel lanes with one in each direction. The exception to this is the section between Hanover Street and Seventh Street through the Old Youngs Bay Bridge intersection where there are three lanes. Most of the highway does not have curbs or sidewalks. Highway 202 is signed for a 45 mph speed east of Seventh Street and for a 35 mph speed west of the intersection with Seventh Street. There is also a 20 mph exception when children are present by the high school grounds and it is signed for a drug-free zone inside the planning area.

Youngs Bay is on the south side of Highway 202 with some commercial development at spot locations. On the north side of Highway 202 from Smith Point (US 101) to Seventh Street, the development is mostly business and commercial. The high school is a major land use along this stretch as well. On the north side from Seventh Street to the east, development is spotted residential including the Clatsop County shops as an industrial use. With the exception of the two major intersections at Smith Point (US 101) and the Old Youngs Bay (US 101 Business) all of the side streets have stop signs. There are no existing traffic signals on Highway 202.

Highway 101 Business

Highway 101 Business extends across the Old Youngs Bay Bridge/US 202 Intersection south to Highway 101. Development along this stretch is light commercial and residential. The Old Youngs Bay Bridge will need some improvements for bicycle and pedestrian use. From the bridge south, the highway will need some intersection improvements, some bicycle and pedestrian improvements, and spot improvements. Highway 101 Business is signed for a 40 mph speed within the planning area.

MANAGEMENT PLAN

The primary goal of an access management program is enhanced mobility and improved safety by limiting the number of traffic conflicts. Minimizing the number of driveways and locating driveways to minimize interference between each other and street intersections helps to minimize conflict points and maintain the function of the principal roadway.

Limiting access to higher class roadways is the foundation of access management planning. Where reasonable alternatives exist, the access to an abutting property is generally less disruptive to overall traffic flow if made to and from the lower class roadway. Locating traffic signals to emphasize traffic flow is also an important principle. Appropriate spacing of traffic signals and their interconnection helps to enhance progressive traffic movement along the corridor.

RECOMMENDED ACCESS MANAGEMENT PLAN STRATEGIES

Traffic Signal Installation and Operations Optimization

Traffic signals, when properly designed, installed, and maintained, tend to reduce right-angle collisions, vehicular-pedestrian collisions, and opposing left-turn collisions. However, rear-end collisions commonly increase. Delay to the driveway/cross-street traffic is decreased; however, total delay at the intersection will be increased if the signal interferes with progression.

Traffic signals should be appropriately placed and coordinated to enhance the progressive movement of traffic along the highway. The higher the efficiency of traffic progression (progression band width divided by cycle length), the higher is the capacity of the major arterial highway. Moreover, at high efficiencies, fewer vehicles are required to come to a stop, deceleration noise is reduced, and vehicle emissions, fuel consumption, and delay are minimized.

A driveway should be considered for signalization only if installation of the signal does not interfere with traffic progression on the major arterial or will not interfere when the major street system reaches capacity conditions when the area becomes fully urbanized. This normally means that signalization should be limited to driveways meeting the uniform signalized intersection spacing criteria. When the public street or high volume access driveway does not conform to the selected uniform spacing criteria, consideration of signalization should be based upon a traffic engineering study which demonstrates that the signal will not interfere with efficient traffic progression for peak and off-peak conditions.

Highway 30 Corridor

Highway 30 currently contains twelve signalized intersections, seven of which are located along the downtown Marine Drive/Commercial Street couplet. The traffic signals are located at the following intersections along the Highway 30 corridor:

- Highway 30 and 30th Street (MP 97.23);
- Marine Drive and 14th Street (MP 98.13);
- Commercial Street and 14th Street (MP 98.10E);
- Commercial Street and 12th Street (MP 98.23);
- Marine Drive and 11th Street (MP 98.29);
- Commercial Street and 11th Street (MP 98.26E);
- Marine Drive and Ninth Street (MP 98.36);
- Commercial Street and Ninth Street (MP 98.33E);,
- Highway 30 and West Bond Street/ Columbia Avenue (MP 99.00);
- Highway 30 and Basin (MP 99.26);
- Highway 30 and Highway 101 (MP 99.31); and
- Highway 30 at the Port Way (MP 99.22).

Currently, traffic signals along the downtown Marine Drive/Commercial Street couplet operate under a 55-second-cycle length, including 33 seconds of green for the major street through movement and the remaining 22 seconds assigned to cross-street movement and protected left-turns from the highway. The signal offsets are designed such that traffic would move along the downtown couplet at a speed of 20 mph.

The couplet segment of Highway 30 has been assigned Access Category 4 from the Oregon Highway Plan. Access Category 4 designation requires that the signals be spaced 0.5 miles apart. This would allow for two-way traffic progression. However, traffic signals along the downtown couplet are currently very closely spaced, at an average spacing of 400 feet to 600 feet and this signal spacing does not limit progression for one-way traffic. It is not anticipated that any new traffic signals would be installed in the future along the downtown couplet; nor is it anticipated that any existing traffic signals along the downtown couplet can be removed due to a one-way couplet system.

The remaining segment of Highway 30, other than the downtown couplet, has been assigned Access Category 3. Access Category 3 requires that traffic signals be spaced at an average 0.5 to 1.0 miles apart. Future traffic signals outside of the downtown area should be appropriately placed and coordinated to enhance the progressive movement of traffic along the highway. An average spacing of 0.53 miles (2,800 feet) will allow traffic to flow efficiently along the corridor at a speed of 35 mph, assuming an average system-wide signal cycle length of 110 seconds.

With future new development in Astoria, a traffic signal at or in the vicinity of 20th Street (MP 97.75) would be located approximately equidistant from the existing traffic signals at 30th Street and 14th Street that are 0.9 miles apart, and it would provide signalized access to the hospital located on Exchange Street. East of 30th Street, future traffic signals located at or in the vicinity of 37th Street (MP 96.69) and 45th Street (MP 96.12) would enhance the progressive movement of traffic along the highway.

Highway 101

Currently, traffic signals are provided along Highway 101 in the Astoria planning area at its intersections with Highway 30 (MP 3.79) and Portway Street (MP 3.94). In the future, increases in traffic volumes may require the installation of a new traffic signal at its intersection with Highway 202/Highway 101 Business Loop (MP 4.32).

Assuming Access Category 3 for the highway, the spacing of the existing and future signals would be less than the spacing recommended in the Oregon Highway Plan (0.5 to 1.0 miles). Also, the signals would be spaced at less than the 0.53 mile (2,800 feet) spacing that would allow traffic to flow efficiently along the corridor at the currently signed speed limit of 35 mph, assuming an average signal cycle length of 110 sec.

Highway 202

Currently, there are no traffic signals provided along Highway 202 in the Astoria planning area. Additional traffic signals along Highway 202 may be required in the future with an increase in mainline through volumes along the highway accompanied by an increase in traffic demand from cross-streets and driveways associated with new development in Astoria. Traffic signals may also be needed along the highway in the event that access is controlled along the highway through the installation of a raised median treatment with turn movements permitted at only certain specific points along the highway.

Assuming Access Category 3 for the highway, the Oregon Highway Plan requires that traffic signals be spaced along the highway at an average of 0.5 to 1.0 miles apart. The future traffic signals should be appropriately placed and coordinated to enhance the progressive movement of traffic along the highway. An average spacing of 0.53 miles (2,800 feet) would allow traffic to flow efficiently along the corridor at the currently signed speed of 35 mph, assuming an average signal cycle length of 110 sec.

In the future, traffic signals may be warranted and required at the intersection with Highway 101 (MP 0.10) at the west end and with Seventh Street (MP 1.61) just east of the Old Youngs Bay Bridge. Additional traffic signals may be provided when warranted at the intersection with Denver Street (MP 0.69). A traffic signal at the intersection with Denver Street would provide signalized access to Highway 202 from the central westside of Astoria.

Minimize Driveway Spacing

The regulation of the minimum spacing of driveways and public street intersections along the state highway arterial system in Astoria would indirectly reduce the frequency of conflicts by separating adjacent, basic conflict areas and limiting the number of basic conflicts points per length of highway. An additional effect is that driveway vehicles will be delayed less by standing queues at signal-controlled intersections.

Highway 30

Highway 30 is signed for a 20 mph speed along the downtown Marine Drive/Commercial Street couplet. East of the downtown couplet, Highway 30 is signed for a 35 mph speed. West of the downtown couplet, Highway 30 is signed for a 25 mph speed east of the intersection with First Street and it signed for a 30 mph speed west of the intersection with First Street up to its terminus at the intersection with US 101.

For the 35 mph roadway segment east of downtown couplet, a 100-foot minimum spacing is recommended for single-family residence access points. For commercial and multiple-unit residential developments located along the entire Highway 30 corridor in the planning area, a 400-foot minimum spacing is recommended unless the driveway is right-in/right-out only, in which case a minimum 200 feet is recommended. Based on a traffic study, a variance may be allowed.

For major intersections with traffic signals, the minimum spacing may need to be determined by a traffic study to ensure that the driveway and intersection traffic operations don't conflict due to the backup of traffic from the traffic signal. Also, joint access to the highway should be considered whenever possible, even with access to single-unit residential developments.

The 1991 Oregon Highway Plan recommends a higher access spacing standard for Access Oregon Highways (AOH), including US Highway 30, than what is recommended as part of this Access Management Plan. Per the 1991 Oregon Highway Plan, Highway 30 is identified as a roadway facility of statewide significance. The couplet segment of Highway 30 has been assigned Access Category 4 in the US Highway 30 Corridor Study. Category 4 classification permits at-grade intersections or interchanges at a minimum spacing of one-quarter mile. Also, private driveways are permitted at a minimum spacing of 500 feet from each other and from intersections, with both left and right-turns permitted in and out of the driveways.

The remaining segment of Highway 30, other than the downtown couplet, has been assigned Access Category 3. Category 3 classification permits at-grade intersections or interchanges at a minimum spacing of one-half to one mile. Also, private driveways are permitted at a minimum spacing of 800 feet from each other and from intersections, with only right-turns permitted in and out of the driveways.

Neither the spacing of at-grade intersections or driveways can be met on the section of Highway 30 through Astoria. The surrounding land is mostly developed and public streets and driveways currently intersect the highway at an average spacing of 250 feet on the north side and at an average spacing of 185 feet on the south side of the highway.

The higher access spacing standard in the 1991 Oregon Highway Plan corresponds to generally higher travel speeds allowed on most Access Oregon Highways. However, the project corridor is characterized by lower travel speeds, mainly due to the proximity of land use developments. While the lower travel speeds and the lower access spacing standard is not in conformance with the Oregon Highway Plan for Access Oregon Highways, it is expected to lead to safer pedestrian travel along the project corridor than would be achieved under the AOH standards.

Highway 101

Highway 101 is signed for a 30 mph speed zone inside the planning area. For commercial and multiple-unit residential developments, a 400-foot minimum spacing is recommended unless the driveway is right-in/right-out only, in which case a minimum 200 feet is recommended. Based on a traffic study, a variance may be allowed provided the traffic study demonstrates that the proposed driveway location(s) would not impact traffic operations and safety along the highway and at adjacent intersections.

For major intersections with traffic signals, the minimum spacing may need to be determined by a traffic study to ensure that the driveway and intersection traffic operations don't conflict due to the backup of traffic from the traffic signal. Also, joint access to the highway should be considered whenever possible, even with access to single-unit residential developments.

Assuming AOH Category 3 for this segment of Highway 101, the Oregon Highway Plan permits at-grade intersections or interchanges at a minimum spacing of one-half to one mile. Also, private driveways are permitted at a minimum spacing of 800 feet from each other and from intersections, with only right turns permitted in and out of the driveways.

Neither the spacing of at-grade intersections or driveways can be met on the section of Highway 101 through Astoria. The surrounding land is mostly developed and public streets and driveways currently intersect the highway at an average spacing of 100 feet on the north side and at an average spacing of 80 feet on the south side of the highway.

Highway 202

Highway 202 is signed for a 35 mph speed west of the intersection with Seventh Street, and it is signed for a 45 mph speed zone east of Seventh Street inside the planning area. For (all) right-in/right-out access points and for full-access points from single-unit residential developments, a minimum spacing of 150 feet is recommended along the 35 mph segment west of Seventh Street, while a longer spacing of 300 feet is recommended for the 45 mph segment east of Seventh Street. For commercial and multiple-unit residential developments located along the entire Highway 202 corridor in the planning area, a 400-foot minimum spacing is recommended unless the driveway is right-in/right-out only, in which case a minimum 200 feet is recommended. Based on a traffic study, a variance may be allowed provided the traffic study demonstrates that the proposed driveway location(s) would not impact traffic operations and safety along the highway and at adjacent intersections.

For major intersections with traffic signals, the minimum spacing may need to be determined by a traffic study to ensure that the driveway and intersection traffic operations don't conflict due to the backup of traffic from the traffic signal. Also, joint access to the highway should be considered whenever possible, even with access to single-unit residential developments.

Assuming AOH Category 3 for this segment of Highway 202, the Oregon Highway Plan permits at-grade intersections or interchanges at a minimum spacing of one-half to one mile. Also, private driveways are permitted at a minimum spacing of 800 feet from each other and from intersections, with only right-turns permitted in and out of the driveways.

Neither the spacing of at-grade intersections or driveways can be met on the section of Highway 202 through Astoria. The surrounding land is mostly developed and public streets and driveways currently intersect the highway at an average spacing of 180 feet on the north side and at an average spacing of 500 feet on the south side of the highway.

The higher access spacing standard in the 1991 Oregon Highway Plan corresponds to generally higher travel speeds allowed on most Access Oregon Highways. However, the project corridor is characterized by lower travel speeds, mainly due to the proximity of land use developments. While the lower travel speeds and the lower access spacing standard is not in conformance with the Oregon Highway Plan for Access Oregon Highways, it is expected to lead to safer pedestrian travel along the project corridor than would be achieved under the AOH standards.

Minimize the Number of Driveways per Property Frontage

The minimum spacing of driveways is a strategy used to regulate the frequency of access points along highways; thereby, reducing number of basic conflict points, the frequency of conflicts, and the severity of conflicts.

There are many different ways to minimize the number of driveways per length of highway. The following strategies are recommended for the arterial roads in Astoria. This technique can be implemented at existing locations or during the driveway permit authorization stage.

1. *Generally limit the number of driveways per property frontage to a single drive.* This general access control standard limits the number of driveways per property relative to the length of available frontage. Since this regulation has the potential of significantly impacting business activity, these problems should be considered before denial for an additional driveway is given or before an existing driveway is closed.

2. *At the permit-authorization stage, encourage adjacent property owners to construct joint-use driveways in lieu of separate driveways.* This is a general operating practice that requires specific changes on commercial sites when they are assembled for development or redevelopment. The consolidation is accomplished by voiding existing driveway permits upon alteration of the property functions. The new permit authorization depends on the developer's plans to use some existing driveways and close or relocate other driveways.

3. *At the permit-authorization stage, consolidate existing access to commercial sites whenever separate parcels are assembled under one purpose, plan entity or usage.* The feasibility of this technique is viewed primarily at the permit-authorization stage. It encourages adjacent property owners to construct joint-use driveways in lieu of separate driveways. It is recommended that both owners have property rights in a joint-use driveway. That is, the driveway should be located straddling the property line with each having a permanent easement on the other. This practice will not enable either owner the opportunity to deny or restrict access to the neighboring property. The resulting parking area should have an efficient internal circulation plan.

4. *Designate the number of driveways permitted to each existing property before development, and deny additional driveways regardless of future subdivision of that property.* This is a general regulatory policy which designates the maximum number of driveways permitted to each existing property before development. Such policy denies additional driveways regardless of future subdivision of that property.

5. *Restrict access from neighborhood commercial development located on the corner of a public street intersection to access on the cross-street only.* This access control technique is aimed at maintaining the movement function of the major roadway by locating additional driveways on collector streets instead of on the arterial highway. This technique will reduce conflict frequency and severity by diverting some driveway vehicles to the collector street location where traffic volumes and speeds are lower.

Optimize Driveway Spacing in the Permit Authorizing Stage

The optimization of driveway spacing in the permit authorization stage would indirectly reduce the frequency of conflicts by separating adjacent conflict areas and limiting the number of basic conflict points per length of highway. The implementation of this technique is also expected to reduce the severity of conflicts as it allows more deceleration distance and perception time between driveways.

Driveway Widths

Some segments of Highway 30 east of the downtown couplet and segments of Highway 202 are currently characterized by a lack of driveway width definition due to the provision of curbs (and sidewalks) intermittently.

A policy on maximum driveway widths is aimed at reducing conflict areas by defining the maximum width of driveway openings on the highway. The frequency of conflicts would also be reduced because the number of possible conflict points are limited to the defined driveway openings. The reduction in potential conflict areas is expected to be accompanied by a reduction in accident frequency and severity.

Driveway widths may be defined by erecting fences, barriers, plantings, or curbs adjacent to the roadway or shoulder. Possibilities exist for constructing rock walls, rail fences, or other structures that are compatible with the aesthetics of the area. Curbing, however, is the most common method due to (1) ease of installation, (2) low maintenance, and (3) effectiveness. However, when a curb is used, the impact on drainage must be considered.

The maximum allowable width is a function of the types of vehicles using a facility as well as the nature of the development to be served. Consideration must be given to highway operating conditions, volume, geometry, sight distance, angle of intersection, and alignment (vertical and horizontal).

A 20-foot standard driveway width is recommended for single-unit residential developments, with a 16-foot minimum allowable width and a 24-foot maximum allowable width. For multi-family residential, commercial, and industrial developments, a 36-foot standard width and a 40-foot maximum width is recommended. Examples of driveway design are illustrated in Appendix G.

Driveway Sight Distance

Adequate intersection sight distance must be provided at all existing and future signalized and unsignalized intersections, including driveways. Access driveways should not be permitted where the sight distance is not adequate to allow a motorist to maneuver to come to a safe stop.

Access driveways should be designed such that they provide adequate intersection sight distance, per AASHTO guidelines. The guidelines recommend minimum sight distances for a typical vehicle (e.g., passenger car, truck, etc.) to either safely cross the highway or to safely merge with the highway traffic when turning left or right from a stopped position at the access point. The sight distance requirements based on roadway vehicle travel speeds are listed in Table 5-3.

Driveway sight distance can be increased by eliminating or altering physical and geometric barriers, such as by altering roadway alignment (horizontal and vertical curves) and by eliminating physical obstructions (shrubbery, fencing, walls, etc.).

TABLE 5-3
INTERSECTION SIGHT DISTANCE

MPH	Distance Along Crossroads (ft)
25	250
30	300
35	350
40	400
45	450
50	500
55	550

Construct a Bypass Road

The continued growth of commercial strips along major arterials has magnified the problem of access control. Many roadway authorities have been unable to alleviate congestion occurring in the vicinity of such commercial developments.

Bypasses provide motorists with the opportunity to avoid heavily developed or congested areas without conflicting with local traffic. As a result, this technique reduced the frequency and severity of conflicts on both facilities by separating longer-distance and faster-moving through traffic (including trucks) from slower, local traffic. Removal of the intercity traffic from the existing roadway makes it more convenient for local traffic to enter and exit the business sites.

Bypasses are applicable on major intercity routes where development along the existing route makes it impractical to reconstruct the facility or the existing location.

Require Adequate Internal Design And Circulation Plan

An adequate internal design and circulation plan is recommended for all site developments having direct access to the highway. Although this technique can be applied to existing developments, it should be used mainly during the site plan approval and access permitting processes.

New site developments and redevelopment of existing sites having direct access to the arterial roadway should be designed such that they provide adequate handling of limited parking and maneuvering areas, minimize internal interference by supplying storage areas to egress movements, and distribute ingress vehicles into the main circulation patterns with minimal hesitation and confusion. The following list reflects recommendations by which this technique can be properly applied.

- General location of driveway entrances should be approved by permitting agencies before the major effort toward maximum capacity planning begins.

- Wherever possible, the long sides of rectangular parking areas should be parallel.
- Curved, triangular and other irregularly shaped parking areas should be avoided.
- Driveway throats should be designed long enough to allow free movement on and off of the highway. For developments generating more than 500 trips per day, the depth of the driveway throat should be determined based on a site traffic impact study.

Implementing and Financing Access Retrofitting

Implementation of access retrofit projects may take an inordinate amount of time unless sources of funding are made available. Access retrofit projects can be implemented and funded as part of reconstruction or major street improvement projects. Access retrofit projects may also be done as redevelopment or changes in land use occur. With either or both of these types of projects it would take many years to make much progress in retrofitting access unless other sources of funding can be found. It does not appear that any major construction projects will be done covering existing highways other than on the possible bypass route.

The practice of charging an access permit/inspection fee to remove an existing access does not seem fair to the property owner that agrees to remove an access. As a result it is recommended in the proposed policies in this report that language be adopted to allow the access permit fee to be waived by the appropriate road authority when an access is being removed. This would have a negative effect on funds available from access permit fees. Some jurisdictions place a "bounty" on existing access points along arterial streets. A property owner is paid an amount of money by the jurisdiction to voluntarily give up an underutilized driveway. This type of program requires a sizable budget but can be effective at reducing the number of driveways along arterial streets. However, there are a number of possible methods for financing access retrofit projects some of which are listed as follows:

1. Access permit and inspection fees.
2. Local improvement district(s).
3. Development charges.
4. Gas tax funded capital improvement projects.
5. Street utility fees.
6. Special assessments.
7. Traffic impact fees.
8. Service charges for direct access.
9. Private donation.
10. Parking taxes and fees.
11. Federal safety funds.

GENERAL ACCESS MANAGEMENT GUIDELINES FOR ARTERIAL, COLLECTOR, AND LOCAL STREETS

Access management is hierarchical, ranging from complete access control on freeways to increasing the use of streets for access purposes, parking and loading at the local and minor collector level. These general access management guidelines illustrate the general differences for different roadway classifications. The minimum spacings shown will vary depending on the existing and expected future conditions.

Access management restrictions are not intended to eliminate existing intersections or driveways. Rather, they are best implemented by instituting them into the land use permitting process and applying them as new development occurs.

The challenge is greater in applying access management guidelines to a developed major arterial due to right-of-way limitations and concerns by the owners of the adjacent properties and the affected businesses. In such cases, access management can be implemented as part of roadway improvement plans or as part of roadway retrofit plans.

To summarize, access management strategies consist of managing the number of access points and/or providing traffic and facility improvements. The solution is a balanced, comprehensive program that provides reasonable access while maintaining the safety and efficiency of traffic movement.

TABLE 5-4
GENERAL ACCESS MANAGEMENT GUIDELINES

Functional Classification	Posted Speed	Minimum Spacing Between Driveways and/or Streets[1]	Minimum Spacing Between Traffic Signals	Appropriate Adjacent Land Use Type
Arterial	25-50 mph	400 feet	2,800 feet	Community/neighborhood commercial Industrial/office/ low-volume retail and buffered medium or higher density residential between intersections
One-Way	20-35	200 feet	400 feet	Commercial retail and business
Collector Street	25-35 mph	100 ft	400 feet	Primarily lower density residential
Major Local Street	25 mph	access to each lot permitted	400 feet	Primarily residential

[1] *Desirable design spacing (existing spacing will vary)*

These minimum spacings are guidelines and will vary depending on the individual sections of roadway and where variances are approved.

CHAPTER 6: FORECASTING

INTRODUCTION

Travel demand forecasting is a method used to predict future traffic conditions in an area, city, or region. This is done to identify where problems will exist in the future along streets and at intersections. Travel forecast models are based on existing and projected future land uses, such as the population and employment in an area. Using a computer modeling program known as EMME/2, existing and future traffic conditions were simulated on the street network in the Astoria study area. The existing (1996) and future year (2006 and 2016) forecasts focused on the PM peak hour which generally occurs between 4:30 and 5:30 PM for an average weekday in Astoria. This is the time period when traffic volumes on the local street system are highest.

In the preliminary stages of the travel forecast, a study area boundary was developed and a study was done to determine existing and projected future land uses. Development of the travel forecast model, then, involves a four step process: 1) trip generation; 2) trip distribution; 3) trip assignment; and 4) model calibration and validation. Each of these four steps are described in detail below.

STUDY AREA

The study area for the TSP includes all of the land within the city's Urban Growth Boundary (UGB) plus relevant land outside of the UGB. Figure 6-1 shows the study area boundary.

Since the study area boundary differs from Astoria's city limits and UGB, it is important to note that, the demographic data contained in this report should not be compared directly with existing data for the city, nor should the projections be used in other studies associated with the city limits or UGB.

Roadway System Network

The limits of the roadway system network for Astoria were defined by a study area boundary. Within this boundary, a network composed of principal and minor arterial roads and collector streets was selected. This network includes all of the state highways, most of the county roads, and city streets, which are vital to the circulation of traffic in Astoria.

Each roadway in the network has specific distance, speed, and capacity characteristics, which are important factors in the traffic forecasting process. Just as these factors help determine the route that a driver takes when traveling between two locations, they also determine to which route the model assigns a trip.

Transportation Analysis Zones

In addition to defining the study area network, a transportation analysis zone (TAZ) scheme was also developed. The TAZ scheme divides the study area into smaller analysis units that are used to tie land use activity and trip generation to physical locations within the network. Within the study area boundaries, 62 zones were defined, as shown in Figure 6-1. Physical barriers, roadway locations, and land use characteristics were factors used to determine the zone structure.

Each TAZ is then connected to the network by one or more representative roadways. Since the traffic network does not include every road that exists within the study area, one connector may represent several local roads which are loading onto a main route.

Outside of the study area, seven zones load traffic from external locations, generally traffic from other areas. These zones produce three types of trips. The first type is through trips that begin in one external zone and end in another external zone but will pass through the city. For example, a vehicle traveling from Seaside, Oregon, to Washington will take Highway 101 through Astoria to the Astoria Bridge. The second type is a trip that begins in the city and ends at another location. An example would be a Astoria resident who works in Seaside. The last type is a trip which begins at another location and ends in the city, i.e., someone who lives in Seaside and shops in Astoria. In the modeling process, the trips traveling to and from these external zones are associated with the actual roads leading into Astoria.

EXISTING AND FUTURE LAND USE

Once the TAZ scheme was defined, existing (1996), 2006, and 2016 land use forecasts were developed. The existing land use was used in the model calibration process while future land use was the basis for the future travel forecasts.

Land use is divided into two categories in the travel forecasting model: those uses which produce trips and those uses which attract trips. Population, represented by the number of single-family, multi-family, and manufactured home dwelling units in each TAZ, is the source of trip productions. Employment, broken down by type of land use (i.e., retail/commercial, office, industrial, etc.) is the basis for estimating trip attractions. Table 6-1 contains a summary of existing and future housing and employment, by land use category. A detailed projection of 1996, 2006, and 2016 land use is included in Appendix H. The year 2006 land use projections were calculated with the assumption that population and employment would grow at a linear rate. Therefore, the 10 year or 2006 land use forecast was calculated using half of the increases in population and employment between 1996 and 2016.

TABLE 6-1
HOUSING AND EMPLOYMENT FORECASTS

Land Use	1996	2006	2016
Single-Family Dwelling Units	3,134	3,243	3,352
Multi-Family Dwelling Units	2,098	2,136	2,174
Retail/Commercial Employment	1,494	1,522	1,550
Office Employment	1,607	1,665	1,724
Industrial Employment	764	864	962
Government Employment	923	968	1,011
School Employment	390	436	483
Total Population	11,926	12,568	13,201
Total Dwelling Units	5,232	5,382	5,527
Total Employees	5,273	5,554	5,829

**Forecasts for area within the study area boundary.*

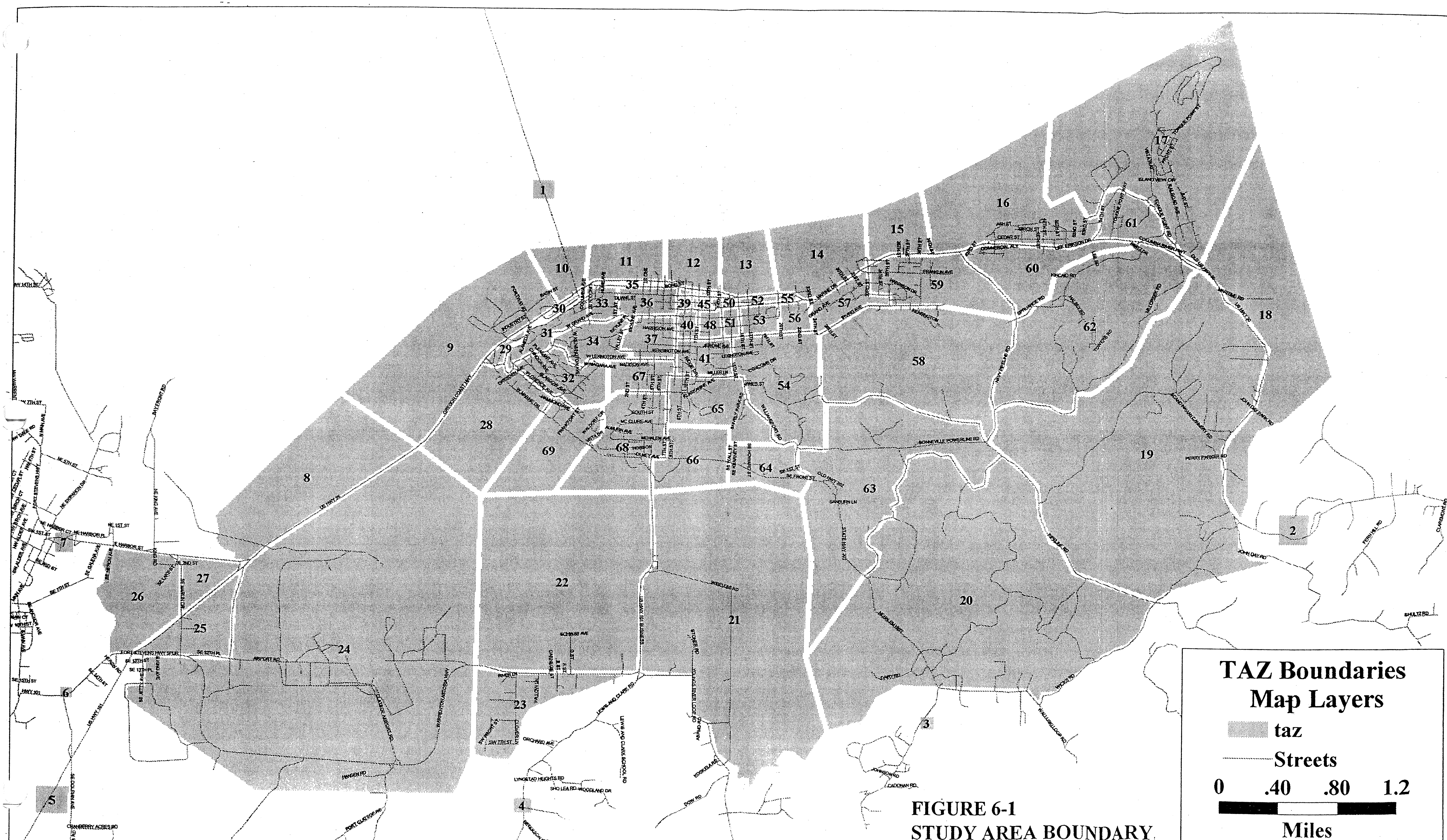


FIGURE 6-1
STUDY AREA BOUNDARY

Existing Housing

For the existing (1996) forecast, housing in the city and the surrounding area within the study area totals about 5,232 dwelling units and a population of 11,926. Approximately 60 percent of the existing dwelling units are single-family homes. The remaining housing consists of multi-family housing (40 percent). Population numbers were established using 1990 US Census data and estimated increases in population through the help of city officials.

Year 2016 Housing

Housing for the year 2016 was based on anticipated growth. Although the population forecast for Clatsop County predicts a reduction in the number of residents, city officials anticipate a slight growth over the next 20 years of about 0.5 percent per year in Astoria. Using this growth rate, housing for the year 2016 is estimated to be at about 5,527 dwelling units. This is an increase of about 295 dwelling units over 1996 housing or an annual growth rate of approximately 0.27 percent. Single-family dwelling units are expected to grow a little faster, reaching approximately 61 percent of the housing market while the market share of multi-family dwelling units will be about 39 percent.

Existing Employment

Existing employment within the study area totals about 5,273. Employment information was obtained through document research, telephone interviews, and a visual survey of the study area. The visual survey was performed in January 1996 which consisted of driving through most of the TAZs, noting the location and type of employers, estimating employment, and meeting with the City of Astoria planner. Initial employment data was refined using information from the Astoria Chamber of Commerce, the Oregon Employment Department, and other local sources. A number of employers were also contacted by phone to confirm employment and to get information on work shifts, etc.

The 1996 population-to-employment ratio in the study area is approximately 2.3 to 1, indicating a relatively strong employment base. In urban areas, the ratio usually falls between 2.1 and 3.0 to 1.

As indicated in Table 6-1, the employment base within the study area is dominated by the retail/commercial and service categories. Approximately 3,101 (59 percent) of the jobs in the study area are related to the retail and service industry. Industrial employees comprise another 764 jobs (14 percent).

Year 2016 Employment

Retail and service employment is expected to increase by 5.6 percent from about 3,101 employees to 3,274 employees. Industrial employment is also expected to increase by 26.0 percent from 764 employees to 962 employees. Other employment levels, such as school and government, would also grow to support the increase in population.

TRIP GENERATION

Vehicle trip generation, the first step in the modeling process, is a method of estimating the number and type of trips a specific land use will produce or attract based on historic data and surveys of similar developments. The trip generation estimates were made for each TAZ in the planning area on the basis of the type and quantity of households and employees. Trip generation rates applied to these land uses were derived from several sources, including the Institute of Transportation Engineers report, *Trip Generation* (Fifth Edition, 1991) and the Transportation Research Board Report 187. These rates were modified to reflect generalized land use categories for planning purposes on the basis of experience in other similar size cities and through the travel model calibration process.

Each trip is defined by the land use from which it is produced or originated, the land use to which it is attracted or destined, and the purpose of the trip. Trip generation rates were refined for each origin and destination for four purposes:

- *Home-based work* - Trips between home and a place of employment.
- *Home-based shopping* - Trips between home and a commercial land use.
- *Home-based other* - Trips between home and another land use for a purpose other than employment and commercial (e.g., school trips).
- *Non-home based* - Trips between two non-residential land uses.

Table 6-2 summarizes the trip rates for each land use category and for each trip purpose.

TABLE 6-2
PM PEAK HOUR VEHICLE TRIP GENERATION RATES
ASTORIA TRANSPORTATION PLANNING MODEL

Land Use		Home-Based Work	Home-Based Shopping	Home-Based Other	Non-Home-Based	Total Rates
Trip Productions						
Single-family	Origin	0.03	0.09	0.14	0.06	0.32
	Destination	0.35	0.17	0.07	0.07	0.66
Multi-Family	Origin	0.02	0.06	0.10	0.05	0.23
	Destination	0.24	0.12	0.05	0.05	0.46
Trip Attractions						
Retail/Commercial	Origin	0.10	0.93	0.00	0.58	1.61
	Destination	0.00	0.58	0.18	0.79	1.55
Industrial	Origin	0.40	0.00	0.00	0.05	0.45
	Destination	0.05	0.00	0.00	0.05	0.10
Government	Origin	0.68	0.00	0.00	0.16	0.84
	Destination	0.00	0.00	0.00	0.16	0.16
Office	Origin	0.49	0.00	0.00	0.09	0.58
	Destination	0.00	0.00	0.00	0.12	0.12
School	Origin	0.68	0.00	0.21	0.16	1.05
	Destination	0.00	0.00	0.10	0.35	0.45

For external TAZs, future trip volumes were estimated based on the historic growth on the roadways they represent.

TRIP DISTRIBUTION

Vehicle trip distribution, the second step in the modeling process, is a method of estimating the origin and destination of trips within the study area. For each TAZ, trip origins were distributed to all of the trip destinations within the planning area and to the roads leading out of the study area.

A gravity model was used for trip distribution. The basic premise of this gravity model is that the number of trips between two areas is directly related to the size of the attractions or destinations in each zone and inversely related to the travel length between each zone. For example, if two destination zones of different sizes were located equal driving times from the origin zone, more trips would be distributed to the larger destination zone. And if two destination zones of equal size were located five minutes and 10 minutes from the origin zone, more trips would be distributed to the closer destination zone. This procedure was followed for trips originating in all 62 internal zones and the roads leading into the study area.

TRIP ASSIGNMENT

Trip assignment, the third step in the modeling process, is a method of assigning trips distributed between origin zones and destination zones to specific paths on the street system. The forecasting model, EMME/2, used a capacity-constrained assignment methodology, which assigns traffic to the street system based on travel time. Initially the model assigns each trip to the route with the shortest travel time between its origin and destination. The travel time on each route is then adjusted to account for congestion and delay that may result from the first assignment. As the fastest route becomes congested, its travel time increases. If the travel time increases substantially, another parallel route may become faster. The model then adjusts the traffic assignments by reassigning traffic to the alternate route. Through an iterative process, the model balances travel times and traffic volumes between alternate routes. Using this procedure, the traffic between a single origin/destination pair could be assigned to several routes depending on the congestion of each route, thereby, simulating "real world" motorists' choices.

MODEL CALIBRATION AND VALIDATION

Before projecting 2016 traffic volumes, the entire process of estimating trip generation, distribution, and assignment was completed for 1996 conditions and compared with actual measurements on the roadway system. The theory behind calibration reasons that if the modeling process forecasts current conditions reasonably well, the same process should then provide a reasonably good estimate of future conditions. To validate the model, changes to the trip generation, distribution, and assignment process were made until the assigned volumes approach actual counts, generally within about ten percent of counts. A more detailed description of the calibration and validation process is discussed in Appendix I.

FUTURE TRAFFIC FORECASTS

After the calibration and validation of the model, future year forecasts were run for the years 2006 and 2016. These forecasts were then evaluated to identify any street and intersection deficiencies that will exist in the next 10 to 20 years. These deficiencies are discussed in the Future Traffic Operations sections.

2006 AND 2016 FORECASTS

The ten year (2006) traffic forecast was determined using a combination of the existing (1996) and projected additional (2006) land use data. Using this new land use for the year 2006, the same steps used in the 1996 forecast were repeated, using trip generation, distribution and finally the assignment of all trips.

The twenty year (2016) traffic forecast was performed in the same manner as the future year (2006) traffic forecast.

Future year forecasts were first performed using the existing transportation network. These forecasts, categorized as the "No-Build" scenarios, assume that no major changes would be made to the existing transportation system in the next 10 or 20 years. The "No-Build" scenarios establish the baseline for all other analysis.

Other street network scenarios were then explored, each utilizing one or more potential street improvement projects. A total of five major street network scenarios were included in the 2006 and 2016 year forecasts using EMME/2. These street network scenarios include:

- Astoria Bypass-Alternative 1.
- Astoria Bypass -Alternative 2 (Extended bypass).
- Extension of the Existing One-Way Couplet Downtown.
- Establishing Duane Street and Exchange Street as Two-Way Streets in the Downtown Area.
- Decoupling the Downtown Area.

Each scenario was evaluated on how it would affect future traffic conditions along certain streets and intersections. These scenarios are discussed in the following section of this chapter. Detailed traffic volume forecast results for each scenario including the "No-Build" scenario are located in Appendix I. Results are expressed in terms of PM peak hour traffic volumes. In some areas of Astoria, the V/C ratios were plotted as well. PM Peak Hour 2016 traffic volumes for some of the alternatives are shown on Figures 6-2 through 6-4.

FUTURE TRAFFIC OPERATIONS ALONG SPECIFIC STREETS

Inspection of existing and projected traffic volumes on the street network and analysis of the intersection operations indicate that several problem areas currently exist or will exist in the future along specific street segments. These streets were evaluated based on projected traffic volumes and the V/C ratios for all time periods and street improvement projects. In each case, alleviating the deficiencies of these street segments is dependent upon the implementation of certain street improvement projects such as the Astoria Bypass alternatives and the potential extension of the one-way couplet along Exchange Street, between 15th and 23rd Street.

Existing and Future No-Build Conditions

Analysis of existing traffic volumes and V/C ratios from the EMME/2 model reveal that three roadway segments currently experience heavy traffic flow with V/C ratios close to or over 1.0 during the PM peak hour for an average weekday of a peak summer month. Future year forecasts for the years 2006 and 2016 along these same street segments reveal that these conditions will become worse without street system improvements. One problem area is located along Marine Drive from the eastern end of the existing one-way couplet at 16th Street to Franklin Avenue. This section of roadway is primarily a two-lane facility with a posted speed of 35 mph. According to the calibrated

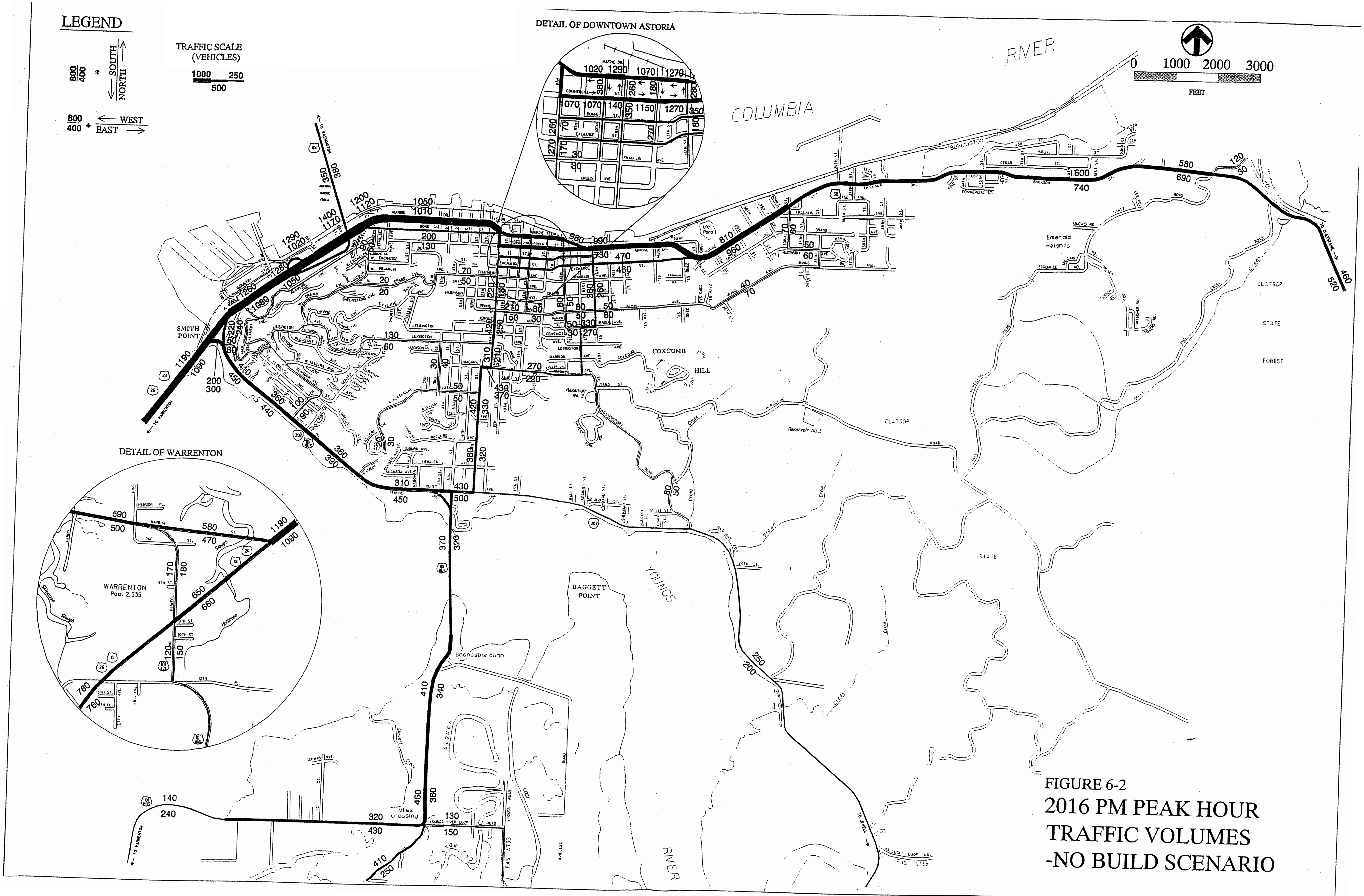


FIGURE 6-2
2016 PM PEAK HOUR TRAFFIC VOLUMES -NO BUILD SCENARIO

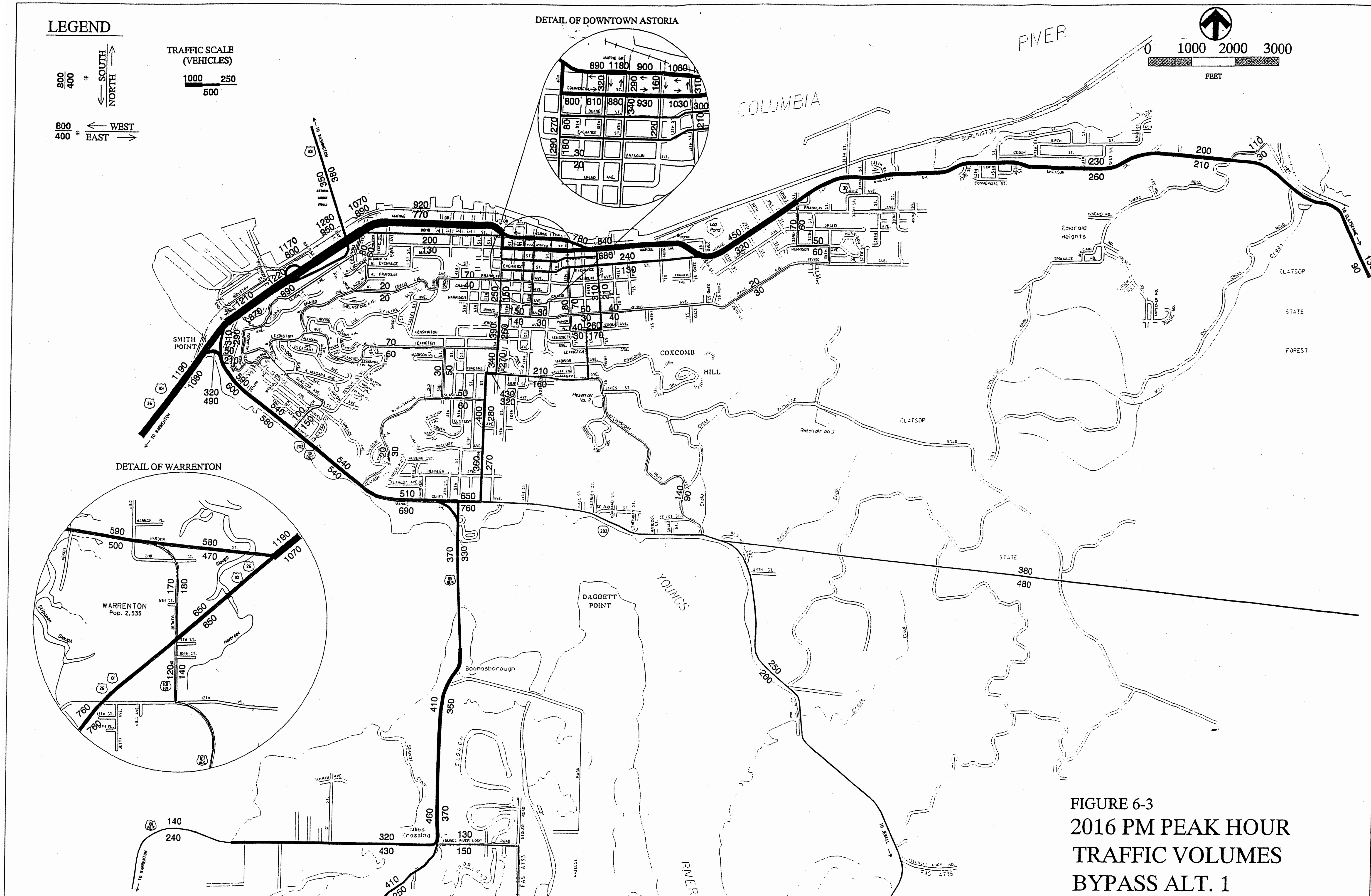


FIGURE 6-3
2016 PM PEAK HOUR
TRAFFIC VOLUMES
BYPASS ALT. 1

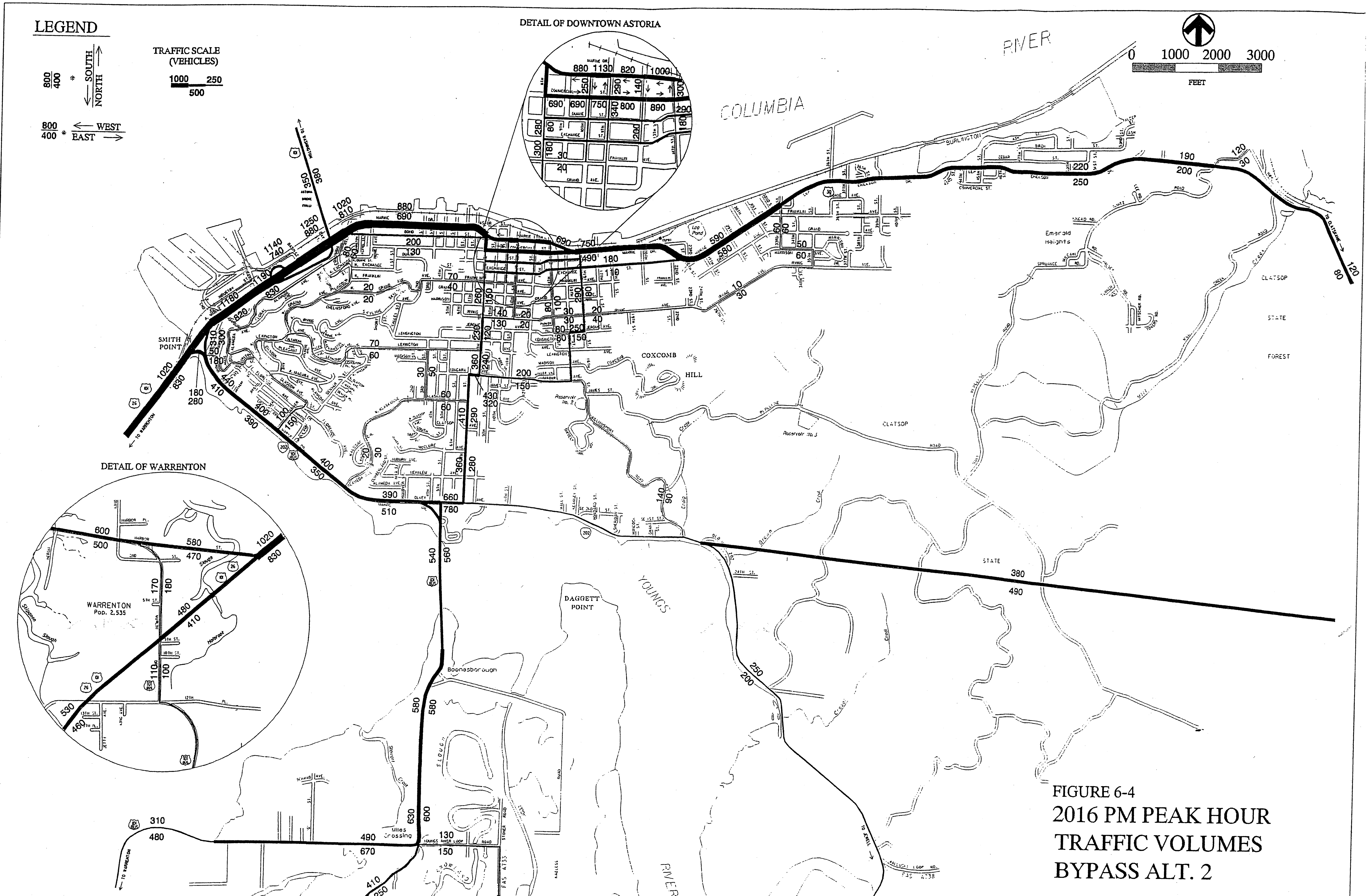


FIGURE 6-4
2016 PM PEAK HOUR
TRAFFIC VOLUMES
BYPASS ALT. 2

EMME/2 traffic model, current (1996) PM peak hour traffic volumes for both directions of traffic combined total 1,678, east of 16th Street, 1,671, east of 23rd Street, and 1,417, west of Franklin Street. The average V/C ratios for both directions of travel combined range between 0.99, 0.98, and 0.83, in these areas. The average capacity of this section of roadway used in the EMME/2 model is approximately 850 vehicles per hour in each direction (1,700 vph for both directions) based on the functional classification and speed limit of this roadway. However, the actual capacity of some parts of this roadway may be higher (900 to 1,200 vph each way) due to several factors including the presence of a continuous left-turn lane between 22nd Street and 27th Street, low cross street traffic volumes, and the presence of only one traffic signal at 30th Street with most of the green time allocated to Marine Drive traffic. Future year (2016) PM peak hour traffic volumes for both directions combined in the same three areas mentioned above are projected to reach 2,010, 1,731, and 1,695 vehicles. These numbers assume full implementation of the planned developments in the Astoria Gateway Master Plan, which would include considerable development along Marine Drive, between 17th Street and 30th Street. Volumes of these magnitudes would result in V/C ratios at or over 1.0 during this time period, assuming a capacity of 850 vph, indicating that future traffic demand will exceed the streets capacity.

The second roadway segment currently experiencing heavy traffic flow is part of the interchange at Smith Point where Highway 26/101 and Highway 202/101-Business Route intersect. The roadway segment in question is located between the eastern end of the Youngs Bay Bridge and where Highway 26/101 intersects with Highway 202/101-Business Route. According to the calibrated EMME/2 traffic model, current (1996) PM peak hour volumes reached 1,017 vehicles in the southwest direction along this section of highway. This is from a combination of 786 vph originating from Marine Drive to the northeast and 231 vph originating from Highway 202/101-Business Route to the southeast. A capacity of 830 vehicles per hour in each direction was chosen for this highway segment based on the posted speed limit of 30 mph and the functional classification of the roadway as a principle arterial. Using this capacity, a V/C ratio of 1.22 was computed for the southwest direction, indicating heavy congestion. By the year 2016, without any street improvements, traffic volumes are expected to reach 1,244 in the southwest direction, which equates to a V/C ratio of 1.50.

Across the Youngs Bay Bridge the capacity and assumed speed were increased to 1,800 vph in each direction and 55 mph over the bridge. These properties were used in the EMME/2 model because they closely resemble free flow conditions for a basic freeway segment. With this capacity and current traffic demand, V/C ratios of 0.565 and 0.539 exists for the westbound and eastbound lanes, respectively. This indicates mild congestion, but smooth traffic flow across the Youngs Bay Bridge. Based on observations of the highway segment in question, it was concluded that the capacity of 830 vph each way was too low. A more realistic capacity for the southwest lane proceeding over the Youngs Bay Bridge would be similar to the bridge capacity of 1,800 vph each way, since there is no traffic control and speed limits increase from 30 to 55 mph. This would result in V/C ratios below 1.0 for existing and future year No-Build conditions. Specific capacity issues for Smith Point analyzed as an intersection are addressed in the next section under (Areas of Special Interest) along with potential street improvement projects for this area.

The third location is also located along Highway 26/101 between the southwest end of the Youngs Bay Bridge and Harbor Street. This is a two-lane section of highway with a speed limit of 45 mph and an assumed capacity of 900 vph. According to the traffic model, current (1996) PM peak hour volumes reached 1,017 vehicles (V/C ratio of 1.10) in the southwest direction and 971 vehicles (V/C ratio of 1.05) in the northeast direction. Several factors indicate that the capacity of this section of highway is actually higher than 900 vph. The first factor is that this section of highway functions close to "ideal" or uninterrupted-flow conditions, especially the northeast-bound lane proceeding over the bridge where the capacity becomes 1,800 vph and a speed limit of 55 mph. Also, only one driveway is present along this section of highway, which gives this highway segment the functional characteristics of a basic freeway segment. Most importantly, a signalized intersection is present at the highway's intersection with Harbor Street and results from the SIGCAP-2 traffic operations analysis indicates a LOS of C currently exists. The results also show that the entire approach to this intersection from the Youngs Bay Bridge can maintain a LOS of C with traffic volumes of up to 1,904 vph, which is roughly double the amount of traffic currently on this approach. All these factors indicate a higher capacity exists along the highway segment than what was initially assumed.

Future forecasts for the years 2006 and 2016 under No-Build conditions reveal that traffic volumes will increase steadily along Highway 26/101 over the Youngs Bay Bridge, without much of an increase on the Highway 101-Business Route over the Old Youngs Bay Bridge, which could act as an alternative route between Astoria and the areas of Warrenton and Seaside. The main reason for this projected occurrence is because the travel time between the Seaside/Warrenton areas and most of the Astoria area will still be quicker using Highway 26/101 over the Youngs Bay Bridge. This route is in most cases shorter in distance and has a higher average speed than the Highway 101-Business Route.

Astoria Bypass

The new road way alignment portion of the Astoria Bypass would link together Highway 30 just west of the John Day River Bridge to Highway 202 near Williamsport Road. This part of the bypass would consist of a two-lane facility with climbing lanes, limited access, and a design speed of 55 mph. The other portion of the bypass on the OR 202 alignment from Williamsport Road to US 101 would be three-lane and five-lane sections including center left-turn lanes or a median. Future forecasts for the year 2016 with and without the bypass reveal that a significant shift in traffic will take place. It is estimated that roughly 76 percent of the total traffic on Highway 30 at the John Day River Bridge will use the bypass instead of the existing Highway 30 alignment heading into the downtown area. Around 43 percent of this traffic is expected to be through traffic. Year 2016 PM peak hour traffic volumes along Highway 30, west of the bypass intersection, are projected to decrease from 455 to 155 vehicles westbound and 522 to 119 vehicles eastbound as a result of the bypass.

This shift will also have noticeable effects along the critical section of Marine Drive east of the existing one-way couplet. Traffic volumes in the year 2016 without and with the bypass during the PM peak hour just east of 23rd Street will decrease from 760 to 400 vehicles westbound and from 971 to 529 vehicles eastbound. This results in a V/C ratio of 0.47 westbound and 0.62 eastbound, which is well under capacity. Traffic volumes along Marine Drive east of 16th Street will reduce from 1,049 to 988 vehicles westbound and from 961 to 854 vehicles eastbound according to the forecast results. This reduction is not as significant because an alternative parallel route exists along Exchange Street to the south. According to the traffic model, traffic flows will reduce along Exchange Street east of 16th Street from 463 to 205 vehicles westbound and from 390 to 96 vehicles eastbound. Even though future traffic volumes with the bypass will be high along the section of Marine Drive east of 16th Street, the overall reduction in traffic resulting from the bypass will eliminate much congestion and allow Marine Drive to function better.

As traffic along Highway 30 east of the John Day River Bridge is routed onto the Astoria Bypass, more traffic will be approaching and leaving Smith Point to the southeast along Highway 101 Business Route/202. As a result, less traffic will be entering and exiting Smith Point to the northeast along Marine Drive. Capacity and traffic flow issues at Smith Point resulting from the construction of the Astoria Bypass are discussed later in this chapter.

Construction of the Astoria Bypass without the extended bypass alternative will have an effect on future traffic conditions along the section of Highway 26/101 between the Youngs Bay Bridge and Harbor Street no different than the No-Build conditions. Approximately the same amount of traffic is projected to cross the Youngs Bay Bridge into the Warrenton area.

Extended Astoria Bypass Alternative

An additional proposed project in Clatsop County, known as the Extended Bypass Alternative, would proceed along the initial bypass alignment, between Highway 30 and Williamsport Road, turning south along Highway 101-Business Route across the Old Youngs Bay Bridge. From there it will continue west across the Lewis and Clark Bridge. A new roadway extension is planned south of the Astoria airport where the existing highway alignment turns westbound to northbound. This extension will connect the Highway 101-Business Route and Highway 101/26 directly with an east-west link.

Overall travel speeds across the Old Youngs Bay Bridge are expected to increase from 35 to 55 mph as a result of upgrading the bridge. The section of road west of the Lewis and Clark Bridge will also be upgraded with an estimated increase in travel speed from 45 to 55 mph.

Results from the traffic forecast indicate a shift in traffic patterns will take place similar to that of the first alternative. Most traffic along Highway 30 east of Astoria is expected to use the bypass instead of traveling through the downtown area. The magnitude of the shift in traffic volumes is roughly the same.

One major difference between this alternative and the first is that more traffic will utilize the Highway 101 Business Route over Old Youngs Bay Bridge instead of using Highway 26/101 and Highway 202 over Youngs Bay Bridge. In a comparison between the first and second alternatives for the year 2016, traffic is expected to shift from Youngs Bay Bridge to the Old Youngs Bay Bridge by about 170 vehicles during the PM peak hour in the southwest direction and 230 vehicles in the northeast direction. Most of this traffic is anticipated to be through traffic between Highway 30 east of Astoria and Highway 26/101 from Seaside. This shift in traffic will help alleviate future congestion along the problem sections of Highway 26/101 mentioned previously.

Extension of Existing One-Way Couplet

One potential solution to control the projected traffic demand along Marine Drive, east of 16th Street, without constructing the Astoria Bypass is to extend the existing downtown couplet further east out to 23rd Avenue. Providing a one-way couplet along Marine Drive and Exchange Street between 15th Street and 23rd Street will fully utilize the capacity potential of Exchange Street which is less traveled. This will also eliminate left-turning movement conflicts associated with heavy mainstream traffic along Marine Drive. Results from the 2006 and 2016 forecast show that the one-way couplet will operate very efficiently with V/C ratios well under 1.0. Extending the one-way couplet will also eliminate the existing and projected adverse operations (LOS F) associated with left-turn movement at 16th Street and Marine Drive.

However, the couplet will not improve traffic conditions east of 23rd Street where future traffic demand may be greater than the street's capacity. Also, traffic on the minor approaches to Marine Drive east of 23rd Street is expected to remain low but will experience longer delays, especially left-turning traffic which will experience a LOS of F, as traffic volumes increase and the gaps in mainline traffic become less frequent. Concern was expressed that this alternative might impair the operations (value) of the Columbia Memorial Hospital's helicopter landing pad adjacent to Exchange Street and that the road vibration could affect hospital equipment and procedures. Another concern raised is the eastbound access to the Maritime Museum. Access to the Maritime Museum with the one-way couplet extension would be via Exchange and 17 Street with special signing required.

Alternative to the Existing One-Way Couplet Extension

An alternative to the one-way couplet extension would be widening Highway 30 to five lanes which includes a center left-turn lane or raised median in the area of 17th Street and in the 20th-Exchange Street area. These projects are described in Chapter 7. This alternative will handle future traffic similar to the one-way couplet extension but will require an extensive amount of additional right-of-way impacting property including buildings adjacent to the Highway. These types of impacts were of much concern and were a factor in the TAC recommending a 60-foot right-of-way for this section of highway in the future. Minimum right-of-way for Five lanes will be 80 feet or more without any highway parking allowed. Much longer traffic signal spacing will be required to provide for traffic coordination on Highway 30. Getting on to or across Highway 30 will result in longer delays for side street traffic and without traffic signals at the desired crossing locations for pedestrians it will be difficult for pedestrians to cross Highway 30.

Decoupling Duane and Exchange Streets in the Downtown Area

Analysis of this scenario with the traffic model showed that the traffic on the Highway 30 couplet would not be increased by making Duane and Exchange Streets two-way instead of one-way in the downtown area. Duane and Exchange Streets will both operate at acceptable levels for traffic with the proposed changes. Although pedestrians will have to watch for two-way traffic both of these streets are only wide enough for two traffic lanes (34 feet) and pedestrians will be able to cross both streets without major problems. Projects to make Duane and Exchange Streets two-way in the downtown area are described in Chapter 7.

Decoupling Highway 30 in the Downtown Area

Analysis of PM peak hour traffic volumes for the year 2016 under No-Build conditions show that decoupling the entire downtown area will force an excessive amount of traffic, mostly through traffic, onto Marine Drive, which would become one lane of travel each way. PM peak hour traffic volumes are expected to reach 910 vehicles westbound and 859 vehicles eastbound just east of Eighth Street. Assuming a capacity of 800 vph this equates to V/C ratios of 1.13 and 1.07 for the same directions of travel. Traffic volumes west of 16th Street will reach 730 vph westbound and 704 vehicles eastbound, which result in V/C ratios of 0.91 and 0.88, respectively. Decoupling the downtown area along Commercial Street and Marine Drive will reduce the capacity of the entire system. Establishing two-way streets institutes a left-turning movement conflict at each intersection, increasing delay and reducing capacity even further. The high truck volume would add additional delay and further reduce capacity. Also, the existing traffic signals on Commercial Street and Marine Drive will have to be replaced with new signals to incorporate approaches from all four directions instead of two. Parking would have to be removed on Marine Drive to provide for turn lanes and to obtain progression for moving two way traffic some of the traffic signals may need to be removed on Marine Drive. The bulb out areas just installed at 14th Street will have to be removed. Signing and striping will have to be done on each street as well. Crossing Marine Drive would be much more difficult and not as safe for pedestrians.

At the open house there was considerable community concern expressed about the need to keep parking on Marine Drive. The TAC recommended that this alternative not be studied further as a result of the major concerns and problems. Expected high costs associated with this project and lack of benefits it will yield were also primary factors.

FUTURE TRAFFIC OPERATIONS AT SPECIFIC INTERSECTIONS

Future traffic operations were estimated at selected key intersections using the traffic model forecasts. A total of nine signalized and seven unsignalized intersections were selected for analysis. These intersections were already selected and evaluated under existing (1996) conditions as mentioned previously in Chapter 3. Each intersection was analyzed under the No-Build condition and conditions that include both Astoria Bypass alternatives. The operations of these intersections were not evaluated under projects such as establishing Duane Street and Exchange Street as two-way streets. This type of project would not be expected to impact the future operations of these intersections any different than under the No-Build conditions. The traffic operations were not determined for the project establishing all streets in the downtown area as two-way streets. Projected traffic volumes from the EMME/2 model show that Marine Drive will experience traffic volumes in excess of the street's capacity, making this street improvement alternative redundant.

Signalized Intersections

Future operations at the nine signalized intersections were determined using the turning movement volume output from the EMME/2 model. The differences in traffic between future (2006 or 2016) model runs, which include the No-Build and both Astoria Bypass alternative scenarios, and the calibrated (1996) model run were applied to actual base turning movement counts performed in June of 1995. SIGCAP-2 was then used to project future traffic operations at the nine signalized intersections. The results are displayed in Table 6-3 and include the Level-of-Service and Saturation Values.

TABLE 6-3
FUTURE LEVELS OF SERVICE AND SATURATION VALUES (X) AT SELECTED SIGNALIZED INTERSECTIONS

Location	Traffic Movement	1996	2006 No-Build	2006 Astoria Bypass-Alt. 1 or 2	2016 No-Build	2016 Astoria Bypass-Alt. 1 or 2
Hwy 26/101						
Harbor Street	All	C (67%)	C-D (72%)	C-D (72%)*	D (79%)	D (79%)*
Portway Street	All	B (55%)	B (57%)	B (55%)	B (59%)	B (58%)
Hwy 30-Marine Drive						
Astoria Bridge	All	C (69%)	C-D (71%)	C-D (70%)	D (74%)	D (74%)
Basin Street	All	B (56%)	B (58%)	B (55%)	C (60%)	B (57%)
Ninth Street	All	D (79%)	D (81%)	D (77%)	D-E (68%)	D (79%)
11th Street	All	D (78%)	D (82%)	D (74%)	D-E (87%)	D (80%)
14th Street	All	C-D (73%)	D (77%)	C (68%)	D-E (84%)	D (75%)
Hwy 30-Commercial Street						
Ninth Street	All	B (52%)	B (53%)	A (47%)	B (58%)	B (50%)
11th Street	All	B (55%)	B (55%)	B (49%)	C (60%)	B (52%)

*Note: *LOS of C and a Saturation value of 69% will exist with the Astoria Bypass Alt. 2 (extended bypass).*
***LOS of C-D and a Saturation value of 72% will exist with the Astoria Bypass Alt. 2 (extended bypass).*

Under existing (1996) conditions all selected signalized intersections operate at a LOS of D or better

Results for the future No-Build operations for the years 2006 and 2016 show that the LOS at many of these intersections will deteriorate. The three signalized intersections in downtown Astoria along Marine Drive at Ninth Street, 11th Street, and 14th Street, are expected to operate with a LOS of D to E by the year 2016, falling below the minimum LOS D requirement stated in the OHP. Another factor which may impact traffic signal operations is construction of the state offices along Marine Drive between Fourth and Fifth Streets especially if another traffic signal is required in the future. Operations at unsignalized intersections are expected to deteriorate as discussed in the following section making it more difficult to get across or on to the highway. As a result some of this traffic will shift to signalized intersections and lower the levels of service.

However, with the implementation of either of the Astoria Bypass alternatives, the operations of these intersections in the years 2006 and 2016 will be maintained at a LOS of D or better, which are close to existing conditions.

Unsignalized Intersections

Future traffic operations were also determined at the nine selected unsignalized intersections analyzed in the Current Conditions section. Future traffic volumes were determined at these intersections using the turning movement count summaries produced from the EMME/2 model. Base count information was obtained at four of the nine intersections; Highway 26/101 at Highway 101-Business and the Fort Stevens Highway, at Highway 202 and Seventh Street, and at Highway 101 Business Route and Lewis and Clark Road. Future traffic volumes were determined at these four intersections by, first, determining the differences in traffic between future (2006 or 2016) model runs, which include the No-Build and both Astoria Bypass alternative scenarios and the calibrated (1996) model run. These differences in traffic were then applied to base turning movement counts. At the remaining four intersections, the future (2006 and 2016) traffic volumes were taken directly from the EMME/2 model output. The projected operations at all seven intersections are summarized in Table 6-4.

TABLE 6-4
FUTURE LEVELS OF SERVICE AT SELECTED UNSIGNALIZED INTERSECTIONS

Location	Traffic Movement	1996	2006 No-Build	2006 Astoria Bypass-Alt. 1 or 2	2016 No-Build	2016 Astoria Bypass-Alt. 1 or 2
Hwy 30-Marine Drive						
16th Street	Northbound; All	F	F	F	F	F
	Southbound; All	E	E	E	E	E
	Eastbound; Left	A	A	A	A	A
	Westbound; Left	C	B	B	C	C
23rd Street	Northbound; Left, Through	E	E	D	F	E
	Southbound; Left, Through	E	E	D	F	C.
	Eastbound; Left	A	A	A	A	A
	Westbound; Left	A	B	A	B	A
Franklin	Northbound; Left	E	E	B	E	A
Street	Westbound; Left	A	A	A	A	A
33rd Street	Northbound; All	C	D	A	D	B
	Southbound; All	C	D	A	D	B
	Eastbound; Left	A	A	A	A	A
	Westbound; Left	A	A	A	A	A
Hwy 26/101						
Hwy. 101	Northbound; Left, Through	E	E	E (E*)	F	F (E*)
Bus.	Southbound; Left, Through	E	E	E (E*)	F	F (E*)
Fort Stevens	Eastbound; Left, Through	D	E	E (C*)	F	F (D*)
Highway	Westbound; Left, Through	D	E	E (D*)	F	F (E*)
Hwy 202						
Seventh	Southbound; Left	A	B	D	C	E
Street	Eastbound; Left	A	A	A	A	A
Hwy 101 Bus.						
Lewis and	Northbound; Right	A	A	A (A*)	A	A (A*)
Clark Road	Southbound; Left	A	A	A (B*)	A	A (C*)
	Westbound; Left	B	B	B (C*)	B	B (D*)

*Note: *LOS with the Extended Bypass (Alternative 2).*

Existing traffic operations at the minor street approaches to Marine Drive at 16th Street, 23rd Street, and Franklin Avenue all suffer excessive delay, especially the left-turning movements at each intersection which operate at a LOS of E to F. As traffic volumes increase in the next 20 years the ability for traffic to access Marine Drive at these locations will become even more difficult without any street improvements. Construction of either of the Astoria Bypass alternatives will relieve much of the traffic along Marine Drive. In a comparison with the No-Build scenarios, either Astoria Bypass project will improve the minor street operations at 23rd Street and Franklin Avenue.

Unless other improvements are made the northbound and southbound movements at the intersection of 16th Street and Marine Drive will remain at a LOS of F and E in the years 2006 and 2016 regardless of the Astoria Bypass construction.

The northbound and southbound movements at the intersection of 33rd Street at Marine Drive will operate with a LOS of D under future (2006 and 2016) No-Build conditions. With the Astoria Bypass, these levels of service will improve to A and B for the same years.

Existing traffic operations are at LOS E for the northbound and southbound left and through movements at the intersection of Highway 26/101 and the Highway 101-Business Route. By the year 2016, the traffic operations for these movements are expected to deteriorate to LOS F, even with the construction of an Astoria Bypass, which proceeds across the Youngs Bay Bridge. Implementation of the extended bypass alignment alternative to the Astoria Bypass, which proceeds across the Old Youngs Bay Bridge, would maintain operations at LOS E in the year 2016.

Existing traffic operations are at LOS D for the eastbound and westbound left and through movements at the intersection of Highway 26/101 at the Fort Stevens Highway. By the year 2016, the traffic operations for these movements are expected to deteriorate to LOS F, even with the construction of the first alternative to the Astoria Bypass. However, with the construction of the extended bypass, a LOS of D would result for the eastbound movement and a LOS of E for the westbound movement.

Existing and future No-Build traffic operations at the Seventh Street intersection with Highway 202 will be at a LOS of C or better. However, the southbound left-turn movement will decay to a LOS of D in 2006 and LOS of E in 2016 with the installation of the bypass. This is based on four lanes with a left turn lane on Highway 202. The draft EIS for the Astoria Bypass showed that four lanes with a median and left turn lanes will be required on Highway 202. A future traffic signal is shown in the draft EIS at the Seventh Street intersection. The TSP 2016 traffic volumes with the bypass appear to warrant traffic signals at this location. The analysis and traffic forecasts in this TSP also show that four lanes with a median and left-turn lanes will be required at signalized intersections on Highway 202. Two lanes with a median and left-turn lanes appear to be adequate for the next 20 years in sections of Highway 202 without traffic signals.

The operations at the intersection of Highway 101 Business Route and the Lewis and Clark Road will remain at a LOS B or better for individual movements through the year 2016, even with the Astoria Bypass. However, conditions will be at a LOS D or better with the extended bypass. The LOS D will exist for the left-turn movement from the Lewis and Clark Road onto Highway 101 Business Route westbound. With mainstream traffic operations on the highway projected to be at a LOS C or better, this intersection will function adequately with the extended bypass.

The unsignalized intersection of Highway 202/101-Business Route and Highway 26/101 at Smith Point was not included in the previous analysis. A separate analysis was performed at this intersection located in the next section under Areas of Special Interest, along with potential intersection improvements.

AREAS OF SPECIAL INTEREST

One area in Astoria has garnered special attention because of its location, use, or type of proposed improvement. This section describes this area and the issues raised.

Smith Point

Smith Point is the intersection of Highway 101 and Highway 202. Additional traffic generated over the next 20 years will require that this intersection be redesigned. In all scenarios, the intersection will have more traffic than it can handle (well above capacity) if no improvements are made. Two major intersection redesign schemes wer examined for this intersection to provide the additional capacity needed to serve traffic demands until 2016. These schemes were a roundabout and a signalized intersection.

A signalized intersection entails widening the roadway, installing a signal, and maintaining the signal including providing power costs. Signalized intersections can handle higher volumes of traffic more safely than an unsignalized intersection. This would make all three legs of the intersection stop in succession, with some protected turning movements.

An unsignalized version of this intersection would retain Highway 101 as it currently is with a stop sign on Highway 202 and traffic on Highway 101 traveling through the intersection without stopping.

Roundabouts are becoming increasingly popular in the United States and are widely used in European countries and Australia. As compared to the old traffic circles that are still found in some locations in Portland, a roundabout is a larger traffic circle that can channel high volumes of traffic through an intersection. Cars enter the roundabout and travel counter clockwise, exiting the circle when they come to the road going the direction they wish to go. Roundabouts serve several functions mostly centering around slowing traffic through an intersection without stopping it. The first is they handle larger numbers of vehicles than signalized intersections. The second is that by slowing traffic without stopping it roundabouts make the overall delay of a vehicle at the intersection less than in the case of a signalized intersection. The third effect of roundabouts is an increase in the safety of an intersection. This is accomplished because drivers are more aware of the intersection as they approach it, are traveling more slowly through the intersection, and rarely collide with each other at right angles or during turning movements. The improvement in safety is the result of reducing the number of conflict points to a figure equal of the number of lanes the roundabout serves (see Chapter 5, discussion of conflict points).

Smith Point is at the entrance to Astoria for traffic from the south and a roundabout could be landscaped to be esthetically pleasing without having a traffic signal. A roundabout would serve traffic at this intersection well because it would slow northbound traffic entering town, make the intersection safer, and reduce delay considerably. This is evidenced by comparing signalized and unsignalized intersections with the same projected traffic volumes. Table 6-5 shows this analysis.

The analysis in Table 6-5 was made using SIDRA5 (Signalized and Unsignalized Intersection Design and Research Aid) which was developed in Australia. It has over 130 users in the United States and Canada and is based on the calibration of model parameters with the 1994 Highway Capacity Manual commonly used nationally. For the Smith Point intersection analysis, the roundabouts were 100-foot-inside diameter with two travel lanes. This would result in an outside diameter of approximately 140 feet which fits within the existing right-of-way.

The results of the analysis in Table 6-5 are that a temporary traffic signal without added left-turn lanes would be over capacity (level of service F) within 20 years with long intersection delays both with or without the Astoria Bypass. If the extended bypass alternative over the existing alignment of US 101 Business Route (Old Youngs Bay Bridge) was constructed, the widening would not be required and the intersection would operate at level of service B. The roundabout option provides the best level of service for all options with the expected level of service B even with the No-Build option. This roundabout option is the one preferred by the city however additional project refinement will determine if the project option to be implemented is the roundabout option.

TABLE 6-5
SMITH POINT INTERSECTION ANALYSIS

Option with Roundabouts	Delay				LOS			
	S	E	N	INT	S	E	N	INT
1. 1996 Existing Conditions	12.1	16.7	12.7	13.1	A	A	A	A
2. 2006 No-Build	12.1	17.5	12.9	13.3	A	A	A	A
3. 2006 Alternative 1 (Smith Point to New Young's Bay Bridge)	12.2	18.8	14	14.3	A	A	A	A
4. 2006 Alternative 2 (Old Young's Bay)	12.2	15	13.9	13.4	A	A	A	A
5. 2016 No-Build	13	23.3	14.6	15.7	A	B	A	A
6. 2016 Alternative 1 (Smith Point to New Young's Bay Bridge)	12.3	20.6	15.1	15.2	A	B	A	A
7. 2016 Alternative 2 (Old Young's Bay)	12.3	14.8	13.3	13.2	A	A	A	A
8. 2016 No-Build - two-way on Duane and Exchange	13	15.7	14.5	14.1	A	A	A	A
9. 2016 two-way on Duane & Exchange, one-way couplet	12.7	15.8	14.2	13.9	A	A	A	A
10. 2016 No-Build with Gateway, no one-way couplet	13.5	15.7	14.9	14.5	A	A	A	A
11. 2016 No-Build with Gateway, with one-way couplet	12.5	14.5	13.7	13.4	A	A	A	A
12. 2016 Alternative 1, with Gateway, no one-way couplet	12.4	15.8	14.9	14	A	A	A	A
Option with Signalization No Left-Turn Bay	**Delay**				**LOS**			
	S	**E**	**N**	**INT**	**S**	**E**	**N**	**INT**
1. 1996 Existing Conditions	9.9	26.3	23	18.1	B	B	C	B
2. 2006 No-Build	11.1	29.8	31	22.5	B	B	C	B
3. 2006 Alternative 1 (Smith Point to New Young's Bay Bridge)	17	39.8	76.4	44.2	B	C	E	D
4. 2006 Alternative 2 (Old Young's Bay)	10.5	27.1	23.1	18.9	B	B	C	B
5. 2016 No-Build	18.4	42	472	206	B	C	F	F
6. 2016 Alternative 1 (Smith Point to New Young's Bay Bridge)	20.1	44.1	229	103	B	D	F	F
7. 2016 Alternative 2 (Old Young's Bay)	10.5	31.4	31.9	22.6	B	C	C	B
8. 2016 No-Build - 2-way on Duane & Exchange	12.4	31.6	161	77.2	B	C	F	E
9. 2016 two-way on Duane and Exchange, one-way couplet	12	31.4	101	51.6	B	C	F	D
10. 2016 No-Build with Gateway, no one-way couplet	12.7	32.3	306	133	B	C	F	F
11. 2016 No-Build with Gateway, with one-way couplet	13.5	33.1	114	56.6	B	C	F	E
12. 2016 Alternative 1, with Gateway, no one-way couplet	13.8	33.1	86.8	44.8	B	C	F	D
Option with Signalization With Left-Turn Bays	**Delay**				**LOS**			
	S	**E**	**N**	**INT**	**S**	**E**	**N**	**INT**
1996 Existing Conditions	10.2	25.6	12.5	13.6	B	B	B	B
2006 Bypass Alternative 1(Smith Point to New Young's Bay)	17	39.8	47.6	33.3	B	C	D	C
2016 Bypass Alternative 1 (Smith Point to New Young's Bay)	23.3	45.6	22.8	28	B	D	C	C
2016 No-Build with Gateway, no one-way couplet	25.8	50.5	57.5	43.4	C	D	E	D
Option with a Stop Sign on the East Approach	**Delay**				**LOS**			
	S	**E**	**N**	**INT**	**S**	**E**	**N**	**INT**
1996 Existing Conditions	3	2678	6	423	A	F	A	F
2006 Alternative 1 (Smith Point to New Young's Bay Bridge)	5	4137	8	888	A	F	B	F

TRUCK TRAFFIC FORECAST

As part of the Astoria TSP, a forecast for truck traffic was performed separate from the travel demand forecast described above in Chapter 6. This involved a quantitative evaluation of truck traffic along existing truck routes and potentially new truck routes created by the Astoria Bypass. Existing and projected truck traffic was determined for the years 1996, 2006, and 2016, which are the years when the auto traffic forecasts were made. Truck traffic was evaluated in terms of the average daily traffic (ADT) using a 50/50 directional split in truck volumes along all truck routes. Forecasts for each scenario involved estimating total truck volumes, and then the distribution and assignment of the truck traffic. Each step in the forecasting process is described below. For the 2006 and 2016 scenarios, truck traffic volumes were determined under No-Build conditions without any street improvements and under conditions with each of the two Astoria Bypass alternatives. Results from this analysis were used to assess the impacts created by some of the proposed projects described later in Chapter 7, such as the Astoria Bypass.

Total Truck Traffic

Total truck traffic volumes projected for the years 1996, 2006, and 2016 were based on the combination of internal-to-internal (I-I), internal-to-external (I-E), external-to-internal (E-I), and external-to-external (E-E) truck traffic. All truck traffic with at least one or both trip ends in the Astoria area are considered as internal traffic. These trucks are related to businesses in the study area whether they are picking up or delivering goods. External (E-E) truck traffic is composed of trucks which pass through the study area without stopping. These trucks enter at one of six external roadway locations in the Astoria study area and exit at another. These external locations are described in the section above under Traffic Analysis Zones. A 50/50 directional split is normally close for daily traffic volumes including trucks. Using the assumed 50/50 directional split in truck traffic for a 24-hour period, the I-E and E-I trips are equal as are the E-E trips in both directions at one station. In this study the I-I truck traffic was assumed to be zero for the Astoria area. Information on these types of trips would require an extensive study of the businesses in the study area. Also, any delivery trucks classified as regular autos, pick-up trucks, or vans were included as part of the auto demand forecast in the section above.

Existing Internal Truck Traffic

A telephone survey was performed to obtain existing (1996) internal truck traffic information related to businesses in the Astoria area. A list of four major trucking industries was compiled by city officials. These four industries were assumed to be responsible for the majority of the local truck traffic. The trucking company names and trucking information obtained from each telephone discussion is described in Table 6-6.

TABLE 6-6
MAJOR TRUCKING COMPANY NAMES AND INFORMATION

TP Freightliner - Astoria	• Mostly local truck deliveries (versus pick-ups). • An average of 30 trucks operate daily within the City of Astoria – usually 18-foot vans – and delivery time varies. • An average of 30 trucks daily each way to Seaside on Highway 101. Trucks typically depart at about 8:00 AM on weekdays. • An average of 20 trucks daily each way across the Astoria Bridge to the State of Washington on Highway 101. Trucks typically depart about 9:00 AM on weekdays.
Willamette Industry Corporate -Seaside	• Willamette Industries Inc., deals with individual loggers who hire their own contractors for delivery purposes.
NyGard	• Trucks travel to and from logging sites in Longview, Washington, and Warrenton, Oregon, daily. • An average of 10 trucks daily each way through the City of Astoria at about 8:00 AM and early afternoon.
Heavy Hauling	Truck deliveries an average of once a month to and/or passing Astoria. • These trucks use either Highway 30 or Highway 101.
Puget Sound Trucks - Portland	• Seasonal salmon truck deliveries; otherwise, an average of once a month delivery to and/or through Astoria.
Port of Astoria	• The Port of Astoria currently does not generate any truck traffic. The port is currently has plans to start up the import/export of timber products in the near future.

Future Internal Truck Traffic

Future year forecasts (2006 and 2016) included an increase in truck traffic related to the reopening of the Port of Astoria. The Port of Astoria and Willamette Industries, Inc., are planning to begin exporting/importing timber products at the existing port. It is estimated from a discussion with port officials that by the years 2006 and 2016 a total of 70 trucks and 90 trucks will enter and exit the port each day, respectively. Trucks will access the port along Hamburg Avenue or Portway Street from West Marine Drive.

All other in local truck traffic was assumed to remain constant over the next 20 years. This was done for two reasons. The first is because of the projected growth trend of the area. Population and employment is expected to increase by only 0.5 percent a year over the next 20 years. Applying this growth rate to the amount of local or internal truck traffic on the road will result in an insignificant increase compared to the external truck traffic which will traverse the city. Another reason is because of the steady trend in the decline in total tonnage in and out of the port over the last seven years (1990-1996). As the total imports and exports declined over these years, so must have the number of trucks serving the port.

Existing External Truck Traffic

There are a total of six locations where a majority of the external truck traffic enters and exits the Astoria study area. Existing external truck traffic was determined at these six locations by subtracting the internal truck traffic, as mentioned above, from the total truck traffic. The total truck traffic volumes are based on three sources of information:

ODOT Traffic Volume Tables
Manual Turning Movement Counts
ODOT Truck Traffic Counts

The 1995 ODOT Traffic Volume Tables were used to obtain truck volume information at three permanent recording stations along highways outside Astoria. These stations are located along Highway 30 (43 miles east of Astoria), Highway 26/101 (13 miles south of Astoria), and Highway 202 (13 miles southeast of Astoria). Existing information such as the total average daily traffic volumes, truck percentages, and seasonal variations in daily traffic was used to determine the average daily truck traffic during the peak summer month of June 1995. This analysis assumed that the daily truck traffic at these recording stations represent the total truck traffic at three external stations located along each highway entering the Astoria study area. Table 6-7 identifies the location of the three external stations and displays information used to calculate existing truck traffic volumes.

TABLE 6-7
EXISTING TRUCK ADT
(ODOT Traffic Volume Tables)

External Station Location	Total ADT	Truck Percentage	Percentage of ADT for June	Truck ADT
Highway 30-East of the John Day River	9486	8.3%	108%	850
Highway 26/101- southwest of the Fort Stevens Highway spur	11943	3.5%	109%	456
Highway 202- South of Walluski Road	355	7.7%	98%	164

Note Truck percentages include only light and heavy trucks (classified as three or more axle single-unit trucks, all axle single-trailer trucks, and all axle multiple-trailer trucks)

Truck traffic at three other external stations was determined using PM peak hour manual turning movement counts at intersections nearest to the external station. The counts were performed on a weekday in June 1995. Using a peak hour percentage of 8.5 percent, the PM peak hour traffic volumes were converted to ADT volumes. The peak hour percentage assumes that during the PM peak hour of a typical weekday the roadway experiences 8.5 percent of the total daily traffic. This percentage was determined from daily road tube counts taken in 1995 along many sections of arterial and collector streets in Astoria. Table 6-8 displays the total daily truck traffic at the remaining three external stations.

TABLE 6-8
EXISTING TRUCK ADT
(Traffic Counts)

External Station Location	PM Peak Hour Traffic	Truck Percentage	PM Peak Hour Percentage	Truck ADT
Highway 101- Astoria Bridge	565	3.9%	8.5%	260
Warrenton-Astoria Highway - west of King Ave.	855	4.0%	8.5%	402
Lewis and Clark Road- south of Miles Crossing	505	2.0%	8.5%	120

Note: The Fort Stevens Highway west of its intersection with Highway 26/101 was excluded from the truck analysis. ADT truck volumes along this roadway are assumed to be insignificant.

Projected External Truck Traffic

External truck traffic was projected for the years 2006 and 2016. This was done by using the historical growth trends in total traffic, including trucks, at each external location. Average growth rates for total traffic were determined at five of the six external street locations from ODOT's Traffic Volume Tables for the last 10 and 20 years. Assuming that growth will remain constant over the next 10 and 20 years, these rates were then applied to existing external truck traffic volumes to project up to the years 2006 and 2016. Table 6-9 displays the projected external truck traffic volumes using an average annual growth rate.

TABLE 6-9
PROJECTED EXTERNAL TRUCK TRAFFIC

External Station Location	Existing External Truck ADT	Annual Growth Rates	2006 External Truck ADT	2016 External Truck ADT
Highway 30-east of the John Day River	850	3.7%	1240	1730
Highway 26/101-southwest of the Fort Stevens Highway spur	456	2.9%	610	810
Highway 202-south of Walluski Road	164	1.8%	195	240
Highway 101-Astoria Bridge	260	2.9%	350	460
Warrenton-Astoria Highway-west of King Ave.	402	4.5%	630	960
Lewis and Clark Road-south of Miles Crossing	120	1.5%	140	160

Note: Since growth trends could not be obtained at the external station located along Lewis and Clark Road, south of Miles Crossing a growth rate of 1.5 percent was chosen. Traffic growth along this roadway was assumed to be similar to the growth trend along Highway 202.

Truck Traffic Distribution

The next step in the truck forecast involves the distribution of truck traffic. The distribution of internal and external truck traffic was performed separately. Internal truck traffic was distributed based on the origin and destination information obtained from the telephone survey previously described. Future additional internal truck volumes related to the reopening of the port were distributed proportionally to the total amount of traffic, including autos, existing at each external station. External traffic was distributed proportionally to the amount of truck traffic entering and exiting each of the six external stations. Assuming a 50/50 directional split in daily truck traffic, the number of trucks traveling from one external station to another is the same in the reverse direction.

Truck Traffic Assignment

Truck traffic was then manually assigned to the street network. The assignment did not take into account congestion created by other vehicles sharing the roadway or by the quickest routes. Trucks were assigned to paths based on existing and potential truck routes. In some situations is was assumed that signing would direct trucks along a predetermined route to avoid the downtown area and other congested areas.

Existing and Potential Truck Route Locations

Existing truck routes include all highways in the study area as well as the route over the hills of the city along 11th Street, Irving Avenue, Seventh Street, and Eighth Street. Two potential truck route alignments exist, both of which are part of the Astoria Bypass. The Astoria Bypass alignment runs from the John Day River Bridge east of Astoria to a connection with Highway 202 near Williamsport Road. One potential truck route (Alternative 1) is along the proposed bypass alignment proceeding west to Smith Point and across the Youngs Bay Bridge where it will continue southwest to Seaside. The second alignment (Alternative 2), known as the Extended Bypass, will proceed along the initial bypass alignment, turning south along Highway 101-Business Route across Old Youngs Bay Bridge. From there it will continue west across the Lewis and Clark Bridge. A new roadway extension is planned south of the Astoria Airport where the existing highway alignment turns west to north. This will connect Highway 101-Business Route and Highway 101/26 directly with an east-west link.

RESULTS OF TRUCK TRAFFIC FORECAST

Results of the truck traffic forecast are illustrated in Figures 6-5 through 6-11 and described below.

Existing Conditions

During June of 1996, it is estimated that between 780 and 950 trucks passed through the downtown core of Astoria along Marine Drive on a typical weekday. It is also estimated that roughly 80 percent of this traffic is related to external truck traffic, most of which are trucks using Highway 30 to the east. This highway carries about 850 trucks in and out of Astoria daily. About 640 trucks per day use the Youngs Bay Bridge crossing along Highway 26/101. This crossing currently serves as the quickest truck route linking the Warrenton area and Highway 26/101 from Seaside to the Astoria area, Highway 101 into Washington, and Highway 30 leading east towards Portland. Approximately 190 trucks per day are estimated to use Old Youngs Bay Bridge along the Highway 101-Business Route. This route may be considerably longer for some truckers because of the existing alignment and connectivity with the rest of the highway system.

It was determined from manual turning movement counts that approximately 90 trucks per day pass over the hills of Astoria from the one-way couplet along Highway 30 in the downtown area instead of using Marine Drive around Smith Point. These trucks mostly originate from or are destined to the Lewis and Clark Road and Highway 202 external stations.

No-Build Scenario

The 2006 and 2016 year scenarios reveal that the section of Highway 30 from the Astoria Bridge heading east towards Portland will experience heavy truck traffic. Truck volumes are expected to reach between 1,220 and 1,340 trucks a day in 2006 and between 1,670 and 1,830 trucks a day by the year 2016, which is roughly double the current truck traffic. Most trucks will still use the Youngs Bay Bridge crossing on Highway 26/101 (1,060 trucks daily) rather than the Old Youngs Bay Bridge on the Highway 101-Business Route, as shown on the 2006 and 2016 No Build scenario figures (Figures 6-6 and 6-7).

Truck traffic using the truck route over the hills of Astoria are expected to increase by about 50 percent in 2006 (120 trucks daily) and twice the existing size by the year 2016 (190 trucks daily).

Astoria Bypass

Construction of the Astoria Bypass will dramatically reduce the amount of trucks passing through the northern portion of Astoria along Highway 30 and Highway 26/101 from the John Day River Bridge where the bypass begins all the way to Smith Point. Daily two-way truck volumes along this section of roadway are anticipated to be between 90 and 430 in the year 2006 and between 110 and 540 in the year 2016. Estimates also show that the one-way couplet in the downtown area will experience truck volumes of 95 and 105 each way for the same time periods. However, the reduction in truck traffic along this entire section of highway will result in a considerable increase in truck traffic along Highway 202 from where the Astoria Bypass will connect near Williamsport Road all the way up to Smith Point. It was assumed for this alternative that trucks related to the reopening of the port and through trucks from the Astoria-Megler Bridge along Highway 101 would be required to use the reroute if heading east of Astoria on Highway 30. It was also assumed that external truck traffic between the Warrenton/Seaside areas and Highway 30 east of Astoria will be required to use the Youngs Bay Bridge and Highway 202. As a result, daily truck volumes will increase to 970 and 1,420 trucks by the years 2006 and 2016, respectively (along Highway 202 south of Smith Point). Although, there may be no capacity issues except at traffic signals if required in the next 20 years for this section of highway (three-lane section), this is a considerable amount of truck traffic passing by the Astoria High School which is located along this section of highway.

With the inclusion of the bypass and the use of Highway 202 to Smith Point as the truck route for all trucks between Warrenton or Seaside and Highway 30 to the east, daily truck volumes on Youngs Bay Bridge will reach 970 trucks and 1,400 trucks by the years 2006 and 2,016, respectively. This is an increase of 51 percent and 119 percent between now and the years 2006 and 2016, respectively. Truck traffic along the Highway 101-Business Route is projected to increase only slightly in the future as a result of the draft Environmental Impact Statement Astoria Bypass (EIS) truck route along Highway 202 to Smith Point. This is based on the assumption that guide signs and improved traffic control at Smith Point would make the Alternative 1 truck route more attractive.

The draft EIS for the Astoria Bypass showed that four lanes with a median and left turn lanes will be required on Highway 202. Future traffic signals were shown at Smith Point, Denver Street and at the Old Youngs Bay Bridge (US 101 Business Route) intersection. The analysis and traffic forecasts in this TSP also show that four lanes with a median and left turn lanes will be required at signalized intersections on Highway 202. Two lanes with a median and left turn lanes appears to be adequate for the next 20 years in sections of Highway 202 without traffic signals. Construction of the Astoria Bypass should not affect truck traffic on the local street network.

Extended Astoria Bypass

This extended bypass alternative will also decrease truck traffic significantly along Highway 30 and Highway 26/101 through downtown Astoria to Smith Point. Trucks will be rerouted onto the new bypass accessing Highway 202 near Williamsport Road. From there one truck route will continue on to Smith Point and another will turn south across Old Youngs Bay Bridge. The truck route from the bypass to Smith Point will be established for trucks traveling to or from the reopened port and through trucks using the Astoria-Megler Bridge. The second truck rout is for trucks heading to the Warrenton and Seaside areas. The proposed extended alignment south of the airport

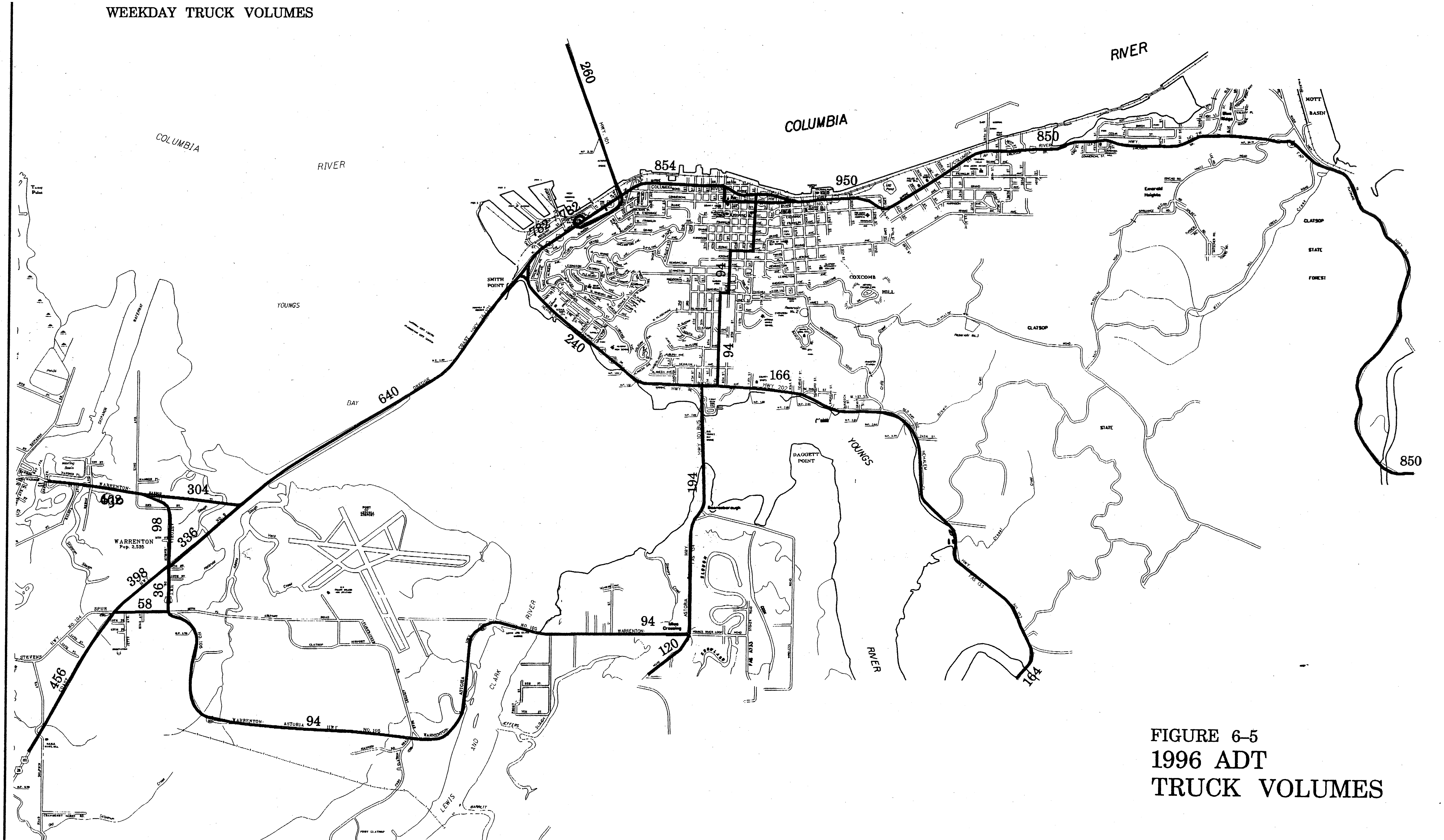


FIGURE 6–5
1996 ADT
TRUCK VOLUMES

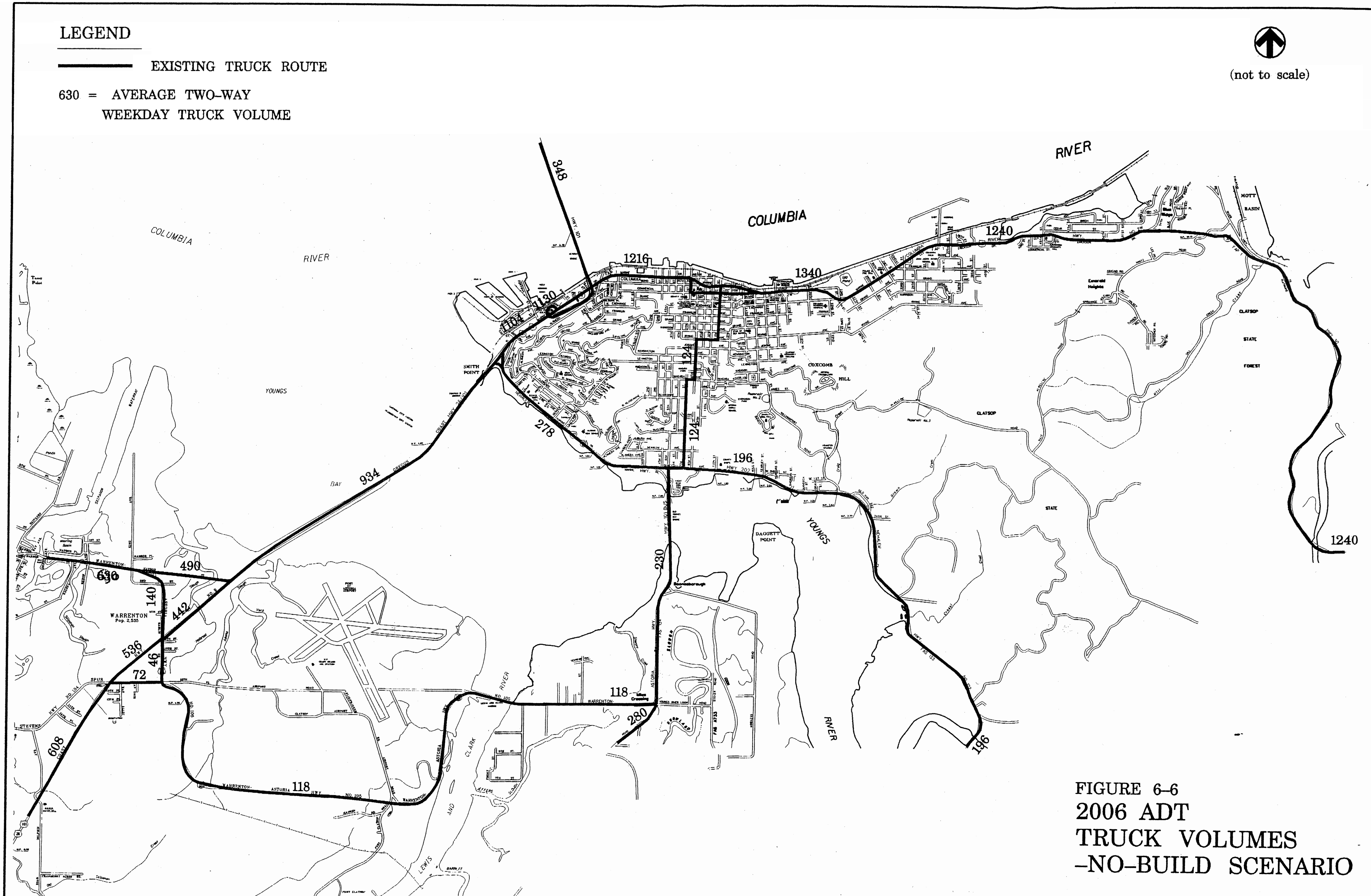


FIGURE 6–6
2006 ADT
TRUCK VOLUMES
–NO-BUILD SCENARIO

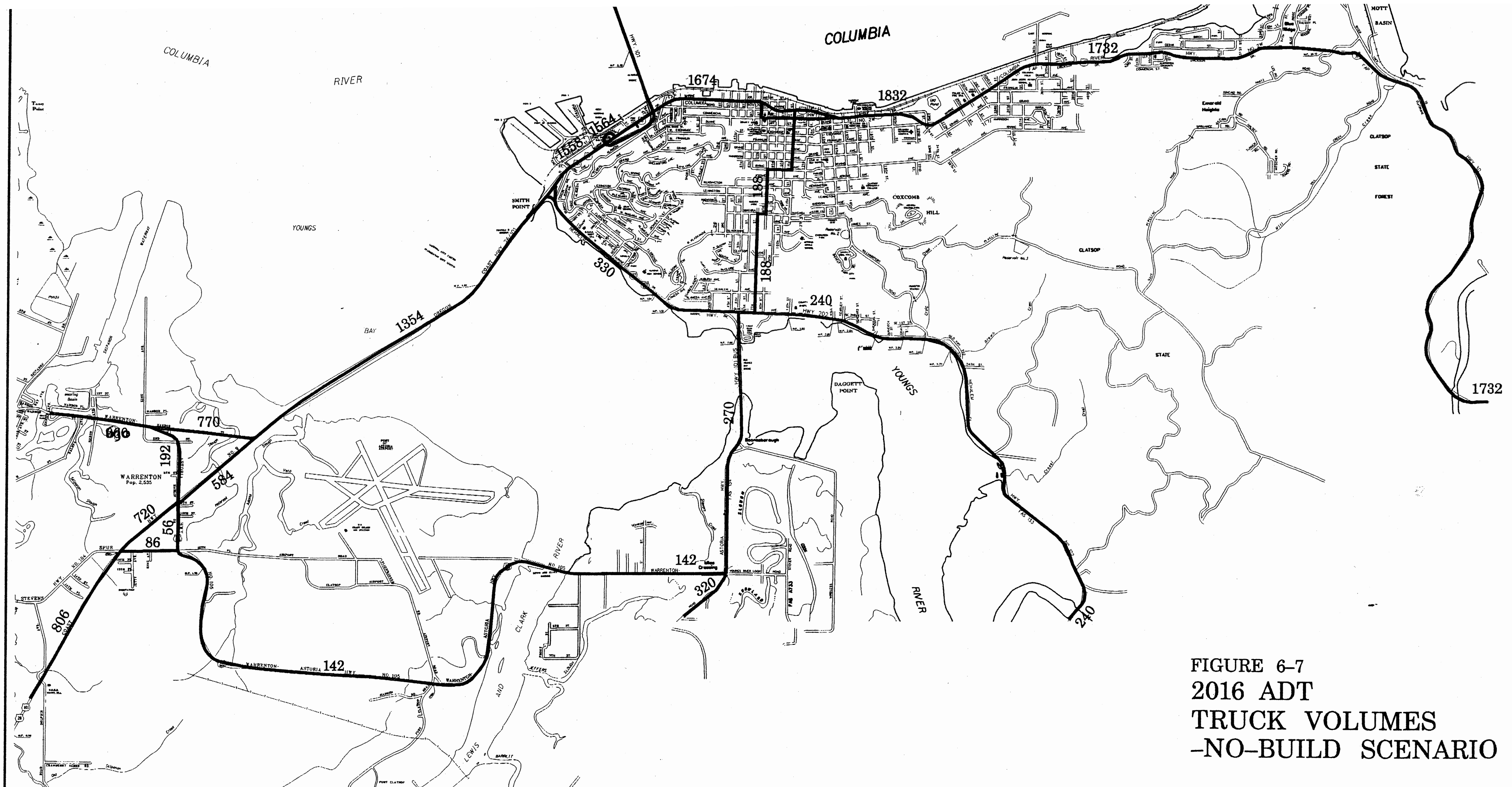


FIGURE 6–7
2016 ADT
TRUCK VOLUMES
–NO–BUILD SCENARIO

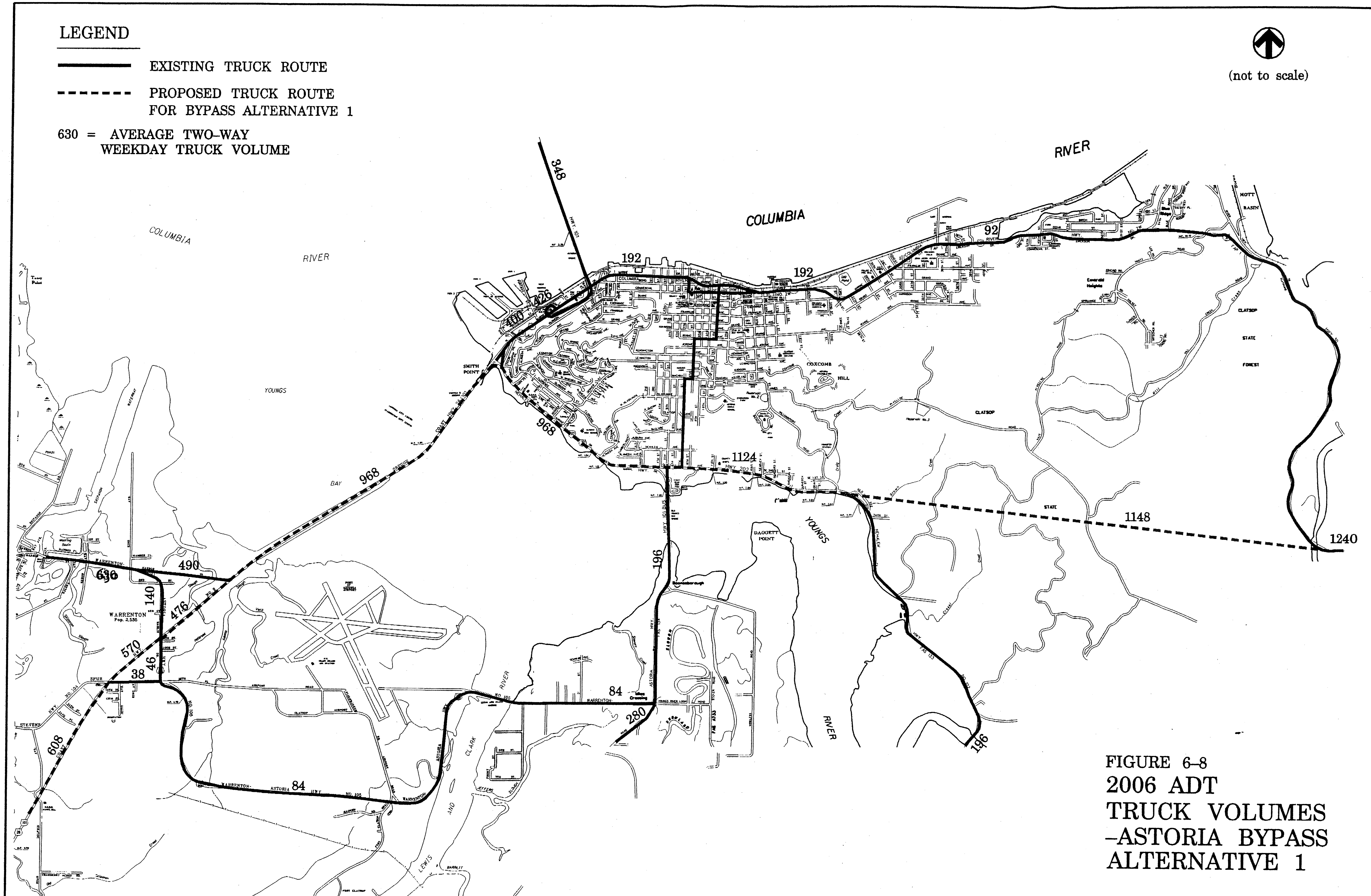


FIGURE 6–8
2006 ADT
TRUCK VOLUMES
–ASTORIA BYPASS
ALTERNATIVE 1

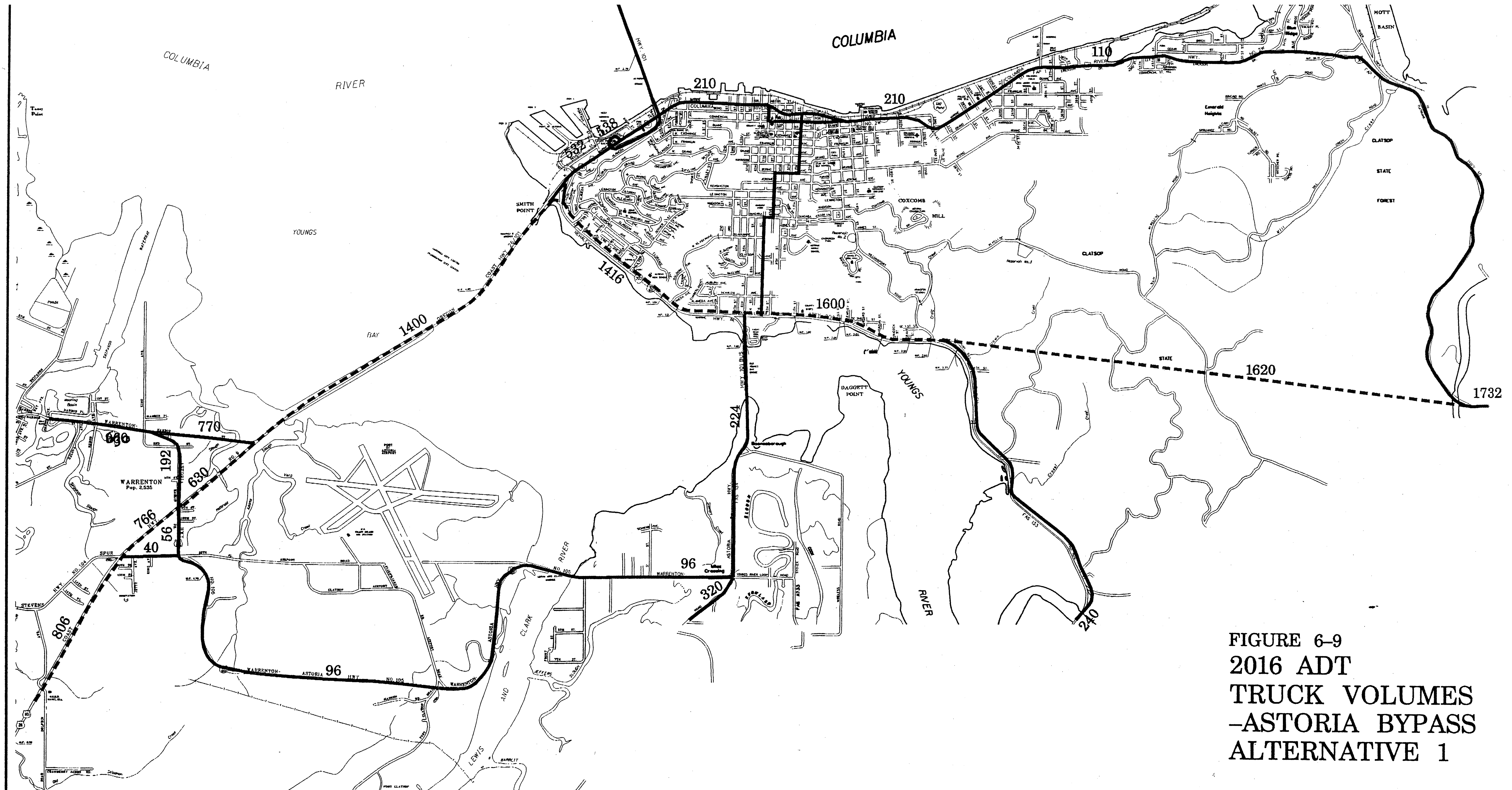


FIGURE 6–9
2016 ADT
TRUCK VOLUMES
–ASTORIA BYPASS
ALTERNATIVE 1

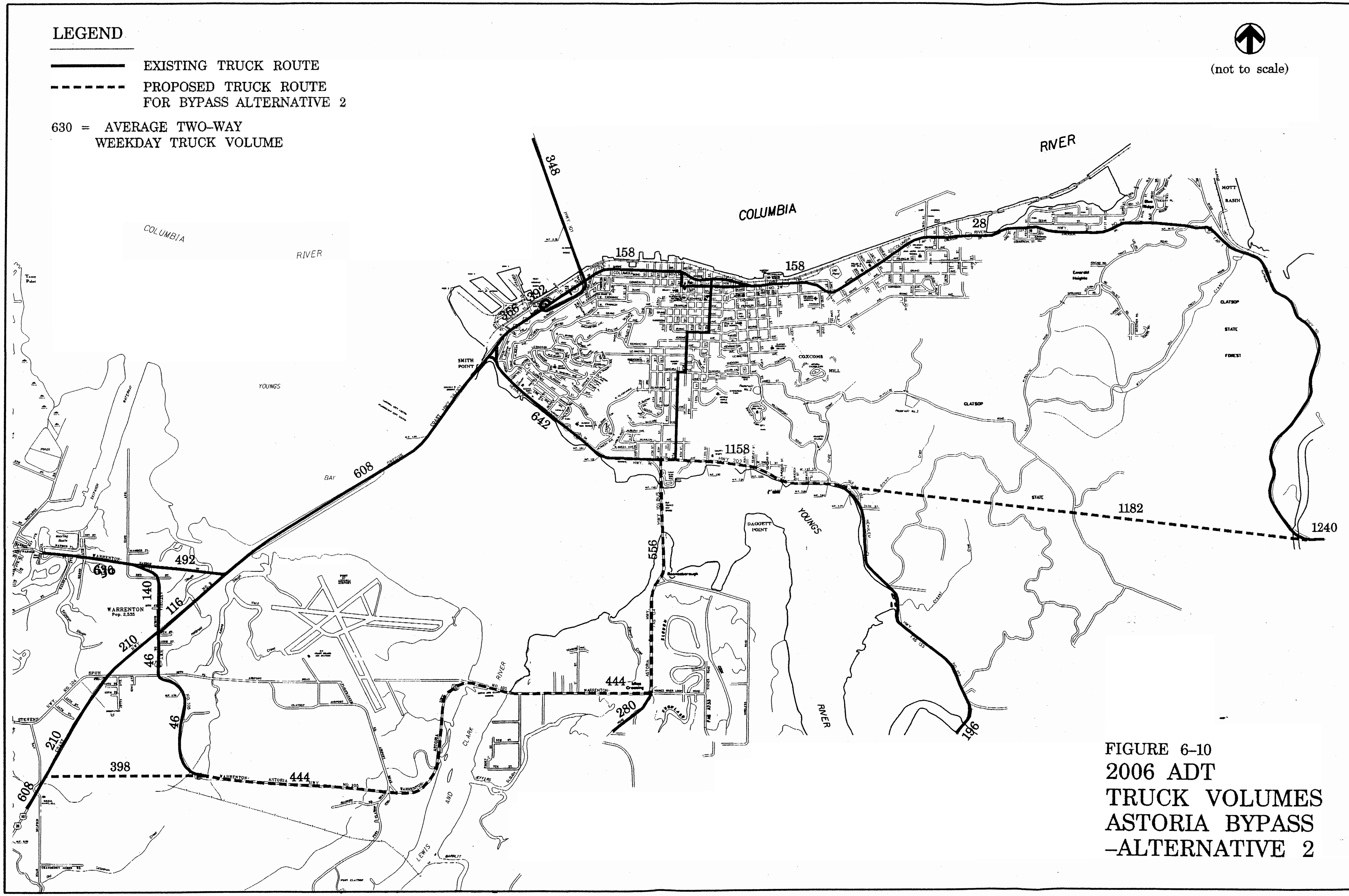


FIGURE 6–10
2006 ADT
TRUCK VOLUMES
ASTORIA BYPASS
–ALTERNATIVE 2

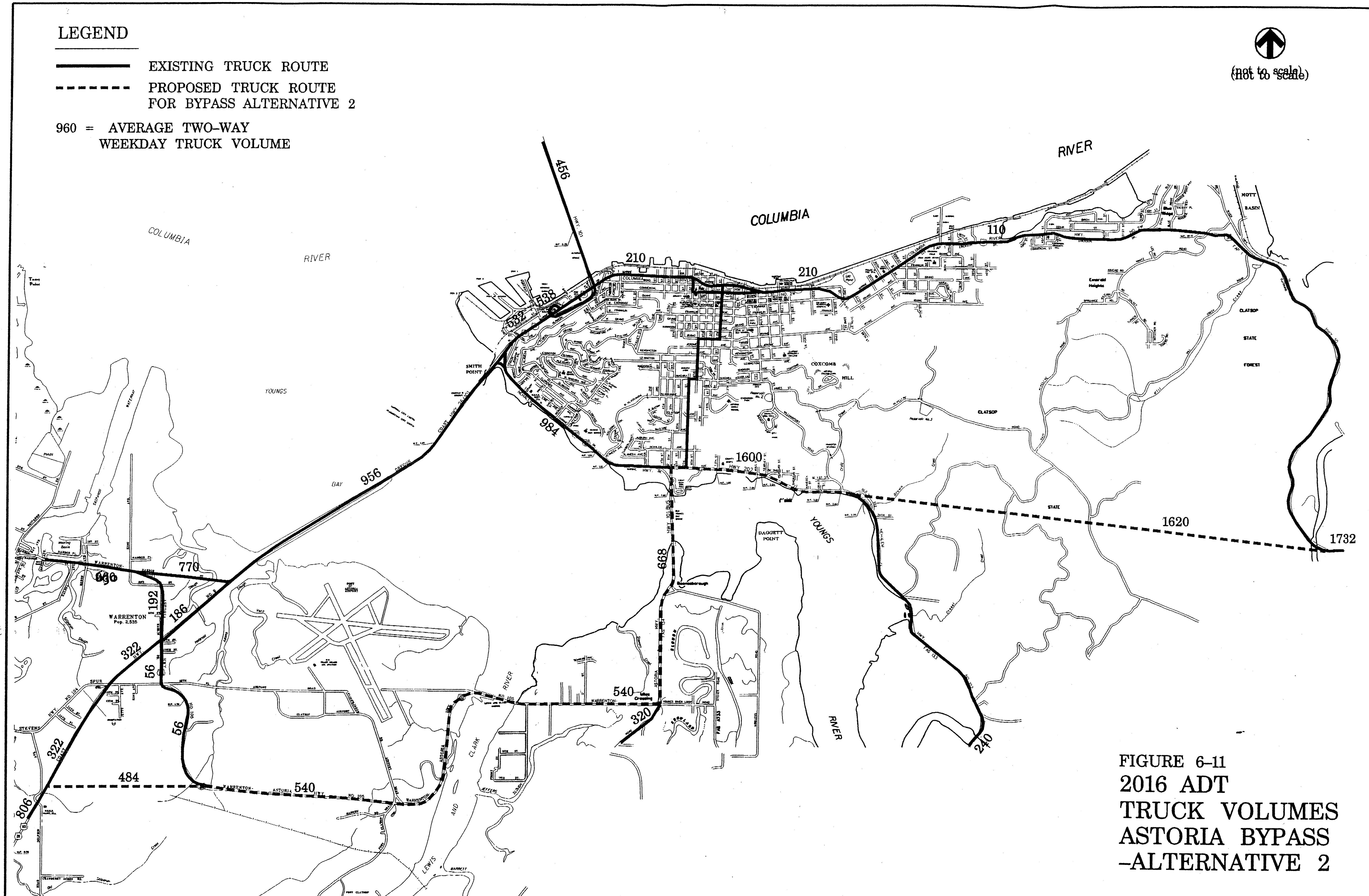


FIGURE 6-11
2016 ADT
TRUCK VOLUMES
ASTORIA BYPASS
-ALTERNATIVE 2

heading due west will provide direct access to Highway 101/26. The existing roadway heading north at the same location will be used by trucks related to the Warrenton area.

This alternative alignment will provide a well balanced truck route system in that the Highway 101-Business Route will direct trucks across Old Youngs Bay Bridge instead of Youngs Bay Bridge. Currently, the capacity of the Business route roadway is underutilized and future traffic forecasts reveal that it will remain this way. Highway 26/101 across the Youngs Bay Bridge is rapidly approaching its capacity. Routing all trucks along the Business route will lower truck volumes along Highway 26/101 and slow the increasing congestion along this roadway.

Between 1996 and the years 2006 and 2016, trucks using the Highway 101-Business Route across the Old Youngs Bay Bridge are expected to increase from 195 to 560 and 670 trucks per day, respectively. Truck volumes on the Youngs Bay Bridge will reduce from about 640 in 1995 to 610 in 2006, increasing to 960 by the year 2016.

CHAPTER 7: TRANSPORTATION SYSTEMS PLAN

The purpose of this chapter is to provide a detailed transportation system plan that will help to promote the goals and objectives set forth by the Astoria community. The plan addresses all modes of transportation available in the Astoria study area which include street system, pedestrian and bicycle, transit, rail, air, water, and pipeline facilities. The plan also includes existing and recommended street classification standards, recommended access management measures, potential future transportation demand management measures and an implementation program project list with estimated costs.

RECOMMENDED STREET CLASSIFICATION STANDARDS

The development of the Astoria Transportation System Plan provides the city with an opportunity to revise their street design standards to more closely fit the functional street classification, and the goals and objectives of the Transportation System Plan. The street classification system for the Astoria area depends on construction of the proposed Astoria Bypass. If the bypass is not planned for construction within the 20-year planning period, then the street classification system shown on Figure 7-1 is recommended. If the bypass is planned for construction during this period, then the street classification system show in Figure 7-2 is recommended. Figure 7-2 includes the extended bypass alignment.

The street design standards that correspond to either of the recommended street classification system figures are listed in Table 7-1, illustrated in Figures 7-3 through 7-9, and summarized in the following pages.

Street design standards relate the design of a roadway to its function. The function is determined by operational characteristics such as traffic volume, operating speed, safety, and capacity. Street standards are necessary to provide a community with roadways that are relatively safe, aesthetic, and easy to administer when new roadways are planned or constructed. They are based on experience, and policies, and publications of the profession[2].

Existing Astoria ordinances provide minimum right-of-way and roadway widths. The street design standards are made more specific to the functional street classification, and modified to comply with bikeway and pedestrian requirements.

Residential Streets

The design of a residential street and the surrounding neighborhood will affect the street's traffic operation, safety and livability. Generally, the average weekday traffic volume on a local residential street averages 400 to 500 vehicles per day. When traffic volumes exceed approximately 1,000 to 1,200 vehicles per day, residents begin to notice and often complain about increasing traffic, noise, and potential accidents. It has also been observed that when traffic volumes reach approximately 5,000 vehicles per day on residential streets, driveway-related accidents become identifiable by location.

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[2] A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials. Recommended Guidelines for Subdivision Streets, Institute of Transportation Engineers. Residential Streets, Objectives, Principles, and Design Considerations, the Urban Land Institute, American Society of Civil Engineers, and the National Association of Home Builders.

Narrower street standards may be used to provide slower traffic and to discourage through traffic movements on local residential streets. Some narrow street standards are proposed in the following section. These narrow standards need to be balanced with the need for access by large fire trucks and large sanitary service vehicles. A possible mitigation for the need for large fire truck access would be a requirement to install sprinkler systems in buildings. This could be considered in new subdivisions along with streets narrower than 28 feet.

TABLE 7-1
RECOMMENDED STREET STANDARDS

Area/Section	Classification	Pavement Width (feet)	Right-of-Way Width (feet)
Citywide	Major Local	36	60
Citywide	Minor Local & Cul-De-Sacs	28	40
Citywide	Collector	40	60
US 30 - US 101 to First Street	Arterial	70	80
US 30 - First Street to West End Couplet	Arterial	58	70
US 30 - East Couplet to Nimitz	Arterial	48	60
US 30 east of Nimitz	Arterial	52	60
US 101 Astoria-Megler Bridge to 202	Arterial	76	100
OR 202 Smith Point to Denver Street	Arterial	82	100
OR 202 Denver Street to Eighth Street	Arterial	74	100
OR 202 Eighth Street to Williamsport	Arterial	58	100
Citwide	One Way Arterials	44	64
Citywide	Local Commercial	38	50
Citywide	Collector Industrial	36	60

The location of sidewalks on residential streets is also important. Sidewalks located adjacent to the curb generally contain mailboxes, street light standards, and sign poles, thus reducing the effective width of the walk. Sidewalks located away from the curb with a planting strip between the street and the walk generally eliminate obstructions in the walkway, and provide a more pleasing design as well as a buffer from traffic. To maintain a safe and convenient walkway for at least two adults, a five-foot sidewalk should be used in residential areas.

Based on these observations, the following residential street standards are recommended.

Local Residential Streets

Local residential streets are intended to serve the adjacent land without carrying through traffic. These streets shall be designed to carry fewer than 1,200 vehicles per day. To maintain low volumes, local residential streets shall be designed to encourage low-speed travel. If the forecast volume exceeds 1,200 vehicles per day, as determined in the design stage, the street system configuration shall either be changed to reduce the forecast volume or the street shall be designed and reclassified as a collector.

There are two options for a local residential street. Each option is illustrated in Figure 7-3. Major local streets sh be a 36-foot roadway within a 60-foot right-of-way. Five-foot-wide sidewalks should be provided. Seven feet o

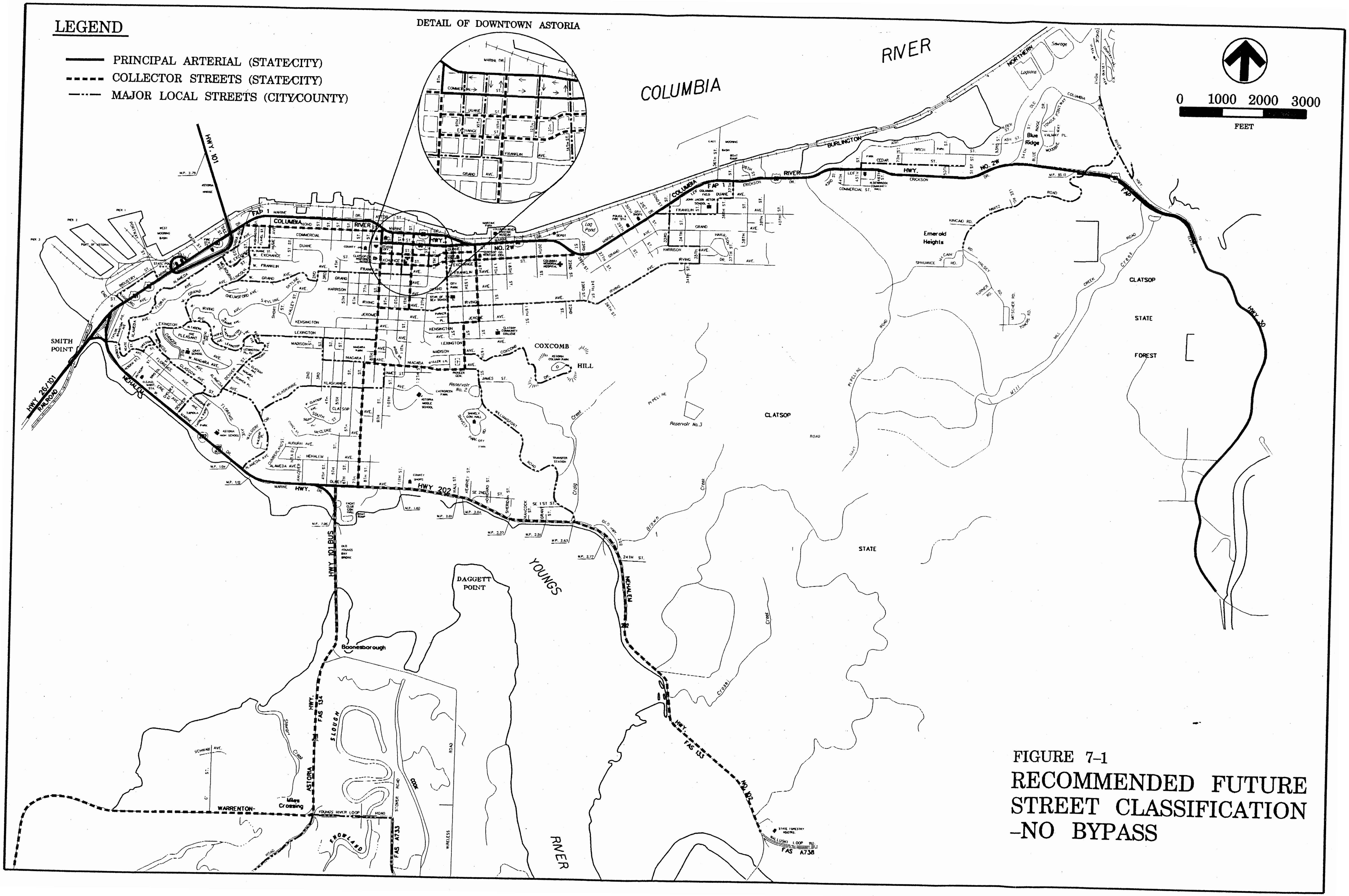


FIGURE 7-1
RECOMMENDED FUTURE STREET CLASSIFICATION –NO BYPASS

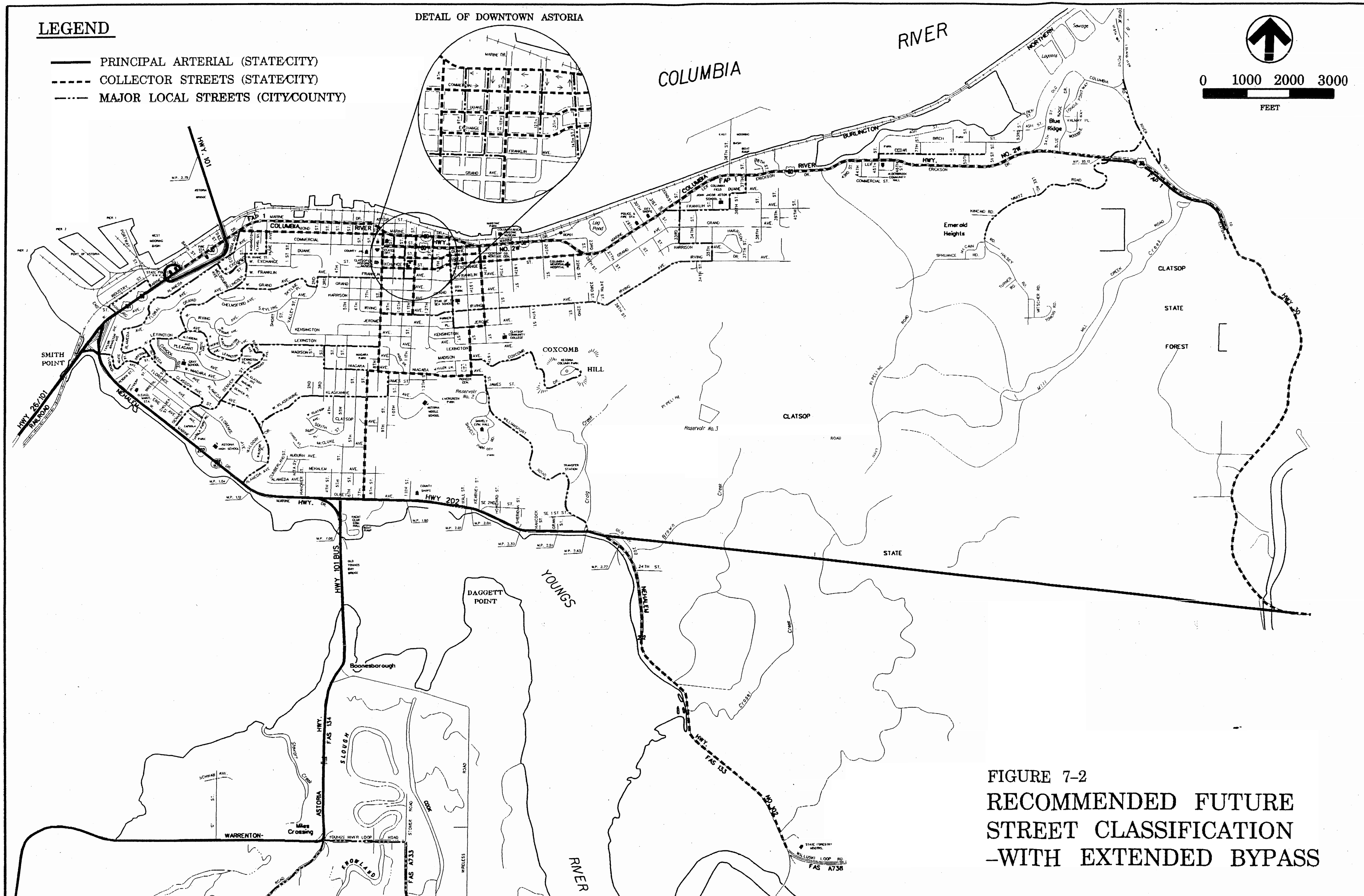
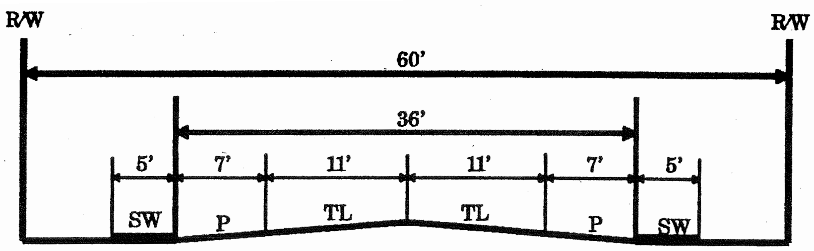
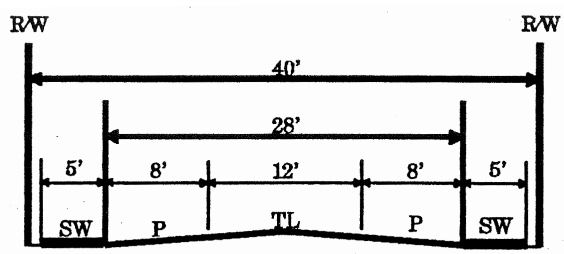


FIGURE 7–2
RECOMMENDED FUTURE STREET CLASSIFICATION –WITH EXTENDED BYPASS

MAJOR LOCAL STREETS



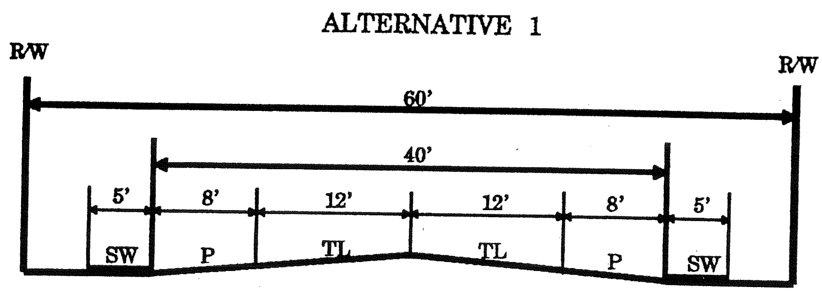
MINOR LOCAL STREETS
AND CUL-DE-SACS

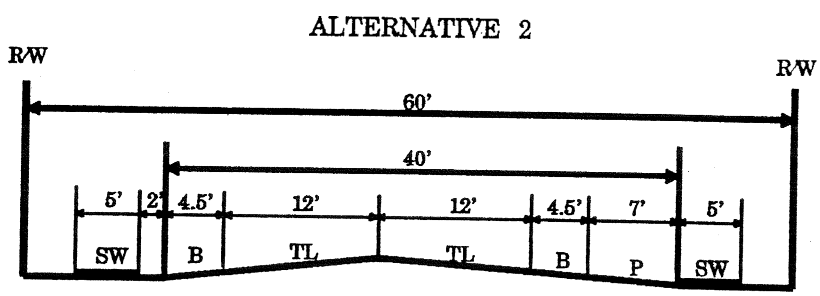


LEGEND

TL = TRAVEL LANE
P = PARKING
SW = SIDEWALK
R/W = RIGHT OF WAY LINE

FIGURE 7-3
STREET DESIGN STANDARDS
-RESIDENTIAL AREA LOCAL STREETS

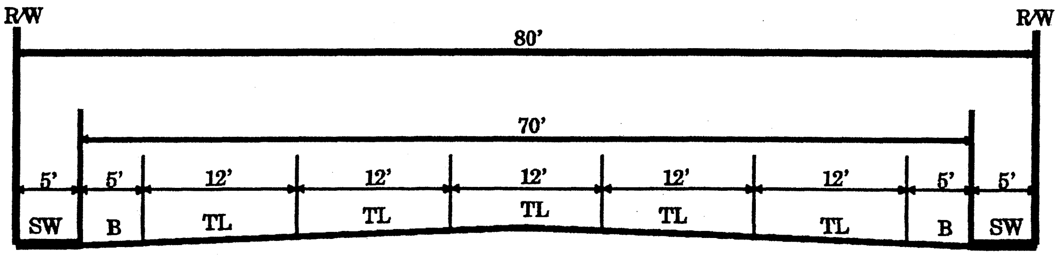




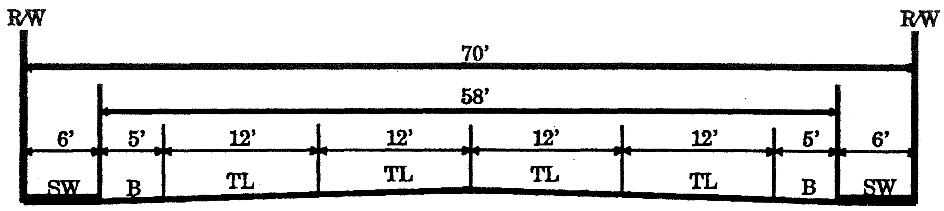
LEGEND

TL = TRAVEL LANE
B = BIKE LANE
P = PARKING
SW = SIDEWALK
R/W = RIGHT OF WAY LINE

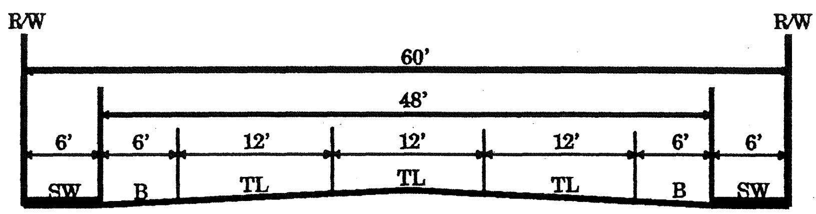
FIGURE 7-4
STREET DESIGN STANDARDS
-COLLECTOR STREETS



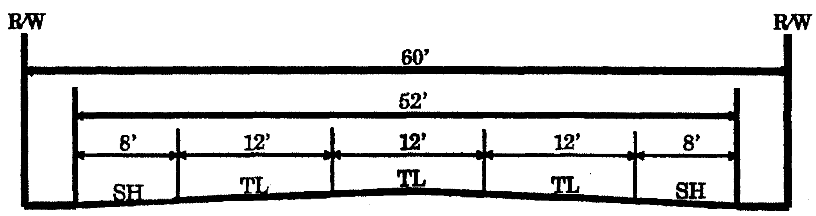
US 101 TO 1ST STREET



1ST STREET TO WEST END OF COUPLET



EAST END OF COUPLET TO NIMITZ

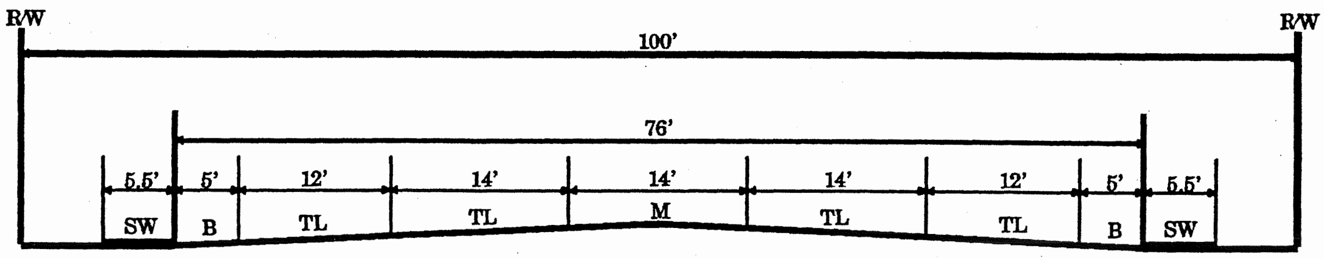


EAST OF NIMITZ

LEGEND

TL = TRAVEL LANE
B = BIKE LANE
SW = SIDEWALK
SH = SHOULDER
R/W = RIGHT OF WAY LINE

FIGURE 7-5
STREET DESIGN STANDARDS -US HIGHWAY 30

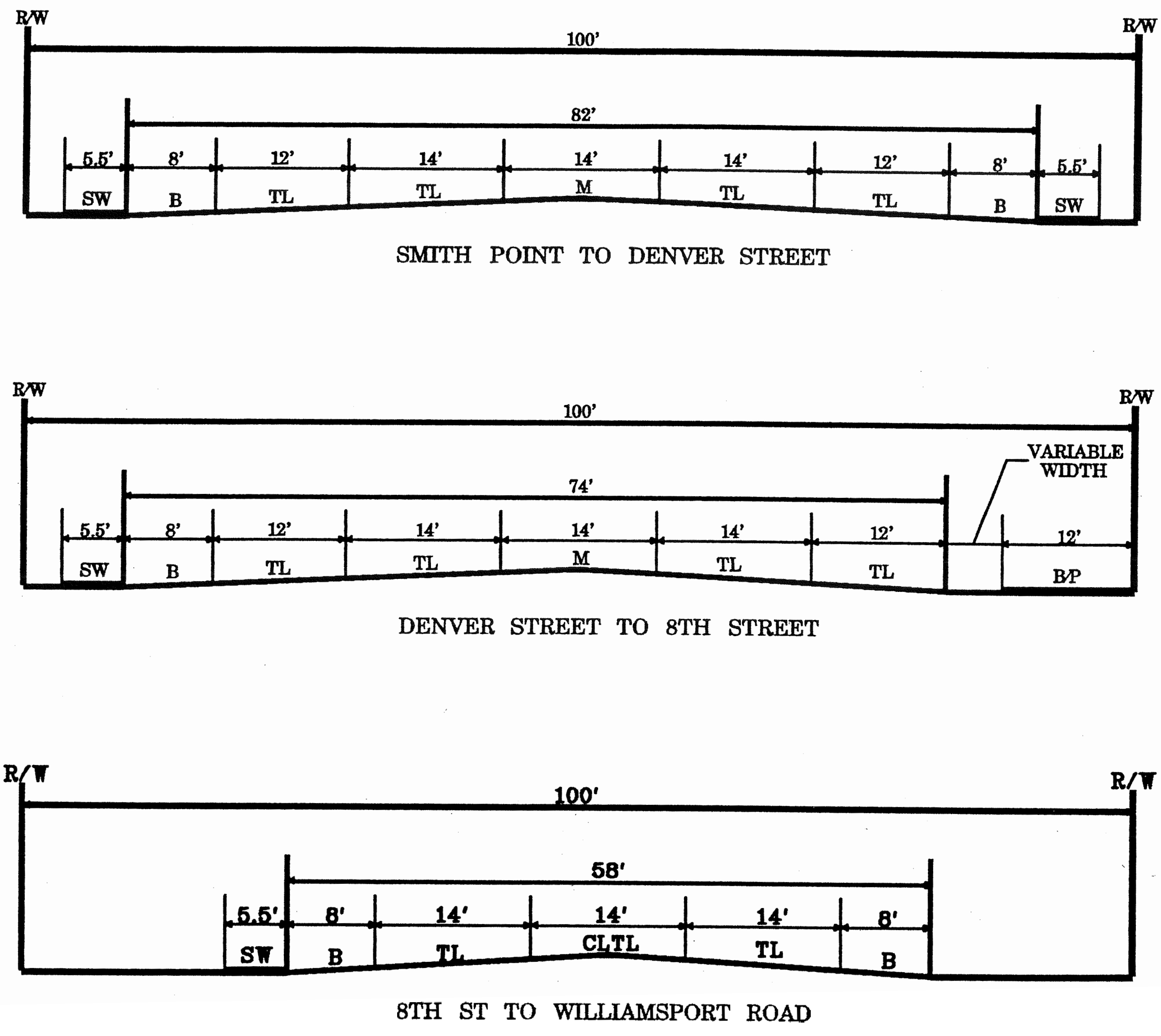


ASTORIA–MEGLER BRIDGE TO OR 202

LEGEND

TL = TRAVEL LANE
M = MEDIAN
B = BIKE LANE
SW = SIDEWALK
R/W = RIGHT OF WAY LINE

FIGURE 7–6
STREET DESIGN STANDARDS
–US HIGHWAY 101



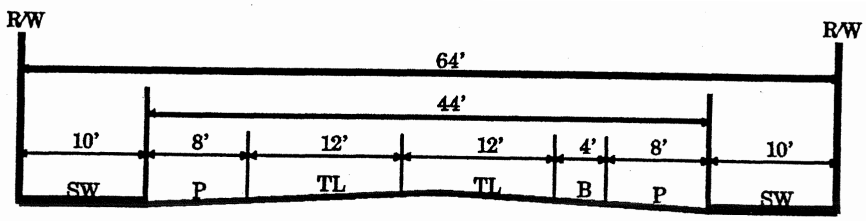
LEGEND

TL = TRAVEL LANE
M = MEDIAN
CLTL = CONTINUOUS LEFT TURN LANE
B = BIKE LANE
B/P = BICYCLE AND PEDESTRIAN USE
SW = SIDEWALK
R/W = RIGHT OF WAY LINE

FIGURE 7-7
STREET DESIGN STANDARDS
-OR HIGHWAY 202

ONE-WAY ARTERIAL STREETS

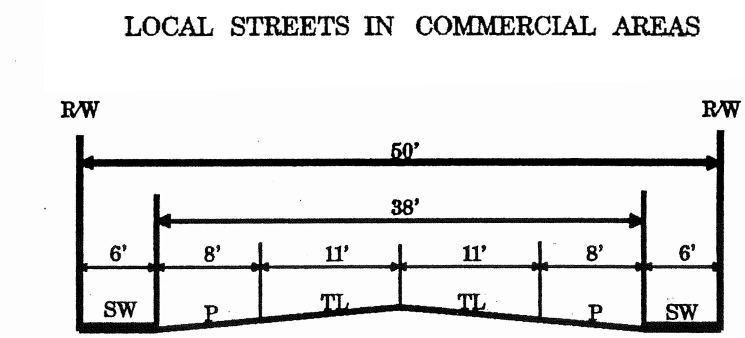
RECOMMENDED

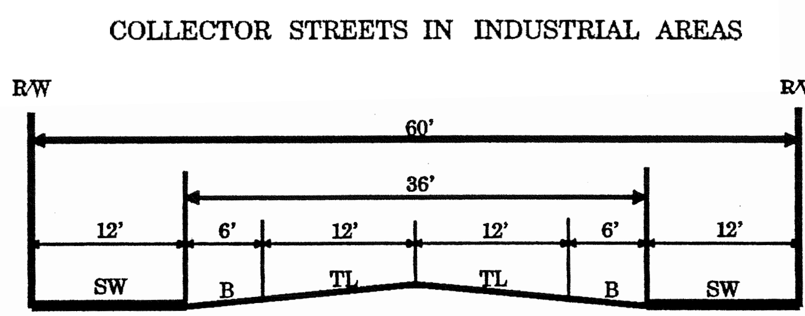


LEGEND

TL = TRAVEL LANE
B = BIKE LANE
P = PARKING
SW = SIDEWALK
R/W = RIGHT OF WAY LINE

FIGURE 7-8
STREET DESIGN STANDARDS
-ARTERIAL STREETS





LEGEND

TL = TRAVEL LANE
P = PARKING
B = BIKE LANE
SW = SIDEWALK
R/W = RIGHT OF WAY LINE

FIGURE 7–9
STREET DESIGN STANDARDS
–COMMERCIAL AND INDUSTRIAL
AREA STREETS

curb parking shall be provided on both sides of the street. Two eleven-foot travel lanes will be provided. Major local streets will carry 600 to 1,200 vehicles per day.

Minor local streets should have a 28-foot roadway, curb face-to-curb face within a 40-foot right-of-way. Five-foot-wide sidewalks should be provided on each side of the street. Eight feet of curb parking shall be provided on both sides of a 12-foot-wide travel lane. On low volume residential streets where curb parking might occur on both sides of the street, one lane of traffic will move freely. This condition has been found acceptable in residential areas where curb parking does not extend for great distances. The level of residential inconvenience caused by the lack of two moving lanes is remarkably low. Narrower streets generally improve neighborhood aesthetics and discourage speeding. They are also more cost-effective due to reduced right-of-way needs, construction cost, stormwater run-off, and vegetation clearance. Minor local streets should carry up to 600 vehicles per day.

Residential Cul-de-Sac Streets

Cul-de-sac streets are intended to serve only the adjacent land in residential neighborhoods. These streets shall be short, serving a maximum of 20 single-family houses. Because the streets are short and the traffic volumes relatively low, the street width can be narrow, allowing for the passage of two lanes of traffic when no vehicles are parked at the curb or one lane of traffic when vehicles are parked at the curb. As shown in Figure 7-2, the street width should be 28 feet, curb face-to-curb face within a 40-foot right-of-way except that a 50-foot right-of-way shall be required for a turn around at the end of the street.. A five-foot-wide sidewalk shall be located constructed on each side of the roadway. Cul-de-sac streets hinder street and neighborhood connectivity and shall not be permitted if future connections to other streets are feasible or likely. Sidewalk connections from a new cul-de-sac shall be provided to other nearby streets and sidewalks

Collector Streets

Collector streets are primarily intended to carry traffic from local streets to arterials. They are generally intended to carry between 1,200 and 10,000 vehicles per day, including limited through traffic. The collector could serve either residential, commercial, industrial, or mixed land uses.

Figure 7-4 illustrates two alternative standards for collector streets. Alternative 1 allows for a 40-foot roadway within a 60-foot right-of-way. Two 12-foot travel lanes, two eight-foot parking lanes and two five-foot sidewalks will be provided. Alternative 2 allows for a 40-foot roadway within a 60-foot right-of-way. Two 12-foot travel lanes will be provided. Five-foot-wide sidewalks and four-and-a-half-foot-wide bikeways shall be provided on each side of the road. One seven-foot parking lane will be provided. Alternative 2 should be considered if traffic volume forecasts exceed 5,000 vehicles per day.

Arterial Streets

Arterial streets form the primary roadway network within and through a region. They provide a through and continuous roadway system which distributes traffic between different neighborhoods and districts. Generally, arterial streets are high capacity roadways that carry high traffic volumes with minimal localized activity.

In Astoria, topography and travel needs limit the number and location of such high volume streets. For these reasons, the arterials in Astoria are parts of Highways 30, 101 and 202. These roadways are specific to their locations. Their widths and composition are largely dictated by topography, right-of-way and adjacent land uses. They are divided into eight subsections and are illustrated in Figures 7-5, 7-6, and 7-7.

One-Way Arterial Streets

One-way arterial streets are intended to move traffic, loaded from collector streets, between areas and across portions of a city or region. In Astoria, the roadways within the one-way couplets serve these functions. These are high capacity one-way arterials intended to quickly and efficiently channel Highway 30 traffic through the city.

Figure 7-8 illustrates the one-way arterial street configuration. These streets will have 44 feet of paved surface in a 64-foot right-of-way. Two 12-foot travel lanes, two eight-foot parking lanes and one four-foot bike lane will be provided. Two 10-foot sidewalks are included. The added width of the sidewalks is necessary due to downtown pedestrian volumes.

Local Streets in Commercial Areas

On local streets in commercial areas traffic and pedestrian volumes are considerably higher than on local streets in residential neighborhoods. Therefore, streets in commercial areas need to be slightly wider both in pavement width and sidewalk width to facilitate the movement of traffic and pedestrians. Figure 7-9 illustrates the street standard for all local streets in commercial areas. These streets will have a 38 feet of paved surface with a 50-foot right-of-way. Two eight-foot parking lanes will be provided along with two six-foot sidewalks. In downtown areas eight-foot wide sidewalks and wider right-of-way are desirable.

Curb Parking Restrictions

Curb parking shall be prohibited at least 25 feet from the end of an intersection curb return to provide sight distance at street crossings.

ACCESS MANAGEMENT

Chapter 5 details the principles of access management and the options the City of Astoria has to apply the principles to the Astoria Transportation System. This section provides the final recommended access management plan for the City of Astoria, including Highways 30, 101, and 202. These recommendations should provide a safer, better managed transportation system for Astoria.

General Access Management Guidelines

The state highways form an integral part of the Astoria transportation system. Access management is an important factor in promoting safe and efficient travel for both local and long distance users. The 1991 *Oregon Highway Plan (*OHP*)* specifies an access management classification system for state facilities. Although Clatsop County the City of Astoria may designate state highways as arterial roadways within their transportation systems, the access management categories for these facilities shall generally follow the guidelines of the OHP.

This section of the TSP describes the state highway access categories, defined in the OHP, which apply to the highways in the Astoria area. Each access category has specific access management guidelines, such as minimum driveway, intersection, and signal spacing.

Highways 101 and 30 through Astoria are roadway facilities of statewide significance. Within the Astoria urban area, OHP Category 4, "Limited Control" applies. A Category 4 facility is defined in the OHP as follows:

> *These highway segments provide for efficient and safe medium-to-high-speed and medium-to-high volume traffic movements on higher function interregional and intercity highway segments. They may also carry significant volumes of longer distance intra-city trips. They are appropriate for routes passing through areas that have moderate dependence on the highway to serve land access and where the financial and social costs of attaining full access control would substantially exceed benefits. This category includes a small part of the statewide facilities and most regional facilities.*

This type of classification permits at-grade intersections or interchanges at a minimum spacing of one-quarter mile. Private driveways shall have a minimum spacing of 500 feet from each other and from adjacent intersections, with both left and right-turns permitted in and out of the driveways. Traffic signals are permitted at a minimum of one-half mile spacing.

However, it is not possible to apply the access management guidelines from the Highway Plan to portions of 30, 101, and 202 in the urban area where the city already has a grid system with intersections spaced at approximately 400-foot intervals. Existing development also precludes the practicality of achieving the OHP spacing guidelines. Clearly, the OHP Category 4 classification cannot be met on these sections of the roadways. Most of the urban core area on Highway 30 is a one-way couplet and all turns are similar to right turns. The access spacing can therefore be closer than on two-way streets as shown in Table 7-2 without reducing safety and efficiency.

These guidelines in Table 7-2 were developed with the help of city, county and state officials as part of the Technical Advisory Committee (TAC).This table describes some access management guidelines that can generally be applied for all roadway functional classifications and the appropriate adjacent land uses.

These access management guidelines are not intended to eliminate existing intersections or driveways. Rather, they shall be applied as new development occurs along arterial collectors and major local streets in Astoria. Over time, as land is developed and redeveloped, the access to roadways will meet these guidelines.

TABLE 7-2
GENERAL ACCESS MANAGEMENT GUIDELINES

Functional Classification	Posted Speed	Minimum Spacing between Driveways and/or Streets3	Minimum Spacing between New Traffic Signals	Appropriate Adjacent Land Use Type
Arterial (Two-way Traffic)	25-50 mph	400 feet	2,800 feet	• Community/neighborhood commercial • Industrial/office/low-volume retail and buffered medium or higher density residential between intersections
Arterial (One-way Traffic	20-35	200 feet	400 feet	• Commercial retail and business
Collector Street	25 -35 mph	100 ft	400 feet	• Primarily lower density residential
Major Local Street	25 mph	access to each lot permitted	400 feet	• Primary residential

Note: These minimum spacings are guidelines and will vary depending on where variances are approved.

Access Management Strategies

As discussed in Chapter 5, general access management strategies were formulated to reduce the number of conflic points along roadways and intersections. Table 7-3 displays the strategies most relevant to the state highway system in Astoria (including US Highway 30, US Highway 101, US Highway 202, and US Highway 101 Business Loop) and should be used where they are deemed necessary. These strategies are discussed in detail in Appendix G.

3 Desirable design spacing (existing spacing will vary)

TABLE 7-3
APPLICATION OF ACCESS MANAGEMENT STRATEGIES TO ARTERIAL, COLLECTOR, AND LOCAL STREETS

Access Management Strategy for Astoria Transportation System Plan	Arterial Collector Local
Limit Conflict Points	
Install raised median divider with left-turn deceleration lane at key intersections	A
Install or expand one-way operations on the highway	A, C & L
Optimize traffic signal installation, spacing and coordination	A & C
Channelize median opening to restrict left-turn ingress or left-turn egress	A
Install curbs, fences, plantings, etc. to prevent uncontrolled access along property frontages and to	A
Offset opposing driveways	A & C
Local driveway opposite a three-leg intersection or driveway and install traffic signals where	A & C
Reconfigure driveways (two-way/one-way)	A & C
Install driveway divisional island to prevent driveway encroachment conflicts	A & C
Regulate the width of driveways (also total driveway widths per property frontage)	A, C & L
Separate Conflict Areas	
Regulate minimum spacing of driveways	A, C & L
Regulate minimum corner clearance	A, C & L
Regulate minimum from property line clearance	A
Provide feasibility standards to optimize driveway spacing in the permit authorizing stage	A, C & L
Regulate maximum number of driveways per property frontage	A, C & L
Consolidate access for adjacent properties	A, C & L
Buy abutting properties	A
Consolidate existing access whenever separate parcels are assembled under one purpose, plan,	A, C & L
Designate the number of driveways to each existing property and deny additional driveways	A & C
Require access on adjacent cross-street (when available)	A & C
Reduce Deceleration Requirements	
Restrict parking on roadway adjacent to driveways to increase driveway turning speeds	A & C
Install visual cues of the driveway	A & C
Improve driveway sight distance	A, C & L
Establish minimum sight distance standards	A, C & L
Optimize driveway location in the permit authorization stage	A, C & L
Increase the effective approach width of the driveway	A & C
Improve the vertical geometrics of the driveway	A, C & L
Require driveway paving	A, C & L
Install right-turn acceleration lane	A
Remove Turning Vehicles	
Install continuous two-way left-turn lane	A & C
Install left-turn deceleration lane to remove turning vehicle from through lane	A & C
Install median storage for left-turn egress vehicles	A & C
Construct a bypass road	A
Provide direct access on lower functional class street when available	A & C
Install right-turn deceleration lane	A
Install additional exit lane on driveway	A
Encourage connections between adjacent properties	A & C
Require adequate internal design and circulation plan	A & C

STREET SYSTEM PLAN

The street system plan outlines a series of improvement options that are recommended for construction within the next 20 years. The street system plan was developed by applying recommended street design standards to year 2016 traffic forecasts for the recommended street system. The proposed street system plan, which includes general roadway improvement projects and projects related to the proposed bypass, is summarized in Table 7-4 and illustrated in Figure 7-10, along with non-motorized improvement projects. A major element of the street system plan is the Astoria Bypass project, which would alleviate the need for other major projects on Highways 30, 101, and 202. The bypass would safely and efficiently accommodate the expected increase in highway traffic in the Astoria area over the next 20 years and would divert much of the Highway 30 truck traffic away from the downtown area of Astoria. The result would be that the existing Highway 30 alignment could be classified as a local collector route in Astoria serving as more of a local access route, as shown on Figure 7-1.

Truck Routes

Trucks routes through Astoria are along the major highways (30, 101, and 202). Future truck traffic will be significantly altered with the construction of either bypass alternative. Currently, a majority of east and westbound truck traffic uses US 30. Some additional truck traffic may be created on US 30 if the Port of Astoria increases its import levels and with development in the Tongue Point area. Due to the topography and existing development there are no existing east/west truck route alternatives for US 30 truck traffic in Astoria.

NON-MOTORIZED PLAN

The Transportation Planning Rule and Goal 12 require that planning be done for all modes of travel. This includes non-motorized travel as well as the vehicular modes. This section provides plans designed to improve the ability of travelers to choose bicycles or walking as a mode of transportation within Astoria. All non-motorized improvement projects included in the Bicycle Plan and Pedestrian System Plan are summarized in Table 7-4 with the locations shown on Figure 7-10 in the projects list section of this chapter.

Bicycle Plan

The current Bicycle Plan for the City of Astoria was adopted on October 5, 1992. This plan outlined the bicycle plans and policies for the city from 1992 to 2012. The bicycle facilities recommended in the Astoria TSP support the recommendations made in the Astoria Bicycle Plan with some modifications through street improvement projects, specific bicycle projects, and recommended street design standards (Figures 7-3 through 7-9).

Where new bike lanes are recommended, they will be one-way, four to six feet wide and will be located adjacent to the curb, except where there is curb parking, a right-turn lane or other mitigating factor. Where these conditions occur, the bike lane will be located between the through travel lane and the parking or right-turn lane. The bike lane will be marked in the same direction as the adjacent travel lane. The striping shall be done in conformance with the *Manual on Uniform Traffic Control Devices*.

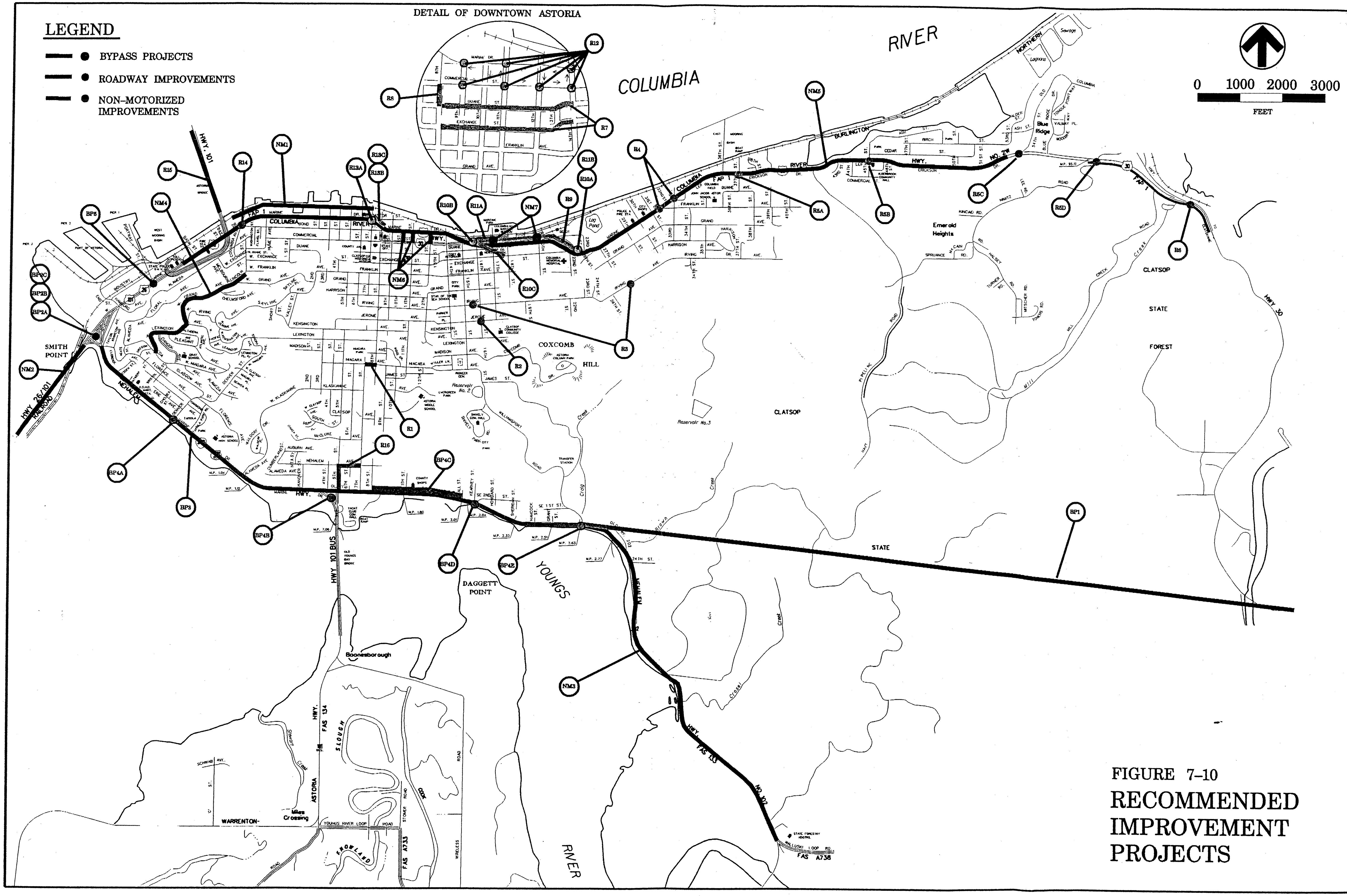


FIGURE 7-10
RECOMMENDED IMPROVEMENT PROJECTS

Bicycles are legally classified as vehicle, which may be ridden on most public roadways in Oregon. Because of this, bicycle facilities shall be designed to allow bicyclists to emulate motor vehicle drivers. Shared roadway facilities are common on city street systems. On a shared roadway facility, bicyclists share normal vehicle lanes with motorists. Where bicycle travel is significant, these roadways shall be signed as bicycle routes.

The bikeways on new streets or streets to be improved as part of the street system plan shall be added when the improvements are made. The implementation program identifies an approximate schedule for these improvements.

On arterial and collector streets not scheduled to be improved as part of the street system plan, improvements shall be implemented based on traffic volumes. When forecast traffic volumes exceed 2,500 to 3,000 vehicles per day, bike lanes shall be added to the existing roadway. The striping of bike lanes on streets that lead directly to schools shall be high priority. Bikeways on local residential streets will only be signed as a route because the vehicular traffic volume is low on these streets and exclusive bike lanes are not necessary

In cases where a bikeway is proposed within the street right-of-way, the roadway pavement (between curbs) shall be widened to provide a five-foot bike lane (collector streets) or a four-foot bikeway (one way arterial streets), as shown on the cross sections in Figures 7-3 through 7-9. Bike lanes on one-way streets shall be located on the right side of the roadway, be one-way, and flow in the same direction as vehicular traffic. The striping shall be done in conformance with the *Manual on Uniform Traffic Control Devices*. In cases where curb parking will exist with a bike lane, the bike lane will be located between the parking and travel lanes. In some situations, curb parking may have to be removed to permit a bike lane.

Bicycle racks for parking have been installed at key locations around the city in the past. This practice should be continued as development or redevelopment occurs. Bicycle parking racks should be installed at all major attractions.

Pedestrian System Plan

A complete pedestrian system should be implemented in the city. Every paved street should have sidewalks on both sides of the roadway as shown on the cross sections in Figure 7-3 through 7-9. Sidewalks on residential and collector streets shall have a five-foot-wide paved width. Sidewalks along arterial streets will have widths ranging between five and 12 feet, they may be present on one or both sides of the road, and may also be part of a multi-use pathway with bicycle usage. In commercial areas, sidewalks should be a minimum of six feet wide and at least eight feet wide in downtown areas.

Pedestrian access on walkways shall be provided between all buildings including shopping centers and abutting streets and adjacent neighborhoods. (Ordinances specifying these requirements will be prepared in a separate document.)

Some sidewalks will be added as improvements to the street system are made. The implementation program identifies an approximate schedule for these improvements.

To address some of the high priority locations, a list of specific sidewalk improvements is included in the capital improvement program.

Costs for adding sidewalks are relatively low if the addition is within the existing right-of-way. A five-foot-wide sidewalk with no curb, would cost about $9 per linear foot. Adding a curb as well as a five-foot-wide sidewalk would cost about $15 per linear foot. In commercial areas, an eight-foot-wide sidewalk with a curb would cost about $20 per linear foot.

Applying these costs to a typical block in Astoria would require about 300 linear feet of sidewalk. For a five-foot-wide sidewalk with curbs, the cost would be approximately $4,500. Without curbs, the cost would be approximately $2,700. The cost of making the mid and low priority pedestrian improvements have not been included in the total capital improvement program cost. Instead it is recommended these improvements be made as funding becomes available and/or as development occurs.

PUBLIC TRANSPORTATION PLAN

The existing public transportation services described in Chapter 3 already meet the requirements of the Oregon Transportation Plan. Connections are possible and convenient between all the services provided, and the service frequency meets the required daily trip to a larger city specified for communities the size of Astoria. In addition new service is planned in the near future to provide line-haul services and direct connections to the Portland Metropolitan area.

Astoria's public transportation service is coordinated through the Sunset Empire Transportation District. With intercity bus service, Astoria's Public Transportation System meets the guidelines of the Oregon Transportatio Plan (OTP). These guidelines are intended to help provide an integrated transportation system for regional ar local agency transportation planning policies and programming. In the OTP under *The Planning and Performance Guidelines,* it states that for jurisdictions with a population under 25,000 such as Astoria, a minimum level of public transportation service should be provided. An example would be to connect intercity bus services to local transit including elderly and disadvantaged services.

For transit provisions, the Transportation System Plan includes a pedestrian and bicycle shuttle across the Astoria-Megler Bridge. This would be a demand response service that would pick up pedestrians and bicyclists wishing to cross the bridge and shuttling them to the other side. Currently, Pacific Transit operates one bus across this bridge, but there are large gaps in the coverage time. Service is currently being coordinated by Sunset Empire across the New Youngs Bay Bridge. Additional bus shelters, kiosks and a transportation center are also included as projects in the plan. Better service to the Emerald Heights area in Astoria will be considered. Future expansion of service will be considered to better serve some of the rural unincorporated areas such as Arch Cape to the south, Knappa/Svensen/Westport to the east and Jewell/Olney to the southeast. Extending the hours of operations in the evenings and on Sundays will also be considered as has been requested. Funding is adequate to meet existing service requirements but will need to be increased in the future for expansions of service and costs.

Taxi Service

Taxi service provides an important and flexible component to the transportation system in Astoria. This is also true in many other communities in America with approximately 88 percent of the communities having taxis controlling the number of taxis. The four areas of taxi service commonly regulated are market entry (number of companies and taxis), rates, public safety and service quality. With one taxi per 500 population, it appears that Astor presently has plenty of taxis to service the demand expected. As long as there few complaints and the taxi industr is economically viable at this level it would not appear a change is needed in the number allowed. There are some other transportation factors that could change the number of taxis required such as needed service for additional cruise ships or other new services. One option to controlling the number and rates for taxis would be to allow open entry and let the market determine the number and the rates charged. This has not always worked well for the benefit of the users and providers as evidenced by the 88 percent of jurisdictions regulating the number of taxis. Assuming that regulation of the number continues in Astoria, the process should continue to be flexible enough to allow for changes and new services. The burden of proof for additional service should rest with the additional taxi proponent (applicant) to provide the needed facts for the city police to make the decision to allow more taxis.

PLANS FOR OTHER MODES OF TRANSPORTATION

Rail Service

There are no rail service recommendations in this Transportation Systems Plan. Recent changes by Burlington Northern have left most of the trackage in the city unused and rail banked by the city. The existing rail line may be the location for a future trolley or other rail service in a future update of the TSP.

Air Service

A runway improvement for the Port of Astoria Airport is included in the Transportation Systems Plan. Commercial air service to and from Astoria is provided by Harbor Airlines.

Water Service

No water service improvements are included in this Transportation Systems Plan. There are no projects regarding the Port of Astoria in the Transportation Systems Plan. It is recommended, however, that the Port and the City of Astoria continue to coordinate their improvement plans in the future, should activity at the Port rise.

Pipeline Service

There are no pipeline service improvements in this Transportation Systems Plan.

TRANSPORTATION DEMAND MANAGEMENT PLAN

Through transportation demand management, peak travel demands could be reduced or spread to more efficiently use the transportation system, rather than building new or wider roadways. Techniques that have been successful and could be initiated to help alleviate some traffic congestion include carpooling and vanpooling, alternative work schedules, bicycle and pedestrian facilities and programs focused on high density employment areas. There are no current high-density employment areas or high-density residential developments in Astoria to justify TDM measures at the present time. Existing vehicle occupancy is high in Astoria and TDM in Astoria would not alleviate the need for any other transportation projects. However, some TDM measures may be appropriate in the future to supplement the other transportation systems.

Alternative Work Schedules

Alternative work schedules (such as flex-time or staggered work hours), especially with large employers, can help spread the peak period traffic volumes over a longer time period, thus providing greater service out of a fixed capacity roadway. Staggered work schedules should be encouraged with new industries and be coordinated to eliminate high surges of traffic.

Carpooling and Vanpooling

The city can work with any new large employers to establish a carpool and vanpool program. These programs, especially oriented to workers living in other neighboring cities, will help to reduce the travel and parking requirements, and to reduce air pollution. Employers can encourage ridesharing by providing matching services subsidizing vanpools, establishing preferential car and vanpool parking and convenient drop-off sites, and through other promotional incentives.

Bicycle/Pedestrian Facilities

Bicycle/pedestrian use can be encouraged by implementing strategies discussed earlier in this plan. Providing bicycle parking, showers and locker facilities helps to encourage bicycle commuting and walking to work.

Telecommuting

The ability for people to work at home with the telecommuting technology is likely to continue to grow during the next two decades. During the past ten years, the percent of people working at home has more than doubled. If this trend continues, an additional 3 percent of the work force could stay home and work, thus reducing trips during the peak hour.

TRANSPORTATION SYSTEM IMPLEMENTATION PROGRAM

Implementation of the Astoria Transportation Systems Plan requires some changes to the comprehensive plan and zoning code, and preparation of a 20-Year Capital Improvement Plan (CIP). These actions will enable the City of Astoria to address existing and future transportation issues throughout the planning area. The "Model Transportation Planning Rule Ordinances and Policies for Small Jurisdictions," dated August 1996 and prepared by David Evans and Associates, Inc., can serve as a guide for ordinances and policies adoption. The implementation program is intended to provide the city with the tools to fund and schedule transportation system improvements.

The CIP details necessary transportation system improvements for the planning area based on expected growth and provides a process to fund and schedule the identified improvements. It is expected that this transportation system plan capital improvement plan can be integrated into the existing Astoria CIP and the ODOT transportation improvement program. This integration is important since funding from all sources is needed for some of the transportation improvement projects.

It is important to provide for updates to this transportation system plan and CIP. As part of the update process will be necessary to periodically review the available financing and transportation project needs. A spreadsheet is being provided as part of this project so the city can update the project list and financing. The financial analysis for the CIP is discussed in the next chapter of this report.

Table 7-4 shows the CIP project list that is discussed in the following section.

PROJECT LIST

A variety of improvement projects have been identified by the TAC to mitigate current concerns and forecasted deficiencies in Astoria's transportation system. This chapter details all of the proposed Transportation System Plan projects including estimated costs. These projects are designed to provide the most cost-effective solutions to existing and anticipated transportation deficiencies.

The projects are divided into the following four categories:

- Bypass Improvements;
- Roadway Improvements;
- Non-motorized Improvements; and
- Transit Water and Air Improvements.

Bypass improvements refer to projects that are part of the proposed Astoria Bypass project. Roadway Improvements encompass projects that primarily benefit vehicles. Non-motorized Improvements encompass projects that primarily benefit bicycle and pedestrian access and travel. Transit Water and Air Improvements includes projects that help with transit, boat and air operations.

Table 7-4 presents the list of recommended projects along with their prioritization and costs. The cost of each project listed was prepared on the basis of 1995 dollars. These costs include design, construction, right-of-way acquisition, and contingencies where appropriate. The cost estimates are preliminary by roadway segment and do not include water or sewer facilities, or more detailed intersection design. This capital improvement program is estimated to cost approximately $65 million for Astoria to implement. Figure 7-10 displays the locations of these projects. A detailed description of the recommended projects follows Table 7-4. The improvement costs are summarized by mode in Table 7-4.

TABLE 7-4
STREET, BIKEWAY AND PEDESTRIAN SYSTEM IMPROVEMENTS PROJECT LIST

New Proj No.	Project Location	Project Description	Project Impacts: Vehicle	Project Impacts: Bicycle	Project Impacts: Pedestrian	Project Justification: Access	Project Justification: Economic	Project Justification: Safety	Project Justification: Operations	Project Justification: Upgrade	Project Phasing	Project Cost
	Category BP Bypass Projects											
BP1	Astoria Bypass	Bypass	■	■	■	✓	✓	✓	✓	✓	Long-Range	$40,000,000
BP2	*Nehalem Highway /Oregon Coast Highway Intersection (Smith Pt.)*											
BP2a	Nehalem Highway /Oregon Coast Highway Intersection (Smith Pt.)	New Signalization	■	■	■	✓	✓	✓	✓	✓	Short-range	$150,000
BP2b	Nehalem Highway /Oregon Coast Highway Intersection (Smith Pt.)	Roundabout	■	■	■	✓	✓	✓	✓	✓	Intermediate-Range	$300,000
BP2c	Nehalem Highway /Oregon Coast Highway Intersection (Smith Pt.)	Widening, Revise Intersection and Traffic Signal	■	■	■	✓	✓	✓	✓	✓	Intermediate-Range	$1,000,000
BP3	Hwy 202 Between Williamsport and US 30	Bike Lanes		■	■	✓		✓	✓		Long-Range	$250,000
BP4	*Highway 202 Intersection Improvements*											
BP4a	Highway 202 and Denver Street	Intersection Redesign	■	■	■	✓	✓	✓	✓	✓	Intermediate-Range	$250,000
BP4b	Hwy 202 & Hwy 101 Business Intersection	Intersection Redesign, New Signal	■	■	■	✓	✓	✓	✓	✓	Intermediate-Range	$250,000
BP4c	Highway 202 8th St to Wall Street	Left Turn Lane	■	■		✓	✓	✓	✓	✓	Long-Range	$1,000,000
BP4d	Highway 202 and Kearney / 2nd Streets	Intersection Improvements	■								Long-Range	$250,000
BP4e	Highway 202 and Williamsport Road	New Interchange	■	■		✓	✓	✓	✓	✓	Long-Range	$700,000
BP5	Marine Drive at Portway Street	Intersection Redesign	■	■	■	✓	✓	✓	✓	✓	Long-Range	$300,000
	Category R Roadway Improvements											
R1	Niagara @ 7th / 8th Interchange	Intersection / Channelization Improvements		■		✓	✓	✓	✓	✓	Short-range	$10,000
R2	Jerome @ 16th	Intersection / Sight Distance Improvements	■	■	■	✓	✓	✓	✓	✓	Short-range	$5,000
R3	Irving Street (2 locations)	Bridge Improvements (Painting)	■			✓	✓	✓	✓	✓	Intermediate-range	$1,500,000
R4	Highway 30 @ Franklin and 33rd	Intersection Improvements	■	■	■	✓	✓	✓	✓	✓	Short-range	$300,000
R5	*Highway 30 at Eastern Intersections*											
R5a	Highway 30 at 37th	Intersection Improvements and parking	■	■	■	✓		✓	✓		Intermediate-Range	$50,000
R5b	Highway 30 @ 45th	Intersection Improvements (Left Turn Lane)	■	■	■	✓	✓	✓	✓	✓	Intermediate-Range	$700,000
R5c	Highway 30 @ 54th	Intersection Improvements	■	■	■	✓		✓	✓	✓	Intermediate-Range	$500,000
R5d	Highway 30 @ Nimitz Road and @ Old US 30	Intersection Improvements	■	■	■	✓		✓	✓		Intermediate-Range	$[illegible]
R6	Highway 30 and South Tongue Point	New Intersection	■	■	■	✓	✓	✓	✓	✓	Intermediate-Range	$[illegible]
R7	Duane and Exhange Streets	End One-Way Designation	■	■	■	✓	✓	✓	✓	✓	Intermediate-Range	$[illegible]
R8	8th Between Duane and Commercial	Make One-Way	■	■	■	✓	✓	✓	✓	✓	Intermediate-Range	$50,000
R9	Highway 30 at 16th to 23rd street	Install center left turn lane	■	■	■	✓	✓	✓	✓	✓	Intermediate-Range	$800,000
R10	*One-Way Couplet Extension Projects (optional with R11)*	*Couplet Extension*										
R10a	Highway 30 @ Exchange Street	Intersection Improvements	■	■	■	✓	✓	✓	✓	✓	Long-Range	$100,000
R10b	Highway 30 @ 16th Street	Intersection Improvements	■	■	■	✓	✓	✓	✓	✓	Long-Range	$300,000
R10c	Highway 30 @ West End of New One-Way Couplet Extension	Intersection Improvements	■	■	■	✓	✓	✓	✓	✓	Long-Range	$1,000,000
R11	*Highway 30 16th to Exchange Widening (optional with R10)*											
R11a	Highway 30 at 16th-17th Street	5-Lanes, With Signal at 17th Street	■	■	■	✓	✓	✓	✓	✓	Long-Range	$1,000,000
R11b	Highway 30 at Exchange Street	Widening with turn lanes at Exchange Street	■	■	■	✓	✓	✓	✓	✓	Long-Range	$850,000
R12	Highway 30 on existing one-way couplet (Marine & Commercial)	New Traffic Signals	■	■	■	✓	✓	✓	✓	✓	Intermediate-Range	$850,000
R13	*Highway 30 @ West end of Existing One-Way Couplet*	*Intersection Improvements*										
R13a	7th Street	7th Street Revisions	■	■	■	✓	✓	✓	✓	✓	Short-range	$5,000
R13b	US 30 Western End	Pedestrian Island			■	✓		✓	✓		Short-Range	$50,000
R13c	US 30 Western End	Channelization	■					✓	✓	✓	Short-Range	$1,000,000
R14	US 30 and Columbia Avenue Intersection	Rechannelization and Intersection Control	■	■	■	✓		✓	✓	✓	Intermediate-Range	$750,000
R15	US 101 Astoria Megler Bridge	Bridge Painting	■				✓				Short-Range	$7,000,000
R16	7th Street and OR 202	Arterial Realignment	■	■	■	✓		✓	✓	✓	Intermediate-Range	$350,000
	Category NM Non-Motorized Improvements											
NM1	Railroad ROW near Marine Drive	Pedestrian Trail		■	■	✓		✓	✓	✓	Intermediate-Range	$250,000
NM2	New Youngs Bay Bridge	Pedestrian Improvements		■	■	✓		✓	✓	✓	Intermediate-Range	$1,000,000
NM3	Highway 202 between Williamsport and the Walluski Loop Road	Bike Lanes		■	■	✓		✓	✓		Short-range	$1,500,000
NM4	Lexington and Grand Ave Loop	Sidewalk and Pedestrian Improvements		■	■	✓		✓	✓	✓	Short-range	$250,000
NM5	Highway 30 Full Length	Pedestrian Improvements to fix Sidewalk gaps.	■	■	■	✓		✓	✓	✓	Short-Range	$250,000
NM6	10th, 11th and 12th Streets @ Marine and Commercial	Pedestrian Improvements		■	■	✓		✓	✓		Short-Range	$250,000
NM7	17th Street/20th Street and Highway 30	Pedestrian Improvements		■	■	✓	✓	✓	✓	✓	Short-Range	$300,000
	Category X Transit Water and Air Improvements											
X1	Astoria Megler Bridge	Pedestrian and Bike Shuttle		■	■	✓		✓	✓		Intermediate-Range	$100,000
X2	Highway 101 North and South of Astoria Megler Bridge	Install Bus Shelters and Kisosks		■	■			✓	✓	✓	Short-Range	$20,000
X3	Highway 101 East and West of New Youngs Bay Bridge	Install Bus Shelters and Kisosks		■	■			✓	✓	✓	Short-Range	$20,000
X4	Highway 30 @ 20th, 37th, 45th and Nimitz	Install Bus Shelters		■	■			✓	✓	✓	Short-Range	$50,000
X5	Runway at Astoria Airport	Improve Runway Surface	■				✓		✓	✓	Short-Range	$1,000,000
X6	Highway 30 in Gateway District	Construct Transportation Cntr (Bus, Taxi, Boat)	■	■	■	✓	✓	✓	✓	✓	Intermediate-Range	$2,000,000
											Bypass	$40,000,000
											Roadway	$17,670,000
											Non-motorized	$3,800,000
											Transit Water & Air	$3.[illegible]
											Total	$64.[illegible]

As this table indicates, although these projects may primarily benefit one mode, they may have beneficial impacts on other modes as well.

Bypass projects with a "K" will be built with or without the construction of a bypass. All other bypass projects will be contingent on bypass construction as identified in the text. It is not expected that the bypass construction will occur in the near future. Clatsop County and the Oregon Department of Transportation are preparing documentation for a Transportation Planning Rule Goal exception. It is expected that this issue will be resolved before the next TSP review and update.

Category BP: Bypass Improvements

The improvements included in Category BP are proposed components of the Astoria Bypass project and are covered in the Astoria Bypass Draft Environmental Impact Statement (ODOT, 8 August 1993). These improvements cover vehicular, bicycle, and pedestrian improvements.

Project BP1: Astoria Bypass

The bypass will be constructed and funded in phases. Phase 1 consists of the proposed new alignment for the Astoria Bypass. The new alignment for the bypass reroutes the majority of traffic from the Columbia River Highway (US 30) to OR 202. New roadway would be constructed to connect Highway 202 at approximately Williamsport Road to Highway 30 near the John Day River Bridge. Phase 2 of this project involves road widening of US 101 from Basin Street to Smith Point and OR 202 from Smith Point to Williamsport Road. Also included in this project is a median with turning refuges on US 101 and OR 202. Cost: $40 million.

K Project BP2: Nehalem Highway/Oregon Coast Highway Intersection (Smith Point)

Project BP2 has two options to redesign the intersection of the Oregon Coast Highway. Both of these projects are part of the bypass project and may be paid for from that funding.

Project BP2a

This project involves a new signal at the intersection of OR 202 and US 101. This would be a short-term, temporary project until one of the two redesign options (BP2b or c) can be constructed. Cost: $150,000.

Option BP2b

This project creates a roundabout at this intersection. A roundabout may be able to handle the traffic volumes described below in option BP2c without forcing complete traffic stoppages. Roundabouts tend to increase the safety of an intersection, reduce delays, and provide better allowances for emergency vehicles when compared to signalized intersections. Roundabout may also enhance the Gateway of Astoria. Cost: $300,000.

Option BP2c

This will be a high capacity intersection involving approximately 64,000 vehicles per day. A new signal would be designed at this intersection that could handle this level of traffic. This project would also include intersection redesign and road widening. There are some problems with trying to channel this level of traffic volume through a signalized intersection. While it is possible, large traffic backups are expected. These backups decrease safety, increase delay, and hinder the movements of emergency vehicles. Cost: $1,000,000.

Project BP3: Highway 202 - Bike Lanes

Project BP3 involves constructing six- to ten-foot bike lanes along OR 202 from Smith Point to the Williamsport Road and on the length of the new bypass alignment between Williamsport Road and US 30. These bike lanes would be mostly adjacent to the travel lanes, but also would be separated along Youngs Bay where practical to allow bicycles and pedestrians a wider pavement width and better access to scenic amenities. Most of the separated alignments would occur between Smith Point and the Highway 101 Business Intersection. Cost: $250,000.

Project BP4: Highway 202 Intersection Improvements

These projects would all improve operations at intersections along Highway 202 between Smith Point and Williamsport Road. Signing would also be improved along OR 202 to better show the upcoming intersections. Total Cost for Project BP4: $2,450,000. The intersection improvement projects are as follows:

K Project BP4a: OR 202 and Denver Street

This will involve a redesign of the intersection. Denver Street serves as a conduit of traffic from the western neighborhoods of Astoria. This intersection will need at least a left-turn refuge for eastbound traffic and a westbound deceleration lane. There is a potential future need for a traffic signal at the intersection. Cost: $250,000.

K Project BP4b: OR 202/US 101 Business Intersection

This involves a redesign of the OR 202/US 101 Business intersection. These improvements include realignment of the southern and western approaches, a right-turn merge from northbound 101 Business to eastbound 202 and the potential need for a traffic signal. This redesign may be enhanced by project R17, the Seventh Avenue arterial realignment. Cost: $250,000.

K Project BP4c: Highway 202 at Eighth-Wall Street

A center left turn lane would be installed for the length of the project. The 11th Street intersection would receive a right-turn deceleration lane on OR 202 westbound and 11th Street would be widened at the intersection to allow better turning access for large trucks. Cost: $1,000,000.

K Project BP4d: Highway 202 at Kearney/Second Street

The Kearney and Second Street intersection would involve a redesign of the Kearney and Second Street approaches to make them one common approach at a right angle to OR 202. On OR 202, a left-turn lane in the eastbound direction would be added. The new intersection would be wide enough at the intersection to allow turning access for large trucks. Cost: $250,000.

Project BP4e: Highway 202 at Williamsport Road

The OR 202 and Williamsport Road intersection would be redesigned as part of the bypass to allow grade separated access to Williamsport Road and the continuation of OR 202. Cost: $700,000.

K Project BP5: Marine Drive at Portway Street

This is a high accident intersection, with 12 accidents and 10 injuries in 1993. Marine Drive at Portway Street improvements include a new signal and rechannelization of the approaches to the intersection. These improvements will improve intersection performance as well as provide a better interface with the bypass. Total cost: $300,000.

Category R: Roadway Improvements

Project R1: Niagara and Seventh and Eighth Interchanges

Seventh and Eighth Streets form an arterial across Astoria linking the downtown to OR 202. The arterial leaves downtown on Eighth and moves to Seventh via Niagara Street. Both the intersections of Niagara and Seventh and Niagara and Eighth have sight distance issues that make it difficult for turning traffic to see oncoming traffic. Some intersection channelization could better position traffic for better sight distance. Cost: $10,000.

Project R2: Jerome and 16th Street

This intersection also has sight distance restrictions. Elimination of some parking would improve sight distance. Cost: $5,000.

Project R3: Irving Street and 19th Bridge

This improvement involves repainting the bridge. By doing maintenance type repairs and repainting it is expected that this bridge can be moved out of the structurally deficient category. Cost: $1,500,000.

Project R4: Highway 30 at Franklin and 33rd

This improvement relates to the stretch of Highway 30 between Franklin and 33rd Streets. These intersections both meet the highway at oblique angles, creating sight distance, and other safety concerns. These intersections will be redesigned to provide turning refuges on Highway 30 and potentially the closing of one of the intersections or designating them as one-way streets. Restricting turning movements may be another option. Cost: $300,000.

Project R5: Highway 30 at Eastern Intersections

This project relates to intersection improvements at four key intersections along US 30:

Project R5a: 37th and US 30

Channelization, restriping, and parking prohibitions would improve operations for drivers at this intersection. Cost: $50,000.

Project R5b: 45th and US 30

This project would include signing and the construction of a left-turn lane. Cost: $700,000.

Project R5c: 54th and US 30

Channelization, signing, and striping would be done at this intersection to improve traffic operations. Cost: $500,000.

Project R5d: Nimitz Road and US 30

Some realignment and striping would be done to improve sight distance and facilitate truck turning movements including a westbound right-turn acceleration area. Cost: $100,000.

Project R6: Highway 30 with South Tongue Point Development

The South Tongue Point Master Plan increased the potential for future higher land use in the South Tongue Point Area. This plan included research stations, industrial uses, US Fish and Wildlife offices and oth general commercial or industrial uses. This plan created a new road crossing over the BNRR tracks anu intersecting Highway 30. This would involve a new bridge and a new intersection. If the Astoria Bypass is built, this may not be warranted.

The South Tongue point intersection has a high instance of truck traffic requiring left-turn refuges and intersection widening. South Tongue Point Road also intersects Highway 30 at an angle, creating turning movement problems for trucks, especially turning onto westbound Highway 30. If elements of the South and North Tongue Point Master Plans are adopted, this intersection will be a major traffic conduit and may require higher capacity improvements. In addition, the South Tongue Point Master Plan calls for a new intersection approximately a half mile to the east of the existing intersection. This project is for the construction of a new intersection. Cost: $200,000.

Project R7: Duane and Exchange Streets

This project would remove the one-way designations of Duane and Exchange streets, opening them to two-way traffic. This would involve restriping and resigning, reconfiguration of intersections, and signalization. Cost: $200,000.

Project R8: Eighth Street Between Duane and Commercial

This would designate Eighth Street between Duane and Commercial as a one-way segment and involve the restriping and resigning of the roadway. This redesignation would remove awkward turns and vehicle approaches toward the one-way southbound section on Eighth Street as Highway 30 traffic enters the Duane and Commercial one-way couplet. This project will increase the safety of the intersection for both vehicular and pedestrian traffic. Cost: $50,000.

Project R9: Highway 30 From 16th to 23rd Street

If the long-range projects (R10 or R11) are not constructed a center left-turn lane would be constructed on US Hwy 30. Cost: $800,000.

Project R10: One-Way Couplet Extension (optional with R11)

This project consists of three components that would extend the one-way Couplet east from the downtown area. If the bypass is constructed, this project would not be needed. This is also an optional project with R11. Due to the impacts on existing development along Exchange and Marine Drive this project may not be practical. Further analysis of other projects and the bypass are appropriate. This area is being studied in the Astoria Gateway Area Growth Management Project and transportation improvement projects will be determined and resolved at a future date.

Project R10a: US 30 at Exchange Street

Highway 30 currently angles northward at Exchange Street, creating an intersection which involves several confusing turning movements and safety concerns. The roadway would be realigned to better intersect Highway 30. Cost: $100,000.

Project R10b: US 30 (Marine Drive) at 17th Street

This project involves intersection and pedestrian facilities improvements to the intersection of US 30 and 17th Streets. Improvements should include a signalized pedestrian crossing. This will facilitate pedestrian crossings from the downtown area to the waterfront and the Columbia River Maritime Museum. Sight distances, traffic speeds, and existing facilities make this an ideal location for this improvement. Cost: $300,000.

Project R10c: US 30 at Western One-Way Couplet Terminus

The one-way couplet terminus occurs slightly before the US 30 and 16th Street intersection. This intersection needs realignment. This project includes right-of-way acquisition, new road construction, and widening and signage to extend the couplet along eastbound Exchange Street. Cost: $1,000,000.

Project R11 Highway 30 From 16th to Exchange Widening (optional with R10)

This project consists of two component projects to widen US 30 to five lanes at the critical intersections. If the one-way couplet option (R10) or the Astoria Bypass is constructed, this project would not be needed. . Due to the impacts on existing development along Marine Drive this project may not be practical. Further analysis of other projects and the bypass are appropriate. This area is being studied in the Astoria Gateway Area Growth Management Project and transportation improvement projects will be determined and resolved at a future date.

Project R11a Highway 30 at 16th-17th Street

Widening Highway 30 from 16th (east end of the existing one-way couplet) through the 17th Street intersection is required for traffic capacity. A traffic signal at 17th Street is also required for pedestrian and traffic safety. Cost: $1,000,000.

Project R11b Highway 30 at Exchange Street

This project involves widening with turn lanes and a traffic signal at Exchange Street. Additional through lanes would be required on Highway 30 to handle the expected traffic volumes. Cost: $850,000.

Project R12: Highway 30 on Existing One-Way Couplet (Marine Drive and Commercial Street)

New traffic signals in the downtown area would provide for better signal visibility resulting in better safety. There are seven traffic signals on the existing one-way couplet that would be replaced. Cost: $850,000.

Project R13: US 30 at West End of Existing One-Way Couplet

This project includes revisions to several intersections along US 30 between Sixth and Ninth Streets. This section of the highway begins as a two-way facility running along Marine Drive. As the alignment approaches Seventh Street, it begins to curve southward and splits traffic into a one-way couplet with Marine Drive handling the westbound traffic and Commercial Street handling the eastbound traffic. Along this curve, the highway intersects Seventh, Eighth, Bond and Astoria Streets. This curve of US 30 could be improved with th following projects:

Project R13a: Seventh Street Between Marine and Bond

Seventh Street between Marine Drive (US 30) should be one-way southbound. Traffic turning onto US 30 has sight distance, turning, and traffic volume issues. Vehicles entering the highway can do so more safely from Sixth or Fifth Streets or by entering the one-way couplet at Eighth Street. Cost: $5,000.

Project R13b: US 30 at Seventh Street

A pedestrian Island should be added, particularly at Seventh Street and US 30. Currently, sight distance concerns and automobile speeds make crossing difficult. Cost: $50,000.

Project R13c: US 30 from Eighth Street to Fifth Street

Channelization improvements need to made from the west end of the existing one-way couplet (Eighth Street) through Fifth Street. This would include a turning lane and raised island for pedestrians. Channelization will also be changed from the present configuration. Cost: $1,000,000.

Project R14: US 30 and Columbia Avenue Intersection

This project involves rechannelization and access control for the section of US 30 between Columbia and Hume Avenues. Currently, there are several curb cuts providing at times unrestricted access to and from US Hwy 30. In addition to this, left-turn lanes are unavailable. For this section, left-turn lanes should be adde and access management standards concurrent with a Category 4 ODOT facility should be enforced in th future. This means that new accesses should not occur within 500 feet of each other. There are historic land uses in the area which may make add to the cost of this project. Cost: $750,000.

Project R15: US 101 Astoria-Megler Bridge

The Astoria-Megler Bridge across the Columbia River requires repainting of the steel structures to prevent rust and deterioration of the structural steel. This project is environmentally sensitive which adds to the cost and it is included in the 1998 to 2001 draft of the State Transportation Improvement Program. Cost: $7,000,000.

Project R16: Seventh Street and OR 202

Currently, the intersection Seventh Street and OR 202 provides arterial access to OR 202 and US 101 Business. This intersection is about one tenth of a mile from the Highway 101 business intersection to the Old Youngs Bay Bridge. The close proximity of these two intersections on an arterial roadway such as OR 202 creates problems for safety, turning movements, signal timing and access. Realigning the arterial to intersect OR 202 at Fifth Street, as opposed to Seventh Street, would align it with US 101 Business. This would alleviate the need for two separate signals in the future and would increase safety as well as provide for more efficient traffic movement through the intersections on OR 202. Cost: $350,000.

Category NM: Non-Motorized Improvements

Project NM1: Railroad ROW near Marine Drive Between Astoria Bridge and Seventh Street

Along the abandoned railroad right of way, improvements will be made to facilitate pedestrian use of the alignment. Gaps in Bridges will be filled in and a walkable surface will replace or be placed over the existing railroad ties. Cost: $250,000.

Project NM2: US 101 New Youngs Bay Bridge

Pedestrian improvements are desirable on the Bridge between Astoria and Warrenton. There are no sidewalks for pedestrians on the bridge. This project would provide pedestrian facilities across the bridge. Cost: $1,000,000.

Project NM3: Highway 202 Bike Lanes

Bike lanes need to be added to the Nehalem Highway (OR 202) south of the new bypass alignment from Williamsport to the Walluski Loop Road. The level of traffic and development along the highway warrants these improvements. Currently, bicycles share the general travel lanes with traffic for much of the alignment, creating safety and speed concerns. Cost: $1,500,000.

Project NM4: Lexington and Grand Avenues Sidewalk Improvements

Sidewalks need to be added to Lexington and Grand Avenues. These two streets form a major conduit through the western section of Astoria and serve many school children. Safety concerns are a major factor in this project. Cost: $250,000.

Project NM5: Highway 30 Pedestrian Improvements

Highway 30 has sporadic sidewalks. The following table lists the locations of needed sidewalk improvements. Cost: $250,000.

TABLE 7-5
LOCATIONS OF NEEDED SIDEWALK IMPROVEMENTS

Eastbound	Westbound
MP 96.93 to 96.70	Nimitz Road to 95.12
MP 96.63 to 96.35	MP 96.69 to 97.06
MP 95.73 to Nimitz Road	MP 97.32 to 97.84

Note: On the westbound side, between MP 97.06 and 97.32 the sidewalk has large poles in the middle of the sidewalk, making it difficult to use.

Project NM6: 10th, 11th, and 12th Streets at Marine and Commercial Pedestrian Improvements

The projects would involve the placement of pedestrian bulbs at the ends of 10th, 11th, and 12th at the two roads that make up the Highway 30 one-way couplet. This will increase pedestrian safety. Cost: $250,000.

Project NM7: Pedestrian Improvements at 17th Street/20th Street and Highway 30

Pedestrian refuge islands should be added to these two intersections. This will require some roadway widening. This, combined with other pedestrian improvements along Highway 30, will provide convenient and safe pedestrian crossings of the roadway. Cost: $300,000.

Category X: Transit, Sea and Air Improvements

Project X1: US 101 Astoria-Megler Bridge Shuttle Service

Currently, motorized and bicycles travelers share the lanes of the bridge. Sharing lanes slows traffic and creates safety concerns for all travelers. The Astoria-Megler Bridge currently cannot handle pedestrian traffic and pedestrians are not allowed on the bridge. A dial-a-ride service that could provide transportation to pedestrians and bicycle riders on demand could be instituted and managed by Pacific Transit from Washington. Cost: $100,000.

Project X2: US 101 North and South of the Astoria-Megler Bridge

This project would provide for bus shelters and information kiosks at both ends of the bridge. The kiosks would provide transit information and be a location for future communications such as a dial-a-ride type system for pedestrians and bicycle riders. Cost: $20,000.

Project X3: US 101 East and West of the New Youngs Bay Bridge

There are no shelters available for pedestrians to use during inclement weather on either end of the New Youngs Bay Bridge. This project would provide for the needed shelters and information kiosks. Cost: $20,000.

Project X4: US 30 at 20th, 37th, 45th, and Nimitz Streets

This project would provide for bus shelters at bus stops for the Sunset Empire Transit District. Cost: $50,000.

Project X5: Runway at Astoria Airport

This project will resurface and improve a runway at the Astoria Airport. Cost: $1,000,000.

Project X6: US 30 Gateway District

As the Gateway District is developed it will attract and generate traffic from and to different modes. This project is to construct a transportation center to be accessible and used by pedestrians, bicycles, buses, taxi and boat. Cost: $2,000,000.

CHAPTER 8: FINANCIAL ANALYSIS

This chapter addresses potential funding sources for the improvement projects included in the Astoria Transportation System Plan. Transportation improvements in Astoria will primarily be funded by the private sector, the City of Astoria, Clatsop County, or state and federal funds administered by ODOT. This chapter begins by describing the level of funding for transportation improvements in Astoria from each of these sources, and the outlook for the future level of this funding. The project costs in the TSP are then presented, organized by jurisdiction and project phase. This chapter concludes by discussing potential funding sources for specific projects or groups of projects.

EXISTING TRANSPORTATION FUNDING IN ASTORIA

Developer-Provided Improvements

The city's Development Code (13.610) requires private developers to provide improved streets, sidewalks, railroad crossings, street lighting, and street name signs within and adjacent to subdivided or partitioned land. These improvements must be constructed to city standards. Since none of the projects in the Astoria TSP would improve streets within new subdivisions or that serve new development, there appears to be little opportunity for private developers to contribute a significant portion of project costs.

City Roadway Funding

Table 8-1 shows street-related revenue and expenditures from the Public Works Fund in the city's currently adopted budget. Revenue transferred from the State Tax Street Fund is State Highway Fund revenue allocated to the city by ODOT; this source is expected to contribute over 90 percent of street-related funding in Table 8-1 for the 1995-96 and 1996-97 fiscal years. Revenue in the State Tax Street Fund is transferred to the Public Works Fund; this revenue supports expenditures for maintenance and preservation of the roadway system.

The Astoria Road District Fund tracks revenue from property tax levies dedicated to road improvements. The large amount of funding in the Astoria Road District Fund for 1994–95 resulted from a one-year, $200,000 property tax levy that was used to repay bonds that financed street improvements. There is no road district levy for 1996–97; according to city staff, the city will seek voter approval of another road levy in fall 1997.

Table 8-1 shows Street Department expenditures annually exceed street-related revenues in the four years shown. Additional revenue to fund Street Department expenditures may come from beginning fund balances, interest, or miscellaneous revenue in the Public Works fund. Table 8-1 understates street-related expenditures, because it does not include expenditures by the Engineering or Shop and Yard Departments that support street maintenance projects.

There are additional transportation-related revenues and expenditures in the city budget that are not shown in Table 8-1. The city's Capital Improvement Fund includes $334,000 for the Riverwalk between Fifth and 15th Streets; $292,100 of this cost will be funded by grants from unidentified sources. The city's budget also includes a Local Improvement Debt Service Fund that tracks special assessment revenue that is used to repay bonds that financed local improvements. Special assessments are levied on property to fund improvements that benefit the assessed property. The city's Municipal Code (2.125–2.240) establishes the procedure by which the City Council can levy special assessments on property to fund local improvements. While the city's budget does not describe the specific projects funded by special assessments, city staff indicated that several street improvement projects were funded by special assessments, including paving of South Street, widening several streets, enhancements to 10th Street, and Sixth Street dock improvements.

TABLE 8-1
STREET FUNDING IN THE CITY OF ASTORIA

	1993–94 Actual	1994–95 Actual	1995–96 Budgeted	1996–97 Adopted
Total Revenue	**491,127**	**591,999**	**516,650**	**580,600**
State Tax Street Fund	406,797	387,900	493,800	519,900
Astoria Road Dist. Fund	3,238	188,591	10,000	46,700
Charges for Services	81,092	15,508	12,850	14,000
Street Dept. Expenditures	**749,903**	**627,651**	**527,130**	**590,880**

Source: City of Astoria. 1996. *Adopted Budget, Year Beginning July 1, 1996.*

After the city's current budget was adopted, the city received its allocation of funding from the Federal Surface Transportation Program (STP), about $148,000. This amount represents three years of annual allocations from the STP; the City of Astoria has received about $50,000 per year since 1992 from the STP.[4] Local jurisdictions typically let their STP funding accumulate for several years before requesting an STP allocation from ODOT. The STP was established by the Intermodal Surface Transportation Act of 1992 (ISTEA), which requires a portion of STP funds to be distributed to counties and cities based on their share of population.[5] The $148,000 received by Astoria will fund improvements to Marine Drive and 20th Street.

County Funding

Clatsop County does not make regular contributions of funding for transportation projects in the City of Astoria. The county has contributed funds in the past for transportation improvements in the city, which indicates there is potential for future county funding on transportation projects in Astoria. The county's current policy is to make decisions on contributing to projects in the city on a case-by-case basis, without specific criteria. Given the speculative nature of future county funding for projects in Astoria, the analysis in this chapter only acknowledges the potential for county funding without assuming specific funding levels.

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[4] According to information provided by Micheal Augden, ODOT Statewide County/City Programs Coordinator, in a correspondence of March 4, 1996.

[5] This funding is often referred to by its older title, Federal Aid Urban or FAU.

State Roadway Funding

ODOT allocates funding to transportation projects through the Statewide Transportation Improvement Program (STIP), which lists projects that will be constructed over a four-year period. The STIP is updated every two years, when ODOT asks local jurisdictions for their priorities for transportation project funding. Projects included in the draft STIP are those that have been given the highest priority in various local and regional planning processes. Following public comment on the draft STIP, a final STIP is prepared. Project costs included in the final STIP may not exceed available funding.

The current draft STIP for 1998–2001 includes only three roadway projects in the Astoria area: a 4.6 mile overlay of U.S. 30 between Fernhill and the John Day River bridge (with a construction cost of $3.5 million in 1999); repainting of the Astoria-Megler Bridge ($7.5 million in 2000); and replacement of the deck and railing on the Walluski River bridge on Oregon 202 ($610,000 in 2001). These projects total $11.6 million in the four-year period, or $2.9 million/year. ODOT expects total costs in the draft STIP to be reduced by 20 percent in the final version of the document, to bring expenses within the level of available revenue. If this 20 percent reduction is applied to the expenditures in the Astoria area, these expenditures would total $2.3 million/year in the 1998–2001 period.

Funding for Non-Motorized Improvements

Funding for non-motorized improvements in Astoria is primarily from federal and state funding that is specifically set-aside for pedestrian and bicycle improvements. At the federal level, ISTEA requires 10 percent of STP funds allocated to states to be set aside for transportation enhancement projects, which include pedestrian and bicycle improvements along with projects that enhance the visual and historic aspects of roadways.[6] ODOT distributes this set-aside funding through the STIP and the Oregon Bicycle and Pedestrian Program, which distributes about $450,000 per year to cities and counties for bicycle and pedestrian facility improvements. In addition, ORS 366.514(1) requires jurisdictions to provide footpaths and bicycle trails wherever a highway, road, or street is being constructed, reconstructed, or relocated using State Highway Fund money.

Oregon law (ORS 366.514(3)) requires jurisdictions to spend at least one percent of funds received from the State Highway Fund be expended on footpaths or bicycle trails. The city's Trails Reserve Fund tracks this revenue, which is expected to be $4,600 in 1996–97. Expenditures from the Trails Reserve Fund in 1996–97 are expected to total $34,700, which is all of the resources available except for a $5,000 contingency reserve.

Funding for Transit, Water, and Air Improvements

Transit services in Astoria are provided by the Sunset Empire Transit District, a private operator under contract to the City of Astoria. The City's Public Transit Fund indicates that operating expenses for transit services in 1996–97 will be funded primarily by a transfer from the General Fund ($71,800), a state operating subsidy ($37,500), and farebox revenue ($15,000). The Public Transit Fund contains no funding for capital improvements such as those included in this TSP.

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6 U.S. Department of Transportation (1992). *Intermodal Surface Transportation Act of 1991: A Summary*. FHWA-PL-92-008. Revised for Oregon by the FHWA Oregon Division 2/18/92. p. 11.

ODOT distributes federal and state funding for transit operations and capital improvements through the STIP. The draft STIP for 1998–2001 shows that transit funding allocated to non-metropolitan areas in Region 2 (which includes Astoria) totals $4.2 million. The STIP identifies the recipients of this funding as "various," so the amount allocated to Astoria is indeterminate. The city's Public Transit Fund shows intergovernmental revenue of $37,350 in 1996–97.

The city's budget and the STIP contain no funding for water transportation in the Astoria area. The only water-related transportation project in the TSP is one that would construct a pedestrian/bus/boat transportation center in the Gateway District, an area targeted for redevelopment. An urban renewal district currently exists within this area, which generates about $75,000 per year for improvements in the district.

Summary of Existing Funding for Improvement Projects

The primary issue for this Transportation System Plan is the level of funding available for the types of improvement projects that are included in the plan. Existing funding sources in Astoria for transportation improvement projects are primarily:

- *Surface Transportation Program* (STP) funds, which currently contribute $50,000/year.

  Local Improvement District (LID) funding from special assessments on property
- ODOT's *Statewide Transportation Improvement Program* (STIP), which currently includes $2.3 million/year for projects in the Astoria area between 1998 and 2001.
- *State Highway Fund* set-aside for footpaths and bicycle trails, currently about $4,600/year.
- *Grants* distributed by ODOT and from other sources.

OUTLOOK FOR EXISTING FUNDING SOURCES

Future levels of funding from most major sources are currently uncertain, pending decisions made in the current sessions of Congress and the Oregon legislature. At the federal level, Congress has postponed until 1998 reauthorization of the Inter-modal Surface Transportation Efficiency Act of 1991 (ISTEA). This Act authorizes every major transportation funding program at the federal level, and establishes the criteria by which federal funds are allocated to states, counties, and cities. The Clinton Administration recently proposed NEXTEA, which would reauthorize ISTEA with a 25–30 percent increase in program spending, but this proposal may be substantially modified by Congress. A Federal Highway Administration comparison of funding from NEXTEA vs. a continuation of ISTEA indicates that NEXTEA would increase the average level Federal transportation funding in Oregon by 22 percent.[7]

At the state level, the Oregon legislature failed to increase funding for transportation by increasing the gas tax, weight-mile tax, or other transportation-related revenue sources. Given the existing level of funding, ODOT will run out of funding for modernization projects in about five years.

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[7] Federal Highway Administration, *NEXTEA vs. ISTEA*, FWHA HFS-30, March 11, 1997.

To estimate the level of future funding available for improvements in Astoria, assumptions have been made about the level and growth rate of funds from existing sources. These assumptions are found in ODOT's official forecast of federal and state revenue.[8] These assumptions were applied to a base funding amount, based on the level of current funding from each source. For STIP funding, the funding for repainting the Astoria-Megler Bridge was omitted from the base funding amount, because the high cost of this extraordinary project would significantly increase the projected level of future funding beyond what could reasonably be expected.

Given the simplified assumptions used for this analysis, the complexity of forecasting transportation revenue, and the uncertainty of future conditions, this forecast should be considered a rough estimate of the future level of improvement funding available in Astoria. The assumptions and methods used are described in the following section.

Funding Forecast Assumptions

The ODOT forecast assumes that ISTEA will be reauthorized with existing funding programs and that ISTEA funding would grow through 2015 at the same rate as in the period from 1984–1994. for State Highway Fund revenue, the ODOT forecast assumed the fuel tax (and corresponding weight-mile fee) will increase 1¢ per gallon per year, with an additional 1¢ per gallon added every fourth year, or equivalent increases in vehicle registration fees or other revenue sources. The forecast committee also assumed that Transportation Planning Rule goals are met (in particular, that per capita vehicle-miles traveled annually will actually decrease 10 percent by 2015). In fact, there has not been an increase in the state's gas tax since ODOT's forecast was published, and recent analysis suggests that meeting goals for reducing VMT are overly optimistic. Over the 20-year forecast period, however, there will probably be increases in the fuel tax or other transportation revenue source. Overall, the assumptions in the ODOT forecast yield a reasonable estimate of future funding from existing sources in their current form.

The assumptions used to forecast future funding are derived from the ODOT forecast. These assumptions, by funding source, are:

- *STP:* The ODOT forecast shows future STP revenue allocated to local jurisdictions is expected to grow by 1.4–1.9 percent per year through 2020, with slower growth at the end of the forecast period (in inflation-adjusted dollars). We assume STP revenue allocated to Astoria will grow at the same rate, and that the city will continue to use this funding for improvement projects.

- *STIP:* Funding available for highway modernization is expected to grow at an average rate of 10 percent per year through 2003, and then decline at an average rate of 8.7 percent per year through 2020 (in inflation-adjusted dollars). The ODOT forecast indicates that state funding for modernization projects will decline rapidly after 2003, even with the assumed increases in revenue.[9]

[8] Oregon Department of Transportation. 1995. *Financial Assumptions for the Development of Metropolitan Transportation Plans*. Salem: ODOT Transportation Development Branch, Policy Section. March.

[9] Such shortfalls, however, are typical of long-run forecasts that compare costs and revenues: the sources of costs are relatively easy to identify and forecast; revenues almost always require new programs or other legislative changes that are uncertain.

- *State Highway Fund:* In this forecast, we assume that State Highway Fund revenue in Astoria will be less than the city's maintenance costs, so this funding will be used solely for maintenance and preservation, not for transportation improvements. The level of State Highway Fund revenue, however, will affect the amount of funding set-aside for footpath and bicycle trails. The State Highway Fund is expected to grow slightly through 2005 (0.6 percent per year) through 2005 and then declining slightly through 2015 (-0.4 percent per year), in inflation-adjusted dollars. State Highway Fund revenue is distributed to cities based on their share of population. Astoria's population is projected to grow at an average rate of 0.5 percent per year through 2016, while Oregon's population is projected to grow at an average rate of 1.3 percent per year. Therefore, Astoria's share of population will decline over time, reducing the city's share of State Highway Fund revenue. We assume the level of State Highway Fund revenue in Astoria will remain constant through 2005, then decline by 1 percent per year through 2015 (in inflation-adjusted dollars).

The results of applying these assumptions to the level of existing funding in Astoria is shown in Table 8-2. The next section describes the project costs in the TSP, and compares these costs with the level of expected funding shown in Table 8-2. If the funding sources in Table 8-2 are not sufficient to cover the project costs, funding sources for remaining costs will be discussed, including Local Improvement Districts, grants distributed by ODOT and other agencies, and sources of additional funding the city may implement.

TABLE 8-2
ESTIMATED LEVEL OF FUNDING FOR TRANSPORTATION IMPROVEMENTS IN ASTORIA (1997 Dollars)

Funding by Source	Base Amount	Time Period (years) 1–5	6–10	11–20
STP	50,000	264,363	288,746	652,008
STIP	1,027,500	6,900,289	6,349,201	6,583,059

Source: ECONorthwest, based on assumptions in the text.

PROJECT COSTS IN THE TRANSPORTATION SYSTEM PLAN

Roadway Project Costs

Total roadway project costs in the Astoria TSP will depend on whether or not the Astoria Bypass is constructed and which options are chosen for improvements to the Highway 101/202 intersection at Smith Point. Figure 8-1 indicates the impact of the Bypass project on total project costs by dividing project costs into three groups: 1) costs for projects that will be constructed with or without the Astoria Bypass, 2) costs for projects that would be constructed with the Astoria Bypass, and 3) costs for projects that would be constructed without the Astoria Bypass.

Most of the roadway projects in the TSP would be constructed with or without the Bypass; the total cost of these projects is $16.0 to $16.7 million. This range of costs results from the two options for the improvement of the Hwy. 101/202 intersection at Smith Point (Project BP2)—the roundabout option (BP2b) would cost $300,000 while widening the intersection and adding a signal (BP2c) would cost $1 million.

FIGURE 8-1
ROADWAY PROJECT ALTERNATIVES IN THE ASTORIA TSP

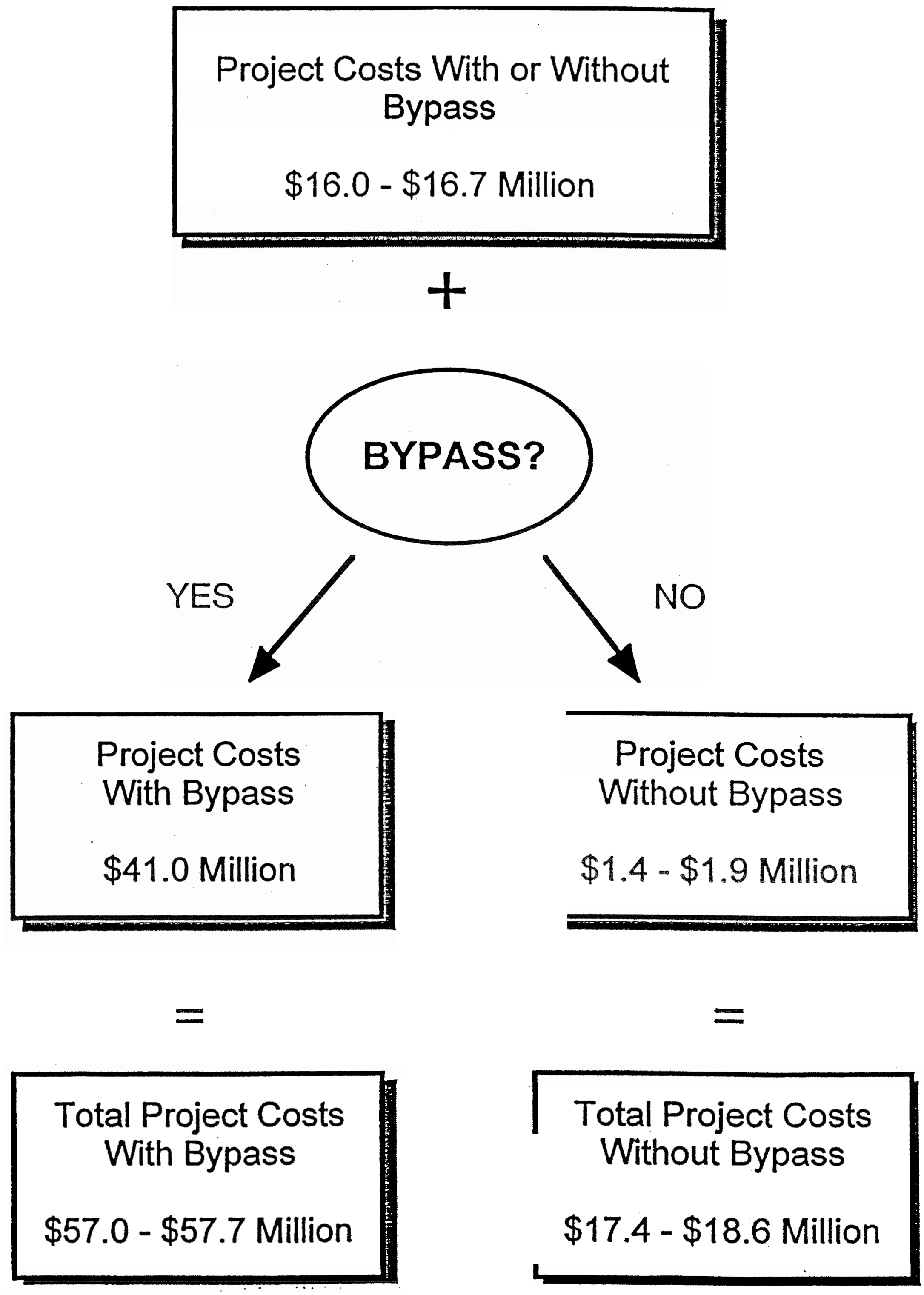

TABLE 8-3
ROADWAY SYSTEM IMPROVEMENTS IN THE ASTORIA TRANSPORTATION SYSTEM PLAN (1997 Dollars)

Proj. No.	Project Location	Project Description	Project Phasing	Project Cost
Projects With or Without Bypass				
BP2	*Nehalem Highway/Oregon Coast Highway Intersection (Smith Pt.)*			
BP2a	Nehalem Highway/Oregon Coast Highway Intersection	New Signalization	Short Range	$150,000
BP2b	Nehalem Highway/Oregon Coast Highway Intersection	Roundabout	Intermediate Range	$300,000
BP2c	Nehalem Highway/Oregon Coast Highway Intersection	Widening, Revise Intersection	Intermediate Range	$1,000,000
BP4	*Highway 202 Intersection Improvements*			
BP4a	Highway 202 & Denver	Intersection Redesign	Intermediate Range	$250,000
BP4b	Hwy 202 & Hwy 101 Business	Intersection Redesign,	Intermediate Range	$250,000
BP4c	Hwy 202–8th Street to Wall	Left-turn Lane	Long Range	$1,000,000
BP4d	Hwy 202 and Kearney/2nd	Intersection Improvements	Long Range	$250,000
BP5	Marine Drive at Portway Street	Intersection Redesign	Long Range	$300,000
R1	Niagara at 7th/8th	Intersection/Channelization	Short Range	$10,000
R2	Jerome at 16th	Intersection/Site Distance	Short Range	$5,000
R3	Irving Street (2 locations)	Bridge Improvements (painting)	Intermediate Range	$1,500,000
R4	Highway 30 at Franklin and 33rd	Intersection Improvements	Short Range	$300,000
R5	***Highway 30 at Eastern Intersections***			
R5a	Highway 30 at 37th	Intersection Improvements and	Intermediate Range	$50,000
R5b	Highway 30 at 45th	Intersection Improvements (left-	Intermediate Range	$700,000
R5c	Highway 30 at 54th	Intersection Improvements	Intermediate Range	$500,000
R5d	Highway 30 at Nimitz	Intersection Improvements	Intermediate Range	$50,000
R6	Highway 30 and South Tongue Pt.	New Intersection	Intermediate Range	$200,000
R7	Duane and Exchange Streets	End One-Way Designation	Intermediate Range	$200,000
R8	8th Between Duane and Commercial	Make One-Way	Intermediate Range	$50,000
R9	Highway 30 at 16th to 23rd	Install Center Left-turn Lane	Intermediate Range	$800,000
R12	***Highway 30 at West End of Existing One Way***			
R12a	7th Street	7th Street Revisions	Short Range	$5,000
R12b	US 30 Western	Pedestrian Island	Short Range	$50,000
R12c	US 30 Western	Channelization	Short Range	$1,000,000
R13	US 30 and Columbia Avenue Intersection	Rechannelization and Intersection	Intermediate Range	$350,000
R14	US 101 Astoria-Megler Bridge	Bridge Painting	Short Range	$7,000,000
R15	7th Street and OR 202	Arterial Realignment	Intermediate Range	$350,000
Subtotal				**$16,020,000 – $16,720,000**
Projects With Bypass				
BP1	Astoria Bypass	Bypass	Long Range	$40,000
BP3	Hwy 202 between Williamsport and US 30	Bike Lanes	Long Range	$250,000
BP4e	Hwy 202 and Williamsport Road	New Interchange	Long Range	$700,000
Subtotal				**$40,950,000**
Projects Without Bypass				
R10	*One-Way Couplet Extension Projects (optional with R11)*			
R10a	Highway 30 at Exchange	Intersection Improvements	Long Range	$100,000
R10b	Highway 30 at 16th	Intersection Improvements	Long Range	$300,000
R10c	Highway 30 at West End of New One-Way Extension	Intersection Improvements	Long Range	$1,000,000
R11	***Highway 30 – 16th to Exchange Widening (optional with R10)***			
R11a	Highway 30 at 16th/17th	Five Lanes, with Signal at 17th	Long Range	$1,000,000
R11b	Highway 30 at Exchange St.	Widening with turn lanes at	Long Range	$850,000
Subtotal				**$1,400,000 – $1,850,000**
Total Cost With Bypass				**$59,970,000 – $57, 670, 000**
Total Cost Without Bypass				**$17,420,000 – $18,570,000**

Source: David Evans and Associates, Inc., *Astoria Transportation System Plan Draft*, April 1997; summarized by ECO Northwest.

If the Astoria Bypass if built, total roadway costs in the TSP will increase by $41.5 million for the cost of the Bypass itself ($40 million), plus the cost of projects the TSP indicates will be built only if the Bypass is built (BP3, BP4e, and R9).

If the Bypass is not built, total roadway costs in the TSP will increase by $1.9 to $6.8 million. This range of costs results from options for improvements of Highway 30 east of downtown. The low-cost option (R9) would add a center turn lane to Highway 30 between 16th and 23rd Street, at a cost of $800,000. Another option (R10) would extend the existing one-way couplet east to Exchange Street, at a total cost of $1.4 million. The high-cost option (R11) would widen Highway 30 between 16th and Exchange Street, add turn lanes, and add a signal at 17th Street, at a total cost of $1.85 million.

Roadway projects in the Astoria TSP are shown in Table 8-3. These projects are described in more detail in Chapter 7 of this report.

Projects on State Highways

Most of the roadway projects in Table 8-3 would improve federal and state highways in Astoria-U.S. Highway 30 and Oregon Highway 202. ODOT has primary responsibility to maintain and improve these roadways, so most of the funding for these projects would be allocated through the STIP process. While it is assumed that ODOT will be fully responsible for funding these projects, some projects may require local funding for a portion of costs, and a local contribution may increase the chances of a project being included in the STIP.

Table 8-4 compares the cost of projects on state highways without the Bypass with the projected funding available in the Astoria area through the STIP, as reported in Table 8-2. The repainting of the Astoria-Megler Bridge is excluded from Table 8-4 because this project is already funded in the STIP. A range of projected funding is shown based on the assumptions described earlier. Table 8-4 shows a state funding surplus in all phases, but a local funding shortfall in the intermediate period.

TABLE 8-4
COMPARISON OF ROADWAY COSTS WITHOUT BYPASS AND FUTURE FUNDING
(1997 Dollars)

	Short	Intermediate	Long
Cost of Projects on State Highways	$1,505,000	$3,850,000 to $4,550,000	$2,950,000 to $3,400,000
State Funding	$6,900,000	$6,350,000	$6,600,000
Surplus (Shortfall)	$5,395,000	$1,800,000 to $2,500,000	$3,200,000 to $3,650,000
Cost of Projects on Local Roadways	$15,000	$2,100,000	$0
Local Funding	$265,000	$290,000	$650,000
Surplus (Shortfall)	$250,000	($1,810,000)	$650,000

Source: ECONorthwest.
Note: Numbers in parentheses are negative, indicating a funding shortfall.

To pursue state funding for projects on state highways, the city should seek to have these projects included in the STIP; the process for including projects in the 2000–2004 STIP will begin in 1998. For all projects that the city seeks to include in the STIP, funding will depend on how well the proposed projects will compete for other projects in ODOT Region 2. The comparison of costs to funding in Table 8-4 suggests that ODOT should have sufficient funding for the state highway projects in this plan, with the exception of the Bypass.

In addition to funding through the STIP, the intersection of Highway 30 at South Tongue Point (Project R6, $200,000) may be eligible for economic development funding. The Immediate Opportunity Fund may be available if imminent commercial or industrial development of Tongue Point depends on construction of the intersection; this funding would be contingent on local matching funds. The Special Public Works Fund, administered by the Oregon Economic Development Department, provides grants or loans to support local economic development that creates jobs; grants up to $500,000 are available for projects that would help create or keep a minimum of 50 jobs.

ODOT Funding for Bypass Alternatives

All of the projects associated with the Astoria Bypass or the alternative improvements of Highway 30 in downtown Astoria would be on roadways in ODOT's jurisdiction. The decision to build the Bypass or the alternative improvements will depend in part on whether sufficient funding can be found for the Bypass.[10] The Bypass project would increase the cost of state-funded projects in the long-range phase to $42,500,000. The large cost of the Bypass project would lead to a funding shortfall of $32–$35.9 million for state-funded projects in the long-range phase of this plan. ODOT has indicated that the state does not have enough revenue to fully fund the cost of the Bypass projects; significant local contributions will be needed.

Tolls are one potential source of the "local" contribution that could be implemented by ODOT with authorization from the Oregon legislature. Tolls, of course, would charge both local and non-local users of the Astoria Bypass, and so may be politically acceptable in Astoria because tolls would charge people who benefit from the Bypass and raise some funding from non-local residents. According to Ed Cantrell, ODOT project coordinator for the Bypass FEIS, the FEIS will not consider tolls as a funding source because the traffic volumes are too low to generate significant revenue, and a toll would reduce use of the Bypass and so decrease its effectiveness at reducing traffic congestion in downtown Astoria. Tolls have been used in Oregon to fund bridge improvements, and ORS 383.007 allows tolls to be charged on the proposed Newberg-Dundee bypass and Tualatin-Sherwood highway without further authorization from the legislature. If the city wants to consider toll funding for the Bypass, additional analysis will be needed to assess the amount of funding generated by a toll (taking into account that Bypass use will go down as the toll goes up), and how a toll will affect the ability of the Bypass to reduce traffic congestion in downtown Astoria. Using tolls to fund the Astoria bypass would require legislative approval.

To overcome the difficulty of funding the Astoria Bypass, the city may try to have Bypass funding specifically included in federal or state legislation. At the national level, the pending reauthorization of ISTEA in the US Congress provides an opportunity to have the Bypass project specifically included in legislation (ISTEA included funding for several "Special Projects" in Oregon, including the Ferry Street Bridge in Eugene and I-5

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[10] ODOT has funded a Final Environmental Impact Statement (FEIS) for the Astoria Bypass, which will assess the impact of the Bypass on the environment, economy, land use, and traffic congestion. The findings of the FEIS may affect whether or not jurisdicitions commit funding for the project.

reconstruction in Salem). The city could work with federal and state legislative delegations from the Astoria area and lobbying organizations to seek Bypass funding through specific legislation.

If sufficient funding for the Bypass project cannot be secured, the TSP identifies alternative projects that will be needed to improve traffic flow on Highway 30 through downtown Astoria. The cost for these alternatives are included in Table 8-4, which shows ODOT is expected to have sufficient revenue to fund these alternatives.

Projects on Local Roadways

Table 8-4 also shows the costs for projects on local roadways, and the projected level of local funding for improvement projects from federal STP grants and the State Highway Fund. The comparison of costs to funding for projects on local roadways shows a funding shortfall for projects in the intermediate-range phase of this plan; Table 8-2 shows the shortfall would total $910,000 over the 20-year planning period.

Much of the cost for intermediate-range projects on local roadways ($1.5 million) would be to repaint two bridges on Irving Street. These projects may be eligible for funding through the Federal Bridge Replacement and Rehabilitation Program, which provides funds to improve any bridge on a public road. Bridge painting is eligible for funding from this program in its current form. Funding from this program is allocated based on a formula that rates the deficiency of bridges throughout Oregon—available funding is allocated to the most deficient bridges.

Another intermediate-range project would realign the intersection of Seventh Street and Highway 202 (R1[illegible] $350,000). Since this project may improve traffic flow on Highway 202, it may be eligible for funding through the STIP, although a portion of the cost will probably need to come from local sources. The city may be able to contribute a portion of the cost from existing funding sources if portions of this project are funded through the STIP or by Clatsop County.

Federal and state funding for bridge repainting and the intersection of Seventh Street and Highway 202 could reduce or eliminate the funding shortfall in Table 8-4 for local projects in the intermediate phase of the planning period. If all of the bridge paining costs ($1.5 million) and half of the intersection improvement ($175,000) is funded by federal or state funds, local funding in the intermediate phase would have a shortfall of $135,000.

Two intermediate-range projects would improve Duane and Exchange Streets in downtown Astoria (R7 and R8, with a total cost of $250,000). Since these projects would benefit businesses in downtown Astoria, the city may want to seek funding through a Local Improvement District (LID) that would levy assessments on property in the area, or an Urban Renewal District that would dedicate tax-increment revenue to improvements in the district. Given the economic condition in downtown Astoria, businesses and property owners may oppose paying LID assessments but may support an Urban Renewal District because this would not increase the property taxes on property in the district. The financial capacity of Urban Renewal Districts is in doubt due to the combined effects of tax limitation Measures 5 and 50. If an Urban Renewal District is a viable funding option, it would require citywide voter approval.

The level of costs for projects on local roadways will not be affected by the Bypass project, which would occur on state-maintained highways. All of the projects on local roadways would be constructed with or without the Bypass. The likelihood of state funding for the Bypass, however, will depend in part on the level of local contributions for the project costs. With the revenue forecast in this report, the city would have little or no surplus revenue contribute to the Bypass project in the absence of action by the city to generate additional revenue from local sources.

NON-MOTORIZED IMPROVEMENTS

Table 8-5 shows the non-motorized improvements included in the Astoria TSP—these projects are described in Chapter 7. All of these projects would be constructed with or without the Bypass. Short-range projects in Table 8-5 have a total cost of $2.55 million, and intermediate-range projects total $1.25 million, with a total cost of $3.8 million over the 20-year planning period.

Most of the non-motorized improvements in the Astoria TSP would occur on or at intersections of Highway 30 and 202, which are in ODOT's jurisdiction; the cost for these projects is $2.3 million in the short-range phase, and $1 million in the intermediate-range phase. These costs are within the range of surplus state funding shown in Table 8-4 above, and we assume these projects will be funded by ODOT. The city should seek to have these projects included in the STIP.

There are two non-motorized projects on local streets in the TSP, with a cost of $250,000 in the short-range and $250,000 in the intermediate-range phase of this plan. The revenue forecast in this report shows the city will face a shortfall for roadway projects and would not have funding available for non-motorized projects beyond the funds set-aside in the Trails Reserve Fund (currently $4,600/year).

TABLE 8-5
NON-MOTORIZED IMPROVEMENTS IN THE ASTORIA TRANSPORTATION SYSTEM PLAN (1997 Dollars)

No.	Location	Description	Phasing	Cost
NM3	Hwy 202 between Williamsport and the Walluski Loop Rd.	Bike Lanes	Short	$1,500,000
NM4	Lexington and Grand Ave Loop	Pedestrian Improvements	Short	$250,000
NM5	Hwy 30 Full Length	Pedestrian Improvements	Short	$250,000
NM6	10th, 11th and 12th Streets @ Marine and Commercial	Pedestrian Improvements	Short	$250,000
NM7	17th St./20th St. and Hwy. 30	Pedestrian Improvements	Short	$300,000
NM1	Railroad ROW near Marine Drive	Pedestrian Trail	Intermediate	$250,000
NM2	New Young's Bay Bridge	Pedestrian Improvements	Intermediate	$1,000,000

Source: David Evans and Associates, Inc., *Astoria Transportation System Plan Draft*, April 1997.

The pedestrian and sidewalk improvements to Lexington and Grand Avenue to address safety concerns may be eligible for enhancement and safety set-aside funds available through the STIP. In addition, the project to construct a pedestrian walkway on the BNRR right-of-way near Marine Drive may also be eligible for funding from enhancement set-asides through the STIP, or funding from the National Recreational Trails Funding Program and rails-to-trails funding administered by ODOT.

In addition, the city may seek funding for non-motorized projects through the Oregon Bicycle and Pedestrian Program. This program provides up to $100,000 for projects selected for funding by the Oregon Bicycle and

Pedestrian Advisory Committee. Projects on urban state highways may be fully funded by the program, while projects on local streets would require a local 20 percent match. The local match could come from set-aside funds in the Trails Reserve Fund. While all of the non-motorized projects in the TSP would cost more than $100,000, the city could divide projects into smaller parts that would cost $100,000 or less to seek funding from this program.

TRANSIT, WATER, AND AIR IMPROVEMENTS

Table 8-6 shows the transit, water, and air improvements included in the Astoria TSP—these projects are described in Chapter 7. All of these projects would be constructed with or without the Astoria Bypass project. Projects costs in Table 8-4 total $1.09 million in the short-range and $2.1 million in the intermediate-range, with a total cost of $3.2 million.

TABLE 8-6
TRANSIT, WATER, AND AIR IMPROVEMENTS IN THE ASTORIA TRANSPORTATION SYSTEM PLAN (1997 Dollars)

No.	Location	Description	Phasing	Cost
X2	Hwy 101 North and South of Astoria Megler Bridge	Install Bus Shelters and Kiosks	Short	$20,000
X3	Hwy 101 East and West of New Young's Bay Bridge	Install Bus Shelters and Kiosks	Short	$20,000
X4	Hwy 30 @ 20th, 37th, 45th and Nimitz	Install Bus Shelters	Short	$50,000
X5	Runway at Astoria Airport	Improve Runway Surface	Short	$1,000,000
X1	Astoria Megler Bridge	Pedestrian and Bike Shuttle	Intermediate	$100,000
X6	Hwy 30 in Gateway District	Construct Transportation Center (Bus, Taxi, Boat)	Intermediate	$2,000,000

Source: David Evans and Associates, Inc., *Astoria Transportation System Plan Draft*, April 1997.

Two of these projects would provide bus shelters on both sides of the Astoria Megler Bridge in the short-range and a pedestrian/bike shuttle service in the intermediate-range, with a total cost of $120,000. These projects would provide for better pedestrian and bicycle mobility and safety on the Astoria Megler Bridge, and so they are eligible for enhancement set-asides and transit funding available through the STIP.

Two projects would provide bus shelters on both sides of the New Young's Bay Bridge and at intersections along Highway 30, with a total cost of $70,000 in the short-range phase of the TSP. These projects are eligible for funding from a wide variety of transit funding programs, including the Community Transportation Program, and the Non-Urbanized Area Formula Program. These funding programs are administered by the Public Transit Section of ODOT, which recommends projects for funding to the Oregon Transportation Commission.

The TSP includes a $1 million resurfacing of the runway surface at the Astoria Airport in the short-range phase. The Port of Astoria anticipates receiving a Federal Airport Improvement Program grant from the Federal Aviation Administration for 90 percent of the project cost, with the 10 percent local match from Port or county funds.

The remaining project in this category would construct a pedestrian/bus/boat transportation center in the Gateway District, at a cost of $2 million in the intermediate-range phase of the planning period. The city recently adopted

Gateway Master Plan for the area, which will guide redevelopment of the area between 17th and 39th Streets north of Exchange Street. This area includes the Maritime Museum, the former Astoria Plywood mill site, the new Aquatic Center, and Columbia Memorial Hospital. An urban renewal district currently exists within this area, which generates about $75,000 per year for improvements in the district. The redevelopment of the Gateway District provides opportunity to funding the transportation center from a wide variety of sources, including grants administered by ODOT, grants or loans administered by the Oregon Economic Development Department, Community Development Block Grant funding from the Federal Department of Housing and Urban Development, urban renewal funding, and assessments or contributions from private developers, in addition to citywide local funding sources.

SOURCES OF ADDITIONAL LOCAL FUNDING

Table 8-4 shows the city faces a local funding shortfall of $910,000 for local transportation improvements over the 20-year planning period, or an average of $45,500/year (in 1997 dollars). Table 8-4, however, is based on project costs without the Bypass. If the city chooses to pursue construction of the Bypass, the size of the local contribution would need to be significant, and the larger the local contribution the greater the chance for funding through the STIP. Local funding would probably need to be 20–50 percent of the total cost, or about $8–$20 million in 1997 dollars.

This section evaluates potential sources of additional local funding by two primary criteria:*financial capacity* (can the source pay for the improvements?) and*political acceptability* (is the source politically acceptable to the citizens of Astoria?). A critical issue for political acceptability is who pays for the funding source—in general, citizens of Astoria will prefer federal and state funding for improvements over local sources. The potential for state and federal funding for projects in this TSP was described in the previous section, which found that additional local funding may be needed, and definitely will be needed if the Bypass is constructed. Since additional local funding is probably needed, a basic principle of public finance is that the people should pay based on either the costs they impose or the benefits they receive, unless they belong to some group that deserves special treatment. If charging people who benefit from an improvement is not feasible or the benefits are widespread, funding sources that spread the cost out among a large number of people may be acceptable because of the low cost to individuals.

Given the consideration of who pays and the perspective of citizens in Astoria, the city may want to pursue funding sources for transportation improvements in the following order:

- Use federal, state, or county funds first. Try to get more projects or funds from ODOT (which distributes state and federal funds) or Clatsop County, or tie what might otherwise be local projects (e.g., sidewalks and bike paths) to federal, state, or county highway projects.

- For the remaining projects that primarily benefit specific areas, charge property owners (through local improvement districts or special assessment) where possible and appropriate. Continue to require developers to provide streets needed within new developments, constructed to city standards.

- For remaining projects that do not directly benefit property owners that are willing to pay for the project, make sure that they are needed and that the design options have considered lower-cost alternatives.

- Pay for remaining projects out of existing revenue sources if possible.

- If additional revenue is needed, implement new funding mechanisms, based on a consideration of financial capacity, who pays, and the other criteria described above. Some new fees or taxes (such as tolls, vehicle registration fees, street utility fees, and fuel taxes) would be based on use of the transportation system, while others (such as property taxes) would charge residents regardless of their use of the transportation system. some funding sources (such as tolls and fuel taxes) would spread some of the cost out non-residents. Many new funding mechanisms would need voter approval.

- If raising additional revenue is not feasible, scale back or eliminate the proposed improvements.

There are two basic ways the city can fund projects: on a *pay-as-you-go basis*, where the city would pay for projects out of current and reserved revenue, or with *debt financing*, where the city would issue bonds backed by a stable revenue stream to raise funds for improvements. Cities use debt financing to raise a large sum of money in a short amount of time, but they end up paying back more than they borrow because of interest on the debt. Table 8-7 illustrates this point by showing the annual payment that would be needed to support various levels of bonded debt, with the assumptions of a 7 percent annual interest rate over 30 years, and fees at 3 percent of bonded debt. Table 8-7 shows that the city could issue $600,000 of bonded debt with an annual payment of $50,000 for 30 years. But the city could also fund projects with a total cost of $600,000 by spending $50,000 per year on a pay-as-you-go basis over a 15-year period.[11] If the $600,000 is needed all at once, however, the city may not have the time to accumulate the funds in reserve or find it difficult to accumulate such a substantial reserve in the face of multiple demands.

TABLE 8-7
ANNUAL PAYMENT NEEDED TO
SUPPORT VARIOUS AMOUNT OF BONDED DEBT

Annual Payment	Bonded Debt
$50,000	$600,000
$664,000	$8,000,000
$830,000	$10,000,000
$1,660,000	$20,000,000

Source: ECONorthwest, based on assumptions in text.

Bonds are typically backed by property tax revenue (General Obligation bonds) or another stable revenue source with secondary backing by property tax revenue (Revenue or Double-Barreled bonds). There are a variety of revenue sources used by local jurisdictions in Oregon that could be implemented by the City of Astoria to fund improvements on a pay-as-you-go or debt financing basis. These funding sources include:

Local Option Gas Tax. Several local jurisdictions have a local gas tax, including Tillamook ($0.015 per gallon), Woodburn ($0.01), and Multnomah County ($0.03). Woodburn, with a population of 15,475, raised

[11] An important note about Table 9-7 is that the annual payment is in current dollars, which means the payment amount would decline in real (1997) dollars. To illustrate, the payment in 2007 on a $600,000 bond issue would be $50,000 *in 2007 dollars*. Inflation will make future dollars worth less than they are today—this is why it will take 15 years for $50,000 per year to fund $600,000 worth of projects in 1997 dollars, assuming an annual inflation rate of 3%.

$97,540 in 1995 with its $0.01/gallon fuel tax. If Astoria could raise a similar amount per person, the city could generate over $75,000 per year for every $0.01/gallon fuel tax. Home rule cities have the authority to enact local fuel taxes if their charter allows, but current state law requires countywide voter approval to implement a local fuel tax. Local fuel taxes are typically opposed by local gasoline retailer, who fear the tax will reduce their sales. Most proposed local fuel taxes in Oregon have been defeated at the polls. A local option gas tax would be a relatively stable funding source for the city.

Street Utility Fee. Most city residents pay water and sewer utility fees; street utility fees apply the same concept to city streets. A fee is assessed to all households and businesses in the city for use of streets, based on the amount of use typically generated by a particular use. Street Utility Fees are currently used by the City of Medford to generate over $1 million annually (single-family households pay $2/month). Street utility fees have a potential to be a substantial and stable revenue stream for Astoria. If we conservatively assume that fees paid by single-family households would generate 40 percent of total revenue, a $2/month fee on single-family households in Astoria would yield a total revenue of over $185,000 per year. Street utility fee revenue would grow with population growth, and could increase the fee to reflect increased costs of providing transportation services. Since the fee would be based on use of the existing transportation system, the most appropriate use of this funding would be costs for maintenance and preservation. However, Street Utility Fee revenue could free up an equivalent amount of other funds in the city's budget that could be used for capital improvement projects.

Property Tax Serial Levy. Many jurisdictions fund transportation improvements with serial levies, including Washington County, which has been very successful at getting voter approval for serial levies to fund specific sets of transportation projects. The City of Astoria has used serial levies in the past to fund street maintenance; the last levy expired in 1994 and generated revenue of $250,000/year. The city intends to seek another serial levy for street maintenance this fall, after the city has a pavement management program that identifies the maintenance needs. Under Measure 50, serial levies that provide pay-as-you-go funding are subject to the Measure 5 property tax limit, but levies that support bond issues are exempt from this limitation. The city's budget indicates that Astoria is currently under the Measure 5 limit of $10 per $100,000 assessed value for non-school property taxes. A serial levy would require voter approval, and levies for transportation are generally more successful if they are for specific projects for which the community perceives a real need.

CHAPTER 9: IMPLEMENTATION

The Transportation System Plan (TSP) has been prepared to provide direction for transportation systems in the Astoria urban area over the next 20 years. Planning efforts create **real change** for a community through precise implementation strategies. The Astoria TSP is implemented in part through the adoption of revisions and additions to city policies and requirements in the Astoria Comprehensive Plan, and in the Development Code of the City of Astoria.

In addition, the Oregon Transportation Planning Rule (Section 660-12-045[1]) requires that cities and counties amend their land use regulations to conform to the jurisdiction's adopted TSP. The Comprehensive Plan and Development Code revisions listed below create consistency between the TSP and these documents.

COMPREHENSIVE PLAN REVISIONS

Amend the Astoria Comprehensive Plan as follows:

Land and Water Use Element

- CP.015(6) Revise second sentence to read-- "New development should be permitted if public facilities such as sewer, water, *transportation*, police and fire protection, and schools, are capable of accommodating increased demand."

Urban Growth Element

- CP.125(1) Replace policy with new language as follows–"It is the policy of the city to support efforts of the Oregon Department of Transportation to construct the Astoria Bypass sand the proposed Extended Bypass. To ensure the long-term viability of the Astoria Bypass, to protect the vitality of Astoria's existing business district, to limit any potential for development of commercial sprawl, it is the policy of the City of Astoria to support effective access management to the Bypass."

Columbia River Estuary Land and Water Use Element

- CP.160(G)(4) Delete policy. (Could replace with affirmative policy supporting the alternative by-pass route already selected.)

Transportation Element

- CP.355 Add new goal after goal 2 to read-- "3. Planning and developing a network of streets, accessways and other improvements, including bikeways, sidewalks and safe street crossings to promote safe and convenient bicycle and pedestrian circulation within the community."

- CP. 355 Add new goal after goal 3 to read-- "4. The City shall protect the function of existing or planned roadways, through such mechanisms as access management and traffic control requirements, as identified in the Transportation System Plan (chapter 5, p. 6-15)."

- CP.360(8) Replace policy with new policy 8 to read-- "The City shall protect the function of existing or planned roadways or roadway corridors through the application of appropriate land use regulations, including access management considerations."

- CP. 360(13) Replace policy with new policy 13 to read-- "The City will implement the Bicycle Plan for the City of Astoria (1992) in part through the bicycle facilities included in the Transportation System Plan."

- CP. 360(16) Add new policy to read-- "16. Changes in the specific alignment of proposed public road and highway projects shall be permitted without plan amendment if the new alignment falls within a transportation corridor identified in the Transportation System Plan

- CP. 360(17) Add new policy to read-- "17. Dedication of right-of-way, authorization of construction and the construction of facilities and improvements, for improvements designated in the Transportation System Plan, shall be allowed without land use review."

  CP. 360(18) Add new policy to read-- "18. Operation, maintenance, repair, and preservation of existing transportation facilities shall be allowed without land use review, except where specifically regulated."

  CP. 360(19) Add new policy to read-- "19. The City should preserve right-of-way for planned transportation facilities through such methods as acquisition, exaction, voluntary dedication, or setbacks."

DEVELOPMENT CODE REVISIONS

Amend the Development Code of the City of Astoria as follows:

Article 1 Basic Provisions

- Add new section to read-- "1.210 M. Astoria Transportation System Plan.

- Add new section to read-- "1.370. Review of Land Transportation Facilities for Compliance with Land Use Regulations.

Except where otherwise specifically regulated by this ordinance, the following improvements are permitted uses and activities:

A. Normal operation, maintenance, repair, and preservation activities of existing transportation facilities.

B. Installation of culverts, pathways, medians, fencing, guardrails, lighting, water lines, sewer lines, and similar types of improvements within existing right-of-way.

C. Projects specifically identified in the Transportation System Plan .

D. Landscaping as part of a land transportation facility.

E. Emergency measures necessary for the safety and protection of the public and property.

F. Acquisition of right-of-way for public streets, highways, and other transportation improvements designated in the Transportation System Plan (chapter 8).

All other land transportation facilities not described above shall be reviewed as conditional uses consistent with the procedures for the zone where they are proposed.

- Add new terms or modify definitions to read-- "1.400. Definitions.

ACCESS: The place means or way by which pedestrians, bicycles and vehicles enter or leave property.

ACCESS MANAGEMENT: The process of providing and managing access to land development while preserving the regional flow of traffic in terms of safety, capacity, and efficiency.

ACCESSWAY: A walkway that provides pedestrian and bicycle passage either between streets or from a street to a building or other destination such as a school, park, or transit stop. Accessways generally include a walkway and additional land on either side of the walkway, often in the form of an easement or right-of-way, to provide clearance and separation between the walkway and adjacent uses.

BICYCLE: A vehicle designed to operate on the ground on wheels, propelled solely by human power, upon which any person or persons may ride, and with two tandem wheels at least 14 inches in diameter. An adult tricycle is considered a bicycle.

DEVELOPMENT: To construct or alter a structure, to make a physical change in the use or appearance of land, to divide land into parcels, or to create or terminate rights of access.

JOINT ACCESS (OR SHARED ACCESS): A driveway connecting two or more contiguous sites to the public street system.

LAND TRANSPORTATION FACILITIES: Highways, railroads, bridges and associated structures (*including bike and pedestrian facilities*), and signs which provide for land transportation of motorized and/or non-motorized vehicles (excluding logging roads).

SUBSTANTIAL IMPROVEMENT: Any repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure either:

A. Before the improvement or repair is started; or

B. If the structure has been damaged and is being restored, before the damage occurred. For the purposes of this definition, "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. The terms do not, however, include either:

1) Any project for improvement of a structure to comply with existing state or local health, sanitary or safety code specification which are solely necessary to assure safe living conditions; or

2) Any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.

3) Public bridges or other similar public transportation structures.

Article 2 Use Zones

- Add new section to read-- "2.515(13). All uses will comply with access, parking and loading standards in Article 7."
- Add new section to read-- "2.565(10). All uses will comply with access, parking and loading standards in Article 7."
- Add new section to read-- "2.590(10). All uses will comply with access, parking and loading standards in Article 7."
- Add new section to read-- "2.615(10). All uses will comply with access, parking and loading standards in Article 7."
- Add new section to read-- "2.665(11). All uses will comply with access, parking and loading standards in Article 7."
- Add new section (adjust other numbering) to read-- "2.900(J). Pedestrian and Bicycle Circulation. Pedestrian and bicycle circulation plans shall conform to all the provisions of this City of Astoria Development Code, except that the Planning Commission may authorize exceptions where warranted by unusual circumstances."
- Add new section (adjust other numbering) to read-- "2.905(A)(11). Proposed pedestrian and bicycle circulation plan."
- Revise section to read--"2.905(B)(6). The streets are adequate to support the anticipated traffic and the development will not overload the streets outside the planned area. Development shall comply with access management provisions in Article 7."
- Add new section (adjust other numbering) to read-- "2.905(B)(7). The plan adequately provides for bicycle and pedestrian circulation and provides for connecting on-site pedestrian and bicycle facilities to adjacent areas."
- Revise section to read-- "2.910(A)(2). Location and dimensions of streets, *pedestrian and bicycle facilities*, roads, trails, common open space, recreation area and parks."

Article 3 Additional Use and Development Standards

- Add new section (adjust other numbering) to read-- "3.240" SUBDIVISION AND LAND PARTITION STANDARDS APPLY

Design standards contained in Article 13 of the Zoning Code entitled General Regulations and Design Standards and Improvements shall apply to all development.

Article 7 Parking and Loading

- Re-title section to read--"**Parking, Loading, Pedestrian/Bicycle Facilities and Access Management"**
- Add new section at end of Parking and Loading to read--

PEDESTRIAN AND BICYCLE FACILITIES

7.200 PEDESTRIAN AND BICYCLE CIRCULATION.

A. On-site facilities shall be provided that accommodate safe and convenient pedestrian and bicycle access within new subdivisions, multi-family developments, planned developments, and commercial and industrial developments, for all zoning districts referencing the requirement for compliance with Chapter 7 of the Code.

B. Internal pedestrian and bicycle circulation shall be provided in new development through accessways designed to minimize trip distances. Accessways through parking lots should be physically separated from adjacent vehicle parking or parallel vehicle traffic by curbs or similar devices and include landscaping, trees and lighting. Where accessways cross-driveways, they are generally raised, paved, or marked in a manner that makes it clear that pedestrians may be present.

C. Accessways and internal parking lot circulation design shall maintain ease of access for pedestrians from abutting streets, pedestrian facilities, and transit stops.

7.210 BICYCLE PARKING REQUIRED.

A. At least one bicycle parking space shall be provided for every 10 required parking spaces (or portions thereof) in any development unless otherwise specified by this Code. Bicycle parking spaces shall be provided in a lockable rack. The Director may reduce the number of required bicycle parking spaces on a case-by-case basis if the applicant can demonstrate that the proposed use by its nature would be reasonably anticipated to generate a lesser need for bicycle parking. Single-family residences and duplexes are excluded from the bicycle parking requirements.

B. Bicycle parking facilities shall be placed in a convenient location near the main entrance of the site's principal use. Where possible, bicycle-parking facilities shall be placed under cover. Bicycle parking areas shall not interfere with parking aisles, landscape areas, or pedestrian ways. For security and convenience purposes, bicycle-parking facilities shall be located in areas visible to the adjacent sidewalks and/or vehicle parking areas within the site.

7.220 PEDESTRIAN FACILITIES INCLUDING TRANSIT ACCESS REQUIRED.

A. Access facilities shall be constructed consistent with approved pedestrian circulation plans with all new development.

B. Sidewalks shall be constructed with all new development including substantial improvements to existing structures on streets immediately adjacent to the development site. These sidewalks shall be constructed to the standards specified in the Code and by City policy.

C. Transit shelters shall be installed, where appropriate, when new development including substantial improvements to existing structures occurs along existing or planned transit routes. Applicants shall consult with the local transit provider to determine the appropriate facility, if any.

ACCESS MANAGEMENT

7.320 TRAFFIC IMPACT STUDIES REQUIRED.

A. For new developments, substantial improvements, or changes in use, that are likely to generate more than 400 average daily motor vehicle trips (ADT's), the applicant shall provide a traffic impact study to demonstrate the level of impact to the surrounding street system. The applicant shall work with the City Engineer and, if appropriate, the Oregon Department of Transportation to determine the scope of a required traffic study.

B. Based on the findings of the traffic impact study on the impact to the surrounding street system, the developer may be required to mitigate impacts attributable to the project.

C. The applicant shall bear all cost of preparation of the study.

7.300 PURPOSE OF ACCESS MANAGEMENT.

The intent of this Code is to manage access to land development while preserving the flow of traffic in terms of safety, capacity, functional classification, and level of service. Major roadways, including highways, arterials, and collectors serve as the primary network for moving people and goods. These transportation corridors also provide access to businesses and homes and have served as the focus for commercial and residential development. If access points are not properly designed, these roadways will be unable to accommodate the needs of development and retain their primary transportation function. This Code balances the right of reasonable access to private property with the right of the citizens of Astoria and the State of Oregon to safe and efficient travel.

This Code is intended to implement the access management policies of the City of Astoria as set forth in the Transportation System Plan.

CITY OF ASTORIA
MATRIX OF COMPLIANCE-TRANSPORTATION SYSTEMS PLAN
TSP Chapters

Transportation Planning Rule	1 Requirements	2 Public Involvement	3 Current Conditions	4 Safety	5 Access Management	6 Forecast	7 Plan	8 Financial	9 (Dev. Code/Comp Plan Ref.) Implementation
Amend Land Use Regulations, to Reflect/Implement TSP.									TSP Chapt. 9 inclusive DCCA Art. 1.240 ACP Section CP.360(16)
Identify Transportation Facilities, Services, and Improvements Allowed Outright.									DCCA Art. 1.370 ACP Section CP.360(17) CP.360(18)
Adopt Land Use or Subdivision Measures to Protect Transportation Facilities, Corridors & Sites.									
- access management and control					p.5-6 to p.5-15				ACP Section CP.360(8) DCCA Art.1.400 Art 7.320 Art 7.300 Art 7.310 Art.7.330
- coordinated review of land use decisions									***DCCA Art.9.020***
- conditions to minimize development impacts to transportation facilities					p.5-6 to p.5-15				ACP Section CP.015(6) CP.355(4) CP.360(19) DCCA Art.2.515* Art 2.910(B)(6) Art.13.410(D); Art 13.440(B); Art 13.610(M)
- regulations to provide notice to public agencies									***DCCA Art.9.020***
- regulations assuring that amendments to land use applications, densities and design standards consistent with TSP									***DCCA Art.10.040*** ***Art 10.070***
Regulations Supportive of Bicycle/Pedestrian Circulation and Bicycle Parking									ACP Section CP.360(3) CP.360(13) DCCA Art.2.900(J); 2.905(A)(11); 2.905(B)(7); 2.910(A)(2) Art.7.200; 7.210; 7.220 Art.13.610(M)
Establish Street Standards							p.7-1 to p.7-4		DCCA Art.13.400 Art 13.410(B) Art 13.410(E) Art 13.410(I)
Provide a Street System Plan for Arterials & Collectors							p.7-1 to p.7-8		
Provides a Public Transportation Plan							p.7-10		
Provides a Bicycle & Pedestrian Plan							p.7-8 to p.7-10		
Provides for an Air, Water & Pipeline Plan							p.7-11		
Provides for a Transportation Financing Program							p.7-12 to p.7-22	p.8-1 to p.8-15	

DCCA=Development Code City of Astoria
TSP=Transportation System Plan
ACP=Astoria Comprehensive Plan
Bold Text References Existing Code Language

*2.515(13); 2.565(10); 2.590(10); 2.665(11); 2.615(10) (These sections all tie access management to zones)

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7.310 ACCESS MANAGEMENT STANDARDS.

A. All new development including substantial improvements that access or abut arterials and collectors within the City of Astoria shall develop access improvements consistent with the access management guidelines described in section 7.330 of this Code. The location and design of all accesses to and/or from arterials and collectors (as designated in the Transportation System Plan) are subject to review and approval by the City Engineer and where applicable, by ODOT.

B. In the interest of promoting unified access and circulation systems, development sites under the same ownership or consolidated for the purposes of development e shall be reviewed as a single property in relation to the access standards of this Code. The number of access points permitted shall be the minimum number necessary to provide reasonable access to these properties, not the maximum available for that frontage.

C. The parking circulation system shall be internalized to avoid multiple accesses to adjacent streets.

D. Off-street facilities shall be designed and constructed with turnaround areas to prevent back up movements onto arterial or collector streets. In limited situations where no alternative design is possible and sight distance is acceptable, parking and loading areas having less than five (5) spaces may allow for backing movements onto collector or local streets subject to the approval of the City Engineer.

E. Driveways shall be developed consistent with the City Code Section 2.050 through 2.100, and ODOT standards on state highways..

F. Where feasible, joint access points and parking facilities for more than one use should be provided.

G. If access from a secondary street is feasible, then access should not be allowed onto the arterial or collector street. Site development should be oriented to the secondary street.

H. Adjacent commercial or office uses that are major traffic generators (i.e., shopping centers, office parks) shall provide a cross access drive and pedestrian access to allow circulation between sites.

7.330 ACCESS MANAGEMENT GUIDELINES.

A. It is not possible to strictly apply access management standards to all development situations, particularly in the urban area where the City of Astoria already has a grid system with intersections spaced at approximately 400-foot intervals. Access management guidelines are included in the Transportation System Plan that should be used in evaluating access management designs proposed to the City and ODOT.

- Delete section—"7.110 E."
- Delete section—"7.120."

Article 13 Subdivision and Land Partition

- Add new language to section (last sentence) to read-- "13.400. PRINCIPLES OF ACCEPTABILITY."

  The City Engineer shall prepare and submit to the City Council *for adoption* specifications to supplement the standards of this ordinance, based on standard engineering practices, concerning streets, drainage facilities, sidewalks, sewer and water systems.

- Add new language to section (first sentence) to read-- "13.410 (B). Street Widths."

  Street widths shall conform with City standards, *included in part in the adopted Street Design Standards,* except where it can be shown by the land divider *(developer),* to the satisfaction of the Planning Commission, that the topography or the small number of lots or parcels served and the probable future traffic development are such as to unquestionably justify a narrower width.

- Modify language in section to read-- "13.410 (E). Intersection Angles."

  Streets shall intersect at angles as practical except where topography requires a lesser angle, but in no case shall the acute angle be less than *75* degrees unless there is a special intersection design.

- Modify with new language to section to read-- "13.410 (I). Cul-de-Sac."

  Through streets are encouraged except where topographic, environmental, or existing adjacent land use constraints make connecting streets unfeasible, then cul-de-sacs or permanent dead-end streets may be used as part of a development plan. A cul-de-sac shall be as short as possible and shall have a maximum length of *500* feet and serve building sites for not more than 18 dwelling units. A cul-de-sac shall terminate with a turnaround sufficient for all vehicles expected on that roadway. *When cul-de-sacs are planned, accessways shall be provided connecting the ends of cul-de-sacs to each other, or to neighborhood activity centers, such as schools or parks, whenever feasible.*

- Add new language to section (first sentence) to read-- "13.410 (D). Future Street Extension."

  The street system of proposed subdivisions shall be designed to connect with existing, proposed, and planned streets outside of the subdivision.

- Modify with new language to section (first sentence) to read-- "13.440 (B). Size."

  No block shall be more than *600* feet in length between street corner lines unless it is adjacent to an arterial street or unless the topography or the location of adjoining streets justifies an exception.

- Add new language to section to read-- "13.610 (M). Transit Shelters."

  Transit shelters shall be installed, where appropriate, when new development including substantial improvements to existing structures occurs along existing or planned transit routes. Applicants shall consult with the local transit provider to determine the appropriate facility, if any.