REPORT
TRANSPORTATION SYSTEM PLAN

CITY OF SENECA

June 1997

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CHAPTER 1: INTRODUCTION

The Seneca Transportation System Plan (TSP) guides the management of existing transportation facilities and the design and implementation of future facilities for the next 20 years. This TSP constitutes the transportation element of the city's Comprehensive Plan and satisfies the requirements of the Oregon Transportation Planning Rule (TPR).

PLANNING AREA

The Seneca TSP planning area includes the City of Seneca and the area within the city's UGB. The planning area is shown on Figure 1-1. Roadways included in the TSP fall under several jurisdictions: Seneca, Grant County, and the State of Oregon.

The City of Seneca is located in the southern-central portion of Grant County, 25 miles south of John Day. In 1996, the population of Seneca reached 230 residents, which is around 2.8 percent of the county's population.

Highway 395 passes through the city, linking Seneca to the cities of Canyon City and John Day to the north and the cities of Burns and Hines to the south. Logan Valley Road extends east from the city and is under the jurisdiction of the US Forest Service. This road serves as a logging road and provides access to winter recreation areas to the east. Inside the UGB this road becomes 1st Street and also falls under the jurisdiction of the city.

A strong street grid pattern of local streets, east of the highway, has been maintained in Seneca as it has developed over the years. The grid pattern is laid out in a typical north-south and east-west orientation.

A land use zoning map of the Seneca TSP planning area is shown on Figure 1-2. This map was taken from the City of Seneca Comprehensive Plan, October 1980.

As shown in the figure, land is zoned for commercial use along both sides of the highway from the north side of the OSHD Maintenance Station to the south side of Shirttail Creek Road.

A small parcel of land zoned for Park Reserve is located across from the OSHD Maintenance Station on the western side of the highway. This area currently contains the city park.

A residential zone is located east of the highway between 4th Street and the southern UGB line. This area encompasses almost all of the homes in the city.

All other land inside the UGB is zoned for industrial use.

PLANNING PROCESS

The Seneca TSP was prepared as part of an overall project in Grant County that involved preparing individual plans for Grant County and the six communities of Dayville, Long Creek, Monument, Mt. Vernon, Prairie City, and Seneca. Each plan was developed through a series of technical analyses combined with systematic input and review by the city, the Local Working Group, the TAC, ODOT, and the public. Key elements of the process include:

- Involving the Seneca community (Chapter 1)
- Defining goals and objectives (Chapter 2)
- Reviewing existing plans and transportation conditions (Chapters 3 and 4 and Appendices A and B)
- Developing population, employment and travel forecasts (Chapter 5)
- Developing and evaluating potential transportation system improvements (Chapter 6)
- Developing the TSP (Chapter 7)
- Developing a capital improvement program (Chapter 8)
- Developing Recommended Policies and Ordinances (Chapter 9)

Community Involvement

Community involvement was an important part of developing the Seneca TSP. Interaction with the community was achieved with several different techniques including, a local working group, a transportation advisory committee, stakeholder interviews, and newspaper articles.

Because the overall project involved seven different jurisdictions, a local working group was formed for each community. The local working group functioned as a citizen advisory committee, providing local knowledge, guidance to the consultant team, and review of work products. Two meetings were held during the plan development process. The first meeting was held to discuss transportation issues and concerns to serve as the basis for identifying and evaluating improvement alternatives for the community. The second meeting was held to review the draft TSP.

In addition to the local working groups, a Transportation Advisory Committee (TAC) was formed for the overall project. The TAC consisted of citizens and representatives from each city, Grant County and the Oregon Department of Transportation (ODOT). The purpose of the TAC meetings was to disseminate general information about the planning process and to share information about the needs in each community and the county. Three TAC meetings were held during the planning process.

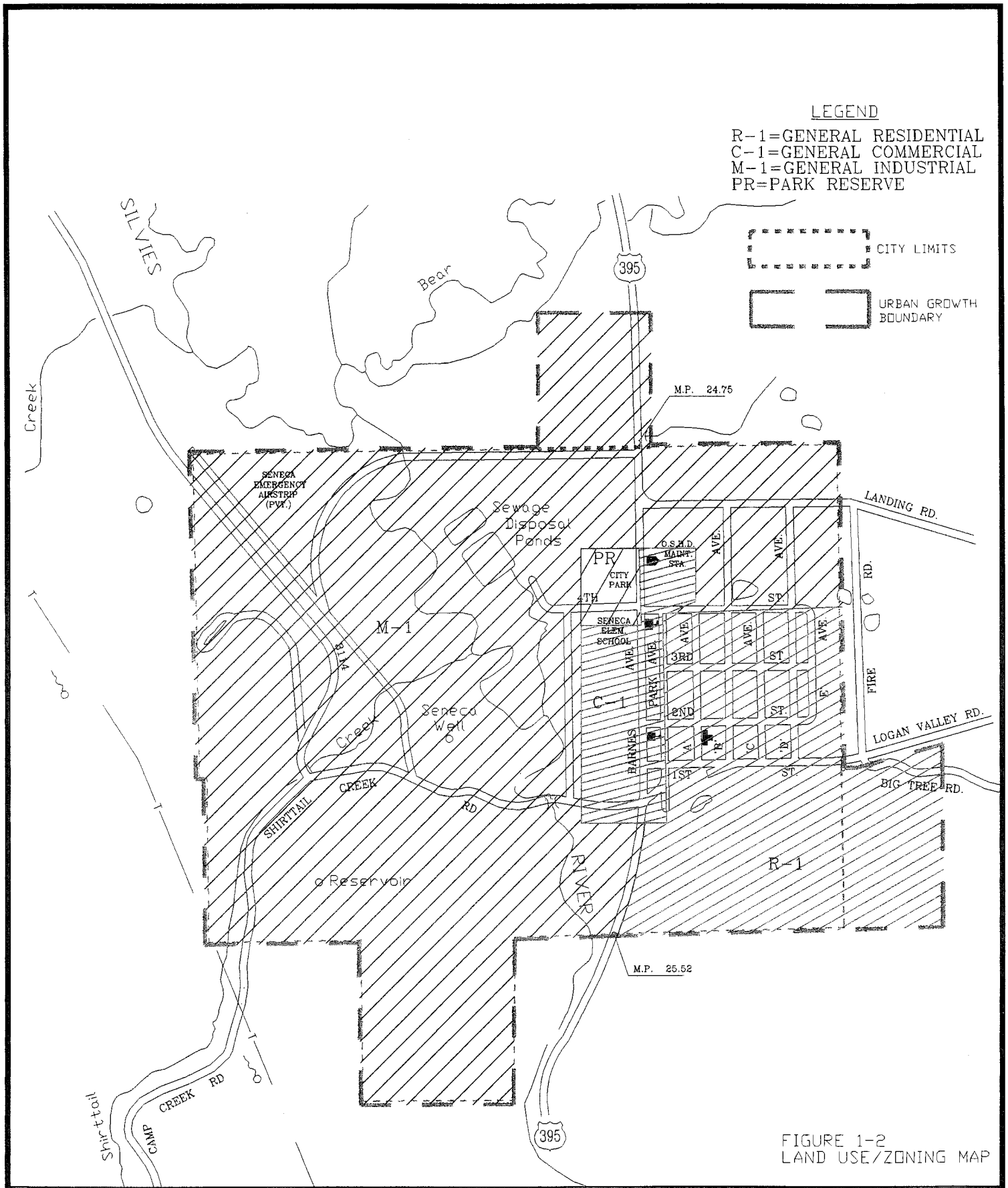
Goals and Objectives

Using input from the city, the TAC, and the community, a set of goals and objectives were defined for the Seneca TSP. These goals and objectives were used to make decisions about various potential improvement projects. They are described in Chapter 2.

Review and Inventory of Existing Plans, Policies, and Public Facilities

To begin the planning process, applicable Seneca and Grant County transportation and land use plans and policies were reviewed and an inventory of public facilities was conducted. The purpose of these efforts was to understand the history of transportation planning in the Seneca area, including the street system improvements planned and implemented in the past, and how the city is currently managing its ongoing development. Existing plans and policies are described in Appendix A of this report.

The inventory of existing facilities catalogs the current transportation system. The results of the inventory are described in Chapter 3, while Chapter 4 describes how the system operates. Appendix B summarizes the inventory of all streets in the Seneca planning area.


LEGEND
R-1=GENERAL RESIDENTIAL
C-1=GENERAL COMMERCIAL
M-1=GENERAL INDUSTRIAL
PR=PARK RESERVE
CITY LIMITS
URBAN GROWTH BOUNDARY
SILVIES
Bear
Creek
395
M.P. 24.75
SENECA EMERGENCY AIRSTRIP (PVT.)
Sewage Disposal Ponds
PR
CITY PARK
O.S.H.D. MAINT. STA.
LANDING RD.
4TH
SENECA ELEM. SCHOOL
M-1
C-1
3RD
2ND
1ST
PARK
BARNES
AVE.
ST.
FIRE RD.
LOGAN VALLEY RD.
BIG TREE RD.
SHIRTTAIL CREEK
Seneca Well
Reservoir
RIVER
R-1
M.P. 25.52
CAMP CREEK RD
Shirttail
FIGURE 1-2
LAND USE/ZONING MAP
MAINLINE STATE HIGHWAY
STREET OPEN FOR TRAVEL
CITY LIMITS
INTERSTATE ROUTE
U.S. ROUTE
STATE ROUTE
TERMINATION OF FA SYSTEM
ALL STATE HIGHWAYS AND FEDERAL AID ROADS SHOWN IN RED
PUBLIC BUILDING
COURT HOUSE
CITY HALL
ARMORY
POST OFFICE
SCHOOL
LIBRARY
CITY OF SENECA
0 500 1000 FEET

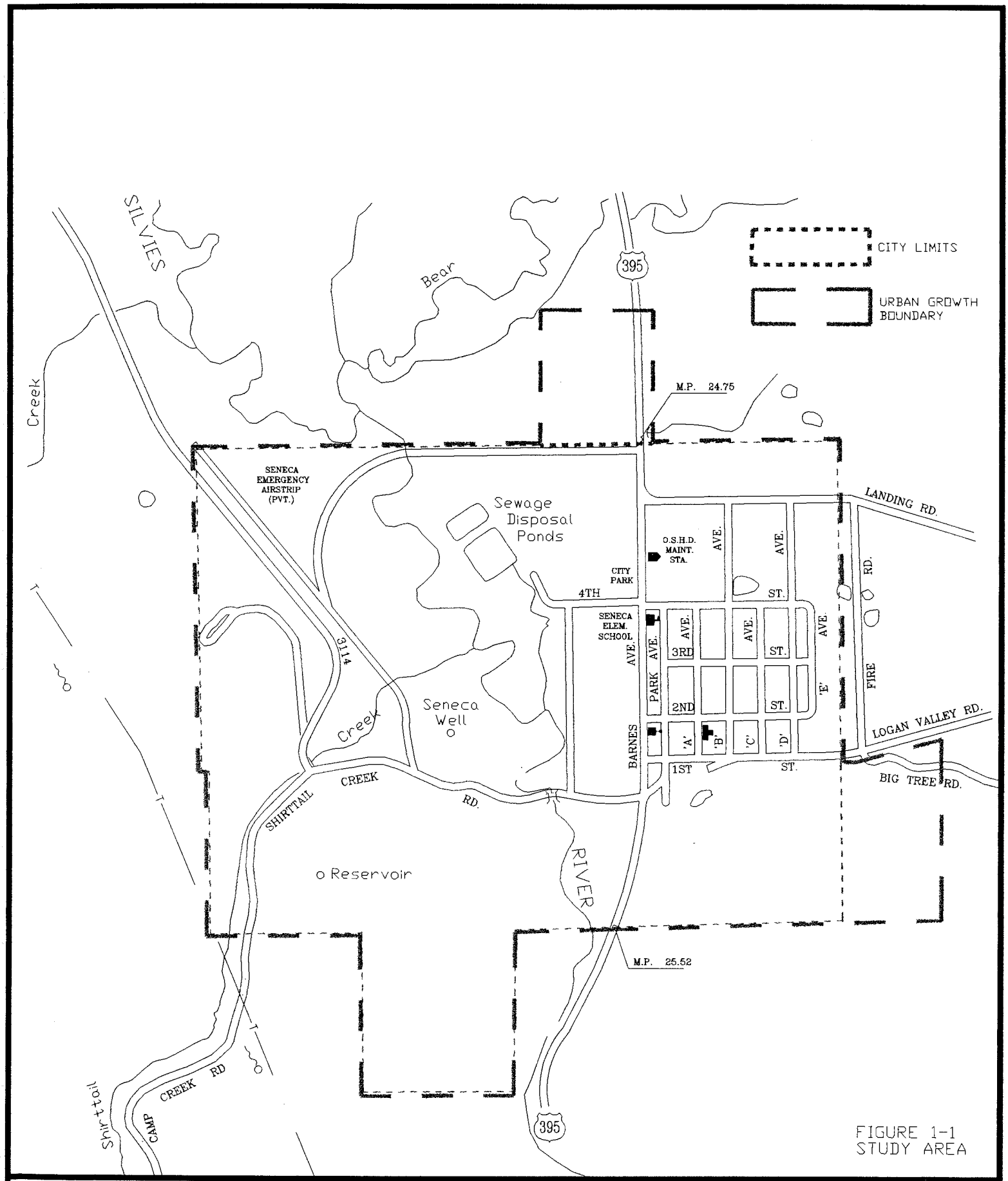


FIGURE 1-1
STUDY AREA

Future Transportation System Demands

The TPR requires the TSP to address a 20-year forecasting period. Future traffic volumes for the existing plus committed transportation systems were projected using ODOT's *Level 1 -- Trending Analysis* methodology. The overall travel demand forecasting process is described in Chapter 5.

Transportation System Potential Improvements

Once the travel forecasts were developed, it was possible to evaluate a series of potential transportation system improvements. The initial evaluation was the "No Build" option, which is the existing street system plus any currently committed street system improvements. Then, transportation demand management measures and potential transportation improvements were developed and analyzed as part of the transportation system analysis. These improvements were developed with the help of the local working group, and they attempt to address the concerns specified in the goals and objectives (Chapter 2). After evaluating the results of the potential improvements analysis, several transportation system improvements were selected. These recommended improvements are described in Chapter 6.

Transportation System Plan

The TSP addresses each mode of transportation and provides an overall implementation program. The street system plan was developed from the forecasting and potential improvements evaluation described above. The bicycle and pedestrian plans were developed based on current usage, land use patterns, and the requirements set forth by the TPR. The public transportation, air, waterborne, rail, and pipeline plans were developed based on discussions with the owners and operators of those facilities. Chapter 7 details the plan elements for each mode.

Funding Options

The City of Seneca will need to work with Grant County and ODOT to finance new transportation projects over the 20-year planning period. An overview of funding sources that might be available to the community is provided in Chapter 8. This synopsis includes current and potential revenue sources as well as debt financing options.

Recommended Policies and Ordinances

Suggested Comprehensive Plan policies and implementing zoning and subdivision ordinances are included in Chapter 9.

CHAPTER 2: GOALS AND OBJECTIVES

The purpose of the TSP is to provide a guide for Seneca to meet its transportation goals and objectives. The following goals and objectives were developed from information supplied by the Transportation Advisory Committee, the Local Working Group, city staff, and public response. Throughout the planning process, each element of the plan was evaluated against these parameters.

An overall goal was developed, then more specific goals and objectives were formulated. The goals and objectives are listed below. These goals and objectives are addressed in the following plan chapters.

OVERALL TRANSPORTATION GOAL: Develop a transportation system that enhances the livability of Seneca and accommodates growth and development through careful planning and management of existing and future transportation facilities.

GOAL 1: Preserve the function, capacity, level of service, and safety of the state highways.

Objectives:

A. Develop access management standards.

B. Develop alternative, parallel routes.

C. Promote alternative modes of transportation.

D. Promote transportation demand management programs.

E. Promote transportation system management.

F. Develop procedures to minimize impacts to and protect transportation facilities, corridors, or sites during the development review process.

GOAL 2: Improve and enhance safety and traffic circulation on the local street system.

Objectives:

A. Maintain and enhance the existing grid street system.

B. Improve and maintain existing roadways to preserve the capacity, level of service, and safety of the existing transportation system.

C. Examine the need for speed reduction and improved traffic control at specific locations.

D. Identify local problem spots and recommend solutions.

E. Ensure planning coordination between the City of Seneca, Grant County, the state, and the US Forest Service.

GOAL 3: Identify roadway system needs to accommodate developing or undeveloped areas without undermining the character of existing neighborhoods.

Objectives:

A. Adopt policies and standards that address street connectivity, spacing, and access management.

B. Integrate new arterials and collectors into the existing grid system.

C. Improve access into and out of Seneca for goods and services.

D. Improve access onto and off arterial roadways to encourage growth.

GOAL 4: Increase the use of alternative modes of transportation (walking, bicycling, and transit) through improved access, safety, and service.

Objectives:

A. Provide sidewalks and safe crossings on urban arterial and collector streets.

B. Provide shoulders on rural collectors and arterials.

C. Provide appropriate bikeways where high use occurs or may occur.

D. Promote alternative modes and carpool programs through community awareness and education.

E. Plan for expanded transit service by sustaining funding to local transit efforts and seeking consistent state support.

F. Protect the emergency air strip from land use encroachment.

CHAPTER 3: TRANSPORTATION SYSTEM INVENTORY

As part of the planning process, DEA conducted an inventory of the existing transportation system in Seneca. This inventory covered the street system as well as the pedestrian, bikeway, public transportation, rail, air, waterborne, and pipeline systems.

STREET SYSTEM

Transportation in the United States is dominated by cars and trucks. The mobility provided by the personal automobile has resulted in a great reliance on this form of transportation. Likewise, the ability of trucks to carry freight to nearly any destination has greatly increased their use. As a result, the basis of transportation in all American cities is the roadway system, and most transportation dollars are devoted to building, maintaining or planning roads to carry automobiles and trucks.

This trend is clearly seen in the existing Seneca transportation system, which consists almost entirely of roadway facilities for cars and trucks. The street system will most likely continue to be the basis of the transportation system for at least the 20-year planning period; however, encouraging the use of cars and trucks must be balanced against other factors. The increasing cost of constructing new roadway facilities, livability factors, the ability to accommodate other modes of transportation, and negative impacts on adjacent land uses should also be considered.

Street Layout

The City of Seneca has a well-established grid system along and east of Highway 395 in the central core of the city. North of 4th Street, the 'B' and 'D' Avenue dirt roads provide a starting point for extending the existing grid system to the north in the future.

Inventory

The existing street system inventory was conducted for all roadways within Seneca including state highways and US Forest Service roads that lie within the planning area. Inventory elements include:

- street classification and jurisdiction
- street width and right-of-way
- number of travel lanes
- presence of on-street parking, sidewalks, or bikeways
- speed limits
- presence of curb and gutter
- general pavement conditions

Figure 3-1 shows the roadway functional classification and jurisdiction. Appendix B lists the complete inventory.

State Highways

Discussion of the Seneca street system must include all state highways that traverse the planning area. Although Seneca has no direct control over these highways, adjacent development as well as traffic patterns are heavily influenced by the highways.

Seneca is served by US Highway 395, the only highway in the planning area. This highway serves as the major route through town with industrial, commercial, and public development focused along the corridor. It is a two-lane facility with posted speed limits of 55 mph north of the city limits, 45 mph inside the northern city limits, 30 mph between 4th Street and Shirttail Creek Road, and back to 55 mph south of Shirttail Creek Road.

Oregon Highway Plan

The 1991 Oregon Highway Plan (OHP) classifies the state highway system into four levels of importance (LOI): Interstate, Statewide, Regional, and District. ODOT has established primary and secondary functions for each type of highway and objectives for managing the operations for each one.

Highway 395 though Seneca is classified as a highway of statewide importance. According to the OHP, the primary function of a state highway is to "provide connections and links to larger urban areas, ports, and major recreation areas that are not directly served by interstate highways." A secondary function is "to provide links and connections for intra-urban and intra-regional trips." The overall emphasis on this highway is to provide safe and efficient high-speed through travel in rural areas, and high- to moderate-speed operations in urban or urbanizing areas. This means that design factors such as controlling access and providing passing lanes are of primary importance along Highway 395.

Recently, two Oregon highways in Grant County were included in the National Highway System (NHS). Highway 26, which does not run through Seneca, was included in the NHS because of its statewide importance. Highway 395 was added as a congressional high priority route in the NHS. This is a new national classification system to identify highways of significance.

Street Classification

The City of Seneca has no street classification system identified in its comprehensive plan. Therefore, a classification system was created at three levels: state highways/arterial streets, US Forest Service (USFS) roads, and local city streets. These categories were created based on street functionality and jurisdiction.

State Highways/Arterial Streets

State highways often function as arterial streets, forming the primary roadway network within and through a region. They provide a continuous road system that distributes traffic between neighborhoods and districts. Generally, arterial streets are high capacity roadways that carry high traffic volumes with minimal localized activity. In smaller communities, such as Seneca, the state highways/arterial streets often serve both regional and local traffic demands.

In Seneca, the arterial network consists of only Highway 395. Besides serving as the major route through the city, Highway 395 also serves the bulk of Seneca's local industrial, commercial, and public facilities. North of 4th Street is the Oregon State Highway Division Maintenance Station. On the west side of the highway near

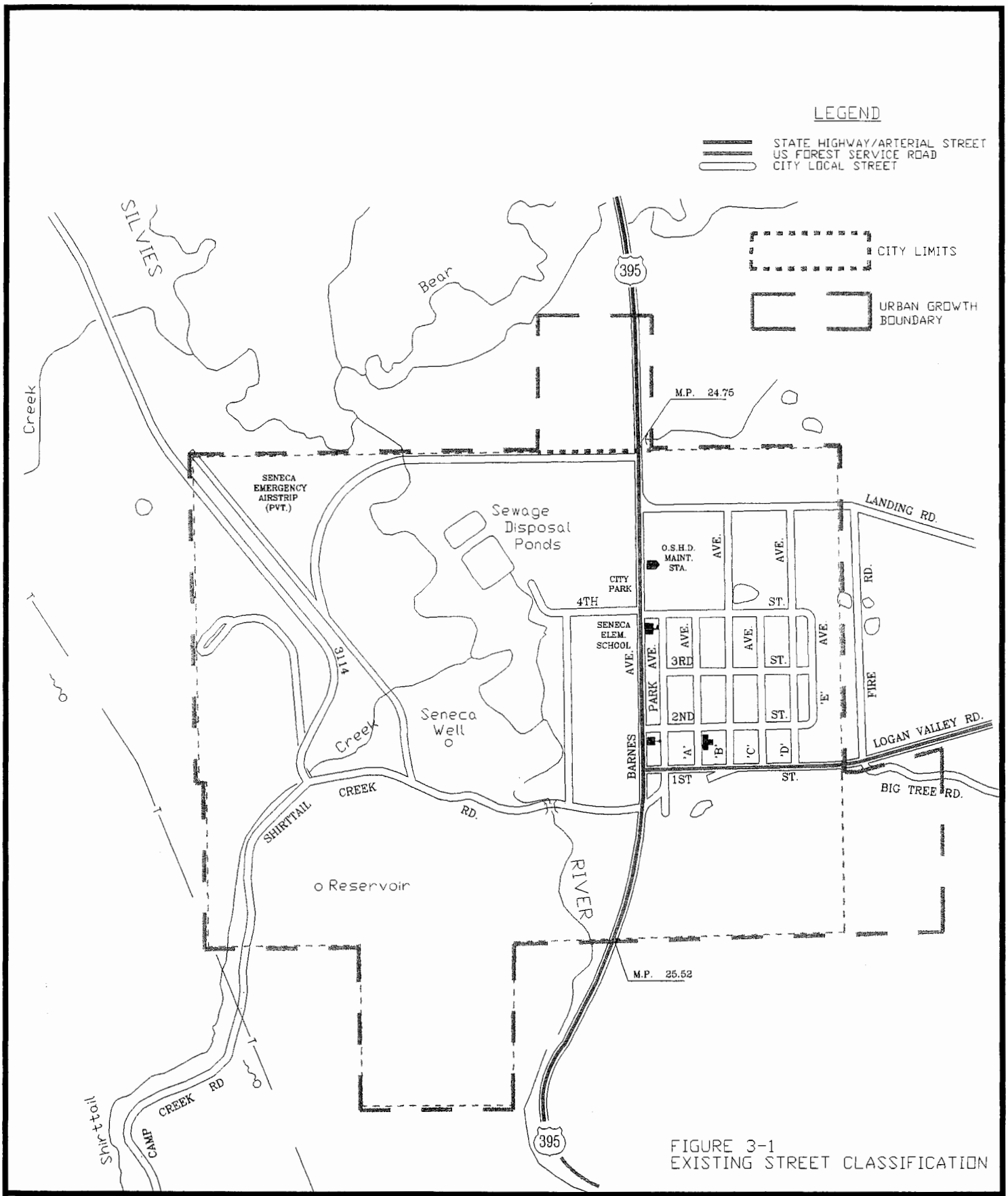


FIGURE 3-1
EXISTING STREET CLASSIFICATION

4th Street are the city park and baseball field, with the elementary school on the east side of the highway. Between 4th Street and 1st Street are a few stores, the elementary school playground, a church, and the post office.

US Forest Service Roads

There is one road in the Seneca planning area under the jurisdiction of the USFS. Logan Valley Road, also named 1st Street inside the city limits, is primarily used for the purposes of logging and winter recreation in the Malheur National Forest northeast of the city. This road is paved both for its entire length. Within the city limits, local city streets tie into it.

Local City Streets

Local city streets are designed to carry the very low traffic volumes associated with the local uses which abut them. In Seneca there are about 13 local streets as displayed in Figure 3-1. A few of these roads have no assigned name. Most of the streets west of Highway 395, except 4th Street, are dirt roads. 'B' and 'D' Avenue, north of 4th Street, are also dirt roads, as are Fire Road and Landing Road, east of the city.

PEDESTRIAN SYSTEM

The most basic transportation option is walking. Walking is the most popular form of exercise in the United States and can be performed by people of all ages and all income levels. However, it is not often considered as a means of travel. This is mainly because pedestrian facilities are generally an afterthought and not planned as an essential component of the transportation system.

An average trip length for a pedestrian is around 1/2 mile. The relatively small size of Seneca indicates that walking could be employed regularly to reach a variety of destinations in the area.

Currently, there are no sidewalks present in the City of Seneca. On the low volume and low speed local roadways, pedestrians and autos can both share the roadway without safety being a critical issue. However, pedestrian traffic is an important issue along Highway 395, (Barnes Avenue) through town.

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 relatively higher speeds than walking. Because of the small size of Seneca, a cyclist can travel to any destination in town within a matter of minutes.

In a typical city, a short trip that would be taken by bicycle is around two miles. Judging from the size of Seneca, average bicycle trip lengths would be much shorter.

Seneca currently has no sanctioned bikeways. On low volume roadways, such as many of the local streets, bicyclists and autos can safely and easily share the roadway. On a higher volume roadway, such as Highway 395, safety for the bicyclists should be an important issue.

PUBLIC TRANSPORTATION

The City of Seneca has no local (city-only) public transportation services and no direct access to long distance transit services. The closest transit and paratransit service provide is The People Mover which operates out of John Day.

The People Mover company provides long distance, out-of-county van service available to senior citizens and the disabled as well as the general public. The shuttle van operates three times a week (MWF) from Prairie City to Bend with stops in John Day, Mt. Vernon, Dayville, Mitchell, Prineville, and Redmond. Connections to Greyhound Bus Lines are possible in Prineville, Redmond, and Bend. The People Mover will also stop at the Redmond Airport with advance notice. The shuttle van travels westbound in the morning and returns eastbound in the afternoon. Seneca is about 25 miles from the nearest shuttle van stop in John Day. Currently, The People Mover is able to fully meet the demand for services.

The People Mover also provides dial-a-ride services, van service to meal sites, and a Friday shopping run. These services are limited to the cities of Canyon City, John Day, Mt. Vernon, and Prairie City.

The small size and low traffic volumes on city streets indicate that mass transit is not currently necessary. A citywide public transportation program would not be economically feasible at this time. The TPR exempts cities with a population less than 25,000 from including mass transit facilities in their development regulations.

RAIL SERVICE

Currently, there is no passenger or freight rail services provided in Grant County. The nearest rail line follows the Interstate 84 corridor from Portland to Boise, Idaho and points east. This line serves only freight traffic. AMTRAK passenger service along the line was terminated in May of 1997. Historically, rail service was also available between Burns/Hines and Seneca via Oregon and Northwestern Railroad. This line has not had any active service for many years.

AIR SERVICE

Currently, there is no private or commercial air service provided in Seneca. A private emergency airstrip is located on the west side of Highway 395. The nearest public use airport is the state-owned facility located in John Day. The nearest commercial airport is in Redmond, about 170 miles to the northwest, or Pendleton, about 150 miles to the north.

PIPELINE SERVICE

The City of Seneca has no pipeline services.

WATERBORNE SERVICE

The City of Seneca has no waterborne transportation services.

CHAPTER 4: CURRENT TRANSPORTATION CONDITIONS

As part of the planning process, the current operating conditions for the transportation system were evaluated. This evaluation focused primarily on street system operating conditions since the automobile is by far the dominant mode of transportation in Seneca. This involved analysis of existing traffic volumes, street capacity, and street safety. Census data was also examined to determine where local residents work and the mode of transportation used to get to work.

1995 TRAFFIC VOLUMES

The 1995 Average Daily Traffic (ADT) volumes for the City of Seneca were collected. ADT volumes are defined as the average amount of two-way traffic recorded on a roadway over a 24-hour period. The 1995 ADT information was obtained from the Oregon Department of Transportation *Traffic Volume Tables,* published in May 1996.

Average Daily Traffic

The ADT volumes on Highway 395 (Barnes Avenue) are shown in Figure 4-1. Traffic volumes are greatest on the highway and lowest on the Forest Service roads and local city streets serving the residential areas. An extensive traffic count program involving the local city streets was not necessary due to the size of the city.

The volumes shown on Figure 4-1 are average volumes for the year. During the summer months, traffic volumes on Highway 395 are typically higher. Information from a permanent traffic recorder station, located just north of the City of Burns in Harney County, indicates that September is the peak summer month. In 1995, traffic volumes during this month were about 35 percent higher than average volumes.

Truck Volumes

Truck volume information along Highway 395 is not available at any locations immediately outside of Seneca. To estimate truck volumes, data from the permanent counter located just north of Burns was used again. The data on Highway 395 indicate that truck traffic was about 13.2 percent of the total 1995 ADT north of Burns. With an ADT volume of 560 just south of Seneca, this would equate to about 75 trucks per day. Within the city itself, truck volumes as a percentage of total traffic may be slightly lower because local traffic activity increases the overall traffic volume.

1995 Street Capacity

Transportation engineers have established various standards for measuring traffic capacity of roadways or intersections. Each standard is associated with a particular level of service (LOS). The LOS concept requires consideration of factors that include travel speed, 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 Level A where traffic flow is relatively free-flowing, to Level F, where the street system is totally saturated with traffic and movement is very difficult.

Analysis of the street system capacity in Seneca focused on the intersections along Highway 395 through town, where traffic volumes are the greatest. Currently, all intersections along the highway are unsignalized and STOP-controlled on the minor approaches, with continuous flow on the highway. The LOS was determined at the busiest intersection on the highway to determine the worst possible traffic operations.

The LOS criteria for an unsignalized intersection is listed in Table 4-1. Level of service is defined by the average total delay vehicles experience for individual approaches or for the intersection as a whole.

TABLE 4-1
LEVEL OF SERVICE CRITERIA
FOR UNSIGNALIZED INTERSECTIONS

Level of Service	Average Total Delay (seconds/vehicle)
A	< = 5.0
B	> 5.0 and < = 10.0
C	> 10.0 and < = 20.0
D	> 20.0 and < = 30.0
E	> 30.0 and < = 45.0
F	> 45.0

Source: Transportation Research Board, *Highway Capacity Manual*, Special Report 209, Third Edition, 1994, p. 10-12.

The intersection of 2nd Street at Highway 395 was determined to be the busiest intersection in the city. Daily traffic volumes were slightly lower along Highway 395 at this location (820 vehicles per day) than at the location north of Landing Road (840 vehicles per day). However, traffic volumes on the 2nd Street approach are estimated to be greater than traffic accessing or exiting the highway at Landing Road. To determine the worst possible traffic operations at this intersection, the ADT on Highway 395 was increased by 34 percent to reflect an ADT for the peak summer month. Traffic operations were then analyzed using peak hour traffic volumes of roughly 10 percent of the daily traffic, which is typical for most cities. Also, a 60/40 directional split was used to reflect the distribution of traffic on the highway during the peak hour. No traffic data were available on the 2nd Street approach. Therefore, a conservative approach volume was used (20 vehicles during the peak hour).

Under these assumptions, the 2nd Street approach operates exceptionally well with a LOS A. This indicates all other local roads accessing Highway 395 in the city are also operating at the same LOS.

SAFETY ANALYSIS

As part of the existing conditions evaluation, a safety analysis was performed along Highway 395 within Seneca. Accident data for a three-year period between 1993 and 1995 were collected using information from the ODOT Accident Summary Database. According to the database, no accidents have occurred along the highway during this period.

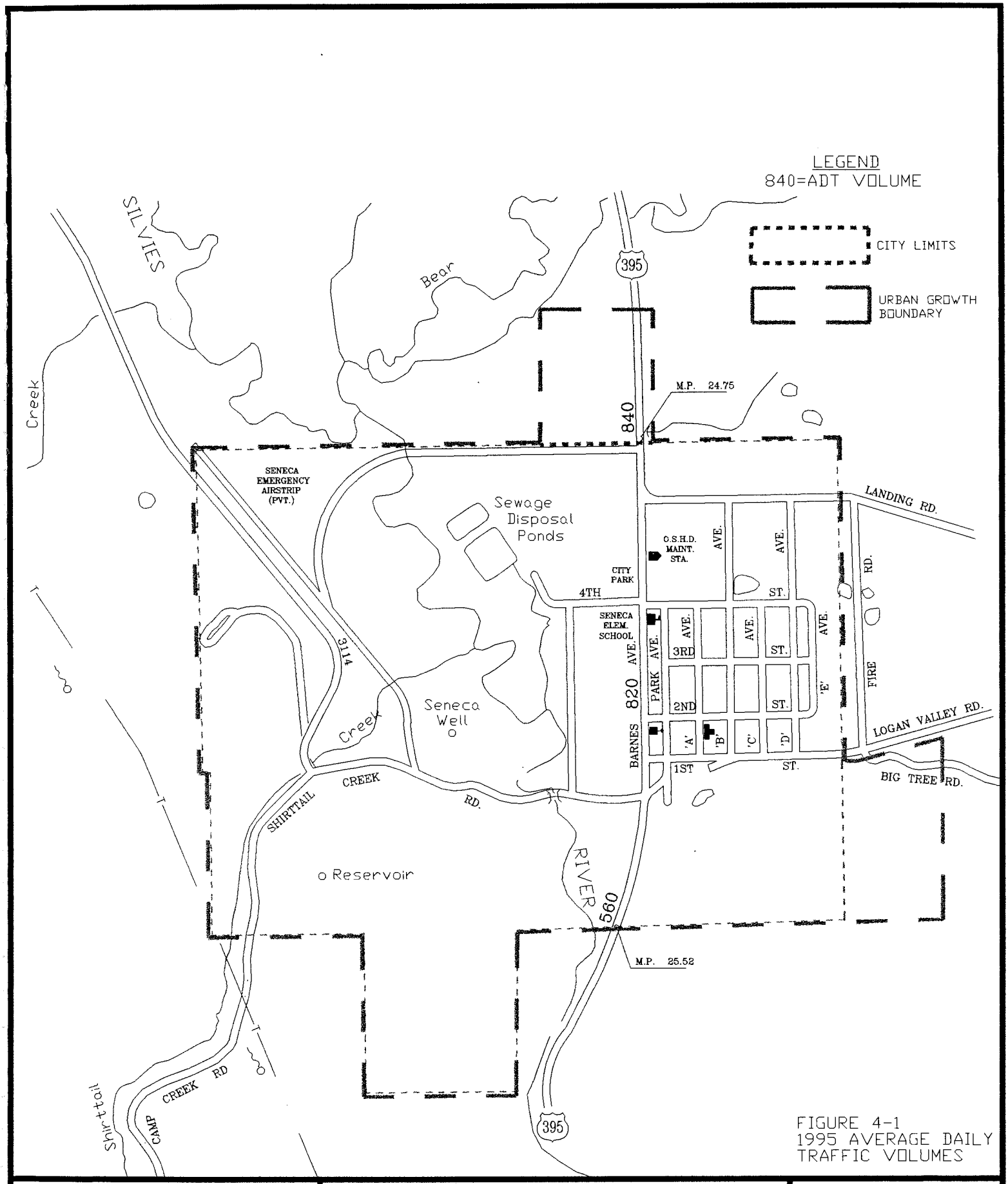


FIGURE 4-1
1995 AVERAGE DAILY TRAFFIC VOLUMES

JOURNEY-TO-WORK INFORMATION

Place of Work

According to the 1990 US Census, Seneca had a total of 56 residents who work. Of these residents, 23 worked inside the city and 33 commuted elsewhere. A majority of the residents who worked inside the city had commute times of around 10 minutes or less. Most of those who worked elsewhere had commute times spread out over a period of around 20 to 60 minutes, indicating that the nearby cities of John Day, Canyon City, Burns, and Hines, are the most likely destinations of these commuters.

Travel Mode Distribution

Although the automobile is the primary mode of travel for most residents in the Seneca area, some other modes are used as well. Modal split data is not available for all types of trips; however, the 1990 Census data do include statistics for journey-to-work trips as shown in Table 4-2.

Most Seneca residents travel to work via a private vehicle. In 1990, 76.8 percent of all trips to work were made by auto, van, or truck. Trips in single-occupancy vehicles made up 53.6 percent of all trips, and carpooling accounted for 23.2 percent.

Bicycle usage was shown to be nonexistent (zero percent) in 1990. Since the census data do not include trips to school or other non-work activities, overall bicycle usage is probably higher.

Pedestrian activity was relatively high (23.2 percent of trips to work). Because of the small size of the Seneca community, walking trips are easy and most destinations can be reached fairly quickly. Again, census data do not include trips to school or other non-work activities.

Although the census data reflects the predominant use of the automobile, relatively short travel distances within the city, level terrain, and clear weather conditions during the warmer seasons are favorable for other modes of transportation. The statewide emphasis on providing pedestrian and bicycle facilities along with roadways encourages the use of these modes.

TABLE 4-2
JOURNEY-TO-WORK TRIPS

	1990 Census	
Trip Type	**Trips**	**Percent**
Private Vehicle	43	76.8
Drove Alone	*(30)*	*(53.6)*
Carpooled	*(13)*	*(23.2)*
Public Transportation	0	0
Motorcycle	0	0
Bicycle	0	0
Walk	13	23.2
Other	0	0
Work at Home	0	0
Total	**56**	**100.0**

Source: 1990 US Bureau of Census.

CHAPTER 5: TRAVEL FORECASTS

The traffic forecast prepared for Seneca projects traffic volumes for the year 2017 based on historical growth on the state highway system, historical population growth, and projected population growth. The forecast focuses mainly on Highway 395 (Barnes Avenue) in the planning area, since the volumes on this roadway are much higher than on any other road in the city.

LAND USE

Land use, with respect to population growth, plays an important part in projecting future traffic volumes. In some instances the historical population growth of a city may be related to the historical traffic growth trend on roads in the city. If a relationship is found between the two, future traffic growth on roadways may be guided by population projection estimates. Both historical and projected population for Seneca are summarized in Table 5-1.

TABLE 5-1
SENECA POPULATION TRENDS

Year	Population	% Change
1960	N/A	
1970	N/A	N/A
1980	285	N/A
1990	191	-33.0
1995 Estimated	230	+20.4
2017 Projected	257	+11.7

Source: Portland State University's Center for Population Research and Census and the State of Oregon Office of Economic Analysis

The technical memorandum titled *Population and Employment Analysis* summarizes the methodology and data sources used to determine both historical and projected population for the city (see Appendix C). The analysis also includes population statistics pertaining to other nearby cities, as well as population and employment statistics for Grant County as a whole.

Historical

Seneca was not an incorporated city until after the 1970 Census. Therefore, population data was only available only from 1980 to the present. Between 1980 and 1990, Seneca's population plummeted by 33 percent from 285 to 191 persons. From 1990 to 1995 the total population increased 20.4 percent. Overall, the city's population decreased over the 15 year period from 285 to 230 persons resulting in a total population decrease of 19.3 percent or an annual decrease of 1.42 percent per year.

Projected

The population of Seneca is projected to increase slightly over the next 20 years from 230 to 257 residents. This is a total population increase of 11.7 percent or an annual increase of 0.50 percent per year.

HISTORICAL TRAFFIC VOLUMES

Before projecting future traffic growth, it is important to examine past growth trends on the roadway system in Seneca. Historical data is only available for Highway 395 through Seneca; however, this roadway carries far more traffic than any other streets in the urban area.

Historical traffic volumes along Highway 395 (Barnes Avenue) were established using the ADT volume information presented in the ODOT Traffic Volume Tables for the years 1975 through 1995. The ADT volumes were obtained at several locations along the highway within the planning area. Averaging the ADT volumes at each location together for each year and using a linear regression analysis, an average annual growth rate was determined for the highway.

From 1975 to 1995, the annual traffic growth rate was low on Highway 395 at 0.25 percent per year with an overall growth of 5.0%. This was higher than the annual population growth in Seneca itself since it became an incorporated city (determined to be a negative growth rate of around-1.42 percent per year). This relationship reflects the current trend toward an increase in per capita vehicle miles traveled, and that through traffic has been growing at a higher rate than traffic related to Seneca's population.

FORECASTING METHODOLOGY

The traffic forecast for Seneca was performed using a Level 1 - Trending Forecast[1] analysis. This type of forecast projects future traffic volumes based on one or more of the following growth rates; the historical growth on the state highway system, the historical population growth, and the projected population growth.

The forecasting methodology used in this forecast assumed that traffic demand on Highway 395 will continue to grow at a rate equivalent to the historical traffic growth trend. To confirm that using the historical traffic growth trend in the Trending Forecast analysis was the best projection methodology, comparisons were made with the historical and projected population growth for the city.

Comparisons show that the historical traffic growth rate on Highway 395 is higher than the historical population growth rate for the city. Traffic on Highway 395 has increased slightly over the last 20 years at a rate of 0.25 percent per year, however, the population of Seneca has decreased overall. Future population growth is projected to be around 0.50 percent per year which is higher than anticipated growth on the highway. However, the small population size of Seneca indicates that additional traffic generated by the city will not significantly affect traffic volumes on the highway.

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[1] ODOT *Transportation System Planning Guidelines*, August 1995, pg. 29.

FUTURE TRAFFIC VOLUMES

Future year ADT volumes on Highway 395 were determined by applying the historical traffic growth trend to existing 1995 counts. Projected traffic volumes for the year 2017 are illustrated in Figure 5-1.

Over the next 20 years, traffic volumes are expected to grow by about 5.3 percent on Highway 395, which is a minor increase in traffic for this time frame. ADT volumes are estimated to reach a maximum of 880 vehicles on Highway 395 near the north city limits.

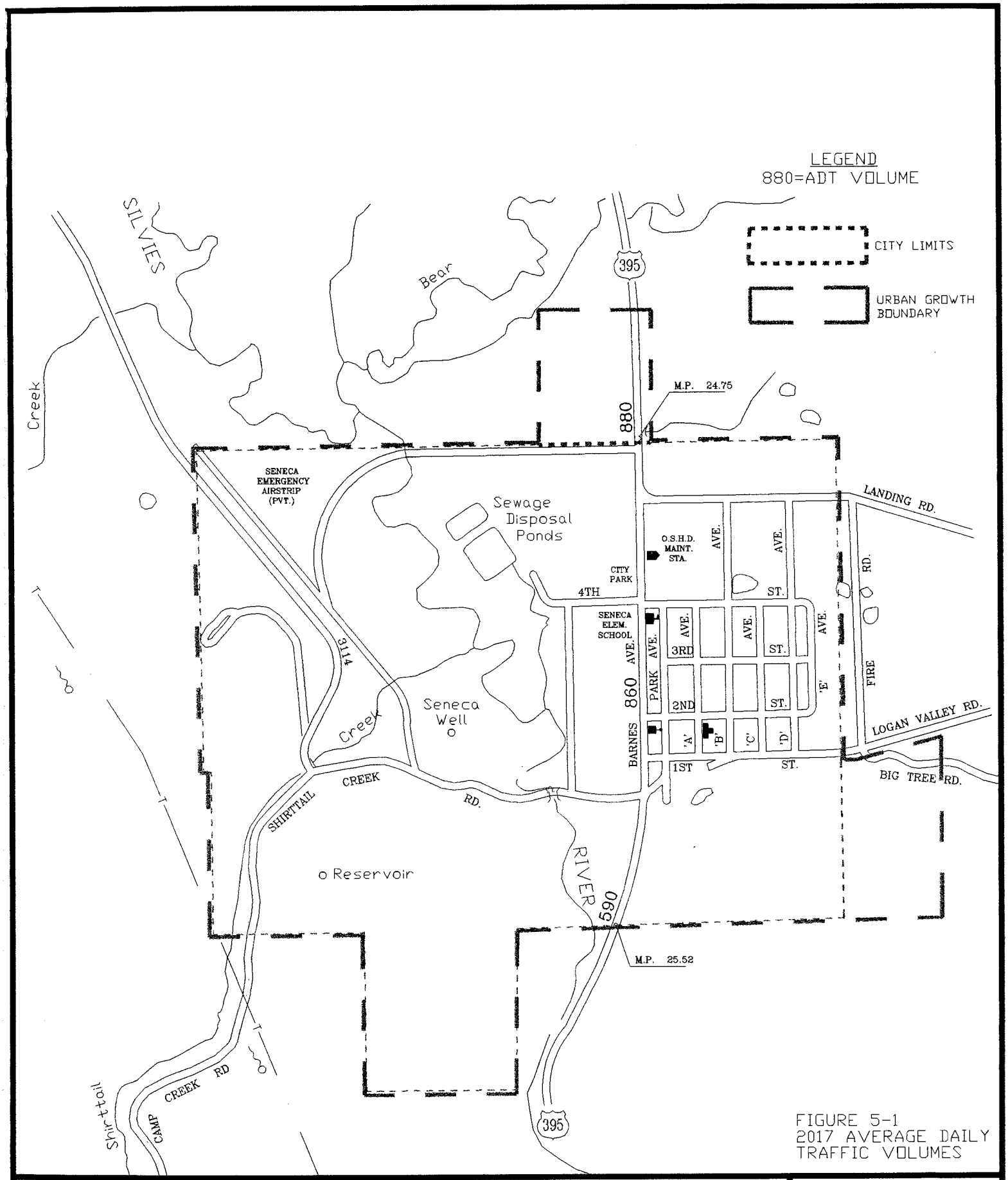
HIGHWAY SYSTEM CAPACITY

With overall ADT volumes remaining low in the future, travel conditions are projected to remain favorable throughout the city. This is supported by the estimated future traffic operations at the busiest intersection in the city, Highway 395 and 2nd Street, where the LOS is expected to remain at a satisfactory level.

Analysis Results

To evaluate the future traffic operations at the intersection, the peak hour volumes used in the existing operations analysis for the peak summer month were factored up to year 2017 levels. This was done by increasing the existing traffic volumes by 5.3 percent on Highway 395. Traffic volumes on the 2nd Street approach were increased by 11.6 percent which is consistent with the projected population growth.

Under these assumptions, traffic operations at this intersection during the peak summer month will remain unchanged in the year 2017 with LOS A for all approaches.


LEGEND
880=ADT VOLUME
CITY LIMITS
URBAN GROWTH BOUNDARY
SILVIES
Bear
Creek
395
880
M.P. 24.75
SENECA EMERGENCY AIRSTRIP (PVT.)
Sewage Disposal Ponds
O.S.H.D. MAINT. STA.
CITY PARK
4TH
SENECA ELEM. SCHOOL
LANDING RD.
AVE.
ST.
RD.
FIRE
3RD
2ND
1ST
PARK
BARNES
860
'A'
'B'
'C'
'D'
'E'
LOGAN VALLEY RD.
BIG TREE RD.
414
Creek
Seneca Well
SHIRTTAIL CREEK RD.
Reservoir
RIVER
590
M.P. 25.52
Shirttail CREEK RD
CAMP
395
FIGURE 5-1
2017 AVERAGE DAILY TRAFFIC VOLUMES
MAINLINE STATE HIGHWAY
STREET OPEN FOR TRAVEL
CITY LIMITS
INTERSTATE ROUTE
U.S. ROUTE
STATE ROUTE
TERMINATION OF FA SYSTEM
ALL STATE HIGHWAYS AND FEDERAL AID ROADS SHOWN IN RED
PUBLIC BUILDING
COURT HOUSE
CITY HALL
ARMORY
POST OFFICE
SCHOOL
LIBRARY
CITY OF SENECA
0 500 1000 FEET

CHAPTER 6: IMPROVEMENT OPTIONS ANALYSIS

Potential transportation improvements for the City of Seneca were developed and evaluated as part of the transportation system analysis. These potential improvements were developed with the help of the TAC, and attempt to address the concerns specified in the goals and objectives (Chapter 2). Based on an analysis of these projects, a list of improvements to be incorporated into the TSP is recommended.

Each of the transportation system improvement options was developed to address specific deficiencies and safety and access concerns. The following list includes all of the potential transportation system improvements considered.

1. Revise zoning code to allow and encourage mixed-use development and redevelopment.
2. Implement transportation demand management strategies.
3. Implement Speed Control Measures Along Highway 395.

As discussed in the remaining sections of this chapter, not all of these considered improvements were recommended. Recommendations were based on the evaluation of each project using the criteria described below.

EVALUATION CRITERIA

The evaluation of the potential transportation improvements was based on a qualitative review of safety, environmental, socioeconomic, and land use impacts, as well as estimated cost. The effect of each potential project on traffic patterns was not evaluated since existing and future traffic projections for the city indicate there will be no deficiencies in the capacity of the street system over the next 20 years.

Safety was the first qualitative factor to be evaluated. Although driver safety is considered in these projects, pedestrian and bicycle safety are a critical concern for the city. Environmental factors were also evaluated, such as air quality, noise, and water quality. Evaluation of socioeconomic and land use impacts considered right-of-way requirements, impacts to adjacent lands, and community livability. The final factor in the evaluation of each potential transportation improvement was cost. Costs were estimated in 1997 dollars based on preliminary alignments for each potential transportation system improvement.

EVALUATION OF POTENTIAL TRANSPORTATION IMPROVEMENTS

Alternative 1. Revise Zoning and Development Codes

Overview: One of the goals of the Oregon TPR is to reduce the reliance on the automobile. One way a city jurisdiction can do this is through amendments in zoning and development codes to permit mixed use developments and increases in density in certain areas. Specific amendments include allowing neighborhood commercial uses within residential zones and allowing residential uses within commercial zones. Such code amendments can encourage residents to walk and bicycle throughout the community by providing shorter travel distances between land uses.

Impacts: These code revisions are more effective in medium to large sized cities with populations of 25,000 and over, but in cities such as Seneca, they are not appropriate. Because of Seneca's size, the decision of what mode of transportation to use when making a trip inside the city is not influenced by distance. The longest distance between city limit boundaries in Seneca is around one mile, a distance short enough to walk, ride a bike, or drive. Distances between different land uses, such as residential and commercial, is even shorter. More than 23 percent of the population already walks to work, which is much higher than the statewide average.

Cost: No direct costs are associated with making the zoning code amendments.

Recommendation: Revisions to zoning and development codes are not applicable to Seneca. Because of the small size of Seneca, the relationship between land uses is already similar to the mixed use zoning patterns that are recommended in larger urban areas. Increasing density is also likely to have little effect on development in a community that is expecting a population increase of less than 12 percent (27 additional residents) in the next 20 years.

Alternative 2. Implement Transportation Demand Management (TDM) Strategies

Overview: The TPR also recommends that cities should evaluate TDM measures as part of their TSPs. These strategies are designed to change the demand on the transportation system by providing facilities for other modes of transportation, implementing carpooling programs, and applying other transportation measures within the community, such as staggering work schedules at local businesses. TDM strategies may be more effective in larger, more urban, cities but some strategies can still be useful in smaller cities such as Seneca. Provisions for alternative modes of transportation, such as sidewalks and bike lanes, and implementing a county-wide carpooling program can be beneficial for residents in the city. Other TDM measures such as staggering work shift schedules at local businesses may not be appropriate since there are no large businesses in the urban area.

All future street improvement projects, whether they involve constructing a new roadway or upgrading an existing roadway, should include the addition of some sort of pedestrian facility, such as new sidewalks or walkways. All new street improvement projects should also consider bicycle lanes as well.

Implementing a local carpool program in Seneca alone is not necessary because of Seneca's geographical size. However, a county-wide carpool program is possible. Because intercity commuting is a factor in Grant County, residents who live in Seneca and work in other cities should be encouraged to carpool with a fellow coworker or someone who works in the same area.

Impacts: Providing adequate facilities for pedestrians and bicyclists increases the livability of a city, and improves traffic and pedestrian safety. With more emphasis on walking or biking in the city, conditions such as air quality and noise levels would be improved as well.

As street improvements are made to the existing street system, projects involving the construction of new sidewalks may require on-street street parking to be implemented in place of parking on grass or gravel shoulders.

Cost: The estimated cost to install a new sidewalk on one side of an existing street is around $30 per linear foot. This includes a 6-foot wide walkway composed of 4 inches of concrete and 2 inches of aggregate. Curbing would cost an additional $5 per linear foot.

The cost to construct an asphalt sidewalk is about $10 per linear foot. This estimate assumes that the asphalt pad is 6 feet wide and composed of 2 inches of asphalt and 4 inches of aggregate. Asphalt sidewalks require more maintenance than concrete sidewalks. Maintenance would include sealing every five years at about $0.50 per linear foot and resurfacing every 10 years at about $2.50 per linear foot.

The cost to install bike lanes on both sides of an existing road is around $45 per linear foot. This cost includes widening the roadway by 5 feet on both sides, installing curbs, using a fill composed of 4 inches of asphalt and 9 inches of aggregate, and placement of a 8 inch painted stripe.

These costs for are for standalone improvements; the costs can be reduced when they are included as needed in roadway improvement projects throughout the Seneca area.

Costs associated with a county-wide carpool program were not determined as part of this plan.

Recommendation: Implementing TDM strategies would provide needed facilities for pedestrians and bicyclists, increase the safety of the roadway system, and enhance the quality of life in the Seneca area. Therefore, the TDM strategies summarized above are recommended.

Alternative 3. Implement Speed Control Measures Along Highway 395

The residents of Seneca are concerned about traffic exceeding the posted speed limit along Highway 395 through the city. Residents would like to see a system developed that would encourage traffic to slow down to a more appropriate speed.

In response to the public's concern over this issue, DEA compiled a variety of speed control measures used on the roadways of many cities in the state. These measures were reviewed at one of the TAC meetings. After the review, TAC members representing each jurisdiction selected speed control measures that they felt were most appropriate for their jurisdiction. The speed control measures selected for Seneca are summarized below. A technical memorandum explaining the different types of speed control measures available can be found in Appendix D.

Option A. Speed Detector Trailer

Overview: A speed detector is an instrument that uses a radar to detect the speeds of vehicles traveling on a roadway. The purpose of the speed detector is not to enforce the posted speed limit but to make drivers more aware of their speed and surroundings. A large display on the instrument indicates to the targeted driver what speed his/her vehicle is traveling. The display can be located near a speed limit sign indicating the legal speed limit. This machine is portable, as it is usually mounted on a trailer, and can be placed in any location.

Safety: Utilization of a speed detector may or may not effectively discourage speeding. Initially, driver response to the speed detector may be effective, but after some time, drivers may become accustomed to the machine and disregard it. There have also been situations where the effect of the detector is counteractive. Some drivers do not take the detector seriously and have been known to speed up to see how high a speed they can register on the display.

Impacts: The detector has no effect on reducing the noise levels of traffic passing by since it will not reduce traffic volumes and has only a minor effect on speed. The detector is battery operated and does not produce any noise.

A detector unit should be placed far enough to one side of the street shoulder so as not to create a hazardous situation.

Cost: The cost to purchase a speed detector and trailer is around $10,000 to $11,000 and requires yearly maintenance and repair. Also, the speed detector unit is susceptible to vandalism.

Option B. Driver Education and Public Service Signage

Overview: This option is designed to inform the residents of Seneca and other residents in the county about the concern for speeding along the highway through town. To inform drivers, residents in the community can be informed through newspaper articles, mailings, cable access channels, and public signage. Pedestrians can be warned about the hazards of crossing the highway by installing public service signs at all crosswalks.

Safety: This option is geared towards improving driver and pedestrian safety.

Impacts: No impacts are associated with this option.

Cost: No costs were estimated for this option.

Option C. Increase Enforcement

Overview: This option would increase the enforcement of the speed limit along Highway 395 through town, by increasing police patrols.

Safety: In the presence of police enforcement, motorists tend to slow down. Speed enforcement not only reduces speed but also has the tendency to reduce accident severity as well. Studies have shown that the variance of speed distribution is reduced by enforcement. The effect of enforcement on speed variance is of interest since it is related to accident involvement. Other studies have shown that the effect of enforcement is to shift the entire speed distribution in the direction of lower speeds without actually altering speed distribution.

Impacts: As would be expected, the greater the number of enforcement measures present in a given area or the greater the frequency of presence, the greater the impact on the speed of traffic in that area.

Enforcement also appears to have a carryover effect. That is, the speed suppression effect remains for some period of time after the enforcement unit is removed. The duration of this effect and the factors which can alter it are not well defined, but are associated with driver communication and frequency of exposure.

Economic and work force constraints usually prohibit widespread or long-term employment of speed enforcement measures. Seneca has no city police department. However, there are three state patrol officers who patrol the five state highways in the county, and four county patrol officers. Taking into consideration the working shifts and daily duties of these officers, these patrol officers may not have enough time to provide the speed enforcement Seneca residents feel is necessary. Also, a major influence in increasing speed enforcement in an area is a high accident history, which Seneca does not have.

Cost: There are no costs associated with increasing police enforcement in the City of Seneca utilizing the current state and county patrol officers. The cost to hire an additional patrol officer for the City of Seneca alone would be high, roughly $30,000 per year. It may be feasible, however, for all incorporated cities in the county to share the cost of a single patrol officer hired specifically to enforce the speed limits in all cities in the county.

Recommendations

Since the purpose of each speed control measure, described above, is to discourage speeding along the highway through town and improve bicycle and pedestrian safety, all of the speed control measures are recommended. It should be noted that because the Highway 395 is under the jurisdiction of the state, the City of Seneca will need to work with and get approval from ODOT to implement any of these measures.

SUMMARY

Table 6-1 summarizes the recommendations of the transportation improvement options based on the evaluation process described in this chapter. Chapter 7 describes how these improvement options fit into the modal plans for the Seneca area.

TABLE 6-1
TRANSPORTATION IMPROVEMENT OPTIONS:
RECOMMENDATION SUMMARY

Option	Recommendation
1. Zoning and Development Code Revisions	• Not Applicable
2. Implement TDM Strategies	• Implement
3. Implement Speed Control Measures Along Highway 395	• Implement

CHAPTER 7: TRANSPORTATION SYSTEM PLAN

The purpose of this chapter is to provide detailed operational plans for each of the transportation systems within the community. The City of Seneca TSP covers all the transportation modes that exist and are interconnected throughout the urban area. Components of the TSP include street classification standards, access management recommendations, transportation demand management measures, modal plans, and an implementation program.

STREET DESIGN STANDARDS

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. A good, well-connected grid system of relatively short blocks can minimize excessive volumes of motor vehicles by providing a series of equally attractive or restrictive travel options. This street pattern is also beneficial to pedestrians and bicyclists.

The development of the City of Seneca TSP provides the city with an opportunity to review and revise street design standards to more closely fit with the functional street classification, and the goals and objectives of the TSP. The recommended street standards are shown graphically in Figure 7-1 and Figure 7-2, summarized in Table 7-1 and described in detail on the following pages. Since the City of Seneca TSP includes land within the UGB, urban road standards should be applied in these outlying areas as well. Although portions of the city, especially outside the City Boundary, may presently have a rural appearance, these lands will ultimately be part of the urban area. Retrofitting rural streets to urban standards in the future is expensive and controversial; it is better to initially build them to an acceptable urban standard.

TABLE 7-1
RECOMMENDED STREET STANDARDS FOR THE CITY OF SENECA

Classification	Pavement Width	Right-of-Way Width	Min. Posted Speed
Local Residential - Option 1	28 feet	40 feet	15-25 mph
Local Residential - Option 2	20-24 feet	40 feet	15-25 mph
Local Residential - Option 3	20-24 feet	60 feet	15-25 mph
Alley	16-20 feet	20 feet	15 mph
Collector	36 feet	60 feet	25-35 mph
Arterial	36 feet	60 feet	25-45 mph

Local Residential Streets

The design of a residential street affects its traffic operation, safety, and livability. The residential street should be designed to enhance the livability of the neighborhood as well as to accommodate less than 1,200 vehicles per day. Design speeds should be 15-25 mph. When traffic volumes exceed approximately 1,000 to 1,200 vehicles per day, the residents on that street will begin to notice the traffic as a noise and safety

problem. To maintain neighborhoods, local residential streets should be designed to encourage low speed travel and to discourage through traffic.

Cul-de-sac, or "dead-end" residential streets are intended to serve only the adjacent land in residential neighborhoods. These streets should be short, serving a maximum of 20 single family houses. Because cul-de-sac streets limit street and neighborhood connectivity, they should only be used where topographical or other environmental constraints prevent street connections. Where cul-de-sacs must be used, pedestrian and bicycle connections to adjacent cul-de-sacs or through streets should be included.

Three local residential street options have been identified varying in width and the ability to accommodate parking. Narrower streets should be encouraged for several reasons. They improve neighborhood aesthetics and discourage speeding and through traffic. They also reduce right-of-way needs, construction costs, storm water run-off, and the need to clear vegetation.

Option 1

The first option for a local residential street is a 28-foot roadway surface within a 40-foot right-of-way, as shown in Figure 7-1. Five-foot wide sidewalks should be provided on each side of the roadway, located one foot from the right-of-way line.

The 28-foot cross section will accommodate passage of two lanes of moving traffic, one in each direction, with curb parking on one side. Narrower streets improve neighborhood aesthetics and discourage speeding and through traffic. They also reduce right-of-way needs, construction costs, storm water run-off, and the need to clear vegetation.

Option 2

The existing roadways in Seneca are generally 20 to 24 feet wide. The standard shown in shown in Figure 7-1, follows a similar design pattern. The 20- to 24-foot cross section will accommodate passage of two lanes of moving traffic, one in each direction, with no on-street parking. Five-foot wide sidewalks should be provided on each side of the roadway, located adjacent to the curb.

Option 3

The local street standard for Option 3 is similar to Option 2 except that it provides for grass or gravel shoulders between the walkway and the roadway as shown in Figure 7-1. The 20- to 24-foot cross section will accommodate passage of two lanes of moving traffic. The shoulders will allow for parking on both sides of the street but off the paved surface. Five-foot wide sidewalks should be provided on each side of the roadway, separated from the paved surface by the shoulder.

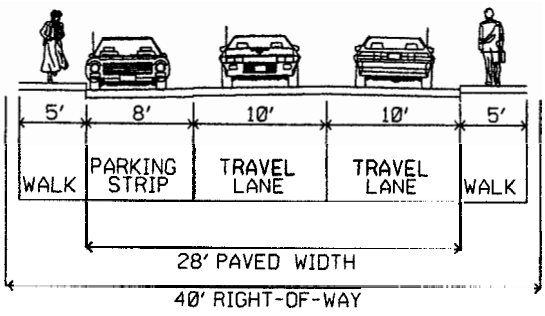
Alleys

Alleys can be a useful way to diminish street width by providing rear access and parking to residential areas. Including alleys in a subdivision design allows homes to be placed closer to the street and eliminates the need for garages to be the dominant architectural feature. This pattern, once common, has been recently revived as a way to build better neighborhoods. In addition, alleys can be useful in commercial and industrial areas,

(not to scale)

DAVID EVANS
AND ASSOCIATES, INC.
2828 S.W. CORBETT AVENUE
PORTLAND, OR. 97201-4830 (503) 223-6663

OPTION 1:



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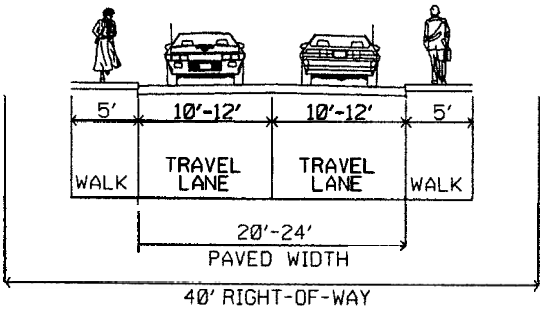
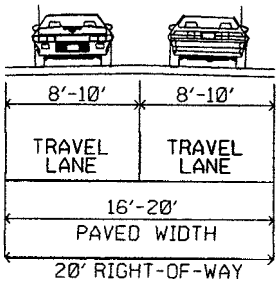


ALLEY



OPTION 3:

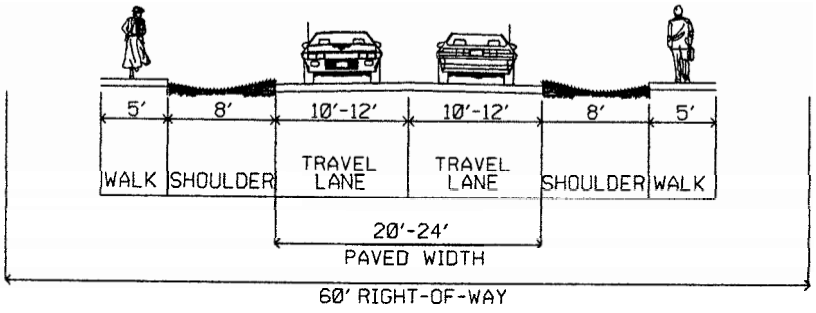


FIGURE 7-1
STREET STANDARDS
-LOCAL RESIDENTIAL
STREETS

(not to scale)

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AND ASSOCIATES, INC.
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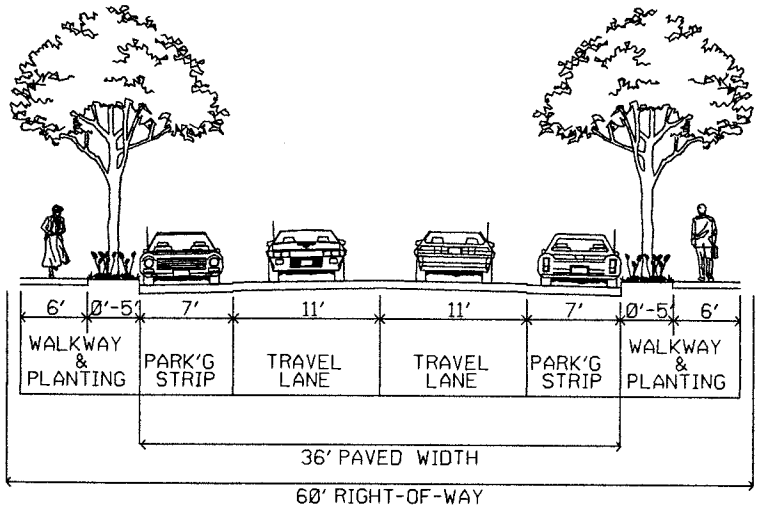
PORTLAND, OR. 97201-4830 (503) 223-6663

COLLECTOR



ARTERIAL

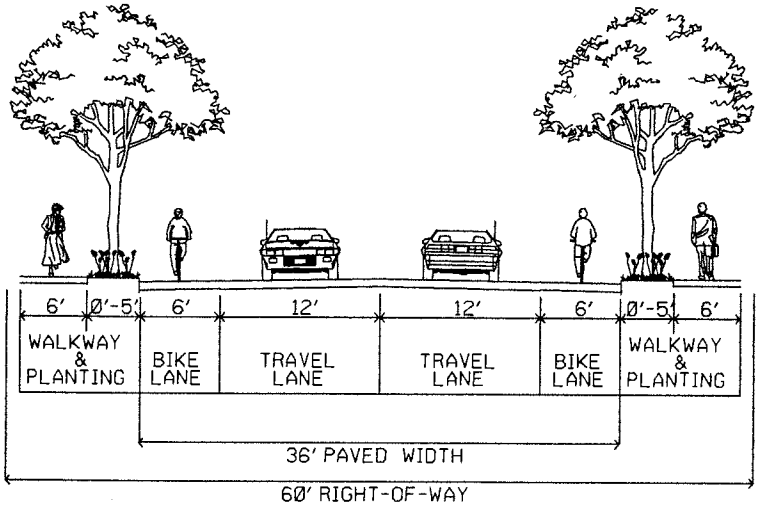


FIGURE 7-2
STREET STANDARDS
-COLLECTOR AND
ARTERIAL STREETS

allowing access by delivery trucks off the main streets. Alleys should be encouraged in the urban area of City of Seneca. Alleys should be 16-20 feet wide, with a 20-foot right-of-way, as shown in Figure 7-1

Collector Streets

Collector streets are primarily intended to serve abutting lands and local access needs of neighborhoods. They are intended to carry between 1,200 and 10,000 vehicles per day, with a design speed of 25 to 35 mph. Collector streets may serve either residential, commercial, industrial, or mixed land uses.

Figure 7-2 shows a cross section with a 60-foot right-of-way and a 36-foot paved width. The 36-foot cross-section allows two 11-foot travel lanes and parking on both sides of the street. The roadway can also be striped to provide two travel lanes plus left-turn lanes at intersections or driveways by removing parking for short distances.

Six-foot sidewalks should be provided on each side of the roadway. An optional planting strip has been included with a width up to 5 feet. In commercial or business areas, the sidewalks may be 8 feet wide or extend to the property line, and may be located adjacent to the curb to facilitate loading and unloading at the curb.

Arterial Streets

Arterial streets form the primary roadway network within and through a region. They provide a continuous roadway system that distributes traffic between different neighborhoods and districts. Generally, arterial streets are higher capacity roadways that carry high traffic volumes with minimal localized activity. Design speeds should be between 25 and 45 mph. Residential property should not face or be provided with access onto arterial streets.

Figure 7-2 shows a cross section with a 60-foot right-of-way and a 36-foot paved width. The 36-foot cross-section allows two 12-foot travel lanes with two 6-foot bike lanes.

Six-foot sidewalks should be provided on each side of the roadway. An optional planting strip has been included with a width up to 5 feet. In commercial or business areas, the sidewalks may be 8 feet wide or extend to the property line, and may be located adjacent to the curb to facilitate loading and unloading at the curb.

Bike Lanes

In cases where a bikeway is proposed within the street right-of-way, 12 feet of roadway pavement (between curbs) should be provided for a 6-foot bikeway (arterial streets) on each side of the street, as shown in Figure 7-2. The striping should be done in conformance with the State Bicycle and Pedestrian Plan (1995). 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.

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

On arterial and collector streets that are not scheduled to be improved as part of the street system plan, bike lanes may be added to the existing roadway at any time to encourage cycling, or when forecast traffic volumes exceed 2,500 to 3,000 vehicles per day. The striping of bike lanes on streets that lead directly to schools should be high priority.

Sidewalks

A complete pedestrian system should be implemented in the urban portion of the City of Seneca planning area. Every urban street should have sidewalks on both sides of the roadway, when possible, as shown on the cross sections in Figure 7-1 and Figure 7-2. Sidewalks on residential streets should have a 5-foot wide paved width. Collector streets should have 6-foot wide sidewalks with optional planting strips. Arterial streets should have at least 6-foot sidewalks with optional planting strips. In commercial areas, sidewalks may be 8 feet wide or extend to the property line. They may also be located adjacent to the curb to facilitate loading and unloading.

Cul-de-sacs should be discouraged; however, where they must be used, a pedestrian and bicycle accessway connecting to adjacent cul-de-sacs or through streets should be included.

In some cases, constraints, such as topography, may make it unfeasible to construct sidewalks on both sides of a local residential street. Under rare circumstances, sidewalks may be provided on only one side of the street; however, this practice should be discouraged.

Another essential component of the sidewalk system is street crossings. Intersections must be designed to provide safe and comfortable crossing opportunities. This includes not only signal timing (to ensure adequate crossing time) and crosswalks, but also such enhancements as curb extensions and center medians.

Curb Parking Restrictions

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

Street Connectivity

Street connectivity is important because a well-connected street system provides more capacity than a disconnected one, provides alternate routes for local traffic, and is more pedestrian and bicycle friendly. Ensuring that the existing grid is extended as development occurs is important to Seneca's continued livability. Cul-de-sacs and "dead-end" streets should be discouraged. To this end, public through streets should have a maximum spacing of 500 feet. The only exceptions to this spacing standard should result from natural or man-made barriers.

ACCESS MANAGEMENT

Access management is an important tool for maintaining a transportation system. Too many access points can diminish the function of an arterial, mainly due to delays and safety hazards created by turning movements. Traditionally, the response to this situation is to add lanes to the street. However, this can lead to increases in traffic and, in a cyclical fashion, require increasingly expensive capital investments to continue to expand the roadway.

Reducing capital expenditures is not the only argument for access management. Additional driveways along arterial streets lead to an increased number of potential conflict points between vehicles entering and exiting the driveway, and through vehicles on the arterial streets. This not only leads to increased vehicle delay and a deterioration in the level of service on the arterial, but also leads to a reduction in safety.

Research has shown a direct correlation between the number of access points and collision rates. In addition, the wider arterial streets that can ultimately result from poor access management can diminish the livability of a community. Therefore, it is essential that all levels of government maintain the efficiency of existing arterial streets through better access management.

Access Management Techniques

The number of access points to an arterial can be restricted through the following techniques:

- Restricting spacing between access points (driveways) based on the type of development and the speed along the arterial
- Sharing of access points between adjacent properties
- Providing access via collector or local streets where possible
- Constructing frontage roads to separate local traffic from through traffic
- Providing service drives to prevent spill-over of vehicle queues onto the adjoining roadways
- Providing acceleration, deceleration, and right turn only lanes
- Installing median barriers to control conflicts associated with left turn movements
- Installing side barriers to the property along the arterial to restrict access width to a minimum

Recommended Access Management Standards

Access management is hierarchical, ranging from complete access control on freeways to increasing use of streets for access purposes, parking and loading at the local level. Table 7-2 describes recommended general access management guidelines by roadway functional classification.

Application

These access management restrictions are generally not intended to eliminate existing intersections or driveways. Rather, they should be applied as new development occurs. Over time, as land is developed and redeveloped, the access to roadways will meet these guidelines. In some cases, where there is a recognized problem, such as an unusual number of collisions, these techniques and standards can be applied to retrofit existing roadways.

TABLE 7-2
RECOMMENDED ACCESS MANAGEMENT STANDARDS

Functional Classification	Public Road		Private Drive[2]	
	Type[1]	Spacing	Type	Spacing
Arterial				
Highway 395: General	at-grade	1,000 feet	L/R Turns	300 feet
STA (2nd St. to Shirttail Creek Rd.)	at-grade	250 feet	L/R Turns	125 feet
Other Arterials within UGB				
Collector	at-grade	250 feet	L/R Turns	125 feet
Local Street	at-grade	250 feet	L/R Turns	Access to Each Lot
Alley	at-grade	100 feet	L/R Turns	Access to Each Lot

STA = Special Transportation Area

(1) For most roadways, at-grade crossings are appropriate.

(2) Allowed moves and spacing requirements may be more restrictive than those shown to optimize capacity and safety. Any access to a State Highway requires a permit from the ODOT District Office. Access will generally not be granted where there is a reasonable alternative access.

State Highways

Access management is important to promoting safe and efficient travel for both local and long distance users along state highways. Although the City of Seneca may designate Highway 395 as an arterial street within their transportation system, the access management category for this facility should generally follow the guidelines of the OHP.

General

On Highway 395, within Seneca's UGB, OHP Category 4[2], "Limited Control" applies. This classification permits at-grade intersections or interchanges at a minimum spacing of one-quarter mile. Private driveways should have a minimum spacing of 500 feet from each other and from intersections. Traffic signals are permitted at a minimum of one-half mile spacing. These requirements are similar to the general access management guidelines specified for Highway 395 under arterial roadways in Table 7-2.

Special Transportation Area

While the OHP access management guidelines can be applied to some portions of the highway, the layout of the existing roadway system does not always meet these guidelines. On average, the spacing of roadways accessing Highway 395 is almost 1,000 feet except for 2nd Street, 1st Street, and Shirttail Creek Road, which are spaced about 250 feet apart. The OHP Category 4 cannot be met on the section of Highway 395 where existing roadway connections already exist.

To address this issue, a Special Transportation Area (STA) is recommended from 2nd Street to Shirttail Creek Road. To accommodate existing public roadway spacing and allow reasonable access spacing for private driveways, less restrictive access standards are recommended for this downtown section. Within the

[2] Table 1 - Access Management Classification System, Appendix B, 1991 Oregon Highway Plan.

STA, access standards should allow intersection spacing at a minimum of 250 feet and driveway spacing at a minimum of 125 feet (see Table 7-2.)

MODAL PLANS

The City of Seneca modal plans have been formulated using information collected and analyzed through a physical inventory, forecasts, goals and objectives, and input from local community representatives. The plans consider transportation system needs for City of Seneca during the next 20 years assuming the growth projections discussed in Chapter 5. The timing for individual improvements will be guided by the changes in land use patterns and growth of the population in future years. Specific projects and improvement schedules may need to be adjusted depending on when and where growth occurs within City of Seneca.

Street System Plan

The street system plan, shown in Figure 7-3, for the City of Seneca does not include the construction of any new street projects.

The City of Seneca has identified some transportation system management measures that it would like to implement to help control speeds along Highway 395 through town. These measures include:

- *Speed Detector Trailer* - Make drivers more aware of their speed and surroundings by using a speed detector to display actual vehicle speed as a driver passes through town. (Estimated cost = $10,000 - $11,000 for speed detector purchase plus annual operating expenses.)

- *Driver Education and Public Service Signage Program* - Inform drivers about the hazards of speeding and inform pedestrians about safety along state highways. (Estimated would be a function of the specific program created.)

- *Speed Limit Enforcement* - Use police to enforce speed limits through town. (Estimated cost = $30,000 annually for an additional patrol officer excluding vehicle costs.)

The small size of Seneca would make it difficult to raise funding to pay for these measures. However, if the costs are shared with several other cities, Grant County, and even the State, it may be possible for Seneca to implement a speed control program. Discussions with other jurisdictions should be a high priority for city officials to determine what kind of county-wide enforcement program may be possible and how the City of Seneca could participate in and contribute to it. The total estimated cost of these speed control measures cannot be easily calculated because exact programs are unknown at this time and some of the costs are annual costs.

Pedestrian System Plan

A complete pedestrian system should be implemented in the City of Seneca. As funding permits, every paved street and new street should have sidewalks on both sides of the roadway to meet the requirements set forth in the street standards. Pedestrian access on walkways should be provided between all buildings including shopping centers and abutting streets and adjacent neighborhoods. (Ordinances specifying these requirements are included in Chapter 9.)

No specific pedestrian system improvements are recommended for the City of Seneca. Over time, sidewalks shall be added to streets that currently lack them and are not programmed for improvements. Missing sidewalk segments should be added whenever an opportunity presents itself (such as infill development, special grants, etc.). Sidewalks along Highway 395 should also be added with any future ODOT improvements within the Seneca urban area.

Because of the relatively low traffic volumes on most roadways in Seneca, asphalt pathways could be provided instead of a concrete sidewalk. In general, asphalt pathways are a lower cost alternative to concrete sidewalks. Construction costs for asphalt pathways are about 40 percent of the costs for concrete sidewalks; however, maintenance, such as sealing and resurfacing of the asphalt, must occur more frequently.

Bicycle System Plan

No specific bicycle facility improvements are recommended for the City of Seneca.

Shared roadways, where bicyclists share normal vehicle lanes with motorists, are generally acceptable if speeds and traffic volumes are relatively low. On the collector and local streets in Seneca, shared roadways are not an issue; however, on arterial roadways bike lanes are recommended.

Highway 395 functions as an arterial street through Seneca, which means that it should have bike lanes on both sides of the street as specified in the street standards listed earlier in this chapter and as required by the TPR. Based on the trendline projections described in Chapter 5, Highway 395 is projected to carry a volume of less than 900 vehicles per day for the next 20 years. Shared travel lanes on a roadway with these volumes should be acceptable, particularly if the speed control measures discussed in the street system plan can be implemented. To make certain that the highways are functioning safely for bicyclists, ODOT should track both traffic volumes and accident rates on these facilities.

Bicycle parking is generally lacking in City of Seneca. Bike racks should be installed in front of downtown businesses and all public facilities (schools, post office, library, city hall, and parks). Typical rack designs cost about $50 per bike plus installation. Bicycle parking requirements are further addressed in Chapter 9 (Policies and Ordinances).

Transportation Demand Management Plan

Through transportation demand management (TDM), peak travel demands can 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.

In Seneca, where traffic volumes are low and the population and employment is small, implementing TDM strategies is not practical in most cases. However, adding sidewalks improvements whenever an opportunity presents itself (such as infill development, special grants, etc.) is also considered a TDM strategy. By providing these facilities, the City of Seneca is encouraging people to travel by other modes than the automobile.

Because intercity commuting is factor in Grant County, residents who live in Seneca and work in other cities should be encouraged to carpool with a fellow coworker or someone who works in the same area.

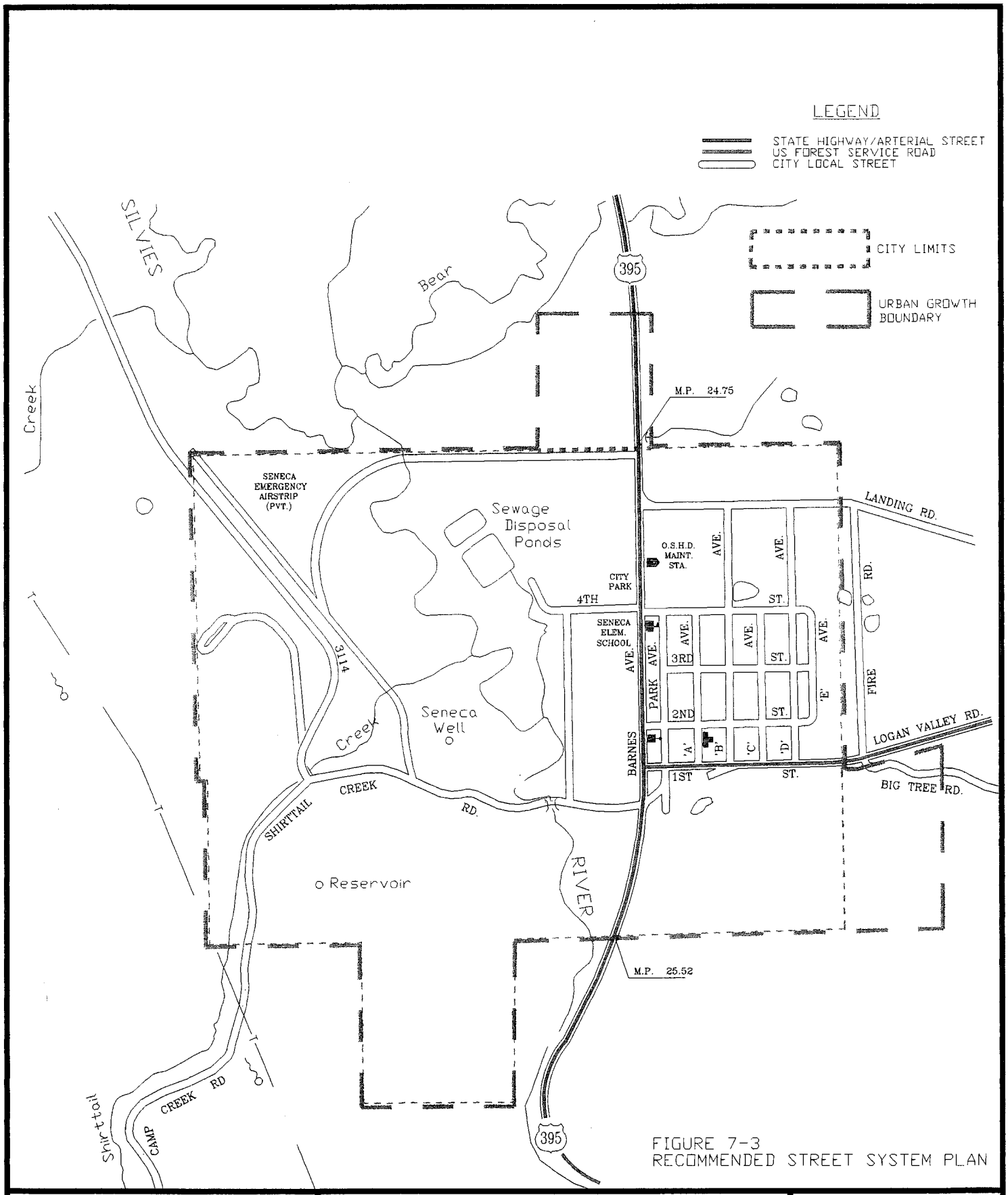


FIGURE 7-3
RECOMMENDED STREET SYSTEM PLAN

Implementing a local carpool program in Seneca alone is not practical because of the city's small size; however, a county-wide carpool program is possible. Based on journey-to-work statistics from the 1990 Census, more than 23 percent of all work trips are currently made by carpool. The City of Seneca should support state and county carpooling and vanpooling programs which could further boost carpooling ridership.

No costs have been estimated for the TDM plan. Grants may be available to set up programs; other aspects Transportation Demand Management can be encouraged through ordinance and policy.

Public Transportation Plan

The City of Seneca has no local (city-only) public transportation services. The closest long distance transit service is provided by the People Mover, which runs along Highway 26. They provide shuttle van service three times a week (MWF) from Prairie City to Bend with stops in John Day, Mt. Vernon, Dayville, Mitchell, Prineville, and Redmond. Connections with Greyhound Bus Lines are available in Prineville, Redmond, and Bend. A stop at the Redmond Airport is also available with advance notice. The closest stop to Seneca is in John Day, about 25 miles to the north.

No specific expansion of any of these services is currently planned; however, with county-wide population growth projected about 15 percent over the next 20 years, additional demand for these services can be expected. Furthermore, increased usage of these services should be encouraged. The resulting increase in demand may require some expansion in the future.

No costs have been estimated for expanding existing public transportation services. Some potential funding sources include grants to conduct feasibility studies and State and Federal funding to purchase equipment.

Rail Service Plan

The City of Seneca has no passenger or freight rail services.

Air Service Plan

The City of Seneca has a private emergency airstrip located on the west side of Highway 395. There is no private or commercial air service provided in Seneca. The nearest private air service is located at the state airport in John Day. This airport is used by recreational flyers, businesses, and public agencies. The nearest commercial airport is in Redmond, about 170 miles to the northwest, or Pendleton, about 150 miles to the north.

Pipeline Service Plan

The City of Seneca has no pipeline transportation services.

Waterborne Service Plan

The City of Seneca has no waterborne transportation services.

TRANSPORTATION SYSTEM PLAN IMPLEMENTATION PROGRAM

Implementation of the City of Seneca TSP will require both changes to the city comprehensive plan and zoning code and preparation of a 20-year capital improvement plan. These actions will enable City of Seneca to address both existing and emerging transportation issues throughout the urban area in a timely and cost effective manner.

One part of the implementation program is the formulation of a 20-year capital improvement program (CIP). The purpose of the CIP is to detail what transportation system improvements will be needed as Seneca grows and provide a process to fund and schedule the identified transportation system improvements. Ultimately the transportation CIP should be integrated into the existing city CIP, Grant County CIP, and the ODOT Statewide Transportation Improvement Program (STIP). This integration is important since the TSP proposes that all three governmental agencies will participate in funding the transportation improvement projects.

Model policy and ordinance language that conforms with the requirements of the TPR are contained in Chapter 9 of this report. The proposed ordinance amendments will require approval by the City Council and those that affect the unincorporated urban area will also require approval by the Board of County Commissioners.

20-Year Capital Improvement Program

The City of Seneca has not identified any projects with known costs to be included in a CIP. The costs for implementing speed control measures cannot be easily calculated because exact programs are unknown at this time and some of the costs are annual costs. However, discussions with other jurisdictions should be a high priority for city officials to determine what kind of county-wide speed control program may be possible and how the City of Seneca could participate in and contribute to it.

CHAPTER 8: FUNDING OPTIONS AND FINANCIAL PLAN

The TPR requires TSPs to evaluate the funding environment for recommended improvements. This evaluation must include a listing of all recommended improvements, estimated costs to implement those improvements, and a review of potential financing mechanisms to fund proposed transportation improvement projects. The City of Seneca's TSP identifies only one improvement project over the next 20 years with no known cost at this time. This section of the TSP provides an overview of the City of Seneca's revenue outlook and a review of some funding and financing options that may be available to the City of Seneca.

Pressures from increasing growth throughout much of Oregon have created an environment of estimated improvements that remain unfunded. The City of Seneca will need to work with Grant County and ODOT to finance new transportation projects over the 20-year planning horizon. The actual timing of these projects will be determined by the rate of population and employment growth actually experienced by the community. If population growth exceeds the anticipated rate, the improvements may need to be accelerated. Slower than expected growth will relax the improvement schedule.

HISTORICAL STREET IMPROVEMENT FUNDING SOURCES

In Oregon, state, county, and city jurisdictions work together to coordinate transportation improvements. In addition to this overlapping jurisdiction of the road network, transportation improvements are funded through a combination of federal, state, county, and city sources.

Table 8-1 shows the distribution of road revenues for the different levels of government within the state by jurisdiction level. Although these numbers were collected and tallied in 1991, ODOT estimates that these figures accurately present the current revenue structure for transportation-related needs.

TABLE 8-1
SOURCES OF ROAD REVENUES BY JURISDICTION LEVEL

	Jurisdiction Level			Statewide
Revenue Source	State	County	City	Total
State Road Trust	58%	38%	41%	48%
Local	0%	22%	55%	17%
Federal Road	34%	40%	4%	30%
Other	9%	0%	0%	4%

Source: ODOT 1993 Oregon Road Finance Study

At the state level, nearly half (48 percent in Fiscal Year 1991) of all road-related revenues are attributable to the State Highway Fund, whose sources of revenue include fuel taxes, weight per mile taxes on trucks, and vehicle registration fees. As shown in the table, the state road trust is a considerable source of revenue for all levels of government. Federal sources (generally the federal highway trust account and federal forest revenues) comprise another 30 percent of all road-related revenue. The remaining sources of road-related revenues are generated locally, including property taxes, LIDs, bonds, traffic impact fees, road user taxes, general fund transfers, receipts from other local governments, and other sources.

As a state, Oregon generates 94 percent of its highway revenues from user fees, compared to an average of 78 percent among all states. This fee system, including fuel taxes, weight distance charges, and registration fees, is regarded as equitable because it places the greatest financial burden upon those who create the greatest need for road maintenance and improvements. Unlike many states that have indexed user fees to inflation, Oregon has static road-revenue sources. For example, rather than assessing fuel taxes as a ***percentage*** of price per gallon, Oregon's fuel tax is a fixed amount (currently 24 cents) per gallon.

Transportation Revenue Outlook

ODOT's policy section recommends certain assumptions in the preparation of transportation plans. In its *Financial Assumptions* document prepared in March 1995, ODOT projected the revenue of the State Highway Fund through year 2018. The estimates are based on the following assumptions:

- Fuel tax (and weight per mile fee) increases of 1 cent per gallon per year, with an additional 1 cent per gallon every fourth year;
- Transportation Planning Rule goals are met; and
- Inflation occurs at an average annual rate of 3.7 percent (as forecast by DRI).

Figure 8-1 shows the forecast in both current-dollar and inflation-deflated constant (1995) dollars. As highlighted by the constant-dollar data, the highway fund is expected to grow faster than inflation early in the planning horizon, with growth slowing to a rate somewhat less than inflation around year 2004, continuing a slight decline through the remainder of the planning horizon.

The State Highway Fund is expected to remain a significant source of funding for the City of Seneca during the next 20 years. Although the City has historically received revenue from this fund for transportation maintenance and improvements, Seneca should be cautious of relying heavily on this source, since funds are expected to decline after 2005.

REVENUE SOURCES

In order to finance the recommended transportation system improvements in Seneca, it will be important to consider a range of funding sources. Recent property tax limitations have created the need for local governments to seek revenue sources other than the traditional property tax. The use of alternative revenue funding has been a trend throughout Oregon as the full implementation of Measure 5 has significantly reduced property tax revenues. This trend is expected to continue with the recent passage of Measure 47 and its revised version, Measure 50. The alternative revenue sources described in this section may not all be appropriate in the City of Seneca; however, this overview is being provided to illustrate the range of options currently available to finance transportation improvements during the next 20 years.

Property Taxes

Property taxes have historically been the primary revenue source for local governments. This dependence is due, in large part, to the fact that property taxes are easy to implement and enforce. Property taxes are based on real property (i.e., land and buildings) which have a predictable value and appreciation to base taxes upon. This is opposed to income or sales taxes which can fluctuate with economic trends or unforeseen events.

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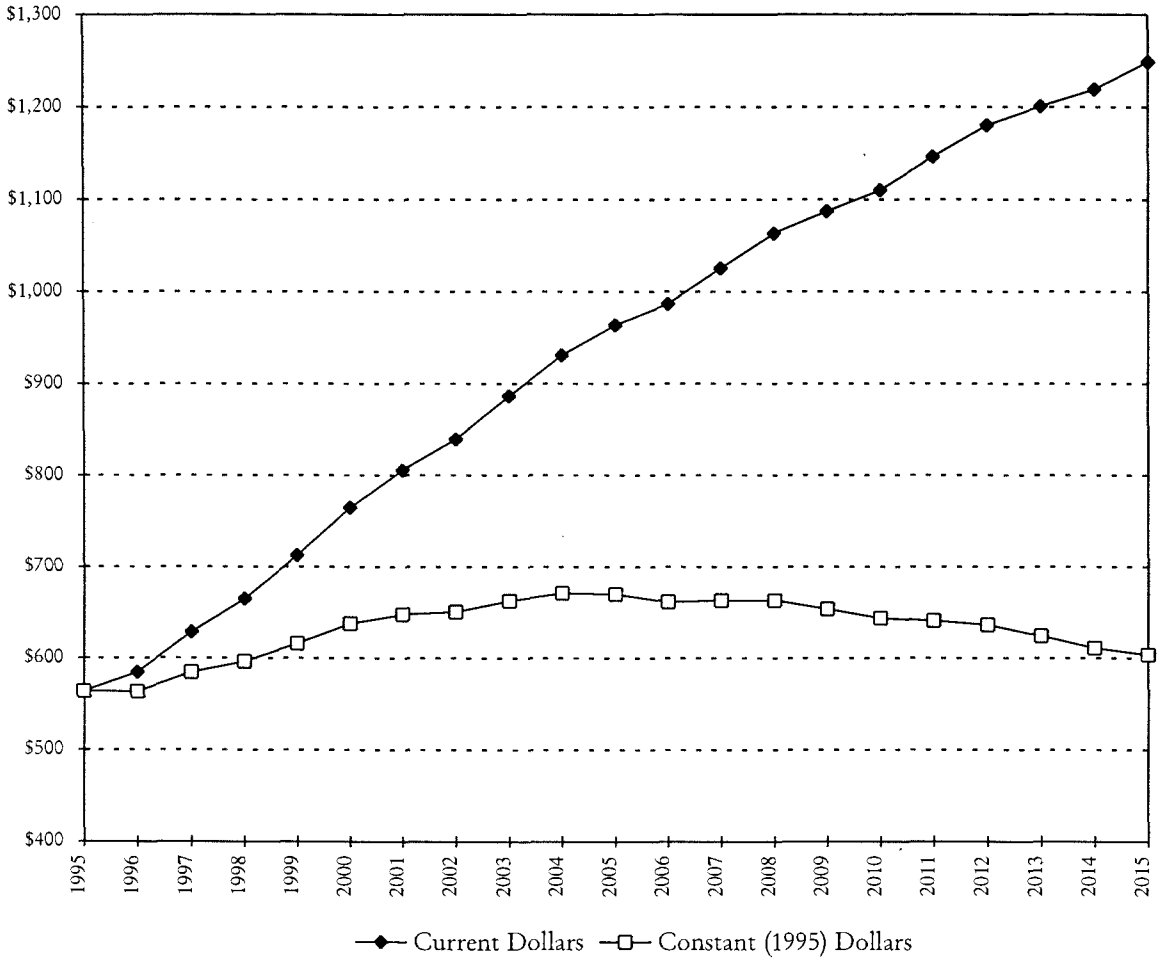

Source: ODOT Financial Assumptions

FIGURE 8-1
STATE HIGHWAY FUND

Property taxes can be levied through: 1) tax base levies, 2) serial levies, and 3) bond levies. The most common method uses tax base levies which do not expire and are allowed to increase by six percent per annum. Serial levies are limited by amount and time they can be imposed. Bond levies are for specific projects and are limited by time based on the debt load of the local government or the project.

The historic dependence on property taxes is changing with the passage of Ballot Measure 5 in the early 1990s. Ballot Measure 5 limits the property tax rate for purposes other than payment of certain voter-approved general obligation indebtedness. Under full implementation, the tax rate for all local taxing authorities is limited to $15 per $1,000 of assessed valuation. As a group, all non-school taxing authorities are limited to $10 per $1,000 of assessed valuation. All tax base, serial, and special levies are subject to the tax rate limitation. Ballot Measure 5 requires that all non-school taxing districts' property tax rate be reduced if together they exceed $10 per $1,000 per assessed valuation by the county. If the non-debt tax rate exceeds the constitutional limit of $10 per $1,000 of assessed valuation, then all of the taxing districts' tax rates are reduced on a proportional basis. The proportional reduction in the tax rate is commonly referred to as compression of the tax rate.

Measure 47, an initiative petition, was passed by Oregon voters in November 1996. It is a constitutional amendment that reduces and limits property taxes and limits local revenues and replacement fees. The measure limits 1997-98 property taxes to the lesser of the 1995-96 tax minus 10 percent, or the 1994-95 tax. It limits future annual property tax increase to three percent, with exceptions. Local governments' lost revenue may be replaced only with state income tax, unless voters approve replacement fees or charges. Tax levy approvals in certain elections require 50 percent voter participation.

The state legislature created Measure 50, which retains the tax relief of Measure 47 but clarifies some legal issues. This revised tax measure was approved by voters in May 1997 and it now replaces Measure 47.

The League of Oregon Cities (LOC) estimated that direct revenue losses to local governments, including school districts, will total $467 million in fiscal year 1998, $553 million in 1999, and increasing thereafter. The actual revenue losses to local governments will depend on actions of the Oregon Legislature. LOC also estimates that the state will have revenue gains of $23 million in 1998, $27 million in 1999, and increasing thereafter because of increased personal and corporate tax receipts due to lower property tax deduction.

Measure 50 adds another layer of restrictions to those which govern the adoption of tax bases and levies outside the tax base, as well as Measure 5's tax rate limits for schools and non-schools and tax rate exceptions for voter approved debt. Each new levy and the imposition of a property tax must be tested against a longer series of criteria before the collectible tax amount on a parcel of property can be determined.

The implementation of Measure 50 will require that cities and counties protect and prioritize funding for public safety and public education. Another major requirement of Measure 50 is that cities and counties must obtain voter approval to raise fees for services, if the increased fee revenue is a substitute for property tax support.

The Governor's Office and state legislature are in the process of preparing the new budget for the next biennium. Based on the preliminary budget released by the Governor's Office, cities and counties will not receive additional funding from the state to reduce the impacts of Measure 50. Instead, the new budget will focus on retaining and increasing support for basic school education programs. Again, the preliminary budget will likely be modified during the current legislative session.

System Development Charges

System Development Charges (SDCs) are becoming increasingly popular in funding public works infrastructure needed for new local development. Generally, the objective of systems development charges is to allocate portions of the costs associated with capital improvements upon the developments that increase demand on transportation, sewer, or other infrastructure systems.

Local governments have the legal authority to charge property owners and/or developers fees for improving the local public works infrastructure based on projected demand resulting from their development. The charges are most often targeted towards improving community water, sewer, or transportation systems. Cities and counties must have specific infrastructure plans in place that comply with state guidelines in order to collect SDCs.

The City of Seneca could implement SDCs for their transportation system. The fee is collected when new building permits are issued. The cities would calculate the fee based on trip generation of the proposed development. Residential calculations would be based on the assumption that a typical household will generate a given number of vehicle trips per day. Nonresidential use calculations are based the number of trips generated or on employee ratios for the type of business or industrial uses. The SDC fees will help construct and maintain the transportation network throughout the TSP study area. The implementation of SDCs in the City of Seneca is not considered a practical funding option since the rate of new development has been slow, and is not expected to grow significantly in the future.

State Gas Taxes

Gas tax revenues received from the State of Oregon are used by all counties and cities to fund street and road construction and maintenance. In Oregon, the state collects gas taxes, vehicle registration fees, overweight/overheight fines, and weight per mile taxes and returns a portion of the revenues to cities and counties through an allocation formula. The revenue share to cities is divided among all incorporated cities based on population. The theory is that these taxes are somewhat tied to the benefits people receive, since those who drive more would pay more. Like other Oregon cities, the City of Seneca uses its State Gas Tax allocation to fund street construction and maintenance.

Local Gas Taxes

The Oregon Constitution permits counties and incorporated cities to levy additional local gas taxes with the stipulation that the moneys generated from the taxes will be dedicated to street-related improvements and maintenance within the jurisdiction. At present, only a few local governments (including the Cities of Woodburn and The Dalles, and Multnomah and Washington Counties) levy a local gas tax. Based on the experiences of other local jurisdictions, the City of Seneca may have difficulty gaining public support for a local gas tax, even on a countywide basis.

Vehicle Registration Fees

The Oregon Vehicle Registration Fee is allocated to the state, counties, and cities for road funding. Oregon counties are granted authority to impose a vehicle registration fee covering the entire county. The Oregon Revised Statutes allow Grant County to impose a biannual registration fee for all passenger cars licensed within the county. Although both counties and special districts have this legal authority, vehicle registration

fees have not been imposed by local jurisdictions. Like fuel taxes, this fee would be somewhat tied to the benefits of the transportation system, because it would be paid by automobile owners in the county. In order for a local vehicle registration fee program to be viable in Grant County, all the incorporated cities and the county would need to formulate an agreement that would detail how the fees would be spent on future street construction and maintenance.

Local Improvement Districts

The Oregon Revised Statutes allow local governments to form Local Improvement Districts (LIDs) to construct public improvements. LIDs are most often used by cities to construct localized projects such as streets, sidewalks, or bikeways. The statutes allow formation of a district by either the city government or property owners. Cities that use LIDs are required to have a local LID ordinance that provides a process for district formation and payback provisions. Through the LID process, the costs of local improvements are generally spread out among a group of property owners within a specified area. The cost can be allocated based on property frontage or other methods such as traffic trip generation. The types of allocation methods are only limited by the Local Improvement Ordinance. The cost of LID participation is considered an assessment against the property which is a lien equivalent to a tax lien. Individual property owners typically have the option of paying the assessment in cash or applying for assessment financing through the city. Since the passage of Ballot Measure 5, cities have most often funded local improvement districts through the sale of special assessment bonds.

Grants and Loans

The majority of the grant and loan programs available today are geared towards economic development and not specifically for construction of new streets. Typically, grant programs target areas that lack basic public works infrastructure needed to support new or expanded industrial businesses. Because of the popularity of some grant programs such as the Oregon Special Public Works Fund, the emphasis has shifted to more of a loan program. Many programs require a match from the local jurisdiction as a condition of approval. Because grant programs are subject to change, they should not be considered a secure long-term funding source for the City of Seneca.

These programs include the Immediate Opportunity Grant, the Oregon Special Public Works Fund program, and the Special Small City Allotment program which are described below.

Immediate Opportunity Grant Program

The Oregon Economic Development Department (OEDD) and ODOT collaborate to administer a grant program designed to assist local and regional economic development efforts. The program is funded to a level of approximately $5,000,000 per year through state gas tax revenues. The following are primary factors in determining eligible projects:

- Improvement of public roads;
- Inclusion of an economic development-related project of regional significance;
- Creation of primary employment; and
- Ability to provide local funds to match grant (lesser matches may also be considered).

The maximum amount of any grant under the program is $500,000. Local governments which have received grants under the program include Washington County, Multnomah County, Douglas County, City of Hermiston, Port of St. Helens, and the City of Newport.

Oregon Special Public Works Fund

The Special Public Works Fund (SPWF) program was created by the 1995 State Legislature as one of the several programs for the distribution of funds from the Oregon Lottery to economic development projects in communities throughout the state. The program provides grant and loan assistance to eligible municipalities primarily for the construction of public infrastructure that supports commercial and industrial development that results in permanent job creation or job retention. To be awarded funds, each infrastructure project must support businesses wishing to locate, expand, or remain in Oregon. SPWF awards can be used for improvement, expansion, and new construction of public sewage treatment plants, water supply works, public roads, and transportation facilities.

While SPWF program assistance is provided as both loans and grants, the program emphasizes loans in order to assure that funds will return to the state over time for reinvestment in local economic development infrastructure projects. The maximum loan amount per project is $11,000,000 and the term of the loan cannot exceed the useful life of the project or 25 years, whichever is less. Interest rates for loans funded with the State of Oregon Revenue Bonds are based on the rate the state may borrow through the Oregon Economic Development Department Bond Bank. The department may also make loans directly from the SPWF and the term and rate on direct loans can be structured to meet project needs. The maximum grant per project is $500,000, but may not exceed 85 percent of the total project cost.

Jurisdictions that have received SPWF funding for projects that include some type of transportation-related improvement include the Cities of Baker City, Bend, Cornelius, Forest Grove, Madras, Portland, Redmond, Reedsport, Toledo, Wilsonville, Woodburn, and Douglas County.

Special Small City Allotment Program

This program is restricted to cities with populations under 5,000 residents. Unlike the OEDD Immediate Opportunity Grant program and the Oregon Special Public Works Fund, no locally funded match is required for participation. Grant amounts are limited to $25,000 and must be earmarked for surface projects (drainage, curbs, sidewalks, etc.). However, the program does allow jurisdictions to use the grants to leverage local funds on non-surface projects if the grant is used specifically to repair the affected area.

Public Transportation Funds

There are several different grants and loans which are available to fund public transportation, including:

- Special Transportation Fund (STF)
- Section 5311
- Community Transportation Program
- Special Transportation District

The public transportation grant and loan programs may be applicable to funding The People Mover system in Grant County. However, funding opportunities may be limited since the system serves a small rural population that is spread out in small communities in the County. These grant and loan programs require a local funding match from the participating local government agencies.

Bicycle and Pedestrian Program Funds

The state Bicycle and Pedestrian Program has grants available for bicycle and pedestrian system improvements. These improvements must benefit the overall transportation system by providing good, alternative transportation options to the automobile. Funds are not available for bicycle and pedestrian facilities which serve a purely recreational use. The bicycle and pedestrian grant program requires a local match to fund the identified improvements.

ODOT Funding Options

The State of Oregon provides funding for all highway-related transportation projects through the Statewide Transportation Improvement Program (STIP) administered by ODOT. The STIP outlines the schedule for ODOT projects throughout the state. The STIP, which identifies transportation for a three-year funding cycle, is updated on an annual basis. Starting with the 1998 budget year, ODOT will then identify projects for a four-year funding cycle. In developing this funding program, ODOT must verify that the identified projects comply with the Oregon Transportation Plan (OTP), ODOT Modal Plans, Corridor Plans, local comprehensive plans, and ISTEA Planning Requirements. The STIP must fulfill ISTEA planning requirements for a staged, multi-year, statewide, intermodal program of transportation projects. Specific transportation projects are prioritized based on a review of the ISTEA planning requirements and the different state plans. ODOT consults with local jurisdictions before highway-related projects are added to the STIP.

The highway-related projects identified in the City of Seneca's TSP will be considered for future inclusion on the STIP. The timing of including specific projects will be determined by ODOT based on an analysis of all the project needs within Region 5. The TSP will provide ODOT with a prioritized project list for The City of Seneca for the next 20 years. The City of Seneca, Grant County, and ODOT will need to communicate on an annual basis to review the status of the STIP and the prioritization of individual projects within the project area. Ongoing communication will be important for the city, county, and ODOT to coordinate the construction of both local and state transportation projects.

ODOT also has the option of making some highway improvements as part of their ongoing highway maintenance program. Types of road construction projects that can be included within the ODOT maintenance programs are intersection realignments, additional turn lanes, and striping for bike lanes. Maintenance related construction projects are usually done by ODOT field crews using state equipment. The maintenance crews do not have the staff or specialized road equipment needed for large construction projects.

An ODOT funding technique that will likely have future application to the City of Seneca's TSP is the use of state and federal transportation dollars for off-system improvements. Until the passage and implementation of ISTEA, state and federal funds were limited to transportation improvements within highway corridors. ODOT now has the authority and ability to fund transportation projects that are located outside the boundaries of the highway corridors. The criteria for determining what off-system improvements can be funded have not yet been clearly established. It is expected that this new funding technique will be used to finance local system improvements that reduce traffic on state highways or reduce the number of access points for future development along state highways.

The transportation funding program ISTEA expires at the end of this fiscal year. Congress is considering several bills which would reauthorize the program in various forms. In general, funding levels are expected to remain stable or slightly higher.

FINANCING TOOLS

In addition to funding options, the recommended improvements listed in this plan may benefit from a variety of financing options. Although often used interchangeably, the words financing and funding are not the same. Funding is the actual generation of revenue by which a jurisdiction pays for improvements, some examples include the sources discussed above: property taxes, SDCs, fuel taxes, vehicle registration fees, LIDs, and various grant programs. In contrast, financing refers to the collecting of funds through debt obligations.

There are several of debt financing options available to the City of Seneca. The use of debt to finance capital improvements must be balanced with the ability to make future debt service payments and to deal with the impact on its overall debt capacity and underlying credit rating. Again, debt financing should be viewed not as a source of funding, but as a time shifting of funds. The use of debt to finance these transportation system improvements is appropriate since the benefits from the transportation improvements will extend over a period of years. If such improvements were to be tax financed immediately, a large short-term increase in the tax rate would be required. By utilizing debt financing, local governments are essentially spreading the burden of the costs of these improvements to more of the people who are likely to benefit from the improvements and lowering immediate payments.

General Obligation Bonds

General obligation bonds (GOs) are voter-approved bond issues which represent the least expensive borrowing mechanism available to municipalities. GO bonds are typically supported by a separate property tax levy specifically approved for the purposes of retiring debt. The levy does not terminate until all debt is paid. The property tax levy is distributed equally throughout the taxing jurisdiction according to assessed value of property. General obligation debts are typically used to make public improvement projects that will benefit the entire community.

State statutes require that the general obligation indebtedness of a city not exceed three percent of the real market value of all taxable property in the city. Since general obligation bonds would be issued subsequent to voter approval, they would not be restricted to the limitations set forth in Ballot Measures 5 and 50 (revised Measure 47). Although new bonds must be specifically voter approved, Measure 50 provisions are not applicable to outstanding bonds, unissued voter-approved bonds, or refunding bonds.

Limited Tax Bonds

Limited tax general obligation bonds (LTGOs) are similar to general obligation bonds in that they represent an obligation of the municipality. However, a municipality's obligation is limited to its current revenue sources and is not secured by the public entity's ability to raise taxes. As a result, LTGOs do not require voter approval. However, since the LTGOs are not secured by the full taxing power of the issuer, the limited tax bond represents a higher borrowing cost than general obligation bonds. The municipality must pledge to levy the maximum amount under constitutional and statutory limits, but not the unlimited taxing

authority pledged with GO bonds. Because LTGOs are not voter approved, they are subject to the limitations of Ballot Measures 5 and 50 (revised Measure 47).

Bancroft Bonds

Under Oregon statute, municipalities are allowed to issue Bancroft bonds that pledge the city's full faith and credit to assessment bonds. As a result, the bonds become general obligations of the city but are paid with assessments. Historically, these bonds provided a city with the ability to pledge its full faith and credit in order to obtain a lower borrowing cost without requiring voter approval. However, since Bancroft bonds are not voter approved, taxes levied to pay debt service on them are subject to the limitations of Ballot Measures 5 and 50 (revised Measure 47). As a result, since 1991, Bancroft bonds have not been used by municipalities who were required to compress their tax rates.

CHAPTER 9: RECOMMENDED POLICIES AND ORDINANCES

In 1991, the Oregon TPR was adopted to implement State Planning Goal 12 - Transportation (amended in May and September 1995). The TPR requires cities and counties to complete a TSP that includes policies and ordinances to implement that plan. The City of Seneca's Comprehensive Plan and implementing ordinances were completed in 1980, and so will require the addition of policies and ordinances to bring it into compliance with this TSP.

ELEMENTS REQUIRED BY THE TRANSPORTATION PLANNING RULE

The applicable portion of the TPR is found in Section 660-12-045 *Implementation of the Transportation System Plan*. In summary, the TPR requires that local governments revise their land use regulations to implement the TSP in the following manner:

- *Amend land use regulations to reflect and implement the Transportation System Plan.*
- *Clearly identify which transportation facilities, services, and improvements are allowed outright, and which will be conditionally permitted or permitted through other procedures.*
- *Adopt land use or subdivision ordinance measures, consistent with applicable federal and state requirements, to protect transportation facilities, corridors and sites for their identified functions, to include the following topics:*
  - ⇒ *access management and control;*
  - ⇒ *protection of public use airports;*
  - ⇒ *coordinated review of land use decisions potentially affecting transportation facilities;*
  - ⇒ *conditions to minimize development impacts to transportation facilities;*
  - ⇒ *regulations to provide notice to public agencies providing transportation facilities and services of land use applications that potentially affect transportation facilities;*
  - ⇒ *regulations assuring that amendments to land use applications, densities, and design standards are consistent with the Transportation System Plan.*
- *Adopt land use or subdivision regulations for urban areas and rural communities to provide safe and convenient pedestrian and bicycle circulation and bicycle parking, and to ensure that new development provides on-site streets and accessways that provide reasonably direct routes for pedestrian and bicycle travel.*
- *Establish street standards that minimize pavement width and total right-of-way.*

These elements are discussed in the following sections, where they are grouped by similarity in terms of appropriate policy and ordinance.

APPROVAL PROCESSES FOR TRANSPORTATION FACILITIES

Section 660-12-045(1) of the TPR requires that cities and counties amend their land use regulations to conform with the jurisdiction's adopted TSP. This section of the TPR is intended to clarify the approval process for transportation-related projects.

Recommended Policies for Approval Process

Policies should clarify the approval process for different types of projects. The following policies are recommended to be adopted in the Transportation Section of the Seneca Comprehensive Plan:

- *The Transportation System Plan is an element of the City of Seneca Comprehensive Plan. It identifies the general location of transportation improvements. Changes in the specific alignment of proposed public road and highway projects that shall be permitted without plan amendment if the new alignment falls within a transportation corridor identified in the Transportation System Plan.*

- *Operation, maintenance, repair, and preservation of existing transportation facilities shall be allowed without land use review, except where specifically regulated.*

- *Dedication of right-of-way, authorization of construction and the construction of facilities and improvements, for improvements designated in the Transportation System Plan, the classification of the roadway and approved road standards shall be allowed without land use review.*

- *For State projects that require an Environmental Impact Study (EIS) or Environmental Assessment (EA), the draft EIS or EA shall serve as the documentation for local land use review, if local review is required.*

Recommended Ordinances for Approval Process

Projects that are specifically identified in the TSP and for which the jurisdiction has made all the required land use and goal compliance finding are permitted outright, subject only to the standards established by the Plan.

However, a city may not allow outright an improvement that is included in the TSP but for which no site-specific decisions have been made. Therefore, it is recommended that Seneca review these transportation projects as regulated land use actions, using conditional use process. This following process is recommended for inclusion in the supplementary provisions section or as a new section within the development code.

__.__ *Standards for Transportation Improvements*

__.__.__ ***Uses Permitted Outright. Except where otherwise specifically regulated by this ordinance, the following improvements are permitted outright:***

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

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

C. Projects specifically identified in the Transportation System Plan as not requiring further land use regulation.

D. Landscaping as part of a transportation facility.

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

F. Acquisition of right-of-way for public roads, highways, and other transportation improvements designated in the Transportation System Plan except for those that are located in exclusive farm use or forest zones.

G. Construction of a street or road as part of an approved subdivision or land partition approved consistent with the applicable land division ordinance.

__.__.__ Conditional Uses Permitted

A. Construction, reconstruction, or widening of highways, roads, bridges or other transportation projects that are: (1) not improvements designated in the Transportation System Plan or (2) not designed and constructed as part of a subdivision or planned development subject to site plan and/or conditional use review, shall comply with the Transportation System Plan and applicable standards, and shall address the following criteria. For State projects that require an Environmental Impact Statement (EIS) or EA (Environmental Assessment), the draft EIS or EA shall be reviewed and used as the basis for findings to comply with the following criteria:

1. The project is designed to be compatible with existing land use and social patterns, including noise generation, safety, and zoning.

2. The project is designed to minimize avoidable environmental impacts to identified wetlands, wildlife habitat, air and water quality, cultural resources, and scenic qualities.

3. The project preserves or improves the safety and function of the facility through access management, traffic calming, or other design features.

4. Project includes provision for bicycle and pedestrian circulation as consistent with the comprehensive plan and other requirements of this ordinance.

B. If review under this Section indicates that the use or activity is inconsistent with the Transportation System Plan, the procedure for a plan amendment shall be undertaken prior to or in conjunction with the conditional permit review.

__.__.__ Time Limitation on Transportation-Related Conditional Use Permits

A. Authorization of a conditional use shall be void after a period specified by the applicant as reasonable and necessary based on season, right-of-way acquisition, and other pertinent factors. This period shall not exceed three years.

PROTECTING EXISTING AND FUTURE OPERATION OF FACILITIES

Section 60-12-045(2) of the TPR requires that jurisdictions protect future operation of transportation corridors. For example, an important arterial for through traffic should be protected in order to meet the community's identified needs. In addition, the proposed function of a future roadway must be protected from incompatible land uses.

Other future transportation facilities that the City of Seneca may wish to protect include the space and building orientation necessary to support future transit, and right-of-ways or other easements for accessways, paths, and trails. Policies are suggested below that will demonstrate the desire of the community to protect these transportation facilities.

Protection of existing and planned transportation systems can be provided by ongoing coordination with other relevant agencies, adhering to the road standards, and to the access management policies and ordinances suggested below.

Recommended Policies for Protection of Transportation Facilities

- *The City of Seneca shall protect the function of existing and planned roadways as identified in the Transportation System Plan.*
- *The City of Seneca shall include a consideration of a proposal's impact on existing or planned transportation facilities in all land use decisions.*
- *The City of Seneca shall protect the function of existing or planned roadways or roadway corridors through the application of appropriate land use regulations.*
- *The City of Seneca shall consider the potential to establish or maintain accessways, paths, or trails prior to the vacation of any public easement or right-of-way.*
- *The City of Seneca shall preserve right-of-way for planned transportation facilities through exactions, voluntary dedication, or setbacks.*

Recommended Access Control Ordinances

The following ordinances are recommended to support the access management standards.

Section ____ ACCESS MANAGEMENT

A. General

The intent of this ordinance is to manage access to land development to preserve the transportation system in terms of safety, capacity, and function. This ordinance shall apply to all arterials and collectors within the City of Seneca and to all properties that abut these roadways. This ordinance is adopted to implement the access management policies of the City of Seneca as set forth in the Transportation System Plan.

B. Corner Clearance

1. *Corner clearance for connections shall meet or exceed the minimum connection spacing requirements for that roadway.*
2. *New connections shall not be permitted within the functional area of an intersection or interchange as defined by the connection spacing standards of this ordinance, unless no other reasonable access to the property is available.*
3. *Where no other alternatives exist, the City may allow construction of an access connection along the property line farthest from the intersection. In such cases, directional connections (i.e. right in/out, right in only, or right out only) may be required.*

C. Joint and Cross Access

1. *Adjacent commercial or office properties classified as major traffic generators (i.e. shopping plazas, office parks), shall provide a cross access drive and pedestrian access to allow circulation between sites.*

2. *A system of joint use driveways and cross access easements shall be established wherever feasible and shall incorporate the following:*

   a) *A continuous service drive or cross access corridor extending the entire length of each block served to provide for driveway separation consistent with the access management classification system and standards.*

   b) *A design speed of 10 mph and a maximum width of 20 feet to accommodate two-way travel aisles designated to accommodate automobiles, service vehicles, and loading vehicles;*

   c) *Stub-outs and other design features to make it visually obvious that the abutting properties may be tied in to provide cross-access via a service drive;*

   d) *A unified access and circulation system plan for coordinated or shared parking areas is encouraged.*

3. *Shared parking areas shall be permitted a reduction in required parking spaces if peak demands do not occur at the same time periods.*

4. *Pursuant to this section, property owners shall:*

   a) *Record an easement with the deed allowing cross access to and from other properties served by the joint use driveways and cross access or service drive;*

   b) *Record an agreement with the deed that remaining access rights along the roadway will be dedicated to the City and pre-existing driveways will be closed and eliminated after construction of the joint-use driveway;*

   c) *Record a joint maintenance agreement with the deed defining maintenance responsibilities of property owners.*

5. *The City may reduce required separation distance of access points where they prove impractical, provided all of the following requirements are met:*

   a) *Joint access driveways and cross access easements are provided in accordance with this section.*

   b) *The site plan incorporates a unified access and circulation system in accordance with this section.*

   c) *The property owner enters into a written agreement with the City, recorded with the deed, that pre-existing connections on the site will be closed and eliminated after construction of each side of the joint use driveway.*

6. *The City may modify or waive the requirements of this section where the characteristics or layout of abutting properties would make a development of a unified or shared access and circulation system impractical.*

D. Access Connection and Driveway Design

1. *Driveways shall meet the following standards:*

   a) *If the driveway is a one way in or one way out drive, then the driveway shall be a minimum width of 10 feet and a maximum width of 12 feet and shall have appropriate signage designating the driveway as a one way connection.*

   b) *For two-way access, each lane shall have a minimum width of 10 feet and a maximum width of 12 feet.*

2. *Driveway approaches must be designed and located to provide an exiting vehicle with an unobstructed view. Construction of driveways along acceleration or deceleration lanes and tapers shall be avoided due to the potential for vehicular weaving conflicts.*

3. *The length of driveways shall be designed in accordance with the anticipated storage length for entering and exiting vehicles to prevent vehicles from backing into the flow of traffic on the public street or causing unsafe conflicts with on-site circulation.*

E. *Requirements for Phased Development Plans*

1. *In the interest of promoting unified access and circulation systems, development sites under the same ownership or consolidated for the purposes of development and composed of more than one building site shall be reviewed as single properties in relation to the access standards of this ordinance. 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. All necessary easements, agreements, and stipulations shall be met. This shall also apply to phased development plans. The owner and all lessees within the affected area are responsible for compliance with the requirements of this ordinance and both shall be cited for any violation.*

2. *All access must be internalized using the shared circulation system of the principal development or retail center. Driveways shall be designed to avoid queuing across surrounding parking and driving aisles.*

F. *Nonconforming Access Features*

1. *Legal access connections in place as of (date of adoption) that do not conform with the standards herein are considered nonconforming features and shall be brought into compliance with applicable standards under the following conditions:*

   a) *When new access connection permits are requested;*

   b) *Change in use or enlargements or improvements that will increase trip generation.*

G. *Reverse Frontage*

1. *Lots that front on more than one street shall be required to locate motor vehicle accesses on the street with the lower functional classification.*

2. *When a residential subdivision is proposed that would abut an arterial, it shall be designed to provide through lots along the arterial with access from a frontage road or interior local road. Access rights of these lots to the arterial shall be dedicated to the City of Seneca and recorded with the deed. A berm or*

buffer yard may be required at the rear of through lots to buffer residences from traffic on the arterial. The berm or buffer yard shall not be located with the public right-of-way.

H. Flag Lot Standards

1. *Flag lots shall not be permitted when the result would be to increase the number of properties requiring direct and individual access connections to the State Highway System or other arterials.*

2. *Flag lots may be permitted for residential development when necessary to achieve planning objectives, such as reducing direct access to roadways, providing internal platted lots with access to a residential street, or preserving natural or historic resources, under the following conditions:*

   a) *Flag lot driveways shall be separated by at least twice the minimum frontage requirement of that zoning district.*

   b) *The flag driveway shall have a minimum width of 10 feet and maximum width of 20 feet.*

   c) *In no instance shall flag lots constitute more than 10 percent of the total number of building sites in a recorded or unrecorded plat, or three lots or more, whichever is greater.*

   d) *The lot area occupied by the flag driveway shall not be counted as part of the required minimum lot area of that zoning district.*

   e) *No more than one flag lot shall be permitted per private right-of-way or access easement.*

I. Lot Width-to-Depth Ratios

1. *To provide for proper site design and prevent the creation of irregularly shaped parcels, the depth of any lot or parcel shall not exceed 3 times its width (or 4 times its width in rural areas) unless there is a topographical or environmental constraint or an existing man-made feature.*

J. Shared Access

1. *Subdivisions with frontage on the state highway system shall be designed into shared access points to and from the highway. Normally a maximum of two accesses shall be allowed regardless of the number of lots or businesses served. If access off a secondary street is possible, then access should not be allowed onto the state highway. If access off a secondary street becomes available, then conversion to that access is encouraged, along with closing the state highway access.*

K. Connectivity

1. *The street system of proposed subdivisions shall be designed to connect with existing, proposed, and planned streets outside of the subdivision as provided in this Section.*

2. *Wherever a proposed development abuts unplatted land or a future development phase of the same development, street stubs shall be provided to provide access to abutting properties or to logically extend the street system into the surrounding area. All street stubs shall be provided with a temporary turn-around unless specifically exempted by the Public Works Director, and the restoration and extension of the street shall be the responsibility of any future developer of the abutting land.*

3. *Minor collector and local residential access streets shall connect with surrounding streets to permit the convenient movement of traffic between residential neighborhoods or facilitate emergency access and evacuation. Connections shall be designed to avoid or minimize through traffic on local streets. Appropriate design and traffic control such as four-way stops and traffic calming measures are the preferred means of discouraging through traffic.*

L. *Variances to Access Management Standards.*

1. *The granting of the variance shall meet the purpose and intent of these regulations and shall not be considered until every feasible option for meeting access standards is explored.*

2. *Applicants for a variance from these standards must provide proof of unique or special conditions that make strict application of the provisions impractical. Applicants shall include proof that:*

a) Indirect or restricted access cannot be obtained;

b) No engineering or.construction solutions can be applied to mitigate the condition; and

c) No alternative access is available from a street with a lower functional classification than the primary roadway.

3. *No variance shall be granted where such hardship is self-created.*

Recommended Ordinances to Protect Public Use Airports

The Oregon Airport Land Use Compatibility Guidelines (November 1994), which have been distributed to all County and City planning departments, provide examples for ordinance development. The following Airport Overlay Zone is an example of zoning that is appropriate to protect many smaller airports.

AIRPORT OVERLAY ZONE

A. *Purpose. In order to carry out the provisions of (this/these) overlay zone(s), there are hereby created and established certain zones which include all of the land lying beneath the Airport Imaginary Surfaces as they apply to the airport in the County. This overlay zone is intended to prevent the establishment of airspace obstructions in airport approaches and surrounding areas through height restrictions and other land use controls as deemed essential to protect the health, safety, and welfare of the people of the County.*

B. *Special Definitions.*

1. *Airport Approach Safety Zone. The land that underlies the approach surface, excluding the RPZ.*

2. *Airport Hazard. Any structure, tree, or use of land which exceeds height limits established by the Airport Imaginary Surfaces.*

3. *Airport Imaginary Surfaces. Those imaginary areas in space which are defined by the Approach Surface, Transitional Surface, Horizontal Surface, and Conical Surface and in which any object extending above these imaginary surfaces is an obstruction.*

4. *Approach Surface. A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the Primary Surface. The inner edge of the approach surface is the same width as the Primary Surface and extends to a width of: 1,250 feet for utility runway having only visual approaches; 1,500 feet for a runway other than a utility runway having only visual approaches; 2,000 feet for a utility runway having a nonprecision instrument approach; 3,500 feet for a nonprecision instrument runway other than utility, having visibility minimums greater than three-fourths of a statute mile; 4,000 feet for a nonprecision instrument runway having visibility minimums as low as three-fourths statute mile; and 16,000 feet for precision instrument runways. The Approach Surface extends for a horizontal distance of 5,000 feet at a slope of 20 feet outward to each foot upward (20:1) for all utility and visual runways; 10,000 feet at a slope of 34 feet outward for each foot upward (34:10 for all nonprecision instrument runways other than utility; and for all precision instrument runways extends for a horizontal distance of 10,000 feet at a slope of 50 feet outward for each foot upward (50:1); thence slopes upward 40 feet outward for each foot upward (40:1) an additional distance of 40,000 feet.*

5. *Conical Surface. Extends 20 feet outward for each one foot upward (20:1) for 4,000 feet beginning at the edge of the horizontal surface (5,000 feet from the center of each end of the Primary Surface of each visual and utility runway or 10,000 feet for all nonprecision instrument runways other than utility at 150 feet above and airport elevation) and upward extending to a height of 350 feet above the airport elevation.*

6. *Horizontal Surface. A horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging runways 5,000 feet from the center of each end of the Primary Surface of each visual or utility runway and 10,000 feet from the center of each end of the Primary Surface of all other runways and connecting the adjacent arcs by lines tangent to those arcs.*

7. *Noise Sensitive Area. Within 1,500 feet of an airport or within established noise contour boundaries exceeding 55 Ldn.*

8. *Place of Public Assembly. Structure of place which the public may enter for such purposes as deliberation, education, worship, shopping, entertainment, amusement, awaiting transportation, or similar activity.*

9. *Primary Surface. A surface longitudinally centered on a runway. When the runway has a specially prepared hard surface, the Primary Surface extends 200 feet beyond each end of that runway. When the runway has no specially prepared hard surface, or planned hard surface, the Primary Surface ends at each end of that runway. The width of the primary Surface is 250 feet for utility runways having only visual approaches, 500 feet for utility runways having nonprecision instrument approaches, 500 feet for other than utility runways having only visual approaches or nonprecision instrument approaches with visibility minimums greater than three-fourths of a mile and 1,000 feet for nonprecision instrument runways with visibility minimums of three-fourths of a mile or less and for precision instrument runways.*

10. *Runway Protection Zone (RPZ). An area off the runway end (formerly the clear zone) used to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape and centered about the extended runway centerline. It begins 200 feet (60 m) beyond the end of the arcs usable for takeoff or landing. The RPZ dimensions are functions of the type of aircraft and operations to be conducted on the runway.*

11. *Transitional Surface. Extend seven feet outward for each one foot upward (7:1) beginning on each side of the Primary Surface which point is the same elevation as the runway surface, and form the sides of the approach surfaces thence extending upward to a height of 150 feet above the airport elevation (Horizontal Surface).*

12. *Utility Runway. A runway that is constructed for and intended to be used by propeller driven aircraft of 12,500 pounds maximum gross weight or less.*

13. *Visual Runway. A runway that is intended solely for the operation of aircraft using visual approach procedures with no instrument approach procedures has been approved, or planned, or indicated on an FAA or state planning document or military service airport planning document.*

C. *Permitted uses within the Runway Approach Zone (RPZ). While it is desirable to clear all objects from the RPZ, some uses are permitted, provided they do not attract wildlife, are below the approach surface and do not interfere with navigational aids.*

1. *Agricultural operations (other than forestry or livestock farms).*

2. *Golf courses (but not club houses).*

3. *Automobile parking facilities.*

D. *Permitted uses within the Airport Approach Safety Zone.*

1. *Farm use, excluding the raising and feeding of animals which would be adversely affect by aircraft passing overhead.*

2. *Landscape nursery, cemetary, or recreation areas which do not include buildings or structures.*

3. *Roadways, parking areas, and storage yards located in such a manner that vehicle lights will not make it difficult for pilots to distinguish between landing lights and vehicle lights or result in glare, or in any way impair visibility in the vicinity of the landing approach. Approach surfaces must clear these by a minimum of 15 feet.*

4. *Pipeline.*

5. *Underground utility wire.*

E. *Conditional uses within the Airport Approach Safety Zone.*

1. *A structure or building accessory to a permitted use.*

2. *Single family dwellings, mobile homes, duplexes, and multifamily dwellings, when allowed by the underlying zone, provided the landowner signs and records in the deed and mortgage records of County a Hold Harmless Agreement and Aviation and Hazard Easement and submits them to the airport sponsor and the County Planning Departments.*

3. *Commercial and industrial uses, when allowed by the underlying zone, provided the use does not result in:*

a) *Creating electrical interference with navigational signals or radio communication between the airport and aircraft.*

b) *Making it difficult for pilots to distinguish between airport lights and lighting from nearby land uses.*

c) Impairing visibility.

d) Creating bird strike or other wildlife hazards.

e) Endangering or interfering with the landing, taking off or maneuvering of aircraft intending to use airport.

f) Attracting a large number of people.

4. *Buildings and uses of public works, public service, or public utility nature.*

F. *Procedures. An applicant seeking a conditional use shall include the following information:*

1. *Property boundary lines as they relate to the Airport Imaginary Surfaces.*

2. *Location and height of all existing and proposed buildings, structures, utility lines, and roads.*

In accordance with OAR Chapter 738 Division 100, City or County Planning Authority shall notify the owner of the airport and Aeronautics Section on land use permits or zone changes within 5,000 feet of a visual and 10,000 feet of instrument airport so as to provide Oregon Aeronautics Section an opportunity to review and comment.

G. *Limitations.*

1. *To meet the standards established in FAA Regulations, Part 77 and OAR Chapter 738 Division 70, no structure shall penetrate into the Airport Imaginary Surfaces as defined above.*

2. *No place of public assembly shall be permitted in the Airport Approach Safety Zone or RPZ.*

3. *No structure or building shall be allowed within the RPZ.*

4. *Whenever there is a conflict in height limitations prescribed by this overlay zone and the primary zoning district, the lowest height limitation fixed shall govern; provided, however, that the height limitations here imposed shall not apply to such structures customarily employed for aeronautical purposes.*

5. *No glare producing materials shall be used on the exterior of any structure located within the Airport Approach Safety Zone.*

6. *In noise sensitive areas (within 1,500 feet of an airport or within established noise contour boundaries of 55 Ldn and above for identified airports) where noise levels are a concern, a declaration of anticipated noise levels shall be attached to any building permit, land division appeal, deed, and mortgage records. In areas where the noise level is anticipated to be 55 Ldn and above, prior to issuance of a building permit for construction of noise sensitive land use (real property normally used for sleeping or normally used as schools, churches, hospitals, or public libraries) the permit applicant shall be required to demonstrate that a noise abatement strategy will be incorporated into the building design which will achieve an indoor noise level equal to or less than 55 Ldn. The planning and building department will review building permits or noise sensitive developments.*

7. *No development that attracts or sustains hazardous bird movements from feeding, watering, or roosting across the runways and/or approach and departure patterns of aircraft. Planning authority shall notify*

Oregon Aeronautics of such development (e.g., waste disposal sites and wetland enhancements) within the airport overlay zone so as to provide Oregon Aeronautics Section an opportunity to review and comment on the site in accordance with FAA AC 150/5200-33.

PROCESS FOR COORDINATED REVIEW OF LAND USE DECISIONS

A lack of coordination between state and local decision processes can result in costly delays and changes in public road and highway projects, as well as some maintenance and operation activities. Section 660-12-045(2)(d) of the TPR requires that jurisdictions develop a process for the coordinated review of land use decisions affecting transportation facilities. The following recommended policies will establish coordinated review.

Recommended Policies for Coordinated Review

- *The City of Seneca shall coordinate with the Department of Transportation to implement the highway improvements listed in the Statewide Transportation Improvement Program (STIP) that are consistent with the Transportation System Plan and comprehensive plan.*

- *The City of Seneca shall provide notice to ODOT of land use applications and development permits for properties that have frontage or access onto Highway 395.*

- *The City of Seneca shall consider the findings of ODOT's draft Environmental Impact Statements and Environmental Assessments as integral parts of the land use decision-making procedures. Other actions required, such as a goal exception or plan amendment, will be combined with review of the draft EA or EIS and land use approval process.*

Recommended Process for Applying Conditions to Development Proposals

Section 660-12-045(2)(e) of the TPR requires that jurisdictions develop a process that allows them to apply conditions to development proposals to in order to minimize impacts on transportation facilities.

The Site Plan review process is a useful tool for a small jurisdiction. The City of Seneca may wish to implement a Site Plan review process that includes a requirement to provide data on the potential traffic impacts of a project through a traffic impact study or, at the minimum, an estimation of the number of trips expected to be generated. Recommended language to be included under Site Plan Criteria is as follows:

- *The proposed use shall impose an undue burden on the public transportation system. For developments that are likely to generate more than 400 average daily motor vehicle trips (ADTs), the applicant shall provide adequate information, such as a traffic impact study or traffic counts, to demonstrate the level of impact to the surrounding street system. The developer shall be required to mitigate impacts attributable to the project.*

- *The determination of impact or effect and the scope of the impact study should be coordinated with the provider of the affected transportation facility.*

If the City of Seneca decides to implement a Site Plan review process, conditions such as the following may be included in the ordinance, to be applied in the event that a proposed project is demonstrated to

potentially have an adverse effect on the transportation system. These are additional to the conditions imposed by the recommended Access Management Ordinance included previously.

- *Dedication of land for streets, transit facilities, sidewalks, bikeways, paths, or accessways shall be required where the existing transportation system will be impacted by or is inadequate to handle the additional burden caused by the proposed use.*

- *Improvements such as paving, curbing, installation or contribution to traffic signals, construction of sidewalks, bikeways, accessways, paths, or streets that serve the proposed use where the existing transportation system may be burdened by the proposed use.*

Recommended Regulations to Provide Notice to Public Agencies

Review of land use actions is typically initiated by a Notice. This process is usually defined by a Procedures Ordinance or Noticing Policy. This Ordinance or Policy should be amended to provide for timely notice to ODOT regarding any land use action on or adjacent to Highway 395. Similarly, all actions by the City potentially affecting a county road should provide notice to Grant County.

Information that should be conveyed to reviewers includes:

- *Project location.*

- *Proposed land use action.*

- *Location of project access point(s).*

Additional information that could be supplied to the review upon request (provided the information is available) includes a site plan showing the following:

- *Distances to neighboring constructed access points, median openings, traffic signals, intersections, and other transportation features on both sides of the property;*

- *Number and direction of lanes to be constructed on the driveway, plus striping plans;*

- *All planned transportation features (lanes, signals, bikeways, walkways, crosswalks, etc.);*

- *Trip generation data or appropriate traffic studies;*

- *Parking and internal circulation plans for vehicles and pedestrians;*

- *Plat map showing property lines, right-of-way, and ownership of abutting properties; and*

- *A detailed description of any requested variance.*

Recommended Regulations to Assure that Amendments are Consistent with the Transportation System Plan

Section 660-12-045(2)(g) of the TPR requires that jurisdictions develop regulations to assure that all development proposals, plan amendments, or zone changes conform with the TSP. This requirement can be addressed by adding a policy to the Comprehensive Plan, as follows:

- *All development proposals, plan amendments, or zone changes shall conform with the adopted Transportation System Plan.*

Within the zoning ordinance, development proposals can be addressed through Site Plan Review, discussed above. Zone changes and plan amendments can be partially addressed by the following language:

- *The applicant must show that the proposed change conforms with the Comprehensive Plan.*

The following statements should be added to the local ordinance and policy language governing zone changes and plan amendments:

A. *A plan or land use regulation amendment significantly affects a transportation facility if it:*

   1. *Changes the functional classification of an existing or planned transportation facility;*

   2. *Changes standards implementing a functional classification system;*

   3. *Allows types or levels of land use that would result in levels of travel or access what are inconsistent with the functional classification of a transportation facility; or*

   4. *Would reduce the level of service of the facility below the minimum acceptable level identified in the Transportation System Plan.*

B. *Amendments to the comprehensive plan and land use regulations which significantly affect a transportation facility shall assure that allowed land uses are consistent with the function, capacity, and level of service of the facility identified in the Transportation System Plan. This shall be accomplished by one of the following:*

   1. *Limiting allowed land uses to be consistent with the planned function of the transportation facility;*

   2. *Amending the Transportation System Plan to ensure that existing, improved, or new transportation facilities are adequate to support the proposed land uses consistent with the requirement of the Transportation Planning Rule; or,*

   3. *Altering land use designations, densities, or design requirements to reduce demand for automobile travel and meet travel needs through other modes.*

SAFE AND CONVENIENT PEDESTRIAN AND BICYCLE CIRCULATION

Bicycling and walking are often the most appropriate mode for short trips. Especially in small cities where the downtown area is compact, walking and bicycling can replace short auto trips, reducing the need for construction and maintenance of new roads. However, the lack of safe and convenient bikeways and

walkways can be a strong discouragement for these mode choices. The TPR (660-12-045(3)) requires that urban areas and rural communities plan for bicycling and walking as part of the overall transportation system.

Recommended Policies for Pedestrian and Bicycle Circulation

To comply with the objectives of the TSP and the TPR, the City of Seneca should amend its Comprehensive Plans with policies such as the following to protect, support, and encourage bicycle and pedestrian travel.

- *It is the policy of the City of Seneca to plan and develop a network of streets, accessways, and other improvements, including bikeways, walkways, and safe street crossings to promote safe and convenient bicycle and pedestrian circulation within the community.*

- *The City of Seneca shall require streets and accessways where appropriate to provide direct and convenient access to major activity centers, including downtown, schools, shopping areas, and community centers.*

- *In areas of new development the City of Seneca shall investigate the existing and future opportunities for bicycle and pedestrian accessways. Many existing accessways such as user trails established by school children distinguish areas of need and should be incorporated into the transportation system.*

- *Bikeways shall be included on new arterials and major collectors within the Urban Growth Boundary, as identified in the TSP. Walkways shall be included on new streets within the city, as identified in the TSP.*

- *Retrofitting existing streets with walkways and bikeways shall proceed on a prioritized schedule, as identified in the TSP.*

- *Design and construction of walkways and bikeways shall follow the guidelines established by the Oregon Bicycle and Pedestrian Plan.*

- *Bicycle parking facilities shall be provided at all new residential multifamily developments of four units or more, commercial, industrial, recreational, and institutional facilities.*

Recommended Ordinances for Bicycle Parking

The lack of safe and convenient bicycle parking can waste resources and further discourage bicycling as a transportation mode. The following are recommended ordinances:

A. A minimum of 2 bicycle parking spaces per use (one sheltered and one unsheltered) shall be required.

B. The following Special Minimum Standards shall be considered as supplemental requirements for the number of required bicycle parking spaces.

1. <u>Multi-Family Residences</u>. Every residential use of four (4) or more dwelling units shall provide at least one sheltered bicycle parking space for each unit. Sheltered bicycle parking spaces may be located within a garage, storage shed, basement, utility room or similar area. In those instances in which the residential complex has no garage or other easily accessible storage unit, the required bicycle parking spaces shall be sheltered under an eave, overhang, an independent structure, or similar cover.

2. *Parking Lots. All public and commercial parking lots and parking structures shall provide a minimum of one bicycle parking space for every 10 motor vehicle parking spaces.*

3. *Schools. Elementary and middle schools, both private and public, shall provide one bicycle parking space for every 10 students and/or employees. High schools shall provide one bicycle parking space for every 5 students and/or employees. All spaces shall be sheltered under an eave, overhang, independent structure, or similar cover.*

4. *Colleges. Colleges, universities, and trade schools shall provide one bicycle parking space for every 10 motor vehicle spaces plus one space for every dormitory unit. Fifty percent of the bicycle parking spaces shall be sheltered under an eave, overhang, independent structure, or similar cover.*

5. *Downtown Areas. In downtown areas with on-street parking, bicycle parking for customers shall be provided along the street at a rate of at least one space per use. Spaces may be clustered to serve up to six (6) bicycles; at least one cluster per block shall be provided. Bicycle parking spaces shall be located in front of the stores along the street, either on the sidewalks in specially constructed areas such as pedestrian curb extensions. Inverted "U" style racks are recommended. Bicycle parking shall not interfere with pedestrian passage, leaving a clear area of at least 5 feet. Customer spaces are not required to be sheltered. Sheltered parking (within a building, or under an eave, overhang, or similar structure) shall be provided at a rate of one space per 10 employees, with a minimum of one space per store.*

6. *Rural Schools, Service Centers, and Industrial Parks. Where a school, service center, or industrial park is located 5 or more miles from the closest urban area or rural residential subdivision with a density of more than one dwelling unit per 20 acres, a minimum of two bicycle parking spaces per use shall be required.*

C. *The following formulas for Calculating the Number of Required Bicycle Parking Spaces are recommended.*

1. *Fractional numbers of spaces shall be rounded up to the next whole space.*

2. *For facilities with multiple uses (such as a commercial center), the bicycle parking requirements shall be calculated by using the total number of motor vehicle parking spaces required for the entire development.*

Recommended Ordinances for Bicycle and Pedestrian Circulation and Access

Sections 660-12-045(3)(b), (c), and (d) of the TPR deals with providing facilities for safe and convenient pedestrian and bicycle circulation and access, both within new residential and commercial development, and on public streets. In order for walking and bicycling to be viable forms of transportation, especially in smaller cities where they can constitute a significant portion of local trips, the proper facilities must be supplied. In addition, certain development design patterns, such as orienting commercial uses to the street and placing parking behind the building, make a commercial district more accessible to non-motorized transportation and to existing or future transit.

The TPR specifies that, at a minimum, sidewalks and bikeways be provided along arterials and collectors in urban areas. Separate bicycle and pedestrian facilities should be provided where these would safely minimize trip distances by providing a "short cut." Small cities should enhance existing ordinances by including the

following recommended language, additions and recommendations. The recommendations should be placed within the appropriate section of the zoning or subdivision ordinance:

Definitions:

A. *Accessway. A walkway that provides pedestrian and bicycle passage either between streets or from a street to a building or other destination such s a school, park, or transit stop. Accessways generally include a walkway and additional land on either side of the walkway, often as an easement or right-of-way, to provide clearance and separation between the walkway and adjacent uses. Accessways through parking lots are generally 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 provides convenient access for pedestrians.*

B. *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.*

C. *Bicycle Facilities. A general term denoting improvements and provisions made to accommodate or encourage bicycling, including parking facilities and all bikeways.*

D. *Bikeway. Any road, path, or way that is some manner specifically open to bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are shared with other transportation modes. The five types of bikeways are:*

   1. *Multi-use Path. A paved 10- to 12-foot wide way that is physically separated from motorized vehicular traffic; typically shared with pedestrians, skaters, and other non-motorized users.*

   2. *Bike Lane. A 4 to 6-foot wide portion of the roadway that has been designated by permanent striping and pavement markings for the exclusive use of bicycles.*

   3. *Shoulder Bikeway. The paved shoulder of a roadway that is 4 feet or wider; typically shared with pedestrians in rural areas.*

   4. *Shared Roadway. A travel lane that is shared by bicyclists and motor vehicles.*

   5. *Multi-use Trail. An unpaved path that accommodates all-terrain bicycles; typically shared with pedestrians.*

E. *Pedestrian Facilities (also Walkways). A general term denoting improvements and provisions made to accommodate or encourage walking, including sidewalks, accessways, crosswalks, ramps, paths, and trails.*

F. *Neighborhood Activity Center. An attraction or destination for residents of surrounding residential areas which includes, but is not limited to existing or planned schools, parks, shopping areas, transit stops, employment areas.*

G. *Reasonably direct. A route that does not deviate unnecessarily from a straight line or a route that does not involve a significant amount of out-of-direction travel for likely users.*

H. *Safe and convenient. Bicycle and pedestrian routes that are:*

1. *Reasonably free from hazards, and*

2. *Provide a reasonably direct route of travel between destinations, considering that the optimum travel distance is one-half mile for pedestrians and three miles for bicyclists.*

I. *Walkway. A hard-surfaced area intended and suitable for pedestrians, including sidewalks and the surfaced portions of accessways.*

If the City of Seneca decides to implement a Site Plan review process, it should include a requirement to show the design and location of bicycle parking and bicycle and pedestrian circulation elements such as accessways and walkways. The following language should be added to the land-use regulations:

A. *Bicycle Parking. The development shall include the number and type of bicycle parking facilities required in the Off-Street Parking and Loading section of this Title. The location and design of bicycle parking facilities shall be indicated on the site plan.*

B. *Pedestrian Access and Circulation.*

1. *Internal pedestrian circulation shall be provided in new commercial, office, and multi-family residential developments through the clustering of buildings, construction of hard surface walkways, landscaping, accessways, or similar techniques.*

C. *Commercial Development Standards.*

1. *New commercial buildings, particularly retail shopping and offices, shall be oriented to the street, near or at the setback line. A main entrance shall be oriented to the street. For lots with more than two front yards, the building(s) shall be oriented to the two busiest streets.*

2. *Off-street motor vehicle parking for new commercial developments shall be located at the side or behind the building(s).*

3. *All site plans (industrial and commercial) shall clearly show how the site's internal pedestrian and bicycle facilities connect with external existing or planned facilities or systems.*

The City Subdivision Ordinances should reflect the intent of the TPR by adding the following provision to development requirements.

- *Approval of Subdivision Tentative Plans and Final Plats. Information required shall include the location and design of all proposed pedestrian and bicycle facilities, including accessways.*

The small jurisdiction Subdivision Ordinance should incorporate the following language into the existing requirements for cul-de-sac design.

A. Cul-de-Sacs and Accessways.

1. *Cul-de-sacs or permanent dead-end streets may be used as part of a development plan; however, through streets are encouraged except where topographical, environmental, or existing adjacent land use constraints make connecting streets infeasible. Where cul-de-sacs are planned, accessways shall be provided connecting the ends of cul-de-sacs to each other, to other streets, or to neighborhood activity centers.*

2. *Accessways for pedestrians and bicyclists shall be 10 feet wide and located within a 20-foot wide right-of-way or easement. If the streets within the subdivision are lighted, the accessways shall also be lighted. Stairs or switchback paths may be used where grades are steep.*

3. *Accessways for pedestrians and bicyclists shall be provided at mid-block where the block is longer than 600 feet.*

4. *The Hearings Body may determine, based upon evidence in the record, that an accessway is impracticable. Such evidence may include but is not limited to:*

   a) *Physical or topographic conditions make an accessway connection impractical. Such conditions include but are not limited to extremely steep slopes, wetlands, or other bodies of water where a connection cannot reasonably be provided.*

   b) *Buildings or other existing development on adjacent lands physically preclude a connection now or in the future, considering potential for redevelopment.*

   c) *Where accessways would violate provisions of leases, easements, covenants, restrictions, or other agreements existing as of May 1, 1995 that preclude a required accessway connection.*

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APPENDIX A:

Technical Memorandum

Review of Existing Plans and Policies

City of Seneca

TECHNICAL MEMORANDUM

REVIEW OF EXISTING PLANS AND POLICIES CITY OF SENECA

The City of Seneca Comprehensive Plan was reviewed to establish the history of planning for the city. The review examines how population and employment were projected and how those projections compare with current measurements, what street system improvements were planned and which were implemented, how other transportation facilities were planned and implemented, and how Seneca is currently managing its ongoing development. It also compares the information in the existing Plan with the requirements of the Oregon Transportation Planning Rule (TPR). A description of the information in the Plan is provided followed by comments in italics.

CITY OF SENECA COMPREHENSIVE PLAN

The City of Seneca Comprehensive Plan was prepared in September 1980 and adopted on October 7, 1980. It focuses on the Oregon Land Conservation and Development Commission Statewide Planning Goals and Guidelines. The Plan begins with general goals, objectives, and principles for Seneca. It then goes through each element of the plan presenting findings and policies.

Goals and Objectives

The general goals and objectives in the Plan were found on page 1. They include:

1. To retain and enhance the character and quality of the Seneca Urban Area as growth and development occurs.

2. To provide a sound basis for orderly and efficient urbanization by establishing proper relationships between residential, commercial, industrial, public and open land uses, and transportation uses.

3. To provide for a close correlation between the provision of urban services and urban development in order to bring about a more orderly and efficient development pattern, and thereby avoid unnecessary tax burdens and excessive utility costs normally associated with scattered, unrelated development.

4. To provide a safe, coordinated, efficient and effective transportation system to bring about the best relationship between places where people live, work, shop and play.

5. To continually strive for excellence in all private development and public services within the constraints of economic reality.

6. To encourage and promote innovations in development techniques in order to obtain maximum livability and excellence in planning and design for all new developments.

7. To encourage and foster economic development in the community, and to consider such as a vital factor in the long-term overall development of the community.

Only Goal 4 specifically relates to transportation.

Population Projections

Population projections were presented on page 15 of the Plan as part of the Urbanization element. A 2% annual growth rate was used for the Seneca urban area projections. The projections are summarized in Table 1.

TABLE 1
POPULATION PROJECTIONS

Year	Seneca Urban Area
1977	375
1980	477
1985	527
1990	582
1995	642
2000	709

Source: Seneca Comprehensive Plan, Table 2

Current (1996) population in the City of Seneca is 230. This number cannot be directly compared with the population projections in Table 1 because those projections are for the Seneca Urban Area, or the area inside the city limits in 1980. Census data for 1980 and 1990 showed Seneca with a population of 285 and 191 respectively. During that 10-year time span, the population in Seneca decreased by 33 percent overall with an average annual decrease of almost 4 percent per year. Since 1990, population has increased about 20 percent overall, or about 3 percent per year.

Transportation Element

The transportation element can be found on pages 30 and 31 of the comprehensive plan. This element contains sections on findings and policies.

The transportation element did not contain any inventory of existing facilities or any traffic volume data. No projections of future traffic demand were presented. No analysis of existing or future system operations was performed. No future improvements were recommended. All of these elements will need to be included to meet the requirements of the TPR.

Findings

1. It is apparent from all available traffic statistics and related data that the most significant traffic volumes and resultant associated problems are found on U.S. Highway 395 and a limited number of City streets and area County roads.

   No traffic statistics were presented in the document to support this statement; however, it is true.

2. U.S. Highway 395, a secondary State Highway, is the principal north-south corridor around which the City of Seneca is framed. The highway is an uncontrolled access system, consisting of a two-lane road. The Logan Valley Road provides the primary eastbound access route.

Highway 395 is now classified as a highway of statewide significance in the 1991 Oregon Highway Plan. It is also designated as a Congressional High Priority Route in the National Highway System.

3. All research data indicated that all of the appropriate modes of transportation are presently being utilized in the area; thereof, the predominant modes identified include air, highway, rail, bicycle and pedestrian, with the automobile being the primary mode.

   No inventory of available transportation modes was presented as part of the transportation element.

4. The area is provided rail service by the Oregon and Northwestern Railroad to the City of Burns. The City's rail transportation is, however, somewhat limited because it is the dead-end of the rail line connecting to the south.

   This rail line is no longer active. In fact in the late 1980s the Oregon and Northwestern rail line was removed as was the Hines Lumber Co. Railroad. In one location the right-of-way from the Oregon and Northwestern rail line was made into a private emergency airstrip and other sections were converted to local gravel roads.

5. The City's street system provides relatively good access to all areas of town.

   This statement is true although no accompanying map is presented in this section of the Plan.

6. Passenger bus service is provided daily to John Day and Burns.

   No bus service is currently available.

Policies

1. It shall be the policy of the City to provide and encourage a safe, convenient and economic transportation system. All transportation plans shall: A) consider all appropriate modes of transportation, B) be based upon an inventory of needs and identified problems, C) consider the differences in social consequences resulting from differing combinations of transportation modes, D) avoid principal reliance upon any one mode of transportation, E) minimize adverse social, economic and environmental impacts and costs, F) conserve energy, G) meet the needs of the transportation disadvantaged, H) facilitate the flow of goods and services relative to the local economy, and I) conform to the applicable policies of the Plan.

2. That a street plan be developed as part of a Capital Improvement Program to show needed street and road projections and connections.

3. Transportation systems within the City and County, to the fullest extent possible, shall be planned to utilize existing facilities and rights-of-way, and shall avoid dividing existing economic and social urban units unless no feasible alternative exists.

4. That roads and utilities in undeveloped areas within the Urban Growth Boundary be planned in order to encourage development in those areas.

5. That the City continue to work with the railroad on decisions regarding railroad improvements.

6. The City shall require that road improvements necessitated by development shall be constructed in accord with City specifications, and financed by the developer. (Such road improvements include roads affected by the impact of the development.)

7. Wherever possible, rights-of-way for major streets and highways should be obtained as part of the development process.

8. Prior to any development being initiated in undeveloped or adjacent areas within the Urban Growth Boundary, the City shall require that major road connections and/or locations that will likely be needed to develop the entire area be planned for.

9. New roads created for the purpose of partitioning or subdividing shall be designed to meet City standards.

This first policy is almost a direct quote from statewide planning goal 12. The policies are generally consistent with the TPR. However, no recommended improvements are included in the transportation plan. The policies do not deal with alternative modes of travel which need to be addressed as part of the TPR.

APPENDIX B:

Table B-1

1996 Major Streets Inventory

Seneca Transportation System Plan

TABLE B-1
1996 MAJOR STREETS INVENTORY
Seneca Transportation System Plan

Street Segment	Jurisdiction	Classification	Speed Limit (mph)	ROW Width (feet)	Street Width (feet)	# of Travel Lanes	Curbs	On-Street Parking	Sidewalks	Bikeway	Pavement Condition
Avenue A											
4th Street to 3rd Street	City	Local	25	40	23	2	No	Shoulder	No	Shared	Good
3rd Street to 2nd Street	City	Local	25	40	23	2	No	Shoulder	No	Shared	Good
2nd Street to 1st Street	City	Local	25	40	23	2	No	Shoulder	No	Shared	Good
Avenue B											
4th Street to 3rd Street	City	Local	25	40	23	2	No	Shoulder	No	Shared	Good
3rd Street to 2nd Street	City	Local	25	40	23	2	No	Shoulder	No	Shared	Good
2nd Street to 1st Street	City	Local	25	40	23	2	No	Shoulder	No	Shared	Good
Avenue C											
4th Street to 3rd Street	City	Local	25	40	23	2	No	Shoulder	No	Shared	Good
3rd Street to 2nd Street	City	Local	25	40	23	2	No	Shoulder	No	Shared	Good
2nd Street to 1st Street	City	Local	25	40	23	2	No	Shoulder	No	Shared	Good
Avenue D											
Landing Road to 4th Street	City	Local	25	40	23	2	No	Shoulder	No	Shared	Good
4th Street to 3rd Street	City	Local	25	40	23	2	No	Shoulder	No	Shared	Good
3rd Street to 2nd Street	City	Local	25	40	23	2	No	Shoulder	No	Shared	Good
2nd Street to 1st Street	City	Local	25	40	23	2	No	Shoulder	No	Shared	Good
Avenue E											
4th Street to 3rd Street	City	Local	25	45	22	2	No	Shoulder	No	Shared	Good
3rd Street to 2nd Street	City	Local	25	45	22	2	No	Shoulder	No	Shared	Good
Barnes Avenue (Highway 395)											
North of Seneca City Limits	State	Arterial	55	80	26	2	No	No	No	Shared	Good
NCL to Landing Road	State	Arterial	55	80	26	2	No	No	No	Shared	Good
Landing Road to 4th Street	State	Arterial	55-30	80	26	2	No	No	No	Shared	Good
4th Street to 2nd Street	State	Arterial	30	80	26	2	No	No	No	Shared	Good
2nd Street to 1st Street	State	Arterial	30	80	26	2	No	No	No	Shared	Good

TABLE B-1
1996 MAJOR STREETS INVENTORY
Seneca Transportation System Plan

Street Segment	Jurisdiction	Classification	Speed Limit (mph)	ROW Width (feet)	Street Width (feet)	# of Travel Lanes	Curbs	On-Street Parking	Sidewalks	Bikeway	Pavement Condition
Barnes Avenue (Highway 395) - continued											
1st Street to Camp Creek Road	State	Arterial	30	80	26	2	No	No	No	Shared	Good
Camp Creek Road to SCL	State	Arterial	30-55	80	26	2	No	No	No	Shared	Good
South of Seneca City Limits	State	Arterial	55	80	26	2	No	No	No	Shared	Good
Landing Road											
Barnes Avenue (Highway 395) to Avenue B	City	Local	25	45	22	2	No	No	No	Shared	Good
Avenue B to Avenue D	City	Local	25	45	22	2	No	No	No	Shared	Good
Avenue D to ECL	City	Local	25	45	22	2	No	No	No	Shared	Good
East of Seneca City Limits	City	Local	25	45	22	2	No	No	No	Shared	Good
Park Avenue											
4th Street to 3rd Street	City	Local	25	45	23	2	No	Shoulder	No	Shared	Fair
3rd Street to 2nd Street	City	Local	25	45	23	2	No	Shoulder	No	Shared	Fair
2nd Street to 1st Street	City	Local	25	45	23	2	No	Shoulder	No	Shared	Fair
1st Street to Dead End	City	Local	25	45	23	2	No	Shoulder	No	Shared	Good

APPENDIX C:

Technical Memorandum

Grant County Population and Employment Analysis

TECHNICAL MEMORANDUM

GRANT COUNTY POPULATION AND EMPLOYMENT ANALYSIS

METHODOLOGY AND DATA SOURCES

Population estimates and projections were developed from historical data as reported by the Census Bureau. Portland State University's Center for Population Research and Census (PSU CPRC) developed annual population estimates for cities and counties for the purpose of allocating certain state tax revenues to cities and counties. The State of Oregon Office of Economic Analysis (OEA) provided long-term (through year 2040) state population forecasts, disaggregated by county, for state planning purposes. OEA also developed county-level employment forecasts based on covered employment payrolls as reported by the Oregon Employment Department.

The Office of Economic Analysis used business-cycle trends (as reflected by the Employment Department's employment forecasts) as the primary driver of population and employment for the short term. For the long term, the forecasts shift to a population-driven model, which emphasizes demographics of the resident population, including age and gender of the population, with assumptions regarding life expectancy, fertility rate, and immigration. DEA used a methodology based on OEA's county-distribution methodology in developing population and employment forecasts for each of the cities in Grant County.[1] DEA calculated a weighted average growth rate for each jurisdiction (weighting recent growth more heavily than past growth) and combined this average growth rate with the projected county-wide growth rate. This methodology assumes convergence of growth rates because of the physical constraints of any area to sustain growth rates beyond the state or county average for long periods of time. These constraints include availability of land and housing, congestion, and other infrastructure limitations. The forecasts were then modified to reflect more recent official estimates and local knowledge.

These population and employment forecasts were developed to determine future transportation needs. The amount of growth, and where it occurs, will affect traffic and transportation facilities in the study area. This report is not intended to provide a complete economic forecast or housing analysis, and it should not be used for any purpose other than that for which it is designed.

HISTORICAL GROWTH

Interestingly, population levels in most of Eastern Oregon are close to, or actually lower than, those experienced earlier in the century. Counties included in this phenomenon include Baker, Harney, Union, Wallowa, and Grant Counties. The population of Grant County actually declined in the 1960s and 1980s, reflecting the general slowdown in the state's economy during these time periods. As a result of this population activity, the population of Grant County increased by less than two percent between the 1960

[1] Seneca was not an incorporated city until after the 1970 census. Since its incorporation, its population has declined from an estimated 405 in 1971 to a count of 191 in the 1990 census, increasing again to 230, the official 1996 estimate. Because of the short and varied history of population growth, DEA applied an average annual growth rate of 0.5 percent to Seneca.

and 1990 Censuses (from 7,726 in 1960 to 7,853 in 1990). The following table shows the population trend for selected communities in Grant County.

GRANT COUNTY HISTORICAL POPULATION TREND

	1960	1970	1980	1990	1960-1990 Change Number	CAARG*
Grant County	7,726	6,996	8,210	7,853	127	0.05%
Dayville	234	197	199	144	(90)	-1.61%
Long Creek	295	196	252	249	(46)	-0.56%
Monument	214	161	192	162	(52)	-0.92%
Mount Vernon	502	423	569	549	47	0.30%
Prairie City	801	867	1,106	1,117	316	1.11%
Seneca**	n.a.	n.a.	285	191	n.a.	n.a.

* Compound Average Annual Rate of Growth

** Seneca was not an incorporated city until after the 1970 Census.

Source: U.S. Bureau of the Census.

Despite this minimal growth in population since 1970, other demographic changes have occurred that may impact the community's employment and travel patterns. For example, there have been national trends of both decreasing household size and increasing numbers of workers per household.

Household size in Grant County has gone from an average of 2.98 persons per household in 1970 to an average of 2.51 persons in 1990. Changes in life expectancy and lifestyle choices (i.e. electing to delay marriage and childbearing) have resulted in relatively high proportions of "empty-nester," "singles," and "couples-without-children" households.

The number of jobs per household has also been increasing. With 6,996 reported persons in 1970 and total employment estimated at 2,750, the population/employment ratio in 1970 was 2.54 persons per job. In 1995, there were 3,760 jobs for the estimated population of 7,950, for a population/employment ratio of 2.11 persons per job. The increasing numbers of jobs in relation to population is due to a number of factors including a low savings rate, increased life expectancy, and higher education levels. These factors have combined to increase the labor participation rate, particularly by women and older adults.

CURRENT POPULATION AND EMPLOYMENT LEVEL

Estimated at 7,950 in 1995, the population of Grant County has remained relatively stable since the 1990 Census, with an average annual growth rate of 0.25 percent. The following table shows the estimated change in population for Grant County and the various jurisdictions from 1990 to 1995. Although Dayville, Mount Vernon, and Seneca have managed to grow at annual rates of over three percent since 1990, these rates are calculated on relatively small population bases, reflecting the population increases of 41 people (in Dayville), 96 (Mount Vernon), and 39 (Seneca).

GRANT COUNTY POPULATION LEVEL

	1990	1995	1990-1995Change Number	CAARG*
Grant County	7,853	7,950	97	0.25%
Dayville	144	185	41	5.14%
Long Creek	249	235	(14)	-1.15%
Monument	162	170	8	0.97%
Mount Vernon	549	645	96	3.28%
Prairie City	1,117	1,170	53	0.93%
Seneca	191	230	39	3.79%

* Compound Average Annual Rate of Growth

Source: Portland State University Center for Population Research and Census.

Employment levels have declined slightly since 1990. This decline is, in part, attributable to an increase in the unemployment rate throughout Oregon. Average unemployment rates for Grant County hit a low for the decade at 8.8 percent in 1989 and 1990. Since then, unemployment has climbed, reaching an average 12.2 percent in 1993 and 10.3 percent for 1995.

GRANT COUNTY EMPLOYMENT

	1990	1995	1990-1995 Change Number	CAARG*
Grant County Employment	3,850	3,760	(90)	-0.47%
Unemployment Rate	8.8%	10.3%	n.a.	n.a.

* Compound Average Annual Rate of Growth

Note: These figures are reported as place-of-work series, rather than place-of-residence. In other words, these estimated total jobs in Grant County may be held by residents of other counties. The impact of this difference is considered minimal for Grant County as the 1990 Census reports that over 95 percent of workers who live in Grant County also work in the County.

Source: Oregon Employment Department.

The county unemployment rates contrast with the economic performance of the state as a whole. The state's unemployment rate has been at approximately 5 percent for several years, and has just begun creeping upward. As of November 1996, the statewide unemployment rate was 5.5 percent--still a historically low rate, but the state's highest level in over two years.

POPULATION AND EMPLOYMENT FORECASTS

Grant County is expected to experience small population gains for the next 20 years. Like much of Eastern Oregon, the economy of Grant County remains largely seasonal, with nearly one-quarter of all employment agriculture-based. Therefore, the population increases are difficult to predict, and are not likely to be as

stable as the forecasts appear to imply. The population forecast for Grant County and the jurisdictions of Dayville, Long Creek, Monument, Mount Vernon, and Seneca are shown in five-year increments in the following table. Population forecasts for Prairie City were drawn from Prairie City's Comprehensive Plan.

GRANT COUNTY POPULATION FORECAST

	1995	2000	2005	2010	2015	2017
Grant County	7,950	8,292	8,517	8,742	8,989	9,088
Dayville	185	187	188	190	193	194
Long Creek	235	240	244	248	253	255
Monument	180	185	186	190	193	195
Mount Vernon	645	688	729	771	809	825
Seneca	230	236	242	248	254	257

Source: 1995 estimates developed by Portland State University Center for Population Research and Census; County forecasts developed by State of Oregon Office of Economic Analysis; and Jurisdiction forecasts developed by David Evans and Associates, Inc.

The population of Grant County is expected to increase by over 14 percent between 1995 and year 2017, from the 1995 estimate of 7,950 to an estimated 9,088 in year 2017. The only jurisdictions expected to grow faster are Mount Vernon (with a forecast increase of nearly 28 percent between 1995 and year 2017, from 645 in 1995 to an estimated 825 in year 2017), and Prairie City.

The Office of Economic Analysis also developed forecasts of Non-Agricultural Employment by county. Oregon Employment data suggests that nearly one-quarter (an estimated 25 percent in 1995) of all employment in Grant County is agriculture-based. This agriculture-based proportion, although higher than the state average, is typical for counties in Eastern Oregon. Although the economy has been moving toward a greater degree of diversification, this proportion has remained relatively stable over the last 25 years: Agricultural employment accounted for 26 percent of total estimated employment in 1970, only one percent greater than the 1995 estimate of 25 percent. Based on the 1995 proportion, the following table shows non-agricultural and estimated total employment for Grant County.

GRANT COUNTY EMPLOYMENT FORECAST

	1995	2000	2005	2010	2015	2017
Non-Agricultural Employment	2,830	3,051	3,161	3,231	3,255	3,265
Estimated Total Employment	3,760	4,016	4,161	4,253	4,284	4,297

Source: Non-Agricultural employment forecasts developed by the State of Oregon Office of Economic Analysis; 1995 estimates developed by the Oregon Employment Department; and Estimated total employment forecasts developed by David Evans and Associates, Inc.

Employment is expected to grow by over 14 percent from 1995 to year 2017, keeping the population/employment ratio relatively stable (increasing slightly from 2.11 persons per job to 2.12 persons per job).

APPENDIX D:

Technical Memorandum

Speed Control Measures

TECHNICAL MEMORANDUM

SPEED CONTROL MEASURES

Numerous studies have been carried out to determine the influence of particular roadway features on traffic speed. Some of the most significant characteristics of roadway features are curvature, grades, length of grade, number of lanes, surface condition, sight distance, lateral clearance, number of intersections, and built-up areas near the roadways. Some of the main reasons drivers give for speeding include being in a hurry, to avoid a potential danger, to keep up with other traffic, and to maintain a speed with which the driver feels comfortable.

This technical memorandum describes a variety of speed control measures to address public concern over high-speed traffic through the downtown areas of many of the cities in Grant County. Speed control measures consist of physical controls, passive controls, and psycho-perception controls. Specific speed control techniques for each of these three categories are summarized in the following pages and listed in Table 1 located at the end of this memorandum.

Physical Controls

Physical speed controls are those measures which are physically constructed to restrict or affect vehicle operation or performance. Speed control techniques that can be designed or built into transportation systems include the use of road markings, texturing, medians, street narrowing, and other physical features. They often result in other "traffic calming" benefits such as reduced traffic volumes and noise levels in congested areas. High construction costs somewhat limit extensive use of these types of speed control measures.

Speed Bumps

Speed bumps are short bumps in a roadway used in parking lots, on private roads, and around universities. Their effectiveness at reducing speed is somewhat inconsistent, as drivers tend to slow down to reduce vehicle rocking while traveling over the bumps but will then increase their speeds between the bumps to make up for lost time. They increase the likelihood of vehicle damage and loss of control even when driving over them at low speeds. Speed bumps can be effective in lowering traffic volumes; however, they cause an increase in noise. They also cause problems for snowplows. Speed bumps have moderately high construction costs and little to no maintenance costs once constructed.

Road Humps

Road humps are typically 12 feet long and three to four inches high and can be safely crossed at speeds of 30 mph. Extensive testing has indicated that road humps are effective in reducing speeds on residential streets; that in the 85th percentile, speeds closely match the 25 mph speed limit used on most residential streets. Road humps are less likely than speed bumps to cause loss of control or vehicle damage caused by vehicles bottoming-out. Tests also showed a reduction in injury accidents and no statistically significant change in accidents on surrounding streets that could have been used as alternate routes. Speed bumps tend to reduce traffic volumes by discouraging through traffic on local neighborhood streets. Noise levels go down by slowing down traffic. Speed humps have moderately high construction costs and little to no maintenance costs once constructed.

Rumble Strips

Like road humps, rumble strips have been found to be effective in reducing average travel speeds and are less likely than speed bumps to cause loss of control or vehicle damage. Rumble strips typically consist of rows of raised metallic saucer-like elements affixed to the roadway which cause a mild rumbling under the vehicle and a significant amount of noise when driven over. The effect is to make motorists more aware of their speed and their surroundings with the intent of causing drivers to slow down. This in turn improves safety. Rumble strips have moderate construction costs and low maintenance costs once installed.

A significant disadvantage to this control measure is that it is difficult to construct a rumble surface that would not generate too much noise for adjacent residents. Raised metallic rumble strips also cause maintenance problems for snowplows and can be a hazard if dislodged.

Rumble strips can also be constructed by scoring the roadway pavement, which may be more desirable as they would create less noise. They would not result in a raised profile which would interfere with snowplows and there would be nothing that could become dislodged.

Median Barrier

The primary function of medians is to restrict conflicting turning movements by not allowing left turns from a travel lane into a driveway. Wide medians can also allow for turning pockets at intersections, provide pedestrian refuge, and reduce pavement width. Medians can be as narrow as two to four feet wide within a limited right-of-way.

Medians often slow traffic by giving the appearance of a parkway setting and narrow lanes. They improve safety and may increase the capacity of high-volume streets by limiting conflicting mid-block movements and channelizing traffic at complex intersections. They may improve safety at certain locations by making side street driveways right turn in and out only. Medians also increase pedestrian safety and ability to cross wider streets by providing mid-street pedestrian refuge. Construction costs for medians are high; however, they have low maintenance costs once constructed.

Traffic Circle

Traffic circles are primarily used to reduce delay at intersections and improve safety. Traffic circles have advantages over traffic signals because they improve intersection operations, tend to have lower accident rates, less severe accidents, and cost less. Entry into traffic circles is continuous and controlled by yield signs. In many situations the capacity is similar to other intersection traffic control.

Traffic circles may reduce delays at intersections and can improve local street access as well as decrease speed depending on design. Traffic circles reduce the number of conflict points and the number and severity of crashes at some locations. Safety may be an issue in areas where drivers are not used to and are unclear about how to use them. Other disadvantages are that they may reduce the opportunity for pedestrians to cross roads and they can be intimidating to bicyclists. Traffic circles also have high construction costs.

Chokers and Road Narrowing

Lateral clearance on a roadway has been proven to have an effect on travel speeds, albeit a minor effect. The narrower a road is, the more slowly drivers tend to travel.

Where on-street parking exists, constructing sidewalks with curb extensions, or bulbs at intersections such that the sidewalk is extended to the end of the parking lane is an effective way to narrow a road. Narrower streets mean shorter crosswalk lengths, thus improving pedestrian safety by reducing the amount of time pedestrians are in the street. Narrow streets also shorten the pedestrian phase at signalized intersections, thus allowing a redistribution of green time to the traffic movements which need it most. They can also slow traffic in these areas.

Road narrowing usually does not result in reduced traffic volumes nor in reduced noise. This measure may cause problems for cyclists if the curb extension conflicts with a bike lane.

This improvement option can be made at a moderate to high construction cost. The cost of a single curb extension is about $2,000. For all four corners of an intersection, the total cost would be about $8,000. Once constructed, there is little to no maintenance required for this option.

Passive Controls

Passive speed control measures do not physically alter vehicle operation or speed. They typically consist of regulatory signs or signals and rely on driver compliance to be effective. This inherently makes them less effective at controlling speeds than physical controls. Their relatively low construction costs, however, may make them more practical to implement on a large-scale basis.

Stop Signs

Experience in the United States over the years indicates that stop signs installed on local streets have little effect on speed except in the immediate vicinity of the signs. Tests found that motorists start to slow down 200 feet before the intersection and return to near normal speed about 100 feet past the stop point. Studies also showed that speeds between intersections are not significantly changed but tend to increase slightly after the installation of stop signs. In addition, some tests found that stop signs installed to control speed were disobeyed on a wide scale. When not forced to stop by a priority vehicle, few drivers came to a complete stop and many did not stop at all. The Manual on Uniform Traffic Control Devices requires that stop signs not be used for speed control.

Speed Limit Signs

Speed limit laws often specify general limits for residential streets, business districts, school zones, or rural areas. The laws usually recognize that safe speed varies from road to road and permit highway agencies to raise or lower speed limits on the basis of an engineering or traffic survey. The basic intent of speed zoning is to identify a safe and reasonable limit for a given road section or zone. The most widely accepted method of setting speed limits is the 85th percentile speed. This is the speed that 85 percent of traffic is moving at or below and reflects the safe speed for the given roadway conditions as determined by a large majority of drivers. The 85th percentile speed is in the speed range where the accident involvement rate is lowest.

Numerous studies have been carried out on the effects of speed limits. Studies on urban and rural roads indicate that speed limits have little or no effect on traffic speed and that drivers respond to changing roadway conditions more so than posted speed limits. A survey of drivers indicated that over three-fourths of the motorists indicated they drive at a speed that traffic and road condition will permit regardless of the posted speed limit. Although the motorists tended to think of speeding as one of the primary causes of accidents, they did not feel that going ten mph over the legal limit was very wrong. One speed study indicated that when the speed limit was raised to match the 85th percentile speed, there was essentially no change in speed. Where the speed limit was lowered, the spread in speeds increased and compliance dropped from 89 percent to 24 percent.

In summary, changing the posted speed limit can be done at a low construction cost with little to no maintenance problems or cost; however, lowering posted speed limits rarely results in actual reductions in speed. Speed zones need to be constantly enforced to be effective. Lowering the posted speed limit rarely results in improved safety because any safety benefits realized by slower speeds is negated by an increase in speed variance. Speed limits can also give pedestrians a false sense of security by expecting drivers to obey signs. Changes to the posted speed limit are not likely to result in any changes in traffic volumes or noise either.

Traffic Activated Signs

Radar can be used to activate variable message signs when vehicles are traveling faster than the speed limit. These signs display the speed indication and the message SLOW DOWN or TOO FAST with flashing beacons to drivers exceeding the posted speed limit. Speed limit signs without beacons produced no significant reductions in speed. Some tests indicated that there was an increase in the speed variance with the speed violation sign. This is an unfavorable effect since it has been shown to increase the likelihood of accidents. Other tests indicated that speeds became more uniform. It is unlikely that a traffic activated sign would have any effect on traffic volumes or noise. These signs have moderately high construction costs and low maintenance costs.

Psycho-Perception Controls

Psycho-perception controls are those speed control measures that rely on drivers' attitudes, perceptions, and reactions to their surroundings. These include knowledge about speed enforcement, perceived safe traveling speed, and reaction to changes in the surrounding environment. They rely less on physically slowing vehicles or driver compliance with the law and more on the human psyche. Nonetheless, their benefits can be quantified and they make an important contribution to speed control.

Enforcement

In the presence of police enforcement, motorists tend to slow down. The magnitude of the speed decrease depends on the relative level of the speed limit and the perceived severity of the threat and enforcement. A marked police vehicle parked with lights flashing and simulating an arrest produces the largest reduction in speed. Stationary enforcement is more effective than moving enforcement in controlling speed. In most cases, the decrease in speed is less than three mph but reductions up to ten mph have been observed. As would be expected, the greater the number of enforcement measures present in a given area or the greater the frequency of presence, the greater the impact on the speed of traffic in that area.

The distance that the speed suppression effect extends from the enforcement measure depends on the frequency or strategy of patrol, the patrol method, the traffic situation, and other factors. In most cases, this distance is less than three miles either side of the measure, but there have been reports of an effect up to four miles upstream and ten miles downstream of the enforcement.

Enforcement also appears to have a carryover effect. That is, the speed suppression effect remains for some period of time after the enforcement unit is removed. The duration of this effect and the factors which can alter it are not well defined, but are associated with driver communication and frequency of exposure.

Speed enforcement not only reduces speed but also has the tendency to reduce accident severity as well. Studies have shown that the variance of speed distribution is reduced by enforcement. The effect of enforcement on speed variance is of interest since it is related to accident involvement. Other studies have shown that the effect of enforcement is to shift the entire speed distribution in the direction of lower speeds without actually altering speed distribution.

Economic and manpower constraints usually prohibit widespread or long-term employment of speed enforcement measures.

Transverse Markings

Transverse markings consist of a series of pavement markings placed across the road. Pavement marking materials consist of paint, thermoplastic, or pre-cut adhesive backed lines. The spacing between the markings gradually decreases as the area of speed control is approached. The marking pattern is intended to give the illusion of high speed and cause drivers to slow down. Tests have shown transverse markings to be successful in producing speed reductions, especially for speeders, and to reduce speed-related accidents, as well as all accidents. The technique may not affect those who are familiar with the area.

Transverse markings do not result in a decrease in traffic volumes nor a decrease in noise. They can create a hazard to pedestrians and bicyclists because some markings are slicker than the normal pavement when wet. Providing painted markings can be accomplished at a low construction cost and do not require much maintenance beyond routine painting.

Crosswalks

Providing marked crosswalks is primarily to improve pedestrian safety. Sometimes crosswalks are effective in causing drivers to slow down when approaching intersections with marked crosswalks. Raised or textured crosswalks are more effective than painted crosswalks at producing this effect, as they act as speed humps; however, they could result in an increase in noise and are not recommended for streets with high traffic volumes. They could also create a safety hazard for bicyclists.

Marked crosswalks indicate to drivers that they are approaching an area of high pedestrian volumes and that they are expected to yield the right-of-way to pedestrians. Crosswalks make crossing streets more pleasant because they delineate and reinforce pedestrian crossing. Area businesses may consider this option a plus.

A danger associated with this improvement option is that marked crosswalks could give pedestrians a false sense of security, especially at unsignalized intersections.

Providing painted crosswalks can be accomplished at a low construction cost (approximately $3 per linear foot) and do not require much maintenance beyond routine painting. Raised or textured crosswalks have higher construction costs and little to no maintenance costs.

Odd Speed Limit Signs

Differentiated speed limits and advisory speed limits can be considered "odd" speed limits. Differentiated speed limits can consist of different speed limits for day and night or different speed limits for cars and trucks. Advisory speed limits are often used to aid drivers in selecting safe speeds for hazardous locations such as curves, roadwork sites, intersections, and road sections with lower design speeds.

When different speed limits are used for day and night, the night speed limits are generally set at five to ten mph lower than day speed limits. There are no reports available on the effectiveness of these limits, although speeds are generally lower and accident risk has been found to be greater at night.

Different speed limits for cars and trucks have also been used. One study of differentiated speed limits indicated that the actual difference in car and truck speeds was less than the posted ten mph differential except on steep upgrades where trucks could not maintain speed. At most sites studied the actual difference between car and truck speeds was less than six mph.

Studies have indicated that drivers exceeded advisory speeds of 15 to 35 miles per hour but did not exceed 45 and 50 mph speed advisories. Advisory and regulatory 35 mph speed limit signs were shown to have little if any effect on speed compared to the standard curve sign. In general, drivers were not influenced by raising or lowering advisory speeds, but they were influenced by the sharpness of the curve. Additionally, drivers using a highway repeatedly, quickly learn the speed that curvature and road conditions will allow and advisory speeds can be expected to have little effect on them.

As with typical speed limit signs, odd speed limit signs can be installed at a low construction cost with little to no maintenance problems or cost; however, they rarely result in actual reductions in speed. These signs also have a tendency to be ignored, and are more subject to vandalism.

Vertical Elements Along Roadway

This option consists of adding a vertical architectural element to the sides of a two-lane highway within an urban area to give the appearance of narrowness. This technique, sometimes called "Gateway Treatment," also gives drivers a sense of "place," i.e., the feeling that they have entered an urban area with lower speed limits, on-street parking, conflicting pedestrian and bicycle movements, and increased highway access.

This treatment may improve pedestrian safety because it causes drivers to be more alert; however, it could also distract motorists' attention.

The most common and most aesthetically pleasing way of accomplishing this is with the use of trees in a landscaped strip along the highway's edge. Trees provide shade and improve the landscape. The subliminal effect of getting drivers to slow down when driving a stretch of highway treated in this way is best achieved when the trees consist of mature shade trees which provide a canopy over the road somewhat limiting peripheral vision; however, it takes many years for newly-planted trees to reach the maturity level needed to provide the desired effect. The disadvantages of using trees are that trees may conflict with utility lines and outdoor advertising, they may obscure traffic signs and limit sight distance, and trees with heavy leaves or

fruit can create slippery conditions. Issues of maintenance including irrigation and drainage must be determined. Appropriate species must be selected so that roots do not disturb sidewalks.

Other vertical elements which could be used in place of trees are period street lamps, signs or even moving building lines closer to the highway edge to provide the illusion of a more narrow right-of-way. Care should be taken so as not to block drivers' sight distance.

This option is a popular improvement because of its aesthetic value, and because it does not compromise safety nor create negative noise impacts. This improvement option is estimated to have moderate to high construction costs; however, there is little to no maintenance required after construction.

Narrowing Lane Widths

Narrowing lane widths may slow traffic through the perceived higher risk of collision in narrower lanes. One study indicated no reduction in roadway capacity when changed from 12-foot-wide to 11-foot-wide lanes. This study noted a decrease in accidents; however, the reduction could not clearly be attributed to the lane modification. Another study of arterials and collectors suggests that for speeds of 30 mph, a 20-foot width is sufficient for a two-lane, two-way road.

Narrowing lane widths marginally shortens crossing distance and may increase pedestrian safety. This technique also has the effect of widening pedestrian space.

Significant narrowing is not feasible where through traffic volumes are close to road capacity. Lanes narrower than 11 feet on through, high volume streets may have higher accident rates. In addition, this technique may limit some truck movements depending on how narrow the streets are. There may also be a decrease in bicycle safety depending on how narrow the lanes are. Motorists may not wait, but attempt to move around a bicyclist even in narrow lanes. The presence of bike lanes might help although motorists might drive in bike lanes.

Narrowing lanes with the use of pavement markings can be accomplished at a low construction cost and little to no maintenance cost.

Bicycle Lanes

Bicycles should be accommodated on virtually all roadways. For most local streets, the traffic volume and speeds are low enough that bicycles and autos can safely share the same roadway. On collector streets and arterials, both the volume and speed of the automobile traffic is high enough that a designated space is needed for bicyclists. In urban areas where there are curbs, a six-foot bike lane is recommended for bicycles, and special care taken to secure safe bicycle passage through intersections. In rural areas without curbs and sidewalks, the typical recommended facility is a shoulder bikeway, where a six-foot standard paved shoulder is provided for bicycles. According to the Oregon Bicycle and Pedestrian Plan, the guideline for rural arterials with a design hour volume of less than 200 vpd is for a paved shoulder which is four feet wide.

Bicycle lanes also improve bicyclist safety and encourage more bicycle trips by improving the cycling experience by taking bike trips out of the general flow traffic lanes. Depending on the existing pavement width, bike lanes can be provided at a low construction cost simply by restriping an existing road (approximately $0.40 per linear foot). If a roadway has to be widened to provide a bike lane or a paved shoulder, it can be done at a relatively high construction cost (approximately $45 per linear foot for a facility

five feet wide on both sides of the road, built to highway standards, with curbs and striping). After construction, little to no maintenance is required except for routine painting of pavement markings.

References

DeLuca, Frank, "Effects of Lane Width Reduction on Safety and Flow." Effectiveness of Highway Safety Improvements, 1985.

Manual on Uniform Traffic Control Devices. US Department of Transportation Federal Highway Administration, Washington, DC, 1988.

Oregon Bicycle and Pedestrian Plan. Oregon Department of Transportation, Salem, OR, June 1995.

Pharaoh, Tim and Russell, John, Traffic Calming: Policy and Evaluations in Three European Countries. London South Bank Polytechnic, 1989.

Sharing the Main Street: A Practitioners' Guide to Managing the Road Environment of Traffic Routes Through Commercial Centers. Roads and Traffic Authority of New South Wales and Federal Office of Road Safety, November, 1993.

Smith, Eugene A. and Barnes, John W., "A Trial of Traffic Calming on a Sub-arterial Road in Sydney." Institution of Professional Engineers New Zealand, Conference Proceedings IPENZ Annual Conference, 1992.

Synthesis of Safety Research Related to Traffic Control and Roadway Elements. US Department of Transportation Federal Highway Administration, Washington, DC, December 1982.

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