



REPORT
TRANSPORTATION SYSTEM PLAN
CITY OF MONUMENT

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The contents of this document do not necessarily reflect the views or policies of the State of Oregon.

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CHAPTER 1: INTRODUCTION

The Monument 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 Monument TSP planning area includes the City of Monument 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: Monument, Grant County, and the State of Oregon.

Monument is located in the northeast portion of Grant County. The Kimberly-Long Creek Highway links Monument to the City of Long Creek, about 18 miles southeast, and the town of Kimberly, about 13 miles to the southwest. Monument is a self-contained community with a population of 185 in the year 1996, which is about 2 percent of Grant County's population.

The Kimberly-Long Creek Highway, classified as a district highway, passes through the heart of the city, and is a two-lane facility. Four county roads are located outside and/or cross over inside the urban growth boundary of the city. The Heppner-Monument Road intersects the highway outside and west of the urban growth boundary and leads to Highway 207 and the City of Heppner to the northwest. Elzey Emry Road and Deer Creek Road also intersect the highway outside the UGB southeast of the city. Wall Creek Road extends north from the city and eventually connects with the Heppner-Monument Road via the Fern Creek Road. Airport Road, is a local road connecting the city to the Monument State Airport to the north. This road proceeds north and eventually connects with the Heppner-Monument Road.

A grid pattern of local streets has been maintained in Long Creek as it has developed over the years. The grid pattern is laid out in a typical north-south and east-west orientation. However, the Kimberly-Long Creek Highway crosses through town in a north-west direction creating several uniquely shaped intersections with three, four, or even five approaches.

A land use zoning map of the Monument TSP planning area is shown on Figure 1-2. This map was taken from the City of Monument Comprehensive Plan, April 1981.

As shown in the figure, land is zoned for commercial use along both sides of the highway north of North Street to the eastern UGB line.

One area is zoned for public use. This area contains the city's elementary and high schools, recreational grounds, and a city park.

Surrounding the public land use is land zoned for residential use. This area extends north and west to the UGB line and west to the Kimberly-Long Creek Highway. A second residential area surrounds the commercial zone southwest of the highway.

All other land within the UGB is zoned for farming. These rural areas are located in the northeast and southwest sectors of the UGB, outside the more urban core.

PLANNING PROCESS

The Monument 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 Monument 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 Monument 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 Monument 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 Monument 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 Monument area, including the street system

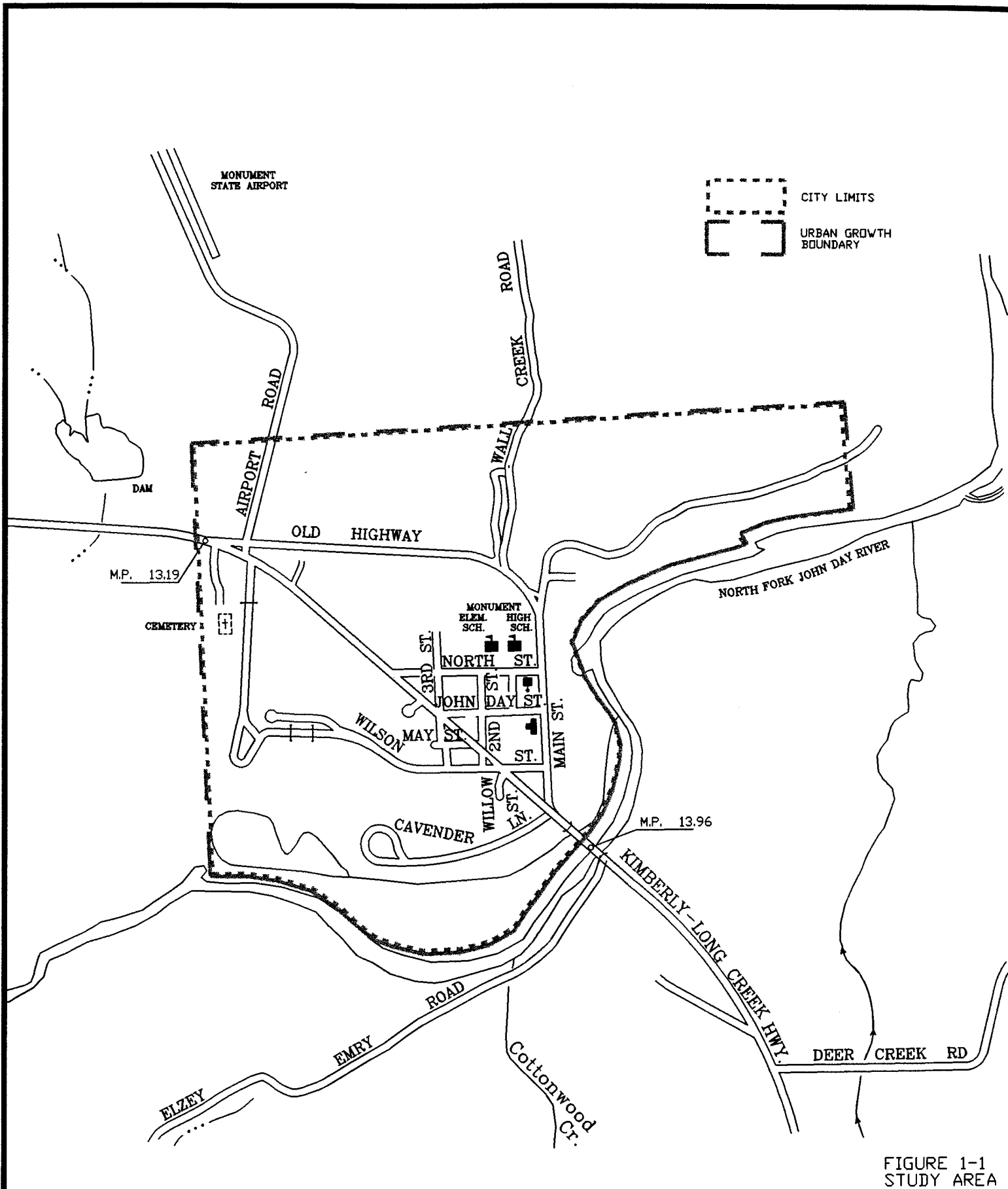


FIGURE 1-1
STUDY AREA

- | | | | |
|---|--------------------------|---|-----------------|
| ≡ | MAINLINE STATE HIGHWAY | ⬛ | PUBLIC BUILDING |
| ≡ | STREET OPEN FOR TRAVEL | ⬛ | COURT HOUSE |
| ≡ | PRIVATE GATE | ⬛ | CITY HALL |
| ≡ | INTERSTATE ROUTE | ⬛ | ARMORY |
| ≡ | U.S. ROUTE | ⬛ | POST OFFICE |
| ≡ | STATE ROUTE | ⬛ | SCHOOL |
| ≡ | TERMINATION OF PA SYSTEM | ⬛ | LIBRARY |
| ALL STATE HIGHWAYS AND FEDERAL AID ROADS SHOWN IN RED | | | |

0 500 1000 FEET

CITY OF MONUMENT



LEGEND

R-1=GENERAL RESIDENTIAL
C-1=GENERAL COMMERCIAL
RF=FARM
(FP)=FLOOD PLAIN

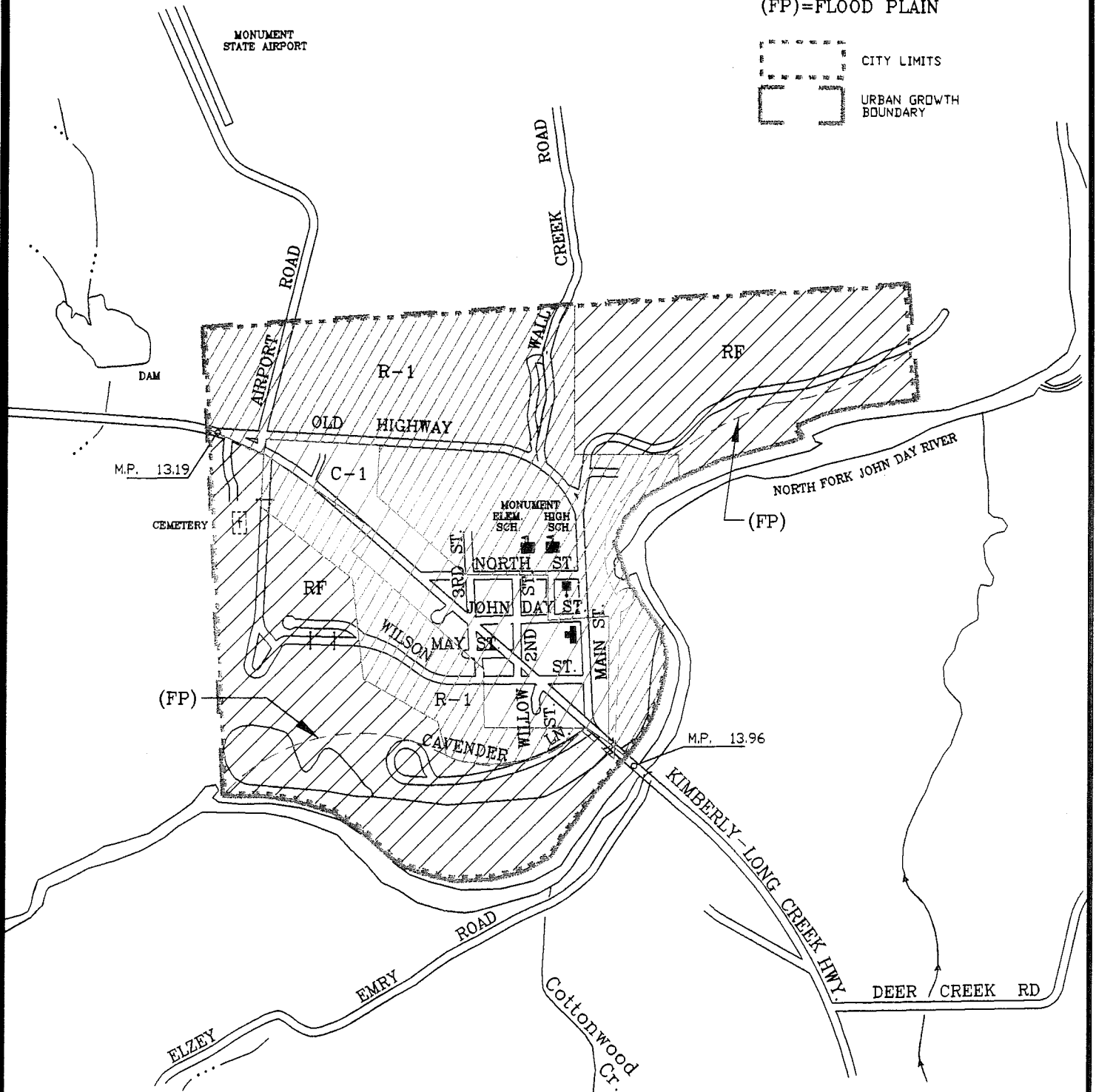
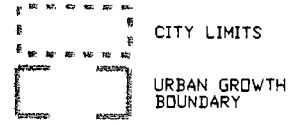


FIGURE 1-2
LAND USE/ZONING MAP

- | | |
|--------------------------|-----------------|
| MAINLINE STATE HIGHWAY | PUBLIC BUILDING |
| STREET OPEN FOR TRAVEL | COURT HOUSE |
| PRIVATE GATE | CITY HALL |
| INTERSTATE ROUTE | ARMORY |
| U.S. ROUTE | POST OFFICE |
| STATE ROUTE | SCHOOL |
| TERMINATION OF FA SYSTEM | LIBRARY |
- ALL STATE HIGHWAYS AND FEDERAL AID ROADS SHOWN IN RED

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CITY OF MONUMENT



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 Monument planning 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 Monument 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 Monument 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 Monument 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. Preserve 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 Monument, 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 Monument 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. Provide a safe and efficient system of multi-use paths through the urban area.
- E. Promote alternative modes and carpool programs through community awareness and education.
- F. Plan for expanded transit service by sustaining funding to local transit efforts and seeking consistent state support.

GOAL 5: Enhance the role of the Monument State Airport.

Objectives:

- A. Maintain the existing airport facility.
- B. Provide an emergency air lift service.
- C. Protect airport from land use encroachment.

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CHAPTER 3: TRANSPORTATION SYSTEM INVENTORY

As part of the planning process, DEA conducted an inventory of the existing transportation system in Monument. 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 Monument 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

A majority of the streets in Monument are positioned in a grid pattern. Some time ago the alignment of the Kimberly-Long Creek Highway followed Main Street and the Old Highway Road. With the realignment of this highway in a northwest-southeast direction a quicker and more direct route was created through the city, but as a result, many skewed and uncommon intersections were created as well.

Inventory

The existing street system inventory was conducted for all roadways within Monument including state highways and county 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

Monument is served by the Kimberly-Long Creek Highway (ODOT Hwy. #402), the only highway in the planning area. Although Monument has no direct control over this state highway, adjacent development as well as traffic patterns are heavily influenced by the highway. This highway serves as the major route through town with mostly residential development located along the corridor. The highway is a two-lane facility with speed limits ranging from 55 mph outside the city limits to 35 to 45 mph within the city.

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.

The Kimberly-Long Creek Highway though Monument is classified as a district highway. According to the OHP, the primary function of a district highway is to "serve local traffic and land access." The overall emphasis is to provide for "safe and efficient moderate- to high-speed through travel and moderate- to low-speed operations in urban and urbanizing areas."

Street Classification

The City of Monument has no street classification system identified in its comprehensive plan. Therefore, a classification system was created at six levels: state highway/arterial streets, county arterial streets, county major collectors, county minor collectors, county local 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 Monument, the state highways/arterial streets often serve both regional and local traffic demands.

In Monument, the arterial network consists of only the Kimberly-Long Creek Highway. As mentioned previously, residential developments are located along the highway.

County Roads

The Grant County Road Department classifies all roadways under county jurisdiction into four categories; arterial streets, major collectors, minor collectors, and local streets. The classification of these roadways is based on the intended function and observed traffic volumes. County roads on an arterial level are primarily long distance roads because they are designed to connect regions, smaller communities, and highways in the county together. A secondary function would be to provide access to roads of a lesser classification. Arterial roadways are usually paved and may experience traffic flows of up to 500 vehicles per day. The primary function of a major collector is to tie US Forest Service roads, minor collectors, and local roads to nearby highways or arterial

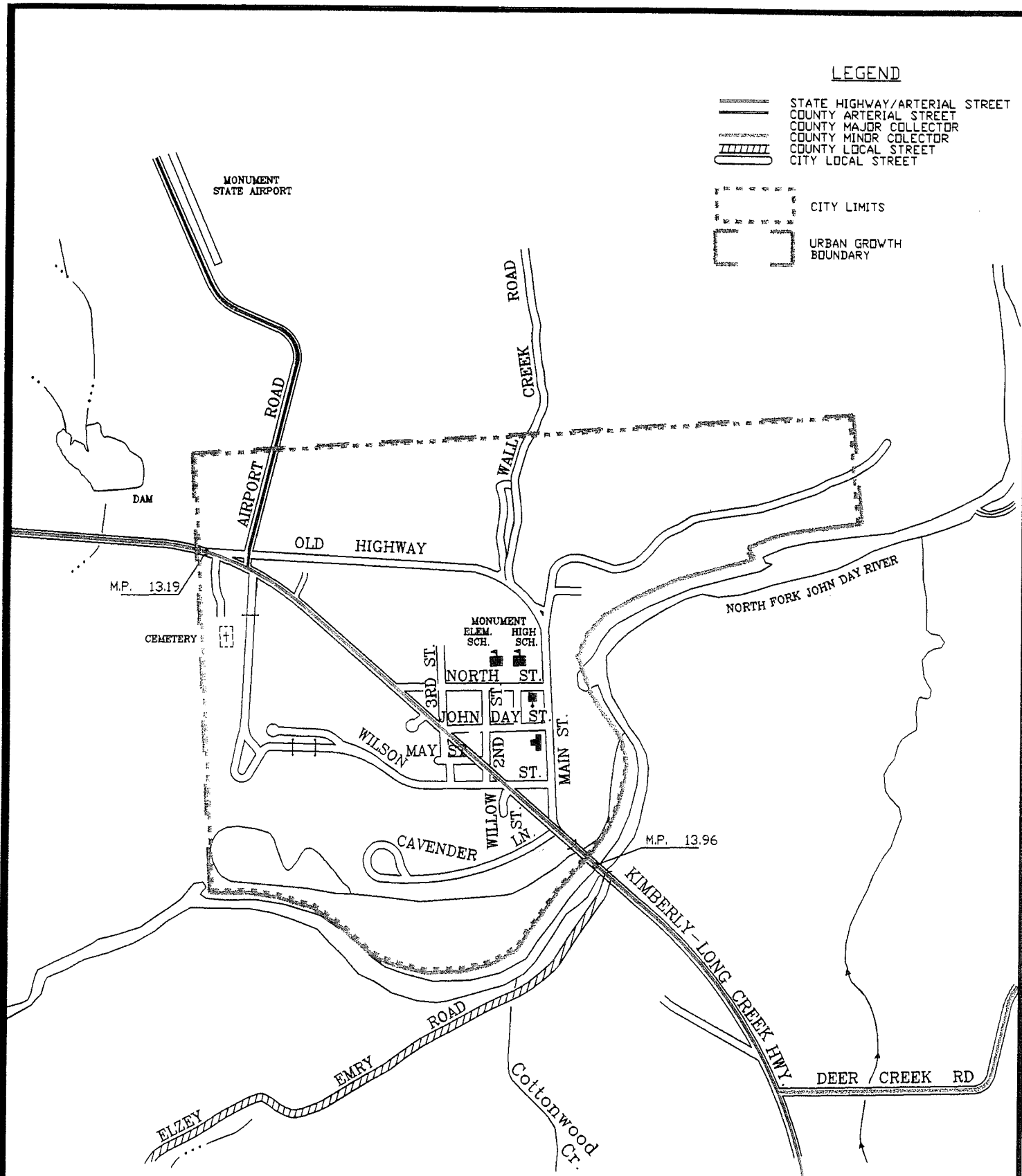


FIGURE 3-1
EXISTING STREET CLASSIFICATION

MAINLINE STATE HIGHWAY	PUBLIC BUILDING
STREET OPEN FOR TRAVEL	COURT HOUSE
PRIVATE GATE	CITY HALL
INTERSTATE ROUTE	ARMORY
U.S. ROUTE	POST OFFICE
STATE ROUTE	SCHOOL
TERMINATION OF FA SYSTEM	LIBRARY

ALL STATE HIGHWAYS AND FEDERAL AID ROADS SHOWN IN RED

CITY OF MONUMENT

0 500 1000 FEET



roadways. These roads also provide access to agricultural, forest, and recreational areas. Major collector roads are usually unpaved in the rural areas and partially to fully paved in the urban areas of the county with traffic volumes reaching up to 400 vehicles per day. County roads classified as minor collectors are shorter distance roads which branch off a highway, arterial, or major collector and provide access to agricultural, forest, and recreational areas, and possibly a few rural residential homes. Minor collectors are mostly unpaved with very little traffic. Local county roads are short distance roads which may serve as a short logging road or a driveway to one or a few homes. They are unpaved and carry very low traffic volumes as well.

Within the Monument planning area, there are four county roads, each of which have a different classification. Airport Road (RD #3) is a gravel road and is classified by the county as an arterial roadway. It proceeds north out of the study area from the Kimberly-Long Creek Highway passing the Monument State Airport. Wall Creek Road (RD #4) is also a gravel road and is classified as a major collector. It also proceeds north from the Old Highway Road. Deer Creek Road is a minor collector and Elzey Emry Road is a county local road both of which are outside the urban growth boundary of Monument.

Local City Streets

Local city streets are designed to carry the very low traffic volumes associated with the local uses which abut them. In Monument there are twelve local streets, as shown in Figure 3-1. A majority of the local city streets have pavement and are in good or fair condition. New pavement and curbing have been installed recently on portions of Main Street, 1st Street, 2nd Street, North Street, and John Day Street.

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 Monument 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 Monument, except across the bridge over the North Fork John Day River. 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 the highway 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 Monument, 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 Monument, average bicycle trip lengths would be much shorter.

Monument currently has no sanctioned bikeways; however, on low volume roadways bicyclists and autos can safely and easily share the roadway.

PUBLIC TRANSPORTATION

The City of Monument 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. Monument is about 40 miles from the nearest shuttle van stop in Dayville. 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.

AIR SERVICE

The City of Monument owns and maintains the Monument Airport. This is a public use airport which serves recreational flyers, businesses, and public agencies.

Currently, there is no commercial air service provided in Monument. The nearest commercial airports are in Pendleton, about 120 miles to the north, and Redmond, about 140 miles to the southwest.

PIPELINE SERVICE

The City of Monument has no pipeline services.

WATERBORNE SERVICE

The City of Monument 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 Monument. This involved analysis of existing traffic volumes, street capacity, and street safety. Census data were 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 Monument 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 the Kimberly-Long Creek Highway are shown in Figure 4-1. Traffic volumes within the city are highest along the highway, and lowest on the county or 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 the Kimberly-Long Creek Highway are typically higher. Seasonal traffic volume information is not available for this highway. However, information is available from the three permanent traffic recorders in Grant County. One located on Highway 395 near Long Creek. The other two are located on Highway 26 near Dayville and Prairie City. These recorders indicate that traffic volumes during the summer months are around 35 percent higher than average volumes.

Truck Volumes

Truck volume information along the Kimberly-Long Creek Highway is not available. However, the low ADT volumes along the highway indicate that truck volumes are low.

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 Monument focused on the intersections along the Kimberly-Long Creek Highway through town, where traffic volumes are the greatest. Currently, the 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 to determine the worst possible traffic operations.

The LOS criteria for an unsignalized intersection are 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 Kimberly-Long Creek Highway's intersection with John Day Street and 3rd Street was determined to be the busiest intersection in the city. This five-way intersection is STOP-controlled on the John Day and 3rd Street approaches to the highway. Daily traffic volumes along the Kimberly-Long Creek Highway were the greatest at this intersection, with an ADT volume of 460 vehicles. To determine the worst possible traffic operations at this intersection, the ADT was increased by 35 percent, to reflect peak summer month conditions. 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 was available on John Day Street or 3rd Street. Therefore, a conservative volume was used for each approach (20 vehicles during the peak hour).

Under these assumptions, the minor approaches on John Day Street and 3rd Street operate exceptionally well with a LOS A. This indicates all other lower volume local roads accessing the highway 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 the Kimberly-Long Creek Highway within Monument. Accident data for the 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 during this period.

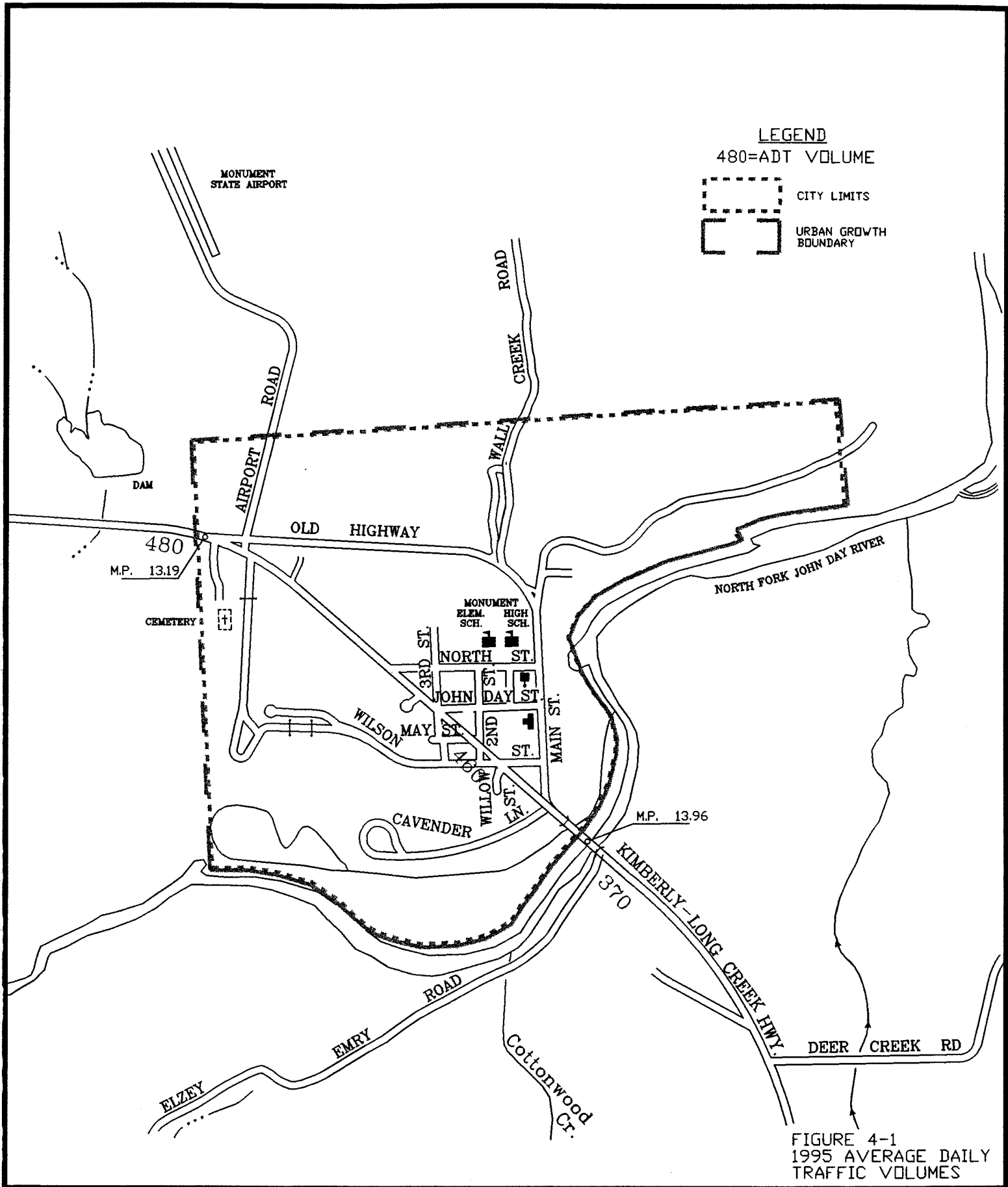


FIGURE 4-1
1995 AVERAGE DAILY
TRAFFIC VOLUMES

- | | |
|---|---|
| <ul style="list-style-type: none"> ≡ MAINLINE STATE HIGHWAY ≡ STREET OPEN FOR TRAVEL ≡ PRIVATE GATE ≡ INTERSTATE ROUTE ≡ U.S. ROUTE ≡ STATE ROUTE ≡ TERMINATION OF PA SYSTEM | <ul style="list-style-type: none"> ■ PUBLIC BUILDING ■ COURT HOUSE ■ CITY HALL ■ ARMORY ■ POST OFFICE ■ SCHOOL ■ LIBRARY |
|---|---|
- ALL STATE HIGHWAYS AND FEDERAL AID ROADS SHOWN IN RED

CITY OF MONUMENT

0 500 1000 FEET



JOURNEY-TO-WORK INFORMATION

Place of Work

According to the 1990 US Census, Monument had a total of 53 residents who work. Of these residents, 33 worked inside the city and 20 commuted elsewhere. A majority of the residents who worked inside the city had commute times of around 10 minutes or less. Those who worked elsewhere had commute times spread out between 10 and 60 minutes.

Travel Mode Distribution

Although the automobile is the primary mode of travel for most residents in the Monument 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.

Just over one half of Monument's workers travel to work via a private vehicle. In 1990, 58.5 percent of all trips to work were made by auto, van, truck, or motorcycle. Trips in single-occupancy vehicles made up 39.6 percent of all trips, and carpooling accounted for 18.9 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 (32.1 percent of trips to work). Because of the small size of the Monument 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.

Census data show that around 3.8 percent of the working population worked at home.

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

Trip Type	1990 Census	
		Percent
Private Vehicle	30	56.6
<i>Drove Alone</i>	<i>(20)</i>	<i>(37.7)</i>
<i>Carpooled</i>	<i>(10)</i>	<i>(18.9)</i>
Public Transportation	0	0
Motorcycle	1	1.9
Bicycle	0	0
Walk	17	32.1
Other	3	5.7
Work at Home	2	3.8
Total	53	100.0

Source: 1990 US Bureau of Census.

CHAPTER 5: TRAVEL FORECASTS

The traffic forecast prepared for the City of Monument, 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 was only prepared for the Kimberly-Long Creek Highway 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 Monument are summarized in Table 5-1.

TABLE 5-1
MONUMENT POPULATION TRENDS

Year	Population	% Change
1960	214	
1970	161	-24.8
1980	192	+19.2
1990	162	-15.6
1995 Estimated	170	+4.9
2017 Projected	195	+14.7

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

Historically, Monument's population has risen and fallen over a 35-year period from 1960 to 1995. Overall, the city's population fell from 214 to 170 during this period resulting in a 20.6 percent decrease overall or an average annual decrease of 0.65 percent per year.

Projected

The population of Monument is expected to increase from 170 to 195 persons by the year 2017. This is an overall increase of 14.7 percent and an annual increase of 0.62 percent per year.

HISTORICAL TRAFFIC VOLUMES

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

Historical traffic volumes along the Kimberly-Long Creek Highway 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 an aggressive 2.63 percent per year on the Kimberly-Long Creek Highway with an overall growth of 68 percent. This was much higher than the annual population growth in Monument itself for the same time period (determined to be a negative growth rate of -0.20 percent per year). This relationship reflects the current trend toward an increase in per capita vehicle miles traveled, and shows that through traffic is growing at a higher rate than traffic related to the City of Monument's population.

FORECASTING METHODOLOGY

The traffic forecast for Monument was performed using a Level 1 - Trending Forecast¹ 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 will grow at a rate equivalent to the historical traffic growth on the Kimberly-Long Creek Highway. 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 is significantly higher than either the historical or projected population growth rates for the city. Traffic on the Kimberly-Long Creek Highway has increased consistently over the last 20 years at a rapid rate of 2.63 percent per year. The population of Monument has remained relatively the same over the past 20 years and the projected population growth rate is less than one quarter the historical traffic growth rate, at 0.62 percent per year. Therefore, the Trending Forecast methodology is appropriate.

FUTURE TRAFFIC VOLUMES

Future year ADT volumes on the Kimberly-Long Creek Highway 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.

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

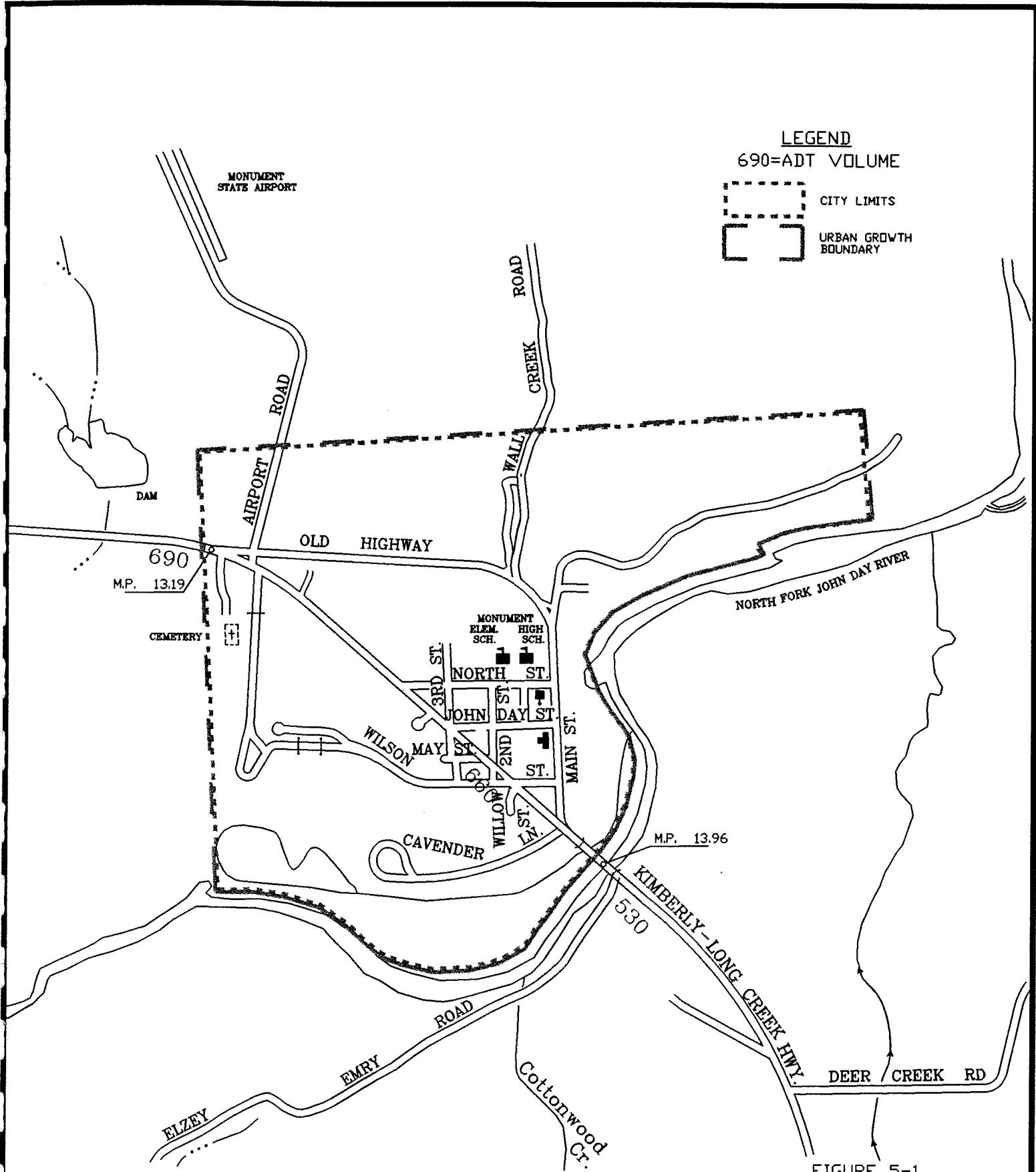


FIGURE 5-1
 2017 AVERAGE DAILY
 TRAFFIC VOLUMES

- | | | | |
|--|--------------------------|--|-----------------|
| | MAINLINE STATE HIGHWAY | | PUBLIC BUILDING |
| | STREET OPEN FOR TRAVEL | | COURT HOUSE |
| | PRIVATE GATE | | CITY HALL |
| | INTERSTATE ROUTE | | ARMORY |
| | U.S. ROUTE | | POST OFFICE |
| | STATE ROUTE | | SCHOOL |
| | TERMINATION OF FA SYSTEM | | LIBRARY |
- ALL STATE HIGHWAYS AND FEDERAL AID ROADS SHOWN IN RED

0 500 1000 FEET

CITY OF MONUMENT



Over the next 20 years, traffic volumes are expected to grow by about 45 percent on the highway which is a moderate increase in traffic for this time frame. However, the overall ADT volumes will remain low reaching a maximum of 690 vehicles per day.

HIGHWAY SYSTEM CAPACITY

With overall ADT volumes remaining fairly low in the future, travel conditions are still projected to remain favorable throughout the city. This is supported by the estimated future traffic operations at the busiest intersection in the city, the Kimberly-Long Creek Highway at John Day Street/3rd 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 on the Kimberly-Long Creek Highway by 45 percent. Traffic volumes on the John Day Street/3rd Street approach are not expected to exceed 20 vehicles per hour.

Under these assumptions, traffic operations at this intersection in the year 2017 during the peak hour of the summer month would remain at LOS A.

CHAPTER 6: IMPROVEMENT OPTIONS ANALYSIS

Potential transportation improvements for the City of Monument 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. Zoning code revisions to allow and encourage mixed-use development and redevelopment.
2. Implement transportation demand management strategies.
3. Implement speed control measures along the Kimberly-Long Creek Highway.
4. Prohibit unmuffled engine braking.
5. Improve signing for the city.
6. Repave and pave city streets.
7. Expand airport facilities.

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 Monument, this is not appropriate. Because of Monument'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 Monument 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 32 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 Monument. Because of the small size of Monument, 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 15 percent (25 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 Monument. 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 area.

Currently, there are no sidewalks present in the City of Monument. Future street improvement projects should include the addition of some sort of pedestrian facility, such as new sidewalks or walkways, which will effectively separate pedestrians from motorized traffic. All new street improvement projects should also consider bicycle lanes as well.

Implementing a local carpool program in Monument alone is not necessary because of Monument's geographical size. However, a county-wide carpool program is possible. Because intercity commuting is a factor in Grant County, residents who live in Monument and work in other cities should be encouraged to carpool with a fellow co-worker 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 Monument 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 Monument area. Therefore, the TDM strategies summarized above are recommended.

Alternative 3. Implement Speed Control Measures Along the Kimberly-Long Creek Highway

The residents of Monument are concerned about traffic exceeding the posted speed limit along the Kimberly-Long Creek Highway 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 Monument 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. A speed limit sign can be located near the display 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 of 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. Also, 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 Monument 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 the Kimberly-Long Creek Highway 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. Monument 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 Monument residents feel is necessary. Also, a major influence in increasing speed enforcement in an area is a high accident history, which Monument does not have.

Cost: There are no costs associated with increasing police enforcement in the City of Monument utilizing the current state and county patrol officers. The cost to hire an additional patrol officer for the City of Monument alone would be high, roughly \$30,000 per year. It may be possible 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.

Option D. Tree Planting at Entrances to City

Overview: This project would include planting trees at the northwest and southeast city limits of Monument along the Kimberly-Long Creek Highway. The purpose of planting trees at the entrances to the city is to install a vertical element along the roadway which gives the driver the perception that he/she is entering an urban area. Vertical elements also give the roadway the appearance of being narrow without physically changing the street or lane width. This type of perception control encourages drivers to slow down before they enter the urban section of a city. This topic is discussed further in the speed control measures summary in Appendix D.

Safety: The goal of this project is to slow traffic down to a reasonable level once inside the city limits. Slowing traffic will increase the driver's awareness and improve the safety for those who are biking and walking in town.

If trees are planted along the highway, they need to be in a safe location. Consideration has to be given to vehicles driving off the road.

Impacts: The vertical element of newly planted trees may not be seen for several years. Over time, as the trees grow, the vertical element will become more effective.

Cost: There are several types of trees available that should produce the desired effect of adding a vertical element to the city entrances. These trees are suitable for the climate in Monument.

- Lombardy Poplar - This tree is characterized by fast growth with a narrow and tall form. Plant these trees 15 feet on center and avoid using near underground utilities. The estimated cost is \$40 for each 8-foot bald and burlapped tree.
- Red Maple ("Armstrong" or "Columnare") - This tree is characterized by fast growth. The "Columnare" variety develops red fall color. Spacing should be 15 feet on center for "Armstrong" and 20 feet on center for "Columnare". The estimated cost is \$166 for each 2 inch Caliper tree.

- Ponderosa Pine - A moderate growth rate characterizes this tree. Lower limbs should be trimmed to keep foliage out of line of sight. Plant these trees 15 to 20 feet on center. The estimated cost is \$90 for each 6-foot bald and burlapped tree.
- Western White Pine - This tree is characterized by fast growth up to 20 feet followed by slower growth. Lower limbs should be trimmed to keep foliage out of line of sight. Plant these trees 15 to 20 feet on center. The estimated cost is \$80 for each 6-foot bald and burlapped tree.

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 Kimberly-Long Creek Highway is under the jurisdiction of the state, the City of Monument will need to work with and get approval from ODOT to implement any of these measures.

Alternative 4. Prohibit Unmuffled Engine Braking

The residents of Monument have complained about the noise generated by trucks using their engines to brake along the Kimberly-Long Creek Highway. Although normal engine braking is legal, the use of unmuffled engine braking is against the law. Unmuffled engine braking occurs as the pressure created in the vehicle's engine, as it decelerates, is released out of an unmuffled exhaust pipe. This produces a loud and unpleasant sound.

This alternative identifies two options to discourage truckers from using unmuffled braking.

Option A. Post "No Unmuffled Braking" Signs

Overview: The first option is to post "No Unmuffled Engine Braking" signs along the highway in areas near the city where engine braking occurs. One area in particular is located west of the city where the highway descends into the Monument area.

Safety: Safety should not be affected by this option. The grade of the Kimberly-Long Creek Highway is not steep enough to make engine braking necessary. In situations where engine braking is not a necessity, some truckers still use their engines to slow down because they either want to save their brakes or because they prefer this type of deceleration over using regular brakes.

Impacts: The signs may be effective in discouraging unmuffled engine braking but will not discourage engine braking altogether. There is no law preventing this. Also, truckers who use unmuffled engine braking may disregard the posted signs if there is no enforcement.

Cost: The cost to post a sign along the highway is low, at around \$100.

Option B. Increase Enforcement of the "No Unmuffled Braking" Law

Overview: This option is to increase the enforcement of the engine braking law. The Oregon Vehicle Code of 1995-1996 states that a person commits the offense of engine braking if the person operating the motor vehicle on the highway uses an unmuffled engine brake. This offense is punishable by a maximum fine of \$500.

Safety: Safety should not be affected by this option.

Impacts: Increased enforcement of this law would be effective.

Costs: With the given work force constraints in the highway and county patrol, this option may not be possible.

Recommendations:

Both of these options are recommended to discourage unmuffled engine braking. To post the signs, the City of Monument must get approval from ODOT and the signs must conform to ODOT signing standards. Increased enforcement of the unmuffled braking law may be difficult to achieve. The City of Monument should consult the State Highway and County Patrol divisions to determine if increased patrol in the Monument area is possible.

Alternative 5. Improve Signing For The City

Overview: Residents in Monument are interested in placing destination signs east and west of Monument along the Kimberly-Long Creek Highway. The destination signs would identify the number of miles to reach the city. Residents feel that drivers, particularly tourists, who are unfamiliar with the Monument area may turn around before reaching the city, thus, reducing potential business and revenue.

Currently, there are destination signs located in the town of Kimberly, 13 miles to the west, and another destination sign in the City of Long Creek, 18 miles to the east.

Safety: Safety is not affected by this alternative.

Impacts: No impacts are associated with this alternative.

Cost: The cost for a destination sign is around \$100.

Recommendation: Because posting these signs may increase tourist activity in Monument, it is recommended. To post these signs, the City of Monument must get approval from ODOT and the signs must conform to ODOT standards.

Alternative 6. Repave and Pave City Streets

Overview: In 1989 and 1990, the city installed storm water drainage and repaved all the streets in the area bounded by the highway and North Street and between 2nd Street and Main Street. This project also included the construction of curbing to provide surface drainage. In the future, the city would like to

continue installing stormwater drainage and upgrading the remaining paved streets and gravel roads in the city.

Safety: Safety is not affected by this alternative.

Impacts: Upgrading the remaining streets in the city will improve community livability. However, stormwater drainage must be installed first, before the roadways are paved.

Cost: The future of this project is uncertain, as the city is currently trying to secure the needed funds.

Recommendations: Upon securing the funds to install storm drainage and pave the remaining streets in the city, it is recommended that all street paving projects include sidewalks or walkways for pedestrians.

Alternative 7. Expand Airport Facilities

Overview: The City of Monument wants to expand the facilities at the Monument Airport to include lighting for the airport's runway and a new helipad.

Safety: The construction of airport lighting would improve the safety for planes flying in the northwestern section of Grant County. Airport lighting would allow planes to take off and land during the night and in adverse weather conditions. A heliport would allow for emergency airlift service in the event of an accident or search and rescue operation.

Impacts: The city currently owns only a portion of the land where the airport is located, with the other portion leased out to the city by the Bureau of Land Management (BLM). In order to expand the facility, the city must purchase the remaining land rights from the BLM.

Cost: The costs associated with purchasing the land rights from the BLM and the expansion of the airport facilities was not determined.

Recommendation: Further study of the airport needs and potential for expansion is needed; however, detailed analysis lies outside the scope of this TSP. The city should consider preparing an Airport Master Plan to address the specific needs of this facility.

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 Monument area.

TABLE 6-1
TRANSPORTATION IMPROVEMENT OPTIONS:
RECOMMENDATION SUMMARY

Option	Recommendation
1. Revise Zoning and Development Codes	• Not Applicable
2. Implement TDM Strategies	• Implement
3. Implement Speed Control Measures	
Speed Detector Trailer	• Implement
Driver Education and Public Service Signage	• Implement
Enforcement	• Implement
Tree Planting at Entrances to City	• Implement
4. Prohibit Unmuffled Engine Braking	
Post Signs	• Implement
Increase Enforcement of Engine Braking Law	• Implement
5. Improve Signing for the City	• Implement
6. Repave and Pave City Streets	• Implement
7. Expand Airport Facilities	• Further Study Needed

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 Monument 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 Monument 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, summarized in Table 7-1 and described in detail on the following pages. Since the City of Monument 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 MONUMENT

Classification	Pavement Width	Right-of-Way Width	Min. Posted Speed
Local Residential	28 feet	40 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. 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.

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.

The standard for a local residential street should be 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.

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, allowing access by delivery trucks off the main streets. Alleys should be encouraged in the urban area of City of Monument. 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.

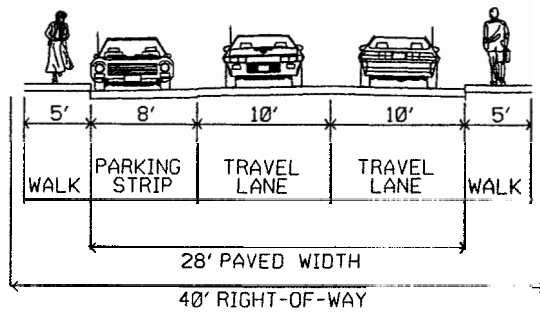
Figure 7-1 shows a cross section with a 60-foot right-of-way and a 36-foot paved width. The 36-foot cross-section allows two 11-foot travel lanes and parking on both sides of the street. The roadway can also be striped to provide two travel lanes plus left-turn lanes at intersections or driveways by 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.

LOCAL RESIDENTIAL



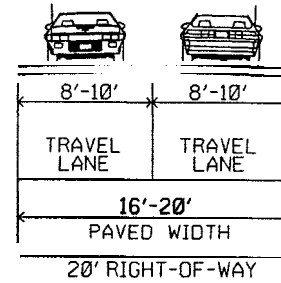
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**DAVID EVANS
AND ASSOCIATES, INC.**

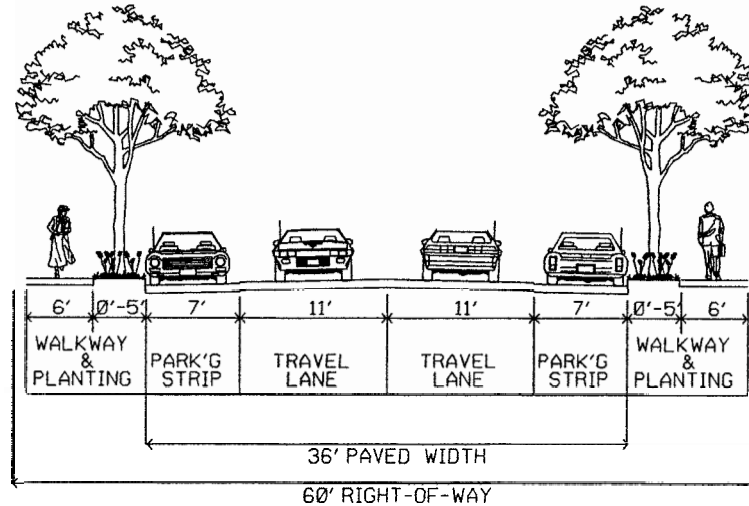
2828 S.W. CORBETT AVENUE
PORTLAND, OR. 97201-4830 (503) 223-6663



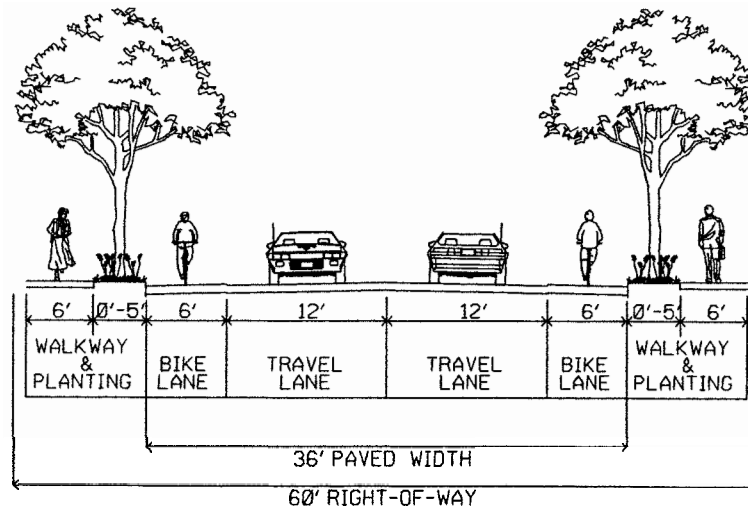
ALLEY



COLLECTOR



ARTERIAL



**FIGURE 7-1
STREET STANDARDS**

Figure 7-1 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 7-1. 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 Monument 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. 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 Long Creek's continued livability. Cul-de-sacs and "dead-end" streets should be discouraged. To this end, public through streets should have an average spacing of approximately 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.

TABLE 7-2
RECOMMENDED ACCESS MANAGEMENT STANDARDS

Functional Classification	Public Road		Private Drive ⁽²⁾	
	Type ⁽¹⁾	Spacing	Type	Spacing
Arterial				
Highway 402: General	at-grade	500 feet	L/R Turns	150 feet
STA (Airport Rd. to Cavender Ln.)	at-grade	250 feet	L/R Turns	125 feet
Other Arterials within UGB	at-grade	250 feet	L/R Turns	125 feet
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.

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.

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 Monument may designate Highway 402 (the Kimberly-Monument Highway) 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 402, within Monument's UGB, OHP Category 6², "Partial Control" applies. This classification permits at-grade intersections at a minimum spacing of 500 feet. Private driveways should have a minimum spacing of 150 feet from each other and from intersections. Traffic signals are permitted at

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

a minimum of one-quarter mile spacing. These requirements are similar to the general access management guidelines specified for Highway 402 under arterial roadways in Table 7-2.

Special Transportation Area

While the OHP access management guidelines can be applied to some portions of the highways, the spacing of the existing downtown grid street system in Monument is often less than the OHP standard of 500 feet. Because the highway passes diagonally through the grid, Monument has unusual intersections and grid spacing. The OHP Category 6 standards cannot be met on this section of highway.

To address this issue, a Special Transportation Area (STA) is recommended from Airport Road to Cavender Lane. 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 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 Monument 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 Monument 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 Monument.

Street System Plan

The street system plan, shown in Figure 7-2, for the City of Monument does not include the construction of any new street projects.

Street Upgrades

In 1989 and 1990, the City of Monument installed storm water drainage, constructed curbing, and repaved all the streets in the area bounded by Highway 402 and North Street between 2nd Street and Main Street. In the future, the City would like to continue this upgrade on the remainder of the street system. Funding is critical to the continuation of this project. The City is seeking additional funding to complete the project. Upon securing funding, future upgrades should also include the addition of sidewalks or walkway for pedestrian.

Speed Control Measures

The City of Monument has identified some transportation system management measures that it would like to implement to help control speeds along the Kimberly-Long Creek Highway through town. These measures include:

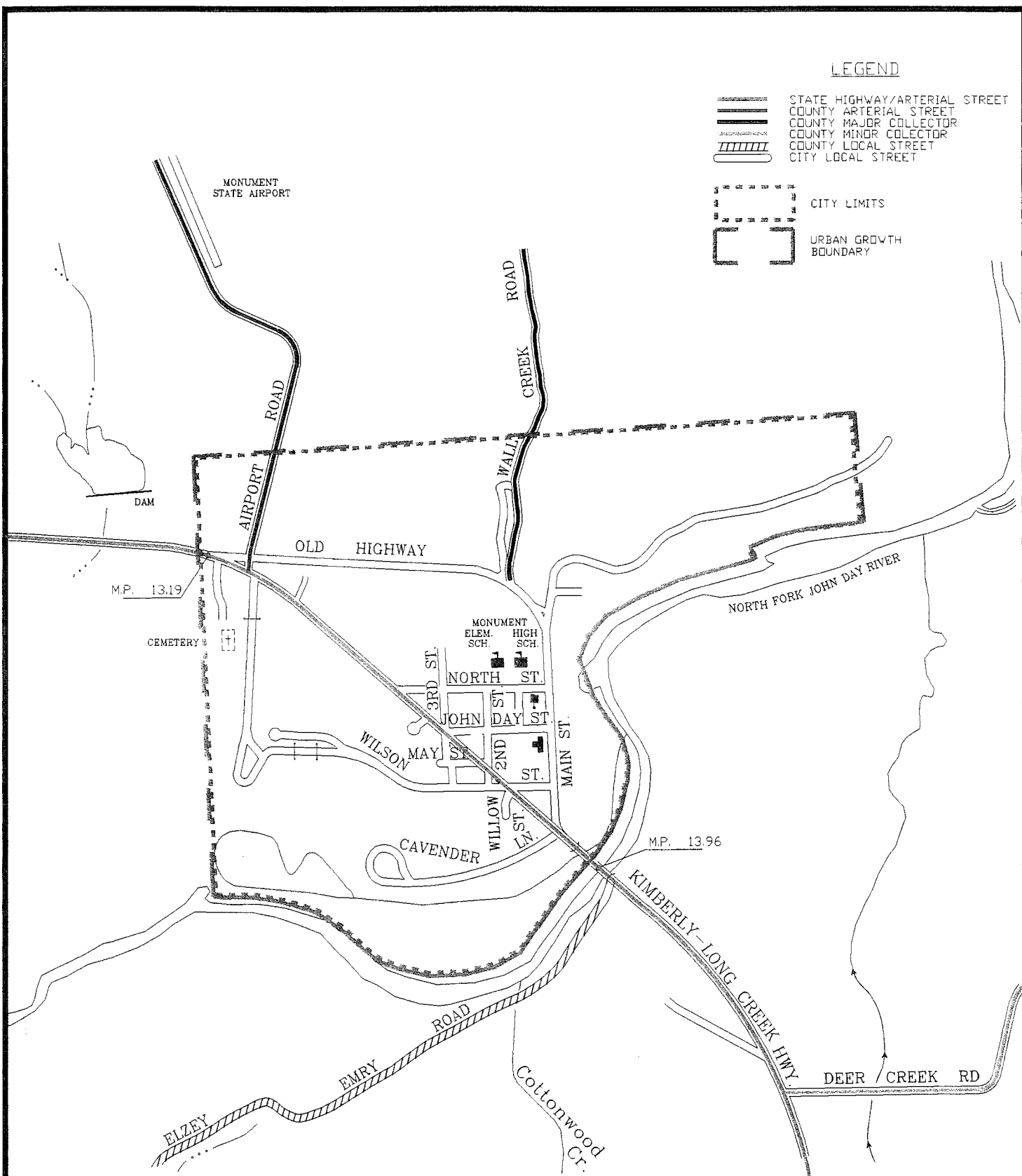


FIGURE 7-2
RECOMMENDED STREET SYSTEM PLAN

MAINLINE STATE HIGHWAY	PUBLIC BUILDING
STREET OPEN FOR TRAVEL	COURT HOUSE
PRIVATE GATE	CITY HALL
INTERSTATE ROUTE	ARMORY
U.S. ROUTE	POST OFFICE
STATE ROUTE	SCHOOL
TERMINATION OF FA SYSTEM	LIBRARY

ALL STATE HIGHWAYS AND FEDERAL AID ROADS SHOWN IN RED

0 500 1000 FEET

CITY OF MONUMENT



- *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.)
- *Trees Planted at Entrance to City* - Plant trees along the Kimberly-Long Creek Highway at the city limits of Monument. These vertical elements create the perception that the road narrows which encourages drivers to slow as they enter the urban area. (Estimated cost < \$10,000.)

The small size of Monument 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 Monument 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 Monument 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.

Noise Reduction

The City of Monument has also identified some measures that it would like to implement to help reduce noise generate by unmuffled engine braking along the Kimberly-Long Creek Highway (Highway 402). These measures include:

- *Signage* - Post "No Unmuffled Engine Braking" signs along the highway in areas near the city where engine braking occurs, particularly on the west side. (Estimated cost = \$100 per sign.)
- *Enforcement* - Increase enforcement of the law in the 1995-1996 Oregon Vehicle Code that prohibits unmuffled engine braking. (Estimated cost not prepared.)

These measures would require cooperation between the City of Monument and ODOT. Support for the signage would be necessary from both agencies and shared funding should be considered. The ability to enforce the braking laws would depend on available work force of the highway and county patrol.

Improved Signage

The City of Monument identified one other improvement that is recommended based on the analysis presented in Chapter 6:

- *Signage* - Improve the signage along the Kimberly-Long Creek Highway (Highway 402) directing traffic to Monument. (Estimated cost = \$100 per sign.)

These measures would require cooperation between the City of Monument and ODOT. Support for the signage would be necessary from both agencies and shared funding should be considered. Grant County may also become involved in the decision process.

Pedestrian System Plan

A complete pedestrian system should be implemented in the City of Monument. 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 Monument. When the City secures funding to continue upgrading street to include storm water drainage, curbs, and new pavement, sidewalks or walkways should be added to all improved roadways.

Over time, sidewalks shall also 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 the Kimberly-Long Creek Highway (Highway 402) should also be added with any future ODOT improvements within the Monument urban area.

Because of the relatively low traffic volumes on most roadways in Monument, 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 Monument.

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 Monument, shared roadways are not an issue; however, on arterial roadways bike lanes are recommended.

Highway 402 functions as an arterial street through Monument, 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 402 is projected to carry a volume of less than 700 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 Monument. 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 Monument, where traffic volumes are low and the population and employment is small, implementing TDM strategies is not practical in most cases. However, the addition of sidewalks with future street upgrades is also considered a TDM strategy. By providing these facilities, the City of Monument is encouraging people to travel by other modes than the automobile.

Because intercity commuting is a factor in Grant County, residents who live in Monument and work in other cities should be encouraged to carpool with a fellow coworker or someone who works in the same area. Implementing a local carpool program in Monument 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, approximately 19 percent of all work trips are currently made by carpool. The City of Monument 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 of Transportation Demand Management can be encouraged through ordinance and policy.

Public Transportation Plan

The City of Monument 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 Monument is in Dayville, about 40 miles to the south.

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 Monument has no passenger or freight rail services.

Air Service Plan

The City of Monument owns and maintains the Monument Airport. This is a public use airport which serves recreational flyers, businesses, and public agencies. The City currently owns only a portion of the land where the airport is located, with the other portion leased out to the City by the Bureau of Land Management (BLM).

The City would like to expand the facilities to include lighting for the airport's runway and a new helipad. The expansion would require some additional land rights from the BLM. An Airport Master Plan should be prepared separately from this TSP to further study of the airport needs and potential for expansion. Monument is not eligible for federal funding for either the Airport Master Plan or the improvements.

Pipeline Service Plan

The City of Monument has no pipeline transportation services.

Water Service Plan

The City of Monument has no waterborne transportation services.

TRANSPORTATION SYSTEM PLAN IMPLEMENTATION PROGRAM

Implementation of the City of Monument 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 Monument 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 Monument 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 CIP is shown with the following priorities:

- Phase 1, 1998 to 2002
- Phase 2, After 2002

These priorities are based on current need, the relationship between transportation service needs, and the expected growth of the city. The following schedule indicates priorities and may be modified to reflect the availability of finances or the actual growth in population and employment.

The CIP is summarized in Table 7-3. The cost of each project is listed in the CIP is shown in present day (1997) dollars by jurisdiction as well as total approximate opening year dollars. These costs include design, construction, and some contingency costs. They are preliminary estimates and do not include right-of-way acquisition, waterborne or sewer facilities, or detailed intersection design. Some of the CIP elements have costs that cannot be easily calculated because exact programs are unknown at this time and some of the costs are annual costs. The totals for each phase and overall show the known costs only.

Monument has identified a total of six projects in its CIP with a total known cost of \$1,000. Four Phase 1 projects have been identified with a known cost of about \$1,000. The actual implementation of some of the unknown cost elements will be determined by the programs outlined through cooperative efforts with other cities, Grant County, and ODOT. Two Phase 2 projects, both related to the airport, have been identified with an unknown cost.

TABLE 7-3
PRIORITIZED CAPITAL IMPROVEMENT PROGRAM (1997) DOLLARS

Project Description	Estimated Cost			
	Local	County	State	Total
<i>Phase 1: 1998 To 2002</i>				
Upgrade remaining street system to include storm water drainage, curbs, walkways, and new pavement*	Unknown	\$0	\$0	Unknown
Implement speed control measures along Highway 402*	Unknown	Unknown	Unknown	Unknown
Prohibit unmuffled engine braking along Highway 402*	Unknown	\$0	Unknown	Unknown
Improve signage to Monument along Highway 402	\$500	\$0	\$500	\$1,000
<i>Phase 2: After 2002</i>				
Prepare an Airport Master Plan*	Unknown	\$0	\$0	Unknown
Expand Airport Facilities*	Unknown	\$0	\$0	Unknown
Subtotal Phase 1	\$500	\$0	\$500	\$1,000
Subtotal Phase 2	\$0	\$0	\$0	\$0
Total	\$500	\$0	\$500	\$1,000

* The costs for implementing some improvements the Highway 402 (the Kimberly-Long Creek Highway) cannot be easily calculated because exact programs are unknown at this time and some of the costs are annual costs.

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 Monument's TSP identifies six improvement projects over the next 20 years with a known cost of \$1,000. This section of the TSP provides an overview of the City of Monument's revenue outlook and a review of some funding and financing options that may be available to the City of Monument.

Pressures from increasing growth throughout much of Oregon have created an environment of estimated improvements that remain unfunded. The City of Monument 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

Revenue Source	Jurisdiction Level			Statewide
	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 Monument during the next 20 years. Although the City has historically received revenue from this fund for transportation maintenance and improvements, Monument should be cautious of relying heavily on this source, since funds are expected to decline after 2005.

REVENUE SOURCES

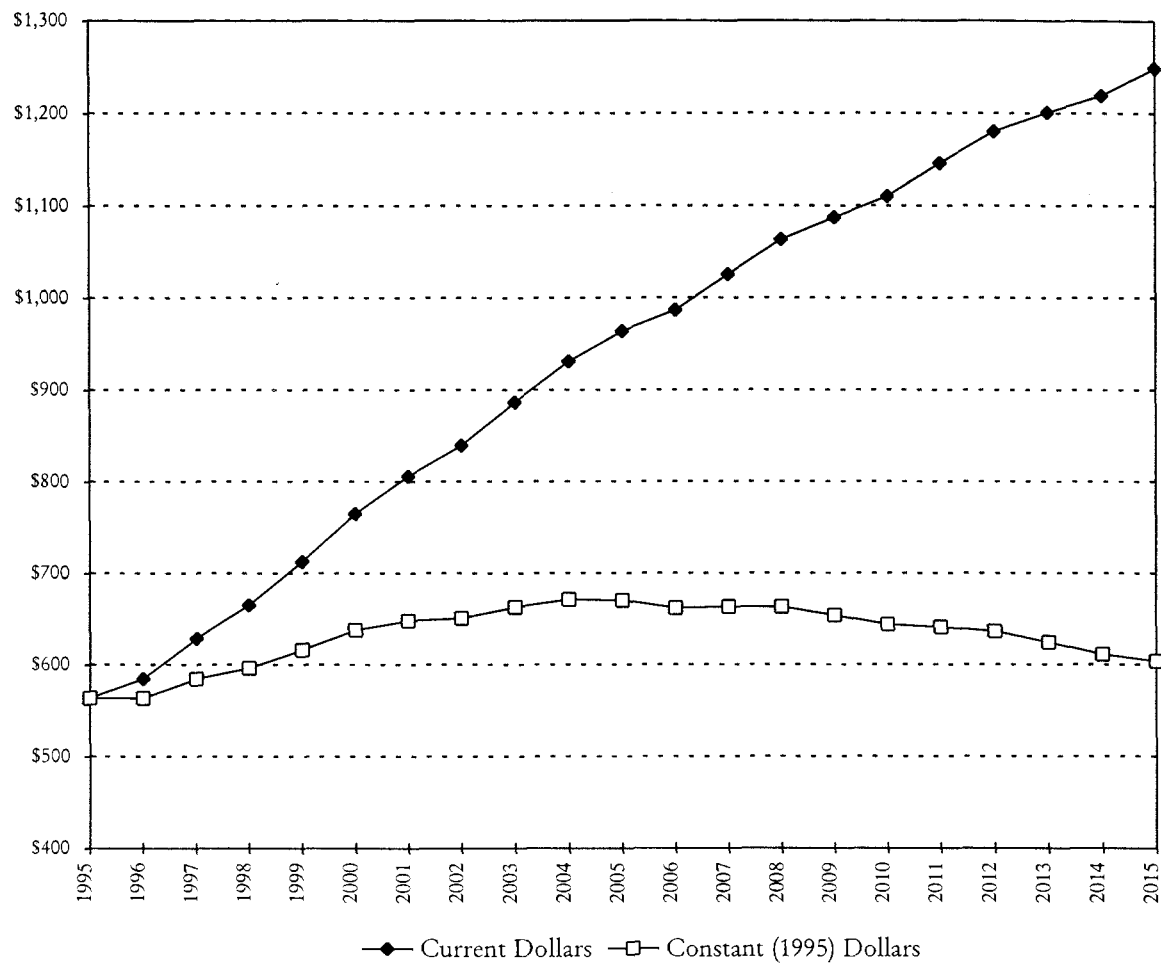
In order to finance the recommended transportation system improvements in Monument, it will be important to consider a range of funding sources. Recent property tax limitations have created the need for local governments to seek revenue sources other than the traditional property tax. The use of alternative 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 Monument; 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 Monument 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 Monument 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 Monument 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 Monument 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 Monument.

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 Monument'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 Monument for the next 20 years. The City of Monument, 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 Monument'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 Monument. 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 Monument's Comprehensive Plan and implementing ordinances were completed in 1981, 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 Monument Plan:

- *The Transportation System Plan is an element of the City of Monument 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 Transportation System Plan but for which no site-specific decisions have been made. Therefore, it is recommended that Monument 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. It is also important to preserve the operation of existing and proposed transportation facilities, such as airports, that are vulnerable to the encroachment of incompatible land uses.

Other future transportation facilities that the City of Monument 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 Monument shall protect the function of existing and planned roadways as identified in the Transportation System Plan.*
- *The City of Monument shall include a consideration of a proposal's impact on existing or planned transportation facilities in all land use decisions.*
- *The City of Monument shall protect the function of existing or planned roadways or roadway corridors through the application of appropriate land use regulations.*
- *The City of Monument 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 Monument 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 Monument and to all properties that abut these roadways. This ordinance is adopted to implement the access management policies of the City of Monument 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. [off-street parking and loading.*
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 Monument 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 within 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, cemetery, 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 Monument 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 Monument shall provide notice to ODOT of land use applications and development permits for properties that have frontage or access onto the Kimberly-Long Creek Highway (Highway 402).*
- The City of Monument 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 Monument 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 Monument 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 the Kimberly-Long Creek Highway (Highway 402). 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 Monument 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 Monument 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 Monument 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 Monument 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 city, as identified in the Transportation System Plan. Walkways shall be included on new streets within the urban growth boundary, as identified in the Transportation System Plan.*
- *Retrofitting existing streets with walkways and bikeways shall proceed on a prioritized schedule, as identified in the Transportation System Plan.*
- *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. *Multi-Family Residences. 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 as 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 Monument 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).*

D. 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.*
- 5. 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.*

APPENDIX A:

Technical Memorandum

Review of Existing Plans and Policies

City of Monument

TECHNICAL MEMORANDUM

REVIEW OF EXISTING PLANS AND POLICIES

CITY OF MONUMENT

The City of Monument 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 Monument 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 MONUMENT COMPREHENSIVE PLAN

The City of Monument Comprehensive Plan was prepared in April 1981. 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 Monument. It then goes through each element of the plan presenting findings and policies.

Goals and Objectives

The general goals and objectives described in the Plan include:

1. To retain and enhance the character and quality of the City of Monument as growth and development occur.
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 bring about a more orderly and efficient development pattern.
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 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 in the Plan as part of the Urbanization element. A 1.5% percent annual growth rate was used for the Monument projections. These were for all persons inside the urban growth boundary. The projections are summarized in Table 1.

TABLE 1
POPULATION PROJECTIONS

Year	City of Monument
1970	161
1980	192
1985	216
1990	239
1995	264
2000	291

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Current (1996) population in the City of Monument is 185. Comparing this number to the population projections in Table 1 for 1995 show that the future projections in the Comprehensive Plan are too conservative and a population growth rate of 1.5% is too high. In fact, during the 10 year period from 1980 to 1990 the population decreased from 192 to 162, which is a negative annual growth rate of 1.7%. However, from 1990 to 1996 the population increased from 162 to 185, which is a positive annual growth rate of 2.2%..

Transportation Element

The transportation element of the Comprehensive Plan 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 the Monument-Long Creek Highway, and area County roads.

No traffic statistics were presented in the document to support this statement; however, it is true. Also, the highway through the city is defined as the Kimberly-Long Creek Highway, not the Monument-Long Creek Highway.

2. The Monument-Long Creek Highway is the principal corridor around which the urban area is framed. The highway is an uncontrolled access system, consisting of a two-lane roadway.

The Kimberly-Long Creek Highway is no longer an uncontrolled access system. According to the Oregon Highway Plan 1991, certain access measures now apply to this district highway for all new intersections, streets, and driveways planned along the highway through the city.

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 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.

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. 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.)
6. Wherever possible, rights-of-way for major streets and highways should be obtained as part of the development process.
7. 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.
8. 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.

CITY ZONING ORDINANCE OF 1981

This is an addendum to the 1981 Comprehensive Plan. This document contains approved information on the zoning regulations and standards for the City of Monument. Key features of this document are the establishment of new land use zones, supplementary provisions, exceptions, conditional uses, variances, amendments, and general provisions.

Establishment of Zones

The following new land use zones were established in this document.

Section	Zone Title	Abbreviated Title
3.010	General Residential Zone	R-1
3.020	General Commercial Zone	C-1
3.030	General Industrial Zone	M-1
3.040	Flood Plain Combining	(FP)

No map was included in this document showing the new land uses inside the urban growth boundary. In 1984 the land use boundaries were modified and a map was created, The City of Monument Zoning Map of 1984 (Map A). In section 3.040 of this document, a Flood Plain Zone (FP) was established. However, this zone was not indicated on the new zoning map of 1984 (Map A).

APPENDIX B:

Table B-1

1996 Major Streets Inventory

Monument Transportation System Plan

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

Street Segment	Jurisdiction	Classification	Speed Limit (mph)	Street Width (feet)	# of Travel Lanes	Curbs	On-Street Parking	Sidewalks	Bikeway	Pavement Condition
1st Street										
John Day Street to North Street	City	Local	25	20	2	Yes	No	No	Shared	Good
2nd Street										
North Street to John Day Street	City	Local	25	50	2	Yes	Yes-E	No	Shared	Good
John Day Street to Highway 402	City	Local	25	25	2	No	No	No	Shared	Good
Highway 402 to Wilson Street	City	Local	25	20	2	No	No	No	Shared	Gravel
3rd Street										
North of North Street	City	Local	25	20	2	No	No	No	Shared	Fair
North Street to Highway 402	City	Local	25	18	2	No	No	No	Shared	Fair
Highway 402 to May Street	City	Local	25	17	2	No	No	No	Shared	Fair
May Street to Wilson Street	City	Local	25	?	2	No	No	No	Shared	Unpaved
Airport Road										
North of Monument City Limits	County	Arterial	25	16-18	2	No	No	No	Shared	Gravel
NCL to Old Highway	County	Arterial	25	16-18	2	No	No	No	Shared	Gravel
Old Highway to Highway 402	County	Arterial	25	14-18	2	No	No	No	Shared	Fair/Poor
Cavender Lane										
One-Way Loop	City	Local	25	14	2	No	No	No	Shared	Good
One-Way Loop to Highway 402	City	Local	25	26	2	No	No	No	Shared	Good
John Day Street										
Highway 402 to 2nd Street	City	Local	25	20	2	No	No	No	Shared	Fair
2nd Street to 1st Street	City	Local	25	31	2	Yes	No	No	Shared	Good
1st Street to Main Street	City	Local	25	31	2	Yes	No	No	Shared	Good
Kimberly-Long Creek Highway (Highway 402)										
West of Monument City Limits	State	Arterial	55	21	2	No	No	No	Shared	Good
WCL to Airport Road	State	Arterial	55	21	2	No	No	No	Shared	Good
Airport Road to North Street	State	Arterial	45	21	2	No	No	No	Shared	Good
North Street to John Day Street	State	Arterial	35	21	2	No	No	No	Shared	Good

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

Street Segment	Jurisdiction	Classification	Speed Limit (mph)	Street Width (feet)	# of Travel Lanes	Curbs	On-Street Parking	Sidewalks	Bikeway	Pavement Condition
Kimberly-Long Creek Highway (Highway 402) continued										
John Day Street to May Street	State	Arterial	35	21	2	No	No	No	Shared	Good
May Street to Wilson Street	State	Arterial	35	21	2	No	No	No	Shared	Good
Wilson Street to Cavender Lane	State	Arterial	35	21	2	No	No	No	Shared	Good
Cavender Lane to Monument City Limits	State	Arterial	35	21	2	No	No	No	Shared	Good
SCL to North Fork John Day River Bridge	State	Arterial	35	25	2	No	No	No	Shared	Good
South of North Fork John Day River Bridge	State	Arterial	55	22	2	No	No	No	Shared	Good
Main Street										
East of Monument City Limits	City	Local	25	12	1	No	No	No	Shared	Gravel
ECL to Old Highway	City	Local	25	12	1	No	No	No	Shared	Gravel
Old Highway to North Street	City	Local	25	18	2	No	No	No	Shared	Good
North Street to John Day Street	City	Local	25	30	2	Yes	Yes - P	No	Shared	Good
John Day Street to Wilson Street	City	Local	25	30-48	2	Yes	Yes - D/P	No	Shared	Good
Wilson Street to Highway 402	City	Local	25	31-46	2	Yes	Yes - D/P	No	Shared	Good
May Street										
3rd Street to Highway 402	City	Local	25	15	2	No	No	No	Shared	Fair
North Street										
Highway 402 to 3rd Street	City	Local	25	20	2	No	No	No	Shared	Fair
3rd Street to 2nd Street	City	Local	25	40	2	No	Yes-S	No	Shared	Fair
2nd Street to 1st Street	City	Local	25	25	2	Yes	No	No	Shared	Good
1st Street to Main Street	City	Local	25	27	2	Yes	No	No	Shared	Good
Old Highway										
Highway 402 to Airport Road	City	Local	25	20	2	No	No	No	Shared	Fair
Airport Road to Wall Creek Road	City	Local	25	20	2	No	No	No	Shared	Good/Fair
Wall Creek Road to Main Street	City	Local	25	18	2	No	No	No	Shared	Good/Fair
Wall Creek Road										
North of Mounment City Limits	County	Major Collector	25	22	2	No	No	No	Shared	Good
NCL to Old Highway	County	Major Collector	25	22	2	No	No	No	Shared	Good

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

Street Segment	Jurisdiction	Classification	Speed Limit (mph)	Street Width (feet)	# of Travel Lanes	Curbs	On-Street Parking	Sidewalks	Bikeway	Pavement Condition
Willow Street										
Highway 402 to Dead End	City	Local	25	10	1	No	No	No	Shared	Gravel
Wilson Street										
Airport Road to West Gate	City	Local	25	12	1	No	No	No	Shared	Gravel
East Gate to 3rd Street	City	Local	25	12	1	No	No	No	Shared	Good
3rd Street to 2nd Street	City	Local	25	20	2	No	No	No	Shared	Good
2nd Street to Highway 402	City	Local	25	20	2	No	No	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	1990-1995 Change	
			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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