3

Roadway Plan

This chapter describes the current conditions of county roadways within Benton County, forecasts the conditions of these roadways in the future, lists current policies and necessary policy changes, and describes the preferred alternatives for improving the roadway system throughout the County (section 3.4).

3.1 Existing Conditions

Roadways carry the majority of transportation trips made in Benton County. The County's roads are used by residents traveling to and from work, shopping, etc.; by trucks carrying farm, forest, and other products; and by recreational and tourist traffic passing through or traveling to the County. The County's roadways also serve bicyclists, pedestrians, and public transit, all of which are discussed further in the respective modal plans.

Substantial effort was used to inventory the roadway system, because it is by far the County's most significant transportation infrastructure in terms of cost and use. Due to the sheer size of the roadway network within the County, it was determined that only those roadways classified as collector level and above would be inventoried and analyzed. This approach complies with both the letter and intent of the Transportation Planning Rule (TPR). *(See Appendix A for the full text of the TPR.)*

3.1.1 Functional Classifications

A roadway's functional classification determines its intended purpose, the amount and type of traffic (local or through) it is expected to carry, and its design standards. Listed below are the functional classification definitions for Benton County and for the Oregon Department of Transportation (ODOT). The ODOT classification system is also included here, as a preface to the performance evaluation of the transportation system and in recognition of the importance to the County of this critical subset of the roadway network.

3.1.1.A Benton County Functional Classification System

This Transportation System Plan (TSP) continues the functional classification system defined in the1980 Comprehensive Plan Transportation Element:

Principal Arterials connect communities, provide through movement, and are primarily state highways. Access is limited and controlled, and parking is generally prohibited.

Minor Arterials connect areas of principal traffic generation to principal arterials, provide through movement, and distribute traffic to collector and local roadways. Access and parking are controlled.

Major Collectors carry local traffic between neighborhoods, or between neighborhoods and arterials, and provide access to minor collectors and community services. Access and parking are controlled.

Minor Collectors serve internal traffic within areas having a single land use pattern, and serve minor traffic generators such as schools or neighborhood shopping or community centers. They should not form a continuous network in urban areas. Access and parking are allowed.

Resource Collectors connect timber and agricultural areas with the arterial system. Their design standards take the characteristics of resource-oriented traffic into account.

Local Roads provide direct access to abutting property and may provide on-street parking. Their design discourages through traffic. Dead-end street lengths are minimized.

Figure 3-1 presents the functional classifications for the Benton County roadway system, including the roadways listed by category below:

Principal Arterials

- U.S. 20
- Highway 34
- Highway 99W
- Kings Valley Highway (OR 223)
- Territorial Highway (OR 200)

Minor Arterials

- Independence Highway
- Camp Adair Road
- Lewisburg Road
- Highland Drive
- Lester Avenue
- Granger Avenue
- Metge Avenue
- Scenic Drive (Valley View Drive to Gibson Hill Drive)
- North Albany Road
- Springhill Drive (U.S. 20 to north of Nebergall Loop)
- Walnut Boulevard
- SW 53rd Street (north of U.S. 20/ Highway 34)
- Reservoir Avenue
- West Hills Road (Reservoir Avenue to 9th Street)
- Bellfountain Road
- Airport Avenue
- Decker Road
- Greenberry Road
- Alpine Road (Bellfountain Road to Alpine Cutoff)
- Alpine Cutoff
- Alsea Deadwood Highway
- Granger Avenue

Major Collectors

- Springhill Drive (Independence Highway to north of Nebergall Loop)
- Scenic Drive (Springhill Drive to north of Valley View Drive)
- Valley View Drive
- Crocker Lane
- Gibson Hill Drive
- West Thornton Lake Drive
- Scenic Drive (Gibson Hill Drive to U.S. 20)
- Oak Grove Drive
- Ryals Avenue
- Arnold Avenue
- Coffin Butte Road
- Soap Creek Road (Coffin Butte Road to Tampico Road)

- Tampico Road (Soap Creek Road to Highway 99W)
- Mountain View Drive
- Crescent Valley Drive (north-south portion)
- Oak Creek Drive
- West Hills Road (east from Reservoir Road)
- 19th Street
- Hoskins Road
- Marys River Road (Hoskins Road to U.S. 20)
- Priest Road
- 13th Street-Fern Road (from U.S. 20/Highway 34 south)
- Chapel Drive
- Plymouth Drive
- SW 53rd Street (U.S. 20/Highway 34 to Plymouth Drive)
- Airport Avenue (Fern Road to Bellfountain Road)
- Llewellyn Road (Fern Road to Highway 99W)
- Dawson Road (Foster Road to Highway 99W)
- Alpine Road (Nichols Road to Bellfountain Road)
- Bellfountain Road (Alpine Road to Cherry Creek Road)
- Alpine Road (Alpine Cutoff to Highway 99W)
- Coon Road

Minor Collectors

- Palestine Avenue
- Hillcrest Drive-Edgewood Drive
- Pettibone Drive
- Robison Road
- Rifle Range Road
- Tampico Road (west of Soap Creek Road)
- Arboretum Road
- 9th Street
- Oak Creek Drive (north of Cardwell Hill Drive)
- Cardwell Hill Drive (near Oak Creek)
- Country Club Drive
- Grange Hall Road
- Ervin Road
- Peterson Road
- Llewellyn Road (west of Fern Road)
- Dykstra Road
- Larson Road
- Larkin Road
- Foster Road
- Orchard Tract Road

The following roads have had their functional classifications changed by this TSP:

- **Oak Grove Drive** (Metge Avenue to Scenic Drive): from Major Collector to Minor Arterial
- **West Hills Road** west of Reservoir Road: from Major Collector to Minor Arterial
- **Reservoir Road**: from Minor Collector to Minor Arterial
- **Crescent Valley Drive**: from Minor Arterial to Major Collector (consistent with City of Corvallis' designation as Neighborhood Collector)
- **Airport Avenue** east of Bellfountain: from Major Collector to Minor Arterial

- **Priest Road**: from Minor Arterial to Major Collector
- **Alpine Road** east of Alpine Cutoff: from Minor Arterial to Major Collector
- **Alpine Cutoff**: from Major Collector to Minor Arterial

These changes recognize changing traffic patterns, new routes created by planned road extensions, and general improvements to the overall system network of streets and roads. The system of functional classifications and the assignment of specific roads to these classes seek to balance access and mobility throughout the system. Local roads provide direct access to abutting property and are not suited to provide a high degree of mobility through the areas they serve. Local roads connect to higher-classification roadways that provide progressively less access and progressively greater mobility. The highest-type facility, a fully controlled freeway or expressway, limits access to connections with well-spaced minor arterials and major collectors, allowing excellent mobility.

In an urban setting, planners strive for a rough grid of streets of each functional classification, with minor collectors in a fairly close grid and freeways in a very large-scale grid. Although the rural nature and hilly terrain of much of Benton County do not lend themselves to this simple grid plan, the principal of balancing access and mobility still holds. Most trips should start and end on lower-type facilities (high access) and be served in the middle by higher-type facilities (high mobility).

3.1.1.B Oregon Highway Classifications

The 1991 **Oregon Highway Plan (OHP)** established a level of importance (LOI), comparable to a functional class, which identified a roadway's function and established level of service and access standards for it. The following levels of importance were defined:

Interstate Highways connect major cities, regions of the state, and other states. These highways should provide "safe and efficient high-speed continuous-flow operation in urban and rural areas."

Statewide Highways connect larger urban areas, ports, and major recreation areas not directly served by the interstate highway system. They should provide "safe and efficient high-speed continuous-flow operation in rural areas and high- to moderate-speed operations with limited interruptions of flow in urban and urbanizing areas."

Regional Highways connect smaller population centers to larger population centers and to higher level facilities. Land access is a secondary function. They should provide "safe and efficient high-speed continuous-flow operation in rural areas, except where there are significant environmental constraints, and moderate- to low-speed operation in urban and urbanizing areas with moderate interruptions to flow."

District Highways serve local traffic and provide land access, providing a function similar to county roads. They should provide "safe and efficient moderate- to high-speed continuous-flow operation in rural areas reflecting the surrounding environment, and moderate- to low-speed operation in urban and urbanizing areas with moderate to high level of interruptions to flow."

The Oregon Transportation Commission adopted an amended OHP in March 1999. The 1999 OHP is an innovative document that will guide how the state highways are developed and managed over the next 20 years. The plan responds to the challenges of major population growth and limited resources by emphasizing the following:

- Investments consistent with state and local community priorities
- Efficient management of the highway system and use of new techniques to increase safety and extend capacity
- Partnerships with other agencies and local governments
- Closer links between land use and transportation
- Closer links with other transportation modes

The 1999 OHP also modifies the classification system, identifying roadway functions and establishing mobility and spacing standards for these roadways. Policy 1A establishes the State Highway Classification System and states: "It is the policy of the State of Oregon to develop and apply the state highway classification system to guide ODOT priorities for system investment and management." The Benton County background work, inventory, and analysis leading to this TSP were completed prior to adoption of the 1999 OHP. Consequently, the above description of the 1991 OHP classification system has been retained in this document. The1999 OHP provides the following new definitions for Interstate, Statewide, Regional, and District Highways, and also establishes new classifications of Expressways and Local Interest Roads:

Interstate Highways (National Highway System, NHS) provide connections to major cities, regions of the state, and other states. A secondary function in urban areas is to provide connections for regional trips within the metropolitan area. The Interstate Highways are major freight routes and their objective is to provide mobility. The management objective is to provide for safe and efficient high-speed continuous-flow operation in urban and rural areas.

Statewide Highways (National Highway System, NHS) typically provide inter-urban and inter-regional mobility and provide connections to larger urban areas, ports, and major recreation areas that are not directly served by Interstate Highways. A secondary function is to provide connections for intra-urban and intra-regional trips. The management objective is to provide safe and efficient, high-speed, continuous-flow operation. In constrained and urban areas, interruptions to flow should be minimal. Inside Special Transportation Areas (STAs), local access may also be a priority.

Regional Highways typically provide connections and links to regional centers, Statewide or Interstate Highways or economic or activity centers of regional significance. The management objective is to provide safe and efficient, high-speed, continuous-flow operation in rural areas and moderate to high-speed operations in urban and urbanizing areas. A secondary function is to serve land uses in the vicinity of these highways. Inside STAs, local access is also a priority. Inside Urban Business Areas, mobility is balanced with local access.

District Highways are facilities of county-wide significance and function largely as county and city arterials or collectors. They provide connections and links between small urbanized areas, rural centers and urban hubs, and also serve local access and traffic. The management objective is to provide for safe and efficient, moderate to high-speed continuous-flow operation in rural areas reflecting the surrounding environment and moderate to low-speed operation in urban and urbanizing areas for traffic flow and for pedestrian and bicycle movements. Inside STAs, local access is a priority. Inside Urban Business Areas, mobility is balanced with local access.

Local Interest Roads function as local streets or arterials and serve little or no purpose for through traffic mobility. Some are frontage roads; some are not eligible for federal funding. Currently, these roads are District Highways or unclassified and will be identified through a process delineated according to Policy 2C. The management objective is to provide for safe and efficient, low to moderate speed traffic flow and for pedestrian and bicycle movements. Inside STAs, local access is a priority. ODOT will seek opportunities to transfer these roads to local jurisdictions.

The Land Use and Transportation Policy of the OHP encourages compact development patterns while serving the mobility needs of the through traveler on state highways that also serve as the main streets of many communities. Compact development patterns benefit the transportation system by reducing local trips and travel on state highways to shop and do business, by encouraging more opportunity to walk, bicycle, or use available transit services, and by increasing opportunities to develop transit. Encouraging growth in more compact development patterns is partially accomplished in the policy with the use of the highway classification "Expressway," a subset of Statewide, Regional, and District Highways, and the highway segment designations of:

- Special Transportation Areas (STAs)
- Urban Business Areas (UBAs)
- Commercial Centers

It is the goal of the OHP to ensure mobility on designated highways and highway segments while encouraging compact development patterns in urban areas. Expressways ensure mobility while STAs promote community vitality and livability in downtowns and compact centers. UBAs and Commercial Centers are tools to improve

the connections between highway use and commercial activity. Expressways, STAs, UBAs, and Commercial Centers are used in conjunction with one another as a set of tools to balance mobility and livability on the state highway system.

The 1999 OHP replaces the old Level of Service (LOS) standard with a mobility standard. The Highway Mobility Standards Policy applies primarily to transportation and land use planning decisions. By defining acceptable levels of highway system mobility, the policy provides direction for identifying highway system deficiencies. The policy does not, however, determine what actions should be taken to address the deficiencies. The highway mobility standards in the policy (volume/capacity ratio, or V/C) are neutral regarding whether solutions to mobility deficiencies should be addressed by actions that reduce highway volumes or increase highway capacities.

The Highway Mobility Standards Policy will primarily affect land use decisions through the requirements of the TPR. The TPR requires that regional and local transportation system plans be consistent with plans adopted by the Transportation Commission. The TPR also requires that comprehensive plan amendments and zone changes which significantly affect a transportation facility be consistent with the adopted function, capacity, and performance measures for the affected facility. The Highway Mobility Standards Policy establishes ODOT's mobility performance measures for state highways. The mobility standards that apply outside of the Portland metropolitan area are contained in Table 6 of the OHP, reproduced in this TSP as **Table 3-1**, below.

Table 3-1
(Table 6 from the Oregon Highway Plan)
Maximum Volume to Capacity Ratios for Peak Hour Operating Conditions Through a Planning Horizon for State Highway Sections Located Outside the Portland Metropolitan Area Urban Growth Boundary

Highway Category	Land Use Type/Speed Limits					
	Inside Urban Growth Boundary				Outside Urban Growth Boundary	
	STAs	MPO	Non-MPO outside of STAs where non-freeway speed limit is <45 mph	Non-MPO where non-freeway speed limit is >= 45 mph	Un-incorporated communities	Rural lands
Interstate Highways and Statewide (NHS) Expressways	N/A	0.80	0.70	0.70	0.70	0.70
Statewide (NHS) Freight Routes	0.85	0.80	0.75	0.70	0.70	0.70
Statewide (NHS) Non-Freight Routes and Regional or District Expressways	0.90	0.85	0.80	0.75	0.75	0.70
Regional Highways	0.95	0.85	0.80	0.75	0.75	0.70
District/ Local Interest Roads	0.95	0.90	0.85	0.80	0.80	0.75

Table 6 Notes:

- Interstates and Expressways shall not be identified as Special Transportation Areas (STAs).
- For the purposes of this policy, the peak hour shall be the 30th highest annual hour. This approximates weekday peak hour traffic in larger urban areas.
- For the purposes of Policy 1F and Table 6, the MPO category includes areas within the planning boundaries of the Eugene/Springfield, Medford, and Salem/Keizer Metropolitan Planning Organizations, and any other MPO areas that are designated after the adoption of this plan.

This Benton County TSP was prepared from an analysis of the levels of service of state highways along with the county roads. The background work leading to the Benton County Plan was completed in June 1996. **Table 3-3** provides an approximate conversion from LOS to volume/capacity ratio (V/C). Inclusion of the following policies is intended to bring the adoption of this plan into acceptable compliance with the TPR and OHP requirements at this time:

- Land use actions affecting state highways shall be consistent with the Oregon Highway Plan.
- Benton County shall use V/C ratios and spacing standards from the OHP for projects and development proposals affecting state highway facilities. Decisions on alternatives shall be evaluated in accordance with the OHP.
- Benton County shall commit to making necessary transportation policy changes to the Benton County Plan in the next periodic review cycle as follows: existing and projected traffic volumes will be updated, and traffic capacity analysis will be changed from LOS to V/C ratios.
- Benton County shall coordinate development of its transportation planning and project development with all affected jurisdictions, including federal, state, regional, county, and cities. One part of the ongoing

coordination will be to notify public agency transportation providers (metropolitan planning organization, public transit operators, municipal airport, and ODOT) of the following land use actions that require a public hearing:

a. subdivision and partition applications

b. other applications that affect private access to roads

c. other applications within airport noise corridors and imaginary surfaces that affect airport operations

Projects identified in this plan that impact state highway facilities are potential solutions that will require further evaluation in accordance with the OHP during the project development process.

Appendix C of the1999 OHP contains new Access Management Standards that must be applied to new or modified public or private access to state highways. These Access Management Standards have been included in Appendix B of this Benton County TSP.

3.1.2 Description of the Roadway System

The public roadway system within Benton County is maintained and under the jurisdiction of five agencies:

- The Oregon Department of Transportation (ODOT), which operates approximately 122 miles of roadway within the County, including all of the most heavily traveled.
- Benton County is responsible for approximately 470 miles of roadway, including a few roadways within incorporated cities.
- The Federal Government, through agencies such as the U.S. Forest Service and the Bureau of Land Management.
- Special Road Districts, which may tax themselves to maintain certain public local access roadways.
- Local cities (Corvallis, Albany, Philomath, Adair Village, and Monroe), with jurisdiction of the remaining public roadways within their boundaries.

3.1.2.A State Highways

The following roadways within Benton County are maintained by and under the jurisdiction of ODOT:

Corvallis-Newport Highway (U.S. 20) provides the primary connection between Benton County and the coast, and serves communities in the northwest portion of the County, including Philomath, Wren, Burnt Woods, and Blodgett. This highway is classified as a Statewide NHS (National Highway System) Highway and is a designated Freight Route.

Corvallis-Lebanon Highway (Highway 34) is the main connection between Benton County and I-5 and provides the most direct route to Santiam Pass leading into Central Oregon. The highway is classified as a Statewide NHS Highway and is a designated Freight Route.

Pacific Highway West (Highway 99W) provides the main north-south route through Benton County, connecting communities along the west side of the Willamette Valley, including Monroe, Corvallis, Lewisburg, and Adair Village. This highway is classified as a Regional Highway.

Albany-Corvallis Highway (U.S. 20) follows the west side of the Willamette River between Albany and Corvallis and serves as an alternate route to I-5 from Benton County. The highway provides the only bridge crossing of the Willamette River between Corvallis and Independence. The highway is classified as a Regional Highway.

Alsea Highway (Highway 34) provides a secondary connection to the coast, departing U.S. 20 at Philomath, climbing over the side of Marys Peak, and passing through Alsea on its way to Waldport. This road has a number of low-speed, windy sections, especially the portions east of Marys Peak Road and west of Alsea. This is classified as a District Highway.

Kings Valley Highway (Highway 223) connects Wren with Kings Valley, Falls City, and Dallas. This is classified as a District Highway.

Eddyville-Blodgett Highway provides an alternate route to U.S. 20 over the Coast Range, leaving U.S. 20 at Blodgett and passing through Summit and Nashville before returning to U.S. 20 at Eddyville. This highway is classified as a District Highway.

Territorial Highway connects Monroe to Cheshire, Veneta, and other communities in Lane County. This is classified as a District Highway.

Alsea-Deadwood Highway heads south from Alsea, providing access to South Fork, Hazel Glen, and Lobster Valley Roads. This is classified as a District Highway.

3.1.2.B County Roads

The County is responsible for many roadways within Benton County. The following sections describe the roadways and current conditions in detail.

3.1.2.B.1 Pavement Conditions

Benton County has jurisdiction over approximately 470 miles of roads. Of this total, the surface of approximately 113 miles are asphaltic concrete, 132 miles of oil mat, 189 miles of gravel, 17 miles of dirt, and 19 miles of an unclassified surface.

During the summer of 1995, as part of the roadway inventory work conducted for this TSP, a pavement conditions survey was conducted on paved County roadways outside urban growth boundaries. The roadways were rated using a good-fair-poor system developed by the Strategic Highway Research Program and adopted by ODOT. ODOT's goal, as stated in the 1991 OHP, is to maintain 90 percent of the state system in fair-or-better condition. **Table 3-2** describes the pavement conditions and riding qualities associated with each category. **Figure 3-2** shows the results of the 1995 pavement condition survey.

Table 3-2
Pavement Condition Categories

Category	Asphaltic Concrete	Portland Cement Concrete
GOOD	Minor cracking, generally hairline and hard to detect. Very good riding qualities. Rutting less than 1/2 inch. Only improvement needed is rejuvenation of the wearing surface.	Original surface texture evident or worn only in wheel tracks. No faulting is evident. Minor cracking or spalling. Ride qualities are good.
FAIR	Minor areas of structural weakness evident. Cracking easier to detect. Patched, but not excessively. Rutting more pronounced and easier to detect. Riding qualities are good. Improvements range from a thin oil mat for low volume roads to a 2-inch overlay for higher-volume roads.	Some spalling and cracking, with a few areas requiring minor levels of repair. Shoulder joints may show evidence of deterioration and loss of slab support. Faulting may be evident. Ride qualities are good.
POOR	Areas of instability, marked evidence of	Cracking patterns are evident.

	structural deficiency, large crack patterns, heavy and numerous patches, and very noticeable deformation. Riding qualities range from acceptable to poor. Improvements range from a 2- to 4-inch overlay to reconstructing the roadway.	Occasional punch out repair evident. Some joints and cracks show loss of base support. Ride may continue to be acceptable.

Benton County also rates its roadways as part of its Pavement Management System (PMS). With few exceptions, the pavement condition survey ratings and the County's ratings agree on pavement sections in fair-or-better condition (number of locations existed where one entity rated a pavement section fair while the other rated it good, and visa-versa). Pavement ratings shown in **Figure 3-2** for roadways within the urban growth boundaries of Albany, Corvallis, and Philomath are taken from the County's pavement management system.

Regular maintenance of roadways will reduce costs over the long term. **Figure 3-3** illustrates the relationship between pavement condition and time ("Pavement Management System Study Summary Report," Metropolitan Transportation Commission, Oakland CA, 1985). The rate of deterioration increases rapidly in the later years of a pavement's useable lifetime. Typical pavements will show a 40 percent quality drop after the first 75 percent of their useable lifetime.

The next 40 percent quality drop will occur in only the next 12 percent of the usable lifetime. Moreover, every dollar spent on pavement rehabilitation when pavement quality is still fair will correspond to four to five dollars required for rehabilitation if maintenance is deferred until pavement quality is very poor. These factors make deferred maintenance very expensive, and an appropriate PMS very desirable.

Pavement Preservation

Benton County is responsible for approximately 245 miles of hard surface roadways. The cost of maintaining these roadways varies from $45,000 to $200,000 per mile of overlay, based on road conditions and width. The average life span of roadway paving and resurfacing is approximately 20 years. Over the 20-year span that this TSP represents, it could reasonably be assumed that all 245 miles of hard surface roadway in the County would require resurfacing. This assumes of course that the County determines that maintaining all 245 miles as hard surface roadways is desirable. This results in a 20-year fiscal need of approximately $24.5 million, or approximately $1.225 million on an average annual basis.

Benton County uses a Pavement Management System (PMS) to determine which roadways require preservation work and the timing of the need. This PMS considers the daily volume of traffic, vehicle mix (truck, auto, recreational vehicle, etc.), roadway classification, and current condition of the roadway as key factors in determining need and timing of improvements.

The key elements of a PMS include: scheduled, regular inspections of all paved roads, established thresholds from roughness and/or visual distress surveys that will trigger a structural survey of a given road segment, correlation between the age of the existing surface, its present condition, and projected time of most economical major maintenance, and an annually updated list of anticipated minor and major maintenance for at least five years ahead.

Roadways identified in poor condition include:

- Northern half-mile of Luckiamute Road
- Most of the Alsea-Deadwood Highway
- Paved section of Old Peak Road near Highway 34

In addition to these poorly rated roadways, several other roadways were identified as likely needing preservation work within the near-term (zero to five-year period), including:

- SW 53rd Street between Reservoir Avenue and U.S. 20/Highway 34
- West Hills Road east of SW 53rd Street to Western Boulevard

- Country Club Road between SW 53rd Street and U.S. 20/Highway 34
- Oak Creek Drive north of Cardwell Hill Road
- Ponderosa Drive west of Deer Run Street
- The section of Harrison Boulevard under County jurisdiction

Expenditures to maintain these roadway pavements will increase substantially if preservation activities are postponed. The County's PMS is calibrated to maximize the efficiency of the roadway system and minimize the overall capital expenditure for such preservation work.

Only when preservation is performed within a reasonable timeframe on the identified need, is the County able to minimize its preservation expenditures in total.

Current funding levels for pavement preservation are not keeping pace with needs. In fact, recent funding levels for pavement preservation have been only approximately 15 percent of the identified average annual need. Information provided in Chapter 7 identifies methods of funding to support the average annual need through the 20-year planning horizon.

An alternative to providing funding at approximately $1.225 million annually would be for the County to convert some of its hard surface roadways to gravel roads. This approach would reduce the financial need, but incur other potential costs and impacts. Roadways converted back to gravel create dust and other environmental/livability impacts, result in increased frequency of automobile repairs, increase travel times, and divert traffic to other paved roads. Although this list of potential costs and impacts resulting from such a policy decision is not complete, it is sufficient to identify the significance of the decision.

Should it become necessary for the County to convert hard surface roadways to gravel, it is recommended that County staff uses the PMS to identify those roadways that would result in the least adverse impacts due to the conversion. Ideally, identified roadways would have low average daily traffic volumes (generated by the lowest population densities) and alternative access via a paved road.

3.1.2.B.2 Railroad Crossings and Bridges

Railroad crossing improvements and bridge repairs account for a number of the County's capital improvement projects. **Figure 3-4** identifies bridges and railroad crossings in the County. In 1996, 16 bridges in Benton County had weight restrictions and two had height restrictions (as shown in **Figure 3-4**).

Many of the bridges in Benton County need to be replaced due to deterioration, structural inadequacy, weight limits, and seismic safety. Within the City of Corvallis, the Van Buren Street Bridge over the Willamette River has been identified for replacement. This project, estimated to cost $5 million, will eliminate a bottleneck for eastbound traffic leaving Corvallis. ODOT has jurisdiction over this bridge. The Corvallis Transportation System Plan recommends this project for inclusion in the State Transportation Improvement Plan. Proposals have been made to retain the existing structure for pedestrian and bicycle use.

The future north Corvallis bypass will provide a northern crossing of the Willamette River in the Corvallis area, providing a faster route between northern Benton County and I-5 and allowing north Highway 99W through traffic to avoid the Corvallis central business district.

CH2M Hill conducted a seismic safety study of Oregon bridges for ODOT, the Association of Oregon Counties, and the League of Oregon Cities ("Seismic Vulnerability of Local Agency Bridges," 1995). This study identified 31 bridges under Benton County's jurisdiction that are in need of seismic upgrades, at a total estimated cost of $4.02 million. The study also identified 26 bridges in Benton County under ODOT's jurisdiction that are seismically vulnerable.

Three historic covered bridges are located in Benton County. One is on Hayden Road over the Alsea River west of Alsea, another is on Harris Road over the Marys River west of Wren, and the third is located on the Oregon State University Campus Way bike path in Corvallis.

3.1.2.B.3 Intersection Alignment and Control

Figure 3-5 identifies the controls used at intersections of arterials and collectors within the County, including whether exclusive left- or right-turn lanes are provided on the main roadway.

The following intersections are currently uncontrolled:

- Coffin Butte Road/Soap Creek Road
- Airport Avenue/Peterson Road
- Bellfountain Road/Nichols Road/Cherry Creek Road.

The intersections listed below are not conventional three- or four-leg intersections. Instead they are "Y" intersections or intersections where the through route makes a 90-degree turn via a horizontal curve in one quadrant of the intersection.

- Palestine Avenue/Oak Grove Drive
- Bellfountain Road/Dawson Road
- Stow Pit Road/Old River Road
- West Ingram Island Road/Old River Road
- Dodge Island Road/Old River Road
- Alsea-Deadwood Highway/Lobster Valley Road/Hazel Glen Road

3.1.2.B.4 Road Shoulders

Road shoulders are commonly used by bicyclists, for emergency parking, and for the movement of farm and other low-speed motorized equipment. They also provide a buffer zone between the travel lane and roadside obstacles such as slopes, ditches, and trees.

Shoulders that are six feet or wider provide sufficient room for vehicles to pull off the roadway in an emergency and allow most low-speed equipment movement without blocking the travel lane. When paved, they also function as bikeways. Shoulders in the range of two to five feet in width still act as buffers and allow vehicles to pull partially off the road. When paved, they function as narrow bikeways. Shoulders narrower than two feet provide no emergency parking, offer limited buffer between the travel lane and roadside obstacles, and bicycles share the travel lane with vehicles. **Figure 3-6** identifies paved shoulder widths on County roads.

Roads with inadequate shoulder widths include a number of roads used by touring and recreational bicyclists, including portions of Bellfountain Road, Soap Creek-Sulphur Springs Road, Highway 34, and South Fork Road.

3.1.2.B.5 Vehicular Demand/Roadway Capacity

Figure 3-7 depicts the most recent available traffic volumes on collectors and arterials within Benton County. Traffic volumes on state highways are 1994 counts, while traffic volumes on County roads are counts from 1989 through 1995.

Residual capacity exists on all of the state and county roadways considered in this TSP, under existing conditions. In 1996, the existing demand exceeded planned level of service thresholds on several segments of the state highway system within Benton County, including:

- U.S. 20 from approximately Clemens Mill Road west to the County line
- U.S. 20 from Conifer Avenue north to approximately Blossom Lane
- Highway 99W from Tampico Road south to approximately Mountain View Drive
- Highway 99W from Park Avenue south to approximately Kiger Island Drive

3.1.3 Performance Evaluation of the Existing Systems

The following section describes the analysis methodologies applied to determine the adequacy of the existing system. System performance was evaluated in terms of capacity, safety, connectivity, and/or mobility. Analysis findings are summarized and deficiencies identified.

3.1.3.A Roadway Level of Service Analysis

To determine how well county roadways are operating under current traffic volumes, a planning level arterial LOS analysis was conducted using the 1995 Florida Level of Service Manual. The Florida method is based on the 1994 Highway Capacity Manual (HCM), but is focused more toward planning applications where only minimal information is available, such as average daily traffic (ADT) volumes and the number of lanes, rather than on detailed operational analyses. The main differences between the two methods are that the default values used in the Florida method are based on studies conducted in Florida by the Florida Department of Transportation, and the Florida method provides capacity adjustment factors for the presence of left-turn lanes and medians along roadways that the HCM does not.

The Florida method provides several levels of detail, depending on the amount of information available to the planner. The lowest level of detail is Florida's Generalized Level of Service Tables, which apply defaults to all of the inputs required for the various HCM methods. These tables list maximum ADTs for particular levels of service for various types of roadways and settings (rural, transitional, or urban). More detail is available through the use of Florida's table-generating spreadsheets, which allow planners to override defaults with locally collected data to create level of service tables individualized for a particular roadway or set of roadways. When signal timing and spacing data are available, a third level of detail is available for analyzing interrupted-flow facilities such as urban arterials.

Benton County roadways were analyzed using several of these methods. In general, state highways were divided into segments having similar traffic and geometric and adjacent land use characteristics. Each segment was analyzed individually. County roadways were grouped into broad categories of roads having similar characteristics. Florida's rural two-lane uninterrupted highway spreadsheets were used for all highways outside of urban growth boundaries and the Alpine/Bellfountain area. The urban two-lane uninterrupted spreadsheets were used for roadways in rural communities and areas transitioning to urban areas. Finally, the detailed arterial planning spreadsheets were used for signalized segments of U.S. 20 and Highway 99W within urban growth boundaries.

Levels of service (LOS) range from A to F, with LOS "A" indicating free-flow, unconstrained conditions, LOS "E" indicating operation at capacity, and LOS "F" indicating over-capacity, congested conditions. For rural two-lane roads, level of service is based on volume/capacity ratio, terrain, and the percent of the roadway segment striped for no passing. For urban arterials, LOS is based on average travel speeds through a particular roadway segment. It should be noted that arterial LOS is not the same as the delay-based intersection levels of service typically reported in traffic studies, which can be higher or lower than the overall arterial LOS. **Figure 3-8** depicts existing roadway levels of service for arterials and major and minor collectors in Benton County.

The 1999 OHP replaces the LOS standards for state highways with V/C ratios and mobility standards. **Table 3-3** provides an approximate conversion for LOS to V/C.

Table 3-3
Level of Service (LOS) to Volume /Capacity Ratio (V/C) Conversions

LOS Value	Rural V/C Range	Urban V/C Range
A	0.00-0.20	0.00-0.26
B	0.21-0.35	0.27-0.42
C	0.36-0.50	0.43-0.56
D	0.51-0.70	0.57-0.75

E	0.71-0.99	0.76-0.99
F	1.0	1.0

Table 3-3 Notes:

- Rural applies to the Rural Two-Lane Uninterrupted Highways; used for all highways in Benton County that are outside of the UGB.
- Urban applies to the Urban Two-Lane Uninterrupted Highways; used for roadways in Benton County that are in rural communities and areas transitioning into urban areas.

3.1.3.B Signal Warrant Analysis

Thirty-five higher-volume intersections were analyzed to determine the possible need for signalization. This need is based on the national-standard signal warrants given in the Manual on Uniform Traffic Control Devices (1988). The Manual provides 11 signal warrants, including those based on accident experience, pedestrian volumes, and coordinated signal systems. This analysis only evaluated two of the volume-based warrants. A signal should not be installed until at least one warrant is met; however, the satisfaction of a warrant is not, of itself, sufficient reason to install a signal. Further engineering evaluation must be conducted and the judgment of an engineer applied to verify the appropriateness of such a treatment.

The two warrants evaluated were Warrant 1 (Minimum Vehicular Volume) and Warrant 2 (Interruption of Continuous Traffic). Both of these warrants are based on 8th-highest hour volumes; in order to satisfy these warrants, traffic volumes on the major and minor intersection approaches must be greater than the warrant volumes for at least eight hours out of the day. The warrant volumes vary by the importance of the approach (major street vs. minor street), the number of through lanes on the approach, the posted or 85th-percentile speed on the major street, and the area population.

To satisfy Warrant 1 with single-lane approaches on both roadways, the total major street volume must be at least 500 vehicles per hour for eight hours of the day, and the higher minor street approach volume must be at least 150 vehicles per hour for eight hours of the day. To satisfy Warrant 2 under the same conditions, the total major street volume must be 750 vehicles per hour, and the higher minor street approach volume must be at least 75 vehicles per hour. When the major street speed is greater than 40 mph or the intersection is located within the built-up area of an isolated community having a population less than 10,000, the warrant volumes are 70 percent of those shown above.

A “planning level” signal warrant analysis was conducted first to identify the most likely locations for potential signals. At this level of analysis, several assumptions are made to convert daily roadway volumes into 8th-highest hour approach volumes. For the purposes of this initial analysis, it was assumed that p.m. peak hour traffic was 10 percent of the average daily traffic, and that the 8th-highest hourly volume was 70 percent of the p.m. peak hour traffic (equivalent to 7 percent of the ADT). It was also assumed that the directional distribution of traffic on minor street intersection approaches was two-thirds in the peak direction and one-third in the off-peak direction. These assumptions are based on averages from national studies. **Table 3-4** lists the intersections that meet at least one signal warrant using this method.

Table 3-4
Planning Level Existing Conditions Signal Warrants

Intersection	Warrant 1	Warrant 2
Scenic Drive/U.S. 20	YES	YES
Highway 34/U.S. 20	YES	YES
Walnut Boulevard/Harrison Boulevard	YES	YES
Reservoir Road/SW 53rd Street	YES	YES
Independence Highway/U.S. 20	NO	YES
Granger Avenue/U.S. 20	NO	YES
Arnold Way/Highway 99W	NO	YES

Once the list of potential signal locations had been narrowed, p.m. peak hour turning movement counts were conducted at these intersections and several other key intersections to more accurately determine existing intersection operation and the need for signalization. The LOS at each intersection was then analyzed using the procedures given in the 1995 HCM. **Table 3-5** lists the results of this analysis and **Figure 3-8** depicts the levels of service at these intersections.

Table 3-5
Existing Conditions Intersection Levels of Service

Intersection	Signalized/All-Way Stop		Unsignalized		LOS
	V/C	Intersection Delay (sec)	Critical Movement	Movement Delay	
Scenic Drive/U.S. 20			SB	33.6	E
Independence Highway/U.S. 20			SB	>60.0	F
Granger Avenue/U.S. 20			SB	>60.0	F
Highway 34/U.S. 20			NB LT	16.2	C
Camp Adair Road/Highway 99W			WB TH/LT	10.1	C
Arnold Avenue/Highway 99W			WB	12.2	C
Greenberry Road/Highway 99W			EB	6.7	B
Walnut Boulevard/Harrison Boulevard	*	9.5			B
Reservoir Road/SW 53rd Street			EB	15.4	C
West Hills Road/SW 53rd Street			EB	7.4	B
West Thornton Lake Road/North Albany Road			EB	5.8	B
Alpine Road/Highway 99W			EB	5.9	B

Orchard Road/Highway 99W			EB	5.7	B
Philomath Boulevard/SW 53rd Street	0.62	18.4			C

V/C: Volume-to-Capacity Ratio LOS: Level of Service

* : A refined level of service analysis was required for this multi-lane approach, all-way stop intersection.

Table 3-5B provides an approximate conversion from LOS to V/C ratio for signalized intersection segments that allow comparison of LOS values on Highway 99W and U.S.20 intersections inside Urban Growth Boundaries.

Table 3-5B
LOS to V/C Ratio Conversion for Signalized Intersections

LOS Value	V/C Range
A	0.00-0.50
B	0.51-0.61
C	0.62-0.75
D	0.76-0.85
E	0.86-0.99
F	1.00

Two intersections currently operate at level of service F: Independence Highway/U.S. 20 and Granger Avenue/U.S. 20. All other intersections currently operate at acceptable levels of service. The Scenic Avenue/U.S. 20 intersection operates at LOS E because of the low volume of traffic approaching the intersection from Scenic Avenue during the weekday p.m. peak hour. It is likely that much of the traffic that might use this intersection diverts to other roads, particularly Gibson Hill and North Albany Roads.

Once actual p.m. peak hour turning movement counts had been obtained, an "operations level" signal warrant analysis was performed again to determine more accurately the need for signalization at key intersections. At this level of analysis, the only assumption is the ratio of 8th highest-hour traffic to peak-hour traffic**. Table 3-6** lists the results of this analysis. **Figure 3-9** shows the locations that meet signal warrants.

Table 3-6
Operations Level Existing Conditions Signal Warrants

Intersection	Warrant 1	Warrant 2
Scenic Drive/U.S. 20	NO	NO
Highway 34/U.S. 20	NO	YES
Walnut Boulevard/Harrison Boulevard	YES	NO
Reservoir Road/SW 53rd Street	YES	NO
Independence Highway/U.S. 20	NO	NO
Granger Avenue/U.S. 20	NO	YES
Arnold Way/Highway 99W	NO	NO

As shown in **Table 3-6**, no intersections meet both warrants 1 and 2. Two intersections along U.S. 20 with poor levels of service (Scenic Drive and Independence Highway) fail to meet signal warrants because of insufficient minor street approach volumes. Signalization is not needed at the Reservoir Road/SW 53rd Street intersection, despite the warrants, because it operates at an acceptable level of service C and because a large portion of the major-street volume that satisfies the warrants is right-turning volume that would not benefit from a signal. Similarly, the U.S. 20/Highway 34 intersection meets signal warrants primarily because of the northbound

right-turn movement, which can be accommodated by other means. The remaining two intersections would be isolated signals, if constructed, and therefore other mitigation measures should also be considered.

3.1.3.C Roadway Safety

The accepted statewide methodology for analyzing the safety of roadways involves a comparative analysis of similar roadway segments across a broad cross section (i.e., all state highways) to identify roadways and segments that have higher than average accident rates. The accidents that occur on these segments are then analyzed to determine if there is an inherent geometric safety problem associated with the roadway. This section summarizes any such deficiencies.

3.1.3.C.1 Roadway Accident History

ODOT accident histories for state highway segments outside of Corvallis were analyzed for the period 1990-92, the most recent years for which accident tables had been published. **Table 3-7** identifies roadway segments that had accident rates higher than the statewide average of similar roads during the same period. Accident rates are measured as number of accidents per million-vehicle-miles (MVM).

Table 3-7
State Highway Accident Rates

Highway	Segment	1990-92Accidents/MVM	Statewide AverageAccidents/MVM
99W	Corvallis SCL-Kiger Island Road	1.25	0.92
	Territorial Highway-Long Tom River	12.48	3.61
34	Lincoln County-Alsea	1.27	0.92
	Summit-Hide Creek Road	1.05	0.92
	Hide Creek Road-Junction U.S. 20	1.37	0.92
U.S. 20	Junction Highway 223-Junction Highway 34	1.09	0.92
	Corvallis NCL-Albany NCL	1.05	0.92
	Corvallis NCL-Albany NCL	1.16	0.92
223	Luckiamute River-Junction U.S. 20	1.29	1.27

NCL: North City Limits SCL: South City Limits MVM: Million Vehicles Miles

The roadway segments with higher-than-average accident rates tend to have higher volumes (U.S. 20 between Corvallis and Albany, Highway 99W immediately south of Corvallis) or have a number of horizontal and vertical curves (Highway 34, Highway 223, U.S. 20 between Highway 223 and Philomath). The very high accident rate for the segment of Highway 99W between Territorial Highway and the Long Tom River is a methodological anomaly, due to the mathematical effect of examining an extremely short segment length (0.06 miles). This segment experienced four accidents during the period 1990–92.

When individual intersections are analyzed, an accident rate greater than 1.0 accidents per million entering vehicles (MEV) generally indicates a need for further study to identify potential accident causes. During the period 1990-92, no rural intersection on a state highway in Benton County had an accident rate higher than 0.58 accidents/MEV (the junction of U.S. 20 and Highway 34 west of Philomath).

County accident records for the period January 1993-March 1996 were also analyzed to identify potential safety problems. Five intersections were identified as having accident rates greater than 1.0 accidents/MEV, as shown in **Table 3-8**.

Table 3-8
Benton County Accident Rates

Location	Accidents/ MVM	Total Number of Accidents
Independence Highway/Springhill Drive	2.53	3
Independence Highway/Pettibone Road	1.91	4
Highway 34/Marys Peak Road	1.10	2
Highway 34/Fish Hatchery Road	1.26	2
Bellfountain Road/SW Airport Avenue	1.22	3

The higher accident rates on County roads are partially due to lower traffic volumes, which tend to magnify the effects of a single accident. However, two intersections (Independence Highway/Springhill Drive and Bellfountain Road/Airport Avenue) also appear on the "intersections of concern" list shown in **Table 3-9** Two of the four accidents at the Independence Highway/Pettibone Road intersection occurred during icy conditions. The other two intersections are on Highway 34 between Alsea and Philomath; each had two accidents in three years.

Table 3-9
Intersections of Concern

Intersection	Problem(s)
Bellfountain Road/Airport Avenue	poor sight distance on west approach due to horizontal and vertical curves to north
Granger Avenue/U.S. 20	high-volume intersection, curve and railroad tracks prior to intersection on Granger Avenue
Bellfountain Road/Greenberry Road	unusual geometry, no southbound left-turn lane, bridge to north
Independence Highway/U.S. 20	high-volume intersection, adjacent railroad tracks
Independence Highway/Ryals Avenue	intersection at hill crest, poor sight distance for northbound left turns, no left-turn lane
Scenic Drive/U.S. 20	high-volume intersection, short intersection spacing with railroad tracks between
Old River Road/Highway 99W	horizontal curve to north, no left-turn lane
Reservoir Avenue/SW 53rd Street	railroad undercrossing creates poor sight distance and roadway obstruction
Cox Lane/Larkin Road	intersection located on horizontal curve, poor sight distance for northbound left turn
Independence Highway/Springhill Drive	intersection located on horizontal curve, unusual intersection geometry
Grange Hall Road/Fern Road	intersection located on horizontal curve, bridge to north restricts sight distance

Intersection	Problem(s)
Stow Pit Road/Hwy 99W	horizontal curve south of intersection, trees and poles further restrict sight distance
Wren Road/Highway 223	intersection located on horizontal curve, unusual intersection geometry
Palestine Avenue/Oak Grove Drive	unusual intersection geometry
Priest Road/U.S. 20	horizontal curve west of intersection, no left-turn lane

3.1.3.C.2 Rail Safety

When railroad safety is considered in the public context, at-grade roadway crossings are usually the prevalent issue. Other concerns can be the haulage of hazardous materials and derailments. Neither of the latter two aspects has been identified as issues in Benton County. Materials that are carried in the County that might be considered low-level hazardous include fertilizers, LPG (Liquid Petroleum Gas), and flue dust.

From the stakeholders' point of view, it appears that the concern with crossings is mainly that of inconvenience in Corvallis. ODOT has documented 89 public crossings in Benton County. Of these, ten are separated crossings and two are pedestrian only. Of the total, 36 crossings lie within the Corvallis City limits. In order to consider the density of crossings within "downtown" Corvallis, this area could be considered to be bounded by U.S. 20 on the south, Buchanan Avenue on the north, 15th Street on the west, and the Willamette River on the east. There are 17 at-grade crossings within these boundaries and 10 of these lie in the 6th Street corridor. Within this area, ODOT has recorded only two accidents in the last five years, one at 6th and Washington and one at 7th near Western.

Elliot Circle: Three accidents in the past five years have been recorded at the railroad crossing at Elliot Circle. The crossing is marked with cross bucks and controlled with stop signs. ODOT Rail Safety Section staff have not supported the county's request for crossing protection improvements at this location due to the proximity to Highway 99W and the lack of a traffic signal on the highway at Elliot Circle. A signal on the highway would allow for rail preemption of the signal so traffic queued on Elliot Circle could enter the highway upon the approach of a train. The traffic volume on Elliot Circle is too low to meet signal warrants. ODOT staff has suggested that the full or partial closure of the Elliot Circle intersection is a preferred alternative. Closure of the intersection would result in out of direction travel to Granger Avenue and back for truck traffic serving the mill that is proximate to the intersection. Traffic would be diverted past the elementary school at the intersection of Granger Avenue and Elliot Circle. This intersection is located within the Corvallis urban growth boundary.

Granger Avenue/U.S. 20: Granger Avenue intersects U.S. 20 from the northwest after rounding a curve. The track lies about 40 feet from U.S. 20. Visibility is fair from both roads except for the reduced vision distance caused by the curve. Gates and signals protect the crossing. There have been no accidents recorded at this crossing in the past five years. Fourteen buses are scheduled to use this crossing. Because the railroad is less than 100 feet from the parallel highway, motorists making a turn off U.S. 20 need to be warned that a crossing is ahead. Therefore, and because of the curve, advance warning signs should be present on both roads.

Independence Highway/U.S. 20: Independence Highway intersects U.S. 20 from the north. The track lies parallel to and about 80 feet from U.S. 20. Because the track lies on a berm above U.S. 20, visibility is good. Gates and signals protect the crossing, and no accidents have been recorded at this crossing in the past five years. Four buses are scheduled to use this crossing. Because the railroad is less than 100 feet from the parallel highway, motorists making a turn off U.S. 20 need to be warned that a crossing is ahead. Therefore, advance-warning signs should be present on both roads.

Scenic Drive/U.S. 20: Scenic Drive first intersects West Thornton Lake Drive, then U.S. 20, from the north. The track lies parallel to and between both roads, about 70 feet from West Thornton Lake Drive and about 80 feet from U.S. 20. Visibility is good except for traffic approaching from the east on U.S. 20 where vision is obstructed by trees and brush. Gates and signals protect the crossing. There have been no accidents recorded at this crossing in the past five years. Ten buses are scheduled to use this crossing. Because the railroad is less than 100 feet from the parallel roadways, motorists making a turn from either need to be warned that a crossing is

ahead. Therefore, advance-warning signs should be present on both roads. Vegetation control would also improve the sight lines.

Reservoir Avenue/SW 53rd Street: The railroad track lies parallel to and about 50 feet from Reservoir and crosses SW 53rd Street above grade on a trestle. Because the grades are separated there is no danger of a vehicle-train accident. The trestle does limit the view of northbound traffic on SW 53rd Street from Reservoir Avenue.

The intersection of Reservoir Avenue and SW 53rd Street should be relocated to the southerly line of the Fairgrounds to facilitate improvement of the railroad crossing either as an at-grade or road overpass. This location was approved by the Board of Commissioners as the preferable alignment at their meeting on May 26, 1999.

According to the five-year train/vehicle accident history in Benton County there were 19 incidents recorded. Three each at Elliot Circle, and North 12th Street in Philomath. Two each at the two crossings in sequence at the west end of Philomath,, North 7th Street and U.S. 20 (spur track at Flynn). One each at the following crossings: North Albany Road, SW 7th Street near Western Boulevard, Reservoir Avenue (westernmost crossing, Conroy, spur track), Greenberry Road, Llewellyn Road, Airport Avenue, SW Washington at 6th, Ryals Avenue, and McFarland Road.

It is worth noting that Greenberry Road, Llewellyn Road, and Airport Avenue lie in a series south of Corvallis. This fact may be a coincidence, because the terrain is relatively open and flat and the track is a fair distance from Highway 99W. Although there is no apparent reason for the incidents, further investigation may be warranted. Gates and signals were recently installed at Ryals Avenue.

3.1.3.D Connectivity

The existing transportation system has a number of discontinuities due to physical constraints and/or obstructions (i.e. rivers, mountains, flood plains, and steep slopes). While it is expected and accepted that some discontinuities will be present in hilly terrain and lowland areas such as exist in Benton County, certain discontinuities may severely inhibit safety, emergency response, and/or livability.

Connectivity of the transportation system must be considered at two levels. The first is from a system-wide perspective that examines the reasonableness of the functional classification system. The second is at the local level and examines the specific issue of secondary access, primarily for safety reasons.

3.1.3.D.1 Connectivity of the Functional Classification System

The functionally classified street system is planned to provide an orderly series of roadways that accommodate trips of an appropriate nature. With few exceptions, interconnected roads should be of the same order or one step higher or lower in the hierarchy. As an example, rarely should a Minor Collector provide direct access to a Minor Arterial or Principal Arterial. Instead, a Major Collector should be used to “bridge the gap” between these functional classes and serve the appropriate travel demand. Therefore, where such “gaps” exist in the existing system, an examination was performed to determine if the roads are appropriately classified for the demand being served and whether it is necessary to provide a new connection at the appropriate classification level.

The findings of this examination of the existing system revealed that connectivity between roadway classifications has been adequately planned for and addressed.

3.1.3.D.2 Connectivity of the Local Street System

As noted above, safety, emergency response, and livability are central issues of concern with regard to connectivity of the transportation system. This is particularly true for secondary access in the local street system. Rural residential areas that have developed over time may have restricted emergency access due to a lack of alternative access roads. This can potentially result in an area being entirely cut off in the event of a failure of the existing facility. Under such circumstances, emergency response could be adversely impacted, resulting in significant service delays. The absence of good alternate routes may severely limit the available modes of travel and significantly increase the overall vehicle-miles-traveled.

Rural areas with significant growth potential should be examined for the possibility of providing both primary and secondary access routes as development occurs. Connectivity for the primary travel modes (vehicle, pedestrian, bicycle, transit) should be considered not only for large areas of development, but also in areas where piece-meal development has or will exacerbate the dependence on a single access point to serve ever-growing demand.

Retrofitting connectivity to a rural residential area can be particularly difficult and very costly. Therefore, emphasis should be placed on guiding future development to ensure that reasonable access is provided with equity among all properties benefiting from such access. Opportunities to provide secondary access in developing and fully developed areas must be actively sought with the participation of the impacted property owners. Equity and minimization of cost and impact are of particular concern to most rural residents in the process of obtaining reasonable or secondary access.

An examination of the local street system in Benton County revealed some areas that are constrained to a primary access only, including:

- Oak Creek Drive
- Cardwell Hill Road
- Brooklane Drive
- Emergency Access road between the Wooded Knolls area and the Chinook Road District

The City of Corvallis Transportation Alternatives Analysis Study recommends a $2.61 million improvement to complete Brooklane Drive as a continuous facility between its intersections with U.S. 20/Highway 34 and SW 53rd Street. This improvement will overcome the identified deficiency. *(For more information, see section "Transfer of County Road Jurisdiction to Cities" in section 3.3.2 in this chapter.)*

3.1.3.D.3 Lifeline Routes

A map of the lifeline routes is included in **Figure 3-13** and depicts alternate routing that can be utilized during periods of loss of roadway function such as bridge failure.

A goal of the transportation system is to provide emergency access to communities in the County when natural events such as flooding, landslides, earthquake, and wildfire or accidents close normal routes. The County will evaluate susceptibility of its transportation infrastructure to natural disasters and identify alternate routes, within available resources. The Lifeline Route map will be updated as this information is available and will be utilized for emergency planning and management.

3.1.3.E Identified Deficiencies and Required Mitigation

Deficiencies identified through the previously described existing system performance evaluation are summarily described below. Types of system-level and specific mitigation strategies for the identified existing deficiencies are provided.

3.1.3.E.1 Roadway System Deficiencies

As previously described, all County-owned roads operate at acceptable levels of service, although some individual intersections may operate at unacceptable levels of service or have operational or safety deficiencies. The old level of service standards for state highways varied by the highway's level of importance (LOI) and the type of area, as previously described. **Table 3-10** lists roadway segments that did not meet ODOT's level of service standards at the time the Benton County TSP analysis was completed.

Table 3-10
Roadway Segments Not Meeting Level of Service Standards (1995)

Highway	Segment	LOI	LOS Standard	1995 LOS
U.S. 20	Lincoln County to Philomath	Statewide	B	C-D

U.S. 20	Downtown Philomath	Statewide	C	E
U.S. 20	Conifer Boulevard to North Albany	Regional	C	D-E
Highway 99W	Tampico Road to Mountain View Avenue	Regional	C	D
Highway 99W	Goodnight Avenue to Kiger Island Road	Regional	C	D

LOI: Level Of Importance

A total of 27 miles of state roadways within Benton County fell below ODOT's level of service standards for their level of importance. It should be noted that this does not necessarily mean that the roadways have failed from a functional standpoint, it means only that traffic does not flow as freely as desired.

Mitigation strategies are developed at both the system-level and at the specific level. Examples of system-level mitigation include additional travel lanes for state highways and the expansion of transit service to existing or new areas. Specific mitigation includes improvements such as intersection signalization, railroad crossing arm installation, and the completion of a missing bicycle link. Potential system-level mitigation and specific mitigation to identified existing deficiencies are presented below.

3.1.3.E.2 System Strategies

Deficiencies identified for a specific location may actually be symptomatic of a larger problem. Providing mitigation at the specified location may not solve the larger problem, and could actually exacerbate a deficiency at another location. Therefore, it is appropriate to examine deficiencies from the system's perspective. This provides the opportunity to identify the larger problem and/or a solution that truly addresses the inherent problem. The following provides a description of this approach and potential system-level mitigation to identified deficiencies.

3.1.3.E.2 a General Discussion

System-level strategies can be divided into two basic groups: **capacity improvements**, which range from the relatively minor (left-turn lanes) and more involved (passing lanes) to the most expensive (additional through lanes), and **access management and control strategies**.

Adding left-turn lanes to a roadway at all major intersection reduces delay to through vehicles that would otherwise stop behind left-turning vehicles waiting for opposing traffic to clear. The Florida Level of Service Manual adjusts a roadway's ideal capacity up or down by as much as +5 to –25 percent to reflect the effects of left-turn lanes and raised medians. Providing passing lanes at intervals along a heavily traveled highway allows faster traffic to get past slower traffic when curves or opposing traffic volumes do not permit ordinary passing. The Florida LOS Manual increases a roadway's capacity by as much as 30 percent to reflect the benefits of passing lanes. Providing additional through lanes provides the greatest capacity benefit at the greatest cost.

Access management and control strategies determine how and where vehicles are allowed access onto a highway. Raised medians reduce interruptions to through traffic by prohibiting left turns onto and off of the highway. Driveway spacing standards determine the locations where vehicles may access the highway and are intended to minimize the number of potential conflict and delay points along a highway. Signal spacing standards set minimum distances between traffic signals, in order to minimize potential delays caused by traffic signals. Frontage roads provide access to land uses adjacent to the highway, while the main highway serves only through traffic. Divided highways provide the benefits of raised medians and also allow side-road traffic to cross or merge onto a highway in two steps, rather than one, thus reducing the need to signalize intersections. Grade-separated interchanges improve intersection safety by changing turning and crossing movements into merging and diverging movements, while maintaining uninterrupted flow along the main highway.

The 1999 OHP Major Improvements Policy includes the following:

Since road construction is very expensive and funding is very limited, it is unlikely that many new highways will be built in the future. Instead, the emphasis will be on maintaining the current system and improving the efficiency of the highways the State already has. The Major Improvements Policy reflects this reality by directing ODOT and local jurisdictions to do everything possible to protect and improve the efficiency of the highway system before adding new highway facilities. This policy carries out the direction of the Oregon Benchmarks. This direction includes improving traffic operations and maintaining the roadway for legal size vehicle travel. These priorities—laid out in Action 1G.1—take precedence over the other actions in this policy.

Policy 1G: Major Improvements

It is the policy of the State of Oregon to maintain highway performance and improve safety by improving system efficiency and management before adding capacity. ODOT will work in partnership with regional and local governments to address highway performance and safety needs.

Action 1G.1

Use the following priorities for developing corridor plans, transportation system plans, the Statewide Transportation Improvement Program, and project plans to respond to highway needs. Implement higher priority measures first unless a lower priority measure is clearly more cost-effective or unless it clearly better supports safety, growth management, or other livability and economic viability considerations. Plans must document the findings which support using lower priority measures before higher priority measures.

1. **Protect the existing system.** The highest priority is to preserve the functionality of the existing highway system by means such as access management, local comprehensive plans, transportation demand management, improved traffic operations, and alternative modes of transportation.
2. **Improve efficiency and capacity of existing highway facilities.** The second priority is to make minor improvements to existing highway facilities such as widening highway shoulders or adding auxiliary lanes, providing better access for alternative modes (e.g., bike lanes, sidewalks, bus shelters), extending or connecting local streets, and making other off-system improvements.
3. **Add capacity to the existing system.** The third priority is to make major roadway improvements to existing highway facilities such as adding general purpose lanes and making alignment corrections to accommodate legal size vehicles.
4. **Add new facilities to the system.** The lowest priority is to add new transportation facilities such as a new highway or bypass.

3.1.3.E.2b Intersection Operation

Many of the mitigation strategies described below may be applicable to a number of intersections within the County. These strategies are described in general terms below, and more specific information is provided as needed for specified deficiencies.

Intersection channelization involves road widening to provide painted islands and turn lanes to better indicate how vehicles should travel through an intersection, and to benefit through traffic and overall safety by removing stopped cars from through lanes. Sufficient right-of-way needs to be available for the additional pavement width not only in the intersection but also for some distance before and after to allow the roadway to taper out to its

full width. This distance depends on the roadway's posted speed. The need for left-turn lanes is generally determined by warrants based on the volumes of left-turning, through, and opposing traffic, and on the posted speed.

Realigning intersections can be done for a number of reasons, including:

- Converting a heavy left-turn movement at a "T" intersection into a through movement
- Moving a skewed intersection approach so that it intersects at a 90-degree angle
- Moving the entire intersection to make room for other roadway improvements
- Moving the entire intersection away from horizontal and/or vertical curves that impair sight distance

Additional right-of-way may be required, depending on the amount of realigning necessary.

Regrading intersections typically involves lowering the roadway grade to provide better sight distance or cutting back slopes adjacent to the roadway to improve sight lines around corners. This strategy is relatively expensive, due to the need to cut and haul away earth, to reconstruct the roadway after the grade has been lowered, and potentially to purchase additional right-of-way, depending on how far back slopes need to be cut.

Additional traffic control devices can be placed at or before intersections to provide advance warning of intersections to motorists, especially when their view of the intersection may be obstructed. These devices include advance-warning signs, posting advisory speeds, and installing flashing beacons. Traffic signals can be installed at higher-volume intersections to allow minor-road traffic easier access onto the main road. The possible need for traffic signals is determined by signal warrants based on traffic volumes, roadway speeds, and area type (urban or rural). Isolated traffic signals are generally not desirable on rural roadways, because motorists do not expect interruptions in the flow of traffic and higher accident rates may result. When utilized, isolated signals are often accompanied by a lower posted speed and advance warning signs and beacons.

3.1.3.E.2c Specific Strategies

Table 3-9 listed specific intersections that were identified by County staff as having safety or operational problems**. Figure 3-9** shows existing deficiencies throughout Benton County. Potential mitigation options for each location are described below. The intersection number listed for each location is keyed to the numbers shown in **Figure 3-9**. Although not specifically mentioned, it should be kept in mind that the "no-build" or "do-nothing" option should also be considered as an alternative in each case.

Specific mitigation measures for state highway projects will be determined through a refinement plan and or project development.

1. Bellfountain Road/Airport Avenue

Existing Conditions: This hillcrest intersection is located on a horizontal curve on Bellfountain Road. The Airport Avenue approaches are stop-controlled and located on upgrades. A flashing beacon is located over the center of the intersection. "STOP AHEAD" signs are posted on Airport Avenue, while "SLOW/40 MPH" and Cross Road signs are posted on Bellfountain Road. The intersection does not meet warrants for left-turn lanes or signalization. A 50-mph speed zone was created on Bellfountain Road from Greenberry Road to north of this intersection in the fall of 1995.

Potential Mitigation: The easier mitigation strategies have already been used at this intersection. Two potential strategies have been identified: (a) Flashing beacons could be installed on the Cross Road signs in advance of the intersection to provide additional warning for motorists unfamiliar with the area, but would not be likely to affect the behavior of the majority of motorists due to the presence of other warning signs and beacons. (b) The ultimate solution to the sight distance problems at this intersection would be to regrade and/or realign Bellfountain Road to provide better sight distance. The feasibility of this strategy depends on weighing the construction costs against the potential for fewer accidents.

2. Granger Avenue/U.S. 20

Existing Conditions: This intersection is a four-leg intersection located next to a horizontal curve on Granger Avenue and the Willamette & Pacific Railroad tracks. The intersection's existing level of service is F and the intersection meets one signal warrant. Left-turn lanes and advance signing are present on U.S. 20. There is not enough room between U.S. 20 and the railroad tracks to store a truck.

Potential Mitigation: Potential mitigation measures are discussed in detail in the system strategies, Section 3.2.1.C.1.

3. Bellfountain Road/Greenberry Road

Existing Conditions: This intersection is a "T" intersection located just south of a bridge over Beaver Creek. Westbound left-turns from Greenberry Road are stop-controlled, while westbound-right turns have a yield-controlled channelized right turn. Decker Road intersects Bellfountain Road a short distance north of the bridge. Side Road signs are posted on Bellfountain Road prior to both intersections. The bridge has no room for adding a left-turn lane or even part of a taper in advance of a left-turn lane. Bellfountain and Greenberry Roads are a commonly used truck route between the Philomath area and Highway 99W south. The southbound left-turn has significant volumes of traffic. The intersection does not meet warrants for signalization but may meet warrants for left-turn lanes.

Potential Mitigation: Three potential strategies have been identified. (a) One strategy moves the intersection sufficiently far south of the bridge to allow a left-turn lane to be constructed. This strategy requires additional right-of-way for the realigned segment of Greenberry Road, creates a small amount of out-of-direction travel, and introduces two new curves onto Greenberry Road. (b) The second strategy widens or replaces the existing bridge on Bellfountain Road to provide three lanes plus bike lanes. The middle lane would be used to provide left-turn lanes on Bellfountain Road at both Greenberry and Decker Roads. (c) The third strategy realigns Greenberry Road to intersect Bellfountain Road opposite Decker Road. This strategy requires a second bridge over Beaver Creek. In addition, there is insufficient room to provide a northbound left-turn lane without moving the intersection farther north, which is difficult due to the location of a school on the northwest corner of the intersection.

4. Independence Highway/U.S. 20

Existing Conditions: This intersection is a "T" intersection located adjacent to the Willamette & Pacific Railroad tracks. The intersection's existing level of service is F; however, the intersection does not meet signal warrants. Left- and right-turn lanes and advance signing are present on U.S. 20. There is a significant change in elevation between the railroad tracks and U.S. 20 and there is insufficient room between the tracks and U.S. 20 to store a truck. Independence Highway is a popular truck route.

Potential Mitigation: Potential mitigation measures are discussed in the system strategies, Section 3.2.1.C.1.

5. Independence Highway/Ryals Avenue

Existing Conditions: This intersection is a "T" intersection located on a ridge, with all three approaches climbing to the intersection. Ryals Avenue is stop-controlled. Sight distance is restricted because of the vertical curvature of the two roadways. Side Road signs are posted on Independence Highway prior to the intersection. The northbound left turn has a significant volume of traffic, but is likely not enough to meet left-turn lane warrants. The intersection does not meet signal warrants.

Potential Mitigation: Three alternative strategies have been identified. (a) Because of the limited sight distance, a left-turn lane should be considered to separate left-turning vehicles from the through traffic, and provide left-turning motorists with a safer, more comfortable opportunity to look for oncoming traffic. This strategy would require some additional regrading to make room for the widened roadway. Other alternatives would be to (b) lower the entire intersection through more extensive regrading, in order to improve sight lines, or (c) post an advisory speed appropriate to the existing sight distance.

6. Scenic Drive/U.S. 20

Existing Conditions: This intersection is a "T" intersection located just south of the Willamette & Pacific Railroad tracks. Scenic Drive intersects West Thornton Lake Drive just north of the railroad tracks. The intersection's existing level of service is E and the intersection does not meet signal warrants. A left turn lane and advance signing are present on U.S. 20. There is not enough room between the tracks and U.S. 20 to store a truck.

Potential Mitigation: Potential mitigation measures are discussed in detail in the system strategies, Section 3.2.1.C.1.

7. Old River Road/Highway 99W

Existing Conditions: This intersection is located south of a horizontal curve on Highway 99W. Old River Road is stop-controlled and carries relatively low volumes (225 average daily traffic [ADT]). The intersection does not meet left-turn lane or signal warrants. Side Road signs are posted in advance of the intersection on Highway 99W.

Potential Mitigation: The only possible mitigation might be to construct a left-turn lane to reduce the possibility of left-turning vehicles being struck from behind by inattentive drivers coming around the curve on Highway 99W.

8. Reservoir Avenue/SW 53rd Street

Existing Conditions: This intersection is located just north of a low, narrow undercrossing of the Willamette & Pacific Railroad tracks. Supports for the trestle are located in the middle of SW 53rd Street, creating a potential hazard. Because of the undercrossing, sight distance to the south is restricted for Reservoir Avenue traffic. About half of the southbound traffic during the weekday p.m. peak hour turns right onto Reservoir Avenue, while the other half continues through on SW 53rd Street.

Potential Mitigation: Following the 1985 SW 53rd Street Corridor Study, a new overcrossing and the realignment of Reservoir Road to the north was identified as the preferred alternative. The project cost was estimated in 1985 to be $3.7 million. Although the project was identified as an immediate need, it has not yet been placed in the County Capital Improvement Program. However, growth in the area has been much less than predicted in the study.

9. Cox Lane/Larkin Road

Existing Conditions: Cox Lane and Larkin Road are two local roads that intersect on a horizontal curve in the Alpine area. Because of a slope on the east side of Larkin Road, sight distance is restricted for northbound left-turning traffic.

Potential Mitigation: Regrading or realigning Larkin Road would solve the sight distance problem, but may not be justified in terms of the amount of traffic benefiting from the improvements. Installing warning signing would be an alternative.

10. Independence Highway/Springhill Drive

Existing Conditions: This intersection is located along a horizontal curve on Independence Highway. The highest-volume movements at this intersection are the north-to-east and east-to-north movements. Westbound left turns are stop-controlled on Springhill Drive, while eastbound right turns are channelized and yield-controlled. Side Road signs are posted on Independence Highway. Southbound motorists approaching the intersection first see the channelized east-to-north right turn lane, posted with "DO NOT ENTER" signs, but do not see the rest of the intersection until after they start to round the curve, which may cause some driver confusion. The intersection does not meet left-turn lane or signal warrants.

Potential Mitigation: Three potential strategies have been identified. (a) Because the highest-volume movements are a left turn and the corresponding right turn in the opposite direction, it may be appropriate to reconfigure the intersection so that southbound Independence Highway to eastbound Springhill Drive becomes the through movement. Southbound traffic continuing on Independence Highway could receive a channelized

right-turn, while northbound traffic would be forced to stop and turn. Appropriate guide signing would be needed. This configuration would improve the intersection's operation and sight lines, and any potential driver confusion can be minimized with good signing. Less-elaborate mitigation measures include (b) closing the channelized right-turn, which would reduce potential driver confusion but would also cause added delay for westbound vehicles, and (c) building a southbound left-turn lane to better guide southbound traffic through the intersection.

11. Grange Hall Road/Fern Road

Existing Conditions: This intersection is located immediately south of a bridge over the Marys River and along a horizontal curve on Fern Road. These two elements combine to restrict the sight lines of northbound motorists desiring to make a left turn onto Grange Hall Road. The intersection does not meet left-turn lane or signal warrants. No signs are posted in advance of the intersection on either road.

Potential Mitigation: Two potential strategies have been identified. (a) Side Road signs posted on Fern Road would provide advance warning of the intersection and might be all that is required. (b) A more-involved mitigation strategy would be to realign Fern Road so that the curve occurs south of the intersection. This option would require a significant amount of new right-of-way.

12. Stow Pit Road/Highway 99W

Existing Conditions: This intersection is located immediately north of a horizontal curve on Highway 99W. Trees and utility poles are located along the inside of this curve and block sight lines to and from the intersection. Side Road signs are posted on Highway 99W. Stow Pit Road carries relatively low traffic volumes (225 ADT). The intersection does not meet left-turn lane or signal warrants.

Potential Mitigation: Removing the trees that block sight lines and possibly relocating the utility poles is likely all that is required.

13. Wren Road/Highway 223

Existing Conditions: This intersection is located along a horizontal curve on Highway 223. A steep bank is located along the inside of the curve, which tends to obscure sight lines. Advance warning of the intersection is provided along Highway 223. Northbound left turns from Wren Road are stop-controlled, while northbound right turns are channelized and yield-controlled. Because the northbound right-turn lane is located relatively far away from the rest of the intersection, it may be confusing to southbound drivers who see the "DO NOT ENTER" signs for the lane, but not the rest of the intersection. Volumes on Wren Road are relatively low, but virtually all traffic to and from Wren must pass through this intersection. This intersection does not meet signal warrants or left-turn lane warrants.

Potential Mitigation: Mitigation options include (a) closing the channelized northbound right-turn lane and (b) posting a lower speed between U.S. 20 and a location north of this intersection, if needed to achieve adequate stopping sight distance. Cutting back the hillside or realigning Highway 223 is likely to be infeasible.

14. Palestine Avenue/Oak Grove Drive

Existing Conditions: This intersection is a "Y," with Palestine Avenue as the east and west legs and Oak Grove Drive as the south leg. The south-to-west movement is uncontrolled, the south-to-east, west-to-south, and west-to-east movements are stop-controlled, and the east-to-west and east-to-south movements are yield-controlled. The heaviest volumes occur on the east and west legs. This intersection does not meet left-turn lane or signal warrants.

Potential Mitigation: To serve the higher-volume movements and to decrease the intersection's complexity, the simplest mitigation option would be reconfigure the intersection as a "T" intersection, with Oak Grove Drive stop-controlled.

15. Priest Road/U.S. 20

Existing Conditions: Priest Road is designated as a minor arterial in the County's Comprehensive Plan because it serves as a shortcut between U.S. 20 and Highway 223; however, it only carries about 290 ADT and has a truck weight restriction. The intersection is located east of a horizontal curve on U.S. 20 and eastbound motorists' views of the intersection are obscured by vegetation growing along the inside of the curve. No advance signing is provided on U.S. 20. The intersection does not meet signal or left-turn lane warrants.

Potential Mitigation: One or more of the following mitigation strategies could be used to reduce the potential for rear-end collisions: (a) installing Side Road signs in advance of the intersection, (b) clearing vegetation on the inside of the curve on U.S. 20 to improve stopping sight distance, (c) constructing a left-turn lane, and (d) restricting access to right-in, right-out only. In the latter scenario, southbound traffic would be required to divert to Highway 223.

16. Signal Warrant Locations

Existing Conditions: The following intersections meet at least one signal warrant. All operate at LOS C or better.

- U.S. 20/Highway 34
- Walnut Boulevard–SW 53rd Street/Harrison Boulevard–Oak Creek Road
- Reservoir Avenue/SW 53rd Street
- Granger Avenue/U.S. 20

Potential Mitigation: Because these intersections now operate at good levels of service, signalization is not required immediately. These intersections should be monitored on a regular basis (no less than every three years, sooner if significant development occurs in the area) to determine when signalization will be necessary.

17. Elliot Circle/Highway 99W South Junction

Existing Conditions: This intersection is located adjacent to the Willamette & Pacific Railroad tracks and has limited stacking distance. Westbound movements across the tracks are controlled by a stop sign, but eastbound movements are uncontrolled.

Potential Mitigation: Strategies include closing this intersection, which would require traffic to divert to the Lewisburg Road/Highway 99W intersection.

18. U.S. 20-Highway 34/Highway 99W Interchange

Existing Conditions Two highway-to-highway movements at this interchange must use local streets to accomplish the desired connection; these being the eastbound-to-southbound and northbound-to-westbound movements. These movements are reliant on either B Avenue or Western Boulevard in downtown Corvallis to continue in desired direction of travel. The turns are difficult for trucks to make, which may encourage them to use Bellfountain and Greenberry Roads as alternates to U.S. 20 and Highway 99W. New ramps at this interchange would require new bridges over the Marys River and Willamette & Pacific Railroad line.

Potential Mitigation: See section 3.4.1.F Bellfountain Road/South Highway 99W Corridor for description of potential mitigation for this interchange.

3.1.4 Summary

Overall, the Benton County transportation system is in good condition and provides adequate service and safety to its users. The component of the overall system that experiences the greatest demands and most significant constraints is the state highway system. The citizens of Benton County recognize the importance of this subset of the Benton County roadway system to the economic viability and livability of the community. Preserving and protecting the capacity and safety of these facilities is, therefore, imperative. Although Benton County does not have direct control over these facilities, it is dedicated to providing acceptable solutions to identified needs, both on and off the state highway system.

3.2 Forecast of Future Conditions

3.2.1 Introduction

This section presents a summary of the travel demand estimate based on accepted 20-year population and employment projections, assessment of performance of the existing transportation system under future conditions, and identification of future deficiencies requiring mitigation.

Accordingly, this section is divided into three main sub-sections:

- Forecasting Future Travel Demand
- Assessment of Future Conditions
- Identification of Deficiencies

The Benton County 2020 population and employment projections adopted in the Comprehensive Plan are 94,045 and 43,765 respectively. The countywide travel demand estimate was prepared in concert with the Cities of Corvallis and Albany and the Oregon Departments of Transportation (ODOT) and Land Conservation and Development (DLCD). The future performance assessment was performed according to acknowledged and accepted practice using the same methodology as employed for existing conditions. Deficiencies were identified in terms of capacity, mobility, and connectivity (safety problems are identified for existing conditions only).

3.2.1.A Forecasting Future Travel Demand

Estimates of future travel demand were prepared for each transportation system element, as appropriate. Gravity models, econometrics-based modeling methodologies, historical trending methodologies, and capacity-based ridership demand models were used to develop these estimates. Each forecasting tool and methodology was reviewed and approved by the Technical Advisory Committee, representing the authorization of each participating agency in the Benton County TSP process. The results of each modal forecast were also refined by the Technical Advisory Committee and approved for use in the planning process.

3.2.1.A.1 Roadway System (Forecasting Methodology Development)

Several forecasting methodologies were incorporated to develop a complete vehicular demand estimate for Benton County that was acceptable by all participating agencies. Summarized below is the methodology used to prepare the 20-year vehicular demand forecast.

Future traffic volumes were forecast using information from several sources. In general, Albany and Corvallis/Philomath travel demand models were used for roadways inside urban growth boundaries for these areas.

Forecasts of future traffic growth from single-family development in rural areas were developed from housing growth forecasts supplied by Benton County and from trip generation rates provided by the Institute of Transportation Engineers' (ITE) Fifth Edition Trip Generation Manual. These trips were distributed onto the County roadway network as described later in this section.

Forecasts of future traffic growth on state highways were developed from 20-year growth factors developed and approved by ODOT.

Traffic volumes from the urban traffic models were generally used as-is, with two notable exceptions. First, the Corvallis model projects an average daily traffic (ADT) volume of 23,400 on U.S. 20 northeast of Granger Avenue, while the Albany model projects an ADT of 27,300 on U.S. 20 west of Scenic Drive. The only major source of traffic between these two roadways is Independence Highway, which is not likely to supply 4,000 north-to-east vehicles. As a result, the ADT for the section of U.S. 20 between Independence Highway and Scenic Drive was assumed to be 25,300 (the midpoint in the range created by the two model forecasts). The second notable exception was the section of Airport Avenue between Highway 99W and the airport. The Corvallis model projects a year 2015 ADT of 190, which is far below the existing ADT of 920. A 3 percent

annual growth rate was assumed instead for this section of Airport Avenue, providing a year 2015 ADT of 1,500.

3.2.1.A.2 Estimation of Future Travel Demand and Trip Distribution

ODOT has developed annual growth factors for all state highways, based on a linear regression of traffic growth over a 20-year period. **Table 3-11** lists the growth factors that have been developed for state highways in rural portions of Benton County.

In areas where the ODOT growth factor was used as-is, it was assumed that the growth factor adequately allows for future development in rural portions of Benton County, as well as growth in through trips and trips generated by the Albany and Corvallis urban areas. On U.S. 20 west of Philomath, traffic volumes were increased by 2,000 ADT above the factored volumes in order to match year 2015 traffic volumes east of Toledo that were projected in the Toledo Transportation System Plan. Highway 34 volumes east of Corvallis were taken from the Corvallis traffic model rather than from the growth factors, as the model volumes were higher.

Future traffic volumes on Highway 99W between Corvallis and Monroe, as well as future traffic volumes on rural county roads outside the North Albany area, were calculated using a different method. Benton County supplied housing growth forecasts for ten areas in the County (Alpine, Bellfountain, Blodgett, Greater Monroe, Greater Philomath, Missouri Bend, North Albany, North Corvallis, Summit, and West Corvallis). Daily trip generation estimates were developed for each area, using a value of 9.55 trips/household, based on the value given in the ITE Fifth Edition Trip Generation Manual. Based on research reported in NCHRP 187 (National Cooperative Highway Research Program) and on values used in nearby counties, it was assumed that 33 percent of these trips would be work trips, while the remainder would be other kinds of trips (shopping, recreation, etc.).

Work trips were assigned to Albany, Corvallis, Eugene, Monroe, Philomath, and Salem in relationship to each city's population and the distance to each city (the formula used was population/distance^3). Other trips were assigned to Albany, Corvallis, Eugene, Salem, Philomath (west county only), and Monroe (south county only) in relationship to the distance to each community (the formula used was 1/distance). One-quarter of the trips assigned to Philomath or Monroe using this formula were assumed to stop at the nearest community currently containing a market (Alpine, Alsea, Bellfountain, or Blodgett), if one of these communities was closer to the trip's origin than Philomath or Monroe. All of the trips were then distributed onto the County's roadway system using existing traffic patterns as a guide. Future traffic volumes on Highway 99W and rural County roads outside North Albany are equal to existing traffic plus 10 percent (to take into account background traffic growth over 20 years) plus the new trips.

Figures 3-10A and **3-10B** show year 2015 projected residential growth in various parts of Benton County and average daily traffic volumes on Benton County roadways, respectively.

Table 3-11
ODOT State Highway Annual Growth Factors

Highway	Growth Factor	Used As-Is?
U.S. 20, west of Philomath	3%	N
Highway 34, west of Philomath	2.5%	Y
Alsea-Deadwood Highway	1%*	Y
Eddyville-Blodgett Highway	2%	Y
Highway 223	2.5%	Y
Highway 99W, north of Lewisburg	2.5%	Y
Highway 99W, South Corvallis to Monroe	1.5%	N
Highway 99W, south of Monroe	1.5%	Y
Territorial Highway	3%	Y
Highway 34, east of Corvallis	3%	N

* 20-year regression shows a slight decrease in traffic; ODOT is assuming 1 percent future growth.

3.2.1.B Performance Evaluation of the Future No-Build Systems

An assessment of the no-build transportation system was performed using the future travel demand estimates assigned to the appropriate systems. The no-build system assumes the existing transportation system with only those funded projects in adopted Improvement Programs. The same performance evaluation procedures as those used for existing conditions were used for the future no-build evaluation. Presented below are the no-build evaluations for each transportation system.

3.2.1.B.1 Roadway System

To determine how well County roadways will operate under year 2015 volumes, a planning level arterial LOS analysis was conducted using the 1995 Florida Level of Service Manual. This methodology is described in section 3.1.3.A, "Roadway Level of Service Analysis." For the purposes of this analysis, it was assumed that no changes would be made to the County's road system, other than those currently programmed by ODOT, the County, or the various cities in Benton County. **Figure 3-11** shows year 2015 no-build roadway levels of service for arterials and major and minor collectors in Benton County.

In the year 2015, all County-owned roads are forecast to operate at acceptable levels of service. (Again, it should be noted that individual intersections may operate at higher or lower levels of service.) Gibson Hill Drive/North Albany Road southeast of Crocker Lane and Springhill Drive south of Hickory Street are the only non-state facilities operating at LOS D or worse. Level of service standards for state highways vary by the highway's level of importance (LOI) and the type of area, as previously described. For the purposes of applying ODOT's LOS standards, it was assumed that the Corvallis/Philomath area would be a Metropolitan Planning Organization by the year 2015**. Table 3-12** lists roadway segments that are projected not to meet ODOT's LOS standards in the year 2015.

As shown in **Table 3-12**, 39 miles of state highways, including most of U.S. 20 through Benton County, Highway 99W north of Corvallis, and Highway 34 entering Corvallis from Linn County, will operate below ODOT's old LOS standards in the year 2015. U.S. 20 between Philomath and Corvallis, between Granger Avenue and the start of the four-lane section in North Albany and east of North Albany Road will operate at LOS F by the year 2015.

The Major Improvement Policy from the 1999 OHP is applicable to the suggested state highway improvements. The final solutions will be developed through a refinement plan and/or project development. Volume/Capacity analysis will be necessary to evaluate conformity with the current OHP mobility standards.

3.2.1.C Future Capacity, Mobility, and Connectivity Deficiencies

The performance evaluation of future conditions on the no-build roadway system resulted in deficiencies being identified. Included were deficiencies of capacity, mobility, and connectivity. The identified future deficiencies are summarized below.

3.2.1.C.1 Roadway Capacity

As previously noted, the only future roadway capacity deficiencies outside of urban areas are located on the state highway system. Approximately 39 miles of state highway in Benton County will fail to meet ODOT's old LOS standards in the year 2015.

Table 3-12 lists the number of weekday p.m. peak hour trips that will need to be shifted to other facilities, other modes, or other times of the day in order to maintain LOS standards on Benton County roadways. (Weekday p.m. peak hour trips are estimated from daily trips by applying a factor of 7-10 percent, depending on the facility type. Since the weekday p.m. peak hour is the time of day with the greatest traffic volumes, it determines how much capacity needs to be provided on a particular roadway.)

Table 3-12
Required Trip Shifts to Achieve ODOT Level of Service Standards (1991 OHP)

Highway	Segment	2015Volume	2015 LOS	Required LOS	MaximumVolume for LOS	RequiredPeak HourTrip Shift
U.S. 20	Lincoln County-Philomath	8,700-15,800	D-E	B	3,4005,900	635-1,490334-1,190
	Philomath-Corvallis	27,700-31,200	F	D	18,000	1,165-1585
	Circle-North Albany	16,100-23,600	E-F	C	8,10013,200	960-1,860350-1,250
	North Albany	38,100-49,600	D-F	D	44,500	0-510
Highway 34	South Bypass	18,900	D	B	12,80017,300	730190
Highway 99W	Polk County-Mountain View	10,500-14,700	D-E	C	7,70012,800	335-8400-230
	Walnut-Downtown Corvallis	18,700-21,500	E	D	17,500-20,000	145-180
	Goodnight-Airport	8,900	D	C	6,900	240

As **Table 3-12** indicates, significant amounts of road widening would be required to maintain adequate levels of service on state highways. Less-expensive strategies, such as adding passing lanes in spot locations, were also investigated but found to be inadequate. In some cases, such as U.S. 20 west of Philomath, and Highway 99W north of Lewisburg, road widening was necessitated more by ODOT's policy to maintain high levels of service on highways of statewide or regional levels of importance rather than by a functional failure of the roadway.

It is anticipated that these roadway segments will also fail to satisfy the v/c mobility standards now contained in the OHP. The OHP's Policy 2C, states, "The State of Oregon shall avoid highway capacity improvements, which primarily serve commuters from outside of urban growth and urban containment boundaries." It is acknowledged that much of the forecasted travel demand in Benton County is from inter-urban commuters. Comments on the Draft Benton County TSP from the DLCD include, "We acknowledge the concerns …that some OTP and OHP policies, when taken individually, appear to be in conflict. We strongly urge you to raise concerns related to compliance with the OHP and OTP in the TSP narrative." The OHP mobility standards to not distinguish between sources of traffic demand. In developing refinement plans or during project development, ODOT will need to demonstrate how highway improvements respond to OTP goals.

3.2.1.C.1.a U.S. 20 Between Corvallis and Albany

The section of U.S. 20 between Corvallis and Albany requires special attention. Potential mitigation strategies include one or more of the following:

- Add an additional through lane in each direction to the existing highway. Two through lanes are required in each direction on U.S. 20 between Corvallis and North Albany to accommodate projected year 2015 traffic; three through lanes may be needed through North Albany. Only two lanes in each direction are available on the Willamette River bridges at downtown Albany.
- Realign U.S. 20 further away from the railroad tracks. The three main intersections along this section of U.S. 20—Granger Avenue, Independence Highway, and Scenic Drive—have insufficient room to store a truck between the highway and the railroad tracks, which creates potential conflicts between trains and

trucks. Realigning U.S. 20 would also improve the grade differential between the highway and the tracks at Independence Highway.

- Realign Granger Avenue to Independence Highway using a new frontage road north of the railroad tracks. This would consolidate access points along U.S. 20 without forcing out-of-direction travel between Lewisburg and Albany. Land use issues regarding road construction through farmland would need to be resolved.
- Close or restrict the Scenic Drive/U.S. 20 intersection. Closure would divert more traffic onto North Albany Road, but would reduce access (and potential accident) points along U.S. 20. A less drastic step would be to restrict Scenic Drive to right-in, right-out access only at U.S. 20, but this would not dramatically improve the intersection's safety. If the Scenic Drive intersection were to be closed, Kouns Drive could be extended to Rondo Street or Independence Highway as an alternate route out of North Albany.
- Convert the existing highway into a frontage road and build a new 4- or 5-lane roadway. The old highway would be allowed access onto the new controlled-access facility at one point, most likely at Independence Highway.
- Signalize the Granger, Independence, and Scenic intersections. This option would improve access onto U.S. 20 from these roads, but would also result in longer travel times between Corvallis and Albany on U.S. 20 due to delays from the signals. Signals would improve safety at the railroad crossings, as a green signal could be provided to clear out traffic before the arrival of a train. However, signals could also degrade safety in that unfamiliar drivers will not be expecting them in a seemingly rural area. In order to provide adequate levels of service at these intersections, U.S. 20 would need two through lanes in each direction. In order to alert drivers of the not-quite-rural nature of the highway following the installation of these signals, a lower posted speed might be appropriate in addition to providing advance signing.
- Construct U.S. 20 as a divided highway. This option would postpone the need for signalization at the Granger, Independence, and Scenic intersections by allowing minor road traffic to make left turns in two steps, rather than trying to find the rare simultaneous gaps in traffic on U.S. 20. As traffic volumes continue to increase on U.S. 20 beyond the year 2015, other mitigation options would be needed in order to safely serve minor road traffic.
- Grade separate one or more intersections. This option creates the least delay to both U.S. 20 and minor road traffic, but requires expensive overpasses. The most likely candidate for an overpass would be Independence Highway, because of its central location and the high number of trucks using the intersection and the existing grade differential between the railroad and the highway..
- Construct a split-diamond interchange at North Albany Road and Springhill Drive in North Albany. This strategy eliminates the need to widen U.S. 20 to seven lanes through North Albany and allows the existing two-lane bridges over the Willamette River to remain functional. The interchange would be expensive to construct and is constrained by the proximity of the bridges, the river paralleling the highway, adjacent development, and Takena Landing park.
- Construct a U.S. 20 bypass of Albany. This strategy reduces through traffic using downtown streets, provides another route into and out of North Albany, and allows the existing Willamette River bridges to remain functional. The bridges would be expensive to construct and it is not clear where the best route for a bypass would be on the Linn County side of the river.

3.2.1.C.2 Intersection Operations

Thirty-five higher-volume intersections were analyzed to determine the possible need for signalization. This need was determined based on signal warrants 1 (Minimum Vehicular Volume) and 2 (Interruption of Continuous Traffic) from the Manual on Uniform Traffic Control Devices (1988). For the purposes of this analysis, it was assumed that p.m. peak hour traffic was 10 percent of the average daily traffic, and that the 8th-highest hourly volume was 70 percent of the p.m. peak hour traffic (equivalent to 7 percent of the ADT). It was also assumed that the directional distribution of traffic on minor street intersection approaches was two-thirds in the peak direction and one-third in the off-peak direction. Where the heaviest movement at "T" intersections were left turns from the major street to the minor street, it was assumed that the intersection would be realigned

first (making the left turn a through movement and the former through movement a right turn). **Table 3-13** lists the intersections that meet one or both signal warrants and **Figure 3-12** shows their locations.

Table 3-13
Operating Level Year 2015 Signal Warrants

Intersection	Warrant 1	Warrant 2
Scenic Drive/U.S. 20	YES	YES
Granger Avenue/U.S. 20	YES	YES
Highway 223/U.S. 20	YES	YES
Highway 34/U.S. 20	YES	YES
Walnut Boulevard/Harrison Boulevard	YES	YES
Reservoir Road/SW 53rd Street	YES	YES
North Albany Road/Hickory Street	YES	YES
Springhill Drive/Hickory Street	YES	YES
Gibson Hill Drive/Crocker Lane	YES	NO
Independence Highway/U.S. 20	NO	YES
Camp Adair Road/Highway 99W	NO	YES
Arnold Avenue/Highway 99W	NO	YES
Airport Avenue/Highway 99W	NO	YES
Eddyville-Blodgett Highway/U.S. 20	NO	YES
West Hills Road/SW 53rd Street	NO	YES
West Hills Road/Reservoir Road	NO	YES
North Albany Road/West Thornton Lake Drive	NO	YES
Greenberry Road/Highway 99W	NO	YES
Alpine Cutoff/Highway 99W	NO	YES
Coon Road/Highway 99W	NO	YES

As **Table 3-13** indicates, up to 20 intersections may require signalization by the year 2015. However, it should be noted that signalization may not be the most appropriate treatment in each case. Depending on turning movements at these intersections, improved channelization (i.e., left-turn lanes) may be all that is required (for example, at the Greenberry Road/Highway 99W intersection). Isolated signals on the state highway system, such as would occur in Wren or Blodgett, are usually undesirable because of safety concerns. Grade-separated interchanges and/or divided highways can also be considered for higher-volume roadways at a significantly higher cost. Alternative modes, such as buses or trains, can also be considered to help reduce future traffic volumes and potentially reduce the need for some mitigation measures.

It should also be noted that the planning level signal warrant analysis for existing conditions was conservative in that it identified more intersections as warranting signalization than did the more detailed operations-level analysis. It is likely that the same situation will hold true in the future. Monitoring these intersections on a regular basis (no less frequently than every three years) would be desirable, to determine if and when signalization is warranted, or other appropriate mitigation.

3.2.1.C.3 Signal Warrant Locations

The following intersections are projected to meet at least one signal warrant under future conditions. They have been separated into two categories: 1) County road intersections meeting warrant under future conditions, and 2) State highway intersections meeting warrant under future conditions.

The following County road intersections are projected to meet at least one signal warrant by the year 2015:

- Gibson Hill Drive/Crocker Lane
- North Albany Road/West Thornton Lake Drive
- North Albany Road/Hickory Street
- Springhill Drive/Hickory Street
- West Hills Road/Reservoir Road
- West Hills Road/SW 53rd Street

Potential Mitigation: These intersections should be monitored on a regular basis (approximately every three years) to determine if and when signalization will be necessary. It should be noted that the planning level signal warrants tend to be conservative in that they predict the need for signalization in some cases where no need exists. There are no apparent reasons why these intersections should not be signalized when volumes warrant; however, any future Hickory Street signals will need to be interconnected with the signals just south on U.S. 20 in order for North Albany Road and Springhill Drive to function satisfactorily with the short signal spacing.

These State highways intersections are projected to meet at least one signal warrant by the year 2015:

- Camp Adair Road/Highway 99W
- Arnold Avenue/Highway 99W
- Greenberry Road/Highway 99W
- Alpine Cutoff/Highway 99W
- Orchard Road/Highway 99W
- Highway 223/U.S. 20
- Eddyville-Blodgett Highway/U.S. 20

Potential Mitigation: These intersections should be monitored on a regular basis (approximately every three years) to determine if and when signalization will be necessary. With the exception of Orchard Road/Highway 99W in Monroe, all of these intersections are on rural roadway sections posted for 55 mph, where drivers do not normally expect to encounter signals. Consequently, alternative mitigation measures should be sought to eliminate the need for signalization or to lower the potential for accidents should signals need to be installed. These measures are discussed in more detail in later sections. For example, at intersections such as Greenberry Road/Highway 99W, improved channelization may be all that is necessary because the movement helped most by signalization, the minor-road left turn, is a very low volume movement.

The OHP Action 3A.3 establishes signal spacing standards for state highways. The identified intersections on the state system are expected to meet the spacing standards. Detailed engineering study is required for all of the possible signal installations prior to programming for construction.

3.2.1.C.4 Roadway Connectivity

Increased travel demand resulting from growth in local population and employment as well as increased through travel will exacerbate the transportation system connectivity constraints. Continued out-of-direction travel and congestion due to these deficiencies will result in longer delays, increased vehicle-miles-traveled and increased emissions.

The following collector and arterial network connectivity deficiencies have been identified, and potential road extensions considered:

- Bellfountain Road Extension to U.S. 20/Highway 34 and continued north to West Hills Road
- West Hills Road Extension to the U.S. 20/Highway 34 junction in Philomath
- U.S. 20/Highway 34 to Highway 99W South Ramp Connections
- Highway 34 North By-Pass Extension to U.S. 20 (Corvallis to Albany section)
- Wake Robin Avenue Extension to Brooklane Road

These classified street system deficiencies have far-reaching impacts that affect most Benton County residents and their travel patterns, as well as those through travelers using the state highway system to bisect Benton County.

A project to complete the connection of U.S. 20/Highway 34 with Highway 99W is included in this plan. None of the other connectivity deficiencies are expected to be corrected during the next 20 year period.

3.2.1.C.5 Local Street System

The future development of the local street system must include a concerted effort to guide development in such a way as to ensure that connectivity, and secondary access in particular, are provided. In addition, solutions must be provided for those existing areas of the County that experience connectivity constraints, including the following:

- Oak Creek Drive
- Cardwell Hill Road
- Brooklane Drive

Through coordinated planning efforts between Benton County and affected property owners, equitable and fundable solutions to these constraints can be effectively developed and implemented.

3.3 Roadway Policies

3.3.1 Existing Policies

Existing policies will be modified when the new policy recommendations are approved.

3.3.1.A Road Standards

Standards for state highways in Benton County are as adopted by ODOT. For all other roadways in unincorporated portions of the County, design standards are as adopted in the Benton County Development Code (1990 with amendments). Standards for traffic volume, right-of-way, road width, shoulder type, maximum grade, pedestrian and bicycle facilities, and parking are presented for rural roads in **Table 3-14**. Design

standards for bikeways are presented in the 1995 Oregon Bicycle and Pedestrian Plan, Section II.1, except where the Benton County Development Code calls for a higher standard.

Table 3-14
Rural Street Design Standards

Classification	ADT	Min. ROW (ft)	Width (ft)	Shoulder Type	Max. Grade	Shoulder Bike/ Walking	Marked for Bike	Parking
Arterial (RA-2)	>5,000	80-100	50-70	6-12 ft paved	4-6%	Y	Shoulder	N
Arterial (RA-1)	1,000-5,000	80	24-34	6 ft paved	5-8%	Y	Shoulder	N
Collector (RC-2)	750-2,000	60-70	24	5 ft paved	10%	Y	Shoulder*	N
Collector (RC-1)	100-750	60	20	5 ft paved	12%	Y	Shoulder*	N
Local (RL-3)	100-750	60	20	5 ft paved	15%	Y	Shoulder*	N
Local (RL-2	0-200	50	18	4 ft gravel	15%	N	N	Y
Local (RL-1)	0-100	50	18	4 ft gravel	17%	N	N	N

* If in RR (Rural Residential) zone ADT: Average Daily Traffic ROW: Right-of-Way

The urban street standards contained in the Development Code should be replaced with a policy that requires the appropriate city standards within areas subject to annexation into the cities of Adair, Corvallis, Philomath, and Monroe. In urban fringe areas outside the city limits of Albany, Corvallis, and Philomath, but within the urban growth boundaries, Benton County road standards should be consistent with the road standards of these cities within their respective urban growth boundaries. This will facilitate an orderly transition of these roadways from the County to the City. Urban standards may also be an appropriate design alternative for some rural areas.

Based on physical, social, funding, or environmental limitations, it may not be desirable to improve all county roadways to the designated standard. The County should establish a process by which exceptions could be addressed.

3.3.1.B Access Standards

Access standards for state highways in Benton County are set by Appendix B in the 1999 Oregon Highway Plan. Based on the OHP, U.S. 20 west of Corvallis is classified as a statewide NHS (National Highway System) highway; U.S. 20 northeast of Corvallis and Highway 99W are classified as regional highways; and all other state highways in Benton County are designated district highways. All principal arterials in Benton County are State Highways. The functional classification of County roads also calls for access standards for minor arterials and major collectors. The County Comprehensive Plan states:

Access control standards for each functional classification shall discourage access on principal and minor arterials, provide controlled access to industrial and commercial development from collectors, discourage access to collectors from residential units, and allow for the use of medians to control access.

Access decisions for resource collectors must be made on a case-by-case basis taking into account the characteristics and needs of the local resource-based traffic (i.e., log trucks, farm machinery). Access standards within urban growth boundaries should be coordinated with the municipality. The Corvallis-Philomath area will

be designated a Metropolitan Planning Organization (MPO). Accordingly, the Cities and County should further coordinate road and access standards within the urban boundary.

3.3.2 New Policy Recommendations

The efforts of reviewing related documents and identifying policy issues with staff, agencies, and the public has resulted in the identification of policies and codes that are recommended for modification. Summarized below are the recommendations.

Identified Policy Issues

In addition to the issues identified during the formal plans and policies review process, several policy issues were identified and new policy solutions developed during the public process of the TSP development. County staff, the TSP committees, the Roads Advisory Committee, stakeholders, and the public identified these issues.

State and County Shared Funding Opportunities

Road financing mechanisms are often separate for state facilities and county facilities; however, there is a growing desire for multi-agency partnerships and an expectation that local jurisdictions participate in the funding of state highway improvements. Due to a significant disparity in road improvement resources available to counties throughout Oregon, those counties able to contribute significantly to state highway improvement projects may be leveraging the limited state highway improvement funds to their areas. The County seeks to establish appropriate partnerships that will secure needed improvements to the state highway system within Benton County.

Proposed New Policy

Where feasible, the County should consider sharing in the costs of state highway improvements on a project-by-project basis when there is a clear County benefit.

Road Improvement Financing

Because current financing mechanisms do not provide adequate funds to maintain existing facilities, much less to improve them to standards, the County should develop new ways to pay for transportation improvements.

Proposed New Policy

The county should develop funding systems that equitably charge those benefiting from the facilities or the improvements.

Maintenance Financing

Benton County maintains 470 miles of public roads. There are approximately another 200 miles of public roads that are not maintained by the County. Some of these are maintained by formal road district, others by road or neighborhood associations, and for some of these roads there is no recognized body that has assumed maintenance responsibility. These roads are maintained only as the road users choose to so invest individually. Some of the roads that are maintained by the County do not differ in use or level of improvement from other public roads that it does not maintain. The County is seeking more equitable policies to handle the prioritization and distribution of funding for ongoing road maintenance.

Over 90 percent of the road maintenance revenues are generated from highway users through gas taxes and equivalent weight mile fees on trucks. The use of most local access roads does not generate adequate revenue to support the required maintenance activity. Road users of higher volume routes are paying for local access road maintenance that benefits the abutting property.

Proposed New Policy

- Benton County supports the continuation of the state's role of collecting and distributing adequate road use revenues to avoid the need for local option road use taxes or fees.
- Maintenance activity should be prioritized by functional classification.

- Identify a minimum level of maintenance by functional class and road use and consider Special Road Districts to provide a higher level of maintenance, if desired.
- Consider a maintenance policy requiring those who benefit from road use to pay.
- Consider elimination of County maintenance on roads that do not serve a through travel function, or significant resource use.
- Consider functional and improvement criteria for the acceptance of new or additional roads into the County road maintenance list.

Revision of the Oregon Highway Plan (OHP) in 1999

The OHP was revised and significantly modified in 1999 after the Draft Benton County TSP had been prepared.

Proposed New Policy

Include Policies from the OHP in the Benton County TSP as follows:

- Consider traffic circulation, highway safety, and mobility in land use decisions.
- Maintain mobility standards on highways by limiting expansion of development along the highway, providing adequate local street network, reducing access, clustering compact development off the highway, avoiding expansion of urban growth boundaries along the highway, and discouraging strip development. (OHP Action 1B.1,p.47 and 1B.4,p.49)
- Include designing and orienting buildings to support various modes. (OHP Action 1B.1,p.47)
- Current Access Management Standards from the OHP, Appendix B, shall be utilized on state highways within Benton County.
- Apply freight route performance standards for U.S. 20/Highway 34 (OHP Policy 1C, p. 64; Policy 4A, p. 121). Action 1C.4 (OHP p. 64): Consider importance of timeliness in freight movements in developing and implementing plans and projects on freight routes. Maintain and improve freight movement efficiency on state highways and access to intermodal connections. Action 4A.1 (OHP p. 121): Identify roadway obstacles and barriers to efficient truck movements on state highways (e.g., bridges with load limits, geometric constraints prohibiting legal size vehicles). Identify highway segments that hinder or prevent freight movements.
- Benton County commits to making necessary transportation policy changes to the Benton County TSP in the next periodic review cycle. At that time, existing and projected traffic volumes will be updated, and traffic capacity analysis will be changed from level of service (LOS) to volume/capacity (V/C) ratios.
- Land use actions affecting state highways will be consistent with the OHP and the Oregon Administrative Rule for Highway Approaches, Access Control, Spacing Standards and Medians (OAR 734-051). Benton County will provide notice to ODOT of land use actions in accordance with OAR 660-012-0045(2)(f).
- Benton County will use V/C ratios and spacing standards from the OHP for projects and development proposals affecting state highway facilities. Decisions on alternatives will be evaluated in accordance with the OHP.
- Projects impacting state highway facilities are identified in this plan, but identified solutions are suggestions and will be evaluated and determined through ODOT's planning and project development process.

Policies to Protect the Highway Function

Protection of the highway function in Benton County could be accomplished, and capacity- increasing improvements avoided or delayed, through a variety of policies.

Proposed New Policy

Benton County shall:

- Work with local jurisdictions to foster changes in land use ordinances to encourage a better jobs-to-housing balance.
- Protect the existing capacity of commuting routes through enhanced access management measures.
- Limit development along rural commuting routes and at the urban interface.
- Plan for infrastructure that promotes alternative modes of travel and Transportation Demand Management (TDM) measures.
- Work with ODOT to target minor improvements to major commuting routes, as necessary, to improve safety or existing capacity of commuting routes.
- Accept some levels of congestion on major commuting routes during peak commute hours.
- Reserve opportunities for major improvements to major commuting routes until needed and after other reasonable measures have been implemented.

Transfer of County Road Jurisdiction to Cities

State law requires that cities agree to accept the jurisdiction of county roads annexed into the City even when they no longer serve a county road function. Cities often require counties to reconstruct county roads to urban standards prior to accepting jurisdiction. Urban development activities under the jurisdiction and control of the cities cause extensive damage to the existing roads. As these areas are annexed, the city share of the state highway revenue increases but they are not obligated to accept additional road maintenance responsibility.

Proposed New Policy

Benton County supports a change in state law that will promote city acceptance of an equitable share of jurisdictional responsibilities for roadways annexed into developing areas.

Fire Access Policy

Benton County shall support construction of secondary access to residential and public lands in high fire hazard areas

Benton County Open Space Lands/Chinook Road District

Benton County supports the policy stated in the City of Philomath TSP, which states,

> "…the Philomath Transportation Plan supports the goal of connecting its community to the public resource lands and trails to the north, particularly County owned Open Space lands. The access road will also fulfill a goal of the Chinook Road district by providing a secondary emergency access for the Philomath Rural Fire District and an escape route for their residents. Connection to this resource will provide more travel options to the residents of Philomath, Corvallis, and Benton County. Livability will be enhanced through this direct link to this recreation Open Space resource for the residents of Philomath."

SW 53rd Street Design Standard

The 1985 Corridor Study recommended a five-lane facility for SW 53rd Street from U.S. 20/ Highway 34 to Harrison Boulevard. The 1996 Corvallis Transportation Plan (CTP) also supports pursuing this standard. Traffic modeling for this TSP, however, suggests that a two-lane facility with center turn lanes/median and bike lanes will be adequate for the 20-year planning horizon.

Benton County will work with the City of Corvallis to reconstruct and upgrade this corridor to the above lane standard with maintenance activity, development, and other funding that may become available.

3.4 Preferred Alternatives

Preferred alternatives for addressing the identified deficiencies are presented below in four improvement categories:

1. Seven roadway corridors with capacity issues
2. Intersection capacity deficiencies in other corridors
3. Bridge replacement needs
4. Roadway and intersection safety improvements

3.4.1 Corridors With Projected Capacity Deficiency

The seven corridors with projected capacity deficiencies are:

- U.S. 20 Corridor, Corvallis to Albany
- North Albany Road/Gibson Hill Road Corridor in North Albany
- U.S. 20/Highway 34, Philomath to Corvallis
- U.S. 20/Lincoln County line to Highway 34 Junction
- North Highway 99W Corridor
- Bellfountain Road/South Highway 99W Corridor
- South Fork Road Corridor

It is important to understand that for state highway alternatives, the OHP requires adherence to the Major Improvement Strategy and the final solutions to the identified deficiencies to be developed through refinement plans and/or project development. The LOS analysis completed for development of this plan will need to be refined to demonstrate compliance with the mobility, spacing, and signal standards contained in the 1999 OHP.

3.4.1.A U.S. 20 Corridor, Corvallis to Albany

The U.S. 20 corridor connecting Corvallis and Albany faces present and future needs for improved safety and greater capacity. Transportation demand in this corridor will continue to grow. The various strategies suggested numerous ways to meet this increasing demand. The Roadway Build strategy would widen highways as needed. The Transit/TDM strategy

seeks to minimize the auto demand on the roadway by providing for alternative modes. The TSM strategy calls for accepting lower levels of service. These strategies play against each other over a variety of specific decisions. The recommended plan and options discussed below are indicated in **Figures 3-A**, **3-B**, **3-C.1**, and **3-C.2**.

The preferred alternative suggests the following improvements to the U.S. 20 corridor between Corvallis and Albany:

- Express bus service *(For more information, see Chapter 5.)*
- Traffic signal and left turn channelization at Granger Road
- Independence Highway traffic signal [A4]
- Scenic Drive turn lanes [A5]

- Gibson Hill Road/Scenic Drive/Oak Grove Drive Intersection realignment [A6]
- U.S. 20 widening to four lanes, Conifer Boulevard to North Albany Road [A1] (This alternative would be pursued only if other alternatives are not acceptable.)

This group of projects addresses capacity and safety issues along U.S. 20 between Corvallis and Albany. Traffic demand on U.S. 20 will require widening the roadway to a four-lane cross-section within the 20-year study period. Demand for a six-lane section is indicated in the section connecting North Albany to Albany. Since the Willamette River bridges have a four-lane capacity and the downtown Albany street system is not planned to be expanded to accept additional bridge capacity the six-lane improvement between North Albany Road and Springhill Drive is not included in the preferred alternative. This is consistent with the adopted City of Albany TSP.

Frequent all-day express bus service could provide an alternative to the private automobile in the corridor, but would not attract enough trips to eliminate the need for road widening. Express bus service provides four times the service at half the price of operating commuter rail along the railroad tracks paralleling the highway. *(For more information, see "Rural Transit and Transportation Demand Management (TDM)," in Chapter 5).*

Traffic signals and turn lanes are required at Independence Highway and Granger Road for safety and capacity reasons. No signal is proposed at Scenic Drive, as less expensive treatments will still provide adequate access.

An alternative plan to realign Granger Avenue to Independence Highway, thereby reducing the number of access points, rail crossings, and potential signal locations along U.S. 20, should be considered in the U.S. 20 corridor refinement planning efforts because of its potential to address capacity needs within the highway corridor. The realignment would require an encroachment on EFU land, requiring a statewide land use goal exception. However, on balance, improvement to U.S. 20 capacity may warrant the encroachment.

3.4.1.B North Albany Road/Gibson Hill Road Corridor in Albany

North Albany Road and Gibson Hill Road are county roads serving as a minor arterial route through the City of Albany. The city's TSP has identified eleven projects to improve this corridor. The projects in the preferred alternative below are consistent with the Albany plan.

The preferred alternative for this corridor includes:

- Improvement of Gibson Hill Road to an urban minor arterial
- Realignment of the Gibson Hill Road and Oakgrove Drive intersections with Scenic Drive
- The re-designation of Oakgrove Drive between Scenic Drive and Metge Avenue from a collector to a minor arterial
- Improvement of North Albany Road as an urban minor arterial
- The extension of a new major collector from the intersection of Gibson Hill Road and North Albany Road to Scenic Drive
- Traffic signals and intersection improvements along North Albany Road at U.S. 20, Hickory Street, West Thornton Lake Drive, Gibson Hill Road, and at Crocker Lane and Gibson Hill Road

NOTE: The preferred alternative does not include the extension of a new road between Scenic and Metge across EFU lands that was included in earlier Benton County plans.

The Albany TSP also anticipates the urban upgrade of the following county maintained roads within the city limits: Springhill Drive, Quarry Road, Crocker Lane, Valley View, Scenic Drive, and West Thornton Lake Drive.

3.4.1.C U.S. 20/Highway 34 Corridor, Philomath to Corvallis

The primary transportation issues in this corridor are capacity, connectivity, and safety. Travel between Philomath and Corvallis is served by several partial or complete parallel routes. Drivers and bicyclists will tend to select among these routes based on directness for their particular destination, perceived speed, and comfort and safety. Transportation improvements in this corridor should seek to make the best use of all routes while preserving a balance of roadway functional classification. The recommended plan and options considered are indicated on **Figures 3-A**, **3-B**, **3-C.1**, **and 3-C.2.**

The main roadways serving the corridor are:

- U.S. 20/Highway 34
- West Hills Road
- Reservoir Avenue
- SW 53rd Street
- North 19th Street

U.S. 20/Highway 34 serves local travel between Philomath and Corvallis and regional and state level travel to and from the coast. Through-travel movements in this corridor to and from Highway 99W south of Corvallis are discussed separately below ("Bellfountain Road/South Highway 99W Corridor"). Regional and statewide travel will continue to be primarily by automobile and truck.

The preferred alternative will provide additional east-west capacity between Highway 99W in Corvallis and the U.S. 20/Highway 34-junction west of Philomath.

The preferred alternative for this corridor includes:

- U.S. 20/Highway 34 expanded capacity, Highway 99W to the U.S. 20/Highway 34 junction [C1]
- U.S. 20/Highway 34 Junction traffic signal [C2]
- Reservoir Avenue/SW 53rd Street traffic signal
- Widen SW 53rd to two through lanes between U.S. 20/Highway 34 and Harrison Boulevard
- Construct new railroad grade crossing on SW 53rd Street
- West Hills Road traffic signal at SW 53rd Street
- Traffic Signal at SW 53rd Street and Harrison Boulevard

These projects address capacity and connectivity issues on the main east-west routes between Philomath and Corvallis. Traffic demand requires two through lanes in each direction on U.S. 20/Highway 34 between Corvallis and Philomath. The roadway through downtown Philomath is identified as a one-way couplet in the Philomath Transportation System Plan.

The extension of West Hills Road to the U.S. 20/Highway 34 junction to provide a bypass of Philomath for regional traffic to and from Corvallis was considered. It would need to cross resource-zoned property and would require an exception to state land use goals to construct. Analysis completed for the City of Philomath TSP suggests that the extension of West Hills Road would not eliminate the need for additional capacity on the highway through Philomath. The improvement may be warranted in the future, beyond the 20-year planning period. It is not included in the preferred alternative for development prior to 2015. The corridor should be further considered for its value to the future roadway network beyond the planning period.

The Reservoir Avenue/SW 53rd Street traffic signal is needed to provide adequate capacity. Reconstructing the SW 53rd Street undercrossing to an at-grade crossing or overcrossing should be pursued as the most cost-effective improvement to meet capacity and safety needs. Railroad operations with the adjacent siding and spur tracks may complicate traffic operations for an at-grade crossing. Modification to the railroad facilities should be considered in refining plans for the rail crossing at this location.

The SW 53rd Street/West Hills Road traffic signal will be required by development within the Corvallis urban growth boundary.

3.4.1.D U.S. 20—Lincoln County Line to Highway 34

U.S. 20 to the east of Philomath is projected to operate at unacceptable levels based upon standards prescribed in the 1991 Oregon Highway Plan. The 1991 OHP had relatively high standards for operations of highways of "statewide level of importance," that will not be met on U.S. 20 in this section.

The preferred alternative is:

- Provide continuous left turn lane on U.S. 20 from Highway 34 to Woods Creek Road [D1]

Provision of a continuous left-turn lane on U.S. 20 from the Highway 34 junction west of Philomath to Woods Creek Road will restore LOS "D" operations to this highway. While this is a lower LOS than is indicated in the 1991 OHP, this improvement is more feasible given the limited funding expected to become available within the planning period.

3.4.1.E North Highway 99W Corridor

In the rural section of Highway 99W north of Corvallis, the primary transportation issue is ensuring continued safe and efficient intersection operations, particularly in the vicinity of Adair Village.

The preferred alternative includes:

- Widen Highway 99W from Willamette & Pacific Railroad crossing through Walnut Boulevard from two to four lanes [E1]
- Arnold Avenue/Highway 99W traffic signal [E3]

These projects address capacity and safety issues. Arnold Avenue is the main entrance to Adair Village from Highway 99W; turn lanes already exist at this intersection. A traffic signal will provide appropriate capacity and safety for this city's entrance.

The Camp Adair Road intersection serves traffic connecting to Independence Highway to the east and heavy truck traffic to and from the landfill to the west. The westbound approach of Camp Adair Road to Highway 99W currently divides, separating out the northbound (right-turn) traffic to a separate stop sign at an oblique approach. Realigning Camp Adair Road will improve safety by bringing all approaching traffic to Highway 99W at one intersection, at a ninety-degree angle.

3.4.1.F Bellfountain Road/South Highway 99W Corridor

Traffic between U.S. 20/Highway 34 west of Corvallis and Highway 99W south of Corvallis should be encouraged to use the state highway system. The highway-to-highway connection on Third and 4th Streets in Corvallis, just north of the Marys River is awkward, has limited capacity, and sometimes experiences long delays. Increasing congestion on South 3rd Street further compromises this all-state route. As a result, more local automobile traffic is cutting through on Avery Avenue, and longer distance automobile and truck traffic avoids this connection by using South 19th Street and Chapel Drive in Philomath, and then Bellfountain, Llewellyn, and Greenberry Roads, a shorter and less congested route.

Bellfountain and Greenberry Roads are currently classified as minor arterials. In order to reach Greenberry Road, traffic must pass over a section of Bellfountain Road that is poorly suited for heavy traffic, especially trucks. The pavement on this section is narrow, the road shoulders are inadequate, and the road winds through a set of low hills, creating areas of poor sight distance and moderate grades. This route also passes Inavale School and areas of rural residential development.

This plan proposes a policy that states, "Benton County shall not encourage diversion of through truck traffic from state highways onto the County system." The projects proposed for this corridor are consistent with that proposed policy. The projects address the need for an improved connection from Philomath and points west to Highway 99W south of Corvallis, improved safety on the route, and retention of the low volume character of

the Greenberry-Bellfountain-Chapel corridor to the greatest extent possible. The recommended plan and options considered are indicated on **Figures 3-A**, **3-B**, **3-C.1**, and **3-C.2**.

The preferred alternative includes:

- U.S. 20/Highway 34 and Highway 99W interchange improvements [F3]
- Highway 99W: Rivergreen Avenue to Airport Avenue Improvements [F7]
- Highway 99W: Kiger Island Drive to Bruce Road Improvements [F8]
- The Bellfountain Road Refinement Plan (see below).

Analysis showed that due to the congestion and delay along Philomath Boulevard and South 3rd Street in Corvallis, constructing ramps and bridges over the Marys River to improve the interchange between U.S. 20/Highway 34 and Highway 99W would not effectively divert through traffic from the Bellfountain Road corridor. The completion of a full interchange at the highway junction is widely believed to be a significant deficiency in the local transportation system. The improvement is included in the City of Corvallis TSP and is a part of the preferred alternative in this plan. The project has not been supported by ODOT or included in the STIP up to this time.

A relatively inexpensive project was proposed during the planning effort that would improve the existing U-turn connection for eastbound-to-southbound and northbound-to-westbound movements at the interchange. The improvement would greatly increase the turning radii, make the connecting section from South 3rd to South 4th one-way, provide channelization improvements, thereby facilitating conversion of stop-controls to yield-control for these movements, and potentially replace the stop sign at South 4th with a merge lane. Refinement planning efforts for the U.S. 20 corridor should further consider this alternative, perhaps as an interim improvement to the full interchange.

Capacity needs indicate that widening Highway 99W between Rivergreen Avenue and Airport Avenue from two lanes to four lanes is needed. ODOT STIP projects from Kiger Island Drive to Bruce Road will preserve Highway 99W for the planning horizon. Left turn channelization at additional intersections along Highway 99W should be developed to improve safety and preserve capacity.

Bellfountain Road Refinement Plan

The Bellfountain Road Refinement Plan will identify, analyze, and recommend specific actions to improve safety and retain the rural character of the area. Projects to be considered include:

- Bellfountain Road/Airport Avenue intersection improvements [F6]
- Bellfountain Road shoulder improvements [M6]
- Greenberry Road/Bellfountain Road minor alignment improvements [F4]
- Other projects as appropriate, including signing, Inavale School sight distance improvements, speed controls, etc.

Alternatives Considered But Not Included

- Airport Avenue Connection to SW 53rd Street/Borden Road

A new route connecting Bellfountain Road to Airport Avenue via Borden Road/SW 53rd Street was considered during development of this TSP. It is believed that the route would reduce travel times and help to relieve congestion at the connections between U.S. 20/Highway 34 and Highway 99W, as well as on South 3rd Street (Highway 99W). If constructed, potential projects at Airport Avenue/Bellfountain Road, Greenberry Road/Bellfountain Road, and Greenberry Road/Highway 99W might be eliminated or reduced in scale. These roads would then remain deficient in width and alignment for the remaining traffic if a bypass via Airport Avenue were developed.

The Airport Avenue connection was proposed in an attempt to route traffic away from the sight-restricted Airport Avenue/Bellfountain Road intersection. The proposed road would have to cross Muddy Creek and the associated riparian areas. Wetland mitigation would be required. It would also require exceptions to state land use goals for encroachment into resource-zoned lands.

This project has not been included in the preferred alternative due to the considerable expense associated with development of this route, the extent of negative environmental impacts, the poor condition of portions of the existing Airport Avenue pavement strength, and the lack of a significant constituency in support of the project.

- Northerly Extension of Bellfountain Road

This plan also considered a northerly extension of Bellfountain Road from Plymouth Drive to U.S. 20/Highway 34. This project has been included in previous Benton County Transportation Plans, including the Comprehensive Plan. The extension would be built to minor arterial standards, with the connection from Plymouth Drive to U.S. 20/Highway 34 providing a needed link in the arterial level structure of the road system. It would reduce cut-through traffic on collectors Chapel Drive and Plymouth Drive and help relieve congestion on South 3rd Street in Corvallis. Design of the final alignment would need to avoid the cemetery and the existing residential development. The alignment would also need to provide for traffic safety at the intersection of Country Club Drive with U.S. 20/Highway 34 by assuring adequate separation of the intersections.

The projected need and justification for development of this route during the next 20 years is not deemed adequate to overcome the funding and land use issues associated with this proposal.

3.4.1.G South Fork Road Corridor

The preferred alternative includes:

- South Fork Road paving [J1]

The last few miles of South Fork Road that are still unpaved (from the eastern terminus of South Mountain Road to about three miles westward near Tobe Creek Road) severely inhibit this route for travel between the rural communities of Alsea and Alpine. While the volume of travel between these communities is relatively low, paving this section would improve connectivity between the two communities for both vehicles and bicyclists. The Bureau of Land Management has designated this route as a Scenic Byway. The designation may attract visitors with vehicles inappropriate for the primitive nature of the unpaved portion of this road. The cost of this improvement is estimated at $4,866,000.

3.4.2 Intersection Capacity Projects

The analysis identified a number of locations where traffic signal warrants are met now or may be met in the 20-year future. Depending on the location and the projected traffic volumes, intersection improvements may take the form of traffic signals or new turn lanes. Modern roundabouts should be considered a potential alternative to traffic signals on a case-by-case basis.

Signalization

Based on an evaluation of existing and future traffic conditions, traffic volumes are projected to grow to a level requiring signalization at numerous intersections throughout the county. Most of these new signals have been described in association with other projects (i.e. road extensions or widenings). Three locations that are expected to require signalization are the intersections at West Hills Road/Reservoir Road, West Hills Road/SW 53rd Street, and SW 53rd/Harrison. They will meet warrants for the installation of traffic signals due to the general growth in traffic in Corvallis and Philomath. As traffic volumes grow on Highway 99W, signalized access from the City of Monroe onto Highway 99W may become necessary. The intersection at Highway 99W/Orchard Street has been identified as the most likely point of signalized access to the highway within the City of Monroe.

Turn Lanes

In addition to those locations in which new turn lanes have been identified to be associated with other roadway projects, the analysis identified three locations requiring turn lanes. These locations are at higher volume highway locations in which turning volumes require some protection, but do not warrant the full protection of a traffic signal. **Figures 3-A**, **3-B**, **3-C.1**, and **3-C.2** show the locations of the recommended projects.

The preferred alternative includes:

- West Hills Road/Reservoir Road traffic signal [G1]
- West Hills Road/SW 53rd Street traffic signal [G2]
- Highway 99W/Orchard Street traffic signal in Monroe [G4]
- Highway 223/U.S. 20 turn lanes [G5]
- Eddyville-Blodgett Highway/U.S. 20 turn lanes [G6]
- Old River Road/Highway 99W turn lanes [G7]

The choice between signalization and adding turn lanes depends mainly on two factors: (1) the intersection location, rural vs. urbanizing, and (2) the traffic volume that would benefit from signalization, which is generally the side road left-turning and crossing movements. Motorists do not expect to find traffic signals in rural areas and installing them in such locations may only replace one safety issue (unsafe turning maneuvers by impatient motorists) with another (red-light running and rear-end crashes caused by inattentive motorists). If side road left-turning and crossing movements were relatively low at a rural location, the recommended course of action was to separate the side road right-turning movements (which experience less delay) from the other side road movements, and to provide left-turn lanes on the main road, if not already present.

3.4.3 Bridge Replacement Projects

The preferred alternative includes:

- Llewellyn Road bridge over Overflow Channel (2001) [H4]
- Van Buren Avenue bridge over Willamette River [H6]
- Crescent Valley bridge (1999) [H7]
- Norton Creek bridge (2000) [H8]
- Old River Road bridge (1999) [H9]
- Chapel Drive bridge (2000) [H10]
- Tampico Road bridge (1999) [H11]
- Harris Road bridge over Alder Creek (2003) [H12]
- Elliot Circle bridge (2000) [H13]
- Llewellyn bridge #25 (2001) [H14]
- Bellfountain Road bridge over Oliver Creek (2000) [H15]
- Llewellyn Bridge #2 (2002) [H16]
- Airport Avenue bridge [H17]
- Harris Covered bridge [H18]

- Price Creek Road Bridge [H19]
- North Fork Alsea Road at Highway 34 [H20]

These bridge replacement projects will address the identified issues of weight restricted bridges, poor condition, and structural inadequacies.

3.4.4 Airport-Related Project

The Corvallis Airport Master Plan identifies Airport Avenue as needing improvements to urban standards in order to promote land use development supportive of the airport. The City of Corvallis designates Airport Avenue as an arterial street. As future development occurs on Airport Avenue, this street should be improved to urban standards (i.e. underground storm drainage, streetlights, etc.). **Figure 3-C.1** shows the location of the recommended project.

The preferred alternative includes:

- Airport Avenue improvement to City Arterial Standards [I1]

This project will support the further urban development in and around the Corvallis Airport. The Corvallis Airport Master Plan calls for the improvement of Airport Avenue to arterial standards.

3.4.5 Safety Projects

The analysis and public involvement process identified a variety of safety-related issues at intersections around Benton County. These issues included poor sight distance, unusual intersection configurations, sharp curves, and locations where heavy volumes of vehicles must slow or stop in a travel lane while making a turn off of a highway**. Figure 3-B** shows the locations of each of the recommended projects.

The preferred alternative includes:

- Independence Highway/Springhill Drive intersection reconfiguration [K1]
- Grange Hall Road/Fern Road advance beacons, signing, and striping [K2]
- Wren Road/Highway 223 intersection reconfiguration [K3]
- Priest Road signing at U.S. 20 [K4]
- Independence Highway/Ryals Avenue signing [K5]
- Palestine Avenue/Oak Grove Drive realignment [K6]
- U.S. 20/Marys River Estates right-turn lane [K7}
- Highway 34/Fish Hatchery Road turn lanes [K8]
- Highway 34 curve realignment, Alsea area [K9]

Sight distance concerns will be addressed at the Grange Hall Road/Fern Road, Priest Road/U.S. 20, and Ryals Avenue/Independence Avenue intersections by providing improved advance warning of the intersection.

The Independence Highway/Springhill Drive intersection will be reconfigured to improve operation and sight lines. Two intersections with yield-controlled legs, Wren Road/Highway 223 and Palestine Avenue/Oak Grove Drive, are planned to be realigned to form conventional “T” intersections.

Turn lanes will be constructed at the U.S. 20/Marys River Estates and Highway 34/Fish Hatchery Road intersections to allow vehicles to slow and/or stop out of the through travel lane, improving safety at these locations. Another safety project along Highway 34 consists of realigning a curve near Alsea with a history of accidents.

3.4.5 Substandard and Non-Programmed Roadway Needs

Many of the roadways within the County road system are substandard with respect to width, vertical or horizontal alignment, and, in the case of cities, the lack of urban features such as curbs and piped storm drains. Projects included in the TSP have been prioritized on capacity and safety needs. The projects identified in this plan are not intended to limit or impede the improvement of any substandard road as opportunities present themselves.