

TANGENT TRANSPORTATION SYSTEM PLAN

Table of Contents

EXISTING CONDITIONS AND DEFICIENCIES.....	Page 4
1.0 Introduction.....	Page 5
2.0 Review of Existing Plans and Policies.....	Page 5
3.0 TSP Goals and Policies.....	Page 6
3.1 State Goal 12 – Transportation.....	Page 6
3.2 Access Management.....	Page 9
3.3 Public Transportation.....	Page 10
3.4 Pedestrian and Bikeways.....	Page.11
4.0 Existing Land Use.....	Page.12
5.0 The Existing Roadway System.....	Page 12
5.1 Functional Classification.....	Page 12
<u>5.1.1 Tangent Classification</u>	Page 12
5.1.32 ODOT Classifications	Page.13
5.2 Lane Widths.....	Page 14
5.3 Pavement Condition.....	Page 14
5.4 Jurisdictional Responsibility.....	Page.14
5.5 Traffic Signals.....	Page 15
5.6 Speed Limits.....	Page 15
5.7 Traffic Volumes.....	Page 16
5.8 Level of Service.....	Page 17
5.9 Accidents Safety Analysis.....	Page 18
6.0 The Existing Bicycle System.....	Page 22
7.0 The Existing Pedestrian System.....	Page 22
8.0 The Existing Transit System.....	Page 23
9.0 The Existing Rail System.....	Page 24
10.0 The Existing Water, Air, and Pipeline Systems.....	Page 25
FUTURE CONDITIONS AND DEFICIENCIES	Page 26
11.0 Future Land Use and Traffic Growth Assumptions.....	Page 27
11.1 Land Use Growth.....	Page 27
11.2 Land Use Densities.....	Page 28
11.3 Vehicular Trip Generation.....	Page 28
11.4 Background Traffic Growth.....	Page 29
11.5 Trip Distribution and Assignment.....	Page 29
12.0 The Future Roadway System.....	Page 30
12.1 Functional Classification.....	Page 30
12.2 Level of Service.....	Page 30
12.3 Lane Widths.....	Page 33
12.4 Pavement Conditions.....	Page 34
12.5 Traffic Signals.....	Page 34
12.6 Speed Limits.....	Page 35
12.7 Accidents Crashes.....	Page 35
12.8 Committed Projects.....	Page 36
13.0 The Future Bicycle System.....	Page 36

14.0 The Future Pedestrian System.....	Page 40
15.0 The Future Transit System.....	Page 40
16.0 The Future Rail System.....	Page 40
17.0 The Future Water, Air, and Pipeline Systems.....	Page 41
TRANSPORTATION SYSTEM PLAN.....	Page 42
18.0 General	Page 43
19.0 Land Use Recommendations.....	Page 43
20.0 The Proposed Roadway System.....	Page 44
20.1 Street Functional Classification Modifications.....	Page 44
20.2 Transportation System Management.....	Page 45
20.2.2 1 Traffic Lane Modifications.....	Page 46
20.2.3 2 Truck Routes.....	Page 47
20.2.4 3 Access Management.....	Page 47
20.2.5 4 Speed Reduction.....	Page 49
20.3 Pavement Preservation and Maintenance.....	Page 50
20.4 Transportation Demand Management.....	Page 51
20.5 Capacity Expansion.....	Page 51
20.6 New Streets	Page 52
20.7 Street Design Standards.....	Page 53
21.0 The Proposed Bicycle System.....	Page 54
22.0 The Proposed Pedestrian System.....	Page 55
23.0 The Proposed Transit Public Transportation System.....	Page 56
24.0 The Proposed Rail System.....	Page 56
25.0 The Proposed Water, Air, and Pipeline Systems.....	Page 56
IMPLEMENTATION PLAN.....	Page 57
26.0 Implementation Plan.....	Page 58
26.1 Project Cost Estimates.....	Page 58
26.2 Transportation Funding Sources.....	Page 63
26.2.1 Federal Funding Sources.....	Page 63
26.2.2 State Funding Sources.....	Page 64
26.2.3 Local Funding Sources.....	Page 64
27. Public Involvement.....	Page 64
APPENDIX.....	Page 65

**EXISTING CONDITIONS
AND DEFICIENCIES**

1.0 Introduction

The City of Tangent is located at the junction of Highway 34 and Highway 99E in Linn County. **Figure 1** shows the location of Tangent, which is roughly half way between Salem and Eugene. Because of its location, and proximity to Interstate-5, Corvallis, and Albany, Tangent is experiencing rapid increases in industrial development. Much of the existing development is agriculturally or construction related. Housing has also grown in response to job growth in Tangent and nearby communities. As a result, roughly 12,000 vehicles travel Highway 34 per day. At the same time, nearly 7,000 vehicles use Highway 99E as it passes through town. With the growth in traffic, truck activity has also significantly increased.

Like most people in the U.S., residents of Tangent generally choose to drive alone rather than car pool, use public transportation, bicycle, or walk. The ~~1990~~ 2000 census results indicate that ~~71%~~ 83 percent drive alone to work as shown in **Figure 2**. Tangent's drive-alone rate is ~~slightly lower~~ higher than the national average of ~~73%~~ 76 percent for work trips. ~~The lower rate may be a result of a relatively high number of residents who reported working at home.~~ This may be because many workers in Tangent actually work outside of the City, either in Albany or other nearby Cities. Travel time to work data (Figure 3) suggests that the majority of employees travel almost 20 minutes to work, suggesting that they are employed outside of Tangent.

This Transportation System Plan (TSP) is intended to meet the need for long range planning and replace the transportation element of the Comprehensive Plan. Other factors have also influenced the need for a TSP.

In 1991, the Oregon Land Conservation and Development Commission (LCDC) adopted the Transportation Planning Rule (TPR). The rule is intended to implement statewide Planning Goal 12 and, in so doing, provide for a carefully planned transportation system designed to reduce reliance on the automobile and increase walking, bicycling, and the use of transit. Recommendations contained in this TSP are in harmony with the applicable requirements of the TPR.

Also in 1991 and again in 1998, Congress passed transportation legislation which made transportation funding to cities more flexible, but reaffirmed that jurisdictions need to prepare transportation plans. These state and federal requirements and the general need by the City for a comprehensive transportation plan have prompted the City to prepare a TSP. The purpose of this TSP is to address existing and twenty year transportation needs within the City of Tangent. The TSP addresses the needs of transportation in Tangent, which include roadway, bicycle, pedestrian, transit, rail, water, air, and pipeline facilities.

2.0 Review of Existing Plans and Policies

As an initial step in preparing the TSP, existing plans and policies were reviewed to establish the history of planning in Tangent, planned street system improvements, and other county and state planned transportation improvements. The review also served to evaluate consistency between local plans/policies and other county, state, and federal plan provisions affecting transportation.

The review included the following documents:

- City of Tangent Comprehensive Plan
- City of Tangent Planning and Zoning Ordinance
- City of Tangent Public Works Design Standards
- City of Tangent Capital Improvement Program
- Linn County Transportation Plan
- Oregon Transportation Plan
- Oregon Highway Plan
- Oregon Transportation Planning Rule
- ODOT Economic Development Analysis of Highway Corridors
- OTDOT Overview of Statewide Corridors
- Oregon Highway 34 Transportation Corridor Plan
- ODOT Accident Rate Tables
- ODOT Traffic Volume Tables
- Oregon Rail Freight Plan
- Oregon High Speed Rail Capacity Analysis
- Governor’s Transportation Initiative

~~The Appendix contains a summary of specific issues or concerns identified during the review.~~

3.0 TSP Goals and Policies

As part of the TSP, community goals and policies were prepared to guide the development and implementation of the plan. Goals and policies were based on input obtained during public meetings and citizen advisory committee meetings held throughout the project.

3.1 State Goal 12 – Transportation

The Tangent Comprehensive Plan was revised and adopted by the voters in November 2007. Statewide Planning Goal 12, Transportation, is “to provide and encourage a safe, convenient and economic transportation system.” (OAR 660-015-0000(12)). As part of the Comprehensive Plan revision process, the City of Tangent conducted the Tangent Visioning project, which resulted in a Vision Statement incorporated into the Comprehensive Plan. The transportation element of the Vision Statement states that:

“Tangent has safe, efficient and economical transportation routes. There are orderly and sufficient outlets, inlets, with railroad crossings, walkways and bike paths designed to minimize congestion and speed. Neighborhoods give input on road and pathway design. Tangent neighborhoods are connected through a series of bike and walking paths. Every street is lined with trees and has gained the reputation of a “Tree City”. Tangent has open green space, walkways, and public parks that serve the entire community with public access with connected walkways to existing areas of the community. Streets, highways and pathways meet the needs of the transportation disadvantaged. Streets and highways facilitate the flow of goods and services throughout the community.”

City Goal #1: To provide and encourage a safe, convenient, and economical transportation system within the City.

City Goal #2: To protect the ability of Highway 34 and 99E to move regional traffic through Tangent in a safe manner.

City Goal #3: To lessen the adverse effects of the rapid and frequent movement of trains through the City.

City Goal #4: To encourage the use of alternatives to the private automobile.

Policy 1:

The City will establish street and sidewalk standards with respect to:

1. Right-of-way.
2. Paved width.
3. Surface cover and composition.
4. Base composition and compaction.
5. Curbs and gutters.
6. Street function.
7. Cul-de-sac length and radius.
8. Curb cuts for driveways.
9. Sidewalks and bikeway standards.
10. Wheelchair ramps.
11. Maximum curve.
12. Speed limits.

Policy 2:

The City will participate in any decision to locate or modify transportation facilities within the City limits and the Urban Growth Boundary.

Policy 3:

The City will participate in all decisions involving transportation facilities which affect the City.

Policy 4:

A workable drainage plan, ~~discussing~~ depicting drainage through the roadbed, how ponding will be prevented, and the effects of flooding upon streets, parking areas, and hard-surfaced pedestrian ways shall be approved by the City prior to any street, parking lot, or pedestrian/bikeway construction.

Policy 5:

New and resurfaced roadways and parking areas will not cause or augment ponding or increase damage due to flooding.

Policy 6:

The City of Tangent shall require all streets and pedestrian ways in new subdivisions, major partitions, mobile home parks, mobile home subdivisions, industrial parks and commercial centers to be the financial responsibility of principals behind the proposed use and designed to City standards. All street development shall be completed or bonded for completion prior to construction of the first structure of the proposed development.

Policy 7:

The Planning Commission shall review development proposals for proper street lighting and shall explore methods of lighting existing areas of Tangent, with lights that use low energy, provide proper lighting levels, and are not a nuisance to surrounding neighbors.

Policy 8:

The City of Tangent shall cooperate with the State Department of Transportation and the Linn County Road Department in the identification and removal of hazards, and ~~the regulating~~ traffic at intersections, with special regard to the intersections of Highway 34 , Old Highway 34 and Highway 99E. The City shall cooperate with appropriate agencies to limit access points to ~~Highways 34 and 99E.~~ ~~the above~~ highways.

Policy 9:

The City shall set standards by which it will accept responsibility for streets and roads, and will encourage the County to meet those standards on existing County roads within the City and Urban Growth Boundary.

Policy 10:

A street plan for the entire City, which shows the location of collector roads, bike routes, pedestrian walkways, railroad-crossing safeguards, overpasses, and all public transportation facilities shall be developed. Developers will be required to conform to the plan when building in the City.

Policy 11:

The City shall establish setback requirements from the right-of-way line of Highway 34 and 99E to reduce the effects of noise, pollution, vibration, and accidents to properties adjacent to these arterials and to reduce the negative effects of access from the property onto the arterials.

Policy 12:

1. Prior to each review of the Comprehensive Plan, the Planning Commission will identify traffic problem areas, review and suggest strategies for their solution, and recommend these strategies be included in the Comprehensive Plan.
- ~~2. The City has determined that the intersection of Highways 34 and 99E is a traffic problem area, and will pursue remedies of these problems with Linn County and Oregon Department of Transportation officials.~~

Policy 13:

Roadways, pedestrian and bicycle ways will be ~~designated~~ ~~designed~~ ~~at all times~~ to maximize safety and to provide a linkage between systems (i.e. schools, parks, neighborhoods, commercial and industrial areas).

Policy 14:

The City of Tangent shall consider a flexible interpretation of adopted street standards when a strict interpretation of street standards would jeopardize or remove an existing structure, a historic structure, site or object, a community landmark, or when the unique physical characteristics of the land will not permit a strict interpretation of street standards without greatly increasing the cost of the project. A flexible interpretation of street standards shall not reduce the function of a street. If, through a flexible interpretation of standards, a street function would be reduced, then the City shall:

1. Consider the cost of moving the structure, site, object, or landmark at the road builders' expense.
2. Reconsider the function of the street and, if possible, reestablish the street function, but only if the street function can be reestablished without transferring the problem to another part of the City.
3. Apply flexibility to a specific street through modification of on-street parking areas.

3.2 Access Management

Policy 15:

The City of Tangent shall require all new commercial or industrial uses and major residential uses which will utilize Old Highway 34 or Highway 99E as primary access, to submit to the City a transportation plan which shows:

1. Location of access points.
2. Estimates of the amount of traffic which will utilize the above access points.
3. Effect on traffic movement of both vehicles and pedestrians that the proposed development will have on Old Highway 34 and 99E.
4. The identification of all improvements that will be required to maintain adequate traffic flow.
5. Permit approval by the Oregon State Highway Division.

Policy 16:

Land uses adjacent to Old Highway 34 , Highway 34 and Highway 99E shall not reduce the ability of Highway 34 or 99E these highways to carry through traffic.

Policy 17:

The negative impact of strip development paralleling Highway 34 and 99E all State highways will be minimized through access controls, land use review procedures, and zoning.

Policy 18:

Subdivisions will provide roadways according to the City street plan.

Policy 19:

Direct access to Highways 34 and 99E all State highways will be provided only where adequate access to another street is not feasible. Frontage roads and access collection points shall be implemented wherever feasible.

Policy 20:

~~Subdivision and partitioning of land abutting Highways 34 and 99E will be reviewed to assure access control and to identify and coordinate access points.~~

Policy 21:

Access control techniques will be used to coordinate traffic and land use patterns, and to help minimize the negative impacts of growth.

Policy 22:

~~Industrial and commercial access to Highways 34 and 99E will be minimized. Development shall be encouraged to utilize common access points.~~

Policy 23:

The City of Tangent and the ~~Southern Pacific Transportation Company~~ Union Pacific Railroad shall cooperate in the siting and issuing of railroad siding permits.

Policy 24:

The City of Tangent shall coordinate in all City street improvements, extensions and closures with the State Public Utility Commission when the ~~Southern Pacific Railroad~~ Union Pacific Railroad is involved.

Policy 25:

The City shall cooperate with the ~~Southern Pacific Transportation Company~~ Union Pacific Railroad to minimize safety hazards at railroad crossings.

Policy 26:

Industrially zoned land will have railroad access, wherever possible.

Policy 27:

Development on land adjacent to the railroad shall be either adequately screened, buffered and constructed, or be activities least affected by noise and vibration.

Policy 28:

Residential development within 400 feet of the railroad shall be buffered from the noise and vibration of the railroad. The developer shall supply the buffer.

3.3 Public Transportation

Policy 29:

The City of Tangent shall support the Linn County Senior Bus Service, the Linn-Benton Loop, and any other public or private bus system as both a form of public transportation and an alternative mode of transportation.

Policy 30:

The Bus systems shall be encouraged to stop at the ~~Corner of Birdfoot and Highway 99E Tangent post office and Community Center and, north of Highway 34, at or near the existing Lumberman's store.~~ Bus stops should be convenient to citizens of Tangent and the bus systems.

~~Policy 31:~~

~~The City of Tangent shall explore methods of supporting the public bus services as public transportation alternatives.~~

~~Policy 32:~~

~~The City shall encourage greater use of the public transportation systems, and shall work with regional transportation officials in the siting of bus stops in Tangent.~~

~~Policy 33:~~

~~The City shall identify areas within Tangent that can be used as commuter transfer points and public transportation stops.~~

Policy 34:

The City of Tangent shall identify a commuter transfer point that is:

1. Usable as an off-street parking lot.
2. Convenient to the citizens of Tangent.
3. Useable as bus stops by all transit systems.
4. Useable as collecting points for car and van pools.

Policy 35:

The City of Tangent shall participate on any committee established to review and develop a regional transportation system.

Policy 36:

The City of Tangent shall actively pursue improved ~~alternative~~ transportation systems to surrounding cities where major educational, employment, commercial and residential centers are located, ~~as an alternative to private automobiles.~~

3.4 Pedestrian and Bikeways

Policy 37:

The Planning Commission of the City of Tangent shall consider pedestrian and bikeways when reviewing all development proposals and street improvements.

Policy 38:

The City of Tangent shall combine efforts with local citizens, Greater Albany Public Schools (GAPS), the Linn County Road Department, and the State of Oregon Department of Transportation to identify and eliminate hazards to pedestrians and non-motorized traffic.

Policy 39:

The City of Tangent shall encourage greater use of bicycles by developing, designating and posting bikeways throughout the City and coordinating with local business establishments to provide ~~covered~~ bicycle parking.

Policy 40:

The City shall formulate a bicycle and pedestrian way plan, and incorporate its recommendations into the City Ordinances and Resolutions. The plan shall cover the City and Urban Growth Boundary ~~and tie into other cities and counties plans where feasible.~~

~~Policy 41:~~

~~Bike and pedestrian ways shall be developed to both Tangent Elementary, McFarland School, and tied into the existing bikeway along Looney Lane to Linn Benton Community College.~~

Policy 42:

Safe bike and pedestrian ways, which are separated from the roadway, shall be encouraged along ~~Old~~ Highways 34 and 99E.

Policy 43:

All new development located in areas with proposed bike/pedestrian ways as identified on the official bike/pedestrian plan map to be developed under Policy ~~43~~ **40** shall be responsible for the development of the bike/pedestrian way through their property.

4.0 Existing Land Use

At the time the City of Tangent was incorporated in 1973, city limits were established. Later, when the Urban Growth Boundary (UGB) was being located, the state determined that the UGB should be considerably smaller than the original city limits, concluding that the City could not justify the need for such a large land area. **Figure 4** shows the city limits and the UGB. In harmony with the requirements of the TPR, the Tangent TSP addresses the transportation needs within the UGB and not the greater city limits. ~~The TSP, however, includes two urban reserve areas expected to be included in the UGB during the 20 year planning horizon. The two urban reserve areas are located immediately south of Highway 34 and are designated for future commercial and industrial purposes.~~

According to the 2000 census, Tangent had a population of 933, with 339 households, and 262 families. The City of Tangent has had a population of approximately 1,049 residents, projected population in 2008 of 985¹, which is a 5.6 percent increase since the 2000 census, and at 0.7 percent annually. Tangent is split by the east-west Corvallis-Lebanon Highway (Highway 34). The City of Tangent is further divided by the Albany-Junction City Highway (Highway 99E), which runs north and south. As shown in **Figure 5**, Southern Tangent consists of a mix of residential and commercial uses. The commercial uses are located adjacent to Highway 99E while the residential lands are predominately further from the highway.

Commercial, residential and industrial land uses are also located north of Highway 34. The commercial and industrial properties are within easy access of the junction of the two state highways.

Most of the community destinations such as the Post Office, City Hall, parks, schools, and some shopping are easily accessible by walking or biking in the southern parts of Tangent. Land uses in the northern part of Tangent are more auto-oriented and are not as readily accessible by walking or cycling. **Figure 6** shows the locations of major community destinations including civic uses, schools, shopping, and park lands. Shopping designations represent general locations and not specific businesses.

5.0 The Existing Roadway System

5.1 Functional Classification

Functional classification is intended to group streets and highways according to the function they are intended to provide, whether it is cross-town travel or access to a business or residence.

5.1.1 Tangent Classification

The City of Tangent Comprehensive Plan classifies streets as either arterial, collector, or local streets. Because of the location of Tangent with respect to Highway 99E and Highway 34, much of the street system is made up of arterial streets. Few collector and local streets exist. A review of the existing functional classification was made to determine deficiencies in the street functional classification. These classifications are shown on **Figure 7** and are described as follows:

Arterial Streets: The City of Tangent has two arterial street designations: major and minor arterial. Major arterial streets, such as highways and freeways, generally bring traffic to and from other cities and geographic areas. Minor arterials provide a similar function but typically serve vehicle trips across town,

rather than between cities. They may also provide connections between major traffic generators as well as important rural routes. The length of the typical trip on the arterial system normally exceeds one mile. Arterial streets often have a considerable amount of commercial and industrial development facing them. Access controls are often necessary to protect carrying capacity and safe access and egress. Generally, residential development is discouraged from having direct access and is served by side streets.

Collector Streets: Collector streets accommodate internal traffic movements between different areas such as residential neighborhoods, shopping center, and employment centers. Collectors do not handle long through-trips and are not necessarily continuous for long lengths. Collectors provide connections between the arterial street system and the local street system.

Local Street: Local streets primarily serve traffic to and from residential neighborhoods and provide direct access to abutting land uses. These streets directly serve residential neighborhoods and have low traffic volumes. Those streets not designated as either arterials or collectors are considered local streets.

5.1.2 ~~Inconsistent Tangent Classifications~~

Old Highway 34: ~~This roadway is currently classified as a local street but operates more like a collector street. The land use surrounding this road will contain additional industrial and commercial development and Old Highway 34 joins Highway 99E to other parts of the City. Future traffic will use this road to travel from residential areas to employment center, which will require classifying this street to a collector street.~~

Old Oak Drive: ~~The Tangent Comprehensive Plan classifies Old Oak Drive, east of Old Church Road, as a minor arterial street. Although Old Oak Drive does carry some through trips, it functions more as a collector street and also connects to Old Church Road and Birdfoot Drive which are classified as collector streets.~~

~~As an alternative, Old Church Road and Birdfoot Drive could be re-classified as minor arterial streets to be consistent with the existing classification of Old Oak Drive.~~

5.1.32 ODOT Classifications

The state highway classification system divides state highways into five categories based on function:

1. Interstate
2. Statewide
3. Regional
4. District
5. Local Interest Roads

Supplementing the five classifications are four special purpose classifications:

1. Land Use
2. Statewide Freight Routes
3. Scenic Byways
4. Lifeline Routes

These four special purpose classifications address the expectations and demands placed on portions of the highway system by land uses, the movement of trucks, the Scenic Byway designation, and significance as a lifeline or emergency response route.

According to the 1999 Oregon Highway Plan, Highway 34 is classified as a Statewide Highway and as a designated state freight route. In the year 2000 Highway 34 was designated by the Oregon Highway Division as an “Expressway”. Highway 34 is also listed as part of the National Highway system. Highway 99E is classified as a Regional Highway.

Statewide Highways:

Statewide Highways, like Highway 34, typically provide inter-urban and inter-regional mobility and provide connections to larger urban areas, ports, and recreational areas not served by the Interstate Highway system. ODOT’s management objective for this type of roadway is to provide safe and efficient, high-speed, continuous-flow operation. In constrained and urban areas, interruptions to traffic flow are intended to be minimal.

Regional Highways:

Regional Highways, like Highway 99E, typically provide connections and links to regional centers, Statewide and Interstate Highways, or economic or activity centers of regional significance. ODOT’s management objective for Regional Highways is to provide safe and efficient, high-speed, continuous-flow operation in rural areas and moderate to high-speed operation in urban and urbanizing areas. A secondary function is to serve land uses in the vicinity of these highways.

5.2 Lane Widths

Roads within the City of Tangent Urban Growth Boundary vary from two to five lanes in width. Highway 34 and Highway 99E are the only roadways with five-lane sections in Tangent. Highway 99E narrows to two lanes as the highway enters the southern portion of the City of Tangent. The remaining road sections within Tangent are two-lane sections. ~~Figure 8 illustrates the existing lane widths within the City of Tangent.~~

5.3 Pavement Condition

Pavement conditions in the City of Tangent were reviewed and ~~mapped as shown in Figure 9.~~ The pavement conditions were rated according to such characteristics as age, deterioration, side spalling, cracking, and appearance. Nearly all of the pavement is in fair condition or better. The recently constructed “Meadow Lark Loop” and housing subdivision and part of Lake Creek Drive have pavement in excellent condition. Rolland Drive and Garden Lane are rated excellent, as they were both given a new surface in 1999. Queen Anne’s Lace Drive has poor pavement conditions. Other streets with poor conditions are Old Mill Road, Blackberry Lane between Birdfoot and Old Oak Drive and Oak Lane (a small road that completes Old Mill Road to Hwy 99E). Streets with excellent pavement conditions, which are in recently constructed subdivisions, are Sequoia Street, Meadow Wood Street, Camas Street, Arrowhead Way, and Wildrose Drive.

5.4 Jurisdictional Responsibility

Jurisdictional responsibility is divided between the City, ODOT, and Linn County. The County currently maintains two city-owned streets, Birdfoot Drive and Old Oak Drive (a portion.) ~~All of the public streets within the City are owned by the City of Tangent, ODOT, or Linn County.~~ Below is a jurisdictional responsibility for the streets. ~~Streets not listed below are private streets.~~

Old Church Road
City of Tangent

-

- Blackberry Lane
- Birdfoot Drive
- Old Mill Road
- Rolland Drive
- Queen Anne's Lace Drive
- Garden Lane
- Old Oak Drive (small section) (One block between Old Church Road and Blackberry Lane)

ODOT

- Highway 34
- Highway 99E
- Old Highway 34

Linn County

- Looney Lane
- McFarland Road
- North Lake Creek Drive
- Tangent Drive
- Old Oak Drive
- Glass Drive

Privately owned

- Quail Run
- Meadow Lark Loop
- Camas Lane
- Meadow Wood Street
- Sequoia Street
- Eagle Road (except for the portion under OR 34)
- Hooska Avenue
- Mallard Avenue
- Thelma Street (as shown on some maps but not used as a road)
- Conser Place
- Arrowhead Way
- Wildrose Drive
- Brush Lane (as shown on some maps – a driveway without current address)

5.5 Traffic Signals

There currently are ~~two~~ ~~three~~ traffic signals located within the UGB as shown in **Figure 8**. Two of the signals are at the intersection of the Highway 34 ramps and Highway 99E, as shown in **Figure 8**. The signals provide protected left turns to the highway ramps as well as turns into the businesses with driveways opposite the ramps. The third and newest signal (~~not shown in Figure 8~~) is located at the intersection of Old Hwy 34 and Hwy 99E. The signals are traffic actuated.

5.6 Speed Limits

~~Speed limits within the Urban Growth Boundary are illustrated in **Figure 10**.~~ Highway 34 is posted at 55 miles per hour. Highway 99E is also 55 miles per hour ~~north~~, except ~~between the northern city limits~~

North Lake Creek Drive and south of Glass Drive where it is posted at 45 miles per hour within the City of Tangent. The speed limit on Old Highway 34 is 45 mph at the westerly end. McFarland Road is 25 mph, along with the local roads east of OR 99E and south of Tangent Drive, and Queen Anne's Lace Drive west of OR 99E. Tangent Drive has a speed limit of 40 mph through the city. North Lake Creek Drive is posted at 35 mph, and Meadowlark Loop west of 99E is 15 mph.

Speeding has been a problem along Highway 34 and as a result the highway is a designed safety corridor. Special signing and enforcement are present to increase safety and maintain speeds at or below the posted levels. Speeding is also an issue along Highway 99E and Tangent Drive. The speed limit drops from 55 mph to 45 mph near City Hall; however, many drivers fail to slow to the lower speed. Other drivers slow down but begin speeding up as soon as they can see the sign near North Lake Creek Drive for the higher speed limit.

5.7 Traffic Volumes

Peak hour turning movements counts were conducted at six intersections within Tangent's UGB. All counts were taken at intersections along the Highway 99E which is classified as a principal (major) arterial. These counts were done during the PM peak hour which traditionally is the time of day when traffic volumes are the greatest. Figure 11 shows the traffic volumes at the six intersections. Because traffic counts were not all collected on the same day, some variations in traffic levels occurred between the counts. As a result, the traffic counts were manually adjusted to balance traffic between the intersections, based upon the intersection with the highest volumes. As shown in the figure, traffic volumes are the highest near the Highway 34 interchange and at the intersection of Highway 99E and Old Highway 34.

A total of nine study intersections, all under Oregon Department of Transportation (ODOT) jurisdiction, were analyzed. These nine intersections are:

1. OR 99E at McFarland Road
2. OR 99E at Old OR 34
3. OR 99E at OR 34 Westbound (WB) Ramps
4. OR 99E at OR 34 Eastbound (EB) Ramps
5. OR 99E at Lake Creek Drive
6. OR 99E at Tangent Drive
7. OR 99E Birdfoot Drive
8. OR 34 at McFarland Road/Looney Lane
9. Old OR 34 at Industrial Parkway

Sixteen-hour, full vehicle classification, turning movement counts were collected at the intersections of OR 99E at OR 34 westbound ramps, OR 99E at OR 34 eastbound ramps, and OR 34 at McFarland Road/Looney Lane. Based on the volume counts for all intersections within the study area, a system wide peak hour of 4:30-5:30 p.m. was established and used for all nine study intersections.

Figure 11 depicts the road system peak hour counts in the city area.

A light/medium/heavy vehicle split was collected at OR 99E intersections with McFarland Road, Old Hwy 34, Lake Creek Drive, Tangent Drive, Birdfoot Drive, and the intersection of Old Highway 34 at Industrial Pkwy.

Appended to this TSP is a technical memorandum (July 6, 2009) that describes and analyzes the existing transportation conditions. Included are traffic count data and analysis results, and the methods and assumptions used for the analysis and approved by ODOT.

All nine study intersections meet ODOT mobility standards. Queue lengths at intersections are within standards.

5.8 Level of Service

Traffic operation levels on Highway 47 (Main Street) are governed by ODOT’s 1999 Highway Plan. In the 1991 Highway Plan, levels of service were defined by a letter grade from A-F, with each grade representing a range of volume to capacity ratios. Level of service of A represents virtually free-flow traffic with few or no interruptions while level of service F indicates bumper-to-bumper, stop-and-go traffic.

The 1999 Highway Plan maintains a similar concept for measuring highway performance, but represents levels of service by specific volume to capacity ratios. A volume to capacity ratio (v/c) is the peak hour traffic volume (vehicles/hour) on a highway section divided by the maximum volume that the highway section can handle. For example, when v/c equals 0.85, peak hour traffic uses 85 percent of a highway’s capacity; 15 percent of the capacity is not used. If the traffic volume entering a highway section exceeds the section’s capacity, traffic queues will form and lengthen for as long as there is excessive demand. When v/c is less than but close to 1.0 (e.g. 0.95), traffic flow becomes very unstable. Small disruptions can cause traffic flow to break down and long traffic queues to form.

Based on the highway classification, as well as the location and posted speed, the operational volume to capacity ratio is 0.75. At unsignalized locations, the v/c ratio threshold is 0.75 for the major street (e.g. Highway 99E) but can be up to 0.95 for the minor street (e.g. Tangent Drive).

The Oregon Department of Transportation’s (ODOT) capacity analysis software, SIGCAP and UNSIG, were used to analyze the existing levels of service at the six intersections. This software bases the level of service upon the level of saturation at the intersection. **Table 1** below shows the results of this analysis.

Table 1—PM Levels of Service—Existing Conditions (1998)

Control	Location	Overall v/c	Overall LOS	Major St. v/c	Minor St. v/c
Stop	Hwy 99E & Old Hwy 34	N/A	N/A	<0.75	<0.95
Signal	Hwy 99E & WB Hwy 34	0.57	B	N/A	N/A
Signal	Hwy 99E & EB Hwy 34	0.58	B	<0.75	<0.95
Stop	Hwy 99E & North Lake Dr.	N/A	N/A	<0.75	<0.95
Stop	Hwy 99E & Tangent Dr.	N/A	N/A	<0.75	<0.95
Stop	Hwy 99E & Birdfoot Dr.	N/A	N/A	<0.75	<0.95

The results indicate that all but the Highway 99E and Old Highway 34 intersection operate at acceptable volume/capacity thresholds. Unacceptable traffic operations at Highway 99E and Old Highway 34 are related to left turn movements from the minor street being unable to turn when traffic volumes are heavy.

Traffic signals can be installed when specific thresholds or “warrants” are satisfied and the installation of the signal will improve the overall safety or operation of the intersection. Because of the poor operation of the Old Highway 34 intersection an analysis was conducted to determine if a signal is currently warranted. Results of the analysis indicate that Peak Hour Warrant #11 is currently satisfied. It is possible that other warrants are also met; however, data was not available to confirm the assumption.

Results from the operational analysis results indicate that all of the nine study intersections currently meet jurisdictional mobility standards, as measured by the volume to capacity (V/C) ratio. *Table 1* shows the results of the existing conditions intersection operational analysis.

TABLE 1

Tangent Integrated Land Use and Transportation Plan Update: Intersection Mobility Standards

ID	Intersecting Roadway (OHP Highway Classification)		Control Type	Existing Mobility Standard		Forecast V/C Ratio	
1	OR 99E (Regional TR)	McFarland Road (Local Road)	1-Way Stop	0.75 ¹	0.90 ²	0.27	0.08
2	OR 99E (Regional TR)	Old OR 34 (Local Road)	Signal	0.75		0.42	
3	OR 99E (Regional TR)	OR 34 WB Ramps (Statewide FR, TR, EXPR, NHS)	Signal	0.75		0.46	
4	OR 99E (Regional TR)	OR 34 EB Ramps (Statewide FR, TR, EXPR, NHS)	Signal	0.75		0.46	
5	OR 99E (Regional TR)	Lake Creek Drive (Local Road)	2-Way Stop	0.75	0.90	0.17	0.14
6	OR 99E (Regional TR)	Tangent Drive (Local Road)	2-Way Stop	0.75	0.85	0.17	0.07
7	OR 99E (Regional TR)	Birdfoot Drive (Local Road)	2-Way Stop	0.75	0.90	0.15	0.07
8	OR 34 (Statewide FR, TR, EXPR, NHS)	McFarland Road/Looney Lane (Local Road)	2-Way Stop	0.70	0.80	0.40	0.44
9	Old OR 34 (Local Road)	Industrial Parkway (Local Road)	1-Way Stop	0.80	0.90	0.06	0.07

Notes:

¹ Indicates OHP Mobility Standard V/C ratio for uncontrolled roadway approach

² Indicates OHP Mobility Standard V/C ratio for stop controlled roadway approach

Signal: Signalized Intersection

TR – Federally Designated Truck Route

FR – State Freight Route

EXPR – Designated Expressway

NHS – Part of the National Highway System

5.9 Accidents Safety Analysis

Accident history was reviewed for a five-year period from January 1993 to December 1997. The number of accidents occurring within the City of Tangent's Urban Growth Boundary are illustrated in **Figure 12**. Each circled number on this figure represents the total number of accidents that have been reported within the past five years at that location.

The location with the most traffic accidents is at the intersection of the Highway 99E and the westbound ramps of the Highway 34. Of the eleven accidents, eight of the accidents resulted from vehicles making turns into oncoming traffic, with the remainder of the accidents being classified as rear-end collisions. A review of the accident dates revealed that nearly all of the accidents near the interchange occurred prior to installation of the traffic signals.

**Figure 12—City of Tangent—Intentionally left out
Traffic Accident Data 1/1/93—12/31/97**

The intersection with the second highest number of accidents is located at the westbound exit from Highway 34 onto Old Highway 34 and Looney Lane. Almost all of these accidents were rear-end collisions resulting from traffic traveling too fast or following too closely and hitting vehicles exiting Highway 34.

Three accidents occurred at the junction of Highway 99E and the Highway 34 eastbound ramps. These occurred when vehicles attempting turns were hit by vehicles traveling straight from the opposite direction. The intersection of the Old Highway 34 and Highway 99E had four accidents. These also were related to conflicts in turning vehicles, with one accident resulting from a driver failing to stop at a stop sign.

The intersection of Birdfoot Drive and Highway 99E had six accidents during the five-year period. Two of these were rear-end collisions which resulted from a vehicle hitting a vehicle that was waiting to make a left turn onto Birdfoot Drive. Three collisions occurred when traffic from Highway 99E collided with traffic turning from Birdfoot Drive to the highway.

The previous data pertained only to roadways under the jurisdiction of the Oregon Department of Transportation and is based upon data obtained from ODOT's Accident Data Unit.

Accident rates were also reviewed for Highway 99E and Highway 34. **Table 2** shows the 1997 rates for the City of Tangent in comparison with statewide accident rates for similar roadways.

Table 2—1997 Accident Rates Per Million Vehicle Miles

Description	From	To	Accident Rate
Highway 99E	South City Limits	Highway 34	2.88
Highway 99E	Highway 34	North City Limits	1.14
Statewide Average			0.72
Highway 34	East City Limits	Highway 99E	0.60
Highway 34	Highway 99E	West City Limits	0.47*
Statewide Average			1.02

*Based on 1995 data. Recent data not available.

As seen from the table, the accident rate for Highway 99E is far above the statewide average, particularly in the southern part of Tangent. Based on available accident data, some of the accidents are from failing to yield to traffic while some is a result of rear-end accidents. Many accidents are associated with the fact that Highway 99E does not have a center turn lane in this area. As Tangent grows and traffic volumes increase from side streets to the state highway, traffic accidents are expected to also increase.

In the early 1990s, the accident rate on Highway 34 was more than double the state average for similar facilities. Since its realignment and reconstruction, the highway has had an accident rate well below the statewide average.

Vehicle crash data for study area intersections and major corridors were analyzed for the years 2003 through 2007. The crash data were analyzed to identify crash patterns that may describe safety deficiencies within the study area.

Segment Crash Rates

Crash rates, expressed in “crashes per million vehicle-miles (MVM) traveled,” are used to compare the crash experience of one roadway segment to another. This rate expresses how many crashes might be expected of vehicles traveling through a particular section of roadway for a cumulative total of one million miles. Three crash segments were analyzed for this study based on separating them by the study area boundaries.

- 1.24 mile segment on OR 99E
 - from MP 6.71 (northern UGB)
 - to MP 7.95 (.05 miles south of OR 99E at OR 34 EB Ramps)
- 1.37 mile segment on OR 99E
 - from MP 7.95 (.05 miles south of OR 99E at OR 34 EB Ramps)
 - to MP 9.32 (southern Tangent City Limits)
- 2.07 mile segment on OR 34
 - from MP 6.53 (western Tangent City Limits)
 - to MP 8.60 (eastern Tangent City Limits)

Table 2 provides a summary of the segment crash analysis results.

TABLE 2
Tangent Integrated Land Use and Transportation Plan Update: Segment Crash Rate Results

No.	Roadway	Milepost		Length (miles)	2003-2007 Average AADT	Number of Crashes	Crash Rate	
		From	To				5-year Segment Average	5-year State Average
1	OR 99E (Highway No. 58)	6.71	7.95	1.24	12430	25	0.89	2.61 ¹
2	OR 99E (Highway No. 58)	7.95	9.32	1.37	4880	20	1.64	2.61 ¹

TABLE 2

Tangent Integrated Land Use and Transportation Plan Update: Segment Crash Rate Results

No.	Roadway	Milepost		Length (miles)	2003- 2007 Average AADT	Number of Crashes	Crash Rate	
		From	To				5-year Segment Average	5-year State Average
3	OR 34 (Highway No. 210)	6.53	8.60	2.07	23,630	16	0.18	1.19 ²

Notes:

¹ Based on Urban Cities, Minor Arterial, 2007 Rate

² Based on Rural Cities, Other Principal Arterial, 2007 Rate

Segment 1: OR 99E (MP 6.71 to 7.95) is partially inside City Limits/inside UGB (MP 7.31 to 7.95), and partially outside City Limits/inside UGB (MP 6.71 to 7.31). Neither of these portions of Segment 1 were long enough to recommend assessment as individual segments, so they remain combined within Segment 1. The majority of this segment is contained within the Urban City classification, so the resulting rate is compared to the Urban City, 2007 Rate threshold. However, the calculated rate (0.89) is also still below the rate threshold that would be used for Suburban Areas (1.09).

At this time (2010), none of the study segments indicate an overrepresentation of crashes. Therefore, no safety improvements are recommended.

General Intersection Safety Observations

During a traffic field visit, conducted May 28, 2009, observations were made in relation to study intersection safety. At the intersection of OR 99E and Birdfoot Drive, the guardrail surrounding the creek appears to have been damaged during previous crashes but not repaired. In its current state, it may not protect vehicles from entering the creek and could puncture those vehicles that collide with it.

The 16-hr counts conducted at OR 34 at McFarland Road/Looney Lane indicated undesirable and illegal maneuvers occurring at this location. Between 6 AM and 10 PM, five vehicles completed eastbound left turns from OR 34 to Looney Lane. This movement is signed as illegal at the intersection. The counts also indicate 11 northbound left turns were completed from McFarland Road to OR 34. While not signed as an illegal movement, it raises safety concerns and is unclear whether it is permitted. Currently, there is a small median separating eastbound and westbound traffic on OR 34 at the intersection. It is located so that it allows vehicles to complete northbound left turns, but prevents vehicles from dwelling in the center two-way left turn lane and completing the turn in two parts. The median location also allows vehicles to cross the highway from McFarland Road to Looney Lane despite a Do Not Enter sign.

Safety Priority Index System (SPIS)

In addition to crash rates, ODOT also assesses roadway safety via the Safety Priority Index System (SPIS) for state routes. The SPIS takes into account crash frequency, crash rate, and crash severity. SPIS scores are computed for sections starting at one tenth of a mile. The scores for different roadway segments can be compared to determine where safety improvement funds might best be spent. Typically, ODOT places the highest priority locations where SPIS scores fall within the top 10 percent in the entire state or region. The 2008 top 10% SPIS data for Region 2 was analyzed for this report. There are no SPIS sites located within the project study area.

6.0 The Existing Bicycle System

A bikeway is a facility designed to accommodate bicyclists and can exist as a shared roadway, shoulder bikeway, bike lane, or off-street path. The majority of the bikeways in the City are shared roadways, where motorists and cyclists share the same travel lanes. Most of the other bicycle facilities are shoulder bikeways where the paved shoulder of the roadway is at least six feet wide. Some bike lanes are present where the street has curb and gutter.

~~Figure 13 illustrates the location of shoulder bikeways and bike lanes in the City.~~ There are shoulder bikeways along both sides of the Highway 34 within the Urban Growth Boundary. Shoulder bikeways are also located on Highway 99E, starting from about the Post Office near mile post 9.0, and extending to the north through the remainder of the City. Near the northern part of the City, the shoulder bikeway transitions to a bike lane. Looney Lane also has a shoulder bikeway while part of North Lake Creek Drive has a bike lane. There are no off-street paths in the City of Tangent.

The current design of drainage catch basins has the street grate in the pavement, which can pose a hazard to cyclists. Some cities use a different design that has the drainage inlet in the curb face. This design completely eliminates the drainage grate in the pavement and is safer for bicyclists.

Overall, the City of Tangent lacks a complete pedestrian and bicycle transportation system. While the Oregon Bicycle and Pedestrian Plan supports bike lanes on collector and arterial streets, the plan does not recommend exclusive bike lanes for local streets. On local streets, the appropriate facilities for bicycles are shared roadways because of the lower traffic speeds and traffic volumes.

7.0 The Existing Pedestrian System

Sidewalks serve as an integral part of a larger transportation system designed to safely move people, goods, and services. To encourage walking as an alternative mode of transportation, sidewalks should not only functionally serve as a pedestrian corridor but should also be regarded by the pedestrian as a safe haven from vehicular traffic.

In general, few streets in the City have curbs and gutters, and fewer have sidewalks. The lack of sidewalks forces pedestrians to walk in the street or use some other mode of transportation to reach their destination. It may not be possible or desirable to construct sidewalks on all streets; however, sidewalks are needed on corridors that lead to major activity centers in the City, such as:

- Schools
- Post Office
- City Hall
- Commercial Businesses

~~Areas which have had sidewalks, and curbs and gutters, within the City of Tangent are shown in Figure 14.~~ Most sidewalks appear to have been constructed concurrent with new developments or due to roadway improvements. There is a continuous sidewalk along both sides of Highway 99E starting from the intersection of Highway 34 and continuing to the north to the City of Albany.

Currently (2010) there are sidewalks along both sides of OR 99E only from the intersection with Old Highway 34 to the North City Limits of Tangent. Newly developed businesses on OR 99E have sidewalks

adjacent to the roadway, such as with Barenbrug, ProBuild, and Linn Benton Tractor. Other businesses have condition of approval requirements to add sidewalks when both neighbors add sidewalks and improvements are made to OR 99E. There also are sidewalks on both sides of North Lake Creek Drive, along with a striped shoulder wide enough for bicycles, and in the Meadow Lake Loop residential development. As lots in the Meadow Wood Estates subdivision are developed, sidewalks are being constructed for each lot and block. There is a sidewalk on one side (east) of Old Church Road adjacent to a subdivision. Elsewhere in the old part of Tangent, sidewalks do not exist.

According to the TPR, sidewalks are required along arterials, collectors and most local streets in urban areas, except that sidewalks are not required along controlled access roadways. In some instances, the UGB is adjacent to one side of the roadway such as along McFarland Road. In these situations, sidewalks may not be needed if development or other walking destinations are not expected on either side of the street.

The City has modified its development standards to provide flexibility in the placement of ~~require~~ property line sidewalks for all street standards. This is based in part upon input from Tangent citizens, the consultant and ODOT that pedestrians typically feel safer when using property line sidewalks but already feel safe on many of Tangent's low volume roads that have no sidewalks or shoulders. ~~because they are farther from street traffic. At the same time, p~~ Property line sidewalks allow street trees to be placed closer to the street, thus encouraging driver to drive slower.

~~The minimum setback for a~~ A property line sidewalk ~~setback of~~ is 4 feet, ~~which~~ is too narrow to support street trees. Four feet is adequate for juvenile trees but will not sustain full grown street trees without damaging the tree and/or the sidewalk. At least five feet is needed for small street tree varieties, while at least eight feet is needed for large street trees.

8.0 The Existing Transit System

~~The Albany Transit Service (ATS) provides bus service to the greater Albany area, which includes McFarland School in the Tangent UGB. ATS Route #1 provides hourly morning service and Route #3 provides hourly mid-day service between the school and Albany. From the ATS, connections can be made to most areas of Albany, as well as the Linn Benton Loop and the Linn County Shuttle. Figure 15 shows existing transit service in the Tangent area.~~

~~The Linn-Benton Loop is run by the Albany Transit System, and operates weekday and Saturday service. It connects Albany and Corvallis via the Linn Benton Community College. Passengers can request a stop at Fisher Implement/Highway 99 in Tangent on an on-call basis. An adult fare is \$1.25.~~

~~The Linn Benton Loop passes through the northern part of Tangent but does not stop. The Loop operates transit service between Albany and Corvallis with a frequency of roughly every hour. The bus travels along Highway 34 and Highway 99E, and provides service to stops including Oregon State University and Hewlett Packard in Corvallis, and Linn-Benton Community College and the AMTRAK rail station in Albany.~~

~~The Linn Shuttle (which primarily serves elderly and disable persons) also passes through the northern part of Tangent five times per day, and provides connections to Sweet Home, Lebanon, Albany and Millersburg. It does not stop in northern Tangent, but does make daily stops at Tangent City Hall. Aside from the shuttle's service to City Hall, all the remaining bus services completely miss the center of~~

Tangent, thus making it difficult for residents to use the systems. Shuttle buses are wheelchair equipped. One-way fare was \$1.50 for elderly and disabled persons, and \$2.50 for others, at the time of this writing. Call (541) 367-4775 for information.

None of the above systems provide Saturday service.

During public meetings, several residents expressed a desire to have improved transit service. Density has a strong influence on the use of transit. Transit requires a relatively high land use density at one or both ends of the trip, or along the travel corridor. Cities generally need a population density of at least three to four persons per acre to support bus service. Tangent currently has a population density less than one person per acre within the UGB.

Other factors, including population and proximity to a larger city, affect whether bus service can be supported. Most cities in Oregon do not have fixed-route local bus service because their relatively small size does not generate enough tax base to support the service. In order to provide efficient transit service, Tangent's land use density, population or tax base would need to increase.

9.0 The Existing Rail System

Roughly 20 trains pass through Tangent daily. Sixteen are freight trains and ~~four~~ six are passenger trains. Amtrak has two northbound and two southbound Cascades commuter-style trains between Eugene and Portland daily. The other two Amtrak trains are the Coast Starlight sleeper-style trains running daily each way through Tangent, serving points between Seattle and Los Angeles.

Union Pacific owns the rail line through the City and operates freight rail service ~~on the tracks~~. Amtrak ~~MTRAK~~ operates its passenger trains on the Union Pacific tracks.

Tangent has at-grade rail crossings at Old Highway 34, Tangent Drive, and Birdfoot Drive. Based on recent accident data, conversations with ODOT, and field observations, all crossings are functioning well and are safe; however, ODOT would like to close some of the rail crossings and replace them with a grade separated facility. ODOT's desire to remove crossings is intended to eliminate the "potential" for conflicts between trains and vehicles. The location of the new crossing or the locations of the crossings to be closed have not been evaluated or identified. ~~This is currently a low priority for ODOT but would become a greater priority if high speed passenger rail activity increases. Until then,~~ no other improvements are planned for the existing rail crossings in Tangent, ~~unless there is an expansion of service.~~

~~Stormwater flows during high precipitation events currently backs-up at the culvert on the north side of Tangent Drive, which carries North Lake Creek under the tracks. The culvert apparently is undersized. Flooding of Tangent Drive can result, and the track bed and crossing could be compromised.~~

Residents wanting to use the passenger rail system typically use the station in Albany. The Linn-Benton Loop currently provides transit service to the rail station, but does not have a schedule that coincides with existing train schedules.

10.0 The Existing Water, Air, and Pipeline Systems

There are no airport facilities located within the City of Tangent; however, there are general aviation and commercial airports nearby. Albany has a general aviation airport within 10 miles of Tangent and Corvallis has a general aviation airport within 15 miles. The nearest commercial airport is located in Eugene which is approximately 35 miles away. Portland International airport is the largest commercial airport in Oregon and is located roughly 90 miles from Tangent.

There are no water routes which could be used for transportation within the City of Tangent. There are also no pipeline facilities within the City of Tangent.

FUTURE CONDITIONS AND DEFICIENCIES

11.0 Future Land Use and Traffic Growth Assumptions

11.1 Land Use Growth

Future land use growth information was provided by the City of Tangent and Linn County, as part of Tangent's Periodic Review Analysis, updated during the 2009-2010 Tangent Integrated Land Use and Transportation Plan Update. The associated Buildable Lands Inventory identified the location of land parcels that are currently vacant, partially vacant, or redevelopable in the future. Database information also indicated how much of each land use type (i.e. industrial, commercial, residential, etc.) is available to be developed within the City's Urban Growth Boundary (UGB).

Based on data provided by the City, the population of Tangent is expected to grow to between 1684 and 2040 1481 residents within the next 20 years. The estimate is based on the adopted annual growth rate (2.17 percent) in the Comprehensive Plan, assuming 3 years of no growth due to the current economic recession. Per the City's direction, future needs and deficiencies were based on the higher population estimate to represent a worst case scenario.

According to the 2000 census, Tangent had a population of 933, with 339 households, and 262 families. Tangent's population in 2008 was estimated to be 985, according to the Portland State University Population Research Center, 2008 Oregon Population Report. This is a 5.6 percent increase since the 2000 census, and 0.7 percent annually.

An inventory of buildable lands (Figure 16) was used to determine land supply by zoning, excluding constrained lands due to flood hazard, wetlands, or water quality issues. Results were as follows:

Housing land needs:

- The housing needs for the projected population were analyzed, recognizing how households will change over the next 20 years.
- An additional 161 housing units will be needed by 2030 to accommodate projected residential needs.
- There is enough residential land for the housing needs in 2030 within the existing urban growth boundary (UGB), although some available land (approximately 4 acres) may need to be rezoned to residential multi-family.

Employment land needs:

- Employment was considered relative to the City's vision and goals statements, and was based on local, regional, and national trends.
- An estimated 810 employees will work in Tangent in 2030, requiring 14.72 acres of industrial/commercial land.
- There are ample industrial and commercial lands available to accommodate projected employment land needs to 2030.

Figure 16 illustrates the general location of future land use growth within the City of Tangent. As seen in Figure 16, industrial development is expected in the northeast parts of Tangent. Highway Commercial/Industrial growth is expected along Old Highway 34 between Looney Lane and Highway 99E. Central Community Commercial land use growth is expected planned south of Highway 34, along Highway 99E. Residential growth will predominantly occur in eastern central Tangent, and in the UGB area north of Highway 34, northwest and southeast Tangent. It should be noted that although Figure 16 indicates general development areas, actual trip generation was based only on vacant or partially vacant

parcels within the shaded areas identified in *Figure 16*. Parcels that are fully developed within the shaded areas in the figure were not assumed to be available for future growth.

11.2 Land Use Densities

Densities of development were calculated based on information provided by the City’s land use planner. Below are the assumptions used to estimate the density of future development:

<u>Land Use Type</u>	<u>Density Assumption</u>
Industrial -	Approximately 7 employees per acre (100% general light industrial) 11.2 jobs per acre
Highway Commercial/Industrial-	Approximately 10 employees per acre (25% commercial, 25% general light industrial, 50% truck terminal)
Central Commercial/Service -	Approximately 7 employees per acre (50% retail @ 10 employees per acre and 50% service @ 4 employees per acre). 23.5 jobs per acre
Institutional/Government -	20 jobs per acre
Other/Uncovered-	6 jobs per acre
Average jobs density-	15 jobs per acre
Residential -	Approximately 4 units per acre.

11.3 Vehicular Trip Generation

Over the next 20 years, vehicular trips will be generated by land use growth inside the City of Tangent. The number of trips created by anticipated land use growth inside the City were estimated using Trip Generation, 6th Edition, published by the Institute of Transportation Engineers (ITE) (see also **Section 11.2** and **Figure 16**). This manual is a standard reference used by jurisdictions throughout the country and is based upon actual trip generation studies. **Table 3** lists the trips generated by future City growth.

Table 3— City of Tangent Trip Generation— 1998 through 2018

Development Land Use	Avg. Daily Trips	Peak Hour Trips					
		AM Peak Hour			PM Peak Hour		
		Entering	Exiting	Total	Entering	Exiting	Total
Industrial	3,158	409	83	492	99	372	471
Highway Commercial/Industrial	5,756	156	84	240	240	301	541

Central Commercial	9,316	125	80	205	447	484	931
Residential	4,088	83	253	336	270	155	425
Total	22,318	773	500	1,273	1,056	1,312	2,368

As seen in the table, PM peak hour trips are considerably greater than AM peak hour trips. Calculations in this report for traffic levels of service, used the PM peak hour as the basis of analysis.

Over the next 20 years, trips will be generated by land use growth within the City of Tangent. Using the ODOT Analysis Procedures Manual, two growth factors were assumed to represent the trips associated with the growth in land use. The OR 99E growth factor (1.85, based on an average annual growth rate of 4.05 percent) was applied uniformly to each of the existing 2009 30th highest hour intersection turn movements to obtain 2030 Future No-Build and Build 30th highest hour intersection volumes, except at the intersection of OR 34 at McFarland Road/Looney Lane, which was adjusted using the OR 34 growth factor (1.44, based on an average annual growth rate of 2.10 percent). Traffic volume would increase in Tangent due to the growth in employment and residents, but the existing street network can accommodate the projected growth.

11.4 Background Traffic Growth

Traffic passing through the Tangent area will also continue to increase due to growth in other cities and regions such as Corvallis, Albany, and the greater Willamette Valley. Historical traffic data was used to estimate the amount of background traffic that is likely to be generated due to non-Tangent sources.

Traffic Volume Tables published by the Oregon Department of Transportation (ODOT) were reviewed to determine an appropriate growth rate for background traffic. The greatest amount of historical data was obtained from traffic count station 22-012 located south of Tangent on Highway 99E. Other historical count data was reviewed within the City. Based on the historical information, it was estimated that background traffic growth would increase between 57% and 76% over the next 20 years. **Figure 17** shows the amount of background traffic expected in the Tangent area by the year 2018, based on the higher rate of 76%. Again, the higher rate was used to represent a worst case scenario.

The growth factor discussed in section 11.3 was used for both the background-related and city-related traffic volume growth.

11.5 Trip Distribution and Assignment

Traffic generated by City growth was distributed based on existing traffic patterns. **Figure 18** shows the amount of PM trips that will be generated by City growth. Tangent related trips were then combined with background trips to determine total vehicular trips for the year 2018. **Figure 19** illustrates the PM peak hour trips generated by background plus City-generated trips.

For the future No-Build and Build scenarios, trips were distributed based on existing traffic patterns. Figure 19A indicates the future assignment and increase in trip volume for the No-Build condition from the existing condition. With the closure of the OR 34 at McFarland Road/ SW Looney Lane in the future Build condition, trips that accessed OR 34 from McFarland Road or SW Looney Lane will instead access OR 34 from the OR 99E at OR 34 eastbound (EB) ramps or OR 99E at OR 34 westbound (WB) ramps.

12.0 The Future Roadway System

12.1 Functional Classification

New land uses proposed within the UGB will require new streets to allow connectivity within each development. Future residential and industrial land development will likely require new local streets; however, additional collector and arterial streets are not expected to be needed during the 20-year planning horizon. The areas that will contain the majority of new residential development will be located in the north UGB area of Tangent. Another area that will experience residential growth will be located north of Tangent Drive in the eastern pocket of Tangent’s UGB.

12.2 Level of Service

The 2018 background plus City generated vehicle trips, as shown in **Figure 19**, were analyzed to determine future impacts to the existing transportation system. Results of the analysis are shown below in **Table 4**.

Table 4— PM Levels of Service (Signalized Intersections)

Year 1998 Existing Traffic		
Location	Overall V/C	Overall LOS
Hwy 99E & WB Hwy 34	0.57	B
Hwy 99E & EB Hwy 34	0.58	B
Year 2018 Existing Traffic		
Location	Overall V/C	Overall LOS
Hwy 99E & WB Hwy 34	0.77	D
Hwy 99E & EB Hwy 34	0.78	D

As noted previously, the V/C threshold for Highway 99# is 0.75, thus the results shown in the table indicate that these two intersections will not operate at acceptable levels of service through the year 2018. Given the traffic growth assumptions, the intersections will exceed the ODOT standard in the year 2016; however, as traffic volumes increase it may be possible to reduce intersection delay by timing adjustments to the traffic signal.

The critical movement at two-way stop-controlled and one-way stop-controlled T-intersections are typically the left turns from the minor street. As traffic volumes grow on the major street, it becomes increasingly difficult to find an acceptable gap in the main street traffic to allow minor street vehicles to cross or turn onto the major street. Significant vehicular delays occur on the minor street. **Table 5** shows existing and future LOS conditions at unsignalized intersections in the City.

Table 5— PM Levels of Service (Unsignalized Intersections)

Location	Major Street V/C	Minor Street V/C
Hwy 99E & Old Hwy 34	< 0.75	> 0.95
Hwy 99E & North Lake Dr	< 0.75	> 0.95
Hwy 99E & Tangent Dr.	< 0.75	> 0.95
Hwy 99E & Birdfoot Dr.	< 0.75	> 0.95
Year 2018 Existing Traffic		
Location	Overall V/C	Overall LOS
Hwy 99E & Old Hwy 34	< 0.75	> 0.95
Hwy 99E & North Lake Dr	< 0.75	> 0.95
Hwy 99E & Tangent Dr.	< 0.75	> 0.95
Hwy 99E & Birdfoot Dr.	< 0.75	> 0.95

As shown in **Table 5**, operations on side streets at unsignalized locations will deteriorate to unacceptable levels of service. This poor level of service is primarily caused by vehicles that are unable to make left turns from the side street. Highway 99E operations will also continue to decline from current conditions with the greatest congestion at Old Highway 34.

Highway 99E and Old Highway 34: This intersection is a two lane cross section on the minor street approaches. Future development along Highway 34 will cause significant traffic growth on the side streets. Daily traffic volumes are estimated to be 5,400 vehicles in the year 2018. Left turning traffic on all approaches will find it difficult due to the heavy through traffic volumes on Highway 99E. The major and minor street approaches already have left turn lanes and further widening would not be expected to improve traffic operations.

Highway 99E and North Lake Creek Drive: North Lake Creek consists of a three lane section on the minor street approach. Projected volumes for this minor arterial street are 2,400 vehicles daily. The minor street approach has a left turn lane and further widening would not be expected to improve traffic operations.

Highway 99E and Tangent Drive: Tangent Drive is a two lane arterial roadway on the minor street approach. Future traffic volumes for this road show traffic volumes at 3,700 vehicles daily. A left turn lane on the minor street approach would be expected to improve the LOS but not sufficiently to meet ODOT standards.

Highway 99E and Birdfoot Drive: The minor street approach, Birdfoot Drive, is currently a two lane road section. Level of service results show that traffic on Birdfoot Drive will have difficulty entering Highway 99E. The addition of a left turn lane on Birdfoot Drive will increase the capacity of this roadway allowing the intersection to operate more efficiently; however, a left turn lane on the minor street approach would not improve the LOS sufficiently to meet ODOT standards. Traffic volumes for year 2018 are forecast to be at 2,100 vehicles per day.

Based on the results of the level of service analyses, adding left turn lanes to the major and minor street approaches will provide a benefit to traffic operations but will not be sufficient unless other measures are implemented such as traffic signals or widening of Highway 99E.

One set of future No-Build and Build traffic volumes were developed that assume no zoning changes from existing land use. A growth factor of 1.85, or 4.05 percent annual, was applied to existing traffic volumes to account for the historical rate of growth in the area to reach future condition traffic volumes.

Results from the operational analysis results show that one of the nine study intersections does not meet ODOT mobility standards for the 2030 Future No-Build scenario. The intersection that does not meet ODOT mobility standards is OR 99E at OR 34 EB Ramps. The heavy flow of vehicles going to and from OR 34 eastbound causes congestion at this intersection: especially on the eastbound approach where vehicles are leaving the highway.

Table 4 shows the results of the 2030 Future No-Build intersection operational analysis. Figure 19B shows the volumes, channelization, and analysis results for all of the study area intersections.

TABLE 4

Tangent Integrated Land Use and Transportation Plan Update: No Build Intersection Mobility Standards and Operations

ID	Intersecting Roadway (OHP Highway Classification)		Control Type	Future No-Build Mobility Standard		Forecast V/C Ratio	
1	OR 99E (Regional TR)	McFarland Road (Local Road)	1-Way Stop	0.75 ¹	0.90 ²	0.50	0.21
2	OR 99E (Regional TR)	Old OR 34 (Local Road)	Signal	0.75		0.70	
3	OR 99E (Regional TR)	OR 34 WB Ramps (Statewide FR, TR, EXPR, NHS)	Signal	0.75		0.73	
4	OR 99E (Regional TR)	OR 34 EB Ramps (Statewide FR, TR, EXPR, NHS)	Signal	0.75		0.94	
5	OR 99E (Regional TR)	Lake Creek Drive (Local Road)	2-Way Stop	0.75	0.90	0.29	0.41
6	OR 99E (Regional TR)	Tangent Drive (Local Road)	2-Way Stop	0.75	0.85	0.32	0.16
7	OR 99E (Regional TR)	Birdfoot Drive (Local Road)	2-Way Stop	0.75	0.90	0.26	0.15
8	OR 34 (Statewide FR, TR, EXPR, NHS)	McFarland Road/Looney Lane (Local Road)	2-Way Stop	0.70	0.80	0.62	0.65
9	Old OR 34 (Local Road)	Industrial Parkway (Local Road)	1-Way Stop	0.80	0.90	0.11	0.14

Notes:

¹ Indicates OHP Mobility Standard V/C ratio for uncontrolled roadway approach

² Indicates OHP Mobility Standard V/C ratio for stop controlled roadway approach

Signal: Signalized Intersection

TR – Federally Designated Truck Route

FR – State Freight Route

EXPR – Designated Expressway

NHS – Part of the National Highway System

The future Build condition assumes two network changes, the closure of the OR 34 at McFarland Road/SW Looney Lane and an additional EB left turn lane at the intersection of OR 99 at OR 34 EB Ramps. Vehicles that previously used McFarland Road and SW Looney Lane to access OR 34 will now use the signalized intersections of OR 99 and OR 34 EB and WB Ramps. Results from the operational

analysis results show that two of the nine study intersections just barely do not meet ODOT mobility standards for the 2030 Future Build scenario. The intersections of OR 99E at OR 34 EB Ramps and OR 99E at OR 34 WB Ramps both have a V/C ratio (Volume to Capacity) just above standard at 0.77 and 0.76 respectively. Should the Looney Lane access to OR 34 remain as at present, the mobility standard would be met. Future Build operations at these ramps are expected to be acceptable to ODOT.

Table 5 shows the results of the 2030 Future Build intersection operational analysis. Figure 19C shows the volumes, channelization, and analysis results for all of the study area intersections.

TABLE 5

Tangent Integrated Land Use and Transportation Plan Update: Build Intersection Mobility Standards and Operations

ID	Intersecting Roadway (OHP Highway Classification)		Control Type	Future Build		Forecast	
				Mobility Standard	Mobility Standard	V/C Ratio	V/C Ratio
1	OR 99E (Regional TR)	McFarland Road (Local Road)	1-Way Stop	0.75 ¹	0.80 ²	0.50	0.21
2	OR 99E (Regional TR)	Old OR 34 (Local Road)	Signal	0.75		0.75	
3	OR 99E (Regional TR)	OR 34 WB Ramps (Statewide FR, TR, EXPR, NHS)	Signal	0.75		0.76	
4	OR 99E (Regional TR)	OR 34 EB Ramps (Statewide FR, TR, EXPR, NHS)	Signal	0.75		0.77	
5	OR 99E (Regional TR)	Lake Creek Drive (Local Road)	2-Way Stop	0.75	0.80	0.29	0.45
6	OR 99E (Regional TR)	Tangent Drive (Local Road)	2-Way Stop	0.75	0.80	0.32	0.16
7	OR 99E (Regional TR)	Birdfoot Drive (Local Road)	2-Way Stop	0.75	0.80	0.26	0.15
8	OR 34 (Statewide FR, TR, EXPR, NHS)	McFarland Road/Looney Lane (Local Road)	N/A	N/A	N/A	N/A	N/A
9	Old OR 34 (Local Road)	Industrial Parkway (Local Road)	1-Way Stop	0.75	0.80	0.11	0.14

Notes:

¹ Indicates OHP Mobility Standard V/C ratio for uncontrolled roadway approach

² Indicates OHP Mobility Standard V/C ratio for stop controlled roadway approach

Signal: Signalized Intersection

TR – Federally Designated Truck Route

FR – State Freight Route

EXPR – Designated Expressway

NHS – Part of the National Highway System

The capacity that exists in the present city street and county road transportation system (Figure 7) would be adequate to handle forecast traffic volumes under the future No-Build and Build scenarios, given the projected growth for Tangent by 2030, which is approximately another 500 persons.

12.3 Lane Widths

Highway 99E is a two-lane roadway south of Highway 34. Projected 2018 peak hour volumes on this portion will be very heavy, thus making it difficult to turn on and off the highway. Based upon the results

from the previous LOS section, widening Highway 99E to three lanes would help improve the level of service at the unsignalized intersections.

A left turn warrant analysis was conducted and found that a left turn lane on Highway 99E is currently warranted at the intersection of Tangent Drive. In less than five years, a left turn lane on Highway 99E will be warranted at the intersection of North Lake Creek Drive.

No changes to lane widths on OR 99E are needed since the recent improvements to the highway through Tangent. However, as was recently constructed at Tangent Drive, a left turn lane for OR 99E southbound traffic at Birdfoot Drive would better serve future traffic from development in the older, southern part of town. Key existing community facilities in this area include a restaurant, fire station, school, city hall, and developing residential area. There is adequate right-of-way at Birdfoot Drive, at least 80 feet according to current tax assessor's maps, for adding a left-turn lane. Should future residential and commercial development substantially increase traffic turning left onto Birdfoot Drive, a turn lane should be considered.

12.4 Pavement Conditions

The road network was evaluated for future pavement conditions based upon existing conditions and anticipated traffic flow demands. If maintenance is continued as it has in the past, most roads will remain in fair or better condition. In order to keep streets in fair or better condition, chip seal, overlay, or reconstruction maintenance will be needed on the following streets:

- Blackberry Lane (south of Birdfoot Drive)
- Garden Lane
- ~~McFarland Road~~
- Old Mill Road
- Old Oak Drive
- Queen Anne's Lace Drive
- ~~Rolland Drive~~

12.5 Traffic Signals

Signal warrant analyses were conducted in 2000 (using 2018 traffic) for the unsignalized intersections listed below.

- ~~Highway 99E & Old Highway 34 (currently meets warrant #11)~~
- Highway 99E & North Lake Creek Drive (meets warrant #11 in 2000)
- Highway 99E & Tangent Drive (meets warrant #11 in 2006)
- Highway 99E & Birdfoot Drive (meets warrant #11 in 2012)

Results of the analysis showed that the unsignalized intersections meet at least one signal warrant by the year 2018. The intersections met Peak Hour Volume Warrant – Warrant #11 based upon the PM traffic volumes. Presumably, other warrants, including #1 and #2 would also be met by the year 2018. Although the three intersections met a peak hour warrant, it is unlikely that more than one could be signalized due to inadequate spacing between intersections. The most likely locations for future traffic signals are at ~~Highway 99E & Old Highway 34~~ and at Highway 99E & Tangent Drive. The Tangent Drive traffic signal would provide pedestrian and vehicular crossing benefits at the intersection, and serves to interrupt traffic on Highway 99E, thus making it easier for traffic on North Lake Creek Drive and Birdfoot Drive to enter and exit the highway. Traffic signals were evaluated at these locations with results as shown in **Table 6**.

Table 6 – PM Levels of Service at Potential Signalized Intersections

Year 2018 Total Traffic		
Location	Overall V/C	Overall LOS
Hwy 99E & Old Hwy 34	0.79	D
Hwy 99E & Tangent Dr.	0.75	D

As shown in the table, A signal was recently installed at the intersection at of Old Highway 34 which was forecast to will be slightly over ODOT’s volume/capacity threshold by the year 2018. Recent analysis (2009) does not show unacceptable intersection operations at the remaining two intersections. Signalization has provided some safety benefit to pedestrians crossing OR99E . Based on expected traffic growth, the signal will exceed the threshold in the year 2016.

As an alternative, a traffic signal could be placed at the Highway 99E and North Lake Creek Drive in lieu of a traffic signal at Highway 99E and Tangent Drive, but it would not provide the same interruption of traffic for the Tangent Drive and Birdfoot Drive intersections. Pedestrians would find it more difficult to cross Highway 99E if the signal is located at North Lake Creek, instead of Tangent Drive.

12.6 Speed Limits

As noted previously, speeding has been a problem along Highway 34 and as a result the roadway is a designated safety corridor. As traffic volumes increase, speeding frequency may decrease due to congestion. Development along Highway 99E and roadway improvements will also provide visual queues to drivers that they need to slow down inside the City. Tangent Drive has been identified by the citizens in the city as a problem with speeders.

12.7 Accidents – Crashes

As the City of Tangent develops, and traffic growth arises, intersections or areas with frequent accidents will likely experience increased accidents if mitigation is not implemented. Future accident potential at the five highest accident locations is discussed below:

Highway 99E and Highway 34 WB Ramps:

This intersection became signalized and had the traffic signal turned on September 11, 1997. Many of the accidents that have occurred here are a result of turning vehicles being hit by oncoming traffic prior to the signal being activated. Many of these accidents are now being prevented due to the traffic signal protecting vehicles that are making turns. Increased traffic levels at the intersection are not expected to cause the accident frequency to significantly increase.

Highway 99E and Highway 34 EB Ramps:

Many accidents taking place at this location have involved turning vehicles and oncoming traffic, prior to installation of the traffic signal. Many of these accidents are now being prevented due to a traffic signal protecting vehicles that are making turns. Increased traffic levels at the intersection are not expected to cause the accident frequency to significantly increase.

Highway 99E Highway 34 and Looney Lane:

Accidents occur at this location when westbound vehicles, traveling too close or driving too fast, rear-end vehicles slowing to exit Highway 34. As growth occurs more vehicles will exit here to access the adjacent commercial and industrial areas which may increase the number of accidents.

Highway 99E and Birdfoot Drive:

As growth occurs in Tangent, traffic volumes will increase. Without mitigation at this intersection, vehicle conflicts will continue to occur here. All recent accidents that have occurred here have been a result of vehicles turning onto or off of Birdfoot Drive and being hit by vehicles traveling through on Highway 99E. Widening Highway 99E to three lanes would provide a left turn lane refuge and will eliminate many of the conflicts.

Highway 99E and Old Highway 34:

~~This intersection is unsignalized and controlled by stop signs for traffic using Old Highway 34. Half of the accidents that have occurred here have been a result of drivers running stop signs. The remaining accidents were a result of conflicts with vehicles turning and vehicles traveling through on the major street. As discussed in the traffic signal section this intersection warrants a traffic signal. When this intersection becomes signalized vehicle accidents should decrease.~~

12.8 Committed Projects

~~Two~~ **One** projects ~~are~~ **is** being planned in the vicinity of Tangent.

ODOT and Linn County are working on a project to eliminate the existing at-grade intersection of Columbus Street and New Highway 34. The intersection ~~is expected to~~ **could** be replaced by an overpass for Columbus traffic and provide right-in and right-out access to the highway. The improvements would also facilitate a potential roadway link to the Tangent Industrial Park and Linn County's EFU zoned lands east of the City. The City should continue to coordinate with the County and ODOT to provide this alternative connection into Tangent. ~~However, the existing private access on the south side of OR 34, approximately 2,100 feet east of the Hwy 99E overcrossing, will not be allowed connection to the industrial park street network, according to ODOT, and would likely be closed with the project's construction. ODOT also will be preparing an OR 34 Corvallis – Lebanon Facility Plan. This facility plan would specify such access controls and changes along the highway, including any changes to the McFarland Road/Looney Lane intersection in Tangent, and improvements to the interchange with OR 99E.~~

~~ODOT, the City of Tangent, and various interested property owners are also working toward the installation of a traffic light at the intersection of Old Highway 34 and Highway 99E. The city will continue to cooperate with all parties toward this end.~~

13.0 The Future Bicycle System

As noted previously, not all collector and arterial streets in Tangent have bikeways. **Figure 20** shows the locations that currently need or will need bikeways in the future. **Table 7** lists the bikeway needs based on year 2018 traffic volumes. Bikeway needs are consistent with requirements of the Transportation Planning Rule (TPR) and the guidelines of the Oregon Bikeway and Pedestrian Plan which state that arterial and collector streets should have shoulder or on-street bike lanes. Shared lanes are permitted on collector streets if traffic volumes are less than 3,000 vehicles per day and speeds are low. Bike lanes are generally not needed on local streets; however, a shared bikeway is recommended on Blackberry Drive to encourage north/south bicycle travel without having to use Highway 99E. ~~Figure 32A provides a graphic depiction of the various types of bikeways discussed herein.~~ **Figure 32A** ~~provides a graphic depiction of the various types of bikeways discussed herein.~~ shows the design and structure of a bike/ped (shared-use) path.

A future recreational bike path and pedestrian trail is recommended between Eagle Drive and Tangent Drive that could also be used as an emergency access lane (see Figure 20). Although this bike/ped path

would cross EFU land, such a path is listed as being exempt from goal exception requirements according to OAR 660-12-065 (3): “(h) bikeways, footpaths and recreation trails not otherwise allowed as a modification or part of an existing road; and (o) facilities...serving local travel needs shall be limited to that necessary to support rural land uses identified in the acknowledge comprehensive plan or to provide adequate emergency access.” Ses or improvements to have considered alternative alignments and relative impacts to EFU lands, demonstrating compliance with the requirements of ORS 215.296.

This connection is important because Tangent’s Rural Fire Station on Birdfoot Drive is on the east side of the UPRR tracks, which must be crossed to reach OR 99E. The fire and emergency response vehicles at the station would have an alternative and shorter (half-mile) route to the industrial park and highways to the north, should the railroad crossings at Birdfoot Drive and Tangent Drive leading to OR 99E, or the one at Old Hwy 34 leading to the industrial park entrance, become blocked for whatever reason. Significantly more train traffic is forecast in the next 20 years, and a second track through Tangent is being considered. Construction as well as accidents at crossings could close access for hours at a time. The only other alternative emergency route to the industrial park that avoids the railroad tracks is 5-miles long, traveling east on Tangent Drive to Seven-Mile Lane and returning west on OR 34 or Old Hwy 34. The connection also would allow employees and shoppers to more directly and safely bike and walk between the residential areas in the southeast and the industrial/commercial properties in the north, without having to travel out of direction and along OR 99E, where sidewalks are not presently continuous. Another benefit is that this bike/ped path would connect with other parts of a proposed community trail system in the south between Old Oak Drive and Tangent Drive, and along North Lake Creek.

This proposed bike/ped path would be a 10-foot wide section (see Figure 32A) of compacted gravel, with removable bollards or swing fences (normally both locked in place) to prevent entry by vehicles other than for emergency access. The recommended alignment would avoid structures and follow property lines through the EFU land to limit impacts to farm operations, and the section would be traversable by farm equipment. There are three alternative alignments at present that would have equal minimum impacts to farming.

Thus this bike/ped/emergency access facility as proposed is low-cost, minimized impacts to EFU land, and enhances community safety, recreation, and connectivity; it would comply with applicable land-use regulations.

Because Tangent Drive, near the residential neighborhood of Meadow Wood Street, has a narrow or non-existent shoulder for bicycle and pedestrian travel, a bike/ped path also is recommended between Tangent Drive and Garden Lane, as shown on Figure 20. This bike path and pedestrian trail would provide safer travel for school children and residents to the southern part of the city. An upgrade of Tangent Drive (A County-owned road) to collector standards, a proposed and costly road improvement, would lessen the safety need for this lower-cost project.

Old Church Road is currently wide enough to accommodate bike lanes in each direction. These bike lanes are a recommended improvement that would tie-in to the proposed bike path in the street’s presently unimproved right-of-way connection to Tangent Drive, as shown in Figure 20. The bike path could be part of a linear park developed by the City in this block along North Lake Creek.

To the west of the city, North Lake Drive with standard shoulders and Tangent Drive with narrow shoulders lead to the larger city of Corvallis via several County roads. Although shoulders are often

minimal through this rural area, the route is popular for bicycle recreation and travel, and warrants designation as a bikeway.

Table 7 – Bikeway needs

Street	From	To	Bikeway Type Needed
McFarland Road	Hwy 99E	Old Hwy 34	McFarland Road is classified as a collector street. The posted speed is 25 mph and future traffic volumes will be less than 3,000 vehicles per day. Given the classification, speed, and volume on the roadway, a shared bike lane is appropriate.
Blackberry Drive	Birdfoot Drive	Tangent Drive	Blackberry Drive is classified as a local street. The posted speed is 25 mph and future traffic volumes will be less than 3,000 vehicles per day. Given the classification, speed, and volume on the roadway, a shared bike lane is appropriate.
McFarland Road	Hwy 34	N. Lake Creek Dr.	McFarland Road is classified as a minor arterial street. The speed limit is unposted and drivers commonly drive in excess of 40 mph. Future traffic volumes will be less than 3,000 vehicles per day. Much of the roadway is outside of the UGB. Given the classification, speed, volume, and location of the roadway, a shoulder bike lane is appropriate.
Old Hwy. 34	Looney Lane	Hwy 99E	Old Highway 34 is classified as a local street but should be classified as a minor arterial street (see Roadway Section). The posted speed is 45 mph and future traffic volumes will be greater than 3,000 vehicles per day. Given the classification, speed, and volume on the roadway, a shoulder or on-street bike lane is appropriate.
Tangent Drive	Hwy 99E	City Limits	Tangent Drive is classified as a minor arterial street. The posted speed is 40 mph. Future traffic volumes will be more than 3,000 vehicles per day. Some of the roadway is outside of the UGB. Given the classification, speed, volume, and location of the roadway, a shoulder or on-street bike lane is appropriate.

Street	From	To	Bikeway Type Needed
Birdfoot Drive	Hwy 99E	Old Church Rd.	Birdfoot Drive is classified as a collector. The posted speed is 25 mph and future traffic volumes will be less than 3,000 vehicles per day. Given the classification, speed, and volume of the roadway, a shared bikeway is permitted; however, an on-street bike lane may be more appropriate because the street is also a route to the local elementary school. An on-street bike lane would provide greater safety for young riders traveling to and from school.
Old Church Rd.	Birdfoot Drive	Old Oak Drive	Old Church Road is classified as a collector. The posted speed is 25 mph and future traffic volumes will be less than 3,000 vehicles per day. Given the classification, speed, and volume of the roadway, a shared bikeway is permitted; however, an on-street bike lane may be more appropriate because the street is also a route to the local elementary school. An on-street bike lane would provide greater safety for young riders traveling to and from school.
Old Oak Drive	Old Church Rd.	City Limits	Old Oak Drive is classified as a minor arterial street but should be classified as a collector. The posted speed is 25 mph and future traffic volumes will be less than 3,000 vehicles per day. Given the classification, speed and volume of the roadway, a shared bikeway is permitted; however, an on-street bike lane may be more appropriate because the street is also a route to the elementary school. An on-street bike lane would provide greater safety for young riders traveling to school
Hwy 99E	S. of Hwy 34	Post Office	Highway 99E is classified as a principal arterial street. The speed limit is 45 mph. Future traffic volumes are greater than 3,000 vehicles per day. Given the classification, speed, and volume of the roadway, a shoulder or on-street bike lane is appropriate.

14.0 The Future Pedestrian System

In addition to existing sidewalk needs, n New sidewalks will be needed as new arterial streets are constructed or brought up to standards. Sidewalks will are one way to provide necessary connections between residential areas and major activity centers within the City. Low traffic volume streets and graveled or paved street shoulders also can provide acceptable pedestrian connections within Tangent's residential core. Figure 21 shows locations with existing and proposed sidewalks. ~~that currently need or will need sidewalks in the future.~~ Sidewalk locations are in harmony with Tangent's Vision Statement requirements of the Transportation Planning Rule (TPR) and the guidelines of the Oregon Bikeway and Pedestrian Plan.

A recommended location for a cross walk with raised median and pedestrian refuge (particularly for school children) is approximately opposite Queen Anne's Lace Drive, where the highway has now been widened with a painted median and, to the north, a turn lane onto Tangent Drive.

15.0 The Future Transit System

As discussed in Section 6.0, there is currently no transit service in Tangent. The Linn-Benton Loop and the Linn County Shuttle transit routes pass through northern Tangent along Highway 99E, but they do not have scheduled stops within the city limits.

By the year 2018 2030, Tangent's population may reach as high as 2010 1,481 persons; however, population density is not expected to exceed three or four persons per acre within the UGB by then, which is the threshold typically needed to support fixed-route bus service.

Although the future City population and density will not be sufficient for new bus service, modifications to existing service may be feasible. The Linn County Shuttle, which currently passes through Tangent, is evaluating the feasibility of bus service to Tangent. The Shuttle could provide connections to the City of Albany and other transit systems including Albany Transit Service and the Linn-Benton Loop. If service is provided, the Shuttle may need to purchase another bus and hire additional staff.

16.0 The Future Rail System

As discussed previously, roughly 20 trains pass through Tangent daily. Sixteen are freight trains and 4 are passenger trains. ODOT expects that the number of freight trains will increase to as many as 20 trains per day during the TSP planning horizon. ~~This is a market driven estimate and is also dependant on the merger between Union Pacific and Southern Pacific railroads.~~ Passenger service is also expected to increase to as many as 10 trains per day.

The ODOT Rail division has informed the City that the Union Pacific Railroad has plans to expand the track through the City of Tangent to a double track, and would increase the number and speed of freight trains through the City. Amtrak has plans to add two more Cascades train trips (one northbound, one southbound) each day in lieu of present thru-way bus service between Portland and Eugene. Additionally, the State is looking at adding high speed rail passenger service between Portland and Eugene at speeds of 90-110 miles per hour, though no alignment has been chosen at this point. With this potential expansion, the ODOT Rail division will discourage any new at grade crossings, and would prefer construction of a grade separation (overcrossing) if funding were available and an alignment feasible. Other alternatives likely would be closing of one or two of the three existing at-grade crossings, with widening and

improvements to the remaining crossing(s), or a completely new crossing with closure of all three existing crossings. Because only approximately 400 feet separates the rail line and the highway, an overcrossing at Tangent Drive , or other street, would also have to cross OR 99E for an acceptable vertical grade of 5 percent to be possible on the structure. Such a long and tall structure--approximately 800 feet on each side of the UPRR tracks with a vertical clearance of 23.5 feet over the tracks and 17.5 feet over OR 99E-- would raise issues of cost-effectiveness for a low-volume road as well as compatibility with the community's Vision Statement.

Regardless of any railroad crossing improvements in the future at Tangent Drive, the culvert on the north side of Tangent Drive that carries North Lake Creek under the tracks needs to be enlarged to provide increased conveyance of stormwater.

~~No other future rail needs have been identified.~~

17.0 The Future Water, Air, and Pipeline Systems

No future plans or needs are expected for air, water, or pipeline transportation systems within the City of Tangent.

TRANSPORTATION SYSTEM PLAN

18.0 General

As a result of existing deficiencies and failure of the existing street network to accommodate future transportation demands, build alternatives were developed and evaluated. The alternatives were developed to mitigate the deficiencies while satisfying the goals and policies outlined in the TSP, as well as other statewide requirements, including the Transportation Planning Rule. The following are the recommended improvements necessary to satisfy the existing and future transportation needs of the City of Tangent. Future improvements are based on the assumed build out of parcels at densities and intensities discussed in **Section 11.2**. Projects regarding ODOT roadways are consistent with the 1999 Highway Plan and standards. ODOT planning staff were involved in the development of the alternatives and final recommendations.

Improvements identified in **Sections 19.0** through **Section 25.0** represent the recommended “build alternatives” evaluated as part of the TSP. The Implementation Plan in **Section 26** lists the probable costs associated with each recommended build alternative. No-build alternatives are not included in the section since their implementation costs are considered to be zero.

19.0 Land Use Recommendations

~~Based on the analyses conducted for the TSP, Industrial, Highway Commercial/Industrial, Central Commercial, and Residential growth should be implemented as shown in **Figure 16**.~~

~~It should be noted that the traffic analyses indicated growth in the City will cause some streets and intersections to operate below acceptable standards. Without transportation improvements, the areas of greatest congestion will be centered around the intersection of Highway 99E and Old Highway 34, as well as between Lake Creek Drive and Birdfoot Drive on Highway 99E. With improvements, most streets and intersections will operate within acceptable standards, except for the intersections of Highway 99E and Old Highway 34, and the intersection of Highway 99E and Tangent Drive. These locations will fall below acceptable operating standards in roughly the year 2016 if development occurs as assumed in the TSP.~~

~~Although not recommended for implementation as part of the TSP, some land use alternatives should be “red flagged” as possible future options to reduce traffic impacts on the street system. These include:~~

- ~~● Adjust Highway Commercial Growth~~
- ~~● Adjust Central Commercial Growth~~

Adjust Highway Commercial Growth

~~Commercial uses typically generate the highest trip rates of all land uses. As a result, the Highway Commercial uses north of Old Highway 34 will generate approximately 23% of all new vehicular trips expected in the City. Trips from this area have the greatest impact on the Old Highway 34 and Highway 99E intersection, which already has poor traffic operations for the Old Highway 34 approaches. A traffic signal is currently warranted at the intersection which will accommodate nearly all of the future traffic; however, trip generation could be reduced by developing less of the land as highway commercial and shifting more of the development to Highway Industrial, which has a lower trip rate.~~

Adjust Central Commercial Growth

~~Planned Central Commercial uses along Highway 99E are expected to generate roughly 42% of all new vehicular trips in the City. This substantial trip generation impacts all intersections along Highway 99E. It should be noted that land use growth assumptions were prepared to model a worst case scenario, thus trip~~

generation may occur at intensities less than previously assumed or may be reduced by developing less of the land during the next 20 years. It is possible that market economics will not support the assumed development levels of the Central Commercial properties in Tangent, which in turn will automatically reduce many of the forecasted traffic impacts.

Tangent's vision for future land use includes remaining a rural community distinct and separate from nearby cities, maintain and encourage existing agricultural activities outside the urban growth boundary (UGB) but within the City limits, preserve the residential area of Tangent by directing commercial and industrial land uses to the northern part of the City, and maintaining a green belt around the residential core.

The *Downtown Tangent Development Plan* (2002) recommends that Birdfoot Drive, along with OR 99E between Birdfoot Drive and Tangent Drive be developed as the Main Street Core Area for the community. Transition zones should be developed to the North and South of this area to aid in traffic calming and cue motorists that they are entering the downtown core. The use of a planted median strip along OR 99E, with turn pockets, will allow for good traffic circulation while helping reinforce the notion of this corridor as a pedestrian friendly area. OR 99E is more suited for the development of businesses that are dependent on through traffic and visibility such as restaurants and grocery stores. There are infill development opportunities on both east and west sides of OR 99E between Birdfoot Drive and North Lake Creek Drive. North Lake Creek Drive and OR 99E would be a good location for a grocery store with parking located behind the building. There are development possibilities on the east side of OR 99E between Tangent Drive and Birdfoot Drive, as well as several buildings along the highway.

The PD (Planned Development) Overlay District should be considered for areas within the Community Commercial District and the Highway Commercial/Industrial District. Perhaps combined with a design review board, a PD Overlay can be used to apply new development standards under an approved plan and program that is professionally prepared. A PD Overlay can encourage new techniques and new technology to community development to achieve economies in land development and maintenance while providing building groupings, open spaces and circulation systems that enhance the working or living environment of the inhabitants. Access management and parking also can be addressed effectively with a PD Overlay in a manner to protect the function of the state highway, maximize development of available land, and promote the Vision for the community.

Changes in land use, in general, should consider techniques to reduce stormwater run-off, such as with Low Impact Development, and to enhance safety for all modes of travel within the city.

20.0 The Proposed Roadway System

Based on the land use assumptions of the TSP, several roadway system improvements will be needed to support existing and future growth. They include the following:

- Street Functional Classification Modifications
- Transportation System Management
- Pavement Preservation and Maintenance
- Transportation Demand Management
- Capacity Expansion

20.1 Street Functional Classification Modifications

Figure 22 illustrates the recommended street functional classification system for Tangent. The following streets should be reclassified to be consistent with the recommended classification map:

- Old Highway 34
- Old Oak Drive

Old Highway 34: This roadway is currently classified as a local street but operates like a collector street. The land use surrounding this road will contain additional industrial and commercial development and joins Highway 99E to other parts of the City. Future traffic will use this road to travel from residential areas to employment centers, which indicates that the street should be reclassified as a collector.

Old Oak Drive: Old Church Road is classified in the Tangent Comprehensive Plan as a minor arterial street. This street connects to Old Church Drive and to Birdfoot Drive, and functions more as a collector street. Reclassifying Old Oak would make the street in harmony with the Birdfoot Drive and Old Church Road classifications.

Reclassifying the street can affect the ultimate design of the streets. **Table 8** shows Tangent’s current street design standards for arterial and collector streets. Additional pavement and right of way may be needed to accommodate turning lanes, parking, and bike lanes.

Table 8 — Street Design Standards for Arterial and Collector Streets

Classification	Minimum Right-of-Way	Minimum Curb-to-Curb Width
Arterial	66 Feet	44 Feet
Collector	60 Feet	36 Feet
Local	60 Feet	36 Feet*

*Discontinuous local streets can be as narrow as 28 feet in 50 foot rights of way.

The street functional classifications for Tangent are as shown in Figure 7. City plans must be consistent with county and regional plans and with the State plan. For instance, classifying a street as a collector, when Linn County has it listed as a local access road, will not make it eligible for federal funds.

20.2 Transportation System Management

Transportation System Management (TSM) is part of the planning process aimed at improving the efficiency of the existing transportation system. Alternatives discussed below are developed to maximize the operation of existing facilities. TSM type projects include:

- Traffic Signal Adjustment or Installation
- Traffic Lane Modifications
- Truck Route Delineation
- Access Management

The TSM projects are generally low-cost, capital improvements that can be implemented more quickly than larger projects that expand system capacity.

20.2.1 Traffic Signal Adjustment or Installation

At two locations, traffic signals should be installed to address existing and future level of service (LOS) deficiencies in Tangent. The intersections include:

- Old Highway 34 and Highway 99E
- Tangent Drive and Highway 99E

Figure 23 shows the locations of the proposed traffic signals.

Old Highway 34 and Highway 99E

A traffic signal is currently needed at the intersection due to poor level of service conditions for the Old Highway 34 approaches. Eventually traffic on all approaches will operate at a volume/capacity ratio over 100% if it remains unsignalized. Based on the traffic projections, the intersection will be operating at a volume/capacity of 79% at the end of the 20 year planning horizon if a signal is installed. Signal timing should be coordinated with the existing traffic signals at the Highway 34 ramps

Tangent Drive and Highway 99E

Future traffic volumes on Highway 99E and on Tangent Drive will warrant the installation of a traffic signal at this intersection by the year 2006. Traffic on the Tangent Drive approach will be operating at a volume/capacity ratio over 100% if it remains unsignalized. With a signal installed, level of service would be improved to a volume/capacity condition of 75% at the end of the planning horizon. Installation of a traffic signal would also improve the operations at nearby intersections by interrupting Highway 99E traffic and creating gaps in the traffic stream. Because the traffic signal is not currently needed, traffic volumes and level of service should be checked annually at the intersection to determine exactly when the signal should be installed.

Highway 34 Ramps and Highway 99E

As traffic volumes increase over time at the interchange ramps, the current traffic signal settings should be updated. Updating the settings allows the traffic signals to operate at peak efficiency and in a manner that best matches the new traffic volumes and distributions. Ideally, the traffic signal settings should be reviewed every 2—3 years and revised as needed. The ramp signal timings should be coordinated with the proposed signal at Highway 99E and Old Highway 34.

20.2.2 Traffic Lane Modifications

Traffic growth on Highway 99E will make it difficult for minor street traffic to enter and exit the highway. A traffic signal at Tangent Drive and Highway 99E will improve the LOS at the intersection; however, because of the close intersection spacing, it is not possible to install traffic signals at the nearby intersections at North Lake Creek Drive and Birdfoot Drive. Instead, operations should be improved by widening Highway 99E to add a center turn lane on Highway 99E between Highway 34 and the South City Limits, as well as provide left turn lanes at the intersections. Widening the highway provides several operational and safety benefits, including:

- Provides a left turn storage for vehicle turning off of Highway 99E.
- Creates a refuge area for left turns from the side streets.
- Reduces the number of rear end and turning accidents.
- Reduces congestion at the intersections.
- Helps maintain traffic speeds at acceptable levels.

The westbound approaches on Tangent Drive and on Birdfoot Drive should also be widened to add left turn lanes at Highway 99E. Adding left turn lanes will reduce intersection delay by allowing right turn traffic to more easily access the highway without being impeded by left turn traffic.

Figure 24 shows the location of the recommended limits of a center turn lane on Highway 99E and other intersection left turn lanes. **Figure 25** shows the proposed number of traffic lanes to accommodate future growth.

Traffic growth on OR 99E could make it difficult for minor street traffic to enter and exit the highway as residential areas develop in Tangent. A left turn lane for OR 99E southbound traffic at Birdfoot Drive, as was recently constructed at Tangent Drive, would more safely serve traffic, including buses and carpools carrying students, destined for the school. Also, zoned future development of multi-family housing on Old Oak Drive, and commercial property fronting the highway with probable access from Birdfoot Drive, would increase traffic at this intersection. Should such development occur, addition of a left-turn lane from OR 99E onto Birdfoot Drive is recommended.

20.2.3 2 Truck Routes

A review of the Comprehensive Plan Designations for commercial and industrial areas and review of the levels of commercial truck activity between geographical areas indicates where truck routes are appropriate and where they should be limited. **Figure 26** illustrates the recommended truck routes within the City. Streets not identified as truck routes should restrict through truck travel.

Restricting truck traffic to designated facilities helps eliminate the problem of heavy trucks disrupting residential areas and damaging street pavements not designed for heavy loads. Although through trucks will be prohibited on some streets, local truck traffic, such as farm equipment, trash pick-up and local deliveries, will be permitted. As shown in the figure, trucks should not be permitted on North Lake Creek Drive and Tangent Drive, nor on local streets. The City should work with the Linn County Roads Department to implement the prohibition.

20.2.4 3 Access Management

In order to maintain acceptable operational conditions and help extend the functional life span of major streets, it is proposed that Tangent adopt and enforce access management standards. The standards would apply to all new development and redevelopment of land adjacent to collectors and arterial streets. State standards would apply to Highway 99E under the jurisdiction of ODOT. Access management standards contained in the 1999 Highway Plan are listed in **Table 9 8**. Minor deviation from these standards may be permitted in some cases, but in all cases access must be consistent with the provisions of Oregon Administrative Rule (OAR) 734-051.

Table 9 8 –Access Management Standards

Location	Intersection Spacing	Speed Limits
Highway 99E North City Limits to North Lake Creek Drive	990 feet	55
Highway 99E North Lake Creek Drive to South City Limits	750 feet	45
Highway 34	1,320 feet	55

East City Limits to West City Limits		
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According to the Highway Plan, "...where a right of access exists, access will be allowed to a property at less than the designated spacing standard only if that property does not have reasonable access and the designated spacing cannot be accomplished. If possible, other options should be considered such as joint access."

The Highway Plan further notes that, "...approach roads shall be located where they do not create undue interference or hazard to the free movement of normal highway or pedestrian traffic. Locations on sharp curves, steep grades, areas of restricted sight distance or at points which interfere with the placement and proper functioning of traffic control signs, signals, lighting or other devices that affect traffic operation will not be permitted."

The number of approaches per properties along City and Linn County roads should be limited to one. More than one access can be considered if the City determines that additional access is necessary to accommodate and service traffic to the property.

~~When Highway 99E is~~ has been widened to provide a center turn lane for approximately a half-mile south of the OR 34 eastbound ramp. ~~At the time of design, a raised median at various locations was considered should be selectively used to limit access, but none were selected for construction.~~ A raised center median can serve a secondary benefit by providing a refuge area for pedestrians crossing the busy highway. **Figure 27** shows the ~~one recommended location for a raised center median.~~ Perhaps a more appropriate location for a raised center median and pedestrian crossing refuge (particularly school children), which might not have been considered earlier, is approximately opposite Queen Anne's Lace Drive, south of where the highway has now been widened with a turn lane onto Tangent Drive.

McFarland Road is a County-owned local road with little traffic past the mobile home park near the intersection with North Lake Creek Drive. However, the 16-hr counts conducted at OR 34 at McFarland Road/Looney Lane indicated undesirable and illegal maneuvers at this intersection. The location of the existing raised median on OR 34 allows vehicles to complete northbound left turns, but prevents vehicles from dwelling in the center two-way left turn lane and completing the turn in two parts. The existing raised median allows vehicles to cross the highway from McFarland Road to Looney Lane despite a Do Not Enter sign. There is no acceleration lane onto OR 34 from Looney Lane, which is a County-owned local road restricted to a right-in/right-out movement for OR 34 westbound traffic. In the near term, the existing raised median should be extended to prevent illegal left-turn maneuvers and crossing the highway entirely from McFarland Road to Looney Lane. Regardless, the south connection of McFarland Road to OR 34 provides no practical benefit to present or future travelers compared to using the OR 34/OR 99E interchange, and should be closed for safety reasons as soon as possible. The distance between McFarland Road and the eastbound OR 34 offramp is only approximately 1,650 feet, which is considerably less than the minimum spacing standard of 1 mile for a rural expressway (OHP Table 18). A cul-de-sac is proposed at the connection, with an off-road bike path continuing approximately 1,000 feet to the Seventh-Day Adventist School property. (Alternatively, McFarland Road could be extended to a private drive, providing vehicular access to the school instead of from OR 34.) For the same reasons, the northern connection of Looney Lane to OR 34 should be closed. Less effective, but with no out-of-direction travel impact for Looney Lane southbound traffic ultimately headed west, would be to restrict the movement to right-out only and provide an acceleration lane. The existing and alternate route connects Looney Lane with Old Hwy 34 and OR 99E to the interchange.

East of the OR 34/OR 99E interchange, there are two parallel private accesses on the southside of OR 34 approximately 2,200 feet from the end of the eastbound on-ramp. This westerly private access, which potentially could connect to Mallard Avenue in the Tangent Industrial Park, should be closed.

According to the 1999 Oregon Highway Plan, OR 34 is a Statewide Highway and a designated state freight route. In 2000, OR 34 was designated by the Oregon Highway Division as an expressway. OR 34 is listed as part of the National Highway system. OR 99E is classified as a Regional Highway. Any future improvements should address opportunities to meet access spacing standards for OR 99E, OR 34, and county roadways. There are 63 driveway approaches on OR 99E, some of which are unrestricted, open frontages for businesses and residences. In the southern end of the study area, most approaches are residents and small businesses, towards the north of the study area, the approaches are mainly to access the industrial and warehouse businesses.

All new commercial or industrial uses, multi-family residential uses, subdivisions, and manufactured dwelling parks, including expansion of existing uses, that propose to use an ODOT facility (Old Hwy 34 or new OR 34 or OR 99E) as access is required to submit a Traffic Assessment, which shall include the following: location of access points, estimates of the amount of traffic that will utilize the above access points, effect of the proposed development on traffic movement of both vehicles and pedestrians on OR 34 and/or OR 99E, identification of all improvements required to maintain adequate traffic flow, and approval by the Oregon Department of Transportation.

Consistent with the Oregon Highway Plan, where a right of access exists, access to a property at less than the designated spacing standard shall be in accordance with the Oregon Highway Plan. Access to a property at less than the designated spacing standard access shall be allowed only if it does not have any other reasonable access and the required spacing cannot be met. If possible, other options should be considered, including joint access. Only one approach per property is allowed to a street owned by either the City of Tangent or Linn County. Access to OR 99E and OR 34 is provided only where adequate access to another street or driveway is not feasible in accordance with the relevant policies and statutes.

Should the Community Commercial district be developed between Birdfoot Drive and Tangent Drive, and OR 99E and the UPRR tracks (as identified in the Tangent Downtown Concept Plan, 2002), new access to businesses would be restricted from OR 99E according to access spacing standards of 750 feet (45 mph) for a regional highway. Alternatively, vehicular access for the development's parking would be provided from Birdfoot Drive and Tangent Drive. Pedestrian access would be provided on-site and from off-site, using the proposed pedestrian crossing with raised median refuge south of Tangent Drive. A Planned Development Overlay zone applied to block development in the Community Commercial district should address access management and parking issues. Development in the Highway Commercial/Industrial district also must meet access spacing standards.

20.2.5 4 Speed Reduction

As discussed previously, speeding on Highway 99E is a concern of residents in Tangent. In this case, speeding is primarily a result of a street design that inadequately conveys to the driver the appropriate velocity. Drivers generally travel at a speed which they believe to be safe, based on visual information such as traffic volumes, street width, alignment, grades, and roadside obstacles. Thus, because Highway 99E has a rural appearance and is relatively uncongested, it is often driven at a greater speed than if it were an urban type street. Increased police enforcement is an option; however, it would be difficult to manage the problem for a sustained period of time given existing and future police staffing levels. The better solution is to alter the geometric design of the street, so as to self-enforce the desired level of speed.

The TSP has several projects that are expected to provide the desired speed reduction when implemented. They include:

- ~~Upgrading Highway 99E to urban standards with sidewalks, curbs, and gutters.~~
- ~~Installation of a traffic signal at the intersection of Tangent Drive and Highway 99E.~~
- ~~_____~~

A traffic light was added at the intersection of OR 99E and Old Highway 34 between 2002 and 2009. The speed limit on OR 99E was reduced between the northern city limits and North Lake Creek Drive from 55 to 45 mph.

Installation of a raised median north of the intersection N. Lake Creek and Highway 99E. and/or between Queen Anne's Lace Drive and Birdfoot Drive on Highway 99E would be expected to encourage speed reduction by drivers to 45 mph or below. In addition, there are still segments of Highway 99E that could be upgraded to urban standards including sidewalks, curbs, gutters, and street trees when adjacent properties are developed.

Until the day when Tangent Drive, posted at 40 mph, is upgraded to minor collector design standards with shoulders and sidewalks, the road through residential areas should be posted with caution signs warning drivers of pedestrians and bicycles on the roadway.

Each of these projects will significantly alter the design appearance of the highway through Tangent and would be expected to reduce traffic speeds to 45 mph or below. Each of these projects are consistent with the policies and goals of ODOT.

20.3 Pavement Preservation and Maintenance

Most streets in the City are currently maintained at a level of fair or better condition. Keeping pavement surfaces in this condition is the most economical method of maintenance. If street conditions are permitted to deteriorate to a poor status, the costs for maintenance increase dramatically. Over the next 20 years, continued maintenance should occur to preserve or improve the condition of Tangent streets. as shown in **Figure 28**. However, funding is inadequate to ensure regular maintenance.

The following streets should be reconstructed and/or paved to provide an all-weather surface:

- ~~Rolland Drive (gravel)~~
- ~~McFarland Road (Rolland Drive to Highway 99E)~~
- ~~McFarland Road (North of North Lake Creek Drive)~~
- Old Mill Road
- Queen Anne's Lace Drive

In addition, the following streets should be resurfaced with an overlay or chip seal during the next 20 years:

- Blackberry Lane (south of Birdfoot Drive)
- ~~Old Mill Road~~
- Old Oak Lane

Depending on traffic levels and weather conditions, other street sections may need to be overlaid or chip sealed. In addition, it is possible that other public streets in the City will need to be slurry sealed

sometime during the 20 year planning period. Periodic inspections of the pavement condition will be necessary to determine if and when other streets need maintenance.

20.4 Transportation Demand Management

Travel Demand Management (TDM) is one alternative in reducing traffic and thus improving the operation of both intersections and roadway links. Travel Demand Management programs are designed to maximize the people-moving capability of the transportation system by increasing the number of persons in a vehicle or by influencing the time of, or need to, travel. Successful TDM strategies help offset some of the negative impacts of future growth on the roadway system or delay the impacts for several years.

TDM strategies include encouraging the use of alternatives to single occupant vehicles (such as car pooling, van pooling, public and private transit, bicycling and walking), and influencing when travel occurs during the day, and how often travel occurs during the week (through compressed work weeks, flexible work schedules, and telecommuting).

Tangent should pursue the following TDM strategies:

- Improved bicycle and pedestrian facilities (see **Section 21.0** and **Section 22.0**).
- Increased transit service (see **Section 23.0**).
- Coordination with major employers to promote transit use, car pools, van pools, and alternative modes of transportations.

Major employers should be encouraged to reduce the number of vehicles at the workplace by implementation of one or more of the following:

- Welcome letter for new employees that includes information about commute options.
- Provide information about bus schedules, bicycle routes, carpools and vanpools.
- Publish information about alternative modes of transportation in the company newsletter.
- Provide a guaranteed ride home for employees who use alternatives to driving alone.
- Allow employees to dress casually on days they use alternative transportation.
- Provide free or discounted transit passes.
- Permit employees to telecommute when appropriate.

~~The City should also dedicate staff to work with employers in setting up programs and in explaining tax incentives for encouraging alternatives to drive alone commuting. Businesses need to be aware that employers that purchase transit passes for employees or purchase vehicles for vanpool or carpool programs are eligible for state Business Energy Tax Credit.~~

The nature of TDM programs are such that the positive impacts on the operation of specific intersections and links are difficult to quantify. TDM programs, however, can be effective and should be implemented as a method to reduce traffic demand in Tangent.

20.5 Capacity Expansion

Results of the traffic study indicate that no significant expansion in capacities of existing streets is needed to support future growth in Tangent. Essentially all of the operational needs can be addressed through other measures such as signalization and minor intersection improvements. As discussed previously, The recent widening and addition of turn lanes to Highway 99E to add a center turn lane is recommended,

although the purpose of the turn lane is primarily to ~~has~~ improved traffic safety and turn movements at the intersections.

The Future 2030 No-Build conditions analysis shows the eastbound (EB) approach of OR 99E and OR 34 EB ramps with a LOS F (Level of Service) and a V/C of 1.16 (failing), and an intersection V/C of 0.94. By adding a left turn lane to the EB approach with 100-feet of storage, adding a protected permitted left turn phase and lagging the protected left turn phase, the approach LOS can be brought down to LOS E and the V/C to 0.97; however, the intersection operates at a V/C of 0.82, which does not meet the standard of 0.75 V/C. By adding a left turn movement to the existing through-right lane and keeping the protected left lane separated while operating the east-west approaches split-phased, improved the intersection C/C to 0.72. This V/C meets the ODOT Standard. ,

The Future 2030 Build conditions analysis shows one intersection will not meet mobility standards. The intersection of OR 99E and OR 34 WB ramps operates at LOS B and V/C of 0.76. By adding right turn pocket of 150 feet, the intersection would operate at LOS B and V/C of 0.71. The necessity of this pocket should be determined in the future.

20.6 New Streets

~~Some local streets are expected to be constructed as part of future development and infrastructure improvements in Tangent. In June and August 2000, the Tangent City Council conducted public worksessions, inviting all the citizens of Tangent, representatives of ODOT, and other interested parties to discuss future street planning in the Tangent city limits. Figures 29 A-C, Recommended Street Connections, is a result of significant participation and input on the parts of citizens and development interest in Tangent; city officials and their staff; and ODOT representatives. Additionally, three public hearings were conducted, and prior notice mailed to all property owners in town, prior to the City adopting this transportation planning document.~~

~~**Figure 29 A-C** shows approximate locations for future streets connections in the Tangent city limits, as identified by the Tangent City Council, participating citizens and the Transportation Subcommittee. The connections will provide increased mobility between existing future development and land uses in the City's residential, commercial, industrial, and agricultural sectors. *Note that all future street locations as depicted on this figure are conceptual in nature, and may be subject to adjustment in conjunction with specific development proposals, subject to approval by the City of Tangent.* The City further notes that the conceptual locations of some streets indicated on these figures may present conflicts with regulated wetlands, and that the final construction plans will seek to avoid or mitigate adverse and unnecessary impacts to wetlands through the final placement, configuration and design of the streets. This may be of particular concerns for the future streets which will be needed in the City's Urban Growth Boundary north of the current City limits, in the area between McFarland Road and Highway 99E.~~

~~The areas in the commercial and industrial reserve areas of Tangent are currently outside of the UGB, but may be included sometime within the next 20 years. When developed, the "Agriculture/Regional Commercial Reserve" area shall have limited access to McFarland Road directly to McFarland. This internal street system should also provide for future extension of the streets to the south as the City develops, and should have one connection to Highway 99E approximately as shown on Figure 29 A.~~

~~Access to the land currently designated as Agricultural/Commercial Reserve cannot occur via Highway 34. Instead, development of the land is predicated on connections to McFarland Road and Highway 99E, as discussed above. Any access to Highway 99E must be located a minimum of ¼ mile south of the interchange for Highways 99E and 34. This minimum distance is necessary to ensure that the new~~

intersection, which may become signalized in the future, will continue to provide adequate traffic flow on Highway 99E.

In addition to the new streets which are indicated on Figures 29 A-C within the Tangent city limits, ODOT is hoping to develop an improved street connection at Highway 34 and Columbus Drive. Currently, the connection is an at grade intersection; however, during peak hours it is difficult to enter the highway from Columbus Drive. ODOT hopes to develop and evaluate alternatives to improve the operation and safety of the intersection.

Conceptual alternatives currently under consideration would create an overpass for Columbus Drive traffic across Highway 34, with provisions for right in/right out access to the highway. The City of Tangent will continue to cooperate with ODOT in order to advocate for an east/west arterial on the south side of New Highway 34, to eventually connect the extended Columbus Street with the Agriculture/Industrial Reserve lands in Tangent's northeasterly city limits. A similar connection may also be desirable north of New Highway 34, as depicted on the previous Transportation Plan (page 119 of the 1996 Tangent Comprehensive Plan).

Figures 29A and 29C show the approximate locations for future street connections in the Tangent UGB and city limits that would be expected as part of future development. New streets would have the functional classification of local streets. Additional connections or extensions would be possible depending upon development plans and city approval. Development of properties in the Community Commercial and Highway Commercial/Industrial districts would have to address access management to the state highway that could potentially involve new private streets.

20.7 Street Design Standards

Roadway design standards are based on the functional classification and operational characteristics of the street. The intent is to provide a street design that can safely and efficiently accommodate traffic demand by autos, buses, bicycles, pedestrians, and emergency vehicles. Street design also influences the development of adjacent land parcels.

In Tangent, the existing street network predominantly consists of local streets with one minor and one rural collector and two arterial streets, according to ODOT's functional classification (Figure 7). As the City develops, new collector and arterial street connection is not expected. Although not a new street, Highway 99E was recently upgraded with turn lanes and shoulders is recommended to be widened to three lanes to improve traffic operations and reduce accidents. Figures 30A-B illustrates the recommended street design standard. The standard includes bike lanes and sidewalks. If sufficient right-of-way is available, a 7 foot wide planting strip should be provided to separate the sidewalk from the traffic lanes. Figures 30 A-B also shows the recommended design standard for Old Highway 34; however a center turn lane is recommended rather than a raised median. Most, if not all, new roadways will be classified as local streets. The Transportation Planning Rule requires cities to review their roadway standards and reduce excessively wide pavements. As a result, street design standards for local streets were evaluated and found to be overly wide. Highway 99E, north of Highway 34 is developed to a 5 lane standard with bikelanes, curbs, and sidewalks. No city standards appear appropriate in this location. The City has recently adopted standards for narrower local streets, which also are already common in the older residential parts of Tangent.

Typical pavement widths of existing residential streets in Tangent are 36 feet or less, unless the street is not continuous. Generally, local streets have traffic volumes with less than 1,000 vehicles per day,

whereas a 36 foot wide street can easily handle 10,000 vehicles per day. Given the current design, a slightly narrower streets also are width is considered to be appropriate for, thus reducing construction costs, stormwater runoff, and resulting in a greater harmony with small neighborhoods. the Transportation Planning Rule. Figures 31C A-D illustrates recommended “skinny” street design standards for Tangent’s local streets. Figure 31D shows a cul-de-sac variation. The Tangent Public Works Design Standards include dimensions for arterials, collectors and local streets; these include a local street standard of 28 feet with options from 34 feet to 16 feet in width, curb to curb pavement edge to pavement edge., depending on on-street parking and travel lane queuing provisions. Such narrow streets also are consistent with Low Impact Development (LID) measures to reduce and naturally treat stormwater run-off.

21.0 The Proposed Bicycle System

Table 8 9 lists proposed bikeway improvements. For shoulder bikeways, these improvements would include shoulder widening or creation as roads were upgraded. Improvements could be painted marking with “sharrows” or a striped lane on the streets in the case of a shared bikeway or an on-street bike lane. Bike /ped paths would be graveled off-street facilities of 8 to 10 feet in width, which ultimately could be paved. The unimproved right-of-way of Old Church Road between Birdfoot Drive and Tangent Drive is proposed for a bike path (shared-use), perhaps part of a linear city park, rather than improvement as a street connection. **Figure 32A** depicts the three type of bikeways recommended for use in the City. **Figure 33** illustrates the proposed bicycle system. Bikeway installations are consistent with requirements of the Transportation Planning Rule (TPR) and the guidelines of the **Oregon Bikeway and Pedestrian Plan**. Figure 32A shows the design and structure of a shared-use path for bicycles and pedestrians.

Table 8 – Recommended Bikeways

Street	From	To	Recommended Bikeway Type
McFarland Rd.	Hwy 99E	Old Hwy 34	Shared Bikeway
Blackberry Ln.	Birdfoot Dr.	Tangent Dr.	Shared Bikeway
McFarland Rd.	Hwy 34	N. Lake Creek Dr.	Shoulder Bike Lane
Old Hwy 34	Looney Ln.	Hwy 99E	On-Street Bike Lane
Tangent Dr.	Hwy 99E	City Limits	On-Street Bike Lane
Birdfoot Dr.	Hwy 99E	Old Church Rd.	On-Street Bike Lane
Old Church Rd.	Birdfoot Dr.	Old Oak Dr.	On-Street Bike Lane
Old Oak Dr.	Old Church Rd.	City Limits	On-Street Bike Lane
Hwy 99E	S. of Hwy 34	Post Office	On-Street Bike Lane

Table 9 – Recommended Bikeways

Street	From	To	Recommended Bikeway Type
McFarland Road	OR 34	7th Day Adventist School	Bike Path
McFarland Road	North Lake Drive	OR 34	Shoulder/Shared Bikeway
McFarland Road	Old Hwy 34	OR 99E (north)	Shoulder/Shared Bikeway
Old Hwy 34	McFarland Road	Tangent Industrial Park	Shoulder Bikeway
North Lake Creek Drive	OR 99E	Tangent Drive	Shoulder Bikeway
Tangent Drive	East City Limits	East UGB	Shared Bikeway
Tangent Drive	East UGB	OR 99E	Shoulder Bikeway
Tangent Loop	South City Limits	South UGB	Shared Bikeway
Tangent Loop	South UGB	Old Oak Drive	Shoulder Bikeway
Old Oak Drive	Tangent Loop	Old Church Drive	Shoulder Bikeway
Old Church Road	Old Oak Drive	Birdfoot Drive	Bike Lane
Old Church Road R/W	Birdfoot Drive	Tangent Drive	Bike Path
Shared-use Path	Tangent Drive	Garden Lane	Bike Path
Shared-use Path	Sequoia Lane	Eagle Drive	Bike Path/Emergency Lane
Birdfoot Drive	OR 99E	Garden Lane	Shared Bikeway
Blackberry Lane	Birdfoot Drive	Old Oak Drive	Shared Bikeway
Garden Lane	Tangent Drive	Blackberry Lane	Shared Bikeway

22.0 The Proposed Pedestrian System

Figure 33 4 shows locations where sidewalks should be completed in the City. In some instances, the UGB is adjacent to one side of the roadway such as along McFarland Road. In these situations, sidewalks are not recommended if development or other walking destinations are not expected on that side of the street. The most important locations for sidewalks are along streets that lead to major activity centers such as the elementary school, post office, City Hall, park and commercial businesses. Sidewalk priorities are based on areas of greatest pedestrian demand and priority areas identified during public meetings on the TSP.

Sidewalks should be at least 5 feet wide and have ramps at the intersections that meet current requirements of the Americans with Disabilities Act.

A recommended location for a raised median and pedestrian crossing refuge (particularly for school children) is approximately opposite Queen Anne’s Lace Drive, south of where the highway has now been widened with a turn lane onto Tangent Drive. The pedestrian system also would be complemented by four proposed bike paths that would function with shared-use.

OR 99E currently acts as a barrier to pedestrian traffic, dividing residential areas from schools and government services. Tangent will need to work with ODOT to design and create pedestrian crossings on OR 99E to promote safe pedestrian circulation. Pedestrian crossings need to be developed to connect the residential areas along the west side of OR 99E with the civic/downtown areas along the east side of the highway. The elementary school needs a safe, complete connection via sidewalks the length of the west side of OR 99E. Crosswalks, using a textured or colored concrete to cue drivers of the pedestrian area should be considered as part of the streetscape upgrades at Birdfoot Drive and OR 99E.

23.0 The Proposed Transit Public Transportation System

Although the future City population and density will not be sufficient to support new bus service, the City should coordinate with the Linn County Shuttle to modify their existing service to create stops in Tangent. The Shuttle could provide connections to the City of Albany and other systems including Albany Transit Service and the Linn-Benton Loop. If the Shuttle service is modified, the bus should come into the northern and southern parts of Tangent via Highway 99E to allow the greatest number of residents access to the system.

Persons that do not have access to a car or are unable to drive would be those who would benefit the greatest by the proposed service.

24.0 The Proposed Rail System

As discussed previously, ODOT has identified a desire to close some of the existing at-grade rail crossings in Tangent. This need is a low priority issue for ODOT until high speed passenger rail activity increases. If one or more crossings are closed, they would be replaced with a grade separated facility. The location of a new crossing and the actual crossings to be closed have not been identified or evaluated by ODOT.

Although the state would like to remove crossings, the City should retain the crossing if possible. Having multiple crossings helps provide secondary routes for emergency vehicles serving the area and creates more opportunities for street connectivity, especially benefiting bicyclists and pedestrians.

As an alternative, the City should work with the state to install more advanced rail crossing systems if needed to further reduce the potential for crossing conflicts and accidents.

The culvert under the tracks at Tangent Drive should be replaced with one with a larger flow capacity to prevent flooding and potential track bed damage.

25.0 The Proposed Water, Air, and Pipeline Systems

There are not airport facilities, no navigable water routes, nor are pipelines within the City of Tangent, thus no improvements needed or recommended.

IMPLEMENTATION PLAN

26.0 Implementation Plan

Previous sections of this report have identified the 20 year transportation needs with the City of Tangent. The City faces a major challenge to obtain adequate funding to complete the proposed improvement projects. This section presents the recommended implementation plan for these improvements. Projects identified for implementation within zero to five years should receive a priority status to solve more immediate transportation issues.

26.1 Project Cost Estimates

Estimates of probable cost were calculated for each improvement project recommended in the TSP. Estimates included design and construction costs and contingencies but not right of way costs. The estimated costs are in 1998 2010 dollars and were determined by examining costs for recent improvement projects in the City of Tangent and other Oregon localities. **Table 10 11** lists recommended improvement projects, probable costs, and implementation schedule. It should be noted that some project implementation may occur sooner than identified in **Table 10-11**, depending on when nearby properties develop.

Table 10— Estimate of Probable Costs and Recommended Implementation Schedule

Improvement Type	Location	Description	Estimated Cost	Timing
Traffic Signals	Highway 99 E and Old Highway 34.	Install traffic signal	\$180,000	0 to 5 years
	Highway 99E and Tangent Drive	Install traffic signal	\$180,000	5 to 10 years
Subtotal			\$360,000	
Raised Median	Highway 99E and North Lake Creek Drive	Install raised median on Hwy 99E north of North Lake Creek Drive.	\$87,000	0 to 5 years
Subtotal			\$87,000	
Bike Lanes	Highway 99E	Install bike lane between existing bike lane near City Hall and south city limits	\$26,000	0 to 5 years
	Old Oak Drive	Install bike lane between Old Church Road and south city limits	128,000	0 to 5 years

Improvement Type	Location	Description	Estimated Cost	Timing
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	Birdfoot Drive	Install bike lane between Highway 99E and Old Church Road.	\$27,000	0 to 5 years
	Old Church Road	Install bike lane between Birdfoot Drive and Old Oak Drive.	\$27,000	0 to 5 years
	Old Hwy 34	Install bike lane between Looney Lane and east city limits.	\$214,000	5 to 10 years
	Tangent Drive	Install bike lane between Highway 99E and east city limits.	\$149,000	10 to 15 years
	McFarland Drive	Install bike lane between Highway 34 and North Lake Creek Drive.	\$174,000	15 to 20 years
Subtotal			\$745,000	
Curb, Gutter, Sidewalk	Highway 99E	Install sidewalk on both sides between existing sidewalks near Old Hwy 34 to south city limits.	\$1,088,000	0 to 5 years
	Old Oak Drive	Install curb, gutter, and sidewalk on south side between Old Church Road and south UGB. Also install on north side approx. 1500' near Old Church Road.	\$431,000	0 to 5 years
	Birdfoot Drive	Install curb, gutter, and sidewalk on both sides between Hwy 99E and Old Church Road.	\$140,000	0 to 5 years

Improvement Type	Location	Description	Estimated Cost	Timing
	Old Church Road	Install curb, gutter and sidewalk on both sides between Birdfoot Drive and Old Oak Drive.	\$84,000	0 to 5 years
	McFarland Road	Install curb, gutter, and sidewalk on east	\$112,000	5 to 10 years

		side between UGB and North Lake Creek Drive.		
	North Lake Creek Drive	Install curb, gutter, and sidewalk on south side between Meadowlark Loop and west UGB.	\$79,000	5 to 10 years
	Rolland Drive	Install curb, gutter, and sidewalk on both sides between McFarland Road and Highway 99E.	\$221,000	5 to 10 years
	Old Hwy 34	Install curb, gutter, and sidewalk on south side between Looney Lane and east UGB. Also install on north side between Looney Lane and approx. 500' east of railroad tracks.	\$881,000	5 to 10 years
	McFarland Road	Install curb, gutter, and sidewalk on east side between highway 99E and Old Highway 34. Also install on west side for approx. 1000' near Hwy 99E.	\$528,000	10 to 15 years
	Tangent Drive	Install curb, gutter, and sidewalk on both sides between Highway 99E and east UGB.	\$515,000	10 to 15 years

Improvement Type	Location	Description	Estimated Cost	Timing
	Birdfoot Drive	Install curb, gutter, and sidewalk on both sides between Old Church Road and Garden Lane.	\$88,000	15 to 20 years
	Old Mill Road	Install curb, gutter, and sidewalk on both sides between Birdfoot Drive and Highway 99E.	\$132,000	15 to 20 years

	Blackberry Lane	Install curb, gutter, and sidewalk on both sides between Birdfoot Drive and Old Oak Drive.	\$221,000	15 to 20 years
	Garden Lane	Install curb, gutter, and sidewalk on both sides between Tangent Drive and Birdfoot Drive.	\$103,000	15 to 20 years
Subtotal			\$4,623,000	
Center Turn Lane	Highway 99E	Install center left turn lane between existing 5-lane section near Hwy 34 and south UGB.	\$207,000	0 to 5 years
	Tangent Drive	Install center left turn lane between Hwy 99E and railroad tracks.	\$13,000	0 to 5 years
	Birdfoot Drive	Install center left turn lane between Hwy 99E and railroad tracks.	\$11,000	0 to 5 years
Subtotal			\$231,000	
Pavement Preservation	McFarland Road	Reconstruct pavement between Hwy 99E and Old Hwy 34.	\$525,000	0 to 5 years
	McFarland Road	Reconstruct pavement between north of North Lake Creek and UGB.	\$80,000	0 to 5 years
	Rolland Drive	Reconstruct pavement between McFarland Road and Hwy 99E.	\$150,000	0 to 5 years

Improvement Type	Location	Description	Estimated Cost	Timing
	Birdfoot Drive	Overlay or chip seal pavement between Old Church Road and Garden Lane.	\$33,000	5 to 10 years
	Old Mill Road	Overlay or chip seal pavement between Birdfoot Drive and Highway 99E.	\$54,000	5 to 10 years
	Blackberry Lane	Overlay or chip seal pavement between Birdfoot Drive and	\$78,000	5 to 10 years

		Old Oak Drive.		
	Garden Lane	Overlay or chip seal pavement between Tangent Drive and Birdfoot Drive.	\$36,000	5 to 10 years
Subtotal			\$956,000	

Table 10 – Estimate of Probable Costs and Recommended Implementation Schedule

Improvement Type	Location	Description	Estimated Cost (2010 dollars)	Timing
Pedestrian crossing	OR 99E and Queen Annes Lace	Construct raised median for pedestrian refuge and install actuated beacon	\$150,000	0-5 years
Bike/Ped Path	McFarland Road	Construct shared-use path from end of road to school property	\$33,000	10-20 years
Bike/Ped Path	South of Tangent Drive (across from Sequoia)	Construct shared-use path from Tangent Drive to Garden Lane	\$49,000	5-10 years
Bike/Ped Path	Old Church Road	Construct shared-use path from Birdfoot Drive to Tangent Drive	\$37,000	5-10 years
Bike/Ped Path	North of Tangent Drive	Construct shared-use path and emergency access lane from Tangent Drive to Eagle Road	\$89,000	10-20 years
Bikeway	Tangent Drive	Construct shoulder bikeway from OR 99E to east UGB	\$200,000	5-10 years
Curb, Gutter, Sidewalk	Old Oak Drive	Construct curb, gutter, sidewalk (at least one side) between Old Church Road and south UGB	\$550,000	10-20 years
Curb, Gutter, Sidewalk	Birdfoot Drive	Construct curb, gutter, drainage, and sidewalk (at least one side) between OR 99E and Old Church Road	\$195,000	10-20 years
Curb, Gutter, Sidewalk	Tangent Drive	Construct curb, gutter, drainage, and sidewalk (at	\$650,000	10-20 years

		least one side) between OR 99E and east UGB		
Pavement Preservation Curb, Gutter, Sidewalk	Queen Anne's Lace Drive	Reconstruction, including curb, gutter, drainage and sidewalks	\$134,882	0-5 years
Pavement Preservation Curb, Gutter, Sidewalk	Old Mill Road	Reconstruction, including curb, gutter, drainage and sidewalks	\$186,000	0-5 years
Pavement Preservation Curb, Gutter, Sidewalk	Blackberry Lane	Reconstruction, including curb, gutter, drainage and sidewalks\$	\$299,000	0-5 years
Pavement Preservation	Old Oak Lane	Overlay or chip seal pavement	\$75,000	0-5 years
Ramp Widening	OR 34 EB Ramps	Construct additional left-turn lane	\$182,000	15-20 years

NOTE: The provided estimates for bike paths include design and construction engineering, 40% contingency, gravel surfacing on all paths and associated construction items. The estimates do not include costs for required right-of-way.

Total costs for the TSP recommended projects are approximately \$7.0 \$2.83 million dollars. Funding for the projects is expected to come from public and private sources. Implementation of the largest cost project, improvements to Old Oak Drive, would depend upon multi-family housing development in the area, and costs could be assigned to the developers. Routine pavement preservation costs for overlay or chip seal are estimated to continue at historic levels. Other identified improvements that are outside of the UGB would be undertaken after projects inside the UGB are completed, which could defer implementation to beyond the 20-year timeframe unless additional funding sources are available.

In addition to the costs noted in the table above, additional storm drainage costs may be applicable based on the actual location and nature of the proposed project. The Tangent Drainage and Stormwater Management Plan should be consulted, Table 6-1 in particular, to verify the scope and estimated costs of major drainage projects that may affect the proposed construction.

26.2 Transportation Funding Sources

The City of Tangent transportation receives funding from federal, state, and local sources.

26.2.1 Federal Funding Sources

Federal transportation funding is obtained primarily from the federal fuel Tax. On June 9, 1998 the President signed the Transportation Efficiency Act for the 21st Century, (TEA 21) which governs federal transportation funding. Funding categories created by TEA 21 are intended to provide discretion in allocating federal transportation funding to a variety of projects, including improvements to highway and street, transit, pedestrian, and bicycle systems.

Federal transportation funding is obtained primarily from the federal fuel tax, which Tangent residents pay when purchasing gasoline and diesel fuels. However, Tangent is too small to receive federal funds for transportation projects directly from the federal government. Linn County receives funding for areas outside MPOs and smaller than 5,000 persons, and such funds can be spent on County roads in the City, as well as for transit, pedestrian, and bicycle system improvements.

26.2.2 State Funding Sources

The State of Oregon obtains transportation funding from a variety of taxes and fees. These include the state fuel tax, weight-mile fees for heavy trucks, vehicle registration fees, state fines and assessments, and the state cigarette tax. State revenues are used to fund projects on state facilities and are distributed from the State Highway Trust Fund to cities based on population.

26.2.3 Local Funding Sources

The local funding sources identified for transportation projects are described below:

General Obligation (G.O.) Bonds

The City of Tangent has the authority to sell bonds to pay for street projects that address a current deficiency and should be funded by the community. These bonds are backed by the general taxing authority of the bonds. General obligation bonds must be approved by voters.

System Development Charges

System Development Charges (SDCs) are fees paid by developers to help meet growth-driven needs. A transportation SDC can be used to fund projects that mitigate the impacts of additional traffic on the existing transportation system.

Transportation System Utility Fees

Properties can be charged monthly fees for use of the transportation system, similar to other utilities. A transportation system utility fee is an option for the City of Tangent to use for funding street maintenance improvements. The fees would be calculated based on the estimated number of vehicle trips generated by each land use. Cities such as Medford, Ashland, and La Grande currently have transportation system utility fees.

Developer Agreements

Significant development is expected to occur within the City of Tangent during the 20-year planning period. The costs of constructing new roadways to serve developing land are expected to be paid by developers. Developers would be required to invest in the transportation infrastructure as part of the permit process.

Other Local Funding Sources

Other possible local funding mechanisms may be available to help fund the TSP. These funding mechanisms include a local gasoline tax, local weight-mile fees, local vehicle registration fees, special assessments, and payroll taxes.

27. Public Involvement

As part of the development of the TSP, a Technical Advisory Committee was formed consisting of community representatives, ODOT, and City Staff. The committee met several times to initiate the study, discuss alternatives, and make recommendations for inclusion in the TSP. Public meetings were also held to assess community support for the options and plan recommendations.

Minutes from Each meeting were recorded by the City of Tangent and are included in the Appendix.

Appendix

Plan and Policy Review

Existing plans and policies were reviewed to establish the history of planning in Tangent, planned street system improvements, and other county and state planned transportation improvements. The review also served to evaluate consistency between local plans/policies and other county, state, and federal plan provisions affecting transportation.

The review included the following documents:

- City of Tangent Comprehensive Plan
- City of Tangent Planning and Zoning Ordinance
- City of Tangent Public Works Design Standards
- City of Tangent Capital Improvement Program
- Linn County Transportation Plan
- Oregon Transportation Plan
- Oregon Highway Plan
- Oregon Transportation Planning Rule
- ODOT Economic Development Analysis of Highway Corridors
- ODOT Overview of Statewide Corridors
- Oregon Highway 34 Transportation Corridor Plan
- ODOT Accident Rate Tables
- ODOT Traffic Volume Tables
- Oregon Rail Freight Plan
- Oregon High Speed Rail Capacity Analysis

Below is a summary of specific issues or concerns identified during the review.

Issues

1. ~~The city limits are much larger than the Urban Growth Boundary (UGB). Typically city limits are within the UGB, with TSPs matching the boundaries of the UGB. Clarification is needed as to how the boundaries were established and how it may affect the development of the TSP.~~
2. ~~The functional classification of streets defined in the Comprehensive Plan may not be consistent with travel patterns and use. Birdfoot Drive and Old Church Road may be inappropriately classified as collector streets.~~
3. ~~Several streets, bikeways, and pedestrian ways are planned outside of the UGB. Many of the facilities are located on lands designated for Exclusive Farm Use (EFU).~~
4. ~~Some recommendations contained in the Comprehensive Plan are yet to be implemented, including a commuter transfer point in Tangent and routing bus service into the City.~~
5. ~~Residential R-1 zones have minimum lot sizes of 10,000 feet, which may limit the City's ability to grow in a compact manner.~~
6. ~~Regulations in the Planning and Zoning Ordinance prevent street trees from being planted closer than 5 feet from the curb. This regulation may prevent planting street trees in new neighborhoods unless the planning strip is over 10 feet wide.~~
7. ~~Street light design standards require the use of cobra head type lighting. While this type of lighting is effective for highway applications, other lighting types are often considered to be more appropriate in neighborhoods and on a scale with pedestrian and cyclists.~~

8. ~~The typical pavement width of residential streets is 36 feet, unless the street is not continuous. Generally, local streets have traffic volumes with less than 1,000 vehicles per day. A 36 foot wide street would easily handle 10,000 vehicles per day and may be excessively wide. Slightly narrower widths may be more appropriate, thus reducing construction costs, storm water runoff, and be in greater harmony with the Transportation Planning Rule.~~
9. ~~The Public Works Design Standards state that bikeways shall meet the requirements of the American Association of State Highway and Transportation Officials publication, Guide for Development of New Bicycle Facilities. The Design Standards may also want to reference conformance with the Oregon Bicycle and Pedestrian Plan.~~
10. ~~The minimum setback for a property line sidewalk is 4 feet, which is too narrow to support street trees. Four feet is adequate for juvenile trees but will not sustain full grown street trees without damaging the tree and/or the sidewalk. At least five feet is needed for small street tree varieties, while at least eight feet is needed for large street trees.~~
11. ~~The City allows the use of both property line sidewalks and curblin sidewalks. Pedestrians typically feel safer when using property line sidewalks because they are farther from street traffic. At the same time, property line sidewalks allow street trees to be placed closer to the street, thus encouraging drivers to drive slower. The City should consider requiring the use of property line sidewalks.~~
12. ~~The current design of drainage catch basins has the street grate in the pavement, which can pose a hazard to cyclists. Some cities use a different design that has the drainage inlet in the curb face. This design completely eliminates the drainage grate in the pavement and is safer for bicycles.~~
13. ~~The Capital Improvement Plan (CIP) is now out of date. It is assumed that upon the completion of the TSP, the CIP will be updated.~~
14. ~~The CIP contains a project to close one end of Rolland Drive. It is unclear why the street needs to be closed and if this is still a desirable project.~~
15. ~~The CIP discusses the installation of traffic signals on Highway 99E (when warranted) at N. Lake Creek Drive, Birdfoot Drive, Tangent Drive, and McFarland Road. The Oregon Department of Transportation may be reluctant to allow new signals that would interrupt traffic flow on the state highway. If a signal is permitted, ODOT will likely require that it be space ½ mile from any other signals, thus eliminating the possibility of multiple signals at N. Lake Creek, Birdfoot, and Tangent, since they are too closely spaced.~~
16. ~~Linn County has identified adequate funding for roughly 10 years but is less sure about whether it will have sufficient monies to meet transportation demands for 20 years. Since most of the streets in Tangent are under county jurisdiction, adequate funding of improvements may become an issue in the long term.~~
17. ~~The only planned county transportation project within the City is for Tangent Drive/N. Lake Creek Drive where there is a pair of sharp curves in the road. The county would like to realign the curve and is currently discussing right of way needs with an adjacent property owner.~~
18. ~~The county's construction standard permits 4 foot shoulder bikeways. However, the Oregon Bicycle and Pedestrian Plan recommends that shoulders be as wide as 6 feet depending on the expected traffic during the peak design hour. Eight foot shoulders are also recommended under high traffic conditions but it is unlikely that the traffic volumes in Tangent will reach these thresholds.~~
19. ~~Access standards in the Linn County TSP are generally more restrictive than those currently contained in the Oregon Highway Plan. Highway 99E is classified as a District Highway by ODOT which allows public roads to intersect every ¼ mile and driveways every 300 feet. It should be noted that ODOT has been actively working to update their access standards which are likely to be different than those in the current Highway Plan.~~
20. ~~The Economic Development Analysis of Highway Corridors identified Highway 34 as a corridor with high economic development potential. As such, the local economy in Tangent is expected to~~

~~readily respond to decreases in the cost of transportation derived from transportation improvements. Highway 99E was not included in the study.~~

~~21. The ODOT Overview of Statewide Corridors indicates that Highway 34 through Tangent may reach high congestion levels by the year 2016.~~

~~22. In the early 1990s, the accident rate on Highway 34 was more than double the state average for similar facilities. Since its realignment and reconstruction, the highway has had an accident rate well below the statewide average. Highway 99E also has an accident rate below the statewide average when compared with similar facilities.~~

Conclusions and Recommendations

~~Aside from the issues previously raised in this evaluation, the planning and policy documents reviewed were in general agreement with each other. It is recommended that the above issues be considered and resolved during the TSP process. Many of the issues can be resolved by the technical advisory committee while others may require discussion at public meetings.~~