Banks Transportation System Plan Update: Existing Conditions

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The Banks Transportation System Plan (TSP) needs to be updated to reflect an updated 20-year population forecast, which has been adopted by the City of Banks and Washington County. The City also has adopted a buildable land inventory and residential land needs analysis that may point to the need for Banks to expand its Urban Growth Boundary (UGB). The two efforts – the TSP and UGB expansion analysis – are being conducted concurrently to ensure that the TSP integrates any decisions regarding expansion. It is likely that the TSP will identify transportation system solutions for Banks such as new collector or arterial street facilities to improve circulation and accommodate growth, design standards, and development code changes consistent with the Oregon Transportation Planning Rule (TPR) (OAR 660-12).

The first step in developing a TSP is analysis of existing conditions.[1] This memorandum describes and analyzes existing transportation conditions (year 2008-2009) in Banks, including traffic operations and safety conditions, land uses, roadway facilities, bicycle/pedestrian facilities, transit, and rail lines. ***This memorandum fulfills Task 2.4 of the Banks Urban Growth Boundary/Transportation System Plan Update scope of work.***

Information used to describe the existing transportation system is from the City of Banks, Washington County, the Oregon Department of Transportation (ODOT), and a consultant team site visit conducted on December 1, 2008.

Study Area

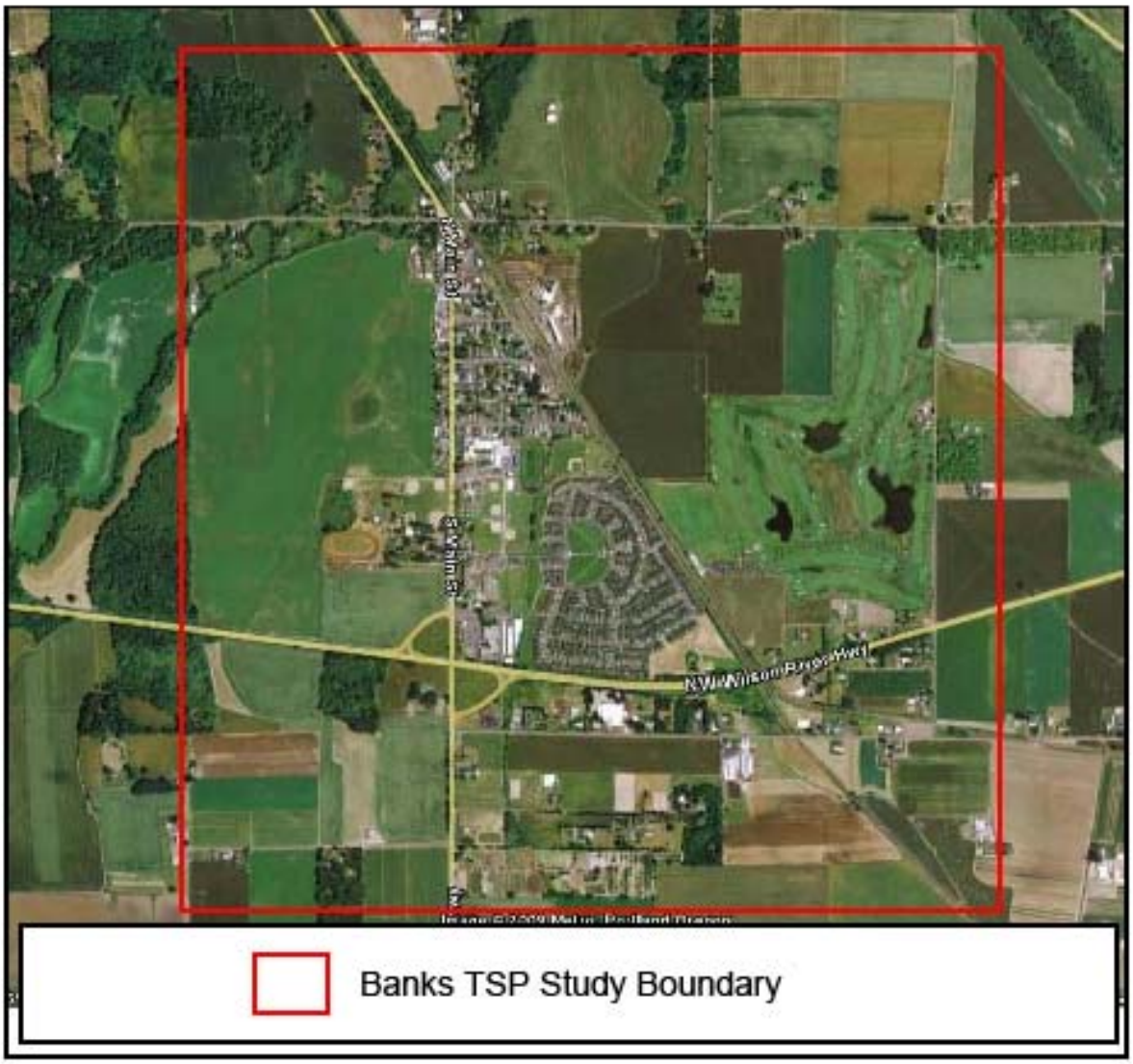
Banks is located in the foothills of Oregon's coast mountain range approximately 20 miles west of Portland. Agriculture and the timber industry are historically important to the economy of the Banks area, with many farms, dairies and livestock operations located in the region. Private and public forest land provides employment for timber workers. According

[1] It should be noted that because Banks population is under 2,500 the City is not required to complete a TSP (per ORS 197.712(2)(e)). However, the Oregon Department of Transportation (ODOT) and the City of Banks have determined that a TSP is necessary to address the future transportation needs for the area. The 2009 TSP will address relevant elements of the TPR.

to City of Banks staff, many Banks residents commute to jobs in the Portland metropolitan area, such as the employment hubs of Hillsboro and Beaverton.

The study area for the Banks Transportation System Plan (TSP) is shown in Figure 1. The study area serves as the area for potential transportation system or program improvements considered for the 20-year time horizon of the Banks TSP. The study area contains the Banks Urban Growth Boundary (UGB) and a UGB buffer (roughly 0.5-to 1-mile) to accommodate potential UGB expansion lands.

FIGURE 1: BANKS TRANSPORTATION SYSTEM PLAN STUDY AREA



Land Use

Land Uses & Zoning

This section provides an overview of existing land uses and zoning to understand existing development patterns and traffic generators within Banks. This is not intended to serve as a comprehensive land use inventory, but to provide information regarding how existing land uses (a) relate to current zoning designations and (b) affect transportation conditions. Generally, the project team found that existing land uses are consistent with the City's zoning map. City of Banks zoning is depicted on Figure 2.

Observations regarding land use patterns in the Banks study area are as follows:

- Banks' downtown area is located in the Main Street (OR 47; Main Street) corridor. The northern end of downtown contains a mix of small-scale retail and eateries along with single and multi-family residences. The central part of downtown contains a mix of institutional uses (city hall, fire station, post office) along with single and multi-family residences. The southern part of downtown contains the Banks school complex. The high school and middle school facilities are located adjacent to each other north of Trellis Way; the elementary school is located immediately south of Trellis Way. A large grocery store and strip retail use parcel is located just south of Oak Way at the far southern edge of downtown near the OR 47 (Main Street)/OR6 interchange ramps. Based on observation and discussion with City staff, a significant amount of pedestrian and bicycle traffic takes place between the school complex and the grocery store retail area.

- The southern section of Banks east of OR 47 (Main Street) contains Arbor Village, a large single-family residential Planned Unit Development (PUD). Narrow, curvilinear sidewalk and tree-lined streets with numerous mid-block pedestrian walkways mark this area. The sidewalks are Americans with Disabilities Act (ADA)-compliant. There is also a pedestrian path on the bank of the stream that extends through the area. The combination of these elements makes this area of the city very pedestrian and bicycle-friendly.

- The northern section of Banks east of OR 47 (Main Street) contains the Banks Lumber Mill, the largest employer in the city (according to City staff), and an older single-family residential area.

- The lands adjacent to, and extending from, the city's UGB boundary are predominantly composed of large agricultural parcels. These parcels are variously zoned Exclusive Farm Use (EFU) and, Agricultural Farm (AF-20 and AF-5).

- Sunset Park, located on the west side of Main Street in the central part of the city, is a 25-acre park with a racetrack, four baseball diamonds, a playground and picnic areas. The park is a non-profit, privately owned park administered by the Sunset Park Association. Sunset Speedway Park, located in the southwest corner of the park, is an oval dirt-racing track that holds race events every weekend during late spring and summer.

- Quail Valley Golf Course is located just east of the Banks' city boundary. The golf course sits on approximately 160 acres and is accessible from Aerts Road, approximately 320

feet north of the Aerts Road/OR 6 intersection. The course, which opened in 1994, is an 18-hole facility that is open to the public and draws most of its customers from the Portland metro area.

FIGURE 2: CITY OF BANKS ZONING (SOURCE: KENNEDY/JENKS CONSULTANTS)

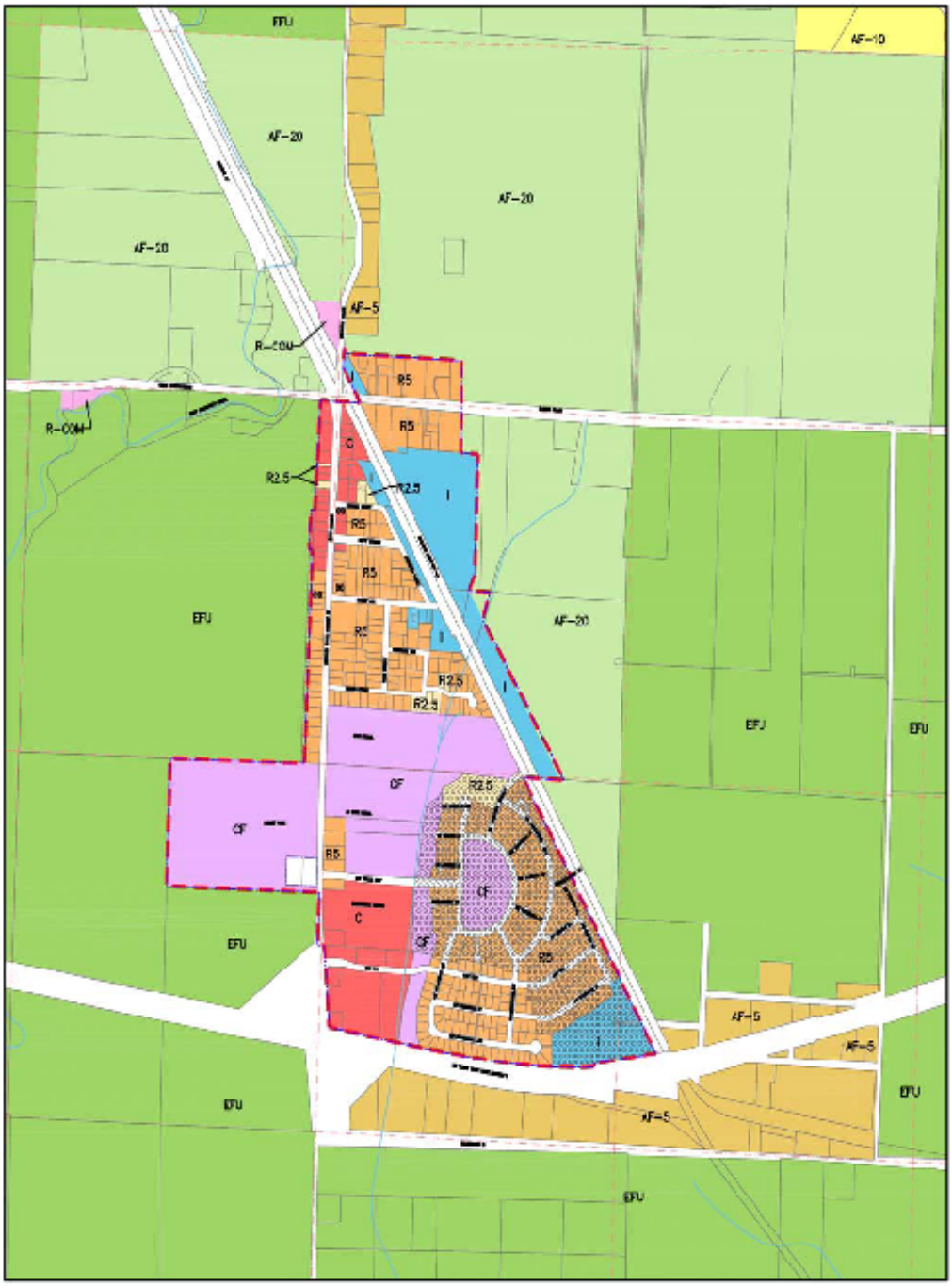


Figure 2: City of Banks Zoning

Streams
Quarter Sections
Taxlots
City Limit
UGB

N

December 2008

Zoning Legend

City of Banks Zoning Districts

- Single Family Residential (R5)
- Multi-Family Residential
- Community Facilities (CF)
- General Commercial (C)
- General Industrial (I)
- Historic Resource Overlay (H)
- Planned Development (PD)

Washington County Zoning Districts

- Exclusive Farm Use (EFU)
- Agriculture and Forest – 20 (AF-20)
- Agriculture and Forest – 10 (AF-10)
- Agriculture and Forest – 5 (AF-5)
- Rural Residential – 5 (RR-5)
- Rural Commercial (R-COM)

Development Potential & Constraints

The City of Banks has a number of vacant[2] and underutilized[3] properties that could be respectively developed or more intensely developed. Vacant and underutilized parcels are shown on Figure 3. The City is also undergoing a UGB expansion analysis that may result in additional lands adjacent to the existing UGB boundary being developed for residential, commercial, or industrial uses. The Banks TSP would need to plan for suitable transportation facilities to accommodate land designated for urbanization.

The Banks area contains a number of environmental constraints to development. Delineated wetland areas are located along the bank of the stream that extends in a north-south direction through the city as well as in low-lying areas at the southeastern part of the city and west of the city. A significant expanse of land located to the west of the city boundary is inside the Federal Emergency Management Agency's (FEMA) 100-year floodplain. The northwest portion of Sunset Park is also located inside the floodplain. Although the city's topography is primarily flat to gently rolling, the far northeastern part of the city contains some significant grades. Existing wetlands, floodplain areas, and contours are depicted on Figure 3.

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[2] "Vacant" defined as lots that do not contain any structures

[3] "Underutilized" defined as lots not being currently used to the intensity/density allowed under current zoning

FIGURE 3: DEVELOPMENT POTENTIAL AND CONSTRAINTS (SOURCE: KENNEDY/JENKS CONSULTANTS)

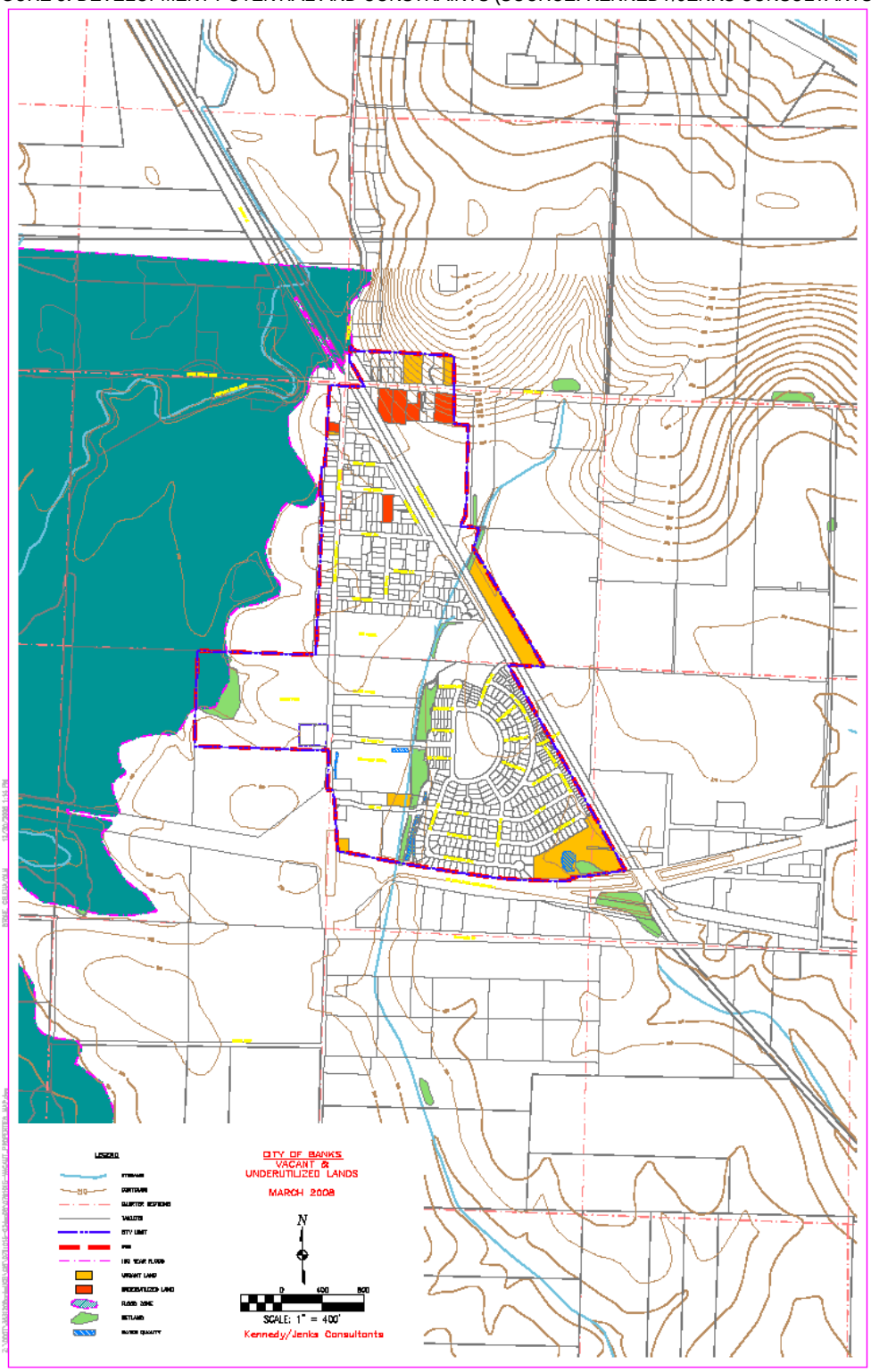


EXHIBIT 1: LOOKING SOUTH INTO DOWNTOWN BANKS

Roadway Facilities

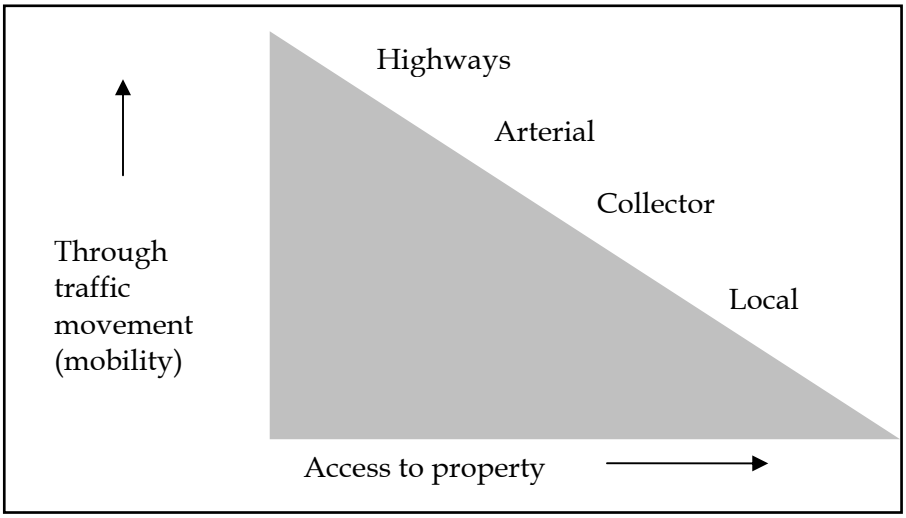
This section describes the current roadway network in Banks through an initial discussion of functional classification followed by a discussion of existing roadways that is organized into three sections – state highways, the local roadway network, and Washington County owned roadways within the study area.

Functional Classifications

The purpose of classifying streets is to provide a balanced transportation system that provides both mobility for all modes at acceptable levels of service and reasonable access to land uses. The functional classification defines a street's role and context in the overall transportation system and how it is used within the community. In addition, the classification defines the appropriate street standards for the facility: desirable roadway width, right-of-way needs, access spacing, and pedestrian and bicycle facilities.

Functional classifications balance the need for mobility - getting from point A to point B quickly - with access - the need to get to land uses. As access points along a street increase, mobility tends to decrease because traffic slows to allow for turns on and off the roadway. Drivers generally slow down to make turns off a roadway, and accelerate after making a turn onto a roadway. The differences in travel speed caused by accelerating and decelerating vehicles interrupt the overall flow of traffic. As illustrated in Figure 4, functional classifications balance mobility with access.

FIGURE 4: THE BALANCE OF THROUGH TRAFFIC MOVEMENT VERSUS ACCESS TO PROPERTY



Since functional classifications define the role of a roadway in the transportation system and overall community, those roadways that have a greater emphasis on mobility, highways and arterials, limit the number of access points to provide for better traffic flow. Retrofitting an existing system of streets to meet design standards can be impracticable. In such cases, deficiencies in the system may be defined instead through other means such as safety analysis, future traffic demand analysis, bicycle and pedestrian needs analysis, and public input. Design standards aid in defining potential improvements, but alone do not prompt improvement on existing roadways.

State Roadways

The state-administered highways within the City of Banks are OR 6 and OR 47 (Main Street). The Banks TSP will need to balance the state's management objectives for OR 6 and OR 47 (Main Street) with the local needs and objectives of Banks in relation to the highways.

OR 47 (Main Street)

OR 47 (Main Street) is a north-south west route that extends approximately 83 miles from OR 18 in McMinnville to OR 30 in Clatskanie (approximately 1.80 miles east of Banks) to US 101 in Tillamook.

Inside the city limits of Banks, OR 47 (the Nehalem Highway; Main Street), is functionally classified in the OHP as a Statewide Highway, a classification which is intended to provide inter-urban and inter-regional mobility and provide connections to larger urban areas, ports, and major recreation areas that are not directly served by Interstate Highways. A secondary function is to provide connections for intra-urban and intra-regional trips. The management objective of the Statewide Highway classification is to provide safe and efficient, high-speed, continuous-flow operation. Inside Special Treatment Areas (STAs), local access may also be a priority.

The section of OR 47 (Main Street) from mile points 82.85-83.58 is designated by the state as a principal arterial. OR 47 (Main Street) is also part of the National Highway System (NHS)

and is a designated truck route. OR 47 (Main Street) contains one northbound and one southbound travel lane inside the City of Banks.

Within the TSP study area, OR 47 (Main Street) is designated as a STA, which are defined as districts of compact development located on a state highway within an UGB where the need for appropriate local access outweighs the considerations of highway mobility (except on designated OHP freight routes). The STA is focused on pedestrian, bicycle and transit modes, and looks like traditional "Main Street". OR 47

Because Banks' Main Street also serves as a state highway, the Banks TSP must strike a balance between the needs of pedestrians, shoppers, employees, business owners, and residents with the needs of through traffic—both auto and freight—to move safely and efficiently over longer distances.

TABLE 1
OR 47 (Main Street) Right-of-Way Dimensions

Highway Section N to S (MP to MP)	SB Lane Width	NB Lane Width	SB Shoulder Width	NB Shoulder Width	Left Turn Bay	Right Turn Bay	Median
82.85 to 82.86	12	12	8	1	0	0	0
82.86 to 83.26	12	12	8	8	0	0	0
83.26 to 83.38	20	12	0	5	0	0	0
83.38 to 83.39	13	12	5	5	0	0	13
83.39 to 83.49	13	20	5	5	13	0	0
83.49 to 83.52	12	12	3	5	0	0	13
83.52 to 83.53	12	12	5	5	0	0	13
83.53 to 83.60	12	12	6	5	13	0	0
83.60 to 83.66	16	12	0	8	12	15	0
83.66 to 83.70	16	12	0	0	0	15	9

Source: ODOT ITIS Database, 2009

OR 6

OR 6 is an east-west route that extends approximately 52 miles from US 26 (approximately 1.80 miles east of Banks) to US 101 in Tillamook.

Inside the city limits of Banks, OR 6 (Wilson River Highway) is functionally classified in the OHP as a Regional Highway, a freight route and a truck route. Regional Highways are intended to provide inter-urban and inter-regional mobility and provide connections and links to regional centers, Statewide or interstate Highways, or economic or activity centers of regional significance. The management objective of the Regional Highway classification is to provide safe and efficient, high-speed, continuous-flow operation in rural areas and moderate to high-speed, continuous flow operation in rural areas and moderate to high-

speed operations in urban and urbanizing areas. A secondary function is to serve land uses in the vicinity of these highways.

There is currently a full at-grade interchange at OR 6 and OR 47 (Main Street). This is the only direct access to the City of Banks from this vital highway. The Banks Transportation Network Plan (TNP), completed in 1999, recommended a secondary access from the city to OR 6. Table 2 shows the roadway width of OR 6 within the study area.

TABLE 2
OR 6 Right-of-Way Dimensions

Highway Section W to E (MP to MP)	EB Lane Width	WB Lane Width	EB Shoulder Width	WB Shoulder Width	Left Turn Bay	Right Turn Bay	Median
49.10 to 50.03	12	12	8	8	0	0	0

Source: ODOT ITIS Database, 2009

City of Banks Roadways

Banks has a number of streets with different classifications, which will guide the use and expected traffic along the identified roadways. City of Banks roadway classifications are outlined in the Transportation Network Plan and described below:

- **Arterial Streets:** Arterial streets are major transportation corridors that provide connections between other cities and geographic areas. Access to Principle Routes is managed and coordinated to minimize degradation of capacity while providing access to abutting land uses. There are two Principle Route Arterial Streets within Banks – OR 6 and OR 47 (Main Street).
- **Collector Streets:** Minor collectors are intended to provide access to abutting properties and to serve the local access needs of a neighborhood, including limiting through traffic. Banks Road, Cedar Canyon Road, and Sellers Road are Minor collectors located within or on the edge of the Banks city limits. Sunset Road is not classified as an arterial or collector street, although it functions as such.
- **Local Streets:** Local streets primarily provide direct access to abutting land uses. These streets have low traffic volumes and are not intended to serve through traffic. The remainder of the streets in Banks (not mentioned above) are classified as Local Streets.

Roadway classifications on Oak Way and Trellis Way may need to be revisited. Oak Way collects traffic from the shopping center and the Banks Estates/Arbor Village housing developments. Its current function and higher traffic volumes suggest potential classification as a Minor Collector street. Trellis Way primarily serves traffic from Arbor Village and the elementary school, and could potentially be classified as a Minor Collector street.

OR 47 (Main Street) was not classified by ODOT as a major truck route when the TNP was written, but in the 1999 OHP, OR 47 (Main Street) was classified as a Truck Route in the segment abutting Banks. The largest destination for truck traffic is the Banks Mill with

access via Sunset Street. Log trucks typically come from locations north of town while processed lumber leaves to destinations south of the city.

EXHIBIT 2: LOOKING EAST TOWARD TRELLIS WAY FROM MAIN STREET

Washington County Roadways

Washington County roadways within the study area are listed below. The functional classification for each roadway as defined in the Washington County 2020 Transportation System Plan (2002) is also listed:

- NW Banks Road – collector
- NW Sellers Road – collector
- NW Wilkesboro Road – collector
- NW Aerts Road – local roadway
- NW Cedar Canyon Road – local roadway
- NW Courting Hill Drive – local roadway

EXHIBIT 3: LOOKING WESTWARD ALONG BANKS ROAD FROM INTERSECTION WITH AERTS ROAD

Bicycle and Pedestrian Facilities

The following section describes existing bicycle and pedestrian facilities in Banks.

Bicycle Facilities

According to the American Association of State Highway and Transportation Officials (AASHTO)'s Guide for the Development of Bicycle Facilities (1999) and the Oregon Bicycle and Pedestrian Plan (OBPP), there are several different types of bicycle facilities. Bikeways are distinguished as preferential roadways that have facilities to accommodate bicycles. Accommodation can be a bicycle route designation or bicycle lane striping. Shared use paths are facilities separated from a roadway for use by cyclists, pedestrians, skaters, runners, and others. Bicycles are allowed on all study area roadways in Banks.

The following types of bikeways are recognized by AASHTO and OBPP:

- *Shared Roadway / Signed Shared Roadway* – Shared roadways include roadways on which bicyclists and motorists share the same travel lane. This is the most common type of bikeway. The most suitable roadways for shared bicycle use are those with low speeds (25 mph or less) or low traffic volumes (3,000 vehicles per day or fewer). Signed shared roadways are shared roadways that are designated and signed as bicycle routes and serve to provide continuity to other bicycle facilities (i.e., bicycle lanes) or designate a preferred route through the community. Common practice is to sign the route with standard Manual on Uniform Traffic Control Devices (MUTCD) green bicycle route signs with directional arrows. The OBPP recommends against the use of bike route signs if they do not have directional arrows and/or information accompanying them. Signed

shared roadways can also be signed with innovative signing that highlights a special touring route (i.e., Oregon Coast Bike Route) or provides directional information in bicycling minutes or distance (e.g., "Library, 3 minutes, 1/2 mile").

- *Shoulder Bikeway* – These are striped shoulders on paved roadways wide enough for bicycle travel. ODOT recommends a 6-foot paved shoulder to adequately provide for bicyclists, and a 4-foot minimum in constrained areas. Roadways with shoulders less than 4-feet are considered shared roadways. Sometimes shoulder bikeways are signed to alert motorists to expect bicycle travel along the roadway.
- *Bike Lane* - Bike lanes are portions of the roadway designated specifically for bicycle travel via a striped lane and pavement stencils. ODOT standard width for a bicycle lane is 6 feet. The minimum width of a bicycle lane against a curb or adjacent to a parking lane is 5 feet. A bicycle lane may be as narrow as 4 feet, but only in very constrained situations (e.g. due to bridges or topography). Bike lanes are most appropriate on arterials and major collectors, where high traffic volumes and speeds warrant greater separation.
- *Shared Use Path* - Shared use paths are used by a variety of non-motorized users, including pedestrians, cyclists, skaters, and runners. Shared use paths may be paved or unpaved, and are often wider than an average sidewalk (i.e., 10 – 14 feet). In rare circumstances where peak traffic is expected to be low, pedestrian traffic is not expected to be more than occasional, good passing opportunities can be provided, and maintenance vehicle loads are not expected to damage pavement, the width may be reduced to as little as 8 feet.

Shared Roadways / Signed Shared Roadways

Most local streets in Banks are low speed/low volume roadways that could be classified as shared roadways. These streets can accommodate bicyclists of all ages and currently have little need for dedicated bicycle facilities (e.g., bicycle lanes). They generally have low vehicle volumes (3,000 ADT or less) and low-posted speeds (25 MPH or less). Curb-to-curb widths range between 25 and 40 feet with typical street cross-sections including two vehicle travel lanes with parking on both sides. Parked vehicles often obstruct visibility.

NW Banks Road – NW Cedar Canyon Road, the major east-west route north of OR 6, has a striped fog line of variable width (0-2 feet) with no signage or other accommodations for bicyclists.

Shoulder Bikeway

As shown in Table 1 most of OR 47 (Main Street) inside Banks has shoulders on both sides of the roadway that meet or exceed the 4-foot width recommendation. However, there are brief sections where there is no shoulder at all, forcing bicyclists to either use the sidewalks or mingle with through-traffic.

Bike Lane

There is a brief 1.70-mile section of bike lane on OR 47 (Main Street). This section, on northbound OR 47 (Main Street), begins at approximately milepost 21.5, near Oak Way. The

bike lane continues until reaching the roadway entrance to Banks High School at milepost 19.79.

Shared Use Path

The Banks-Vernonia Trail is a 21-mile north-south rail trail that is open to hikers, bicyclists, and equestrians. The trail's northern terminus is in Vernonia; the trail itself follows a direction that is roughly adjacent to OR 47 (Main Street) before terminating in the City of Banks at Banks Road. The 2008-2011 State Transportation Improvement Program (STIP) contains programmed funds to extend the trail into Banks.

There is an existing 8-foot wide paved shared use path located immediately west of the Arbor Village development between Oak Way and Banks High School. There are also multiple footpaths within Arbor Village to connect properties.

EXHIBIT 4: START OF NORTHBOUND OR 47(MAIN STREET) BIKE LANE

Pedestrian Facilities

According to the OBPP, pedestrian facilities are defined as any facilities utilized by a pedestrian or people using wheelchairs. These types of facilities include walkways, traffic signals, crosswalks, curb ramps, and other features such as illumination or benches. The following types of pedestrian facilities are recognized by AASHTO and the OBPP:

- *Sidewalks* – Sidewalks are located along roadways, are separated from the roadway with a curb and/or planting strip, and have a hard, smooth surface, such as concrete. ODOT standard sidewalk width is 6 feet, with a minimum width of 5 feet acceptable on local streets.
- *Shared Use Paths* – Shared use paths, as defined earlier, are used by a variety of non-motorized users, including pedestrians, cyclists, skaters, and runners.
- *Roadway Shoulders* – Roadway shoulders often serve as pedestrian routes in many smaller Oregon communities. On roadways with low traffic volumes (i.e., less than 3,000 vehicles per day), roadway shoulders are often adequate for pedestrian travel. These

roadways should have shoulders wide enough so that both pedestrians and bicyclists can use them, usually 6 feet or greater.

Sidewalks

The overwhelming majority of the local streets in Banks have adjacent sidewalks that are 5-foot in width or wider. There are sidewalks located on both sides of OR 47 (Main Street). In general, the majority of sidewalks are ADA-compliant. See Appendix A for a sidewalk inventory.

Shared Use Paths

As noted previously, there are two shared use path facilities in the Banks study area: the Banks-Vernonia Trail and the path located just west of the Arbor Village development between Oak Way and Banks High School.

Roadway Shoulders

Outside the city limits of Banks, several of the rural roads do not have adequately sized roadway shoulders for rural pedestrian travel. These streets include NW Banks Road, NW Cedar Canyon Road, and NW Sellers Road.

EXHIBIT 5: STUDENTS WALKING TO SCHOOL ON THE SIDEWALK ALONGSIDE NB MAIN STREET JUST NORTH OF OAK WAY

Transit Facilities

The City of Banks is located outside the Tri-Met[4] public transportation service district. However, Ride Connection (Washington County U-Ride) provides curb-to-curb bus shuttle service from Banks to 19th and B Streets in Forest Grove, whereupon users can connect to the

[4] Tri-Met is the public transportation service provider in the Portland, Oregon metropolitan area.

Tri-Met #57 bus and, from there, the entire Tri-Met transit system. User fare is two dollars each way. For seniors and those with disabilities, service is provided for free to destinations in Forest Grove or Cornelius.

Pick up and drop off locations for users must be within 1.5-miles if Banks city center. In 2009, pick up service times within Banks are as follows: Monday to Saturday at 5:30 am, 6:30 am, 8:00 am, 10:00 am, 12:00 pm, 2:00 pm, 4:00 pm, 6:00 pm and 8:00 pm. Pick up service times at 19th and B Street in Forest Grove are as follows: Monday to Saturday at 6:30 am, 7:30 am, 9:30 am, 11:30 am, 1:30 pm, 3:30 pm, 5:30 pm, 7:00 pm and 9:00 pm.

The City of Banks is also working with the Tillamook County Transportation District (TCTD) to negotiate a shuttle stop in Banks and North Plains on its way to Portland. This would allow Banks citizens easier transit access to North Plains, Portland and Tillamook.

Traffic Analysis

The existing conditions traffic analysis describes the motor vehicle operations for the existing (2008) P.M. peak hour conditions based on existing roadway geometry and lane configuration. This information provides the project team with an understanding of mobility level and length of delay on the roadway network within the City of Banks. These values are then compared to Oregon Department of Transportation (ODOT) Standards to determine whether improvements are needed.

A traffic operations model network was constructed in Synchro for the Banks Transportation System Plan (TSP) study area, based on field observations and traffic count data collected in December 2008 and January 2009.

The Synchro model is based on methodology defined in the 2000 Highway Capacity Manual (HCM 2000) to analyze both signalized and unsignalized intersections. The model computes the volume-to-capacity (v/c) ratio and level of service (LOS) values. A detailed description of LOS is provided in Appendix B.

Study Intersections and Traffic Counts

The 6 study intersections included in the Banks TSP are listed below and illustrated in Appendix C:

Signalized Intersections

1. OR 47 (Main Street) and NW Oak Way

Unsignalized (Stop-Controlled) Intersections

2. OR 47 (Main Street) and OR 47 Exit
3. OR 47 (Main Street) and NW Trellis Way
4. OR 47 (Main Street) and NW Banks Road
5. NW Banks Road and NW Aerts Road
6. OR 6 and NW Aerts Road

The operational analysis examined one signalized intersections and five unsignalized intersections. Traffic counts for each of the intersections were conducted in December 2008 and January 2009. Counts were collected over a consecutive three-day period, from 4:00 PM to 6:00 PM each day per the project scope.

Traffic Analysis Method

A peak hourly volume for the study area was identified from the 2-hour counts collected for each of the study intersections. Since counts were conducted in December 2008 at four of the intersections, and January 2009 at the remaining two, two system peaks have been identified. To identify peak hours, hourly volumes for each count date (three per month) were compared amongst the other intersections with corresponding month, date, and hour. This identified two system peaks, as shown in Table 3.

TABLE 3
Summary of System Peak Hours by Intersection

Count Month	Intersection	System Peak
December 2008	OR 6 & NW Aerts Rd	December 4, 2008
	NW Banks Rd & NW Aerts Rd	4:30 – 5:30 PM
	OR 47 (Main Street) & NW Banks Rd	
	OR 47 (Main Street) & NW Trellis Way	
January 2009	OR 47 (Main Street) & NW Oak Way	January 6, 2009
	OR 47 (Main Street) & OR 47 Exit	4:30 – 5:30 PM

These two system peak hours have been used for their corresponding intersections in the existing conditions analysis. Although the count months occur in two different years, the counts were taken during the same season, and within 30 days of one another. Therefore, no annual adjustment has been applied. Also, since the first counts were conducted in 2008, the analysis period is referred in whole as the 2008 Existing Conditions analysis.

These count volumes were used as the basis for the calculation of the 30th highest hour traffic volume (30 HV) for all the of the study intersections. To obtain the 30 HV it is necessary to apply a seasonal adjustment factor to the traffic counts. The factors were obtained from Automated Traffic Recorder (ATR) stations that collect hourly traffic volumes for every day of the year. Two ATRs within reasonable distance of the study area, and with similar parameters as the Banks study area have been used in this analysis. Table 4 presents information on ATR 06-001 (Lakeside) and 27-005 (Monmouth), including the five most recent years of seasonal adjustment factors at the station. The Lakeside seasonal adjustment factors of 1.51 for the December counts and 1.60 for the January counts were calculated while the Monmouth seasonal adjustment factors of 1.21 and 1.16 were determined for December and January respectively. The Monmouth factors were applied to OR 6 approaches while the Lakeside factors were used for all remaining approaches. Seasonally adjusted intersection peak hour volumes, rounded up the nearest 5 and balanced, are shown in Appendix C.

Banks has two public schools within the City limits: Banks Elementary School and Banks High School. The schools' peak hour traffic is not included in the study traffic volumes because the study uses the 30th highest hour volumes. The 30th highest hour occurs in late afternoon and the schools' peak traffic is early afternoon when school gets out. The use of the 30th highest hour volumes is an ODOT standard and consistency would be lost if it were adjusted.

Although the school traffic is not included in the study volumes, the additional traffic will still be taken into consideration when developing alternatives. The school district is coordinating with the project team to make sure their concerns are heard.

TABLE 4
Summary of ATR Sites Used for Seasonal Adjustment

Station Name	Station Number	Highway Route Number	2006 AADT	Peak Month	Count Month		Seasonal Adj. Factor (Dec/Jan)
					DEC	JAN	
Lakeside	06-001	US 101	8,000	2007: 1.29	***0.78***	0.78	1.51/1.62
				2006: 1.27	0.85	***0.74***	
				2005: 1.28	***0.91***	0.80	
				2004: 1.26	0.89	***0.80***	
				2003: 1.31	0.80	0.79	
Monmouth	27-005	OR 99W	7,500	***2007: 1.09***	***0.87***	0.88	1.21/1.16
				2006: 1.06	0.90	0.96	
				2005: 1.07	0.89	***0.98***	
				2004: 1.08	***0.93***	***0.83***	
				2003: 1.08	0.88	0.95	

Note: Bold italicized numbers are the high and low monthly count factors removed before calculating the seasonal adjustment factor.

The seasonally adjusted peak hour volumes were then balanced between applicable intersections. The area between the following intersections was not balanced, however, because of uncontrolled access present between them (mainly residential and farm land).

Unbalanced Segments

- OR 47 (Main Street) between NW Trellis Way and NW Banks Road
- NW Banks Road between OR 47 (Main Street) and NW Aerts Road
- NW Aerts Road between NW Banks Road and OR 6

Mobility Standards and Designations

State Highway Mobility Standards were developed for the 1999 Oregon Highway Plan (OHP) as a method to gauge reasonable and consistent standards for traffic flow along state highways. Within the study area, one intersection is located along OR 6, and three are on OR 47 (Main Street). Another intersection is located at the intersection of OR 47 (Main Street) and OR 6. State mobility standards for highways within the City of Banks are shown in Table 5.

TABLE 5
Relevant State Mobility Standards on Highways within City of Banks

Highway	Mileposts	Classification	Speed Limit (MPH)
Wilson River Highway (OR 6)	49.09-50.03	Regional Freight Route	55
Nehalem Hwy (OR 47; Main Street)	82.85-83.72	Statewide/National Highway System	25, 45, and 55

Operational Analysis of Existing Conditions (30th Highest Hour)

Table 6 presents the intersection V/C ratios for each of the study intersections under existing (2008) 30th highest hour design volumes. All of the six intersections analyzed currently meet the OHP V/C thresholds. Detailed reports on each intersection can be found in the Appendix D. V/C ratios that exceed mobility standards indicate that the intersection experiences congestion and operates fairly poorly on at least one approach during the peak period. Intersection V/C ratios lower than the mobility standards indicate that intersections are likely operating at acceptable levels of mobility. Table 6 outlines the intersection results in terms of V/C ratios and Level of Service. A detailed description of LOS can be found in Appendix B.

TABLE 6
Banks Traffic Analysis Intersection Results (2008)

ID	Intersection	Control Type	Future No-Build Mobility Standard	Intersection Performance					
				Average Vehicle Delay (sec)		V/C Ratio		Level of Service	
1	OR 47 (Main Street) & NW Oak Way	Signalized	0.90	8.0		0.38		A	
2	OR 47 (Main Street) & OR 47 Exit	OWSC	0.75	1.7[1]	13.3[2]	0.23[1]	0.10[2]	A[1]	B[2]
3	OR 47 (Main Street) & NW Trellis Way	OWSC	0.90	0[1]	14.4[2]	0.26[1]	0.15[2]	A[1]	B[2]
4	OR 47 (Main Street) & NW Banks Road	TWSC	0.75	2.1[1]	18.7[2]	0.04[1]	0.42[2]	A[1]	C[2]
5	NW Banks Road & NW Aerts Road	TWSC	0.80	0.4[1]	9.8[2]	0.00[1]	0.01[2]	A[1]	A[2]
6	OR 6 & NW Aerts Road	TWSC	0.75	0.5[1]	24.2[2]	0.02[1]	0.11[2]	A[1]	C[2]

Notes:
[1] Indicates OHP Mobility Standard V/C ratio or Level of Service for uncontrolled roadway approach
[2] Indicates OHP Mobility Standard V/C ratio or Level of Service for stop controlled roadway approach

OWSC: One-way stop-controlled
TWSC: Two-way stop-controlled
Existing mobility standards for intersections are established from 1999 Oregon Highway Plan, Policy Element, Table 6: Maximum volume to capacity ratios for peak hour operating conditions
Mobility standards are established from 1999 Oregon Highway Plan, Policy Element, Table 6

As shown in Appendix C, the intersection of OR 47 (Main Street) and NW Banks Road actually operates as three separate intersections. For modeling purposes, all three intersections (OR 47/Main Street and NW Banks Road, NW Banks Road and NW Sellers Road, and OR 47/Main Street and NW Sellers Road) have been included in analysis. However, only results for the OR 47/Main Street and NW Banks Road intersection (which appears to represent the worst case scenario) are reported in this document

Queuing Analysis Results

The vehicle queue analysis identifies deficient vehicle storage locations and provides key information as this project advances into the alternative development stage. Queue analysis is another way to look at traffic impacts in a study area. Table 7 shows the existing 2008 95th percentile vehicle queues for each movement in the study area. The 95th percentile queue values are analyzed based on methodology outlined in section 7.5 of the ODOT Analysis Procedures Manual. The movements without adequate storage are shown in the table with black highlight. Two intersections (a total of 5 movements) have queue lengths that exceed available storage capacity. Four of the movements are either exclusive left or right turn lanes. The other movement is a combined left/through/right lane.

The locations with queue lengths exceeding available storage (OR 47/Main Street & NW Oak Way, and OR 47/Main Street & NW Banks Road) should be reviewed to see whether additional storage can be provided. At OR 47/Main Street & NW Oak Way, the queue exceeds the available storage at on every approach except for the westbound approach. Here, these all occur at dedicated turn lanes (left or right). When queues extend past the available storage for turn lanes like these, operational and safety issues can arise. This results from queued turning vehicles blocking through movements, which reduces intersection capacity and can result in an over-representation of rear-end crashes.

The intersection of OR 47/Main Street & NW Banks Road also experiences a queue that extends past its provided storage. On the westbound approach, the queue likely affects operations at the intersection of NW Banks Road & NW Sellers Road. These two intersections are only separated by 50 feet (measured center to center). Therefore, the westbound queue at this intersection (80 feet) should extend through this neighboring intersection, with the potential of causing operational problems at both. If the 95th percentile queue for westbound Banks Road at Sellers Road is included, then the total queue is approximately 170 feet. Details of the queuing analysis are provided in Appendix E.

Although the entrances to Banks Elementary School and High School are not study intersection, the school district has noted concern over the queuing along Main Street at these entrances. According to observation, vehicle queues back up onto Main Street during the time that parents are picking students up from school. This issue will be noted during process of alternatives analysis.

TABLE 7

2008 Existing 95th Percentile Queues at Banks Study Area Intersections

ID	Intersection	Approach	Lane Group	Existing Storage (feet)	Queue Length (feet)
1	OR 47 (Main Street) & NW Oak Way	Eastbound	**Left**	**70**	**120**
			Thru	750	250
			Right	**30**	**100**
		Westbound	Left	250	200
			Thru/Right	950	100
		Northbound	Left	95	40
			Thru	950	100
			Right	**70**	**90**
		Southbound	Left	125	110
			Thru	530	130
			Right	**25**	**50**
2	OR 47 (Main Street) & OR 47 Exit	Westbound	Left/Right	750	60
		Northbound	Thru	-	-
			Right	70	30
		Southbound	Left	115	70
			Thru	-	-
3	OR 47 (Main Street) & NW Trellis Way	Westbound	Left/Right	-	70
		Northbound	Thru/Right	-	-
		Southbound	Left	125	40
			Thru	-	-
4	OR 47 (Main Street) & NW Banks Road	Eastbound	Left/Thru/Right	-	50
		Westbound	**Left/Thru/Right**	**20**	**80 (170[1])**
		Northbound	Left/Thru	100	60
		Southbound	Left/Thru/Right	-	20
5	NW Banks Road & NW Aerts Road	Westbound	Left/Thru/Right	-	10
		Northbound	Left/Right	-	40
		Southbound	Left/Right	Driveway	30
6	OR 6 & NW Aerts Road	Eastbound	Left/Thru/Right	-	30
		Westbound	Left/Thru/Right	-	70
		Northbound	Left/Thru/Right	-	50
		Southbound	Left/Thru	-	40
			Right	50	30

Notes:

[1]Value is the sum of westbound Banks Road queue at OR 47 and Sellers Road

95th Percentile queues calculated using an average of five, one hour SimTraffic runs

Queue lengths rounded up to the nearest ten feet

Numbers in black highlight indicate a vehicle queue length that exceeds the available storage length

Safety Analysis

The safety analysis for key Banks roadways was updated using crash data from 2003-2007. The Banks TSP crash analysis consisted of three parts:

- Corridor Segment Crash Rates
- Intersection Crash Rates, and
- Safety Priority Index System (SPIS) Analysis.

Each part is described in the sections below.

Corridor Segment Crash Rates

Crash rates, expressed in "crashes per million vehicle-miles traveled (MVMT)," 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.

The two roadway segments listed below were analyzed:

- OR 6 (Wilson River Highway No. 37)
  - MP 49.09, OR 47, to MP 50.03, NW Aerts Road
- OR 47 (Nehalem Highway No. 102; Main Street)
  - MP 82.85, NW Banks Road, to MP 83.72, OR 6

TABLE 8
Historical Crash Data 2003-2007 for Wilson River Highway (OR 6), MP 49.09 to MP 50.03

Year	Total Crashes	Severity of Crash			Type of Crash		Crash Rate
		Fatality	Injury	Property Damage	Turning	Fixed Object	
2003	2	0	1	1	1	1	0.58
2004	2	0	1	1	2	0	
2005	2	0	0	2	1	1	
2006	3	1	2	0	2	1	
2007	0	0	0	0	0	0	
Total	9	1	4	4	6	3	
Average State Crash Rate: **0.99 Crashes per Million Vehicle Miles Traveled**							

Source: ODOT, 2007

As shown in Table 8, the most common type of crash on the Wilson River Highway segment for the 5-year period was a turning crash (67 percent). There is an even split of injury and property damage only crashes (each with 4). This segment also has one fatality recorded. This fatality occurred at MP 49.95, which is about 500 feet west of the OR 6 and NW Aerts Road intersection. This crash involved a driver with a suspended license. The roadway conditions were raining/wet pavement, with dark light conditions. The crash records provided from ODOT do not provide any information on whether this driver was speeding or under the influence. However, collisions with fixed objects do not normally result in fatalities, so it is possible speed was a factor.

The crashes located on this segment all appear to cluster around the OR 6 and NW Aerts Road intersection. Of the 9 crashes shown, there appears to be a pattern of fixed object collisions and turning movement related collisions. Possible approaches to mitigating issues with this intersection could include a roadside inventory to see what fixed objects are present and consideration of intersection design and speed.

The 5-year average crash rate for the Wilson River Highway segment is 0.58. This crash rate is lower than the 5-year statewide average crash rate for minor arterials in rural areas (0.99).

TABLE 9
Historical Crash Data 2003-2007 for Nehalem Highway (OR 47; Main Street), MP 82.85 to MP 83.72

Year	Total Crashes	Severity of Crash			Type of Crash			
		Fatal	Injury	Property Damage	Angle	Rear-End	Turning	Crash Rate
2003	1	0	0	1	1	0	0	0.93
2004	2	0	2	0	0	1	1	
2005	2	0	1	1	1	1	0	
2006	2	0	1	1	1	0	1	
2007	4	0	1	3	0	2	2	
Total	11	0	5	6	3	4	4	
Average State Crash Rate: **1.19 Crashes per Million Vehicle Miles Traveled**								

Source: ODOT, 2007

As shown in Table 9, crash types on the Nehalem Highway segment are fairly evenly distributed among angle, rear-end, and turning movement crashes (about 35 percent each). No fatalities are recorded over the five-year period for this segment. The 11 recorded crashes are split almost evenly between injury and property damage only. No overall trends have been identified regarding lighting, surface conditions, etc. for this segment.

The 5-year average crash rate for the Nehalem Highway segment is 0.93. This crash rate is lower than the 5-year statewide average crash rate for rural city principal arterials (1.19).

Intersection Crash Rates

Intersection crash rates were calculated for all study area intersections. Intersection crash rates are measured in "number of crashes per million vehicles entering into an intersection," or MEV.

Table 10 provides a summary of crash rates for each intersection. None of these rates suggest crash trends or problems.

TABLE 10
Banks Study Area Intersection Crash Data (2003-2007)

Intersection		Severity of Crash			Total Crashes	Crash Rate
		Fatal	Injury	Property Damage		
1	OR 47 (Main Street) & NW Oak Way	No Crashes Recorded				
2	OR 47 (Main Street) & OR 6	No Crashes Recorded				
3	OR 47 (Main Street) & NW Trellis Way	0	0	1	1	0.09
4	OR 47 (Main Street) & NW Banks Road	0	2	1	3	0.29
5	NW Banks Road & NW Aerts Road	No Crashes Recorded				
6	OR 6 & NW Aerts Road	0	4	2	6	0.38

Safety Priority Index System (SPIS)

In addition to crash rates, ODOT also assesses roadway safety via the Safety Priority Index System (SPIS). The SPIS takes into account crash frequency, crash rate, and crash severity. SPIS scores are computed for sections that are 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 2007 top 10% SPIS data for Region 1 was analyzed for this report. The project study does not overlap with any ODOT SPIS sites.

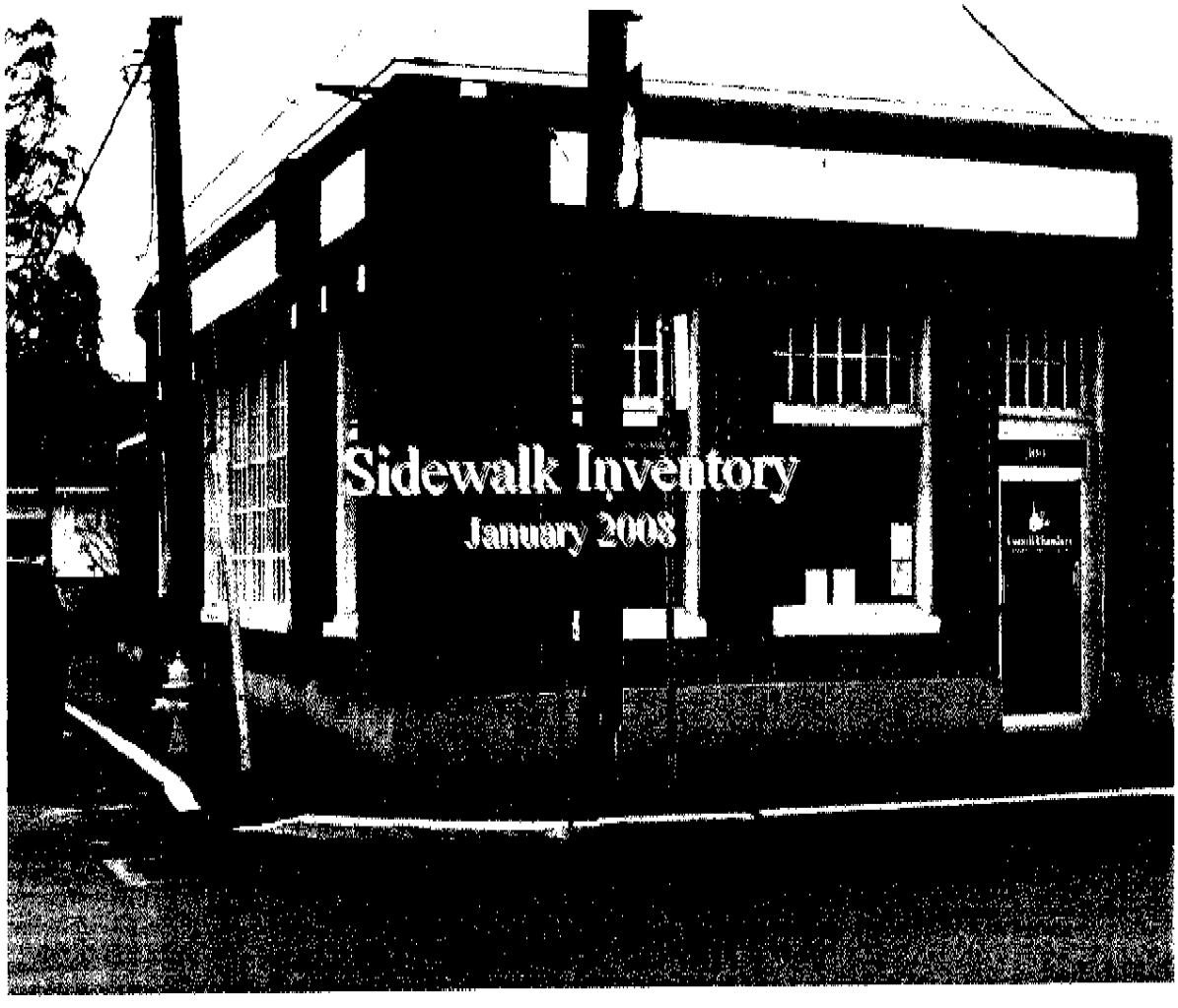
Plan and Policy Review

Appendix F provides a summary of plans, policies, and regulations at the federal, state, regional, and local levels that directly influence transportation planning in the City of Banks.

Next Steps

After review and confirmation of existing transportation conditions with Banks and Washington County decision-makers and the community, traffic analysis will be completed for the "future no-build" scenario – or what the traffic situation in Banks will look like in 20 years without changes to transportation facilities or programs. Following that analysis, alternatives for the transportation system will be developed and vetted with the community. Finally, recommendations and development code changes will be proposed, consistent with Banks' vision and state and local policy.

Appendix A: Sidewalk Inventory



Sidewalk Inventory

January 2008

Prepared by Jeff Hood, Planning and Public Works Intern.

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INTRODUCTION

The 2008 Sidewalk Inventory identifies the location of sidewalks, curbs, and gutters in the public right of way in the City of Banks, measures their attributes, and creates a PostGIS/PostgreSQL Geographic Information/Relational Database Management System for implementing and tracking progress toward two goals: maintenance and accessibility.

For maintenance, the inventory evaluates areas in the city for severity of deficiency and potential hazard to pedestrians. Since the responsibility to maintain the sidewalk rests with the abutting property owner, the database was integrated with Washington County GIS data to enable automatic mailing of the property owners. The inventory prioritizes the projects the City might undertake if the property owners do not make the needed repairs.

For accessibility, the inventory provides self-evaluation to be used as a basis for drafting an ADA transition plan as required by Title II of the Americans with Disabilities Act. In addition to identifying specific features of the pedestrian routes that do not meet the ADA Accessibility Guidelines (ADAAG), the inventory prioritizes blocks in terms of overall barrier to access and potential contribution to connectivity of a city-wide accessible pedestrian network when improved.

Research of the ADA and development of rating methodology were completed in November, 2007. The field survey was completed in December. Data entry and analysis were completed in January, 2008. Results will be presented to the City Council at their meeting on Febuary 12, 2008.

THE ADA AND PUBLIC RIGHTS-OF-WAY

The overall spirit of Title II of the ADA—the section addressing public entities—is that of "program accessibility." No person with a disability can be excluded from a public program because facilities are not accessible. In the public right of way, the pedestrian circulation system provided by sidewalks is in itself a program that the City provides for its citizens. Therefore, if a path for circulation from one place to another is provided for pedestrians in general, that path must be accessible, or the city must provide an alternate accessible route of similar length.

The ADA requirements differ for new construction, alterations, and existing facilities. New construction requires the highest degree of accessibility. When the city makes alterations to the right of way—e.g. by realigning or resurfacing the road—the sidewalks must be updated to comply with the design standards to the maximum extent feasible. In the case of existing facilities along unaltered rights-of-way, the ADA requires local governments to develop a transition plan that provides for the removal of barriers to accessibility (although the requirement is made explicit only for governments that employ 50 or more). The Department of Justice regulations especially require addition of curb ramps anywhere a pedestrian walkway crosses a curb.

The inventory is limited in scope to the pedestrian routes in the public right of way. The City must take additional measures to ensure program accessibility at parks, schools, and other public facilities. Nonetheless, sidewalk improvements are likely to represent the largest expenditure necessary to comply with the ADA.

RATING SYSTEM

The sidewalk system was rated for the two attributes of condition and accessibility on three geographic scales. Specific locations of deficient condition or inaccessible features were recorded as *point features* using a GPS receiver. Each *segment*, the section adjoining any one taxlot on any one block, was rated for condition. Finally, each *block*, the section spanning one side of the street from one intersection to the next, was rated for overall condition and accessibility.

Point Features

Deficiencies
Distresses to the walking surface that present a risk to pedestrian safety.

Cracking >½" width, 3 or more pieces per panel, or w/ spalling
Spalling >25% of panel or deeper than ½"
Displacement at fault or joint w/ >1" deflection
Sunken > 2" in 8 ft from normal profile
Raised > 2" in 8 ft from normal profile
Ponding reverse pitch or lip at curb potentially allowing water to pool
Missing panel or piece of panel
Patch of asphalt or below-grade surface
Heaving by tree causing or exacerbating any deficiency

Severity
1. Low: meets one deficiency criterion
2. Medium: meets multiple or exceeds one deficiency criteria
3. High: exceeds multiple or greatly exceeds one deficiency criteria

Extent
1. Low: one or two panels
2. Medium: multiple panels < 15 linear ft
3. High: > 15 linear ft

Hazard
1. Low: unlikely and small risk to safety
2. Medium: possible, moderate risk to safety
3. High: likely or large risk to safety

(This is a subjective evaluation and does not constitute a legal position or expert opinion.)

Examples of severity and hazard appear in Figures 1 and 2 below.

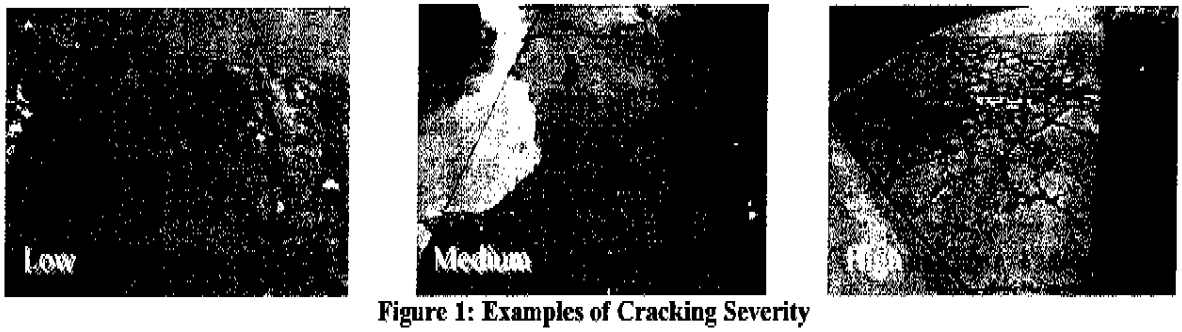


Figure 1: Examples of Cracking Severity

Figure 2: Examples of Displacement Hazard

Inaccessibilities

Features restricting access to persons with disabilities by not meeting ADA guidelines.

Walk features:

W1: path < 36" wide
W2: cross-slope > 1:50
W3: change in level > ½"
W4: change in level > ¼" without bevel
W5: protruding object (ADAAG 4.4)
W6: deficient ramp (any > 1:20 against ADAAG 4.8)
W7: no walk
W8: surface not stable and slip-resistant

Curb Ramp features:

R1: no curb ramp where required
R2: ramp < 36" wide
R3: > 1:12 slope
R4: adjoining street > 1:20 back-slope
R5: No flares where req.
R6: Flares > 1:10 slope
R7: lip at base of ramp
R8: alignment w/ crosswalk

Other: applicable ADAAG section number noted. Examples appear in Figure 3.

Severity

1. Low: only somewhat or unlikely to hinder movement of person with disability
2. Medium: significantly or likely to hinder movement of person with disability
3. High: impassable or potentially dangerous to persons with disabilities

(Temporary features such as vegetation rated of lower severity than permanent features.)

Extent

1. Low: one or two panels
2. Medium: multiple panels < 15 linear ft
3. High: > 15 linear ft

Figure 3: Examples of W5 Protruding Object (Dangerous to Vision-Impaired), W6 Deficient Ramp (No Landing), and R1 Absence of Curb Ramp (Required to Access Crosswalk)

Detectable Warnings

A distinctive surface pattern of domes detectable by cane or underfoot used to alert people with vision impairments of their approach to streets and hazardous drop-offs.

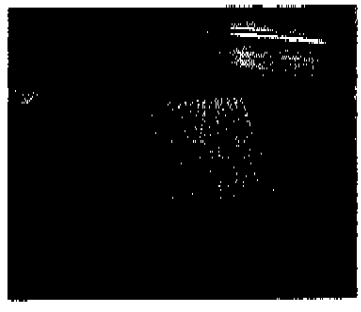


Figure 4: A Detectable Warning

ADA

0. Does not conform to ADAAG 4.29.
1. Conforms to ADAAG 4.29.

Technically, all intersections must have curb ramps, and each of these curb ramps must be fitted with a detectable warning. However, this inventory lists a detectable warning as an asset rather than a deficiency.

Segment Rating

Each segment was rated based on its deficiency point features and overall condition as follows.

Presence

00. No walk & No curb/gutter
01. No walk but Yes curb/gutter
10. Walk but No curb/gutter
11. Walk & Curb/gutter

Continuity

0. Discontinuous or absent walk
1. Continuous walk

Condition Severity 0, 1, 2, or 3 based on max of deficiencies
Condition Extent 0, 1, 2, or 3 based on proportion of deficient areas
Condition Hazard 0, 1, 2, or 3 based on max of deficiencies

Vegetation

1. No vegetation, not overgrown, or not causing deterioration
2. Some vegetation, somewhat overgrown or potentially causing only limited deterioration
3. Extensive or potentially highly deteriorating or overgrown vegetation

In addition, presence, accessibility, and signalization of crosswalks were noted.

Block Rating

Each block was rated based on segment conditions and point inaccessibility as follows.

Presence 0 to 11 based on the prevalent presence of the segments
Continuity 0 to 100 based on the proportion of discontinuous or absent segments

Condition 0 to 100 (100 best condition) based on a weighted segment average:

$$condition = 100 - 10\frac{\sum 0.5\cdot[(severity + hazard)\cdot extent + |vegetation - 1|]\cdot length}{\sum length}.$$

Ten points of the rating go to vegetation, 45 to severity, and 45 to hazard. The total rating depends on the proportion of the length of the block that is deficient.

Accessibility 0 to 100 (100 most accessible) based on a point system

- Curb Ramps (20 points)
- Proportion of path unreachable by medium severity [except curb ramps] (20 points)
- Possibility of through travel: continuous, no high severity [except curb ramps] (20 points)
- Weighted average of severity and extent of inaccessible features (40 points)

RESULTS

The majority of streets in Banks have sidewalks, curbs, and gutters, as shown in Figure 6. Woodman and Parmley Avenues, set back in the residential area of the old town, and the southern end of Main St have curbs only. The Eastern side of Commerce Street, adjacent to the railroad, has neither curb nor sidewalk. At the north end of town, a segment of Main Street, most of Banks Road, Cedar Canyon, and Sellers Road have neither curb nor sidewalk. Portions of Banks Road have sidewalk but no curb. The private roads in the Arbor Village neighborhood have curb and sidewalk, but were not included in this inventory because they are not in the public right of way.

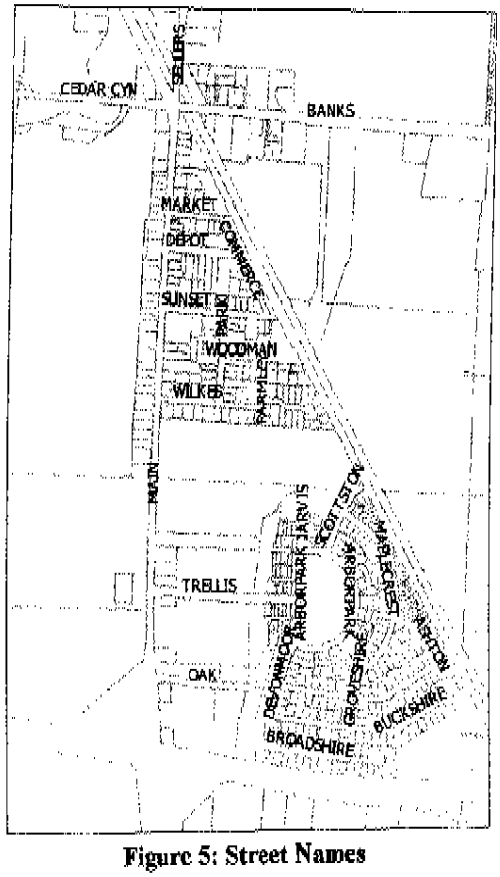


Figure 5: Street Names

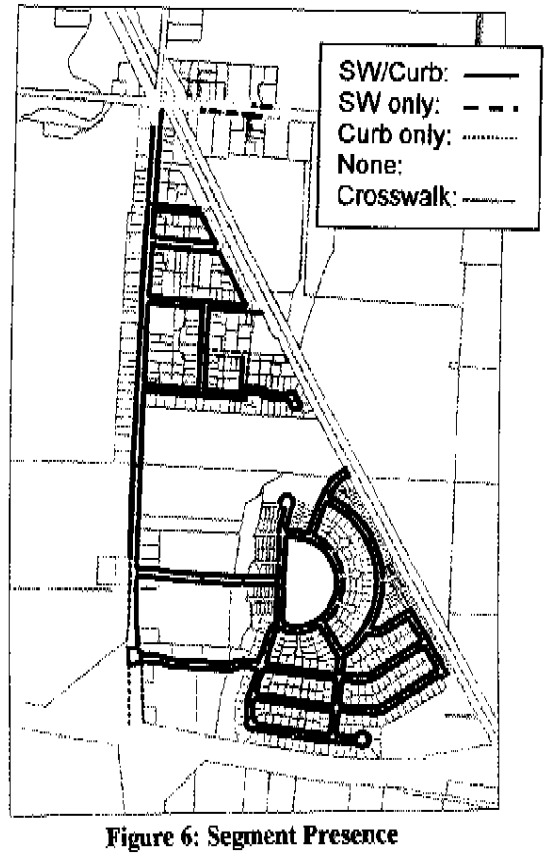


Figure 6: Segment Presence

Condition

Segment condition severity appears in Figure 7. Deficiencies in the old town tend to be distributed throughout entire blocks, resulting from slow deterioration, while deficiencies in the new town are almost all caused by heaving from street trees. Figure 8 demonstrates this separation of, e.g., cracking and heaving.

Overall condition of each block is aggregated in Figure 9. Banks Road is in Poor condition (0-39), and is targeted for removal. Blocks in Fair condition (40-59) should undergo large-scale improvement. Blocks in Good condition (60-84) may be considered for large-scale improvement. The remainder of the city could be spot-treated for the worst deficiencies. The suggested locations for spot treatment—those with either high severity or high hazard—appear as points in Figure 9.

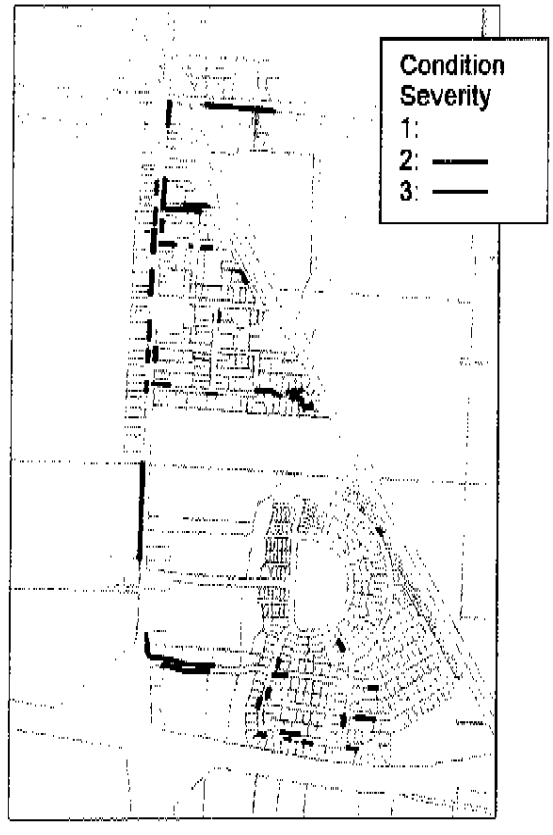


Figure 7: Segment Condition Severity

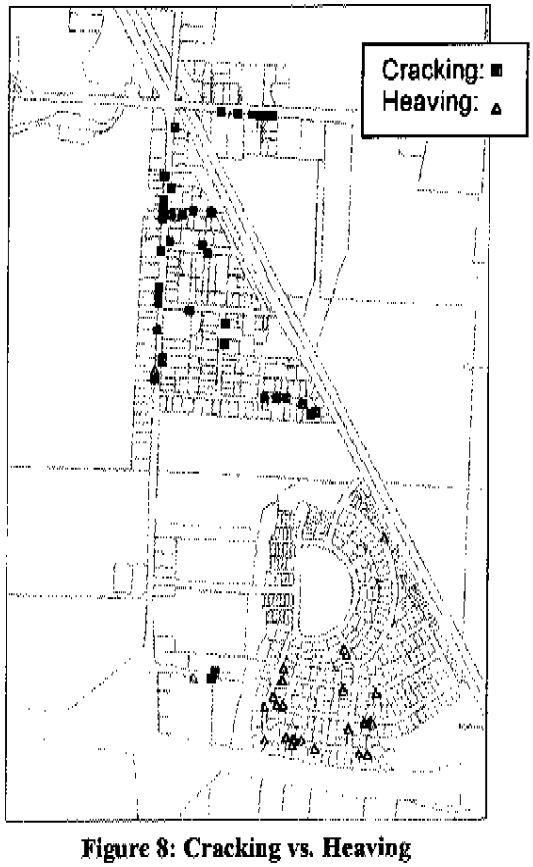


Figure 8: Cracking vs. Heaving

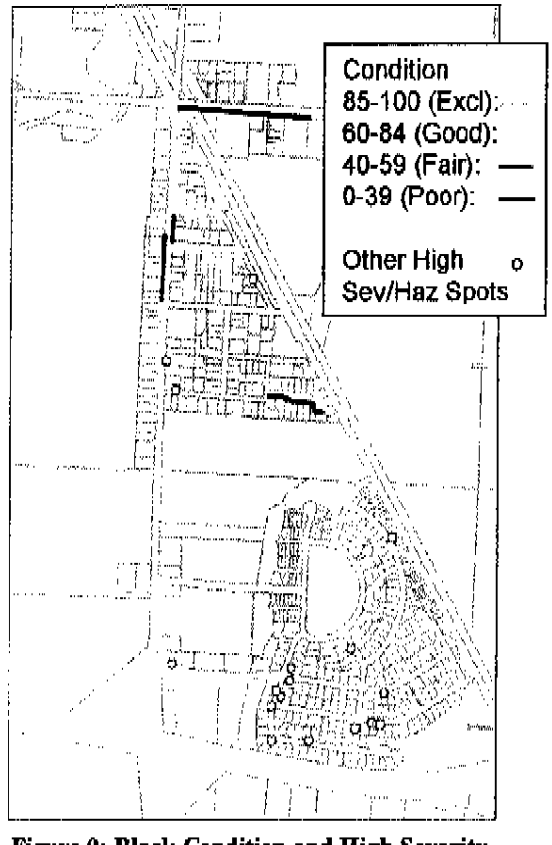


Figure 9: Block Condition and High Severity or High Hazard Spots

Accessibility

Locations where curb ramps must be installed to achieve ADA program accessibility are shown in Figure 10. Installing curb ramps here should be a priority in the City's transition plan.

Overall accessibility of each block is aggregated in Figure 11. Banks Road has Poor accessibility (0-35), and is targeted for removal. Blocks with Fair accessibility (40-59) should undergo large-scale improvement. Blocks with Good accessibility (60-84) may be considered for large-scale improvement. The remainder of the city could be spot-treated for the worst barriers to accessibility. The suggested locations for spot treatment—those with high severity—appear as points in Figure 9.

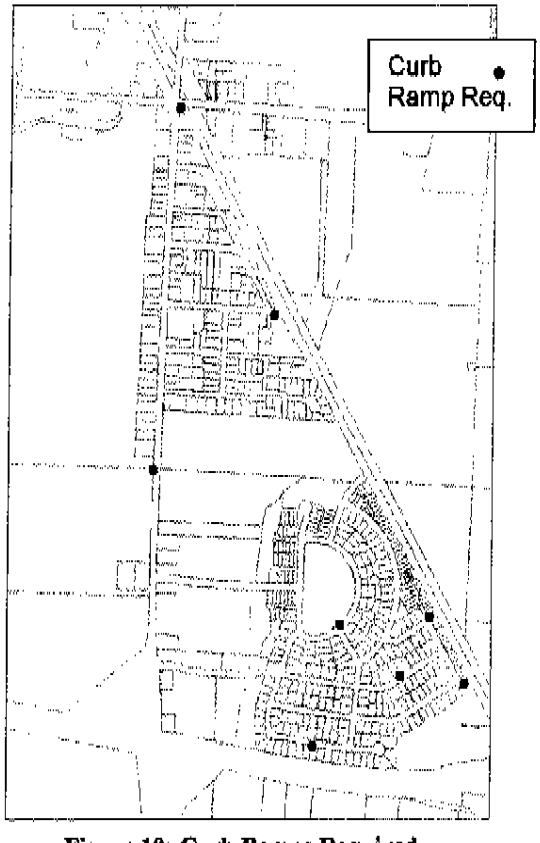


Figure 10: Curb Ramps Required

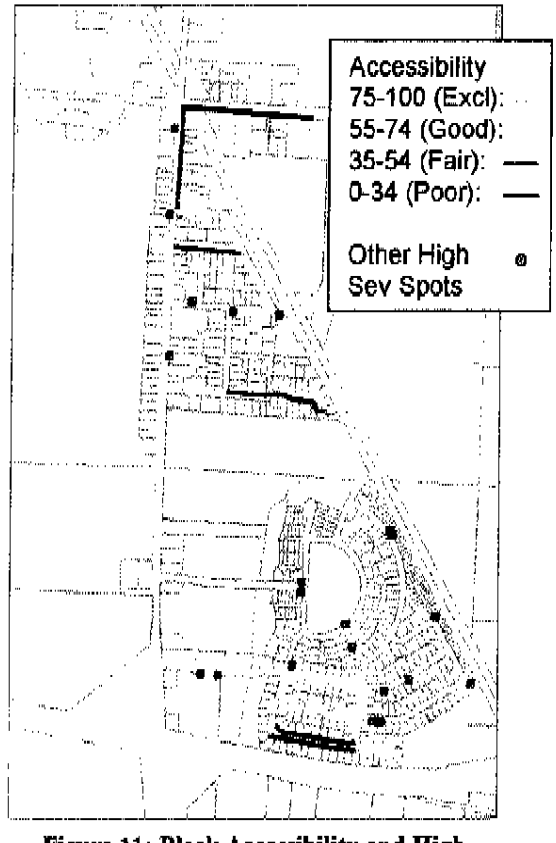


Figure 11: Block Accessibility and High Severity Spots

TARGET AREAS

Southern Banks Road

The south side of Banks Road contains an aged, completely deteriorated sidewalk. Located on a rural county road, the segment has no connectivity with the rest of the pedestrian network, and has been overlaid in spots with gravel driveways. Since the walk is currently highly hazardous, it is targeted for removal, with replacement scheduled only when a pedestrian need on the road presents itself.

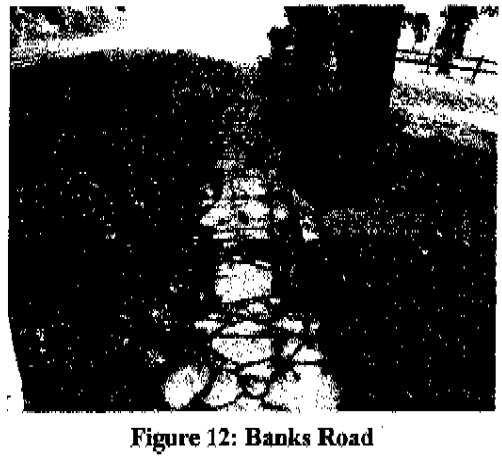


Figure 12: Banks Road

Wilkes Street Cul-de-Sac

The end of Wilkes Street has a narrow sidewalk with spalling and extensive sunken spots, resulting in displacements at the curb and tripping hazards. Furthermore, the narrow sidewalk contains very steep driveway aprons, making the cross-slope impassable to users of crutches or manual wheelchairs. The sidewalk may need to be widened to accommodate a level surface and comply with the ADA. A Local Improvement District would function well here.

Figure 13: Wilkes Street

Banks Estates

The new development of Devonmoor, Groveshire, Oak, Buckshire, and Broadshire Streets, known as Banks Estates, contains both large tripping hazards and barriers to access. The fundamental problem is a very narrow, two-foot, tree-lined planting strip, pictured in Figure 15. Adding to the problems with the uplifted sidewalk are driveway aprons with excessive cross-slope at every lot.

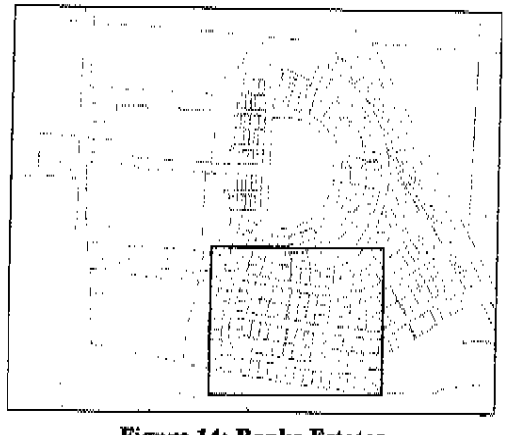


Figure 14: Banks Estates

Built after the ADA was passed, Banks Estates might be classified by the Department of Justice as new construction. The right of way standards have been revised several times, so the City should consult an attorney to assess its potential exposure to a discrimination suit. If qualifying as new construction, the sidewalk may need to be rebuilt. The planting strip should be widened to avoid problems with the street trees resurfacing. Suggested accommodations of driveway aprons appear in Figure 16.

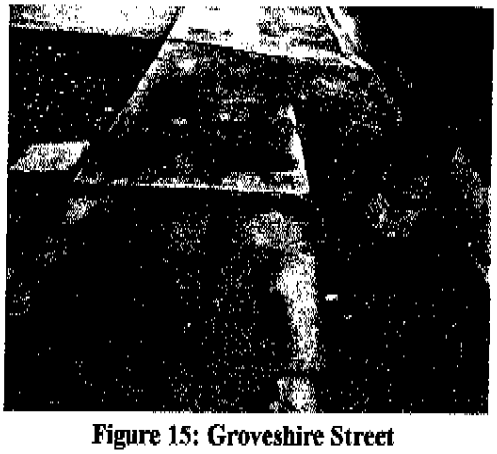


Figure 15: Groveshire Street

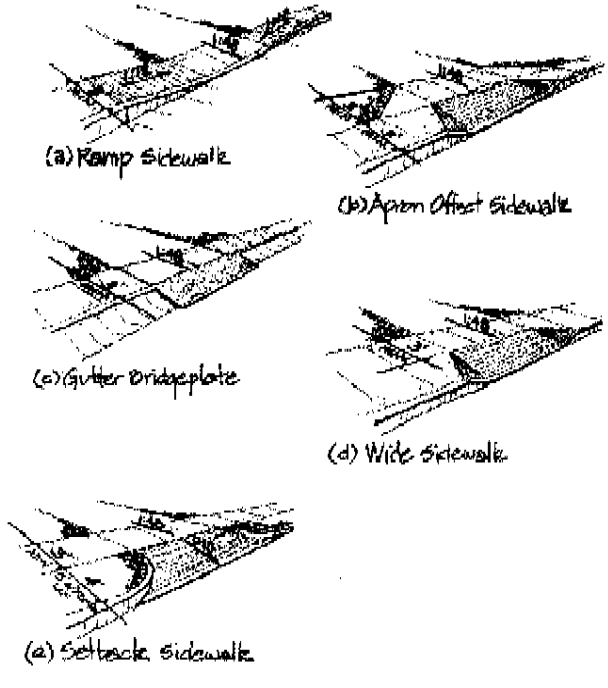


Figure 16: Suggested Driveway Apron Accommodations from ADAAG

City Hall

With significant hazards at City Hall, the City should remedy the deficiencies on its own adjacent sidewalks before sending notices to other property owners for two reasons. First, unlike with the sidewalks adjoining other property, the City could be held liable for injury sustained on these hazards. Second, potentially dissenting property owners would be more receptive to programs aimed at their sidewalks if the City improves its own first.

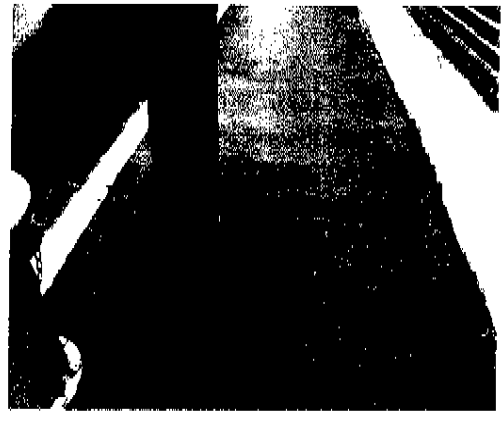


Figure 17: Hazard at City Hall

High-Use Areas

The only significant pedestrian trip attractors in Banks are the schools. The City should pay special attention to the sidewalks near the schools on Main, Wilkes, Trellis, Oak, Jarvis, Arborpark, and Devonmoor Streets, highlighted in Figure 18.

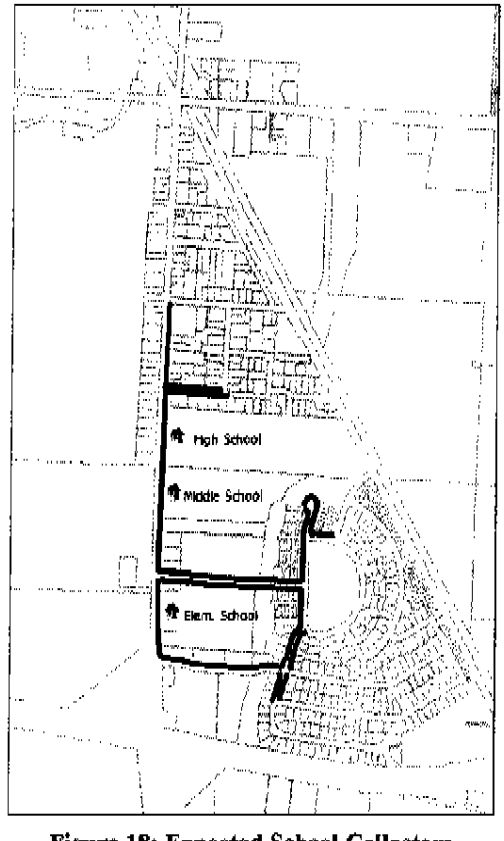


Figure 18: Expected School Collectors

POSTGIS/POSTGRESQL DATABASE

A useful feature of the GIS built for the sidewalk inventory is that it acts as a geographical photo catalog of the deficiencies, for easy identification in the field. To view a photo of a deficiency, select the deficiency layer in the QGIS viewer. Using the "Identify Features Tool" , click on the desired point. In the pop-up window, select action "view photo" , as in Figure 19. The same action with the taxlots layer shows the abutting taxlot. Finally, the database enables automatic mailing of property owners with a detailed notice of their responsibility to fix the sidewalk. A sample notice, Figure 20 below, concludes this report.

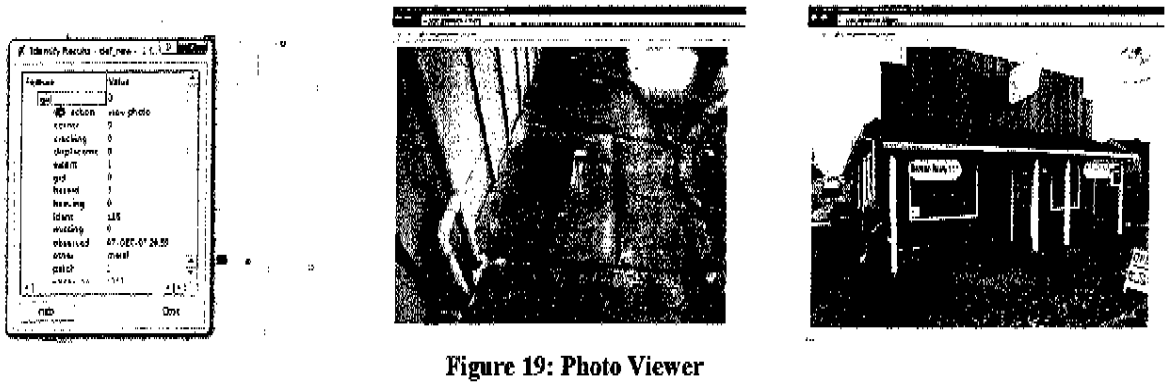


Figure 19: Photo Viewer

15 January 2008
CERTIFIED MAIL

BANKS, CITY OF
100 S MAIN ST
BANKS, OR 97106

120 South Main Street
Banks, Oregon 97106
(503) 324-5112
(503) 324-6674 FAX
(800) 735-2900 TTY

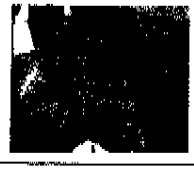
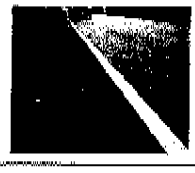
Re: Sidewalk repair in the public right-of-way adjacent to

Address: 100 S MAIN ST

Tax Lot: 2N331BB02000

Dear Property Owner:

The City of Banks is committed to maintaining a safe pedestrian network and an excellent community environment. An inspection of the sidewalks adjacent to the above referenced property on 12/7/2007 indicated the following deficiencies in the walking surface presenting potential hazard to pedestrians.

Deficiency ID: 70 Fronting Street: MARK	☑ Cracking ☐ Spalling ☑ Displacement ☐ Sunken ☐ Heaved by Tree	☐ Ponding ☐ Missing Pieces ☐ Patch ☑ Raised Other:	
Deficiency ID:72 Fronting Street: MARK	☑ Cracking ☐ Spalling ☐ Displacement ☐ Sunken ☐ Heaved by Tree	☐ Ponding ☐ Missing Pieces ☐ Patch ☐ Raised Other:	
Deficiency ID: 74 Fronting Street: MAIN	☐ Cracking ☐ Spalling ☑ Displacement ☐ Sunken ☐ Heaved by Tree	☐ Ponding ☐ Missing Pieces ☐ Patch ☐ Raised Other:	

Number of Deficiencies: 3

By City Ordinance 20-01, Section 10, abutting property owners are responsible for maintaining the sidewalks.

Two options are available to bring this property into compliance:

1. Obtain a permit from the city to work on the sidewalk yourself.
2. Hire a contractor to obtain a permit and perform the work for you.

If the repairs are not made **within 90 days of the date of this notice**, the City will hire a contractor to bring the property in compliance. The property owner will be invoiced for the work expenses plus an administrative fee. If unpaid, the invoice will become an assessment on next year's tax bill.

If you have sold this property, your mailing address has changed, you believe information in this letter to be in error, or you have any questions, please contact the City at (503) 324-5112.

Thank you for your attention to this matter.

Cordially,

City Manager

Figure 20: Sample Notice

Appendix B: Level of Service Concept

Level of Service Concept

Level of Service (LOS) is a qualitative measurement of intersection operation. LOS for both unsignalized and signalized intersections is based on control delay. Control delay is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. In general, control delay is the difference between the travel time actually experienced to the travel time experienced under ideal conditions in the absence of traffic control, geometric delay, incidents, and other vehicles.

Signalized Intersection LOS

Level of service, based on average control delay, is defined for the intersection as a whole at signalized intersections. Control delay is a complex measure and is dependent on a number of variables, including the quality of progression, the cycle length, the deceleration and acceleration delay, the stopped delay, and the volume to capacity ratio for the lane group or approach in question.

TABLE 1
Intersection Level of Service Criteria

Level of Service	Average Delay (seconds per vehicle)	Traffic Flow Characteristics
Signalized Intersections		
A	≤ 10	Most vehicles arrive during the green phase and do not stop at all.
B	> 10 - ≤ 20	More vehicles stop, causing higher delay.
C	> 20 - ≤ 35	Vehicle stopping is significant, but many still pass through the intersection without stopping.
D	> 35 - ≤ 55	Many vehicles stop, and the influence of congestion becomes more noticeable.
E	> 55 - ≤ 80	Very few vehicles pass through without stopping.
F	> 80	Considered unacceptable to most drivers. Intersection is not necessarily over capacity, even though arrivals exceed capacity of lane groups.
Unsignalized Intersections		
A	≤ 10	Free flow
B	> 10 - ≤ 15	Stable flow (slight delays)
C	> 15 - ≤ 25	Stable flow (acceptable delays)
D	> 25 - ≤ 35	Approaching unstable flow (tolerable delays)
E	> 35 - ≤ 50	Unstable flow (intolerable delays)
F	> 50	Queuing on minor approaches and not enough gaps of suitable size to allow safe crossing of major streets. Signalization should be investigated at this point, but warrants must be satisfied before implementation.

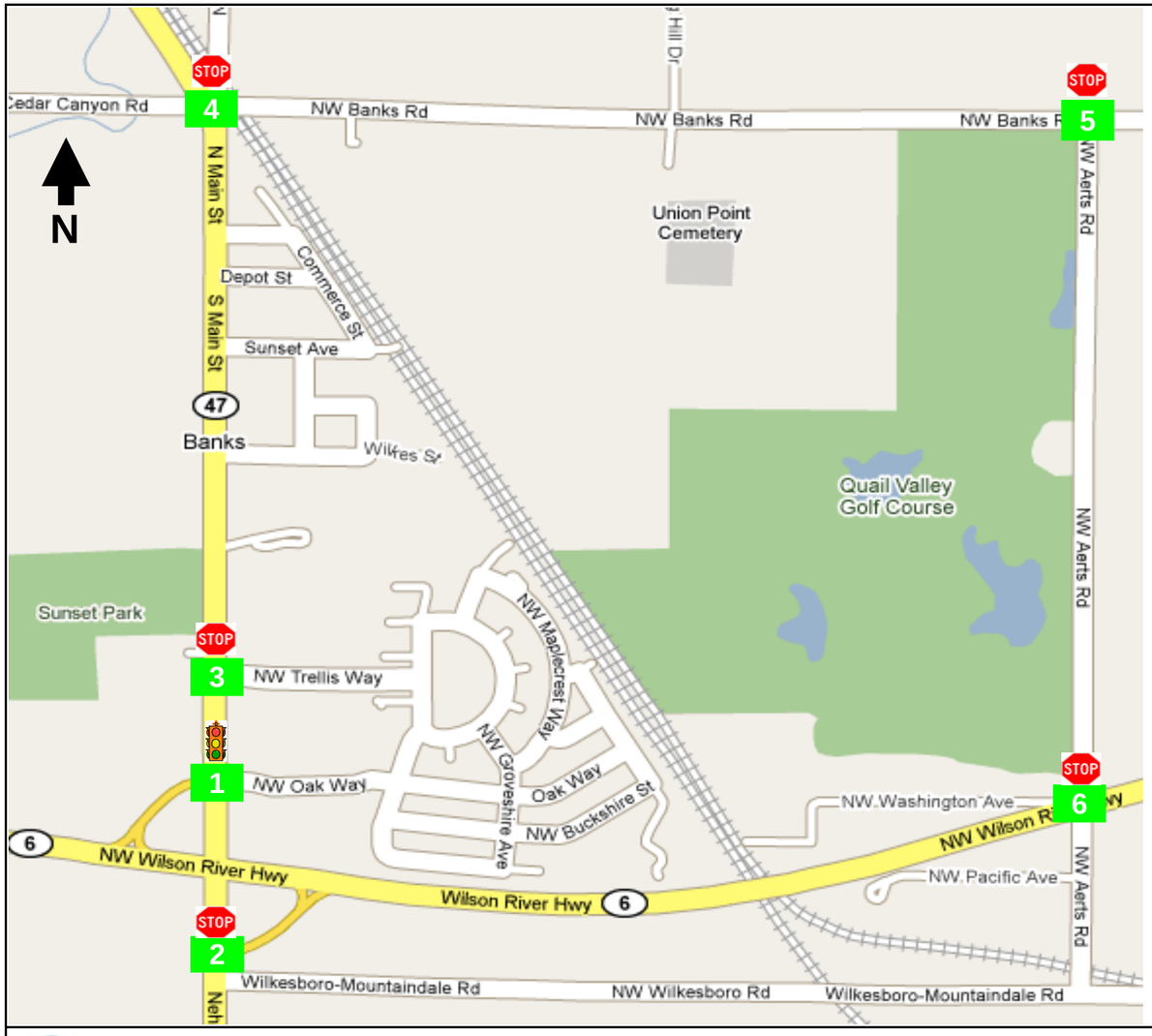
Source: Highway Capacity Manual (2000)

Unsignalized Intersection LOS

Level of service for all-way stop-controlled (AWSC) intersections is defined as average control delay for the whole intersection. Control delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. Two-way stop-controlled (TWSC) intersections apply the same methodology, but only provide delay for the minor stop-controlled approaches. Level of service for TWSC intersections is not defined for the intersection as a whole.

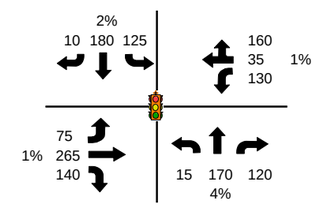
Appendix C: Traffic Study Intersections

Note: Figure 1 in this Appendix, *2008 Existing Conditions (30th Highest Hour Balanced): Volumes, Channelization, & V/C Ratios,* is a summary of the existing conditions analysis. The balanced 30th highest hour volumes used in the analysis are shown next to the black arrows that represent lane channelization. The percentages next to the volumes are the heavy vehicles. The green square over each intersection on the map signifies that the intersection's volume to capacity ratio is within the ODOT standard. This standard comes from the Oregon Highway Plan. Other information provided about each intersection includes the 30th highest hour volume (30th HV) factor, peak hour factor (PHF), count date and peak hour.



1 OR 47 & NW Oak Way

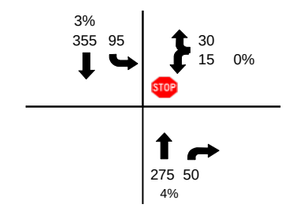
V/C Ratio Std: 0.90 OR 47 30th HV Factor: 1.16
V/C Ratio: 0.38 Oak Way 30th HV Factor: 1.16
OR 6 30th HV Factor: 1.62
PHF: 0.93



Count Date: January 6, 2009
Peak Hour: 4:30-5:30 PM

2 OR 47 & OR 47 Exit

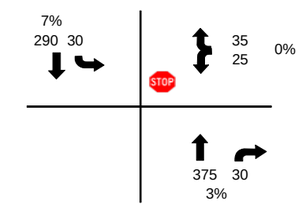
V/C Ratio Std: 0.75 OR 47 30th HV Factor: 1.16
V/C Ratio: 0.10 OR 6 30th HV Factor: 1.62
PHF: 0.91



Count Date: January 6, 2009
Peak Hour: 4:30-5:30 PM

3 OR 47 & NW Trellis Way

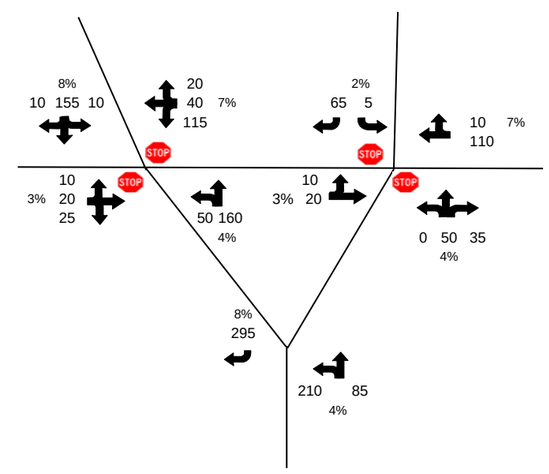
V/C Ratio Std: 0.90 30th HV Factor: 1.21
V/C Ratio: 0.15 PHF: 0.91



Count Date: December 4, 2008
Peak Hour: 4:30-5:30 PM

4 OR 47 & NW Banks Rd

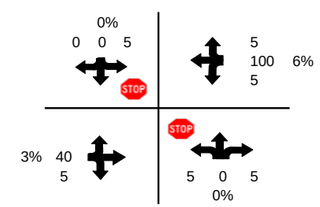
V/C Ratio Std: 0.75 30th HV Factor: 1.21
V/C Ratio: 0.42 PHF: 0.92



Count Date: December 4, 2008
Peak Hour: 4:30-5:30 PM

5 NW Banks Rd & NW Aerts Rd

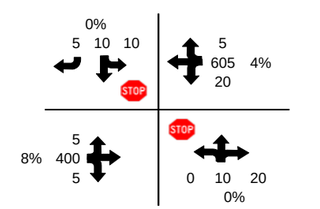
V/C Ratio Std: 0.80 30th HV Factor: 1.21
V/C Ratio: 0.01 PHF: 0.81



Count Date: December 4, 2008
Peak Hour: 4:30-5:30 PM

6 OR 6 & NW Aerts Rd

V/C Ratio Std: 0.75 30th HV Factor: 1.51
V/C Ratio: 0.11 PHF: 0.95



Count Date: December 4, 2008
Peak Hour: 4:30-5:30 PM

CH2MHILL

FIGURE 1. Tillamook: Banks UGB/TSP Update

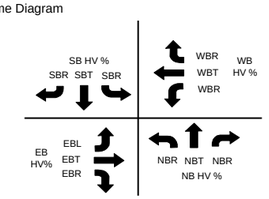
2008 Existing Conditions (30th Highest Hour Balanced):
Volumes, Channelization, & V/C Ratios

Notes:

1. "V/C Ratio Std" corresponds to the intersection's mobility standard
2. Mobility Standards are based on Oregon Highway Plan
3. A green box on the map represents an acceptable measured mobility
4. A red box on the map represents a failing measured mobility
5. V/C ratio for stop controlled intersection is the highest ratio for a controlled approach
6. Balanced 30th Highest Volumes were used in the existing condition analysis
7. The reported Peak Hour Factor (PHF) is for the overall intersection
8. Truck Percentages calculated from raw counts
9. All 30th Highest Hour volumes were seasonally adjusted
10. Intersection map source: Google Earth Maps

Legend:

Volume Diagram



555 Turning Movement Volume
HV% Percent Heavy Vehicles

Channelization

Stop Controlled Intersection

Signalized Intersection

Appendix D: HCM Synchro Reports

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	260	135	180	50	225	20	230	160	155	225	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	12	12	12	10	10	12	13	16	16	14	14	14
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1646	1733	1473	1536	1419		1652	1907	1621	1739	1830	1556
Flt Permitted	0.56	1.00	1.00	0.58	1.00		0.61	1.00	1.00	0.61	1.00	1.00
Satd. Flow (perm)	964	1733	1473	930	1419		1058	1907	1621	1108	1830	1556
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	75	280	145	194	54	242	22	247	172	167	242	16
RTOR Reduction (vph)	0	0	55	0	143	0	0	0	109	0	0	10
Lane Group Flow (vph)	75	280	90	194	153	0	22	247	63	167	242	6
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	4%	4%	4%	2%	2%	2%
Turn Type	Perm		Perm	Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	16.2	16.2	16.2	16.2	16.2		14.6	14.6	14.6	14.6	14.6	14.6
Effective Green, g (s)	16.2	16.2	16.2	16.2	16.2		14.6	14.6	14.6	14.6	14.6	14.6
Actuated g/C Ratio	0.41	0.41	0.41	0.41	0.41		0.37	0.37	0.37	0.37	0.37	0.37
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	2.3	2.3	2.3	2.3	2.3		4.8	4.8	4.8	5.0	5.0	5.0
Lane Grp Cap (vph)	392	705	600	379	578		388	700	595	406	671	571
v/s Ratio Prot		0.16			0.11			0.13			0.13	
v/s Ratio Perm	0.08		0.06	c0.21			0.02		0.04	c0.15		0.00
v/c Ratio	0.19	0.40	0.15	0.51	0.26		0.06	0.35	0.11	0.41	0.36	0.01
Uniform Delay, d1	7.6	8.3	7.5	8.8	7.8		8.1	9.2	8.3	9.4	9.2	8.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.2	0.1	0.7	0.1		0.1	0.6	0.2	1.4	0.7	0.0
Delay (s)	7.7	8.6	7.5	9.6	8.0		8.3	9.8	8.5	10.8	9.9	8.0
Level of Service	A	A	A	A	A		A	A	A	B	A	A
Approach Delay (s)		8.1			8.6			9.2			10.2	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	9.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	39.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	15	30	380	70	120	420
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	16	33	418	77	132	462
Pedestrians			1			
Lane Width (ft)			15.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						1028
pX, platoon unblocked						
vC, conflicting volume	1144	418			418	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1144	418			418	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	95			88	
cM capacity (veh/h)	197	640			1136	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	49	418	77	132	462
Volume Left	16	0	0	132	0
Volume Right	33	0	77	0	0
cSH	366	1700	1700	1136	1700
Volume to Capacity	0.14	0.25	0.05	0.12	0.27
Queue Length 95th (ft)	12	0	0	10	0
Control Delay (s)	16.4	0.0	0.0	8.6	0.0
Lane LOS	C			A	
Approach Delay (s)	16.4	0.0		1.9	
Approach LOS	C				

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	30	45	495	30	40	365
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	33	49	544	33	44	401
Pedestrians	7		7			7
Lane Width (ft)	15.0		12.0			13.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			588			
pX, platoon unblocked						
vC, conflicting volume	1063	574			584	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1063	574			584	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	86	90			95	
cM capacity (veh/h)	235	515			959	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	82	577	44	401
Volume Left	33	0	44	0
Volume Right	49	33	0	0
cSH	348	1700	959	1700
Volume to Capacity	0.24	0.34	0.05	0.24
Queue Length 95th (ft)	23	0	4	0
Control Delay (s)	18.5	0.0	8.9	0.0
Lane LOS	C		A	
Approach Delay (s)	18.5	0.0	0.9	
Approach LOS	C			

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	20	35	140	50	25	60	200	0	10	190	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	22	38	152	54	27	65	217	0	11	207	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	636	582	212	630	587	217	217			217		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	636	582	212	630	587	217	217			217		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.3		
p0 queue free %	97	95	95	55	86	97	95			99		
cM capacity (veh/h)	322	400	826	339	392	810	1340			1317		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	71	234	283	228
Volume Left	11	152	65	11
Volume Right	38	27	0	11
cSH	526	376	1340	1317
Volume to Capacity	0.13	0.62	0.05	0.01
Queue Length 95th (ft)	12	101	4	1
Control Delay (s)	12.9	29.1	2.1	0.4
Lane LOS	B	D	A	A
Approach Delay (s)	12.9	29.1	2.1	0.4
Approach LOS	B	D		

Intersection Summary			
Average Delay	10.3		
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	50	5	5	120	5	5	0	5	5	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	0	62	6	6	148	6	6	0	6	6	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	154			68			228	231	65	235	231	151
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	154			68			228	231	65	235	231	151
tC, single (s)	4.1			4.2			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	99	99	100	100
cM capacity (veh/h)	1420			1508			729	669	1005	718	669	900

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	68	160	12	6
Volume Left	0	6	6	6
Volume Right	6	6	6	0
cSH	1420	1508	845	718
Volume to Capacity	0.00	0.00	0.01	0.01
Queue Length 95th (ft)	0	0	1	1
Control Delay (s)	0.0	0.3	9.3	10.1
Lane LOS		A	A	B
Approach Delay (s)	0.0	0.3	9.3	10.1
Approach LOS			A	B

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	21.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	400	5	20	605	5	0	10	20	10	10	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	421	5	21	637	5	0	11	21	11	11	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												2
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	642			426			1124	1118	424	1142	1118	639
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	642			426			1124	1118	424	1142	1118	639
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			100	95	97	94	95	99
cM capacity (veh/h)	914			1122			172	204	635	163	204	479

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	432	663	32	26
Volume Left	5	21	0	11
Volume Right	5	5	21	5
cSH	914	1122	372	229
Volume to Capacity	0.01	0.02	0.08	0.11
Queue Length 95th (ft)	0	1	7	10
Control Delay (s)	0.2	0.5	15.6	24.2
Lane LOS	A	A	C	C
Approach Delay (s)	0.2	0.5	15.6	24.2
Approach LOS			C	C

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

Appendix E: Queue Analysis

Intersection: 1: Oak Way & Hwy 47

Movement	EB	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	R	L	T	R
Maximum Queue (ft)	194	240	80	239	147	46	115	96	119	157	48
Average Queue (ft)	45	127	48	94	45	10	52	41	61	62	13
95th Queue (ft)	114	241	94	195	99	36	100	89	103	127	44
Link Distance (ft)		219		589	589		939			519	
Upstream Blk Time (%)	0	2									
Queuing Penalty (veh)	0	0									
Storage Bay Dist (ft)	70		30			95		70	125		25
Storage Blk Time (%)	2	41	6			0	3	1	0	18	1
Queuing Penalty (veh)	7	88	22			0	4	2	0	24	2

Intersection: 2: Hwy 47 Exit & Hwy 47

Movement	WB	NB	NB	SB	SB
Directions Served	LR	T	R	L	T
Maximum Queue (ft)	67	38	36	76	23
Average Queue (ft)	27	2	3	26	1
95th Queue (ft)	53	20	28	62	13
Link Distance (ft)	304	382			939
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			70	115	
Storage Blk Time (%)			0		
Queuing Penalty (veh)			0		

Intersection: 3: Trellis & Hwy 47

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	70	28	50	64
Average Queue (ft)	35	2	11	5
95th Queue (ft)	62	15	40	34
Link Distance (ft)	431	519		3156
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			125	
Storage Blk Time (%)				0
Queuing Penalty (veh)				0

Intersection: 4: Banks Road & Hwy 47

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LTR
Maximum Queue (ft)	67	81	62	28
Average Queue (ft)	22	57	17	2
95th Queue (ft)	47	76	57	14
Link Distance (ft)	257	3	61	356
Upstream Blk Time (%)		24	1	
Queuing Penalty (veh)		42	2	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Banks Road &

Movement	WB	NB	SB
Directions Served	LTR	LR	LR
Maximum Queue (ft)	24	35	34
Average Queue (ft)	1	8	4
95th Queue (ft)	9	31	23
Link Distance (ft)	456	3897	213
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Hwy 6 & Aerts Road

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	R
Maximum Queue (ft)	44	125	52	50	34
Average Queue (ft)	2	13	21	14	5
95th Queue (ft)	21	67	49	40	22
Link Distance (ft)	358	492	582	3897	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					50
Storage Blk Time (%)				0	0
Queuing Penalty (veh)				0	0

Intersection: 41: Banks Road & Hwy 47

Movement	EB	WB	NB	SB	SB
Directions Served	LT	TR	LTR	L	R
Maximum Queue (ft)	14	112	74	82	55
Average Queue (ft)	1	31	38	20	41
95th Queue (ft)	8	85	66	67	66
Link Distance (ft)	3	4615	51	333	
Upstream Blk Time (%)	0		1		
Queuing Penalty (veh)	0		1		
Storage Bay Dist (ft)					30
Storage Blk Time (%)				0	22
Queuing Penalty (veh)				0	1

Intersection: 42: Hwy 47 &

Movement	NB
Directions Served	LT
Maximum Queue (ft)	85
Average Queue (ft)	10
95th Queue (ft)	46
Link Distance (ft)	3156
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 197

Appendix F: Plan and Policy Review

Banks Transportation Systems Plan: Plan, Policy, and Regulatory Context Review

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DATE: June 5, 2009

As part of a Transportation System Plan (TSP) effort, policies and regulations affecting transportation facilities must be identified and described, including local, regional and state policies regarding highway access and rail crossings.

This memorandum summarizes plans and policies at the federal, state, regional, and local levels that directly influence transportation planning in the City of Banks. Although each document reviewed contains many policies, only pertinent policies and information are presented to help focus the discussion. This memorandum provides a policy framework for the remainder of the Banks TSP process, and new policies and improvements considered as part of the TSP effort should be consistent with adopted policies described here. This memorandum serves as the basis for identifying policies that may be out-of-date or inconsistent with other adopted policies and can also serve as the basis for updating policies to reflect current conditions and achieving consistency with other local, regional, state, and federal plans.

Documents Reviewed

The following federal, state, regional and local documents were reviewed. The general intent of these documents and the relevance to system and facility plans are summarized in this section.

- SAFETEA-LU (2005)
- Oregon Statewide Planning Goals
- Transportation Planning Administrative Rule
- Access Management Administrative Rule
- Oregon Transportation Plan (2006)
- Oregon Highway Plan (1999)
- Oregon Bicycle and Pedestrian Plan (1995)
- Oregon State Transportation Improvement Plan (2008-2011)
- Oregon Public Transportation Plan (1997)
- Oregon Rail Plan (2001)
- Freight Moves the Oregon Economy (1999)
- Washington County Comprehensive Plan (2008)

- Washington County Transportation System Plan (2002)
- City of Banks Comprehensive Plan (1979, amended 1989)
- City of Banks Transportation Network Plan (1999)
- City of Banks Growth Management Plan (1999)

Federal Policies

Safe, Accountable, Flexible, and Efficient Transportation Equity Act – A Legacy for Users (2005)

The Safe, Accountable, Flexible, and Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU), legislation that renews the nation's surface transportation law (TEA-21) through fiscal year 2009[1] was signed into law in August 2005. Federal transportation planning requirements, such as those specified in SAFETEA-LU and its implementing regulations, are addressed through state and local plans.

State Plans and Policies

Oregon Statewide Planning Goals (OAR 660-015)

Since 1973, Oregon has maintained a strong statewide program for land use planning. The foundation of that program is a set of 19 statewide planning goals. The TPR and the transportation system plans identified in the TPR are the results of implementation of Goal 12—Transportation. Oregon's statewide goals are achieved through local comprehensive planning, of which transportation system plans must be made a part. The goals which apply to transportation system planning are described below; other goals may apply depending on the area addressed by a particular transportation system plan or facility plan.

- **Goal 1—Citizen Involvement:** Develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.
- **Goal 2—Land Use Planning:** Establish a land use planning process and policy framework as a basis for all decisions and actions related to use of land to assure an adequate factual base for such decisions and actions.
- **Goal 2—Agricultural Lands:** Preserve and Maintain agricultural lands for farm use, consistent with existing and future needs for agricultural products, forest, and open space.
- **Goal 6—Air, Water and Land Resources Quality:** Maintain and improve the quality of the air, water and land resources of the state.
- **Goal 9—Economic Development:** Provide adequate opportunities for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

[1] See the Surface Transportation Policy Project, http://www.istea.org/, for current information on SAFETEA-LU; U.S. Department of Transportation, http://www.fhwa.dot.gov/reauthorization/safetea.htm

- **Goal 11—Public Facilities and Services:** Plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.
- **Goal 12—Transportation:** Provide and encourage a safe, convenient, and economic transportation system.
- **Goal 13—Energy Conservation:** Conserve energy.
- **Goal 14—Urbanization:** Provide for an orderly and efficient transition from rural to urban land use.

Statewide Planning Goal 12 (Oregon Transportation Planning Rule) (OAR 660-012)

The objective of the Transportation Goal (Goal 12) is a safe, convenient, multimodal and economic transportation system. Goal 12 states that a consideration of local and regional economies, social consequences, environmental impacts, energy, the needs of transportation disadvantaged, and over reliance on a single mode should be included in local plans. Guidelines for planning and implementation are included to support the Statewide Planning Goals.

In 1991, the Land Conservation and Development Commission (LCDC), with the concurrence of the Oregon Department of Transportation (ODOT), adopted the Transportation Planning Rule (TPR), Oregon Administrative Rule (OAR) 660 Division 12, to implement Goal 12 (amended in May and September 1995, and March 2005). The TPR requires cities (with a population of 2,500 or greater) and counties to prepare and adopt a TSP. Because the population of Banks is approximately 1,435[2], the City is not required to have an adopted TSP. However, Banks has experienced considerable relative growth, and the City is responding by examining transportation system strategies for the future of the community.

The TPR requires local governments to adopt land use regulations consistent with county, state and federal requirements "to protect transportation facilities, corridors, and sites for their identified functions" (OAR 660-012-0045(2))."

The TPR has three key elements that guide planning[3]:

1. TSPs to support comprehensive plans – these are multi-modal assessments of needs, options and priorities developed at a community level
2. Criteria for Comprehensive Plan/zone changes that would alter a TSP
3. Guidelines for rural areas that differentiate them from urban areas for transportation planning

The overarching goals to be accomplished by the TPR are to:

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[2] Source: *2007 Oregon Population Report*, Portland State University Population Research Center: < http://www.pdx.edu/media/p/r/PRC_Population_Report_2007.pdf>

[3] *Oregon's Transportation Planning Rule Goes into the Shop for Repairs*, Ransford S. McCourt, August 2005

- Reduce dependence on the automobile and the number of people driving alone.
- Establish a stronger connection between land use and transportation planning.

Per the TPR, the elements that must be contained in a TSP are dependent upon the size of the local jurisdiction and whether the jurisdictional agency preparing the TSP is a Metropolitan Planning Organization (MPO). The TSPs of metropolitan areas and MPOs are required to include more elements than smaller cities. As noted, Banks, as a city of under 2,500 persons, is not required to have a TSP, but is seeking to adopt a transportation plan that is in line with state guidance relevant to small cities. Therefore, the City's TSP effort will include elements that are required of small cities, such as the following:

- A determination of transportation system needs, including needs of the transportation disadvantaged and for movement of goods and services to support industrial and commercial development planned for pursuant to OAR 660-009 and Goal 9 (Economic Development)
- A road plan for a system of arterials and collectors which includes/addresses:
    - Standards for the layout of local streets and other important non-collector street connections that provide for safe and convenient bike and pedestrian circulation. Street standards will address extensions of existing streets, connections to existing or planned streets (including arterials and collectors), and connections to neighborhood destinations
    - Functional classifications of all roadways
    - Access management
- Bicycle and pedestrian planning
- A list of planned transportation facilities and major improvements;
- A general estimate of the timing for planned transportation facilities and major improvements.

If the Banks TSP proposes an alternative which entails improvements being made outside the city's UGB, the actions would either need to be accordance with requirements of 660-012-0065 (Transportation Improvements on Rural Lands) or would require an exception in accordance with the stipulations of 660-012-0070 (Exceptions for Transportation Improvements on Rural Land).

Preparation of the Banks TSP will be coordinated with affected state and federal agencies, local governments, special districts, and private providers of transportation services. Banks will amend its land use regulations as necessary to implement the TSP.

Access Management Rule (OAR 734-051)

OAR 734-051, commonly known as the Access Management Rule, defines the State's role in managing access to highway facilities in order to maintain functional use and safety and to preserve public investment. The Access Management Rule is the basis for providing

improvements associated with development. The provisions in the Access Management Rule apply to all roadways under the state's jurisdiction. The Access Management Rule includes spacing standards for varying types of state roadways and provisions for developments such as commercial centers. In Banks the Access Management Rule is applicable to OR 6 and OR 47.

The purpose of the Access Management Rule is to control the issuing of permits for access to state highways, state highway rights of way and other properties under the State's jurisdiction. In addition, the ability to close existing approaches, set spacing standards and establish a formal appeals process in relation to access issues is also identified. These rules enable the State to set policy and direct location and spacing of intersections and approaches on state highways, ensuring the relevance of the functional classification system and preserving the efficient operation of state routes. Regulating access can help achieve the following:

- Protection of resource lands
- Preservation of highway capacity
- Improved safety for segments of state routes with sharp curves, steep grades or obstructed sight distance.

The Access Management Rule establishes procedures and criteria used by ODOT to govern highway approaches, access control, spacing standards, medians and restriction of turning movements in compliance with statewide planning goals and in a manner compatible with acknowledged comprehensive plans and consistent with ORSs, OARs, and the Oregon Highway Plan (OHP).

The TSP will provide access management recommendations for the improvement and/or maintenance of the existing system.

Oregon Transportation Plan (2006)

The Oregon Transportation Plan (OTP) is a policy document developed by ODOT in response to federal and state mandates for systematic planning for the future of Oregon's transportation system. The OTP is intended to meet statutory requirements (ORS 184.618(1)) to develop a state transportation policy and comprehensive long-range plan for a multi-modal transportation system that addresses economic efficiency, orderly economic development, safety, and environmental quality. The OTP is a long-range policy document that defines goals, policies and actions for the state for the next 40 years. The OTP's goals, policies, and actions integrate all modes of transportation with the intention of encouraging the most appropriate mode for each type of travel. The Plan's System Element identifies a coordinated multimodal transportation system to be developed over a 25-year horizon which is intended to implement the goals and policies of the Plan. The goals and policies of the OTP cover a broad range of issues and provide a framework to further existing policy objectives with emphasis on maintaining the assets in place, optimizing the existing system performance through technology and better system integration, creating sustainable funding, and investing in strategic capacity enhancements.

The OTP addresses issues of population growth, economic development, sustainability, global warming, and transportation system funding among other challenges. It is the state's 25-year multimodal state transportation plan for airports, bicycles and pedestrian facilities, highways and roadways, pipelines, ports, public transportation, rail and waterways.

Updated OTP work elements and products include:

- Trend analysis;
- Policy refinement;
- Inventory of system condition & needs;
- Financial forecast;
- Identification of system priorities;
- Identification of investment strategies;
- Public outreach program; and
- Plan implementation strategies.

The OTP implementation element is focused on mitigating congestion, strengthening transportation's role in economic development, serving the needs of an aging population, reducing traffic fatalities and serious injuries, increasing technology's role in improving safety and efficiency, protecting and sustaining resources, prioritizing investments, and making the most strategic use of limited funding.

The goals and policies of the OTP most directly applicable to the Banks TSP process are below. The Banks TSP will incorporate all relevant aspects of the OTP.

Goal 1: Mobility and Accessibility

Policy 1.1 – Development of an Integrated Multimodal System

Policy 1.2 – Equity, Efficiency and Travel Choices

Goal 2: Management of the System

Policy 2.1 – Capacity and Operational Efficiency

Policy 2.2 – Management of Assets

Goal 3: Economic Vitality

Policy 3.1 – An Integrated and Efficient Freight System

Policy 3.2 – Moving People to Support Economic Vitality

Policy 3.3 – Downtowns and Economic Development

Goal 4: Sustainability

Policy 4.1 – Environmentally Responsible Transportation System

Policy 4.2 – Energy Supply

Policy 4.3 – Creating Communities

Goal 5: Safety and Security

Policy 5.1 – Safety

Policy 5.2 – Security

Goal 6: Funding the Transportation System

Policy 6.2 – Achievement of State and Local Goals

Policy 6.3 – Public Acceptability and Understanding

Policy 6.4 – Beneficiary Responsibilities

Policy 6.5 – Triage in the Event of Insufficient Revenue

Goal 7: Coordination, Communication, and Cooperation

Policy 7.1 – A Coordinated Transportation System

Policy 7.2 – Public/Private Partnerships

Policy 7.3 – Public Involvement and Consultation

Policy 7.4 – Environmental Justice

Oregon Highway Plan (1999)

The 1999 OHP, an element and modal plan of the state's comprehensive transportation plan (OTP), guides the planning, operations, and financing of ODOT's Highway Division. The basic framework for the OHP is a refinement and application of the goals and policies stated in the OTP applied to the state highway system. The OHP gives policy and investment direction to large scale facility plans and TSPs, but is not intended to direct specific projects and modal alternatives. Policies in the OHP emphasize the efficient management of the highway system to increase safety and to extend highway capacity, partnerships with other agencies and local governments, and the use of new techniques to improve road safety and capacity. These policies also link land use and transportation, set standards for highway performance and access management, and emphasize the relationship between state highways and local road, bicycle, pedestrian, transit, rail, and air systems.

Specific OHP policies with direct bearing on transportation system planning in Banks include the following:

Goal 1: System Definition

Policy 1A: State Highway Classification System

Policy 1A develops a state highway classification system to guide ODOT priorities for system investment and management. The state highway classification system includes five classifications: Interstate, Statewide, Regional, District, and Local Interest Roads. It also includes special provisions for roadways classified as an Expressway.

The Banks TSP will analyze two highways – OR 6 and OR 47. Both are classified as Statewide Highway. Inside the city limits of Banks, OR 6 is functionally classified in the OHP as a Regional Highway, a freight route and a truck routes. Regional Highways are intended to provide inter-urban and inter-regional mobility and provide connections and links to regional centers, Statewide or Interstate Highways, or economic or activity centers of regional significance. The management objective is to provide safe and efficient, high-speed, continuous-flow operation in rural areas and moderate to high-speed, continuous flow operation in rural areas and moderate to high-speed operations in urban and urbanizing areas. A secondary function is to serve land uses in the vicinity of these highways.

OR 47 is functionally classified in the OHP as a Statewide Highway, which provides inter-urban and inter-regional mobility and provide connections to larger urban areas, ports, and major recreation areas that are not directly served by Interstate Highways. A secondary function is to provide connections for intra-urban and intra-regional trips. The management objective is to provide safe and efficient, high-speed, continuous-flow operation. Inside Special Treatment Areas (STAs), local access is also a priority.

The management objective for Statewide Highways is to provide safe and efficient, high-speed, continuous-flow operation along the corridor, with minimal interruptions to flow in constrained or urban areas. The Banks TSP will need to balance the state's management objectives for OR 6 and OR 47 with the local needs and objectives of Banks in relation to the highways.

OR 47 within the TSP study area is designated as a STA, which is a designated district of compact development located on a state highway within an UGB where the need for appropriate local access outweighs the considerations of highway mobility except on designated OHP freight routes (OR 47 is only a truck route in the study area, not a freight route).

Policy 1B: Land Use and Transportation

This policy recognizes the role of both state and local governments regarding the state highway system and calls for a coordinated approach to land use and transportation planning. It calls for coordination between ODOT and local governments to develop plans that support compact development within commercial and community centers, and provides a definition for four highway segment designations which help guide the state's position on local land use planning and development standards. These designations are Special Transportation Areas (STAs), Commercial Centers, Urban Business Areas (UBAs), and Urban segments.

The state-administered highways within the City of Banks are OR 6 and OR 47. The section of OR 47 from mile points 82.85-83.58 is designated as a principal arterial. The section of OR 47 inside Banks is designated a STA, but not as a Commercial Center, or UBA. The Banks TSP will be performed in coordination with Washington County, ODOT, and DLCD. In accordance with this policy, an analysis of planned future land uses will be performed for the TSP to identify the potential for minimizing or mitigating future capacity deficiencies through land use modifications.

Policy 1C: State Highway Freight System

OR 6 within Banks is designated as a Freight Route, and the route should balance the need for movement of goods with other uses of the highway system, and to recognize the importance of maintaining efficient through movement on major truck freight routes.

Policy 1F: Highway Mobility Standards Access Management Policy

This policy provides specific mobility standards for state highway sections, signalized intersections, and interchanges. Alternative standards are provided for certain locations and under certain conditions.

OR 47 is classified as a statewide highway, part of the National Highway System, a truck route, and a Special Transportation Area (STA) for its entire length within the study area.

OR 6 is classified as a Regional Highway, a Freight route, and a truck route.

Oregon Bicycle and Pedestrian Plan (1995)

The Oregon Bicycle and Pedestrian Plan provides guidance to regional and local jurisdictions for the development of safe, connected bicycle and pedestrian systems. The plan is a modal element of the OTP. It contains the standards used on state highway projects and provides guidance to cities in establishing facilities on local transportation systems.

The goal of the Plan is the provision of safe and accessible bicycling and walking facilities for the purposes of encouraging increased levels of bicycling and walking. The Plan provides actions that will assist local jurisdictions in understanding the principles and policies that ODOT follows in providing bike and walkways along state highways. In order to reach the plan's objectives, the strategies for system design are outlined, including:

- Providing bikeway and walkway systems that are integrated with other transportation systems.
- Providing a safe and accessible biking and walking environment.
- Development of education programs that improve bicycle and pedestrian safety.

The document includes two sections, including the Policy & Action Plan and the Bikeway & Walkway Planning Design, Maintenance & Safety Plan. The first section contains background information, legal mandates and current conditions, goals, actions and implementation strategies ODOT proposes to improve bicycle and pedestrian transportation. The second section assists ODOT, cities and counties in designing, constructing and maintaining pedestrian and bicycle facilities. Design standards and

information on safety is provided. These standards are recommended but are not required for use by local jurisdictions in Oregon.

The Oregon Bicycle and Pedestrian Plan also addresses the Oregon Bike Bill (ORS 366.514). This law requires ODOT, counties, and cities in Oregon to expend reasonable amounts of the highway fund to provide bikeways and walkways. It also requires the inclusion of bikeways whenever roadways are constructed, reconstructed, or relocated – except in the following situations:

- There would be no probable use
- Safety would be jeopardized
- The cost would be excessively disproportionate to the need or probable use

The Banks TSP will integrate the guidance of the Oregon Bicycle and Pedestrian Plan and recommended actions will include bicycle/pedestrian elements in accordance with the Bike Bill.

State Transportation Improvement Program (STIP) (2008-2011)

The current adopted (2008-2011) Statewide Transportation Improvement Program (STIP) serves as ODOT's short term capital improvement program and provides funding and scheduling information for transportation projects for both ODOT and the metropolitan planning organizations in the state. Projects funded in the STIP reflect and advance the OTP for highways, public transportation, freight and passenger rail and bicycle and pedestrian facilities.

The 2008-2011 STIP has one project in Banks, which entails constructing a shared-use path, trailhead parking and landscaping (the Banks-Vernonia trail).

Oregon Public Transportation Plan (1997)

The Oregon Public Transportation Plan develops transit, rideshare and transportation demand management services as well as implementing the public transportation system envisioned in the OTP. The plan describes the roles and responsibilities of key players, provides a financial investment strategy and identifies both short and long term implementation steps. The plan provides minimum levels of service standards for public transportation operations. These criteria include peak and off-peak frequencies, vehicle maintenance programs and replacement schedules, intermodal connections and ridesharing. The Banks TSP will incorporate all relevant aspects of this plan.

Oregon Rail Plan (2001)

The Oregon Transportation Commission adopted four policies (included in the Freight Rail Policy). The relevant policies for the Banks TSP are included below:

1. Increase economic opportunities for the State by having a viable and competitive rail system.
2. Strengthen the retention of local rail service where feasible.

4. Integrate rail freight considerations into the State's land use planning process.

Located in Banks are active Portland and Western (P&W) and Port of Tillamook Bay (POTB) Railroad lines, and freight is important to industry and commercial activities in the City. P&W hauls wood and industrial products, plastic and automotive parts along with feed grains. The section of track between United Junction and Banks is in Federal Railroad Administration (FRA) Class 1 and 2 conditions, which means that the freight speed is limited to 10 mph for class 1, and 25 mph for class 2. The POTB railroad is one of the most rugged rail lines in the state with steep gradients and sharp curves. The railroad ships wood products outbound and feed grains inbound. POTB interchanges with the P&W at Banks.

The freight element of the Rail Plan describes the owners of the rail lines within Oregon, commodities that will be handled in Oregon in the future, identifies potential funding sources and funding needs, and assess what the users of the rail system think of their rail service and the role that ODOT might play in rail service.

Freight Moves the Oregon Economy (1999)

Freight plays a major role in the health of the Oregon economy. Most freight moves by truck, rail, waterway, air, and pipeline, with trucks accounting for the greatest volume of fright moved nationally and in Oregon. Depending on how it is measured, freight transportation accounts for between five and 15 percent of the national and state economy. There are a number of companies in the freight industry, though most industries in Oregon rely on freight to move goods to various markets nationally and internationally.

The report focuses on established statewide plans and targets various areas for improvement to continue to move freight throughout Oregon. Major concerns for the existing facilities include safety and congestion. The report analyzes the current conditions of the road and rail system to identify problem areas and need for improvement.

The report concludes with a suggestion for next steps including additional data gathering, and addressing further issues such as funding and Intelligent Transportation Systems to optimize and prioritize improvements to the current freight system.

Washington County is the second highest county for manufacturing employment numbers, and the fifth highest in agricultural sales. Washington County is dependent upon freight for economic vitality. Given this fact, it is vitally important that the Banks TSP incorporate freight considerations.

Regional Plans

Washington County Comprehensive Framework Plan for the Urban Area (Updated 2008)

Washington County's Comprehensive Framework Plan for the Urban Area includes policies directing development and growth within the county, and is the legal framework for comprehensive planning and community development in Washington County. The Framework Plan's overall goal is to accommodate changes and growth in the physical, economic and social environment, in response to the needs of the county's citizens.

The policies that are directly applicable to the Banks TSP are:

- Policy 32, Transportation: The policy of Washington County is to regulate the existing transportation system and provide for the future transportation needs of the County through the development of a transportation Plan as an Element of the Comprehensive Plan. The Washington County Transportation Plan is reviewed below. The County specifies the necessary transportation improvements, maintenance and reconstruction activities needed to carry out the Comprehensive Plan in the Transportation Plan. The County implements the Transportation Plan capital improvements and maintenance programs through a combination of public expenditures, private development actions and the assessment of impact fees.
- Policy 38, Transportation Conservation: The policy of Washington County is to establish a balanced and an efficient transportation system which implements the land use plan and is designed to minimize energy impacts. The County will support planning for and provision of alternative modes of transportation including walking, bicycling, mass transit, carpooling, vanpooling, and ride sharing as a means of conserving energy. The county will also re-examine its road standards to determine the appropriateness and need for current specifications for width of pavements, encourage new and existing governmental, business and industrial employers to provide ride pools and vans for commuting transport of employees to and from work, and grant parking priority to carpooling, vanpooling, and ride-sharing employees of the County.

Washington County 2020 Transportation Plan (2002)

The 2020 Transportation Plan is one of several elements that comprise the Washington County Comprehensive Plan (reviewed above). The Plan supports the adopted development patterns in the community plans, the Rural/Natural Resource Plan, and city comprehensive plans. The Transportation Plan also implements the applicable policies and strategies of the community plans and the Rural/Natural Resource Plan, while addressing provisions of the Regional Transportation Plan and the state Transportation Planning Rule.

Many provisions of the Transportation Plan are implemented by the various community plans, the Rural/Natural Resource Plan and the Community Development Code.

The Washington County TSP includes a general policy to guide transportation system development, programs and strategies within the county. The general policy is:

1. Travel Needs Policy, which provides a multi-modal transportation system that accommodates the diverse travel needs of Washington County residents and businesses.

In addition to the general policy, the TSP includes Policies and modal elements which include:

2. System Safety Policy – provide a transportation system that is safe.
3. Built and Natural Environment Impacts Policy – avoid, limit, and/or mitigate adverse impacts to the built and natural environment that are associated with the transportation system and its improvement, operation and maintenance.

4. System Funding Policy – Aggressively seek adequate and reliable funding for transportation facilities and services, and to ensure that funding is equitably raised and allocated.
5. System Implementation and Plan Management Policy – efficiently implement the transportation plan and efficiently manage the transportation system.

There is a roadway element of the TSP:

6. Roadway System Policy – Ensure that the roadway system is designed in a manner that accommodates the diverse travel needs of all users of the transportation system.
7. Transportation System Management (TSM) Policy – Effectively manage the urban arterial roadways within the county.
8. Roadway Safety Policy – Provide a roadway system that is safe for motorists, pedestrians and bicyclists.
9. Roadway Maintenance Policy – Ensure the roadway system is structurally sound and adequately maintained.
10. Functional Classification Policy – Ensure the roadway system is designed and operates efficiently through use of a roadway functional classification system. Applicable street classifications include: Principal Arterials (Freeways and Highways), and Collector Streets. Each functional classification has its own roadway design standards (see table 1 below).

Table 1: Washington County Functional Classification Design Parameters

Roadway Classification	Lanes	Bike Lanes	Max. ROW	Max. Paved Width
Principal Arterials and Arterials	7	Yes	122 Feet	98 Feet
	5	Yes	98 Feet	74 Feet
	3	Yes	90 Feet	50 Feet
	2	Yes	90 Feet	48 Feet
Collectors	5	Yes	98 Feet	74 Feet
	3	Yes	74 Feet	50 Feet
	2	Yes	74 Feet	50 Feet

11. Road Jurisdiction Policy – Have or seek jurisdiction over a countywide road system that serves major county travel movements, and to pursue the transfer of roads that are not part of that system to other jurisdictions.

Transit Element

12. Transit Policy – Encourage and support development of transit facilities and services that increase transit use in Washington County.

Demand Management Element

13. Demand Management Policy – Encourage and Support implementation of demand management programs that reduce the number of single occupant vehicle trips and/or shift traffic to off-peak travel hours.

Pedestrian Element

14. Pedestrian Policy – Encourage and support greater pedestrian activity in the county by providing and maintaining an environment where walking is safe, convenient, and pleasant mode of travel. There are Pedestrian classification definitions, and only Off-Street Pathways are relevant to the City of Banks. Off-Street Pathways are paved, and multi-use, and serve an important circulation function in areas not well served by the street system and provide short cuts between origins and destinations.

Bicycle Element

15. Bicycle Policy – Encourage and support greater bicycling activity in Washington County by providing an environment in which bicycling is a safe and convenient mode of travel. OR 47 is designated as a State bicycle facility in the TSP.

Roadway Freight Element

16. Freight Policy – Develop and manage transportation system elements to ensure the safe and cost-effective movement of freight in the county. OR 47 adjacent to Banks is considered an existing through-truck route.

Air, Rail, Pipeline and Water Element

17. Air, Rail, Pipeline and Water Policy – Encourage continued use and development of air, rail, pipeline and water transportation facilities in the county. There is a rail line adjacent to the City of Banks on the east side.

System Funding and Financing Element

18. Financial Policy – Seek funding sufficient to implement this plan.

Plan Implementation and Monitoring Element

19. Transportation Planning Coordination and Public involvement Policy – Coordinate its transportation planning with local, regional, state and federal agencies and provide opportunities for citizens to participate in planning processes.

20. Capital Improvement Program and Prioritization Policy – Periodically prepare and adopt a transportation capital improvement program that establishes priorities for transportation capital improvements financed with public funds.

21. Road Maintenance/Reconstruction Prioritization Policy – Establish annual road maintenance and reconstruction programs that protect public safety and property,

and make effective use of available funds and preserve the County's investment in its transportation system.

22. Plan Monitoring Policy – Periodically review the transportation plan to ensure that, considering available resources, implementation actions are consistent with and advancing plan policies, achieving satisfactory transportation and land use benefits, and are resulting in adequate progress toward achieving mode share targets.

23. Development Review Process – Provide a development review process that identifies, addresses, and coordinates review of roadway, transit, bicycle and pedestrian facility improvements that may have a significant impact on the transportation system or the community.

Local Plans

City of Banks Comprehensive Plan (1979, Amended 1989)

The City of Banks Comprehensive Plan is a statement of policies to guide the long-range growth in the city. The Comprehensive Plan lays out the goals and policies to balance growth, economic viability, neighborhood livability, energy conservation, and maintaining resource quality.

The Comprehensive Plan addresses urbanization of undeveloped land and establishes the Urban Growth Boundary (UGB). The plan includes recommendations as to where specific land uses will be located.

The goals of the Comprehensive Plan are in line with and in direct response to the Statewide Planning Goals (reviewed earlier):

1. Citizen Involvement – Create a program of citizen involvement which facilitates the flow of information and ideas between the City and its residents, and insures the opportunity for citizen involvement in the planning process.

2. Land Use – Provide a process and basis for decisions and actions related to the existing and future uses of land, and to ensure the orderly development of the City of Banks. The objective is to situate land uses to take advantage of existing public facility systems, including transportation.

3. Agriculture – Preserve and maintain agricultural lands. Land suitable for agriculture should be preserved.

5. Open Space, Scenic and Historic Areas, and Natural Resources – Protect and enhance through proper use and development the open spaces, scenic and historic areas, and natural resources of the area. An objective of this goal is to examine publicly owned land, including street rights of way for their potential use as open space before any disposition is made.

6. Air, Water, and Land Resource – Maintain and improve the quality of the air, water and land in the Banks area.

8. Recreation – Provide programs and facilities to meet the recreational needs of area residents and visitors. Objectives to meet this goal include promoting development of pedestrian and bicycle pathways.

9. Economics – Provide for the economic diversification and stability of the area by providing sufficient zoned, buildable, and serviceable (including transportation) land for industrial and commercial uses.

10. Housing – Increase and improve the supply of housing commensurate with the community's needs by ensuring adequate, buildable and serviceable (including transportation) vacant land is zoned for all needed housing types.

11. Public Facilities and Services – Coordinate and arrange for the provision of public facilities and services in an efficient, orderly and timely manner. This goal is enforced by a policy requiring development proposals to conform to the design standards for street, water, and sewer. An additional policy requires the equitable sharing of most public facility costs between new development and the community through systems development charges, local improvement districts, or other means.

12. Transportation – Develop and encourage a safe, convenient, and economic transportation system.

    Objectives of this goal include:

    a) City streets should be a priority and a better maintenance plan should be developed.

    b) Development should occur in such a manner as to encourage and facilitate pedestrian movements

    c) Alternative modes of transportation such as public transit and bicycles should be encouraged and promoted.

    Policies of this goal include:

    1. Promote a balanced, safe, and efficient transportation system which protects the quality of neighborhoods and the community, and provide for adequate street capacity, optimum efficiency, and effectiveness.

    2. Require uses fronting on arterials to limit access, minimizing conflicts between local and through traffic.

    3. Promote adequate transportation linkages between residential, commercial and industrial use areas. This will be done through street improvements, new streets, marked turning lanes, warning signs, and/or speed reduction. Identified problems have first priority.

    4. Support efforts to secure a regional mass transit system.

    5. Maintain a street classification system.

       Arterial: Wilson River Highway (No. 6)

       Nehalem State Highway (No. 47)

Local Roads: Banks Road, Sellers Road, all other roads within city limits.

7. Promote development of a bicycle and pedestrian system to link residential areas to other land uses, especially parks, open spaces, schools, the downtown core area and commercial areas.

8. New land developments will be designed to reduce the percentage of land devoted to streets.

9. Coordinate with ODOT to implement the Six Year Highway Improvement Program, consistent with local needs and with the highway compatibility guidelines.

10. Operation, maintenance, repair or preservation of existing public road and highway facilities, as well as improvements within the existing right-of-way are consistent with the Comprehensive Plan and permitted in all zoning designations.

City of Banks Transportation Network Plan (1999)

The Transportation Network Plan (TNP) is intended to meet the need for long range planning and to serve as the transportation element of the comprehensive plan. This Network Plan also addresses the long-term (20 year) transportation needs in the City of Banks. The TSP Update will update this plan for the City of Banks to include new population/employment forecasts and changes in conditions of the transportation system and the community since 1999.

The TNP assessed existing conditions of the roadway system and identified the functional classification of roadways within the City. These classifications are not in the City's Comprehensive Plan, but are in the Washington County Transportation Plan (reviewed above).

Existing Conditions

Banks has a number of streets with different classifications, described below:

Arterial Streets: Arterial streets are major transportation corridors that provide connections between other cities and geographic areas. Access to Principle Routes is managed and coordinated to minimize degradation of capacity while providing access to abutting land uses. There are two Principle Route Arterial Streets within Banks – OR 6 and OR 47.

Collector Streets: Minor collectors are intended to provide access to abutting properties and to serve the local access needs of a neighborhood, including limiting through traffic. Banks Road, Cedar Canyon Road, and Sellers Road are Minor collectors located within or on the edge of the Banks city limits.

Local Streets: Local streets primarily provide direct access to abutting land uses. These streets have low traffic volumes and are not intended to serve through traffic. The remainder of the streets in Banks (not mentioned above) are classified as Local Streets.

Transportation Projects

In the TNP, three options for the realignment of Sellers Road were presented to upgrade the intersection of Main Street (OR 47)/Sellers Road/Banks Road. All three options assume the completion of the Banks–Vernonia Linear Trail and the need for a future traffic signal at the intersection to accommodate trail usage. All options can be designed to accommodate turning movement radii for log trucks and school buses.

The recommended TNP option is to realign Sellers Road to the east of the current Sellers Road/Banks Road intersection (Option 3). Sellers Road would be realigned west of the antique store building on the vacated Burlington Northern alignment. This alignment reduces the number of rail crossings, has the lowest right-of-way and construction costs, is most compatible with the completion of the Banks-Vernonia Linear Trail, and minimizes vehicle queuing conflicts with the railroad tracks. The project was recommended to include the following:

- New curb, gutter, and sidewalks on all corners of the intersection
- Regrading and realigning Sellers Road
- Provisions for completion of the Linear trail including installing a culvert, retaining walls and paving the trail between Banks Road and the Depot
- Upgrading the railroad crossing gates on Banks Road
- Modifying the north driveway access to the antique store to provide improved sight distance to Sellers Road
- Grading on Banks Road to ensure adequate sight distance at the intersection of Banks Road and Sellers Road
- Installing a traffic signal at the Main Street (OR 47) and Banks Road intersection when warranted

The project Advisory Committee did not support the alternative recommended by the TNP, instead favoring the second option, which would add roughly $250,000 to the project costs.

Another project from the Banks Comprehensive Plan included in the TNP is a South Banks secondary access. In all secondary access options, a secondary access into South Banks would pass outside of the Banks Urban Growth Boundary, and would require an exception to statewide planning goals. However, the Transportation Planning Rule does permit new roads without an exception under the following condition:

  - The new road should reduce local access to or local traffic on the state highway, and is limited to two travel lanes. Private access and intersections shall be limited to rural needs or to provide adequate emergency access.

The recommended secondary access option would connect into the Banks Estates and Arbor Village. It was noted that this secondary access road should be designed to keep speeds low and limited to residential traffic by incorporating gentle curves and changes in grade where possible. The new road would reduce local traffic on the state highway and provide secondary emergency access into Banks.

The TNP further recommends, concurrent with the new secondary access connection, that Wilkesboro Road be repaved and Aerts Road upgraded and paved to accommodate the

anticipated increased traffic. The Plan says that OR 6 should be widened to provide a westbound left turn lane at Aerts Road.

Recommended Improvements

The TNP proposes different functional classifications for the streets in the City of Banks. The classification is intended to be compatible with ODOT and Washington County roadway classifications, as well as correct current misclassifications.

The TNP recommended traffic signals at two locations, the intersection of Main Street (OR 47) and Oak Way, and the intersection of Main Street (OR 47) and Banks Road (when warranted). Since the publication of the TNP, the traffic signal at OR 47 and Oaks Way has been added, but the second has not. The timing of the need for the second traffic signal is dependent on the actual rate of traffic growth at the intersection and realignment of Sellers Road. If Sellers Road is realigned to OR 47, the traffic signal may not be needed for roughly 15 years; however, if Sellers is realigned to Banks Road, the additional traffic from Sellers will cause the traffic signal to be warranted in approximately 10 years.

Main Street Design Recommendations[4]

Per Plan recommendations Main Street (OR 47) is paved at 38 to 40 feet within a 60 foot right-of-way. In the downtown, many of the store fronts are on the right-of-way boundary, making widening the street expensive and unlikely. The Plan states that on-street parking is essential to the vitality of the local businesses and should be retained.

Parking Improvement Recommendations

According to the Plan, additional parking should be created in downtown to meet existing and future parking demand.

Bicycle Plan Recommendations

An existing shared bicycle/pedestrian path in the Arbor Village development does not fully connect to other streets. The Plan states that the City should complete the north/south connection to Commerce Street.

Pedestrian Plan Recommendations

The Plan states that sidewalks should be constructed on neighborhood streets and along parts of North Main Street and Oak Way. The following streets have missing sidewalks that should be constructed.

- Banks Road
- Cedar Canyon Road
- Main Street (OR 47)
- Parmle Street
- Woodman Street

In addition, there is a short off-street sidewalk connection that should be completed between Oak Way and an existing path near the Post Office.

[4] It should be noted that these **are not** the recommendations of the current TSP – these recommendations will be updated based on revised population, employment and UGB expansion outcomes.

The TNP includes a detailed list of projects, mostly consisting of repaving, chip seal and sidewalk construction. Most are with a 10 year time frame, and should be considered when developing projects for the TSP.

City of Banks Growth Management Plan (1999)

The Growth Management Plan is a response to population growth, and provides a framework for future growth and development of the City of Banks. It primarily serves to promote compact, efficient, and orderly development by balancing community development, new housing, services, and employment opportunities. The Growth Management Plan provides direction for the periodic review of the Banks Comprehensive Plan and serves as a basis for complying with State planning requirements.

The plan contains the following elements:

- Community vision – the statement for future growth of the city.
- Population and Employment Forecasts – the technical base for the growth management plan.
- Land Use and Infrastructure Analysis – provides a complete picture of land use inside the UGB, and includes existing and planned infrastructure.
- Land Needs Analysis – identifies the amount of land needed to accommodate projected population and employment growth inside the urban area.
- Banks Town Plan – recommends future land use, transportation and urban design improvements, consistent with the community vision and planning requirements.
- Evaluation of Alternative Growth Concepts – evaluated four growth alternatives, and provides justification and reasoning for the preferred alternative or Town Plan.

Community Vision

Relevant community vision elements to the TSP include connection to surrounding urban and rural communities and a transportation system that:

- Ensures future growth can be accommodated, while offering choices for travel by foot, bicycle, automobile, and potential future transit service
- Provides a connected pattern of streets for direct and convenient travel
- Develops alternative north-south and east-west streets to reduce reliance on State highways for local travel
- Reduces truck traffic in residential areas
- Enhances Main Street, including redesign of the Banks Road/Sellers Road/Main Street intersection
- Maintains the viability and safety of the railroad