

CITY OF BANKS TRANSPORTATION SYSTEM PLAN



PREPARED FOR:

THE CITY OF BANKS, OREGON



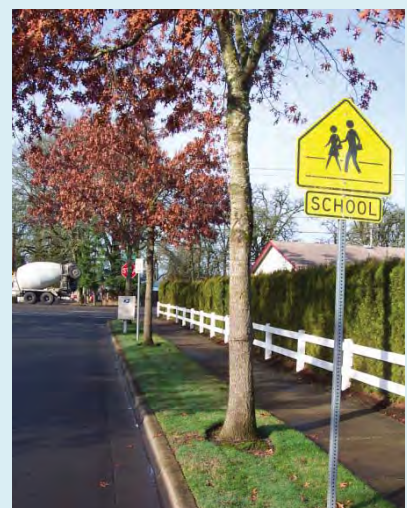
PREPARED BY:

CH2MHILL

WITH SUPPORT FROM:

**OREGON DEPARTMENT OF TRANSPORTATION
WASHINGTON COUNTY, OREGON**

OCTOBER 2010



CONTENTS

Section	Page
1 Introduction	1
2 Planning Process	2
Public Involvement.....	2
Existing Conditions.....	2
Existing Operations and Traffic Analysis.....	14
Regulatory Environment.....	20
Future Traffic Analysis.....	21
3 Alternatives Evaluation and Recommendations.....	34
Concepts to Address Needs Identified in TSP Analysis.....	35
Concepts to Service Expanded UGB Areas	46
Future Functional Classification of Roadways	59
4 Implementation	62
State Funding Sources	62
County Funding Sources.....	65
Local Funding Sources	66

Appendixes

- A Plan and Code Amendments
- B Transportation System Needs, Opportunities, and Constraints
- C Alternatives Evaluation
- D Planning Level Cost Estimates

This project is partially funded by a grant from the Transportation and Growth Management (TGM) Program, a joint program of the Oregon Department of Transportation and the Oregon Department of Land Conservation and Development. This TGM grant is financed, in part, by federal Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), local government, and the State of Oregon funds.

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

Project Staff

City of Banks

Jim Hough

KJ Won

Jolynn Becker

Oregon Department of Transportation

Ross Kevlin

Consultant Staff

CH2M HILL, Inc.

Michael Hoffmann

Kirsten Pennington

Terra Lingley

Andy Kutansky

Terry Yuen

Andra Henriques

Tegan Houghton

Technical Advisory Committee

Ross Kevlin, ODOT Region 1

Joseph Auth, ODOT Region 1

Gloria Gardiner, DLCD

Gary Fish, DLCD

Blair Crumpacker, Washington County
DLUT

Steve Kelley, Washington County
DLUT

Andy Braun, Clean Water Services

Bill Steele, Washington County Sheriff

Levi Eckhardt, Banks Fire District

Jim Foster, Banks School District

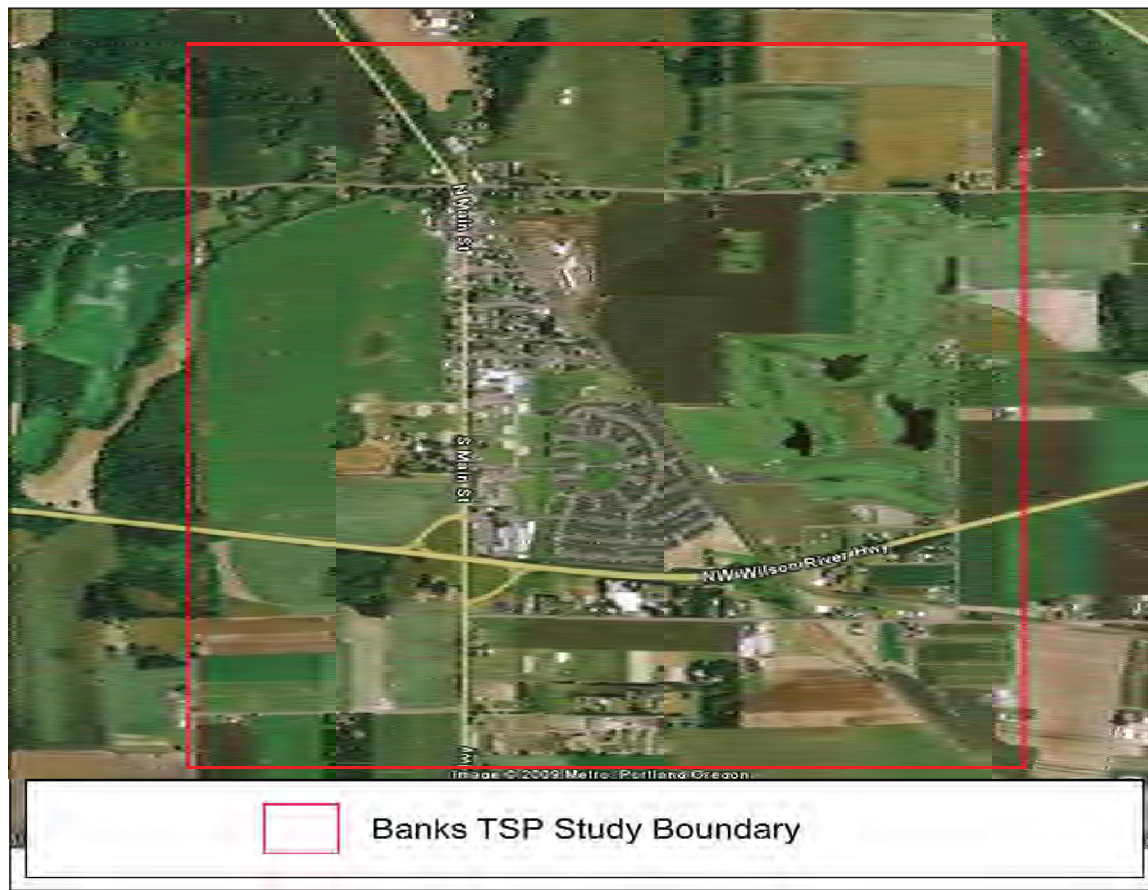
1 INTRODUCTION

The Banks Transportation System Plan addresses key issues related to transportation within the existing City of Banks urban growth boundary (UGB) as well as issues related to the proposed expansion of the UGB. This plan was led by the City of Banks in coordination with the Oregon Department of Transportation (ODOT), Washington County and the Department of Land Conservation and Development (DLCD).

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 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.

FIGURE 1: BANKS TSP STUDY AREA



2 PLANNING PROCESS

This section describes the planning process for the Banks Transportation System Plan, including public involvement, existing and future conditions analysis, and development and evaluation of alternatives.

Public Involvement

Banks community members, stakeholders, and representatives from the City, Washington County, ODOT, and DLCD provided guidance and policy direction for this plan. The Technical Advisory Committee (TAC) for the TSP planning process included members of ODOT, Washington County, and DLCD as well as members of public service provider agencies.

Three community meetings devoted specifically to discussion of the Banks TSP were held; two at Banks Elementary School (April 2009 and October 2010) and one at Schlegel Hall in Sunset Park (June 2009); these meetings allowed substantial input and feedback from the community. The first community meeting collected input on the deficiencies and needs related to existing conditions analysis results. The second community meeting collected input on the deficiencies and needs related to future conditions analysis results and gathered comments on the potential solution concepts under consideration. The final community meeting presented the draft project recommendations for public review and comment. Future traffic analysis conditions were reassessed in spring 2010 to account for the revised UGB expansion strategy approved by the city (the previous UGB expansion preferred alternative from July 2009 had been discarded).

Project background information, the project schedule, open house announcements, meeting summaries, and technical materials were made available on the City of Banks website (<http://www.cityofbanks.org/>). In addition to community meetings, public comments were also collected via email and regular mail.

Existing Conditions

The first step in the planning process was to determine the current transportation conditions within the study area. The project team collected information on traffic operations, safety issues, and the layout of study intersections. These current conditions were verified with the Project Management Team and the TAC.

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-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 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 south-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.

Development Potential & Constraints

The City of Banks has a number of vacant¹ and underutilized² properties that could be respectively developed or more intensely developed. The Banks area contains a number of environmental constraints to development. Small pockets of 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; as shown on Figure 3. 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.

¹ "Vacant" defined as lots that do not contain any structures

² "Underutilized" defined as lots not being currently used to the intensity/density allowed under current zoning

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

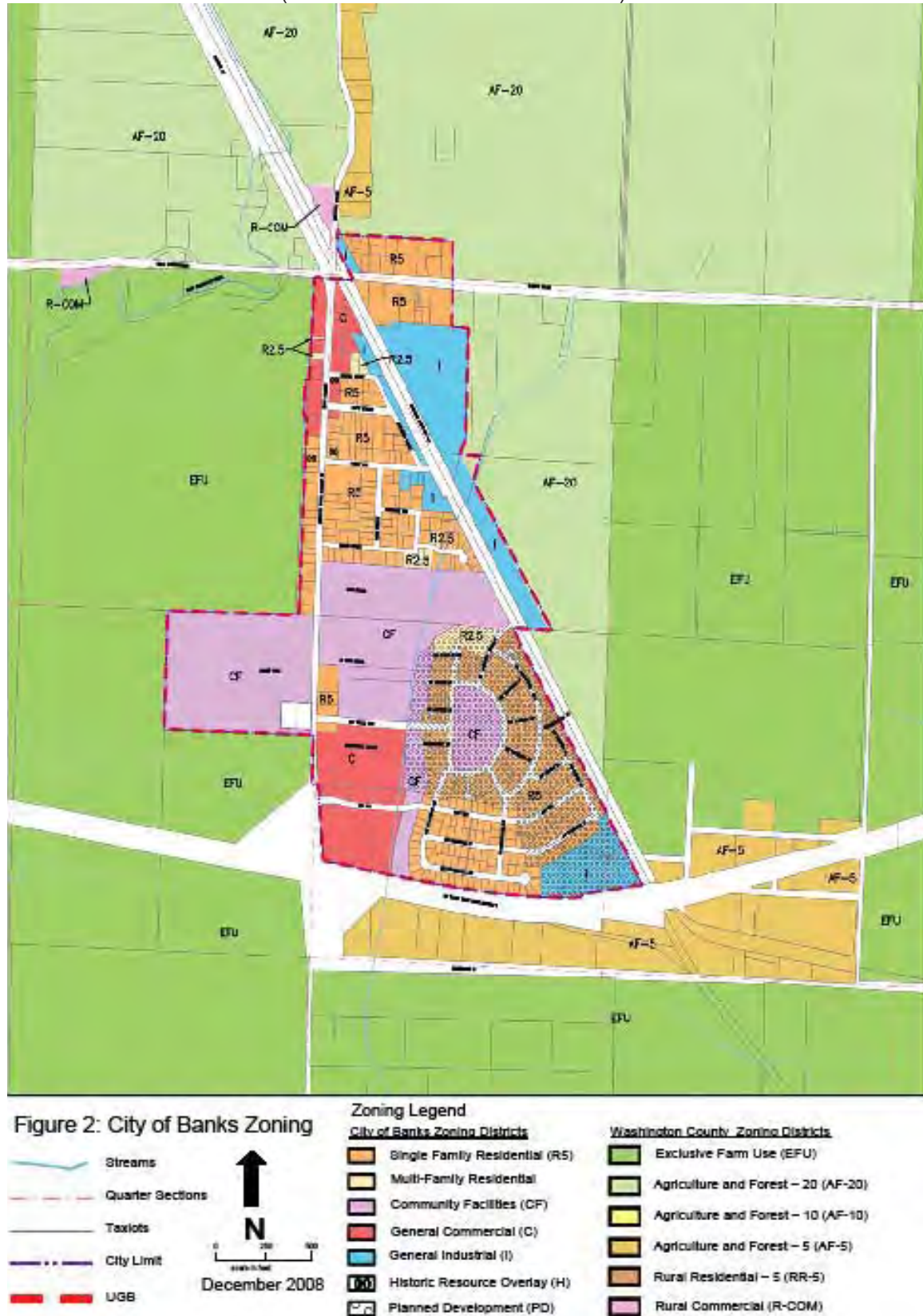
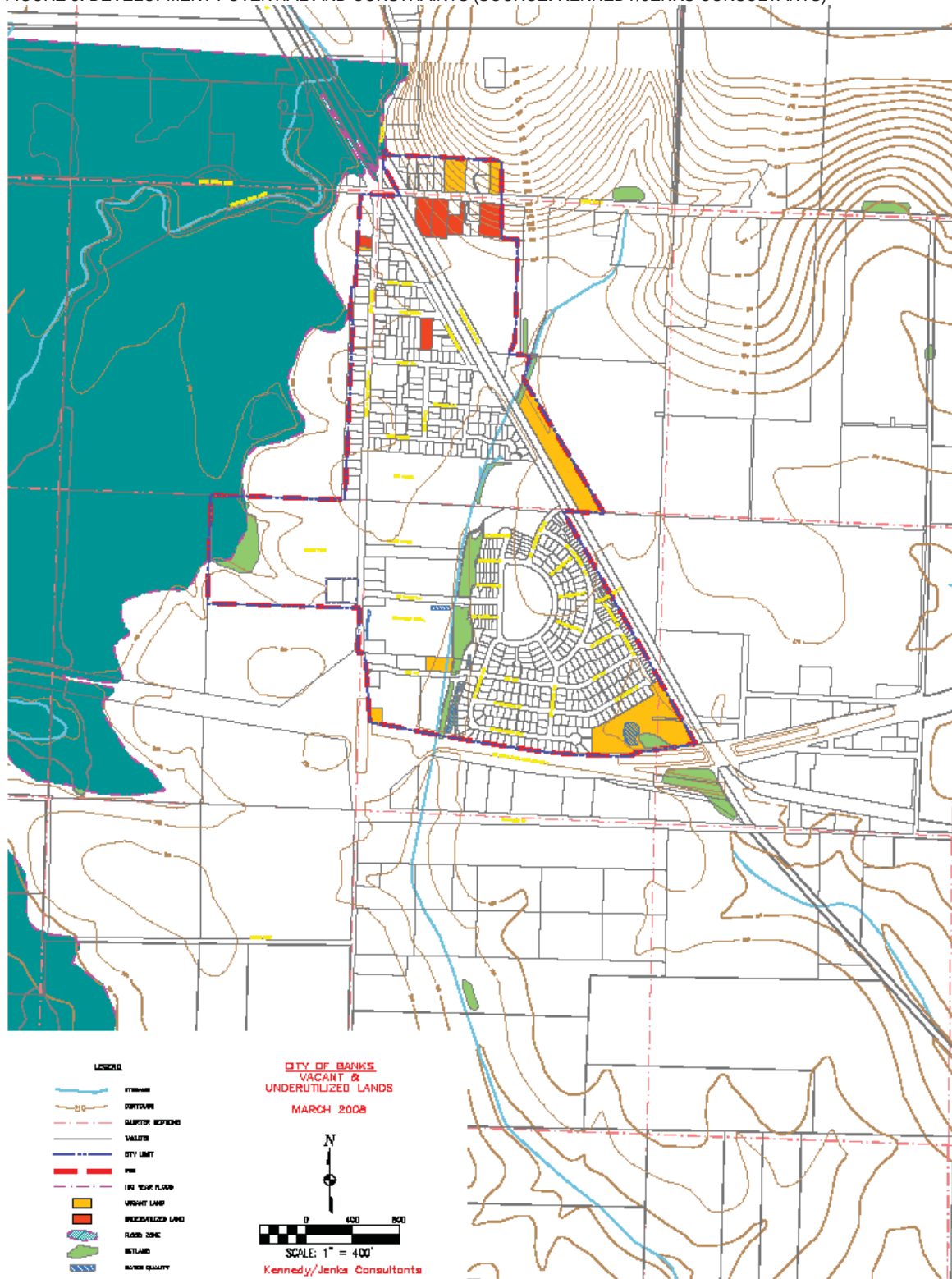


FIGURE 3: DEVELOPMENT POTENTIAL AND CONSTRAINTS (SOURCE: KENNEDY/JENKS CONSULTANTS)





Roadway Facilities

This section describes the current roadway network in Banks – state highways, the local roadway network, and Washington County owned roadways within the study area.

State Roadways

The state-administered highways within the City of Banks are OR 6 and OR 47 (Main Street). A major focus of the TSP planning effort is 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 predominantly north-south route that extends approximately 83 miles from OR 18 in McMinnville to OR 30 in Clatskanie.

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 Special Transportation Area (STA); STA's 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). Table 1 shows the roadway width of OR 47 within the study area.

Because Banks' Main Street also serves as a state highway, a major focus of the TSP planning process is to 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 study area, 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 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 route from the city to access 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 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 a 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.

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 also 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 Lumber Mill with access via Sunset Avenue. Log trucks typically come from locations north of town while processed lumber leaves to destinations south of the city.

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 noted:

- 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

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.



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 (for a complete sidewalk inventory, see Appendix A of *Technical Memorandum 2.4 – Banks Transportation System Plan Update: Existing Conditions* (CH2M Hill, 2009), available upon request from the City of Banks).

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.



Transit Facilities

The City of Banks is located outside the Tri-Met³ 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 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 of Banks city center. In 2009, pick-up service times within Banks were 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 were 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.

³ Tri-Met is the public transportation service provider in the Portland, Oregon metropolitan area.

Existing Operations 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 provided the project team with an understanding of mobility level and length of delay on the roadway network within the City of Banks. These values were then compared to applicable ODOT standards to determine whether improvements might be needed.

Study Intersections

The existing operations traffic analysis examined one signalized intersection and five unsignalized intersections, as listed below.

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 methodology for the traffic analysis conducted is described in *Technical Memorandum 2.4 – Banks Transportation System Plan Update: Existing Conditions* (CH2M Hill, 2009), available upon request from the City of Banks.

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 3.

TABLE 3

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 4 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 threshold (detailed reports on each intersection can be found in the Appendix D of *Technical Memorandum 2.4 – Banks Transportation System Plan Update: Existing Conditions* (CH2M Hill, 2009), available upon request from the City of Banks).

When v/c ratios exceed mobility standards, the indication is that the intersection experiences congestion and operates 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 4 outlines the intersection results in terms of v/c ratios and Level of Service. A detailed description of LOS can be found in *Technical Memorandum 2.4 – Banks Transportation System Plan Update: Existing Conditions* (CH2M Hill, 2009), available upon request from the City of Banks.

TABLE 4

Banks Traffic Analysis Intersection Results (2008)

ID	Intersection	Control Type	Mobility Standard	Intersection Performance		
				Average Vehicle Delay (sec)	V/C Ratio	Level of Service
1	OR 47 (Main Street) & NW Oak Way	Signalized	0.75	8.0	0.38	A
2	OR 47 (Main Street) & OR 47 Exit	OWSC	0.75	13.3	0.23	B
3	OR 47 (Main Street) & NW Trellis Way	OWSC	0.85	14.4	0.26	B
4	OR 47 (Main Street) & NW Banks Road	TWSC	0.90	18.7	0.42	C
5	NW Banks Road & NW Aerts Road	TWSC	*	9.8	0.01	A
6	OR 6 & NW Aerts Road	TWSC	0.70	24.2	0.11	C

Notes:

* ODOT mobility standards do not apply to intersection since it is not located on the state highway system

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

Approach showing worst operations is reported for intersection performance at unsignalized intersections

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. Queue analysis is another way to look at traffic impacts in a study area. Table 5 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.

Two locations had queue lengths exceeding available storage – OR 47/Main Street & NW Oak Way and OR 47/Main Street & NW Banks Road. At OR 47/Main Street & NW Oak Way, the queue exceeds the available storage on every approach to the intersection except for the westbound approach. When queues extend past the available storage for dedicated turn lanes (such as exist at both the aforementioned intersections), operational and safety issues can arise resulting 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 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) could 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 of *Technical Memorandum 2.4 – Banks Transportation System Plan Update: Existing Conditions* (CH2M Hill, 2009), available upon request from the City of Banks.

Although the entrances to Banks Elementary School and High School are not study intersections, 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.

TABLE 5

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 (170¹)
		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:¹Value is the sum of westbound Banks Road queue at OR 47 and Sellers Road95th 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 6

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 6, the most common type of crash on the OR 6 segment in the study area for the 5-year period was a turning crash (67 percent). There was 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. 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 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.

The 5-year average crash rate for the OR 6 segment in the study area 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 7

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		Crash Rate
		Fatal	Injury	Property Damage	Angle	Rear-End	Turning	
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 7, crash types on the OR 47 segment in the study area are fairly evenly distributed among angle, rear-end, and turning movement crashes (about 35 percent each). No fatalities were recorded over the five-year period for this segment. The 11 recorded crashes were 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 OR 47 segment in the study area 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 8 provides a summary of crash rates for each intersection. None of these rates suggest crash trends or problems.

TABLE 8

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 are 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 area does not contain any ODOT SPIS sites.

Regulatory Environment

Plan and Policy Review

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 is provided in Appendix F of *Technical Memorandum 2.4 – Banks Transportation System Plan Update: Existing Conditions* (CH2M Hill, 2009), available upon request from the City of Banks.

Compliance with Transportation Planning Rule (TPR)

Technical Memorandum 5.1 – Banks UGB/TSP Update: TPR Code Review Report (CH2M Hill, 2009), provided in Appendix A, summarizes the requirements of the Oregon Administrative Rule (OAR) 660-012-045 (also referred to the Transportation Planning Rule or TPR) Sections (2) and (3), and identifies and summarizes recommended code changes to ensure Banks' Land Development and Zoning Ordinances comply with the requirements.

Future Traffic Analysis

This section provides a summary of the Future No-Build (Year 2029) traffic conditions within the Banks Transportation System Plan (TSP) study area. Details on the future traffic analysis methodology are provided in traffic analysis methods utilized are provided in Appendix B (*Technical Memorandum 5.1 – Banks UGB Expansion/Transportation System Planning: Transportation Needs, Opportunities, and Constraints Report*) (CH2M Hill, 2010).

Context

The 2029 no-build traffic analysis presents congestion and intersection queuing results in 2029 if: (a) the urban growth boundary were to be expanded as reflected in Figure 4; and, (b) no additional roadway projects are built aside from the realignment of Sellers Road near the Banks Road/OR 47 (Main Street) intersection (which is already programmed for funding). This analysis identifies future deficiencies so that potential solutions can be developed.

Banks will need to expand its urban growth boundary (UGB) by approximately 248 acres (approximately 154 acres of buildable residential land and 94 acres of commercial and industrial land) by 2029 for consistency with the 20-year population and employment forecasts consistent with the Banks Comprehensive Plan and the City's Economic Opportunities Analysis. The UGB expansion area, as approved by the Banks City Council in January 2010, is illustrated in Figure 4.

UGB Expansion Volumes

For the land included in the UGB expansion, a manual trip generation and traffic assignment process was completed. The Banks area was divided into four zones with the land use growth estimated in each zone (see Figure 4). The *ITE Trip Generation Manual (8th Edition)* was used to estimate the number of trips for each zone. A conceptual roadway circulation was used to help estimate trip generation in each zone (see Figure 5). In total, the assumed development resulted in 3,127 new trip ends for the study area.

FIGURE 4: PROPOSED UGB EXPANSION AREA

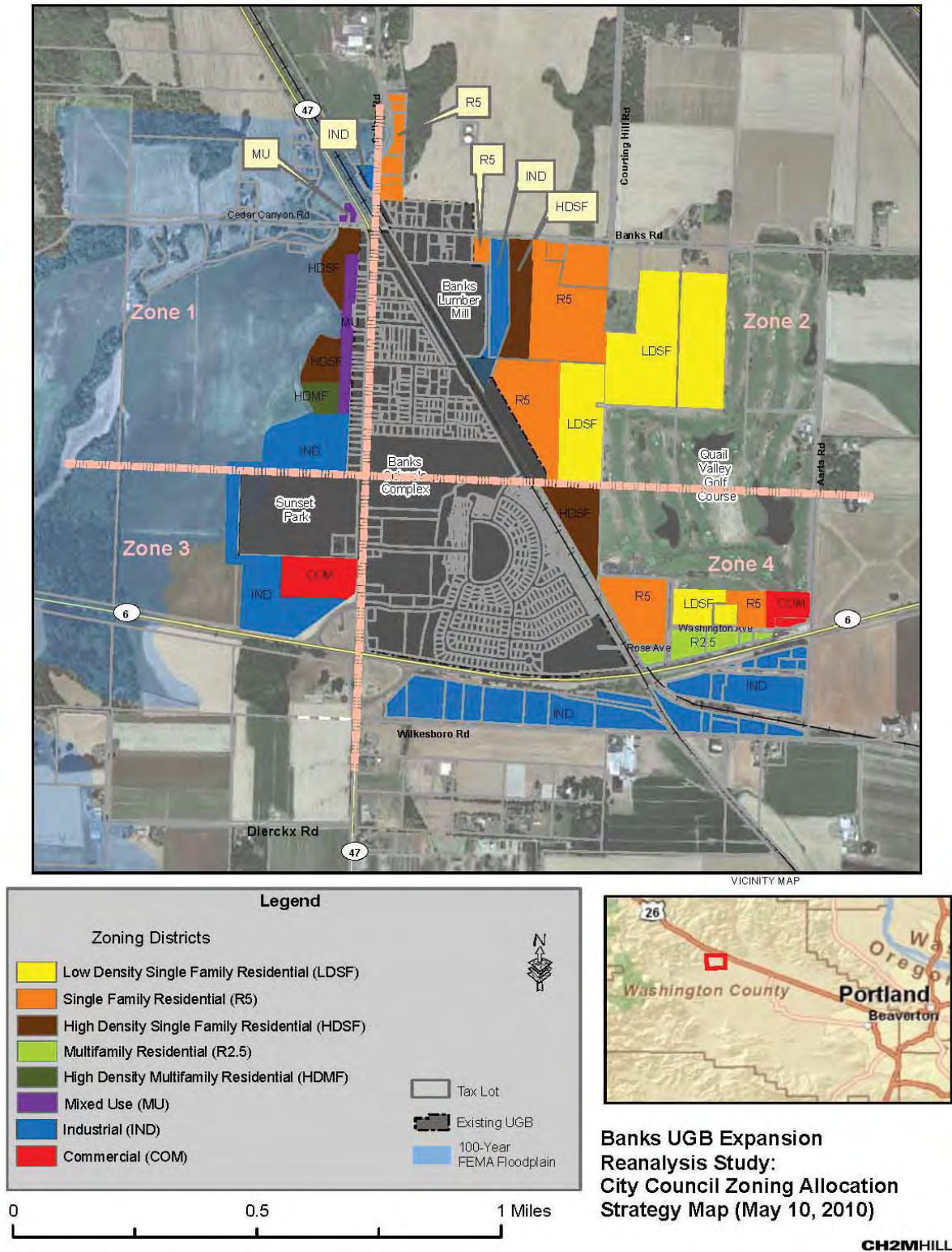
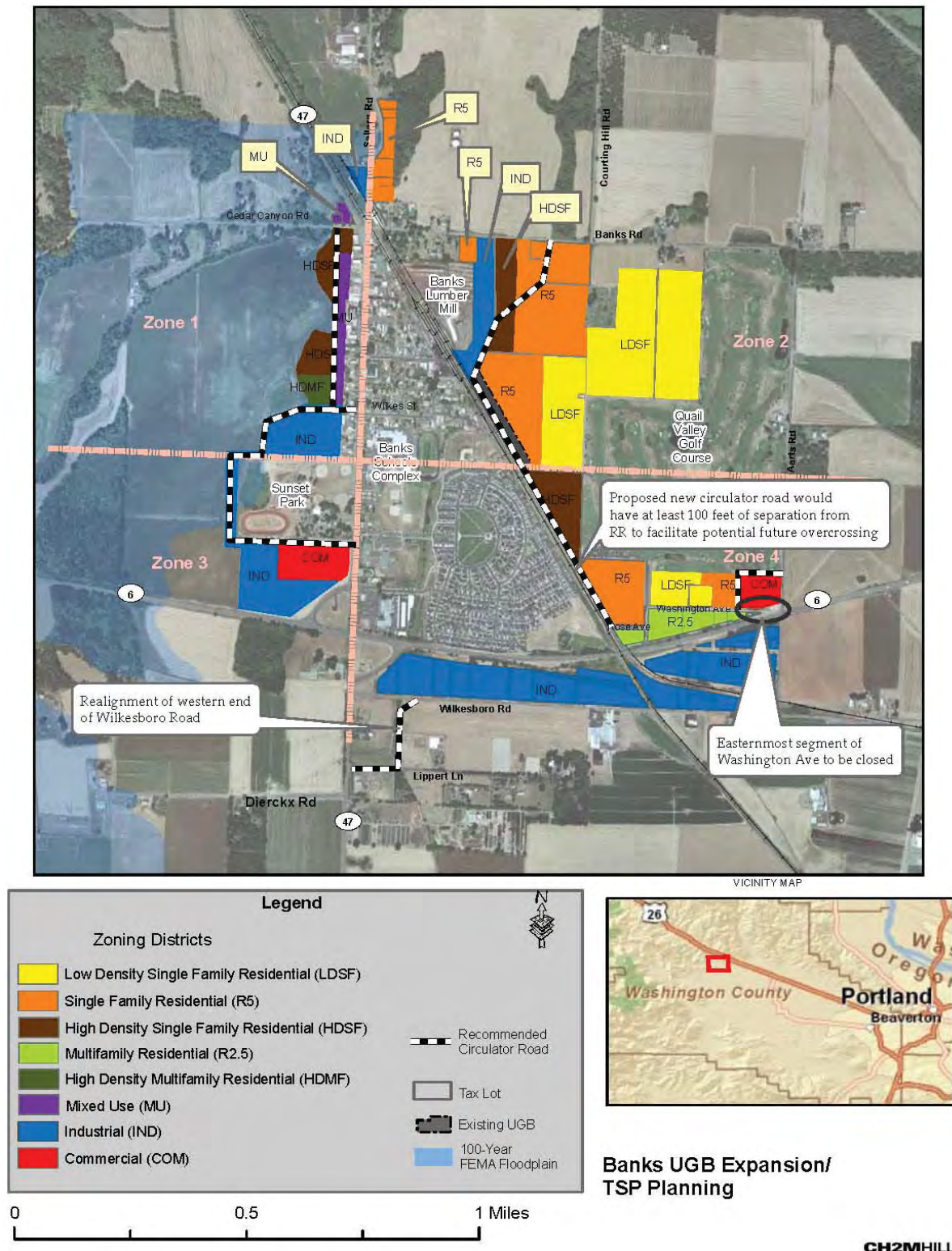


FIGURE 5: CONCEPTUAL UGB EXPANSION AREA ROADWAY CIRCULATION USED FOR TRIP GENERATION ESTIMATION



Future Planned Infrastructure Projects

The traffic analysis assumes that one additional funded roadway infrastructure project will be built by 2029. The future analysis also assumes additional unfunded connection roadways within Banks will be in place by 2029. Sellers Road at NW Banks Road is the only funded project in the study area within the planning horizon. The Sellers Road realignment is currently under construction and should be completed in the autumn of 2010. This project entails realigning Sellers Road so that the intersection occurs approximately 200 feet east of the existing intersection with NW Banks Road. Each approach will be one-lane with no turn lanes, similar to the existing intersection. The traffic control assumed was a STOP approach for Sellers Road while NW Banks Road is uncontrolled.

A funded non-roadway infrastructure project, the extension of the Banks-Vernonia Linear Trail into the northern part of Banks, is also currently under construction (in coordination with the aforementioned Sellers Road realignment) and is anticipated to be completed by mid-October. The Banks-Vernonia Linear Trail serves pedestrians, bicyclists, and equestrian users. This project will extend the existing Banks-Vernonia trail from an existing state park facility located approximately 0.5-miles north of Banks to a trailhead facility to be located at the northwest corner of Banks Road and the realigned Sellers Road. The trailhead facility will provide off-street parking and other amenities for trail users.

At a meeting of the North West Area Commission on Transportation (NWACT) on July 8, 2010, it was revealed that the Portland & Western Railroad (P&WRR) “Banks Rail Connection” project (for which P&WRR had applied for funding through the ConnectOregon III Program) had been approved by the ODOT Final Review Committee and recommended for full funding to the Oregon Transportation Commission. This project will entail the construction of a “Y” track connection to be installed on trackage south of Highway 6 (near Wilkesboro Road). The project is anticipated to be constructed within two years. This project would likely result in a reduction of rail traffic on the portion of P&WRR trackage adjacent to the Arbor Village development and the Banks Lumber Mill, making existing and planned residential development in the vicinity of the existing track lines more favorable.

Future Intersection Operations

Operational Analysis Results

Results from the operational analysis indicate that two of the seven study intersections do not meet the applicable ODOT or Washington County mobility standards for the 2029 Future No-Build condition. These results indicate that the future traffic growth assumed will lead to operational problems at several locations in the Banks study area. However, it should be noted that, due to the limitations of the traffic forecast model (which entails a necessary conservatism), it is likely that projected adverse operational impacts are overstated.

In the existing conditions analysis, all of the intersections meet mobility standards, but in the future No-Build scenario, two intersections (OR 47 & NW Banks Road and OR 6 & NW Aerts Road) are not expected to meet mobility standards. NW Banks Road approaching OR 47 and NW Aerts Road approaching OR 6 are both stop-controlled and are both expected to

exceed the minor street v/c mobility standard. With the growth of through-traffic on the uncontrolled approaches and the minor street traffic growth, the side street traffic that is crossing or turning left will be expected to have a difficult time finding a sufficient gap in traffic to allow them to complete their maneuver in a reasonable amount of time.

Table 9 shows the results of the 2029 Future No-Build intersection operational analysis.

TABLE 9

Banks Traffic Analysis – 2029 Future No-Build Operational Results

ID	Intersection	Control Type	Future No-Build Mobility Standard	Intersection Performance					
				V/C Ratio ¹		Average Vehicle Delay (sec) ¹		Level of Service ¹	
1	OR 47 (Main Street) & NW Oak Way	Signalized	0.75	0.63		12.1		B	
2	OR 47 (Main Street) & OR 6 Interchange Ramp (south of OR 6)	OWSC	0.75	0.37	0.48	9.5	30.3	A	D
3	OR 47 (Main Street) & NW Trellis Way	OWSC	0.85	0.55	0.51	11.0	54.5	B	F
4	OR 47 (Main Street) & NW Banks Road	TWSC	0.90	0.10	> 2.0	2.6	>100	A	F
5	NW Banks Road & NW Aerts Road	TWSC	0.90 ²	0.04	0.29	1.7	14.7	A	B
6	OR 6 & NW Aerts Road	TWSC	0.70	0.24	> 2.0	6.0	>100	A	F
7	NW Banks Road & Sellers Road	OWSC	0.90 ²	0.22	0.27	3.4	14.2	A	B

Notes:

¹ At stop-controlled intersections, the first entry is the result for the uncontrolled roadway approach; the second entry is the result for the stop-controlled approach.

² ODOT mobility standards do not apply to the intersection since it is not located on the state highway system. Instead, the target mobility standard for the "first hour" of "Other Urban Areas" was used.

Black highlighting indicates intersection exceeds mobility standards

OWSC: One-way stop-controlled

TWSC: Two-way stop-controlled

Mobility standards are established from 1999 Oregon Highway Plan, Policy Element, Table 6

Queuing Analysis Results

The vehicle queue analysis identifies deficient vehicle storage locations. Table 10 shows the forecast 2029, 95th percentile vehicle queue lengths for each movement at the study intersections. The movements that are expected to have inadequate storage are shown in the table with black highlight. The intersection of OR 47 (Main Street) and NW Oak Way (a total of seven movements) has queue lengths that exceed available storage capacity. Six of these movements are either exclusive left or right turn pockets that can accommodate 4 or 5 vehicles. Due to the expected growth in volumes, this existing storage will often be exceeded. However, it should be noted that, due to the limitations of the traffic forecast model (which entails a necessary conservatism), it is likely that projected adverse queuing impacts are overstated.

The remaining movement at OR 47 (Main Street) and NW Oak Way that is expected to exceed storage capacity is the southbound through movement. This queue is expected to spill back to (and therefore affect operations at) OR 47 and NW Trellis Way.

TABLE 10

2029 Future No-Build 95th Percentile Queues at Banks Study Area Intersections

ID	Intersection	Approach	Lane Group	Storage (feet)	2029 Queue Length (feet)
1	OR 47 (Main Street) & NW Oak Way	Eastbound	Left	70	180
			Thru	750	300
			Right	30	100
		Westbound	Left	250	220
			Thru/Right	950	150
		Northbound	Left	95	100
			Thru	950	470
		Southbound	Right	70	120
			Left	125	330
			Thru	530	540
			Right	25	70
2	OR 47 (Main Street) & OR 6 Interchange Ramp (south of OR 6)	Westbound	Left/Right	750	140
		Northbound	Thru	-	10
			Right	70	40
		Southbound	Left Thru	115 -	100 -
3	OR 47 (Main Street) & NW Trellis Way	Westbound	Left/Right	-	250
		Northbound	Thru/Right	-	70
		Southbound	Left	125	60
			Thru	-	540
4	OR 47 (Main Street) & NW Banks Road	Eastbound	Left/Thru/Right	-	320
		Westbound	Left/Thru/Right	200	>200
		Northbound	Left/Thru	-	100
		Southbound	Left/Thru/Right	-	90
5	NW Banks Road & NW Aerts Road	Eastbound	Left/Thru/Right	-	650
		Westbound	Left/Thru/Right	-	200
		Northbound	Left/Thru/Right	-	110
		Southbound	Left/Thru/Right	Driveway	50
6	OR 6 & NW Aerts Road	Eastbound	Left/Thru/Right	-	520
		Westbound	Left/Thru/Right	-	390
		Northbound	Left/Thru/Right	-	700
		Southbound	Left/Thru Right	- 50	> 1000 60
7	NW Banks Road & Sellers Road	Eastbound	Left/Thru	200	120
		Westbound	Thru/Right	-	> 1000
		Southbound	Left/Right	-	420

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

Queue lengths not reported for free-flowing and uncontrolled movements

Queue lengths rounded up to the nearest ten feet

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

At the intersection of OR 6 and Aerts Road, the southbound stop-controlled movement could experience queues in excess of 1000 feet due to vehicles not being able to find a safe gap in traffic on OR 6. The southbound queue on Aerts Road could back up to within 700 feet of the Banks Road/ Aerts Road intersection. The northbound movement could also experience long queues, which may result from left turns waiting for available gaps in traffic. These queues could have an impact on travel throughout Banks.

The intersection of OR 47 (Main Street) and NW Banks Road could experience queues in excess of 1000 feet on the westbound approach. This queue could back up beyond Sellers Road, and could extend back to within 400 feet of the NW Banks Road and NW Aerts Road intersection. The southbound queue on Sellers Road could also be long because vehicles waiting to turn from Sellers Road would be blocked by westbound backups on NW Banks Road.

Although the entrances to Banks Elementary School and High School are not study intersections, the school district has noted concern over the queuing in present day along Main Street at these entrances. As volumes along Main Street continue to increase, the 2029 queues at the school entrances are assumed to increase as well.

Future Operations Needs, Constraints and Opportunities

Needs

Based on the examination of existing and future transportation conditions, the following needs were identified:

- **Realignment of Wilkesboro Road.** This is an anticipated need based on buildout of the proposed UGB expansion area south of OR 6. The added vehicles that will accompany growth into the expanded UGB area south of OR 6 would create poor safety and operational conditions at the existing Wilkesboro Road/OR 47 intersection, due to the close proximity of this intersection to the OR 6 ramp terminal. To address this problem, Wilkesboro Road will need to be realigned southward to flow into existing Lippert Lane so that Wilkesboro Road intersects with OR 47 further south from the OR 6 ramp terminal (see Figure 5).
- **Realign Washington Avenue.** There is a need to close the eastern end of Washington Avenue and realign it so that it intersects with Aerts Road at a point further north of its current intersecting point. The existing alignment of Washington Avenue would be operationally inefficient and experience poor safety conditions upon the addition of vehicles that will accompany growth into the expanded UGB area east of the existing city.
- **East-west circulation and a secondary route from the existing City of Banks to the OR 6 access point at Aerts Road via a crossing of the railroad.** This is an anticipated need based on buildout of the proposed UGB expansion area to the east of the railroad. Moreover, the need for a secondary route to access OR 6 at Aerts Road is a need that is supported by the Banks Comprehensive Plan Transportation Element (1988 Update; pp. 73-74) and the Banks Transportation Network Plan (1999), which provides a discussion regarding the need for providing secondary route to access OR 6 from the existing city (pp 38-43). A secondary route to the Aerts Road access point

- at OR 6, which would entail a railroad overcrossing at the south end of Arbor Village (connecting to Rose Avenue/Washington Street on the east side of the track) is an approval criterion for the development for the undeveloped land at the south end of Arbor Village. By virtue of the Banks City Council, in 2008, requiring a covenant (stipulating the installation of a railroad crossing at the previously described location) on the deed to the aforementioned property, the Council reiterated the need for the City to have such a secondary route to access OR 6 at Aerts Road.
- Increased monitoring of safety conditions at the OR 6/Aerts Road intersection (and potential installation of safety measures), as warranted by future conditions (as the UGB expansion area on the east side of railroad is developed). This intersection has no current status as a location with documented safety issues and there are no existing geometric deficiencies or sight-distance issues. However, in addition to the previously noted fatality at this intersection, north-south users of Aerts Road have repeatedly reported unsafe conditions when trying to cross over OR 6 on Aerts Road or make left turns from southbound Aerts Road to eastbound OR 6. This perceived lack of safety is the result of motorists on Aerts Road trying to find “gaps” in OR 6 traffic, where cars are moving at a high rate of speed (posted speed on OR 6 at this location is 55 miles per hour). The perceived lack of safety at this intersection could worsen operations at the intersection, which is already forecasted to have poor operational conditions in the 2029 No Build model (see Tables 9 and 10 of this memorandum). Moreover, the perceived lack of safety could significantly inhibit circulation in the future – the added vehicles that will accompany growth into the expanded UGB area east of the existing city could avoid utilizing this intersection in a manner that would be efficient for the Banks area transportation system as a whole, opting instead for the access point to OR 6 at OR 47 (Main Street), thereby causing potential congestion issues at that location.
 - Sight-distance improvements on Banks Road at the existing intersection with Aerts Road and the future intersection with a new circulator road into the expanded UGB area on the east side of the railroad. Banks Road contains several steep vertical grades – these conditions create sight distance problems for drivers at the intersection of Aerts Road (which sits at the top of a steep grade) and would create problems at a new intersection along Banks Road west of Aerts Road (where a new circulator road would connect with Banks Road – see Figure 5); this latter “new” intersection would sit near the bottom of a vertical grade.
 - Pedestrian and bicycle linkages both north-south within the existing Banks UGB (on the east side of Main Street) and connections from the UGB to other parts of the city, particularly to the downtown commercial area, the schools complex, and Sunset Park.
 - Solutions to congestion issues at OR 47 (Main Street) at NW Banks Road and OR 6 at NW Aerts Road.
 - Solutions to queuing issues at OR 47 (Main Street) at NW Oak Way.
 - East-west collector road connectivity to reduce the Banks residents’ use of the state highway system for local trips.

Constraints

- Railroad lines. The stop-controlled intersections of NW Banks Road & NW Aerts Road, OR 47 & NW Banks Road and OR 6 & NW Aerts Road would need to support increased traffic under the no-build scenario. Any examination of alleviating that load through an east-west connection(s) would need to cross two sets of railroad tracks (Port of Tillamook Bay and P&W). ODOT Rail Division discourages at-grade crossings.
- Main Street and adjacent land uses. Many residences and commercial buildings in Banks are located close to the street; also, Main Street functions as the heart of the city. Expansion of Main Street would be constrained, as public right-of-way is not available. Expansion of Main Street may also not be desired by the community due to safety concerns in relation to pedestrians, school children, etc.
- Schools and parks along Main Street. The location of schools and parks along Main Street require special attention, particularly relating to safety concerns for children.
- Flooding on NW Cedar Canyon Road. Several community members have discussed how NW Cedar Canyon Road has flooded in past years west of the OR 47 and NW Banks Road intersection.
- Neighborhood streets. Many residents have expressed concerns about increased traffic along local streets. Some connectivity options would likely increase traffic along roadways that have historically been neighborhood streets in character.
- Access management. ODOT has access control along OR 6 in the study area. No new accesses are allowed on OR 6. ODOT also has access spacing standards along OR 47. Because of this, Banks will need to efficiently utilize the two existing access points to OR 6 (at OR 47 and Aerts Road) in conjunction with local transportation system improvements.
- Signal warrants. Any new signal would need to meet ODOT signal warrants.
- Cost. In general, many of the transportation connections or upgrades required to accommodate population and employment associated with the UGB expansion will be expensive. Railroad crossings (grade-separated crossings can exceed \$20 million), upgrades of rural county roadways (e.g. Banks Road, Aerts Road), realignment of roadways (e.g. a potential realignment of Wilkesboro to the south), widening to add turn lanes, and any upgrades to Main Street would be expensive and potentially cost prohibitive. Traffic signal installation is also expensive (approximately \$250,000 per signal).

Opportunities to Reduce Congestion and Queuing Issues

- The intersection of OR 47 (Main Street) and NW Banks Road actually operates as three separate intersections, and exhibits a v/c ratio over ODOT's mobility standards for the westbound movement in the future condition. Complicating the three separate intersections is the railroad crossing at NW Banks Road. The project that will alter NW Sellers Road (so that it intersects NW Banks Road further to the east), will provide more storage space westbound, but does not help vehicles on the eastbound and northbound stop-controlled approaches that will experience long delays while waiting to find gaps

in order to perform their maneuver. As the intersection is currently stop-controlled, installing a traffic signal may better control traffic to help reduce the delay and queues on the NW Banks Road approaches, but would impact the performance of the OR 47 (Main Street) approaches. Prior to signal installation, the location would need to be evaluated to determine if the intersection meets ODOT signal warrants and spacing guidelines (this requirement only applies to signals on ODOT facilities).

- Widening and modernizing the approximately 1.70-mile extent of Banks Road between the intersection with OR 47 (Main Street) and the intersection with OR 26. This would entail bringing the road up to current design standards by providing shoulders on Banks Road and performing sight distance improvements at intersections with Banks Road (as warranted by future conditions – described earlier in this memorandum) and adding intermittent or continuous left-turn lanes (as warranted by future conditions). These improvements would make Banks Road a more feasible option for those wishing to travel to, and from, US 26; this could subsequently relieve future congestion issues at the existing access points to OR 6 within Banks, and along OR 6 itself, as drivers would have a suitable east-west alternative to and from US 26.
- Widening Wilkesboro Road to ensure adequate design standard lane width for trucks and other large vehicles in this area that is slated for industrial uses in the 20-year planning horizon.
- The signalized intersection of OR 47 (Main Street) and NW Oak Way will likely have vehicle queues that exceed available storage in the future conditions. The northbound, southbound, and eastbound legs of the intersection have queues that extend past the existing turn pockets, and in some cases extend into the next intersection. Below are potential suggestions to reduce congestion on each approach:
 - Most southbound and northbound movements have queues exceeding the available storage. A low-cost, short-term, and easily implementable improvement to reduce vehicle queuing for the southbound left movement is to extend the southbound left turn pocket from 125 feet to 350 feet. The area is already paved; it would simply require restriping and would not require any right of way acquisition. This additional storage is expected to accommodate future queues in 2029 with the proposed UGB expansion.
 - For the eastbound left movement, a similar turn pocket extension could accommodate the queuing. Currently the left turn pocket is 70 ft. Extending the turn pocket to at least 200 feet would provide turning vehicles with a refuge, removing them from the traffic stream of vehicles continuing through the intersection. This improvement would require additional pavement and widening of the OR 6 westbound exit-ramp.
 - The westbound left queue is nearing capacity and could exceed the available storage. Many of the vehicles are heading eastbound onto OR 6 towards Hillsboro and Portland. Increasing the turn pocket would be difficult as the road is constrained on either side by development, and there is little available right of way to expand the width of the road.

All of these potential solutions would be based on future analyses warranting their funding and construction. These potential solutions will be evaluated during alternatives analysis.

Opportunities to Improve Safety

- Currently OR 6 is designated as a safety corridor by ODOT. There are no identified safety issues from the crash data, and crash rates are below the state average. However, the Banks City Council identified one area of concern, OR 6 near NW Aerts Road. One fatality was reported in this area. Effective safety improvements that could be utilized include increased lighting, a roadside inventory to identify fixed objects in the clear zone, and increased enforcement of speed limits and safe driving in the vicinity.
- As shown on Figure 5, it is recommended that the easternmost segment of Washington Avenue be closed to vehicular traffic. Washington Avenue currently intersects with Aerts Road immediately north of the OR 6/ Aerts Road intersection. Currently, Washington Avenue only services a few single-family homes and therefore receives very little traffic volume; however, assuming a buildout of the east side of Banks per the proposed UGB expansion strategy, the amount of volume would significantly increase, and would pose a significant safety hazard to the intersection of OR 6/ Aerts Road.

Opportunities for Enhanced Local Circulation

- Individual developments in the UGB expansion land should be required to provide internal circulation for vehicles, pedestrians and bicyclists, which should be codified per City of Banks Development Code. Local circulation options should consider the feasibility of new or enhanced east-west connections (e.g. upgrades to Wilkesboro Road, Banks Road, or potential rail crossings) as well as north-south connections (e.g. upgrade of NW Aerts Road, connections between areas of UGB expansion). As new development is planned, the City must ensure that these developments provide suitable external connections to the greater Banks area.
- Construct a vehicular overcrossing of the railroad to connect the existing city to the UGB expansion area to the east of the railroad. Location options for such an overcrossing include the south end of the Arbor Village neighborhood (connecting to Washington Street on the east side of the railroad) or at Sunset Avenue (which would connect to a new circulator road on the east side of the tracks). Although a railroad overcrossing is likely infeasible in the short-term, the City should plan for the long-term construction of such a crossing when it is warranted based future growth.

Opportunities for Bicycle and Pedestrian Connections

- Construct one or more pedestrian/bicycle overcrossings of the railroad to ensure east-west pedestrian/bicycle connectivity from the UGB expansion area east of the railroad to center city destinations, including the residential areas to schools, the library, and town hall.
- Currently bicycle lanes and pedestrian sidewalks are not connected well within the city. Improvements should focus on connecting the existing system of bike lanes and sidewalks to improve non-motorized mobility. A north-south bike route should be established in the existing city in the area east of Main Street, with direct connections to the schools complex.
- All new and modernized roadways should include bicycle and pedestrian accommodations.

Consider Future Transit Connections

The recently added TCTD bus service in Banks should be monitored regularly to identify the need for further future transit capacity improvements, such as potentially increasing the number of pick-up/drop-off times at the stop the Sunset Avenue/Banks Road intersection or adding another stop location in the City of Banks.

3 ALTERNATIVES EVALUATION & RECOMMENDATIONS

The Banks Transportation System Plan alternatives presented in this section are organized around addressing needs identified in the existing and future transportation analysis and needs associated with providing transportation services to the expanded UGB area. Each alternative has an associated planning-level cost estimate.

The following evaluation criteria were developed and approved by the TAC in July 2009 to guide the assessment of potential alternatives.

- **Traffic Operations.** *Does the alternative mitigate existing and anticipated (2029) traffic congestion?* This criterion measures the extent to which alternatives alleviate existing and anticipated future traffic congestion.
- **Safety.** *Does the alternative mitigate existing or anticipated safety issues?* This criterion measures the extent to which alternatives ensure safety for all users (drivers, transit, pedestrians, and bicyclists).
- **Mobility.** *Does the alternative enhance mobility for all users?* This criterion measures the extent to which alternatives enhance mobility for transportation users (freight, nonmotorized, transit, transportation disadvantaged, etc.).
- **Land Use.** *Does the alternative minimize land use impacts? Is the alternative consistent with state and local land use planning goals?* This criterion measures the extent to which alternatives minimize property impacts and impacts on existing residential and business access. This criterion relates to economic development because it also evaluates the extent to which alternatives impact future business development through property takes. It also relates to consistency with local, regional and statewide land use plans.
- **Environmental & Social Impacts.** *Does the alternative minimize environmental and social impacts, including impacts on existing and future development and low-income/minority populations?* Most alternatives will have some built and natural environmental impacts. This criterion measures the extent to which alternatives minimize impacts on the social and environmental considerations for the interchange management area. This criterion includes environmental justice considerations.
- **Support for Implementation.** *Can the alternative be supported by both the state and local community?* This criterion measures the extent to which alternatives can be agreed upon that meet the needs and interests of stakeholders within acceptable timelines.
- **Cost-Effectiveness.** *Is the scale of the alternative consistent with the benefits it provides? Is it a practical, affordable solution?* All alternatives will have costs associated with development and implementation. This criterion evaluates how effective the alternative is at relieving congestion compared to the cost.

A detailed description of the alternatives evaluation process is provided in Appendix C (*Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report*).

Concepts to Address Needs Identified in TSP Analysis

This section discusses projects to address needs identified in analyses performed for this TSP effort. Generally, the conceptual projects discussed in this section are enumerated to correspond with the alternative number title the project had in *Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report* – text is provided to alert the reader where this is not the case.

The location of projects depicted in this TSP are conceptual in nature, and as such are intended as a guide for development and should not be explicitly used as shown to constrain development options in the future. The precise location of all recommended projects should be defined through the land development process as projects are funded, designed, and built.

It is important to note that any modification of a Washington County roadway proposed in this TSP is a recommendation to Washington County that the proposed modification be considered by the County; all such projects would need to be evaluated through the county's transportation plan amendment or update process.

It is also important to note that, due to the limitations of the traffic forecast model (which entails a necessary conservatism), it is likely that projected adverse operational impacts are overstated.

Need:

Remove future volume from the intersection of Wilkesboro Road and OR 47.

Upon urbanization of the Wilkesboro Road corridor (in the UGB expansion area south of OR 6) there would be significant increase vehicles on a road that currently experiences very little volume. This increase in vehicles would potentially pose an operational and safety problem at the existing Wilkesboro Road/OR 47 intersection, due to the close proximity of this intersection to the OR 6 ramp terminal.

Concept #1: Realign Wilkesboro Road

This concept entails realigning Wilkesboro Road southward to flow into existing Lippert Lane so that Wilkesboro Road intersects with OR 47 further south from the OR 6 ramp terminal (see Figure 6 below); the existing intersection of Wilkesboro Road and OR 47 would be closed to vehicular traffic (i.e. dead-ended). This concept would necessitate the construction of approximately 0.27-mile of new road and the purchase of approximately 48,000 square feet of privately owned land for right-of-way.

Per applicable ODOT interchange area access management spacing standards⁴, there should be a minimum spacing distance of 1,320 feet between the OR 6 ramp terminal and the nearest major intersection. The purpose of these spacing standards is to protect the function of the interchange and, consequently, the state's investment in the facility. Moving towards compliance with applicable standards greatly improves the likelihood that an interchange (and its associated local street system connector roads) operates efficiently and safely. This

⁴ Appendix C: Access Management Standards" from the Oregon Department of Transportation (ODOT). See Table 18.

concept would increase the spacing (on the east side of OR 47) between the OR 6 ramp terminal and Wilkesboro Road intersection from 80 feet (existing) to 890 feet (after realignment).

The proposed realignment is optimal because it would result in an increase in future operational efficiency, safety, and mobility, while simultaneously not impacting any residential structures and minimizing the division of active farmland to the greatest extent practicable.

This concept would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion area south of OR 6. The anticipated increase in trips associated with a prospective development (as revealed through a traffic impact assessment) would trigger the need to close the aforementioned intersection and subsequently prompt the need to construct the realigned Wilkesboro Road. Because the safety problem is exacerbated by urbanization, and the adjacent area would become industrial (i.e. generate more large truck movements with relatively slower speeds and wide turns) a project to correct this problem should be a high priority for inclusion in the CIP.

The realigned Wilkesboro Road corridor shown on Figure 6 is conceptual and would be defined through the land development process as it is funded, designed, and built.

FIGURE 6: CONCEPT #1 – REALIGNMENT OF WILKESBORO ROAD



A detailed evaluation of this concept is provided in Appendix C (*Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report*). Based on the evaluation assessment, this concept is recommended as a project to be placed on the City's transportation CIP list for consideration to be constructed.

This concept would become warranted based on future conditions related to urbanization along Wilkesboro Road and the associated increase in traffic volume utilizing the intersection of Wilkesboro Road/OR 47. It is likely that the timing of realignment will coincide with impending development – that is, the anticipated increase in trips associated with a prospective development (as revealed through a traffic impact assessment) would trigger the need to close the aforementioned intersection and subsequently prompt the need to construct the realigned Wilkesboro Road.

Based on planning level estimate tools, this project is estimated at \$853,650. This estimate includes the design and construction of new roadway, new right-of-way, contingency, and engineering costs. Cost estimate details are provided in Appendix D.

A detailed discussion of potential transportation funding sources for this concept is provided in Section 4 of this TSP.

Need:

Remove future volume from the intersection of Washington Avenue and Aerts Road.

Upon urbanization of the UGB expansion area east of the railroad tracks (north of OR 6) there would be significant increase vehicles on Washington Avenue, a road that currently experiences very little volume. This increase in vehicles would pose an operational and safety problem at the existing Washington Avenue/ Aerts Road intersection, which creates a fifth leg at the Aerts Road/OR 6 intersection. This fifth intersection approach is confusing to drivers, and is at an angle that invites high-speed entering traffic to Washington from eastbound OR 6, and involves sharp-angle right turns onto OR 6.

Concept #2: Realign Washington Avenue

This concept entails realigning Washington Avenue northward to intersect with Aerts Road further north from the Aerts Road/OR 6 intersection (see Figure 7 below). This concept addresses the future need to provide greater spacing between the Washington Avenue/ Aerts Road intersection for safety and operational purposes (and provide subsequent potential room for a southbound left-turn storage lane that could be warranted based on future conditions). It should be noted, however, that the traffic forecast model likely overstates the degree of queuing impact – this is due to the limitations of the model.

This concept would close the existing Washington Avenue intersection with Aerts Road, which is currently located immediately north of the intersection with OR 6. This concept would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion area east of the railroad tracks.

The location of this concept is optimal because it would increase the spacing between the Aerts Road/OR 6 intersection and the Aerts Road/Washington Avenue intersection an extra 420 feet, which would improve the safety and operations of the OR 6/OR 47 intersection. Safety conditions are also greatly improved through the closure of the existing Washington Avenue intersection with Aerts Road, which would likely be operationally inefficient and pose a safety problem upon the addition of vehicles that will accompany growth in the expanded UGB area east of the existing city.

The realigned Washington Avenue corridor shown on Figure 7 is conceptual and would be defined through the land development process as it is funded, designed, and built.

FIGURE 7: CONCEPT #2 – REALIGNMENT OF WASHINGTON AVENUE



A detailed evaluation of this concept is provided in Appendix C (*Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report*). Based on analysis conducted, this concept is recommended as a project to be placed on the City's transportation CIP list for consideration to be constructed.

Based on planning level estimate tools, this project is estimated at \$1,198,600. This estimate includes the design and construction of new roadway, new right-of-way, contingency, and engineering costs. Cost estimate details are provided in Appendix D.

This concept would become warranted based on future conditions related to urbanization in the UGB expansion areas west and south of the Quail Valley Golf Course and the associated increase in traffic volume utilizing the intersection of Washington Avenue/Aerts Road. It is likely that the timing of realignment will coincide with impending development; that is, the anticipated increase in trips associated with a prospective development (as revealed through a traffic impact assessment) would trigger the need to close the aforementioned intersection and subsequently prompt the need to construct the realigned Washington Avenue. Because the safety and operational problem is exacerbated by urbanization, and the adjacent area would be substantially developed (i.e. generate a significant number of commuter) a project to correct this problem should be a high priority for inclusion in the CIP.

A detailed discussion of potential transportation funding sources for this concept is provided in Section 4 of this TSP.

Need:

Viable travel alternative to OR 6 for traffic between Banks and the Portland metropolitan area.

A need exists to provide an alternate east-west route that could be used by Banks residents and visitors if congestion issues occur at the intersection of Aerts Road and Highway 6; the alternate route would be Banks Road-to-US 26. To address this need, there is an associated need to address existing geometric/safety issues and inadequate roadway width on Banks Road. There are existing sight distance issues associated with the existing steep vertical grade conditions in the vicinity of the intersection of Banks Road and Aerts Road – although sight distance issues exist currently, the risk these issues pose to user safety would increase significantly in correlation with the number of new vehicles that would be utilizing this intersection upon development build-out of the UGB expansion areas. The existing Banks Road/Aerts Road intersection is shown in Figure 8 below.

Currently, Banks Road has extremely narrow-to-no roadway shoulders on the road segment between Main Street and Aerts Road, which will be a critical segment to improve in association with the development of the UGB expansion areas on the east side of Banks. The lack of shoulder space poses a significant potential safety concern for pedestrians and bicyclists.

FIGURE 8: INTERSECTION OF BANKS & AERTS ROAD (LOOKING WEST)



Concept #4: Install advanced warning signage

Concept 4 is intended to increase safety for motorists, pedestrians, and cyclists traveling on Banks Road and those turning onto Banks Road from Aerts Road who do not have adequate sight distance based upon assumed design speed and existing conditions. The installation of advanced signing on all three legs of the intersection approach would warn motorists of reduced sight distance on the crest vertical curve, thereby improving safety conditions at the intersection. In addition to advanced signing, rumble strips for westbound Banks Road traffic just east of the crest vertical curve should be considered, and are included in the cost estimate. Existing vegetation should also be pruned and/or removed to improve sight distance conditions.

A detailed evaluation of this concept is provided in Appendix C (*Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report*). In the aforementioned memorandum, this concept is titled “Alternative 4a”. Based on analysis conducted, this concept is recommended as a project to be placed on the city’s transportation CIP list.

Based on planning level estimate tools, this project is estimated at \$14,000. This estimate includes the evaluation of existing signing at the site, design and construction of new advanced signing, construction of rumble strips on Banks Road east of the intersection, contingency, and engineering costs. Cost estimate details are provided in Appendix D (in the cost estimate sheets, this concept is titled “Alternative 4a”).

A detailed discussion of potential transportation funding sources for this concept is provided in Section 4 of this TSP.

Concept #5: Reconstruct Banks Road

Concept 5 is intended to increase safety for motorists, pedestrians, and cyclists traveling on Banks Road between Main Street (OR 47) and US 26.

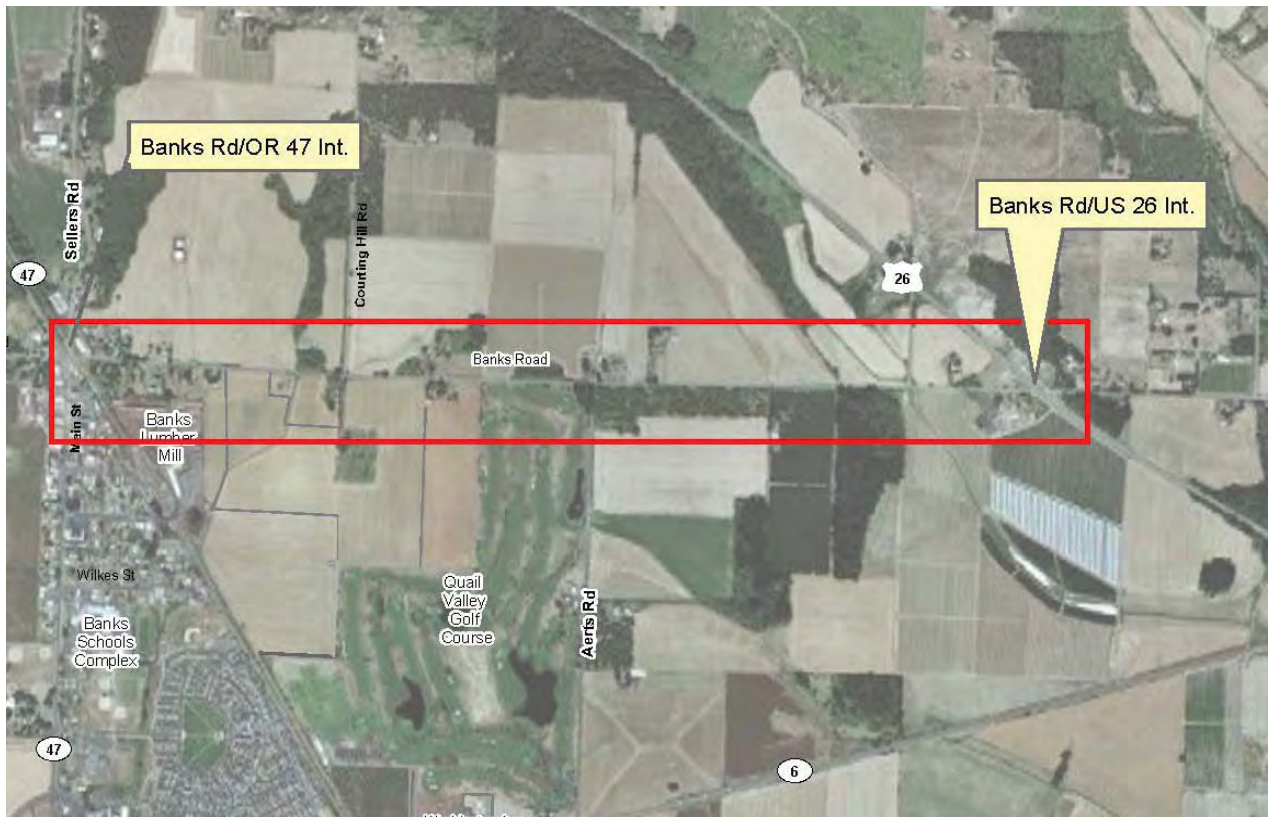
This concept entails re-grading the existing crest vertical curve at Banks Road and Aerts Road, and the sag curve 500 feet to the west of the intersection (see Figure 8), to meet a minimum 60 mile-per-hour vertical design speed sight distance requirement. This would allow drivers approaching Aerts Road from Banks Road, and drivers attempting to turn from Aerts Road, adequate sight distance. Approximately 3,800 feet of Banks Road and 100 feet of Aerts Road would be reconstructed to the Washington County Collector standard width of 36 feet. The golf course to the south of Banks Road would have retaining walls on fill. Some signs would need to be removed and replaced.

This concept would also entail widening the approximately 1.70-mile length of Banks Road between Main Street (OR 47) and US 26 (see Figure 9) to include shoulders on both sides of the road that meet Washington County Major Collector standards. It is assumed that existing usable roadway width is 20 feet, and would be widened to 36 feet. This would address the lack of adequate lane width and shoulders on Banks Road (in consideration of forecasted increases in traffic volume associated with the development of the UGB expansion areas on the east side of Banks) and the need to have a viable east-west alternative to OR 6 for accessing US 26 (so as to alleviate congestion and queuing issues at

both existing Banks access points to OR 6). This concept would significantly improve safety conditions for motorists, bicyclists, and pedestrians.

This concept would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion areas.

FIGURE 9: CONCEPT #5 – WIDENING OF BANKS ROAD BETWEEN MAIN STREET (OR47) AND US 26



This concept is a combination of two formerly separate alternatives (titled “Alternative 4d” and “Alternative 5”) that were evaluated in *Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report*, provided as Appendix C. As noted in the aforementioned memorandum, the two formerly separate alternatives would be exceedingly more cost-effective if done in concurrence. This is the reason that the two alternatives were combined into the present concept being discussed. Based on analysis conducted in the aforementioned memorandum, this concept is recommended as a project to be placed on the city’s transportation CIP list.

Based on planning level estimate tools, this project is estimated at \$8,233,900. This estimate includes the design and construction of new roadway, new right-of-way, contingency, and engineering costs. Cost estimate details are provided in Appendix D (in the cost estimate sheets, see “Alternatives 4d and Alternative 5” for specific cost estimate elements, respective costs and overall combined cost as presented for the present concept). A detailed discussion of potential transportation funding sources for this concept is provided in Section 4 of this TSP.

Need:

Increased left-turn lane storage capacity at intersection of Main Street/Oak Way/OR 6 Ramp Terminal.

Concept #6: Extend Southbound Left-Turn Lane on Main Street at intersection with Oak Way /OR 6 Ramp Terminal

This concept would entail extending the southbound left-turn lane pocket from 125 feet to 350 feet (see Figure 10 below). This concept addresses forecasted queuing issues at the southbound leg of the intersection of Main Street and Oak Way. This concept would be designed according to applicable requirements in ODOT's Highway Design Manual and Striping Manual and would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion areas.

FIGURE 10: CONCEPTS # 6 AND #7 – SOUTHBOUND AND EASTBOUND LEFT-TURN LANE EXTENSION



A detailed evaluation of this concept is provided in Appendix C (*Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report*). Based on analysis conducted, this concept is recommended as a project to be placed on the city's transportation CIP list.

Based on planning-level estimate tools, this project is estimated at \$8,800. This estimate includes the design and construction of new striping and signing associated with the off-ramp and intersection, contingency, and engineering costs. Cost estimate details are provided in Appendix D.

A detailed discussion of potential transportation funding sources for this concept is provided in Section 4 of this TSP.

Concept #7: Extend Eastbound Left-Turn Lane on OR 6 Ramp Terminal at intersection with Oak Way/Main Street

This concept would entail extending the eastbound left-turn lane pocket on the OR 6 ramp terminal from 70 feet to 200 feet (see Figure 10). This concept addresses forecasted queuing issues at the eastbound leg of this intersection. This concept would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion areas.

A detailed evaluation of this concept is provided in Appendix C (*Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report*). Based on analysis conducted, this concept is recommended as a project to be placed on the City's transportation CIP list.

Based on planning-level estimate tools, this project is estimated at \$9,100. This estimate includes the design and construction of new striping and signing associated with the off-ramp and intersection, contingency, and engineering costs. Cost estimate details are provided in Appendix D.

A detailed discussion of potential transportation funding sources for this concept is provided in Section 4 of this TSP.

Summary of Recommendations to Address Needs Identified in Traffic Analysis

Planning level cost estimates for recommended project to address the needs identified in the traffic analysis are included in Table 11. Cost estimate details are provided in Appendix D.

TABLE 11
Recommendations to Address Needs Identified in Traffic Analysis

Recommendation	Estimated Cost (2010\$) (rounded to the nearest \$1,000)
Concept #1: Realign Wilkesboro Rd.	\$854,000
Concept #2: Realign Washington Ave.	\$1,199,000
Concept #4: Install Advanced Warning Signage on Banks Road (in vicinity of Banks/Aerts Rd.	\$14,000
Concept #5: Reconstruct Banks Rd.	\$8,234,000
Concept #6: Extend SB Left Turn Lane on Main St @Main St/Oak Way/OR 6 Ramp Intersection	\$9,000
Concept #6: Extend EB Left Turn Lane on OR 6 Ramp Terminal @Main St/Oak Way/OR 6 Ramp Intersection	\$9,000

Concepts to Service Expanded UGB Areas

This section discusses projects to directly serve as future streets for the expanded UGB area. Generally, the conceptual projects discussed in this section are enumerated to correspond with the alternative number title the project had in *Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report* – text is provided to alert the reader where this is not the case.

The location of projects depicted in this TSP are conceptual in nature, and as such are intended as a guide for development and should not be explicitly used as shown to constrain development options in the future. The precise location of all recommended projects should be defined through the land development process as projects are funded, designed, and built.

Need:

East-west internal circulation in Banks to accommodate expanded urban area and reduce reliance on state highways for intra-city circulation.

Making provisions for east-west travel is critical to maintaining adequate citywide circulation as the City expands east of the railroad tracks. Subsequently, there is a need to provide an east-west collector road for the City of Banks with respect to the UGB expansion area east of the existing city. Such an east-west collector road system, which integrates the proposed new eastside collector road (see Concept 10) is not possible without a railroad crossing. Along with this need is the City's transportation objective of having a secondary route from the existing City of Banks to the Aerts Road access point to OR 6.

The preferred option for a collector road between the east and west sides of Banks would be to construct at-grade railroad crossings because the cost to do so would be significantly less than an overcrossing. However, at-grade crossings of the railroad under existing conditions is infeasible because the tracks that would need to be crossed are currently used for track-switching – an activity that is highly incompatible with at-grade crossings; this is also the reason that at-grade crossings along this segment of tracks is not permitted under ODOT Rail Division Policy.

Based on the above circumstances, at-grade crossings are not a feasible option for recommendation at this time. However, as noted, at-grade crossings are the City's preferred option for east-west railroad crossings, and would be pursued for implementation at such time in the future that at-grade crossings become feasible due to changing conditions.

A proposed over-crossing would be treated as local parallel route to OR6 and Banks Road. To gain a better investment for the structure, this parallel route would be classified as a collector and allow cut-through traffic. Local traffic could use this over-crossing instead of using OR 6 to access different sides of the city. It is important to note that each of the concepts proposed to address this would necessitate close coordination with the railroad companies actively using the rail lines.

Concept #3a: Install vehicular overcrossing of railroad from area south of Arbor Village to Rose Avenue

This concept would entail constructing a vehicular bridge over the railroad tracks connecting the existing street network on the west side of Banks (south of the Arbor Village

neighborhood) to the future street network on the east side of Banks (at Rose Avenue) (see Figure 11 below). This crossing would include bicycle/pedestrian accommodations. This concept is a long-term one which assumes the full build-out of the UGB expansion area on the east side of Banks as a prerequisite for consideration of construction.

This concept would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion area east of the railroad tracks.

The proposed railroad crossing corridor shown on Figure 11 is conceptual and would be defined through the land development process as it is funded, designed, and built.

FIGURE 11: CONCEPT #3A – LOCATION OF RR OVERCROSSING FROM ARBOR VILLAGE TO ROSE AVENUE



A detailed evaluation of this concept is provided in Appendix C (*Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report*). As noted in the aforementioned technical memorandum, this concept's crossing corridor is less advantageous than Concept 3b because it is as centrally located in juxtaposition to the eastside UGB expansion area. Both Washington County and ODOT staff noted that, in a comparison between Concept 3a and 3b, Concept 3b is preferable because Concept 3a appears too far south to be the sole east-west railroad crossing and would result in out of direction travel for significant portions of intra-city traffic in the future (if it were the sole crossing). Therefore, this concept is recommended as a project to be placed on the City's transportation CIP list as a secondary option to Concept 3b.

Based on planning level estimate tools, this project is estimated at \$8,650,000. This estimate includes the design and construction of new roadway, a new single span cast-in-place concrete girder bridge, new right-of-way, contingency, and engineering costs. Cost estimate details are provided in Appendix D.

A detailed discussion of potential transportation funding sources for this concept is provided in Section 4 of this TSP.

Concept #3b: Install vehicular overcrossing of railroad from Sunset Avenue to new collector road on east side of railroad

Concept 3b is intended to address the same needs described for Concept 3a. Concept 3b would construct a vehicular bridge crossing of the railroad tracks at a point further north than 3a; from Sunset Avenue on the west to a future circulator road on the east (see Figure 12). There is currently an at-grade crossing at this location, which is not open to the public that is utilized by the Banks Lumber Mill under an agreement with the existing rail companies. This crossing would include bicycle/pedestrian accommodations.

The proposed railroad crossing corridor shown on Figure 12 is conceptual and would be defined through the land development process as it is funded, designed, and built.

FIGURE 12: CONCEPT #3B – LOCATION OF RR OVERCROSSING FROM SUNSET AVENUE TO EASTSIDE



A detailed evaluation of this concept is provided in Appendix C (*Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report*). Based on analysis conducted, this concept is recommended as a project to be placed on the City's transportation CIP list.

Based on planning level estimate tools, this project is estimated at \$7,083,000. This estimate includes the design and construction of new roadway, a new single span cast-in-place concrete girder bridge, new right-of-way, contingency, and engineering costs. Cost estimate details are provided in Appendix D.

A detailed discussion of potential transportation funding sources for this concept is provided in Section 4 of this TSP.

As noted earlier, Concept 3b is recommended as the primary location option for a vehicular railroad crossing, with Concept 3a being a secondary option. Along with cost, major factors that should be considered with regard to deciding on a railroad crossing location include:

- Usefulness as a intra-city collector to reduce reliance on peripheral roads (OR 6; Banks Road)
- Effect on railroad operations (i.e. feasibility of crossing location vies a vies railroad operations)
- Impact on existing residents, businesses, landowners
- Anticipated associated traffic impacts
- Engineering feasibility

Need:

North-south circulation system on west side of Banks in UGB expansion area and access to new land uses.

Concept #8: New North-South Circulator Road in Westside Banks Area between Cedar Canyon Road and Area South of Sunset Park

This concept entails constructing a new north-south road on the west side of the existing City of Banks with termini intersections at Cedar Canyon Road in the north and Main Street in the south (see Figure 13). This roadway would be a 40-foot wide paved roadway with sidewalks, illumination, landscaping and drainage, occupying a right-of-way footprint of 64 feet, and meeting City of Banks Collector standards.

The location of this proposed roadway is optimal because it will allow for double-loading of mixed uses on the lot line in the northern segment of the road and will provide access to the commercial and industrial areas, while simultaneously providing north-south circulation within the constraints of the adjacent floodplain.

This concept would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion area west of Main Street.

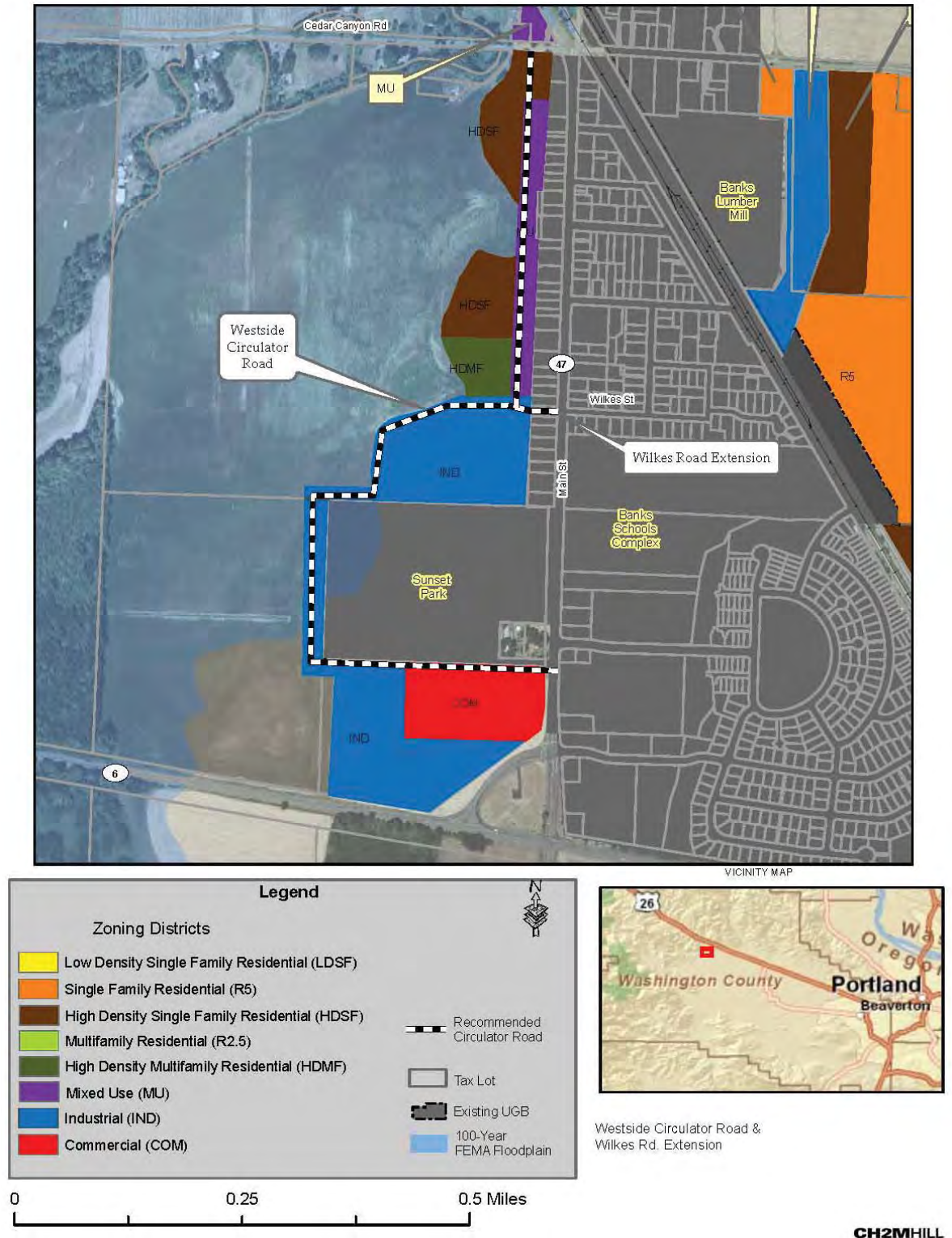
The proposed Westside north-south circulator road corridor as shown on Figure 13 is conceptual and would be defined through the land development process as it is funded, designed, and built.

A detailed evaluation of this concept is provided in Appendix C (*Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report*). Based on analysis conducted, this concept is recommended as a project to be placed on the City's transportation CIP list.

Based on planning level estimate tools, this project is estimated at \$12,673,100. This estimate includes the design and construction of new roadway, new right-of-way, contingency, and engineering costs. Cost estimate details are provided in Appendix D.

A detailed discussion of potential transportation funding sources for this concept is provided in Section 4 of this TSP.

FIGURE 13: CONCEPT #8 – WESTSIDE CIRCULATOR ROAD



Need:

Connection from new UGB expansion area on the west side of Banks to Main Street to provide access and east-west circulation.

Concept #9: New West Extension of Wilkes Road

As shown on Figure 13, this concept entails constructing a west extension of Wilkes Road that would connect to Main Street on the east and the new west side circulator road on the west (see Concept #8), and would result in a new 4-way intersection of Wilkes Road and Main Street. This concept would include the installation of a striped pedestrian crossing. This concept addresses the need to provide an outlet from the new UGB expansion area west of Main Street.

This concept would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion area west of Main Street. Per ODOT staff, the new roadway would require an ODOT approach permit and the proposed marked crosswalks would need State Traffic Engineer Approval.

The location of the proposed Wilkes Road extension is optimal in that it will allow for a formal 4-way intersection with Main Street and the existing Wilkes Road and will support the circulatory function of a collector (Wilkes Road is proposed for upgrading to collector status).

A detailed evaluation of this concept is provided in Appendix C (*Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report*). Based on analysis conducted, this concept is recommended as a project to be placed on the City's transportation CIP list.

Based on planning-level estimate tools, this project is estimated at \$464,000. This estimate includes the design and construction of new roadway, contingency, and engineering costs. Cost estimate details are provided in Appendix D.

A detailed discussion of potential transportation funding sources for this concept is provided in Section 4 of this TSP.

Need:

North-south circulation system on east side of Banks in UGB expansion area and access to new land uses.

Concept #10: New North-South Circulator Road in Eastside Banks Area between Banks Road and Washington Avenue

This concept entails constructing a new north-south road on the east side of the existing City of Banks with termini intersections at Banks Road in the north and Washington Avenue in the south (see Figure 14). The proposed roadway would have a 36-foot paved width within a 60-foot right-of-way, meeting Washington County Major Collector standards. This concept would address the need to provide a primary circulator road for the UGB expansion area to the east of the railroad tracks.

The location of this proposed circulator road would be the most efficient because it is central to the new eastside UGB expansion area and would have significant cost-benefits because it

could serve adjacent land uses on both sides and would limit out-of-direction travel. Washington County and ODOT staff has concurred on this assessment.

A previously considered eastside circulator road that would be located adjacent to the railroad tracks for much of its length was discarded because it would be ineffective from a cost-benefit perspective with regard to serving adjacent land uses. The rationale for the location of the discarded concept was to provide a buffer between land use development and the railroad. However, as was noted by Washington County staff, there are other aesthetically pleasing mechanisms, such as berms or vegetated walls, which could be used to provide a buffer function instead of the roadway, which, as noted, would be significantly more effective if located in a more central location that served adjacent land uses on both sides of the road.

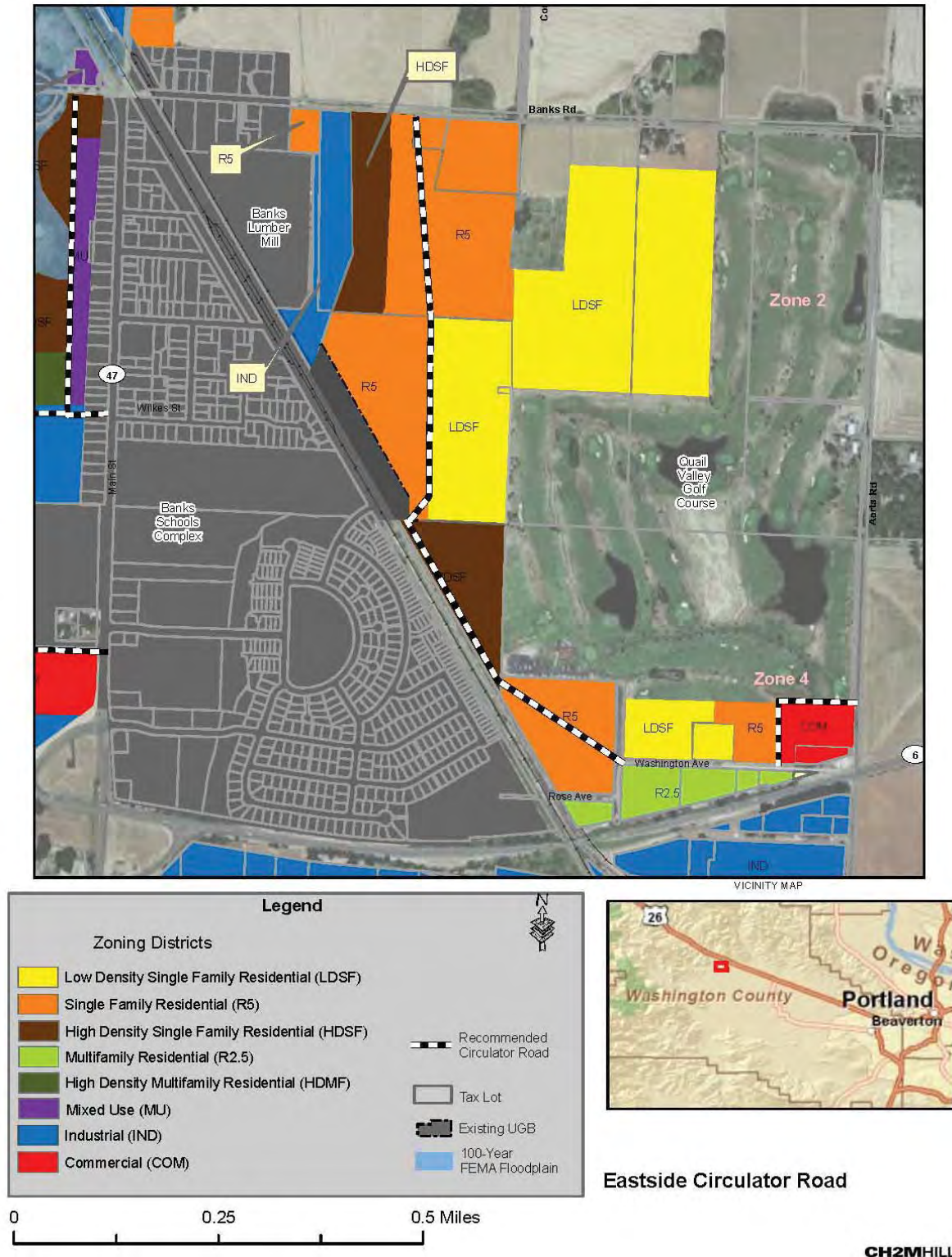
The proposed Westside north-south circulator road corridor as shown on Figure 14 is conceptual and would be defined through the land development process as it is funded, designed, and built.

A detailed evaluation of this concept is provided in Appendix C (*Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report*). Based on analysis conducted, this concept is recommended as a project to be placed on the City's transportation CIP list.

Based on planning level estimate tools, this project is estimated at \$4,441,400. This estimate includes the design and construction of new roadway, new right-of-way, contingency, and engineering costs. Cost estimate details are provided in Appendix D.

A detailed discussion of potential transportation funding sources for this concept is provided in Section 4 of this TSP.

FIGURE 14: CONCEPT #10 – EASTSIDE CIRCULATOR ROAD



Need:

East-west bicycle/pedestrian circulation system.

Several versions of this concept were assessed and are discussed in turn below.

The proposed bicycle/pedestrian crossing corridor as shown on Figure 15 is conceptual and would be defined through the land development process as it is funded, designed, and built.

Concept #11 Option A: Install Bicycle/Pedestrian Overcrossing of Railroad from Area East of Banks Schools Complex to Eastside of Banks (UGB Expansion Area)

As shown in Figure 15, this concept entails constructing a pedestrian/bicycle overcrossing of the railroad tracks to connect the UGB expansion area east of the tracks to the west side of Banks (at the Banks schools complex area) and would include a connecting path on the eastside to the circulator road (thereby providing a connection to the bicycle facilities on the new road). This concept would entail a temporary closure of the railroad tracks (approximately 2 nights at 6 hours a night).

This concept addresses the need to provide safe, convenient, and reasonably direct east-west bicycle/pedestrian circulation. This concept could serve as an affordable interim step to meet this need in the event that the City determines that the longer-term objective of constructing motor vehicle crossings of the railroad with bicycle/pedestrian accommodations (see Concepts 3a and 3b) will occur at an unacceptably late future time with respect to the need for bicycle/pedestrian accommodations across the railroad (to accommodate the population in the eastside UGB expansion area).

This concept would encourage the use of alternate modes of travel between the west and east sides of Banks (assuming development of the UGB expansion areas on the east side of Banks) in keeping with City goals and objectives.

This concept would significantly improve safety conditions for bicyclists and pedestrians who would be provided with an east-west connecting route that was separated from motor vehicle traffic. This concept would be a pivotal safe route to school component.

This concept would significantly improve mobility conditions for bicyclists and pedestrians traveling to and from the UGB expansion area on the east side of the railroad tracks. This concept would enable short trips from east to west Banks and most importantly to the Banks school complex and downtown Banks – to be made conveniently by foot or bicycle.

FIGURE 15: CONCEPT #11 – BIKE/PED RR CROSSING CORRIDOR



A detailed evaluation of this concept is provided in Appendix C (*Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report*). In the aforementioned memorandum this concept is titled “Alternative 11a”. Based on analysis conducted, this concept is recommended as a project to be placed on the City’s transportation CIP list as a secondary bicycle/pedestrian bridge option IF Concept #11 Option B were not feasible, as discussed later in this report. Also, as previously noted, this concept should only be considered for implementation in the event that the City determines that the longer-term objective of constructing motor vehicle crossings of the railroad with bicycle/pedestrian accommodations (see Concepts 3a and 3b) will occur at an unacceptably late future time with respect to the need for bicycle/pedestrian accommodations across the railroad (to accommodate the population in the eastside UGB expansion area).

Based on planning level estimate tools, this project is estimated at \$5,690,800. This estimate includes the design and construction of a new pedestrian/bicycle overcrossing, new right-of-way, contingency, and engineering costs. Cost estimate details are provided in Appendix D.

A detailed discussion of potential transportation funding sources for this concept is provided in Section 4 of this TSP.

Concept #11 Option B: Install Bicycle/Pedestrian Undercrossing of Railroad from Area East of Banks Schools Complex to Eastside of Banks (UGB Expansion Area)

This concept would be in the same location and provide the same connecting points as in Concept 11 Option A (see Figure 15) but would entail an undercrossing (tunnel) connection rather than an overcrossing (bridge). This concept would necessitate a total closure of the railroad tracks for approximately 2-4 weeks.

The location for this undercrossing is optimal for the same reasons described for Concept 11, Option A.

A detailed evaluation of this concept is provided in Appendix C (*Technical Memorandum 5.2: Banks TSP Alternatives Evaluation Report*). In the aforementioned memorandum this concept is titled "Alternative 11c".

Based on analysis conducted, this concept is recommended as a project to be placed on the City's transportation CIP list as the primary bicycle/pedestrian bridge option. **However**, as previously noted, this concept should only be considered for implementation in the event that the City determines that the longer-term objective of constructing motor vehicle crossings of the railroad with bicycle/pedestrian accommodations (see Concepts 3a and 3b) will occur at an unacceptably late future time with respect to the need for bicycle/pedestrian accommodations across the railroad (to accommodate the population in the eastside UGB expansion area). In the event that the City wanted to pursue a bicycle/pedestrian bridge, but Concept 11 Option B were deemed infeasible due to the construction impacts on the railroad companies, Concept Option A would then be recommended.

Based on planning level estimate tools, this project is estimated at \$4,167,000. This estimate includes the design and construction of a new pedestrian undercrossing of the existing railroad, new right-of-way, contingency, and engineering costs. Cost estimate details are provided in Appendix D.

A detailed discussion of potential transportation funding sources for this concept is provided in Section 4 of this TSP.

Summary of Recommendations to Service Expanded UGB Areas

Planning level cost estimates for recommended project to address the needs identified in the traffic analysis are included in Table 12. Cost estimate details are provided in Appendix D.

TABLE 12
Recommendations to Service Expanded UGB Areas

Recommendation	Estimated Cost (2010\$) (rounded to the nearest \$1,000)
Concept #3b: Construct Overcrossing of Railroad from Sunset Avenue to Eastside ¹	\$8,650,000
Concept #3a: Construct Overcrossing of Railroad from South Arbor Village to Rose Avenue ¹	\$7,083,000
Concept #8: Construct Westside Circulator Road	\$12,673,000
Concept #9: Construct Wilkes Road Extension	\$464,000
Concept #10: Construct Eastside Circulator Road	\$4,441,000
Concept #11 Option B: Construct Bicycle/Pedestrian RR Undercrossing ²	\$4,167,000

¹ As noted earlier in this report, the City's preferred option for east-west collector road railroad crossing is to construct at-grade crossings, which, although not currently a feasible option, would be pursued by the City at such point in the future that at-grade railroad crossings become feasible due to changing conditions.

² In the event that the City wanted to pursue a bicycle/pedestrian bridge but Concept 11 Option B were deemed infeasible due to the construction impacts on the railroad companies, Concept 11 Option A would then be recommended

The City should also consider conducting a concept plan for the Eastside UGB expansion area – this would be a comprehensive focused plan to define preferred specific locations for the transportation facility project concepts recommended in this TSP.

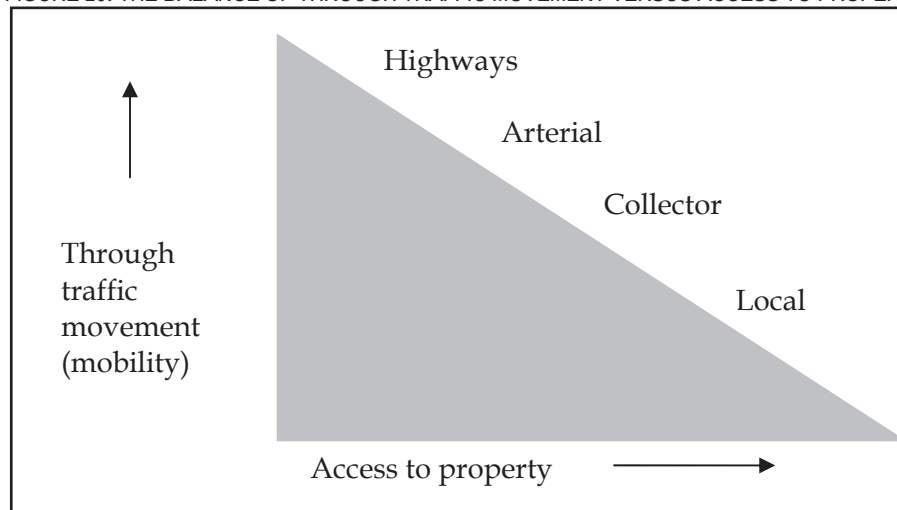
Functional Classification of Roadways

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 16, functional classifications balance mobility with access.

FIGURE 16: THE BALANCE OF THROUGH TRAFFIC MOVEMENT VERSUS ACCESS TO PROPERTY



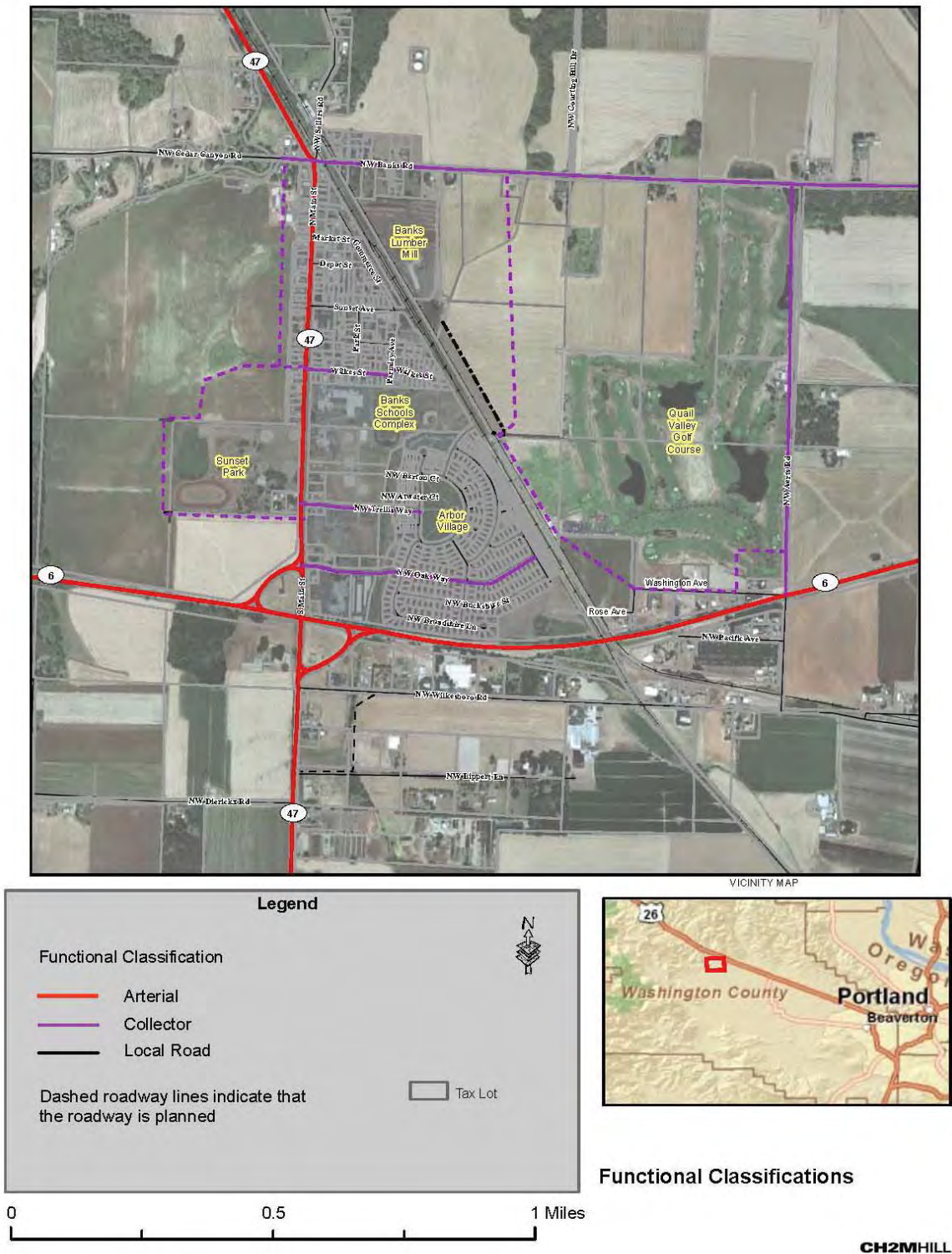
Since functional classifications define the role of a roadway in the transportation system and overall community, those roadways that have a greater emphasis on mobility, highways and arterials, limit the number of access points to provide for better traffic flow. Retrofitting an existing system of streets 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.

The 1999 Banks Transportation Network Plan (TNP) established a functional classification for Banks that included arterial streets, collector streets, and local streets. The proposed functional classification map for streets in Banks is shown in Figure 17. Any street not designated as an arterial or collector street is considered a local street. The recommended

changes to the existing functional classification defined in the 1999 TNP are summarized below.

- Oak Way is upgraded from a local street to a collector
- Trellis Way is upgraded from a local street to a collector
- Wilkes Street is upgraded from a local street to a collector
- Aerts Road is upgraded from a local street to a collector

FIGURE 17: FUNCTIONAL CLASSIFICATIONS



4 IMPLEMENTATION

A variety of local and state funding sources can be explored to help fund the recommendations in this plan.

Further research should be conducted to ensure the applicability of these funding sources for the projects recommended in this report.

State Administered Funding Sources

State Transportation Improvement Program (STIP)

The STIP is the primary programming document that identifies transportation priorities for federal and state funding in Oregon. The STIP provides a schedule and identifies funding for projects throughout the state. The STIP lists projects that are planned for construction during a four-year period. Projects that are included in the STIP are considered “regionally significant” and have been given a high priority through planning efforts and by the relevant area commissions on transportation (ACT). The STIP has five major programs: modernization, safety, preservation, bridge, and operations – and fifteen specific programs from which projects can receive funding. All federally funded transportation projects and programs, and all state and locally funded projects that are deemed “regionally significant” must be included in the STIP.

Transportation projects in the STIP are generally categorized into the five major programs referenced above, plus a sixth “other,” or “special projects” category. Recommended transportation capital improvement projects related to state facilities may fall within two categories: Operations Projects and Special Programs. The STIP states that the applicable uses under each of these projects are as follows:

- **Modernization:** Capital projects that lead to increased highway system capacity.
- **Operations:** System management and improvements that lead to more efficient and safer traffic operations and greater system reliability.
- **Special Programs:** Bicycle and Pedestrian, Congestion Mitigation and Air Quality Improvement, Federal Lands Highways, Fish Passage and Large Culvert Improvement, Immediate Opportunity Fund, Indian Reservation Roads, Public Transit, Railroad Crossing Safety, Scenic Byways, and Transportation Enhancement.

The funding programs under these three categories are described in more detail in the pages that follow.

Modernization

The 2010-2013 Draft STIP states that projects funded under this section are capital highway improvements that lead to increased system capacity. Increased capacity can be accomplished by either adding additional lanes, constructing new highways, or other system improvements. Strong competition exists for funding through the STIP Modernization Program as the need for funding such projects greatly outweighs the funds

available. Projects are awarded funding through this program by the applicable ODOT Region.

Operations

The 2010-2013 Draft STIP states that projects funded under this section “improve the efficiency of the transportation system through the replacement of aging infrastructure and the deployment of technology that allows the existing system to meet increased demands.” Applicable projects may be listed within four sub-categories: (1) Intelligent Transportation Systems (ITS); (2) Signs, Signals, and Illumination; (3) Slides and Rockfalls and; (4) Transportation Demand Management (TDM).

- ***Signs, Signals and Illumination Program*** – The Signs, Signals and Illumination program provides funding for the replacement of equipment that has reached the end of its useful life. This program also provides limited funding for new or upgraded signals at problem intersections.

Special Programs

ODOT also provides funding to a number of special programs. This section describes the programs that are applicable to recommended projects for the City of Banks.

- **ODOT Bicycle and Pedestrian Program** – The ODOT Pedestrian and Bicycle Grant Program provides funding to cities, counties and ODOT regional and district offices through a competitive process. Eligible projects are related to the design and construction of pedestrian and bicycle facilities within the public right-of-way. The application process occurs every two years with applications for the 2012-2013 cycle beginning in 2010 and applications for the 2014-15 cycle beginning in 2012. Every biennium, the program awards approximately \$5 million. A local match is expected for projects that receive this grant.

The bicycle and pedestrian recommendations located within the public right-of-way would be eligible for this program. A grant application could be submitted as early as 2010 for receipt of funds in the 2012-2013 funding cycle.

- **Transportation Enhancement Program** – Oregon’s Transportation Enhancement (TE) program provides federal highway funds for project that strengthen the cultural, aesthetic, or environmental value of our transportation system. TE activities are funded through a required state set aside from STP funds of 10%, or the amount set aside in FY 2005, whichever is greater. Projects fall into four main categories: Bicycle and Pedestrian; Historic Preservation; Landscaping and Scenic Beautification; and Environmental Mitigation. The intent of the program is to fund special or additional activities not normally required on a highway or transportation project.

Since the project’s inception in 1992, 190 projects of approximately \$97 million have been funded in Oregon through the TE program. For fiscal years 2008-2011 the Program will have \$6.5 million per year for competitive selection, and \$2 million per year for the TE Discretionary Account. Awards for the 2012-2013 bienniums were approved by the Oregon Transportation Commission in August 2009; applications for the 2014-2015 bienniums start in April 2010. The funds are provided through reimbursement, not

grants. Participation requires matching funds from the project sponsor, at a minimum of 10.27 percent. All projects must have a direct relationship to surface transportation.

This is a competitive grant application process facilitated by ODOT that awards funding to local governments on an annual basis. The TE Advisory Committee awards the grants based on a project's technical merit and local support. The committee also considers the TE "focus areas" for the year and the connection to other transportation projects.

- **Immediate Opportunity Fund** – This fund provides funding for the construction and improvement of streets and roads that are crucial to support site-specific economic development projects. ODOT manages this fund on a case-by-case basis in cooperation with the Oregon Economic and Community Development Department.

The fund's use is discretionary, and it can only be used when other sources of financial support are unavailable or insufficient. Its use is also restricted to circumstances where an actual transportation problem exists and where funds are needed to identify or retain employers that provide primary industry employment in a community. A match of at least 50 percent of the total fund requested is expected from project's applicants.

- **Railroad Crossing Safety Program** – This program is administered through the Rail Division of ODOT. They allocate funding by prioritizing projects based on an accident prediction model. The Division also has limited funds for discretionary projects that improve safety at railroad-highway grade crossings.

Special Transportation Fund

The Special Transportation Fund (STF) was created by the Oregon Legislature in 1985. It is funded through a cigarette tax and ODOT Transportation Operating Funds. This state funding source provides support for special transportation services that benefit seniors and individuals with disabilities. Seventy-five percent of the funding is allocated to designated counties, transit districts and Indian tribal governments proportional to population. The remaining 25 percent of the funds are distributed through a discretionary grant program called the Public Transportation Discretionary Grant Program.

STF funds can be used to create, maintain, or expand systems that serve seniors or individuals with disabilities, as well as plan and develop new services for those currently not served. ODOT's STF Guidebook provides a list of TSM and TDM examples of previous fund use (http://www.oregon.gov/ODOT/PT/PROGRAMS/stf_program.shtml).

Special City Allotment Grant

The Special City Allotment Grant was created by the Oregon Legislature. The legislature mandated that a \$1 million be set aside for cities with populations less than 5,000. Half of the funds for this grant come from the cities' share of the state gas tax and half of the funds come from ODOT's portion of the State Highway Fund. The maximum grant allocation is \$25,000. Half of the grant can be allocated to the city up front and the second half is provided when the project is completed.

County Funding Sources

Transportation Development Tax (TDT) program

The Transportation Development Tax (TDT) is a countywide tax applied to all new developments to help pay for the transportation infrastructure needed throughout the County to accommodate growth. Ultimately, the TDT is designed to generate enough revenue to construct approximately 28% of the growth-related transportation infrastructure called for in the county and cities' 20-year Transportation Plans. The TDT is not a property tax. New development is required to pay the tax when a building permit or occupancy permit is issued. The TDT tax rate is uniform throughout the County, and the amount of tax due is based on the estimated traffic generated by each development. TDT taxes are assessed and collected by the Washington County Current Planning Division in unincorporated Washington County, and by the cities within city limits. Remodeling, temporary uses, and state and federal government buildings are exempt from the TDT. All TDT revenue will be dedicated to funding transportation improvements designed to accommodate growth, such as:

- Improvements to Arterial and Collector roadways, including sidewalks and bike lanes;
- Transit capital projects (such as bus shelters).

Developers may be eligible to receive credits against their TDT tax for the value of certain developer-constructed improvements built as conditions of development approval. To be eligible for TDT credits, the improvements must be to an arterial or collector roadway or on the adopted Project List ([link to list/ map](#)). There are a number of additional limitations on TDT credit eligibility, and developers are strongly advised to consult with appropriate city or county staff regarding credit eligibility prior to investing in an improvement.

Major Streets Transportation Improvement Program (MSTIP)

The MSTIP is a tax that originated in 1986 as a short term levy put forth by Washington County to fund various construction projects throughout the area. Two more MSTIP measures were approved by voters, in 1989 and 1995. In 1997 voters approved Measure 50, which included provisions to reduce the MSTIP tax rate to 90 percent of the 1995 level and then combine it with Washington County's permanent fixed property tax rate.

Local Funding Sources

City Budget

Many of the state and federal grants identified in this funding section require a local match. This is the most appropriate use of city budget funding as it can leverage larger pools of money available for identified projects.

Exactions

With developer exactions, an improvement is paid for or built by the developer to City standards and then deeded to the City as a condition for development approval. Developer exactions and contributions can pay for portions of roads in, adjacent to, or through new developments. The City of Banks currently requires that all new subdivisions build sidewalks as a developer exaction.

Local Improvement District

Local Improvement Districts (LIDs) are created by property owners within a specified area to raise revenues for constructing street improvements within the same district. LIDs may be used to assess property owners for improvements that benefit properties. The LID can be a larger geographic area than the area with the actual street improvements but all landowners will need to understand advantage to entering into the LID. Property owners typically enter into LIDs because they see economic or personal advantages to the improvements.

Assessments are secured by property liens. The formation of LID districts is governed by state law and local jurisdictional development codes. LID revenues can be used solely for capital costs.

Urban Renewal Areas

Banks does not currently have any urban renewal areas. To establish an Urban Renewal Areas (URAs) the City of Banks would need to create an Urban Renewal Agency. Once this agency was formed, it could identify blighted areas within the city. In the selected area, tax-increment financing (TIF) could be used to generate urban renewal funds. TIF works by 'freezing' property values at the beginning of an urban renewal plan, and assessing a fee only on the incremental growth in property value observed since the beginning of the urban renewal district plan. The revenues generated within an urban renewal area are used to secure bonds to finance projects and programs within that area.

Local Option Levies

In most taxing districts, voters within an established taxing district, such as a city or a fire district can approve levies for operating purposes or capital projects. A levy can either be established as a set rate or a set dollar amount. For capital projects, a levy cannot last longer than 10 years. Levies must be approved at a November election in an even numbered year or by more than 50 percent of eligible voters (double majority).

General Obligation Bonds

Bonding allows municipal and county governments to finance costs for construction projects by borrowing money and paying it back over time (with interest). Financing

requires smaller regular payments over time compared to paying the full cost at once, but financing increases the total cost by adding interest. General Obligation Bonds are often used to pay for construction of large capital improvements. This method is typically used to fund road improvements that will benefit an entire community. General Obligation Bonds add the cost of the improvement to property taxes over a period of time. Oregon State law states “A city may issue general obligation bonds to finance capital construction or capital improvements upon approval of the electors of the city” (287A.050). Revenue for General Obligation Bonds is collected in property tax billings.

Revenue Bonds

Revenue bonds are paid back with dedicated revenue from a source other than property taxes. Revenues from a Systems Development Charge (Washington County’s TDT is a system development charge), Local Improvement District, or other reliable revenue streams can be used. The City of Banks has not used revenue bonds backed by Systems Development Charges, as this funding source is variable based on the amount of development. Revenue bonds are typically used to fund improvements that primarily benefit the people who provide the revenue through fees and assessments.

APPENDIX A

PLAN AND CODE AMENDMENTS

APPENDIX B

TRANSPORTATION SYSTEM NEEDS, OPPORTUNITIES, AND CONSTRAINTS

APPENDIX C

ALTERNATIVES EVALUATION

APPENDIX D

PLANNING-LEVEL COST ESTIMATES

APPENDIX A

PLAN AND CODE AMENDMENTS

Banks Urban Growth Boundary/Transportation System Plan Update: TPR Code Review Report

PREPARED FOR: KJ Won, City of Banks
Ross Kevlin, ODOT

PREPARED BY: Terra Lingley, CH2M HILL
Michael Hoffmann, CH2M HILL

COPIES: Kirsten Pennington, CH2M HILL
Michael Hoffmann, CH2M HILL

DATE: June 26, 2009

This memorandum summarizes the requirements of the Oregon Administrative Rule (OAR) 660-012-045 (also referred to the Transportation Planning Rule or TPR) Sections (2) and (3), and identifies and summarizes recommended code changes to ensure Banks' Land Development and Zoning Ordinances comply with the requirements.

Some sections of the City of Banks Zoning Ordinance and the City of Banks Land Division Ordinance comply with the TPR, however some sections only partially comply, and other sections are missing altogether. Table 1 summarizes City code compliance with the TPR.

TPR Requirements	Code	Ordinance Consistency Finding
Implementation of the Transportation System Plan	☒ Complies with TPR ☐ Partially Complies with TPR ☐ Does Not Comply with TPR	
<i>shall adopt land use or subdivision ordinance with applicable federal and state requirements, facilities, corridors and sites for their</i>		
measures, for example, driveway and g, median control and signal spacing are consistent with the functional ads and consistent with limiting rural lands to rural uses and densities	☐	Section 152.052 of the Banks Land Division Regulations outlines guidelines for Streets. 1) All streets shall be considered in their relation to existing and planned streets, to topographical conditions, to public convenience and safety, and to the proposed use of land to be served by the streets. 13) Access control where a land division abuts or contains an existing or proposed arterial or collector street, the Planning Commission may require marginal access streets, reverse frontage

		lots with suitable depth, screen planning contained in a no-access reservation along the rear of side property line, minimum driveway and intersection spacing of 150-200 feet, or other treatment necessary for adequate protection of residential properties and to afford separation of through and local traffic. There is no discussion of the functional classification of roads. There is also no mention of access management authority and standards of other road jurisdictions (e.g. Washington County and ODOT).
protect future operation of roads, transit transit corridors	●	Street standards are provided in Land Division Regulations Section 151.052. These standards are revised and amended as part of this memo to be in greater accordance with the TPR requirement at issue. Zoning Code Section 151.064 contains performance standards for vehicular access and traffic in a commercial or industrial zone. (151.064(B)(11)). However, the aforementioned Code section is not adequate to satisfactorily address the TPR requirement at issue here. The City's Code also does not provide a performance standard with regard to land use and development actions in a residential zone. To remedy this, 151.064 is revised and amended in this memo to provide performance standards that are in accordance with the TPR requirement at issue. Section 151.066 includes level of service

		descriptions and v/c ratio thresholds.
protect public use airports by controlling airport noise corridors and imaginary limiting physical hazards to air navigation	Not applicable	Not applicable; Banks does not have an airport
coordinated review of future land use transportation facilities, corridors, or sites	○	There is no existing text to address this
apply conditions to development proposals to minimize impacts and protect transportation facilities, or sites	◐	The Banks Code of Ordinances partially addresses the TPR requirement at issue here, as described in the below bullet items: • Banks Zoning Ordinance Code 151.117, Procedure for taking action on a conditional use application. When permitting a new conditional use, the planning commission may impose conditions including c. Controlling the location and number of vehicle access points, and d. Increasing the street width or requiring street dedication • Banks Land Division Regulations Section 152.051 Required Improvements 1. The developer has the responsibility of providing the following improvements and with the plans and specifications: a. All street grading, b. Installation of roadway curbs and permanent roadway paving, c. Installation of facilities for proper storm drainage and erosion control facilities, d. installation of sidewalks. However, as can be discerned from the bullets above, Zoning Code section 151.117 only satisfies

		this TPR requirement in regard to conditional use applications. This memorandum amends the Zoning Code so that the TPR requirement at issue here is satisfied with respect to City review of all types of land use and development applications.
provide notice to public agencies transportation facilities and services, MPOs, and e applications that require public hearings; partition applications; other applications re access to roads.	○	There is no existing text to address this
uring that amendments to land use ities, and design standards are consistent capacities and performance standards of in the TSP.	●	Section 151.157 Comprehensive Plan and Zoning Amendment Criteria: (C) The proposed change is compatible with the surrounding existing and planned land use pattern; (D) Public facilities (i.e. transportation system) are capable of supporting the uses permitted in the proposed zone; and the proposed change is consistent with the statewide planning goals. The existing code is vague and does not define adequate standards.
shall adopt land use or subdivision regulations l communities as set forth below. The purposes vide for safe and convenient pedestrian, bicycle, a consistent with access management on of affected streets, to ensure that new t-site streets and accessways that provide for pedestrian and bicycle travel in areas where avel is likely if connections are provided, and ossible levels of automobile traffic which might age pedestrian or bicycle travel.		

facilities as part of new multi-family developments of four units or more, new retail, commercial developments, and all transit transfer and-ride lots;	○	There is no existing text to address this
ways shall be provided which accommodate pedestrian and bicycle access from residential areas and transit stops, and to activity centers within one-half mile of the multi-family residential developments shall include streets and accessways. Pedestrian parking lots should generally be provided in form of accessways.	◐	Section 152.053 Blocks 3) c. Pedestrian and bicycle ways. When desirable for public convenience and access, a pedestrian and bicycle way easement may be required to connect to a cul-de-sac or to pass through an unusually long or oddly shaped block, or to otherwise provide appropriate circulation. Land Division Regulations should be amended to include development standards for pedestrian/bicycle accessways per linear block lengths and for the provision of such accessways to all activity centers
“neighborhood activity centers” includes, but is not limited to existing or planned schools, parks, shopping centers, or employment centers;	◐	Banks Land Division Regulations includes some language requiring blocks to have cut-throughs to allow access to neighborhood activity centers, but does not define the term. Arterials are also defined as links between activity centers.
Sidewalks shall be required along arterials and major collectors. Sidewalks shall be required along arterials, and most local streets in urban areas, except where they are not required along controlled access streets or as freeways;	◐	The Banks Land Division Regulations requires sidewalks on all streets, however there is no mention of bikeways along arterials and major collectors.
Streets and other dead-end streets may be used in the development plan, consistent with the standards set forth in this section	●	Banks Land Division Regulations Section 152.052 I) describes Cul-de-sac standards which include a maximum length of 500 feet and can serve a building site for not more than 20 dwelling units.

governments shall establish their own criteria for providing streets and accessways for the purposes of this section. Such criteria include but are not limited to: standards for providing streets or accessways; and standards for one-way and two-way travel	●	Banks Land Division Regulations Section 152.052 Streets contains standards and criteria for providing streets and accessways. Street width, parking, sidewalks, parking strips, street angles and access controls are all included in the ordinance. Land Development Regulations need to include reasonably direct bicycle and pedestrian circulation; which will require the adoption of block length limits and maximum street spacing standards.
Streets and accessways need not be required where the following conditions exist: Physical or other conditions that make a street or accessway impracticable, Buildings or other existing structures on adjacent lands physically preclude a street or in the future, and where streets or accessways would violate provisions of leases, covenants, restrictions or other agreements in effect May 1, 1995.	●	General provisions in the Banks Land Division Regulations include text that exempts streets from being required where topography, land use, and in relation to existing and planned streets.
When road improvements are otherwise required for development approval, they shall include providing convenient pedestrian and bicycle facilities along arterials and major roads	○	There is no existing text to address this
Subsection (b) "Safe and convenient" pedestrian routes, facilities and conditions which are reasonably free from hazards, obstructions or levels of automobile traffic which impede or discourage pedestrian or cycle travel	○	There is no existing text to address this

provide a reasonably direct route of travel ons such as between a transit stop and a vel needs of cyclists and pedestrians ation and length of trip; considering that length of pedestrians is generally $\frac{1}{4}$ to $\frac{1}{2}$		
rian circulation within new office parks developments shall be provided through ings, construction of accessways, ilar techniques.	●	Banks Zoning Code Section 151.138 Development Standards (9) Circulation. A pedestrian and bicycle circulation system must be provided to facilitate movement within the Planned Unit Development

Introduction

The following text recommendations are recommended to bring the Banks Zoning Ordinance and Land Development Code in compliance with the TPR. Recommended code language is from the *Model Development Code for Small Cities, 2nd Edition*. The following section outlines the TPR requirements and the recommended revisions (text insertions/text strikethroughs) to the City's Zoning Code (Chapter 151 of City Code of Ordinances) and Land Division Regulations (Chapter 152 of City Code of Ordinances).

Existing TPR language is *italicized*. Existing Banks code language appears in plain text. Recommended additions to Banks code are shown in underline format. Recommended deletions to Banks code are shown in ~~strikeout format~~.

OAR 660-012-0045(2)(a)

(2) Local governments shall adopt land use or subdivision ordinance regulations, consistent with applicable federal and state requirements, to protect transportation facilities, corridors and sites for their identified functions.

(a) Access control measures, for example, driveway and public road spacing, median control and signal spacing standards, which are consistent with the functional classification of roads and consistent with limiting development on rural lands to rural uses and densities

Recommended additions to the Banks Land Division Regulations

Section 152.052 Streets

(M) *Access control*. Where a land division abuts or contains an existing or proposed arterial or collector street, the Planning Commission may require marginal access streets, reverse frontage lots with suitable depth, screen planting contained in a no-access reservation along the rear or side property line, minimum driveway and intersection spacing of 150-200 feet, or other treatment necessary for adequate protection of residential properties and to afford separation of through and local traffic. Such access control measures shall not have the effect of precluding at least one point of access onto a public road per existing lot of record.

(1). Intent and Purpose. The intent of this Section is to manage access to land uses and on-site circulation, and to preserve the transportation system in terms of safety, capacity, and function. This Section applies to all public streets within the City of Banks, and to all properties that abut these roadways. This Section implements the access management policies of the City Transportation System Plan. Access management standards must be coordinated with the appropriate authority or owners as listed in the City of Banks Transportation System Plan, or TSP.

(2). Applicability. This Chapter applies to all public streets within the City and to all properties that abut these streets. The standards apply when lots are created, consolidated, or modified through a land division, partition, lot line adjustment, lot consolidation, or street vacation; and when properties are subject to Land Use Review or Site Design Review.

(3). Access Permit Required. Access to a public street (e.g., a new curb cut or driveway approach) requires an Access Permit. An access permit may be in the form of a letter to the applicant, or it may be attached to a land use decision notice as a condition of approval. In either case, approval of an access permit shall follow the procedures and requirements of the applicable road authority, as determined through the City's review procedures.

(4). Access to State Highways. No new access shall be allowed to OR 6. Any new access to OR 47 requires an ODOT-approved approach road permit.

(P) Functional Classification. Development should reflect functional classification of roadways as identified in the Banks Transportation Network Plan, including any bicycle, pedestrian or frontage requirements. There are no rural lands in Banks.

OAR 660-012-0045(2)(b)

(b) Standards to protect future operation of roads, transitways and major transit corridors

Recommended additions to the Banks Zoning Code

Section 151.064. Performance Standards

(A) In a Commercial or Industrial zone, no land or structure shall be used or occupied unless there is continuing compliance with the following standards. All land use and development applications in a Commercial or Industrial zone shall comply with the below standards, in addition to compliance with all design standards contained in City of Banks Code of Ordinances Chapter 152 (Land Division Regulations).

~~(B) It is the responsibility of the applicant to demonstrate compliance with these standards.~~

(11) ~~Vehicular access and traffic.~~

(a) Access points to an industrial or commercial site from a street shall be located to minimize traffic congestion and, to the extent possible, to avoid directing traffic into residential areas.

(b) Where possible within Industrial or commercial districts, access to the street shall be made to serve more than one site or business.

~~(c) Traffic generated by the proposed use may not have the effect of adversely impacting the existing level of service (LOS) at nearby intersections.~~

(B) All land use and development applications shall comply with the following standards and procedures for the purpose of protecting the future operation of the Banks transportation system:

(1) Development Standards. The following standards shall be met for all new uses and developments:

(a) All new lots created, consolidated, or modified through a land division, partition, lot line adjustment, lot consolidation, or street vacation must have frontage or approved access to a public street.

(b) Streets within or adjacent to a development shall be improved in accordance with the Banks street design standards (Code 152.052).

(c) Development of new streets, and additional street width or improvements planned as a portion of an existing street, shall be improved in accordance with this Section, and public streets shall be dedicated to the applicable road authority;

(d) New streets and drives shall be paved.

(2) Guarantee. The City may accept a future improvement guarantee (e.g., owner agrees not to object to the formation of a local improvement district in the future) in lieu of street improvements if one or more of the following conditions exist:

(a) A partial improvement may create a potential safety hazard to motorists or pedestrians;

(b) Due to the developed condition of adjacent properties it is unlikely that street improvements would be extended in the foreseeable future and the improvement associated with the project under review does not, by itself, provide increased street safety or capacity, or improved pedestrian circulation;

(c) The improvement would be in conflict with an adopted capital improvement plan; or

(d) The improvement is associated with an approved land partition in a residential district and the proposed land partition does not create any new streets.

(3) Creation of Rights-of-Way for Streets and Related Purposes. Streets shall be created through the approval and recording of a final subdivision or partition plat; except the City may approve the creation of a street by acceptance of a deed, provided that the street is deemed in the public interest by the City Council for the purpose of implementing the Comprehensive Plan, and the deeded right-of-way conforms to the standards of this Code.

(4) Creation of Access Easements. The City may approve an access easement when the easement is necessary to provide for access and circulation in conformance with Code sections 152.052 (Streets); 152.053 (Blocks) and; 152.054 (Building Sites). Access easements shall be created and maintained in accordance with the Uniform Fire Code Section 10.207.

Recommended additions to the Banks Land Division Regulations

Section 152.052 Streets.

(B) *Minimum right-of-way and roadway width.* Unless otherwise approved in accordance with the provisions below or those of division (O) below, the street right-of-way and roadway widths shall not be less than the width in feet shown in the following table:

Type of Street	Right-of-way Width	Pavement width
Arterial	80-100 feet	40-52 feet
Collector	60-80 feet	40-48 feet
Residential Street	50 feet	32 feet
Residential Collector	50 feet	32 feet
Residential Boulevard	70 feet	44 feet
Radius for turn around at end of cul-de-sac	55 feet	42 feet
Alleys	20 feet	20 feet

Where a range of width is indicated, the width shall be the narrower in the range unless unique and specific conditions exists as determined by the decision-making authority based upon the following factors:

1. Street classification in the Transportation System Plan;
2. Anticipated traffic generation;
3. On-street parking needs;
4. Sidewalk and bikeway requirements based on anticipated level of use;
5. Requirements for placement of utilities;
6. Street lighting;

7. Minimize drainage, slope, and sensitive lands impacts;
8. Street tree location;
9. Protection of significant vegetation;
10. Safety and comfort for motorists, bicyclists, and pedestrians;
11. Street furnishings (e.g., benches, lighting, bus shelters, etc.), when provided;
12. Access needs for emergency vehicles; and
13. Transition between different street widths (i.e., existing streets and new streets).

OAR 660-012-0045(2)(c)

(c) Measures to protect public use airports by controlling land uses within airport noise corridors and imaginary surfaces, and by limiting physical hazards to air navigation

No recommended additions to the Banks Zoning Code or Land Division Regulations

(Not applicable; Banks does not have an airport)

OAR 660-012-0045(2)(d)

(d) A process for coordinated review of future land use decisions affecting transportation facilities, corridors, or sites

Recommended additions to the Banks Zoning Code

§ 151.079 TRAFFIC IMPACTS

The City may require a traffic impact analysis (TIA) prepared by a qualified professional to determine access, circulation, and other transportation requirements in conformance with TIA results. TIA's shall be required for all land use action and development applications that will generate more than 50 AM or PM peak hour trips per day or 300 Average Daily Trips. Trip calculation shall be based upon the most recent edition of *Trip Generation* published by the Institute of Transportation Engineers

(A) Amendments That Affect Transportation Facilities. Amendments to the comprehensive plan and land use regulations which significantly affect a transportation facility as determined by City staff upon review of applicant's TIA shall assure that allowed land uses are consistent with the function, capacity, and level of service of the facility. This shall be accomplished by one of the following:

- (1) Adopting measures that demonstrate that allowed land uses are consistent with the planned function of the transportation facility; or
- (2) Amending the Comprehensive Plan to provide transportation facilities, improvements, or services adequate to support the proposed land uses; such amendments shall include a funding plan to ensure the facility, improvement, or service will be provided by the end of the planning period; or,

- (3) Altering land use designations, densities, or design requirements to reduce demand for automobile travel and meet travel needs through other modes of transportation; or
 - (4) Amending the planned function, capacity or performance standards of the transportation facility; or
 - (5) Providing other measures as a condition of development or through a development agreement or similar funding method, specifying when such measures will be provided.
- (B) Review of Applications for Effect on Transportation Facilities. When a development application includes a proposed comprehensive plan amendment or land use district change, the proposal shall be reviewed to determine whether it significantly affects a transportation facility, in accordance with Oregon Administrative Rule (OAR) 660-012-0060 (the Transportation Planning Rule – TPR) and the Traffic Impact Study provisions of Section 4.1.900. “Significant” means the proposal would:
- (1) Change the functional classification of an existing or planned transportation facility (exclusive of correction of map errors). This would occur, for example, when a proposal causes future traffic to exceed the levels associated with a “collector” street classification, requiring a change in the classification to an “arterial” street, as identified by Banks’ Transportation System Plan (“TSP”); or
 - (2) Change the standards implementing a functional classification system; or
 - (3) As measured at the end of the planning period identified in the City of Banks adopted TSP allow types or levels of land use that would result in levels of travel or access that are inconsistent with the functional classification of an existing or planned transportation facility; or
 - (4) Reduce the performance of an existing or planned transportation facility below the minimum acceptable performance standard identified in the City of Banks TSP or
 - (5) Worsen the performance of an existing or planned transportation facility that is otherwise projected to perform below the minimum acceptable performance standard identified in the City of Banks TSP.

OAR 660-012-0045(2)(e)

(e) A process to apply conditions to development proposals in order to minimize impacts and protect transportation facilities, corridors, or sites

Recommended additions to the Banks Zoning Code

151.079 TRAFFIC IMPACTS

The purpose of this section of the code is to assist in determining which road authorities participate in land use decisions, and to implement Section 660-012-0045 (2) (e) of the State Transportation Planning Rule that requires the City to adopt a process to apply conditions to development proposals in order to minimize impacts and protect transportation facilities. This Chapter establishes the standards for when a proposal must be reviewed for potential traffic impacts; when a Traffic Impact Analysis must be submitted with a development application in order to determine whether conditions are needed to minimize impacts to and protect transportation facilities; what must be in a Traffic Impact Analysis; and who is qualified to prepare the Study.

(A) When a Traffic Impact Study is Required. The City or other road authority with jurisdiction may require a Traffic Impact Analysis (TIA) as part of an application for development, a change in use, or a change in access. A TIA shall be required when a land use application involves one or more of the following actions:

- (1) A change in zoning or a plan amendment designation;
- (2) Any proposed development or land use action that a road authority states may have operational or safety concerns along its facility(ies);
- (3) An increase in site traffic volume generation by 300 Average Daily Trips (ADT) or more; or
- (4) An increase in peak hour volume of a particular movement to and from the State highway by 20 percent or more; or
- (5) An increase in use of adjacent streets by vehicles exceeding the 20,000 pound gross vehicle weights by 10 vehicles or more per day; or
- (6) The location of the access driveway does not meet minimum sight distance requirements, or is located where vehicles entering or leaving the property are restricted, or such vehicles queue or hesitate on the State highway, creating a safety hazard; or
- (7) A change in internal traffic patterns that may cause safety problems, such as back up onto a street or greater potential for traffic accidents.

(B) Traffic Impact Study Preparation. A Traffic Impact Analysis shall be prepared by a professional engineer in accordance with the requirements of the road authority. If the road authority is the Oregon Department of Transportation (ODOT), consult ODOT's regional development review planner and OAR 734-051-180.

Section 151.069 Design Standards.

(A) Generally.

(1) When reviewing design as part of permit review for any land use action or development, the planning commission may impose conditions including: a) controlling the location and number of vehicle access points, and; b) increasing the street width or requiring street dedication.

(2) All off-street parking lots shall be designed in accordance with city standards for stalls and aisles as set forth in the following below.

Section 151.137 Procedure; Preliminary Site Development Documents [Planned Unit Development]

(C) Planning Commission review of the preliminary site development plan shall be made within 60 days of submission and recommendations for changes or modifications of the submitted preliminary plan given in writing to the applicant. The procedures and review criteria used shall be as for a conditional use application (§§ 151.116 and 151.170 *et seq.*). In addition, the development standards of § 151.138 apply.

When reviewing a PUD, the planning commission may impose conditions including: a) controlling the location and number of vehicle access points, and; b) increasing the street width or requiring street dedication.

Section 151.156 Procedure. [Comprehensive Plan and Zoning Amendments]

Unless part of a legislative action, the procedure for quasi-judicial comprehensive plan and/or zoning code text or map amendments shall be as specified in §§ 151.170 *et seq.*

(Ord. 2-2-80, passed 2-19-1980; Am. Ord. passed 4- -1989)

When reviewing a comprehensive plan and/or zoning code text or map amendment, the planning commission may impose conditions including: a) controlling the location and number of vehicle access points, and; b) increasing the street width or requiring street dedication.

Section 151.171. Procedures for Variance, Conditional Use, Zone Change, and other Land Use Applications.

When reviewing a applicant's request for a variance, conditional use, zone change, or other land use action, the planning commission may impose conditions including: a) controlling the location and number of vehicle access points, and; b) increasing the street width or requiring street dedication.

OAR 660-012-0045(2)(f)

(f) Regulations to provide notice to public agencies providing transportation facilities and services, MPOs, and ODOT of: land use applications that require public hearings; subdivision and partition applications; other applications which affect private access to roads.

Recommended additions to the Banks Zoning Code**§ 151.174 PUBLIC NOTICE.**

(A) Mailed notice. The City shall mail the notice of the Type III action. The records of the Washington County Assessor's Office are the official records for determining ownership. Notice of a Type III application hearing or Type II appeal hearing shall be given by the City Planning Official or designee in the following manner:

- a. At least 20 days before the hearing date, notice shall be mailed to:
 - (1) The applicant and all owners or contract purchasers of record of the property that is the subject of the application;
 - (2) All property owners of record within 100 feet of the site;
 - (3) Any governmental agency that is entitled to notice under an intergovernmental agreement entered into with the City. The City may notify other affected agencies. The City shall notify the road authority, and rail authority and owner, when there is a proposed development abutting or affecting their transportation facility and allow the agency to review, comment on, and suggest conditions of approval for the application.
 - (4) Any neighborhood or community organization recognized by the City Council and whose boundaries include the property proposed for development;
 - (5) Any person who submits a written request to receive notice;
 - (6) For appeals, the appellant and all persons who provided testimony in the original decision; and
 - (7) For a land use district change affecting a manufactured home or mobile home park, all mailing addresses within the park, in accordance with ORS 227.175.
- b. The City Recorder or designee shall have an affidavit of notice be prepared and made a part of the file. The affidavit shall state the date that the notice was mailed to the persons who must receive notice.
- c. At least 14 business days before the hearing, notice of the hearing shall be printed in a newspaper of general circulation in the City. The newspaper's affidavit of publication of the notice shall be made part of the administrative record.

~~A notice of public hearing on any land use application required according to § 151.171 shall be posted at 1 or more locations within the city, including the City Hall, at least 10 days prior to the date of~~

~~the hearing.~~

~~(B) In addition, a notice of hearing shall be mailed to owners of property (based on records at the Washington County Department of Assessment and Taxation) within 200 feet of the site of the application. The notice shall be mailed at least 10 days prior to the date of the hearing.~~

~~(C) Additional notification methods as directed by City Council are also authorized.~~

~~(D)~~ The notice shall include a description of what is being proposed and:

- (1) The property address and legal description;
- (2) The criteria applicable to the request;
- (3) The date, time, and location of the public hearing; and
- (4) A statement that failure to raise an issue in person or by letter precludes appeal, and that failure to specify to which criteria the comment is directed precludes appeal based on that criterion.

~~(E)~~ Failure of a person to receive the notice prescribed in this section shall not impair the validity of the hearing.

OAR 660-012-0045(2)(g)

(g) Regulations assuring that amendments to land use designations, densities, and design standards are consistent with the functions, capacities and performance standards of facilities identified in the TSP.

Recommended additions to the Banks Zoning Code

Section 151.156

F. Amendments That Affect Transportation Facilities. Except as provided in subsection C, amendments to the comprehensive plan and land use regulations which significantly affect a transportation facility shall assure that allowed land uses are consistent with the function, capacity, and level of service of the facility identified in the Banks Transportation System Plan. This shall be accomplished by one of the following:

1. Adopting measures that demonstrate that allowed land uses are consistent with the planned function of the transportation facility; or
2. Amending the TSP or Comprehensive Plan to provide transportation facilities, improvements, or services adequate to support the proposed land uses; such amendments shall include a funding plan to ensure the facility, improvement, or service will be provided by the end of the planning period; or,
3. Altering land use designations, densities, or design requirements to reduce demand for automobile travel and meet travel needs through other modes of transportation; or
4. Amending the planned function, capacity or performance standards of the transportation facility; or

5. Providing other measures as a condition of development or through a development agreement or similar funding method, specifying when such measures will be provided.

G. Exceptions. Amendments to the Comprehensive Plan or land use regulations with a significant effect on a transportation facility, where the facility is already performing below the minimum acceptable performance standard identified in the Transportation System Plan may be approved when all of the following criteria are met:

1. The amendment does not include property located in an interchange area, as defined under applicable law;
2. The currently planned facilities, improvements or services are not adequate to achieve the standard;
3. Development resulting from the amendment will, at a minimum, mitigates the impacts of the amendment in a manner that avoids further degradation to the performance of the facility by the time of the development; and
4. The road authority provides a written statement that the proposed funding and timing for the proposed development mitigation are sufficient to avoid further degradation to the facility.

OAR 660-012-0045(3)(a)

(3) Local governments shall adopt land use or subdivision regulations for urban areas and rural communities as set forth below. The purposes of this section are to provide for safe and convenient pedestrian, bicycle, and vehicular circulation consistent with access management standards and the function of affected streets, to ensure that new development provides on-site streets and accessways that provide reasonably direct routes for pedestrian and bicycle travel in areas where pedestrian and bicycle travel is likely if connections are provided, and which avoids wherever possible levels of automobile traffic which might interfere with or discourage pedestrian or bicycle travel.

(a) Bicycle parking facilities as part of new multi-family residential developments of four units or more, new retail, office and institutional developments, and all transit transfer stations and park-and-ride lots;

Recommended additions to the Banks Land Division Regulations

§ 152.062 BICYCLE PARKING.

All uses that are subject to Site Design Review shall provide bicycle parking, in conformance with the standards in the table below, and following subsections.

(A) Minimum Required Bicycle Parking Spaces. Uses shall provide long- and short-term bicycle parking spaces, as designated in Table 3. Where two options are provided (e.g., 2 spaces, or 1 per 8 bedrooms), the option resulting in more bicycle parking is used.

<u>Use Categories</u>	<u>Specific Uses</u>	<u>Long-term Spaces (Covered or enclosed)</u>	<u>Short-term spaces (near building entry)</u>
<u>Residential Categories</u>			
<u>Household Living</u>	<u>Multifamily</u>	<u>1 per 4 units</u>	<u>2, or 1 per 20 units</u>
<u>Group Living</u>		<u>2, or 1 per 20 bedrooms</u>	<u>None</u>
	<u>Dormitory</u>	<u>1 per 8 bedrooms</u>	<u>None</u>
<u>Commercial Categories</u>			
<u>Retail Sales And Service</u>		<u>2, or 1 per 12,000 sq. ft. of floor area</u>	<u>2, or 1 per 5,000 sq. ft. of floor area</u>
	<u>Lodging</u>	<u>2, or 1 per 20 rentable rooms</u>	<u>2, or 1 per 20 rentable rooms</u>
<u>Office</u>		<u>2, or 1 per 10,000 sq. ft. of floor area</u>	<u>2, or 1 per 40,000 sq. ft. of floor area</u>
<u>Commercial Outdoor Recreation</u>		<u>8, or 1 per 20 auto spaces</u>	<u>None</u>
<u>Major Event Entertainment</u>		<u>8, or 1 per 40 seats or per CU review</u>	<u>None</u>
<u>Industrial Categories</u>			
<u>Manufacturing And Production</u>		<u>2, or 1 per 15,000 sq. ft. of floor area</u>	<u>None</u>
<u>Warehouse And Freight Movement</u>		<u>2, or 1 per 40,000 sq. ft. of floor area</u>	<u>None</u>
<u>Institutional Categories</u>			
<u>Basic Utilities</u>	<u>Bus transit center</u>	<u>8</u>	<u>None</u>
	<u>Park and ride</u>	<u>8, or 5 per acre</u>	<u>None</u>
<u>Community Service</u>		<u>2, or 1 per 10,000 sq. ft. of floor area</u>	<u>2, or 1 per 10,000 sq. ft. of floor area</u>
<u>Parks (active recreation areas only)</u>		<u>None</u>	<u>8, or per CU review</u>
<u>Schools</u>	<u>Grades 2-5</u>	<u>1 per classroom, or per CU review</u>	<u>1 per classroom, or per CU review</u>
	<u>Grades 6-12</u>	<u>2 per classroom, or per CU review</u>	<u>4 per school, or per CU review</u>
<u>Colleges</u>	<u>Excluding dormitories (see Group Living, above)</u>	<u>2, or 1 per 20,000 sq. ft. of net building area, or per CU review</u>	<u>2, or 1 per 10,000 sq. ft. of net building area, or per CU review</u>
<u>Medical Centers</u>		<u>2, or 1 per 70,000 sq. ft. of net building area, or per CU</u>	<u>2, or 1 per 40,000 sq. ft. of net building area,</u>

<u>Use Categories</u>	<u>Specific Uses</u>	<u>Long-term Spaces (Covered or enclosed)</u>	<u>Short-term spaces (near building entry)</u>
		<u>review</u>	<u>or per CU review</u>
<u>Religious Institutions and Places of Worship</u>		<u>2, or 1 per 4,000 sq. ft. of net building area</u>	<u>2, or 1 per 2,000 sq. ft. of net building area</u>
<u>Daycare</u>		<u>2, or 1 per 10,000 sq. ft. of net building area</u>	<u>None</u>
<u>Other Categories</u>			
<u>Other Categories</u>	<u>Determined through Land Use Review, Site Design Review, or CU Review, as applicable</u>		

(B) Exemptions. This Section does not apply to single-family and two-family housing (attached, detached, or manufactured housing), home occupations, agriculture and livestock uses.

(C) Location and Design. Bicycle parking should be no farther from the main building entrance than the distance to the closest vehicle space, or 50 feet, whichever is less. Long-term (i.e., covered) bicycle parking should be incorporated whenever possible into building design. Short-term bicycle parking, when allowed within a public right-of-way, should be coordinated with the design of street furniture, as applicable.

(D) Visibility and Security. Bicycle parking for customers and visitors of a use shall be visible from street sidewalks or building entrances, so that it provides sufficient security from theft and damage;

(E) Options for Storage. Long-term bicycle parking requirements for multiple family uses and employee parking can be met by providing a bicycle storage room, bicycle lockers, racks, or other secure storage space inside or outside of the building;

(F) Lighting. For security, bicycle parking shall be at least as well lit as vehicle parking..

(G) Reserved Areas. Areas set aside for bicycle parking shall be clearly marked and reserved for bicycle parking only.

(H) Hazards. Bicycle parking shall not impede or create a hazard to pedestrians. Parking areas shall be located so as to not conflict with vision clearance standards

OAR 660-012-0045(3)(b)

(b) On-site facilities shall be provided which accommodate safe and convenient pedestrian and bicycle access from within new subdivisions, multi-family developments, planned developments, shopping centers, and commercial districts to adjacent residential areas and transit stops, and to neighborhood activity centers within one-half mile of the development. Single-family residential developments shall

generally include streets and accessways. Pedestrian circulation through parking lots should generally be provided in the form of accessways.

Recommended additions to the Banks Land Division Regulations

(C) Easements.

Pedestrian and bicycle ways. Then desirable for public convenience and access, a pedestrian or bicycle way easement may be required to connect to a cul-de-sac or to pass through an unusually long or oddly shaped block, or to otherwise provide appropriate circulation. To ensure safe, direct, and convenient pedestrian circulation, all developments shall provide a continuous pedestrian system. The pedestrian system shall be based on the standards below:

1. Continuous Walkway System. The pedestrian walkway system shall extend throughout the development site and connect to all future phases of development, and to existing or planned off-site adjacent trails, public parks, and open space areas to the greatest extent practicable. The developer may also be required to connect or stub walkway(s) to adjacent streets and to private property with a previously reserved public access easement for this purpose.
2. Safe, Direct, and Convenient. Walkways within developments shall provide safe, reasonably direct, and convenient connections between primary building entrances and all adjacent streets, based on the following definitions:
 - a. Reasonably direct. A route that does not deviate unnecessarily from a straight line or a route that does not involve a significant amount of out-of-direction travel for likely users.
 - b. Safe and convenient. Routes that are reasonably free from hazards and provide a reasonably direct route of travel between destinations.
 - c. "Primary entrance" for commercial, industrial, mixed use, public, and institutional buildings is the main public entrance to the building. In the case where no public entrance exists, street connections shall be provided to the main employee entrance.
 - d. "Primary entrance" for residential buildings is the front door (i.e., facing the street). For multifamily buildings in which each unit does not have its own exterior entrance, the "primary entrance" may be a lobby, courtyard, or breezeway which serves as a common entrance for more than one dwelling.
3. Connections Within Development. Connections within developments shall be provided as required in subsections a-c, below:

- a. Walkways shall connect all building entrances to one another to the extent practicable
- b. Walkways shall connect all on-site parking areas, storage areas, recreational facilities and common areas, and shall connect off-site adjacent uses to the site to the extent practicable. Topographic or existing development constraints may be cause for not making certain walkway connections.
- c. Large parking areas shall be broken up so that no contiguous parking area exceeds three (3) acres. Parking areas may be broken up with plazas, large landscape areas with pedestrian access ways (i.e., at least 20 feet total width), streets, or driveways with street-like features, Street-like features, for the purpose of this section, means a raised sidewalk of at least 4-feet in width, 6-inch curb, accessible curb ramps, street trees in planter strips or tree wells, and pedestrian-oriented lighting.

OAR 660-012-0045(3)(b)(A)

(A) "Neighborhood activity centers" includes, but is not limited to, existing or planned schools, parks, shopping areas, transit stops or employment centers;

Recommended additions to the Banks Land Division Regulations

Section 152.052 (A)

- (1) Provide for the continuation or appropriate projection of existing principal streets in surrounding areas; or
- (2) Confirm to a plan for the neighborhood approved or adopted by the Planning Commission to meet a particular situation where topographical or other conditions make continuance or conformance to existing streets impractical.
- (3) Provide adequate pedestrian and bicycle access and circulation for all neighborhood activity centers, including existing and planned schools, parks, shopping areas, transit stops and employment centers.

OAR 660-012-0045(3)(b)(B)

(B) Bikeways shall be required along arterials and major collectors. Sidewalks shall be required along arterials, collectors and most local streets in urban areas, except that sidewalks are not required along controlled access roadways, such as freeways;

Recommended additions to the Banks Land Division Regulations

Section 152.052 (A)

- (1) Provide for the continuation or appropriate projection of existing principal streets in surrounding areas; or
- (2) Confirm to a plan for the neighborhood approved or adopted by the Planning Commission to meet a particular situation where topographical or other conditions make

continuance or conformance to existing streets impractical.

(3) Provide adequate pedestrian and bicycle access and circulation for all neighborhood activity centers, including but not limited to existing and planned schools, parks, shopping areas, transit stops and employment centers.

(4) Sidewalks, planter strips, and bicycle lanes shall be installed in conformance with the street standards of this section and the Comprehensive Plan. Maintenance of sidewalks and planter strips in the right-of-way is the continuing obligation of the adjacent property owner. Bikeways shall be required along arterials and major collectors. Sidewalks shall be required along arterials and collectors.

OAR 660-012-0045(3)(b)(C)

(C) Cul-de-sacs and other dead-end streets may be used as part of a development plan, consistent with the purposes set forth in this section

No recommended additions to the Banks Zoning Code or Land Division Regulations

OAR 660-012-0045(3)(b)(D)

(D) Local governments shall establish their own standards or criteria for providing streets and accessways consistent with the purposes of this section. Such measures may include but are not limited to: standards for spacing of streets or accessways; and standards for excessive out-of-direction travel

Recommended additions to the Banks Land Division Regulations

See Recommendations for Section 152.053 (2)

OAR 660-012-0045(3)(b)(E)

(E) Streets and accessways need not be required where one or more of the following conditions exist: Physical or topographic conditions that make a street or accessway connection impracticable, Buildings or other existing development on adjacent lands physically preclude a connection now or in the future, and where streets or accessways would violate provisions of leases, easements, covenants, restrictions or other agreements existing as of May 1, 1995.

Recommended additions to the Banks Land Division Regulations

Section 152.053 Blocks

1. All local and collector streets that stub into a development site shall be extended within the site to provide through circulation unless prevented by environmental or topographical constraints, existing development patterns, or compliance with other standards in this code. This exception applies when it is not possible to redesign or reconfigure the street pattern to provide

required extensions. Land is considered topographically constrained if the slope is greater than 15% for a distance of 250 feet or more. In the case of environmental or topographical constraints, the mere presence of a constraint is not sufficient to show that a street connection is not possible. The applicant must show why the environmental or topographic constraint precludes some reasonable street connection.

2. Street Connectivity and Formation of Blocks. In order to promote efficient vehicular and pedestrian circulation throughout the city, subdivisions and site developments of more than two (2) acres shall be served by a connecting network of public streets and/or accessways, in accordance with the following standards (minimum and maximum distances between two streets or a street and its nearest accessway):
 - a. Residential Districts: Minimum of 100 foot block length and maximum of [600] length; maximum 1,400 feet block perimeter;
 - b. Main Street Area: Minimum of 100 foot length and maximum of 400 foot length; maximum 1,200 foot perimeter;
 - c. General Commercial Districts: Minimum of 100 foot length and maximum of 600 foot length; maximum 1,400 foot perimeter;
 - d. Not applicable to the Industrial Districts;
3. Pedestrian/bicycle accessway Standards. Where a street connection in conformance with the maximum block length standards in subsection 4 is impracticable, a pedestrian/bicycle accessway shall be provided at or near the middle of a block in lieu of the street connection. The City may also require developers to provide a pedestrian/bicycle accessway where a cul-de-sac or other street is planned and the accessway would connect the streets or provide a connection to other developments. Such access ways shall conform to all of the following standards:
 - a. Pedestrian/bicycle accessways shall be no less than ten (10) feet wide and located within a right-of-way or easement allowing public access and, as applicable, emergency vehicle access;
 - b. If the streets within the subdivision or neighborhood are lighted, all accessways in the subdivision shall be lighted. Accessway illumination shall provide at least 2-foot candles;
 - c. A right-of-way or public access easement provided in accordance with subsection b that is less than 20 feet wide may be allowed on steep slopes where the decision body finds that stairs, ramps, or switch-back paths are required;
 - d. All pedestrian/bicycle accessways shall conform to applicable ADA requirements;

- e. The City may require landscaping as part of the required accessway improvement to buffer pedestrians from adjacent vehicles, provided that landscaping or fencing adjacent to the accessway does not exceed four (4) feet in height; and
 - f. which may be modified by the decision body without a variance when the modification affords greater convenience or comfort for, and does not compromise the safety of, pedestrians or bicyclists.
4. Connections within Development. Connections within developments shall be provided as required in subsections a-c, below:
- a. Walkways shall connect all building entrances to one another to the extent practicable;
 - b. Walkways shall connect all on-site parking areas, storage areas, recreational facilities and common areas, and shall connect off-site adjacent uses to the site to the extent practicable. Topographic or existing development constraints may be cause for not making certain walkway connections; and
 - c. Large parking areas shall be broken up so that no contiguous parking area exceeds three (3) acres. Parking areas may be broken up with plazas, large landscape areas with pedestrian access ways (i.e., at least 20 feet total width), streets, or driveways with street-like features, Street-like features, for the purpose of this section, means a raised sidewalk of at least 4-feet in width, 6-inch curb, accessible curb ramps, street trees in planter strips or tree wells, and pedestrian-oriented lighting.

OAR 660-012-0045(3)(c)

(c) Where off-site road improvements are otherwise required as a condition of development approval, they shall include facilities accommodating convenient pedestrian and bicycle travel, including bicycle ways along arterials and major collectors

Recommended additions to the Banks Land Division Regulations

Section 152.052

(P) Off-Site Road Improvements. Where off-site road improvements are otherwise required as a condition of development approval, they shall include facilities accommodating convenient pedestrian and bicycle travel, including bicycle ways along arterials and major collectors.

OAR 660-012-0045(3)(d)

(d) For purposes of subsection (b) "Safe and convenient" means bicycle and pedestrian routes, facilities and improvements, which: are reasonably free from hazards, particularly types or levels of automobile traffic which would interfere with or discourage pedestrian or cycle travel for short trips, provide a reasonably direct route of travel between destinations such as between a transit stop and a store, and meet travel needs of cyclists and pedestrians considering destination and length of trip; considering that the optimum trip length of pedestrians is generally ¼ to ½ mile.

No recommended additions to the Banks Zoning Code or Land Division Regulations

OAR 660-012-0045(3)(e)

(e) Internal pedestrian circulation within new office parks and commercial developments shall be provided through clustering of buildings, construction of accessways, walkways and similar techniques.

Internal pedestrian circulation is addressed through the section to be added into the Banks Land Division Regulations under Section 152.053 Blocks (4).

APPENDIX B

TRANSPORTATION SYSTEM NEEDS, OPPORTUNITIES, AND CONSTRAINTS

Banks UGB Expansion / Transportation System Planning:

Transportation Needs, Opportunities and Constraints Report

PREPARED FOR: Banks City Council
PREPARED BY: Terry Yuen, CH2M HILL
Michael Hoffmann, CH2MHILL
CC: Project Technical Advisory Committee
DATE: August 17, 2010

This memorandum provides an overview of the Future No-Build (Year 2029) traffic conditions within the Banks Transportation System Plan (TSP) study area, as well as transportation needs, opportunities and constraints. Transportation needs are based on assessment of existing and future transportation conditions. Opportunities are options to address needs identified for the Banks future transportation system. Constraints are limitations or barriers to transportation system development.

Executive Summary

The following discussion summarizes the findings from the existing transportation conditions report, which forms the basis for the development of future transportation conditions.

Existing Conditions (Year 2009)

Congestion (Year 2009)

All six identified study intersections perform well from a volume/capacity measurement in 2009, meeting Oregon Department of Transportation and Washington County mobility standards as appropriate.

Study intersections include:

- OR 47 (Main Street) & NW Oak Way
- OR 47 (Main Street) & OR 6 Interchange Ramp (south of OR 6)
- OR 47 (Main Street) & NW Trellis Way
- OR 47 (Main Street) & NW Banks Road
- NW Banks Road & NW Aerts Road
- OR 6 & NW Aerts Road

Westbound vehicle queuing at OR 47 (Main Street) and NW Banks Road blocks the nearby intersection, causing delay and inhibiting vehicle mobility. This location is identified for realignment and at-grade rail crossing consolidation in 2010 (Rural State Transportation

Improvement Program) which will help alleviate queuing and safety problems, but will not reduce delay for vehicles stopped and waiting to turn onto or cross OR 47 (Main Street) from the stop-controlled approaches. Vehicle queuing (wherein queues exceed available lane storage length) also occurs at the OR 47 (Main Street)/Oak Way signalized intersection at the eastbound right and left turn lanes, northbound right turn lane, and southbound right turn lane.

Community members have identified queuing on Main Street in the vicinity of the Banks school complex at the end of the school day as an issue. The Banks School District is working on a circulation plan to alleviate traffic in this location. Banks TSP efforts will be conducted in coordination with the school district.

Safety

ODOT uses the Safety Priority Index System (SPIS) as a method of identifying locations where safety money may be spent to the highest benefit. The SPIS score is based on three years of crash data and considers crash frequency, crash rate, and crash severity. SPIS sites are 0.10-mile sections on the state highway system.

Based on 2009 data there are no locations within the study area that are on the top 10% ODOT SPIS list. However, the Banks City Council identified one area of concern, OR 6 near NW Aerts Road. One fatality was reported in this area.

Pedestrian, Bicycle and Transit Travel

- There are limited bicycle and pedestrian facilities in Banks. Though some of Banks is well-served with pedestrian facilities there is a lack of north-south pedestrian/bicycle connectivity east of Main Street.
- Although very limited as well, bus service has recently been upgraded in Banks. The Tillamook County Transportation District (TCTD) has integrated a shuttle stop into its system. The stop is located at OR 47 (Main Street) and Sunset Avenue, at the frontage of City Park. Ride Connection has installed a bus shelter for bus riders. This bus stop will serve both the WAVE and Ride Connection transit services, described below.

WAVE provides bus service both east and westbound from Banks at two points during the day. Eastbound service connects to the Sunset Transit Station in Beaverton as well as Union Station in Portland. Westbound service connects to downtown Tillamook (where there are connections to other coastal cities).

Ride Connection provides transit van service back-and-forth between Banks and TriMet's Hillsboro Transit Center; the service provides one morning commute trip to Hillsboro and one afternoon commute trip from Hillsboro to Banks. Ride Connection only operates on weekdays.

Future Transportation Conditions Summary (2029)

The following is a summary of the future transportation conditions analyzed for Banks. The future transportation conditions examined traffic levels that would be expected in 2029 based on the recommended Urban Growth Boundary strategy (see Figure 1). The recommended Urban Growth Boundary (UGB) expansion will result in increased

development opportunities for the City of Banks, and hence increases in traffic. The future transportation plan will account for this growth. Results of this analysis are discussed in greater detail in the remainder of this memorandum.

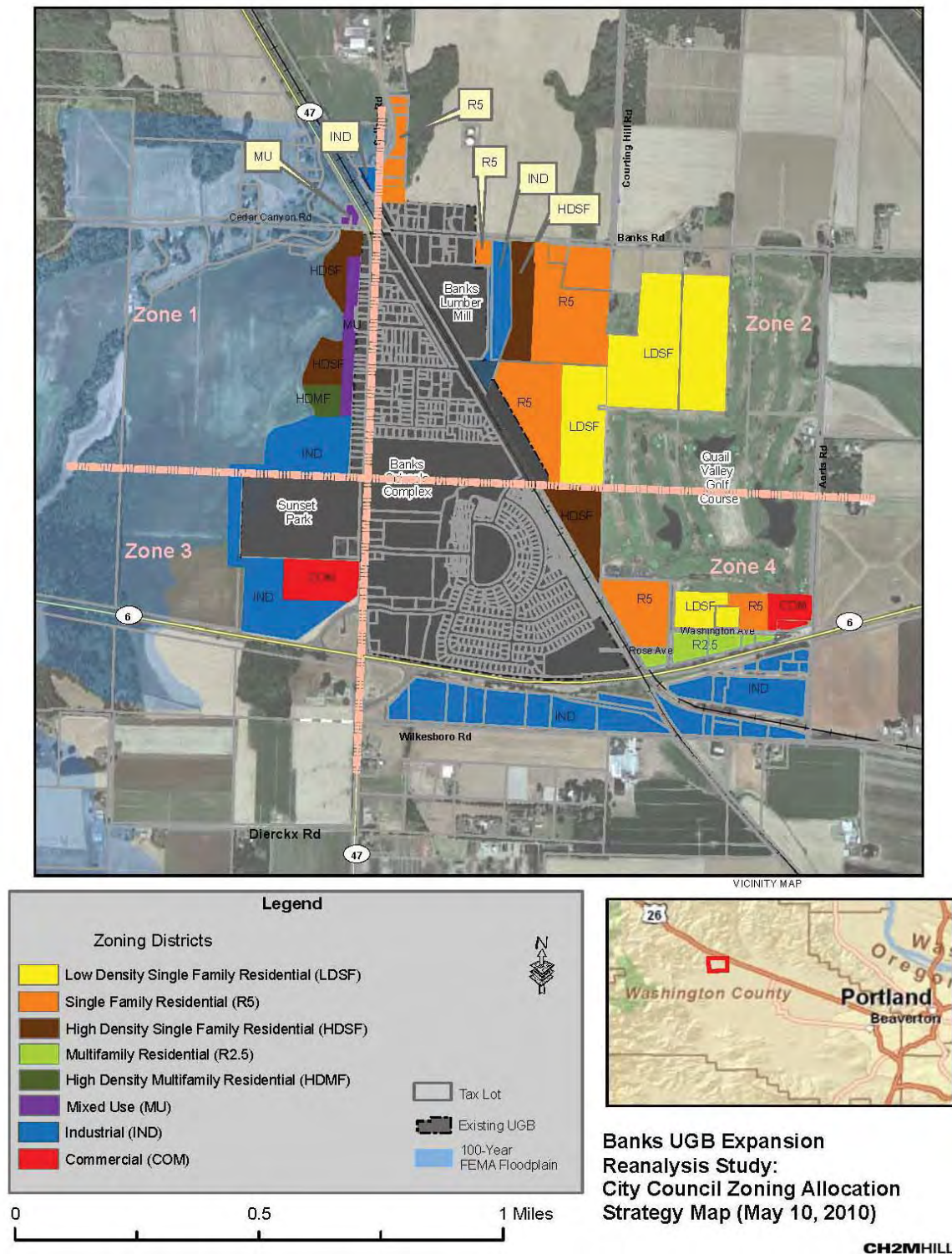


Figure 1: Proposed UGB Expansion Area

Congestion (Year 2029)

Areas of forecasted congestion in 2029 with the recommended UGB expansion are described below. The results of traffic modeling assumes that any funded transportation improvement projects are in place, and that construction of new arterial and collector connections to serve undeveloped areas proposed for inclusion in the UGB will also be in place.

- The intersection of OR 47 (Main Street) at NW Banks Road and the intersection of OR 6 at NW Aerts Road are expected to be highly congested and not meet the Oregon Highway Plan mobility standards.
- Three legs on the OR 47 (Main Street) and NW Oak Way intersection have at least one movement where the queue is longer than the available storage length. Additionally, the southbound through queues on OR 47 will extend upstream to the adjacent intersection.
- OR 6 at NW Aerts Road will experience queues in excess of 600 feet, thereby demonstrating that the intersection will not have sufficient capacity to handle forecasted volumes.

Pedestrian, Bicycle and Transit Travel

- Pedestrian and bicycle connections are needed to link the expanded urban growth boundary areas with the remainder of the city.
- UGB expansion, and its accompanying population increase, will likely result in a greater need for transit services, including demand-response service.

2029 No-Build Traffic Analysis

Context

The 2029 no-build traffic analysis presents congestion and intersection queuing results in 2029 if: (a) the urban growth boundary were to be expanded as reflected in Figure 1; and, (b) no additional roadway projects are built aside from the realignment of Sellers Road near the Banks Road/OR 47 (Main Street) intersection (which is already programmed for funding). This analysis identifies future deficiencies so that potential solutions can be developed. This memorandum discusses opportunities and constraints; defined project recommendations to address transportation deficiencies will be included in a future memorandum.

Project Study Area

The project study area for the 2029 Future No-Build traffic analysis is based on the existing traffic analysis study area outlined in *Technical Memorandum 2.4 Banks Transportation System Plan Update: Existing Conditions*. The analysis study area includes six existing intersections in and near the City of Banks. With the realignment of Sellers Road approximately 200 feet east at NW Banks Road to accommodate a Banks-Vernonia Trail trailhead, the intersection of Sellers Road and NW Banks Road will be reported as a separate intersection, increasing the number of study intersections to seven.

Analysis conducted in 2009 indicates that Banks will need to expand its urban growth boundary (UGB) by approximately 248 acres (approximately 154 acres of buildable residential land and 94 acres of commercial and industrial land) by 2029 for consistency with the 20-year population and employment forecasts consistent with the Banks Comprehensive Plan and the City's Economic Opportunities Analysis. The recommended UGB expansion area is illustrated in **Figure 1**.

Analysis Year and Time Period

The year 2029 is the horizon analysis year for the Future No-Build traffic analysis. This year provides a 20-year forecast from existing conditions. The 30th highest hour was selected as the future No-Build analysis time period because it is consistent with the existing conditions traffic analysis and ODOT methods. The 30th highest hour represents the 30th worst hourly traffic volume of the year, and generally provides a target 'design hour' for future analysis (it is uncommon to analyze and design to the very worst traffic condition of the year). The 30th highest hour can vary based on the area type as well. OR 6 is categorized as a coastal destination route by ODOT's Transportation Planning Analysis Unit (TPAU). Along a coastal destination route, the 30th highest hour traffic volumes are generally indicative of a summer weekday afternoon peak or weekend evening peak when higher volumes of vehicles travel between urban or metropolitan areas and coastal destination cities.

Future No-Build Forecasting

There is no available travel demand model for the study area; consequently, the development of future no-build turning movement volumes was performed using a two-step process. The first step was to estimate future background turning movements based on historical trends. Additionally, trip generation, trip distribution, and traffic assignment was completed for land included in the UGB expansion based on assumed land use type (e.g. residential, commercial or industrial). Traffic generated by the UGB expansion was estimated using the cumulative analysis method in the ODOT *Analysis Procedures Manual* (Section 4.6.2, Updated May 2009). It should be noted that this cumulative analysis volume forecasting methodology is somewhat conservative because it does not assume shared trips between land uses; rather, it assumes that each trip generated by a future land use has a single origin and destination. While a portion of trips are single purpose, it is also reasonable to assume that, for example, trips generated by a residential development would also stop at a retail or commercial development along the way. Under the cumulative analysis method these dual purpose trips are not allowed, which could result in a conservative estimation of trips generated.

The cumulative method also does not account for intrazonal trips. For example, although it is reasonable to assume that some trips generated by commercial uses come from residences within the same zone, all commercial trips are assumed to come from outside that zone – which could further overestimate trips.

Future Background Traffic Volumes

Historical trends provided by ODOT are used to forecast future volumes and evaluate future deficiencies within the traffic system. **Table 1** shows the forecasted growth rates calculated for the project area for state highways OR 47 and OR 6.

TABLE 1
State Highway Annual Growth Rates

Milepost	2006 ADT	2028 ADT	Source	Overall Factor	1-year growth
OR 47 – Nehalem Highway No. 102					
82.75	3,900	4,500	MODEL	1.16	0.70%
82.90	6,800	7,800	MODEL	1.16	0.67%
83.10	6,800	7,800	MODEL	1.16	0.67%
83.14	7,200	8,300	MODEL	1.16	0.69%
83.53	8,000	10,400	MODEL	1.34	1.36%
OR 47 Annual Rate					0.67%
OR 47, 21-Year Factor					1.19

Notes:

Source: ODOT 2028 Highway Future Volume Table
<http://www.oregon.gov/ODOT/TD/TP/docs/TADR/2028FVT.pdf>

ADT – Average Daily Traffic

The available growth rates are only projected to year 2028; this study assumed the AAGR to continue at the same rate through year 2029.

Volumes used to calculate the annual growth rate are chosen based on either an R-squared value from historic volume trends or a travel demand model. As shown in the table, MODEL is written as the source instead of an R-squared value. This indicates that TPAU used a travel demand model to populate the data in the table. The annual rate for OR 47 was calculated using an average of the growth rates within the study area. The annual rate for OR 6 was calculated by ODOT using historical volumes at the Gales Creek Automatic Traffic Recorder (ATR) 34-004. The difference in annual average daily traffic volumes between 1988 and 2008 were averaged to obtain a growth rate for OR 6.

The annual growth rate on OR 47 is 0.67 percent per year or about a 19 percent increase in traffic over the 20-year planning horizon (2009 to 2029). This 19 percent factor was applied to each of the existing 2009 30th highest hour intersection turn movements on OR 47 (except those accessing only a local street) to obtain 2029 background 30th highest hour intersection volumes.

The annual growth rate on OR 6 is 1.03 percent per year or about a 24 percent increase in traffic over the 20-year planning period (2009 to 2029). This 24 percent factor was applied to each of the existing 2009 30th highest hour intersection turn movements on OR 6 (except those accessing only a local street) to obtain 2029 background 30th highest hour intersection volumes.

This future traffic growth represents the growth due to trips passing through the study area (external-external trips) or trips that have one trip end outside the study area (external-internal and internal-external trips). Therefore, the forecast factors were only applied to turning movements that access streets that extend beyond the study boundary.

While background traffic growth on OR 47 and OR 6 through Banks is supported by historical data, the background traffic growth on local streets may be slightly conservative. Local street traffic along NW Banks Road was grown using an average of the above

highway growth rates (which accounts for regional growth), and possibly results in a conservative estimate of future demand on a mainly local street.

UGB Expansion Volumes

For the land included in the UGB expansion, a manual trip generation and traffic assignment process was completed.

Trip Generation

The Banks area was divided into four zones with the land use growth estimated in each zone (see Figure 1). The *ITE Trip Generation Manual (8th Edition)* was used to estimate the number of trips for each zone. In total, the assumed development resulted in 3,127 new trip ends for the study area. This information is summarized in **Tables 2 through 5**.

TABLE 2

Zone 1: Trips Generated for Projected Development in Northwest Development Zone, by Land Use Category

Zoning	Land Use Category/ITE Code*	Developable Acres	PM Peak-Hour Trips Generated
High Density Single Family	Single-Family Detached Housing (210)	7.0 (70)**	76
High Density Multifamily	Apartment (220)	1.8 (43)**	41
Mixed Use	Apartment (220)	4.6 (46)**	43
	Specialty Retail Center (814)	1.4 (29.9)**	93
Industrial	General Light Industrial (110), Industrial Park (130), Manufacturing (140)	12.6	102
Total =			355 trip ends Entering = 178 Exiting = 177

Used peak hour of adjacent street traffic, one hour between 4:00 p.m. and 6:00 p.m.

*Multiple codes listed assume a blend of uses to develop

** Number in parenthesis represent dwelling units for residential developments or 1,000 building square feet for commercial developments.

TABLE 3

Zone 2: Trips Generated for Projected Development in Northeast Development Zone, by Land Use Category

Zoning	Land Use Category/ITE Code*	Developable Acres	PM Peak-Hour Trips Generated
Low Density Single Family	Single-Family Detached Housing (210)	38.8 (233)**	225
Single Family	Single-Family Detached Housing (210)	32.2 (258)**	247
High Density Single Family	Single-Family Detached Housing (210)	5.7 (57)**	63
Industrial	General Light Industrial (110), Industrial Park (130), Manufacturing (140)	6.9	56
Total =			591 trip ends Entering = 356 Exiting = 235

Used peak hour of adjacent street traffic, one hour between 4:00 p.m. and 6:00 p.m.

*Multiple codes listed assume a blend of uses to develop

** Number in parenthesis represent dwelling units for residential developments or 1,000 building square feet for commercial developments.

TABLE 4

Zone 3: Trips Generated for Projected Development in Southwest Development Zone, by Land Use Category

Zoning	Land Use Category/ITE Code*	Developable Acres	PM Peak-Hour Trips Generated
Industrial	General Light Industrial (110), Industrial Park (130), Manufacturing (140)	13.8	111
Commercial	General Office (710), Medical/Dental Office Building (720), Specialty Retail Center (814), Shopping Center (820), Apparel Store (876), Hair Salon (918), High Turnover (sit-down) Restaurant (932), Fast Food Restaurant without Drive-Through Window (933), Auto Parts & Service Center (943)	7.5 (114.1)**	946
Total =			1057 trip ends Entering = 469 Exiting = 588

Used peak hour of adjacent street traffic, one hour between 4:00 p.m. and 6:00 p.m.

*Multiple codes listed assume a blend of uses to develop

** Number in parenthesis represent dwelling units for residential developments or 1,000 building square feet for commercial developments.

TABLE 5

Zone 4: Trips Generated for Projected Development in Southeast Development Zone, by Land Use Category

Zoning	Land Use Category/ITE Code*	Developable Acres	PM Peak-Hour Trips Generated
Single Family	Single-Family Detached Housing (210)	9.7 (78)**	84
Low Density Single Family	Single-Family Detached Housing (210)	4.1 (24)**	29
Multifamily	Residential Condominium/Townhouse (230)	4.7 (81)**	51
High Density Single Family	Single-Family Detached Housing (210)	6.7 (67)**	73
Industrial	General Light Industrial (110), Industrial Park (130), Manufacturing (140)	42.4	343
Commercial	General Office (710), Medical/Dental Office Building (720), Specialty Retail Center (814), Shopping Center (820), Apparel Store (876), Hair Salon (918), High Turnover (sit-down) Restaurant (932), Fast Food Restaurant without Drive-Through Window (933), Auto Parts & Service Center (943)	3.7 (56.7)**	544
Total =			1,124 trip ends Entering = 500 Exiting = 624

Used peak hour of adjacent street traffic, one hour between 4:00 p.m. and 6:00 p.m.

*Multiple codes listed assume a blend of uses to develop

** Number in parenthesis represent dwelling units for residential developments or 1,000 building square feet for commercial developments.

Traffic Assignment

The assignment of the trips related to the UGB expansion (**Tables 2 through 5**) assumed no intrazonal trips. No pass-by trips for existing land uses were removed from the trip generation volumes.

These assumptions will result in a conservative analysis (higher forecasted volumes) as it assumes all trips are only to a single destination and do not include multiple purposes.

Although the two-step volume forecasting methodology provides an estimate of future demand, it does not assign trip routes (as is the case with a travel demand model). Trip assignment as described below is based on the proposed locations of future development in relation to existing land uses within Banks. This assignment process does not account for current locations or corridors with high delay times. Trips were not shifted or reassigned to other potential less congested routes, like actual trips might do to avoid existing congestion.

While this assignment methodology may result in conservative operational results (trips may be assigned to routes that are already over-capacity), it also represents the most logical trip paths to and from UGB expansion land uses, and could identify heavily used corridors where improvements are most necessary.

Based on a preliminary assessment of future circulation needs (assuming full build-out of the UGB expansion area per the proposed zoning strategy), internal connector roadways were proposed, as shown on Figure 2. As noted, these recommendations are preliminary and will be assessed further in the Transportation System Plan Alternatives Evaluation Technical Memorandum.

The traffic assignment of the trips began with the following network loading assumptions.

Zone 1 (NW Quadrant)

- 60% to/from new connection from the UGB expansion area east to OR 47 (Sunset Ave, north of Sunset Park)
- 20% to/from new connection from the UGB expansion area east to OR 47 south of Sunset Park (through Zone 3)
- 20% to/from new connection from the UGB expansion area north to Cedar Canyon Road

Zone 2 (NE Quadrant)

- 50% to/from new connection from the UGB expansion area north to NW Banks Road
- 30% to/from new north-south connection from the UGB expansion area south (through Zone 4) to NW Aerts Road
- 20% to/from Zone 4 (via new north-south connection)

Zone 3 (SW Quadrant)

- 85% to/from new connection from the UGB expansion area east to OR 47 south of Sunset Park
- 10% to/from new connection from the UGB expansion area north then east to OR 47 via Sunset Ave, north of Sunset Park (through Zone 1)
- 5% to/from new connection from the UGB expansion area north to Cedar Canyon Road (through Zone 1)

Zone 4 (SE Quadrant)

Trips North of OR 6:

- 60% to/from new connection east to NW Aerts Road
- 20% to/from NW Banks Road (to the north, via new north-south connection)
- 20% to/from Zone 2 (via new north-south connection)

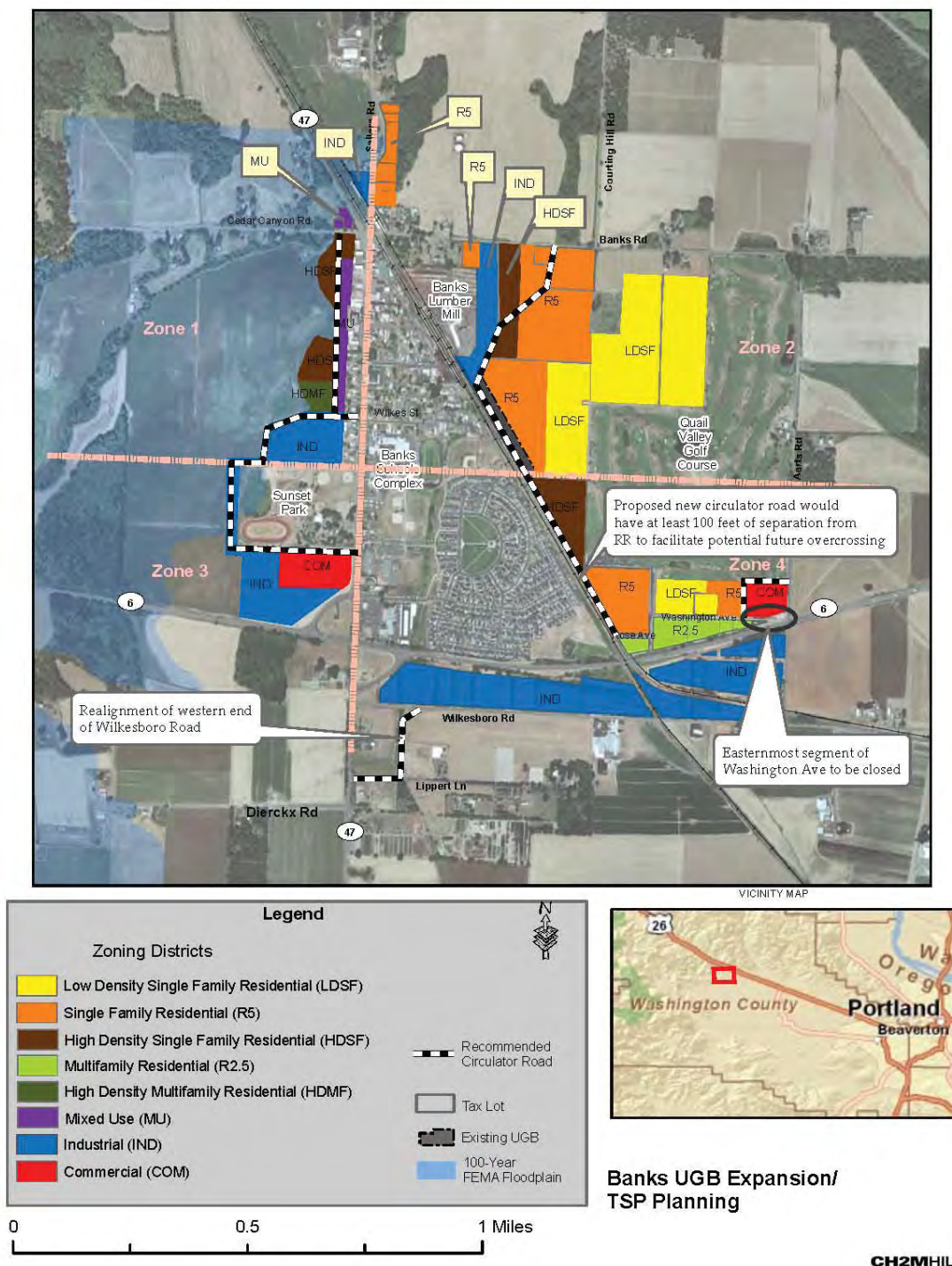
Trips South of OR 6:

- 40% west on Wilkesboro to OR 47; then 60% south and 40% north on 47
- 10% to OR 6 via NW Aerts Road
- 50% east to US 26 via Wilkesboro/Mountaindale Road

Using these access percentages and the assumed future street network, the assignment of trips was completed using logical route choices (i.e., turning volumes were based on existing turning movement percentages) to assign trips to logical destinations or to external stations. The future turning movement volumes, including existing volumes plus the growth from historical trends, and the traffic assignment of the UGB expansion trips are summarized in **Figure A.1** in **Appendix A**.

At the signalized intersection of OR 47 (Main Street) and NW Oak Way, the signal cycle length and phase splits were updated to account for the expected growth. Because updating signal timings requires no new infrastructure or signal equipment, this is a typical change that can be expected to be completed by ODOT staff. Additionally, with a 20-year study horizon, it is reasonable to assume that signal timings will be updated within that timeframe.

It is assumed that traffic from Zone 1 of the UGB expansion would access both Cedar Canyon Road and to OR 47 (Main Street) with a new roadway connection. Zone 2 would also likely include a roadway connection north to Banks Road, between Aerts Road and Sellers Road. Between Zone 2 and 4, there would likely be a new north-south connection near the rail line, and from Zone 4 there would be a new connection to Aerts Road north of OR 6. From Zone 3, a roadway connection to OR 47 (Main Street) would likely be in place south of Sunset Park.



Future Planned Infrastructure Projects

The traffic analysis assumes that one additional funded roadway infrastructure project will be built by 2029. The future analysis also assumes additional unfunded connection roadways within Banks will be in place by 2029. Sellers Road at NW Banks Road is the only funded project in the study area within the planning horizon. The Sellers Road realignment is currently under construction and should be completed in the autumn of 2010. This project entails realigning Sellers Road so that the intersection occurs approximately 200 feet east of the existing intersection with NW Banks Road. Each approach will be one-lane with no turn lanes, similar to the existing intersection. The traffic control assumed was a STOP approach for Sellers Road while NW Banks Road is uncontrolled.

A funded non-roadway infrastructure project, the extension of the Banks-Vernonia Linear Trail into the northern part of Banks, is also currently under construction (in coordination with the aforementioned Sellers Road realignment) and is anticipated to be completed by mid-October. The Banks-Vernonia Linear Trail serves pedestrians, bicyclists, and equestrian users. This project will extend the existing Banks-Vernonia trail from an existing state park facility located approximately 0.5-miles north of Banks to a trailhead facility to be located at the northwest corner of Banks Road and the realigned Sellers Road. The trailhead facility will provide off-street parking and other amenities for trail users.

Additionally, it was recently revealed, at a meeting of the North West Area Commission on Transportation (NWACT) on July 8, 2010, that the Portland & Western Railroad (P&WRR) "Banks Rail Connection" project (for which P&WRR had applied for funding through the ConnectOregon III Program) had been approved by the ODOT Final Review Committee and recommended for full funding to the Oregon Transportation Commission. This project will entail the construction of a "Y" track connection to be installed on trackage south of Highway 6 (near Wilkesboro Road). The project is anticipated to be constructed within two years. This project would likely result in a reduction of rail traffic on the portion of P&WRR trackage adjacent to the Arbor Village development and the Banks Lumber Mill, making existing and planned residential development in the vicinity of the existing track lines more favorable.

Methodology

Performance and Mobility Standards

For the 2029 Future No-Build conditions, the mobility standards for intersections within ODOT's jurisdiction vary based on roadway classification. **Table 6** shows the mobility standards for the intersection operational analysis.

Traffic Analysis Software Tools

A Synchro 7 computer traffic operations model was constructed for the 2029 Future No-Build analysis. The future model forecasts assumed existing truck percentages as that is the most accurate available data. In addition future geometrics and post-processed turning movement volumes were assigned to the traffic model. Peak hour factors were updated to be consistent with the guidance in TPAU's Analysis Procedures Manual (APM) Section 5.3.3, which is 0.95 for major arterials, 0.90 for minor arterials, and 0.85 for minor streets.

SimTraffic, a traffic microsimulation software program, was used to collect vehicle queuing information for all intersections. Queue results are reported as a 95th percentile expected queue length, which means that 95 percent of the time during the peak hour analyzed, the queue length should be less than or equal to the value reported. Five separate model runs of SimTraffic were averaged to obtain queuing results.

Future Intersection Operations

The volume to capacity ratios and 95th percentile queue lengths were collected from the future no-build Synchro and SimTraffic simulation models for the seven study area intersections. The post processed 2029 balanced volumes for each intersection were utilized in the analysis.

Operational Analysis Results

Results from the operational analysis indicate that two of the seven study intersections do not meet the applicable ODOT or Washington County mobility standards for the 2029 Future No-Build condition. These results indicate that the future traffic growth assumed will lead to operational problems at several locations in Banks, Oregon.

In the existing conditions analysis, all of the intersections meet mobility standards, but in the future No-Build scenario, two intersections (OR 47 & NW Banks Road and OR 6 & NW Aerts Road) are not expected to meet mobility standards. NW Banks Road approaching OR 47 and NW Aerts Road approaching OR 6 are both stop-controlled and are both expected to exceed the minor street V/C mobility standard. With the growth of through traffic on the uncontrolled approaches and the minor street traffic growth, the side street traffic that is crossing or turning left will be expected to have a difficult time finding a sufficient gap in traffic to allow them to complete their maneuver in a reasonable amount of time.

Table 6 shows the results of the 2029 Future No-Build intersection operational analysis. **Figure A.1** of **Appendix A** illustrates the volumes, channelization, and analysis results for all of the study area intersections. **Appendix B** compiles the Synchro HCM reports for each study intersection.

TABLE 6
Banks Traffic Analysis – 2029 Future No-Build Operational Results

ID	Intersection	Control Type	Future No-Build Mobility Standard	Intersection Performance					
				V/C Ratio ¹		Average Vehicle Delay (sec) ¹		Level of Service ¹	
1	OR 47 (Main Street) & NW Oak Way	Signalized	0.75	0.63		12.1		B	
2	OR 47 (Main Street) & OR 6 Interchange Ramp (south of OR 6)	OWSC	0.75	0.37	0.48	9.5	30.3	A	D
3	OR 47 (Main Street) & NW Trellis Way	OWSC	0.85	0.55	0.51	11.0	54.5	B	F
4	OR 47 (Main Street) & NW Banks Road	TWSC	0.90	0.10	> 2.0	2.6	>100	A	F
5	NW Banks Road & NW Aerts Road	TWSC	0.90 ²	0.04	0.29	1.7	14.7	A	B
6	OR 6 & NW Aerts Road	TWSC	0.70	0.24	> 2.0	6.0	>100	A	F
7	NW Banks Road & Sellers Road	OWSC	0.90 ²	0.22	0.27	3.4	14.2	A	B

Notes:

¹ At stop-controlled intersections, the first entry is the result for the uncontrolled roadway approach; the second entry is the result for the stop-controlled approach.

² ODOT mobility standards do not apply to the intersection since it is not located on the state highway system. Instead, the target mobility standard for the “first hour” of “Other Urban Areas” was used.

Black highlighting indicates intersection exceeds mobility standards

OWSC: One-way stop-controlled

TWSC: Two-way stop-controlled

Mobility standards are established from 1999 Oregon Highway Plan, Policy Element, Table 6

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. **Table 7** shows the forecast 2029, 95th percentile vehicle queue lengths for each movement at the study intersections. The movements that are expected to have inadequate storage are shown in the table with black highlight. The intersection of OR 47 (Main Street) and NW Oak Way (a total of seven movements) has queue lengths that exceed available storage capacity. Six of these movements are either exclusive left or right turn pockets that can accommodate 4 or 5 vehicles. Due to the expected growth in volumes, this existing storage will often be exceeded.

The remaining movement at OR 47 (Main Street) and NW Oak Way that is expected to exceed storage capacity is the southbound through movement. This queue is expected to spill back to (and therefore affect operations at) OR 47 and NW Trellis Way. **Appendix C** contains the full results from the SimTraffic Queuing Report.

TABLE 7

2029 Future No-Build 95th Percentile Queues at Banks Study Area Intersections

ID	Intersection	Approach	Lane Group	Storage (feet)	2029 Queue Length (feet)
1	OR 47 (Main Street) & NW Oak Way	Eastbound	Left	70	180
			Thru	750	300
			Right	30	100
		Westbound	Left	250	220
			Thru/Right	950	150
		Northbound	Left	95	100
			Thru	950	470
		Southbound	Right	70	120
			Left	125	330
			Thru	530	540
			Right	25	70
2	OR 47 (Main Street) & OR 6 Interchange Ramp (south of OR 6)	Westbound	Left/Right	750	140
		Northbound	Thru	-	10
			Right	70	40
		Southbound	Left	115	100
3	OR 47 (Main Street) & NW Trellis Way	Westbound	Left/Right	-	250
			Thru/Right	-	70
		Southbound	Left	125	60
			Thru	-	540
4	OR 47 (Main Street) & NW Banks Road	Eastbound	Left/Thru/Right	-	320
		Westbound	Left/Thru/Right	200	>200
		Northbound	Left/Thru	-	100
		Southbound	Left/Thru/Right	-	90
5	NW Banks Road & NW Aerts Road	Eastbound	Left/Thru/Right	-	650
		Westbound	Left/Thru/Right	-	200
		Northbound	Left/Thru/Right	-	110
		Southbound	Left/Thru/Right	Driveway	50
6	OR 6 & NW Aerts Road	Eastbound	Left/Thru/Right	-	520
		Westbound	Left/Thru/Right	-	390
		Northbound	Left/Thru/Right	-	700
			Left/Thru	-	> 1000
7	NW Banks Road & Sellers Road	Southbound	Right	50	60
			Left/Thru	-	> 1000
		Eastbound	Left/Thru	200	120
		Westbound	Thru/Right	-	> 1000
7	NW Banks Road & Sellers Road	Southbound	Left/Right	-	420

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

Queue lengths not reported for free-flowing and uncontrolled movements

Queue lengths rounded up to the nearest ten feet

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

At the intersection of OR 6 and Aerts Road, the southbound stop-controlled movement is expected to have long queues in excess of 1000 feet because vehicles likely cannot find a safe gap in traffic on OR 6. The southbound queue on Aerts Road could back up to within 700 feet of the Banks Road/Aerts Road intersection. The northbound movement would also likely experience long queues, which may result from left turns waiting for available gaps in traffic. These queues would likely have an impact on travel through Banks.

The intersection of OR 47 (Main Street) and NW Banks Road is expected to experience queues in excess of 1000 feet on the westbound approach. This queue would likely back up beyond Sellers Road, and could extend back to within 400 feet of the NW Banks Road and NW Aerts Road intersection. The southbound queue on Sellers Road could also be long because vehicles waiting to turn from Sellers Road would be blocked by westbound backups on NW Banks Road.

Although the entrances to Banks Elementary School and High School are not study intersections, the school district has noted concern over the queuing in present day along Main Street at these entrances. As volumes along Main Street continue to increase, the 2029 queues at the school entrances are assumed to increase as well. This issue will be noted during the process of alternatives analysis.

Needs and Constraints

Based on the examination of existing and future transportation conditions, the following needs have been identified:

- Realignment of Wilkesboro Road. This is an anticipated need based on buildout of the proposed UGB expansion area south of OR 6. The added vehicles that will accompany growth into the expanded UGB area south of OR 6 would create unsafe conditions at the existing Wilkesboro Road/OR 47 intersection, due to the close proximity of this intersection to the OR 6 ramp terminal. To address this problem, Wilkesboro Road will need to be realigned southward to flow into existing Lippert Lane so that Wilkesboro Road intersects with OR 47 further south from the OR 6 ramp terminal (see Figure 2).
- Realign Washington Avenue. There is a need to close the eastern end of Washington Avenue and realign it so that it intersects with Aerts Road at a point further north of its current intersecting point. The existing alignment of Washington Avenue would be unsafe and operationally inefficient upon the addition of vehicles that will accompany growth into the expanded UGB area east of the existing city.
- Secondary route from the existing City of Banks to the OR 6 access point at Aerts Road via a crossing of the railroad. This is an anticipated need based on buildout of the proposed UGB expansion area to the east of the railroad. Moreover, the need for a secondary route to access OR 6 at Aerts Road is a need that is supported by the Banks Comprehensive Plan Transportation Element (1988 Update; pp. 73-74) and the Banks Transportation Network Plan (1999), which provides a discussion regarding the need for providing secondary route to access OR 6 from the existing city (pp 38-43). A secondary route to the Aerts Road access point at OR 6, which would entail a railroad overcrossing at the south end of Arbor Village (connecting to Rose Avenue/Washington Street on the east side of the track) is an approval criterion for

- the development for the undeveloped land at the south end of Arbor Village. By virtue of the Banks City Council, in 2008, requiring a covenant (stipulating the installation of a railroad crossing at the previously described location) on the deed to the aforementioned property, the Council reiterated the need for the City to have such a secondary route to access OR 6 at Aerts Road.
- Increased monitoring of safety conditions at the OR 6/ Aerts Road intersection (and potential installation of safety measures), as warranted by future conditions (as the UGB expansion area on the east side of railroad is developed). This intersection has no current status as a location with documented safety issues and there are no existing geometric deficiencies or sight-distance issues. However, in addition to the previously noted fatality at this intersection, north-south users of Aerts Road have repeatedly reported unsafe conditions when trying to cross over OR 6 on Aerts Road or make left turns from southbound Aerts Road to eastbound OR 6. This perceived lack of safety is the result of motorists on Aerts Road trying to find “gaps” in OR 6 traffic, where cars are moving at a high rate of speed (posted speed on OR 6 at this location is 55 miles per hour). The perceived lack of safety at this intersection could worsen operations at the intersection, which is already forecasted to have poor operational conditions in the 2029 No Build model (see Tables 6 and 7 of this memorandum). Moreover, the perceived lack of safety could significantly inhibit circulation in the future – the added vehicles that will accompany growth into the expanded UGB area east of the existing city could avoid utilizing this intersection in a manner that would be efficient for the Banks area transportation system as a whole, opting instead for the access point to OR 6 at OR 47 (Main Street), thereby causing potential congestion issues at that location.
 - Sight-distance improvements on Banks Road at the existing intersection with Aerts Road and the future intersection with a new circulator road into the expanded UGB area on the east side of the railroad. Banks Road contains several steep vertical grades – these conditions create sight distance problems for drivers at the intersection of Aerts Road (which sits at the top of a steep grade) and would create problems at a new intersection along Banks Road west of Aerts Road (where a new circulator road would connect with Banks Road – see Figure 2); this latter “new” intersection would sit near the bottom of a vertical grade.
 - Pedestrian and bicycle linkages both north-south within the existing Banks UGB (on the east side of Main Street) and connections from the UGB to other parts of the city, particularly to the downtown commercial area, the schools complex, and Sunset Park.
 - Solutions to congestion issues at OR 47 (Main Street) at NW Banks Road and OR 6 at NW Aerts Road.
 - Solutions to queuing issues at OR 47 (Main Street) at NW Oak Way.
 - Enhanced local connections to reduce the Banks residents’ use of the state highway system for local trips.

The following constraints will guide the types of solutions that will address the needs identified:

- Railroad lines. The stop-controlled intersections of NW Banks Road & NW Aerts Road, OR 47 & NW Banks Road and OR 6 & NW Aerts Road would need to support increased traffic under the no-build scenario. Any examination of alleviating that load through an east-west connection(s) would need to cross two sets of railroad tracks (Port of Tillamook Bay and P&W). ODOT Rail Division discourages at-grade crossings and grade-separated crossings generally cost between \$20-30 million.
- Main Street and adjacent land uses. Many residences and commercial buildings in Banks are located close to the street; also, Main Street functions as the heart of the city. Expansion of Main Street would be constrained, as public right-of-way is not available. Expansion of Main Street may also not be desired by the community due to safety concerns in relation to pedestrians, school children, etc.
- Schools and parks along Main Street. The location of schools and parks along Main Street require special attention, particularly relating to safety concerns for children.
- Flooding on NW Cedar Canyon Road. Several community members have discussed how NW Cedar Canyon Road has flooded in past years west of the OR 47 and NW Banks Road intersection.
- Neighborhood streets. Many residents have expressed concerns about increased traffic along local streets. Some connectivity options would likely increase traffic along roadways that have historically been neighborhood streets in character.
- Access management. ODOT has access control along OR 6 in the study area. No new accesses are allowed on OR 6. ODOT also has access spacing standards along OR 47. Because of this, Banks will need to efficiently utilize the two existing access points to OR 6 (at OR 47 and Aerts Road) in conjunction with local transportation system improvements.
- Signal warrants. Any new signal would need to meet ODOT signal warrants.
- Cost. In general, many of the transportation connections or upgrades required to accommodate population and employment associated with the UGB expansion will be expensive. Railroad crossings (grade-separated crossings can exceed \$20 million), upgrades of rural county roadways (e.g. Banks Road, Aerts Road), realignment of roadways (e.g. a potential realignment of Wilkesboro to the south), widening to add turn lanes, and any upgrades to Main Street would be expensive and potentially cost prohibitive. Traffic signal installation is also expensive (approximately \$250,000 per signal).

Further analysis of solutions will also take into account the decision criteria included in Appendix D.

Potential Opportunities and Range of Solutions

The following opportunities for transportation system improvement will be further discussed during the alternatives analysis portion of the transportation analysis.

Opportunities to Reduce Congestion and Queuing Issues

- The intersection of OR 47 (Main Street) and NW Banks Road actually operates as three separate intersections, and exhibits a v/c ratio over ODOT's mobility standards for the westbound movement in the future condition. Complicating the three separate intersections is the railroad crossing at NW Banks Road. The project that will alter NW Sellers Road (so that it intersects NW Banks Road further to the east), will provide more storage space westbound, but does not help vehicles on the eastbound and northbound stop-controlled approaches that will experience long delays while waiting to find gaps in order to perform their maneuver. As the intersection is currently stop-controlled, installing a traffic signal may better control traffic to help reduce the delay and queues on the NW Banks Road approaches, but would impact the performance of the OR 47 (Main Street) approaches. Prior to signal installation, the location would need to be evaluated to determine if the intersection meets ODOT signal warrants and spacing guidelines.
- Widening and modernizing the approximately 1.70-mile extent of Banks Road between the intersection with OR 47 (Main Street) and the intersection with OR 26. This would entail bringing the road up to current design standards by providing shoulders on Banks Road and performing sight distance improvements at intersections with Banks Road (as warranted by future conditions – described earlier in this memorandum) and adding intermittent or continuous left-turn lanes (as warranted by future conditions). These improvements would make Banks Road a more feasible option for those wishing to travel to, and from, US 26; this could subsequently relieve future congestion issues at the existing access points to OR 6 within Banks, and along OR 6 itself, as drivers would have a suitable east-west alternative to and from US 26.
- Widening Wilkesboro Road to ensure adequate design standard lane width for trucks and other large vehicles in this area that is slated for industrial uses in the 20-year planning horizon.
- The signalized intersection of OR 47 (Main Street) and NW Oak Way will likely have vehicle queues that exceed available storage in the future conditions. The northbound, southbound, and eastbound legs of the intersection have queues that extend past the existing turn pockets, and in some cases extend into the next intersection. Below are potential suggestions to reduce congestion on each approach:
 - Most southbound and northbound movements have queues exceeding the available storage. A low-cost, short-term, and easily implementable improvement to reduce vehicle queuing for the southbound left movement is to extend the southbound left turn pocket from 125 feet to 350 feet. The area is already paved; it would simply require restriping and would not require any right of way acquisition. This additional storage is expected to accommodate future queues in 2029 with the proposed UGB expansion.

- For the eastbound left movement, a similar turn pocket extension could accommodate the queuing. Currently the left turn pocket is 70 ft. Extending the turn pocket to at least 200 feet would provide turning vehicles with a refuge, removing them from the traffic stream of vehicles continuing through the intersection. This improvement would require additional pavement and widening of the OR 6 westbound exit-ramp.
- The westbound left queue is nearing capacity and could exceed the available storage. Many of the vehicles are heading eastbound onto OR 6 towards Hillsboro and Portland. Increasing the turn pocket would be difficult as the road is constrained on either side by development, and there is little available right of way to expand the width of the road.

All of these potential solutions would be based on future analyses warranting their funding and construction. These potential solutions will be evaluated during alternatives analysis.

Opportunities to Improve Safety

Currently OR 6 is designated as a safety corridor by ODOT. There are no identified safety issues from the crash data, and crash rates are below the state average. However, the Banks City Council identified one area of concern, OR 6 near NW Aerts Road. One fatality was reported in this area. Effective safety improvements that could be utilized include increased lighting, a roadside inventory to identify fixed objects in the clear zone, and increased enforcement of speed limits and safe driving in the vicinity. These will be examined during the alternatives analysis.

As shown on Figure 2, it is recommended that the easternmost segment of Washington Avenue be closed to vehicular traffic. Washington Avenue currently intersects with Aerts Road immediately north of the OR 6/Aerts Road intersection. Currently, Washington Avenue only services a few single-family homes and therefore receives very little traffic volume; however, assuming a buildout of the east side of Banks per the proposed UGB expansion strategy, the amount of volume would significantly increase, and would pose a significant safety hazard to the intersection of OR 6/Aerts Road.

Opportunities for Enhanced Local Circulation

Individual developments in the UGB expansion land should be required to provide internal circulation for vehicles, pedestrians and bicyclists, which should be codified per City of Banks Development Code. Local circulation options should consider the feasibility of new or enhanced east-west connections (e.g. upgrades to Wilkesboro Road, Banks Road, or potential rail crossings) as well as north-south connections (e.g. upgrade of NW Aerts Road, connections between areas of UGB expansion). As new development is planned, the City must ensure that these developments provide suitable external connections to the greater Banks area.

Construct a vehicular overcrossing of the railroad to connect the existing city to the UGB expansion area to the east of the railroad. Location options for such an overcrossing include the south end of the Arbor Village neighborhood (connecting to Washington Street on the east side of the railroad) or at Sunset Avenue (which would connect to a new circulator road on the east side of the tracks – see Figure 2 for general location concept of the circulator road). Although a railroad overcrossing is likely infeasible in the short-term, the City should

plan for the long-term construction of such a crossing when it is warranted based future growth.

Opportunities for Bicycle and Pedestrian Connections

Currently bicycle lanes and pedestrian sidewalks are not connected well within the city. Improvements should focus on connecting the existing system of bike lanes and sidewalks to improve non-motorized mobility. A north-south bike route should be established in the existing city in the area east of Main Street, with direct connections to the schools complex.

All new and modernized roadways should include bicycle and pedestrian accommodations.

Construct one or more pedestrian/bicycle overcrossings of the railroad to ensure east-west pedestrian/bicycle connectivity from the UGB expansion area east of the railroad to center city destinations, including the residential areas to schools, the library, and town hall.

Consider Future Transit Connections

The recently added TCTD bus service in Banks should be monitored regularly to identify the need for further future transit capacity improvements, such as potentially increasing the number of pick-up/drop-off times at the stop the Sunset Avenue/Banks Road intersection or adding another stop location in the City of Banks.

Appendix A: Future No-Build Traffic Operations

1 OR 47 & NW Oak Way V/C Ratio Std: 0.75 OR 47 30th HV Factor: 1.16 V/C Ratio: 0.63 Oak Way 30th HV Factor: 1.16 OR 6 30th HV Factor: 1.62 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: 0.48 OR 6 30th HV Factor: 1.62 Count Date: January 6, 2009 Peak Hour: 4:30-5:30 PM	3 OR 47 & NW Trellis Way V/C Ratio Std: 0.85 30th HV Factor: 1.21 V/C Ratio: 0.51 Count Date: December 4, 2008 Peak Hour: 4:30-5:30 PM
4 OR 47 & NW Banks Rd V/C Ratio Std: 0.90 30th HV Factor: 1.21 V/C Ratio: > 2.0 Count Date: December 4, 2008 Peak Hour: 4:30-5:30 PM	5 NW Banks Rd & NW Aerts Rd V/C Ratio Std: 0.90 30th HV Factor: 1.21 V/C Ratio: 0.29 Count Date: December 4, 2008 Peak Hour: 4:30-5:30 PM	
6 OR 6 & NW Aerts Rd V/C Ratio Std: 0.70 30th HV Factor: 1.21 V/C Ratio: > 2.0 Count Date: December 4, 2008 Peak Hour: 4:30-5:30 PM	7 NW Banks Road & Sellers Road V/C Ratio Std: 0.90 30th HV Factor: 1.21 V/C Ratio: 0.27 Count Date: December 4, 2008 Peak Hour: 4:30-5:30 PM	
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. The reported Peak Hour Factor (PHF) is for the overall intersection 6. Truck Percentages calculated from raw counts 7. All 30th Highest Hour volumes were seasonally adjusted 8. Intersection map source: Google Earth Maps	Legend: Volume Diagram 555 Turning Movement Volume HV% Percent Heavy Vehicles Channelization Stop Controlled Intersection Signalized Intersection	

Appendix B: HCM Synchro Reports

Banks TSP Update Future No Build
1: NW Oak Way & OR 47 (Main Street)

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	130	330	183	130	35	210	30	491	120	203	468	55
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		4.0	4.0	4.0	4.0	4.0	4.0
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	0.87		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	1410		1652	1907	1621	1739	1830	1556
Flt Permitted	0.52	1.00	1.00	0.40	1.00		0.39	1.00	1.00	0.37	1.00	1.00
Satd. Flow (perm)	905	1733	1473	639	1410		676	1907	1621	675	1830	1556
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	140	355	197	140	38	226	32	517	126	214	493	58
RTOR Reduction (vph)	0	0	71	0	153	0	0	0	44	0	0	11
Lane Group Flow (vph)	140	355	126	140	111	0	32	517	82	214	493	47
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)	16.9	16.9	16.9	16.9	16.9		26.5	26.5	26.5	26.5	26.5	26.5
Effective Green, g (s)	16.9	16.9	16.9	16.9	16.9		27.5	27.5	27.5	27.5	27.5	27.5
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32		0.52	0.52	0.52	0.52	0.52	0.52
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)	292	559	475	206	455		355	1001	851	354	960	817
v/s Ratio Prot		0.20			0.08			0.27			0.27	
v/s Ratio Perm	0.15		0.09	0.22			0.05		0.05	0.32		0.03
v/c Ratio	0.48	0.64	0.26	0.68	0.24		0.09	0.52	0.10	0.60	0.51	0.06
Uniform Delay, d1	14.2	15.1	13.1	15.4	13.1		6.2	8.1	6.2	8.7	8.1	6.1
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	0.7	1.9	0.2	7.4	0.2		0.2	0.8	0.1	4.3	0.9	0.1
Delay (s)	14.9	17.1	13.3	22.8	13.2		6.4	9.0	6.3	12.9	9.0	6.2
Level of Service	B	B	B	C	B		A	A	A	B	A	A
Approach Delay (s)		15.6			16.5			8.3			9.9	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM Average Control Delay			12.1			HCM Level of Service			B			
HCM Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			52.4			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			80.3%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Banks TSP Update Future No Build
2: OR 47 Exit & OR 47 (Main Street)

HCM Unsignalized Intersection Capacity Analysis

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	25	90	551	85	180	601
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	27	99	580	89	189	633
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	1593	580			580	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1593	580			580	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	71	81			81	
cM capacity (veh/h)	96	518			989	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	126	580	89	189	633	
Volume Left	27	0	0	189	0	
Volume Right	99	0	89	0	0	
cSH	265	1700	1700	989	1700	
Volume to Capacity	0.48	0.34	0.05	0.19	0.37	
Queue Length 95th (ft)	60	0	0	18	0	
Control Delay (s)	30.3	0.0	0.0	9.5	0.0	
Lane LOS	D			A		
Approach Delay (s)	30.3	0.0		2.2		
Approach LOS	D					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			59.8%	ICU Level of Service		B
Analysis Period (min)			15			

Banks TSP Update Future No Build

3: NW Trellis Way & OR 47 (Main Street)

HCM Unsignalized Intersection Capacity Analysis

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	25	41	832	50	45	649
Sign Control	Stop		Free		Free	Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	27	45	876	53	47	683
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	0.83	0.83			0.83	
vC, conflicting volume	1694	916			935	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1734	796			819	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	63	86			93	
cM capacity (veh/h)	74	319			649	
Direction, Lane #	WB 1	NB 1	SB 1	SB 2		
Volume Total	73	928	47	683		
Volume Left	27	0	47	0		
Volume Right	45	53	0	0		
cSH	142	1700	649	1700		
Volume to Capacity	0.51	0.55	0.07	0.40		
Queue Length 95th (ft)	61	0	6	0		
Control Delay (s)	54.5	0.0	11.0	0.0		
Lane LOS	F		B			
Approach Delay (s)	54.5	0.0	0.7			
Approach LOS	F					
Intersection Summary						
Average Delay			2.6			
Intersection Capacity Utilization			64.0%		ICU Level of Service	C
Analysis Period (min)			15			

Banks TSP Update Future No Build

4: NW Banks Road & OR 47 (Main Street)

HCM Unsignalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	24	86	86	241	116	60	109	410	0	40	314	24
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	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	26	93	93	262	126	65	115	432	0	42	331	25
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	1217	1088	343	1229	1101	432	356			432		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1217	1088	343	1229	1101	432	356			432		
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 %	53	50	87	0	30	89	90			96		
cM capacity (veh/h)	56	187	697	72	180	613	1192			1097		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	213	453	546	398								
Volume Left	26	262	115	42								
Volume Right	93	65	0	25								
cSH	193	102	1192	1097								
Volume to Capacity	1.10	4.44	0.10	0.04								
Queue Length 95th (ft)	257	Err	8	3								
Control Delay (s)	146.2	Err	2.6	1.3								
Lane LOS	F	F	A	A								
Approach Delay (s)	146.2	Err	2.6	1.3								
Approach LOS	F	F										
Intersection Summary												
Average Delay			2834.6									
Intersection Capacity Utilization			99.0%		ICU Level of Service				F			
Analysis Period (min)			15									

Banks TSP Update Future No Build
5: NW Banks Road & NW Aerts Road

HCM Unsignalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	8	120	15	50	225	5	70	7	52	5	7	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	9	141	18	59	265	6	82	8	61	6	8	13
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	271			159			571	557	150	619	563	268
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	271			159			571	557	150	619	563	268
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 %	99			96			80	98	93	98	98	98
cM capacity (veh/h)	1287			1397			405	420	902	357	417	776
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	168	329	152	27								
Volume Left	9	59	82	6								
Volume Right	18	6	61	13								
cSH	1287	1397	522	511								
Volume to Capacity	0.01	0.04	0.29	0.05								
Queue Length 95th (ft)	1	3	30	4								
Control Delay (s)	0.5	1.7	14.7	12.4								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.5	1.7	14.7	12.4								
Approach LOS			B	B								
Intersection Summary												
Average Delay			4.7									
Intersection Capacity Utilization			49.2%		ICU Level of Service				A			
Analysis Period (min)			15									

Banks TSP Update Future No Build
6: OR 6 & Aerts Road

HCM Unsignalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	155	500	14	32	755	171	3	64	43	110	54	140
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)	163	526	15	34	795	180	3	67	45	116	57	147
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	975			541			1914	1902	534	1891	1819	885
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	975			541			1914	1902	534	1891	1819	885
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 %	76			97			0	0	92	0	2	58
cM capacity (veh/h)	684			1018			2	51	550	0	58	347
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	704	1008	116	320								
Volume Left	163	34	3	116								
Volume Right	15	180	45	147								
cSH	684	1018	40	0								
Volume to Capacity	0.24	0.03	2.89	879.78								
Queue Length 95th (ft)	23	3	321	Err								
Control Delay (s)	6.0	0.9	1068.0	Err								
Lane LOS	A	A	F	F								
Approach Delay (s)	6.0	0.9	1068.0	Err								
Approach LOS			F	F								
Intersection Summary												
Average Delay			1549.3									
Intersection Capacity Utilization			121.5%		ICU Level of Service				H			
Analysis Period (min)			15									

Banks TSP Update Future No Build

7: NW Banks Road & Sellers Road

HCM Unsignalized Intersection Capacity Analysis



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	107	223	311	35	30	106
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	116	242	338	38	33	115
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	376				832	357
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	376				832	357
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				89	83
cM capacity (veh/h)	1177				306	687
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	359	376	148			
Volume Left	116	0	33			
Volume Right	0	38	115			
cSH	1177	1700	539			
Volume to Capacity	0.10	0.22	0.27			
Queue Length 95th (ft)	8	0	28			
Control Delay (s)	3.4	0.0	14.2			
Lane LOS	A		B			
Approach Delay (s)	3.4	0.0	14.2			
Approach LOS			B			
Intersection Summary						
Average Delay			3.7			
Intersection Capacity Utilization			58.1%	ICU Level of Service		B
Analysis Period (min)			15			

Banks TSP Update Future No Build

41: NW Banks Road & Hwy 47

HCM Unsignalized Intersection Capacity Analysis

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	126	0	0	417	0	204
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.95	0.95
Hourly flow rate (vph)	137	0	0	453	0	215
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			137		590	137
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			137		590	137
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			100		100	76
cM capacity (veh/h)			1417		467	906
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	137	453	215			
Volume Left	0	0	0			
Volume Right	0	0	215			
cSH	1700	1700	906			
Volume to Capacity	0.08	0.27	0.24			
Queue Length 95th (ft)	0	0	23			
Control Delay (s)	0.0	0.0	10.2			
Lane LOS			B			
Approach Delay (s)	0.0	0.0	10.2			
Approach LOS			B			
Intersection Summary						
Average Delay		2.7				
Intersection Capacity Utilization		27.6%		ICU Level of Service		A
Analysis Period (min)		15				

Appendix C: SimTraffic Queue Report

Banks TSP Update Future No Build Queuing and Blocking Report

6/21/2010

Intersection: 1: NW Oak Way & OR 47 (Main Street), Interval #1

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)	219	245	82	194	151	113	480	99	272	477	50
Average Queue (ft)	94	219	67	125	85	37	312	56	231	308	25
95th Queue (ft)	198	291	101	213	158	111	479	114	328	574	59
Link Distance (ft)		224			594		947			527	
Upstream Blk Time (%)	0	14								13	
Queuing Penalty (veh)	0	0								95	
Storage Bay Dist (ft)	70		30	250		95		70	125		25
Storage Blk Time (%)	11	49	14	1		0	34	3	74	35	3
Queuing Penalty (veh)	59	164	70	2		3	53	17	405	95	21

Intersection: 1: NW Oak Way & OR 47 (Main Street), Interval #2

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)	218	243	80	221	177	140	524	100	274	496	50
Average Queue (ft)	84	182	58	102	72	28	241	54	194	269	33
95th Queue (ft)	170	287	98	210	138	85	448	115	315	528	61
Link Distance (ft)		224			594		947			527	
Upstream Blk Time (%)	0	7								5	
Queuing Penalty (veh)	0	0								33	
Storage Bay Dist (ft)	70		30	250		95		70	125		25
Storage Blk Time (%)	11	46	12	1		0	30	2	50	37	3
Queuing Penalty (veh)	55	142	53	2		2	44	8	258	94	20

Intersection: 1: NW Oak Way & OR 47 (Main Street), All Intervals

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)	219	245	82	227	177	173	540	100	274	530	50
Average Queue (ft)	86	191	61	108	75	30	258	54	203	279	31
95th Queue (ft)	178	292	99	212	144	92	462	114	321	540	61
Link Distance (ft)		224			594		947			527	
Upstream Blk Time (%)	0	9								7	
Queuing Penalty (veh)	0	0								49	
Storage Bay Dist (ft)	70		30	250		95		70	125		25
Storage Blk Time (%)	11	47	12	1		0	31	2	56	37	3
Queuing Penalty (veh)	56	147	57	2		2	46	10	295	94	20

Banks TSP Update Future No Build Queuing and Blocking Report

6/21/2010

Intersection: 2: OR 47 Exit & OR 47 (Main Street), Interval #1

Movement	WB	NB	NB	SB
Directions Served	LR	T	R	L
Maximum Queue (ft)	157	14	17	97
Average Queue (ft)	68	2	5	47
95th Queue (ft)	155	15	36	95
Link Distance (ft)	310	386		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			70	115
Storage Blk Time (%)			0	1
Queuing Penalty (veh)			0	4

Intersection: 2: OR 47 Exit & OR 47 (Main Street), Interval #2

Movement	WB	NB	NB	SB
Directions Served	LR	T	R	L
Maximum Queue (ft)	152	11	69	116
Average Queue (ft)	57	1	5	52
95th Queue (ft)	125	7	36	93
Link Distance (ft)	310	386		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			70	115
Storage Blk Time (%)			0	0
Queuing Penalty (veh)			0	2

Intersection: 2: OR 47 Exit & OR 47 (Main Street), All Intervals

Movement	WB	NB	NB	SB
Directions Served	LR	T	R	L
Maximum Queue (ft)	173	18	86	129
Average Queue (ft)	60	1	5	51
95th Queue (ft)	133	10	36	94
Link Distance (ft)	310	386		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			70	115
Storage Blk Time (%)			0	0
Queuing Penalty (veh)			0	2

Banks TSP Update Future No Build
Queuing and Blocking Report

6/21/2010

Intersection: 3: NW Trellis Way & OR 47 (Main Street), Interval #1

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	161	81	59	354
Average Queue (ft)	93	18	27	195
95th Queue (ft)	263	66	63	869
Link Distance (ft)	435	527		3164
Upstream Blk Time (%)	3			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)			125	
Storage Blk Time (%)				13
Queuing Penalty (veh)				6

Intersection: 3: NW Trellis Way & OR 47 (Main Street), Interval #2

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	178	115	60	486
Average Queue (ft)	76	14	19	73
95th Queue (ft)	242	68	51	373
Link Distance (ft)	435	527		3164
Upstream Blk Time (%)	5			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)			125	
Storage Blk Time (%)				5
Queuing Penalty (veh)				2

Intersection: 3: NW Trellis Way & OR 47 (Main Street), All Intervals

Movement	WB	NB	SB	SB
Directions Served	LR	TR	L	T
Maximum Queue (ft)	183	125	66	596
Average Queue (ft)	80	15	21	102
95th Queue (ft)	248	68	54	533
Link Distance (ft)	435	527		3164
Upstream Blk Time (%)	5			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)			125	
Storage Blk Time (%)				7
Queuing Penalty (veh)				3

Banks TSP Update Future No Build
Queuing and Blocking Report

6/21/2010

Intersection: 4: NW Banks Road & OR 47 (Main Street), Interval #1

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LTR
Maximum Queue (ft)	284	112	78	118
Average Queue (ft)	190	91	54	39
95th Queue (ft)	330	116	97	117
Link Distance (ft)	262	27	68	361
Upstream Blk Time (%)	21	97	3	
Queuing Penalty (veh)	0	441	15	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: NW Banks Road & OR 47 (Main Street), Interval #2

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LTR
Maximum Queue (ft)	287	130	83	110
Average Queue (ft)	166	93	44	26
95th Queue (ft)	316	119	91	80
Link Distance (ft)	262	27	68	361
Upstream Blk Time (%)	18	97	3	
Queuing Penalty (veh)	0	391	14	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: NW Banks Road & OR 47 (Main Street), All Intervals

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LT	LTR
Maximum Queue (ft)	290	135	83	139
Average Queue (ft)	172	93	47	29
95th Queue (ft)	320	119	93	90
Link Distance (ft)	262	27	68	361
Upstream Blk Time (%)	19	97	3	
Queuing Penalty (veh)	0	404	14	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Banks TSP Update Future No Build
Queuing and Blocking Report

6/21/2010

Intersection: 5: NW Banks Road & NW Aerts Road, Interval #1

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	906	39	74	40
Average Queue (ft)	130	8	46	18
95th Queue (ft)	1366	36	76	49
Link Distance (ft)	4429	460	3905	216
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: NW Banks Road & NW Aerts Road, Interval #2

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	40	168	140	49
Average Queue (ft)	2	39	50	17
95th Queue (ft)	16	226	107	48
Link Distance (ft)	4429	460	3905	216
Upstream Blk Time (%)		6		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: NW Banks Road & NW Aerts Road, All Intervals

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	928	168	145	55
Average Queue (ft)	33	31	49	17
95th Queue (ft)	647	197	101	48
Link Distance (ft)	4429	460	3905	216
Upstream Blk Time (%)		4		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Banks TSP Update Future No Build Queuing and Blocking Report

6/21/2010

Intersection: 6: OR 6 & Aerts Road, Interval #1

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	R
Maximum Queue (ft)	417	321	600	2224	30
Average Queue (ft)	375	99	525	1853	6
95th Queue (ft)	481	312	746	2424	41
Link Distance (ft)	363	497	586	3905	
Upstream Blk Time (%)	49	1	64		
Queuing Penalty (veh)	0	0	0		
Storage Bay Dist (ft)					50
Storage Blk Time (%)				100	1
Queuing Penalty (veh)				147	2

Intersection: 6: OR 6 & Aerts Road, Interval #2

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	R
Maximum Queue (ft)	428	509	605	3182	75
Average Queue (ft)	345	129	590	2762	13
95th Queue (ft)	521	411	608	3393	60
Link Distance (ft)	363	497	586	3905	
Upstream Blk Time (%)	39	1	100		
Queuing Penalty (veh)	0	0	0		
Storage Bay Dist (ft)					50
Storage Blk Time (%)				100	1
Queuing Penalty (veh)				138	2

Intersection: 6: OR 6 & Aerts Road, All Intervals

Movement	EB	WB	NB	SB	SB
Directions Served	LTR	LTR	LTR	LT	R
Maximum Queue (ft)	428	509	605	3182	75
Average Queue (ft)	352	121	574	2542	11
95th Queue (ft)	516	389	693	3432	56
Link Distance (ft)	363	497	586	3905	
Upstream Blk Time (%)	42	1	91		
Queuing Penalty (veh)	0	0	0		
Storage Bay Dist (ft)					50
Storage Blk Time (%)				100	1
Queuing Penalty (veh)				140	2

Banks TSP Update Future No Build
Queuing and Blocking Report

6/21/2010

Intersection: 7: NW Banks Road & Sellers Road, Interval #1

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	81	1852	334
Average Queue (ft)	34	1139	305
95th Queue (ft)	114	1906	433
Link Distance (ft)	154	4429	333
Upstream Blk Time (%)	1		76
Queuing Penalty (veh)	5		0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: NW Banks Road & Sellers Road, Interval #2

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	153	3985	375
Average Queue (ft)	32	3153	342
95th Queue (ft)	114	4298	399
Link Distance (ft)	154	4429	333
Upstream Blk Time (%)	1	7	94
Queuing Penalty (veh)	5	21	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: NW Banks Road & Sellers Road, All Intervals

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	160	3985	378
Average Queue (ft)	33	2667	333
95th Queue (ft)	114	4444	418
Link Distance (ft)	154	4429	333
Upstream Blk Time (%)	1	6	89
Queuing Penalty (veh)	5	16	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Banks TSP Update Future No Build
Queuing and Blocking Report

6/21/2010

Intersection: 41: NW Banks Road & Hwy 47, Interval #1

Movement	EB	WB	NB
Directions Served	T	T	R
Maximum Queue (ft)	14	193	78
Average Queue (ft)	3	173	58
95th Queue (ft)	17	209	80
Link Distance (ft)	27	154	63
Upstream Blk Time (%)	1	76	3
Queuing Penalty (veh)	2	343	6
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 41: NW Banks Road & Hwy 47, Interval #2

Movement	EB	WB	NB
Directions Served	T	T	R
Maximum Queue (ft)	29	234	82
Average Queue (ft)	1	176	58
95th Queue (ft)	13	214	80
Link Distance (ft)	27	154	63
Upstream Blk Time (%)	0	70	4
Queuing Penalty (veh)	1	283	7
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 41: NW Banks Road & Hwy 47, All Intervals

Movement	EB	WB	NB
Directions Served	T	T	R
Maximum Queue (ft)	30	237	82
Average Queue (ft)	2	175	58
95th Queue (ft)	14	213	80
Link Distance (ft)	27	154	63
Upstream Blk Time (%)	1	71	3
Queuing Penalty (veh)	1	298	7
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Banks TSP Update Future No Build Queuing and Blocking Report

6/21/2010

Intersection: 42: Hwy 47 & , Interval #1

Movement	NB
Directions Served	LT
Maximum Queue (ft)	202
Average Queue (ft)	79
95th Queue (ft)	203
Link Distance (ft)	3164
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 42: Hwy 47 & , Interval #2

Movement	NB	SE
Directions Served	LT	R
Maximum Queue (ft)	284	14
Average Queue (ft)	73	1
95th Queue (ft)	204	11
Link Distance (ft)	3164	68
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 42: Hwy 47 & , All Intervals

Movement	NB	SE
Directions Served	LT	R
Maximum Queue (ft)	286	14
Average Queue (ft)	75	0
95th Queue (ft)	204	10
Link Distance (ft)	3164	68
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty, Interval #1: 1955
Network wide Queuing Penalty, Interval #2: 1577
Network wide Queuing Penalty, All Intervals: 1672

Appendix D: Decision Criteria

The following criteria could be used to evaluate potential transportation alternatives and select recommended transportation solutions for the TSP. The proposed evaluation criteria include:

- **Traffic Operations.** *Does the alternative mitigate existing and anticipated (2029) traffic congestion?* This criterion measures the extent to which alternatives alleviate existing and anticipated future traffic congestion.
- **Safety.** *Does the alternative mitigate existing or anticipated safety issues?* This criterion measures the extent to which alternatives ensure safety for all users (drivers, transit, pedestrians, and bicyclists).
- **Mobility.** *Does the alternative enhance mobility for all users?* This criterion measures the extent to which alternatives enhance mobility for transportation users (freight, nonmotorized, transit, transportation disadvantaged, etc.).
- **Land Use.** *Does the alternative minimize land use impacts? Is the alternative consistent with state and local land use planning goals?* This criterion measures the extent to which alternatives minimize property impacts and impacts on existing residential and business access. This criterion relates to economic development because it also evaluates the extent to which alternatives impact future business development through property takes. It also relates to consistency with local, regional and statewide land use plans.
- **Environmental & Social Impacts.** *Does the alternative minimize environmental and social impacts, including impacts on existing and future development and low-income/minority populations?* Most alternatives will have some built and natural environmental impacts. This criterion measures the extent to which alternatives minimize impacts on the social and environmental considerations for the interchange management area. This criterion includes environmental justice considerations.
- **Support for Implementation.** *Can the alternative be supported by both the state and local community?* This criterion measures the extent to which alternatives can be agreed upon that meet the needs and interests of stakeholders within acceptable timelines.
- **Cost-Effectiveness.** *Is the scale of the alternative consistent with the benefits it provides? Is it a practical, affordable solution?* All alternatives will have costs associated with development and implementation. This criterion evaluates how effective the alternative is at relieving congestion compared to the cost.

APPENDIX C
ALTERNATIVES EVALUATION

Banks Transportation System Plan Alternatives Evaluation Report

PREPARED FOR: Ross Kevlin, ODOT
City of Banks, Oregon

PREPARED BY: Michael Hoffmann, CH2M HILL
Andy Kutansky, CH2M HILL

CC: Banks UGB/TSP Technical Advisory Committee

DATE: October 18, 2010

A. Introduction / Purpose

This report describes transportation solution alternatives that consider the needs, opportunities, constraints, and potential solutions identified in *Technical Memorandum 5.1: Banks Transportation Needs, Opportunities, and Constraints Report*. Proposed solution alternatives are compared against the “decision criteria” that were presented in Appendix D of the aforementioned memorandum. This report provides a recommended list of projects to be implemented over the 20-year planning horizon (to 2030). This report is intended for adoption into the transportation element of the Banks Comprehensive Plan. The recommended project list presented in this report will be utilized in the City of Banks transportation capital improvement program (CIP).

The alternatives examined in this report, and the projects recommended for inclusion on the City’s CIP list, have been assessed at a planning level of detail and would need to be analyzed at a further advanced level at such time as the City were to propose a particular project to receive funding to construct.

This report addresses Task 5.2 of the *Urban Growth Boundary/Transportation Systems Plan Update* contract between the Oregon Department of Transportation (ODOT) and CH2MHILL.

B. Transportation System Improvement Alternatives – Physical Improvements

This section describes physical transportation system improvement alternatives to address needs identified in the Banks area (as previously described in Technical Memorandum 5.1). Each alternative presented in this section is compared against the following evaluation criteria:

- **Traffic Operations.** *Does the alternative mitigate existing and anticipated (2029) traffic congestion?* This criterion measures the extent to which alternatives alleviate existing and anticipated future traffic congestion.
- **Safety.** *Does the alternative mitigate existing or anticipated safety issues?* This criterion measures the extent to which alternatives ensure safety for all users (drivers, transit, pedestrians, and bicyclists).
- **Mobility.** *Does the alternative enhance mobility for all users?* This criterion measures the extent to which alternatives enhance mobility for transportation users (freight, nonmotorized, transit, transportation disadvantaged, etc.).
- **Land Use.** *Does the alternative minimize land use impacts? Is the alternative consistent with state and local land use planning goals?* This criterion measures the extent to which alternatives minimize property impacts and impacts on existing residential and business access. This criterion relates to economic development because it also evaluates the extent to which alternatives impact future business development through property takes. It also relates to consistency with local, regional and statewide land use plans.
- **Environmental & Social Impacts.** *Does the alternative minimize environmental and social impacts, including impacts on existing and future development and low-income/minority populations?* Most alternatives will have some built and natural environmental impacts. This criterion measures the extent to which alternatives minimize impacts on the social and environmental considerations for the interchange management area. This criterion includes environmental justice considerations.
- **Support for Implementation.** *Can the alternative be supported by both the state and local community?* This criterion measures the extent to which alternatives can be agreed upon that meet the needs and interests of stakeholders within acceptable timelines.
- **Cost-Effectiveness.** *Is the scale of the alternative consistent with the benefits it provides? Is it a practical, affordable solution?* All alternatives will have costs associated with development and implementation. This criterion evaluates how effective the alternative is at relieving congestion compared to the cost.

Need

Remove future volume from the intersection of Wilkesboro Road and OR 47.

Upon urbanization of the Wilkesboro Road corridor (in the UGB expansion area south of OR 6) there would be significant increase vehicles on a road that currently experiences very little volume. This increase in vehicles would potentially pose an operational and safety problem at the existing Wilkesboro Road/OR 47 intersection, due to the close proximity of this intersection to the OR 6 ramp terminal.

Alternative #1: Realign Wilkesboro Road

This alternative entails realigning Wilkesboro Road southward to flow into existing Lippert Lane so that Wilkesboro Road intersects with OR 47 further south from the OR 6 ramp terminal (see Figure 1 below); the existing intersection of Wilkesboro Road and OR 47 would be closed to vehicular traffic (i.e. dead-ended). This alternative would necessitate the construction of approximately 0.27-mile of new road and the purchase of approximately 48,000 square feet of privately owned land for right-of-way.

The rationale for why the location of this proposed alternative is optimal is described in the responses to the evaluation criteria below.

This alternative would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion area south of OR 6. The anticipated increase in trips associated with a prospective development (as revealed through a traffic impact assessment) would trigger the need to close the aforementioned intersection and subsequently prompt the need to construct the realigned Wilkesboro Road.

Because the safety problem is exacerbated by urbanization, and the adjacent area would become industrial (i.e. generate more large truck movements with relatively slower speeds and wide turns) a project to correct this problem should be a high priority for inclusion in the CIP.

The realigned Wilkesboro Road corridor shown on Figure 1 is conceptual and would be defined through the land development process as it is funded, designed, and built.

Figure 1: Alternative #1 – Realignment of Wilkesboro Road



Criteria Evaluation

Traffic Operations

The intersection of Wilkesboro Road and OR 47 was not a study intersection in the current analysis that was performed in June-July, 2010. The intersection of OR 47 and the OR 6 Interchange Ramp was evaluated, however, and did not result in either poor vehicle-to-capacity (v/c ratio) or poor queuing conditions.

Per applicable ODOT interchange area access management spacing standards¹, there should be a minimum spacing distance of 1,320 feet between the OR 6 ramp terminal and the nearest major intersection. The purpose of these spacing standards is to protect the function of the interchange and, consequently, the state's investment in the facility. Moving towards compliance with applicable standards greatly improves the likelihood that an interchange (and its associated local street system connector roads) operates efficiently and safely. This alternative would increase the spacing (on the east side of OR 47) between the OR 6 ramp terminal and Wilkesboro Road intersection from 80 feet (existing) to 890 feet (after realignment). The result of this realignment would therefore be an increase in future operational efficiency, safety, and mobility.

¹ Appendix C: Access Management Standards" from the Oregon Department of Transportation (ODOT). See Table 18.

Safety

See discussion under traffic operations regarding increased access spacing.

Mobility

See discussion under traffic operations regarding increased access spacing.

Land Use

This alternative may necessitate an exception to Statewide Planning Goal 3 (Agricultural Lands) because it would entail utilizing Washington County land zoned exclusive farm use (EFU). The Washington County Community Development Code (CDC) Article III (Land Use Districts) Section 340 does not reference roadways as either a permitted, conditional, or prohibited use. However, CDC Article VII (Public Transportation Facilities) Section 705.2.1 notes that a realigned public road is a Category C Project that is permitted outside an urban growth boundary. This alternative would not eliminate any residential or business access points. This alternative would be subject to applicable standards of CDC Section 610 (Land Divisions Outside the UGB).

In summary, this alternative would entail a slight land use impact because of its location on land currently zoned EFU; however, this impact would not be inconsistent with state law governing the use of EFU, as it would be permitted (subject to design standards and conditions) under Washington County's CDC, which implements Goal 3 in Washington County.

Environmental & Social Impacts

As noted under the Land Use discussion, this alternative would entail the incorporation of approximately 48,000 square feet of farmland. No other significant natural resources are impacted by this alternative. The conceptual layout of the realigned Wilkesboro Road does minimize potential impacts, however, by being located as closely adjacent to OR 47 as possible so as to leave as much contiguous farmland is possible while not impacting any residences or structures of any kind.

Support for Implementation

This alternative has also been concurred on by ODOT and Washington County Land Use and Transportation Division staff and has been discussed with City of Banks staff, City of Banks Council members, and City of Banks Planning Commission members. There has been no expression of disapproval from any of the aforementioned agencies; therefore, it is assumed that there is support for this alternative.

Cost-Effectiveness

Based on planning level estimate tools, this projected is estimated at \$853,650. This estimate includes the design and construction of new Washington County Minor Collector roadway, new right-of-way, contingency, and engineering costs. No escalation factor is included. See Appendix A for further detail on the cost estimate for this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative.

Interchange Reconfiguration Option

During the TSP analysis process an idea was raised by a Banks landowner to reconfigure the OR 6/OR 47 interchange as a way to address the future anticipated operational and safety issues associated with the forecasted increase of volume at the Wilkesboro Road/OR 47 intersection (discussed earlier) without realigning Wilkesboro Road. However, ODOT staff discarded the idea because the existing interchange does not experience, nor is forecasted to experience, operational or safety issues, and therefore it would be unreasonable to pursue the reconfiguration of the interchange as a way to address this local need associated with UGB expansion.

Conclusion

Based on the above assessment, this alternative is recommended as a project to be placed on the City's transportation CIP list for consideration to be constructed. This alternative would become warranted based on future conditions related to urbanization along Wilkesboro Road and the associated increase in traffic volume utilizing the intersection of Wilkesboro Road/OR 47. It is likely that the timing of realignment will coincide with impending development – that is, the anticipated increase in trips associated with a prospective development (as revealed through a traffic impact assessment) would trigger the need to close the aforementioned intersection and subsequently prompt the need to construct the realigned Wilkesboro Road.

A detailed discussion of potential transportation funding sources for this alternative is provided in Section D of this memorandum.

Need

Remove future volume from the current intersection of Washington Avenue and Aerts Road.

Upon urbanization of the UGB expansion area east of the railroad tracks (north of OR 6) there would be significant increase vehicles on Washington Avenue, a road that currently experiences very little volume. This increase in vehicles would pose an operational and safety problem at the existing Washington Avenue/Aerts Road intersection, which creates a fifth leg at the Aerts Road/OR 6 intersection. This fifth intersection approach is confusing to drivers, and is at an angle that invites high-speed entering traffic to Washington from eastbound OR 6, and involves sharp-angle right turns onto OR 6.

Alternative #2: Realign Washington Avenue

This alternative entails realigning Washington Avenue northward to intersect with Aerts Road further north from the Aerts Road/OR 6 intersection (see Figure 2 below) at a location approximately 100 feet north of the existing entrance to the Quail Valley Golf Course. This alternative addresses the future need to provide greater spacing between the Washington Avenue/Aerts Road intersection for safety and operational purposes (and provide subsequent potential room for a southbound left-turn storage lane that could be warranted based on future conditions). This alternative also addresses the future need to close the existing Washington Avenue intersection with Aerts Road, which is currently located immediately north of the intersection with OR 6. This alternative would be constructed only

when warranted based on future traffic conditions associated with future development of the UGB expansion area east of the railroad tracks.

The realigned Washington Avenue corridor shown on Figure 2 is conceptual and would be defined through the land development process as it is funded, designed, and built.

The rationale for why the location of this proposed alternative is optimal is described in the responses to the evaluation criteria below.

Criteria Evaluation

Traffic Operations

This alternative would increase the spacing between the Aerts Road/OR 6 intersection and the Aerts Road/Washington Avenue intersection an extra 420 feet. Under future conditions modeling, the southbound queue on Aerts Road is expected to back up significantly from the Aerts Road/OR 6 intersection. It should be noted, however, that the traffic forecast model likely overstates the degree of queuing impact. Nonetheless, having a greater distance between the two aforementioned intersections will increase the likelihood that the queue will end before the new intersection, thereby allowing turning movements in and out of Washington Avenue to occur more efficiently. Upon assessment of this alternative, Washington County staff noted that the proposed realignment of Washington Avenue would improve the safety and operations of the OR 6/OR 47 intersection. County staff also noted that, to relieve OR 47, Aerts Road should be utilized as a collector or minor arterial upon UGB expansion; a recommendation related to this County assessment is provided later in this memorandum.

Figure 2: Alternative #2 - Realignment of Washington Avenue



Safety

Conditions at the existing intersection of Washington Avenue at Aerts Road (immediately north of the Aerts Road/OR 6 intersection) could be potentially operationally inefficient and pose a potential safety problem upon the addition of vehicles that will accompany growth into the expanded UGB area east of the existing city. This alternative would close off the existing Washington Avenue intersection with Aerts Road, which would greatly improve safety conditions at the Aerts Road/OR 6 intersection.

Mobility

Mobility for non-motorized users would be enhanced by this alternative. Bicyclists traveling eastward on Washington Avenue out of the east Banks area would be able to access Aerts Road at a location that is safer than the existing intersection, which is immediately adjacent to OR 6, where vehicles are moving at a consistently high rate of speed.

Land Use

The realigned Washington Avenue roadway would be within the expanded UGB and would be an allowed use under City zoning. This alternative would entail the use of private land to construct (owned by the Quail Valley Golf Course) and would relocate the existing entry point to the Quail Valley Golf Course; however, the realignment of this road is anticipated to have a beneficial economic impact on the properties to be developed by the golf course, given that no development could occur without an access point to Aerts Road, and no significant percentage increase in traffic volume would be permitted to use the existing Washington Avenue intersection at Aerts Road because of previously noted operational and safety concerns. This alternative would not eliminate any existing residential access points.

Environmental & Social Impacts

This alternative would not impact any significant natural resources nor would it impact any existing residences or businesses.

Support for Implementation

This alternative has also been concurred on by ODOT and Washington County Land Use and Transportation Division staff and has been discussed with City of Banks staff, City of Banks Council members, and City of Banks Planning Commission members. There has been no expression of disapproval from any of the aforementioned agencies; therefore, it is assumed that there is support for this alternative.

Cost-Effectiveness

Based on planning level estimate tools, this projected is estimated at \$1,198,600. This estimate includes the design and construction of new City of Banks Collector roadway, new right-of-way, contingency, and engineering costs. No escalation factor is included. See Appendix A for further detail on the cost estimate for this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative.

Conclusion

Based on the above assessment, this alternative is recommended as a project to be placed on the City's transportation CIP list for consideration to be constructed. This alternative would become warranted based on future conditions related to urbanization in the UGB expansion

areas west and south of the Quail Valley Golf and the associated increase in traffic volume utilizing the intersection of Washington Avenue/Aerts Road. It is likely that the timing of realignment will coincide with impending development – that is, the anticipated increase in trips associated with a prospective development (as revealed through a traffic impact assessment) would trigger the need to close the aforementioned intersection and subsequently prompt the need to construct the realigned Washington Avenue. Because the safety and operational problem is exacerbated by urbanization, and the adjacent area would be substantially developed (i.e. generate a significant number of commuter) a project to correct this problem should be a high priority for inclusion in the CIP.

A detailed discussion of potential transportation funding sources for this alternative is provided in Section D of this memorandum.

Need

Provide collector-level east-west internal circulation in Banks to accommodate expanded urban area and reduce reliance on state highways for intra-city circulation.

Alternative #3: Install vehicular crossing of railroad from west to east sides of Banks

Making provisions for east-west travel is critical to maintaining adequate citywide circulation as the City expands east of the railroad tracks. This alternative addresses the need to provide an east-west collector road for the City of Banks with respect to the UGB expansion area east of the existing city. Such an east-west collector road system, which integrates the proposed new eastside collector road (see Alternative 10), is not possible without a railroad crossing. This alternative also addresses the City's transportation objective of having a secondary route from the existing City of Banks to the Aerts Road access point to OR 6 and the desire to provide internal west-east circulation in Banks (again, assuming build-out of the UGB expansion area on the east side of the railroad tracks).

A proposed over-crossing should be treated as local parallel route to OR6 and Banks Road. To gain a better investment for the structure, this parallel route should be classified at least as a collector and allow cut-through traffic. Local traffic should use this over-crossing instead of using OR6 to access different sides of the City.

Several alternative versions of this alternative were assessed and are discussed in turn below.

Alternative #3a: Install vehicular overcrossing of railroad from area south of Arbor Village to Rose Avenue

This alternative would entail constructing a vehicular bridge over the railroad tracks connecting the existing street network on the west side of Banks (south of the Arbor Village neighborhood) to the future street network on the east side of Banks (at Rose Avenue) (see Figure 3 below). This crossing would include bicycle/pedestrian accommodations. This alternative is a long-term one which assumes the full build-out of the UGB expansion area on the east side of Banks as a prerequisite for consideration of construction.

As noted, this alternative would provide a secondary route from the existing City of Banks to the Aerts Road access point to OR 6 and the desire to provide internal west-east circulation in Banks (again, assuming build-out of the UGB expansion area on the east side of the railroad tracks).

This alternative is conceived as a low-speed collector road that would include bicycle and pedestrian accommodations which met City street standards.

This alternative is an alternative for addressing the needs described above. Alternatives 3b through 3f also describe projects considered to address this need.

This alternative would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion area east of the railroad tracks.

The proposed railroad crossing corridor shown on Figure 3 is conceptual and would be defined through the land development process as it is funded, designed, and built.

Figure 3: Alternative #3a – Location of Vehicular Overcrossing of RR Tracks from Arbor Village to Rose Avenue



Criteria Evaluation

Traffic Operations

Constructing this alternative would improve traffic circulation on a system-wide basis for the City at such time when the UGB expansion area is built-out. Based on anticipated road congestion conditions, commuters on the west side of the railroad tracks wishing to travel to points east (Hillsboro; Beaverton; Portland) would be able to utilize the bridge to either access OR 6 at Aerts Road or use the eastside street system to access Banks Road, and proceed east to US 26, whereas without a railroad crossing such drivers would, by necessity, utilize OR 47 (Main Street) to access OR 6 or proceed north through town to Banks Road, from which point they could then travel to a connection with US 26. Conversely, drivers on the east side of Banks would have the option, based on anticipated road congestion conditions, of utilizing the bridge to access OR 6 from Main Street rather than from Aerts Road (or using Banks Road to connect to US26).

This alternative would remove local in-town trips from OR 6. Drivers on either side of the railroad tracks wishing to travel to in-town destinations could utilize the bridge to do so without needing to travel on OR 6 or traveling along OR 47 (Main Street) and Banks Road (on the west side) or Aerts Road and Banks Road (on the east side) to perform in-town trips.

Safety

This alternative was not conceived to address an existing or anticipated safety issue. However, it will be necessary to include safety precaution measures to ensure that no safety issue arises with regard to the introduction of cut-through traffic into the Arbor Village neighborhood. Potential safety issues associated with neighborhood cut-through traffic could be addressed through the imposition of a low posted speed (prominently signed), consistent police monitoring of the speed limit, and the installation of traffic calming measures such as speed bumps and/or landscaped intersection islands.

Mobility

As described under the discussion of traffic operations, traffic circulation would be improved by this alternative (under an assumed east side build-out scenario). Mobility would be improved for bicyclists and pedestrians, as this alternative would include bicycle and pedestrian accommodations. City of Banks, ODOT, and Washington County staff concurs with this proposed alternative in concept. However, both Washington County and ODOT staff noted that, in a comparison between Alternative 3a and 3b, Alternative 3b is preferable because Alternative 3a appears too far south to be the sole east-west railroad crossing and would result in out of direction travel for significant portions of intra-city traffic in the future (if it were the sole crossing).

Land Use

This alternative would be permitted under City of Banks Zoning regulations. This alternative would not eliminate any existing residential or business access points.

Environmental & Social Impacts

This alternative is not anticipated to have an impact on any significant natural resources. The potential for a social impact related to cut-through traffic in the Arbor Village neighborhood is addressed under the Safety discussion for this alternative.

Support for Implementation

The need for a secondary route to access OR 6 at Aerts Road is supported by the Banks Comprehensive Plan Transportation Element (1988 Update; pp. 73-74) and the Banks Transportation Network Plan (1999), which provides a discussion regarding the need for providing secondary route to access OR 6 from the existing city (pp 38-43). A secondary route to the Aerts Road access point at OR 6, which would entail a railroad overcrossing at the south end of Arbor Village (connecting to Rose Avenue/Washington Street on the east side of the track) is an approval criterion for the development for the undeveloped land at the south end of Arbor Village. By virtue of the Banks City Council, in 2008, requiring a covenant (stipulating the installation of a railroad crossing at the previously described location) on the deed to the aforementioned property, the Council reiterated the need for the City to have such a secondary route to access OR 6 at Aerts Road.

ODOT Rail staff has expressed initial concerns about the feasibility of this alternative. The companies operating active operations on the rail lines which would be crossed under this alternative have expressed initial opposition to the alternative based on concerns related to trespassing/liability issues associated with people crossing over the railroad tracks.

This alternative would require early planning close coordination with both the ODOT Rail Division and with the railroad companies actively operating on the rail lines at the time the project was being considered for implementation.

Cost-Effectiveness

Based on planning level estimate tools, this projected is estimated at \$8,650,000. This estimate includes the design and construction of new City of Banks Collector roadway, new single span cast-in-place concrete girder bridge, new right-of-way, contingency, and engineering costs. No escalation factor is included. See Appendix A for further detail on the cost estimate for this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative.

Alternative #3b: Install vehicular overcrossing of railroad from Sunset Avenue to new collector road on east side of railroad

Alternative 3b is intended to address the same needs described for Alternative 3a. Alternative 3b would construct a vehicular bridge crossing of the railroad tracks at a point further north than 3a, from Sunset Avenue on the west to a future circulator road on the east (see Figure 4 below). This new crossing would include bicycle/pedestrian accommodations. There is currently an at-grade crossing at this location that is utilized by the Banks Lumber Mill under an agreement with the existing rail companies.

The proposed railroad crossing corridor shown on Figure 4 is conceptual and would be defined through the land development process as it is funded, designed, and built.

Figure 4: Alternative #3b – Location of Vehicular Overcrossing of RR Tracks from Sunset Avenue to east side



Criteria Evaluation

Traffic Operations

Same evaluation rationale as for Alternative 3a.

Safety

As with Alternative 3a, Alternative 3b was not conceived to address an existing or anticipated safety issue. However, it will be necessary to include safety precaution measures to ensure that no safety issue arises with regard to the introduction of cut-through traffic into the neighborhood located between the railroad tracks (on the east) and Main Street (on the west). Potential safety issues associated with neighborhood cut-through traffic could be addressed through the imposition of a low posted speed (prominently signed), consistent police monitoring of the speed limit, and the installation of traffic calming measures such as speed bumps and/or landscaped intersection islands.

Mobility

Same evaluation rationale as for Alternative 3a.

Land Use

This alternative would be permitted under City of Banks Zoning regulations.

Environmental & Social Impacts

This alternative is not anticipated to have an impact on any significant natural resources.

Support for Implementation

City of Banks, ODOT, and Washington County staff concurs with this proposed alternative in concept.

ODOT Rail staff has expressed initial concerns about the feasibility of this alternative. The companies operating active operations on the rail lines which would be crossed under this alternative have expressed initial opposition to the alternative based on concerns related to trespassing/liability issues associated with people crossing over the railroad tracks.

This alternative would require early planning close coordination with both the ODOT Rail Division and with the railroad companies actively operating on the rail lines at the time the project was being considered for implementation.

Cost-Effectiveness

Based on planning level estimate tools, this projected is estimated at \$7,083,000. This estimate includes the design and construction of new City of Banks Collector roadway, new single span cast-in-place concrete girder bridge, new right-of-way, contingency, and engineering costs. No escalation factors or costs for acquisition of adjacent properties are included. See Appendix A for further detail on the cost estimate for this alternative.

Alternative #3c: Install undercrossing of railroad from area south of Arbor Village to Rose Avenue

This alternative was assessed at a cursory level and has been discarded currently. Costs would be at an order-of-magnitude higher than an overcrossing due to the required extreme depth and linear distance that such an alternative would entail coupled with the complexity of installing such an underground structure beneath an active rail line.

Alternative #3d: Install at-grade crossing of railroad from area south of Arbor Village to Rose Avenue

This alternative was discussed with ODOT Rail and has been discarded currently. An at-grade crossing of an active double-track at this location would not be permitted. This would be the preferred option for a collector road between the east and west sides of Banks because the cost to do so would be significantly less than an overcrossing. However, at-grade crossings of the railroad under existing conditions is infeasible because the tracks that would need to be crossed are currently used for track-switching – an activity that is highly incompatible with at-grade crossings; this is also the reason that at-grade crossings along this segment of tracks is not permitted under ODOT Rail Division Policy.

Based on the above circumstances, at-grade crossings are not a feasible option for recommendation at this time. However, as noted, at-grade crossings are the City's preferred option for east-west railroad crossings, and would be pursued for implementation at such time in the future that at-grade crossings become feasible due to changing conditions.

Alternative #3e: Install at-grade crossing of railroad from Sunset Avenue to new collector road on east side of railroad

This alternative was discussed with ODOT Rail and has been discarded currently. An at-grade crossing of an active double-track at this location would not be permitted. This would be the preferred option for a collector road between the east and west sides of Banks because the cost to do so would be significantly less than an overcrossing. However, at-grade crossings of the railroad under existing conditions is infeasible because the tracks that would need to be crossed are currently used for track-switching – an activity that is highly incompatible with at-grade crossings; this is also the reason that at-grade crossings along this segment of tracks is not permitted under ODOT Rail Division Policy.

Based on the above circumstances, at-grade crossings are not a feasible option for recommendation at this time. However, as noted, at-grade crossings are the City’s preferred option for east-west railroad crossings, and would be pursued for implementation at such time in the future that at-grade crossings become feasible due to changing conditions.

Alternative #3f: Install vehicular overcrossing of railroad adjacent to OR 6 bridge

Alternative 3f is intended to address the same needs described for Alternative 3a. This alternative would entail constructing a vehicular bridge adjacent to the OR 6 bridge over the railroad tracks, thereby connecting the existing street network on the west side of Banks (south of the Arbor Village neighborhood) to the future street network on the east side of Banks (at Washington Avenue) (see Figure 5 below). This alternative is a long-term one which assumes the full build-out of the UGB expansion area on the east side of Banks as a prerequisite for consideration of construction.

This alternative was discussed with ODOT Rail and has been discarded currently. ODOT Bridge staff did a review of this alternative and found it to not be a viable alternative – the existing OR 6 bridge is structurally in good condition and would not need to be replaced in the next 20 years and that the proposed alternative creates difficulties for ODOT if the agency decided to widen OR 6 in the future. ODOT Bridge staff also noted that there would not be significant cost-savings building this alternative versus building a separate local-route bridge (as discussed in Alternative 3a).

Conclusion for Alternative 3 alternatives

Based on the above assessment, Alternative 3a and 3b are recommended as projects to be placed on the City’s transportation CIP list for consideration to be constructed (when warranted based on future conditions). However, both Washington County and ODOT staff noted that, in a comparison between Alternative 3a and 3b, Alternative 3b is preferable because Alternative 3a appears too far south to be the sole east-west railroad crossing and would result in out of direction travel for significant portions of intra-city traffic in the future (if it were the sole crossing).

It is important to reiterate that, as noted previously, an at-grade crossing would be the preferred option for a collector road between the east and west sides of Banks because the cost to do so would be significantly less than an overcrossing. However, at-grade crossings of the railroad under existing conditions is infeasible because the tracks that would need to be crossed are currently used for track-switching – an activity that is highly incompatible with at-grade crossings; this is also the reason that at-grade crossings along this segment of

tracks is not permitted under ODOT Rail Division Policy. Based on the above circumstances, at-grade crossings are not a feasible option for recommendation at this time. However, as noted, at-grade crossings are the City's preferred option for east-west railroad crossings, and would be pursued for implementation at such time in the future that at-grade crossings become feasible due to changing conditions.

Alternatives 3c and 3f are NOT recommended for further consideration.

A detailed discussion of potential transportation funding sources for this alternative is provided in Section D of this memorandum.

Need

Provide viable travel alternative to OR 6 for traffic between Banks and the Portland metropolitan area.

Alternative #4: Sight distance improvements at intersection of Banks Road/Aerts Road

This alternative addresses the need to provide an alternate route that could be used by Banks residents and visitors if congestion issues occur at the intersection of Aerts Road and Highway 6; the alternate route would be Banks Road-to-US 26. To address this need, this alternative subsequently needs to address existing geometric/safety issues on Banks Road. There are existing sight distance issues associated with the existing steep vertical grade conditions in the vicinity of the intersection of Banks Road and Aerts Road; although sight distance issues exist currently, the risk these issues pose to user safety would increase significantly in correlation with the number of new vehicles that would be utilizing this intersection upon development build-out of the UGB expansion areas. The existing Banks Road/Aerts Road intersection is shown in Figure 5 below.

This alternative could be done at varying degrees of complexity and cost, as warranted under future conditions. Alternative 4a through 4c could be viewed as alternatives to one another or as phases of the same project, as will be discussed in turn below. Alternative 4d would be a standalone alternative to Alternatives 4a, 4b, and 4c; a decision to program Alternative 4d for implementation would negate the need to construct Alternatives 4a through 4c.

This alternative would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion area east of the railroad tracks.

Figure 5: Alternative #4's – Intersection of Banks Road and Aerts Road (looking west)



Alternative 4a: Install advanced warning signage

Alternative 4a is intended to increase safety for motorists, pedestrians, and cyclists traveling on Banks Road and those turning onto Banks Road from Aerts Road who do not have adequate sight distance based upon assumed design speed and existing conditions. The installation of advanced signing on all three legs would improve safety conditions at the intersection. In addition to advanced signing, rumble strips for westbound Banks Road traffic just east of the crest vertical curve may be considered, and are included in the cost estimate.

Criteria Evaluation

Traffic Operations

Traffic operations would not be adversely affected by this alternative.

Safety

Advanced signing and rumble strips on Banks Road in the vicinity of the intersection with Aerts Road will improve the safety of this intersection by providing warning to motorists who may be unfamiliar with the area of the relatively blind intersection at Aerts Road.

Mobility

Mobility conditions would not be adversely affected by this alternative.

Land Use

There would be no land use impacts associated with this alternative.

Environmental & Social Impacts

No significant environmental resources would be impacted by this alternative. No social impacts are anticipated with this alternative.

Support for Implementation

As Banks Road is owned and maintained by Washington County, this alternative would need to be coordinated closely with staff from the Washington County Land Use and Transportation Department to determine when this alternative would be warranted and to plan for implementation. It is anticipated that the Banks community would support this alternative given its overall benefits and lack of impacts to any parties.

Cost-Effectiveness

Based on planning level estimate tools, this projected is estimated at \$14,000. This estimate includes the evaluation of existing signing at the site, design and construction of new advanced signing, and construction of rumble strips on Banks Road east of intersection, contingency, and engineering costs. No escalation factor is included. See Appendix A for further detail on the cost estimate for this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative.

Conclusion

Based on the above assessment, this alternative is recommended as a project to be placed on the City's transportation CIP list (with the exclusion of the proposed posted speed element and the inclusion of speed advisory plaques) for consideration to be constructed (when warranted based on future conditions related to an increase in road volumes associated with development of the UGB expansion area).

A detailed discussion of potential transportation funding sources for this alternative is provided in Section D of this memorandum.

Alternative 4b: Install advanced warning signage

As with Alternative 4a, Alternative 4b is intended to increase safety for motorists, pedestrians, and cyclists traveling on Banks Road and those turning onto Banks Road from Aerts Road who do not have adequate sight distance based upon assumed design speed and existing conditions. The installation of advanced signing on all three legs that would reduce posted speed and warn oncoming vehicle traffic of reduced sight distance on the crest vertical curve, in combination with a flashing yellow light at the intersection, would improve safety. In addition to the installation of advanced signing and flashing light, rumble strips for westbound Banks Road traffic just east of crest vertical curve may be considered, and are included in the cost estimate.

Criteria Evaluation

Traffic Operations

Based on the discussion provided with regard to Alternative 4a, the proposed speed limit element of this alternative is discarded.

Safety

A flashing yellow beacon would not be an effective tool with regard to mitigating safety issues at Aerts Road and Banks Road associated with poor sight distance; therefore the flashing yellow beacon element of this alternative is disregarded.

Mobility

Mobility will not be affected by this alternative.

Land Use

There would be no land use impacts associated with this alternative.

Environmental & Social Impacts

No significant environmental resources would be impacted by this alternative. No social impacts are anticipated with this alternative.

Support for Implementation

As Banks Road is owned and maintained by Washington County, this alternative would need to be coordinated closely with staff from the Washington County Land Use and Transportation Department to determine when this alternative would be warranted and to plan for implementation. It is anticipated that the Banks community would support this alternative given its overall benefits and lack of impacts to any parties.

Cost-Effectiveness

Based on planning level estimate tools, this projected is estimated at \$83,700. This estimate includes the evaluation of existing signing at the site, design and construction of new advanced signing, yellow flashing light, rumble strips on Banks Road east of intersection, contingency, and engineering costs. No escalation factor is included. See Appendix A for further detail on the cost estimate for this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative.

Conclusion

Based on the above assessment with regard to ODOT review comments on this alternative, it is not recommended as a project to be placed on the City's transportation CIP list for consideration to be constructed.

Alternative 4c: Install advanced warning signage and install traffic signal at intersection of Aerts Road/Banks Road

As with Alternatives 4a and 4b, Alternative 4c is intended to increase safety for motorists, pedestrians, and cyclists traveling on Banks Road and those turning onto Banks Road from Aerts Road who do not have adequate sight distance based upon assumed design speed and existing conditions. Advanced signing on all three legs that warns vehicle traffic of traffic signal in combination with a proposed traffic signal at the intersection will improve safety. Because of the crest vertical curve just to the east of the intersection, advanced warning lights, in addition to advanced warning signs, may be required. In addition to signing and signal improvements, the three approach legs would be widened to the Washington County Collector standard of 36 feet.

Conclusion

ODOT staff directed that this alternative be discarded because this intersection would not meet signal warrants.

Alternative 4d: Correct vertical grade issues on Banks Road at Banks Road/Aerts Road intersection area

Alternative 4d is intended to increase safety for motorists, pedestrians, and cyclists traveling on Banks Road in the vicinity of Aerts Road and those turning onto Banks Road from Aerts Road who do not have adequate sight distance based upon assumed design speed and existing conditions. The existing crest vertical curve at Banks Road and Aerts Rd, and the sag curve 500 feet to the west (see Figure 5 for photo), would be regarded to meet 60mph vertical design speed sight distance requirements at a minimum. This would allow drivers approaching Aerts Road from Banks Road, and drivers attempting to turn from Aerts Road, adequate sight distance and would therefore not require a speed reduction (currently posted as “Basic Rule”). Approximately 3,800 feet of Banks Road and 100 feet of Aerts Road would be reconstructed to Washington County Collector standard width of 36 feet. The golf course to the south of Banks Road would have retaining walls on fill. Some signs would need to be removed and replaced.

Criteria Evaluation

Traffic Operations

This alternative would likely increase speeds because two vertical curves were “flattened” and upgraded to standards, but traffic analysis based upon existing speeds and future estimated volumes should be performed to get a more thorough understanding of the impact on operations. Washington County staff noted that modifying the vertical curve and sag to conform to County road improvement standards would be the best long-term solution to the sight distance/safety issues on Banks Road, but that the appropriate strategy would best be determined by County engineering staff, which generally prefers to introduce improvement measures in a stepped approach (starting with relatively modest treatments and moving to more aggressive measures).

Safety

This alternative would improve sight distance on all three legs of the Banks Road/ Aerts Road intersection and would therefore remove the previously described sight distance issue altogether. In addition to the vertical curve upgrades, the reconstructed roadway would be constructed to meet the Washington County Collector standard of 36 feet, providing adequate lane and shoulder spacing for vehicles, bicycles, and pedestrians attempting to travel through the intersection. ODOT staff noted that modifying the vertical profile of Banks Road would be the best tool to improve sight distance. ODOT staff also advised clearing vegetation at the corners of the Banks Road/ Aerts Road intersection to improve sight distance conditions. Safety conditions would be upgraded to an even higher degree if this project were done in concurrence with Alternative 5 (the widening of Banks Road – discussed later in this memorandum).

This alternative does not address the other substandard vertical curves on the Banks Road corridor, so consideration must be made to the consistency of roadway design speeds if only this segment of Banks Road is upgraded.

Mobility

Mobility will be improved for vehicles turning on to or off of Aerts Road as the intersection will be safer for all users. The wider roadway width associated with the 3,800 feet of reconstructed roadway will provide increased mobility for larger vehicles and those vehicles needing to pass cyclists and pedestrians on what is currently a narrow-to-nonexistent shoulder.

Land Use

There would be no land use impacts associated with this alternative. Per Washington County CDC Article VII, Section 702-3 this project, because it would take place on existing public right-of-way, would be permitted outright subject to design standard review. It is anticipated that 15 feet of right-of-way would be needed on each side of Banks Road for the entire 3,800 feet of the project to match into existing drainage and cut and fill slopes. Based on a cursory GIS assessment, this widening could be accommodated on existing public road right-of-way (a detailed survey of the corridor would need to be performed in the early planning for this alternative to confirm this assessment).

Environmental & Social Impacts

No significant environmental resources would be impacted by this alternative. No social impacts are anticipated with this alternative.

Support for Implementation

As Banks Road is owned and maintained by Washington County, this alternative would need to be coordinated closely with staff from the Washington County Land Use and Transportation Department to determine when this alternative would be warranted and to plan for implementation. It is anticipated that the Banks community would support this alternative given its overall benefits and lack of permanent impacts to any parties (there would be temporary impacts associated with road delays or closures related with construction).

Cost-Effectiveness

Based on planning level estimate tools, this projected is estimated at \$3,856,500. This estimate includes the design and construction of new Washington County Major Collector roadway, new right-of-way, contingency, and engineering costs. No escalation factor is included. See Appendix A for further detail on the cost estimate for this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative. It would be most cost-effective to construct this project in concurrence with Alternative 5 (the widening of Banks Road – discussed later in this memorandum).

Conclusion

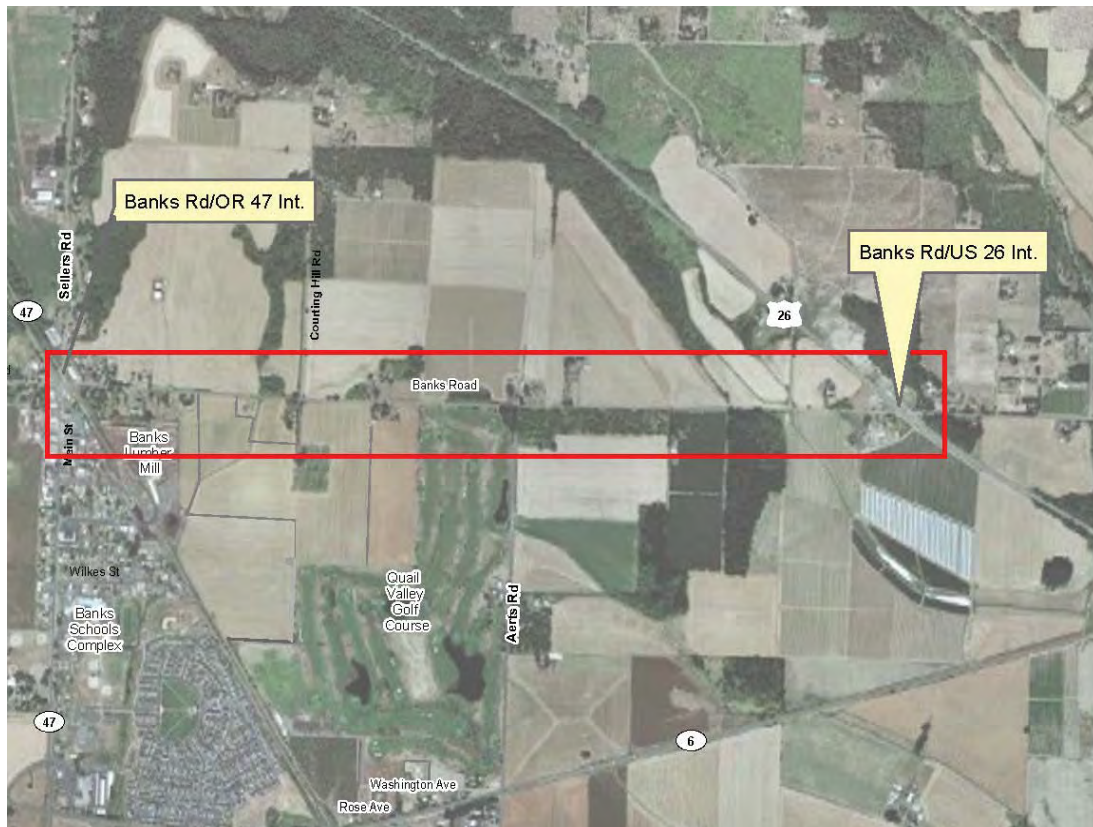
Based on the above assessment, this alternative is recommended as a project to be placed on the City's transportation CIP list for consideration to be constructed (when warranted based on future conditions). As noted under the Safety and Cost-Effectiveness criteria discussions, if possible it would be advantageous to construct this project in concurrence with Alternative 5 (the widening of Banks Road – discussed later in this memorandum).

A detailed discussion of potential transportation funding sources for this alternative is provided in Section D of this memorandum.

Alternative #5: Widen Banks Road between OR 47 (Main Street) and US 26

This alternative entails widening Banks Road between OR 47 (Main Street) and US 26 (approximately 1.70-mile distance) to include shoulders on both sides of the road that meet Washington County Major Collector standards (see Figure 6 below). It is assumed that existing usable roadway width is 20 feet, and would be widened to 36 feet. This alternative addresses the lack of adequate lane width and shoulders on Banks Road (in consideration of forecasted increases in traffic volume associated with the development of the UGB expansion areas on the east side of Banks) and the need to have a viable east-west alternative to OR 6 for accessing US 26 so as to alleviate congestion and queuing issues at both existing Banks access points to OR 6 (Main Street; Aerts Road). Currently, Banks Road has extremely narrow-to-no roadway shoulders on the road segment between Main Street and Aerts Road, which will be a critical segment to improve in association with the development of the UGB expansion areas on the east side of Banks. This alternative would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion areas.

Figure 6: Alternative #5 – Widening of Banks Road between OR 47 (Main Street and US 26)



Criteria Evaluation

Traffic Operations

Adding roadway shoulders would provide accommodations for vehicles that have broken down or stalled out and would also provide space for slow moving vehicles to move to the

right so as to allow vehicles behind them to pass in a much safer manner than existing conditions would allow, thereby improving traffic operations under such conditions. As noted, this alternative would create a more viable and attractive option for commute traffic between Banks and major employment areas in Hillsboro, Beaverton and Portland. Construction of this alternative could necessitate associated improvements at the Banks Road/US 26 intersection, as that intersection would likely see an increase of volume over present conditions.

Safety

Adding roadway shoulders improves safety conditions for all users. Vehicles needing to pull off the road unexpectedly would have accommodations to do so, bicyclists and pedestrians would have accommodations that were removed from the active travel lanes. The need for the safer roadway conditions that adding roadway shoulders would provide will be heightened considerable over time as the UGB expansion areas are developed and the number of potential bicyclists and pedestrians on Banks Road increases. Moreover, with the completion of the Banks-Vernonia Trailhead in the Autumn of 2010, there will likely be an increase of bicyclists using Banks Road to either access, or return from, the Banks-Vernonia Trail.

Safety conditions would be upgraded to an even higher degree if this project were done in concurrence with Alternative 5 (the widening of Banks Road – discussed later in this memorandum).

Mobility

Adding roadway shoulders would significantly enhance mobility along Banks Road for all users, most notably for bicyclists and pedestrians, who do not currently have any accommodations on Banks Road. Larger vehicles navigating the vertical curves and needing to pass cyclists and pedestrians would also see a benefit in this project.

Land Use

Based on a cursory GIS assessment, it appears that there is sufficient public-right-of way to widen Banks Road to include shoulders on both sides of the road, thereby negating the need to purchase any right-of-way from properties adjacent to the road. It is anticipated the overall benefits described in this section would also benefit property owners in the Banks Road corridor.

Per Washington County CDC Article VII, Section 702-3 this project, because it would take place on existing public right-of-way, would be permitted outright subject to design standard review.

Environmental & Social Impacts

No significant environmental resources would be impacted by this alternative. No social impacts are anticipated with this alternative.

Support for Implementation

This alternative was preliminarily presented and reviewed by ODOT, Washington County, and City of Banks staff – there has been no expression of disapproval from any of the aforementioned agencies regarding this alternative. It is anticipated that the Banks community would support this alternative given its overall benefits and lack of impacts to any parties.

Cost-Effectiveness

Based on planning level estimate tools, this project is estimated at \$4,377,400. This estimate includes the design and construction of new Washington County Major Collector roadway, new right-of-way, contingency, and engineering costs. No escalation factor is included. See Appendix A for further detail on the cost estimate for this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative. It would be most cost-effective to construct this project in concurrence with Alternative 5 (the widening of Banks Road – discussed later in this memorandum).

Conclusion

Washington County staff noted that this alternative would be consistent with the Banks Road’s collector designation in the County’s TSP. ODOT staff concurred that adding shoulders to Banks Road would improve safety.

Based on the above assessment, this alternative is recommended as a project to be placed on the City’s transportation CIP list for consideration to be constructed (when warranted based on future conditions).

A detailed discussion of potential transportation funding sources for this alternative is provided in Section D of this memorandum.

Need

Insufficient vehicle storage capacity at southbound and eastbound left-turn lanes at intersection of Main Street (OR 47) and Oak Way/OR 6 ramp terminal.

Alternative #6: Extend southbound left-turn pocket on Main Street (OR 47) at intersection with Oak Way

This alternative would entail extending the southbound left-turn lane pocket from 125 feet to 350 feet (see figure 7 below). This alternative addresses the need to address forecasted queuing issues at the southbound leg of the intersection of Main Street and Oak Way. This alternative would be designed according to applicable requirements in ODOT’s Highway Design Manual and Striping Manual. This alternative would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion areas.

Figure 7: Alternative #6 and #7 – Southbound and Eastbound Left-turn Lane Extensions



Criteria Evaluation

Traffic Operations

This alternative would reduce vehicle queuing in the southbound left-turn lane; the existing storage is forecasted to be inadequate under 2029 conditions. By having adequate turn-lane storage, through-traffic is able to proceed efficiently. It should be noted that, although the extension of the left-turn lane would improve future operational conditions at the intersection, it will be important to consider the implications of extending the left-turn lane storage with relation to the OR 6 exit ramp geometry as a whole.

Safety

This alternative was not conceived to address an existing or anticipated safety issue. However, by removing left-turning vehicles from the through-lane at this intersection, safety conditions are improved as stopped vehicles wishing to proceed straight would not need to pass from behind to reach the intersection at a green light in a manner that potentially poses safety problems.

Mobility

By reducing queuing issues, freight traffic is able to proceed more efficiently. This alternative would not affect non-motorized uses to any measurable degree.

Land Use

The area where this project would take place is already paved; it would simply require and would not require any right of way acquisition.

Environmental & Social Impacts

This alternative would not impact any significant natural resources nor would it impact any existing residences or businesses.

Support for Implementation

Both ODOT and Washington County staff concur with this alternative. This alternative was also reviewed by City of Banks staff as well as the project Technical Advisory Committee. There has been no expression of disapproval from any of the aforementioned agencies; therefore, it is assumed that there is support for this alternative.

Cost-Effectiveness

Based on planning level estimate tools, this projected is estimated at \$8,800. This estimate includes the design and construction of new striping and signing associated with the off-ramp and intersection. The estimate includes contingency and engineering costs, but no escalation factor. See Appendix A for further detail on the cost estimate for this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative.

Conclusion

Based on the above assessment, this alternative is recommended as a project to be placed on the City's transportation CIP list for consideration to be constructed (when warranted based on future conditions).

A detailed discussion of potential transportation funding sources for this alternative is provided in Section D of this memorandum.

Alternative #7: Extend eastbound left-turn pocket on Main Street (OR 47) at intersection with Oak Way/OR 6 ramp terminal

This alternative would entail extending the eastbound left-turn lane pocket from 70 feet to 200 feet (see Figure 7). This alternative addresses the need to address forecasted queuing issues at the eastbound leg of the intersection of Main Street and Oak Way. This alternative would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion areas.

Criteria Evaluation

Traffic Operations

This alternative would reduce vehicle queuing in the southbound left-turn lane; the existing storage is forecasted to be inadequate under 2029 conditions. By having adequate turn-lane storage, through-traffic is able to proceed efficiently. ODOT staff noted that as long this widening does not reduce the radius of the first curve exiting from OR 6 traveling westbound, there are no concerns with extending this left-turn lane and that, upon their review, the widening appears not to impact the radius of the curve

Safety

This alternative was not conceived to address an existing or anticipated safety issue. However, by removing left-turning vehicles from the through-lane at this intersection, safety is increased as stopped vehicles wishing to proceed straight would not need to pass

from behind to reach the intersection at a green light in a manner that potentially poses safety problems.

Mobility

By reducing queuing issues, freight traffic is able to proceed more efficiently. This alternative would not affect non-motorized uses to any measurable degree.

Land Use

This alternative would require a minor widening of the OR 6 westbound exit ramp and the placement of additional pavement; however, no additional right-of-way would be necessary.

Environmental & Social Impacts

This alternative would not impact any significant natural resources nor would it impact any existing residences or businesses.

Support for Implementation

This alternative was reviewed by ODOT and City of Banks staff as well as the project Technical Advisory Committee. There has been no expression of disapproval from any of the aforementioned agencies; therefore, it is assumed that there is support for this alternative.

Cost-Effectiveness

Based on planning level estimate tools, this projected is estimated at \$9,100. This estimate includes the design and construction of new striping and signing associated with the off-ramp and intersection. The estimate includes contingency and engineering costs, but no escalation factor. See Appendix A for further detail on the cost estimate for this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative.

Conclusion

Based on the above assessment, this alternative is recommended as a project to be placed on the City's transportation CIP list for consideration to be constructed (when warranted based on future conditions).

A detailed discussion of potential transportation funding sources for this alternative is provided in Section D of this memorandum.

Need

North-south roadway circulation system on west side of Banks in UGB expansion area and provide access to new land uses.

Alternative #8: New north-south circulator road in west side Banks area between Cedar Canyon Road and area south of Sunset Park

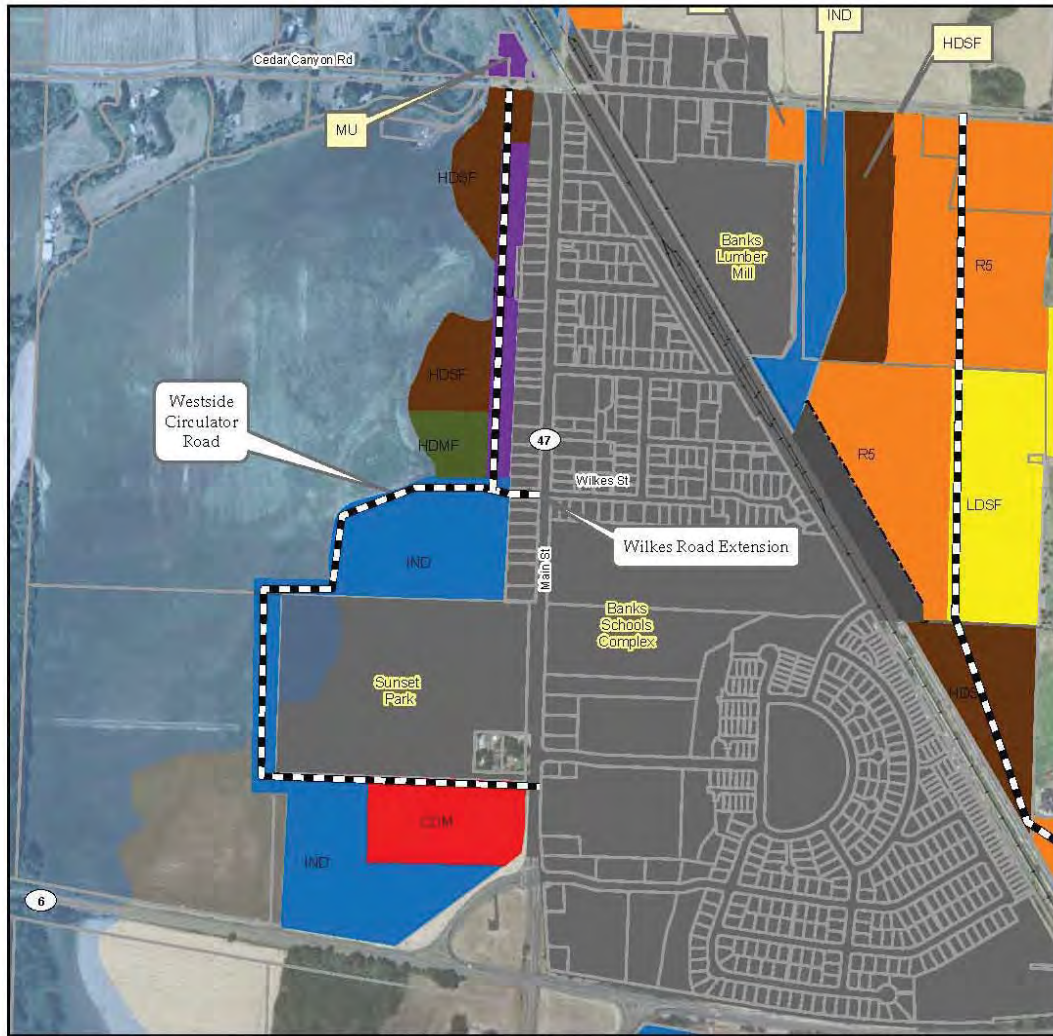
This alternative entails constructing a new north-south road on the west side of the existing City of Banks with termini intersections at Cedar Canyon Road in the north and Main Street in the south (see Figure 8 below). The termini intersection at Main Street south of Sunset Park would be restricted to right-in/right-out movements. This roadway would be a 40 foot wide paved roadway with sidewalks, illumination, landscaping and drainage, occupying a right-of-way footprint of 64 feet, and meeting City of Banks Collector standards. This alternative would address the need to provide a primary circulator road for the UGB expansion area to the west of Main Street (both north and south of Sunset Park).

The location of this proposed roadway is optimal because it will allow for double-loading of mixed uses on the lot line in the northern segment of the road and will provide access to the commercial and industrial areas, while simultaneously providing this critical north-south roadway within the constraints of the adjacent floodplain.

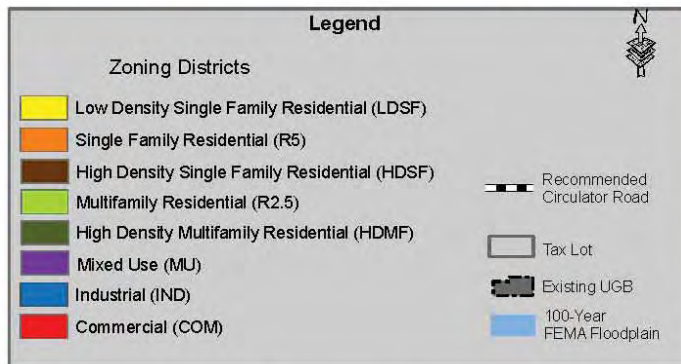
This alternative would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion area west of Main Street.

The proposed Westside north-south circulator road corridor as shown on Figure 8 is conceptual and would be defined through the land development process as it is funded, designed, and built.

Alternative 8: Westside Circulator Road



VICINITY MAP



Westside Circulator Road & Wilkes Rd. Extension

CH2MHILL

Criteria Evaluation

Traffic Operations

As noted, constructing a circulator road would be necessary for the development of the UGB expansion area west of Main Street, both north and south of Sunset Park. The UGB expansion area north of Sunset Park will be primarily residential (with the exception of approximately 12 acres that would be zoned industrial immediately north of Sunset Park); the area south of Sunset Park would be zoned both industrial and commercial. This alternative would include right-in/right-out only restrictions at the new road's intersection with both Cedar Canyon Road and Main Street. Both of these new intersections would need to be analyzed prior to programming for funding in tandem with trip generation information from planned developments on the west side of Banks to determine the extent to which intersection modifications would be warranted to mitigate traffic operation issues revealed at that future time.

Safety

This alternative was not conceived to address an existing or anticipated safety issue. However, potential safety issues associated with left turning vehicles both onto, and from, the new circulator road from Main Street would be eliminated by the installation of right-in/right-out only restrictions.

Mobility

This alternative would be essential for the mobility of all users living and working in the UGB expansion areas west of Main Street, as currently there is no transportation system in this area.

Land Use

This alternative would be permitted under the Banks Zoning Code (at such time that this road would be warranted, the UGB expansion area would have been annexed into the City). It is also assumed that at such time that this road would be built, previous coordination between the City and property owners (via the formal subdivision of existing farmland) would have resulted in the dedication of right-of-way for this road.

Environmental & Social Impacts

Approximately 1,300 linear feet of this roadway would be built within the Federal Emergency Management Agency (FEMA) 100-year floodplain. It is assumed that at such time that this road would be built, the City would have already annexed into the City the land upon which the road would be located. It is also assumed that the City would have already adopted a Floodplain Ordinance which would dictate the design standards for constructing a roadway in a 100-year floodplain (likely similar in nature to correlating Washington County standards); therefore, the road would be permitted to be constructed in accordance with the Floodplain Ordinance standards (i.e. without raised structures; built to be overtopped and not channel water flows).

No social impacts are anticipated with this alternative, as it is anticipated that at such time that this road would be built, previous coordination between the City and property owners (via the formal subdivision of existing farmland) would have resulted in the dedication of right-of-way for this road.

Support for Implementation

This alternative has been presented to ODOT, Washington County, City of Banks staff, City of Banks Council members, City of Banks Planning Commission members, and the general public as a necessary element to UGB expansion on the west side of Banks. There has been some opposition *to the planned UGB expansion* on the west side of Banks, but no pointed opposition or expressions of disapproval from any of the aforementioned parties with regard to this road alternative (again, assuming UGB expansion west of Banks); therefore, it is assumed that there is support for this alternative.

Cost-Effectiveness

Based on planning level estimate tools, this projected is estimated at \$12,673,100. This estimate includes the design and construction of new City of Banks Collector roadway, new right-of-way, contingency, and engineering costs. No escalation factor is included. See Appendix A for further detail on the cost estimate for this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative.

Conclusion

Based on the above assessment, this alternative is recommended as a project to be placed on the City's transportation CIP list for consideration to be constructed (when warranted based on future conditions).

A detailed discussion of potential transportation funding sources for this alternative is provided in Section D of this memorandum.

Need

Connection from new UGB expansion area on west side of Banks to Main Street to provide access and east-west circulation.

Alternative #9: New west extension of Wilkes Road

As shown on Figure 8, this alternative entails constructing a west extension of Wilkes Road that would connect to Main Street on the east and the new west side circulator road on the west (see Alternative #8), and would result in a new 4-way intersection of Wilkes Road and Main Street. This alternative would include the installation of a striped pedestrian crossing. This alternative addresses the need to provide an outlet from the new UGB expansion area west of Main Street.

This alternative would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion area west of Main Street. Per ODOT staff, the new roadway would require an ODOT approach permit and the proposed marked crosswalks would need State Traffic Engineer Approval.

The location of the proposed Wilkes Road extension is optimal in that it will allow for a formal 4-way intersection with Main Street and the existing Wilkes Road and will support the circulatory function of a collector (Wilkes Road is proposed for upgrading to collector status).

Criteria Evaluation

Traffic Operations

The intersection at the west extension of Wilkes Street at Main Street would be one of three “outlet” routes available to people living, working, or visiting the UGB expansion area west of Main Street (the other two outlets being Cedar Canyon Road and Main Street south of Sunset Park); it is anticipated that the existence of three outlet points will result in a rational dispersal of traffic emanating to and from the west Banks area. It is further anticipated that the overwhelming majority of vehicles entering and exiting the west side extension of Wilkes Road would be utilizing Main Street (not crossing over to the existing Wilkes Street east of Main Street. Because of this, it is not anticipated that there will be unacceptable traffic congestion at the west extension of Wilkes Road/Main Street intersection. However, this new intersection would need to be analyzed prior to programming for funding, in tandem with trip generation information from planned developments on the west side of Banks, to determine the extent to which intersection modifications would be warranted to mitigate traffic operation issues revealed at that future time.

Safety

This alternative was not conceived to address an existing or anticipated safety issue. However, potential safety issues associated with left turning vehicles both onto, and from, the new west extension of Wilkes Road, would potentially need to be mitigated (as warranted and discussed under the Traffic Operations discussion above). Pedestrian safety would be bolstered by the installation of a striped pedestrian crossing (and potential other measures such as a flashing pedestrian beacon, as warranted by future conditions).

Mobility

This alternative would be significantly important for the mobility of all users living and working in the UGB expansion areas west of Main Street, as currently there is no transportation system in this area.

Land Use

This alternative would be permitted under the Banks Zoning Code (at such time that this road would be warranted, the UGB expansion area would have been annexed into the City). It is also assumed that at such time that this road would be built, previous coordination between the City and property owners (via the formal subdivision of existing farmland) would have resulted in the dedication of right-of-way for this road.

Environmental & Social Impacts

No significant environmental resources would be impacted by this alternative. No social impacts are anticipated with this alternative, as it is anticipated that at such time that this road would be built, previous coordination between the City and property owners (via the formal subdivision of existing farmland) would have resulted in the dedication of right-of-way for this road.

Support for Implementation

This alternative has been presented to ODOT, Washington County, City of Banks staff, City of Banks Council members, City of Banks Planning Commission members, and the general public as a necessary element to UGB expansion on the west side of Banks. There has been some opposition to *the planned UGB expansion* on the west side of Banks, but no pointed

opposition or expressions of disapproval from any of the aforementioned parties with regard to this road alternative (again, assuming UGB expansion west of Banks); therefore, it is assumed that there is support for this alternative.

Cost-Effectiveness

Based on planning level estimate tools, this projected is estimated at \$464,000. This estimate includes the design and construction of new City of Banks Collector roadway, contingency, and engineering costs. No escalation factor is included. See Appendix A for further detail on the cost estimate for this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative.

Conclusion

Based on the above assessment, this alternative is recommended as a project to be placed on the City's transportation CIP list for consideration to be constructed (when warranted based on future conditions).

A detailed discussion of potential transportation funding sources for this alternative is provided in Section D of this memorandum.

Need

North-south roadway circulation system on east side of Banks in UGB expansion area and provide access to new land uses.

Alternative #10: New north-south circulator road in eastside Banks area between Banks Road and Washington Avenue

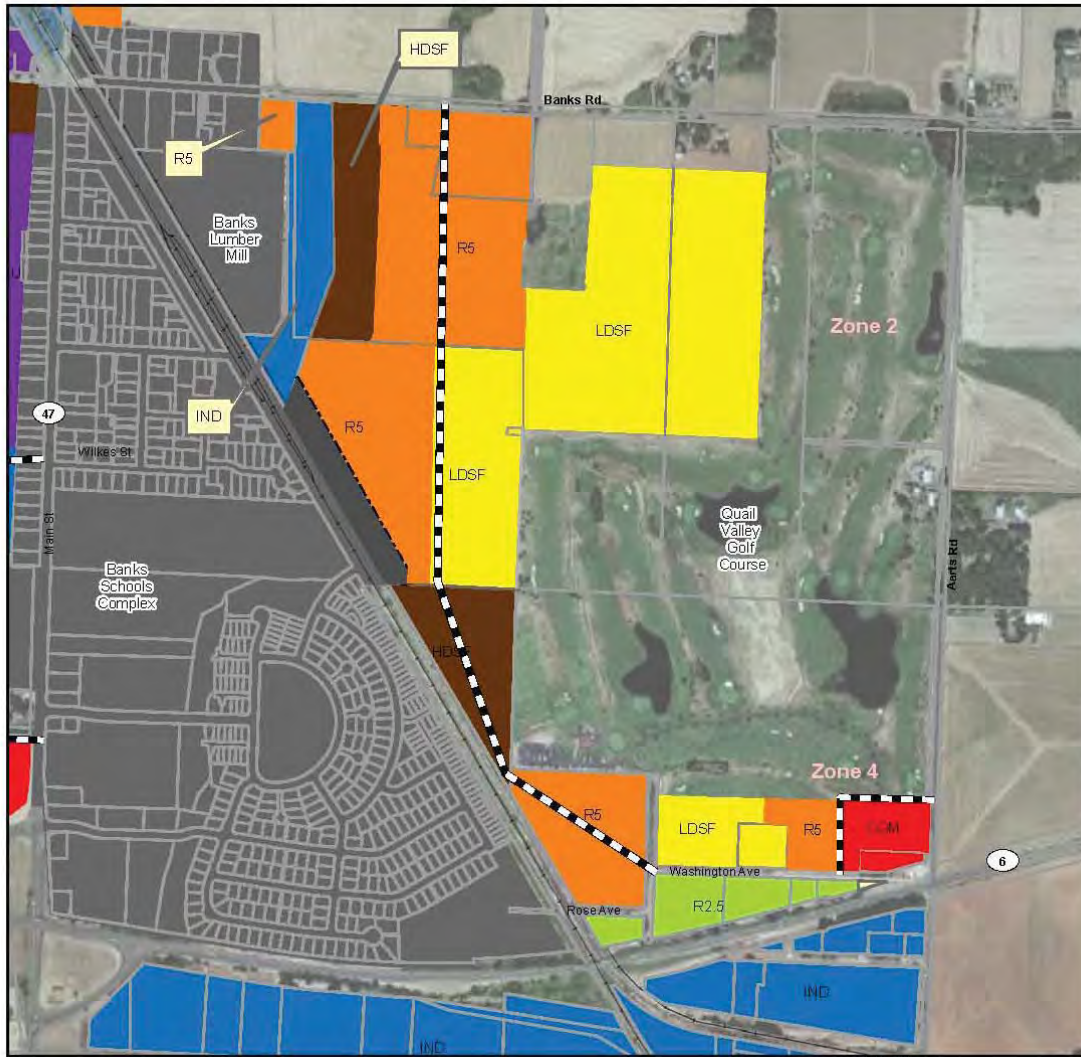
This alternative entails constructing a new north-south road on the east side of the existing City of Banks with termini intersections at Banks Road in the north and Washington Avenue in the south (see Figure 9 below). The proposed roadway would have a 36 foot paved width within a 60 foot right-of-way, meeting Washington County Major Collector standards. This alternative would address the need to provide a primary circulator road for the UGB expansion area to the east of the railroad tracks.

The location of this proposed would be the most efficient because it is central to the new eastside UGB expansion area, would have significant cost-benefits because it could serve adjacent land uses on both sides and would limit out-of-direction travel. Washington County and ODOT staff has concurred on this assessment.

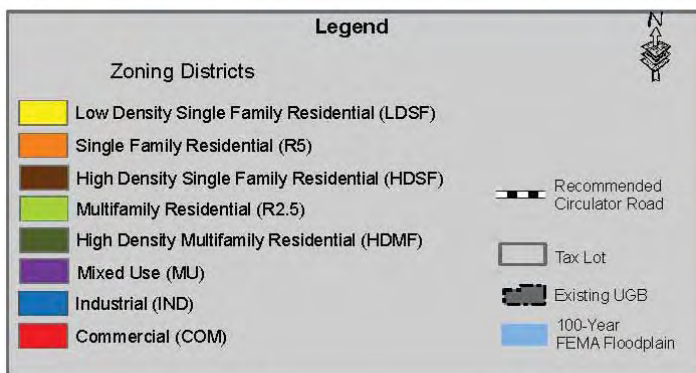
A previously considered eastside circulator road that would be located adjacent to the railroad tracks for much of its length was discarded because it would be ineffective from a cost-benefit perspective with regard to serving adjacent land uses. The rationale for the location of the discarded alternative was to provide a buffer between land use development and the railroad. However, as was noted by Washington County staff, there are other aesthetically pleasing mechanisms, such as berms or vegetated walls, which could be used to provide a buffer function instead of the roadway, which, as noted, would be significantly more effective if located in a more central location that served adjacent land uses on both sides.

The proposed Westside north-south circulator road corridor as shown on Figure 8 is conceptual and would be defined through the land development process as it is funded, designed, and built.

Alternative 10: Eastside Circulator Road



VICINITY MAP



Eastside Circulator Road



CH2MHILL

Criteria Evaluation

Traffic Operations

As noted, constructing a circulator road would be necessary for the development of the UGB expansion area east of the railroad tracks. The UGB expansion area through which this road would extend would be overwhelmingly residential. As warranted, this alternative may necessitate the inclusion of right-in/right-out only restrictions at the new road's intersection with Banks Road (to mitigate potential traffic congestion issues related to left turning vehicles both onto, and from, the new circulator road). The new intersection with Banks Road would need to be analyzed prior to programming for funding, in tandem with trip generation information from planned developments on the east side of Banks, to determine the extent to which intersection modifications would be warranted to mitigate traffic operation issues revealed at that future time.

Safety

This alternative was not conceived to address an existing or anticipated safety issue. However, potential safety issues associated with left turning vehicles both onto, and from, the new east side circulator road, would potentially need to be mitigated (as warranted and discussed under the Traffic Operations discussion above). Based on a preliminary engineering assessment, the location of the new intersection of the east side circulator road at Banks Road would be a practical one because there would not be any sight-distance issues.

Mobility

This alternative would be essential for the mobility of all users living and working in the UGB expansion areas east of Main Street, as currently there is no transportation system in this area.

Land Use

This alternative would be permitted under the Banks Zoning Code (at such time that this road would be warranted, the UGB expansion area would have been annexed into the City). It is also assumed that at such time that this road would be built, previous coordination between the City and property owners (via the formal subdivision of existing farmland) would have resulted in the dedication of right-of-way for this road.

Environmental & Social Impacts

No significant environmental resources would be impacted by this alternative. No social impacts are anticipated with this alternative, as it is anticipated that at such time that this road would be built, previous coordination between the City and property owners (via the formal subdivision of existing farmland) would have resulted in the dedication of right-of-way for this road.

Support for Implementation

This alternative has been presented to ODOT, Washington County, City of Banks staff, City of Banks Council members, City of Banks Planning Commission members, and the general public as a necessary element to UGB expansion on the east side of Banks. There has been some opposition to the planned UGB expansion on the east side of Banks, but no pointed opposition or expressions of disapproval from any of the aforementioned parties with

regard to this road alternative (again, assuming UGB expansion east of Banks); therefore, it is assumed that there is support for this alternative.

Cost-Effectiveness

Based on planning level estimate tools, this projected is estimated at \$4,441,400. This estimate includes the design and construction of new Washington County Major Collector roadway, new right-of-way, contingency, and engineering costs. No escalation factor is included. See Appendix A for further detail on the cost estimate for this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative.

Conclusion

Based on the above assessment, this alternative is recommended as a project to be placed on the City's transportation CIP list for consideration to be constructed (when warranted based on future conditions).

A detailed discussion of potential transportation funding sources for this alternative is provided in Section D of this memorandum.

Need

East-west bicycle/pedestrian circulation system.

Alternative #11: Install bicycle/pedestrian crossing of railroad from west to east sides of Banks

This alternative addresses the need to provide safe, convenient, and reasonably direct east-west bicycle/pedestrian circulation. This alternative could serve as an affordable interim step to meet this need in the event that the City determines that the longer-term objective of constructing motor vehicle crossings of the railroad with bicycle/pedestrian accommodations (see Alternatives 3a and 3b) will occur at an unacceptably late future time with respect to the need for bicycle/pedestrian accommodations across the railroad (to accommodate the population in the eastside UGB expansion area).

This alternative would encourage the use of alternate modes of travel between the west and east sides of Banks (assuming development of the UGB expansion areas on the east side of Banks) in keeping with City goals and objectives.

Several versions of this alternative were assessed and are discussed in turn below.

The proposed bicycle/pedestrian crossing corridor as shown on Figure 10 is conceptual and would be defined through the land development process as it is funded, designed, and built.

Alternative #11a: Install pedestrian/bicycle overcrossing of railroad from area north of Banks schools complex area to west side of east Banks circulator road

As shown in Figure 10, this alternative entails constructing a pedestrian/bicycle overcrossing of the railroad tracks to connect the UGB expansion area east of the tracks to the west side of Banks (at the Banks schools complex area) and would include a connecting path on the eastside to the circulator road (thereby providing a connection to the bicycle

facilities on the new road). This alternative would entail a temporary closure of the railroad tracks (approximately 2 nights at 6 hours a night).

This location is optimal for a bicycle/pedestrian crossing for the reasons provided in response to the criteria below.

Figure 10: Location of Bicycle/Pedestrian Bridge over Railroad Tracks from East Side Circulator Road to Banks Schools Complex Area



This alternative would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion area east of the railroad tracks.

Criteria Evaluation

Traffic Operations

This alternative was not conceived to address an existing or anticipated traffic congestion issue.

Safety

This alternative would significantly improve safety conditions for bicyclists and pedestrians who would be provided with an east-west connecting route that was separated from motor vehicle traffic. The location of this crossing would be a pivotal safe route to school measure.

Mobility

This alternative would significantly improve mobility conditions for bicyclists and pedestrians traveling to and from the UGB expansion area on the east side of the railroad tracks. This alternative would enable short trips from east to west Banks (and vice-versa), most importantly to the Banks school complex and downtown Banks, to be made conveniently by foot or bicycle.

Land Use

This alternative would be permitted under the Banks Zoning Code (at such time that the bicycle/pedestrian bridge would be warranted, the UGB expansion area would have been annexed into the City). It is also assumed that at such time that the bicycle/pedestrian bridge would be built, previous coordination between the City and property owners (via the formal subdivision of existing farmland) would have resulted in the dedication of right-of-way for this alternative.

Environmental & Social Impacts

No significant environmental resources would be impacted by this alternative. No social impacts are anticipated with this alternative, as it is anticipated that at such time that the bicycle/pedestrian bridge would be built, previous coordination between the City and property owners (via the formal subdivision of existing farmland) would have resulted in the dedication of right-of-way for this alternative.

Support for Implementation

This alternative has been presented to ODOT, Washington County, City of Banks staff, City of Banks Council members, City of Banks Planning Commission members, and the general public as a critical element for non-motorized travel for the UGB expansion on the east side of Banks. There has been some opposition *to the planned UGB expansion* on the east side of Banks, but no pointed opposition or expressions of disapproval from any of the aforementioned parties with regard to this alternative (again, assuming UGB expansion east of Banks); therefore, it is assumed that there is support for this alternative.

Cost-Effectiveness

Based on planning level estimate tools, this projected is estimated at \$5,690,800. This estimate includes the design and construction of a new pedestrian/bicycle overcrossing, new right-of-way, contingency, and engineering costs. No escalation factor is included. See Appendix A for further detail on the cost estimate for this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative.

Alternative #11b – discarded due to revised location of eastside circulator road

Alternative #11c: Install pedestrian/bicycle undercrossing of railroad from area north of Arbor Village (at east end of Banks schools complex) to west side of east Banks circulator road

This alternative would be in the same location and provide the same connecting points as in Alternative 11a (see Figure 10) but would entail an undercrossing (tunnel) connection and would include a connecting path on the eastside to the circulator road (thereby providing a

connection to the bicycle facilities on the new road). This alternative would necessitate a total closure of the railroad tracks for approximately 2-4 weeks.

This alternative would be constructed only when warranted based on future traffic conditions associated with future development of the UGB expansion area east of the railroad tracks.

Criteria Evaluation

Traffic Operations

Same evaluation rationale as for Alternative 11a.

Safety

Same evaluation rationale as for Alternative 11a.

Mobility

Same evaluation rationale as for Alternative 11a.

Land Use

Same evaluation rationale as for Alternative 11a.

Environmental & Social Impacts

Same evaluation rationale as for Alternative 11a.

Support for Implementation

This alternative has been presented to ODOT, Washington County, City of Banks staff, City of Banks Council members, City of Banks Planning Commission members, and the general public as a critical element for non-motorized travel for the UGB expansion on the east side of Banks. There has been some opposition *to the planned UGB expansion* on the east side of Banks, but no pointed opposition or expressions of disapproval from any of the aforementioned parties with regard to this alternative (again, assuming UGB expansion east of Banks); therefore, it is assumed that there is support for this alternative. That said, because this alternative would necessitate the closure of the railroad tracks for 2-4 weeks to allow installation of the tunnel structure, it is very uncertain whether this project could move forward (if the railroad companies find that such a closure would result in an unacceptably high impact to their business operations).

Cost-Effectiveness

Based on planning level estimate tools, this projected is estimated at \$4,167,000. This estimate includes the design and construction of a new pedestrian undercrossing of the existing railroad, new right-of-way, contingency, and engineering costs. No escalation factor is included. See Appendix A for further detail on the cost estimate for this alternative. The explicit cost-effectiveness of this alternative would need to be assessed in comparison to the severity of future issues warranting the consideration of funding this alternative.

Conclusion for Alternative 11 alternatives

Of the bicycle-pedestrian crossing alternatives discussed, Alternative 11c would be ranked highest based on likely cost and efficiency. Washington County staff note that the challenge of funding a stand-alone bicycle/pedestrian bridge could be significant and that it would be

more cost-effective to pursue a vehicular crossing with bicycle/pedestrian accommodations. County staff also noted the advantage of limiting the amount of railroad crossings.

Because Alternative 11c would necessitate the closure of the railroad tracks, it is uncertain whether Alternative 11c would be feasible based on potential impact to the railroad companies. Therefore, it is concluded that 11c be recommended as projects to be placed on the City's transportation CIP list for consideration to be constructed (when warranted based on future conditions and in consideration of the related issues discussed in this section). If the construction impacts associated with Alternative 11c were to be acceptable to the railroad companies at a future time when this project would be warranted, then Alternative 11c would be recommended. If Alternative 11c is not feasible (per impacts to the railroad companies) then Alternative 11a would be recommended.

The caveat to the above recommendation is that, as County staff noted, a "combined" vehicular/bicycle-pedestrian crossing would be more cost effective, and therefore Alternative 11a or Alternative 11c should only be considered for implementation if the City determines that the longer-term objective of constructing motor vehicle crossings of the railroad with bicycle/pedestrian accommodations will occur at an unacceptably late future time with respect to the need for bicycle/pedestrian accommodations across the railroad.

A detailed discussion of potential transportation funding sources for this alternative is provided in Section D of this memorandum.

C. Transportation System Improvement Alternatives – Policy

The following are new policies (non-physical transportation system improvement alternatives) recommended for adoption into the Transportation element of the City of Banks Comprehensive Plan.

Policy #1: Regular monitoring of safety conditions at OR 6/Aerts Road intersection

Safety conditions at the OR 6/ Aerts Road intersection should be monitored regularly and the potential installation of safety measures should be performed as warranted by future conditions (as the UGB expansion area on the east side of railroad is developed). This intersection has no current status as a location with documented safety issues and there are no existing geometric deficiencies or sight-distance issues. However, in addition to the previously noted fatality at this intersection, north-south users of Aerts Road have repeatedly reported unsafe conditions when trying to cross over OR 6 on Aerts Road or make left turns from southbound Aerts Road to eastbound OR 6. This perceived lack of safety is the result of motorists on Aerts Road trying to find “gaps” in OR 6 traffic, where cars are moving at a high rate of speed (posted speed on OR 6 at this location is 55 miles per hour). The perceived lack of safety at this intersection could worsen operations at the intersection; moreover, the perceived lack of safety could significantly inhibit circulation in the future – the added vehicles that will accompany growth into the expanded UGB area east of the existing city could avoid utilizing this intersection in a manner that would be efficient for the Banks area transportation system as a whole, opting instead for the access point to OR 6 at OR 47 (Main Street), thereby causing potential congestion issues at that location.

If future monitoring of this intersection reveals safety issues, then the following safety measures could be utilized to mitigate safety conditions: increased lighting; a roadside inventory to identify fixed objects in the clear zone, and; increased enforcement of speed limits and safe driving in the vicinity.

Policy #2: Change functional classification of Oak Way, Trellis Way, and Wilkes Street to City collector (existing)

Oak Way, Trellis Way, and Wilkes Street are all currently classified as City local streets. The functional classification for each of these streets should be upgraded to collector status to more accurately reflect the fact that these roads serve a collector road function; that is, they lead traffic from local roads within neighborhoods to activity areas in the Banks community and to the arterial road (Main Street/OR 47). The proposed functional classifications of roadways in the Banks area are shown on Figure 11.

Policy #3: Change functional classification of Aerts Road to collector (future)

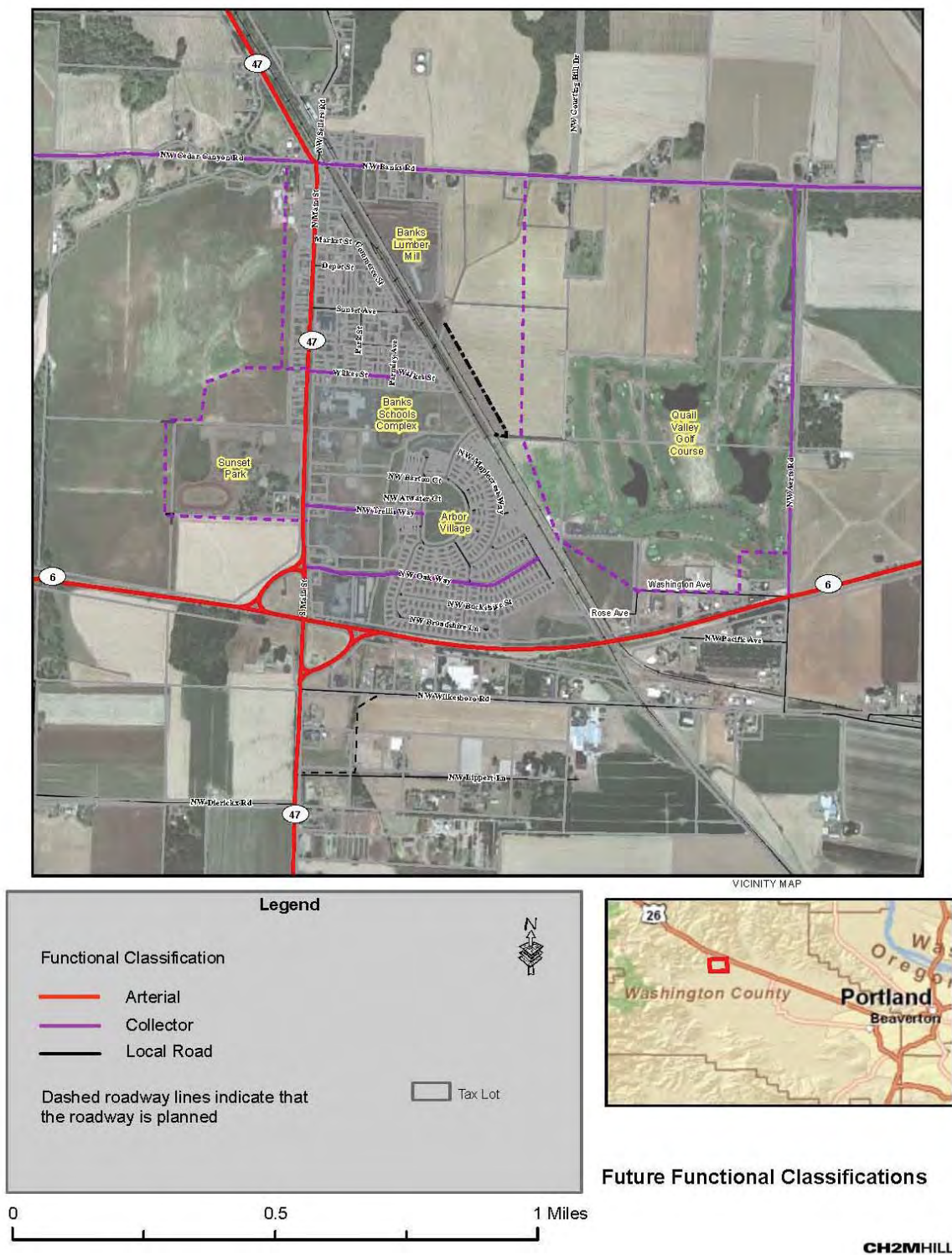
Aerts Road is currently classified as a County local street. The functional classification for this road, which would still be a County road, should be upgraded to collector status upon the future build-out of the UGB expansion areas on the east side of Banks, so as to more

accurately reflect the future role this road would serve – as a collector road; that is, it would directly leads traffic lead traffic from local roads within the new east side neighborhoods to the highway (OR 6). Washington County staff concurs with this policy recommendation. The proposed functional classifications of roadways in the Banks area are shown on Figure 11.

Policy #3: Provide land use/zoning setbacks to allow for future ODOT projects in Banks

Per ODOT staff, the City of Banks and Washington County should provide setbacks to enable ODOT to perform the following unplanned roadway improvements in the future:

- Widen OR 6 at the OR 47 interchange to provide longer deceleration lanes on OR 6.
- Add left-turn lanes on OR 47 and Banks Road at the OR47 / Banks Road intersection.



D. Funding Recommended Projects

As noted, per State law, the City of Banks is not required to have a financially constrained transportation capital improvements projects list. That said, this section presents the sources available to fund the projects on the recommended project list. A variety of local and state funding sources can be explored to help fund the recommendations outlined in this report.

Further research should be conducted to ensure the applicability of these funding sources for the projects recommended in this report.

State Administered Funding Sources

State Transportation Improvement Program (STIP)

The STIP is the primary programming document that identifies transportation priorities for federal and state funding in Oregon. The STIP provides a schedule and identifies funding for projects throughout the state. The STIP lists projects that are planned for construction during a four-year period. Projects that are included in the STIP are considered “regionally significant” and have been given a high priority through planning efforts and by the relevant area commissions on transportation (ACT). The STIP has five major programs: modernization, safety, preservation, bridge, and operations – and fifteen specific programs from which projects can receive funding. All federally funded transportation projects and programs, and all state and locally funded projects that are deemed “regionally significant” must be included in the STIP.

Transportation projects in the STIP are generally categorized into the five major programs referenced above, plus a sixth “other,” or “special projects” category. Recommended transportation capital improvement projects related to state facilities may fall within two categories: Operations Projects and Special Programs. The STIP states that the applicable uses under each of these projects are as follows:

- **Modernization:** Capital projects that lead to increased highway system capacity.
- **Operations:** System management and improvements that lead to more efficient and safer traffic operations and greater system reliability.
- **Special Programs:** Bicycle and Pedestrian, Congestion Mitigation and Air Quality Improvement, Federal Lands Highways, Fish Passage and Large Culvert Improvement, Immediate Opportunity Fund, Indian Reservation Roads, Public Transit, Railroad Crossing Safety, Scenic Byways, and Transportation Enhancement.

The funding programs under these three categories are described in more detail in the pages that follow.

Modernization

The 2010-2013 Draft STIP states that projects funded under this section are capital highway improvements that lead to increased system capacity. Increased capacity can be accomplished by either adding additional lanes, constructing new highways, or other system improvements. Strong competition exists for funding through the STIP

Modernization Program as the need for funding such projects greatly outweighs the funds available. Projects are awarded funding through this program by the applicable ODOT Region.

Operations

The 2010-2013 Draft STIP states that projects funded under this section “improve the efficiency of the transportation system through the replacement of aging infrastructure and the deployment of technology that allows the existing system to meet increased demands.” Applicable projects may be listed within four sub-categories: (1) Intelligent Transportation Systems (ITS); (2) Signs, Signals, and Illumination; (3) Slides and Rockfalls and; (4) Transportation Demand Management (TDM).

- **Signs, Signals and Illumination Program** – The Signs, Signals and Illumination program provides funding for the replacement of equipment that has reached the end of its useful life. This program also provides limited funding for new or upgraded signals at problem intersections.

Special Programs

ODOT also provides funding to a number of special programs. This section describes the programs that are applicable to recommended projects for the City of Banks.

- **ODOT Bicycle and Pedestrian Program** – The ODOT Pedestrian and Bicycle Grant Program provides funding to cities, counties and ODOT regional and district offices through a competitive process. Eligible projects are related to the design and construction of pedestrian and bicycle facilities within the public right-of-way. The application process occurs every two years with applications for the 2012-2013 cycle beginning in 2010 and applications for the 2014-15 cycle beginning in 2012. Every biennium, the program awards approximately \$5 million. A local match is expected for projects that receive this grant.

The bicycle and pedestrian recommendations located within the public right-of-way would be eligible for this program. A grant application could be submitted as early as 2010 for receipt of funds in the 2012-2013 funding cycle.

- **Transportation Enhancement Program** – Oregon’s Transportation Enhancement (TE) program provides federal highway funds for project that strengthen the cultural, aesthetic, or environmental value of our transportation system. TE activities are funded through a required state set aside from STP funds of 10%, or the amount set aside in FY 2005, whichever is greater. Projects fall into four main categories: Bicycle and Pedestrian; Historic Preservation; Landscaping and Scenic Beautification; and Environmental Mitigation. The intent of the program is to fund special or additional activities not normally required on a highway or transportation project.

Since the project’s inception in 1992, 190 projects of approximately \$97 million have been funded in Oregon through the TE program. For fiscal years 2008-2011 the Program will have \$6.5 million per year for competitive selection, and \$2 million per year for the TE Discretionary Account. Awards for the 2012-2013 bienniums were approved by the Oregon Transportation Commission in August 2009; applications for the 2014-2015 bienniums start in April 2010. The funds are provided through reimbursement, not grants. Participation requires matching funds from the project sponsor, at a minimum of 10.27 percent. All projects must have a direct relationship to surface transportation.

This is a competitive grant application process facilitated by ODOT that awards funding to local governments on an annual basis. The TE Advisory Committee awards the grants based on a project's technical merit and local support. The committee also considers the TE "focus areas" for the year and the connection to other transportation projects.

- **Immediate Opportunity Fund** – This fund provides funding for the construction and improvement of streets and roads that are crucial to support site-specific economic development projects. ODOT manages this fund on a case-by-case basis in cooperation with the Oregon Economic and Community Development Department.

The fund's use is discretionary, and it can only be used when other sources of financial support are unavailable or insufficient. Its use is also restricted to circumstances where an actual transportation problem exists and where funds are needed to identify or retain employers that provide primary industry employment in a community. A match of at least 50 percent of the total fund requested is expected from project's applicants.

- **Railroad Crossing Safety Program** – This program is administered through the Rail Division of ODOT. They allocate funding by prioritizing projects based on an accident prediction model. The Division also has limited funds for discretionary projects that improve safety at railroad-highway grade crossings.

Special Transportation Fund

The Special Transportation Fund (STF) was created by the Oregon Legislature in 1985. It is funded through a cigarette tax and ODOT Transportation Operating Funds. This state funding source provides support for special transportation services that benefit seniors and individuals with disabilities. Seventy-five percent of the funding is allocated to designated counties, transit districts and Indian tribal governments proportional to population. The remaining 25percent of the funds are distributed through a discretionary grant program called the Public Transportation Discretionary Grant Program.

STF funds can be used to create, maintain, or expand systems that serve seniors or individuals with disabilities, as well as plan and develop new services for those currently not served. ODOT's STF Guidebook provides a list of TSM and TDM examples of previous fund use (http://www.oregon.gov/ODOT/PT/PROGRAMS/stf_program.shtml).

Special City Allotment Grant

The Special City Allotment Grant was created by the Oregon Legislature. The legislature mandated that a \$1 million be set aside for cities with populations less than 5,000. Half of the funds for this grant come from the cities' share of the state gas tax and half of the funds come from ODOT's portion of the State Highway Fund. The maximum grant allocation is \$25,000. Half of the grant can be allocated to the city up front and the second half is provided when the project is completed.

County Funding Sources

Transportation Development Tax (TDT) program

The Transportation Development Tax (TDT) is a countywide tax applied to all new developments to help pay for the transportation infrastructure needed throughout the County to accommodate growth. Ultimately, the TDT is designed to generate enough revenue to construct approximately 28% of the growth-related transportation infrastructure called for in the county and cities' 20-year Transportation Plans. The TDT is not a property tax. New development is required to pay the tax when a building permit or occupancy permit is issued. The TDT tax rate is uniform throughout the County, and the amount of tax due is based on the estimated traffic generated by each development. TDT taxes are assessed and collected by the Washington County Current Planning Division in unincorporated Washington County, and by the cities within city limits. Remodeling, temporary uses, and state and federal government buildings are exempt from the TDT. All TDT revenue will be dedicated to funding transportation improvements designed to accommodate growth, such as:

- Improvements to Arterial and Collector roadways, including sidewalks and bike lanes;
- Transit capital projects (such as bus shelters).

Developers may be eligible to receive credits against their TDT tax for the value of certain developer-constructed improvements built as conditions of development approval. To be eligible for TDT credits, the improvements must be to an arterial or collector roadway or on the adopted Project List ([link to list/map](#)). There are a number of additional limitations on TDT credit eligibility, and developers are strongly advised to consult with appropriate city or county staff regarding credit eligibility prior to investing in an improvement.

It is important to convey that the TDT is not designed to generate revenues sufficient to pay for all improvements. The TDT is not intended as a resource for addressing existing needs or bringing existing streets up to standard. Existing safety problems (or the addition of highway shoulders, for example) may not be good candidates. The TDT can only be spent on projects that have been placed on the TDT project list; projects can be added to this by submitting a request through the Washington County Coordinating Committee (WCCC) to the WCCC Board, which makes the decision.

Major Streets Transportation Improvement Program (MSTIP)

The MSTIP is a tax that originated in 1986 as a short term levy put forth by Washington County to fund various construction projects throughout the area. As voters continued to approve various MSTIP levies over the years this temporary tax eventually became part of the permanent Washington County property tax rate.

Local Funding Sources

City Budget

Many of the state and federal grants identified in this funding section require a local match. This is the most appropriate use of city budget funding as it can leverage larger pools of money available for identified projects.

Exactions

With developer exactions, an improvement is paid for or built by the developer to City standards and then deeded to the City as a condition for development approval. Developer exactions and contributions can pay for portions of roads in, adjacent to, or through new developments. The City of Banks currently requires that all new subdivisions build sidewalks as a developer exaction.

Local Improvement District

Local Improvement Districts (LIDs) are created by property owners within a specified area to raise revenues for constructing street improvements within the same district. LIDs may be used to assess property owners for improvements that benefit properties. The LID can be a larger geographic area than the area with the actual street improvements but all landowners will need to understand advantage to entering into the LID. Property owners typically enter into LIDs because they see economic or personal advantages to the improvements.

Assessments are secured by property liens. The formation of LID districts is governed by state law and local jurisdictional development codes. LID revenues can be used solely for capital costs.

Urban Renewal Areas

Banks does not currently have any urban renewal areas. To establish an Urban Renewal Areas (URAs) the City of Banks would need to create an Urban Renewal Agency. Once this agency was formed, it could identify blighted areas within the city. In the selected area, tax-increment financing (TIF) could be used to generate urban renewal funds. TIF works by 'freezing' property values at the beginning of an urban renewal plan, and assessing a fee only on the incremental growth in property value observed since the beginning of the urban renewal district plan. The revenues generated within an urban renewal area are used to secure bonds to finance projects and programs within that area.

Local Option Levies

In most taxing districts, voters within an established taxing district, such as a city or a fire district, can approve levies for operating purposes or capital projects. A levy can either be established as a set rate or a set dollar amount. For capital projects, a levy cannot last longer than 10 years. Levies must be approved at a November election in an even numbered year or by more than 50 percent of eligible voters (double majority).

General Obligation Bonds

Bonding allows municipal and county governments to finance costs for construction projects by borrowing money and paying it back over time (with interest). Financing requires smaller regular payments over time compared to paying the full cost at once, but financing increases the total cost by adding interest. General Obligation Bonds are often

used to pay for construction of large capital improvements. This method is typically used to fund road improvements that will benefit an entire community. General Obligation Bonds add the cost of the improvement to property taxes over a period of time. Oregon State law states “A city may issue general obligation bonds to finance capital construction or capital improvements upon approval of the electors of the city.” (287A.050) Revenue for General Obligation Bonds is collected in property tax billings.

Revenue Bonds

Revenue bonds are paid back with dedicated revenue from a source other than property taxes. Revenues from a Systems Development Charge (Washington County’s TDT is a system development charge), Local Improvement District, or other reliable revenue streams can be used. The City of Banks has not used revenue bonds backed by Systems Development Charges, as this funding source is variable based on the amount of development. Revenue bonds are typically used to fund improvements that primarily benefit the people who provide the revenue through fees and assessments.

Appendixes

A. Planning-Level Cost Estimate Details

Appendix A: Planning-Level Cost Estimate Details

CH2M HILL**SUMMARY - ALTERNATIVE COST ESTIMATE SUMMARY**

PROJECT: Banks TSP Alternatives Analysis			DATE:	SHEET:
DESIGN LEVEL: Planning Level			8/25/2010	1 of 12
CONCEPT	IMPROVEMENT			COST
1	Realign Wilkesboro Road			\$ 853,700
2	Realign Washington Avenue			\$ 1,198,600
3A	Bridge Over Railroad, from south of Arbor Village to Rose Avenue			\$ 8,647,100
3B	Bridge Over Railroad, from Sunset Ave to East Banks Circulator Rd			\$ 6,984,000
4A	Banks Rd/Aerts Road Vertical Sight Dist. Improvements: Signing			\$ 14,000
4B	Banks Rd/Aerts Road Vertical Sight Dist. Improvements: Signing w/Flashing Yellow L			\$ 83,700
4C	Banks Rd/Aerts Road Vertical Sight Dist.:Signal w/Additional Intersection Improvemen			\$ 1,066,400
4D	Banks Rd/Aerts Road Vertical Sight Dist. Improvements: Re-construct vertical curve			\$ 3,856,500
5	Banks Road, Modernization between OR47 and US 26			\$ 4,377,400
6	Main St & Oak Way: SB Left Turn Pocket lengthening			\$ 8,800
7	Main St & Oak Way: EB Left Turn Pocket lengthening			\$ 9,100
8	West Banks: New North-South Road			\$ 12,673,100
9	Wilkes Street Extension			\$ 464,000
10	East Banks: New North-South Circulator Road			\$ 4,441,400
11A	Bike/Ped Bridge Over Railroad, east end of Banks Schools Complex			\$ 5,690,800
11B	Bike/Ped Bridge Over RR and East Banks Circulator Rd, east end of Schools Comple			\$ 4,638,100
11C	Bike/Ped Box Culvert Railroad Undercrossing, east end of Banks Schools Complex			\$ 4,167,000
12	Pedestrian Crossing (Striping & Adv Signing) at N & E Legs at Main St & Trellis Way			\$ 6,400

— Items Included In This Estimate:

Inlay of Existing Pavement
 New Asphalt Concrete and Aggregate Base for Widening
 Excavation / Embankment
 Concrete Curbs and Sidewalks
 Pavement Markings
 Storm Sewer RCP, Catch Basins, and Manholes
 Illumination
 Traffic Signal
 Retaining Walls
 Bridges - Pedestrian and Vehicle
 Streetscape (Planter strip) - City Collector Section
 Traffic Control and Mobilization
 Erosion Control
 Signing and Striping
 ROW

Concept 1 Realign Wilkesboro Road

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 2 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 0.27		DATE 8/25/2010	
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing				NAME A. Kutansky	
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.00	\$1,298,000	\$0
2	New Roadway with Storm	Lane-Mi.	0.00	\$342,872	\$0
3	New Rural Roadway	Lane-Mi.	0.67	\$338,903	\$227,065
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.03	\$152,846	\$4,585
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$10,000	\$10,000
12	Illumination	Mi.	0.00	\$260,000	\$0
13	Landscaping - Streetscape	Mi.	0.00	\$434,000	\$0
14	Bridges	SF	0.00	\$200	\$0
15	Walls	SF	0.00	\$115	\$0
SUBTOTAL					\$241,650

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$5,000
	TP & DT	3.0-8.0%	5.5%		\$13,000
	Mobilization	8.0-10.0%	9.0%		\$22,000
	Erosion Control	0.5-2.0%	1.3%		\$3,000
	Contingency	40.0%	40.0%		\$97,000
	Escalation (per year) -current year	0.5-2.0%	2.0%		\$0
TOTAL CONSTRUCTION COST					\$381,650
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	48,000	\$8.00	\$384,000
	Design Engineering	13.0%	13%		\$50,000
	Construction Engineering	10.0%	10%		\$38,000
TOTAL PROJECT COST					\$853,650

Concept 1 Assumptions:

Pavement Section:

2" Inlay Overlay for Existing 100 ft prior to leaving Wilkesboro Rd
6" Asphalt Over 10" Aggregate Base for New Roadway

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint
R/W Areas Based on 60' required ROW on proposed major and minor collectors

Cross Section: (County Minor Collector)

Travel Lanes 2 @ 12 ft
Shoulders 2 @ 4 ft

Concept 2 Realign Washington Avenue

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE		SHEET	
DESIGN LEVEL: Planning Level		Andy Kutansky / 503.736.4335		3 of 12	
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing		LENGTH (MI.):	DATE	NAME	
		0.17	8/25/2010	A. Kutansky	
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.34	\$1,298,000	\$441,320
2	New Roadway with Storm	Lane-Mi.	0.17	\$342,872	\$58,288
3	New Rural Roadway	Lane-Mi.	0.00	\$338,903	\$0
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	0.00	\$10,000	\$0
12	Illumination	Mi.	0.17	\$260,000	\$44,200
13	Landscaping - Streetscape	Mi.	0.17	\$434,000	\$73,780
14	Bridges	SF	0.00	\$200	\$0
15	Walls	SF	0.00	\$115	\$0
SUBTOTAL					\$617,588

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$12,000
	TP & DT	3.0-8.0%	5.5%		\$34,000
	Mobilization	8.0-10.0%	9.0%		\$56,000
	Erosion Control	0.5-2.0%	1.3%		\$8,000
	Contingency	40.0%	40.0%		\$247,000
	Escalation (per year) -current year	0.5-2.0%	2.0%		\$0
	TOTAL CONSTRUCTION COST				\$974,588
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	0	\$8.00	\$0
	Design Engineering	13.0%	13%		\$127,000
	Construction Engineering	10.0%	10%		\$97,000
TOTAL PROJECT COST					\$1,198,588

Concept 2 Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 64' required ROW for City of Banks Collector Road

Cross Section: (City of Banks Collector)

Travel Lanes 2 @ 12.5 ft

Shoulders 2 @ 6 ft

S/W, Curb & Gutter, Streetscapes, Illumination

Concept 3A Bridge Over Railroad, from south of Arbor Village to Rose Avenue

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE		SHEET	
DESIGN LEVEL: Planning Level		Andy Kutansky / 503.736.4335		4 of 12	
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing		LENGTH (MI.):	DATE	NAME	
		0.20	8/25/2010	A. Kutansky	
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.32	\$1,298,000	\$415,360
2	New Roadway with Storm	Lane-Mi.	0.52	\$342,872	\$178,293
3	New Rural Roadway	Lane-Mi.	0.00	\$338,903	\$0
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$10,000	\$10,000
12	Illumination	Mi.	0.20	\$260,000	\$52,000
13	Landscaping - Streetscape	Mi.	0.17	\$434,000	\$73,780
14	Bridges	SF	6,800.00	\$200	\$1,360,000
15	Walls	SF	19,550.00	\$115	\$2,248,250
SUBTOTAL					\$4,337,683

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$87,000
	TP & DT	3.0-8.0%	5.5%		\$239,000
	Mobilization	8.0-10.0%	9.0%		\$390,000
	Erosion Control	0.5-2.0%	1.3%		\$54,000
	Contingency	40.0%	40.0%		\$1,735,000
	Escalation (per year)	0.5-2.0%	2.0%		
	-current year		2010		\$0
TOTAL CONSTRUCTION COST					\$6,842,683
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	28,800	\$8.00	\$230,400
	Design Engineering	13.0%	0		\$890,000
	Construction Engineering	10.0%	0		\$684,000
TOTAL PROJECT COST					\$8,647,083

Concept 3a Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 64' required ROW for City of Banks Collector Road

Cross Section: (City of Banks Collector)

Travel Lanes 2 @ 12.5 ft

Shoulders 2 @ 6 ft

S/W, Curb & Gutter, Streetscapes, Illumination

Concept 3B Bridge Over Railroad, from Sunset Ave to East Banks Circulator Rd

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 5 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 0.12		DATE 10/18/2010	NAME A. Kutansky
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing					
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.19	\$1,298,000	\$246,620
2	New Roadway with Storm	Lane-Mi.	0.31	\$342,872	\$106,290
3	New Rural Roadway	Lane-Mi.	0.15	\$338,903	\$50,835
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$10,000	\$10,000
12	Illumination	Mi.	0.12	\$260,000	\$31,200
13	Landscaping - Streetscape	Mi.	0.09	\$434,000	\$39,060
14	Bridges	SF	7,250.00	\$200	\$1,450,000
15	Walls	SF	14,360.00	\$115	\$1,651,400
SUBTOTAL					\$3,585,406

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$72,000
	TP & DT	3.0-8.0%	5.5%		\$197,000
	Mobilization	8.0-10.0%	9.0%		\$323,000
	Erosion Control	0.5-2.0%	1.3%		\$45,000
	Contingency	40.0%	40.0%		\$1,434,000
	Escalation (per year)	0.5-2.0%	2.0%		
	-current year		2010		\$0
TOTAL CONSTRUCTION COST					\$5,656,406
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	15,680	\$8	\$125,440
	Design Engineering	13.0%	0	\$0	\$735,000
	Construction Engineering	10.0%	0		\$566,000
TOTAL PROJECT COST					\$7,082,846

Concept 3B Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 64' required ROW for City of Banks Collector Road

Cross Section: (City of Banks Collector)

Travel Lanes 2 @ 12.5 ft

Shoulders 2 @ 6 ft

S/W, Curb & Gutter, Streetscapes, Illumination

Concept 4C Banks Rd/Aerts Road Vertical Sight Dist.:Signal w/Additional Intersection Improvements

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE		SHEET	
DESIGN LEVEL: Planning Level		Andy Kutansky / 503.736.4335		6 of 12	
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing		LENGTH (MI.):	DATE	NAME	
		0.13	8/25/2010	A. Kutansky	
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.00	\$1,298,000	\$0
2	New Roadway with Storm	Lane-Mi.	0.00	\$342,872	\$0
3	New Rural Roadway	Lane-Mi.	0.41	\$338,903	\$138,950
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.23	\$361,645	\$83,178
6	Restriping Existing Roadway	Lane-Mi.	0.19	\$29,040	\$5,518
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	1.00	\$250,000	\$250,000
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$10,000	\$10,000
12	Illumination	Mi.	0.06	\$260,000	\$15,600
13	Landscaping - Streetscape	Mi.	0.00	\$434,000	\$0
14	Bridges	SF	0.00	\$200	\$0
15	Walls	SF	0.00	\$115	\$0
SUBTOTAL					\$503,246

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$10,000
	TP & DT	1.0-2.5%	5.5%		\$28,000
	Mobilization	1.0-2.5%	9.0%		\$45,000
	Erosion Control	1.0-2.5%	1.3%		\$6,000
	Contingency	1.0-2.5%	40.0%		\$201,000
	Escalation (per year)	0.5-2.0%	2.0%		
	-current year		2010		\$0
TOTAL CONSTRUCTION COST					\$793,246
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	11,400	\$8	\$91,200
	Design Engineering	13.0%	0	\$0	\$103,000
	Construction Engineering	10.0%	0		\$79,000
TOTAL PROJECT COST					\$1,066,446

Concept 4C Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway
reconstruct current roadway 300 ft in all directions with same section but no drainage needed

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint
R/W Areas Based on 60' required ROW for Washco Major Collector Road

Cross Section: (County Major Collector)

Travel Lanes 2 @ 12 ft
Shoulders 2 @ 6 ft

Concept 4D Banks Rd/Aerts Road Vertical Sight Dist. Improvements: Re-construct vertical curve

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 7 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 0.64		DATE 8/25/2010	NAME A. Kutansky
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing		UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.00	\$1,298,000	\$0
2	New Roadway with Storm	Lane-Mi.	0.00	\$342,872	\$0
3	New Rural Roadway	Lane-Mi.	2.66	\$338,903	\$901,481
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$10,000	\$10,000
12	Illumination	Mi.	0.00	\$260,000	\$0
13	Landscaping - Streetscape	Mi.	0.00	\$434,000	\$0
14	Bridges	SF	0.00	\$200	\$0
15	Walls	SF	5,000.00	\$115	\$575,000
SUBTOTAL					\$1,486,481

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$30,000
	TP & DT	1.0-2.5%	8.0%		\$119,000
	Mobilization	1.0-2.5%	9.0%		\$134,000
	Erosion Control	1.0-2.5%	2.0%		\$30,000
	Contingency	1.0-2.5%	40.0%		\$595,000
	Escalation (per year)	0.5-2.0%	2.0%		
	-current year		2010		\$0
TOTAL CONSTRUCTION COST					\$2,394,481
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	114,000	\$8	\$912,000
	Design Engineering	13.0%	0	\$0	\$311,000
	Construction Engineering	10.0%	0		\$239,000
TOTAL PROJECT COST					\$3,856,481

Concept 4D Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway, 36' pvmt width
reconstruct current roadway 3800 ft

Right-Of-Way:

Need 15 ft additional on both side for cut/fill slopes
Walls assumed in front of golf course

Cross Section: (County Major Collector)

Travel Lanes 2 @ 12 ft
Shoulders 2 @ 6 ft

Concept 5 Banks Road, Modernization between OR47 and US 26

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE		SHEET	
DESIGN LEVEL: Planning Level		Andy Kutansky / 503.736.4335		8 of 12	
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing		LENGTH (MI.):	DATE	NAME	
		1.70	8/25/2010	A. Kutansky	
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.00	\$1,298,000	\$0
2	New Roadway with Storm	Lane-Mi.	0.00	\$342,872	\$0
3	New Rural Roadway	Lane-Mi.	2.27	\$338,903	\$769,309
4	Inlay/Overlay Extg Roadway	Lane-Mi.	2.83	\$152,846	\$432,555
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$30,000	\$30,000
12	Illumination	Mi.	0.00	\$260,000	\$0
13	Landscaping - Streetscape	Mi.	0.00	\$434,000	\$0
14	Bridges	SF	0.00	\$200	\$0
15	Walls	SF	8,970.00	\$115	\$1,031,550
SUBTOTAL					\$2,263,414

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$45,000
	TP & DT	1.0-2.5%	5.0%		\$113,000
	Mobilization	1.0-2.5%	9.0%		\$204,000
	Erosion Control	1.0-2.5%	1.3%		\$28,000
	Contingency	1.0-2.5%	40.0%		\$905,000
	Escalation (per year)	0.5-2.0%	2.0%		
	-current year		2010		\$0
TOTAL CONSTRUCTION COST					\$3,558,414
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	0	\$8	\$0
	Design Engineering	13.0%	0	\$0	\$463,000
	Construction Engineering	10.0%	0		\$356,000
TOTAL PROJECT COST					\$4,377,414

Concept 5 Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway, 36' pvmt width

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 60' extg ROW for Washco Major Collector Road

Cross Section: (County Major Collector)

Travel Lanes 2 @ 12 ft

Shoulders 2 @ 6 ft

Concept 8 West Banks: New North-South Road

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 9 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 1.12		DATE 8/25/2010	NAME A. Kutansky
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing					
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	2.24	\$1,298,000	\$2,907,520
2	New Roadway with Storm	Lane-Mi.	3.72	\$342,872	\$1,275,483
3	New Rural Roadway	Lane-Mi.	0.00	\$338,903	\$0
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$200,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$30,000	\$30,000
12	Illumination	Mi.	1.12	\$260,000	\$291,200
13	Landscaping - Streetscape	Mi.	1.12	\$434,000	\$486,080
14	Bridges	SF	0.00	\$200	\$0
15	Walls	SF	0.00	\$115	\$0
SUBTOTAL					\$4,990,283

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$100,000
	TP & DT	1.0-2.5%	5.0%		\$250,000
	Mobilization	1.0-2.5%	9.0%		\$449,000
	Erosion Control	1.0-2.5%	1.3%		\$62,000
	Contingency	1.0-2.5%	40.0%		\$1,996,000
	Escalation (per year) -current year	0.5-2.0%	2.0%		\$0
			2010		
TOTAL CONSTRUCTION COST					\$7,847,283
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	377,600	\$8	\$3,020,800
	Design Engineering	13.0%	0	\$0	\$1,020,000
	Construction Engineering	10.0%	0		\$785,000
TOTAL PROJECT COST					\$12,673,083

Concept 8 Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway, 40' pvmt width

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 64' required ROW for City of Banks Collector Road

Cross Section: (County Minor Collector)

Travel Lanes 2 @ 12.5 ft

Shoulders 2 @ 6 ft

S/W, Curb & Gutter, Streetscapes, Illumination

Concept 10 East Banks: New North-South Circulator Road

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 10 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 0.98		DATE 8/25/2010	
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing				NAME A. Kutansky	
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.00	\$1,298,000	\$0
2	New Roadway with Storm	Lane-Mi.	0.00	\$342,872	\$0
3	New Rural Roadway	Lane-Mi.	2.94	\$338,903	\$996,374
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$15,000	\$15,000
12	Illumination	Mi.	0.00	\$260,000	\$0
13	Landscaping - Streetscape	Mi.	0.00	\$434,000	\$0
14	Bridges	SF	0.00	\$200	\$0
15	Walls	SF	0.00	\$115	\$0
SUBTOTAL					\$1,011,374

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$20,000
	TP & DT	1.0-2.5%	5.0%		\$51,000
	Mobilization	1.0-2.5%	9.0%		\$91,000
	Erosion Control	1.0-2.5%	1.3%		\$13,000
	Contingency	1.0-2.5%	40.0%		\$405,000
	Escalation (per year)	0.5-2.0%	2.0%		
	-current year		2010		\$0
TOTAL CONSTRUCTION COST					\$1,591,374
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	310,500	\$8	\$2,484,000
	Design Engineering	13.0%	0	\$0	\$207,000
	Construction Engineering	10.0%	0		\$159,000
TOTAL PROJECT COST					\$4,441,374

Concept 10 Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway, 36' width

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 60' required ROW for WashCo Major Collector

Cross Section: (County Major Collector)

Travel Lanes 2 @ 12 ft

Shoulders 2 @ 6 ft

Concept 11A Bike/Ped Bridge Over Railroad, east end of Banks Schools Complex

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 11 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 0.13		DATE 8/25/2010	NAME A. Kutansky
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing					
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.22	\$1,298,000	\$285,560
2	New Roadway with Storm	Lane-Mi.	0.00	\$342,872	\$0
3	New Rural Roadway	Lane-Mi.	0.00	\$338,903	\$0
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$5,000	\$5,000
12	Illumination	Mi.	0.11	\$260,000	\$28,600
13	Landscaping - Streetscape	Mi.	0.11	\$434,000	\$47,740
14	Bridges	SF	1,560.00	\$200	\$312,000
15	Walls	SF	19,550.00	\$115	\$2,248,250
SUBTOTAL					\$2,927,150

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$59,000
	TP & DT	1.0-2.5%	5.0%		\$146,000
	Mobilization	1.0-2.5%	9.0%		\$263,000
	Erosion Control	1.0-2.5%	1.3%		\$37,000
	Contingency	1.0-2.5%	40.0%		\$1,171,000
	Escalation (per year) -current year	0.5-2.0%	2.0%		\$0
	TOTAL CONSTRUCTION COST				\$4,603,150
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	3,700	\$8	\$29,600
	Design Engineering	13.0%	0	\$0	\$598,000
	Construction Engineering	10.0%	0		\$460,000
TOTAL PROJECT COST					\$5,690,750

Concept 11a Assumptions:

Pavement Section:

12" Conc. Over 10" Aggregate Base for New Roadway, 10' width

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 13' required ROW for ped path and walls

Cross Section:

Travel Lanes 1 @ 10 ft
Illumination, Streetscape, and Drainage

Concept 11B Bike/Ped Bridge Over RR and East Banks Circulator Rd, east end of Schools Complex

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 12 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 0.12		DATE 8/25/2010	NAME A. Kutansky
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing		UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.18	\$1,298,000	\$233,640
2	New Roadway with Storm	Lane-Mi.	0.00	\$342,872	\$0
3	New Rural Roadway	Lane-Mi.	0.00	\$338,903	\$0
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$5,000	\$5,000
12	Illumination	Mi.	0.12	\$260,000	\$31,200
13	Landscaping - Streetscape	Mi.	0.12	\$434,000	\$52,080
14	Bridges	SF	2,340.00	\$200	\$468,000
15	Walls	SF	13,850.00	\$115	\$1,592,750
SUBTOTAL					\$2,382,670

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$48,000
	TP & DT	1.0-2.5%	5.0%		\$119,000
	Mobilization	1.0-2.5%	9.0%		\$214,000
	Erosion Control	1.0-2.5%	1.3%		\$30,000
	Contingency	1.0-2.5%	40.0%		\$953,000
	Escalation (per year) -current year	0.5-2.0%	2.0%		\$0
	TOTAL CONSTRUCTION COST				\$3,746,670
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	3,675	\$8	\$29,400
	Design Engineering	13.0%	0	\$0	\$487,000
	Construction Engineering	10.0%	0		\$375,000
TOTAL PROJECT COST					\$4,638,070

Concept 11B Assumptions:

Pavement Section:

12" Conc. Over 10" Aggregate Base for New Roadway, 10' width

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 13' required ROW

Cross Section:

Travel Lanes 1 @ 10 ft
Illumination, Streetscape, and Drainage

APPENDIX D

PLANNING-LEVEL COST ESTIMATES

CH2M HILL**SUMMARY - ALTERNATIVE COST ESTIMATE SUMMARY**

PROJECT: Banks TSP Alternatives Analysis			DATE:	SHEET:
DESIGN LEVEL: Planning Level			8/25/2010	1 of 12
CONCEPT	IMPROVEMENT			COST
1	Realign Wilkesboro Road			\$ 853,700
2	Realign Washington Avenue			\$ 1,198,600
3A	Bridge Over Railroad, from south of Arbor Village to Rose Avenue			\$ 8,647,100
3B	Bridge Over Railroad, from Sunset Ave to East Banks Circulator Rd			\$ 6,984,000
4A	Banks Rd/Aerts Road Vertical Sight Dist. Improvements: Signing			\$ 14,000
4B	Banks Rd/Aerts Road Vertical Sight Dist. Improvements: Signing w/Flashing Yellow L			\$ 83,700
4C	Banks Rd/Aerts Road Vertical Sight Dist.:Signal w/Additional Intersection Improvemen			\$ 1,066,400
4D	Banks Rd/Aerts Road Vertical Sight Dist. Improvements: Re-construct vertical curve			\$ 3,856,500
5	Banks Road, Modernization between OR47 and US 26			\$ 4,377,400
6	Main St & Oak Way: SB Left Turn Pocket lengthening			\$ 8,800
7	Main St & Oak Way: EB Left Turn Pocket lengthening			\$ 9,100
8	West Banks: New North-South Road			\$ 12,673,100
9	Wilkes Street Extension			\$ 464,000
10	East Banks: New North-South Circulator Road			\$ 4,441,400
11A	Bike/Ped Bridge Over Railroad, east end of Banks Schools Complex			\$ 5,690,800
11B	Bike/Ped Bridge Over RR and East Banks Circulator Rd, east end of Schools Comple			\$ 4,638,100
11C	Bike/Ped Box Culvert Railroad Undercrossing, east end of Banks Schools Complex			\$ 4,167,000
12	Pedestrian Crossing (Striping & Adv Signing) at N & E Legs at Main St & Trellis Way			\$ 6,400

— Items Included In This Estimate:

Inlay of Existing Pavement
New Asphalt Concrete and Aggregate Base for Widening
Excavation / Embankment
Concrete Curbs and Sidewalks
Pavement Markings
Storm Sewer RCP, Catch Basins, and Manholes
Illumination
Traffic Signal
Retaining Walls
Bridges - Pedestrian and Vehicle
Streetscape (Planter strip) - City Collector Section
Traffic Control and Mobilization
Erosion Control
Signing and Striping
ROW

Concept 1 Realign Wilkesboro Road

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 2 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 0.27		DATE 8/25/2010	NAME A. Kutansky
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing		UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.00	\$1,298,000	\$0
2	New Roadway with Storm	Lane-Mi.	0.00	\$342,872	\$0
3	New Rural Roadway	Lane-Mi.	0.67	\$338,903	\$227,065
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.03	\$152,846	\$4,585
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$10,000	\$10,000
12	Illumination	Mi.	0.00	\$260,000	\$0
13	Landscaping - Streetscape	Mi.	0.00	\$434,000	\$0
14	Bridges	SF	0.00	\$200	\$0
15	Walls	SF	0.00	\$115	\$0
SUBTOTAL					\$241,650

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$5,000
	TP & DT	3.0-8.0%	5.5%		\$13,000
	Mobilization	8.0-10.0%	9.0%		\$22,000
	Erosion Control	0.5-2.0%	1.3%		\$3,000
	Contingency	40.0%	40.0%		\$97,000
	Escalation (per year) -current year	0.5-2.0%	2.0%	2010	\$0
TOTAL CONSTRUCTION COST					\$381,650
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	48,000	\$8.00	\$384,000
	Design Engineering	13.0%	13%		\$50,000
	Construction Engineering	10.0%	10%		\$38,000
TOTAL PROJECT COST					\$853,650

Concept 1 Assumptions:

Pavement Section:

2" Inlay Overlay for Existing 100 ft prior to leaving Wilkesboro Rd
6" Asphalt Over 10" Aggregate Base for New Roadway

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint
R/W Areas Based on 60' required ROW on proposed major and minor collectors

Cross Section: (County Minor Collector)

Travel Lanes 2 @ 12 ft
Shoulders 2 @ 4 ft

Concept 2 Realign Washington Avenue

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE		SHEET	
DESIGN LEVEL: Planning Level		Andy Kutansky / 503.736.4335		3 of 12	
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing		LENGTH (MI.):	DATE	NAME	
		0.17	8/25/2010	A. Kutansky	
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.34	\$1,298,000	\$441,320
2	New Roadway with Storm	Lane-Mi.	0.17	\$342,872	\$58,288
3	New Rural Roadway	Lane-Mi.	0.00	\$338,903	\$0
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	0.00	\$10,000	\$0
12	Illumination	Mi.	0.17	\$260,000	\$44,200
13	Landscaping - Streetscape	Mi.	0.17	\$434,000	\$73,780
14	Bridges	SF	0.00	\$200	\$0
15	Walls	SF	0.00	\$115	\$0
SUBTOTAL					\$617,588

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$12,000
	TP & DT	3.0-8.0%	5.5%		\$34,000
	Mobilization	8.0-10.0%	9.0%		\$56,000
	Erosion Control	0.5-2.0%	1.3%		\$8,000
	Contingency	40.0%	40.0%		\$247,000
	Escalation (per year) -current year	0.5-2.0%	2.0%		\$0
	TOTAL CONSTRUCTION COST				\$974,588
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	0	\$8.00	\$0
	Design Engineering	13.0%	13%		\$127,000
	Construction Engineering	10.0%	10%		\$97,000
TOTAL PROJECT COST					\$1,198,588

Concept 2 Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 64' required ROW for City of Banks Collector Road

Cross Section: (City of Banks Collector)

Travel Lanes 2 @ 12.5 ft

Shoulders 2 @ 6 ft

S/W, Curb & Gutter, Streetscapes, Illumination

Concept 3A Bridge Over Railroad, from south of Arbor Village to Rose Avenue

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE		SHEET	
DESIGN LEVEL: Planning Level		Andy Kutansky / 503.736.4335		4 of 12	
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing		LENGTH (MI.):	DATE	NAME	
		0.20	8/25/2010	A. Kutansky	
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.32	\$1,298,000	\$415,360
2	New Roadway with Storm	Lane-Mi.	0.52	\$342,872	\$178,293
3	New Rural Roadway	Lane-Mi.	0.00	\$338,903	\$0
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$10,000	\$10,000
12	Illumination	Mi.	0.20	\$260,000	\$52,000
13	Landscaping - Streetscape	Mi.	0.17	\$434,000	\$73,780
14	Bridges	SF	6,800.00	\$200	\$1,360,000
15	Walls	SF	19,550.00	\$115	\$2,248,250
SUBTOTAL					\$4,337,683

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$87,000
	TP & DT	3.0-8.0%	5.5%		\$239,000
	Mobilization	8.0-10.0%	9.0%		\$390,000
	Erosion Control	0.5-2.0%	1.3%		\$54,000
	Contingency	40.0%	40.0%		\$1,735,000
	Escalation (per year)	0.5-2.0%	2.0%		
	-current year		2010		\$0
TOTAL CONSTRUCTION COST					\$6,842,683
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	28,800	\$8.00	\$230,400
	Design Engineering	13.0%	0		\$890,000
	Construction Engineering	10.0%	0		\$684,000
TOTAL PROJECT COST					\$8,647,083

Concept 3a Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 64' required ROW for City of Banks Collector Road

Cross Section: (City of Banks Collector)

Travel Lanes 2 @ 12.5 ft

Shoulders 2 @ 6 ft

S/W, Curb & Gutter, Streetscapes, Illumination

Concept 3B Bridge Over Railroad, from Sunset Ave to East Banks Circulator Rd

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 5 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 0.12		DATE 10/18/2010	NAME A. Kutansky
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing					
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.19	\$1,298,000	\$246,620
2	New Roadway with Storm	Lane-Mi.	0.31	\$342,872	\$106,290
3	New Rural Roadway	Lane-Mi.	0.15	\$338,903	\$50,835
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$10,000	\$10,000
12	Illumination	Mi.	0.12	\$260,000	\$31,200
13	Landscaping - Streetscape	Mi.	0.09	\$434,000	\$39,060
14	Bridges	SF	7,250.00	\$200	\$1,450,000
15	Walls	SF	14,360.00	\$115	\$1,651,400
SUBTOTAL					\$3,585,406

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$72,000
	TP & DT	3.0-8.0%	5.5%		\$197,000
	Mobilization	8.0-10.0%	9.0%		\$323,000
	Erosion Control	0.5-2.0%	1.3%		\$45,000
	Contingency	40.0%	40.0%		\$1,434,000
	Escalation (per year)	0.5-2.0%	2.0%		
	-current year		2010		\$0
TOTAL CONSTRUCTION COST					\$5,656,406
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	15,680	\$8	\$125,440
	Design Engineering	13.0%	0	\$0	\$735,000
	Construction Engineering	10.0%	0		\$566,000
TOTAL PROJECT COST					\$7,082,846

Concept 3B Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 64' required ROW for City of Banks Collector Road

Cross Section: (City of Banks Collector)

Travel Lanes 2 @ 12.5 ft

Shoulders 2 @ 6 ft

S/W, Curb & Gutter, Streetscapes, Illumination

Concept 4C Banks Rd/Aerts Road Vertical Sight Dist.:Signal w/Additional Intersection Improvements

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 6 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 0.13		DATE 8/25/2010	NAME A. Kutansky
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing		UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.00	\$1,298,000	\$0
2	New Roadway with Storm	Lane-Mi.	0.00	\$342,872	\$0
3	New Rural Roadway	Lane-Mi.	0.41	\$338,903	\$138,950
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.23	\$361,645	\$83,178
6	Restriping Existing Roadway	Lane-Mi.	0.19	\$29,040	\$5,518
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	1.00	\$250,000	\$250,000
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$10,000	\$10,000
12	Illumination	Mi.	0.06	\$260,000	\$15,600
13	Landscaping - Streetscape	Mi.	0.00	\$434,000	\$0
14	Bridges	SF	0.00	\$200	\$0
15	Walls	SF	0.00	\$115	\$0
SUBTOTAL					\$503,246

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$10,000
	TP & DT	1.0-2.5%	5.5%		\$28,000
	Mobilization	1.0-2.5%	9.0%		\$45,000
	Erosion Control	1.0-2.5%	1.3%		\$6,000
	Contingency	1.0-2.5%	40.0%		\$201,000
	Escalation (per year)	0.5-2.0%	2.0%		
	-current year		2010		\$0
TOTAL CONSTRUCTION COST					\$793,246
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	11,400	\$8	\$91,200
	Design Engineering	13.0%	0	\$0	\$103,000
	Construction Engineering	10.0%	0		\$79,000
TOTAL PROJECT COST					\$1,066,446

Concept 4C Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway
reconstruct current roadway 300 ft in all directions with same section but no drainage needed

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint
R/W Areas Based on 60' required ROW for Washco Major Collector Road

Cross Section: (County Major Collector)

Travel Lanes 2 @ 12 ft
Shoulders 2 @ 6 ft

Concept 4D Banks Rd/Aerts Road Vertical Sight Dist. Improvements: Re-construct vertical curve

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 7 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 0.64		DATE 8/25/2010	NAME A. Kutansky
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing		UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.00	\$1,298,000	\$0
2	New Roadway with Storm	Lane-Mi.	0.00	\$342,872	\$0
3	New Rural Roadway	Lane-Mi.	2.66	\$338,903	\$901,481
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$10,000	\$10,000
12	Illumination	Mi.	0.00	\$260,000	\$0
13	Landscaping - Streetscape	Mi.	0.00	\$434,000	\$0
14	Bridges	SF	0.00	\$200	\$0
15	Walls	SF	5,000.00	\$115	\$575,000
SUBTOTAL					\$1,486,481

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$30,000
	TP & DT	1.0-2.5%	8.0%		\$119,000
	Mobilization	1.0-2.5%	9.0%		\$134,000
	Erosion Control	1.0-2.5%	2.0%		\$30,000
	Contingency	1.0-2.5%	40.0%		\$595,000
	Escalation (per year)	0.5-2.0%	2.0%		
	-current year		2010		\$0
TOTAL CONSTRUCTION COST					\$2,394,481
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	114,000	\$8	\$912,000
	Design Engineering	13.0%	0	\$0	\$311,000
	Construction Engineering	10.0%	0		\$239,000
TOTAL PROJECT COST					\$3,856,481

Concept 4D Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway, 36' pvmt width
reconstruct current roadway 3800 ft

Right-Of-Way:

Need 15 ft additional on both side for cut/fill slopes
Walls assumed in front of golf course

Cross Section: (County Major Collector)

Travel Lanes 2 @ 12 ft
Shoulders 2 @ 6 ft

Concept 5 Banks Road, Modernization between OR47 and US 26

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 8 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 1.70		DATE 8/25/2010	NAME A. Kutansky
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing					
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.00	\$1,298,000	\$0
2	New Roadway with Storm	Lane-Mi.	0.00	\$342,872	\$0
3	New Rural Roadway	Lane-Mi.	2.27	\$338,903	\$769,309
4	Inlay/Overlay Extg Roadway	Lane-Mi.	2.83	\$152,846	\$432,555
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$30,000	\$30,000
12	Illumination	Mi.	0.00	\$260,000	\$0
13	Landscaping - Streetscape	Mi.	0.00	\$434,000	\$0
14	Bridges	SF	0.00	\$200	\$0
15	Walls	SF	8,970.00	\$115	\$1,031,550
SUBTOTAL					\$2,263,414

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$45,000
	TP & DT	1.0-2.5%	5.0%		\$113,000
	Mobilization	1.0-2.5%	9.0%		\$204,000
	Erosion Control	1.0-2.5%	1.3%		\$28,000
	Contingency	1.0-2.5%	40.0%		\$905,000
	Escalation (per year) -current year	0.5-2.0%	2.0%		\$0
	TOTAL CONSTRUCTION COST				\$3,558,414
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	0	\$8	\$0
	Design Engineering	13.0%	0	\$0	\$463,000
	Construction Engineering	10.0%	0		\$356,000
TOTAL PROJECT COST					\$4,377,414

Concept 5 Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway, 36' pvmt width

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 60' extg ROW for Washco Major Collector Road

Cross Section: (County Major Collector)

Travel Lanes 2 @ 12 ft

Shoulders 2 @ 6 ft

Concept 8 West Banks: New North-South Road

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 9 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 1.12		DATE 8/25/2010	NAME A. Kutansky
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing					
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	2.24	\$1,298,000	\$2,907,520
2	New Roadway with Storm	Lane-Mi.	3.72	\$342,872	\$1,275,483
3	New Rural Roadway	Lane-Mi.	0.00	\$338,903	\$0
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$200,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$30,000	\$30,000
12	Illumination	Mi.	1.12	\$260,000	\$291,200
13	Landscaping - Streetscape	Mi.	1.12	\$434,000	\$486,080
14	Bridges	SF	0.00	\$200	\$0
15	Walls	SF	0.00	\$115	\$0
SUBTOTAL					\$4,990,283

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$100,000
	TP & DT	1.0-2.5%	5.0%		\$250,000
	Mobilization	1.0-2.5%	9.0%		\$449,000
	Erosion Control	1.0-2.5%	1.3%		\$62,000
	Contingency	1.0-2.5%	40.0%		\$1,996,000
	Escalation (per year) -current year	0.5-2.0%	2.0%		\$0
			2010		
TOTAL CONSTRUCTION COST					\$7,847,283
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	377,600	\$8	\$3,020,800
	Design Engineering	13.0%	0	\$0	\$1,020,000
	Construction Engineering	10.0%	0		\$785,000
TOTAL PROJECT COST					\$12,673,083

Concept 8 Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway, 40' pvmt width

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 64' required ROW for City of Banks Collector Road

Cross Section: (County Minor Collector)

Travel Lanes 2 @ 12.5 ft

Shoulders 2 @ 6 ft

S/W, Curb & Gutter, Streetscapes, Illumination

Concept 10 East Banks: New North-South Circulator Road

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 10 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 0.98		DATE 8/25/2010	
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing				NAME A. Kutansky	
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.00	\$1,298,000	\$0
2	New Roadway with Storm	Lane-Mi.	0.00	\$342,872	\$0
3	New Rural Roadway	Lane-Mi.	2.94	\$338,903	\$996,374
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$15,000	\$15,000
12	Illumination	Mi.	0.00	\$260,000	\$0
13	Landscaping - Streetscape	Mi.	0.00	\$434,000	\$0
14	Bridges	SF	0.00	\$200	\$0
15	Walls	SF	0.00	\$115	\$0
SUBTOTAL					\$1,011,374

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$20,000
	TP & DT	1.0-2.5%	5.0%		\$51,000
	Mobilization	1.0-2.5%	9.0%		\$91,000
	Erosion Control	1.0-2.5%	1.3%		\$13,000
	Contingency	1.0-2.5%	40.0%		\$405,000
	Escalation (per year)	0.5-2.0%	2.0%		
	-current year		2010		\$0
TOTAL CONSTRUCTION COST					\$1,591,374
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	310,500	\$8	\$2,484,000
	Design Engineering	13.0%	0	\$0	\$207,000
	Construction Engineering	10.0%	0		\$159,000
TOTAL PROJECT COST					\$4,441,374

Concept 10 Assumptions:

Pavement Section:

6" Asphalt Over 10" Aggregate Base for New Roadway, 36' width

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 60' required ROW for WashCo Major Collector

Cross Section: (County Major Collector)

Travel Lanes 2 @ 12 ft

Shoulders 2 @ 6 ft

Concept 11A Bike/Ped Bridge Over Railroad, east end of Banks Schools Complex

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 11 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 0.13		DATE 8/25/2010	NAME A. Kutansky
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing					
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.22	\$1,298,000	\$285,560
2	New Roadway with Storm	Lane-Mi.	0.00	\$342,872	\$0
3	New Rural Roadway	Lane-Mi.	0.00	\$338,903	\$0
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$5,000	\$5,000
12	Illumination	Mi.	0.11	\$260,000	\$28,600
13	Landscaping - Streetscape	Mi.	0.11	\$434,000	\$47,740
14	Bridges	SF	1,560.00	\$200	\$312,000
15	Walls	SF	19,550.00	\$115	\$2,248,250
SUBTOTAL					\$2,927,150

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$59,000
	TP & DT	1.0-2.5%	5.0%		\$146,000
	Mobilization	1.0-2.5%	9.0%		\$263,000
	Erosion Control	1.0-2.5%	1.3%		\$37,000
	Contingency	1.0-2.5%	40.0%		\$1,171,000
	Escalation (per year) -current year	0.5-2.0%	2.0%		\$0
	TOTAL CONSTRUCTION COST				\$4,603,150
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	3,700	\$8	\$29,600
	Design Engineering	13.0%	0	\$0	\$598,000
	Construction Engineering	10.0%	0		\$460,000
TOTAL PROJECT COST					\$5,690,750

Concept 11a Assumptions:

Pavement Section:

12" Conc. Over 10" Aggregate Base for New Roadway, 10' width

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 13' required ROW for ped path and walls

Cross Section:

Travel Lanes 1 @ 10 ft
Illumination, Streetscape, and Drainage

Concept 11B Bike/Ped Bridge Over RR and East Banks Circulator Rd, east end of Schools Complex

CH2M HILL SUMMARY - QUICK COST ESTIMATE					
PROJECT: Banks TSP Alternatives Analysis		REFERENCE NAME/PHONE Andy Kutansky / 503.736.4335		SHEET 12 of 12	
DESIGN LEVEL: Planning Level		LENGTH (MI.): 0.12		DATE 8/25/2010	NAME A. Kutansky
KIND OF WORK: New Roadway, Bridge, Signals, Restriping, and Signing					
NO.	ITEM	UNIT	QUANTITY	UNIT COST	TOTAL
1	Curb, Sidewalks & Drainage	Mi.	0.18	\$1,298,000	\$233,640
2	New Roadway with Storm	Lane-Mi.	0.00	\$342,872	\$0
3	New Rural Roadway	Lane-Mi.	0.00	\$338,903	\$0
4	Inlay/Overlay Extg Roadway	Lane-Mi.	0.00	\$152,846	\$0
5	Reconstruct Existing Roadway	Lane-Mi.	0.00	\$361,645	\$0
6	Restriping Existing Roadway	Lane-Mi.	0.00	\$29,040	\$0
7	Building Removals	LS	0.00	\$75,000	\$0
8	Interconnect Signal	LS	0.00	\$30,000	\$0
9	New Signal	EA	0.00	\$250,000	\$0
10	Signal Modifications	EA	0.00	\$60,000	\$0
11	Permanent Signing	LS	1.00	\$5,000	\$5,000
12	Illumination	Mi.	0.12	\$260,000	\$31,200
13	Landscaping - Streetscape	Mi.	0.12	\$434,000	\$52,080
14	Bridges	SF	2,340.00	\$200	\$468,000
15	Walls	SF	13,850.00	\$115	\$1,592,750
SUBTOTAL					\$2,382,670

	ADDITIONAL COSTS	RANGE	PERCENTAGE	UNIT COST	TOTAL
	Construction Surveying	1.0-2.5%	2.0%		\$48,000
	TP & DT	1.0-2.5%	5.0%		\$119,000
	Mobilization	1.0-2.5%	9.0%		\$214,000
	Erosion Control	1.0-2.5%	1.3%		\$30,000
	Contingency	1.0-2.5%	40.0%		\$953,000
	Escalation (per year) -current year	0.5-2.0%	2.0%		\$0
	TOTAL CONSTRUCTION COST				\$3,746,670
	Right-of-Way				
	Parcels	EA	0	\$400,000	\$0
	R/W	SF	3,675	\$8	\$29,400
	Design Engineering	13.0%	0	\$0	\$487,000
	Construction Engineering	10.0%	0		\$375,000
TOTAL PROJECT COST					\$4,638,070

Concept 11B Assumptions:

Pavement Section:

12" Conc. Over 10" Aggregate Base for New Roadway, 10' width

Right-Of-Way:

Parcels - Buildings Inside Proposed Roadway Footprint

R/W Areas Based on 13' required ROW

Cross Section:

Travel Lanes 1 @ 10 ft
Illumination, Streetscape, and Drainage