

TECHNICAL MEMORANDUM #3

Date: March 20, 2015

Project #: 18078

To: Stakeholder Advisory Committee

Cc: Project Management Team

From: Kelly Laustsen, Bart Rudolph and Marc Butorac, P.E., PTOE

Project: City of Banks Bicycle and Pedestrian Master Plan

Subject: System Inventory and Evaluation

This memorandum provides a system inventory and evaluation of the existing land uses; natural and cultural resources; demographics; transportation system; and vehicle, bicycle, and pedestrian volumes. The purpose of the system inventory and existing evaluation is to help inform the conceptual bicycle and pedestrian route options developed as part of the Bicycle and Pedestrian Plan (BPP).

SYSTEM INVENTORY

The subsections below provide existing information on the transportation system in Banks and other related items, including land uses, historic and natural resources, and socio-economic data. The inventory will be used to help evaluate the pedestrian and bicycle network in Banks and identify potential elements to include in the BPP. All figures referenced below are provided in *Appendix A*.

Existing Land Uses

Figure 1 identifies vacant and developable land within the City of Banks. The majority of the vacant land within the city limits is northeast of the Portland and Western railroad tracks. The city is primarily surrounded by agricultural or vacant land. Vacant and developable land within the City's urban growth boundary (UGB) helps identify where future recreation, trail, or other improvements may be viable presently or in the future.

Figures 2 and 3 identify the existing land uses and current zoning within the urban growth boundary. Zoning establishes allowable and specific regulations for certain land uses within the City. Commercial zoning is primarily located along the northern and southern portions of Main Street, which includes the City's elementary, middle, and high school facilities immediately north of the southern commercial

area. Single family residential zoning is located along the middle portion of Main Street and in the southeastern part of the City. Industrial zoning is located generally in the northeast area of the city along the railroad tracks; however, existing non-conforming industrial uses are located south of Oregon Highway 6.

Figure 4 displays the comprehensive plan future zoning designations. There is not much difference between the current zoning and the comprehensive plan zoning, other than a few areas that reflect the actual land use and Exclusive Farm Use (EFU).

Figure 5 maps the activity centers located within the City, including the schools, library, City Hall, parks, and trail heads. Activity centers are typically considered to be attractions for bicycle and pedestrian activity.

Rights of way Tax Assessor Information

In examining potential opportunities, the evaluation will utilize the Oregon Map (ORMAP, <http://www.ormap.net>) to provide taxlot information for the properties within the City of Banks. The website includes an interactive map to identify specific tax lot information.

Historic, Natural Resources and Environmental Considerations

Figure 6 identifies historic places that have been inventoried by the State Historic Preservation Office (SHPO) and deemed eligible to be included in the historic places list, but currently not listed.

Figure 7 illustrates existing wetlands and the 100-year floodplain which mirrors the western edge of the City limits. However, it should be noted that recreation and nature trails are permitted uses and activities within the flood plain. The topography of Banks is relatively flat with the exception of northeast part of the community, where the elevation raises approximately 310 feet to its highest point at 520 feet above sea level.

Socio-Economic Data

Many factors can be used to help determine the demand for bicycle and pedestrian infrastructure. The population age can help determine ability and/or necessity. The median age of the population in Banks is approximately 30 years old. The poverty rate can also help determine the means to afford other modes of transportation. Roughly 7% of the population in Banks lives below the poverty line. Finally, the mode share for commute to work can help determine how many people rely on the infrastructure already in place. Approximately 4.2% of the population walk or take public transportation to/from work. Additional details are provided in *Appendix B*.



Existing Road Network

Figure 8 identifies the roadway functional classifications within the City of Banks. Table 1 provides a summary of the existing major routes within the city. Table 2 displays functional classification definitions as defined in the Banks Transportation System Plan (TSP).

Table 1. Existing Major Routes Summary

Street	Functional Class	# of Travel Lanes	Ownership	Sidewalks?	Bikelanes?	Freight Route?
Highway 6	Regional Highway ¹	2	State	No	No	Yes
Main Street / OR 47 (Inside City Limits)	Arterial	2	State	Partial ²	Partial ³	Yes
OR 47	Arterial	2	State	No	No	Yes
NW Banks Road	Collector	2	County	No	Partial ⁴	No
Wilkes Street	Collector	2	City	Yes	No	No
NW Trellis Way	Collector	2	City	Yes	No	No
NW Oak Way	Collector	2	City	Yes	Partial ⁵	No
NW Sellers Road	Collector ⁶	2	County	No	Partial ⁷	No
NW Wilkesboro Road	Collector ⁶	2	County	No	No	No

¹ Per the Oregon Highway Plan; the functional classification map in the Banks TSP shows Highway 6 an arterial

² No sidewalk on west side of roadway south of Sunset Park

³ No bike lanes north of Banks High School

⁴ Sidewalk provided on south side between Main Street and NW Sellers Road and a portion of the north side east of NW Sellers Road

⁵ Segment of bike lane approximately 250 feet east of Main Street to NW Devonmoor Avenue

⁶ Per the 2020 Washington County TSP (2035 update currently underway)

⁷ No bike lanes north of Banks Bicycle Repair & Rental

Table 2. Functional Classification Definitions

Classification	Definition
Regional Highways	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.
Arterial Streets	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.
Collector Streets	Intended to provide access to abutting properties and to serve the local access needs of a neighborhood, including limiting through traffic.
Local Streets	Provide direct access to abutting land uses. These streets have low traffic volumes and are not intended to serve through traffic.

Source: Banks, OR Transportation System Plan

The Banks Transportation System Plan references Main Street (OR 47), within the city of Banks, as a designated Special Transportation Area (STA). STAs are a designated district of compact development located on a state highway within an urban growth boundary in which the need for appropriate local access outweighs the considerations of highway mobility except on designated OHP Freight Routes where through highway mobility has greater importance.

Figure 9 identifies existing speed limits in the city. The speed limit on Main Street (OR47) is 45 miles per hour (mph) south of the City, 25 mph through the city and 55 mph north of the City.



Figure 10 identifies on-street parking locations and traffic control devices. On-street parking is provided on virtually all local roads on at least one side of the street. On-street parking is not allowed on Main Street south of the High School entrance, where the bike lanes are located. On-street parking is allowed on Main Street north of the High School entrance and where the majority of the businesses are located. There is one signalized intersection at the NW Oak Way/Main Street and one overhead flashing pedestrian sign at the High School entrance, as shown in Exhibit 1.

Exhibit 1. Pedestrian Crossing at High School Entrance



Overhead flashing pedestrian sign at the High School entrance along Main Street (OR47)



Marked crosswalk at the Main Street (OR47)/Market Street intersection.

Transit System

The Tillamook County Transportation District (TCTD) provides passenger bus service between Portland and Tillamook via “The Wave” Route 5. According to the TCTD’s website, Route 5 operates 7 days a week with 2 daily eastbound and 2 daily westbound stops in Banks. The bus stop is located on NW Sunset Avenue as depicted in Figure 11.

Existing Bicycle and Pedestrian Network

Figure 12 identifies the existing bicycle infrastructure in Banks. Bicycle lanes are installed on Main Street (OR 47) between NW Oak Way and the Banks High School entrance. Bicycle lanes are currently prohibited from advancing north on Main Street (OR47) due to the existing roadway width and on-street parking, as shown in Exhibit 2. Bicycle lanes are also provided on NW Oak Way accessing the residential neighborhood in the southeast part of the city.

Exhibit 2. Bicycle Lane Challenges



Storm drain grate in the bicycle lane along Main Street (OR47)



Bicycle lane ending at the high school entrance along Main Street (OR47)

Figure 13 identifies the existing pedestrian facilities within the City. Sidewalks are available on almost every roadway, with the exception of Woodman Avenue, NW Banks Road, NW Sellers Road and NW Cedar Canyon Road. The southeast neighborhood has sidewalks on both sides of every street with multi-use trails connecting throughout the neighborhood. There are three marked crosswalks along Main Street (OR 47), including: NW Oak Way/Main Street intersection, the entrance to the High School and at the Market Street/Main Street (OR 47) intersection, as shown in Exhibit 3. There is a marked crosswalk across NW Banks Road connecting with the Banks-Vernonia Trailhead. Multiple crosswalks exist in the southeast neighborhood.

Exhibit 3. Existing Sidewalk Conditions



Sidewalk ending at Banks Sunset Park along Main Street (OR47)



Sidewalk approaching the Main Street (OR47)/NW Banks Road/NW Cedar Canyon Road intersection.

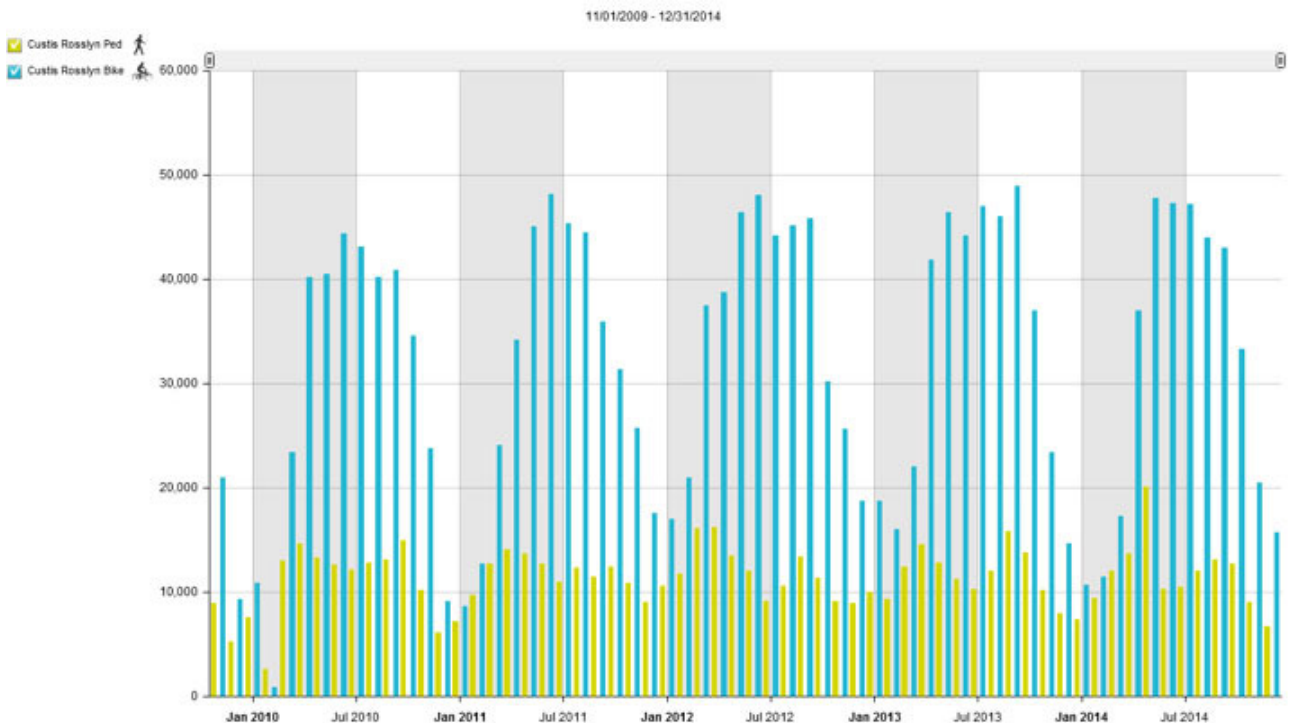
Existing Vehicle, Bicycle, and Pedestrian Volumes

In order to better understand existing vehicle, bicycle, and pedestrian volumes, a variety of data was collected at key locations throughout the City. Before reviewing the data collection, it is important to consider what factors impact multimodal user volumes, specifically environmental conditions. An explanation of the factors that affect bicycle and pedestrian data, as well as a summary of the data collected for the Banks BPP, is provided in the sub-sections below.

Factors Impacting Bicycle and Pedestrian Data

It is important to consider the seasonality of bicycle and pedestrian activity when reviewing the data collected for this project. As described *NCHRP 797: Guidebook on Pedestrian and Bicycle Volume Data Collection*, “One key difference between non-motorized and motorized volume counting that must always be kept in mind is that non-motorized volumes are much more sensitive to environmental conditions—precipitation, temperature, darkness, etc.—than are motorized vehicle volume” (2014). As an example, monthly bicycle data from Arlington County, VA is shown in Exhibit X. The data was continuously collected on the Custis Trail (an off-street, multi-use trail running east-west across Arlington) between November 2009 and December 2014 and shows seasonal patterns in pedestrian and bicycle use.

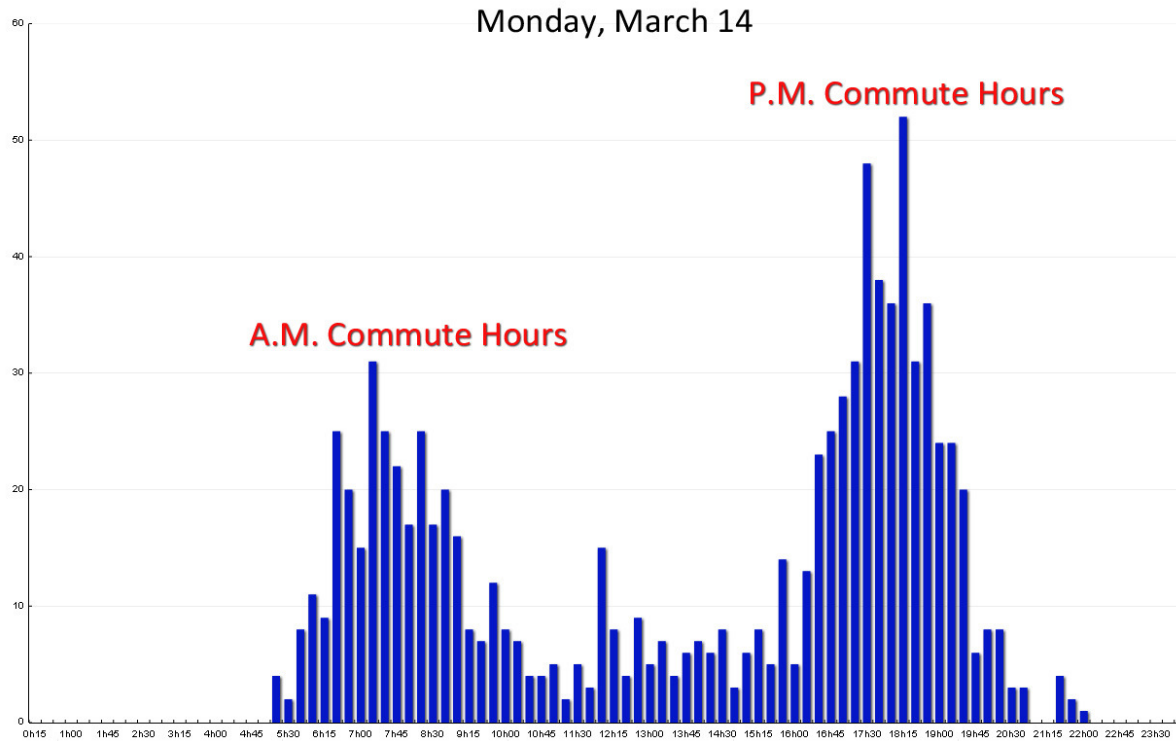
Exhibit 4. Bike and Pedestrian volumes on the Custis Trail (source: www.bikearlington.com)



The exhibit shows that on the Custis Trail bicycle volumes are particularly prone to seasonal variations, with volumes peaking during the warmer spring and summer months.

In addition, bicycle and pedestrian volumes are influenced by the time of day and don't always follow typical trends observed in vehicle counts. On most roadways with commuter traffic, vehicle volumes will peak during the morning and evening, reflecting typically commuting times. Bicycle or pedestrian facilities that serve commuters may also show morning and evening peaks. For example, the Custis Trail previously shown in Exhibit 4 is a popular commuting facility and more highly used on weekdays than weekends, with morning and evening peaks as shown in Exhibit 5.

Exhibit 5. Fifteen-minute bike volumes on the Custis Trail (source: www.bikearlington.com)



However, recreational trails (like the Banks-Vernonia Trail) will not exhibit the same trends and are more likely to peak in volume during the weekends. Areas that serve schools may peak in the morning or afternoon to reflect students walking or biking to school.

Due to the timeline of this project, data was collected during December and January, typically low points for bicycle and pedestrian volumes. Therefore, it is not representative of typical volumes throughout the year and should primarily be considered as one reference point. This data is also valuable for the vehicle data collected and information it provides about truck volumes and activity. In addition, data was collected on a weekday during the evening peak and weekend during the midday. Therefore, it may not capture other periods of bicycle or pedestrian activity in Banks, such as that associated with the schools on Main Street.

Data Collection

Two types of traffic counts were collected at key intersections and on key roadways throughout the City, including:



- Turning movement counts (TMCs) were collected at the eight intersections shown in Figure 14 during the weekday evening peak hour (4 - 6 p.m.) and Saturday midday peak hour (10a.m. – 2 p.m.) in December 2014. The counts included vehicle, truck, pedestrian, and bicycle turning movement volumes.
- Twenty-four hour vehicle classification counts (tube counts) were collected at three locations for one week in January 2015. The counts include bicycle and vehicle volumes (by class) for the full period.

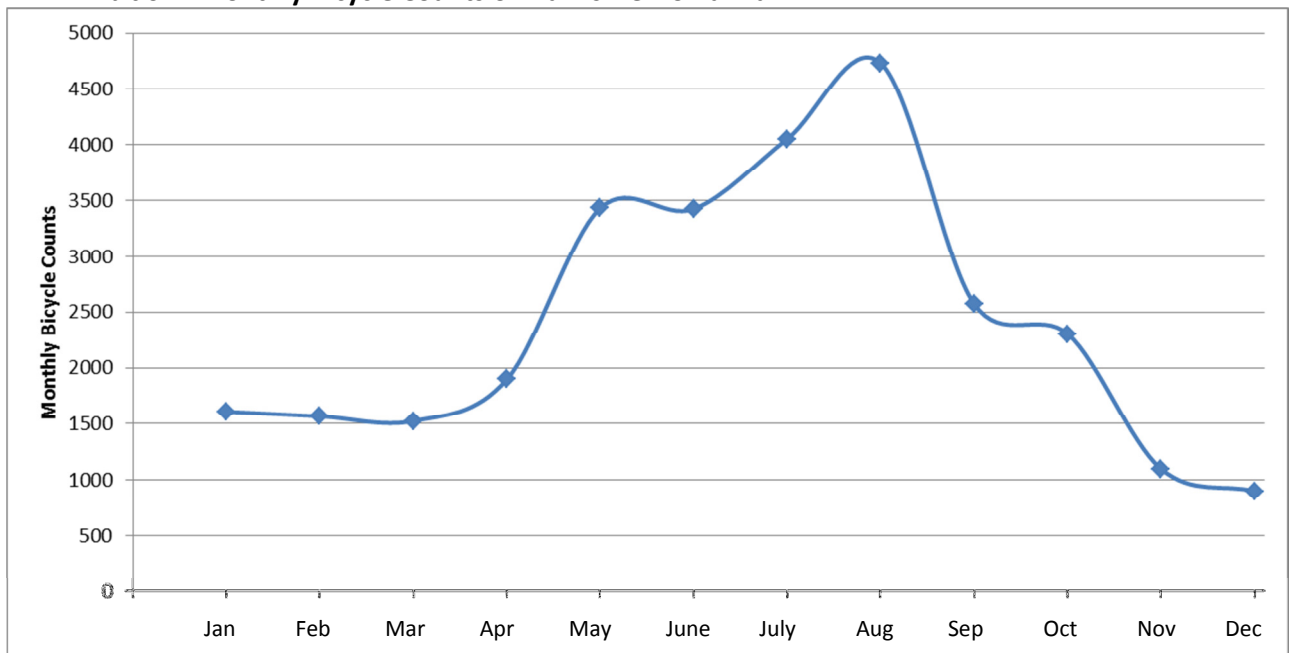
In addition, data was provided from Oregon State Parks for the Banks Vernonia Trail. The data collected is provided in *Appendix C*. The vehicle turning movement counts for the weekday PM and weekend peak hours are shown in Figure 15. The bicycle and pedestrian volumes at each intersection are shown in Figure 16. It should be noted that there are currently pedestrian crossings across Main Street at NW Oak Way, the Banks High School, and Market Street.

The data collected at each of the tube count locations and provided by Oregon State Parks on the trail is summarized below by location.

Banks-Vernonia Trailhead

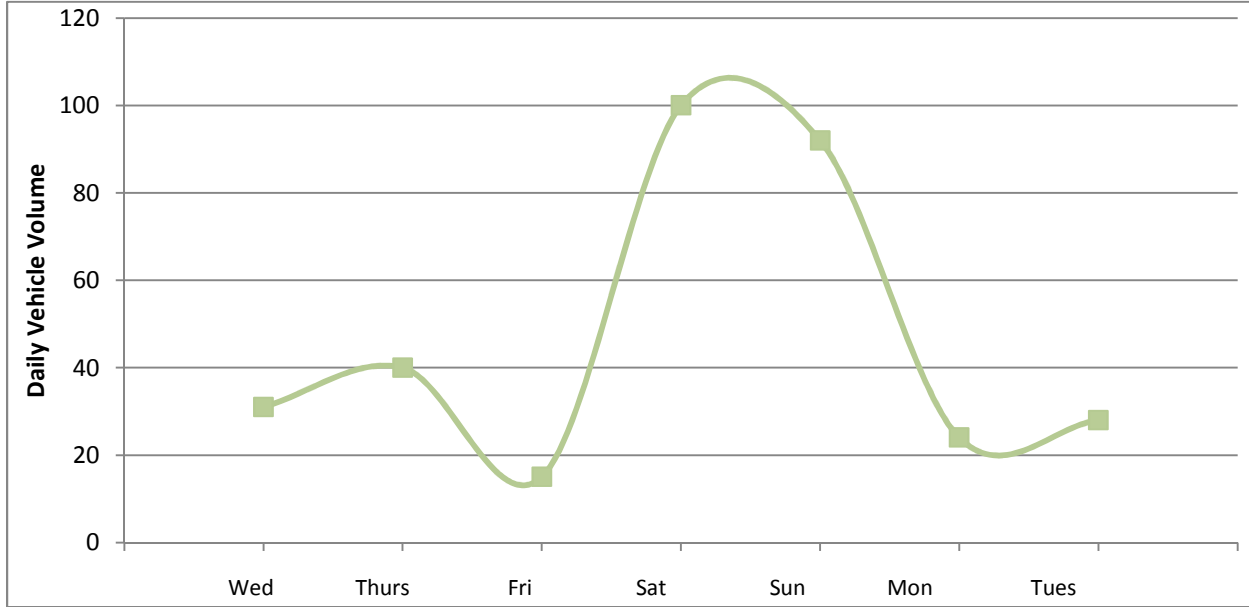
Oregon State Parks provided monthly bicycle counts at the Banks-Vernonia Trailhead for 2014, shown in Exhibit 6. As seen in the exhibit, volumes fluctuate significantly throughout the year, with the highest counts observed in May through August. This data translates in to an average of about 80 bicycle counts per day.

Exhibit 6. Monthly Bicycle Counts on Banks-Vernonia Trail



Twenty-four hour bicycle counts were collected on the Banks-Vernonia Trail north of the trailhead for one week in January 2015. The average daily vehicle volumes throughout the week are shown in Exhibit 7.

Exhibit 7. Bicycle Volumes on Banks-Vernonia Trail



As seen in the exhibit, bicycle volumes are higher during the weekend than the week, reflecting the recreational use of the trail.

NW Banks Road

Twenty-four hour vehicle classification counts were collected for one week in January 2015 on NW Banks Road just west of NW Courting Hill Drive. The average numbers of daily vehicles observed by class are shown in Table 3.

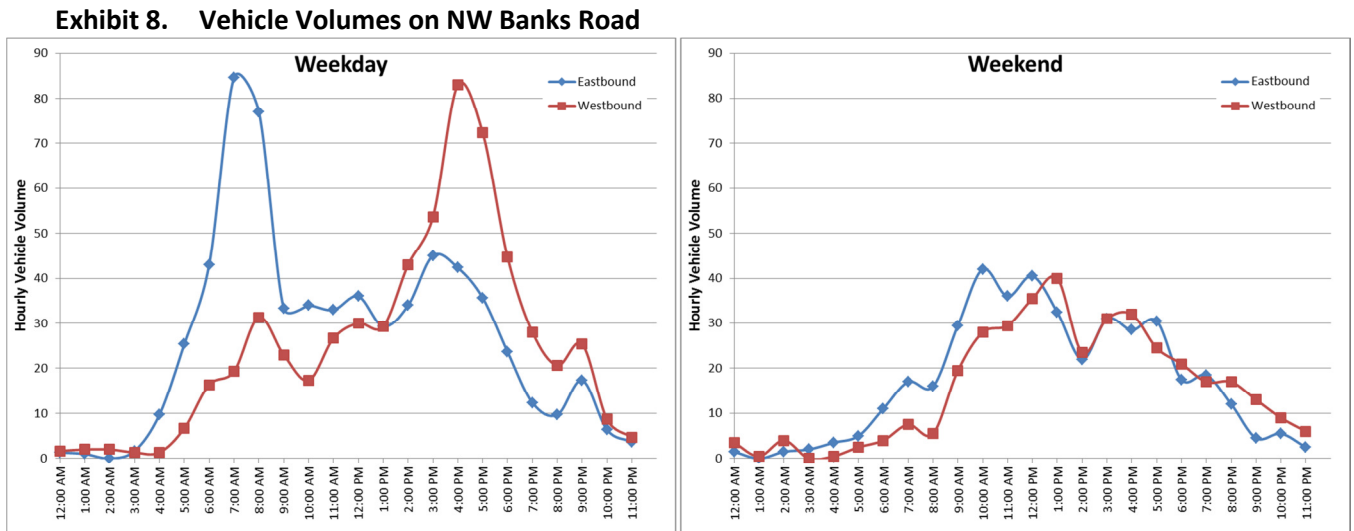
Table 3. NW Banks Road Vehicle Classification Data

	Daily Average	Percent Total
Motorcycles	3	0.2%
Cars and Trailers	796	72.1%
Buses	3	0.2%
2 Axle Long	195	17.6%
2 Axle, 6 Tires	93	8.5%
3 Axles or larger	14	1.3%
Total	1,103	100.0%

As indicated in the table, the majority of vehicles counted on NW Banks Road are cars and trailers (72.1%). Over 25% of vehicles counted were 2 axle or larger trucks.



The average hourly vehicle volume throughout a weekday and weekend are shown in Exhibit 8.



As indicated in the exhibit, vehicle volumes on NW Banks Road are higher during the week than on the weekend. Volumes are more directional during the week, with eastbound volumes peaking in the morning and westbound volumes peaking in the evening.

Bicycle volumes observed on NW Banks Road were low, with a total of ten bicyclists observed over the week period (with eight observed on Sunday). This could be due to both the fact that counts were collected in January, typically a low month for bicyclist activity, and the lack of bicycle facilities on NW Banks Road. There are no paved shoulders on NW Banks Road and the vertical curves limit sight distance.

NW Main Street (OR 47)

Twenty-four hour vehicle classification counts were collected for one week in January 2015 on NW Main Street (OR 47) just north of NW Trellis Court. The average numbers of vehicles observed by class are shown in Table 4.

Table 4. NW Main Street (OR47) Vehicle Classification Data

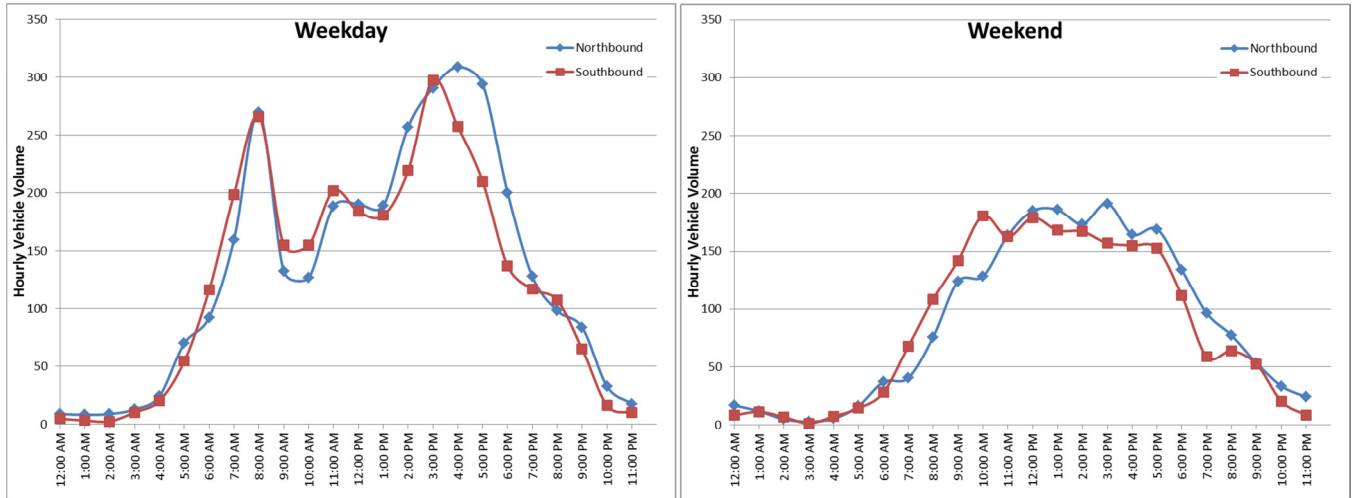
	Daily Average	Percent Total
Motorcycles	27	0.5%
Cars and Trailers	3463	62.2%
Buses	71	1.3%
2 Axle Long	1308	23.5%
2 Axle, 6 Tires	494	8.9%
3 Axles or larger	202	3.6%
Total	5565	100.0%



As seen in table 4, over 35% of vehicles observed on NW Main Street are 2 axle or larger trucks. The average daily traffic on NW Main Street is about five times higher than that on NW Banks Road.

The average hourly vehicle volume throughout a weekday and weekend are shown in Exhibit 9.

Exhibit 9. Vehicle Volumes on NW Main Street



As indicated in the exhibit, vehicle volumes on NW Main Street peak during the morning and early evening, with a small peak around the lunch time hour. Volumes are higher on a weekday than the weekend. No directional trends between northbound and southbound vehicles were observed.

Bicycle volumes observed on NW Main Street are higher during the weekend than during the week. Table 5 shows the average daily number of bicyclists observed. Bicyclists were also observed riding on the sidewalk along Main Street, noted in the table as well.

Table 5. NW Main Street (OR47) Average Daily Bicycle Volumes

	On Roadway		On West Sidewalk		On East Sidewalk	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
Average Weekday	4	2	0	1	2	2
Average Weekend	8	13	0	0	4	3

As previously noted, these volumes were collected in January, which is typically a low month for bicyclist activity. Therefore, they should not be considered representative of typical bicycle volumes on NW Main Street.

Crash Data

Figure 17 maps the twenty reported crashes during the last five years of available data. Between January 1, 2009 and December 31, 2013, twenty reported crashes occurred in Banks. Four of the five non-fatal injury accidents involved bicyclists or pedestrians. The bicycle related crash occurred at the



intersection of Main Street (OR47) and NW Depot Street and involved a vehicle turning, not yielding to the right-of-way. Two pedestrians were involved in a crash at or around the high school entrance off main Street (OR47) when a vehicle did not yield to the right of way. Another pedestrian was involved in a vehicle-related crash on NW Oak Way between Main Street (OR47) and NW Devonmoor Avenue. The pedestrian was illegally in the roadway. Three pedestrians were also hit by a vehicle near the intersection of NW Oak Way and NW Groveshire Avenue due to careless driving and the vehicle not yielding to the right of way. Table 6 summarizes all the reported crashes by type and severity.

Table 6 Crash Summary 2009-2013

Year	Crash Type						Severity	
	Bike/Ped	Backing	Fixed Object	Rear End	Sideswipe	Turning Movement	Property Damage Only	Non-Fatal Injury
2009	0	0	1	3	1	0	4	1
2010	0	0	0	0	0	0	0	0
2011	1	1	1	2	1	1	6	1
2012	2	1	0	0	0	2	3	2
2013	1	0	1	0	0	1	2	1

As seen in Table 6, rear-end crashes are slightly more prevalent than the other crash types, but turning movement and bicycle and pedestrian related crashes are also predominant crash types. While no specific location was identified as a high crash location, 55% of all crashes occurred along the Main Street (OR47) corridor. Three of the four crash reports that involved bicycles or pedestrians noted the driver’s inattention or failure to yield to the right of way.

Planned Infrastructure Improvements / Recommendations

Previous planning improvement projects to the bicycle and pedestrian system are mapped in Figure 18. Recommendations include the west side corridor road, reconstruction of NW Banks Road, Bicycle and pedestrian railroad crossings to the UGB expansion area, safety improvements along Main Street (OR47) and other connectivity related improvements. At the time this memorandum was developed, none of these recommended improvements had been funded.

EVALUATION

The inventory above was used to identify gaps and deficiencies in the existing bicycle and pedestrian network. A gap is defined as a missing link in the network, such as a roadway without a bike or pedestrian facility. A deficiency is defined as a bicycle or pedestrian facility that is not up to standards or sufficient to meet users’ needs, such as a sidewalk that is too narrow (less than four feet) or not ADA compliant.



Bicycle Gaps and Deficiencies

There is a lack of bicycle infrastructure connecting the southern part of Banks with the Banks-Vernonia State Trail, as well as a comprehensive connected network within the City itself. Currently, bicycle lanes are prevented from extending north of their current location on Main Street (OR 47) due to the roadway width and on-street parking. There is also a small gap between the Main Street (OR 47)/NW Oak Way intersection and where the bike lanes begin on NW Oak Way. The local neighborhoods have low volume roads and a trail system within them that helps provide connectivity and mode options.

The Main Street (OR 47)/NW Banks Road/NW Cedar Canyon Road intersection is an important intersection linking the Banks-Vernonia State Trail with the City. A bicycle lane is installed on a small section of NW Banks Road between Main Street and NW Sellers Road, but no infrastructure in place to help bicyclists navigate the intersection.

Pedestrian Gaps and Deficiencies

Sidewalks are in place on at least one side of almost every roadway in the city of Banks. The neighborhood in the southwest corner of the City has sidewalks on both sides of every street with trails and marked crosswalks leading to Greenville Park. The most notable gaps in sidewalk appear on the west side of Main Street (OR 47) from where the sidewalk ends next to Banks Sunset Park south to Highway 6 and the lack of designated facilities at the Main Street (OR 47)/NW Banks Road/NW Cedar Canyon Road intersection. Pedestrians have access to a sidewalk on the east side on Main Street and a crosswalk on NW Banks Road, but no facilities exist on the west side of Main Street at that intersection.

An interactive map is available online (<http://maps.kittelson.com/banksbpp>) that notes the gaps and deficiencies identified above, as well as those highlighted in Technical Memorandum #2 and the walking tour during the SAC meeting. SAC members and the public are encouraged to use the map to note any additional gaps or deficiencies they have observed in the city. The map will serve as a catalogue of the gaps and deficiencies in the bicycle and pedestrian network.

NEXT STEPS

This memorandum was reviewed by the Stakeholder Advisory Committee (SAC) during SAC Meeting #1 on March 5th, 2015. SAC members were invited to comment on the inventory and evaluation and provide their recommended changes. The project team reviewed the SAC's feedback and updated the memorandum accordingly, with this final copy incorporating their comments. Moving forward with the development of the BPP, the evaluation section will be used to identify gaps and deficiencies in the bicycle and pedestrian networks and develop potential plan elements. As noted above, the SAC members and public are encouraged to continue to use the interactive map available online (<http://maps.kittelson.com/banksbpp>) to note additional gaps and deficiencies.



APPENDICES

- A. Figures
- B. Socio-economic Data
- C. Traffic Counts