Existing Conditions and Needs: City of Vernonia Transportation System Plan Update

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This memorandum describes existing conditions and needs in the Vernonia TSP Update project study area. The focus is on deficiencies in existing transportation facilities as well as concerns related to existing safety and congestion, and updates the information found in the 1999 City of Vernonia TSP. Where applicable, this memorandum will identify where information has been updated from the 1999 TSP document. This memorandum is divided into five parts: existing transportation facility inventories, land use inventories (base and future year), existing traffic conditions, an analysis of Safe Routes to School, and issues identified at the first Project Advisory Committee and Project Management Team joint meeting.

Background

The City of Vernonia is located in central Columbia County, 22 miles west of Scappoose and 28 miles south of Clatskanie on OR 47. Vernonia is a former timber town located between Portland and the Coast Range, and has approximately 2,370 residents[1]. In the past 15 years, Vernonia has experienced two serious flood events; one in 1996 and 2007. As a result of the most recent flooding--which damaged the elementary, middle and high schools--the Vernonia School District, Transportation and Growth Management (TGM), and Oregon Solutions have identified a new school site with the intention of replacing the existing schools. The school district and the City are dedicated to meeting the objectives of the Safe Routes to School Program. In addition to bicycle and pedestrian safety, it is important to create safe, efficient school bus routes and vehicle access. Identifying existing or new streets and pathways to serve the new school site is important to the community.

In addition to addressing and connecting the new school site, the TSP update will emphasize multi-modal transportation, in line with the community's values. The TSP

[1] From the 2009 Oregon Population Report and Tables. Portland State University Population Research Center. Available at http://www.pdx.edu/prc/. Accessed September 2010.

update will also address roads that are now within the City's urban growth boundary (UGB) since expansion after 1999. A road conditions analysis will also be conducted as part of the TSP update to provide a baseline and prioritize improvement projects and to help determine future funding sources.

Study Area

The study area is bounded by Vernonia's city limits and the City's UGB, whichever is larger (Figure 1). This figure replaces Figure 1-2 of the 1999 TSP. Existing zoning for the City is shown in Figure 2. Community facilities are shown in Figure 3.

Inventory of Transportation Facilities

Roadway Jurisdictions

Oregon Highway 47, the Nehalem Highway, is the only State-owned roadway in the City. This highway has several names within the city limits and is a designated arterial on Rose Avenue from the south city limits to Bridge Street, on Bridge Street from Rose Avenue to Mist Drive, and on Mist Drive from Bridge Street to the north city limit.

The following roadways are City-owned and designated collectors: State Avenue from Bridge Street to the north city limit, River/Cougar/2nd Street, Rose Avenue north of Bridge Street, Louisiana Avenue, Nehalem Street, and Knott Street. All other roadways in Vernonia are City-owned and designated local streets. This updates the Functional Classification section of the 1999 TSP.

Pavement Conditions

The pavement of Highway 47 is uniformly in excellent condition (looks new) from the south city limits at Rose Avenue and River Street to Bridge Street and State Avenue. To the east as far as the river, the pavement of Bridge Street (Highway 47) is generally in excellent-to-good condition, with the pavement nearest the bridge in good-to-fair condition. On the east side of the river, the pavement condition of Mist Drive (Highway 47) is generally good.

The pavement condition of State Avenue from Bridge Street to "C" Street is poor. However, from "C" Street north to Stoney Road, pavement condition is excellent.

Land Use Inventory

The draft City of Vernonia Buildable Lands Inventory is being finalized concurrently with the Vernonia TSP update. This study includes existing land use information and serves as the basis of the information provided in this section. The report draws on information from the City's geographic information system (GIS) database, County Assessor tax lot data, flood maps, and the City of Vernonia Local Wetland Inventory and Riparian Assessment.

The current acres of land within the Vernonia Urban Growth Boundary (UGB) is displayed in Table 1, and is broken down by zoning designation and the number of tax

lots within each zone. Over 70% of the land within the Vernonia UGB is zoned for residential uses, 19% is zoned for commercial and industrial uses, and 8% is zoned for parks and recreational uses.

TABLE 1
2009 Total Vernonia Land by Zone

Zone	Number of Taxlots	Acres	Percent of Total Land Supply
Residential (R)	965	501.76	54%
General Residential (GR)	277	117.85	13%
Low Density Residential (LDR)	3	62.92	7%
Light Industrial (LI)	21	103.34	11%
Public Recreation (PR)	11	74.55	8%
General Commercial (GC)	45	57.77	6%
Downtown (DT)	81	13.61	1%
Totals	**1,403**	**931.6**	**100%**

Source: Draft City of Vernonia Buildable Land Inventory (2009)

According to US Census data, in 2000 Vernonia had 880 housing units and 789 households. According to City geographic information system (GIS) parcel data, Vernonia currently has 943 homes. Vernonia's current housing is dominated by single family residential.

Buildable Lands

According to OAR 660 Division 8, "buildable land" means residentially designated land within the urban growth boundary, including both vacant and developed land likely to be redeveloped, that is suitable, available, and necessary for residential uses. Publicly owned land is generally not considered available for residential uses. Land is generally considered "suitable and available" unless it is:

- Severely constrained by natural hazards as determined under Statewide Planning Goal 7
- Subject to natural resource protection measures determined under statewide Planning Goals 5, 15, 16, 17, or 18
- Has slopes of 25 percent or greater
- Is within the 100-year flood plain; or
- Cannot be provided with public facilities

The acreage of land within the UGB is described in Table 2, broken down by zoning designation and by land development class. Each class of land is described below:

- **Developed:** A tax lot is considered developed when it is built to its zoned density

- **Vacant:** A tax lot is considered to be vacant when there is no improvement on the values. Vacant lands do not include tax lots that are below 5,000 square feet since those lots do not meet the minimum size for development.
- **Redevelopable:** A tax lot is considered redevelopable when the property is developed but has a low improvement value. For this inventory, residential low improvement value is when the value per square foot is below $10. This was determined by dividing the improvement value by the land value. If that number was below $10 per square foot the lot was deemed redevelopable.
- **Infill:** A tax lot is classified as infill, if the lot is developed but has sufficient land left available to build at least one other dwelling unit. To simplify this process a developed lot must be greater than .5 acres to be considered a candidate for infill development.
- **Constrained:** For this inventory, a tax lot was considered constrained if it is in a floodway, floodplain, wetland, or is government owned. According to the Vernonia public works department, all developed property within city limits are currently served by water and sewer and all undeveloped properties within the UGB can be served by water and sewer, so no development constraints exist related to the provision of public facilities.

TABLE 2
2009 Total Vernonia Land by Class and Zone

Zone	Developed	Vacant	Redevelopable	Infill	Constrained	Total
R	115.2	114.43	14.95	46.67	210.51	501.76
GR	18.16	8.69	1.94	4.59	85.21	118.59
LDR	0	24.43	0	0	38.57	63
LI	3.41	3.49	0	34.16	62.42	103.48
PR	0	0	0	0	74.55	74.55
GC	0.44	1.38	0.29	0	54.72	56.83
DT	9.88	0.15	0	0	3.39	13.42
TOTALS	**147.09**	**152.57**	**17.18**	**85.42**	**529.37**	**931.6**

Source: Draft City of Vernonia Buildable Land Inventory (2009)

Table 3 is a list of buildable lands within the UGB. To calculate the amount of buildable land within the UGB, the acres of vacant, redevelopable and infill land were added together and then a percentage of this total was subtracted to account for public right of way needs. For this report, 25 percent of the buildable land supply was assumed to be needed for public right of way. In 2009 Vernonia had 189.9 acres of buildable land within the UGB.

TABLE 3
2009 Buildable Lands

Zone	Vacant	Redevelopable	Infill	Public Right of Way	Total Buildable
R	112.43	14.95	46.67	43.51	130.54
GR	8.69	1.94	4.59	3.81	11.42
LDR	24.43	0	0	6.11	18.32
LI	3.49	0	34.16	9.41	28.24
PR	0	0	0	0.00	0.00
GC	1.38	0.29	0	0.42	1.25
DT	0.15	0	0	0.04	0.11
TOTALS	**150.57**	**17.18**	**85.42**	**-63.29**	**189.9**

Source: Draft City of Vernonia Buildable Land Inventory (2009)

Current Employment

The draft City of Vernonia Economic Opportunity Analysis is being finalized concurrently with the Vernonia TSP update. This study includes existing employment information and serves as the basis of the information provided in this section.

The estimated employment for 2008 within the City by type of employment is shown in Table 4. Existing employment was estimated by using business licenses and information from the Vernonia Chamber of Commerce. These estimates were based on regular market conditions. Due to the recession, there has been a significant increase in unemployment which may reduce the amount of employment currently found within the City.

TABLE 4
City of Vernonia Current Employment

North American Industry Classification System	# of Firms	Employees 2008
Natural Resource	5	20
Construction	24	41
Manufacturing	12	22
Wholesale Trade	0	0
Retail Trade	43	100
Transportation, Warehouse and Utilities	8	40
Information	3	5
Financial Activities	8	21
Professional & Business Services	30	48
Education Services	1	85
Healthcare and Social Assistance	13	32
Leisure & Hospitality Services	15	65
Other Services	17	44
Public Administration	6	32
Total observed	**185**	**555**

Source: Draft City of Vernonia Economic Opportunity Analysis (2009)

Since Vernonia is a small study area, it is important to realize that any change in employment can affect the amount of jobs available to community members. Currently there are no plans for firms to settle in Vernonia, though the three largest employers, the School District, Government, and a Retreat and Conference Center are not expected to leave in the next 20 years.

Vernonia currently has three schools located on the same site, including Washington Grade School, Vernonia Middle School, and Vernonia High School. The Vernonia School District currently serves approximately 586 students, and employs an estimated 68 teachers and staff[2]. The school district may see a significant increase in enrollment and jobs if financing for the new school campus is found. Enrollment at the local school has decreased sine the 2007 flood. It is expected to rise significantly if a new school is built outside the floodplain.

[2] This excludes the students and employees at Mist Elementary School, which is within the Vernonia Schools District, but outside the Vernonia UGB. Source: http://www.vernonia.k12.or.us/

Existing Conditions Operational Analysis

Traffic Operations

This section describes the existing (2010) transportation conditions within the Vernonia Transportation System Plan (TSP) analysis study area. This section provides an overview of the traffic analysis and operational results, which are appended. This section updates the Roadway Operation section of the 1999 TSP.

Methodology

This section describes the data collected for the traffic analysis task and the methodology employed for the traffic operational analysis.

Study Intersections and Analysis Time Period

The existing conditions traffic analysis describes the motor vehicle operations for the existing (2010) p.m. peak hour conditions based on existing roadway geometry, lane configuration, and intersection control. This information provides the project team with an understanding of the mobility level and length of average vehicle delay on the existing roadway network within the City of Vernonia.

Ten study intersections were analyzed as part of the Vernonia TSP existing conditions analysis. The 1999 TSP analyzed different study area intersections than this TSP update. Table 5 shows the 1999 TSP intersections and the TSP update study area intersections. The difference between the two sets of intersections is based on the change in expected areas of development within the City of Vernonia and the focus of the TSP update, which includes relocating the Schools. Five of the study area intersections are the same, while five are different. The different intersections are highlighted in grey in the table below. No operational issues were found in the 1999 TSP study area intersections. Counts were provided by ODOT from previous study efforts conducted during the last 3 years. Table 6 identifies the count locations, intersection traffic control, count duration, and count date.

TABLE 5
1999 Vernonia TSP and TSP Update Study Area Intersections

1999 TSP intersections	TSP Update Intersections
Rose Avenue/Cougar Street	Rose Avenue/Cougar Street
Rose Avenue/Bridge Street	Rose Avenue/Bridge Street
Bridge Street/State Avenue	Bridge Street/State Avenue
Bridge Street/Texas Avenue	Bridge Street/Texas Avenue
Keasey Road/State Avenue/Stoney Point Road	Stoney Point Road/State Avenue
Bridge Street/ California	Bridge Street/Weed Avenue
Bridge Street/Jefferson Avenue	Bridge Street/Missouri Avenue
Bridge Street/Mist Drive	Bridge Street/Riverside Drive
Mist Drive/Knott Street	Maple Street/Rose Avenue
Stoney Point Road/Mellinger Road	Maple Street/Weed Avenue[1]

Sources: City of Vernonia TSP 1999
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TABLE 6

Vernonia Transportation System Plan – Traffic Study Intersections

ID #	Intersection	Traffic Control	Time of Count	Count Date
1	Stoney Point Road/State Avenue[1]	Two-Way Stop Controlled	4:00 PM to 6:00 PM	April 15th, 2008
2	Bridge Street/Rose Avenue	All-Way Stop Controlled[2]	3:00 PM to 5:00 PM	March 10th, 2010
3	Bridge Street/Weed Avenue	One-Way Stop Controlled	3:00 PM to 5:00 PM	March 10th, 2010
4	Bridge Street/State Avenue	One-Way Stop Controlled	4:00 PM to 6:00 PM	April 15th, 2008
5	Bridge Street/Texas Avenue	Two-Way Stop Controlled	2:30 PM to 6:00 PM	December 2nd, 2009
6	Bridge Street/Missouri Avenue	Two-Way Stop Controlled	3:00 PM to 6:00 PM	December 2nd, 2009
7	Bridge Street/Riverside Drive	Two-Way Stop Controlled	4:00 PM to 6:00 PM	April 24th, 2008
8	Maple Street/Rose Avenue	Two-Way Stop Controlled	3:00 PM to 5:00 PM	March 10th, 2010
9	Maple Street/Weed Avenue[1]	All-Way Stop Controlled	3:00 PM to 5:00 PM	March 10th, 2010
10	Cougar Street/Rose Avenue	Two-Way Stop Controlled	3:00 PM to 5:00 PM	March 10th, 2010

Notes:
[1]Intersection not under ODOT jurisdiction. Under jurisdiction of City of Vernonia.
[2]Westbound approach is yield controlled.

Peak hour turning movement volumes at each study intersection were identified from the p.m. peak period counts at each location. The peak hour is the single hour of the day that has the highest system hourly volume. Raw traffic count data is provided in Appendix A, Figure A.1, which shows that each intersection peaks during a different p.m. peak hour. Upon inspection of the counts, the p.m. peak hour occurs between 4:00 and 5:00 p.m. at the majority of intersections. Since the majority of study intersections share a common peak hour, and two previous studies - *West Oregon Electric Cooperative, Inc. Transportation Impact Analysis (DEA, May 2010*) and the *Nehalem View Subdivision Traffic Impact Study (Lancaster Engineering, May 2008)* – also identified 4:00 to 5:00 p.m. as the system peak hour, this system peak was selected for the Vernonia TSP traffic analysis. The system peak hour traffic volumes and intersection channelization are illustrated in Appendix A, Figure A.2.

Seasonal and Growth Adjustments

The traffic volumes collected at the intersections shown above were used to develop the 30th higher hour traffic volume (30 HV). The 30 HV volumes represent traffic that has been normalized to the same existing year (2010) and seasonally adjusted to the peak month of the year. Traffic volumes are converted to 30 HV because traffic counts were not collected during the month(s) when traffic volumes are typically at their highest levels. This approach provides a more conservative analysis and satisfies the requirements outlined by ODOT.

Traffic volumes were collected between 2008 and 2010. To adjust the 2008 and 2009 volumes to existing year (2010), an annual growth factor of 1.01 was applied to the applicable traffic counts. The 1.01 growth factor was derived from historic average daily traffic counts taken between OR 47 milepost 61.72 to 62.79 over the past 10 years.

After factoring the counts to 2010 volumes, the peak hour turning movement counts were adjusted to account for seasonal effects according to the ODOT Transportation Planning Analysis Unit (TPAU) *Analysis Procedures Manual (APM)*. The APM documents three different methods to calculate seasonal adjustment factors:

- On-Site Automatic Traffic Recorder (ATR) Method
- ATR Characteristic Table Method
- ATR Seasonal Trend Table Method

The on-site ATR method uses traffic trends measured at an ATR within the project site. There were no ATR stations located along OR 47 in the immediate study area. The closest ATR station, 34-005 is located along US 26. Upon inspection of the ATR seasonal trends, this site experiences a coastal destination route seasonal traffic trend, which is not representative of the agricultural and rural trends experienced through the study area. Therefore, the on-site ATR method was not selected to seasonally adjust the traffic counts.

Since an appropriate on-site ATR cannot be located, the ATR Characteristic Table Method was used to determine the seasonal adjustment factor. This method identifies an ATR with similar seasonal traffic characteristics as the project area. Using the data provided in the ODOT 2010 ATR Characteristic Table, ATR 03-013 was selected as the

most representative station for the Vernonia study area. The characteristics for this site are provided in Table 7.

TABLE7

Vernonia Transportation System Plan – ATR 03-013 Site Characteristics

Seasonal Traffic Trend	Area Type	# of Lanes	Weekly Traffic Trend	AADT	OHP Classification
AGRICULTURAL	RURAL	2	WEEKDAY	3900	DISTRICT HIGHWAY

Source: 2010 ATR Characteristics Table, ODOT
http://www.oregon.gov/ODOT/TD/TPAU/A_Data.shtml

This ATR site was selected since it has similar characteristics, such as the seasonal traffic trend and area type, compared with the project study area. Furthermore, the ATR site average annual daily traffic (AADT) is within 10 percent of the traffic volumes along OR 47, and has the same number of lanes as OR 47 through the study area.

Using data provided by ATR 03-013, seasonal adjustment factors are calculated for each count date and provided in Table 8. The yearly and seasonally adjusted traffic volumes for each study intersection are also shown in Appendix A, Figure A.3.

TABLE 8

Vernonia Transportation System Plan – Seasonal Trend Adjustment

Count Date	Seasonal Adjustment Factor
December 2	1.185
March 10	1.149
April 15	1.091
April 24	1.082

Note: Data for counts not occurring on the 15th of the month has been interpolated.
Source: 2005-2009 Permanent Automatic Traffic Recorder Stations – Trend Summaries. ODOT. http://www.oregon.gov/ODOT/TD/TDATA/tsm/tvt.shtml

Detailed calculations for these seasonal adjustment factors are provided in Appendix A of this memo.

The derived 30th highest hour design volumes were balanced between adjacent study intersections, as outlined by ODOT standards. Traffic volumes were not balanced along OR 47 between Weed Avenue and Texas Avenue, and between Missouri Avenue and Riverside drive due to the presence of other local roads and multiple driveways. Traffic volumes were also rounded to the nearest five vehicles. Traffic volumes less than 5 vehicles are indicated by a "<5" annotation. Appendix A, Figure A.4 illustrates the final rounded and balanced 30HV traffic volumes.

Performance and Mobility Standards

State highway mobility standards were developed for the *Oregon Highway Plan (OHP)* as a method to gauge reasonable and consistent standards for traffic flow along state highways. These mobility standards consider the classification (e.g., freeway, regional, district) and location (rural, urban) of each state highway. Mobility standards are based on volume to capacity (V/C) ratios. The 1999 OHP, with amendments adopted by the Oregon Transportation Commission from November 1999 through January 2006, was released on August 23, 2006. This version of the 1999 OHP will be referred to in this study.

Table 8 shows the OHP mobility standards for each study intersection. . These standards will be applied to all study intersections since they are all within ODOT jurisdiction. The intersection mobility standard is determined based on its traffic control. For unsignalized intersections, the highest V/C value for the major movement and the minor street movement is reported. Table 9 will be used to identify mobility standards in the existing and future conditions analysis.

Eight of the ten study intersections are located within ODOT Jurisdiction. The intersections of Maple Street/Weed Avenue and State Avenue/Stoney Point Road are under City of Vernonia jurisdiction. The 1999 Vernonia TSP assumed a mobility standard of LOS D, which will be applied to these two study intersections for existing and future scenarios.

TABLE 9
Vernonia Transportation System Plan – Intersection Classifications and Mobility Standards

No.	Location	Mile Point	OHP Highway Classification	Mobility Standard Category	Area	Speed (mph)	Existing or Future No-Build V/C Ratio Standard
				OR 47			
2	At Bridge Street	62.54	District	District	STA	20	0.95/0.95*
3	At Weed Avenue	62.48	District	District	STA	20	0.95/0.95
4	At State Avenue	62.09	District	District	Non-MPO	25	0.90/0.90
5	At Texas Avenue	61.70	District	District	Non-MPO	35	0.90/0.90
6	At Missouri Avenue	61.63	District	District	Non-MPO	35	0.90/0.90
7	At Riverside Drive	61.32	District	District	Non-MPO	35	0.90/0.90
8	At Maple Street	62.60	District	District	Non-MPO	25	0.90/0.90
10	At Cougar Street	62.66	District	District	Non-MPO	35	0.90/0.90

STA – Special Transportation Area
* V/C Ratio Standards are shown as uncontrolled approach/controlled approach
Speed Source: Field Visit (2010)
Existing and No-Build Mobility Source: Adopted Oregon Highway Plan as Amended in August 2006 (Table 6)

Traffic Analysis Software Tools

A Synchro 7 computer traffic operations model was constructed for the study area based on field observations of lane geometry and intersection control. The balanced 30th highest hour design turning movement volumes were applied, along with peak hour factors and truck percentages from the gathered turning movement counts. This model was used to assess existing traffic operations within the study area.

The Synchro model uses methodologies in the *2000 Highway Capacity Manual (HCM)* to analyze both signalized and stop-controlled intersections. The model also computes the v/c ratio and LOS to determine whether the intersection meets the applicable mobility standards.

SimTraffic, a traffic microsimulation software program, was used to collect vehicle queuing information for all signalized intersections. As a microscopic traffic model, SimTraffic models each vehicle as a separate entity with its own individual parameters and car-following logic.

Vehicle queue results are reported for the expected 95th percentile 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. An average of five SimTraffic runs was used to calculate the 95th percentile queue lengths.

Intersection Operational & Vehicle Queuing Analysis

Average intersection vehicle delay and level-of-service, 95th percentile queue length, and volume to capacity ratios were collected from the existing conditions Synchro and SimTraffic simulation models for the study area intersections. All Synchro and SimTraffic modeling followed the procedures outlined in the APM

Operational Analysis Results

Results from the operational analysis indicate that all ten study intersections currently meet jurisdictional mobility standards. This section updates the Current Intersection Level of Service section of the 1999 TSP.

Table 6 shows the results of the existing conditions intersection operational analysis. Appendix A, Figure A.4 provides the volumes, channelization, and analysis results for all of the study area intersections. Appendix A also provides the Synchro HCM reports for each study intersection.

V/C ratios that exceed mobility standards indicate 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.

As shown in Table 10, all of the 10 study intersections meet the OHP or City of Vernonia mobility standards during the p.m. peak hour. All study intersections operate with a v/c ratio less than 0.25, indicating very good operating conditions.

TABLE 10

Vernonia Transportation System Plan – Intersection Operational Results

ID	Intersection	Control Type	Mobility Standard		Existing Conditions (2010) Operations	
			Uncontrolled Approach	Controlled Approach	Uncontrolled Approach	Controlled Approach
1	State Avenue/Stoney Point Road	TWSC	LOS D		LOS A (9.7 sec/veh) Worst Movement= EBL/T/R	
2	Rose Avenue/Bridge Street[1]	AWSC	0.95		0.25	
3	Bridge Street/Weed Avenue	TWSC	0.95	0.95	0.02	0.16
4	Bridge Street/State Avenue	TWSC	0.90	0.90	0.15	0.14
5	Bridge Street/Texas Avenue	TWSC	0.90	0.90	0.02	0.05
6	Bridge Street/Missouri Avenue	TWSC	0.90	0.90	0.00	0.03
7	Bridge Street/Riverside Drive	TWSC	0.90	0.90	0.01	0.02
8	Rose Avenue/Maple Street	TWSC	0.90	0.90	0.00	0.08
9	Maple Street/Weed Avenue	AWSC	LOS D		LOS A (7.5 sec/veh)	
10	Rose Avenue/Cougar Street	TWSC	0.90	0.90	0.00	0.05

Notes:
[1]The intersection of Bridge Street/Rose Avenue has a free NBR movement. The westbound approach is yield controlled.
AWSC: All-Way Stop Controlled
TWSC: Two-Way Stop Controlled
V/C ratios for All-Way Stop Controlled intersections are for the whole intersection.
Source: Synchro 7 Operational Analysis

Vehicle Queuing Analysis Results

The analysis shows that no intersection lane groups within the study area are experiencing vehicle queue lengths that exceed existing available storage. Vehicle queues and available storage are shown in Table 11.

TABLE 11

Vernonia TSP - 2010 Existing Conditions 95th Percentile Queues

ID	Intersection	Method	Approach	Lane Group	Existing Storage (feet)	Queue Length (feet)
1	State Avenue/ Stoney Point Road	95% Queue SimTraffic	Eastbound	Left/Thru/Right	-	20[1]
			Westbound	Left/Thru/Right	740	40
2	Rose Avenue/ Bridge Street	95% Queue SimTraffic	Eastbound	Left/Thru/Right	280	50
			Westbound	Left/Thru/Right	260	40
			Northbound	Left/Thru	280	60
				Right	75	50
			Southbound	Left/Thru/Right	300	60
3	Bridge Street/ Weed Avenue	95% Queue SimTraffic	Southbound	Left/Thru/Right	-	70
4	Bridge Street/ State Avenue	95% Queue SimTraffic	Southbound	Left/ Right	240	70
5	Bridge Street/ Texas Avenue	95% Queue SimTraffic	Northbound	Left/Thru/Right	Driveway	n/a
			Southbound	Left/Thru/Right	150	50
6	Bridge Street/ Missouri Avenue	95% Queue SimTraffic	Northbound	Left/Thru/Right	850	30
			Southbound	Left/Thru/Right	120	20
7	Bridge Street/ Riverside Drive	95% Queue SimTraffic	Northbound	Left/Thru/Right	170	n/a
			Southbound	Left/Thru/Right	170	20
8	Rose Avenue/ Maple Street	95% Queue SimTraffic	Eastbound	Left/Thru/Right	260	20
			Westbound	Left/Thru/Right	290	60
9	Maple Street/ Weed Avenue	95% Queue SimTraffic	Eastbound	Thru/Right	290	60
			Westbound	Left/Thru	290	50
			Northbound	Left/ Right	270	30
			Southbound	Left/Thru/Right	280	60
10	Rose Avenue/ Cougar Street	95% Queue SimTraffic	Eastbound	Left/Thru/Right	270	50
			Westbound	Left/Thru/Right	driveway	20[1]

Notes:

[1] Queue Lengths less than 20' were rounded up to 20' to represent the minimum queue length of a single vehicle.

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

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

- indicates existing storage exceeds 1,000 feet.

Distances provided are available storage lengths from stop bar to the beginning of the taper or to nearest adjacent intersection.

Queue lengths are rounded up to the nearest 10 feet.

n/a= not applicable. No vehicle turn movements were recorded during the p.m. peak hour.

Safety Analysis

This section updates the Traffic Safety Section of the 1999 TSP.

A detailed traffic safety analysis was not conducted for the Vernonia Transportation System Plan Update. Based on OR 47 crash records between milepost 61 through 63, 46 recorded crashes occurred between 2000 and 2009. These crashes were fairly uniform in distribution. The highest number of crashes were fixed object. Other crashes types included rear end, pedestrian, and animal type crashes. Angle (turning) and crossing type crashes did occur; however, they were infrequent. Due to the relatively low number of recorded collisions over the last 10 years (4.6 collisions per year), ODOT and the project team concluded a focused crash analysis would not be of significant value to update.

Summary of Existing Conditions

Operational Conditions

All study intersections meet applicable mobility standards and all intersection lane groups have 95th percentile queue lengths that are at or less than storage capacity.

Access Points along OR 47

This section updates the State Highway Access Conditions section of the 1999 TSP.

An inventory of all public and private access points within the study area was conducted, and the access points are aggregated by OR 47 road segment in Table 12 and Figure 4 a,b. Within the study area, there are a total of 112 access points along the facility. Forty access points are associated with intersection approaches while the remaining 82 access points are residential or business driveways. Many residential driveways access OR 47 directly.

TABLE 12
City of Vernonia TSP – OR 47 Existing Access Inventory

	Number of Access Points to Highway	
OR 47 Road Segment	South and East Side	North and West Side
Rose Street from Limits to Bridge	4	10
Bridge Street from Rose Avenue to Rock Creek	7	13
Bridge Street from Rock Creek to Texas Avenue	7	13
Bridge Street from Texas Avenue to Mist Drive	9	11
N Mist Drive from Bridge Street to Ivy Street	13	0
N Mist Drive from Ivy Street to City Limits	8	17
Total Access Points	48	64

CH2M HILL analysis, 2010

The State of Oregon had codified access management and spacing standards. The purpose of these standards is to provide a safe and efficient transportation system by protecting highway traffic from the hazards of unrestricted and unregulated entry from adjacent properties. Oregon Administrative Rule (OAR) 734-051-0115 specifies access management standards for ODOT facilities. The standards are based on the functional classification of the highway, the general type of land use (i.e., rural, urban), and the posted speed. In the Vernonia study area, OR 47 is subject to state access spacing standards. Relevant state access management spacing standards for OR 47 are found in Table 4 of the OAR Division 51 Tables. This Division 51 table is provided here as Table 13, with applicable spacing standard values bolded in each table.

TABLE 13
Division 51 Tables, Table 4:ODOT Access Management Spacing Standards for Private and Public Approaches on District Highways (1)(2)(3)(4)
*Measurement is in Feet**

Posted Speed(5) **(miles per hour)**	**Rural Expressway ** **	**Rural**	**Urban Expressway** *** **	**Urban *** **	**STA**** **
≥55	5,280	700	2,640	700	
50	5,280	550	2,640	550	
40 & 45	5,280	500	2,640	500	
30 & 35		400		350	(6)
≤25		400		350	(6)

Notes:

**Measurement of the approach road spacing is from center to center on the same side of the roadway*

*** Spacing for Expressway at-grade intersections only. See the OHP for interchange spacing guidelines.*

****These standards also apply to Commercial Centers.*

*****Special Transportation Area*
Source: http://www.oregon.gov/ODOT/HWY/ACCESSMGT/accessmanagementmanual.shtml

(1) These access management spacing standards are for unsignalized approaches only. Signal spacing standards supersede access management spacing standards for approaches.

(2) These access management spacing standards do not apply to approaches in existence prior to April 1, 2000 except as provided in OAR 734-051-0115(1)(c) and 734-051-0125(1)(c).

(3) For infill and redevelopment, see OAR 734-051-0135(4).

(4) For deviations to the designated access management spacing standards see OAR 734-051-0135.

(5) Posted (or Desirable) Speed: Posted speed can only be adjusted (up or down) after a speed study is conducted and that study determines the correct posted speed to be different than the current posted speed. In cases where actual speeds are suspected to be much higher than posted speeds, the Department reserves the right to adjust the access management spacing accordingly. A determination can be made to go to longer access management spacing standards as appropriate for a higher speed. A speed study will need to be conducted to determine the correct speed.

(6) Minimum access management spacing for public road approaches is the existing city block spacing or the city block spacing as identified in the local comprehensive plan. Public road connections are preferred over private driveways and in STAs driveways are discouraged. However, where driveways are allowed and

where land use patterns permit, the minimum access management spacing for driveways is 175 feet (55 meters) or mid-block if the current city block spacing is less than 350 feet (110 meters).

Of the 40 public approaches onto OR 47 in the Vernonia Study area, only three intersections meet ODOT intersection spacing requirements outlined in Table 13. The spacing between public intersections widely varies. Most intersections in the downtown area are spaced between 300 and 390 feet apart; however, none of these intersections maintain the required 350 feet between both upstream and downstream intersections. Furthermore, seven of the eighty-two private driveway approaches meet the standard. Only driveways located along N. Mist Drive near the Vernonia north city limits are within standard. These driveways are isolated from public approaches and therefore meet the applicable access standard.

Transit Facilities

This section updates the Public Transportation Services section of the 1999 TSP. The Columbia County Rider (CC Rider) provides the Nehalem Valley Fixed Route Service each Monday through Friday to serve commuters of Vernonia. The morning route originates from Vernonia City Hall, departing at 6:15 a.m., with stops at Stub Stewart State Park and Staley's Junction before arriving at Tri-Met's Willow Creek Station at 7:15 a.m. for transfers to Tri-Met's system. The morning return trip arrives back at City Hall at 8:10 a.m. The afternoon trip makes the same stops and departs City Hall a 4:30 p.m., arrives at the Willow Creek Station at 5:30 p.m., and is back at City Hall at 6:25 p.m. In addition, Vernonia is served by the CC Rider West County Flex Route, which operates between Vernonia and St. Helens with stops in Scappoose. This route currently operates on Tuesdays and Thursdays only, with departure times from Vernonia at 8:30 and 11:00 am, and 2:00 pm. This bus connects with the CC Rider Portland and Washington County Fixed Route buses as well as the North and South Flex Routes.

Bicycle and Pedestrian Facilities

According to the American Association of State Highway and Transportation Officials (AASHTO)'s Guide for the Development of Bicycle Facilities 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.

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 or provides directional information in bicycling minutes or distance.

- *Shoulder Bikeway* – These are paved roadways that have striped shoulders 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. 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 when maintenance vehicle loads are not expected to damage pavement, the width may be reduced to as little as 8 feet.

Existing Facilities

The following paragraphs describe the bicycle facilities present in Vernonia. See Figure 5 for an inventory of bicycle facilities on arterial and collector streets. Guidance for the construction of new bicycle facilities in the City of Vernonia is included in Public Works Design Standards Section 6.0070, with minimum widths for different facility types provided in Section 6.0071.

Bike Lanes / Shoulder Bikeways

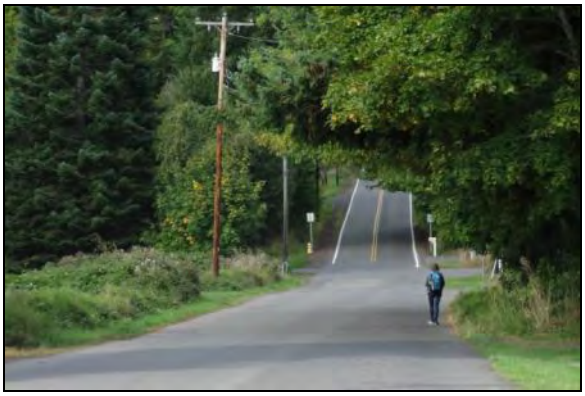
This section updates the Bicycle Facilities section of the 1999 TSP. Oregon Highway 47 is marked with a bike lane for approximately one third of a mile inside the Vernonia city limits, from Vernonia Lake City Park on the east to Texas Avenue on the west. The highway lacks bike lanes or shoulders through central Vernonia between O-A Hill and Rose Street, due to topographic constraints around O-A Hill and on-street parking provided through

Highway 47 bike lane with bike stencil.

downtown. The Rock Creek and Nehalem River bridges are constrained areas for bicyclists riding on Highway 47, where the roadway narrows to approximately 22-24 feet, where cyclists and motorists share 11-12 foot lanes in each direction. The Oregon State Bicycle Map shows Highway 47 as having wide 4-foot shoulders as it travels on Rose Avenue south of Bridge Street and on Mist Drive from the Nehalem River Bridge to Knott Street.

Shared Roadways / Signed Shared Roadways

Most local streets in Vernonia are low speed/low volume roadways that could be classified as shared roadways. These streets can accommodate bicyclists of varying 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). Roadway widths range between 25 and 40 feet with typical street cross-sections including two vehicle travel lanes with parking on both sides, depending on the presence of curbs and sidewalks.



State Avenue is an example of a shared roadway in Vernonia.

State Avenue is the only street in Vernonia designated as an urban collector/major rural collector other than Highway 47. A posted speed of 25 mph and a curb-to-curb width of 36 feet provide ample room for the street to function as a shared roadway south of C Street. North of C Street, State Avenue narrows, with a variable width shoulder of zero to two feet. The posted speed increases to 35 mph and there is no bikeway signing or other accommodations for bicyclists.

Shared-use Paths

There are several shared-use paths in Vernonia, all of which are located south of Bridge Street and Highway 47. The Banks-Vernonia State Trail parallels Highway 47, connecting Vernonia to the town of Banks and the recently opened Stub Stewart State Park to the south. The State Trail is paved with asphalt and measures approximately eight feet wide, below the recommended minimum width for shared-use paths. Just under two miles long, the Vernonia Linear Trail Extension connects the Banks-

The Vernonia Linear Trail Extension is a two-mile long multi-use path that loops around Vernonia Lake.

Vernonia State Trail to Vernonia Lake City Park and completes a loop around Vernonia Lake. The Linear Extension also measures approximately eight feet wide, with two foot wide gravel shoulders on either side. Another 0.2 miles of shared-use path connects the Banks-Vernonia State Trail to California Avenue long the southern edge of the existing Vernonia school fields. Access to these paths from east of the Nehalem River is difficult, given lack of bicycle facilities on the Nehalem River bridge on Highway 47.

Pedestrian Facilities

This section updates the Pedestrian Facilities section of the 1999 TSP. According to the OBPP, pedestrian facilities are defined as any facilities utilized by a pedestrian or persons in 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. The ODOT standard for sidewalk travelway width is 6 feet, with a minimum travelway width of 5 feet acceptable on local streets. The unobstructed travelway for pedestrians should be clear of utility poles, sign posts, fire hydrants, vegetation and other site furnishings. Sidewalks located directly adjacent to the curb are known as "attached" sidewalks, while sidewalks buffered from the curb by a planter strip are known as "detached" sidewalks.
- *Shared-use Paths* – 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.
- *Roadway Shoulders* – Roadway shoulders often serve as pedestrian routes in many rural 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.

Existing Pedestrian Facilities

The following paragraphs describe the pedestrian facilities present in Vernonia. See Figure 6 for an inventory of pedestrian facilities on arterial and collector streets.

Sidewalks

The presence and condition of sidewalks in Vernonia varies by location. Where they exist, older sidewalks are generally four feet wide, set back from the curb by a planter strip, and may show some condition issues including cracks or heaves. Newer sidewalks are five feet wide, set curb-tight and in good condition, though some segments of newer sidewalks are located in areas without a consistent sidewalk

network. Sidewalk widths throughout the city measure from four feet in areas with older sidewalks, to ten feet downtown and along the south side of Bridge Street adjacent to the existing Vernonia schools. Design requirements for the construction of sidewalks in the City of Vernonia are set forth in Public Works Design Standards Section 6.0060. The minimum width for the construction of new sidewalks is 5 feet or greater, depending on street classification and adjacent land use.

Northwest Vernonia

North of Bridge Street and west of Rose Avenue, most streets lack sidewalks. Exceptions are in areas of recent development, where curb-tight sidewalks were installed along with the construction of new housing. Examples of these areas include 4th Avenue and Rose Hedge Court.

Bridge Street in downtown Vernonia has pedestrian amenities – such as curb extensions, street trees, pedestrian-scale lighting and decorative stamped crosswalks – that help improve the pedestrian experience.

Downtown Vernonia and Bridge Street

The sidewalk environment in the downtown core includes a variety of complementary pedestrian facilities such as ADA-compliant curb ramps at intersections, sidewalk curb extensions, pedestrian-scale lighting, and street trees. Sidewalks on Bridge Street downtown are ten feet wide, with a six foot clear zone and four foot planter strip/furniture zone. Planter strips downtown contain street trees but are otherwise filled with concrete paving stones. Most intersections at Bridge Street downtown are equipped with small curb extensions with curb ramps and decorative stamped crosswalks. These amenities, along with improved building frontages, make for an inviting pedestrian environment in downtown Vernonia.

Most north-south side streets in the downtown area also have sidewalks set back from the curb by planter strips. Notable streets in the downtown area missing sidewalks include Maple Street, Cougar Street and Weed Avenue. Sidewalks on Bridge Street taper to five feet wide, curb-tight, over the Rock Creek Bridge. The lack of sidewalks on Weed Avenue north of Bridge Street is highlighted by the presence of an informal demand path between the dead-end of Columbia Street and the Wauna Federal Credit Union parking lot.

Rock Creek to O-A Hill

The majority of existing sidewalks in Vernonia are located in the residential area between Rock Creek and O-A Hill, north of Bridge Street and the existing Vernonia schools. Most sidewalks in this area are four feet wide and set back from the curb by a planter strip. However, sidewalks lack curb ramps at most intersections in this area. In some places, the sidewalk is set lower than the roadway and existing curbs, and the curb

becomes an obstacle and trip-hazard to pedestrian traffic. Intersections along Bridge Street are generally exceptions to this trend, with stamped crosswalks and curb ramps at locations that access the existing Vernonia Schools. The sidewalk on the south side of Bridge Street directly adjacent to the schools is ten feet wide and curb-tight.

O-A Hill

O-A Hill is the main obstacle to east-west pedestrian movement across Vernonia; Bridge Street/Highway 47 is the only through street pedestrians can use to traverse the hill. As it wraps around O-A Hill, Bridge Street lacks sidewalks or shoulders on either side, but pedestrians may use a sidepath on the south side of the street, separated from motor vehicle traffic by a guard rail. Like the adjacent roadway, the sidepath is paved with asphalt. There are no major issues with the pavement condition on the sidepath. The clear travelway along the sidepath is six feet between the guard rail footings on the north side and a chain link fence on the south side, which is below the standard for a path facility that is shared by both pedestrians and bicyclists. Pedestrians and bicyclists may have difficulty crossing to the south side of Bridge Street in order to use the sidepath due to limited visibility on either side as the street curves around O-A Hill.

A six foot wide sidepath along the south side of Bridge Street is the only formal facility for bicyclists and pedestrians who need to cross O-A Hill.

The many informal paths between the alphabet streets on the west and Louisiana Avenue on the east side of O-A Hill reflect the need to cross the hill for Vernonia residents. These paths are steep, with slopes of up to 40%in order to gain the elevation of over 100 feet to summit the hill. Many of these informal paths begin at the bottom of the hill at the ends of streets such as North Street and A Street, and emerge at the top of the hill on Louisiana Avenue or in the bushes of Ora Bolmeier City Park.

O-A Hill to Nehalem River

With the exception of Bridge Street, and several houses recently constructed on Lakeview Drive, there are virtually no sidewalks on streets between O-A Hill and the Nehalem River. Sidewalks along Bridge Street in this area are generally curb-tight and five feet wide, with curb ramps at most intersections. Sidewalks along Bridge Street end near Spencer Avenue and Vernonia Lake City Park. Pedestrians use the shoulder on the south side of Bridge Street to cover the remaining distance east to the Nehalem River Bridge.

East of Nehalem River

There are five foot sidewalks on the Nehalem River Bridge, but the clear travelway is constrained at either end of the bridge to widths as little as three feet or less. Several local streets east of the Nehalem River such as Heather Lane have sidewalks, but Mist Drive/Highway 47 lacks dedicated pedestrian facilities. Pedestrians walking along Mist Drive use the highway shoulder, which varies up to four feet in width.

Shared-use Paths

Vernonia's shared-use paths, –discussed in the bicycle facilities section above, are attractive to residents and visitors as recreational and exercise facilities for walking and running. But whereas the majority Vernonia residents live on the north side of Bridge Street/Highway 47, all of Vernonia's existing shared-use paths are located on the south side of Bridge Street/Highway 47. Because they do not provide direct connections between common pedestrian trip origins and destinations in Vernonia, these shared-use paths serve only a limited function as pedestrian transportation routes.

Safe Routes to School

Walking and bicycling are key aspects of student travel to school in Vernonia. According to the Vernonia School Siting Travel Mode Study completed by Kittleson and Associates in 2008, walking is the most common mode of travel to school for students living inside the Vernonia city limit. Approximately 46 percent of students walk to school on a given day. Rates for student bicycling are lower, approximately 3 percent, but may reach levels as high as 10 percent during fair weather months at the beginning and end of the school year.

Existing conditions along Missouri Avenue near the future site of Vernonia schools. The 2009 Vernonia School Campus Transportation Impact Analysis Current plans call for the construction of a shared-use path parallel to the road

The sidewalk network adjacent to the existing Vernonia schools is among the most complete in the city. However, when the new Vernonia schools are built at the Boot Site at the existing Spencer Park, the schools will be located in an area that generally lacks sidewalks. The two streets that will provide access to the school, Texas Avenue and Missouri Avenue, currently lack sidewalks. The Vernonia School Campus Transportation Impact Analysis prepared by Kittleson and Associates in 2009 calls to "provide pedestrian and bike facilities" along Missouri Avenue (, and a "pedestrian-bike connection linking the campus to Texas Avenue."

The new schools' location east of O-A Hill will create a challenge for students living west of O-A Hill. According to the Vernonia School Siting Travel Mode Study completed by Kittleson and Associates in 2008, nearly 70% of students inside the Vernonia city limits live west of O-A Hill, and represent more than 74% of students currently walking to school. The only existing route to access the new school site from west of O-A Hill uses the six foot wide sidepath along the south side of Bridge Street. In light of conditions along the existing route on Bridge Street, the Transportation Impact Analysis recommends the following improvements:

- Retain bike lanes on Bridge Street between Texas and Missouri Avenues;

- Install a multi-use pedestrian-bicycle path along the south side of Bridge Street between Texas and Missouri Avenues;
- Provide a pedestrian connection from the new school site to the city center of Vernonia.

The Transportation Impact Analysis does not directly address the condition of the existing sidepath along Bridge Street around O-A Hill. However, it did develop two additional Proposed Alternative Routes intended to be analyzed further in the Vernonia TSP. These proposed routes would climb O-A Hill from North Street to Ora Bolmeier City Park, and follow local streets north of Bridge Street to connect to the new school site. These routes are currently used informally by local residents, but would be challenging to develop into formal pedestrian and bicycle facilities. Both alternative routes pass through a heavily forested area and face an elevation gain of approximately 100 feet over a short horizontal distance.

Bicycle and Pedestrian Volumes

Census 2000 Journey to Work data shows that approximately 3 percent of employed residents in Vernonia walk to work, while bicycling rates are too low to measure as a commute mode. Additionally, another 3 percent of Vernonia residents work from home, and may be likely to make local walking or bicycling trips during the day. Walking and bicycling are not feasible commute options for the majority of Vernonia workers who work outside the city, 77 percent as of Census 2000, due to distance.

A series of traffic counts conducted at key intersections in March 2010 correlates with moderate levels of walking traffic and low levels of bicycle traffic in Vernonia. The highest levels of pedestrian activity were measured in downtown, where 97 pedestrians, along with two bicyclists, were counted passing through the intersection of Bridge Street and Weed Avenue during the evening peak travel hours from 3 to 5 p.m.

Issues Important to the Community

The Transportation System Plan update is the first City document to be updated. The City hopes to continue updating various planning documents including the City's Comprehensive Plan to make sure they are up to date and consistent with State, County and other documents within the City.

At the first joint Project Advisory Committee (PAC) and Project Management Team (PMT) meeting, community leaders and stakeholders identified specific issues that might not be captured by the traffic analysis and inventory of existing facilities.

A number of PAC and PMT members noted that sight distance along Bridge Street from the side streets was hampered by on street parking, making it difficult to pull out onto Bridge Street safely. Other safety concerns or areas where "near misses" occur include the three leg intersection near Green Bride where Pebble Creek, Mist Drive and Bridge Street intersect, sight distance issues near Stoney Point and Keasey Roads near Mellinger. Pulling out from Hawkins Park onto Bridge Street is also dangerous due to limited sight distances. The group noted that the Rose Avenue/Bridge Street

intersection is confusing for visitors who are trying to follow OR 47 through town, and dangerous for pedestrians and bicyclists.

There were concerns about congestion on City streets from new development including the Nehalem View subdivision and the location of the new schools, potential development near the airport, and potential residential development near Rose and 6th Avenue. The Fire Department is concerned that queuing vehicles waiting to turn left onto Missouri to access the future school site may interfere with or lengthen response times for emergency vehicles exiting the fire station to respond to emergency calls.

PAC and PMT members also raised concerns about bicyclists and pedestrians in the City, specifically how students will get to the new school site by bicycle and walking, and were concerned with the sidewalk ending on the west side of Green bridge to and along Mist Drive. There was a concern about the safety of bicyclists on Bridge Street, and some members noted that bicyclists sometimes ride erratically on OR 47 through town.

The group discussed the need for bus pull-outs to allow vehicles to move out of the traffic flow to pick up riders, and the need for a park and ride in town, potentially at the site of the old Western Oregon Electric Co-Op building.

Summary

Land Use Inventory

- Most land in Vernonia is zoned residential
- There are some Buildable lands still available for development, mostly in residentially zoned areas, with some zoned light industrial
- There were approximately 560 jobs in Vernonia in 2008, and the main employers are the school district, government, and a retreat and conference center

Traffic Operations

- All 10 study area intersections operate within State and City standards
- There are currently no vehicle queues that exceed available storage capacity

Bicycle and Pedestrian Facilities

- There is a bike lane for approximately one third of a mile along OR 47 within the City Limits. The highway lacks shoulders through central Vernonia between O-A Hill and Rose Street due to topographical constraints and on-street parking
- Cyclists share the travel lane over Rock Creek and Nehalem River Bridges
- Most local streets could be considered shared roadways due to their low speeds and low traffic volumes
- There are some newly developed areas with sidewalks, though these are not always continuous

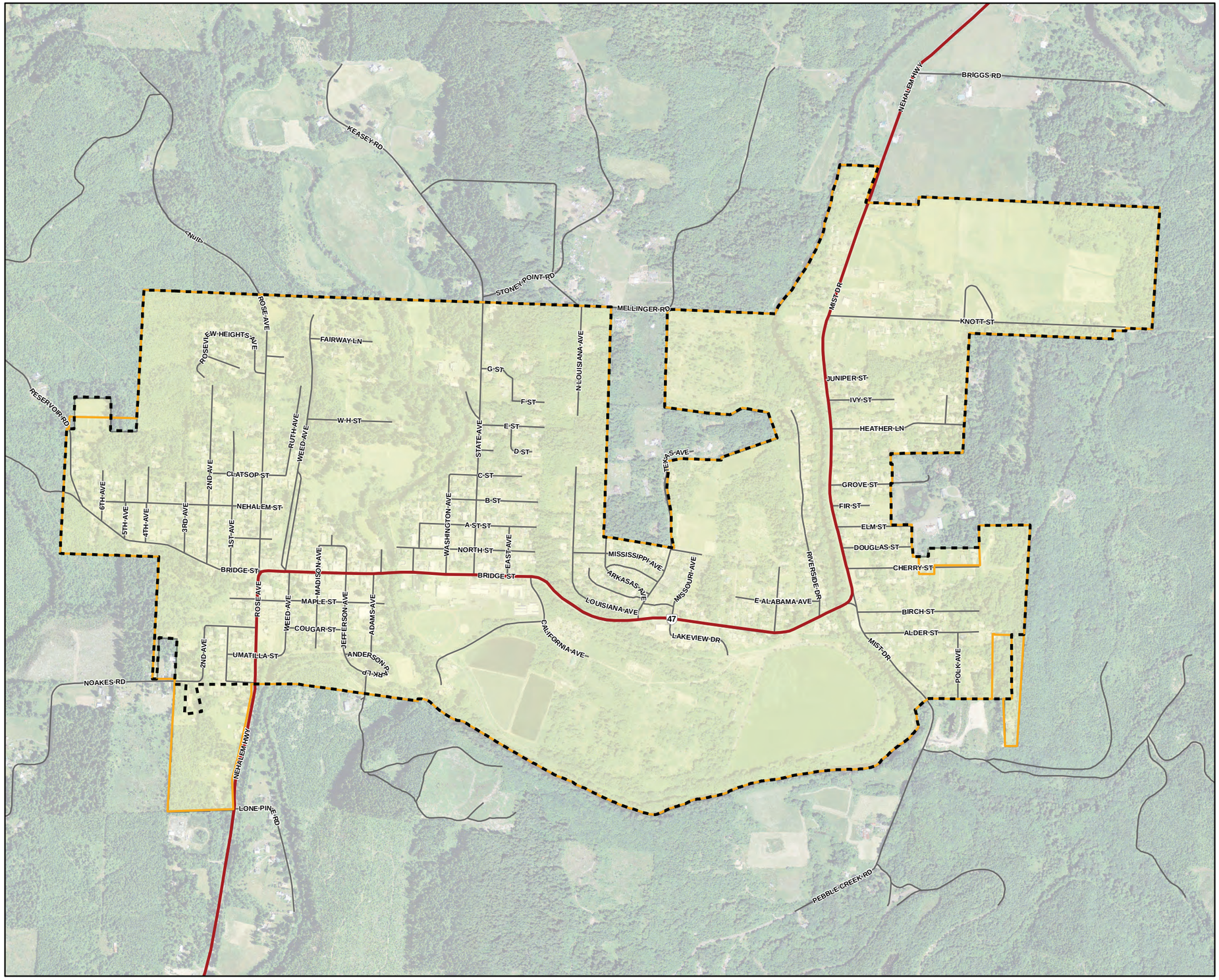
- Downtown and adjacent streets have a connected network of sidewalks with pedestrian amenities
- Maple Street, Cougar Street and Weed Avenue are lacking sidewalks near the downtown area
- O-A Hill is the main obstacle to east-west pedestrian movement within Vernonia – a sidepath along the south side of OR 47 is the only option for pedestrians
- There are very few sidewalks between O-A Hill and the Nehalem River
- Mist drive north of Bridge Street does not have any dedicated pedestrian facilities

NOTICE:

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.

Figures



VICINITY MAP

LEGEND

- State Highway
- Streets
- City Limits
- Urban Growth Boundary
- Study Area

N

0 250 500 1,000
Feet

FIGURE 1
Study Area
Vernonia Transportation System Plan
City of Vernonia, Oregon

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VICINITY MAP

LEGEND

- Study Area
- Streets
- State Highway

Zoning - BW

ZONING

- DT - Downtown
- GC - General Commercial
- GR - General Residential
- IP - Institutional Public
- LDR - Low Density Residential
- LI - Light Industrial
- PR - Public Recreation
- R - Residential

Sources:
1. UGB and City Limits - City of Vernonia, 2010
2. Parcels and Streets - City of Vernonia, 2010

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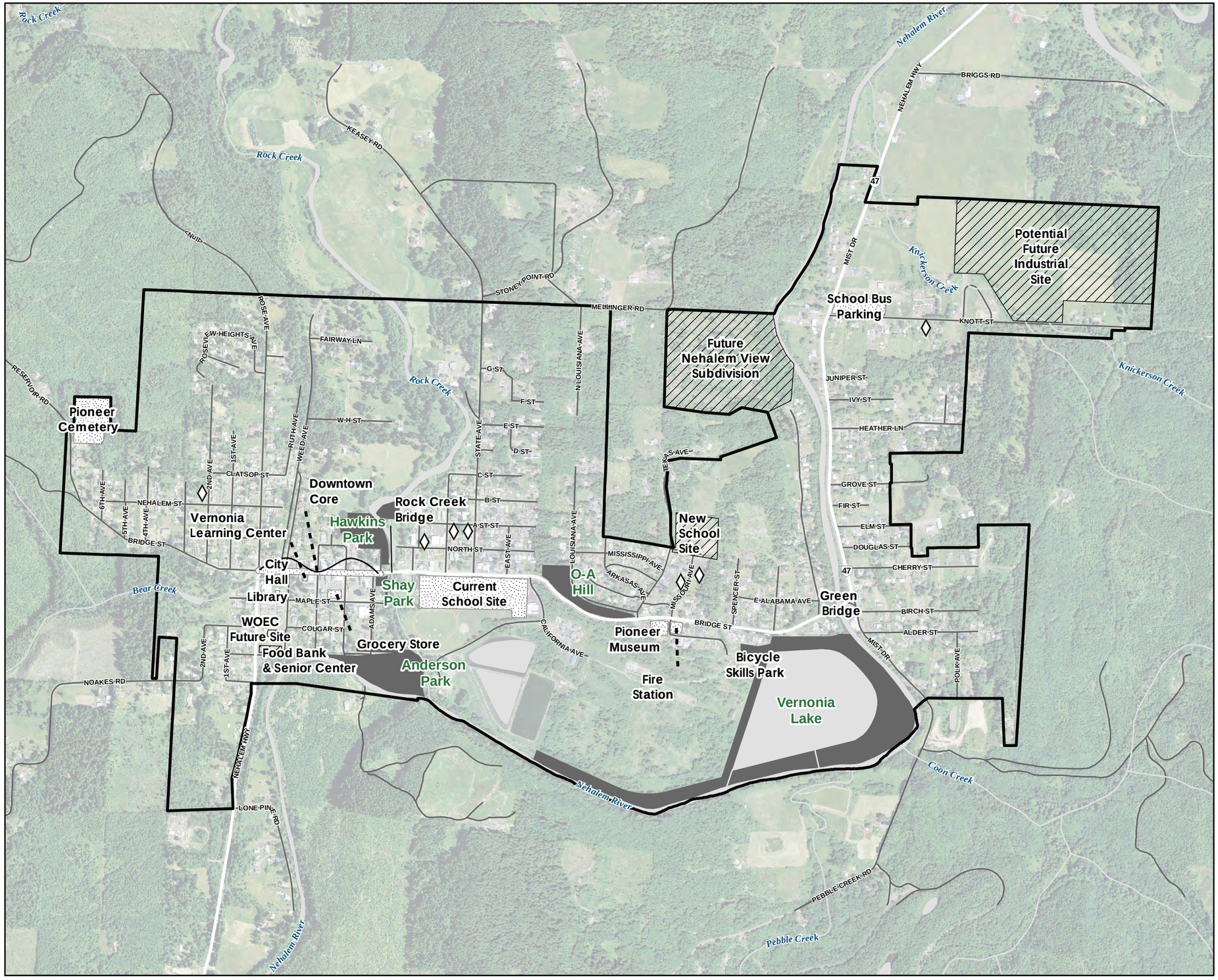
Feet

FIGURE 2
Zoning
Vernonia Transportation System Plan
City of Vernonia, Oregon



VICINITY MAP

LEGEND

- Churches
- State Highway
- Streets
- Study Area
- Parks
- Water Bodies

Community Facilities

- Current
- Future

Sources:
1. City Limits - City of Vernonia, 2010
2. Parks and Streets - City of Vernonia, 2010
3. Waterbodies - PNW Hydro, 2005
4. Community Facilities and Churches - CH2M Hill, 2010

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Feet

FIGURE 3
Vernonia Community Facilities
Vernonia Transportation System Plan
City of Vernonia, Oregon

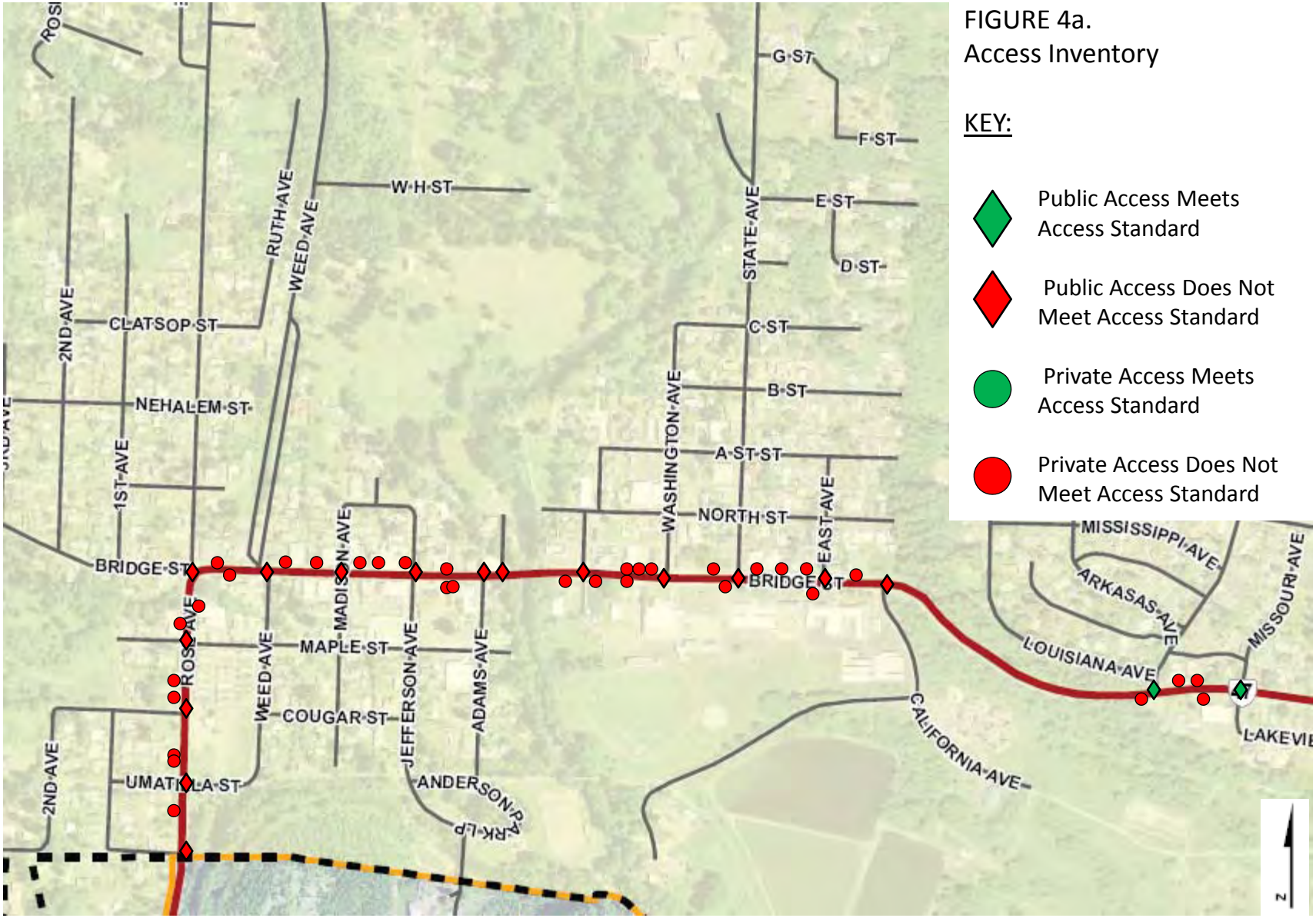
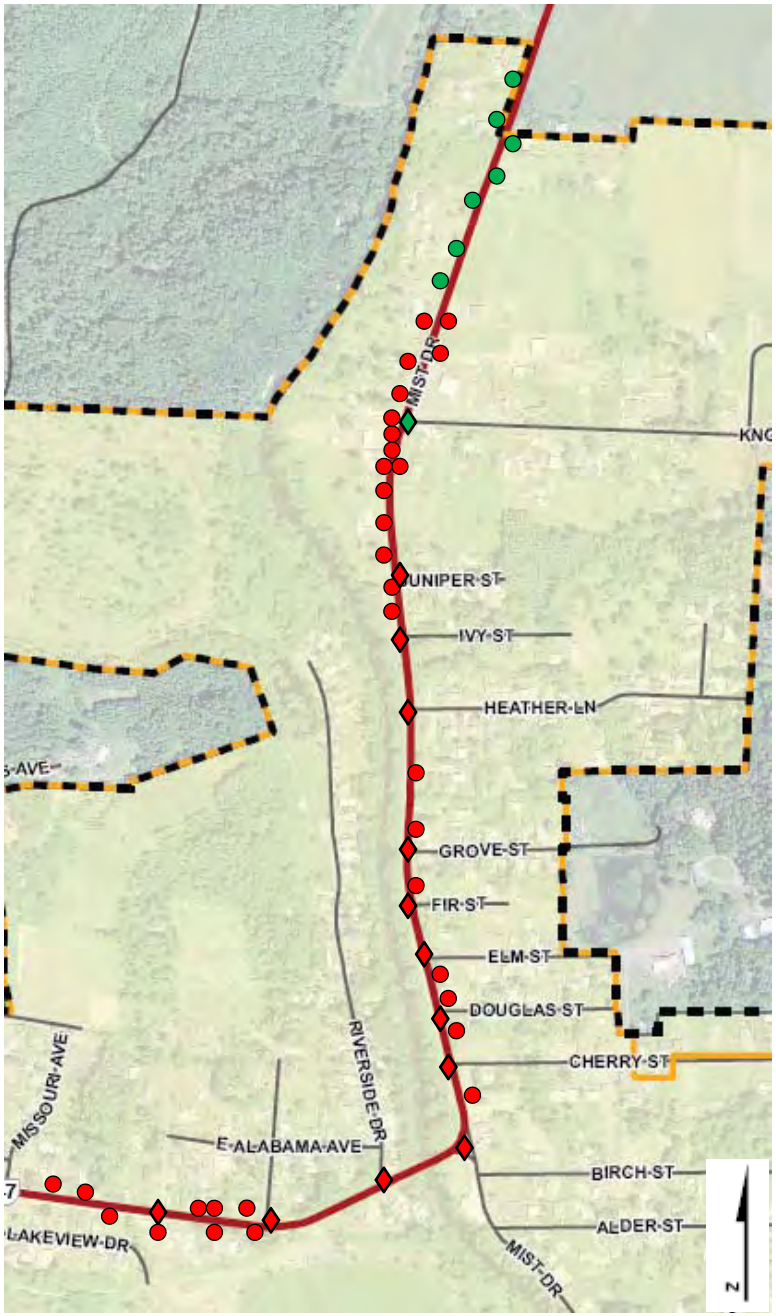


FIGURE 4a.
Access Inventory

KEY:

- Public Access Meets Access Standard
- Public Access Does Not Meet Access Standard
- Private Access Meets Access Standard
- Private Access Does Not Meet Access Standard

Note: Driveway locations are approximate.

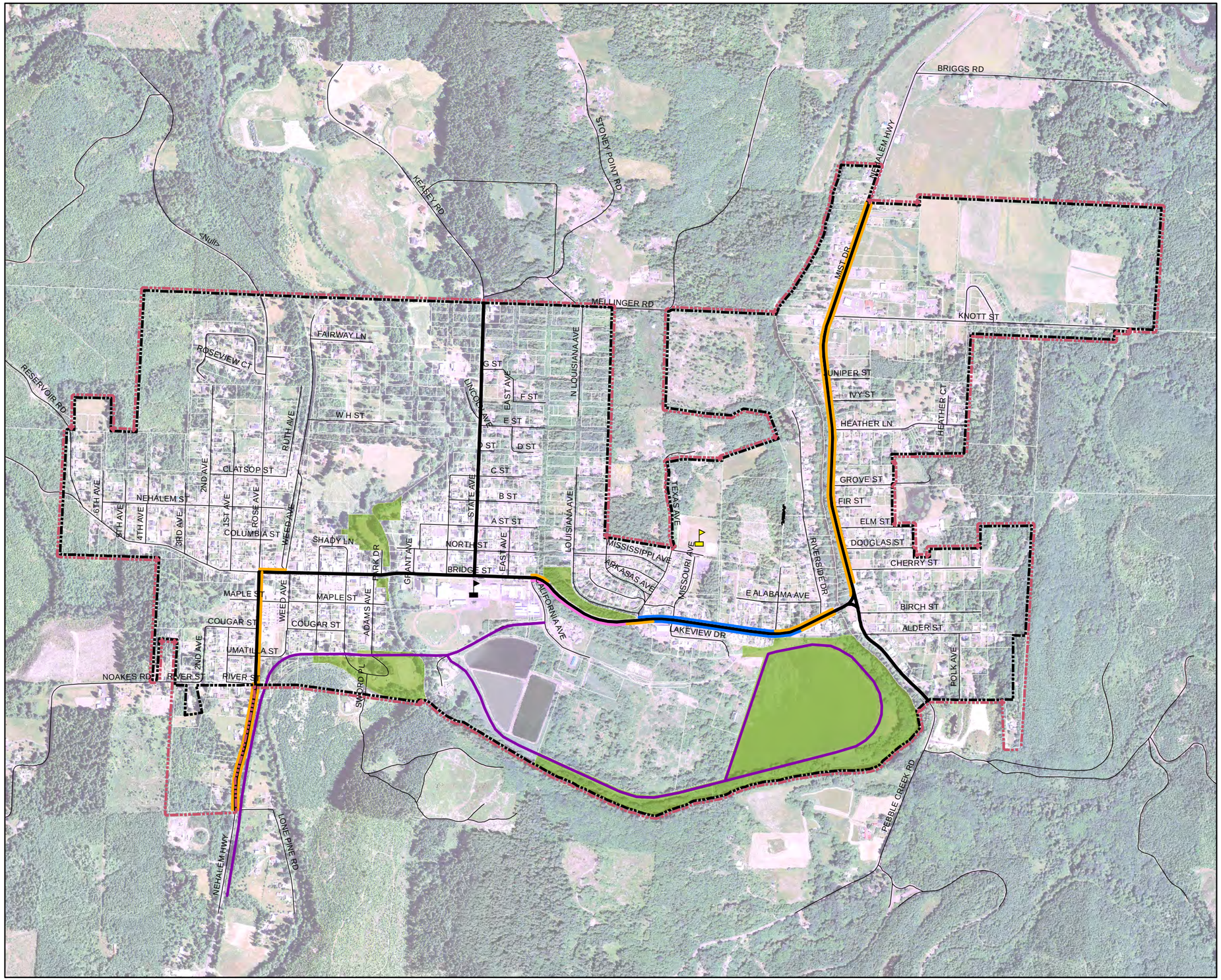


Note: Driveway locations are approximate.

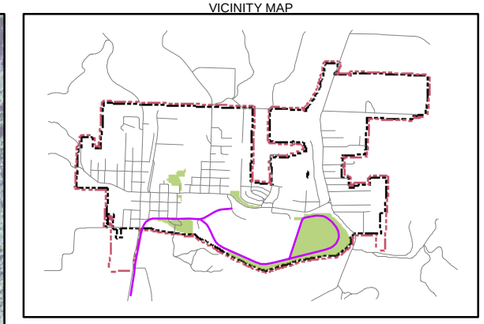
FIGURE 4b.
Access Inventory

Key:

- Public Access Meets Access Standard
- Public Access Does Not Meet Access Standard
- Private Access Meets Access Standard
- Private Access Does Not Meet Access Standard



VICINITY MAP



LEGEND

- Existing Vernonia Schools
- Future Site of Vernonia Schools

Bike Facilities Inventory

- Bike Lane
- Shoulder Sidepath
- Shoulder
- Shared-Use Paths
- Inventoried Streets (Arterials & Collectors)
- Streets
- Parks
- City Limits
- Vernonia TSP Study Area

Sources:
1. UGB and City Limits - City of Vernonia, 2010
2. Streets - City of Vernonia, 2010

N

0 250 500 1,000 1,500 2,000
Feet

FIGURE 5
Bicycle Facilities Inventory
Technical Memo #2
Vernonia TSP

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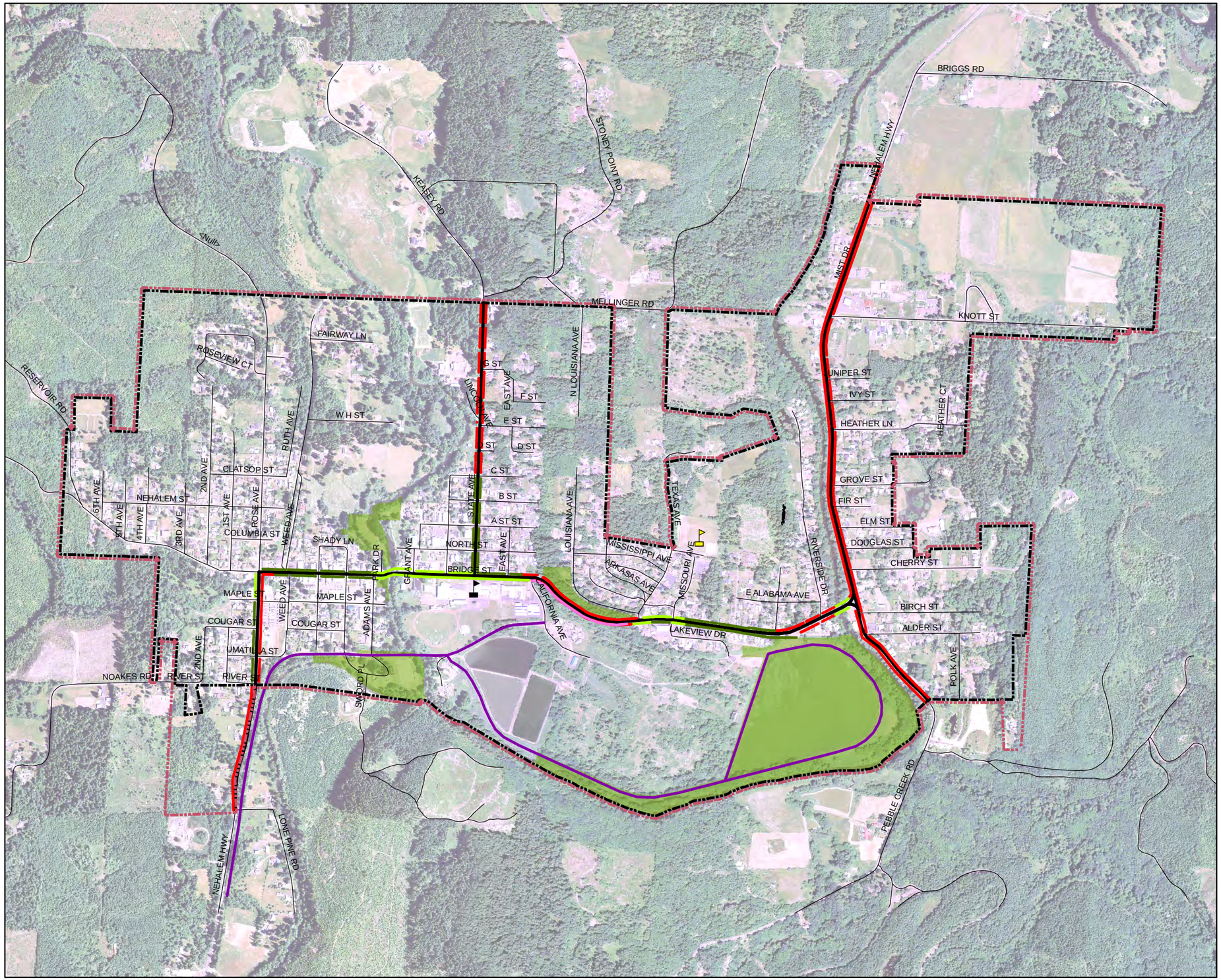
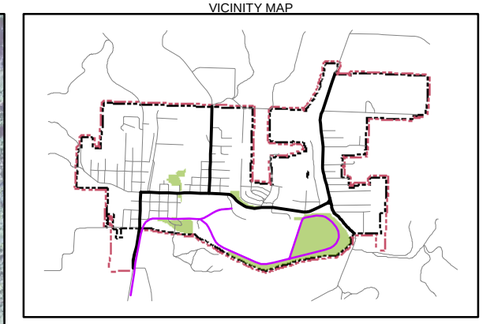


VICINITY MAP



LEGEND

- Existing Vernonia Schools
- Future Site of Vernonia Schools

Pedestrian Facilities Inventory

- Attached Sidewalk
- Detached Sidewalk
- Sidewalk Missing
- Shoulder Sidepath
- Shared-Use Paths
- Inventoried Streets (Arterials & Collectors)
- Streets
- Parks
- City Limits
- Vernonia TSP Study Area

Sources:
1. UGB and City Limits - City of Vernonia, 2010
2. Streets - City of Vernonia, 2010

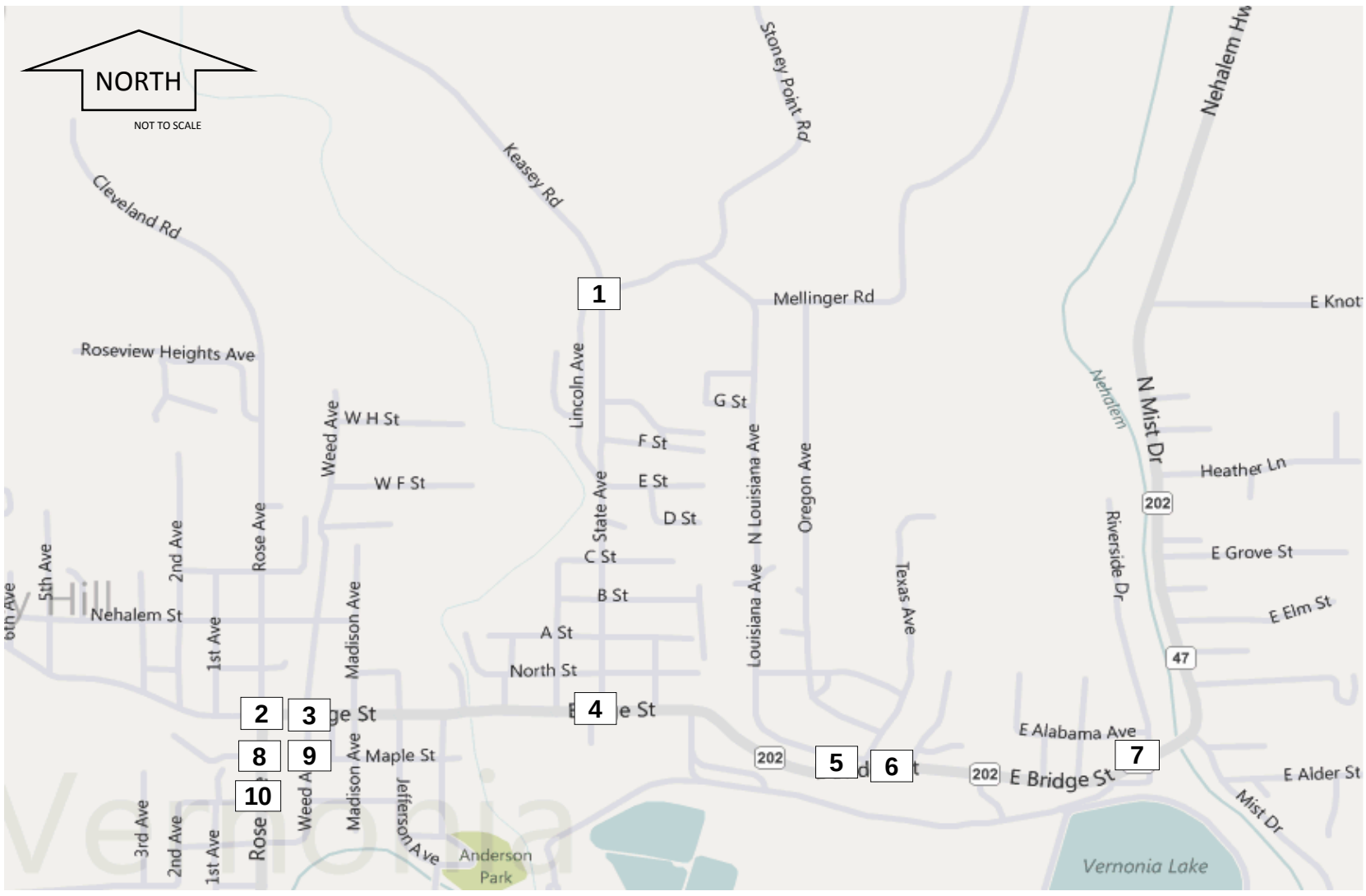
N

0 250 500 1,000 1,500 2,000
Feet

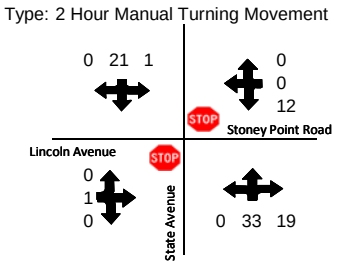
FIGURE 6
Pedestrian Facilities Inventory
Technical Memo #2
Vernonia TSP

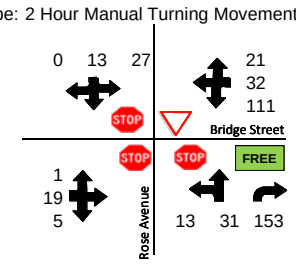
Appendix A Traffic Analysis

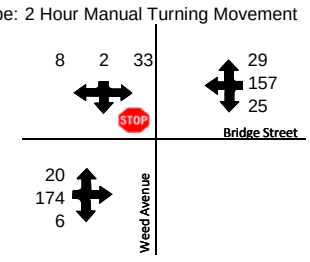
Appendix A Traffic Analysis

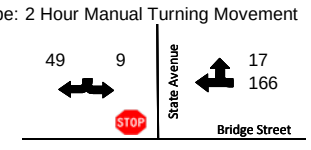


1	Stoney Point Road/State Avenue	2	Bridge Street/Rose Avenue	3	Bridge Street/Weed Avenue	4	Bridge Street/State Avenue
Peak Hour:	4:00 PM to 5:00 PM	Peak Hour:	4:00 PM to 5:00 PM	Peak Hour:	4:00 PM to 5:00 PM	Peak Hour:	4:00 PM to 5:00 PM
Date:	April 15th, 2008	Date:	March 10th, 2010	Date:	March 10th, 2010	Date:	April 15th, 2008
Type:	2 Hour Manual Turning Movement	Type:	2 Hour Manual Turning Movement	Type:	2 Hour Manual Turning Movement	Type:	2 Hour Manual Turning Movement

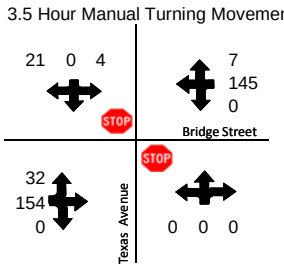


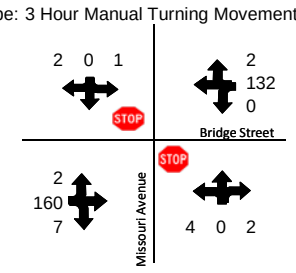


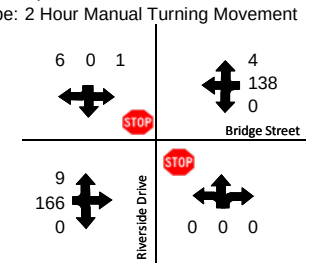


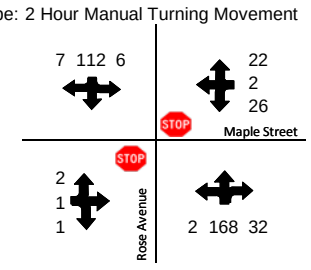


5	Bridge Street/Texas Avenue	6	Bridge Street/Missouri Avenue	7	Bridge Street/Riverside Drive	8	Maple Street/Rose Avenue
Peak Hour:	3:45 PM to 4:45 PM	Peak Hour:	4:00 PM to 5:00 PM	Peak Hour:	4:30 PM to 5:30 PM	Peak Hour:	4:00 PM to 5:00 PM
Date:	December 2nd, 2009	Date:	December 2nd, 2009	Date:	April 24th, 2008	Date:	March 10th, 2010
Type:	3.5 Hour Manual Turning Movement	Type:	3 Hour Manual Turning Movement	Type:	2 Hour Manual Turning Movement	Type:	2 Hour Manual Turning Movement

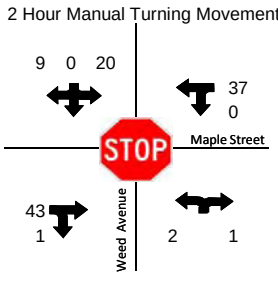


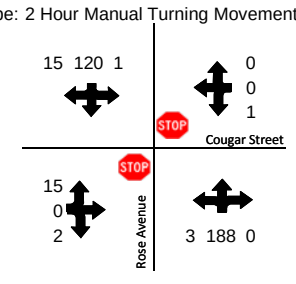


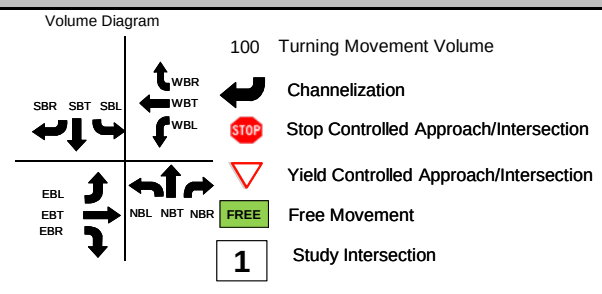




9	Maple Street/Weed Avenue	10	Cougar Street/Rose Street	Legend:
Peak Hour:	4:00 PM to 5:00 PM	Peak Hour:	4:00 PM to 5:00 PM	
Date:	March 10th, 2010	Date:	March 10th, 2010	
Type:	2 Hour Manual Turning Movement	Type:	2 Hour Manual Turning Movement	





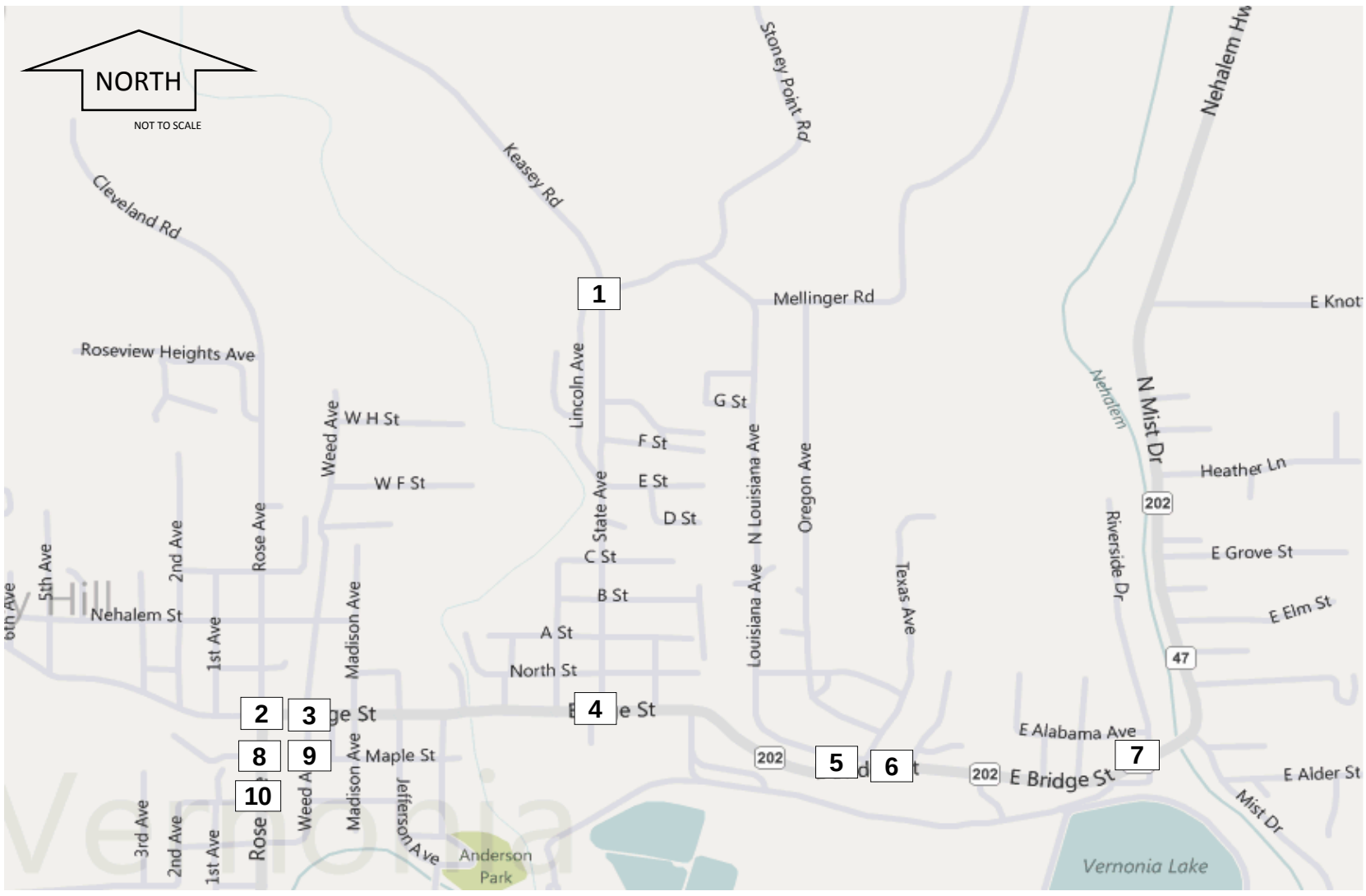


Notes:

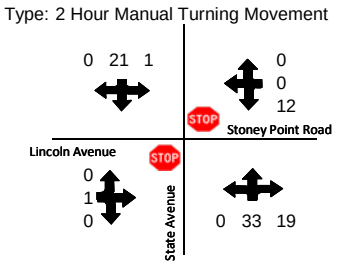
Map Source: www.bing.com/maps

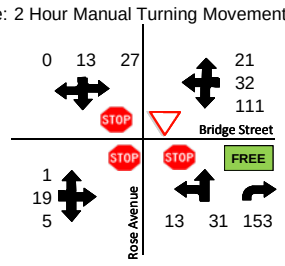
FIGURE A.1 Raw Count: 2008-2010 Individual Intersection Peak Hour Volumes & Channelization

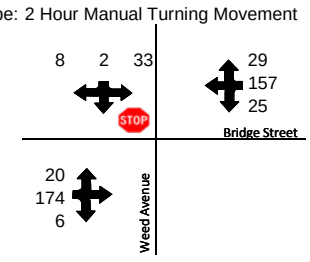
Vernonia Transportation System Plan

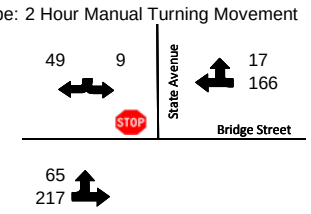


1	Stoney Point Road/State Avenue	2	Bridge Street/Rose Avenue	3	Bridge Street/Weed Avenue	4	Bridge Street/State Avenue
Peak Hour:	4:00 PM to 5:00 PM	Peak Hour:	4:00 PM to 5:00 PM	Peak Hour:	4:00 PM to 5:00 PM	Peak Hour:	4:00 PM to 5:00 PM
Date:	April 15th, 2008	Date:	March 10th, 2010	Date:	March 10th, 2010	Date:	April 15th, 2008
Type:	2 Hour Manual Turning Movement	Type:	2 Hour Manual Turning Movement	Type:	2 Hour Manual Turning Movement	Type:	2 Hour Manual Turning Movement

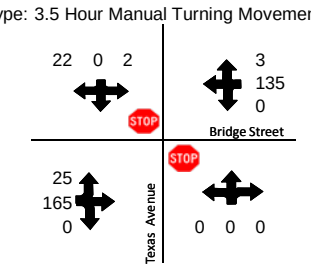


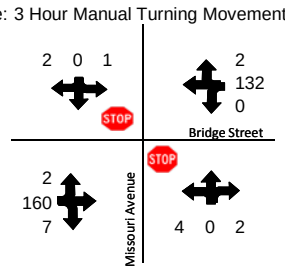


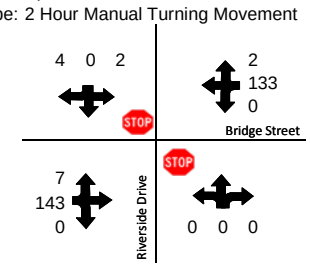


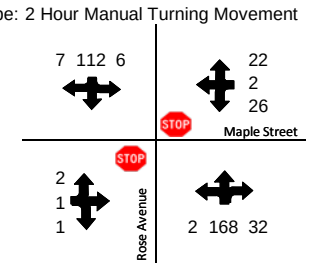


5	Bridge Street/Texas Avenue	6	Bridge Street/Missouri Avenue	7	Bridge Street/Riverside Drive	8	Maple Street/Rose Avenue
Peak Hour:	4:00 PM to 5:00 PM	Peak Hour:	4:00 PM to 5:00 PM	Peak Hour:	4:00 PM to 5:00 PM	Peak Hour:	4:00 PM to 5:00 PM
Date:	December 2nd, 2009	Date:	December 2nd, 2009	Date:	April 24th, 2008	Date:	March 10th, 2010
Type:	3.5 Hour Manual Turning Movement	Type:	3 Hour Manual Turning Movement	Type:	2 Hour Manual Turning Movement	Type:	2 Hour Manual Turning Movement

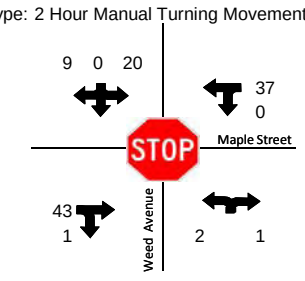


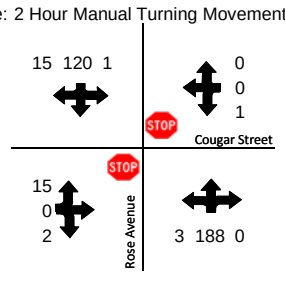


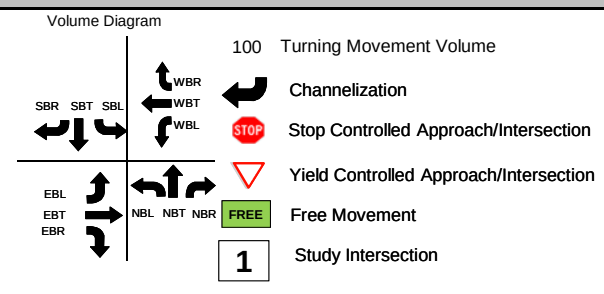




9	Maple Street/Weed Avenue	10	Cougar Street/Rose Street	Legend:
Peak Hour:	4:00 PM to 5:00 PM	Peak Hour:	4:00 PM to 5:00 PM	
Date:	March 10th, 2010	Date:	March 10th, 2010	
Type:	2 Hour Manual Turning Movement	Type:	2 Hour Manual Turning Movement	





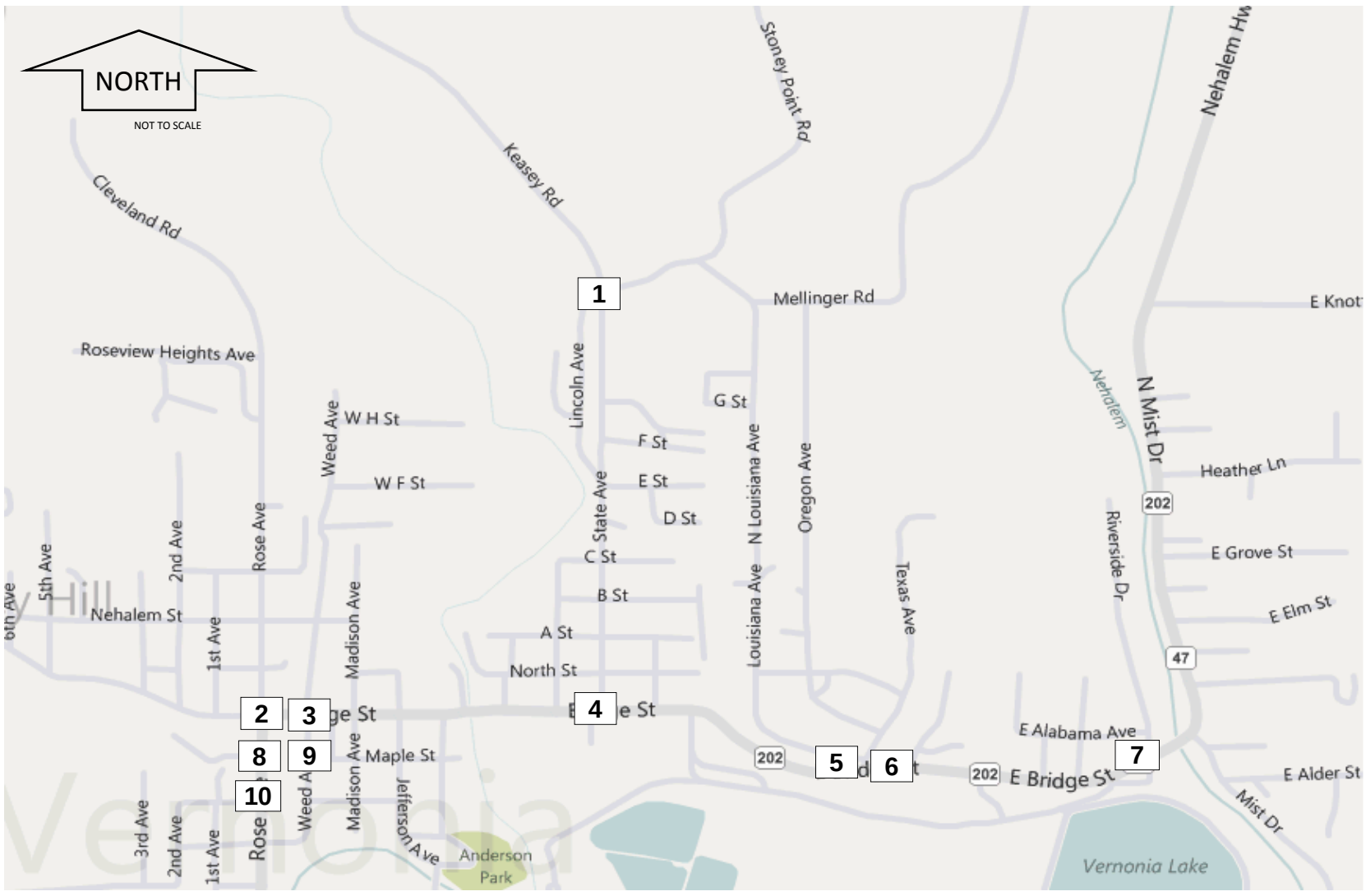


Notes:

1. Map Source: www.bing.com/maps
2. System peak hour occurred between 4:00 PM to 5:00 PM.
3. System peak hour was based on the individual peak hour of the majoirty of intersections.

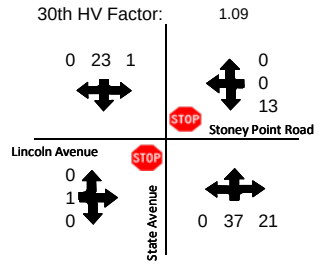
FIGURE A.2 Raw System Peak: 2008-2010 Individual Intersection Peak Hour Volumes & Channelization

Vernonia Transportation System Plan



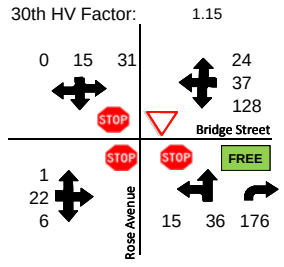
1 Stoney Point Road/State Avenue

Date: April 15th, 2008
Growth Factor: 1.02
30th HV Factor: 1.09



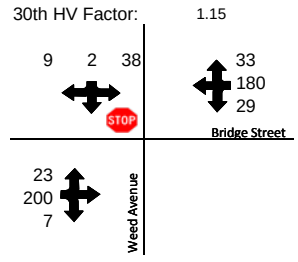
2 Bridge Street/Rose Avenue

Date: March 10th, 2010
Growth Factor: 1.00
30th HV Factor: 1.15



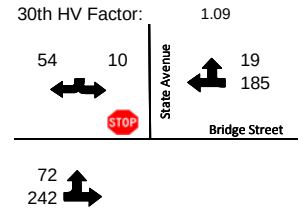
3 Bridge Street/Weed Avenue

Date: March 10th, 2010
Growth Factor: 1.00
30th HV Factor: 1.15



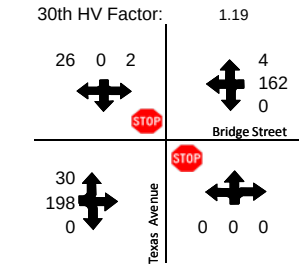
4 Bridge Street/State Avenue

Date: April 15th, 2008
Growth Factor: 1.02
30th HV Factor: 1.09



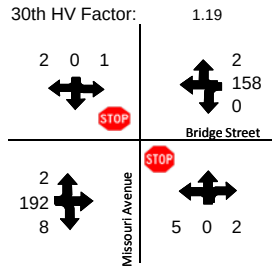
5 Bridge Street/Texas Avenue

Date: December 2nd, 2009
Growth Factor: 1.01
30th HV Factor: 1.19



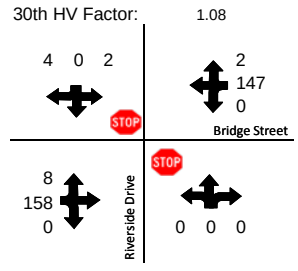
6 Bridge Street/Missouri Avenue

Date: December 2nd, 2009
Growth Factor: 1.01
30th HV Factor: 1.19



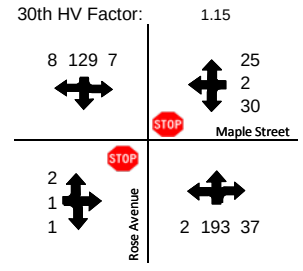
7 Bridge Street/Riverside Drive

Date: April 24th, 2008
Growth Factor: 1.02
30th HV Factor: 1.08



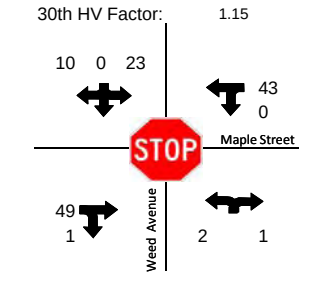
8 Maple Street/Rose Avenue

Date: March 10th, 2010
Growth Factor: 1.00
30th HV Factor: 1.15



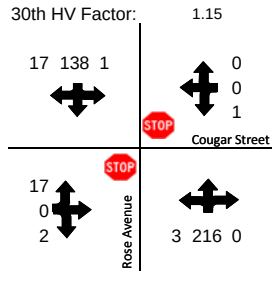
9 Maple Street/Weed Avenue

Date: March 10th, 2010
Growth Factor: 1.00
30th HV Factor: 1.15



10 Cougar Street/Rose Street

Date: March 10th, 2010
Growth Factor: 1.00
30th HV Factor: 1.15



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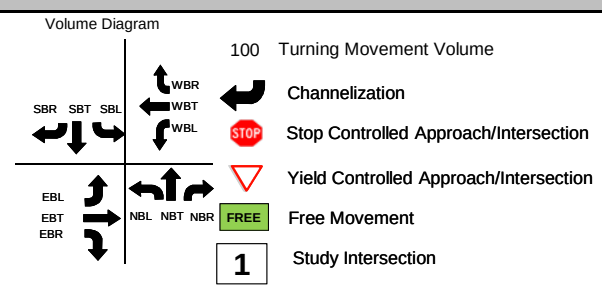
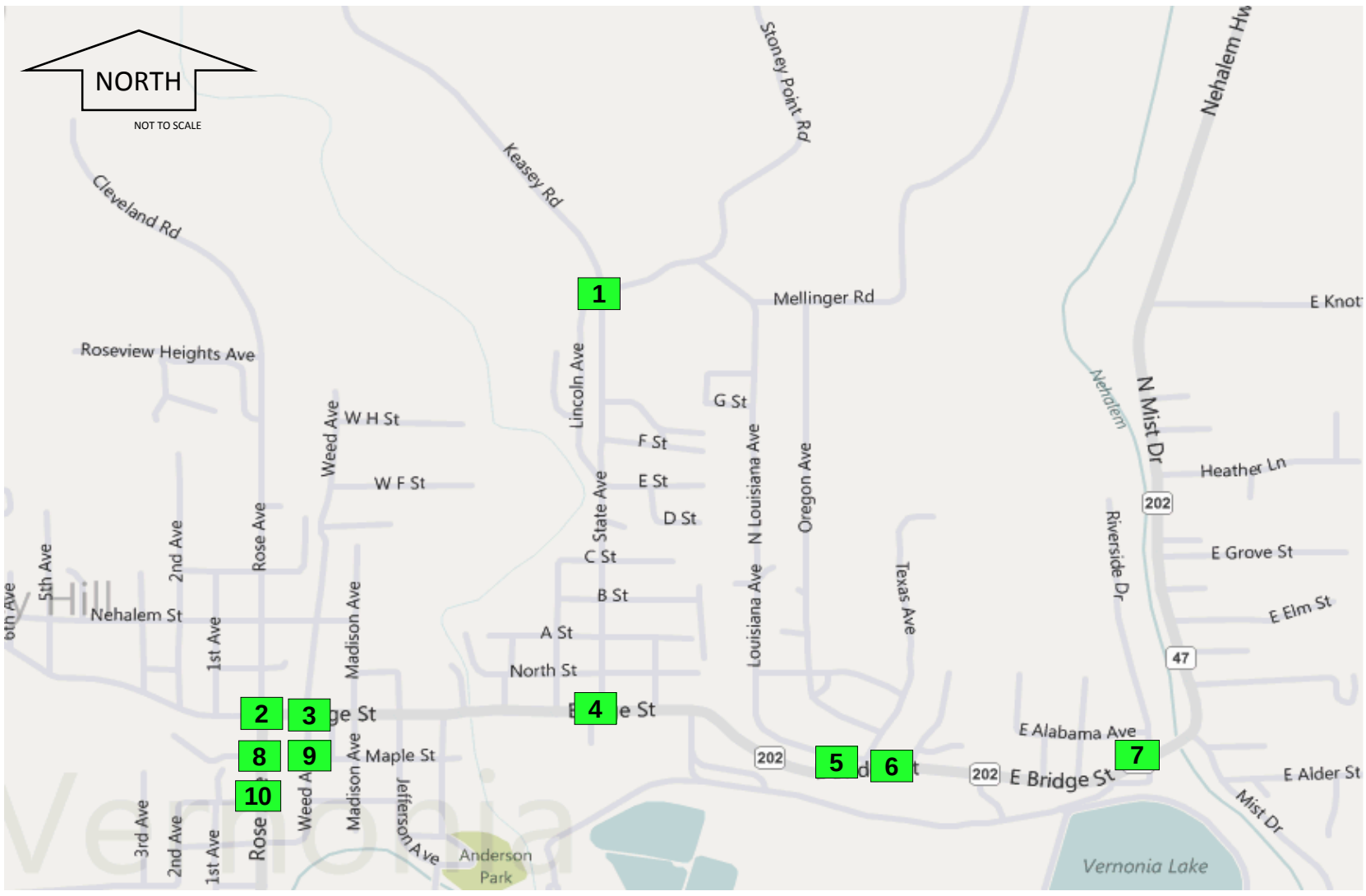


Notes:

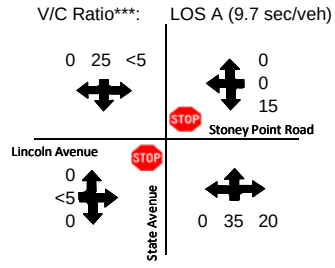
1. Map Source: www.bing.com/maps
2. System peak hour occurred between 4:00 PM to 5:00 PM.
3. System peak hour was based on the individual peak hour of the majoirty of intersections.
4. Annual growth factor was assumed to be 1 percent/year per ODOT Region 1 Traffic.
5. 30th highest hour factor is derived from ATR station 03-013.

FIGURE A.3 Unrounded and Unbalanced Existing 30th Highest Hour Volumes & Channelization
Vernonia Transportation System Plan



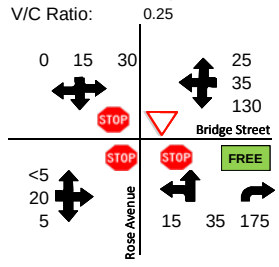
1 Stoney Point Road/State Avenue

Date: April 15th, 2008
V/C Ratio Std: LOS D
V/C Ratio***: LOS A (9.7 sec/veh)



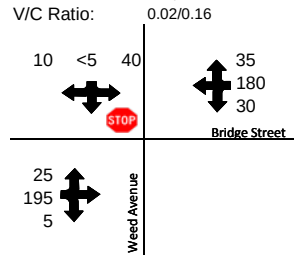
2 Bridge Street/Rose Avenue

Date: March 10th, 2010
V/C Ratio Std: 0.95/0.95
V/C Ratio: 0.25



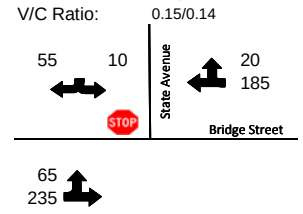
3 Bridge Street/Weed Avenue

Date: March 10th, 2010
V/C Ratio Std: 0.95/0.95
V/C Ratio: 0.02/0.16



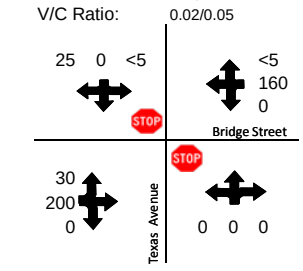
4 Bridge Street/State Avenue

Date: April 15th, 2008
V/C Ratio Std: 0.90/0.90
V/C Ratio: 0.15/0.14



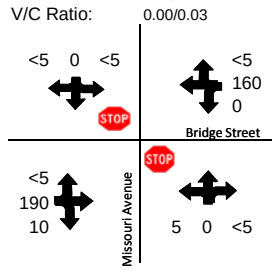
5 Bridge Street/Texas Avenue

Date: December 2nd, 2009
V/C Ratio Std: 0.90/0.90
V/C Ratio: 0.02/0.05



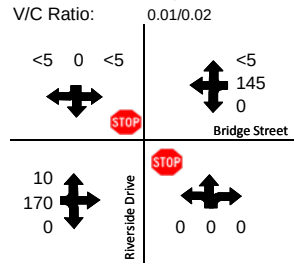
6 Bridge Street/Missouri Avenue

Date: December 2nd, 2009
V/C Ratio Std: 0.90/0.90
V/C Ratio: 0.00/0.03



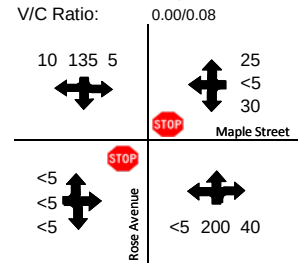
7 Bridge Street/Riverside Drive

Date: April 24th, 2008
V/C Ratio Std: 0.90/0.90
V/C Ratio: 0.01/0.02



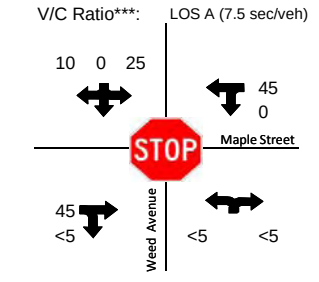
8 Maple Street/Rose Avenue

Date: March 10th, 2010
V/C Ratio Std: 0.90/0.90
V/C Ratio: 0.00/0.08



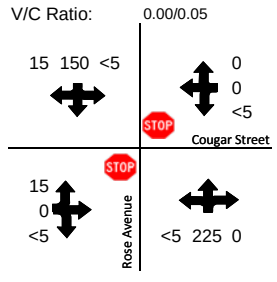
9 Maple Street/Weed Avenue

Date: March 10th, 2010
V/C Ratio Std: LOS D
V/C Ratio***: LOS A (7.5 sec/veh)

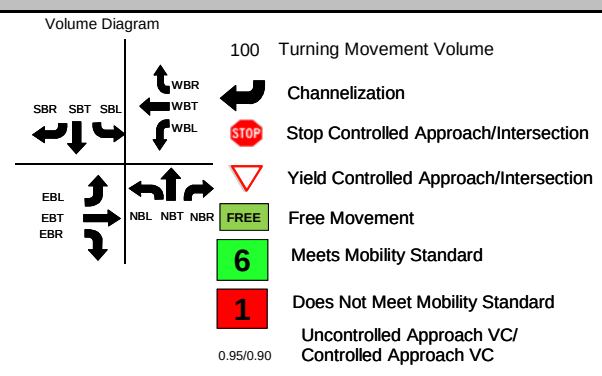


10 Cougar Street/Rose Street

Date: March 10th, 2010
V/C Ratio Std: 0.90/0.90
V/C Ratio: 0.00/0.05



Legend:



Notes:

1. Map Source: www.bing.com/maps
2. System peak hour occurred between 4:00 PM to 5:00 PM.
3. Mobility Standards are based on the Oregon Highway Plan or City of Vernonia LOS Standards.
4. Synchro software version 7 used for analysis.
5. VC = Volume to Capacity Ratio
6. V/C Ratio Std = Intersection Mobility Standard (per ODOT)

*** City of Vernonia has a LOS D mobility standard. LOS (avg delay/veh) is reported for the worst operating movement (for TWSC) and total intersection (for AWSC).

FIGURE A.4 Rounded and Balanced Existing 30th Highest Hour Volumes, Channelization, and Operations
Vernonia Transportation System Plan

HCM Unsignalized Intersection Capacity Analysis
1: Stoney Point Rd & State St

10/25/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	1	0	15	0	0	0	35	20	1	25	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	0.25	0.60	0.60	0.60	0.76	0.76	0.76	0.61	0.61	0.61
Hourly flow rate (vph)	0	4	0	25	0	0	0	46	26	2	41	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	103	117	41	105	103	59	41			72		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	103	117	41	105	103	59	41			72		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	100	99	100	97	100	100	100			100		
cM capacity (veh/h)	881	777	1036	875	789	1012	1568			1484		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	25	72	43
Volume Left	0	25	0	2
Volume Right	0	0	26	0
cSH	777	875	1568	1484
Volume to Capacity	0.01	0.03	0.00	0.00
Queue Length 95th (ft)	0	2	0	0
Control Delay (s)	9.7	9.2	0.0	0.3
Lane LOS	A	A		A
Approach Delay (s)	9.7	9.2	0.0	0.3
Approach LOS	A	A		

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	17.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Yield			Stop			Stop	
Volume (vph)	1	20	5	130	35	25	15	35	175	30	15	0
Peak Hour Factor	0.69	0.69	0.69	0.91	0.91	0.91	0.74	0.74	0.74	0.67	0.67	0.67
Hourly flow rate (vph)	1	29	7	143	38	27	20	47	236	45	22	0

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	38	209	68	236	67
Volume Left (vph)	1	143	20	0	45
Volume Right (vph)	7	27	0	236	0
Hadj (s)	-0.11	0.09	0.13	-0.53	0.13
Departure Headway (s)	4.4	4.4	4.7	3.2	4.7
Degree Utilization, x	0.05	0.25	0.09	0.21	0.09
Capacity (veh/h)	788	792	723	1122	722
Control Delay (s)	7.6	8.8	8.1	7.0	8.1
Approach Delay (s)	7.6	8.8	7.3		8.1
Approach LOS	A	A	A		A

Intersection Summary			
Delay	7.9		
HCM Level of Service	A		
Intersection Capacity Utilization	34.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	25	195	5	30	180	35	0	0	0	40	2	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.78	0.78	0.78	0.96	0.96	0.96	0.92	0.92	0.92	0.77	0.77	0.77
Hourly flow rate (vph)	32	250	6	31	188	36	0	0	0	52	3	13
Pedestrians					3			4			12	
Lane Width (ft)					12.0			0.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	236			260			604	620	260	601	605	218
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	236			260			604	620	260	601	605	218
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			98			100	100	100	87	99	98
cM capacity (veh/h)	1312			1310			384	381	776	390	388	814

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	288	255	68
Volume Left	32	31	52
Volume Right	6	36	13
cSH	1312	1310	433
Volume to Capacity	0.02	0.02	0.16
Queue Length 95th (ft)	2	2	14
Control Delay (s)	1.1	1.1	14.8
Lane LOS	A	A	B
Approach Delay (s)	1.1	1.1	14.8
Approach LOS			B

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	65	235	185	20	10	55
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.78	0.78	0.83	0.83	0.69	0.69
Hourly flow rate (vph)	83	301	223	24	14	80
Pedestrians		1	7		6	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	1		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	253				716	242
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	253				716	242
tC, single (s)	4.1				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.4
p0 queue free %	94				96	90
cM capacity (veh/h)	1300				361	780

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	385	247	94
Volume Left	83	0	14
Volume Right	0	24	80
cSH	1300	1700	662
Volume to Capacity	0.06	0.15	0.14
Queue Length 95th (ft)	5	0	12
Control Delay (s)	2.2	0.0	11.3
Lane LOS	A		B
Approach Delay (s)	2.2	0.0	11.3
Approach LOS			B

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	30	200	0	0	160	4	0	0	0	2	0	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.75	0.75	0.75	0.92	0.92	0.92	0.75	0.75	0.75
Hourly flow rate (vph)	32	215	0	0	213	5	0	0	0	3	0	33
Pedestrians		1			2							
Lane Width (ft)		12.0			12.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	219			215			530	498	217	498	496	217
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	219			215			530	498	217	498	496	217
tC, single (s)	4.2			4.2			7.1	6.5	6.2	7.2	6.6	6.3
tC, 2 stage (s)												
tF (s)	2.3			2.3			3.5	4.0	3.3	3.6	4.1	3.4
p0 queue free %	98			100			100	100	100	99	100	96
cM capacity (veh/h)	1327			1314			432	462	821	458	450	798

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	247	219	0	36
Volume Left	32	0	0	3
Volume Right	0	5	0	33
cSH	1327	1314	1700	756
Volume to Capacity	0.02	0.00	0.00	0.05
Queue Length 95th (ft)	2	0	0	4
Control Delay (s)	1.2	0.0	0.0	10.0
Lane LOS	A		A	A
Approach Delay (s)	1.2	0.0	0.0	10.0
Approach LOS			A	A

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	190	10	0	160	2	5	0	2	1	0	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.82	0.82	0.82	0.35	0.35	0.35	0.44	0.44	0.44
Hourly flow rate (vph)	2	211	11	0	195	2	14	0	6	2	0	5
Pedestrians		1						3				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	198			225			426	422	220	423	426	197
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	198			225			426	422	220	423	426	197
tC, single (s)	4.1			4.2			7.1	6.5	6.2	7.4	6.8	6.5
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.8	4.3	3.6
p0 queue free %	100			100			97	100	99	100	100	99
cM capacity (veh/h)	1363			1311			536	524	823	486	474	770

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	224	198	20	7
Volume Left	2	0	14	2
Volume Right	11	2	6	5
cSH	1363	1311	595	645
Volume to Capacity	0.00	0.00	0.03	0.01
Queue Length 95th (ft)	0	0	3	1
Control Delay (s)	0.1	0.0	11.3	10.6
Lane LOS	A		B	B
Approach Delay (s)	0.1	0.0	11.3	10.6
Approach LOS			B	B

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	23.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	170	0	0	145	2	0	0	0	2	0	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.92	0.92	0.92	0.38	0.38	0.38
Hourly flow rate (vph)	12	212	0	0	181	2	0	0	0	5	0	11
Pedestrians								2				
Lane Width (ft)								12.0				
Walking Speed (ft/s)								4.0				
Percent Blockage								0				
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	184			214			433	423	214	420	422	182
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	184			214			433	423	214	420	422	182
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			100			100	100	100	99	100	99
cM capacity (veh/h)	1373			1324			525	520	829	543	521	865

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	225	184	0	16
Volume Left	12	0	0	5
Volume Right	0	2	0	11
cSH	1373	1324	1700	722
Volume to Capacity	0.01	0.00	0.00	0.02
Queue Length 95th (ft)	1	0	0	2
Control Delay (s)	0.5	0.0	0.0	10.1
Lane LOS	A		A	B
Approach Delay (s)	0.5	0.0	0.0	10.1
Approach LOS			A	B

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	28.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	1	1	30	2	25	2	200	40	5	135	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.50	0.50	0.50	0.78	0.78	0.78	0.79	0.79	0.79	0.89	0.89	0.89
Hourly flow rate (vph)	4	2	2	38	3	32	3	253	51	6	152	11
Pedestrians		4			1			4				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		0			0			0				
Right turn flare (veh)						1						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	473	482	165	460	463	279	167			305		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	473	482	165	460	463	279	167			305		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	99	100	100	92	99	96	100			100		
cM capacity (veh/h)	475	482	878	493	482	745	1394			1255		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	8	73	306	169
Volume Left	4	38	3	6
Volume Right	2	32	51	11
cSH	539	876	1394	1255
Volume to Capacity	0.01	0.08	0.00	0.00
Queue Length 95th (ft)	1	7	0	0
Control Delay (s)	11.8	11.7	0.1	0.3
Lane LOS	B	B	A	A
Approach Delay (s)	11.8	11.7	0.1	0.3
Approach LOS	B	B		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	32.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	45	1	0	45	0	2	0	1	25	0	10
Peak Hour Factor	0.65	0.65	0.65	0.66	0.66	0.66	0.75	0.75	0.75	0.81	0.81	0.81
Hourly flow rate (vph)	0	69	2	0	68	0	3	0	1	31	0	12

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	71	68	4	43
Volume Left (vph)	0	0	3	31
Volume Right (vph)	2	0	1	12
Hadj (s)	0.07	0.05	0.49	0.02
Departure Headway (s)	4.1	4.1	4.7	4.2
Degree Utilization, x	0.08	0.08	0.01	0.05
Capacity (veh/h)	851	856	727	821
Control Delay (s)	7.5	7.5	7.8	7.5
Approach Delay (s)	7.5	7.5	7.8	7.5
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.5		
HCM Level of Service	A		
Intersection Capacity Utilization	19.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	0	2	1	0	0	3	225	0	1	150	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.61	0.61	0.61	0.25	0.25	0.25	0.76	0.76	0.76	0.87	0.87	0.87
Hourly flow rate (vph)	25	0	3	4	0	0	4	296	0	1	172	17
Pedestrians		8										
Lane Width (ft)		12.0										
Walking Speed (ft/s)		4.0										
Percent Blockage		1										
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	495	495	189	491	504	296	198			296		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	495	495	189	491	504	296	198			296		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	100	100	99	100	100	100			100		
cM capacity (veh/h)	481	474	852	486	468	748	1360			1265		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	28	4	300	191
Volume Left	25	4	4	1
Volume Right	3	0	0	17
cSH	507	486	1360	1265
Volume to Capacity	0.05	0.01	0.00	0.00
Queue Length 95th (ft)	4	1	0	0
Control Delay (s)	12.5	12.5	0.1	0.1
Lane LOS	B	B	A	A
Approach Delay (s)	12.5	12.5	0.1	0.1
Approach LOS	B	B		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	25.1%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection: 1: Stoney Point Rd & State St

Movement	EB	WB
Directions Served	LTR	LR
Maximum Queue (ft)	30	38
Average Queue (ft)	2	14
95th Queue (ft)	14	39
Link Distance (ft)	524	999
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Bridge St & Rose Ave

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	LT	R	LTR
Maximum Queue (ft)	50	56	74	77	54
Average Queue (ft)	22	10	28	8	25
95th Queue (ft)	51	38	57	45	51
Link Distance (ft)	1293	224	265		448
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)				75	
Storage Blk Time (%)			0	0	
Queuing Penalty (veh)			0	0	

Intersection: 3: Bridge St & Weed Ave

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	19	63	71
Average Queue (ft)	1	11	32
95th Queue (ft)	9	43	64
Link Distance (ft)	224	2044	618
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Bridge St & State St

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (ft)	92	7	76
Average Queue (ft)	24	0	34
95th Queue (ft)	71	6	65
Link Distance (ft)	2044	1938	3068
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Bridge St & Texas Ave

Movement	EB	WB	SB
Directions Served	LTR	LTR	LR
Maximum Queue (ft)	47	15	74
Average Queue (ft)	5	1	18
95th Queue (ft)	27	14	50
Link Distance (ft)	1938	295	1761
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Bridge St & Missouri Ave

Movement	NB	SB
Directions Served	LR	LR
Maximum Queue (ft)	24	34
Average Queue (ft)	5	3
95th Queue (ft)	21	18
Link Distance (ft)	294	320
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Bridge St & Riverside Dr

Movement	EB	SB
Directions Served	LTR	LR
Maximum Queue (ft)	35	30
Average Queue (ft)	2	4
95th Queue (ft)	17	20
Link Distance (ft)	1614	674
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Maple St & Rose Ave

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	R	LTR	LTR
Maximum Queue (ft)	31	62	54	7	21
Average Queue (ft)	4	24	20	0	1
95th Queue (ft)	20	54	55	5	9
Link Distance (ft)	488	298		252	265
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			25		
Storage Blk Time (%)		3	2		
Queuing Penalty (veh)		1	1		

Intersection: 9: Maple St & Weed Ave

Movement	EB	WB	NB	SB
Directions Served	TR	LT	LR	LR
Maximum Queue (ft)	70	45	47	50
Average Queue (ft)	28	19	4	26
95th Queue (ft)	58	42	25	52
Link Distance (ft)	298	630	226	264
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 10: Cougar St & Rose Ave

Movement	EB	WB
Directions Served	LR	LR
Maximum Queue (ft)	43	20
Average Queue (ft)	14	1
95th Queue (ft)	43	10
Link Distance (ft)	548	236
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 2

City of Vernonia TSP Update

Population	2340	
ADT	4000	
2-lane	District Highway	
Weekday	Rural Populated	
ATR Range	3600	4400
Highway 102	MP 62.5	

NO ONSITE OR NEARBY ATR!

Note: Table was modifed to include 2009 Seasonal Trends for ATR Station 03-013 and seasonal adjustment interpolation calculations.
-JDJ

1. Similar ATR Method

			Trend	Area	Facility		Classifica	ADT	Designation		Population			
BEST METHOD	-2.50%	**ATR 03-013**	*Aggricultural*	*Rural*	2 lane	Weekday	District Hi	3900	OR 213 Cascade					
Marquam			31	28	31	30	31	30	31	31	30	31	30	31
03-013	Peak Month	Peak%	January	February	March	April	May	June	July	August	September	October	November	December
2009	August	109	93	94	96	102	105	105	106	109	108	103	98	91
2008	July	114	91	100	102	104	110	109	114	106	103	100	105	84
2007	June	112	84	96	101	103	107	109	110	112	109	102	100	89
2006	August	113	89	92	94	103	105	109	111	113	111	106	98	92
2005	August	111	92	95	97	101	105	109	110	111	107	103	102	94
	Average	112	91	95	98	103	106	109	110	111	108	103	100	91
	Factor		**1.2353**	**1.1789**	**1.1429**	**1.0909**	**1.0599**	**1.0275**	**1.0151**	**1.0120**	**1.0370**	**1.0909**	**1.1200**	**1.2353**

Seasonal Adjustment Interpolation

Month	Date	Days Ahead	Days Back	Month Ahead	Month Back	Seasonal Adj Factor
December	2	13	17	1.2353	1.1200	1.185
March	10	5	23	1.1429	1.1789	1.149
April	24	21	9	1.0599	1.0909	1.082

2. Seasonal Trend Table

			January	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Peak**
AGRICULTURE			**1.1881**	**1.0732**	**1.0221**	**0.9854**	**0.9446**	**0.9240**	**0.8917**	**0.8940**	**0.9054**	**0.9336**	**0.9865**	**1.1632**	**0.8821**
Factor			**1.3469**	**1.2166**	**1.1587**	**1.1171**	**1.0709**	**1.0475**	**1.0109**	**1.0134**	**1.0264**	**1.0583**	**1.1184**	**1.3186**	

Yearly Growth Adjustment Factor

MP	**Location**	**2009 ADT**	**2008 ADT**	**2007 ADT**	**2006 AD**	**2005 ADT**	**2004 AD**	**2003 ADT**	**2002 ADT**	**2001 ADT**	**2000 ADT**	**1999 ADT**		Growth **2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**Avg**	
61.72	0.01 mile wes	5100	4000	4200	4200	3900	4000	4000	5300	5100	4900	4600		1.0652	1.0408	0.9623	0.7547	1.0000	0.9750	1.0769	1.0000	0.9524	1.2750	1.0102	
62.11	0.02 mile wes	6600	4800	5100	5000	4900	5000	5000	6500	6400	6300	5900		1.0678	1.0159	0.9846	0.7692	1.0000	0.9800	1.0204	1.0200	0.9412	1.3750	1.0174	
62.27	Rock Creek E	7200	5200	5400	5400	5300	5400	5400	6900	6800	6700	6700		1.0000	1.0149	0.9855	0.7826	1.0000	0.9815	1.0189	1.0000	0.9630	1.3846	1.0131	
62.52	0.02 mile eas	5200	3600	3800	3700	4200	4300	4300	5500	5400	5300	5200		1.0192	1.0189	0.9818	0.7818	1.0000	0.9767	0.8810	1.0270	0.9474	1.4444	1.0078	
62.56	0.02 mile sou	4100	3200	3400	3300	3600	3700	3700	4600	4500	4400	4200		1.0476	1.0227	0.9783	0.8043	1.0000	0.9730	0.9167	1.0303	0.9412	1.2813	0.9995	
62.79	0.02 mile sou	3900	3100	3300	3300	3300	3400	3400	4100	4000	3900	3800		1.0263	1.0256	0.9756	0.8293	1.0000	0.9706	1.0000	1.0000	0.9394	1.2581	1.0025	
	AVG	5350	3983	4200	4150	4200	4300	4300	5483	5367	5250	5067												1.008	Average

ANNUAL GROWTH