# South Lewis County Subarea Transportation Plan

Existing Conditions Report

**November 2008**
**Revised: June 2009**

Prepared for:

Lewis County

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## APPENDICES

APPENDIX A Collision Report
APPENDIX B Traffic Report
APPENDIX C Environmental Screening Report

**Note: Federal law 23 USCS 409 governs the use of the data contained in this report. Under this law data utilized for purposes of evaluating potential highway safety enhancements "…Shall not be subject to discovery or admitted into evidence in a federal or state court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists or data."**

# CHAPTER 1 INTRODUCTION

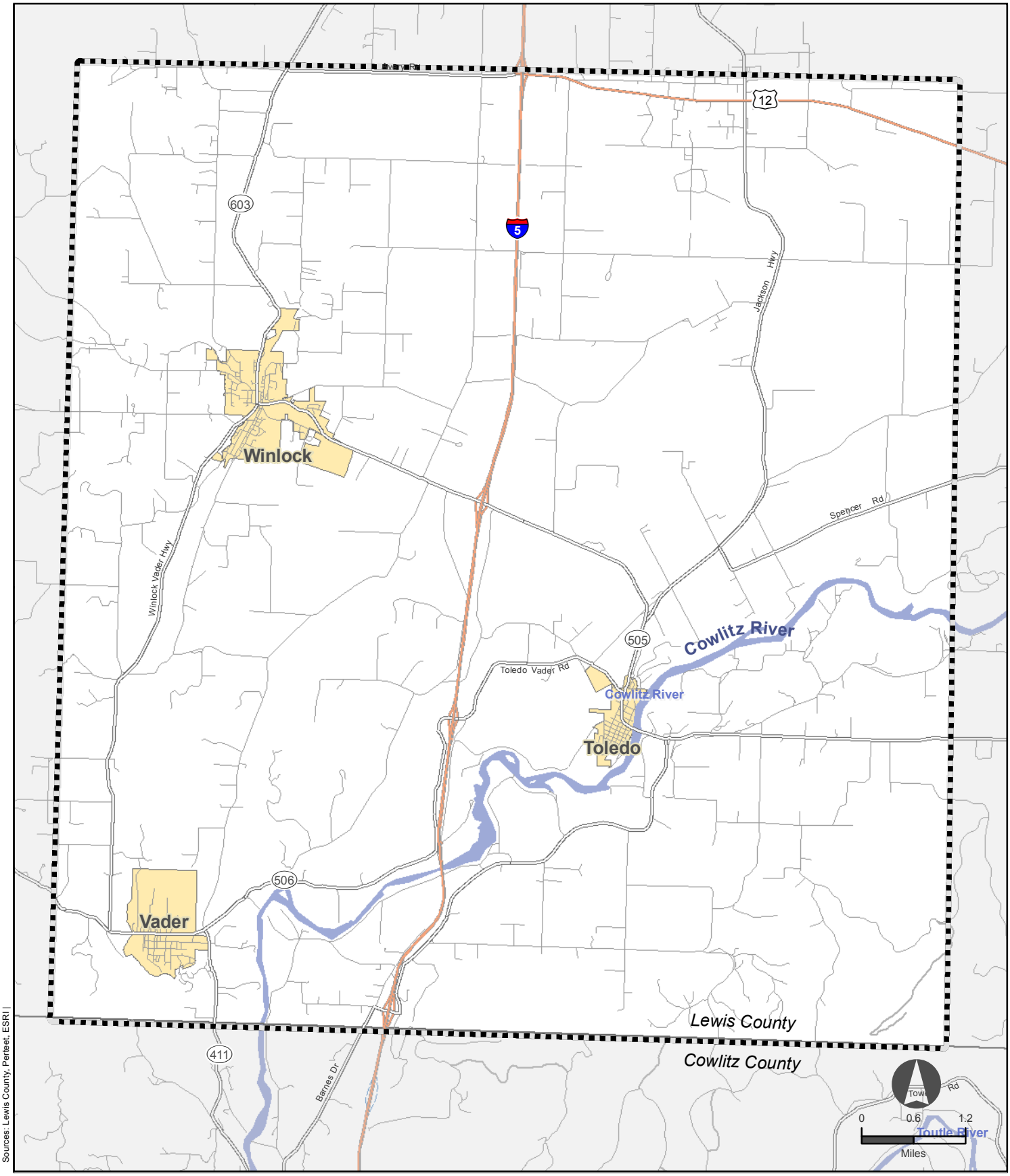
Lewis County Washington is the lead agency contracting with Perteet, Inc. for conducting an interchange/corridor study for a portion of SR 505 (MP 0.0 to MP 6.8). This work is being performed as a portion of a larger effort supporting Lewis County in the creation of a subarea plan for the region generally bounded in the north by Avery Road and US 12, in the west by Highway 603, by Tucker Road in the east and by the county line to the south. Exhibit 1.1 shows the extent of the subarea. The project is known to project stakeholders as the "South Lewis County Subarea Transportation Plan (SLCSTP)". Perteet, Inc. is subcontracting portions of the work to Cook Engineering and Development Services PLLC and EnviroIssues. Lewis County Community Development Department is contracting with BHC Consultants for preparing the subarea plan.

Project stakeholders are: Washington State Department of Transportation (WSDOT), City of Toledo, City of Winlock, SW Washington Regional Transportation Planning Organization (SWWRTPO) and Cowlitz Indian Tribe. Many of the transportation partners are also represented on the County's subarea planning group (exceptions include WSDOT and the RTPO). The project is funded pursuant to a 2004 Federal Transportation earmark "Widen I5 in Lewis County". While several projects are listed under this earmark with WSDOT, this project is identified as being: "Exit 63 Corridor/Interchange Study". The title adequately describes the focus of this study, though expansion of this work serving as the transportation element of Lewis County's subarea plan provides even greater support for future interchange evaluation (the local network is now fully evaluated in proximity to the interchange).

## 1.1 Background

During the fall of 2005, the City of Winlock, WA issued a final environmental impact statement (FEIS) for amending its comprehensive growth management plan and related land use and planning actions. The document was produced to support the City's Urban Growth Area (UGA) expansion towards Interstate 5 in Lewis County, WA. The City prevailed in its efforts to create significant industrial and commercial lands along SR 505 and Interstate 5. A map depicting the city's UGA expansion is provided in Exhibit 1.2.

The transportation component of the FEIS forecasts significant increases in traffic demand over the 20 year period of evaluation. Lewis County, anticipating potential traffic impact in the area worked with WSDOT staff from the Southwest Region to secure a 2004 federal transportation earmark ("Widen I5 in Lewis County"). The county included traffic studies in its Six Year Transportation Plan and wrote a project prospectus with WSDOT to begin traffic analysis for the SR 505 corridor from the City of Winlock to the City of Toledo.




Sources: Lewis County, Perteet, ESRI |

Lewis County

Perteet

Legend

Study Area

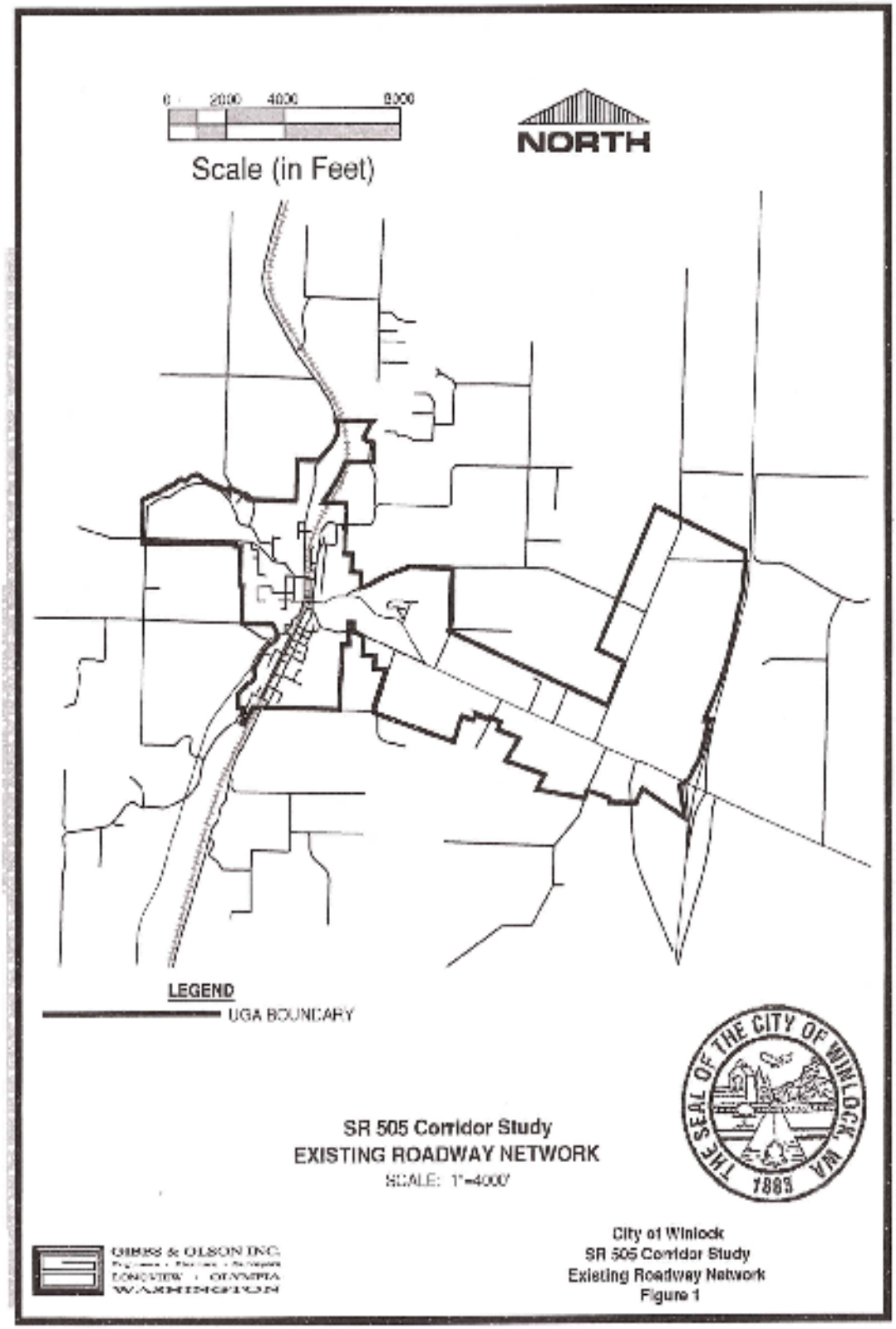
Stream

City Limit

South Lewis County Subarea Transportation Plan

Study Area
Exhibit 1.1

**Exhibit 1.2**
**City of Winlock Urban Growth Area (UGA)**



In 2007, several large potential land developers expressed interest in the newly designated industrial and commercial lands within Winlock's UGA. All developers expressed concerns regarding the lack of public right of way accessing key properties north of SR 505. The City of Winlock, working with an area property owner, contracted with an area engineering firm to design a potential public roadway from SR 505 (extension of Knowles Road) through property formally known as "Mickelsen Dairy". The design was used to allow Lewis County the opportunity to consider establishing public right of way over the route for future roadway construction. Exhibit 1.3 shows the preliminary design alignment of the roadway and it's tie-in to SR 505.

As the likelihood for development in the area increases, deteriorating levels of service at intersections and segments along SR 505 is inevitable. Lewis County, working with the cities of Winlock and Toledo, WSDOT, the Cowlitz Indian Tribe, and the Regional Transportation Planning Organization elected to pursue a corridor planning approach for the region. In a companion effort, Lewis County Community Development Department began a sub-area planning effort. The subarea plan contains a utility element that addresses potential urban service providers within the subarea. Urban services are necessary to support land use intensification beyond current zoning. This transportation plan forecasts impacts to existing facilities within the subarea and proposing sufficient mitigations at various planning years to maintain Lewis County's adopted level of service (LOS) D at intersections and along roadway segments. These planning efforts compliment work that has been already completed, work that is anticipated to adequately develop currently zoned commercial and industrial properties in the area and potentially serve more intense land uses for the region in the future.

## 1.2 Extent of the Study Area

The study area includes local roadways within the subarea and along SR 505 from mile post 0.0 (downtown City of Winlock) to mile post 6.8 (downtown City of Toledo). In addition, one interchange to the south (Exit 60) of Exit 63 and one to the north (Exit 68) are being evaluated for existing and future conditions. During initial traffic counting efforts, the consultant collected existing traffic volumes along three key local corridors (Highway 603, North Military Road and Jackson Highway) and at seven key subarea intersections. Exhibit 1.1 shows the SR 505 corridor and extent of the study area.

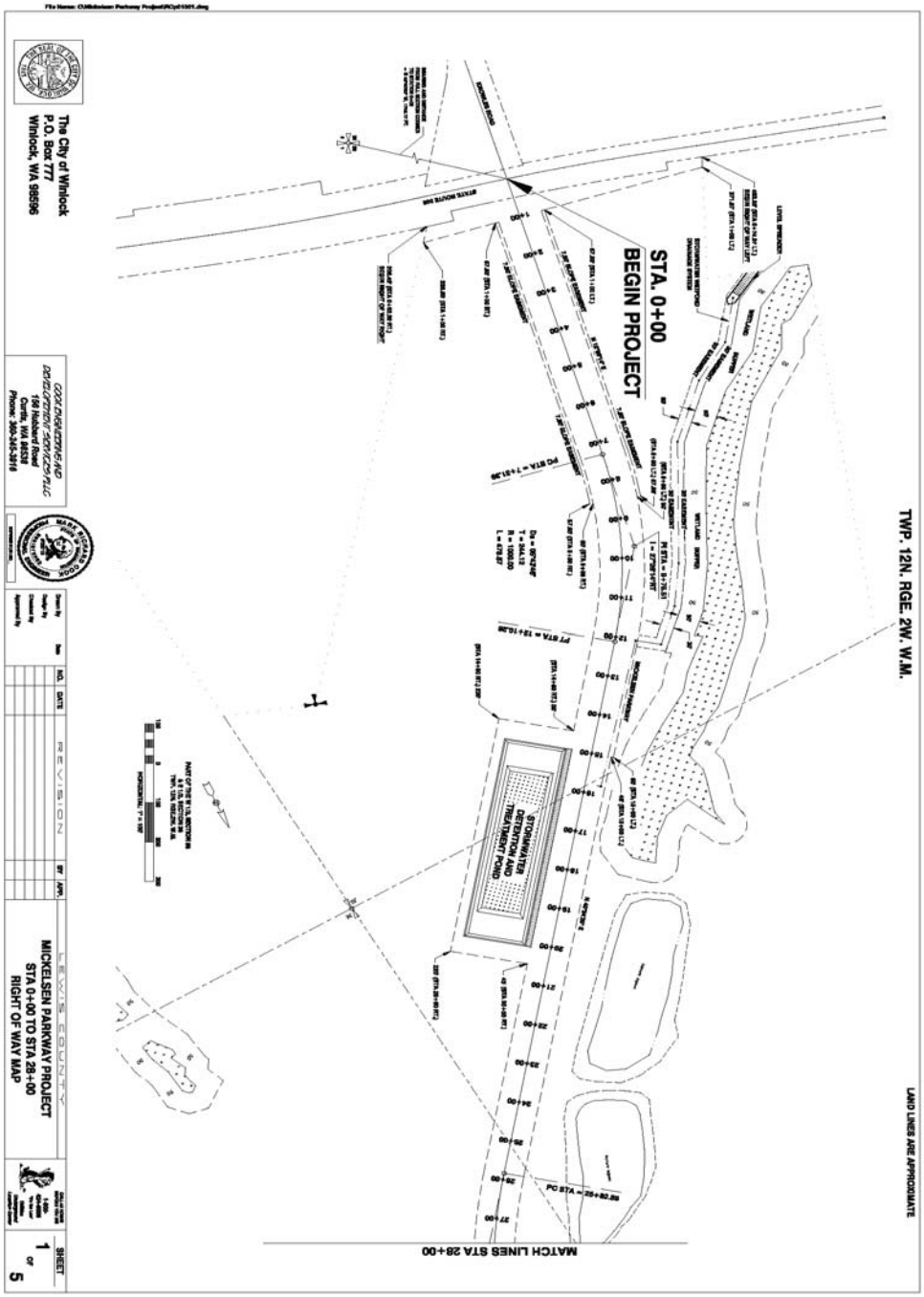
## 1.3 Plan Objectives

The SLCSTP is being developed in cooperation with multiple jurisdictions to address future land use intensification and traffic congestion anticipated with south Lewis County future land use development. The Plan will form the basis for:

- Identifying necessary future transportation improvements along the SR 505 Corridor and along local roadways and at key intersections within the subarea
- Create an agreement amongst project participants on regional infrastructure needs and improvements ahead of congestion resulting from new development and re-development land uses

- Provide the initial analysis for potential future improvements to Interstate 5 interchange Exit 63 located in South Lewis County, Washington

**Exhibit 1.3**
**Preliminary Alignment of Mickelsen Dairy**



# CHAPTER 2 CURRENT AREA LAND USE

## 2.1 Cities

The cities of Toledo and Winlock are both incorporated cities with their own zoning ordinances and comprehensive plans within their individual corporate city boundaries. Additionally, the cities have completed plans consistent with the County UGA policies. A typical range of land uses are found in each city:

- Low to high density residential
- Special uses
- Commercial
- Industrial
- Multi-family
- Other

In 2005, the City of Winlock substantially increased its UGA lands by adding lands along SR 505 to Interstate 5. Exhibits 2.1 and 2.2 display the current zoning for the cities of Winlock and Toledo respectively.

## 2.2 Unincorporated Lewis County

The predominant zoning for county lands associated within the SR 505 corridor study area is largely:

- rural residential – 1:5 – 1 dwelling unit per 5 acres
- 1:10 – 1 dwelling unit per 10 acres
- 1:20 – 1 dwelling unit per 20 acres, agricultural or designated resource lands

There is a small area of commercially designated land near the Interstate 5 interchange at Exit 63. Exhibit 2.3 displays the current zoning for South Lewis County.

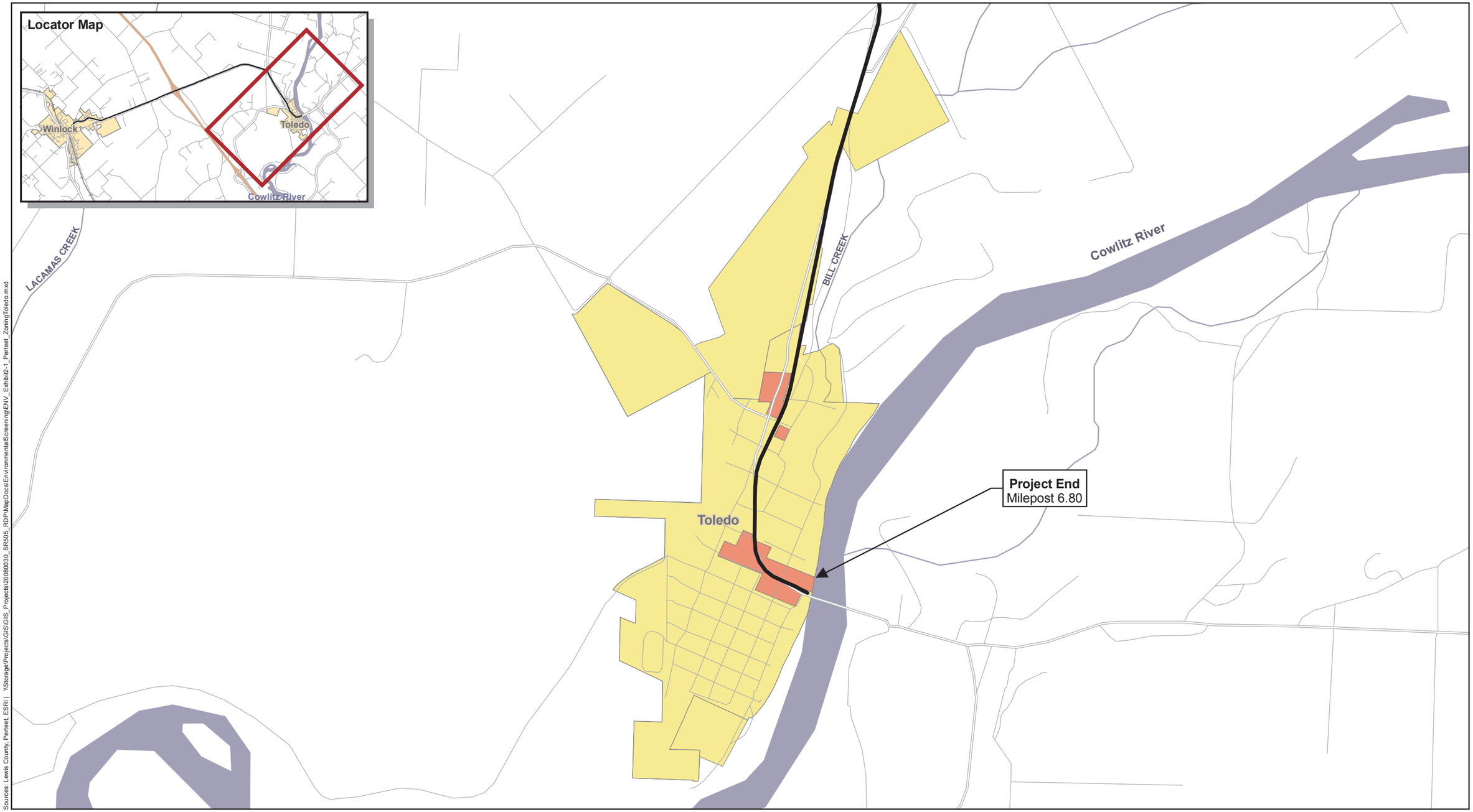
## 2.3 Population

The United States Census Bureau (Census 2000) currently lists the City of Toledo population at 653 and population for the City of Winlock as being 1,166. The general demographic breakout for the two cities is not dissimilar from the bulk of rural Lewis County:

- Essentially equal populations of male and female residents
- Approximately 85% Caucasian (see environmental screening for additional detail)
- Approximately 60% of residents are in the work force
- Median age is about 35 years for city residents and about 38 for county areas

## 2.4 Growth

Lewis County in general grew at a rate of approximately 0.6% per year for the period of 1980 to 1990. Between 1990 and 2000, the County grew at about 1.6% per year. The 2020 projected population is reported as being 92,395. This represents a forecasted annual growth rate (2000 – 2020) of about 1.75%.




Sources: Lewis County, Perteet, ESRI | \\Storage\Projects\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\Environmental\Screening\ENV_Exhibit2-1_Perteet_ZoningToledo.mxd

0 2,000
Feet

Lewis County

Perteet

Legend

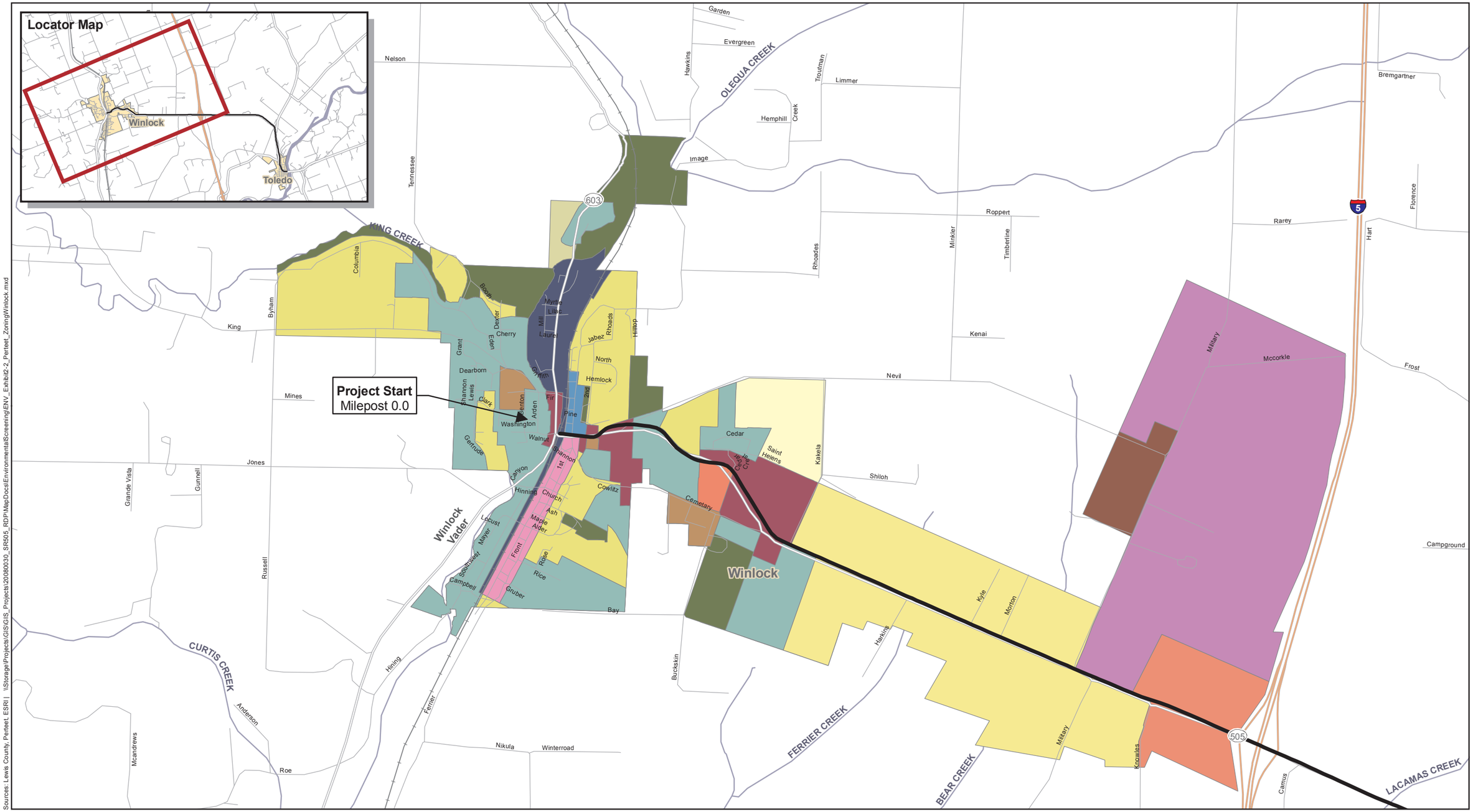
Project Extent
Stream
City Limit

Zone

C
RES

South Lewis County Subarea
Transportation Plan

**City of Toledo Zoning**
**Exhibit 2.1**




Sources: Lewis County, Perteet, ESRI | \\Storage\Projects\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\ENV_Exhibit2-2_Perteet_ZoningWinlock.mxd

0 Miles

Lewis County

Perteet

**Legend**

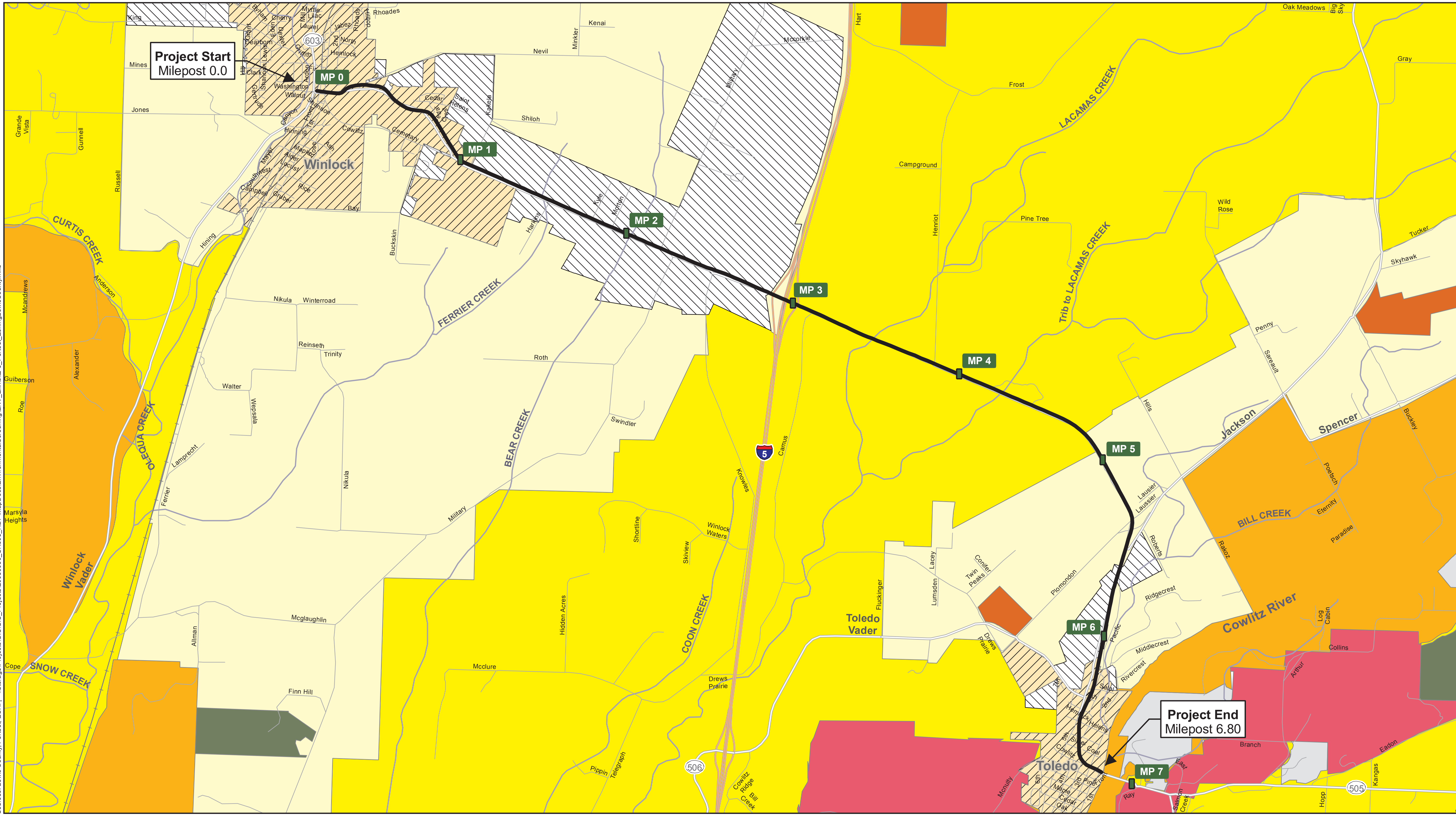
- Project Extent
- Stream
- City Limit

Zone

- C
- Commercial
- DC
- HDR
- Industrial
- LDR
- LI
- MDR
- MUN
- MUS
- OS
- Public Facilities
- RUA
- Residential
- UDA

South Lewis County Subarea Transportation Plan

**City of Winlock Zoning**
**Exhibit 2.2**




Sources: Lewis County, Perteet, ESRI | \\Storage\Projects\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\ENV_Exhibit2-3_Perteet_ZoningLewisCounty.mxd

0 1
Miles

Lewis County

Perteet

Legend

- Project Extent
- Stream
- City Limit

Zone

| | | |
|---|---|---|
| UGA | Mine | RDD-10 |
| City | ARL | RDD-20 |
| Forest | RAI | RDD-5 |

South Lewis County Subarea
Transportation Plan

**Lewis County Zoning**
**Exhibit 2.3**

# CHAPTER 3 ROADWAY CHARACTERISTICS

## 3.1 Topography

Generally, the area rises in elevation from the Cowlitz River (Toldeo, MP 6.8; approximate elevation of 105 feet above Mean Sea Level) towards the City of Winlock (MP 0.0, approximate elevation of 300 feet above MSL). The approximate grade leaving the City of Toledo westbound is 9%. The terrain is then rolling from just west of Interstate 5 to the city limit of Winlock. The terrain then slopes gradually downward at an approximate grade of 7% into the city center. There are two sustained grades in the study area: an approximate grade of 10% west of Camus Road to Knowles Road and a grade of about 7% from the downtown core of Winlock to just east of Cemetery Road.

## 3.2 Right-of-Way

Right-of-way width varies throughout the study area (MP 0.0 to MP 6.8). WSDOT provided plan and profile sheets for several projects from 1950's to 1990's within the study area. Widths vary from approximately 50 feet (downtown City of Winlock) to 117 feet at MP 4.89. There appears to be 60 feet through the downtown area of Toledo. Many of the documents provided date back into the 1940s and some date back to 1919. Significant research by a right of way specialist will be required to create a right of way for the study area.

## 3.3 Intersections

There are 13 intersections located on the SR 505 corridor. Of the 13, only three are located outside the Urban Growth Areas (UGAs) of Winlock and Toledo: Camus Road, Henriot Road and Jackson Highway/Plomondon Road. All intersections are stop controlled. There are no signalized intersections within the SR 505 corridor study area.

## 3.4 Parking

On-street parking on SR 505 is prohibited in the City of Winlock with the exception of parallel parking on the north side of SR 505 approaching the intersection of First Street. Parallel parking is generally allowed on both sides of SR 505 in the City of Toledo. The exceptions to parking occur at North Fifth/Kellogg Way/St Helens Street, Silver Street and at the Cowlitz River Bridge.

## 3.5 Roadway Surface and Shoulder

SR 505 physical features are from WSDOT State Highway Road Log records. Asphalt concrete pavement width varies from a maximum width of 44 feet (MP 6.78) to a minimum width of 22 feet (MP 2.22 to MP 6.45). Shoulders throughout the study area are paved ranging from widths of 2 to 8 feet. A complete listing of physical features is provided in Exhibit 3.1.

**Exhibit 3.1**
**SR 505 Physical Inventory of Roadway Features by MP (WSDOT Road Log)**

| MP | Feature | Description | Roadway width | Paved Shoulders L, R | Posted Speed | Terrain R = rolling L = level | Parking (L, R or P = prohibited) |
|---|---|---|---|---|---|---|---|
| 0.01 | RR Xing | Kerron St | 32 | | 25 | R | P |
| 0.03 | Intersection | E Front St | | | | | |
| 0.06 | Intersection | First St | 32 | | 25 | R | L |
| 0.10 | | | 32 | | 25 | R | P |
| 0.16 | | | 26 | 4 | 25 | R | P |
| 0.23 | Intersection | Nevil Rd | 26 | 2 | 40 | R | P |
| 0.28 | | | 26 | 2 | 40 | R | P |
| 0.4 | Bridge | Olequa Ck | | | | | |
| 0.41 | End Bridge | | | | | | |
| 0.7 | Intersection | Cedar Crest Dr | 23 | 2, 2 | 40 | R | P |
| 1.00 | MP Marker | 1, E Walnut St | 23 | 2, 2 | 50 | R | P |
| 1.01 | Intersection | Cemetery Rd | 23 | 2, 2 | 50 | R | |
| 1.08 | Intersection | Kakela Rd | | | | | |
| 1.18 | Leave City | Winlock | | | | | |
| 1.56 | Intersection | Harkins Rd | | | | | |
| 1.93 | Intersection | Morton Rd | | | | | |
| 2.00 | MP Marker | 2 | | | | | |
| 2.05 | Bridge | Box culvert | | | | | |
| 2.06 | End Bridge | | | | | | |
| 2.22 | Intersection | N Military Rd | 22 | 8, 8 | 50 | R | |
| 2.31 | Intersection | S Military Rd | | | | | |
| 2.43 | | | 22 | 8, 8 | 50 | R | |
| 2.52 | Intersection | Knowles Rd | | | | | |
| 2.88 | On/off ramps | I5 | | | | | |
| 2.94 | Overpass | I5 | 26 | | 50 | R | |
| 2.98 | End Overpass | | 22 | 6, 6 | 50 | L | |
| 3.00 | MP Marker | 3 | | | | | |
| 3.03 | On/off Ramp | I5 | | | | | |
| 3.09 | Intersection | Camas Rd | 22 | 6, 8 | 55 | L | |
| 3.16 | | | 22 | 6, 6 | 55 | L | |
| 3.47 | Bridge | Lacamas Ck | 26 | | 55 | L | |
| 3.51 | End Bridge | | 22 | 6, 6 | 55 | L | |
| 3.85 | Intersection | Henriot Rd | | | | | |
| 3.96 | MP Marker | 4 | | | | | |
| 4.25 | Bridge | Mill Ck | 33 | | 55 | L | |
| 4.26 | End Bridge | | 22 | 6, 6 | 55 | L | |
| 5.00 | MP Marker | 5 | | | | | |

**Exhibit 3.1**
**SR 505 Physical Inventory of Roadway Features by MP (WSDOT Road Log) Cont.**

| MP | Feature | Description | Roadway width | Paved Shoulders L, R | Posted Speed | Terrain R = rolling L = level | Parking (L, R or P = prohibited) |
|---|---|---|---|---|---|---|---|
| 5.19 | | | 22 | 6, 6 | 40 | L | |
| 5.30 | Intersection | Laussier Rd | | | | | |
| 5.44 | | | 24 | 5, 5 | 40 | L | |
| 5.46 | Intersection | Jackson Highway, Plomondon Rd | 22 | 6, 6 | 40 | L | |
| 5.57 | | | 22 | 6, 6 | 40 | L | |
| 5.60 | Intersection | Pacific Rd | | | | | |
| 5.75 | Ent/ext | Toledo HS | 22 | 3, 7 | 40 | L | |
| 6.00 | Mp Marker | 6 | | | | | |
| 6.16 | Enter City | Toledo | 22 | 3, 7 | 40 | L | |
| 6.18 | | | 22 | 3, 7 | 25 | L | R |
| 6.26 | Intersection | Pacific Rd | | | | | |
| 6.27 | End/begin St<br>Intersection | Toledo Vader Rd, N Fifth St<br>Salal St | | | | | |
| 6.32 | Intersection | Ash St | 26 | 5 | 25 | R | L, R |
| 6.38 | Intersection | Hemlock St | | | | | |
| 6.43 | Intersection | N Fifth St | | | | | |
| 6.45 | End/beg<br>Intersection | N Fifth St, Kellogg Wy<br>St Helens St | 22 | 2, 4 | 25 | R | P |
| 6.52 | Intersection | Silver St | 26 | 3 | 25 | R | P |
| 6.68 | End/beg<br>Intersection | Kellogg Wy, Cowlitz St<br>Third St | 44 | | 25 | R | L, R |
| 6.71 | | | 44 | | 25 | R | L, R |
| 6.73 | Intersection | Second St | | | | | |
| 6.78 | End | Cowlitz St | 44 | | 25 | R | L, R |
| 6.79 | Intersection | Front St | | | | | |
| 6.80 | Bridge | Cowlitz River | 32 | | 25 | R | P |

Source: WSDOT State Highway Road Log, 2007

Exhibit 3.2 provides a road log inventory that has been enhanced to include additional culverts identified during the environmental screening that were not documented in the road log.

**Exhibit 3.2**
**Additional Culverts within the Study Area**

| | List of SR 505 culverts and their WDFW fish barrier status | | | | |
|---|---|---|---|---|---|
| **Site Id** | **Mile Post** | **Stream Name** | **Tributary to** | **Fish Use** | **Barrier Status** |
| 992244 | 0.14 | Unnamed | Olequa Creek | Yes | Total |
| 992245 | 0.21 | Unnamed | Olequa Creek | Yes | Partial |
| 992246 | 0.24 | Unnamed | Unnamed to Olequa Creek | Yes | Total |
| 992247 | 0.34 | Unnamed | Olequa Creek | No | Non-Fish Bearing |
| 992248 | 0.40 | Unnamed | Unnamed to Olequa Creek | No | Non-Fish Bearing |
| 992249 | 2.04 | Unnamed | Unnamed to Olequa Creek | No | Non-Fish Bearing |
| 992250 | 2.35 | Landers Creek | Olequa Creek | No | Non-Fish Bearing |
| 992251 | 3.34 | Unnamed | Lacamas Creek | Yes | Non-Barrier |
| 992252 | 3.79 | Unnamed | Lacamas Creek | No | Non-Fish Bearing |
| 992253 | 4.71 | Unnamed | Lacamas Creek | No | Non-Fish Bearing |

## 3.6 Crosswalks and Bike Paths

There are marked crosswalks at the intersection of Front Street in Winlock and at the intersection of Front Street in Toledo. There are no designated bike paths along SR 505 in the study area.

## 3.7 Transit/Park and Ride

Currently, there is no transit service provider in the study area. There is a park and ride lot located in the southeast corner of the Exit 63 Interchange area, which is owned and maintained by WSDOT. Intercity Transit currently provides a daily vanpool service – Vanpool No. 26 from Winlock to Lacey between 8:00 AM and 4:30 PM.

## 3.8 Bridges and Intercrossing Structures

WSDOT Bridge Inspection Manual 2006 defines a bridge as: "A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between under copings of abutments or spring lines of arches, or extreme ends openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous openings".

Six bridges are listed in the road log including the bridge over Interstate 5. The other five structures span the following:

- Olequa Creek
- Bear Creek
- Lacamas Creek
- Mill Creek, and
- Cowlitz River.

The crossing at Bear Creek is listed as being a box culvert – all others are identified as bridges. WSDOT's "2007 Annual Traffic Report", road log does not provide any details beyond identifying a box culvert at Bear Creek. This study does not provide field reconnaissance to verify elements reported within the road log. Exhibit 3.3 shows the bridge over Interstate 5 at Exit 63.

**Exhibit 3.3**
**Exit 63 over Interstate 5**

## 3.9 Functional Classification and Access Control

In 1991, the Washington state legislature enacted statutes establishing rules in Chapter 47.50 of the Revised Code of Washington (RCW) to protect the safety and capacity of the state highway system through access management. Access control manages vehicle turning movements onto and off of state highways to improve system performance, minimize traffic conflicts, and increase traffic control flow. The Washington Administrative Code (WAC) 468-52 established five classification categories, for non-limited access highways like SR 505. Exhibit 3.4 lists and defines the five classification categories.

**Exhibit 3.4**
**Access Classifications**

| Class | Nonconforming[1] | Variance[2] | Conforming[3] | Access Point Spacing** | Limitations[4] |
|---|---|---|---|---|---|
| **Class 1**<br>Mobility is the primary function | Yes* | No | No | 1320 ft | • One access only to contiguous parcels under same ownership<br>• Private access connection is not allowed unless no other reasonable access exists (must use local road/street system if possible) |
| **Class 2**<br>Mobility is favored over access | Yes* | Yes* | No | 660 ft | • One access connection only to contiguous parcels under same ownership unless frontage > 1320 ft<br>• Private access connection not allowed unless no other reasonable access exists (must use local road/street system if possible) |
| **Class 3**<br>Balance between mobility and access in areas with less than maximum buildout | Yes | Yes | Yes | 330 ft | • One access connection only to contiguous parcels under same ownership<br>• Joint access connection for subdivisions preferred; private connection allowed, with justification |
| **Class 4**<br>Balance between mobility and access in areas with less than maximum buildout | Yes | Yes | Yes | 250 ft | One access connection only to contiguous parcels under same ownership, except with justification |
| **Class 5**<br>Access needs may have priority over mobility | Yes | Yes | Yes | 125 ft | More than one access connection per ownership, with justification |

**Notes:**

* The access connection continues only until such time other reasonable access to a highway with a less restrictive class or acceptable access to the local road/street system becomes available and is allowed.

** Minimum, on the same side of the highway.

[1] See 1435.09(2).

[2] See 1435.09(3).

[3] See 1435.09(1).

[4] Unless grandfathered (see 1435.08).

Source: WSDOT Design Manual, November 2007

Within the study area, SR 505 is designated as a rural collector. It is predominately Class 3 access control in the corridor with two exceptions: Limited Access (full control) between the ramps for Interstate 5 and Class 5 at MP 5.25. Class 3 is described as being a balance between mobility and access in areas with less than maximum build out. Class 5 describes access needs as having potential priority over mobility needs. Class 3 highways have a minimum intersection spacing of 0.5 miles and a minimum access spacing of 330'.

## 3.10 Speed Limits

The posted speed limit for the rural areas along SR 505 east of Interstate 5 is 55 mph. 50 mph is the posted speed west of Interstate 5. Speeds are reduced at the city limits for the cities of Toledo and Winlock. Progressive speed reduction occurs (40mph) to 25 mph as you approach the downtown core areas of both cities. Exhibit 3.5 lists the speed limits obtained from the WSDOT Highway Log (2007) and verified in the field.

**Exhibit 3.5**
**Posted Speed Limits**

| Milepost | Posted Speed Limit | West | East |
|---|---|---|---|
| 0.00 – 0.74 | 25 | Highway 603 | Cedar Crest Drive |
| 0.74 – 1.01 | 40 | Cedar Crest Drive | Winlock City Limit |
| 1.01 – 3.03 | 50 | Winlock City Limit | Camus Road |
| 3.03 – 5.00 | 55 | Camus Road | Milepost 5 |
| 5.00 – 6.16 | 40 | Milepost 5 | Toledo City Limits |
| 6.16 – 6.32 | 25 | Toledo City Limits | SR 506 (Ash Road) |

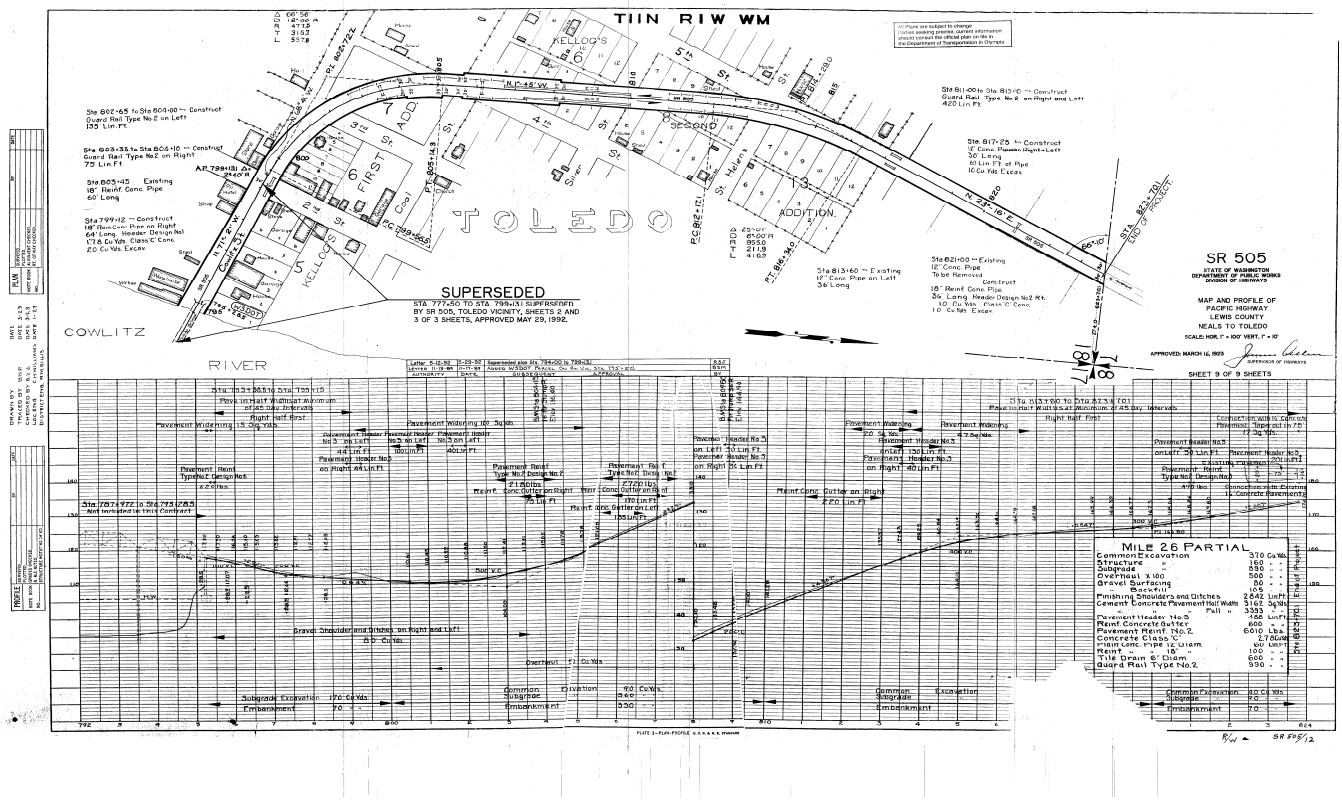
Source: WSDOT State Highway Road Log, 2007.

## 3.11 Horizontal and Vertical Alignments

A complete "as constructed" centerline survey for SR 505 (MP 0.0 to MP 6.85) does not exist. A centerline profile was generated from Lewis County LiDAR data and plotted. This profile was plotted to correlate the collision data. Additional vertical information is needed to complete a deficiency review of the vertical alignments. No data has been collected or generated that will enable a deficiency review of horizontal alignments. Historic files represent the intended design only. Exhibit 3.6 shows a Historic Sample Design Map.

It may be prudent to collect "as constructed" vertical and horizontal alignment data for segments (or point locations) that are identified for capital improvement following the future condition land use analysis. WSDOT design practice is to meet current AASHTO (American Association of State Highway Transportation Officials) vertical and horizontal curve design requirements. WSDOT has produced several historic designs of roadway improvements along the study segment of SR 505 that reach back well into the last Century. While the design documents can be relied upon to verify design requirements of the day, there is no guarantee that the improvements were built to design in the absence of "as constructed" drawings. An aerial survey combined with targeted ground survey will produce vertical and horizontal data sufficient to evaluate existing roadway geometrics. Current design software such as AUTODESK Civil 3D could then be utilized to evaluate existing geometrics using today's AASHTO design standards. The software will identify any roadway element that fails current standards. In the absence of certified "as constructed" documentation, some level of survey is required to verify existing conditions and identify potentially deficient roadway geometrics.

**Exhibit 3.6**
**Historic Sample Design Map**




## 3.12 Rail Facilities

The Burlington Northern Santa Fe (BNSF) mainline rail is located immediately west of MP 0.0 in downtown Winlock. The crossing is at grade and in fair to good condition.

## 3.13 Freight

The Washington State Freight and Goods Transportation System (FGTS) is used to classify state highways, county roads and city streets according to the average gross truck tonnage experienced per year. The FGTS classifies roadways using five freight tonnage classifications, T-1 through T-5, as follows:

T-1 more than 10 million tons per year
T-2 4 to 10 million tons per year
T-3 300,000 to 4 million tons per year
T-4 100,000 to 300,000 tons per year
T-5 at least 20,000 tons in 60 days

Washington Strategic Freight Corridors are those routes that carry 4 million or more gross tons of freight annually (T-1 and T-2). The FGTS classification system had historically been used to: establish grant funding eligibility, fulfill federal reporting requirements and support planning for pavement needs, traffic management and investment decisions at the state and local level. Strategic corridors help define the balance between the cost of investment with resulting economic output, direct limited resources to their most productive use and set clear priorities linked to growth of jobs and the state's economy. SR 505 has average daily truck traffic ranging from 52 in summer to 69 in winter. Freight consists of wood products, paper products, rock products, machinery and agricultural products. SR 505 carries the following average tonnage by season ("Washington State Freight Truck Origin and Destination Study: Lewis County", EWITS Research Report Number 21-Lewis January 1998):

- Fall = 1,657 tons
- Winter = 996 tons
- Spring = 922 tons
- Summer = 808 tons

SR 505 is a T-3 freight corridor. The two cities of Toledo and Winlock are predominantly served by surface based freight arriving via Interstate 5.

### 3.14 Intersections and Traffic Control

Within the study area, there are 29 non-signalized intersections: 13 along the SR 505 study corridor and 16 in the South Lewis County subarea. In addition, there are many local accesses, private or dead-end streets present that have been considered on a cumulative and not individual basis.

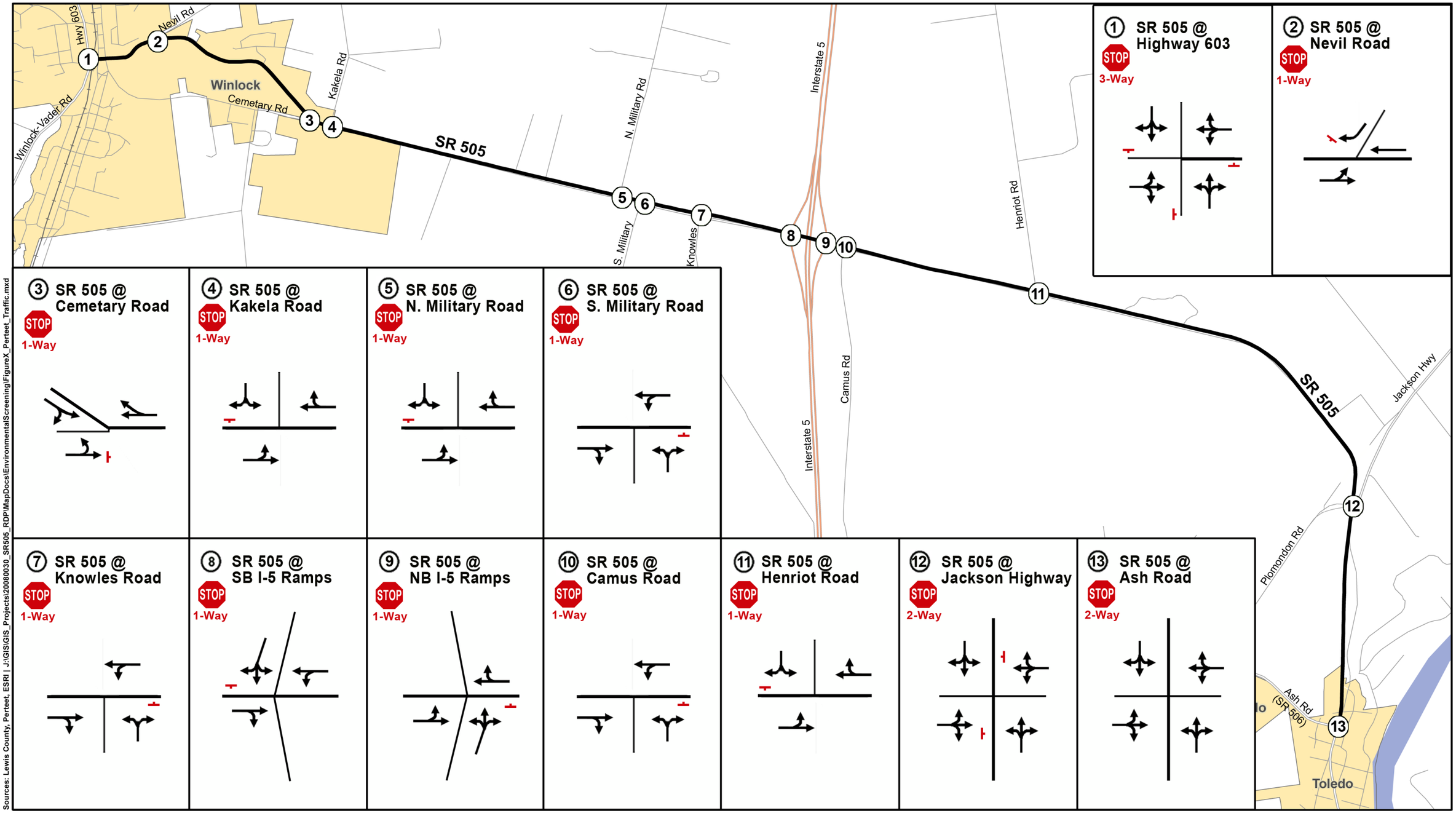
Field observations were conducted to verify the characteristics of the study intersections (traffic controls, channelization and approaches), traffic operations, and travel time for model calibration. Exhibit 3.7 summarizes the characteristics of the SR 505 corridor intersections and the existing lane channelization is shown in Exhibit 3.8. Characteristics of intersections located off SR 505 and in the South Lewis County Subarea are shown in Exhibit 3.9.

**Exhibit 3.7**
**SR 505 Corridor – Intersection Characteristics**

| MP | SR 505 Intersection | Intersection Type | Channelization | Traffic Control | Study ID Number |
|---|---|---|---|---|---|
| -0.1* | Highway 603 (AKA Kerron Street / Walnut Street | 4-Leg | Single Lane Approaches | 3-way stop (WB Free) | 1 |
| 0.23 | Nevil Road | T-intersection located northeast | Single Lane Approaches | 1-way stop | 2 |
| 1.01 | Cemetery Road | T-intersection located west | Single Lane Approaches | 1-way stop | 3 |
| 1.08 | Kakela Road | T-intersection located north | Single Lane Approaches | 1-way stop | 4 |
| 2.22 | North Military Road | T-intersection located south | Single Lane Approaches | 1-way stop | 5 |
| 2.31 | South Military Road | T-intersection located south | Single Lane Approaches | 1-way stop | 6 |
| 2.52 | Knowles Road | T-intersection located south | Single Lane Approaches | 1-way stop | 7 |
| 2.88 | Southbound I-5 Ramps | 4-Leg (On-Off Ramps) | Single Lane Approaches | 1-way stop | 8 |
| 3.03 | Northbound I-5 Ramps | 4-Leg (On-Off Ramps) | Single Lane Approaches | 1-way stop | 9 |
| 3.09 | Camus Road | T-intersection located south | Single Lane Approaches | 1-way stop | 10 |
| 3.85 | Henriot Road | T-intersection located north | Single Lane Approaches | 1-way stop | 11 |
| 5.46 | Jackson Highway / Plomondon Road | 4-Leg | Single Lane Approaches additional NB RTL | 2-way stop | 12 |
| 6.32 | Ash Road / State Route 506 | 4-Leg | Single Lane Approaches | 2-way stop | 13 |

*Included owing to its proximity to MP 0.0.

**Exhibit 3.8**
**SR 505 Corridor - Intersection Channelization**




Sources: Lewis County, Perteet, ESRI | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\FigureX_Perteet_Traffic.mxd

0 0.8 Miles

Lewis County

Perteet

Legend
Stream
City Limit

South Lewis County Subarea Transportation Plan

SR 505 Corridor Intersection Channelization

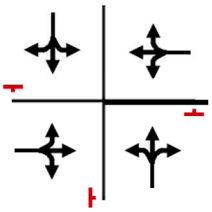
Exhibit 3.8

**Exhibit 3.9**
**South Lewis County Subarea – Intersection Characteristics**

| Intersection | Intersection Type | Channelization | Traffic Control | Study ID Number |
|---|---|---|---|---|
| US 12 @ I-5 Southbound Ramps | T-intersection On / Off Ramps located north | Single Lane Approaches | 1-way stop | 22 |
| US 12 @ I-5 Northbound Ramps | 4-Leg (On-Off Ramps) | Single Lane Approaches | 1-way stop | 23 |
| SR 506 @ I-5 Southbound Ramps | 4-Leg (On-Off Ramps) | Single Lane Approaches | 1-way stop | 101 |
| US 12 @ Tucker Road | T-intersection located south | Single Lane Approaches additional WB Left Turn Lane | 1-way stop | 35 |
| SR 506 @ I-5 Northbound Ramps | 4-Leg (On-Off Ramps) | Single Lane Approaches | 1-way stop | 102 |
| Highway 603 @ Avery Road | 4-Leg | Single Lane Approaches | 2-way stop | 20 |
| Highway 603 @ Antrim Road | T-intersection located east | Single Lane Approaches | 1-way stop | 30 |
| North Military Road @ Avery Road | 4-Leg | Single Lane Approaches | 4-way stop | 21 |
| North Military Road @ Nevil Road | T-intersection located west | Single Lane Approaches | 1-way stop | 33 |
| Jackson Highway @ US 12 | 4-Leg | EB & WB 3-Lane (Left, Thru, Right) NB & SB 1 Lane | Signal | 24 |
| Jackson Highway @ Park Road | 4-Leg | Single Lane Approaches | 2-way stop | 25 |
| Jackson Highway @ Frost Road | T-intersection located west | Single Lane Approaches | 1-way stop | 26 |
| Jackson Highway @Tucker Road | T-intersection located east | Single Lane Approaches | 1-way stop | 27 |
| Jackson Highway @ Spencer Road | 4-Leg | Single Lane Approaches | 2-way stop | 28 |
| Jackson Highway /Plomondon Road @ Toledo-Vader Road | 4-Leg | Single Lane Approaches | 2-way stop | 106 |
| Jackson Highway @ Tucker Road | T-intersection located east | Single Lane Approaches | 1-way stop | 27 |

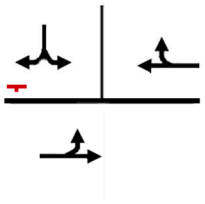
1 SR 505 @ Highway 603

STOP 3-Way



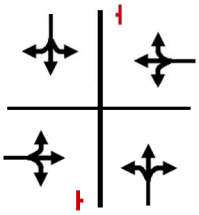
5 SR 505 @ N. Military Road

STOP 1-Way



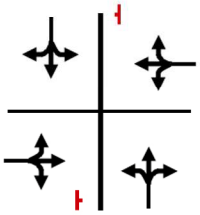
12 SR 505 @ Jackson Highway

STOP 2-Way



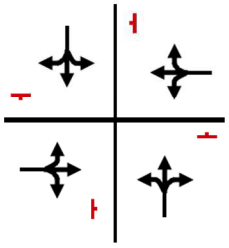
20 Highway 603 @ Avery Road

STOP 2-Way

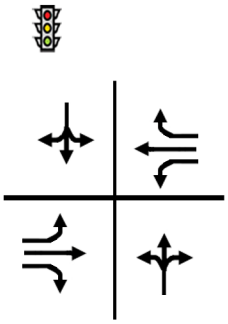


21 N Military Rd @ Avery Road

STOP 4-Way

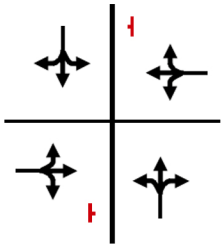


24 Jackson Hwy @ US 12



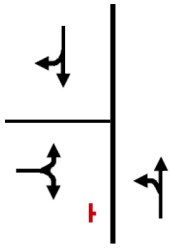
25 Jackson Hwy @ Park Road

STOP 2-Way



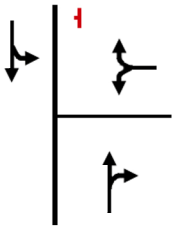
26 Jackson Hwy @ Frost Road

STOP 1-Way



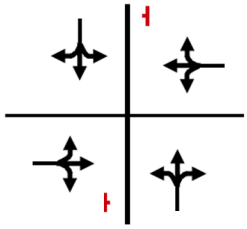
27 Jackson Hwy @ Tucker Road

STOP 1-Way



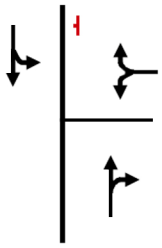
28 Jackson Hwy @ Spencer Rd

STOP 2-Way



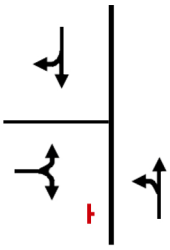
30 Highway 603 @ Atrim Road

STOP 1-Way



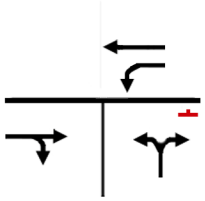
33 N Military Road @ Nevil Road

STOP 1-Way



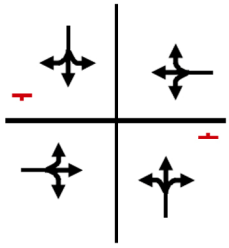
35 Tucker Road @ US 12

STOP 1-Way



106 Jackson Hwy @ Toledo-Vader Rd

STOP 2-Way



Sources: Lewis County, Perteet, ESRI | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\Traffic\Traffic_Exhibit_Perteet_TurningTemplate.mxd

Lewis County

Perteet

South Lewis County Subarea Transportation Plan

South Lewis County Subarea Arterials
2008 Existing Intersection Channelization
Exhibit 3.10

# CHAPTER 4 COLLISION HISTORY

The following is a summary of collision analysis prepared for SR 505 corridor. A complete Collision Report is provided in Appendix A of this report.

## 4.1 Data Sets Evaluated

All reported collisions in the SR 505 study corridor (MP 0.0 to MP 6.8) between 01/01/2003 to 12/31/2007 were collected and processed for potential High Accident Locations (HAL) and/or Severe Accident Locations (SAL) nomination. Two consecutive years, representing a rolling two period inside of the study period of 2003 thru 2007 were utilized when developing severity points for any given analysis unit. Data was provided by Washington State Department of Transportation.

**Note: Federal law 23 USCS 409 governs the use of the data contained in this report. Under this law data utilized for purposes of evaluating potential highway safety enhancements "…Shall not be subject to discovery or admitted into evidence in a federal or state court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists or data."**

## 4.2 Study Methodology

This study evaluates collision data based on historic and pending approaches for analysis as defined by WSDOT. The data set was screened for potential HALs and site specific collision locations with severity point totals exceeding 10. Four representative roadway segments were identified and evaluated for collision rate within the entire corridor. The segments are broke out as follows:

Segment A, MP 0.0 to MP 1.18
Segment B, MP 1.19 to MP 3.03
Segment C, MP 3.04 to MP 6.16
Segment D, MP 6.17 to MP 6.85

Segment A is characterized by more urbanized land uses with curb and gutter sections transitioning to roadway shoulders and ditches at you move towards the easterly limit of the segment. The roadway slopes moderately from the downtown core of Winlock yielding to rolling topography in the easterly limit of the segment. Traffic speed increases from 25 to 50 mph as you leave the city limits.

Segment B has paved shoulders of varying widths and is drained by ditch section. Travel lane widths are typically 11 feet with paved shoulders that are predominantly 2 feet wide. Speed in this segment is posted as being 50 mph. Land use is predominantly rural in this segment.

Segment C supports a posted speed of 55 mph, generally 11 foot travel lanes with paved shoulders varying from 2 to 6 feet. Land use is predominantly rural in this segment.

Segment D represents a transition from rural land use to those associated with more urban areas. As you approach the downtown core area of Toledo, travel lanes increases in width from 11 feet to 13 feet, paved shoulders are replaced by curb and gutter sections, and speeds are reduced to 25 mph.

Four intersections of interest along the SR 505 corridor are also being evaluated for collision rate. They are: North Military Road @ MP 2.22, I-5 Southbound Ramp @ MP 2.88, I-5 Northbound Ramp @ MP 3.03, and Jackson Highway/Plomondon Road @ MP 5.46. The resulting rates are compared to state published collision rates for rural collector access class 3 roadways in the various years of interest.

Complete details on the identification and evaluation of the roadway segments are provided in Appendix A.

## 4.3 Summary of Collision Severity

During the analysis period (01/01/2003 to 12/31/2007) a total of 85 collisions were reported within the study area (mile post 0.0 to mile post 6.8). A breakout of collisions by severity is shown in Exhibit 4.1 and is as follows:

- 2 fatalities
- 6 serious injuries
- 13 evident injuries
- 21 possible injuries
- 43 property damage collisions.

## 4.4 Summary of First Collision Types

First collision type is described as being: the first injury damage producing event in the series of events that constitute a motor vehicle traffic collision. The following is break down of the collision types:

- 58 occurred at intersections or at driveways (68%)
- 55 during dry conditions (65%)
- 62 during daylight conditions (73%)

Exhibits 4.1 thru 4.8 provide summaries of all collisions on the four SR 505 study segments classified by collision type and collision severity.

## 4.5 Intersections

The North Military Road intersection appears to exceed the state average intersection frequency for rural intersections in years 2003 and 2004. The north bound ramps at Interstate 5, also appears to exceed the state average intersection collision frequency for rural highways for years 2003 and 2006. The state average for four-legged rural intersection is 0.589, and for a three-legged rural intersection it is 0.157.

## Segment A: MP 0.0 to MP 1.18 (2003 – 2007) SUMMARY

**Exhibit 4.1**
**Collision Type Summary MP 0.0 – 1.18**

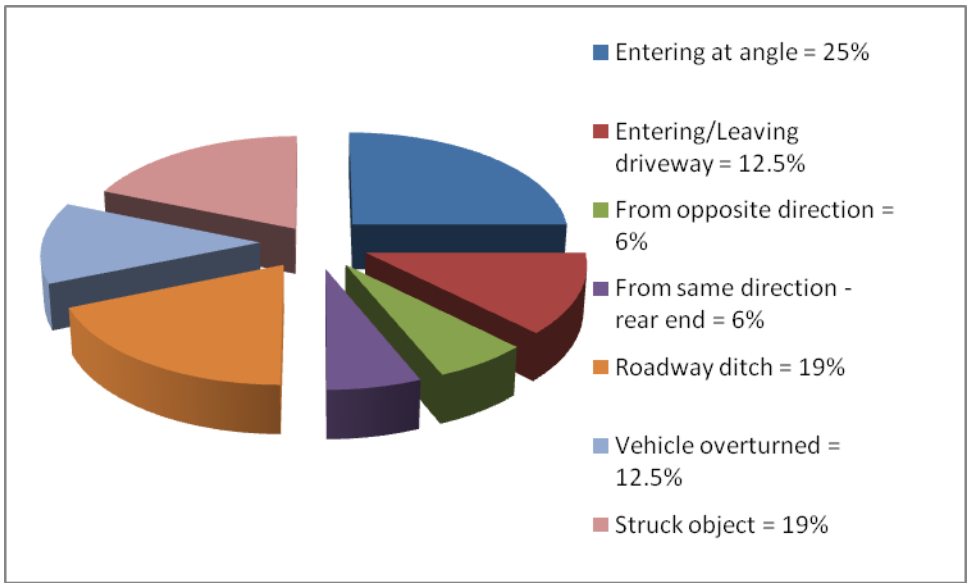
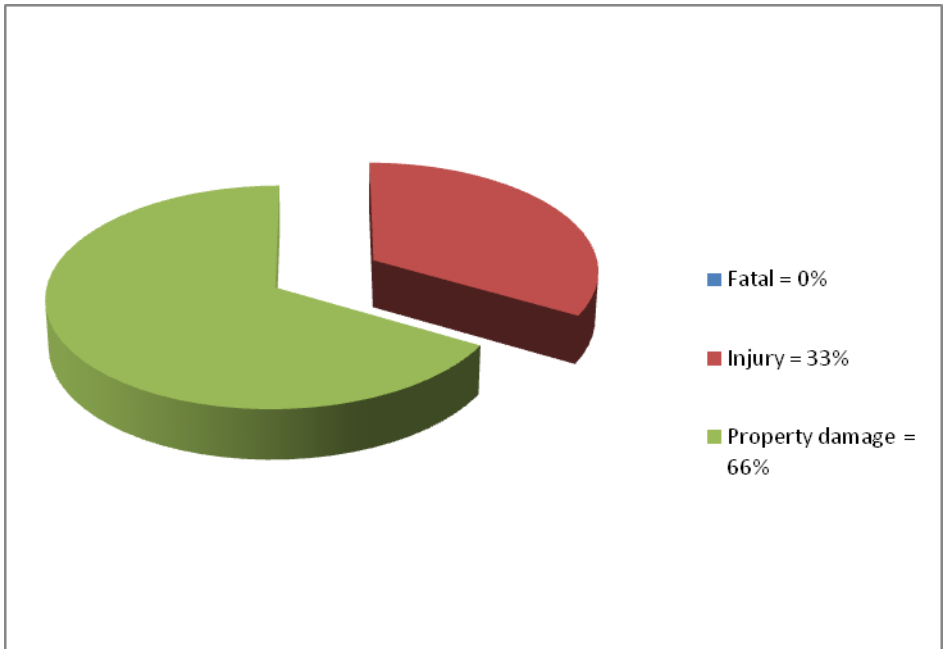



**Exhibit 4.2**
**Collision Severity Summary MP 0.0 – 1.18**



## Segment B: MP 1.19 TO MP 3.03 (2003 – 2007) SUMMARY

**Exhibit 4.3**
**Collision Type Summary MP 1.19 – 3.03**

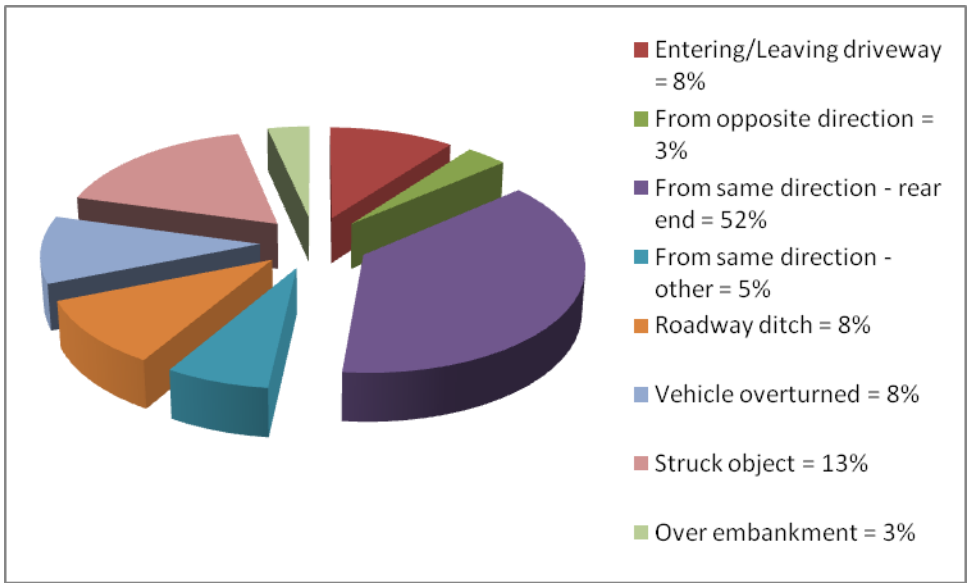
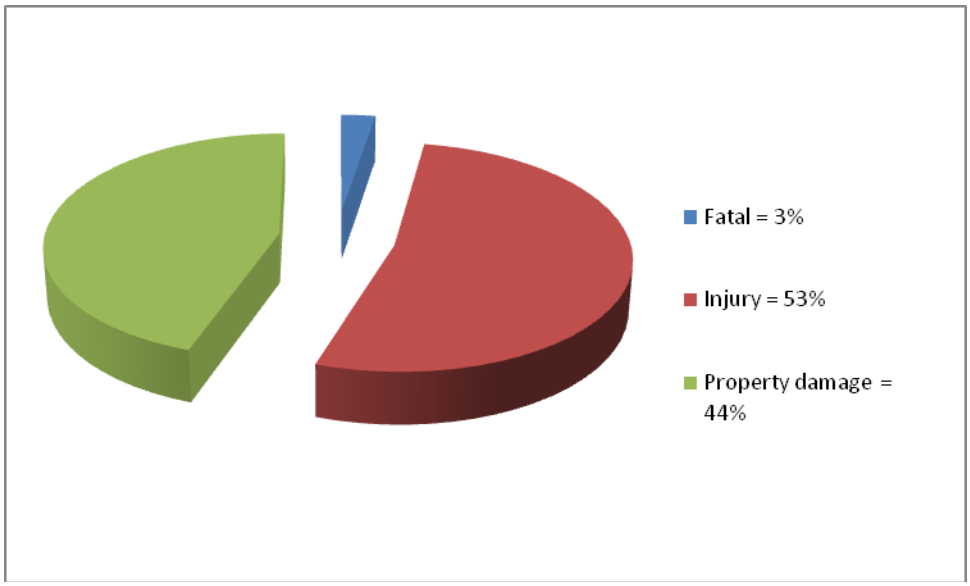
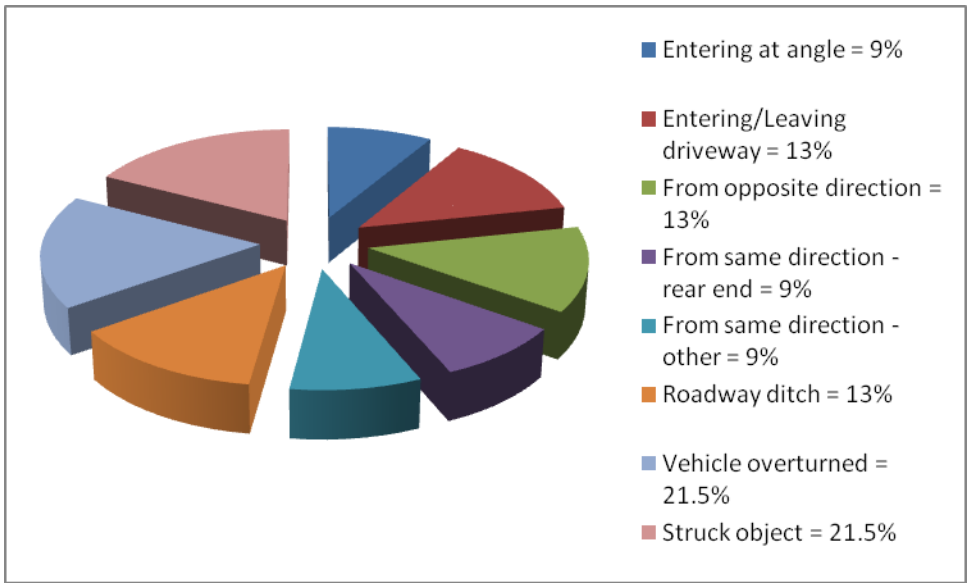



**Exhibit 4.4**
**Collision Severity Summary MP 1.19 – 3.03**

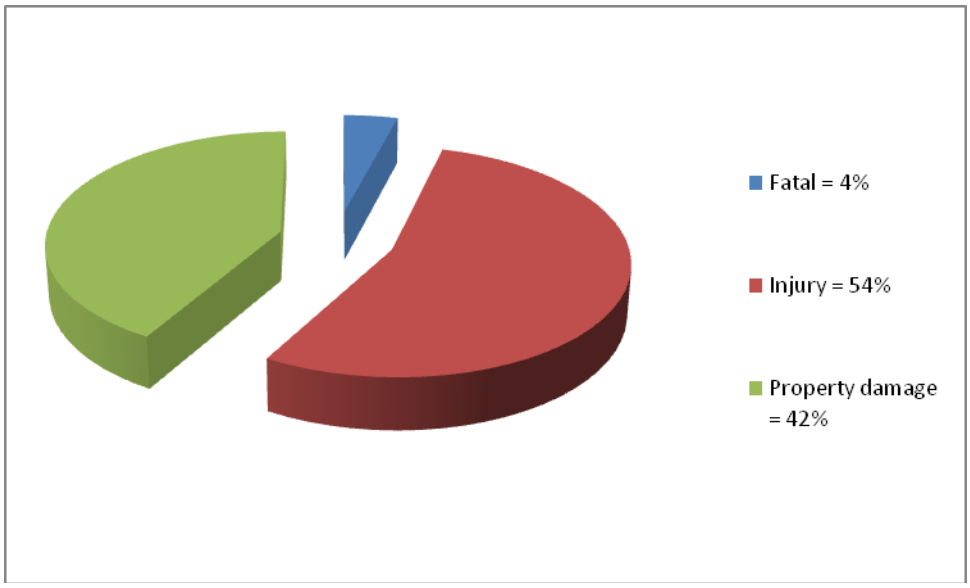


## Segment C: MP 3.04 TO MP 6.16 (2003 – 2007) SUMMARY

**Exhibit 4.5**
**Collision Summary By Type MP 3.04 – 6.16**




## Exhibit 4.6: COLLISION SEVERITY SUMMARY MP 3.04 – 6.16



## Segment D: MP 6.17 TO MP 6.8 (2003 – 2007) SUMMARY

**Exhibit 4.7**
**Collision Summary by Type MP 6.17 – 6.8**

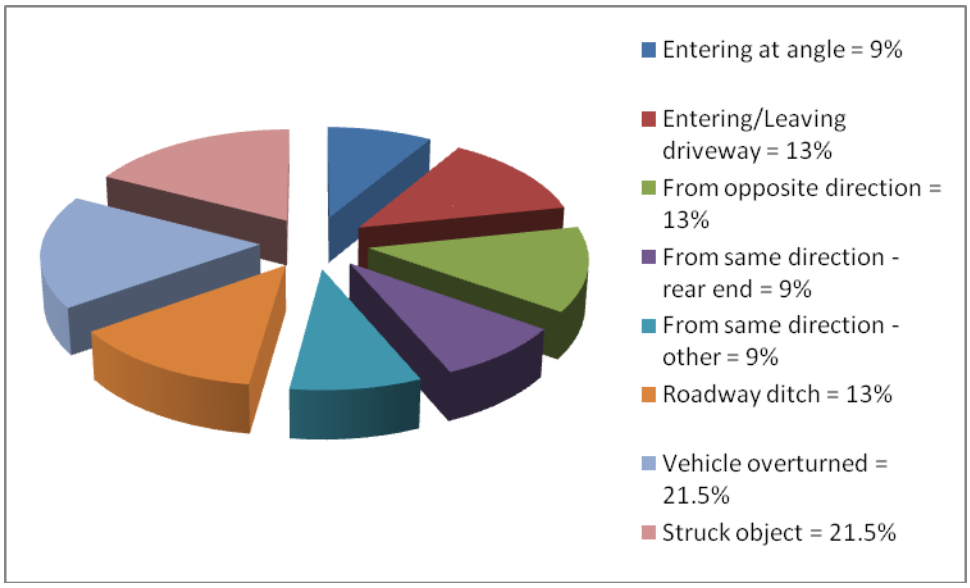
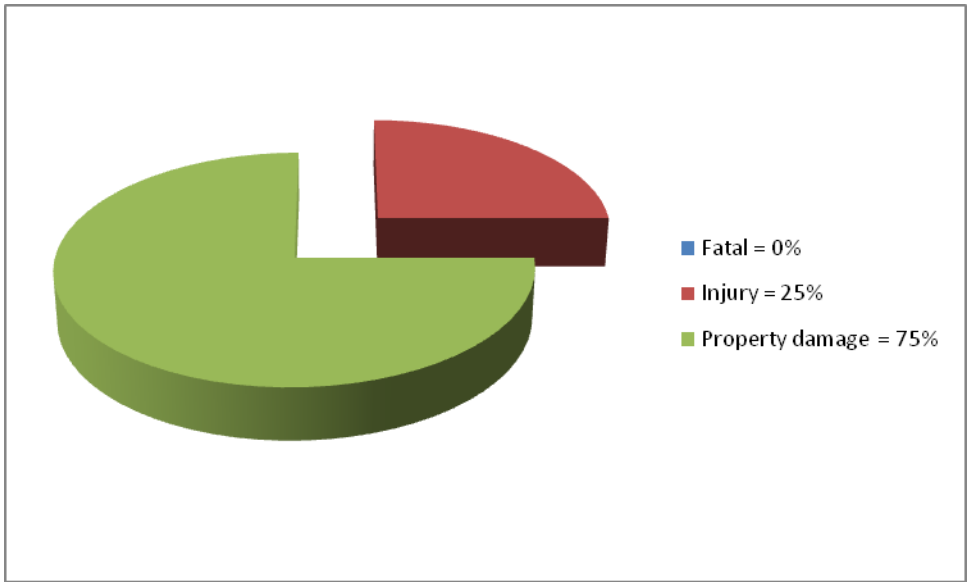



**Exhibit 4.8**
**Collision Severity Summary MP 6.17 – 6.8**



## 4.6 Segments

All of the study segments appear to exceed statewide average collision rates for at least one year out of the five year study period as shown in Exhibit 4.9. Segments A and B appear to exceed statewide average collision frequencies (rural collector access class 3) for several years within the study period. The collision frequencies for segments A and B suggest access control may be a significant contributor to total reported collisions in the corridor. The urbanizing segment within the City of Toledo reflects similar collision rates for concern. Nearly 70% of all collisions (first collision type) list intersection or driveway as related collision causation. Hence access control is expected to be a significant consideration in potential collision rate reduction strategies.

**Exhibit 4.9**
**Collision Rate Summary by Roadway Segment**

| Study Segment | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|
| A | 2.19 | 0.5 | 2.06 | 0.5 | 2.64 |
| B | 2.53 | 2.91 | 1.65 | 3.56 | 1.35 |
| C | 0.95 | 2.83 | 1.13 | 0.28 | 1.03 |
| D | 1.18 | 2.81 | 1.40 | 1.40 | 3.84 |
| WSDOT rate* | | 1.48 | 1.66 | 1.55 | |

*WSDOT Collision Rates for Rural Highway Class 3

## 4.7 Recommendations

Collision frequencies for statewide rural collector roadways access class 3 should be obtained from WSDOT (for 2003 AND 2007) and compared to calculated values in this report. Where appropriate, one standard deviation from the mean value for each WSDOT annual frequency should also be obtained and the calculated values compared to determine the significance of the calculated values. It does appear that several segments, in various years of the study period will likely exceed statewide average collision rates for rural collector class 3 roadways. Segments A, B and D should be further evaluated for improvement potential during the future conditions analysis portion of this study. The available data suggests: access, driver attention and potentially, speed, are all suspect causes for a majority of the collisions reported during the study period (+/- 70%).

# CHAPTER 5 TRAFFIC OPERATIONS

This section provides a summary of the existing traffic conditions and traffic operations along SR 505 corridor between the cities of Winlock and Toledo. A complete Traffic Report is provided in Appendix B in this report.

## 5.1 Traffic Volumes

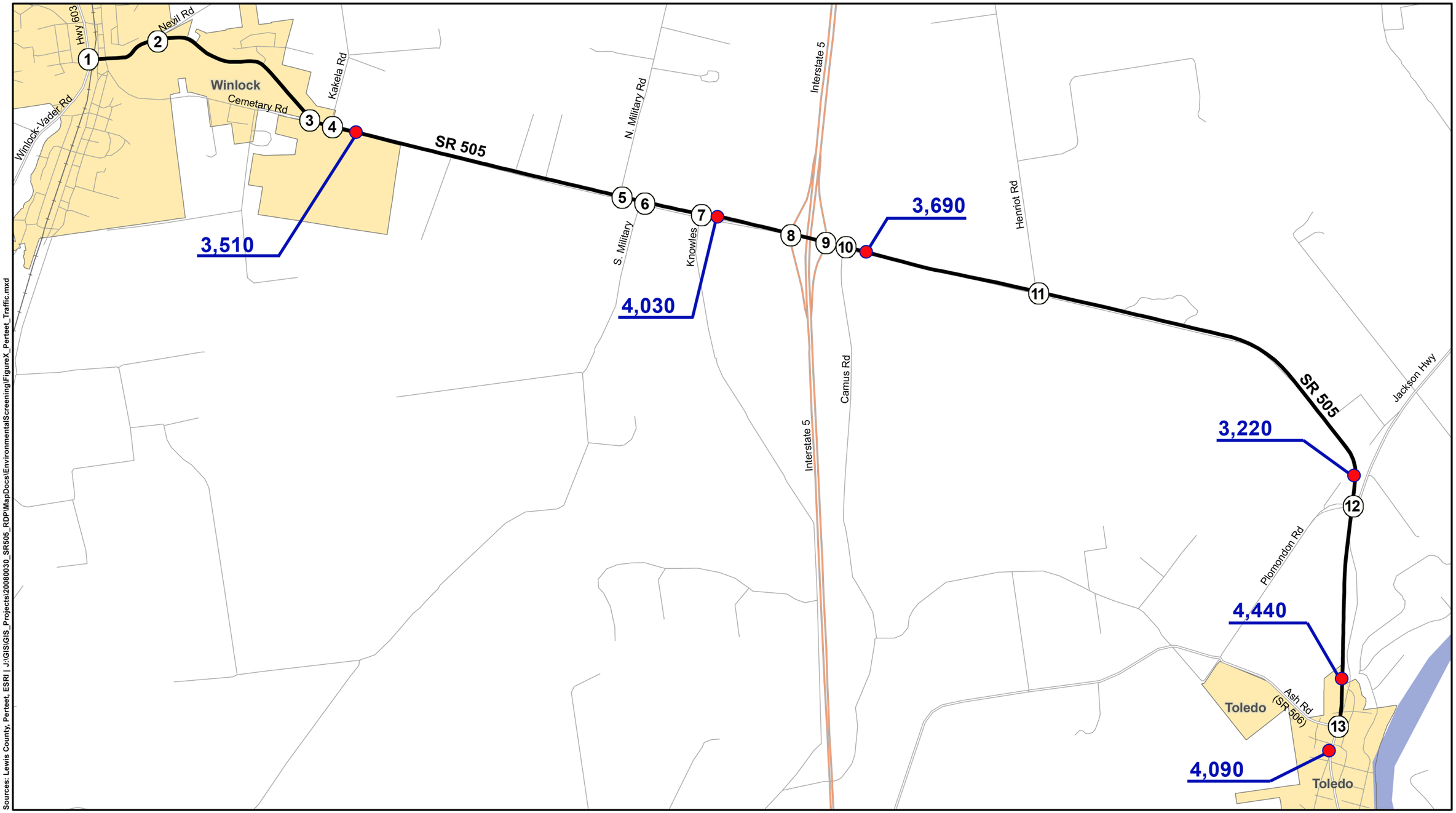
Volumes and traffic counts were collected along the corridor and throughout the study area. Two-hour turn movement counts were collected at all study intersections for the AM (6:00 to 8:00 am) and PM (4:00 to 6:00 pm) peak periods with 24 hour hourly volume counts along and on numerous approaches to SR 505. Exhibit 5.1 shows the Average Weekday Traffic volumes along the SR 505 corridor. In cases where current data was not available, as with numerous locations along I-5, historical data for the years 2005 and 2006 provided by the Southwest Region, WSDOT, was used. Traffic volumes were expanded with growth rates calculated from nearby locations where historical data could be obtained. AM and PM peak hour turn movement volumes at the study intersections along SR 505 are shown in Exhibits 5.2 and 5.3, respectively.

## 5.2 Methodology

The existing traffic operations were modeled to establish the baseline traffic conditions. Traffic operations were evaluated for intersections along SR 505 and for the segments between intersections.

Roadway volume to capacity (V/C) ratios, were estimated for the sections of SR 505 between intersections. The methodology was based on the *Highway Capacity Manual 2000*. Since SR 505 is a two-lane rural highway, a capacity of 1200 vehicles per lane was assumed. The V/C ratios reveal the extent of utilization of existing capacity on SR 505, and will serve as the basis for future availability of capacity and the potential need for increased capacity on the highway.

The traffic operations for SR 505 study corridor were also modeled in VISSIM, a microsimulation tool. The existing conditions VISSIM model was calibrated using traffic volumes and travel times collected in the field. The model will serve to evaluate proposed alternatives for the SR 505 corridor.




Sources: Lewis County, Perteet, ESRI | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\FigureX_Perteet_Traffic.mxd

0 0.8
Miles

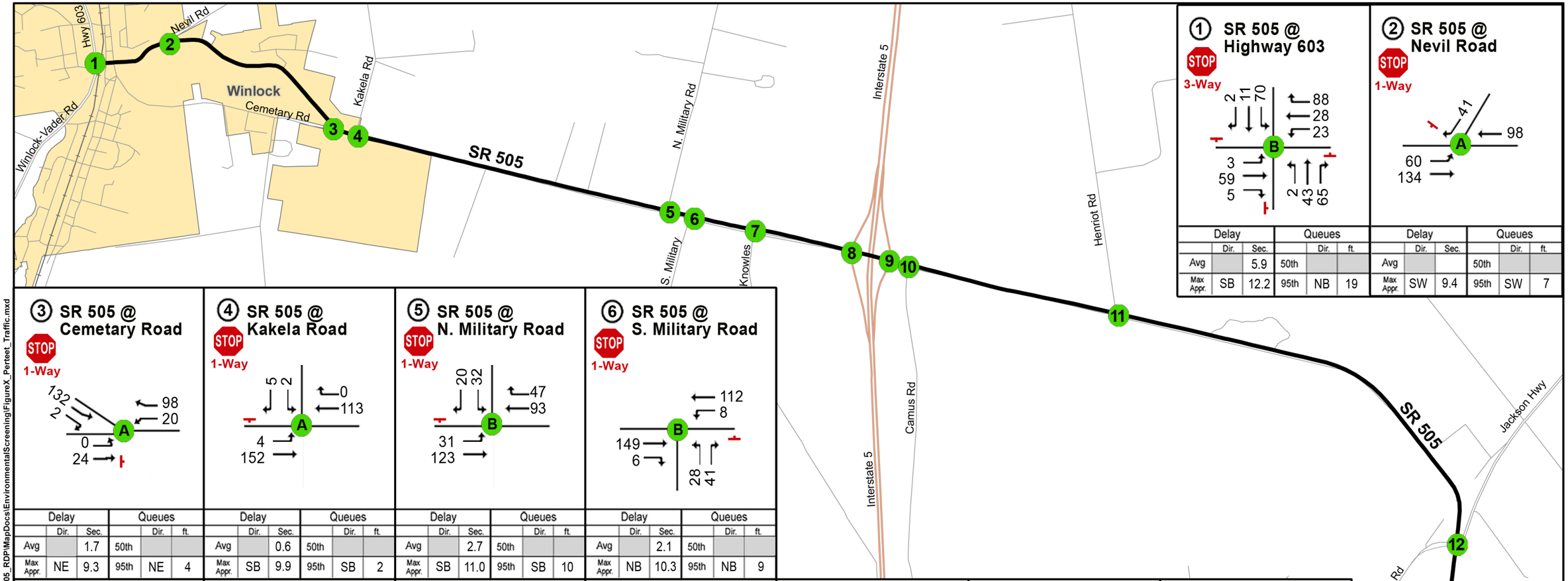
Lewis County

Perteet

Legend
Stream
City Limit

South Lewis County Subarea Transportation Plan

SR 505 Corridor Average Weekday Traffic Volumes
2008 Existing
Exhibit 5.1




## ① SR 505 @ Highway 603

STOP 3-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 5.9 | 50th | | |
| Max Appr. | SB | 12.2 | 95th | NB | 19 |

## ② SR 505 @ Nevil Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | | 50th | | |
| Max Appr. | SW | 9.4 | 95th | SW | 7 |

## ③ SR 505 @ Cemetary Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 1.7 | 50th | | |
| Max Appr. | NE | 9.3 | 95th | NE | 4 |

## ④ SR 505 @ Kakela Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.6 | 50th | | |
| Max Appr. | SB | 9.9 | 95th | SB | 2 |

## ⑤ SR 505 @ N. Military Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.7 | 50th | | |
| Max Appr. | SB | 11.0 | 95th | SB | 10 |

## ⑥ SR 505 @ S. Military Road

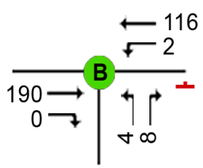
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.1 | 50th | | |
| Max Appr. | NB | 10.3 | 95th | NB | 9 |

## ⑦ SR 505 @ Knowles Road

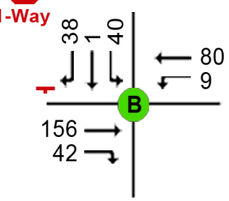
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.7 | 50th | | |
| Max Appr. | NB | 10.5 | 95th | NB | 3 |

## ⑧ SR 505 @ SB I-5 Ramps

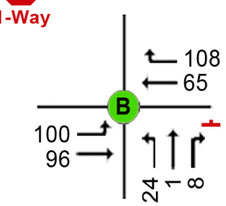
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.5 | 50th | | |
| Max Appr. | SB | 10.6 | 95th | SB | 10 |

## ⑨ SR 505 @ NB I-5 Ramps

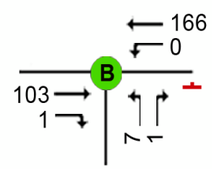
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 3.0 | 50th | | |
| Max Appr. | NB | 12.1 | 95th | EB | 6 |

## ⑩ SR 505 @ Camus Road

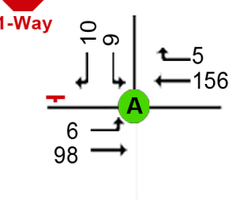
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.5 | 50th | | |
| Max Appr. | NB | 10.8 | 95th | NB | 2 |

## ⑪ SR 505 @ Henriot Road

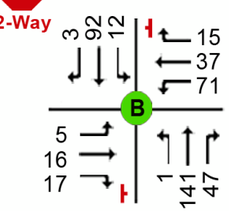
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 1.0 | 50th | | |
| Max Appr. | SB | 9.8 | 95th | SB | 3 |

## ⑫ SR 505 @ Jackson Highway

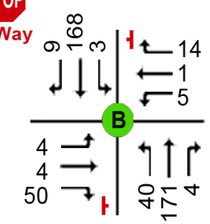
STOP 2-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 5.2 | 50th | | |
| Max Appr. | WB | 14.2 | 95th | WB | 30 |

## ⑬ SR 505 @ Ash Road

STOP 2-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 3.0 | 50th | | |
| Max Appr. | WB | 11.8 | 95th | EB | 10 |

Sources: Lewis County, Perteet, ESRI | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\FigureX_Perteet_Traffic.mxd

0 0.8 Miles

Lewis County

Perteet

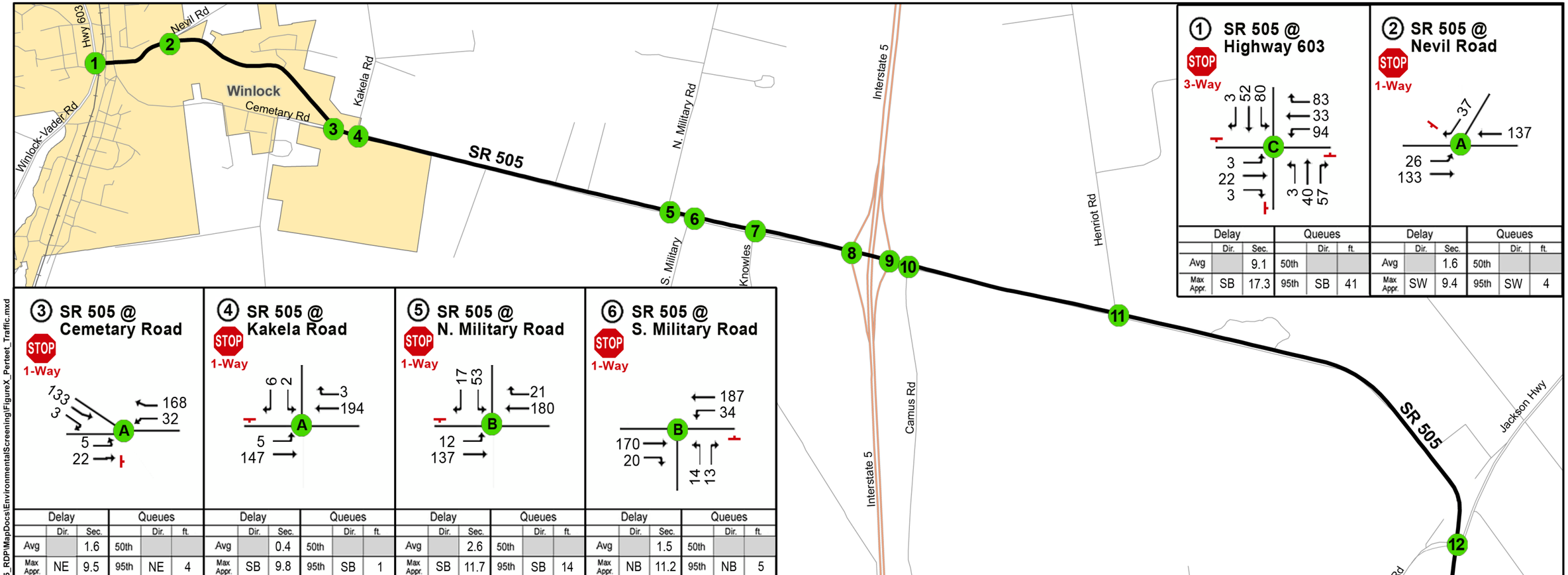
Legend
- Stream
- City Limit

Levels of Service (LOS)
- A Little/No Delay
- B Short Delays
- C Average Delays
- D Long Delays
- E Very Long Delays
- F Extreme Delays

South Lewis County Subarea Transportation Plan

SR 505 Corridor 2008 AM Peak Hour Traffic Volumes and Intersection Levels of Service (LOS)

Exhibit 5.2




## ① SR 505 @ Highway 603

STOP 3-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 9.1 | 50th | | |
| Max Appr. | SB | 17.3 | 95th | SB | 41 |

## ② SR 505 @ Nevil Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 1.6 | 50th | | |
| Max Appr. | SW | 9.4 | 95th | SW | 4 |

## ③ SR 505 @ Cemetery Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 1.6 | 50th | | |
| Max Appr. | NE | 9.5 | 95th | NE | 4 |

## ④ SR 505 @ Kakela Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.4 | 50th | | |
| Max Appr. | SB | 9.8 | 95th | SB | 1 |

## ⑤ SR 505 @ N. Military Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.6 | 50th | | |
| Max Appr. | SB | 11.7 | 95th | SB | 14 |

## ⑥ SR 505 @ S. Military Road

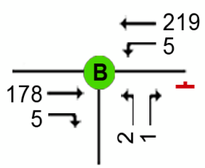
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 1.5 | 50th | | |
| Max Appr. | NB | 11.2 | 95th | NB | 5 |

## ⑦ SR 505 @ Knowles Road

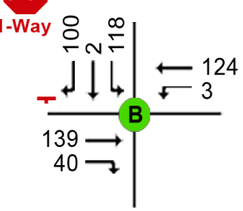
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.2 | 50th | | |
| Max Appr. | NB | 11.0 | 95th | NB | 1 |

## ⑧ SR 505 @ SB I-5 Ramps

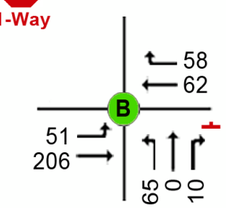
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 5.3 | 50th | | |
| Max Appr. | SB | 13.0 | 95th | SB | 41 |

## ⑨ SR 505 @ NB I-5 Ramps

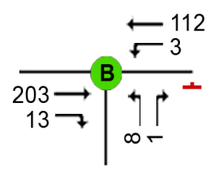
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 3.1 | 50th | | |
| Max Appr. | NB | 13.5 | 95th | NB | 15 |

## ⑩ SR 505 @ Camus Road

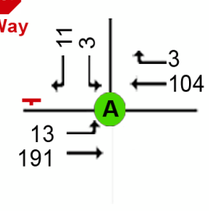
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.4 | 50th | | |
| Max Appr. | NB | 10.8 | 95th | NB | 1 |

## ⑪ SR 505 @ Henriot Road

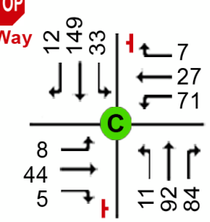
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.8 | 50th | | |
| Max Appr. | SB | 9.5 | 95th | SB | 2 |

## ⑫ SR 505 @ Jackson Highway

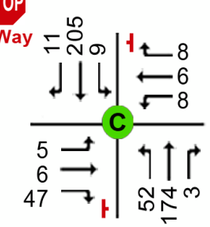
STOP 2-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 4.9 | 50th | | |
| Max Appr. | WB | 16.0 | 95th | WB | 26 |

## ⑬ SR 505 @ Ash Road

STOP 2-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 3.3 | 50th | | |
| Max Appr. | WB | 15.4 | 95th | EB | 13 |

Sources: Lewis County, Perteet, ESRI | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\FigureX_Perteet_Traffic.mxd

0 0.8 Miles

Lewis County

Perteet

Legend
- Stream
- City Limit

Levels of Service (LOS)
- A Little/No Delay
- B Short Delays
- C Average Delays
- D Long Delays
- E Very Long Delays
- F Extreme Delays

South Lewis County Subarea Transportation Plan

SR 505 Corridor 2008 PM Peak Hour Traffic Volumes and Intersection Levels of Service (LOS)

Exhibit 5.3

## 5.3 Intersection Level of Service

Intersection Level of Service (LOS) illustrates traffic operations values were calculated for existing condition using the Synchro version 7.0 (Build 761). LOS illustrates the average delay experienced by vehicles accessing the intersection and range from A to F. LOS A is the best operating condition with minimal delays. LOS F is the worst with very long delays and heavy congestion. Exhibit 5.4 shows the Highway Capacity Manual criteria for each level of service and what the average user expects in delay time for each LOS grade.

**Exhibit 5.4**
**Levels of Service Criteria**

| Level of Service (LOS) | Expected Delay | Intersection Control Delay (Seconds per Vehicle) | |
|---|---|---|---|
| | | Un-signalized Intersections | Signalized Intersections |
| A | Little/No Delay | ≤10 | ≤10 |
| B | Short Delays | >10 and ≤15 | >10 and ≤20 |
| C | Average Delays | >15 and ≤25 | >20 and ≤35 |
| D | Long Delays | >25 and ≤35 | >35 and ≤55 |
| E | Very Long Delay | >35 and ≤50 | >55 and ≤80 |
| F | Extreme Waits | >50 | >80 |

Exhibits 5.5 and 5.6 show the AM and PM peak hour intersection levels of service, respectively. The approaches at all the intersections operate at LOS B or better in AM and at LOS C or better during the PM peak hours.

**Exhibit 5.5**
**SR 505 Corridor - 2008 AM Peak Hour Intersection Levels of Service**

| Mile Post (MP) or INT ID | Intersection | Control | 2008 Existing | | Worst Approach Queue | |
|---|---|---|---|---|---|---|
| | | | LOS | Delay | Feet | Direction |
| 0.00 | SR 505 @ SR 603/Kerron Street | 3-way Stop* | B | 12.2 | 19’ | NB SR 603 |
| 0.23 | SR 505 @ Nevil Road | 1-way Stop | A | 9.4 | 7’ | SW Nevil |
| 1.01 | SR 505 @ Cemetery Road | 1-way Stop | A | 9.3 | 4’ | NE Cemetery |
| 1.08 | SR 505 @ Kakela Road | 1-way Stop | A | 9.9 | 2’ | SB Kakela |
| 2.22 | SR 505 @ North Military Road | 1-way Stop | B | 11.0 | 10’ | SB North Military |
| 2.31 | SR 505 @ South Military Road | 1-way Stop | B | 10.3 | 9’ | NB South Military |
| 2.52 | SR 505 @ Knowles Road | 1-way Stop | B | 10.5 | 3’ | NB Knowles |
| 2.88 | SR 505 @ I-5 SB Ramps | 1-way Stop | B | 10.6 | 10’ | SB SB I-5 Ramp |
| 3.03 | SR 505 @ I-5 NB Ramps | 1-way Stop | B | 12.1 | 5’ | NB NB I-5 Ramp |
| 3.09 | SR 505 @ Camus Road | 1-way Stop | B | 10.8 | 2’ | NB Camus |
| 3.95 | SR 505 @ Henriot Road | 1-way Stop | A | 9.8 | 3’ | SB Henriot |
| 5.46 | SR 505 @ Jackson Highway/Plomondon | 2-way Stop | B | 14.2 | 30’ | WB Jackson Hwy |
| 6.32 | SR 505 @ Toledo-Vader Road/Ash St | 2-way Stop | B | 11.8 | 10’ | EB Ash Street |
| 22 | US 12 @ I-5 SB Ramps | 1-way Stop | B | 12.8 | 32’ | SB SB I-5 Ramp |
| 23 | US 12 @ I-5 NB Ramps | 1-way Stop | B | 14.7 | 17’ | NB NB I-5 Ramp |
| 101 | SR 506 @ I-5 SB Ramps | 1-way Stop | B | 11.4 | 3’ | SB SB I-5 Ramp |
| 102 | SR 506 @ I-5 NB Ramps | 1-way Stop | A | 8.8 | 4’ | NB NB I-5 Ramp |

**Coded in Synchro as a 2-way stop to obtain output*

**Exhibit 5.6**
**SR 505 Corridor - 2008 PM Peak Hour Intersection Levels of Service**

| Mile Post (MP) or INT ID | Intersection | Control | 2008 Existing | | Worst Approach Queue | |
|---|---|---|---|---|---|---|
| | | | LOS | Delay | Feet | Direction |
| 0.00 | SR 505 @ SR 603/Kerron Street | 3-way Stop* | C | 17.3 | 41’ | SB SR 603 |
| 0.23 | SR 505 @ Nevil Road | 1-way Stop | A | 9.4 | 4’ | SW Nevil |
| 1.01 | SR 505 @ Cemetery Road | 1-way Stop | A | 9.5 | 4’ | NE Cemetery |
| 1.08 | SR 505 @ Kakela Road | 1-way Stop | A | 9.8 | 1’ | SB Kakela |
| 2.22 | SR 505 @ North Military Road | 1-way Stop | B | 11.7 | 14’ | SB N. Military |
| 2.31 | SR 505 @ South Military Road | 1-way Stop | B | 11.2 | 5’ | NB S. Military |
| 2.52 | SR 505 @ Knowles Road | 1-way Stop | B | 11.0 | 1’ | NB Knowles |
| 2.88 | SR 505 @ I-5 SB Ramps | 1-way Stop | B | 13.0 | 41’ | SB SB I-5 Ramp |
| 3.03 | SR 505 @ I-5 NB Ramps | 1-way Stop | B | 13.5 | 15’ | NB NB I-5 Ramp |
| 3.09 | SR 505 @ Camus Road | 1-way Stop | B | 10.8 | 1’ | NB Camus |
| 3.95 | SR 505 @ Henriot Road | 1-way Stop | A | 9.5 | 2’ | SB Henriot |
| 5.46 | SR 505 @ Jackson Hwy/Plomondon | 2-way Stop | C | 16.0 | 26’ | WB Jackson Hwy |
| 6.32 | SR 505 @ Toledo-Vader Road/Ash St | 2-way Stop | C | 15.4 | 13’ | EB Ash Street |
| 22 | US 12 @ I-5 SB Ramps | 1-way Stop | C | 18.4 | 118’ | SB SB I-5 Ramp |
| 23 | US 12 @ I-5 NB Ramps | 1-way Stop | B | 13.4 | 16’ | NB NB I-5 Ramp |
| 101 | SR 506 @ I-5 SB Ramps | 1-way Stop | A | 9.5 | 3’ | SB SB I-5 Ramp |
| 102 | SR 506 @ I-5 NB Ramps | 1-way Stop | A | 8.8 | 5’ | NB NB I-5 Ramp |

**Coded in Synchro as a 2-way stop to obtain output*

## 5.4 SR 505 Corridor Capacities

Volume to capacity ratios (v/c) can identify areas of concern within corridors that may be experiencing congestion. A v/c ratio of greater than 0.9 usually indicates congestion. To evaluate the roadway performance the corridor was divided into a series of segments. A segment is the portion of roadway between major intersections or interchanges. For example, the roadway link between South Military Road and Knowles Road represents a segment in the SR 505 Corridor. Using segmental data, the SR 505 corridor was evaluated for areas of concern and to establish a base condition for future alternatives evaluation. Exhibits 5.7 and 5.8 show the volume to capacity ratios for SR 505 segments for AM and PM peaks, respectively.

**Exhibit 5.7**
**2008 AM Peak Hour Segment Volumes to Capacity Ratios**

| Mile Post (MP) | Collision Analysis Segment | SR 505 Segment | Eastbound | | Westbound | |
|---|---|---|---|---|---|---|
| | | | Volume | V/C | Volume | V/C |
| 0.00 – 0.23 | A | SR 603 to Nevil | 194 | 0.24 | 139 | 0.17 |
| 0.23 – 1.01 | A | Nevil to Cemetery Rd | 134 | 0.11 | 98 | 0.08 |
| 1.01 – 1.08 | A | Cemetery Rd to Kakela Rd | 156 | 0.13 | 118 | 0.10 |
| 1.08 – 2.22 | A/B | Kakela Rd to North Military Rd | 154 | 0.13 | 113 | 0.09 |
| 2.22 – 2.31 | B | North Military to South Military | 155 | 0.13 | 140 | 0.12 |
| 2.31 – 2.52 | B | South Military Rd to Knowles | 190 | 0.16 | 120 | 0.10 |
| 2.52 – 2.88 | B | Knowles to SB I-5 Ramps | 198 | 0.17 | 118 | 0.10 |
| 2.88 – 3.03 | B | SB I-5 Ramps to NB I-5 Ramps | 196 | 0.16 | 89 | 0.07 |
| 3.03 -3.09 | C | NB I-5 Ramps to Camus Rd | 104 | 0.09 | 173 | 0.14 |
| 3.09 – 3.85 | C | Camus Rd to Henriot Rd | 104 | 0.09 | 166 | 0.14 |
| 3.85 – 5.46 | C | Henriot Rd to Jackson Hwy | 107 | 0.09 | 161 | 0.13 |
| 5.46 – 6.32 | C/D | Jackson Hwy to Ash Rd | 180 | 0.23 | 189 | 0.24 |

**Exhibit 5.8**
**2008 PM Peak Hour Link Volumes to Capacity Ratios**

| Mile Post (MP) | Collision Analysis Segment | SR 505 Segment | PM Peak Hour | | | |
|---|---|---|---|---|---|---|
| | | | Eastbound | | Westbound | |
| | | | Volume | V/C | Volume | V/C |
| 0.00 – 0.23 | A | SR 603 to Nevil | 159 | 0.20 | 210 | 0.26 |
| 0.23 – 1.01 | A | Nevil to Cemetery Rd | 133 | 0.11 | 173 | 0.14 |
| 1.01 – 1.08 | A | Cemetery Rd to Kakela Rd | 152 | 0.13 | 200 | 0.17 |
| 1.08 – 2.22 | A/B | Kakela Rd to North Military Rd | 149 | 0.12 | 197 | 0.16 |
| 2.22 – 2.31 | B | North Military to South Military | 190 | 0.16 | 201 | 0.17 |
| 2.31 – 2.52 | B | South Military Rd to Knowles | 183 | 0.15 | 221 | 0.18 |
| 2.52 – 2.88 | B | Knowles to SB I-5 Ramps | 179 | 0.15 | 224 | 0.19 |
| 2.88 – 3.03 | B | SB I-5 Ramps to NB I-5 Ramps | 257 | 0.21 | 127 | 0.11 |
| 3.03 -3.09 | C | NB I-5 Ramps to Camus Rd | 216 | 0.18 | 120 | 0.10 |
| 3.09 – 3.85 | C | Camus Rd to Henriot Rd | 204 | 0.17 | 115 | 0.10 |
| 3.85 – 5.46 | C | Henriot Rd to Jackson Hwy | 194 | 0.16 | 107 | 0.09 |
| 5.46 – 6.32 | C/D | Jackson Hwy to Ash Rd | 225 | 0.28 | 187 | 0.23 |

These V/C results indicate none of the evaluated segments approach or exceed the 0.9 v/c congestion threshold indicator along the SR 505 Study corridor during the AM or PM peak hours.

# CHAPTER 6 ENVIRONMENTAL SCREENING

## 6.1 Study Area

Approximately 6.8 miles of SR 505 (MP 0.0 to MP 6.8) were screened for environmental data sets. The study area is approximately 85 acres, an area generated by a 50 foot buffer extended from both (south and north) roadway edges. An alternate analysis was also conducted on environmental elements not specifically bounded by the study area such as: noise, air and water pollution. These methodologies are described for each element that uses an extended study area, with the "SR 505 IC/Corridor Study Draft Existing Environmental Screening" report prepared by Perteet, July 30, 2008. A complete Environmental Screening Report is provided in Appendix C of this report.

## 6.2 Screening Methods

Documenting existing environmental conditions is achieved through a GIS screening process. Available GIS data is overlaid onto the study area, (e.g. potential project footprint and adjacent areas) to inventory environmental resources, environmental hazards, and the human environment. This screening will provide detail for analysis of environmental considerations during project planning and help develop strategies for future regulatory approval.

For this existing conditions report the environmental resources are divided into three categories:

- Natural resources, which include critical areas that are typically regulated by local, state, and federal law.
- Natural hazards, which are areas, resources, and/or critical areas/natural systems and processes that pose a potential hazard to people and property.
- The built environment, which considers the community, population and potential effects on community services.

The specific environmental elements evaluated for each category are shown in Exhibit 6.1. The elements evaluated are the typical resources or considerations that would be regulated under Lewis County Code (LCC 17.35 'Critical Areas'), and reviewed for compliance with the State Environmental Policy Act (SEPA) and, when a federal nexus is present, the National Environmental Policy Act (NEPA).

**Exhibit 6.1**
**Environmental Elements Evaluated for Each Category**

| Environmental Screening | |
|---|---|
| **Category** | **Element** |
| Natural Resources | Water Quality |
| | Wetlands |
| | Streams |
| | Fish & Aquatic Resources |
| | Wildlife |
| Natural Hazards | Flood Hazards |
| | Geologic Hazard Areas |
| | Hazardous Materials |
| Human Environment | Environmental Justice |
| | Parks and Recreation Resources |
| | Cultural and Historic Resources |
| | Air Quality |
| | Noise |

## 6.3 GIS Analysis

The GIS analysis used ModelBuilder software, published by ESRI, which is an established method for designing, conducting, and recording complex GIS analyses. The ModelBuilder analysis improves a standard GIS analysis in five important ways:

- It is a published, well-known, recognized, peer-reviewed process.
- It generates a detailed, standardized record (metadata) of the GIS processing.
- It is easily replicated.
- It is easy to modify.
- It creates a framework that facilitates standard analysis across resource types.

In order to create the base map for the ModelBuilder process, Perteet used the current roadway edge of pavement provide by Lewis County. The existing GIS data was gathered from numerous sources including local, state, and federal databases. No site-specific field data was obtained for this analysis. Due to the high-level screening and nature of the data used, numerous assumptions were made in order to conduct this environmental screening. Those assumptions are documented in the methodology sections in each individual environmental element subsection.

## 6.4 Technical Findings Summary

| | | |
|---|---|---|
| **Study Area** | | |
| | Length of Study Area | 6.8 Miles |
| | Study Area (50 feet from edge of pavement) | 84.8 acres |
| **Water Quality** | | |
| | Existing Impervious Surfaces[1] | 28.3 acres |
| **Wetlands** | | |
| | NWI Wetlands in the Study Area[2] | 1.6 acres |
| | Wetland Buffers in the Study Area[3] | 8.9 acres |
| | Hydric Soils in the Study Area[4] | 25.6 acres |
| **Streams** | | |
| | Streams Crossings in the Study Area[5] | 16 |
| | Stream Buffer in the Study Area[6] | 17.6 acres |
| | WDFW Barrier Culverts in the Study Area[7] | 2 |
| | WDFW Partial Barrier Culverts in the Study Area[8] | 1 |
| **Fish and Aquatic Resources in the Study Area[9]** | | |
| *ESA Threatened* | Chinook Salmon | O. tshawytscha |
| | Coho Salmon | O. kisutch |
| | Chum Salmon | O. keta |
| *ESA Threatened* | Steelhead | O. mykiss |
| | Cutthroat | O. clarki |
| **Wildlife in the Study Area[10]** | | |
| | Mount Saint Helens and Mount Rainier Elk Herds | |
| | Spotted Owl terrestrial buffer | |
| | Pacific salmon and trout habitats | |

[1] Calculated using edge of pavement provided by Lewis County.
[2] Based on NWI data which typically understates wetlands. This is not a NEPA/SEPA level analysis. Wetland determination and delineation will be required for future permitting.
[3] Buffers based on several assumptions, see Appendix C for details.
[4] Based on NRCS data typically overstates potential wetlands. This is not a NEPA/SEPA level analysis. Wetland determination and delineation will be required for future permitting.
[5] Represents the intersection of streams and SR 505 centerline, needs to be field verified.
[6] Buffers based on several assumptions, see Appendix C for details.
[7] WDFW inventory see Appendix C for details.
[8] WDFW inventory see Appendix C for details.
[9] WDFW salmonscape data see Appendix C for details.
[10] WDFW PHS data see Appendix C for details.

| | | |
|---|---|---|
| **Natural Hazards in the Study Area** | | |
| | Flood Plains[11]<br>Steep Slopes[12] | 4.5 acres<br>0.6 acres |
| **Environmental Justice[13]** | | |
| | Minority populations are similar to County<br>Very few non-English speakers<br>Poverty rates are higher than County | |
| **Parks and Recreation Resources[14]** | | |
| | None identified within or immediately adjacent to study area | |
| **Cultural and Historic Resources[15]** | | |
| | None identified within or immediately adjacent to study area | |
| **Air Quality[16]** | | |
| | The study area is not in an Ozone or Carbon Monoxide Maintenance Area | |
| **Noise[17]** | | |
| | There are noise sensitive receptors in the study area. The residential and some commercial are considered sensitive noise receptors when analyzing potential noise effects or impacts. | |

[11] Lewis County
[12] Lewis County
[13] 2000 Census data
[14] Lewis County
[15] Lewis County Screening – No 106 Assessment Conducted
[16] SW Clean Air Agency
[17] Lewis County Land Use

# CHAPTER 7 SOUTH LEWIS COUNTY SUBAREA ROADS

## 7.1 Introduction

The South Lewis County subarea is served by several county roads that are designated as "major collector" on the County's functional classification network. Three main roadways (Highway 603, North Military Road and Jackson Highway) connect SR 505 traffic north to Avery Road and US Highway 12 (Interstate 5 Exit 68). One County roadway, Tucker Road, connects Jackson Highway traffic easterly to US Highway 12. In addition to determining deficiencies and needs for these county roads, Lewis County is interested in understanding the potential interaction of traffic along these roads with traffic associated with SR 505 and Interstate Exit 63.

In October 2008, Lewis County compiled reports from its MOBILITY traffic database. The data set includes physical features, traffic studies and collision history. This data provides the basis for defining existing conditions for: Highway 603, North Military Road, Jackson Highway and Tucker Road.

This chapter documents the evaluation of existing conditions for four additional county roads that are anticipated to serve the south Lewis County subarea:

- Highway 603
- North Military Road
- Jackson Highway and
- Tucker Road.

The existing conditions analysis contains the following elements:

- Current land use
- Roadway characteristics
- Collision history, and
- Traffic operations.

## 7.2 Current Land Use

Current Lewis County land use zoning maps are provided in Exhibits 7.1 and 7.2.

**Exhibit 7.1**
**Lewis County Zoning Map West of Interstate 5**

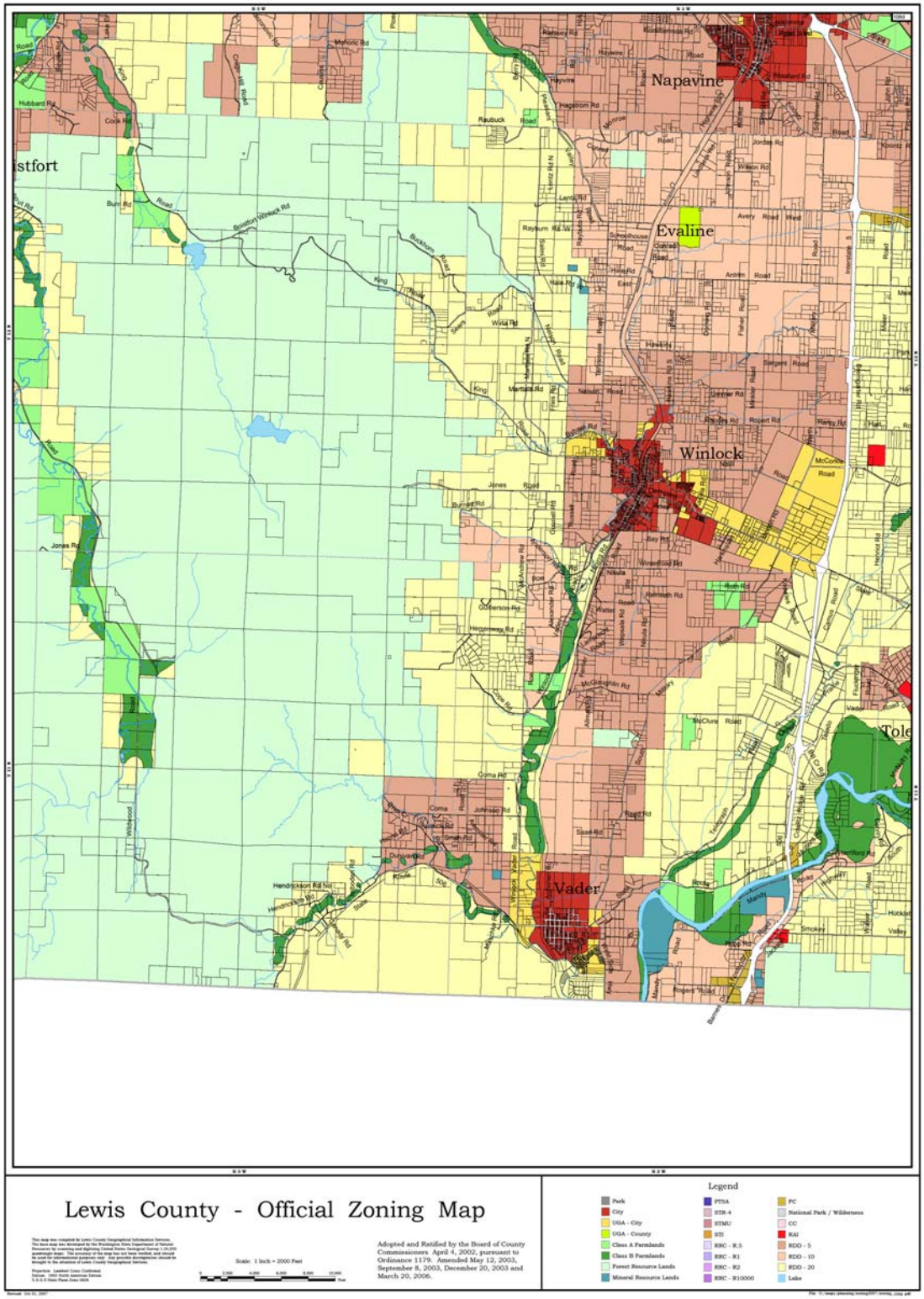
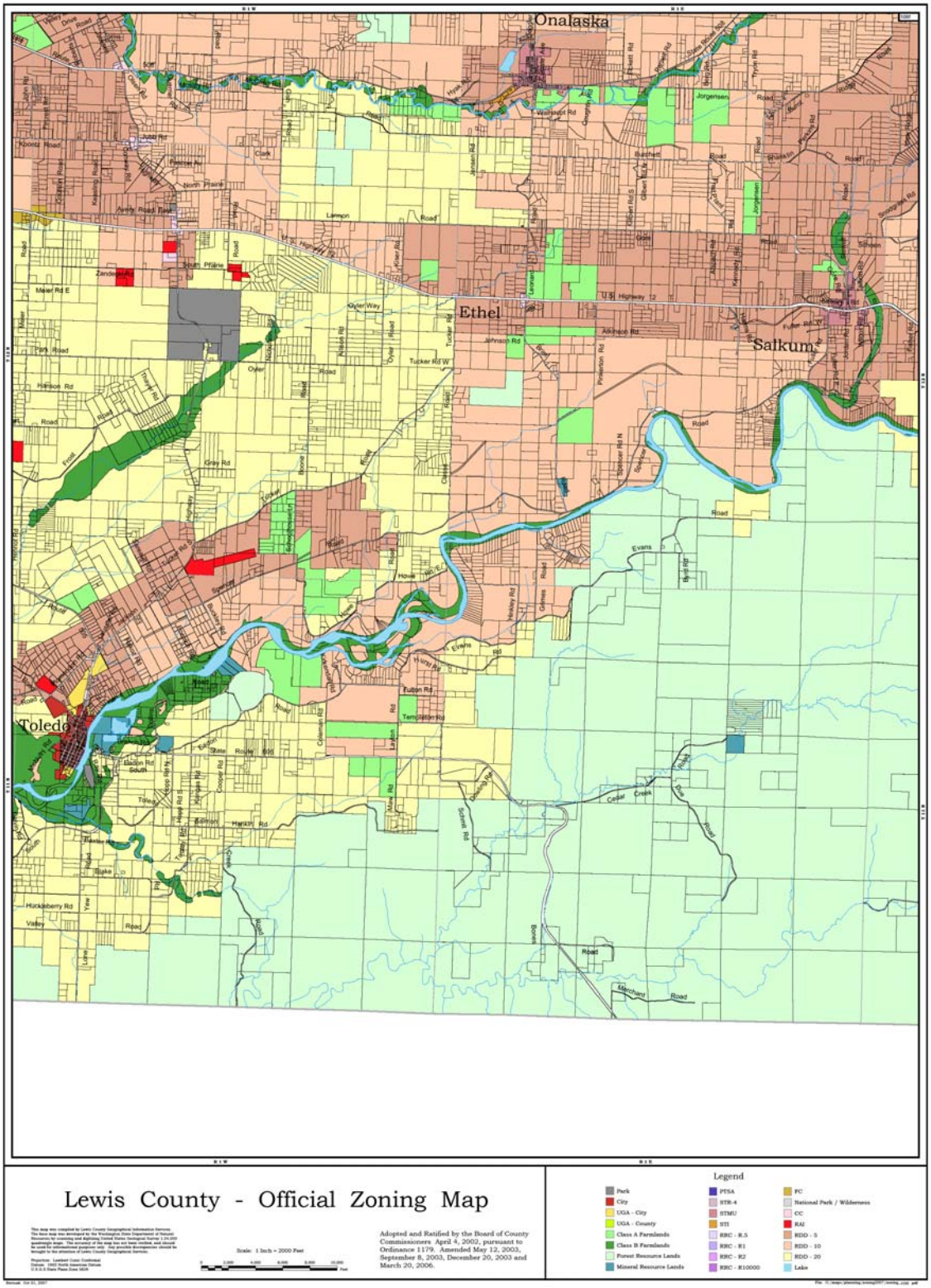


**Exhibit 7.2**
**Lewis County Zoning Map East of Interstate 5**



**Highway 603**
Predominant zoning along the length of the Highway 603 corridor is Rural Residential 5 and 10 acres per dwellings.

**North Military**
Predominant zoning along the length of the Highway 603 corridor is Rural Residential 5 and 10 acres per dwellings.

**Jackson Highway**
Predominant zoning along the length of the Jackson Highway corridor is Rural Residential 20, 10 and 5 acres per dwelling unit. Potentially significant agricultural lands are identified in the southern area of the corridor.

**Tucker Road**
Predominant zoning along the length of the Jackson Highway corridor is Rural Residential 20, 10 and 5 acres per dwelling unit. Potentially significant agricultural lands are identified in the southwestern area of the corridor.

**Agricultural lands**
In 1999, several petitions for review were filed with the Western Washington Growth Management Hearings Board (BOARD) challenging Lewis County's Agricultural resource lands designations. It is anticipated that Lewis County will resubmit a final proposal to the BOARD during late 2009 or early 2010. These lands were again challenged in 2000. The BOARD has coordinated hearings and decisions on these two cases dealing with agricultural resource lands. The County's agricultural resource lands component of its comprehensive land use plan is currently designated as being "invalid" by the BOARD. Once Lewis County's agricultural land use component is determined to be "valid" by the BOARD, the final extent of commercially significant long term agricultural lands within the south Lewis County subarea will be known. This is anticipated to occur in late 2009 or early 2010.

## 7.3 Roadway Characteristics

**Topography**
The three north-south corridors (Highway 603, North Military Road and Jackson Highway) are all higher in elevation at their northern limits. Slopes are typically general (0 – 5 %) with some areas of rolling terrain. Tucker Road rises gently in elevation from its westerly limit at Jackson Highway to its easterly connection with US Highway 12.

**Right of Way**
County right of way records were not researched as part of this evaluation. Typically, Lewis County maintains a minimum of 60 feet of dedicated right of way for significant roadways on it transportation network.

## Intersections

Highway 603

Seven intersections exist along Highway 603 from the City of Winlock in the south to Avery Road in the north. Of these intersections, the most significant are the intersections at Avery Road and East Walnut. All intersections are stop-controlled on the minor legs with free movement afforded to Highway 603 traffic.

North Military Road

Six intersections are located along North Military Road outside the City of Winlock's urban growth area. The intersection at Avery Road is controlled by a flashing red overhead light. All other intersections are stop-controlled on the minor legs of the intersection. Free movement is afforded to North Military Road traffic. The intersections at Avery Road, Nevil Road and SR 505 are the most significant intersections along the corridor. North Military Road traffic yields to the traffic on SR 505 and Avery Road.

Jackson Highway

Twelve intersections are included in the SR 505 to US Highway 12 segment. The intersections at SR 505, Spencer Road, Tucker Road, and US Highway 12 are the most significant.

Tucker Road

Of the six intersections along the route (Jackson Highway to US Highway 12), the intersections at Jackson Highway and at US Highway 12 are the most significant.

## Parking

There is no on-street parking provided along: Highway 603, North Military Road, Jackson Highway or Tucker Road.

## Roadway Surface and Shoulder

Highway 603

Lane widths along the corridor are 12 feet wide with one foot wide Asphalt Concrete Pavement shoulders present on both sides of the roadway from City of Winlock limits to Avery Road. 18 culverts are listed for the segment. A complete listing of features is provided in Exhibit 7.3 with intersection characteristics shown in Exhibit 7.4.

**Exhibit 7.3**
**Highway 603 - Physical Features**

| Feature | BMP | EMP | Notes |
|---|---|---|---|
| **LANE WIDTH** | | | |
| Lane width - Right | 9.87 | 13.34 | (9.87 = Avery Road) 13.0 ACP |
| Lane width - Left | 9.87 | 13.34 | 13.0 ACP |
| **SHOULDERS** | | | |
| ACP | 9.87 | 13.34 | L = 1.0, R = 1.0 |
| | | | |
| **DRAINAGE** | | | |
| | 10.39 | | 12 inch circular (C) |
| | 10.77 | | 12 C |
| | 10.91 | | 18 C |
| | 11.31 | | 48 C |
| | | | 36 C |
| | 11.65 | | 48 C |
| | | | 36 C |
| | 11.72 | | 12 C |
| | 11.84 | | 36 C |
| | 12.09 | | 18 C |
| | 12.13 | | 8 C |
| | 12.17 | | 18 C |
| | 12.35 | | 24 C |
| | 12.51 | | 18 C |
| | 12.65 | | 18 C |
| | | | 18 C |
| | 12.69 | | 18 C |
| | 13.38 | | Bridge #228, Olequa Creek |
| **GUARDRAIL** | 12.76 | 12.94 | L, 12 Gauge (G) W section |
| | 13.33 | 13.41 | L, 12G W |
| | 13.33 | 13.41 | R, 12G W |

**Exhibit 7.4**
**Highway 603 – Intersection Characteristics**

| Intersection | Intersection Type | Channelization | Traffic Control | Study ID Number |
|---|---|---|---|---|
| Highway 603 @ Avery Road | 4-Leg | Single Lane Approaches | 2-way stop | 20 |
| Highway 603 @ Antrim Road | T-intersection located east | Single Lane Approaches | 1-way stop | 30 |
| Highway 603 / Walnut Street/ Kerron Street (SR 505) | 4-Leg | Single Lane Approaches | 3-way stop (WB Free) | 1 |

North Military Road

ACP lane widths vary from twelve to thirteen feet in the segment. Gravel shoulders vary from 1 foot in width to 4 feet. 18 drainage features are reported within the segment. A complete listing of features is provided in Exhibit 7.5 with intersection characteristics shown in Exhibit 7.6.

**Exhibit 7.5**
**North Military Road - Physical Features**

| Feature | BMP | EMP | Notes |
|---|---|---|---|
| **LANE WIDTH** | | | |
| Right | 0.00 | 4.70 | (0.00 = SR 505), 12.0 ACP |
| Left | 0.00 | 4.70 | 12.0 ACP |
| Right | 4.70 | 4.77 | 13.0 ACP |
| Left | 4.70 | 4.77 | 13.0 ACP |
| **SHOULDERS** | | | |
| | 0.00 | 0.86 | L = 8, R = 8 |
| | 0.86 | 1.50 | L = 1, R = 4 |
| | 1.50 | 5.79 | L = 2, R = 2 |
| **DRAINAGE** | | | |
| | 0.00 | | 12 inch Circular (C) |
| | 0.11 | | 12 C |
| | 0.24 | | |
| | 0.33 | | 12 C |
| | 0.52 | | 36 inch arch |
| | 1.21 | | 18 C |
| | 1.53 | | 12 C |
| | 2.00 | | 36 C |
| | 2.11 | | 48 C |
| | 2.70 | | 12 C |
| | 2.77 | | 12 C |
| | 3.01 | | Rectangular box |
| | 3.23 | | Rectangular box |
| | 3.69 | | 36 C |
| | 4.49 | | 2 X 24 C |
| | 4.53 | | Rectangular box |
| | 4.54 | | Bridge – Olequa Creek |
| | 4.75 | | 24 C |
| **GUARDRAIL** | 4.52 | 4.53 | 12 Gauge (G) W section |
| | 4.53 | 4.54 | Jersey barrier |
| | 4.54 | 4.55 | 12G W |

**Exhibit 7.6**
**North Military Road – Intersection Characteristics**

| Intersection | Intersection Type | Channelization | Traffic Control | Study ID Number |
|---|---|---|---|---|
| North Military Road @ Avery Road | 4-Leg | Single Lane Approaches | 4-way stop | 21 |
| North Military Road @ Nevil Road | T-intersection located west | Single Lane Approaches | 1-way stop | 33 |
| North Military Road @ SR 505 | T-intersection located south | Single Lane Approaches | 1-way stop | 5 |

Jackson Highway

Lane widths vary within the corridor from 11 feet ACP to 18 feet ACP. Shoulders are ACP and are consistently six feet in width. 32 drainage features (culverts, rectangular box sections and bridges) are reported in the corridor. A complete listing of features is provided in Exhibit 7.7, and intersection characteristics are shown in Exhibit 7.8.

**Exhibit 7.7**
**Jackson Highway - Physical Features**

| Feature | BMP | EMP | Notes |
|---|---|---|---|
| **LANE WIDTH** | | | |
| Right, Left | 9.64 | 11.74 | (9.64 = US Highway 12), 11.0 ACP |
| Right, Left | 11.74 | 12.44 | 17.0 ACP |
| | 12.44 | 14.14 | 18.0 ACP |
| Right, Left | 14.14 | 16.40 | 12.0 ACP |
| **SHOULDERS** | | | |
| | 9.64 | 16.40 | R, L 1.0 ACP |
| **DRAINAGE** | | | |
| | 9.65 | | 18 C |
| | 9.85 | | 12 C |
| | 10.10 | | Rectangular box |
| | 10.58 | | Rectangular box |
| | 11.00 | | 12 C |
| | 11.06 | | 18 C |
| | 11.09 | | 12 C |
| | 11.21 | | 12 C |
| | 11.75 | | Rectangular box |
| | 11.78 | | 24 C |
| | 11.90 | | 18 C |
| | 12.12 | | Bridge, Lacamas Creek |
| | 12.36 | | Bridge, Lacamas Creek |
| | 12.46 | | 12 C |

**Exhibit 7.7**
**Jackson Highway - Physical Features (Cont.)**

| Feature | BMP | EMP | Notes |
|---|---|---|---|
| **LANE WIDTH** | | | |
| | 12.63 | | 24 C |
| | 12.76 | | 24 C |
| | 12.84 | | 12 C |
| **Feature** | **BMP** | **EMP** | **Notes** |
| | 13.16 | | Rectangular box |
| | 13.32 | | 12 C |
| | 13.60 | | 18 C |
| | | | 18 C |
| | 13.82 | | 24 C |
| | 14.00 | | Bridge, Laussier Creek |
| | 14.37 | | 18 C |
| | 14.57 | | Rectangular box |
| | 14.72 | | 48 C |
| | 14.91 | | 18 C |
| | 15.33 | | 18 C |
| | 15.69 | | 12 C |
| | 16.11 | | 18 C |
| | 16.31 | | 18 C |
| **GUARDRAIL** | | | |
| | 10.78 | 10.94 | R, 12 G W |
| | 12.12 | 12.14 | R, 12 G W |
| | 12.12 | 12.13 | L, Jersey barrier |
| | 12.13 | 12.14 | L. 12 G W |
| | 12.35 | 12.36 | L, 12G W |
| | 12.36 | 12.37 | L, Jersey barrier |
| | 12.35 | 12.36 | R, 12 G W |

**Exhibit 7.8**
**Jackson Highway – Intersection Characteristics**

| Intersection | Intersection Type | Channelization | Traffic Control | Study ID Number |
|---|---|---|---|---|
| Jackson Highway @ US 12 | 4-Leg | EB & WB 3-Lane (Left, Thru, Right) NB & SB 1 Lane | Signal | 24 |
| Jackson Highway @ Park Road | 4-Leg | Single Lane Approaches | 2-way stop | 25 |
| Jackson Highway @ Frost Road | T-intersection located west | Single Lane Approaches | 1-way stop | 26 |
| Jackson Highway @Tucker Road | T-intersection located east | Single Lane Approaches | 1-way stop | 27 |
| Jackson Highway @ Spencer Road | 4-Leg | Single Lane Approaches | 2-way stop | 28 |
| Jackson Highway / Plomondon Road @ SR 505 | 4-Leg | Single Lane Approaches additional NB RTL | 2-way stop | 12 |
| Jackson Highway /Plomondon Road @Toledo-Vader Road | 4-Leg | Single Lane Approaches | 2-way stop | 106 |

Tucker Road

Lane widths vary from 11 to 15 feet and from ACP to Bituminous Surface Treatment (BST – "Chip Seal"). Gravel shoulders one foot in width are present throughout the corridor. Thirty-one separate drainage features are present. A complete listing of features is provided in Exhibit 7.9 and intersection characteristics are shown in Exhibit 7.10.

**Exhibit 7.9**
**Tucker Road - Physical Features**

| Feature | BMP | EMP | Notes |
|---|---|---|---|
| **LANE WIDTH** | | | |
| Right, Left | 0.00 | 0.10 | (0.00 = US Highway 12), 15.0 ACP |
| Right, Left | 0.10 | 2.10 | 12.0, BST |
| Right, Left | 2.10 | 5.55 | 11.0, BST |
| **SHOULDERS** | | | |
| Right, Left | 0.00 | 2.07 | Gravel |
| Right, Left | 2.07 | 5.50 | BST |
| **DRAINAGE** | | | |
| | 0.01 | | Bridge, Lacamas Creek |
| | 0.48 | | 18 C |
| | 0.64 | | 12 C |
| | 0.74 | | 12 C |
| | 0.83 | | 12 C |

**Exhibit 7.9**
**Tucker Road - Physical Features (Cont.)**

| Feature | BMP | EMP | Notes |
|---|---|---|---|
| **LANE WIDTH** | | | |
| | 1.18 | | 18 C |
| | 1.21 | | 18 C |
| | 1.25 | | 60 C |
| | 1.54 | | 60 C |
| | 1.92 | | 12 C |
| | 2.32 | | 18 C |
| | 2.60 | | 12 C |
| | 2.73 | | 12 C |
| | 2.95 | | 18 C |
| | 3.16 | | 12 C |
| | 3.31 | | 12 C |
| | 3.58 | | 12 C |
| | 3.74 | | 18 C |
| | 3.94 | | 12 C |
| | 3.97 | | 12 C |
| | 4.37 | | 12 C |
| | 4.54 | | 24 C |
| | 4.67 | | 24 C |
| | 4.92 | | 12 C |
| | 5.00 | | 12 C |
| | | | 18 C |
| | 5.12 | | 12 C |
| | 5.15 | | 18 C |
| | 5.18 | | 12 C |
| **Feature** | **BMP** | **EMP** | **Notes** |
| | 5.41 | | 12 C |
| | 5.5 | | 12 C |
| **GUARDRAIL** | | | None |

**Exhibit 7.10**
**Tucker Road – Intersection Characteristics**

| Intersection | Intersection Type | Channelization | Traffic Control | Study ID Number |
|---|---|---|---|---|
| US 12 @ Tucker Road | T-intersection located South | Single Lane Approaches additional WB Left Turn Lane | 1-way stop | 35 |
| Jackson Highway @Tucker Road | T-intersection located east | Single Lane Approaches | 1-way stop | 27 |

**Crosswalks and Bike Paths**
With the exception of a marked crosswalk at Jackson Highway and US Highway 12, there are no marked crosswalks on any of the four roadways. There are no bike paths on any of the four roadways.

**Transit/Park and ride**
Intercity Transit provides vanpool service to the City of Winlock via Highway 603. There is no transit provider serving the area except along US Highway 12, where East Mountain Highway Transit provides transit service to East Lewis County.

**Bridges and intercrossing structures**
Complete drainage inventories for each roadway are provided in Exhibits 7.3, 7.5, 7.7 and 7.9.

**Functional Classification and access control**
Highway 603, North Military Road, Jackson Highway and Tucker Road are all classified as Rural Major Collectors on Lewis County's functional classification network. Access to all roadways is controlled by Lewis County Road Standards, Ordinance #1260. This ordinance contains all of Lewis County's road standards including design and access.

**Speed limits**
The Lewis County rural un-posted speed limit is 50 mph by adopted Lewis County ordinance. Speed limits for the various study roadways are listed below.

- Highway 603: 50 MPH – Avery Road to City of Winlock city limits
- North Military: 40 MPH – SR 505 to vicinity of Hart Road then 50 MPH to Avery Road
- Jackson Highway: 50 MPH – SR 505 to Park Road, 30 MPH – Park Road to vicinity Lewis and Clark state park then 40 MPH to US Highway 12
- Tucker Road: 50 MPH – Jackson Highway to US Highway 12.

**Rail Facilities**
The Burlington Northern mainline rail track parallels Highway 603 along the length of the corridor. There are no other rail facilities associated with the other three roadways. The railway crossing at Avery Road is an "at grade" crossing in good condition. Avery Road is the westerly extension of US Highway 12 from Interstate 5. Average seasonal tonnage along US 12 is summarized below ("Washington State Freight Truck Origin and Destination Study: Lewis County", EWITS Research Report Number 21-Lewis January 1998):

- Fall = 5,520
- Winter = 5,762
- Spring = 4,766
- Summer = 19,276.

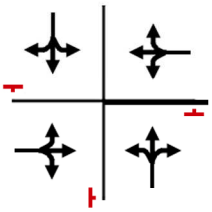
**Freight**
Avery Road is designated as a T-3 truck route within its comprehensive land use plan.

**Intersections and Traffic Control**

Existing levels of service are evaluated for 15 intersections along the four county roads in the "Traffic Operations" section of this chapter. The intersection channelization and control is illustrated in Exhibit 7.11.

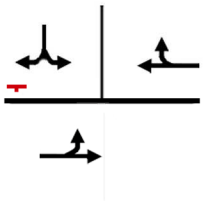
1 SR 505 @ Highway 603

STOP 3-Way



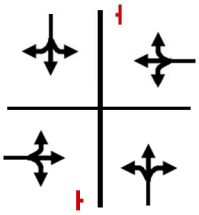
5 SR 505 @ N. Military Road

STOP 1-Way



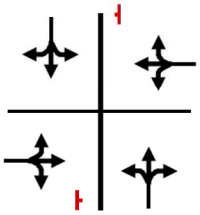
12 SR 505 @ Jackson Highway

STOP 2-Way



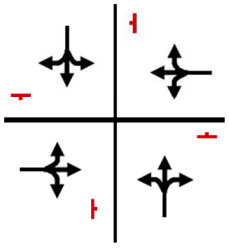
20 Highway 603 @ Avery Road

STOP 2-Way

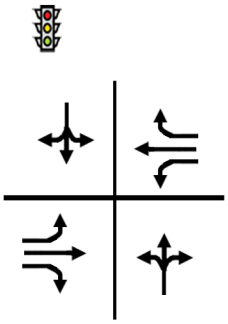


21 N Military Rd @ Avery Road

STOP 4-Way

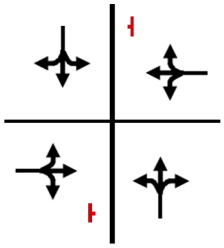


24 Jackson Hwy @ US 12



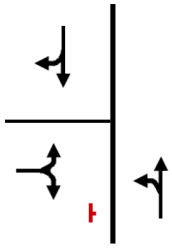
25 Jackson Hwy @ Park Road

STOP 2-Way



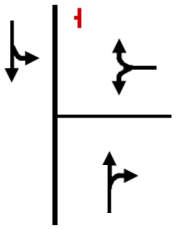
26 Jackson Hwy @ Frost Road

STOP 1-Way



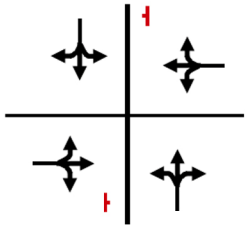
27 Jackson Hwy @ Tucker Road

STOP 1-Way



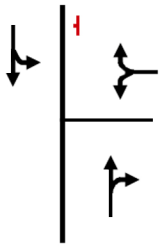
28 Jackson Hwy @ Spencer Rd

STOP 2-Way



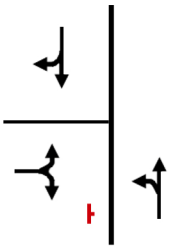
30 Highway 603 @ Atrim Road

STOP 1-Way



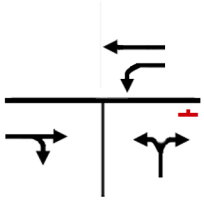
33 N Military Road @ Nevil Road

STOP 1-Way



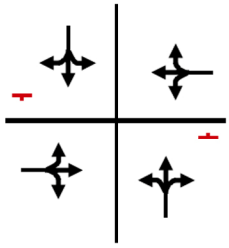
35 Tucker Road @ US 12

STOP 1-Way



106 Jackson Hwy @ Toledo-Vader Rd

STOP 2-Way



Sources: Lewis County, Perteet, ESRI | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\Traffic\Traffic_Exhibit_Perteet_TurningTemplate.mxd

Lewis County

Perteet

South Lewis County Subarea Transportation Plan

South Lewis County Subarea Arterials
2008 Existing Intersection Channelization
Exhibit 7.11

## 7.4 Collision History

**Data sets evaluated**

All reported collisions from each roadway segment were collected and evaluated for the period 2003 – 2008. The collisions were evaluated for potential grouping using 1/100th of a milepost. Collision locations are considered "connected" if the grouping of injury collisions is "connected" by continuous locations not exceeding a separated distance of 0.25 of a mile increasing milepost and 0.25 of a mile decreasing milepost – during a two year study period.

Highway 603

Twelve (12) injury collisions and one fatality are reported in the corridor from 2003 through 2008. A listing of injury collisions by milepost is provided in Exhibit 8.12.

**Exhibit 7.12**
**Highway 603 Injury Collisions by Milepost (2003 – 2008)**

| Milepost | Date | Description |
|---|---|---|
| 9.87 | 11-17-03 | One left – one straight, improper passing |
| 10.16 | 09-01-04 | Opposite direction – did not grant ROW |
| | 10-22-04 | Entering at angle – did not grant ROW |
| 10.96 | 04-14-05 | Strikes object – exceeding safe speed |
| 11.79 | 01-25-04 | Vehicle overturned – exceeding safe speed |
| 11.96 | 05-27-05 | Fatal – strikes pedestrian |
| 12.33 | 12-18-05 | Vehicle overturned |
| 12.34 | 10-25-05 | Head on, exceeding safe speed |
| 12.57 | 11-18-04 | Rear end, inattention |
| | 02-07-03 | Rear end, exceeding safe speed |
| | 01-03-04 | Vehicle overturned, exceeding safe speed |
| 12.87 | 09-23-03 | Fixed object, exceeding safe speed |
| 13.25 | 08-04-05 | Car entering driveway, did not grant ROW |

A "grouping" of injury collisions appears to be located from milepost 12.08 to milepost 12.82. The collisions occurred over a three year period: 2003, 2004 and 2005. If 2003 is discarded, four collisions occurred in the segment from 2004 to 2005. In 2005, the PM peak hour traffic volume at milepost 13.39 is reported as being 106 VPH. The ADT is listed as being 1058. The calculated collision rate for the segment is:

4 * (1,000,000)/1058 * (12.82 – 12.02 = 1 minimum) * 365 = 10.36

Collision type and descriptions all (save one) reference operator error (inattention, exceeding safe speed) suggesting that the segment does not contain sufficient data to warrant further evaluation.

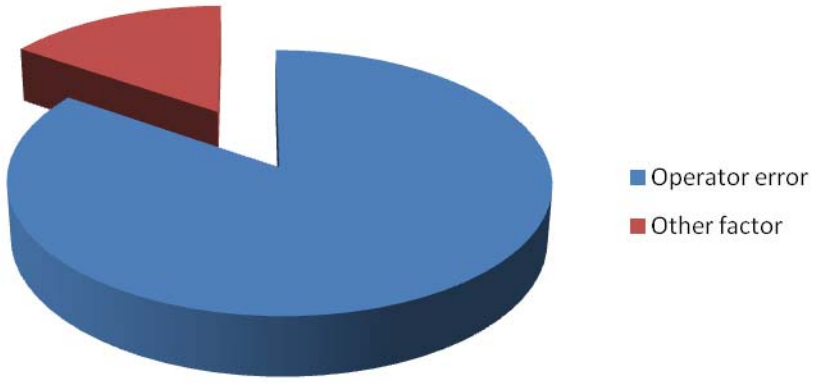
Lewis County's MOBILITY software reports total collisions per million vehicle miles at various mileposts within the study area. Exhibit 7.13 lists collision rates within the study area in excess of 2.0.

**Exhibit 7.13**
**Highway 603 MOBILITY APMVM > 2.0**

| BMP | EMP | Number of Collisions (2004 – 2008) | Vehicle Miles | Rate |
|---|---|---|---|---|
| 10.93 | 12.57 | 17 | 6,221,644 | 2.73 |
| 12.57 | 13.07 | 5 | 2,118,529 | 2.36 |
| 13.07 | 13.38 | 6 | 1,310,255 | 4.58 |

The segment (10.93 – 13.38) represents a rate of 3.6. Of the thirteen injury collisions, 11 reference operator error as primary collision causation. If the eleven are removed from the study total of 28, the resulting corridor rate is 2.0. This rate is not expected to be significant relative to injury collisions per million vehicle miles. Exhibit 7.14 illustrates the Highway 603 injury collisions by cited operator error.

**Exhibit 7.14**
**Highway 603 Injury Collisions by Cited Operator Error**




North Military Road

Eleven (11) injury collisions are reported in the corridor for 2003 – 2008. A listing of injury collisions by milepost is provided in Exhibit 7.15.

**Exhibit 7.15**
**North Military Road Injury Collisions by Milepost (2003 – 2008)**

| Milepost | Date | Description |
|---|---|---|
| 1.06 | 03-11-08 | Vehicle overturned, alcohol related |
| 1.71 | 12-26-07 | Fixed object, exceeding speed |
| 1.76 | 05-28-05 | Fixed object, inattention |
| 2.76 | 09-08-07 | Entering at angle, did not grant ROW |
| | 10-05-03 | Entering at angle, did not grant ROW |
| | 10-30-06 | Entering at angle, disregard stop sign |
| 3.06 | 05-18-08 | Vehicle overturned, exceeding safe speed |
| 3.56 | 01-16-04 | Fixed object |
| 4.46 | 01-20-07 | Fixed object, exceeding safe speed |
| 4.76 | 01-10-07 | Rear end |
| | 12-06-05 | Entering at angle, disregards stop sign |

A single "groupings" of injury collisions occurs at MP 1.46 – 2.01. The study period 2006 – 2007 contains two injury collisions. ADT at milepost 4.72, 2007, is reported as being 1,888. The resulting collision rate is 2.90. Both collisions types (entering at angle) reference apparent driver error as the primary cause of the collision.

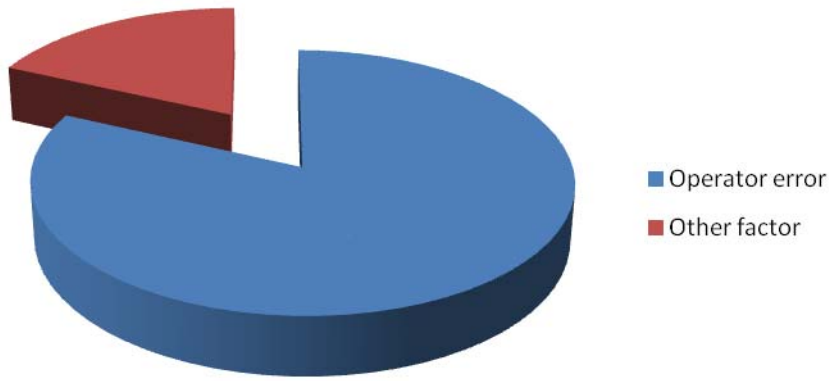
Lewis County's MOBILITY software reports total collisions per million vehicle miles at various mileposts within the study area. Exhibit 7.16 lists collision rates within the study area in excess of 2.0.

**Exhibit 7.16**
**North Military Road MOBILITY APMVM > 2.0**

| BMP | EMP | Number of collisions (2004 – 2008) | Vehicle Miles | Rate |
|---|---|---|---|---|
| 0.86 | 1.22 | 2 | 833,076 | 2.40 |
| 1.41 | 1.5 | 1 | 159,487 | 6.27 |
| 1.5 | 3.77 | 18 | 6,197,554 | 2.90 |
| 4.70 | 4.76 | 5 | 213,627 | 23.41 |
| 4.80 | 5.79 | 4 | 1,680,686 | 2.38 |

The segment from approximately milepost 1 to 1.5 reports an collision rate of 3.00 per million vehicle miles. The corridor rate (MP 0.86 to 5.79) is estimated at being approximately 3.3. This rate seems somewhat high for the region. It may be prudent to review the entire collision record to identify common collision elements that might suggest some potential remedial actions. 15 separate injuries are listed as a result of the 18 collisions MP 1.5 to 3.77. Many of the reported collisions list various operator errors as primary collision causation. None the less, the segment does report a high number of injuries during the study period. This might be explained by the proximity of the middle and high schools located at MP 0.86. Exhibit 7.17 illustrates North Military Road injury collisions by cited operator error.

**Exhibit 7.17**
**North Military Road Injury Collisions by Cited Operator Error**




Jackson Highway

Seventeen (17) injury collisions occurred in the study corridor between the years 2003 – 2008. A listing of injury collisions by milepost is provided in Exhibit 7.18.

**Exhibit 7.18**
**Jackson Highway Injury Collisions by Milepost (2003 – 2008)**

| Milepost | Date | Description |
|---|---|---|
| 10.28 | 05-17-06 | Fixed object, distracted |
| 10.58 | 07-18-03 | Fixed object, inattention |
| 10.73 | 06-15-05 | Fixed object, exceeding safe speed |
| 10.93 | 05-26-04 | Fixed object, inattention |
| 11.13 | 06-14-04 | Fixed object |
| 11.66 | 10-25-06 | Fixed object, asleep |
| 11.78 | 01-18-07 | Vehicle overturned, exceeding safe speed |
| 12.2 | 12-09-05 | Fixed object, asleep |
| 13.46 | 08-29-06 | Fixed object, asleep |
| 13.52 | 05-04-08 | Fixed object, asleep |
| 14.00 | 03-18-04 | Fixed object |
| 15.26 | 08-26-06 | Rear end |
| 15.66 | 02-24-06 | Fixed object, exceeding safe speed |
| 15.78 | 05-28-06 | Fixed object, asleep |
| 15.9 | 02-06-06 | One car entering driveway, improper passing |
| 16.45 | 08-15-05 | From opposite directions, exceeding safe speed |

Several "grouping" occur throughout the corridor. The first, MP 10.58 – 11.38, lists four collisions from the period 2003 – 2005. Using a two year consecutive evaluation period, three collisions are evaluated from 2004 – 2005. The second grouping spans MP 11.41 to 12.03. Two collisions in the 2006-07 timeframe are evaluated. A third grouping from MP 15.41 – 16.15 produces three collisions recorded in 2006. 1,135 ADT at MP 12.4 in 2005 is used to calculate the collision rates at all locations. Group one's collision rate is estimated at being 7.24; group two at 4.83 and group three at 7.24. Group one lists only one injury collision as not having operator error as primary causation. Group two collisions all list operator error as primary collision causation. Group three all list operator error as primary collision causation.

Lewis County's MOBILITY software reports total collisions per million vehicle miles at various mileposts within the study area. Exhibit 7.19 lists collision rates within the study area in excess of 2.0.

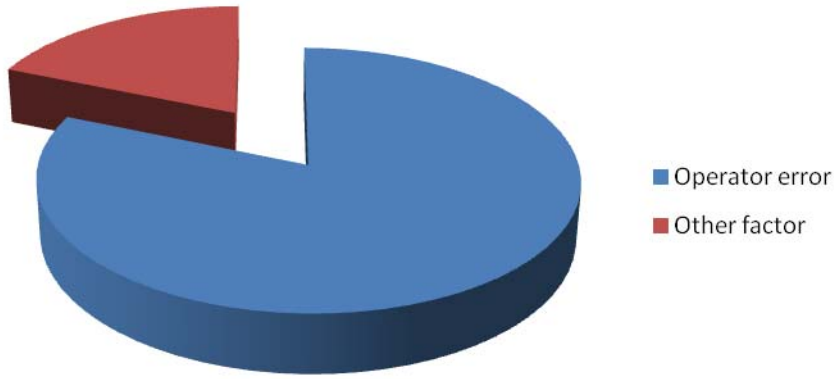
**Exhibit 7.19**
**Jackson Highway MOBILITY APMVM > 2.0**

| BMP | EMP | Number of Collisions (2003 – 2008) | Vehicle Miles | Rate |
|---|---|---|---|---|
| 10.18 | 10.44 | 2 | 630,428 | 3.17 |
| 10.44 | 11.14 | 4 | 1,599,248 | 2.50 |
| 11.42 | 11.64 | 1 | 340,071 | 2.94 |
| 11.64 | 11.68 | 1 | 61,831 | 16.17 |
| 14.08 | 14.31 | 1 | 468,523 | 2.13 |
| 14.31 | 16.00 | 9 | 2,698,719 | 3.33 |

Examining the collision rate for the study corridor and period (2004 – 2008) a composite rate of 3.0 is developed. Given the large number of operator error causation cited in injury collisions, the corridor does not appear to present undue concern relative to collision frequency.

Figure 7.20 illustrates the Jackson Highway injury collisions by cited operator error.

**Figure 7.20**
**Jackson Highway Injury Collisions by Cited Operator Error**




Tucker Road

Seven injury collisions are reported for the study period (2003 – 2008). A listing of injury collisions by milepost is provided in Exhibit 7.21.

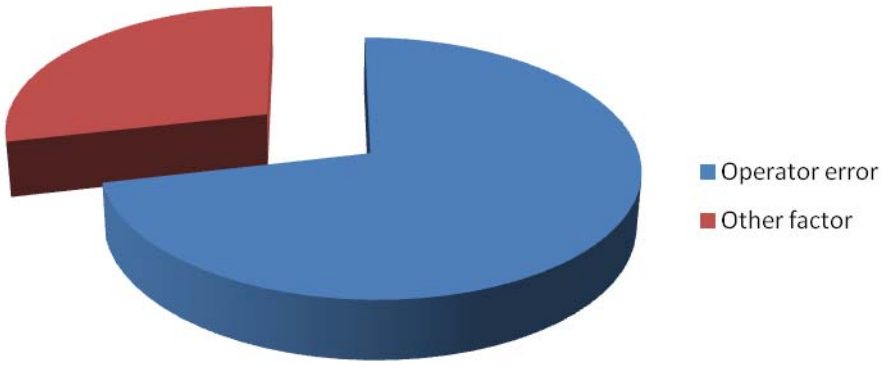
**Exhibit 7.21**
**Tucker Road Injury Collisions by Milepost (2003 – 2008)**

| Milepost | Date | Description |
|---|---|---|
| 0.4 | 04-15-03 | Fixed object, exceeding safe speed |
| 1.06 | 08-04-05 | Fixed object, inattention |
| 2.7 | 01-30-08 | Fixed object, exceeding safe speed |
| 2.97 | 04-30-04 | Vehicle overturned, inattention |
| 4.25 | 08-14-07 | Fixed object |
| 4.54 | 07-03-07 | Head on, under influence of alcohol |
| 5.35 | 07-19-05 | Fixed object |

A single "grouping" is located at MP 2.45 to MP 3.22. Two injury collisions are reported for this section of the corridor. 2007 ADT at MP 0.76 is reported as being 1,192 and 978 at MP 4.67. An average rate is used to calculate the collision rate for the 2.45 - 3.22 segment. The calculated collision rate (2.45 - 3.22) is 5.05. Both of the injury collisions listed in the segment identifies operator error as the primary causation. There is only one MOBILTY APMVM for the study area that exceeds 2.0 and that occurs at MP 2.07 – 3.79. The reported rate of 2.5 is made up two injury and three non-injury collisions. Both injury collisions reference operator error as primary causation. It does not appear that collision rates associated for Tucker Road are such to warrant further investigation.

Figure 7.22 illustrates the Tucker Road injury collisions by cited operator error.

**Figure 7.22**
**Tucker Road Injury Collisions by Cited Operator Error**




### Recommendations and Conclusions

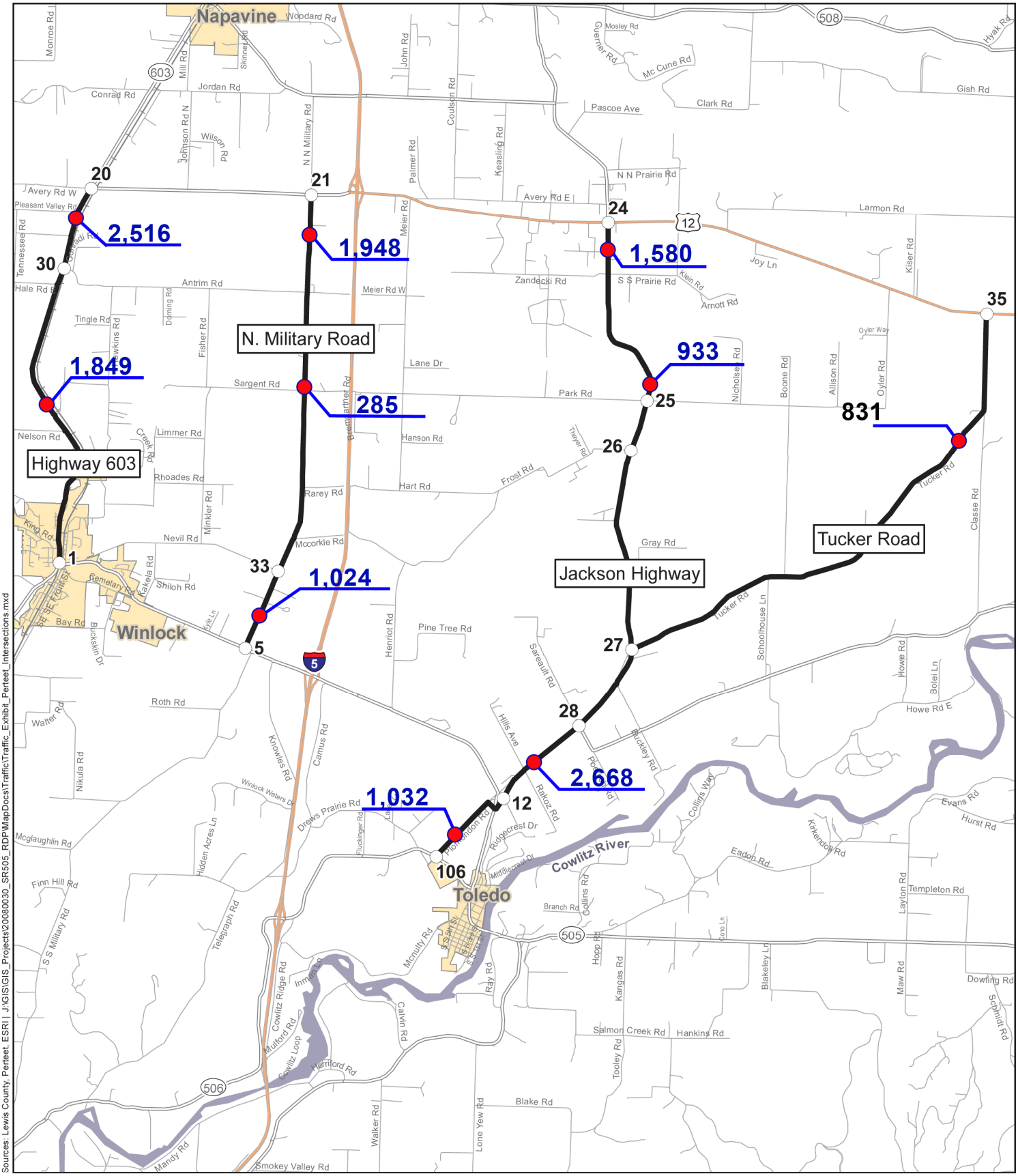
Of the four county major collectors evaluated in this study (Highway 603, North Military Road, Jackson Highway and Tucker Road), the North Military Road segment MP 1.5 to 3.77 reflects an collision rate per million vehicle miles of 3.0. Fifteen injuries (18 total collisions) in the North Military Road segment MP 1.5 to 3.77 reflect and collision rate per million vehicle miles of 3.0. This rate seems somewhat high. It may be prudent to review all of the collision record for this segment and correlate milepost locations to possible physical features to determine if any geometric deficiencies exist in the segment. For all other study roadways, the large number of operator error primary causation reported in the record tends to dilute any other significant injury collision reporting.

## 7.5 Traffic Operations

This section provides a summary of the existing traffic conditions and traffic operations along four study arterials in the south county subarea.

### Traffic Volumes

New traffic counts were conducted along the corridors and throughout the study area to evaluate the existing condition of traffic operations. Turn Movement Counts were conducted at the study intersections for the AM and PM peak periods with 24 hour hourly volume counts at cross-section screenline locations. Exhibit 7.23 shows the Average Weekday Traffic volumes along the four study corridors. AM and PM peak hour turn movement volumes at the study intersections are shown in Exhibits 7.24 and 7.25, respectively.




Legend

- Study Intersection
- Study Segment
- Stream
- City Limit

0 1 Miles

Lewis County

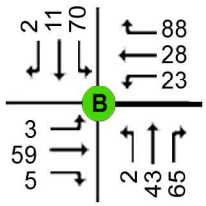
Perteet

**South Lewis County Subarea Transportation Plan**

**Average Daily Traffic Volumes**
**South Lewis County Subarea Arterials**
**Exhibit 7.23**

## 1 SR 505 @ Highway 603

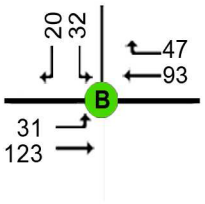
STOP 3-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 5.9 | 50th | | |
| Max Appr. | SB | 12.2 | 95th | NB | 19 |

## 5 SR 505 @ N. Military Road

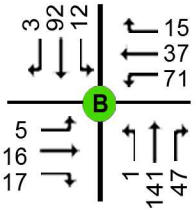
STOP 1-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.7 | 50th | | |
| Max Appr. | SB | 11.0 | 95th | SB | 10 |

## 12 SR 505 @ Jackson Highway

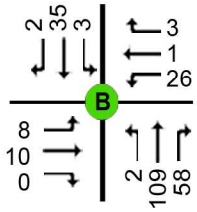
STOP 2-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 5.2 | 50th | | |
| Max Appr. | WB | 14.2 | 95th | WB | 30 |

## 20 Highway 603 @ Avery Road

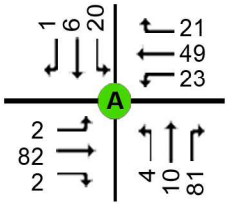
STOP 2-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.5 | 50th | | |
| Max Appr. | WB | 10.5 | 95th | WB | 4 |

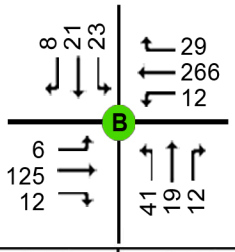
## 21 N Military Rd @ Avery Road

STOP 4-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 8.2 | 50th | | |
| Max Appr. | WB | 8.5 | 95th | -- | -- |

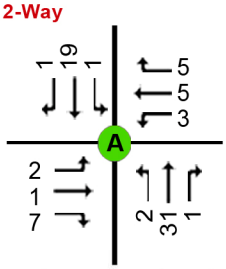
## 24 Jackson Hwy @ US 12




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 19.4 | 50th | WB | 98 |
| Max Appr. | WB | 23.9 | 95th | WB | 160 |

## 25 Jackson Hwy @ Park Road

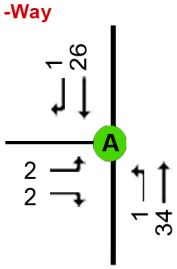
STOP 2-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 3.2 | 50th | | |
| Max Appr. | WB | 9.2 | 95th | -- | -- |

## 26 Jackson Hwy @ Frost Road

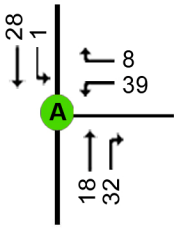
STOP 1-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.7 | 50th | | |
| Max Appr. | EB | 8.8 | 95th | -- | -- |

## 27 Jackson Hwy @ Tucker Rd

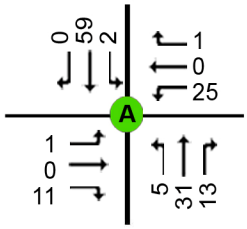
STOP 1-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 3.4 | 50th | | |
| Max Appr. | WB | 9.4 | 95th | WB | 7 |

## 28 Jackson Hwy @ Spencer Rd

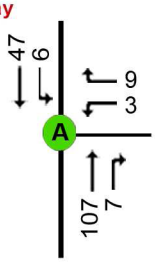
STOP 2-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.7 | 50th | | |
| Max Appr. | WB | 9.7 | 95th | -- | -- |

## 30 Highway 603 @ Atrim Road

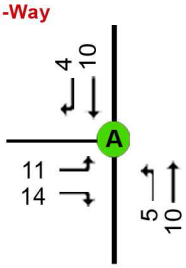
STOP 1-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.9 | 50th | | |
| Max Appr. | WB | 9.6 | 95th | -- | -- |

## 33 Military Road @ Nevil Road

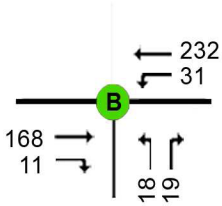
STOP 1-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 4.0 | 50th | | |
| Max Appr. | EB | 8.7 | 95th | -- | -- |

## 35 Tucker Road @ US 12

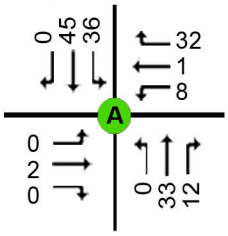
STOP 1-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 1.5 | 50th | | |
| Max Appr. | NB | 10.3 | 95th | NB | 6 |

## 106 Jackson Hwy @ Toledo-Vader Rd

STOP 2-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 7.7 | 50th | | |
| Max Appr. | SB | 9.9 | 95th | SB | 11 |

### Levels of Service (LOS)

- A Little/No Delay
- B Short Delays
- C Average Delays
- D Long Delays
- E Very Long Delays
- F Extreme Delays

Sources: Lewis County, Perteet, ESRI | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\Traffic\Traffic_Exhibit_Perteet_TurningTemplate.mxd

Lewis County

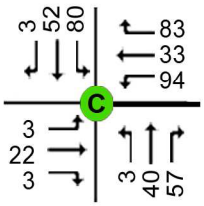
Perteet

**South Lewis County Subarea Transportation Plan**

**South Lewis County Subarea Arterials**
**2008 Existing Intersection Levels of Service**
**AM Peak Hour**
**Exhibit 7.24**

## 1 SR 505 @ Highway 603

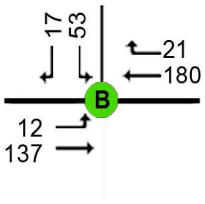
STOP 3-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 9.1 | 50th | | |
| Max Appr. | SB | 17.3 | 95th | SB | 41 |

## 5 SR 505 @ N. Military Road

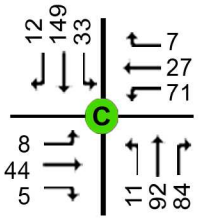
STOP 1-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.6 | 50th | | |
| Max Appr. | SB | 11.7 | 95th | SB | 14 |

## 12 SR 505 @ Jackson Highway

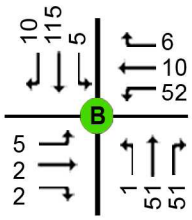
STOP 2-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 4.9 | 50th | | |
| Max Appr. | WB | 16.0 | 95th | WB | 26 |

## 20 Highway 603 @ Avery Road

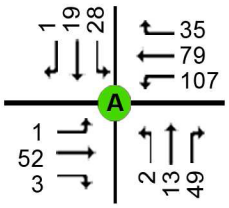
STOP 2-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 3.1 | 50th | | |
| Max Appr. | WB | 10.8 | 95th | WB | 11 |

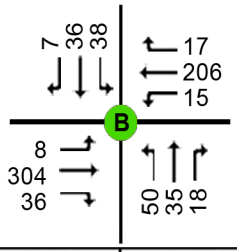
## 21 N Military Rd @ Avery Road

STOP 4-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 8.9 | 50th | | |
| Max Appr. | WB | 9.5 | 95th | -- | -- |

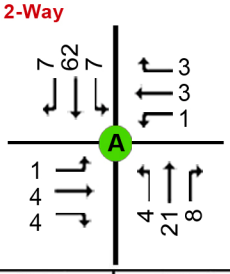
## 24 Jackson Hwy @ US 12




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 18.0 | 50th | EB | 83 |
| Max Appr. | EB | 22.3 | 95th | EB | 190 |

## 25 Jackson Hwy @ Park Road

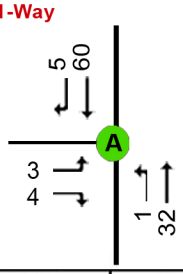
STOP 2-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.2 | 50th | | |
| Max Appr. | EB | 9.4 | 95th | -- | -- |

## 26 Jackson Hwy @ Frost Road

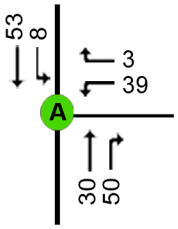
STOP 1-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.9 | 50th | | |
| Max Appr. | EB | 9.0 | 95th | -- | -- |

## 27 Jackson Hwy @ Tucker Rd

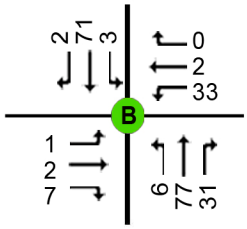
STOP 1-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.7 | 50th | | |
| Max Appr. | WB | 9.6 | 95th | WB | 5 |

## 28 Jackson Hwy @ Spencer Rd

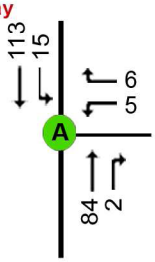
STOP 2-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.6 | 50th | | |
| Max Appr. | WB | 10.9 | 95th | WB | 7 |

## 30 Highway 603 @ Atrim Road

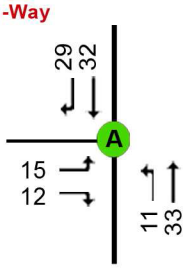
STOP 1-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 1.1 | 50th | | |
| Max Appr. | WB | 9.6 | 95th | WB | -- |

## 33 Military Road @ Nevil Road

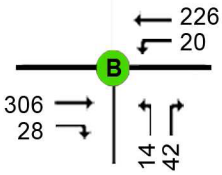
STOP 1-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.3 | 50th | | |
| Max Appr. | EB | 9.1 | 95th | -- | -- |

## 35 Tucker Road @ US 12

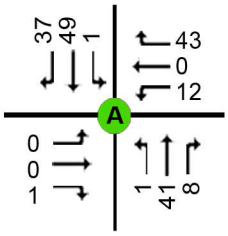
STOP 1-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 1.3 | 50th | | |
| Max Appr. | NB | 11.5 | 95th | NB | 9 |

## 106 Jackson Hwy @ Toledo-Vader Rd

STOP 2-Way




| Delay | | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 6.9 | 50th | | |
| Max Appr. | NB | 9.9 | 95th | SB | 9 |

### Levels of Service (LOS)

- A Little/No Delay
- B Short Delays
- C Average Delays
- D Long Delays
- E Very Long Delays
- F Extreme Delays

Sources: Lewis County, Perteet, ESRI | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\Traffic\Traffic_Exhibit_Perteet_TurningTemplate.mxd

Lewis County

Perteet

**South Lewis County Subarea Transportation Plan**

**South Lewis County Subarea Arterials**
**2008 Existing Intersection Levels of Service**
**PM Peak Hour**
**Exhibit 7.25**

## Intersection Level of Service

Exhibits 7.26 and 7.27 show the AM and PM peak hour intersection levels of service, respectively. The intersection levels of service are also shown graphically in Exhibits 7.24 and 7.25 for the AM and PM peak hours. The approaches at all the intersections operate at LOS B or better in AM and at LOS C or better during the PM peak hours. The only noticeable queues are on Jackson Highway approaching US 12; where the worst queues reach 160 and 190 feet long.

**Exhibit 7.26**
**2008 AM Peak Hour Intersection Levels of Service**

| ID | Intersection | Control | 2008 Existing | | Worst Approach Queue | |
|---|---|---|---|---|---|---|
| | | | LOS | Delay | Feet | Direction |
| 20 | Highway 603 @ Avery Road | 2-way Stop | B | 10.5 | 4’ | WB Avery |
| 30 | Highway 603 @ Antrim Road | 1-way Stop | A | 9.6 | 2’ | WB Antrim |
| 1 | Highway 603/Kerron Street @ SR 505 | 3-way Stop* | B | 12.2 | 19’ | NB SR 603 |
| 21 | North Military Road @ Avery Road | 4-way Stop | A | 8.2 | 0 | - |
| 33 | North Military Road @ Nevil Road | 1-way Stop | A | 8.7 | 2’ | EB Nevil |
| 5 | North Military Road @ SR 505 | 1-way Stop | B | 11.0 | 10’ | SB North Military |
| 24 | Jackson Highway @ US 12 | Signal | B | 19.3 | 160’ | WB US 12 |
| 25 | Jackson Highway @ Park Road | 2-way Stop | A | 9.2 | 2’ | WB Park |
| 26 | Jackson Highway @ Frost Road | 1-way Stop | A | 8.8 | 1’ | EB Frost |
| 27 | Jackson Highway @ Tucker Road | 1-way Stop | A | 9.4 | 7’ | WB Tucker |
| 28 | Jackson Highway @ Spencer Road | 2-way Stop | A | 9.7 | 3’ | WB Spencer |
| 12 | Jackson Hwy/Plomondon @ SR 505 | 2-way Stop | B | 14.2 | 30’ | WB Jackson Hwy |
| 106 | Jackson Hwy/Plomondon @ Toledo-Vader Road | 2-way Stop | A | 9.9 | 11’ | SB Plomondon |
| 35 | Tucker Road @ US 12 | 1-way Stop | B | 10.3 | 6’ | NB Tucker |
| 27 | Tucker Road @ Jackson Highway | 1-way Stop | A | 9.4 | 7’ | WB Tucker |

** Coded in Synchro as a 2-way stop to obtain output.*

**Exhibit 7.27**
**2008 PM Peak Hour Intersection Levels of Service.**

| ID | Intersection | Control | 2008 Existing | | Worst Approach Queue | |
|---|---|---|---|---|---|---|
| | | | LOS | Delay | Feet | Direction |
| 20 | Highway 603 @ Avery Road | 2-way Stop | B | 10.8 | 11’ | WB Avery |
| 30 | Highway 603 @ Antrim Road | 1-way Stop | A | 9.6 | 2’ | WB Antrim |
| 1 | Highway 603/Kerron Street @ SR 505 | 3-way Stop* | C | 17.3 | 41’ | SB SR 603 |
| 21 | North Military Road @ Avery Road | 4-way Stop | A | 8.9 | 0 | - |
| 33 | North Military Road @ Nevil Road | 1-way Stop | A | 9.1 | 3’ | EB Nevil |
| 5 | North Military Road @ SR 505 | 1-way Stop | B | 11.7 | 14’ | SB N. Military |
| 24 | Jackson Highway @ US 12 | Signal | B | 18.0 | 190’ | EB US 12 |
| 25 | Jackson Highway @ Park Road | 2-way Stop | A | 9.4 | 1’ | EB Park |
| 26 | Jackson Highway @ Frost Road | 1-way Stop | A | 9.0 | 1’ | EB Frost |
| 27 | Jackson Highway @ Tucker Road | 1-way Stop | A | 9.6 | 5’ | WB Tucker |
| 28 | Jackson Highway @ Spencer Road | 2-way Stop | B | 10.9 | 7’ | WB Spencer |
| 12 | Jackson Hwy/Plomondon @ SR 505 | 2-way Stop | C | 16.0 | 26’ | WB Jackson Hwy |
| 106 | Jackson Hwy/Plomondon @ Toledo-Vader Road | 2-way Stop | A | 9.9 | 9’ | SB Plomondon |
| 35 | Tucker Road @ US 12 | 1-way Stop | B | 11.5 | 9’ | NB Tucker |
| 27 | Tucker Road @ Jackson Highway | 1-way Stop | A | 9.6 | 5’ | WB Tucker |

**Coded in Synchro as a 2-way stop to obtain output.*

## Roadway Capacities

Roadway volume to capacity (V/C) ratios, were estimated for the arterial sections between intersections. The methodology was based on the *Highway Capacity Manual 2000*. For the rural arterials a capacity of 800 vehicles per hour per lane was assumed. The V/C ratios reveal the extent of utilization of existing capacity on the roadways, and will serve as the basis for future availability of capacity and the potential need for increased capacity on the arterials.

Volume to capacity ratios can identify areas of concern within corridors that may be experiencing congestion, a volume to capacity ratio greater than 0.9 usually leads to congestion. To evaluate the roadway performance the corridor is divided into a series of segments. A segment is the portion of roadway between major intersections or interchanges. Using segmental data, the corridors were evaluated for areas of concern and to establish a base condition for future alternatives evaluation. Exhibits 7.28 and 7.29 show the volume to capacity ratios for the arterial segments for AM and PM peaks, respectively.

**Exhibit 7.28**
**2008 AM Peak Hour Segment Volumes to Capacity Ratios**

| Arterial Segment | Northbound | | Southbound | |
|---|---|---|---|---|
| | Volume | V/C | Volume | V/C |
| Hwy 603 – Avery to Antrim | 143 | 0.18 | 58 | 0.07 |
| Hwy 603 – Antrim to SR 505 | 120 | 0.15 | 65 | 0.08 |
| N Military – Avery to Nevil | 58 | 0.07 | 23 | 0.03 |
| N Military – Nevil to SR 505 | 47 | 0.06 | 35 | 0.04 |
| Jackson Hwy – US 12 to Park | 55 | 0.07 | 33 | 0.04 |
| Jackson Hwy – Park to Frost | 35 | 0.04 | 28 | 0.04 |
| Jackson Hwy – Frost to Tucker | 31 | 0.04 | 29 | 0.04 |
| Jackson Hwy – Tucker to Spencer | 43 | 0.05 | 64 | 0.08 |
| Jackson Hwy – Spencer to SR 505 | 105 | 0.13 | 100 | 0.13 |
| Jackson Hwy – SR 505 to Toledo-Vader | 127 | 0.16 | 129 | 0.16 |
| Tucker – US 12 to Jackson Hwy | 37 | 0.05 | 45 | 0.06 |

**Exhibit 7.29**
**2008 PM Peak Hour Segment Volumes to Capacity Ratios**

| Arterial Segment | Northbound | | Southbound | |
|---|---|---|---|---|
| | Volume | V/C | Volume | V/C |
| Hwy 603 – Avery to Antrim | 97 | 0.12 | 149 | 0.19 |
| Hwy 603 – Antrim to SR 505 | 106 | 0.13 | 129 | 0.16 |
| N Military – Avery to Nevil | 56 | 0.07 | 95 | 0.12 |
| N Military – Nevil to SR 505 | 39 | 0.05 | 57 | 0.07 |
| Jackson Hwy – US 12 to Park | 64 | 0.08 | 82 | 0.10 |
| Jackson Hwy – Park to Frost | 34 | 0.04 | 66 | 0.08 |
| Jackson Hwy – Frost to Tucker | 33 | 0.04 | 63 | 0.08 |
| Jackson Hwy – Tucker to Spencer | 79 | 0.10 | 84 | 0.11 |
| Jackson Hwy – Spencer to SR 505 | 134 | 0.17 | 147 | 0.18 |
| Jackson Hwy – SR 505 to Toledo-Vader | 159 | 0.20 | 150 | 0.19 |
| Tucker – US 12 to Jackson Hwy | 57 | 0.07 | 45 | 0.06 |

These V/C results show that there are currently no areas of concern along the arterial corridors within the South Lewis County subarea during the AM or PM peak hours.

## CHAPTER 8 REFERENCES


1. Highway Capacity Manual, 2000.

2. Washington State Freight Truck Origin and Destination Study: Lewis County http://ewits.wsu.edu/reports/research/err21lewis.pdf

# APPENDIX A

# COLLISION REPORT

# SR 505 Interchange/Corridor Plan

# Collision Report

Collision Data Set Evaluated: 01/01/2003 to 12/31/2007

Perteet

Cook Engineering and Development Services PLLC

Prepared on August, 2008
Revised May, 2009

**Note: Federal law 23 USCS 409 governs the use of the data contained in this report. Under this law data utilized for purposes of evaluating potential highway safety enhancements "…Shall not be subject to discovery or admitted into evidence in a federal or state court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists or data."**

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# SECTION 1: BACKGROUND

Historically, Washington State Department of Transportation (WSDOT) safety deficiency analysis consists of three types of analysis done every other year on all state routes outside of city limits to identify:

- High Collision Locations (HALs)
- High Collision Corridors (HACs)
- Pedestrian Collision Locations (PALS).

This analysis focuses on the first two types of collision evaluation: HALs and HACs.

HALS are evaluated using two consecutive (2) years of historical collision data. Individual analysis units are 0.1 miles in length (every 0.01 mile is tracked). Severity points are assigned by collision type (for each state route) and severity points per million vehicles per mile (severity rate) compared against other state routes with similar access control designations. The severity point system is as follows:

1 - Property damage only
3 - Possible injury
5 - Evident injury
9 - Disabling injury (aka serious injury)
10 - Fatality.

Six types of highways are analyzed separately and an average severity rate is calculated for each type. The following types that are evaluated are:

- Rural, full access control
- Rural, 2-lane without full access control
- Rural, 4-lane without full access control
- Urban, full access control
- Urban, 2-lane without full access control
- Urban, 4-lane without full access control.

SR 505 is functionally classified as a Rural Collector (FHWA) and currently designated as predominately Class 3 managed access highway for the majority of the study corridor. The access ramps at Interstate 5 ramps which are designated full access control. For evaluating collisions in the study corridor (MP 0.0 to MP 6.8) this study utilizes data developed by WSDOT for: Rural, 2-lane without full access control.

When an analysis unit has six (6) or more collisions with 10 or more severity points it is labeled a Severe Collision Location (SAL). All SALS in each highway type are then compared statistically against the average severity rate for that type. All SALS whose severity rate is above one standard deviation of the severity rate for that type of highway

are designated HALS. In addition, any analysis unit that has two (2) or more fatal collisions is also designated as a HAL, regardless of its severity rate.

Historically, High Collision Corridors (HACs) utilize five (5) years of historical collision data, analyzes one (1) mile segment every one half (0.5) miles. The six highway types are analyzed separately. The criterion used to evaluate HACS is listed below:

- Total severity points per mile
- Total collisions per mile
- Severity points per collision per mile
- IF – a section of highway is above the average of all three criteria for the highway type it is considered a HAC.

At the time of this study, WSDOT was in the process of evaluating its historic collision rating system. This study utilizes historic approaches to guide the identification of locations of interest relative to reported collision frequency but does not nominate any location based on WSDOT's historic rating system in recognition of emerging WSDOT strategies. This study does identify several intersections and roadway segments that, given reported collision data, seem to merit further evaluation.

# SECTION 2: DATA SETS EVALUATED

All reported collisions in the SR 505 study corridor (MP 0.0 to MP 6.8) between 01/01/2003 to 12/31/2007 were collected and processed for potential HAL and/or SAL nomination. Two consecutive years (within the entire evaluation period) were utilized when developing severity points for any given analysis unit. Data was provided by Washington State Department of Transportation Southwest Region staff.

**Note: Federal law 23 USCS 409 governs the use of the data contained in this report. Under this law data utilized for purposes of evaluating potential highway safety enhancements "…Shall not be subject to discovery or admitted into evidence in a federal or state court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists or data."**

# SECTION 3: STUDY METHODOLOGY

This study evaluates collision data based on historic and emerging approaches to analysis as defined by WSDOT. The data set was screened for potential HALs and site specific collision locations identified with severity point totals exceeding 10. Four typical roadway segments were identified and evaluated for collision rate within the entire corridor. The segments are broke out as follows:

Segment A: MP 0.0 to MP 1.18
Segment B: MP 1.19 to MP 3.03
Segment C: MP 3.04 to MP 6.16
Segment D: Mp 6.17 to MP 6.8

Four intersections of interest are being evaluated for collision rate. The resulting rates are compared to state published collision rates for rural collector access class 3 roadways in the various years of interest.

# SECTION 4: SUMMARY OF COLLISIONS BY SEVERITY, FIRST COLLISION TYPE AND LOCATION

## SUMMARY OF COLLISION SEVERITY

During the analysis period (01/01/2003 to 12/31/2007) a total of 85 collisions were reported from mile post 0.0 to mile post 6.8 (study area). The breakout by collision category appears below:

- 2 fatalities
- 6 serious injuries
- 13 evident injuries
- 21 possible injuries
- 43 property damage collisions.

## SUMMARY OF FIRST COLLISION TYPE ALL COLLISIONS

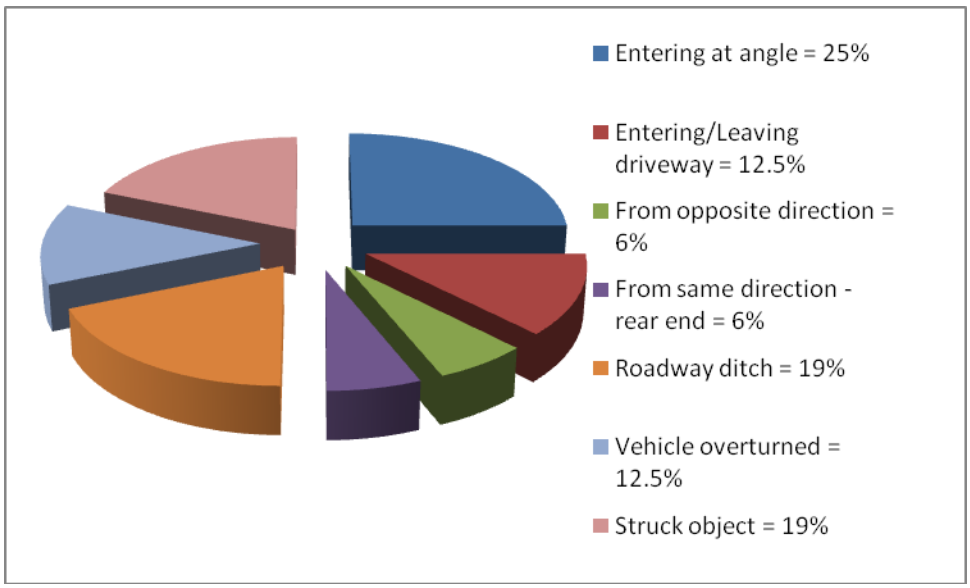
First collision type is described as being: the first injury damage producing event in the series of events that constitute a motor vehicle traffic accident.

- 58 occurred at intersections or at driveways (68%)
- 55 during dry conditions (65%)
- 62 during daylight conditions (73%)

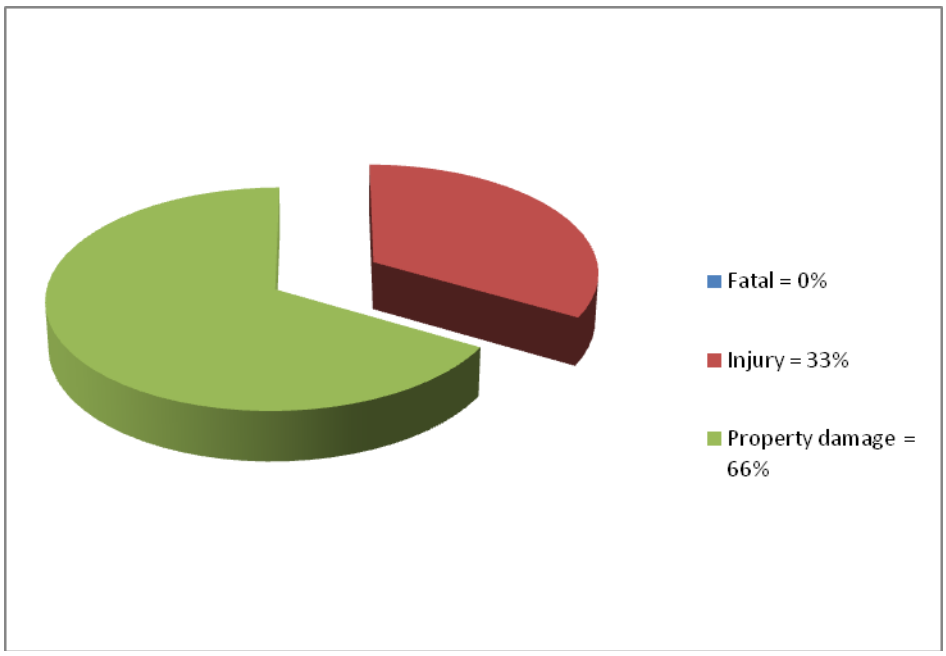
Exhibits 1 through 8 provide a summary of all collisions on the four segments of SR 505 classified by collision type and collision severity.

## Segment A: MP 0.0 to MP 1.18 (2003 – 2007) SUMMARY

### Exhibit 1: COLLISION TYPE SUMMARY MP 0.0 – 1.18




### Exhibit 2: COLLISION SEVERITY SUMMARY MP 0.0 – 1.18



## Segment B: MP 1.19 TO MP 3.03 (2003 – 2007) SUMMARY

Exhibit 3: COLLISION TYPE SUMMARY MP 1.19 – 3.03

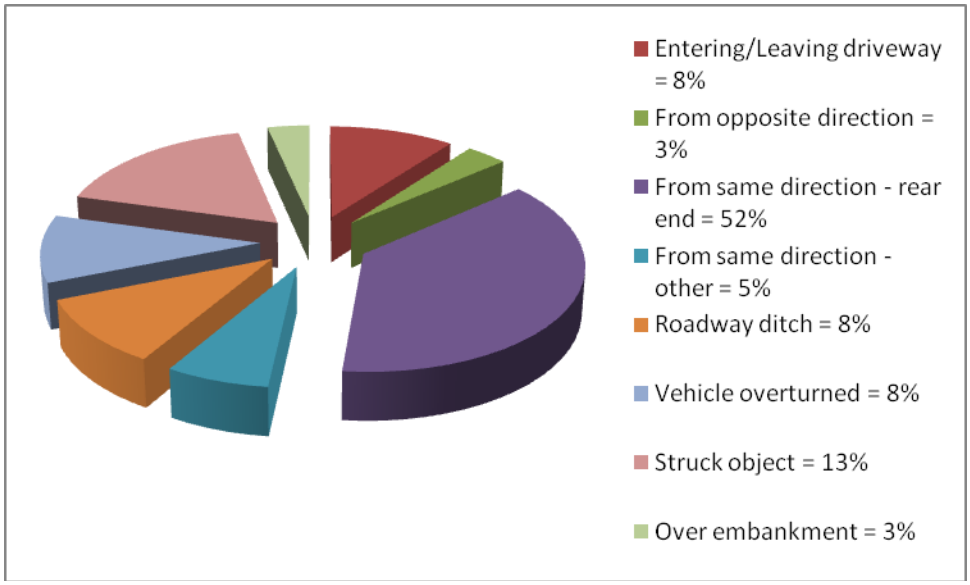
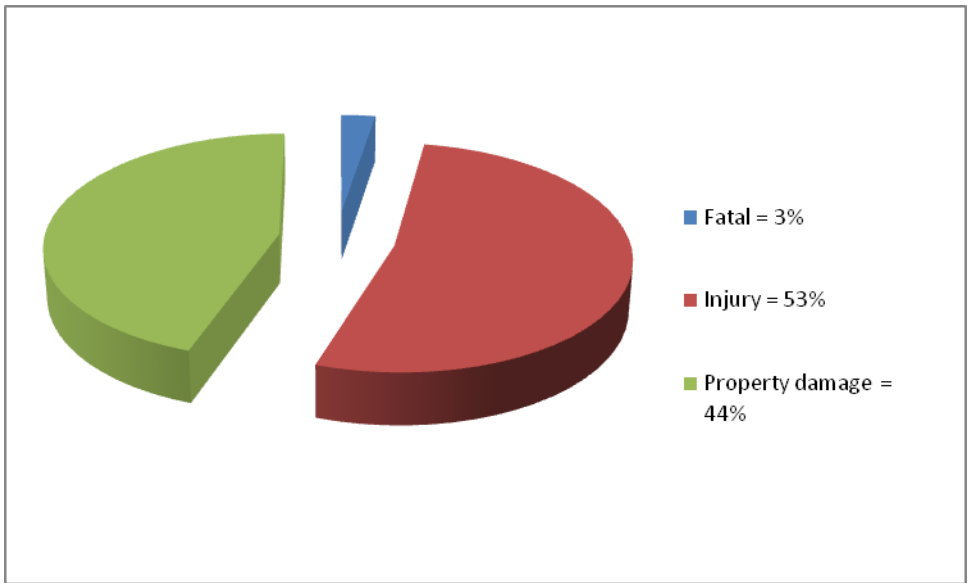



Exhibit 4: COLLISION SEVERITY SUMMARY MP 1.19 – 3.03



## Segment C: MP 3.04 TO MP 6.16 (2003 – 2007) SUMMARY

Exhibit 5: COLLISION SUMMARY BY TYPE MP 3.04 – 6.16

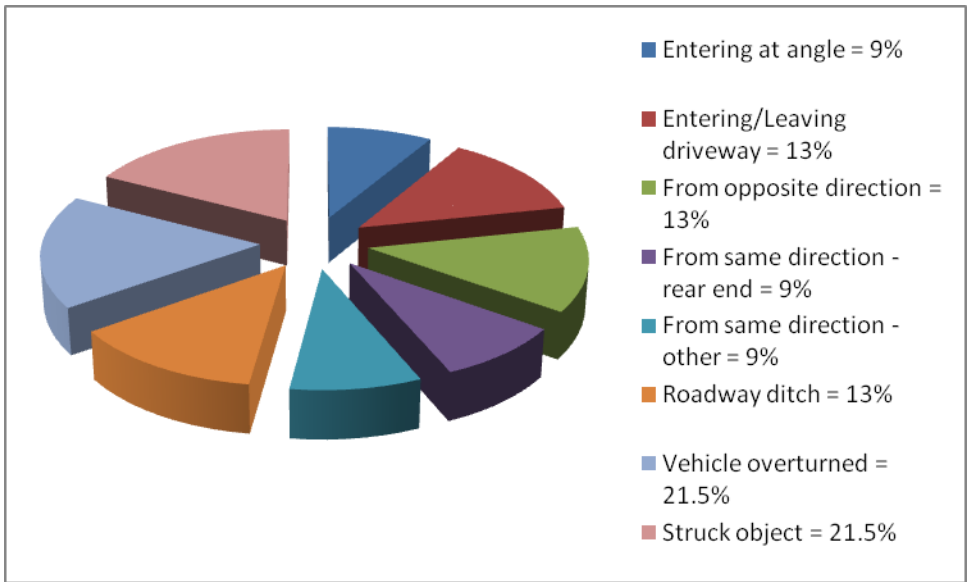
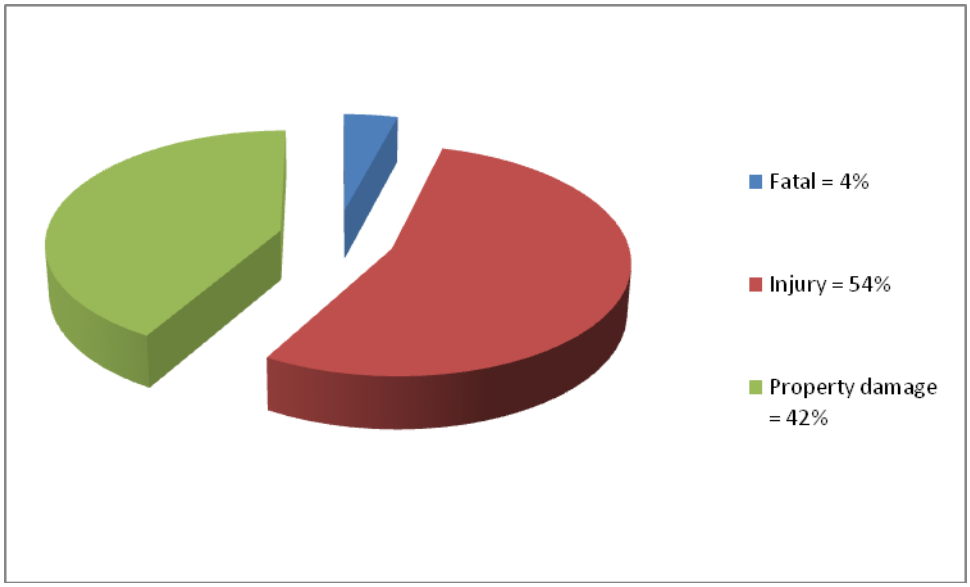



Exhibit 6: COLLISION SEVERITY SUMMARY MP 3.04 – 6.16



## Segment D: MP 6.17 TO MP 6.8 (2003 – 2007) SUMMARY

Exhibit 7: COLLISION SUMMARY BY TYPE MP 6.17 – 6.8

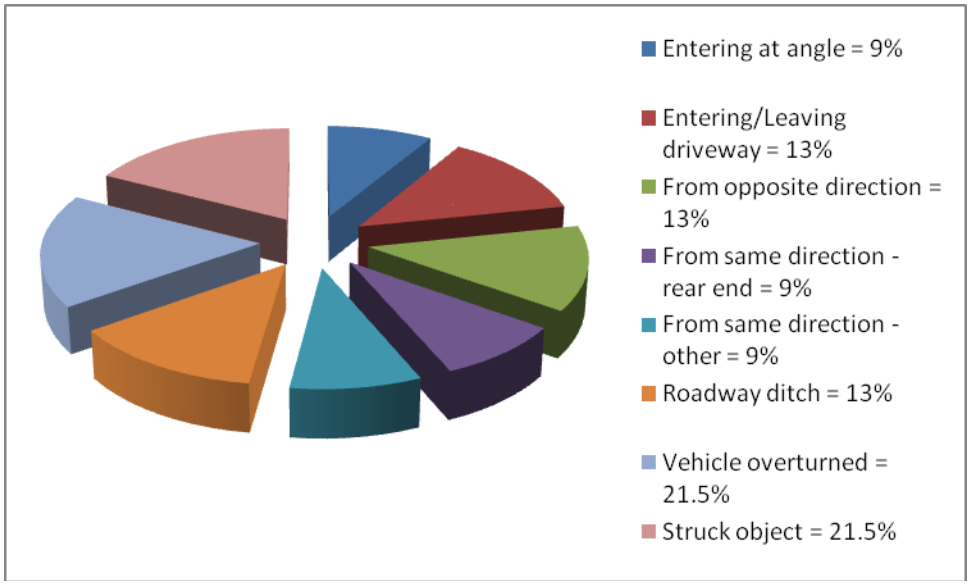
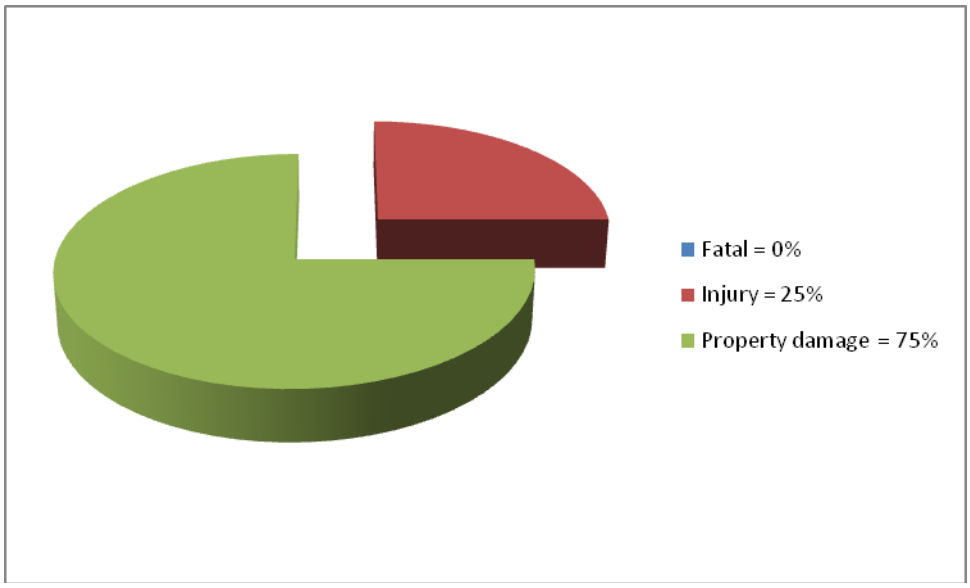



Exhibit 8: COLLISION SEVERITY SUMMARY MP 6.17 – 6.8



## SUMMARY OF COLLISIONS BY LOCATION (SEVERITY POINTS)

A summary of the collision locations that total ten, or more, severity points (WSDOT historic rating system) are tabulated below in Exhibit 9.

Exhibit 9: Collision Severity Point Allocation Summary (2003 – 2007)

| Mile Post | Date | Most severe injury type | WSDOT severity point allocation |
|---|---|---|---|
| 2.22 | 5-20-2003 | PI = potential injury | 3 |
| | 7-3-2003 | PI | 3 |
| | 3-9-2004 | PI | 3 |
| | 8-26-2004 | EI = evident injury | 5 |
| | 03-17-05 | No Injury (NI) | 1 |
| | | | |
| 2.76 | 8-27-2004 | Fatal | 10 |
| | | | |
| 2.88 | 09-30-04 | NI = non injury | 1 |
| | 5-10-2006 | NI | 1 |
| | 10-24-2006 | DI = disabling injury aka serious injury | 9 |
| | | | |
| 3.03 | 1-10-2003 | EI | 5 |
| | 8-16-2003 | EI | 5 |
| | 10-7-2004 | NI | 1 |
| | 9-16-2005 | PI | 3 |
| | 5-7-2006 | EI | 5 |
| | 10-7-2006 | PI | 3 |
| | | | |
| 3.55 | 1-20-2007 | Fatal | 10 |
| | 07-03-05 | Unknown | |
| | | | |
| 5.46 | 5-25-2003 | EI | 5 |
| | 5-28-2004 | EI | 5 |
| | 10-16-05 | PI | 3 |
| | 09-06-07 | NI | 1 |

Based on historic data reviewed for this study, the following roadway segments or milepost locations might qualify as locations of concern:

- MP 2.22, the intersection of SR 505/North Military Road
- MP 2.88 – 3.03, roadway segment
    - Interstate 5 SB ramps
    - Interstate 5 NB ramps
- MP 5.46, the intersection of SR 505/Jackson Highway and Plomondon Road

In addition to the above intersections, there are two fatal collisions (both located within segments at MP 2.76 and MP 3.55). Each fatal collision report indicates the driver "had been drinking" and that on other collisions were associated with the event. Analysis of intersection collision rates is performed in Section 8 of this report.

## SUMMARY OF FIRST COLLISION TYPE AT LOCATIONS OF INTEREST

At MP 2.22, the first collision type is listed as being "entering at angle" for two of the collisions and three are listed as being "same direction, both going straight – one stopped – rear end". One is listed as being "from same direction – one left turn – one straight".

At MP 2.88, the first collision type is listed as being "entering at angle" for all three reported collisions in the study period (2003 – 2007).

MP 3.03 records the first collision type listed as being "entering at angle" for three collisions, "utility pole" for two collisions and "from same direction – both going straight – one stopped – rear end" for a single collision.

MP 5.46 lists four first collision types:

- "from opposite direction – one left turn – one straight"
- "entering at angle"
- "from opposite direction – all others"
- "from same direction – one left turn – one straight".

The collision types at the locations of concern suggest that the collisions are primarily related to access control and expectation of driver speeds.

# SECTION 5: CORRELATION OF DATA SETS TO ROADWAY GEOMETRY

CEDS generated a plan and profile for SR 505 centerline using Lewis County GIS LiDAR data. The resulting centerline profile was then “field evaluated” by Lewis County Survey staff using a GPS rover unit. The resulting correlation of the field and laboratory data sets suggests, in general, good correlation of predictive centerline elevation. While the resulting profile should not be relied upon for design purposes, CEDS generated the profile and added stationing to screen the collision data sets for association with roadway geometric features. The resulting plan and centerline profile sheets may be viewed in APPENDIX A of this report (Sheets 1 – 7). Collision data sets are called out on the plan and profile views by mile post and stationing to attempt correlating location by geometric feature. Mile post and stationing were generated using WSDOT monument #242, designation GP21603-5 as mile post and station 0.00 (0+00). Stationing is approximate and has not been generated from actual centerline survey data. The correlation of MP location with physical features of the roadway appears to be fairly good. Reliance on the supplied LiDAR data for identifying potential geometric deficiencies (SR 505) is not embraced by this study.

MP 2.22, (Sheet 3) records a large number of daylight occurrences. The approximate location of the North Military Road (MP 2.22) intersection suggests possible intersection interactions with SR 505 traffic. This site may qualify for traffic engineering mitigation approaches and/or potential capital facility improvements.

MP 2.88 – 3.03, (Sheet 4) is located within a fairly long grade section that starts near Camus Road and ends at the top of the vertical crest curve near Knowles Road. A steady grade exists from the north bound ramps of Interstate 5, gaining in elevation to the summit at Knowles Road. Site distance to the east from the south bound ramp is somewhat obscured by the overpass guardrail.

MP 5.46 (Sheet 6) is associated with the Jackson Highway/Plomondon Road intersection. The roadway horizontal alignment curves southerly from the approximate apex of the vertical curve eastbound towards the Jackson Highway/Plomondon Road intersection. The combination of the horizontal and vertical curves as well as the transition to the more urban environment of the City of Toledo may be contributing factors to the recorded collisions. In addition, sight distance is diminished as you enter the vertical curve eastbound towards the intersection from SR 505.

Collision rates for these locations are presented in Section 7.

# SECTION 6: ROADWAY SEGMENTS EVALUATED

## SR 505 STUDY SEGMENTS

The study corridor was evaluated for collision rates by segments defined by common roadway characteristics. The segments are as follows:

Segment A, MP 0.0 to MP 1.18 (City limits of Winlock)
Segment B, MP 1.19 to MP 3.03 (NB ramps of Interstate 5)
Segment C, MP 3.04 to MP 6.16 (City limits of Toledo)
Segment D, MP 6.17 to MP 6.85 (Bridge over the Cowlitz River).

Segment A is characterized by more urbanized land uses with curb and gutter sections transitioning to roadway shoulders and ditches at you move towards the easterly limit of the segment. The roadway slopes moderately from the downtown core of Winlock yielding to rolling topography in the easterly limit of the segment. Traffic speed increases from 25 to 50 mph as you leave the city limits.

Segment B has paved shoulders of varying widths and is drained by ditch section. Travel lane widths are typically 11 feet with paved shoulders that are predominantly 2 feet wide. Speed in this segment is posted as being 50 mph. Land use is predominantly rural in this segment.

Segment C supports a posted speed of 55 mph, generally 11 foot travel lanes with paved shoulders varying from 2 to 6 feet. Land use is predominantly rural in this segment.

Segment D represents a transition from rural land use to those associated with more urban areas. As one approaches the downtown core area of Toledo, the travel lanes change in width from 11 feet to 13 feet, paved shoulders are replaced by curb and gutter sections, and speeds are reduced to 25 mph.

Collision rates for each segment are evaluated in Section 7 below.

# SECTION 7: COLLISION RATES

## ROADWAY SEGMENTS ANALYZED

Roadway segments are developed considering similar characteristics such as urban/rural, associated land use, posted speed limits, typical cross-sections and collision data. For SR 505, the following segments were identified:

MP 0.0 to MP 1.18 (Approximate City of Winlock city limit line)
MP 1.19 to MP 3.03 (Approximate end of Interstate 5 ramps)
MP 3.04 to MP 6.16 (Approximate City of Toledo city limit line)
MP 6.17 to MP 6.80 (Cowlitz River Bridge)

These segments are selected for similar characteristics such as urban/rural, posted speed, roadway characteristics and associated land uses. The number of collisions in each segment (by year) is listed below in Exhibit 10 below.

Exhibit 10: Number of collisions in roadway segments (A – D) in various years

| Segment /MP | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|
| A. 0.0 – 1. 18 | 5 | 1 | 4 | 1 | 5 |
| B. 1.19 – 3.03 | 9 | 9 | 5 | 11 | 4 |
| C. 3.04 – 6.16 | 4 | 10 | 4 | 1 | 4 |
| D. 6.17 – 6.8 | 1 | 2 | 1 | 1 | 3 |

WSDOT annual traffic reports (2003 – 2007) record average annual daily traffic (AADT) counts for several locations between the City of Winlock and Toledo. Listed below are two reference points that have a consistent descriptor and are available for each study year. These segments are selected to represent traffic west and east of Interstate 5. Two locations that appear to best represent the segments identified in Exhibit 10 (consistently through all years) are:

- “After MP 0.0” – west of Interstate 5
- “Before MP 5.46” – east of Interstate 5

The segments are selected to represent traffic west and east of Interstate 5. Reported Average Annual Daily Traffic values (WSDOT annual reports) are tabulated below in Exhibit 12.

## SPECIFIC LOCATIONS

The number of collisions per year per location are listed below (Exhibit 11).

Exhibit 11: Collisions per year at locations of interest

| Mile post | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|
| 2.22 | 2 | 2 | | | |
| 2.76 | | 2 | | | |
| 2.88 | | 1 | | 2 | |
| 3.03 | 2 | 1 | 1 | 2 | |
| 3.55 | | | | | 1 |
| 5.46 | 1 | 1 | | | |

This suggests that the intersections at: North Military Road (MP 2.22), the ramps at Interstate 5 (MP 2.88 – 3.03) and the intersection at Jackson Highway/Plomondon Road warrant specific collision rate analysis. These locations are discussed further below in "INTERSECTIONS" below.

## COLLISION RATES

Collision rates for each segment were calculated using the Average Daily Traffic (ADT) values at two study representative locations identified in Exhibit 12. All collisions west of Camas Road rely on "after MP 0.0" (west of Interstate 5) and all collisions east of Camas Road rely on "before MP 5.46"( east of Interstate 5). To test the reliability of this approach, actual current segment count information was evaluated and then compared to historic WSDOT ADT values for segments west of Interstate 5 ("after MP 0.0") and east of Interstate 5 ( "before MP 5.46").

During June of 2008, the following seven day average values were collected at four locations: two locations east of Interstate 5 (west of Jackson Highway and west of Camas) and at two locations west of Interstate 5, (east of Knowles and east of Kakela) and presented in Exhibit 13 below. These count locations are then compared to those "after MP 0.0" and to those "before MP 5.46".

Collision rates for this study are calculated as follows:

RMVM = A * 1,000,000/365 * ADT * L, where
RMVM = Number of collisions per million vehicle miles of travel
A = Number of total collisions during the study period
ADT = Average Daily Traffic
L = Length of the roadway segment (minimum of one mile)

Exhibit 12: AADT: MP 0.0 to MP 5.46

| Year | After MP 0.0 | Before MP 5.46 |
|---|---|---|
| 2003 | 5300 | 3700 |
| 2004 | 4600 | 3100 |
| 2005 | 4500 | 3100 |
| 2006 | 4600 | 3100 |
| 2007 | 4400 | 3400 |

Exhibit 13: AADT: four locations in the corridor

| Location | Approximate mile post (MP) | Seven day average ADT | WB | EB |
|---|---|---|---|---|
| West of Jackson Highway | 5.46 | 3216 | 1676 | 1540 |
| West of Camas | 3.09 | 3684 | 1878 | 1805 |
| East of Knowles | 2.52 | 4031 | 2061 | 1970 |
| East of Kakela | 1.08 | 3509 | 1766 | 1743 |

The data collected from WSDOT annual traffic reports (ADTs) suggests that a traffic volume increase of approximately 40-50% for westbound traffic compared to eastbound traffic. The data collected in June 2008, suggests that approximately 20% more traffic is currently occurring west of Interstate 5. The count data collected in June 2008 appears to be substantially consistent with the reported historic data (ADT data both west and east of Interstate 5). Therefore, this study utilizes WSDOT ADT values for calculating collision rate west and east of Interstate 5. Collisions occurring west of Interstate 5 rely on ADTs reported “After MP 0.0”. Collisions occurring east of Interstate 5 rely on ADTs reported “Before MP 5.46”.

## SEGMENTS

Exhibit 14: Calculated collisions rates per segment per year

| Segment | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|
| A. 0.0 – 1. 18 | 2.19 | 0.5 | 2.06 | 0.5 | 2.64 |
| B. 1.19 – 3.03 | 2.53 | 2.91 | 1.65 | 3.56 | 1.35 |
| C 3.04 – 6.16 | 0.95 | 2.83 | 1.13 | 0.28 | 1.03 |
| D. 6.17 – 6.8 | 1.18 | 2.81 | 1.40 | 1.40 | 3.84 |

Five year average rates per segment are as follows:
A = 1.59
B = 2.42
C = 1.23
D = 2.12

WSDOT statewide rates for a rural collector access class 3 are tabulated by year below in Exhibit 15.

Exhibit 15: WSDOT collisions rates by year for rural collector access class 3

| 1996 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|---|
| **2.05** | | | | | **1.48** | **1.66** | **1.55** | |

Rural collector class 3 average collision rate information was not available on WSDOT's website for years: 2003 and 2007 at the time of report publication.

For the study period (2003 – 2007), it appears that MP 0.0 to MP 1.18 reports collision rates in excess of the state average for a rural collector, access class 3 for years 2003, 2005, and likely 2007. The data set utilized by WSDOT to develop statewide statistics has not been verified for developing one standard deviation within the data set.

For years 2003, 2004 and 2006, the segment from Winlock's City limit to the ramps at Interstate 5 appears to exceed (collision rate) the published state average for each of those years.

The segment from the Interstate 5 NB ramps to the City limits of Toledo report only one year (2004) exceeding the reported state average rate.

The segment from the City limit of Toledo to the bridge at the Cowlitz River is less than one mile in length. The collision rate for 2004 and 2007 appears to warrant further evaluation.

The five year study period (2003 – 2007) collision rate average per segment is reported again in (Exhibit 16):

Exhibit 16: 5 year average collision rate per segment

| Segment | Rate |
|---|---|
| A | 1.59 |
| B | 2.42 |
| C | 1.23 |
| D | 2.12 |

Segments B and D suggest rates that warrant additional consideration. One fatal collision is reported in 2004 at MP 2.76 (segment B) while the other fatal collision (2007) lies within segment C at MP 3.55. One disabling injury occurred in 2004 at MP 3.57. No other injuries that would lengthen the potential area of concern are recorded within the study period (2003 – 2007). The two reported collisions that could generate an area of concern occurred within two separate – two year periods within the total study period.

## INTERSECTIONS

Intersection analysis is performed on the three points of interest (North Military Road MP 2.22, the ramps at I5 MP 2.88/3.03 and Jackson Highway/Plomondon Road MP

5.46) using intersection count data obtained in June 2008. The peak hour counts are converted to average daily traffic (using scaling factors developed from tube counts) and then forecasted to million vehicles entering the intersection per year.

Exhibit 17: Estimated 24-hour vehicles entering for study years

| Intersection | MP | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|
| North Military Road | 2.22 | 6,902 | 5,991 | 5,850 | 5,980 | 5,720 |
| SB ramp at I5 | 2.88 | 6,902 | 5,991 | 5,850 | 5,980 | 5,720 |
| NB ramp at I5 | 3.03 | 5,943 | 5,152 | 5,040 | 5,152 | 4,928 |
| Jackson Highway/Plomondon Road | 5.46 | 6,253 | 5,239 | 5,239 | 5,239 | 5,746 |

Exhibit 18: Reported collisions by year at each intersection

| Intersection | MP | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|
| North Military Road | 2.22 | 2 | 2 | | | |
| SB ramp at I5 | 2.88 | | 1 | | 2 | |
| NB ramp at I5 | 3.03 | 2 | 1 | 1 | 2 | |
| Jackson High way/Plomondon Road | 5.46 | 1 | 1 | | | 1 |

Exhibit 19: Estimated intersection rates for 2003 - 2007

| Intersection | MP | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|
| North Military Road | 2.22 | 0.79 | 0.91 | | | |
| SB ramp at I5 | 2.88 | | 0.46 | | | |
| NB ramp at I5 | 3.03 | 0.92 | 0.53 | 0.54 | 1.06 | |
| Jackson Highway/Plomondon Road | 5.46 | 0.44 | 0.52 | | | 0.48 |

A rural collector intersection collision rate was not available for various years of the study period. If a relative crash frequency of 0.7 per year at rural intersections is used ("Access Control - A Local and Global Perspective, Transportation Planning Symposium, Spokane, WA, 2007, Demosthenes), North Military Road and the north bound ramps of Interstate 5 appear to exceed the average rate for study years 2003, 2004 and 2006. A more definitive Washington State rural two-lane four-legged intersection accident rate is found in Table 7, "Accident Models for Two-Lane Rural Roads: Segments and Intersections", Vogt and Bared, Publication No. FHWA-RD-98-133, October 1998. A rate of 0.589 (per million vehicles entering – injury accidents) is reported from 90 intersections studied between 1993 –1998. Using the lesser rate appears to diminish the severity of the northbound ramp rate. The same study lists rural two-lane three legged injury rate as being 0.157 per million vehicles entering.

The five year collision frequency for each of the intersections is:

North Military Road (MP 2.22): 0.36
SB ramps at I5 (MP 2.88): 0.27
NB ramps at I5 (MP 3.03): 0.63
Jackson Highway/Plomondon Road (MP 5.46): 0.30

# SECTION 8: COLLISION RATE SUMMARY/RECOMMENDATIONS

WSDOT collision rates for rural collectors were not available at the time of this study from the "Transportation Data" website for all of the evaluation period (2003 and 2007): http://www.wsdot.wa.gov/mapsdata/tdo/collisionannual.htm. Study collision rates are summarized below.

## INTERSECTIONS

The North Military Road intersection appears to exceed state average intersection collision frequency for rural intersections for study years 2003 and 2004. The north bound ramps at Interstate 5 appear to exceed average intersection collision frequency for rural highways for years 2003 and 2006.

## SEGMENTS

All of the study segments appear to exceed statewide average collision rates for at least one year out of the five year study period (Exhibit 20 below). Segments A and B appear to exceed statewide average collision frequencies (rural collector access class 3) for several years within the study period. The collision frequencies for segments A and B suggest access control may be a significant contributor to total reported collisions in the corridor. The urbanizing segment within the City of Toledo reflects similar collision rates for concern. Nearly 70% of all collisions (first collision type) list intersection or driveway as related collision causation. Hence access control is expected to be a significant consideration in potential collision rate reduction strategies.

Exhibit 20: Collision rate summary by roadway segment

| Study Segment | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|
| A | 2.19 | 0.5 | 2.06 | 0.5 | 2.64 |
| B | 2.53 | 2.91 | 1.65 | 3.56 | 1.35 |
| C | 0.95 | 2.83 | 1.13 | 0.28 | 1.03 |
| D | 1.18 | 2.81 | 1.40 | 1.40 | 3.84 |
| WSDOT rate | | 1.48 | 1.66 | 1.55 | |

## RECOMMENDATIONS

Collision frequencies for statewide rural collector roadways access class 3 should be obtained from WSDOT (for 2003 and 2007) and compared to calculated values in this report. Where appropriate, one standard deviation from the mean value for each WSDOT annual frequency should also be obtained and the calculated values compared to determine the significance of the calculated values. It does appear that several roadway segments, in various years of the study period will likely exceed statewide average collision rates for rural collector class 3 roadways. Segments A, B and D should be further evaluated for improvement alternatives during the future conditions analysis portion of this study. The available data suggests access, driver attention and potentially speed, are all suspect causes for a majority of the collisions reported during the study period (+/- 70%).

# REFERENCES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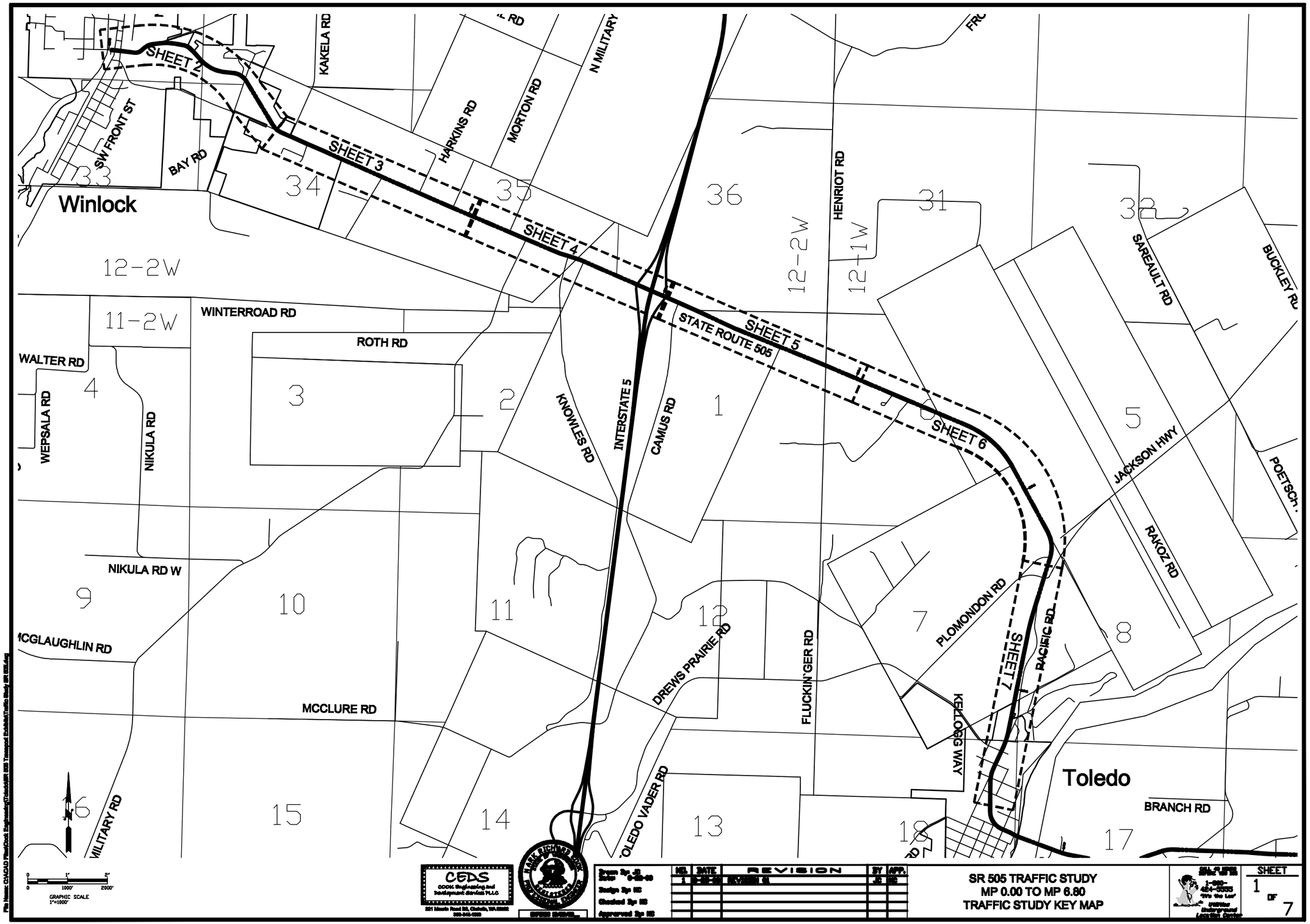
11. "Safety Evaluation Testbeds – An Assessment of Safety Project Prioritization in the WSDOT 12 Program", Pennsylvania Transportation Institute, Pennsylvania State University, September 2006.
12. "Highway Collision Expected Value Analysis", Utah Department of Transportation Research Division, September 2003.
13. "SR 505 MP 0.00 to MP 17.27 (Winlock to Lewis County/Cowlitz County Line) Accident Data from 1/01/2000 to 12/31/2007", WSDOT SW Region staff.
14. "2004 Annual State Highway Collision Data Summary", WSDOT, No date.
15. "2005 Annual State Highway Collision Data Summary", WSDOT, No date.
16. "2006 Washington State Collision Data Summary Highways Only", WSDOT, No date.
17. "Washington State Department of Transportation Data Office" POWERPOINT presentation, Horton, No date.
18. "WSDOT Methodology of Collision Analysis", conceptual draft graphic, WSDOT SW Region staff, No date.
19. "Accident Models for Two-Lane Rural Roads: Segments and Intersections", Vogt and Bared, Publication No. FHWA-RD-98-133, October 1998

# APPENDIX A:  SR 505 PLAN AND PROFILE SHEETS




CEDS
COOK Engineering and Development Services PLLC
521 Lincoln Road NE, Chehalis, WA 98532
360-748-1200

MARK RICHARD COOK
STATE OF WASHINGTON
PROFESSIONAL ENGINEER

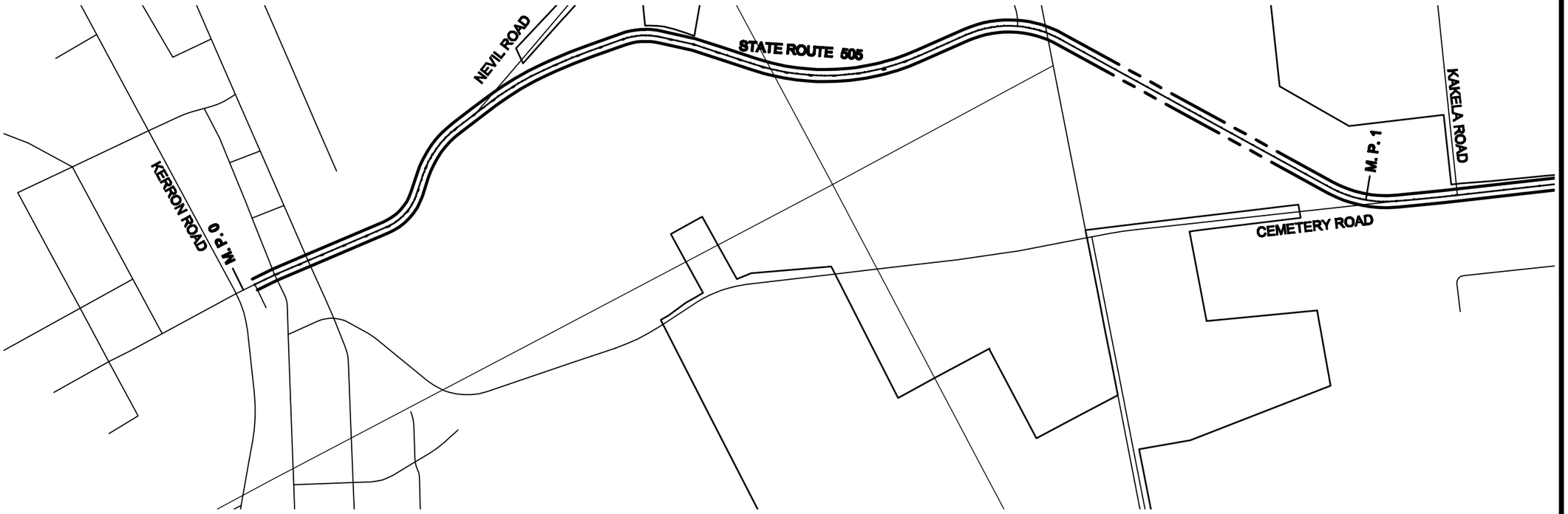
Drawn By: JC
Date: 6-26-08
Design By: MS
Checked By: MS
Approved By: MS

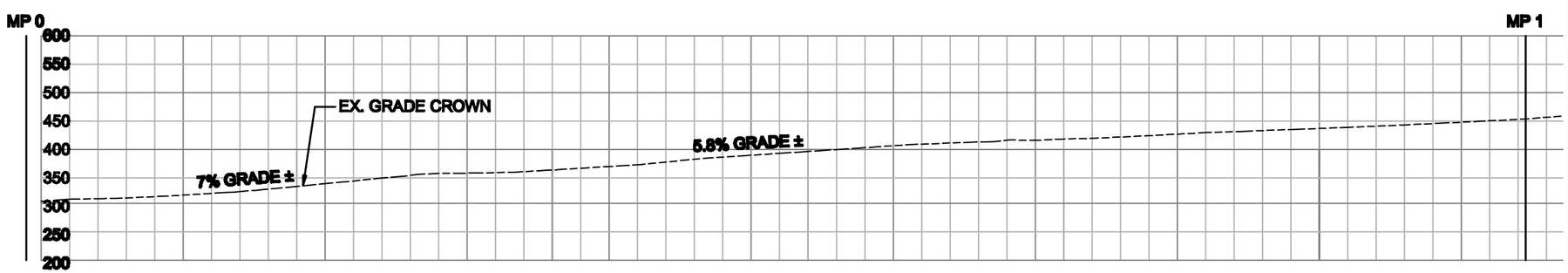
| NO. | DATE | REVISION | BY | APP. |
|---|---|---|---|---|
| 1 | [illegible] | REVISION 1 | JC | MS |

SR 505 TRAFFIC STUDY
MP 0.00 TO MP 6.80
TRAFFIC STUDY KEY MAP

CALL BEFORE YOU DIG
1-800-424-5555
"It's the Law"
Utilities Underground Location Center

SHEET 1 OF 7




GRAPHIC SCALE
1"=200'

CEDS
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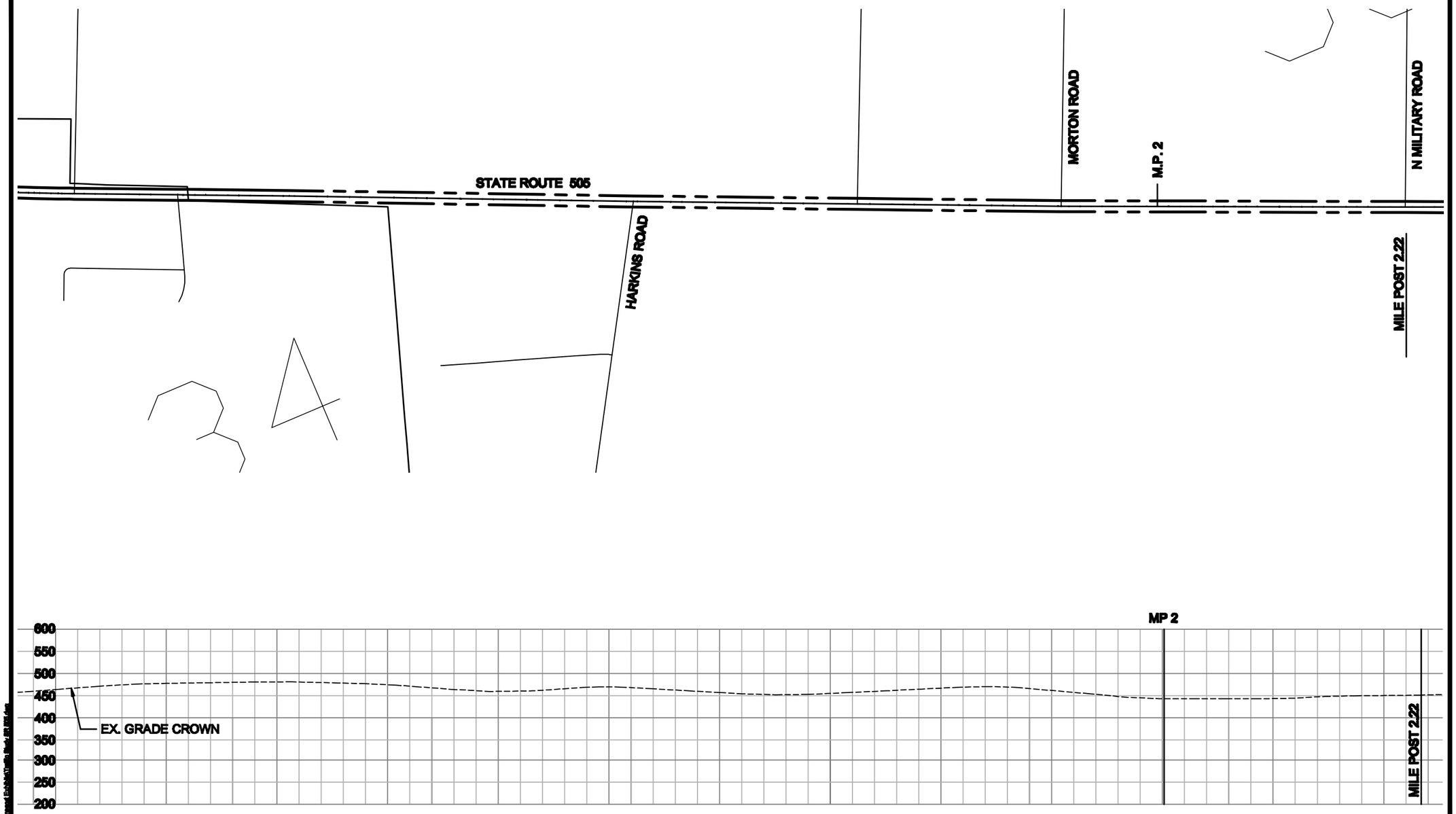
|---|---|---|---|---|
| 1 | [illegible] | REVISION 1 | JC | RC |

SR 505 TRAFFIC STUDY
MP 0.00 TO MP 6.80
TRAFFIC ACCIDENT DETAIL

SHEET 2 OF 7




GRAPHIC SCALE
1"=200'

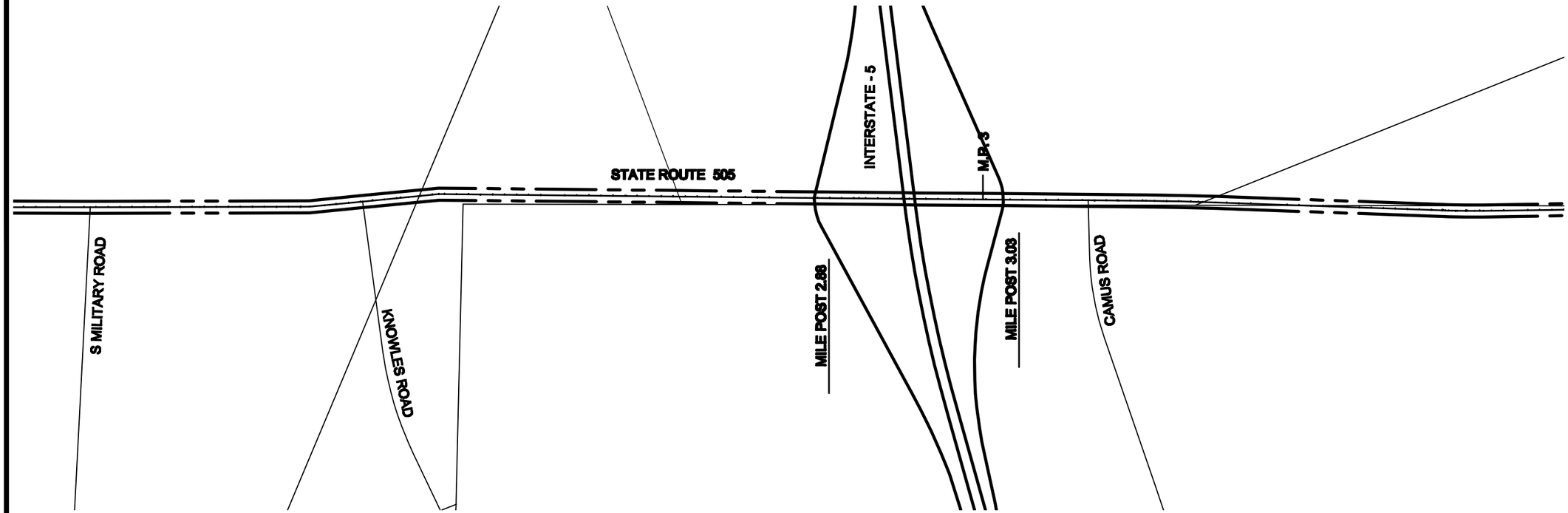
CEDS
COOK Engineering and Development Services PLLC

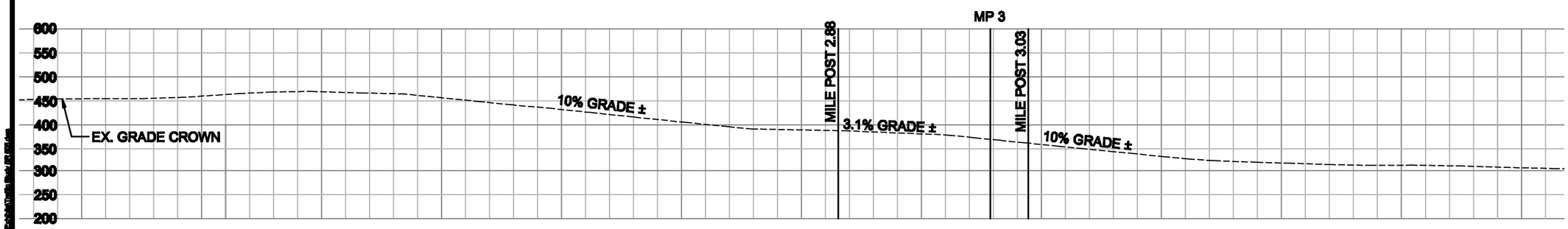
| NO. | DATE | REVISION | BY | APP. |
|---|---|---|---|---|
| 1 | [illegible] | REVISION 1 | JC | RC |

SR 505 TRAFFIC STUDY
MP 0.00 TO MP 6.80
TRAFFIC ACCIDENT DETAIL

CALL 2 BEFORE YOU DIG
1-800-
424-5555
"It's the Law"
NORTHWEST
Underground
LOCATING CENTER

SHEET
3
OF
7




GRAPHIC SCALE
1"=200

CEDS
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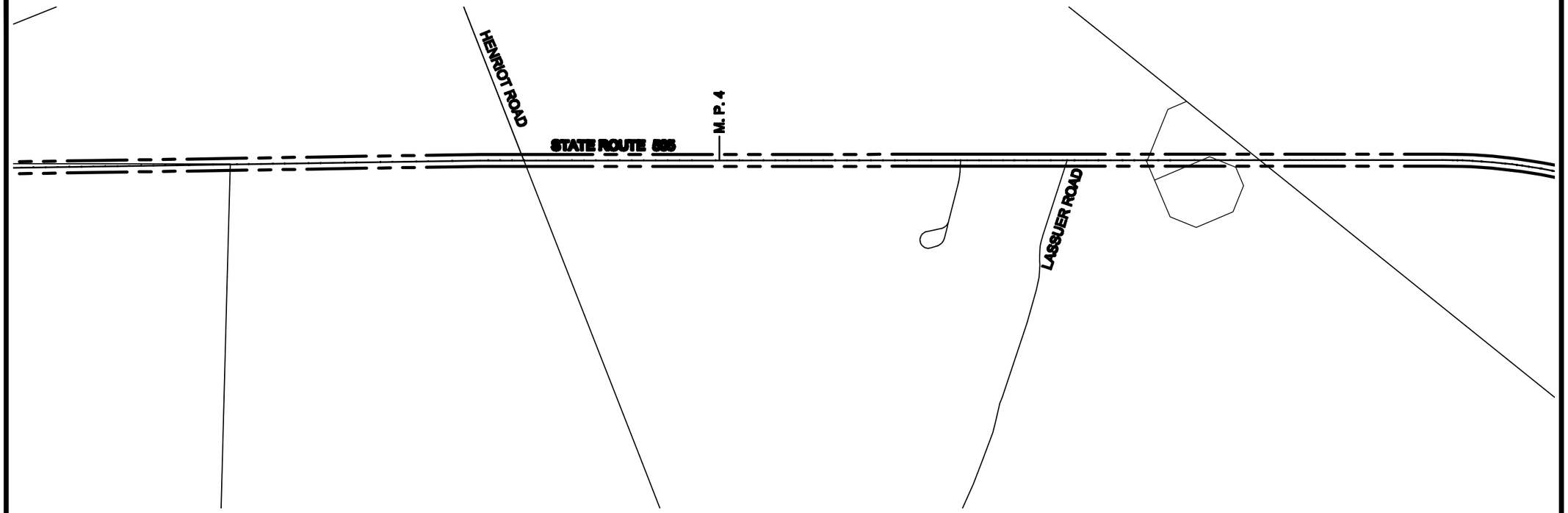
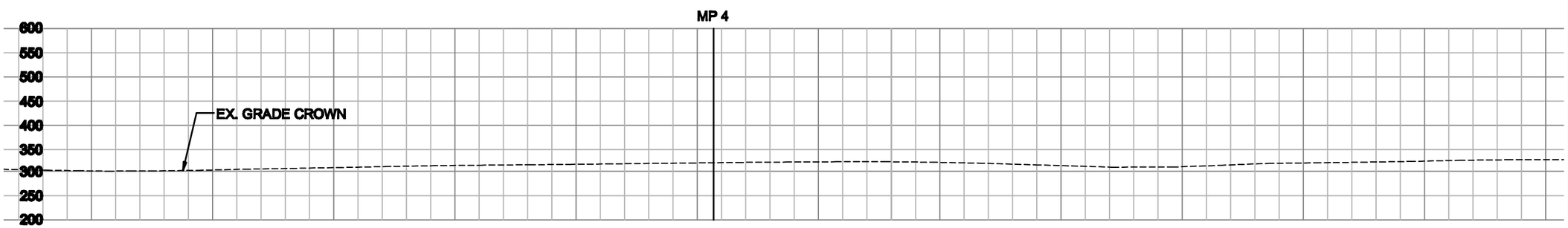
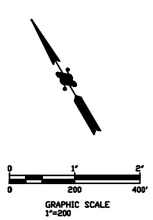
| NO. | DATE | REVISION | BY | APP. |
|---|---|---|---|---|
| 1 | 10-28-09 | REVISION 01 | JC | RC |

SR 505 TRAFFIC STUDY
MP 0.00 TO MP 6.80
TRAFFIC ACCIDENT DETAIL

SHEET 4 OF 7

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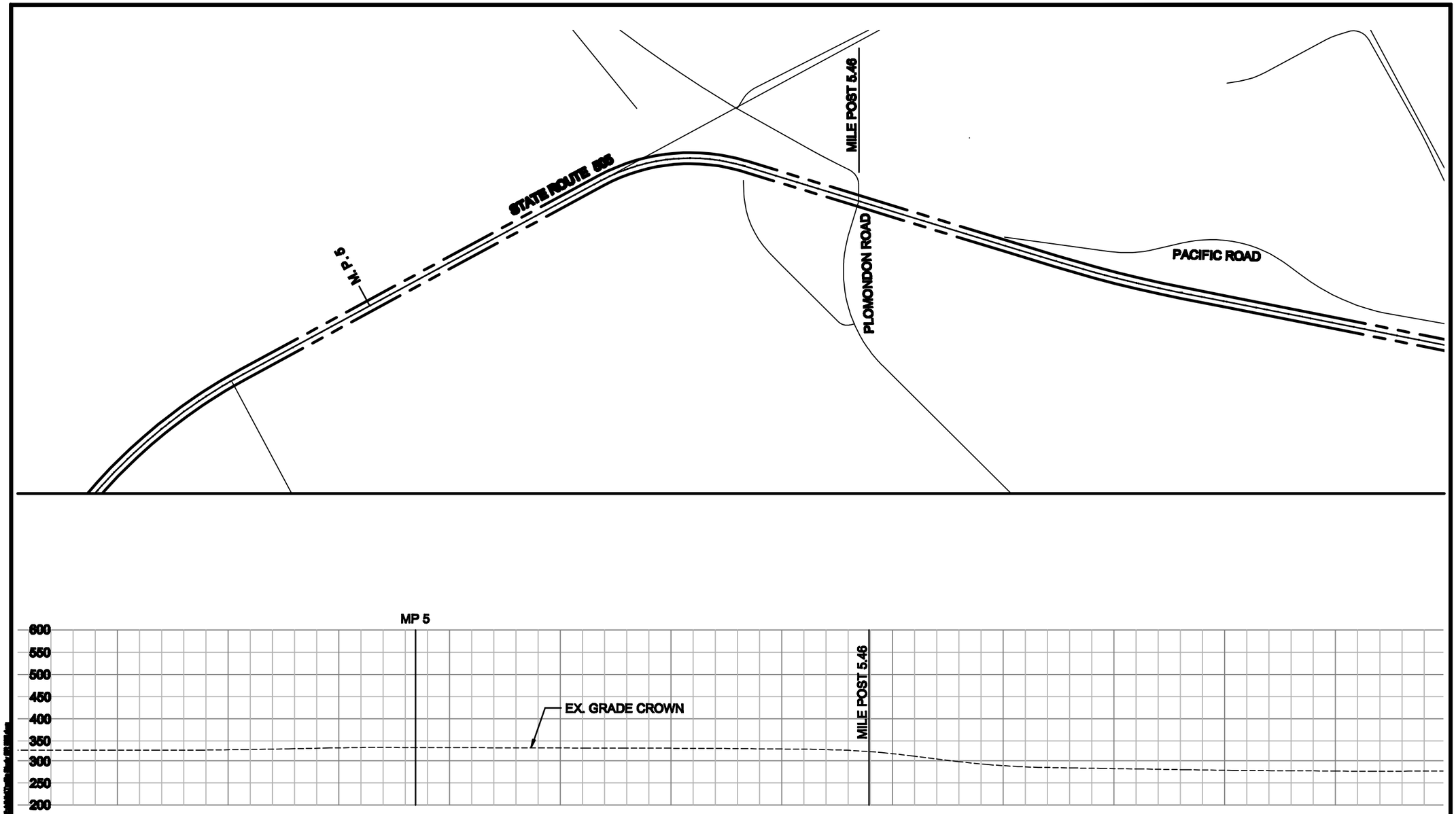
321 Mauna Road NE, Chehalis, WA 98532
360-345-1355

| NO. | DATE | REVISION | BY | APP. |
|---|---|---|---|---|
| 1 | [illegible] | REVISION 1 | JC | RC |

SR 505 TRAFFIC STUDY
MP 0.00 TO MP 6.80
TRAFFIC ACCIDENT DETAIL

1-800-
424-5555
"We the Law"
Washington
Underground
Locating Center

SHEET
5
OF
7




N

0 1" 2"
0 200 400'
GRAPHIC SCALE
1"=200

CEDS
COOK Engineering and Development Services PLLC
321 Mauna Road NE, Chehalis, WA 98532
360-748-1555

MARK RICHARD COOK
STATE OF WASHINGTON
PROFESSIONAL ENGINEER

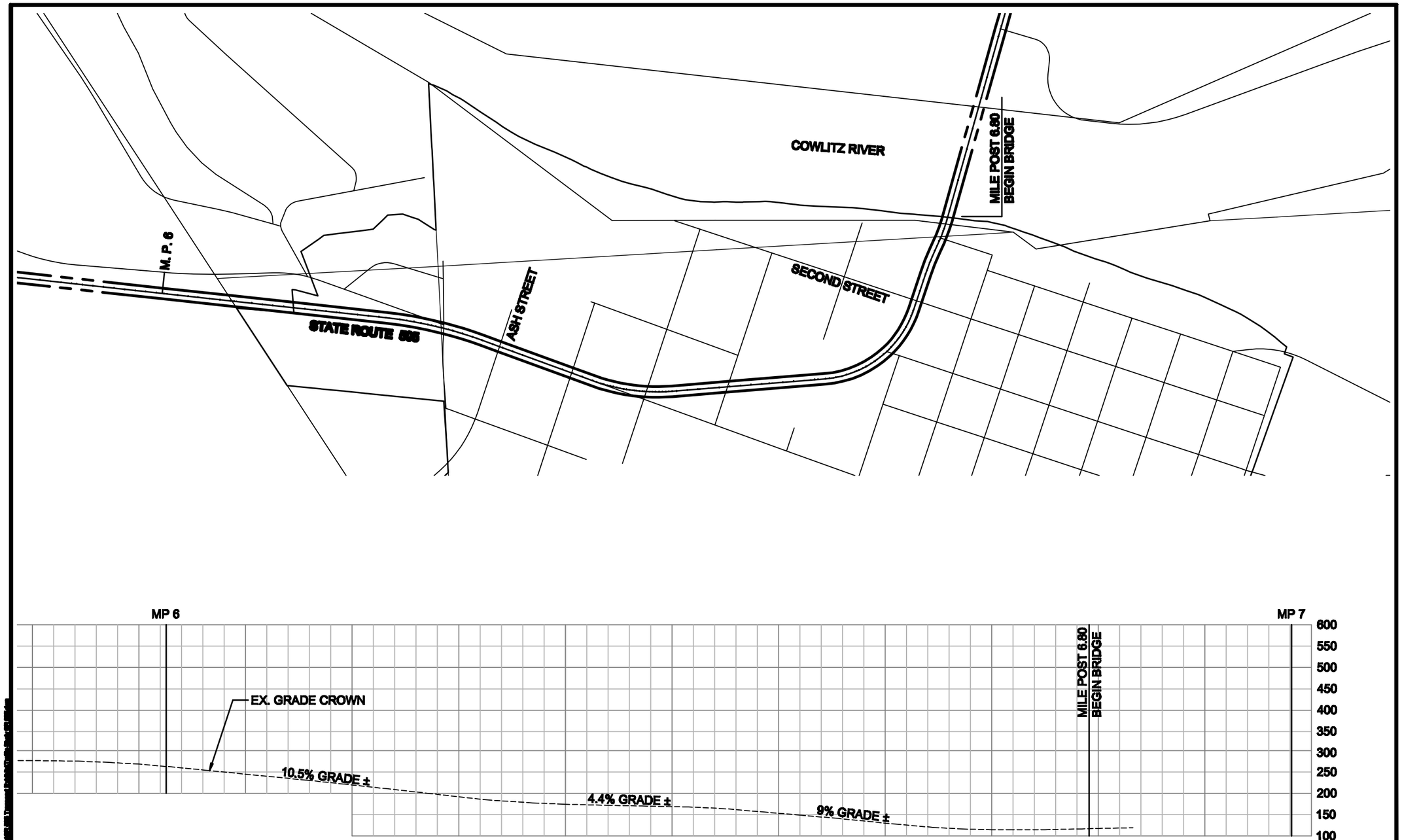
Issue Date: 0-00-00
Design By: MC
Checked By: MC
Approved By: MC

| NO. | DATE | REVISION | BY | APP. |
|---|---|---|---|---|
| 1 | 0-00-00 | REVISION 1 | JC | MC |

SR 505 TRAFFIC STUDY
MP 0.00 TO MP 6.80
TRAFFIC ACCIDENT DETAIL

CALL 2 BEFORE YOU DIG
1-800-
424-5555
"We's the Law"
Washington
Underground
Location Center

SHEET
6
OF
7




GRAPHIC SCALE
1"=200

CEDS
COOK Engineering and Development Services P.L.L.C.

| NO. | DATE | REVISION | BY | APP. |
|---|---|---|---|---|
| 1 | 0-00-00 | REVISION 1 | JS | RC |

SR 505 TRAFFIC STUDY
MP 0.00 TO MP 6.80
TRAFFIC ACCIDENT DETAIL

1-800-
424-5555
"It's the Law"
(WSRA)
Underground
Location Center

SHEET 7 OF 7

# APPENDIX B

# TRAFFIC REPORT

# Traffic Report - SR 505 Corridor Plan/South Lewis County Subarea Transportation Plan

## EXISTING CONDITIONS TRAFFIC ANALYSIS

State Route 505 is a 19 mile highway that originates at Highway 603 inside the City of Winlock, heading east it connects with I-5 and then continues east and south to its termination with State Route 504. The towns of Winlock and Toledo constitute the major traffic generators along this rural route, with Interstate 5 spaced equally between them as a primary draw for vehicles. It is primarily a rural highway that transports people and goods throughout this portion of Lewis County.

The 6.32 mile section of State Route 505 originating at Highway 603 in Winlock and east to Ash Street in Toledo will be the focus of the State Route 505 Corridor Plan Study. To evaluate traffic operations of proposed future land use plans the study area is generally bordered by US 12 to the north, Highway 603 on the west, State Route 506 to the south, Jackson Highway and the City of Toledo to the east.

SR 505 is a 2-lane rural collector under the State's functional classification system with posted speeds ranging from 25 mph to 55 mph along the rolling terrain. Speed limits were obtained from the WSDOT Highway Log (2007) and verified in the field. **Exhibit 1** shows the posted speed limits along the study route.

Exhibit 1: Posted Speed Limits

| Milepost | Posted Speed Limit (mph) | West | East |
|---|---|---|---|
| 0.00 – 0.74 | 25 | Highway 603 | Cedar Crest Drive |
| 0.74 – 1.01 | 40 | Cedar Crest Drive | Winlock City Limit |
| 1.01 – 3.03 | 50 | Winlock City Limit | Camus Road |
| 3.03 – 5.00 | 55 | Camus Road | Milepost 5 |
| 5.00 – 6.16 | 40 | Milepost 5 | Toledo City Limits |
| 6.16 – 6.32 | 25 | Toledo City Limits | Ash Road |

## INTERSECTIONS AND TRAFFIC CONTROL

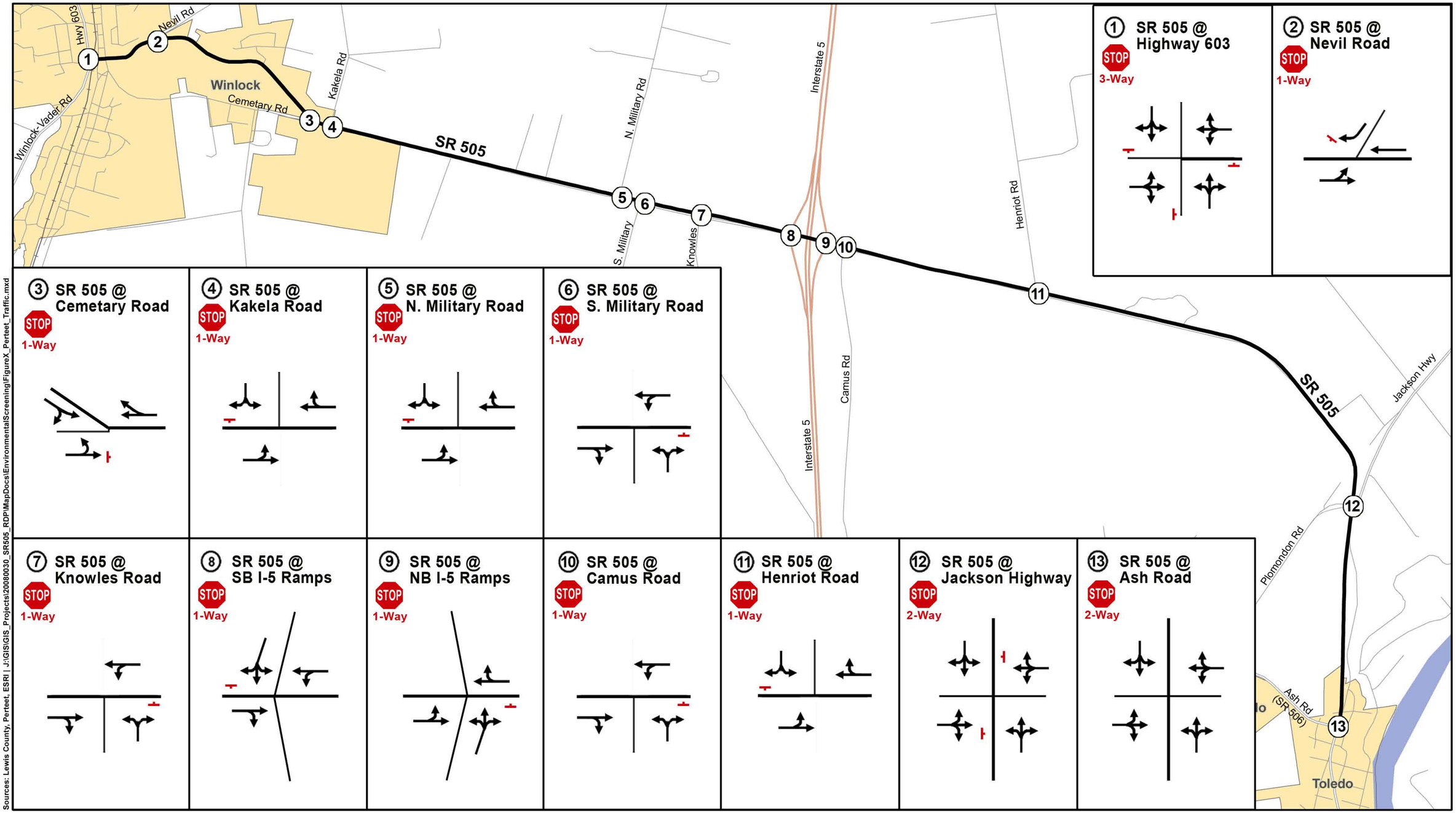
Within the study area, there are 29 non-signalized intersections: 13 along the SR 505 corridor and 16 in the South Lewis County Subarea. In addition, there are many local accesses, private or dead-end streets present that have been considered on a cumulative and not individual basis.

Field observations were conducted to verify the characteristics of the study intersections (traffic control, channelization and approaches), traffic operations, and travel time for model calibration. **Exhibit 2** summarizes the characteristics of the SR 505 corridor intersections and the existing

lane channelization is shown in **Exhibit 3**. Characteristics of intersections located off SR 505 and in the South Lewis County Subarea are shown in **Exhibit 4**.

Exhibit 2: SR 505 Corridor - Intersection Characteristics

| MP | SR 505 Intersection | Intersection Type | Channelization | Traffic Control | Study ID Number |
|---|---|---|---|---|---|
| 0.00 | Highway 603 / Walnut Street / Kerron Street | 4-Leg | Single Lane Approaches | 3-way stop (WB Free) | 1 |
| 0.23 | Nevil Road | T-intersection located northeast | Single Lane Approaches | 1-way stop | 2 |
| 1.01 | Cemetery Road | T-intersection located southwest | Single Lane Approaches | 1-way stop | 3 |
| 1.08 | Kakela Road | T-intersection located north | Single Lane Approaches | 1-way stop | 4 |
| 2.22 | North Military Road | T-intersection located south | Single Lane Approaches | 1-way stop | 5 |
| 2.31 | South Military Road | T-intersection located south | Single Lane Approaches | 1-way stop | 6 |
| 2.52 | Knowles Road | T-intersection located south | Single Lane Approaches | 1-way stop | 7 |
| 2.88 | Southbound I-5 Ramps | 4-Leg (On-Off Ramps) | Single Lane Approaches | 1-way stop | 8 |
| 3.03 | Northbound I-5 Ramps | 4-Leg (On-Off Ramps) | Single Lane Approaches | 1-way stop | 9 |
| 3.09 | Camus Road | T-intersection located south | Single Lane Approaches | 1-way stop | 10 |
| 3.85 | Henriot Road | T-intersection located north | Single Lane Approaches | 1-way stop | 11 |
| 5.46 | Jackson Highway / Plomondon Road | 4-Leg | Single Lane Approaches additional NB RTL | 2-way stop | 12 |
| 6.32 | Ash Road | 4-Leg | Single Lane Approaches | 2-way stop | 13 |




Sources: Lewis County, Perteet, ESRI | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\FigureX_Perteet_Traffic.mxd

0 0.8 Miles

Lewis County

Perteet

Legend
Stream
City Limit

SR 505 Interchange / Corridor Plan

2008 Existing Intersection Channelization

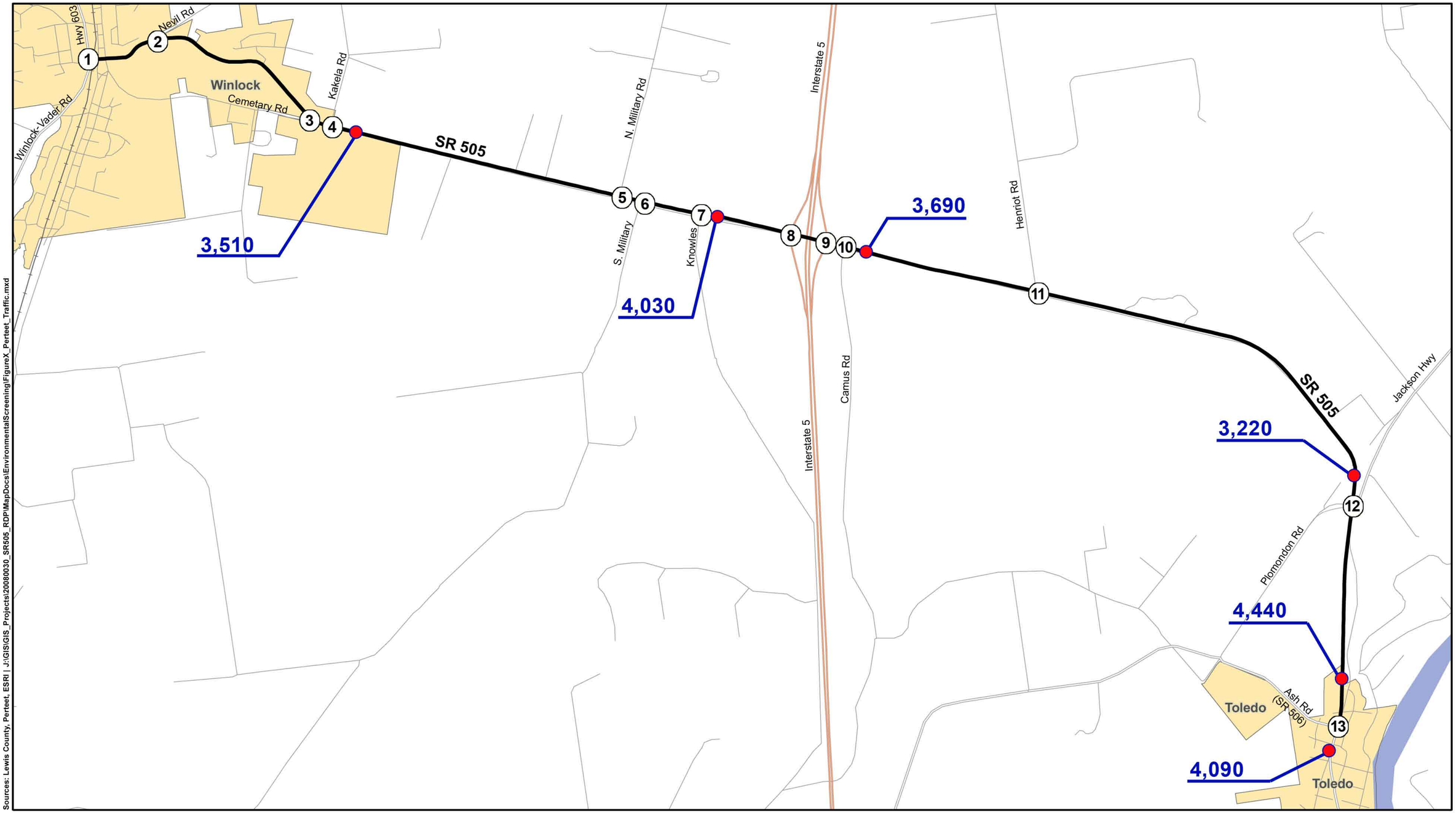
Exhibit 3

Exhibit 4: South Lewis County Subarea- Intersection Characteristics

| Intersection | Intersection Type | Channelization | Traffic Control | Study ID Number |
|---|---|---|---|---|
| Avery Road @ Highway 603 | 4-Leg | Single Lane Approaches | 2-way stop | 20 |
| Avery Road @ North Military Road | 4-Leg | Single Lane Approaches | 4-way stop | 21 |
| US 12 @ I-5 Southbound Ramps | T-intersection On / Off Rams located north | Single Lane Approaches | 1-way stop | 22 |
| US 12 @ I-5 Northbound Ramps | 4-Leg (On-Off Ramps) | Single Lane Approaches | 1-way stop | 23 |
| US 12 @ Jackson Highway | 4-Leg | EB & WB 3-Lane (Left, Thru, Right) NB & SB 1 Lane | Signal | 24 |
| Jackson Highway @ Park Road | 4-Leg | Single Lane Approaches | 2-way stop | 25 |
| Jackson Highway @ Frost Road | T-intersection located west | Single Lane Approaches | 1-way stop | 26 |
| Jackson Highway @ Tucker Road | T-intersection located east | Single Lane Approaches | 1-way stop | 27 |
| Jackson Highway @ Spencer Road | 4-Leg | Single Lane Approaches | 2-way stop | 28 |
| Highway 603 @ Antrim Road | T-intersection located east | Single Lane Approaches | 1-way stop | 30 |
| Nevil Road @ North Military Road | T-intersection located west | Single Lane Approaches | 1-way stop | 33 |
| State Route 506 @ I-5 Southbound Ramps | 4-Leg (On-Off Ramps) | Single Lane Approaches | 1-way stop | 101 |
| State Route 506 @ I-5 Northbound Ramps | 4-Leg (On-Off Ramps) | Single Lane Approaches | 1-way stop | 102 |
| Ash Road @ Plomondon Road | 4-Leg | Single Lane Approaches | 2-way stop | 106 |
| | | | | |

## TRAFFIC VOLUMES

New traffic counts were conducted along the corridor and throughout the study area to evaluate the existing condition of traffic operations. Turn Movement Counts were obtained at all the study intersections for the AM and PM peak periods as well as 24 hour daily volume counts along SR 505 and the County roadways intersecting with SR 505and on numerous approaches to SR 505. **Exhibit 5** shows the Average Weekday Traffic volumes along the SR 505 corridor. Where historical data was available, as was the case with numerous locations along I-5, volumes were expanded with growth rates calculated from available I-5 locations. AM and PM peak hour turn movement volumes at the study intersections along SR 505 are shown in **Exhibits 6 and 7**, respectively.




Sources: Lewis County, Perteet, ESRI | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\FigureX_Perteet_Traffic.mxd

0 0.8
Miles

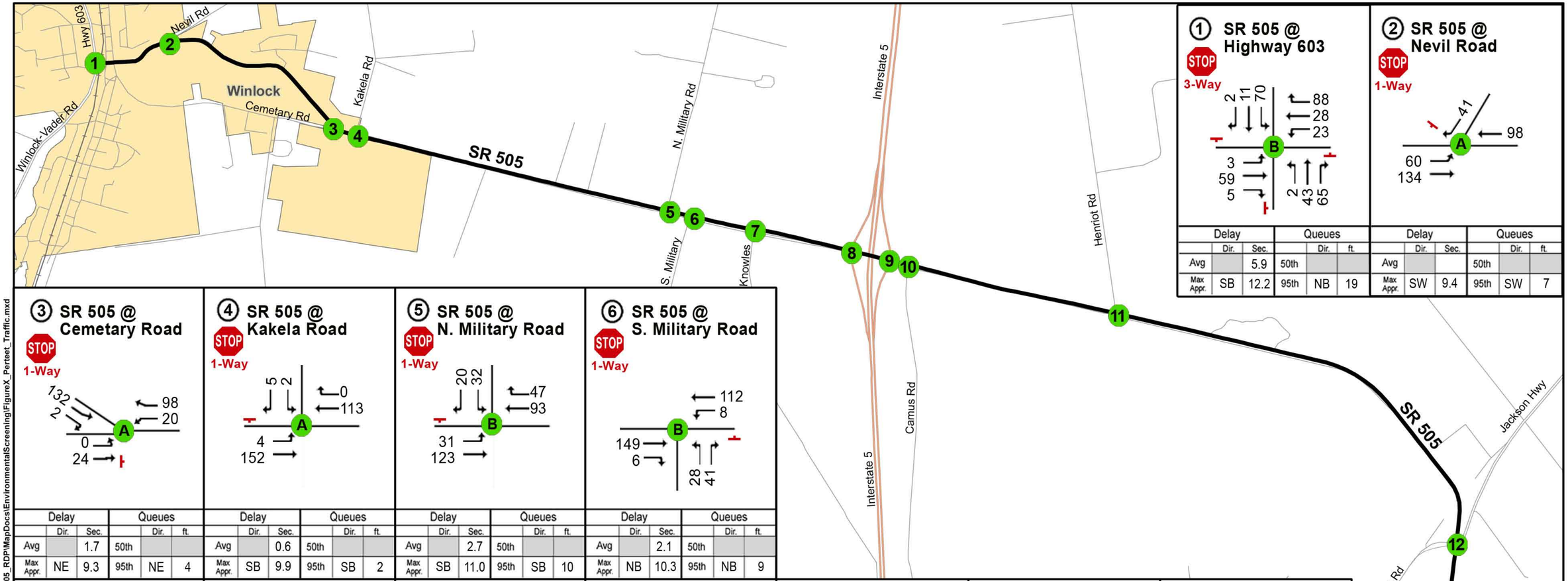
Lewis County

Perteet

Legend
Stream
City Limit

SR 505 Interchange / Corridor Plan

Average Weekday Traffic Volumes
2008 Existing
Exhibit 5




## ① SR 505 @ Highway 603

STOP 3-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 5.9 | 50th | | |
| Max Appr. | SB | 12.2 | 95th | NB | 19 |

## ② SR 505 @ Nevil Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | | 50th | | |
| Max Appr. | SW | 9.4 | 95th | SW | 7 |

## ③ SR 505 @ Cemetery Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 1.7 | 50th | | |
| Max Appr. | NE | 9.3 | 95th | NE | 4 |

## ④ SR 505 @ Kakela Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.6 | 50th | | |
| Max Appr. | SB | 9.9 | 95th | SB | 2 |

## ⑤ SR 505 @ N. Military Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.7 | 50th | | |
| Max Appr. | SB | 11.0 | 95th | SB | 10 |

## ⑥ SR 505 @ S. Military Road

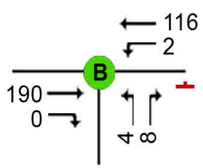
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.1 | 50th | | |
| Max Appr. | NB | 10.3 | 95th | NB | 9 |

## ⑦ SR 505 @ Knowles Road

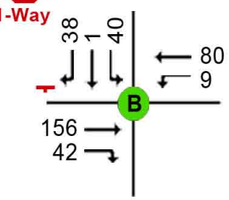
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.7 | 50th | | |
| Max Appr. | NB | 10.5 | 95th | NB | 3 |

## ⑧ SR 505 @ SB I-5 Ramps

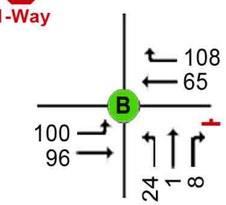
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.5 | 50th | | |
| Max Appr. | SB | 10.6 | 95th | SB | 10 |

## ⑨ SR 505 @ NB I-5 Ramps

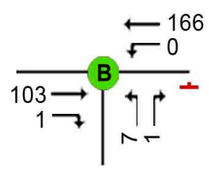
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 3.0 | 50th | | |
| Max Appr. | NB | 12.1 | 95th | EB | 6 |

## ⑩ SR 505 @ Camus Road

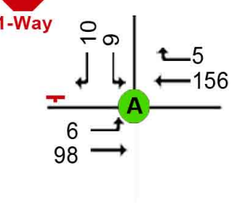
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.5 | 50th | | |
| Max Appr. | NB | 10.8 | 95th | NB | 2 |

## ⑪ SR 505 @ Henriot Road

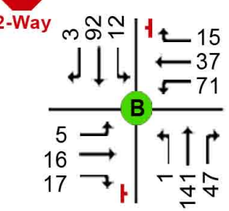
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 1.0 | 50th | | |
| Max Appr. | SB | 9.8 | 95th | SB | 3 |

## ⑫ SR 505 @ Jackson Highway

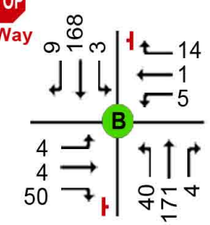
STOP 2-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 5.2 | 50th | | |
| Max Appr. | WB | 14.2 | 95th | WB | 30 |

## ⑬ SR 505 @ Ash Road

STOP 2-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 3.0 | 50th | | |
| Max Appr. | WB | 11.8 | 95th | EB | 10 |

Sources: Lewis County, Perteet, ESRI | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\FigureX_Perteet_Traffic.mxd

0 0.8 Miles

Lewis County

Perteet

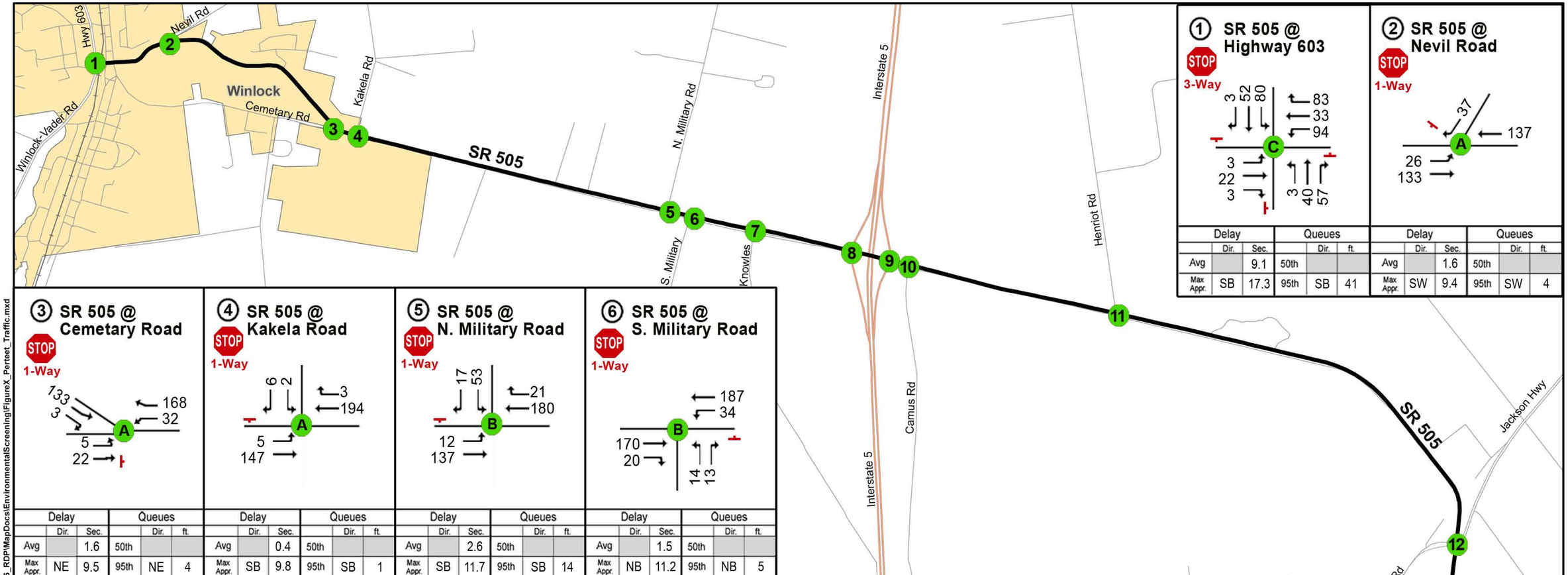
Legend
- Stream
- City Limit

Levels of Service (LOS)
- A Little/No Delay
- B Short Delays
- C Average Delays
- D Long Delays
- E Very Long Delays
- F Extreme Delays

SR 505 Interchange / Corridor Plan

2008 AM Peak Hour Traffic Volumes and Intersection Levels of Service (LOS)

Exhibit 6




## ① SR 505 @ Highway 603

STOP 3-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 9.1 | 50th | | |
| Max Appr. | SB | 17.3 | 95th | SB | 41 |

## ② SR 505 @ Nevil Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 1.6 | 50th | | |
| Max Appr. | SW | 9.4 | 95th | SW | 4 |

## ③ SR 505 @ Cemetery Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 1.6 | 50th | | |
| Max Appr. | NE | 9.5 | 95th | NE | 4 |

## ④ SR 505 @ Kakela Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.4 | 50th | | |
| Max Appr. | SB | 9.8 | 95th | SB | 1 |

## ⑤ SR 505 @ N. Military Road

STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 2.6 | 50th | | |
| Max Appr. | SB | 11.7 | 95th | SB | 14 |

## ⑥ SR 505 @ S. Military Road

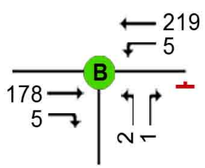
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 1.5 | 50th | | |
| Max Appr. | NB | 11.2 | 95th | NB | 5 |

## ⑦ SR 505 @ Knowles Road

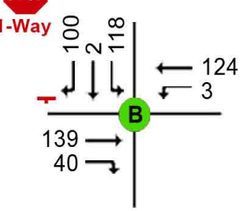
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.2 | 50th | | |
| Max Appr. | NB | 11.0 | 95th | NB | 1 |

## ⑧ SR 505 @ SB I-5 Ramps

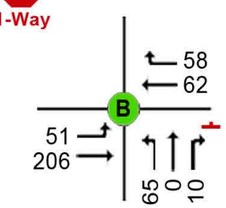
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 5.3 | 50th | | |
| Max Appr. | SB | 13.0 | 95th | SB | 41 |

## ⑨ SR 505 @ NB I-5 Ramps

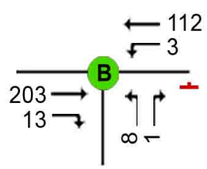
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 3.1 | 50th | | |
| Max Appr. | NB | 13.5 | 95th | NB | 15 |

## ⑩ SR 505 @ Camus Road

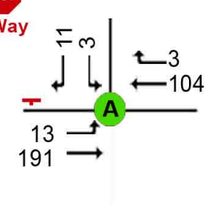
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.4 | 50th | | |
| Max Appr. | NB | 10.8 | 95th | NB | 1 |

## ⑪ SR 505 @ Henriot Road

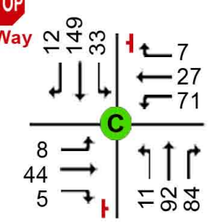
STOP 1-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 0.8 | 50th | | |
| Max Appr. | SB | 9.5 | 95th | SB | 2 |

## ⑫ SR 505 @ Jackson Highway

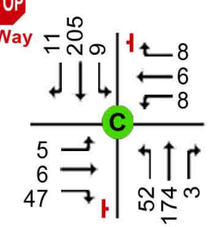
STOP 2-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 4.9 | 50th | | |
| Max Appr. | WB | 16.0 | 95th | WB | 26 |

## ⑬ SR 505 @ Ash Road

STOP 2-Way




| | Delay | | Queues | | |
|---|---|---|---|---|---|
| | Dir. | Sec. | | Dir. | ft. |
| Avg | | 3.3 | 50th | | |
| Max Appr. | WB | 15.4 | 95th | EB | 13 |

Sources: Lewis County, Perteet, ESRI | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\FigureX_Perteet_Traffic.mxd

0 0.8 Miles

Lewis County

Perteet

Legend
- Stream
- City Limit

Levels of Service (LOS)
- A Little/No Delay
- B Short Delays
- C Average Delays
- D Long Delays
- E Very Long Delays
- F Extreme Delays

SR 505 Interchange / Corridor Plan

2008 PM Peak Hour Traffic Volumes and Intersection Levels of Service (LOS)

Exhibit 7

## METHODOLOGY

The existing traffic operations were modeled to establish the baseline traffic conditions. Traffic operations were evaluated for intersections along SR 505 and for the segments between intersections.

The intersection Level of Service (LOS) calculations were conducted for existing conditions using the Synchro version 7.0 (Build 761). Intersection LOS is a measure of the traffic operations at the intersection. It is based on the average delay experienced by the vehicles accessing the intersection. Transportation analysts rate intersection delay as an LOS from A to F. LOS A is the best operating condition with minimal delays. LOS F is the worst with very long delays and heavy congestion. For intersections with 1-way or 2-way stop-control, the delay and LOS for the worst-operating approach is reported. **Exhibit 8** shows the Highway Capacity Manual criteria for each level of service and what the average user expects in delay time for each LOS grade.

Exhibit 8: Levels of Service Criteria

| Level of Service (LOS) | Expected Delay | Intersection Control Delay (Seconds per Vehicle) | |
|---|---|---|---|
| | | Unsignalized Intersections | Signalized Intersections |
| A | Little/No Delay | ≤10 | ≤10 |
| B | Short Delays | >10 and ≤15 | >10 and ≤20 |
| C | Average Delays | >15 and ≤25 | >20 and ≤35 |
| D | Long Delays | >25 and ≤35 | >35 and ≤55 |
| E | Very Long Delay | >35 and ≤50 | >55 and ≤80 |
| F | Extreme Waits | >50 | >80 |

Roadway volume to capacity (V/C) ratios was estimated for the sections of SR 505 between intersections. The methodology was based on the *Highway Capacity Manual 2000*. Since SR 505 is a two-lane rural highway, a capacity of 1200 vehicles per lane was assumed. The V/C ratios reveal the extent of utilization of existing capacity on SR 505, and will serve as the basis for future availability of capacity and the potential need for increased capacity on the highway.

The traffic operations for SR 505 study corridor were also modeled in VISSIM, a micro-simulation tool. The existing conditions VISSIM model was calibrated using traffic volumes and travel times collected in the field. The model will serve to evaluate proposed alternatives for the SR 505 Corridor Plan Study.

## INTERSECTION LEVEL SERVICE

**Exhibits 9 and 10** show the AM and PM peak hour levels of service for intersections along the SR 5050 Corridor as well as in the South Lewis County Subarea, respectively. The SR 505 Corridor intersection AM and PM peak hour levels of service are also shown graphically in **Exhibits 3 and 4**. The approaches at all the intersections operate at LOS B or better in AM and

at LOS C or better during the PM peak hours. The only noticeable queues are on Jackson Highway approaching US 12; where queues reach 160 and 190 feet long.

Exhibit 9: 2008 AM Peak Hour Intersection Levels of Service – SR 505 Corridor and South Lewis County Subarea

| Mile Post (MP) ID or INT ID | Intersection Location | Control | 2008 Existing | | Worst Approach Queue | |
|---|---|---|---|---|---|---|
| | | | LOS | Delay | Feet | Direction |
| 0.00 | SR 505 @ SR 603/Kerron Street | 3-way Stop* | B | 12.2 | 19' | NB SR 603 |
| 0.23 | SR 505 @ Nevil Road | 1-way Stop | A | 9.4 | 7' | SW Nevil |
| 1.01 | SR 505 @ Cemetery Road | 1-way Stop | A | 9.3 | 4' | NE Cemetary |
| 1.08 | SR 505 @ Kakela Road | 1-way Stop | A | 9.9 | 2' | SB Kakela |
| 2.22 | SR 505 @ North Military Road | 1-way Stop | B | 11.0 | 10' | SB North Military |
| 2.31 | SR 505 @ South Military Road | 1-way Stop | B | 10.3 | 9' | NB South Military |
| 2.52 | SR 505 @ Knowles Road | 1-way Stop | B | 10.5 | 3' | NB Knowles |
| 2.888 | SR 505 @ I-5 SB Ramps | 1-way Stop | B | 10.6 | 10' | SB SB I-5 Ramp |
| 3.03 | SR 505 @ I-5 NB Ramps | 1-way Stop | B | 12.1 | 5' | NB NB I-5 Ramp |
| 3.09 | SR 505 @ Camus Road | 1-way Stop | B | 10.8 | 2' | NB Camus |
| 3.85 | SR 505 @ Henriot Road | 1-way Stop | A | 9.8 | 3' | SB Henriot |
| 5.46 | SR 505 @ Jackson Hwy/Plomondon | 2-way Stop | B | 14.2 | 30' | WB Jackson Hwy |
| 6.32 | SR 505 @ Toledo-Vader Rd/Ash St | 2-way Stop | B | 11.8 | 10' | EB Ash Street |
| 20 | Avery Road @ Highway 603 | 2-way Stop | B | 10.5 | 4' | WB Avery |
| 21 | Avery Road @ North Military Road | 4-way Stop | A | 8.2 | 0 | - |
| 22 | US 12 @ I-5 SB Ramps | 1-way Stop | B | 12.8 | 32' | SB SB I-5 Ramp |
| 23 | US 12 @ I-5 NB Ramps | 1-way Stop | B | 14.7 | 17' | NB NB I-5 Ramp |
| 24 | US 12 @ Jackson Highway | Signal | B | 19.3 | 160' | WB US 12 |

| Mile Post (MP) ID or INT ID | Intersection Location | Control | 2008 Existing | | Worst Approach Queue | |
|---|---|---|---|---|---|---|
| | | | LOS | Delay | Feet | Direction |
| 25 | Jackson Highway @ Park Road | 2-way Stop | A | 9.2 | 2’ | WB Park |
| 26 | Jackson Highway @ Frost Road | 1-way Stop | A | 8.8 | 1’ | EB Frost |
| 27 | Jackson Highway @ Tucker Road | 1-way Stop | A | 9.4 | 7’ | WB Tucker |
| 28 | Jackson Highway @ Spencer Road | 2-way Stop | A | 9.7 | 3’ | WB Spencer |
| 29 | Frost Road @ Henriot Road | 1-way Stop | A | 8.7 | 1’ | NB Henriot |
| 30 | Highway 603 @ Antrim Road | 1-way Stop | A | 9.6 | 2’ | WB Antrim |
| 33 | Nevil Road @ North Military Road | 1-way Stop | A | 8.7 | 2’ | EB Nevil |
| 101 | SR 506 @ I-5 SB Ramps | 1-way Stop | B | 11.4 | 3’ | SB SB I-5 Ramp |
| 102 | SR 506 @ I-5 NB Ramps | 1-way Stop | A | 8.8 | 4’ | NB NB I-5 Ramp |
| 106 | Ash Road @ Plomondon Rd | 2-way Stop | A | 9.9 | 11’ | SB Plomondon |
| | | | | | | |

** Coded in Synchro as a 2-way stop to obtain output.*

Exhibit 10: 2008 PM Peak Hour Intersection Levels of Service- SR 505 Corridor and South Lewis County Subarea

| Mile Post (MP) ID or INT ID | Intersection Location | Control | 2008 Existing | | Worst Approach Queue | |
|---|---|---|---|---|---|---|
| | | | LOS | Delay | Feet | Direction |
| 0.00 | SR 505 @ SR 603/Kerron Street | 3-way Stop* | C | 17.3 | 41’ | SB SR 603 |
| 0.23 | SR 505 @ Nevil Road | 1-way Stop | A | 9.4 | 4’ | SW Nevil |
| 1.01 | SR 505 @ Cemetery Road | 1-way Stop | A | 9.5 | 4’ | NE Cemetary |
| 1.08 | SR 505 @ Kakela Road | 1-way Stop | A | 9.8 | 1’ | SB Kakela |
| 2.22 | SR 505 @ North Military Road | 1-way Stop | B | 11.7 | 14’ | SB N. Military |
| 2.31 | SR 505 @ South Military Road | 1-way Stop | B | 11.2 | 5’ | NB S. Military |
| 2.52 | SR 505 @ Knowles Road | 1-way Stop | B | 11.0 | 1’ | NB Knowles |
| 2.88 | SR 505 @ I-5 SB Ramps | 1-way Stop | B | 13.0 | 41’ | SB SB I-5 Ramp |
| 3.03 | SR 505 @ I-5 NB Ramps | 1-way Stop | B | 13.5 | 15’ | NB NB I-5 Ramp |
| 3.09 | SR 505 @ Camus Road | 1-way Stop | B | 10.8 | 1’ | NB Camus |
| 3.85 | SR 505 @ Henriot Road | 1-way Stop | A | 9.5 | 2’ | SB Henriot |
| 5.46 | SR 505 @ Jackson Hwy/Plomondon | 2-way Stop | C | 16.0 | 26’ | WB Jackson Hwy |
| 6.32 | SR 505 @ Toledo-Vader Rd/Ash St | 2-way Stop | C | 15.4 | 13’ | EB Ash Street |
| 20 | Avery Road @ Highway 603 | 2-way Stop | B | 10.8 | 11’ | WB Avery |
| 21 | Avery Road @ North Military Road | 4-way Stop | A | 8.9 | 0 | - |
| 22 | US 12 @ I-5 SB Ramps | 1-way Stop | C | 18.4 | 118’ | SB SB I-5 Ramp |
| 23 | US 12 @ I-5 NB Ramps | 1-way Stop | B | 13.4 | 16’ | NB NB I-5 Ramp |
| 24 | US 12 @ Jackson Highway | Signal | B | 18.0 | 190’ | EB US 12 |
| 25 | Jackson Highway @ Park Road | 2-way Stop | A | 9.4 | 1’ | EB Park |
| 26 | Jackson Highway @ Frost Road | 1-way Stop | A | 9.0 | 1’ | EB Frost |

| Mile Post (MP) ID or INT ID | Intersection Location | Control | 2008 Existing | | Worst Approach Queue | |
|---|---|---|---|---|---|---|
| | | | LOS | Delay | Feet | Direction |
| 27 | Jackson Highway @ Tucker Road | 1-way Stop | A | 9.6 | 5’ | WB Tucker |
| 28 | Jackson Highway @ Spencer Road | 2-way Stop | B | 10.9 | 7’ | WB Spencer |
| 29 | Frost Road @ Henriot Road | 1-way Stop | A | 8.6 | 2’ | NB Henriot |
| 30 | Highway 603 @ Antrim Road | 1-way Stop | A | 9.6 | 2’ | WB Antrim |
| 33 | Nevil Road @ North Military Road | 1-way Stop | A | 9.1 | 3’ | EB Nevil |
| 101 | SR 506 @ I-5 SB Ramps | 1-way Stop | A | 9.5 | 3’ | SB SB I-5 Ramp |
| 102 | SR 506 @ I-5 NB Ramps | 1-way Stop | A | 8.8 | 5’ | NB NB I-5 Ramp |
| 106 | Ash Road @ Plomondon Rd | 2-way Stop | A | 9.9 | 9’ | SB Plomondon |

** Coded in Synchro as a 2-way stop to obtain output.*

## SR 505 CORRIDOR ROADWAY CAPACITIES

To evaluate roadway performance, a corridor is divided into a series of segments between major intersections or interchanges and volume to capacity ratios (V/C) determined. The SR 505 corridor was segmented to establish the baseline condition and to identify areas of concern that are to be considered with future alternatives analysis. A V/C ratio of greater than 0.90 usually indicates traffic congestion. For example, the roadway section between South Military Road and Knowles Road is a segment along the SR 505 corridor. **Exhibits 11 and 12** show the volume to capacity ratios for SR 505 segments for the AM and PM peak hours, respectively. A roadway capacity of 1200 vehicles per hour per lane (vphpl) was assumed along SR 505 from MP 0.23 to 5.46, while a capacity of 800 vehicles per hour per lane (vphpl) was assumed from MP 0.00 to 0.23 and 5.46 to 6.32.

Exhibit 11: 2008 AM Peak Hour Link Volume to Capacity Ratios

| Mile Post (MP) | SR 505 Segment | Eastbound | | Westbound | |
|---|---|---|---|---|---|
| | | Volume | V/C | Volume | V/C |
| 0.0 - 0.23 | SR 603 to Nevil | 194 | 0.24 | 139 | 0.17 |
| 0.23 – 1.01 | Nevil to Cemetery Rd | 134 | 0.11 | 98 | 0.08 |
| 1.01 – 1.08 | Cemetery Rd to Kakela Rd | 156 | 0.13 | 118 | 0.10 |
| 1.08 – 2.22 | Kakela Rd to North Military Rd | 154 | 0.13 | 113 | 0.09 |
| 2.22 – 2.31 | North Military to South Military | 155 | 0.13 | 140 | 0.12 |
| 2.31 – 2.52 | South Military Rd to Knowles | 190 | 0.16 | 120 | 0.10 |
| 2.52 – 2.88 | Knowles to SB I-5 Ramps | 198 | 0.17 | 118 | 0.10 |
| 2.88 – 3.03 | SB I-5 Ramps to NB I-5 Ramps | 196 | 0.16 | 89 | 0.07 |
| 3.03 – 3.09 | NB I-5 Ramps to Camus Rd | 104 | 0.09 | 173 | 0.14 |
| 3.09 -3.85 | Camus Rd to Henriot Rd | 104 | 0.09 | 166 | 0.14 |
| 3.85 – 5.46 | Henriot Rd to Jackson Hwy | 107 | 0.09 | 161 | 0.13 |
| 5.46 – 6.32 | Jackson Hwy to Ash Rd | 180 | 0.23 | 189 | 0.24 |

Exhibit 12: 2008 PM Peak Hour Link Volume to Capacity Ratios

| Mile Post (MP) | SR 505 Segment | Eastbound | | Westbound | |
|---|---|---|---|---|---|
| | | Volume | V/C | Volume | V/C |
| 0.0 - 0.23 | SR 603 to Nevil | 159 | 0.20 | 210 | 0.26 |
| 0.23 – 1.01 | Nevil to Cemetery Rd | 133 | 0.11 | 173 | 0.14 |
| 1.01 – 1.08 | Cemetery Rd to Kakela Rd | 152 | 0.13 | 200 | 0.17 |
| 1.08 – 2.22 | Kakela Rd to North Military Rd | 149 | 0.12 | 197 | 0.16 |
| 2.22 – 2.31 | North Military to South Military | 190 | 0.16 | 201 | 0.17 |
| 2.31 – 2.52 | South Military Rd to Knowles | 183 | 0.15 | 221 | 0.18 |
| 2.52 – 2.88 | Knowles to SB I-5 Ramps | 179 | 0.15 | 224 | 0.19 |
| 2.88 – 3.03 | SB I-5 Ramps to NB I-5 Ramps | 257 | 0.21 | 127 | 0.11 |
| 3.03 – 3.09 | NB I-5 Ramps to Camus Rd | 216 | 0.18 | 120 | 0.10 |
| 3.09 -3.85 | Camus Rd to Henriot Rd | 204 | 0.17 | 115 | 0.10 |
| 3.85 – 5.46 | Henriot Rd to Jackson Hwy | 194 | 0.16 | 107 | 0.09 |
| 5.46 – 6.32 | Jackson Hwy to Ash Rd | 225 | 0.28 | 187 | 0.23 |

These V/C results indicate that there are currently no areas of concern along the SR 505 Study corridor during the existing AM or PM peak hours.

## FREIGHT AND GOODS TRANSPORTATION SYSTEM

The Washington State Freight and Goods Transportation System (FGTS) is used to classify state highways, county roads and city streets according to the average gross truck tonnage they carry. The FGTS classifies roadways using five freight tonnage classifications, T-1 through T-5, as follows:

T-1 more than 10 million tons per year
T-2 4 to 10 million tons per year
T-3 300,000 to 4 million tons per year
T-4 100,000 to 300,000 tons per year
T-5 at least 20,000 tons in 60 days

Washington Strategic Freight Corridors carry 4 million or more gross tons of freight annually (T-1 and T-2). Tonnage values are derived from truck count data that is converted into average weight by truck type. According to the Washington State Freight Truck Origin and Destination Study: Lewis County (see #2 in the Reference), the daily tonnage on SR 505 is 1,650 . This translates to SR 505 being a T-3 corridor.

## ACCESS CLASSIFICATION

In 1991, the Washington state legislature enacted statutes establishing rules in Chapter 47.50 of the Revised Code of Washington (RCW) to protect the safety and capacity of the state highway system through access management. Access Management strategies are varied and applied based roadway function and adjacent land-use. Roadway access points are minimized to reduce turning movement conflicts and yielding through traffic delays that maximizes system performance... The Washington Administrative Code (WAC) 468-52 established five classification categories for non-limited access highways like SR 505. **Exhibit 13** shows SR 505 designated as Class 3, which focuses on balancing mobility and access in areas with less than maximum build out.

Exhibit 13: SR 505's Access Classification

| **Classification & Definition** | **Speed** | **Minimum Access Spacing** | **Minimum Intersection Spacing** | **Multilane Median** | **Notes & Access Limitations** |
|---|---|---|---|---|---|
| **Class 3**<br>Balance between mobility and access in areas with less than maximum build-out | 30-40 MPH (urban);<br>45-55 MPH (rural) | 330 feet | 0.5 mile | Median not required | Shorter trips. TWLTL allowed if warranted.<br>1 access connection only to continuous parcels under the same ownership. Joint access connection for subdivisions is preferred, but private access allowed with acceptable justification. |

References


1. Highway Capacity Manual, 2000.
2. Washington State Freight Truck Origin and Destination Study: Lewis County http://ewits.wsu.edu/reports/research/err21lewis.pdf

# APPENDIX C

# ENVIRONMENTAL SCREENING REPORT

**TO:** Michael Booth, Principal
Mike Horton, Project Manager
Mark Cook, Deputy Project Manager

**FROM:** C.K. Eidem, Ecologist
Jill Crotwell, Senior GIS Analyst

**DATE:** July 31, 2008

**RE:** SR 505 Corridor Existing Environmental Screening

## 1 Purpose

This memorandum documents the existing conditions of environmental resources along the alignment of SR 505 in Lewis County, Washington. Existing environmental resources were screened using Geographic Information System (GIS) as a preliminary planning step for the SR 505 IC/Corridor Plan proposed by Lewis County.

### Project Description

The SR 505 Interchange/Corridor Plan is being developed in cooperation with multiple jurisdictions in anticipation of pending land use intensification between the cities of Winlock and Toledo, Washington. The plan will form the basis for:

- Identifying necessary future transportation improvements;
- Supporting approaches project participants on funding mechanisms;
- Developing a range of potential mitigation measures or programs on a broad scale; and
- Planning future land use actions as they relate to traffic growth.

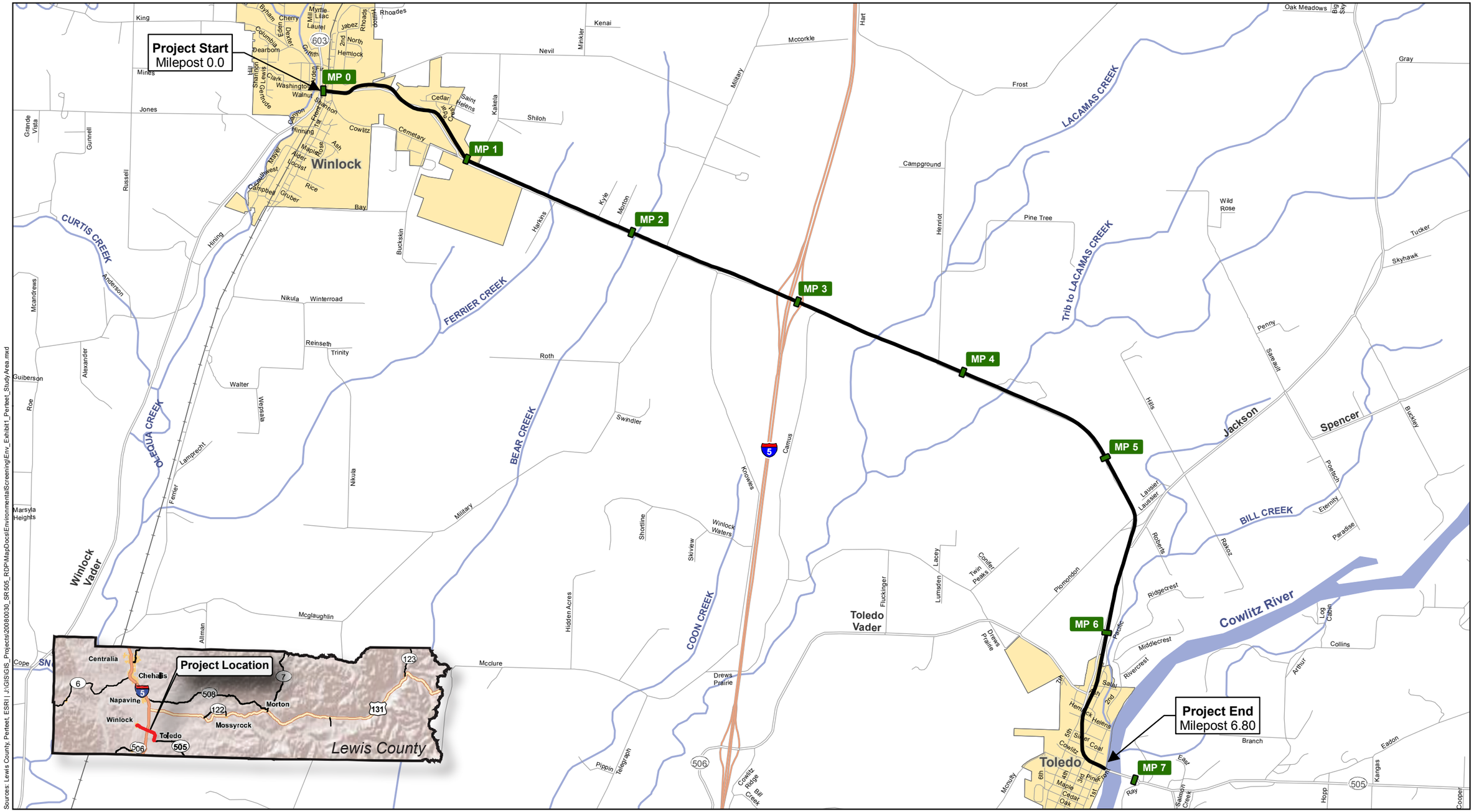
The plan will provide the initial analysis necessary to support potential future improvements to Interstate 5 at interchange Exit 63 located in south Lewis County, Washington. The plan will also provide the foundation for possible expansion of effort to other key local arterials serving south Lewis County.

Documenting existing environmental conditions is achieved through a GIS screening process. In GIS, available data is overlaid onto the study area, (e.g. potential project footprint and adjacent areas) to inventory environmental resources, environmental hazards, and the human environment. This screening will provide detail for analysis of

environmental considerations during project planning and help develop strategies for future regulatory approval.

## Study Area

The study area centered on SR 505 is 6.8 miles long, extending from the city of Winlock (MP 0.0) to the city of Toledo (MP 6.8) in Lewis County, Washington (**Exhibit 1**).




0 1
Miles

Lewis County

Perteet

Legend

- Project Extent
- Milepost
- Stream
- City Limit

SR 505 Interchange / Corridor Plan
Environmental Screening

**Study Area**
**Appendix A**

## Technical Findings Summary

### Study Area

| | | |
|---|---|---|
| Length of study area | 6.8 | miles |
| Study Area (50 feet from edge of pavement) | 84.8 | acres |

### Water Quality

| | | |
|---|---|---|
| Existing impervious surfaces | 28.3 | acres |

### Wetlands

| | | |
|---|---|---|
| NWI wetlands in the study area | 1.6 | acres |
| Wetland buffers in the study area | 8.9 | acres |
| Hydric soils in the study area | 25.6 | acres |

### Streams

| | | |
|---|---|---|
| Streams crossings in the study area | 16 | |
| Stream buffer in the study area | 17.6 | acres |
| WDFW barrier culverts in the study area | 2 | |
| WDFW partial barrier culverts in the study area | 1 | |

### Fish & Aquatic Resources in the study area

| | | |
|---|---|---|
| ESA,Threatened | Chinook Salmon | O. tshawytscha |
| | Coho Salmon | O. kisutch |
| | Chum Salmon | O. keta |
| ESA,Threatened | Steelhead | O. mykiss |
| | Cutthroat | O. clarki |

### Wildlife in the study area

Mount Saint Helens and Mount Rainer Elk Herds
Spotted Owl terrestrial buffer
Pacific salmon and trout habitats

### Natural Hazards in the study area

| | |
|---|---|
| Flood plains | 4.5 acres |
| Steep slopes | 0.6 acres |

### Environmental Justice

- Minority populations are similar to County
- Very few non-English speakers
- Poverty rates are higher than County

### Parks and Recreation Resources

None Identified Presently

### Cultural and Historic Resources

None Identified Presently

### Air Quality

The study area is not in an Ozone or Carbon Monoxide Maintenance Area.

### Noise

There are noise sensitive receptors in the study area. The residential and some commercial areas are considered sensitive noise receptors when analyzing potential noise effects or impacts.

## 2 Screening Methods

For this existing conditions report the environmental resources are divided into three categories:

- Natural resources, which include critical areas that are typically regulated by local, state, and federal law;
- Natural hazards, which are areas, resources, and/or critical areas/natural systems and processes that pose a potential hazard to people and property; and
- The human environment, which considers how the project may affect people and their quality of life.

The specific environmental elements evaluated for each category are shown in **Exhibit 2**. The elements evaluated are the typical resources or considerations that would be regulated under Lewis County Code (LCC 17.35 'Critical Areas'), and reviewed for compliance with the State Environmental Policy Act (SEPA) and, when a federal nexus is present, the National Environmental Policy Act (NEPA).

**Exhibit 2**
**Environmental Screening**

| Category | Element |
|---|---|
| Natural Resources | Water Quality |
| | Wetlands |
| | Streams |
| | Fish & Aquatic Resources |
| | Wildlife |
| Natural Hazards | Flood Hazards |
| | Geologic Hazard Areas |
| | Hazardous Materials |
| Human Environment | Environmental Justice |
| | Parks and Recreation Resources |
| | Cultural and Historic Resources |
| | Air Quality |
| | Noise |

Each environmental element is discussed separately in its own section, which includes a brief explanation about why the element is relevant, and the specific methods used to analyze the potential project affects on the resource or potential hazard the element presents to the project. In addition, the subsequent sections provide the source of the data and any potential data limitations.

## Project Footprint and Analysis Area

The project footprint is defined as the physical area of the project, which normally includes the new road surface, curb, gutter, and development of the following associated features:

- fill
- slopes
- retaining walls
- noise walls
- signs
- other utilities or transportation related facilities

A design for stormwater facilities has not been completed at this time, and the environmental effects of the required stormwater systems are potentially outside the currently defined areas of analysis.

Two different sizes of analysis areas have been developed for this environmental screening: the "standard" analysis area, and the "alternate" analysis area.

The **standard analysis** area reflects only the area directly affected by the proposed project – essentially, the area of the environment that may be physically disturbed, which was assumed to include all areas fifty (50) feet from the road edge of the project corridor (**Exhibit 3**).

For some environmental elements, a different analysis area was chosen. These alternative analysis areas are described below.

The **alternate analysis** area reflects areas not directly affected by the proposed project, but that may be indirectly affected by the project. Indirect effects may include increases in noise, air, and water pollution. The alternate analysis area is variable in size, based on the regulations and guidelines related to the environmental element being evaluated. These modifications are described for each element that uses an extended analysis area.

## GIS Analysis Methodology

The GIS analysis used ModelBuilder software, published by ESRI, which is an established method for designing, conducting, and recording complex GIS analyses. The ModelBuilder analysis improves a standard GIS analysis in five important ways:

- It is a published, well-known, recognized, peer-reviewed process;
- It generates a detailed, standardized record (metadata) of the GIS processing;
- It is easily replicated;
- It is easy to modify; and
- It creates a framework that facilitates standard analysis across resource types.

In order to create the base map for the ModelBuilder process, Perteet used the current roadway edge of pavement provide by Lewis County. The existing GIS data was

gathered from numerous sources including local, state, and federal databases. No site-specific field data was obtained for this analysis. Due to the high-level screening and nature of the data used, numerous assumptions were made in order to conduct this environmental screening. Those assumptions are documented in the methodology sections in each individual environmental element subsection.

# 3 Natural Resources

This environmental screening looks at natural resources typically regulated by local, state, and federal law. Each natural resource element section has a brief introduction to the resource, methods specific to screening for that resource, and results of the screening for the resource.

## Water Bodies listed for existing or potential pollution

Water quality is the physical, chemical and biological characteristics of water in relationship to a set of standards. For this report, water quality is considered "natural resources" because it is integral to the health of wetlands, streams, and many other environmental processes. In the State of Washington, the Department of Ecology (DOE) is primarily responsible for regulating water quality, and they publish Washington State's Water Quality Assessment list as requirement of section 303 of the Clean Water Act (CWA).

**Data Sources:**

- 303(d) list published by the Washington Department of Ecology (DOE, 2004)
- GIS shape file depicting the edge of pavement (Perteet, 2008b)

Washington State's Water Quality Assessment lists the status of water quality for a particular location using a Total Maximum Daily Loading (TMDL) as a criteria, which defines how much pollutant have to be reduced or eliminated to be considered clean. There are five categories, with Category 5 being the threshold screened in the broad-brush environmental screening. The general categories are as follows:

- Category 1 – Meet standards for not being polluted;
- Category 2 – Waters of Concern;
- Category 4[1] (4a, 4b, and 4c) - Allowable TMDL's, a pollution plan is in place, and other factors such as low flow are in play;
- Category 5 – Water Quality Standards have been violated and there are not approved TMDLs or pollution plan in place.

Alternative Analysis was used for this analysis. Specifically, Perteet used the existing edge of pavement provided by Lewis County to calculate and establish the existing condition of impervious surface area. This will be used for existing impervious and

[1] 303(d) Listings – There is no Category 3

pollution generating surfaces and as an alternate form for estimating existing water quality.

**Methodology:** The existing condition of water quality as reported by DOE was screened with the online Water Quality Assessment for Washington interactive tool, using an alternate analysis area of one mile upstream of the project and four miles downstream of the project. No listed 303(d) waters are located within the alternate analysis area of the project; therefore no further GIS analysis was conducted.

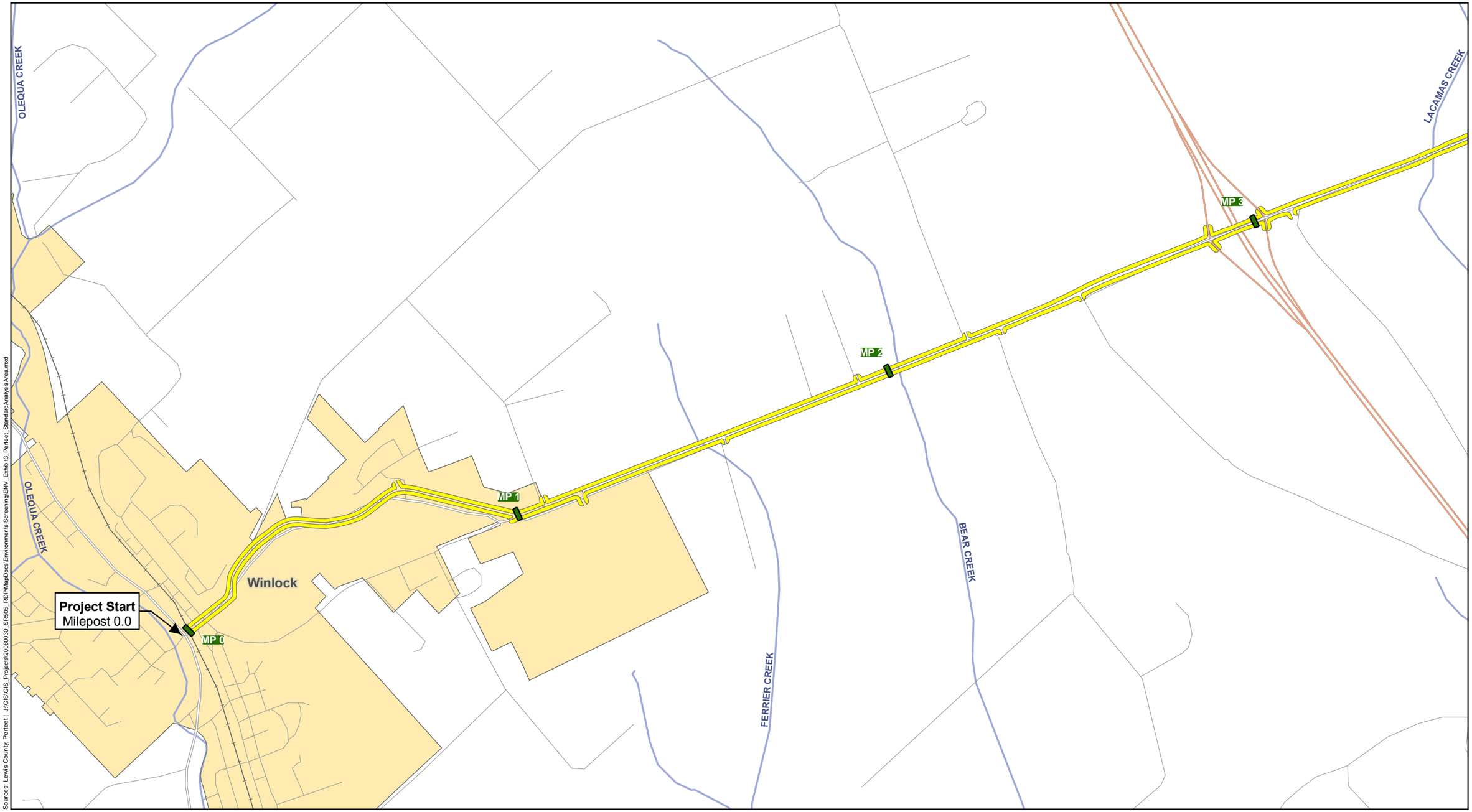
The area of impervious surface can be used in the future as a measure of relative water quality (generally the greater the impervious area, the lower the water quality). By comparing the existing impervious surfaces to future impervious surfaces project managers can analyze proposed project impacts to water quality and quantity, to nearby water resources (i.e., peak flows), and to create stormwater strategies.

In construction projects, these elements are normally protected or maintained using constructed stormwater management structures and through best management practices, such as silt fences. Any proposed project that may affect water quality and/or quantity must adhere to federal, state, and local regulations by providing sufficient stormwater detention, stormwater filtration, and adhering to current best management practices.

The condition of existing impervious and pollution generating surfaces (an alternate form for measuring existing water quality) was calculated using the GIS Model-Builder process. Perteet used the edge of pavement shape files provided by Lewis County to calculate the existing area of impervious surface. This alternate analysis area includes only the existing road surface.

**303(d) Water Bodies and Impervious Surface Findings:** No DOE listed 303 (d) waters are located within 4 miles downstream of the project or 1 mile upstream of the project.

There are 1,230,540 square feet, or 28.3 acres, of existing impervious surface area in the study area.




Sources: Lewis County, Perteet | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\ENV_Exhibit3_Perteet_StandardAnalysisArea.mxd

0 0.5
Miles

Lewis County

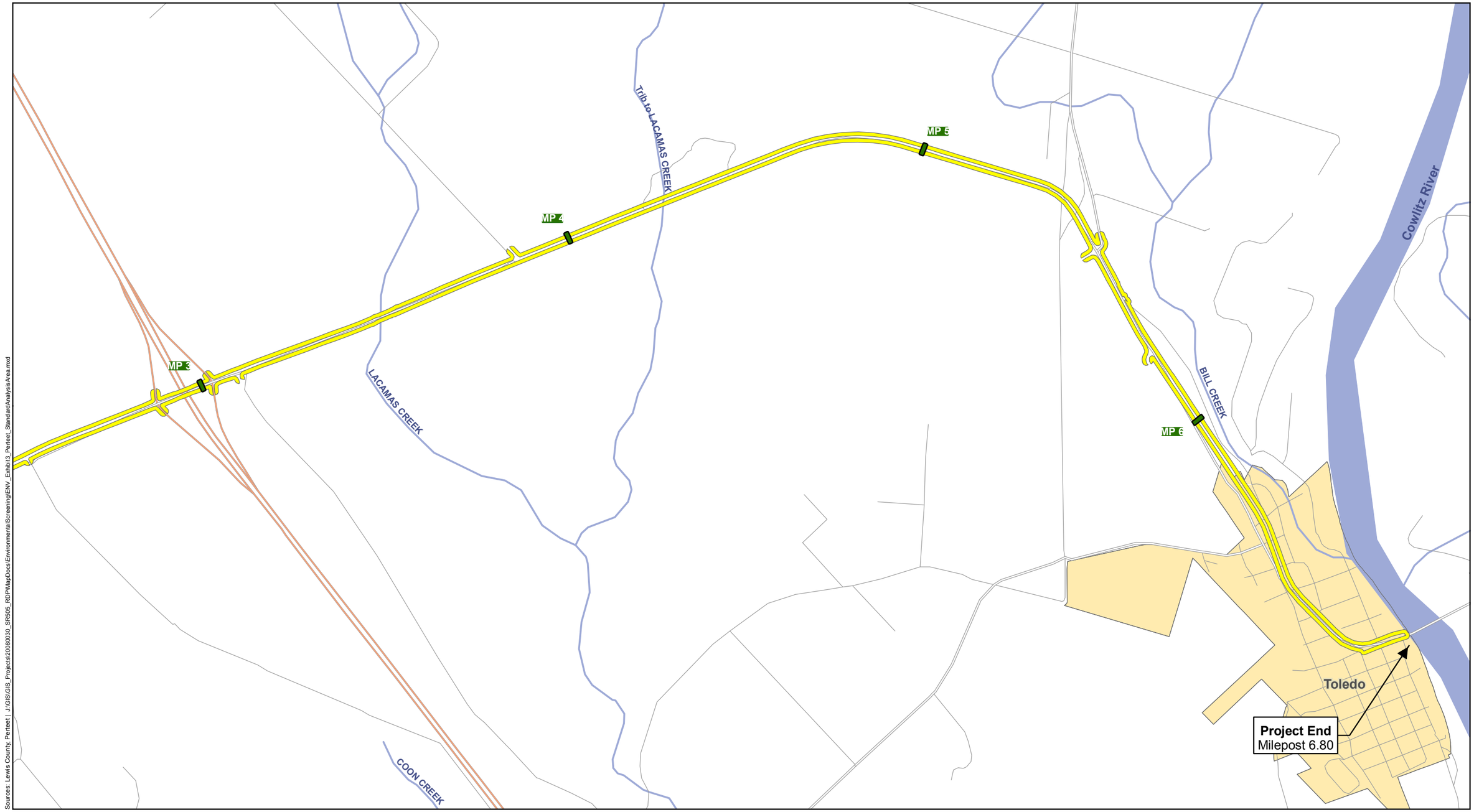
Perteet

Legend

- Standard Analysis Study Area
- Stream
- City Limit

SR 505 Interchange / Corridor Plan
Environmental Screening

**Standard Analysis Area**
**Exhibit 3 - Sheet 1**




Sources: Lewis County, Perteet | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\ENV_Exhibit3_Perteet_StandardAnalysisArea.mxd

0 0.5
Miles

Lewis County

Perteet

Legend

- Standard Analysis Study Area
- Stream
- City Limit

SR 505 Interchange / Corridor Plan
Environmental Screening

**Standard Analysis Area**
**Exhibit 3 - Sheet 2**

## Wetlands

Generally, wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface (Cowardin, December 1979). For regulatory purposes under the Clean Water Act, the term wetlands means "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." In Lewis County Wetlands are regulated by Lewis County Code (LCC 17.35 'Critical Areas').

Any proposed project that may affect wetlands or their buffers must adhere to federal, state, and local regulations regarding wetland impacts, including water quality, hydrology and habitat effects.

**Data Sources:**

- Wetland, GIS shapefile (Lewis County, 2008a)
- Hydric Soils, GIS shapefile (Lewis County, 2008b)

The GIS shapefile for wetlands consisted of wetland data from Lewis County that is based on the National Wetland Inventory (NWI [ US Fish and Wildlife Service, 2008]), and in some cases local observation. This data set represents the extent, approximate location and type of wetlands and deepwater habitats in the conterminous United States. These data delineate the aerial extent of wetlands and surface waters (Cowardin et al., 1979).

NWI wetland maps provide important information about the general locations of wetlands, but they have some major limitations and should not be relied upon for final wetland determination. They should be viewed as an approximate starting point for wetland identification. The inventory's main limitation is due to its large size. The inventory covers the whole of the U.S. and was based originally on large scale (1:80,000 scale) black and white air photos, which have been updated in places with color-infrared photography (1:60,000 scale). NWI maps typically understate the amount of wetlands in an area. To supplement this data, Perteet used the NWI hydric soils to identify areas where wetlands are likely to be located.

The GIS shapefile for hydric soils consisted of data from Lewis County, which is based on the Soil Survey report of Lewis County Area, Washington, issued May, 1987. (NRCS [National Resource Conservation Service, 2008]), Updated tables were generated from the NRCS National Soil Information System (NASIS). The soil map data has been

digitized and may include some updated information. This data is used as a predictor of wetlands but should not be mistaken as an inventory of wetlands.

**Methodology**: Standard Analysis Area - project footprint, plus fifty (50) feet from the road edge of the project corridor on both sides (north/south).

- Wetlands over two acres are given a Class A wetland 'high intensity' with a buffer of 100 feet;
- Wetlands less than two acres are given a Class B 'high intensity' buffer of 50 feet (Applicable code - Lewis County Code (LLC) 17.35.590(2), and.610)

**Wetlands, Buffers, and Hydric Soils Findings:**

- A total of 69,670 square feet or 1.6 acres of wetlands are located in the study area.
    - 48,040 square feet or 1.10 acres of wetlands are Type A wetlands
    - 21,630 square feet or .50 acres of wetlands are Type B wetlands
- A total of 387,250 square feet or 8.9 acres of wetland buffer are located in the study area.
- A total of 1,115,760 square feet or 25.6 acres of hydric soils are located in the study area.

The location of the wetlands and hydric soils are shown in relation to the standard analysis area are depicted in Appendix A, Exhibits A-1 and A-2.

When a complete environment review is conducted for a selected project, detailed wetland delineations and a buffer analysis will need to be completed. If, at that time wetland impacts are identified, the project will have to go through the avoidance and mitigation sequencing process as required by the U.S. Army Corps of Engineers, Department of Ecology and local regulations.

## Streams

Streams are important as conduits in the water cycle, instruments in groundwater recharge, and they serve as corridors for fish and wildlife migration. In Lewis County, streams are regulated by federal and state rules and regulations and the Lewis County Code (LCC 17.35).

Any proposed project that may potentially affect streams or their buffers must adhere to federal, state, and local regulations. Normally those regulations require protecting stream buffers, using mitigation sequencing when in-water work is required, and providing for fish passage when stream crossings of fish-bearing waters are necessary.

**Data Sources:**

- Hydrology, GIS shapefile (Lewis County, 2008c)
- SR 505 centerline shapefile (Lewis County, 2008d)

The GIS shapefile for streams is from Lewis County. It is based on the 2005 Washington Department of Natural Resources data (Washington State Watercourse Hydrography, WDNR, 2006). The SR 505 Centerline GIS shapefile was obtained from Lewis County and depicts the centerline of SR 505.

**Methodology:** Standard Analysis Area - project footprint, plus fifty (50) feet from the road edge of the project corridor on both sides (north/south).

Alternative Analysis - The stream buffer in the study area was calculated using Lewis County stream data locations (assigning a 100 foot buffer) and with the standard analysis area approach (the edge of the pavement, plus 50 feet). No stream category information was readily available so the analysis assumes all streams are Type 3 streams, as defined by Lewis County. The buffer is therefore based on a natural Type 3 rural stream with high intensity use (LCC 17.35.680).

Perteet calculated the location and number of stream crossings in the study area using the Lewis County Stream Data and the centerline of SR 505 and tallying the number of intersections.

**Stream Findings:** There are a total of 5,295 linear feet of streams in the study area, a total of 765,120 sq. ft. or 17.6 acres of stream buffers, and a total of 16 stream crossings in the project corridor.

The location of the streams and buffer in relation to the mile posts are depicted on the Stream Inventory Maps in Appendix A, Exhibit A-3. A list of stream crossings is shown in **Exhibit 4**.

**Exhibit 4**
**Stream Crossings in Study Area**

| Stream Crossing | Stream Name | Fish Status |
|---|---|---|
| 1 | Tributary to Olequa Creek | Fish |
| 2 | Tributary to Lacamas Creek | Fish |
| 3 | Tributary to Lacamas Creek | Fish |
| 4 | Tributary to Lacamas Creek | Non-Fish |
| 5 | Tributary to Lacamas Creek | Fish |
| 6 | Tributary to Lacamas Creek | Unknown |
| 7 | Tributary to Olequa Creek | Non-Fish |
| 8 | Tributary to Bear Creek | Fish |
| 9 | Bear Creek | Fish |
| 10 | Lacamas Creek | Shoreline |
| 11 | Tributary to Ferrier Creek | Fish |
| 12 | Tributary to Olequa Creek | Fish |
| 13 | Tributary to Olequa Creek | Fish |
| 14 | Tributary to Olequa Creek | Fish |
| 15 | Tributary to Ferrier Creek | Fish |
| 16 | Tributary to Olequa Creek | Unknown |

## Fish and Aquatic Resources

Fish species protected under the Endangered Species Act (ESA) and determined to inhabit aquatic resources within the area of analysis must be considered during the design of the stormwater system and in the permitting and environmental review process. Fish species that were screened for presence in the study area included endangered, threatened, and candidate species and state priority species found in Western Washington. **Exhibit 5** lists the fish species potentially located within the study area, if they are found in the study area, and the regulatory status of each of these species.

**Exhibit 5**
**List of Western Washington Fish Species and their Regulatory Status**

| Common Name | Found in Study Area | ESA Status | | Habitat Status | Source |
|---|---|---|---|---|---|
| | | Federal | State | | |
| Chinook salmon (fall, spring) *Oncorhynchus tshawytscha* | ✓ | Federal threatened | State priority species or candidate species (food) | Federal - designated; State -any occurrence | WDFW, NOAA |
| Coho salmon, *O. kisutch* | ✓ | Federal species of concern | Food fish | Federal - NA; State -any occurrence | WDFW, NOAA |
| Pink salmon, *O. gorbuscha* | | Not warranted | Food fish | Federal - NA; State -any occurrence | WDFW, NOAA |
| Chum salmon (fall), *O. keta* | ✓ | Not warranted | Food fish | Federal - NA; State -any occurrence | WDFW, NOAA |
| Steelhead/ Rainbow trout (summer, winter), *O mykiss* | ✓ | Federal Threatened | Food fish | Federal – TBD; State - any occurrence | WDFW, NOAA |
| Cutthroat trout, *O. clarki* | ✓ | Not warranted | Game Fish | | WDFW, NOAA |
| Sockeye Salmon, *O. nerka* | | Not warranted | Food fish | Federal - NA; State -any occurrence | WDFW, NOAA |
| Dolly Varden/ Bull Trout, *Salvelinus confluentus* | | Federal threatened | Game Fish | Federal - NA; State - NA | USFW |

**Data Sources:**

- Fish Distribution, GIS Shape file, (WDFW, 2002)
- Washington State Fish Passage Barrier Inventory - Culverts, GIS shapefile (WDFW, 2008a).

The Fish Distribution data was obtained from Washington Department of Fish and Wildlife (WDFW) StreamNet Project; Washington Conservation Commission's Limiting Factors Analysis (LFA) Project; and WDFW Bull Trout 2000 Update: Arc/Info coverages. The Fish Distribution layer contains fish presence and use type information for salmon, steelhead, and Bull Trout/Dolly Varden in Washington streams. Information is color-coded by presence category. Where use type information (known spawning or known juvenile rearing) exists, it is displayed instead, with spawning shown in preference to rearing where they overlap.

The Washington State Fish Passage Barrier Culvert Inventory data set contains information on the location, physical characteristics, and fish passage barrier status of culverts. It is a subset of data contained in the Washington Department of Fish and Wildlife's (WDFW) Fish Passage and Diversion Screening Inventory (FPDSI) pertaining specifically to culverts. It includes data compiled from several WDFW and non-WDFW culvert inventory efforts. The data is statewide in scope but does not represent a comprehensive or complete inventory of fish passage barriers. The data set is updated continually as inventory efforts are ongoing.

**Methodology:** Standard Analysis Area - project footprint, plus fifty (50) feet from the road edge of the project corridor on both sides (north/south).

Perteet documented the inventoried culverts in the study area using WDFW's Washington State Fish Passage Barrier Culvert Inventory when the culvert was recorded as passing under SR 505.

**Fish Species Findings:** Five of the nine potential fish species (**Exhibit 5**) were found to be within the study area. The locations of the streams are depicted on screening maps, which are provided in Appendix A, Exhibit A-4.

SR 505 has 12 inventoried culverts and stream crossings in the study area. Of those:

- 1 is passable(non-barriers)
- 1 is a partial barriers
- 2 are full barriers
- 6 are non-fish bearing

For each culvert, **Exhibit 6** lists the WDFW culvert id, the stream name, fish use, and barrier status.

| | Exhibit 6<br>**List of SR 505 culverts and their WDFW fish barrier status** | | | | |
|---|---|---|---|---|---|
| **Site Id** | **Milepost** | **Stream Name** | **Tributary to** | **Fish Use** | **Barrier Status** |
| 992244 | 0.14 | Unnamed | Olequa Creek | Yes | Total |
| 992245 | 0.21 | Unnamed | Olequa Creek | Yes | Partial |
| 992246 | 0.24 | Unnamed | Unnamed to Olequa Creek | Yes | Total |
| 992247 | 0.34 | Unnamed | Olequa Creek | No | Non-Fish Bearing |
| 992248 | 0.40 | Unnamed | Unnamed to Olequa Creek | No | Non-Fish Bearing |
| 992249 | 2.04 | Unnamed | Unnamed to Olequa Creek | No | Non-Fish Bearing |
| 992250 | 2.35 | Landers Creek | Olequa Creek | No | Non-Fish Bearing |
| 992251 | 3.34 | Unnamed | Lacamas Creek | Yes | Non-Barrier |
| 992252 | 3.79 | Unnamed | Lacamas Creek | No | Non-Fish Bearing |
| 992253 | 4.71 | Unnamed | Lacamas Creek | No | Non-Fish Bearing |

## Wildlife Species

Protected wildlife species present within the area of analysis must be considered during the permitting and environmental review process. Wildlife evaluated for this screening includes both state and federal endangered, threatened, sensitive, and candidate species; animal aggregations which are considered vulnerable; and those species of recreational, commercial, or tribal importance that are vulnerable and could be affected by project elements. Any proposed project that may affect wildlife must adhere to federal and state regulations, especially the federal Endangered Species Act.

**Data Sources:**

- Priority Habitats and Species (PHS),
- GIS shape files (WDFW, 2008)

The Priority Habitats and Species (PHS) List is a catalog of those species and habitat types identified by the Washington Department of Fish and Wildlife (WDFW) as priorities for management and preservation. Because information on fish, wildlife, and their habitats is dynamic, the PHS List is updated periodically. This data is not allowed to be displayed on map documents.

**Methodology:** Alternative Analysis approach - The alternate analysis area for the Wildlife Screening is the State PHS GIS layers overlaid and noted where intersecting the centerline of SR 505.

**PHS Findings:** Several priority habitats intersect the study area including:

- PHS region of Rocky Mountain and Roosevelt Elk Winter Range, Mount Saint Helens and Mount Rainer Herds;
- Spotted Owl terrestrial buffer; and
- Pacific salmon and trout habitats.

A detailed wildlife impact analysis (Biological Assessment) will be required for any future project.

## 4 Natural Hazards

Natural hazards are areas, resources, and/or critical area/natural systems and processes that pose a potential hazard to people and property. This environmental screening looks at natural hazards typically regulated by local, state, and federal laws including: local Critical Area Regulations, State Environmental Policy Act (SEPA) or, Federal laws (i.e., flood management), and/or areas with special engineering considerations (i.e., liquefaction risk).

### Floodplains

Floodplains in Lewis County are classified as the 100-year floodplain, and the floodway. The technical definition of the floodplain is that part of the valley that has a 1 percent chance of flooding in a given year (though recent and historical floods would contradict this conservative definition). The floodway means the regular channel of a river, stream, or other watercourse, plus the adjacent land areas that must be reserved in order to discharge the base flood (100-year flood) without cumulatively increasing the water surface elevation more than one foot.

**Data Source:** FEMA 100-year floodplain (Lewis County, 2008l)

**Methodology:** Standard Analysis Area - project footprint, plus fifty (50) feet from the road edge of the project corridor on both sides (north/south). No floodway files were available from Lewis County so floodway area was not calculated.

**Floodplain Findings:** The location of the floodplains in relation to the SR 505 is depicted on the Floodplain Map in Appendix A, Exhibit A-5.

- A total of 196,901 square feet or 0.45 acres of floodplain are located in the project area.

## Steep Slopes and Soil Type

Lewis County critical area code regulates Erosion and Landslide Hazard Areas (LCC 17.35.910) to minimize hazards to the public from development activities on or adjacent to areas of geological hazard. Steep slopes are an indicator of erosion and landslide hazard. Slopes over 15% with certain types of geology and hydrology are defined as landslide hazards (LCC 17.35.920). Steep Slopes (15% or greater) were therefore used to identify areas of potential landslide hazard.

**Data Sources:**

- Slope Data (Lewis County, 2008j)
- Soil Type Data (NRCS, 2008)

Topography GIS files with slopes over 15% were identified.

The GIS shapefile for soils information consisted of data from Lewis County, which is based on the Soil Survey report of Lewis County Area, Washington issued May, 1987 (NRCS [National Resource Conservation Service, 2008]). Updated tables were generated from the NRCS National Soil Information System (NASIS). The soil map data has been digitized and may include some updated information.

**Methodology:** Standard Analysis Area - project footprint, plus fifty (50) feet from the road edge of the project corridor on both sides (north/south).

**Steep Slopes and Soils Findings:** The location of the steep slopes and soils in relation to the mile posts and depicted on the Steep Slope and Soil Map is in Appendix-A, Exhibit A-6.

- A total of 24,300 square feet or 0.56 acres of steep slopes are located in the study area.

# 5 Human Environment

The human environment refers to project effects that impact quality of life, social justice, historic places, and cultural resources. This environmental screening looks at the human environment typically regulated by local, state, and federal law and policies.

## Environmental Justice

The County will comply with WSDOT Environmental Justice policies and procedures as required. This environmental justice screening is not intended to fully satisfy WSDOT requirements or to be a comprehensive environmental justice analysis but instead is a preliminary screening of available environmental justice data. This screening is intended to determine if minority and/or low-income populations are found in the vicinity of the proposed projects and to facilitate development of project-specific environmental justice analysis. For further information on the environmental justice analysis process please visit the WSDOT website, http://www.wsdot.wa.gov/Environment/EJ/EnviroJustice.htm.

This environmental screening will also help project planners establish a strategy for Environmental Justice public involvement. When significant populations in a project area speak languages other than English, WSDOT policy is that outreach and noticing be available in those languages, as well as English. This screening will identify those areas where populations may need this additional public outreach.

**Methodology:** The environmental justice analysis was based on the use of census geography rather than the standard study area. Census geographical units are variable and based mainly on population density. These units are aggregated at different scales to protect privacy. Specifically, higher sensitivity census information is reported in larger census geographical units to protect the privacy of individual locations.

**Data Sources:** Perteet reviewed 2000 U.S. Census Bureau data for low-income and minority populations for the Lewis County. The census geography selected were those that are within 500-feet of any project. Census data used included:

- Race Table P4
- Language Spoken at Home Table PCT 10
- Poverty by Age Table P87
- Disability Table QT P21

**Environmental Justice Findings:**

Race (Table P4)

This part of the analysis used 2000 Census data, Table P4 Race. Each race is shown as a percent of the total population for the County and for the project area in Exhibit 7. Race data is presented by Census Block on maps located in Appendix A, Exhibit A-7. A pie chart in each Census Block shows the percent of each race in that census block. Race can be used to determine public outreach and noticing requirements and to conduct environmental justice analysis.

**Exhibit 7**

**Race as a Percentage of total population, 2000 Census Data**

| Geographic Area | Caucasian | Hispanic | African American | American Indian | Asian |
|---|---|---|---|---|---|
| Lewis County | 91.1 | 5.2 | 0.3 | 1.2 | .05 |
| Study Area | 92.4 | 5.3 | 0.2 | 1.3 | 0.6 |

Language Spoken at Home (Table PCT 10)

When greater than 5% of a population in a project area speaks a language other than English at home, WSDOT environmental justice guidance recommends that notice of the project be published in the appropriate language(s) and a public outreach program be established. This analysis used 2000 Census data, Table PCT 10, and only considered the population over 18. In the study area there are no populations over 5% that speak a language other than English at home.

Poverty by Age (Table P87)

This analysis used 2000 Census data, Table P87. The percentage of the population 18 to 64 with incomes below the poverty level in 1999 in Lewis County was 19.4%, while the project area percentage ranges from 10% to 31.1%. These preliminary results show that the projects may impact low-income populations.

Results are displayed in Appendix A, Exhibit A-8 by census block group. The map compares the poverty rate of all people to the County average.

## Parks and Recreation Resources

Perteet evaluated the effects of the proposed project on parks and recreation. These areas are protected by Section 4(f) of the Department of Transportation Act of 1966 (49 United States Code Section 303), which prohibits the Federal Highway Administration (FHWA) from approving projects that would potentially affect these resources.

**Data Source:** Parks Data (Lewis County, 2008i)

**Methodology:** Standard Analysis Area - project footprint, plus fifty (50) feet from the road edge of the project corridor on both sides (north/south).

**Parks Resource Findings:** No parks are located in the study area.

## Cultural and Historical Resources

Cultural resources are archaeological sites, historic structures (such as buildings and bridges) and areas of traditional cultural importance to tribes or other communities. Section 106 of the National Historic Preservation Act protects important historical, archeological, and cultural places, either as a property that is registered with or is eligible for registering with the National Registry of Historic Places (NRHP).

**Data Source:** Cultural, archeological resources, and historic structures (Lewis County, 2008g).

**Methodology:** Standard Analysis Area - project footprint, plus fifty (50) feet from the road edge of the project corridor on both sides (north/south).

**Cultural and Historical Findings:** No known cultural, archeological resources, or historic structures where identified with the available records. The absence of inventoried cultural or historic resources in the study area indicates that there may not be resources but it does not preclude them. A detailed site specific Cultural and Historical Resources analysis will need to be conducted for any future project.

## Air Quality

Road projects may affect air quality either indirectly by changing the amount of vehicle emissions in an area, or directly by maintenance, construction, or demolition of facilities that release particulates and other emissions into the air. Federal, state, and local regulations require that projects which change traffic flow, increase capacity and/or traffic lanes, or add traffic signals within carbon monoxide, non-attainment or maintenance areas conduct quantitative analysis for potential impacts to carbon monoxide at the project level.

**Data Sources:**

- Ozone and Carbon Monoxide Maintenance Area Boundary (Southwest Clean Air Agency, 2007).
- Review of Southwest Clean Air Agencies Web site (www.swcleanair.org)

**Methodology:** Maps and online documents were reviewed; no GIS analysis was conducted.

**Air Quality Findings:** The study area is not in an Ozone or Carbon Monoxide Maintenance Area.

## Noise

State policy requires the review and consideration of noise abatement for sensitive noise receptors (described in the methods) for projects that substantially alter the topography surrounding a state highway.

**Data Source:** Parcels/Zoning (Lewis County, 2008h)

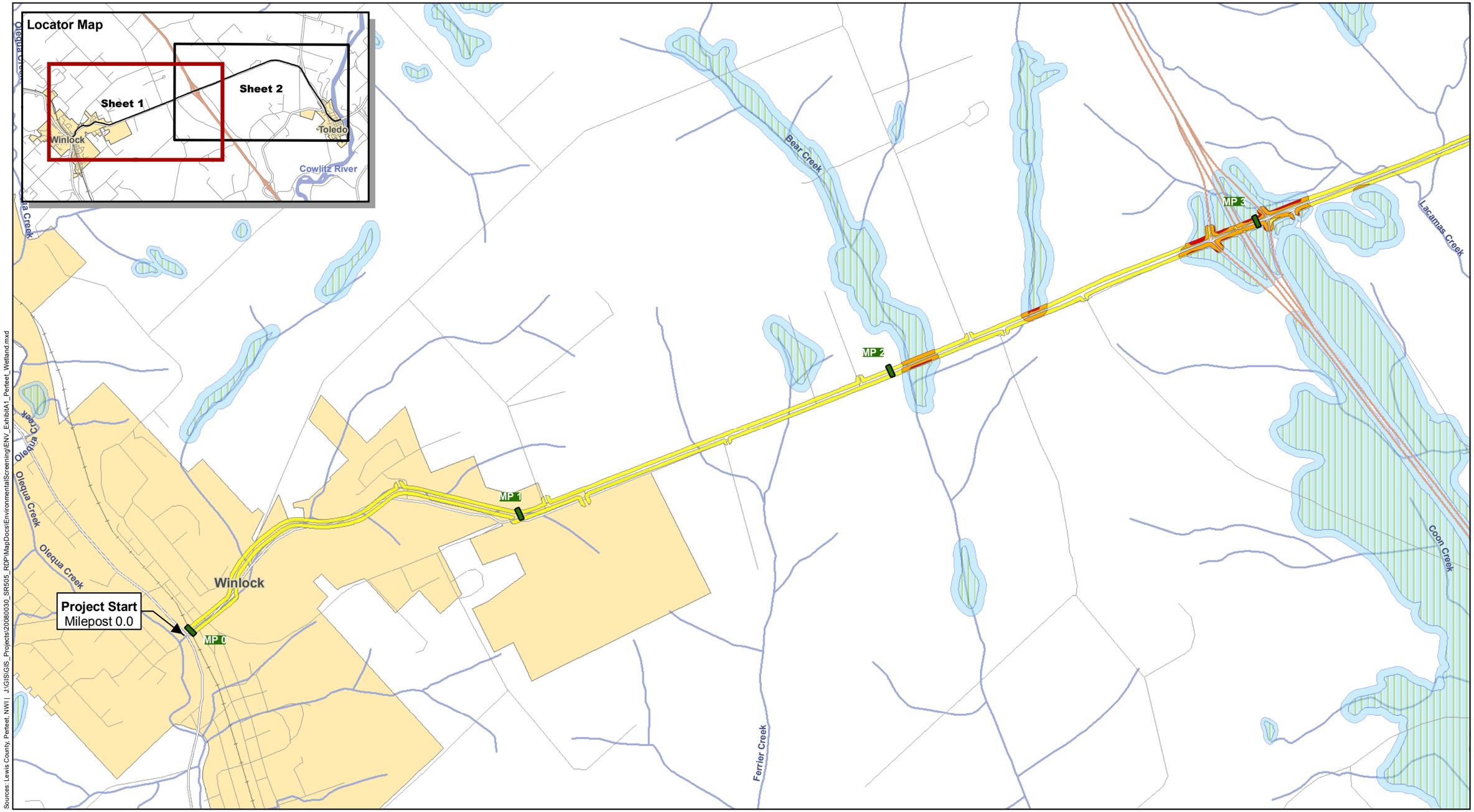
**Methodology:** Alternate analysis area for studying noise quality. This area included the proposed project footprint plus 500 feet around the project. The analysis area was overlaid on zoning maps. Residential zones were used as a surrogate for all sensitive receptors which include residential dwellings, nursing homes, medical and health services, churches, libraries, cultural activities centers, and schools.

**Potential Noise Impact Findings:** The residential zones within 500 feet of the project are depicted on screening maps, which are provided in Appendix A, Exhibit A-9. Portions of the study area are considered sensitive noise receptors. It should be noted that these areas already experience highway noise. However, construction noise and potential increases in existing noise will need to be examined after a specific project is proposed. Specific noise analysis will need to be conducted for any future project.

## Technical GIS Shape files References

US Census, 2000, Census Summary File 3
US Census, 2000, Census Block Group
ESRI, Carto-streets
ESRI, rail roads
Lewis County, 2008a, Wetlands (wetlands)
Lewis County, 2008b, Hydric Soils (hydric)
Lewis County, 2008c, Hydrology (wc-2007May25)
Lewis County, 2008d, SR 505 centerline
Lewis County, 2008e, City Limits (Citylimits)
Lewis County, 2008f, Rail Roads (railroads)
Lewis County, 2008g, Historic (historic)
Lewis County, 2008h, Parcels (parcels)
Lewis County, 2008i, Parks (parks)
Lewis County, 2008j, Step Slopes (slp15plus10m)
Lewis County, 2008k, Water Bodies (wbws_2007May25)
Lewis County, 2008l, 100-year floodplain (fema 100)
NRCS, 2008, Soils (soil_wa641)
Perteet, 2008a, Project Extent (project extent)
Perteet, 2008b, Existing Edge of Pavement (Existing_edgeofpavements)
Perteet, 2008c, Existing Road Centerline (Existing_roadcenterlines)
Perteet, 2008d, Impact Area Standard Analysis (ImpactArea_StandardAnalysis)
Perteet, 2008e, Wetland Buffer (wetland_buffer)
Perteet, 2008f, Impact Stream Crossing (impacts_streamcrossing)
Perteet, 2008g, Impacts Floodplains (impactSA_floodplains)
Perteet, 2008h, Impacts Hydric Soils (impactSA_hydricsoils)
Perteet, 2008i, Impacts Steep Slopes (impactSA_steepslopes)
Perteet, 2008j, Stream Buffers (impactSA_streambuffer)
Perteet, 2008k, Streams (impactSC_streams)
Perteet, 2008l, Wetland (impactSC_wetland)
Perteet, 2008m, Wetland Buffers (impactSC_wetlandbuffers)
Perteet, 2008n, Parcels, (impactsSA_Parcels)
Puget Sound Lidar Consortium, 2008, Lidar Coverage
WDFW, 2008a, Washington State Fish Passage Barrier Inventory – Culverts (culverts/fish passage)
WDFW, 2008b, Priority Habitats and Species (PHS)
WDFW, 2002, Fish Distribution (fish distribution)
WDNR, 2006, Washington State Watercourse (WC) Hydrography

# APPENDIX A
# MAPS




0 0.5
Miles

Lewis County

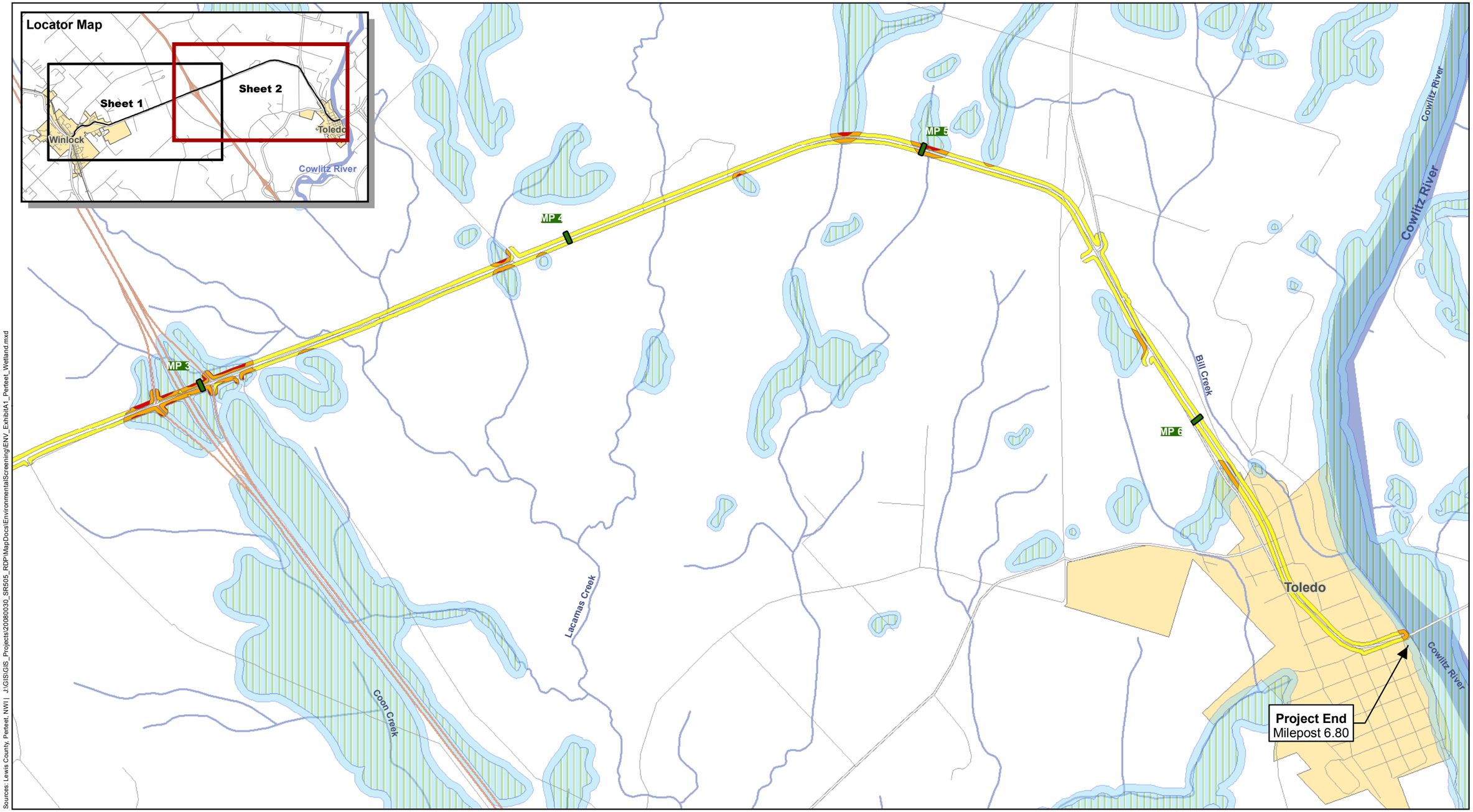
Perteet

Legend

- Impacted Wetland
- Wetland
- Impacted Wetland Buffer
- Wetland Buffer
- Standard Analysis Study Area
- Project Extent
- Stream
- City Limit

SR 505 Interchange / Corridor Plan
Environmental Screening

**Wetlands**
**Exhibit A-1 - Sheet 1**




Sources: Lewis County, Perteet, NWI | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\ENV_ExhibitA1_Perteet_Wetland.mxd

0 0.5
Miles

Lewis County

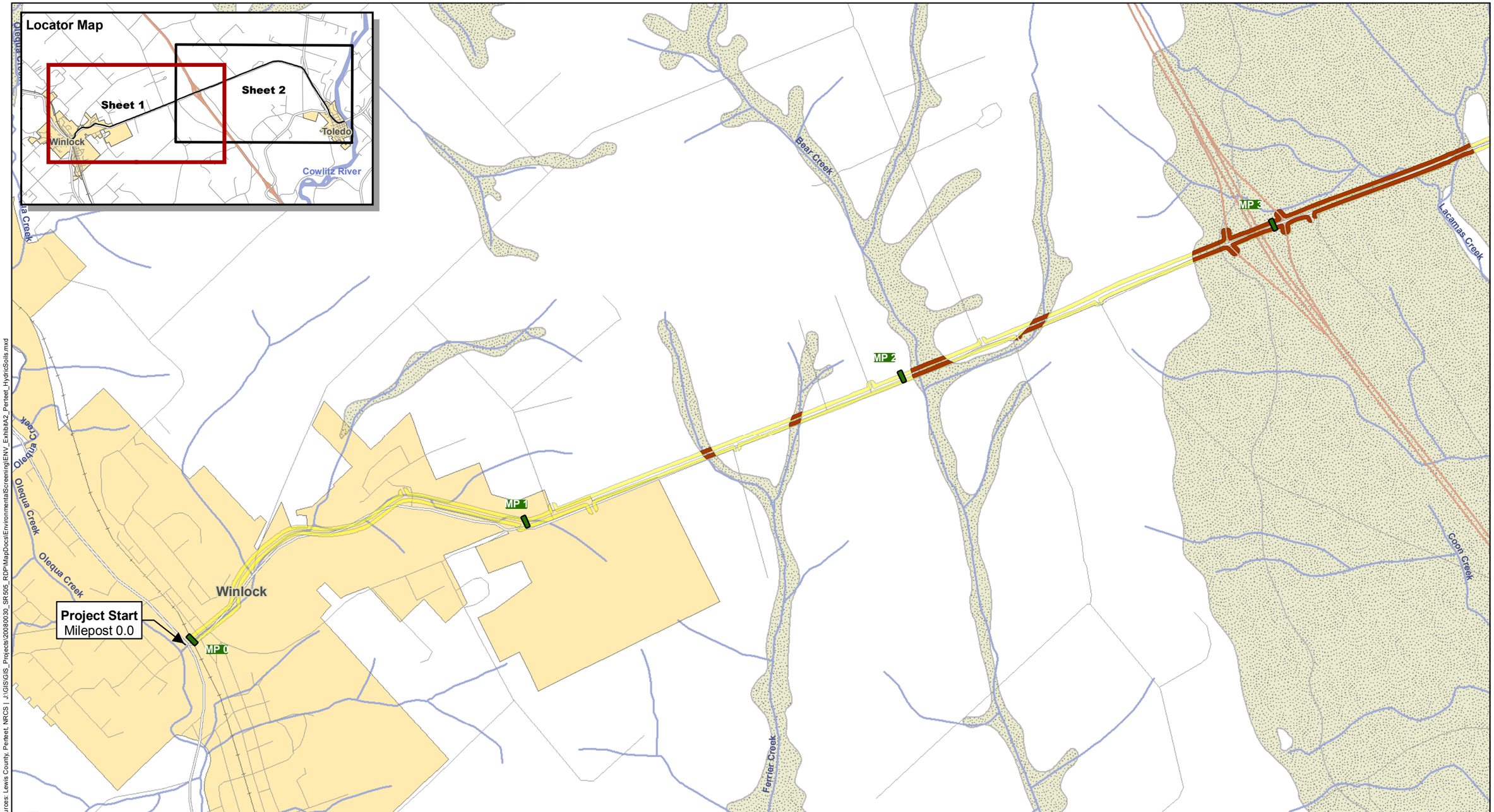
Perteet

Legend

- Impacted Wetland
- Wetland
- Impacted Wetland Buffer
- Wetland Buffer
- Standard Analysis Study Area
- Project Extent
- Stream
- City Limit

SR 505 Interchange / Corridor Plan
Environmental Screening

**Wetlands**
**Exhibit A-1 - Sheet 2**




Sources: Lewis County, Perteet, NRCS | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\ENV_ExhibitA2_Perteet_HydricSoils.mxd

0 0.5
Miles

Lewis County

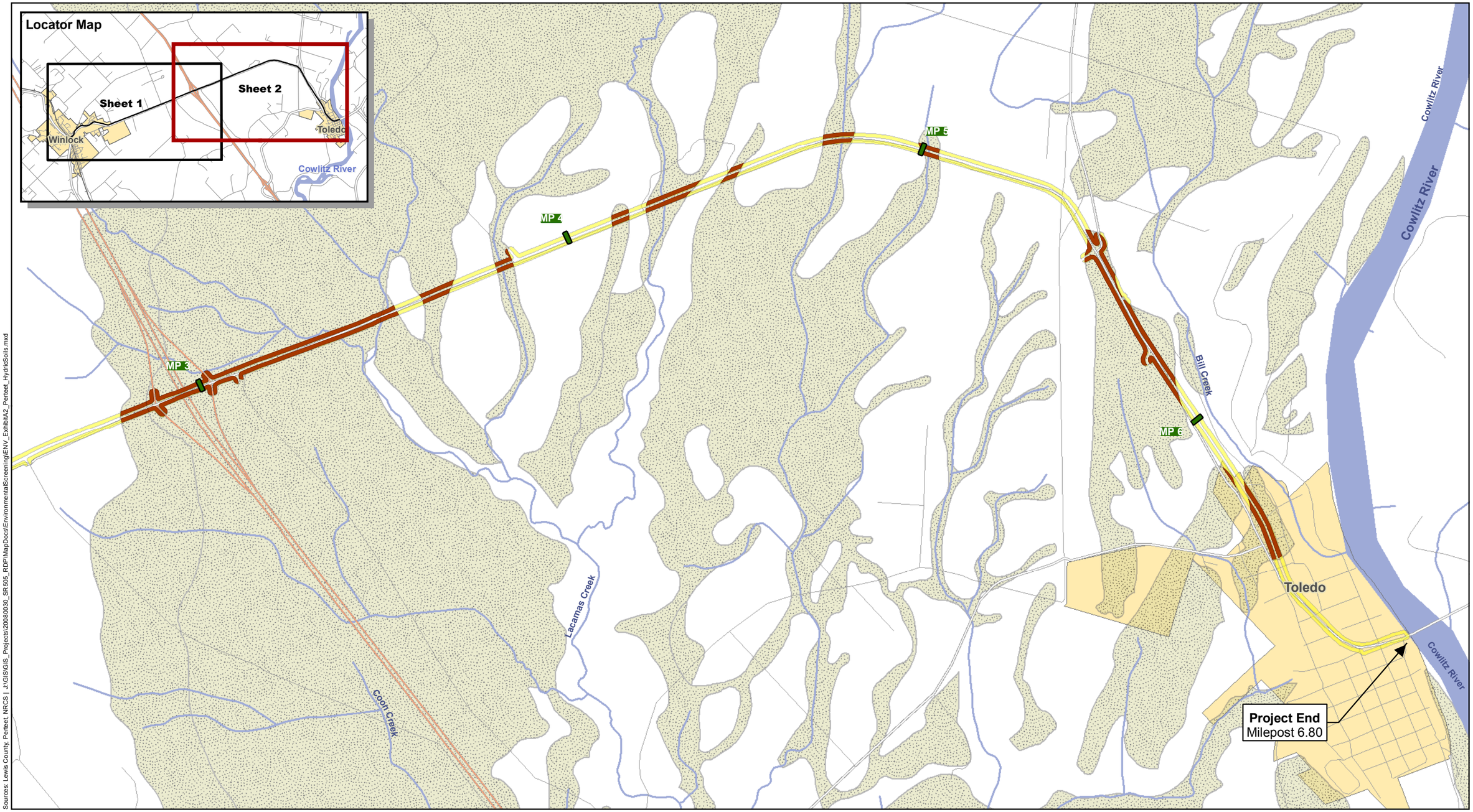
Perteet

Legend

- Hydric Soil
- Impacted Hydric Soil
- Standard Analysis Study Area
- Stream
- City Limit

SR 505 Interchange / Corridor Plan
Environmental Screening

**Hydric Soils**
**Exhibit A-2 - Sheet 1**




Sources: Lewis County, Perteet, NRCS | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\ENV_ExhibitA2_Perteet_HydricSoils.mxd

0 0.5
Miles

Lewis County

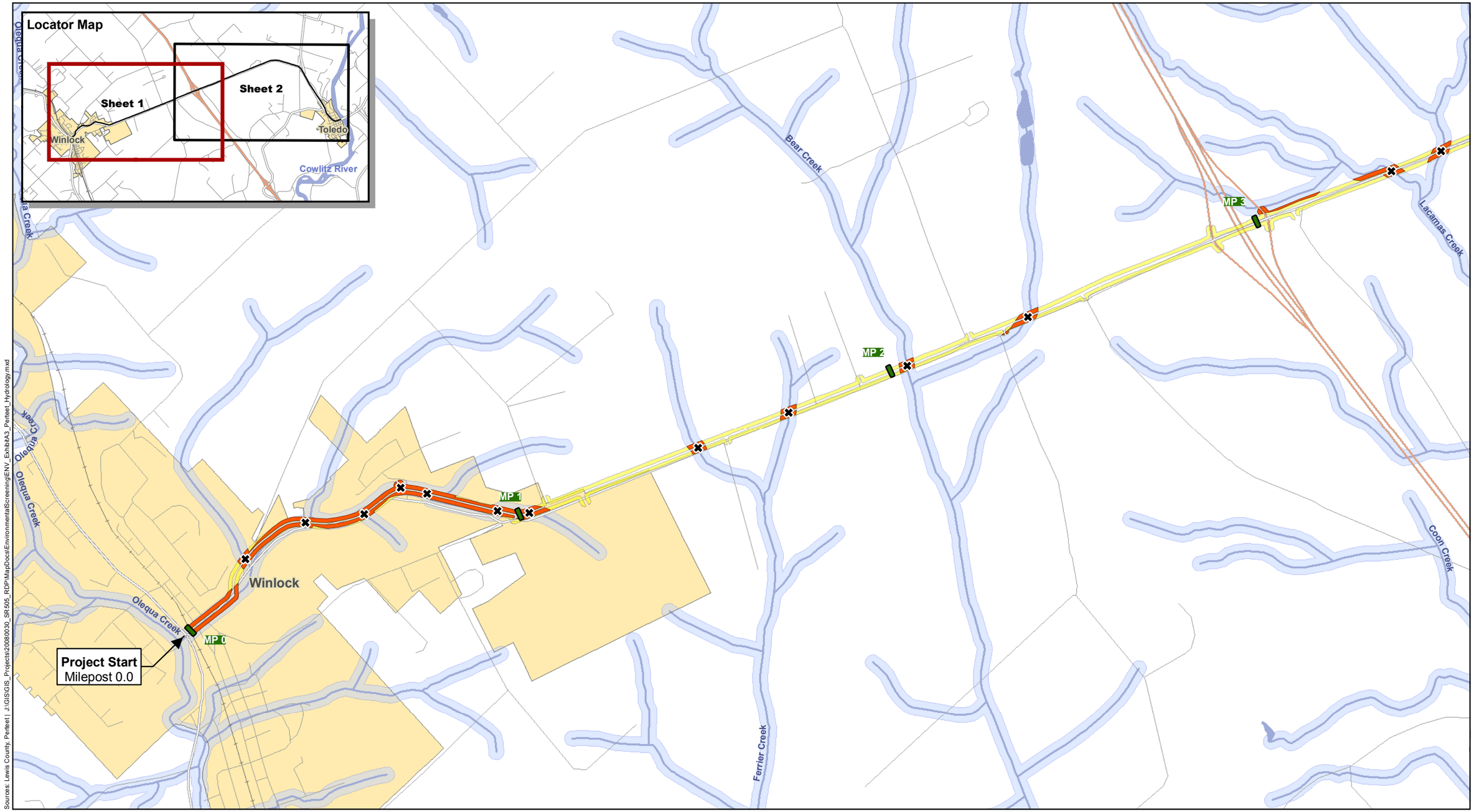
Perteet

Legend

- Hydric Soil
- Impacted Hydric Soil
- Standard Analysis Study Area
- Stream
- City Limit

SR 505 Interchange / Corridor Plan
Environmental Screening

**Hydric Soils**
**Exhibit A-2 - Sheet 2**




Sources: Lewis County, Perteet | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\ENV_ExhibitA3_Perteet_Hydrology.mxd

0 0.5
Miles

Lewis County

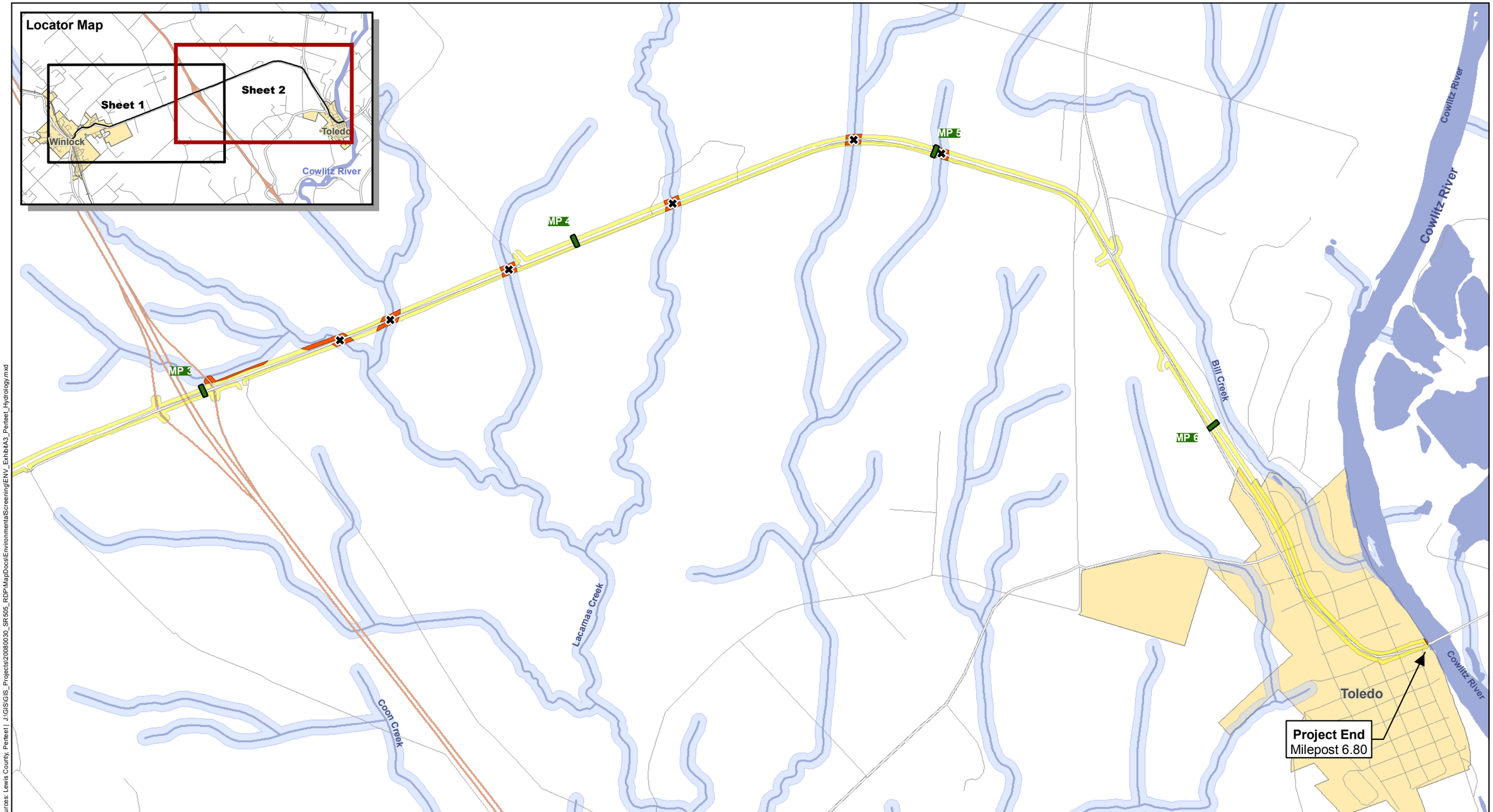
Perteet

Legend

- Stream Crossings
- Impacted Stream Buffer
- Stream Buffer
- Stream
- Waterbody
- Standard Analysis Study Area
- Project Extent
- City Limit

SR 505 Interchange / Corridor Plan
Environmental Screening

**Hydrology**
**Exhibit A-3 - Sheet 1**




Sources: Lewis County, Perteet | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreeningENV_ExhibitA3_Perteet_Hydrology.mxd

0 0.5
Miles

Lewis County

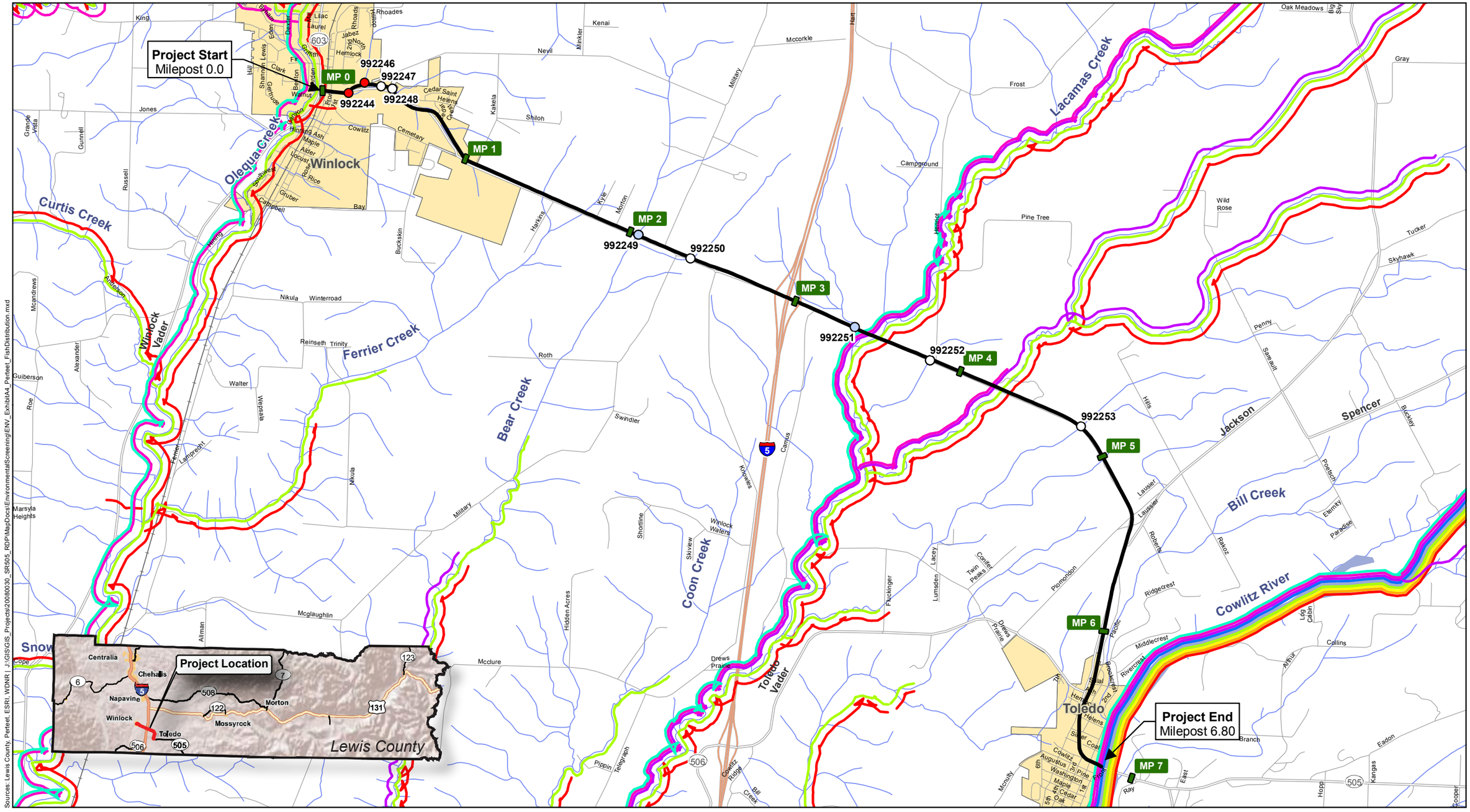
Perteet

Legend

- Stream Crossings
- Impacted Stream Buffer
- Stream Buffer
- Stream
- Waterbody
- Standard Analysis Study Area
- Project Extent
- City Limit

SR 505 Interchange / Corridor Plan
Environmental Screening

**Hydrology**
**Exhibit A-3 - Sheet 2**




Sources: Lewis County, Perteet, ESRI, WDNR | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\ENV_ExhibitA4_Perteet_FishDistribution.mxd

0 1
Miles

Lewis County

Perteet

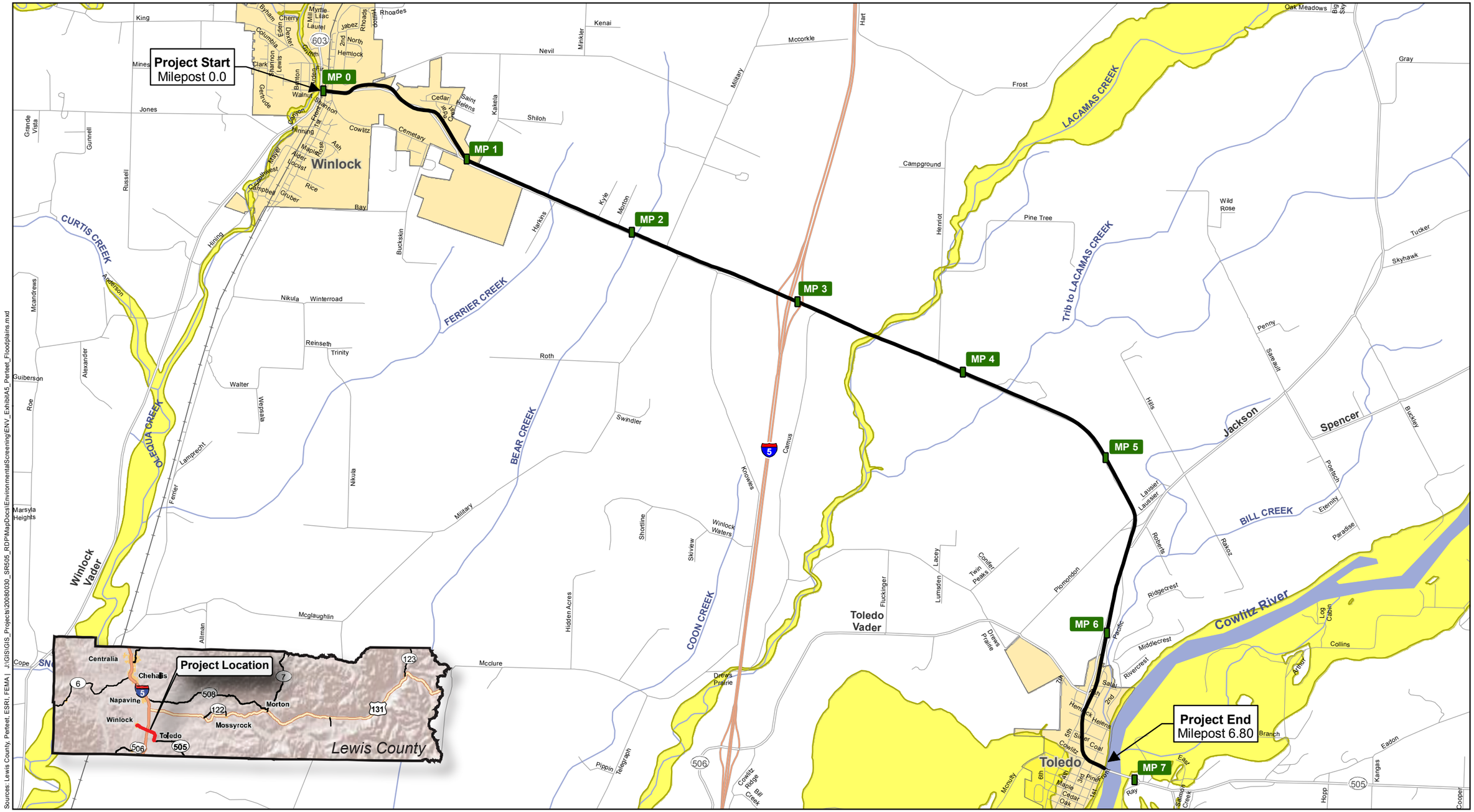
## Legend

- Project Extent
- Stream
- City Limit
- Coastal Cutthroat Trout
- Fall Chinook
- Fall Chum
- Spring Chinook
- Coho Salmon
- Rainbow Trout
- Summer Steelhead
- Winter Steelhead

Culvert
- Non-Barrier
- Non-Fish Bearing
- Partial Barrier
- Total Barrier

SR 505 Interchange / Corridor Plan
Environmental Screening

**Fish Distribution**
**Exhibit A-4**




0 1
Miles

Lewis County

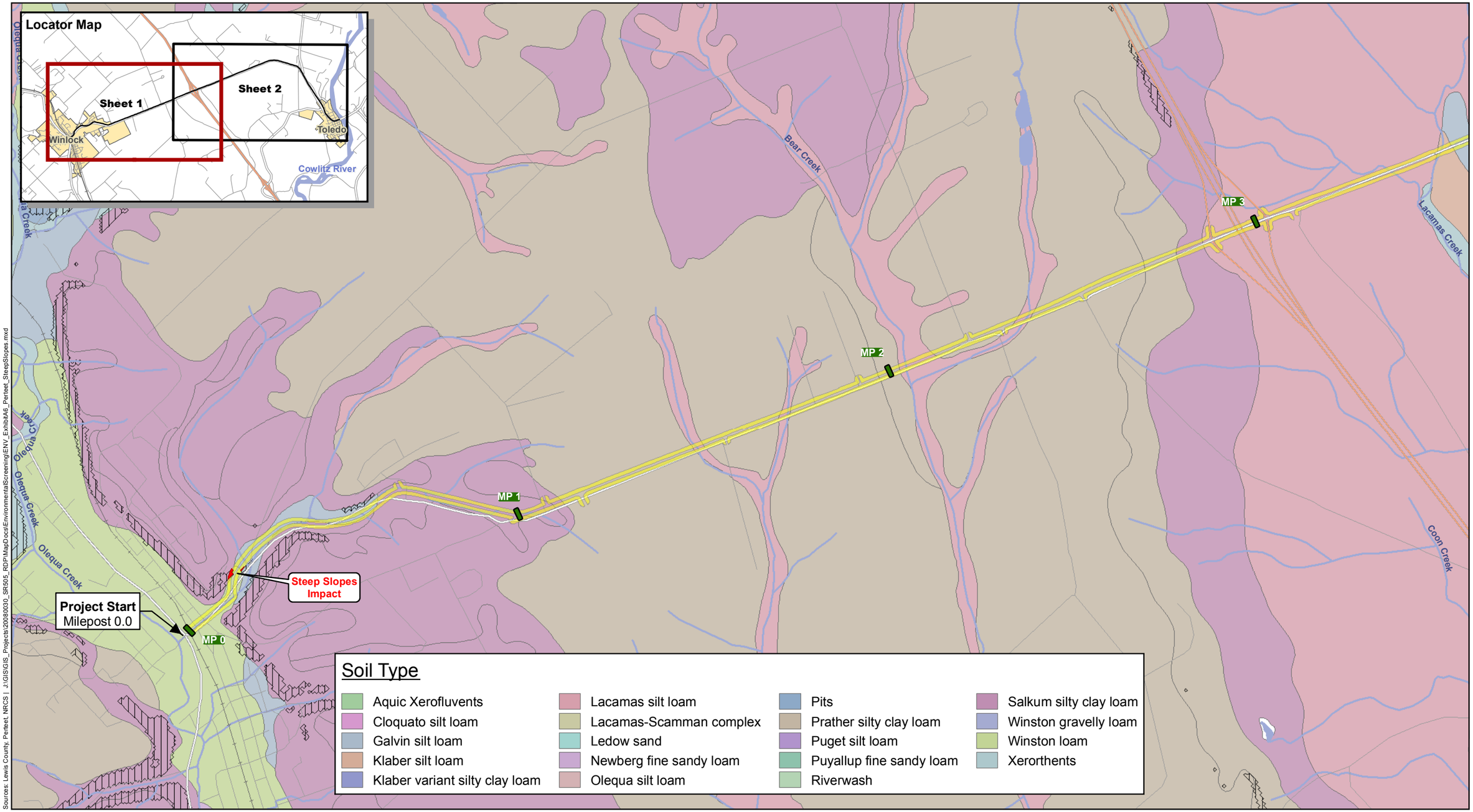
Perteet

Legend

- Floodway
- 100yr Floodplain
- Milepost
- Project Extent
- City Limit

SR 505 Interchange / Corridor Plan
Environmental Screening

**Floodplains and Floodway**
**Exhibit A-5**




Sources: Lewis County, Perteet, NRCS | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\ENV_ExhibitA6_Perteet_SteepSlopes.mxd

0 0.5
Miles

Lewis County

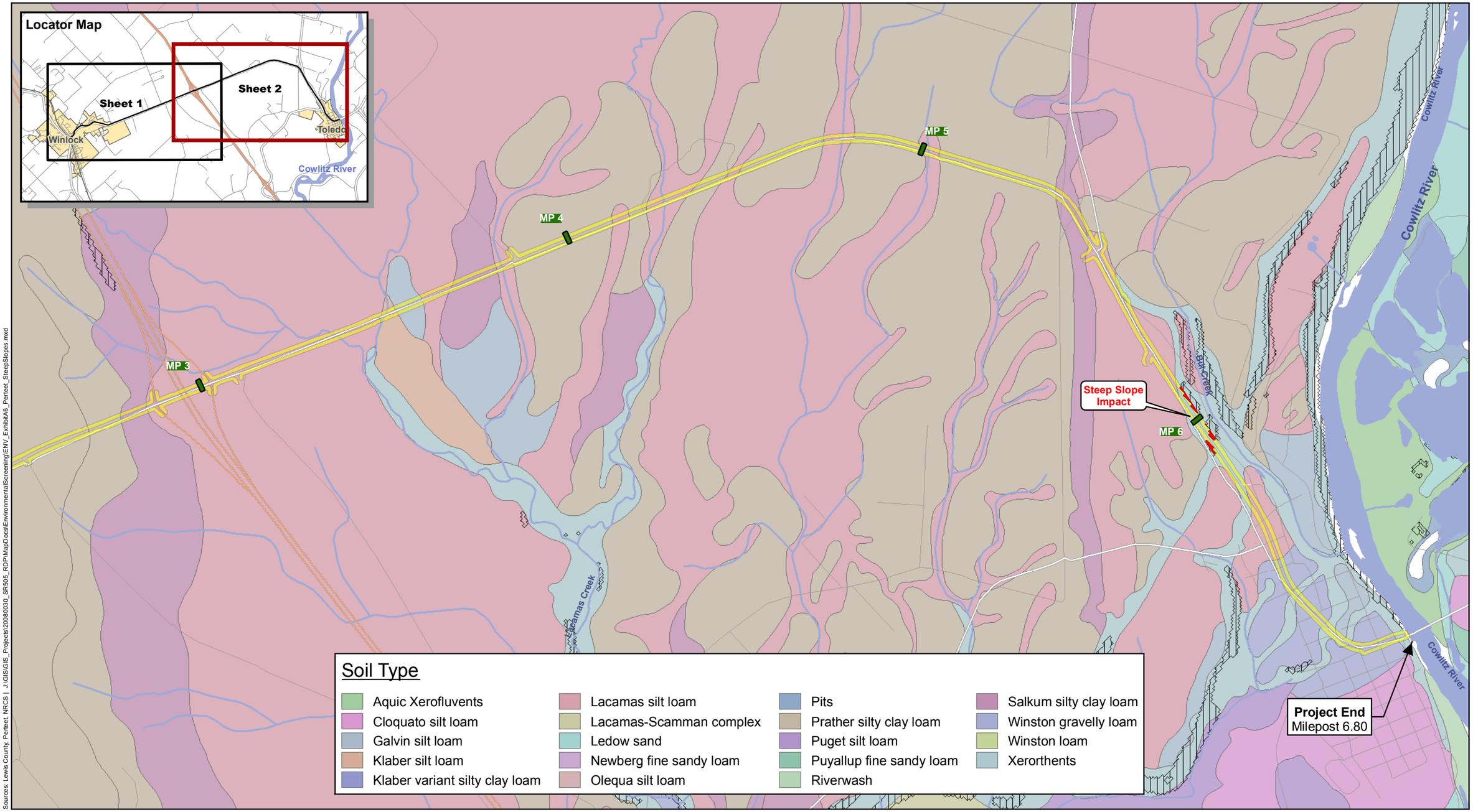
Perteet

## Legend

- Impacted Steep Slope
- Steep Slope
- Standard Analysis Study Area
- Stream
- Waterbody
- City Limit

SR 505 Interchange / Corridor Plan
Environmental Screening

**Steep Slopes and Soils**
**Exhibit A-6 - Sheet 1**




Sources: Lewis County, Perteet, NRCS | J:\GIS\GIS_Projects\20080030_SR505_RDP\MapDocs\EnvironmentalScreening\ENV_ExhibitA6_Perteet_SteepSlopes.mxd

0 0.5 Miles

Lewis County

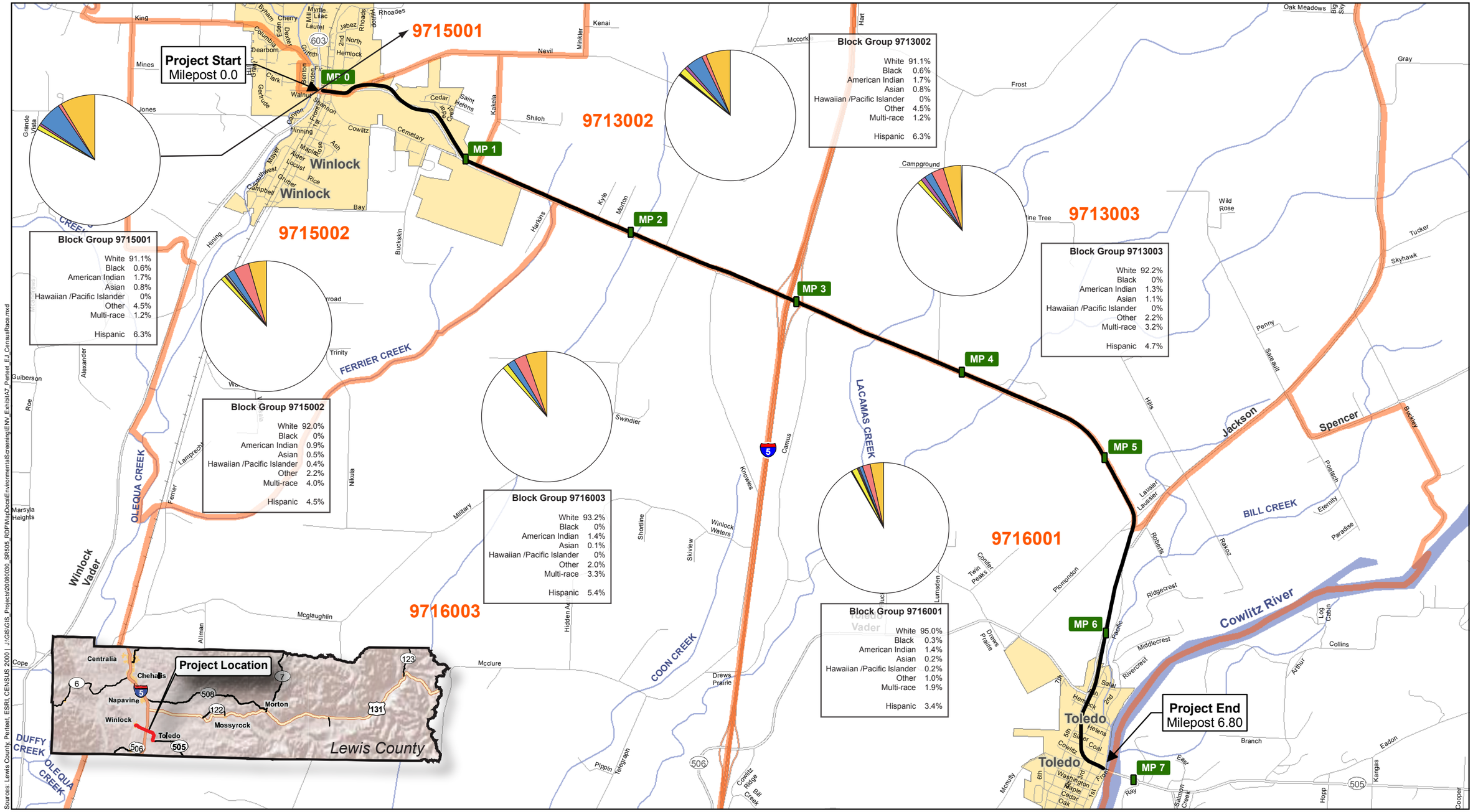
Perteet

## Legend

- Impacted Steep Slope
- Steep Slope
- Standard Analysis Study Area
- Stream
- Waterbody
- City Limit

SR 505 Interchange / Corridor Plan
Environmental Screening

**Steep Slopes and Soils**
**Exhibit A-6 - Sheet 2**




0 1
Miles

Lewis County

Perteet

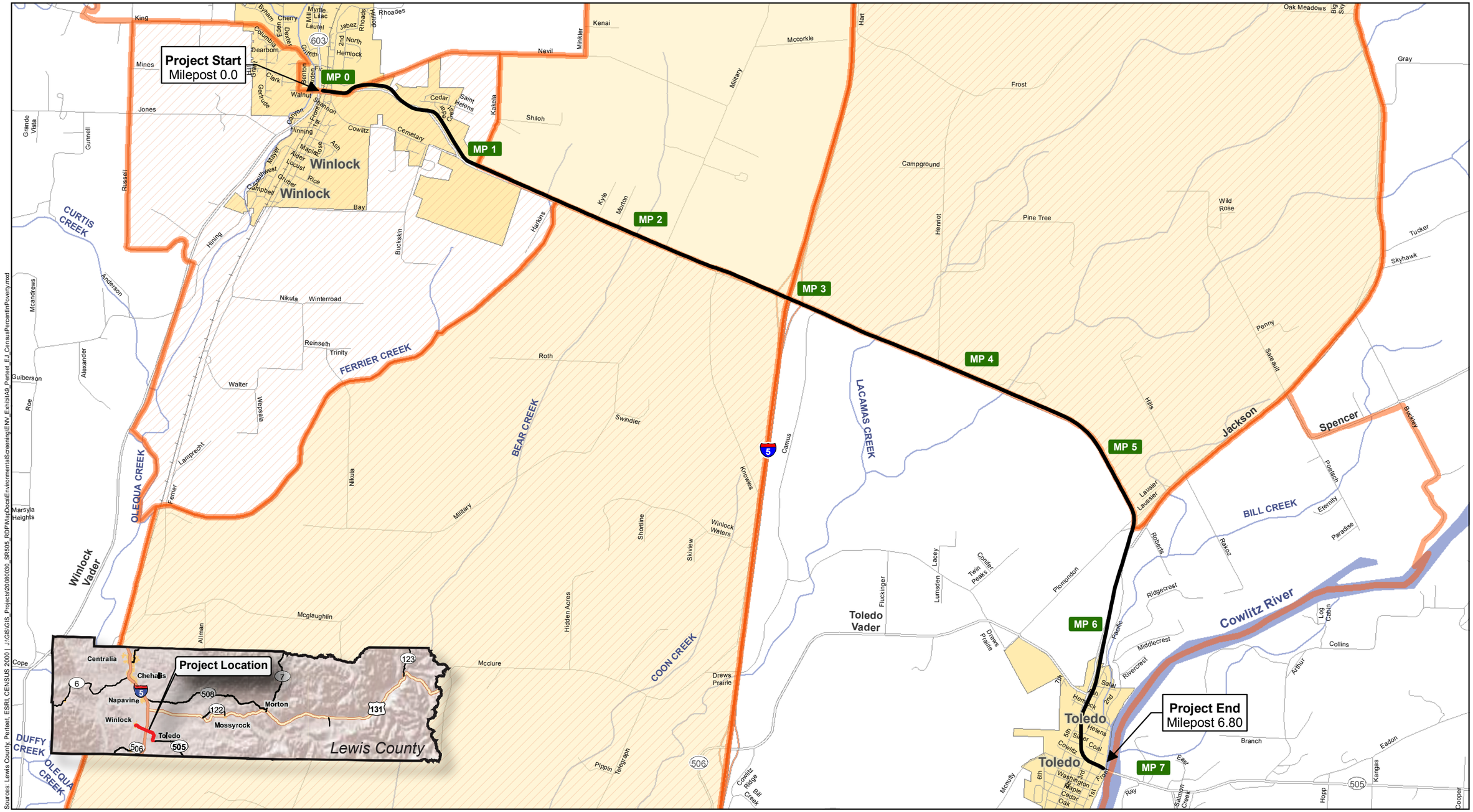
Legend

- Milepost
- Block Group
- Project Extent
- Stream
- City Limit

SR 505 Interchange / Corridor Plan
Environmental Screening

**Population by Race**
**Exhibit A-7**

Note: There are no Census Block Groups in poverty above the county average for ages >64




Sources: Lewis County, Perteet, ESRI, CENSUS 2000 | J:\GIS\GIS_Projects\2080030_SR505_RDP\MapDocs\EnvironmentalScreening\ENV_ExhibitA9_Perteet_EJ_CensusPercentInPoverty.mxd

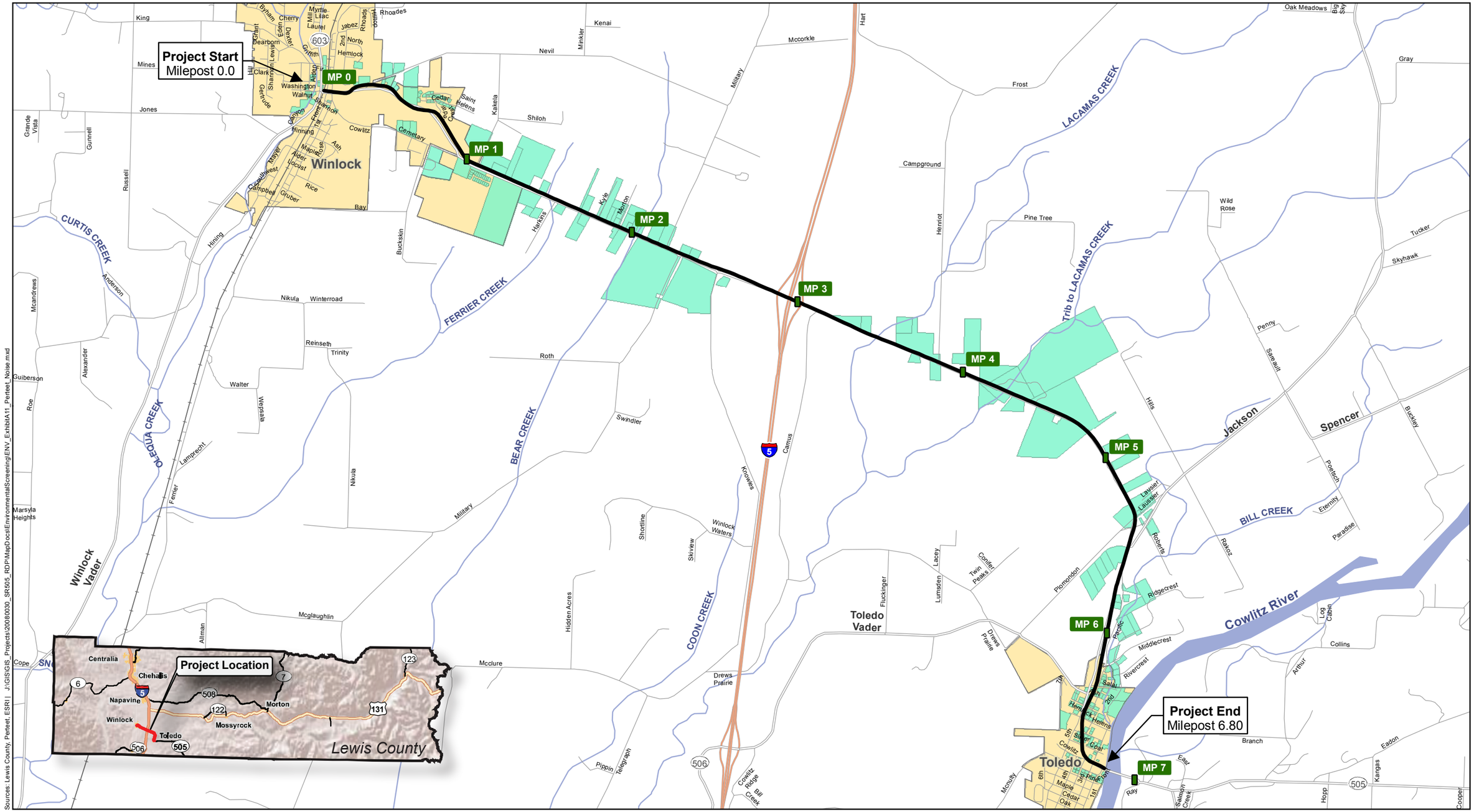
## Legend

- Population in Poverty Above County Average Ages < 18
- Population in Poverty Above County Average Ages 18 - 64
- Project Extent
- Stream
- City Limit
- Block Group

SR 505 Interchange / Corridor Plan
Environmental Screening

**Population in Poverty**
**Exhibit A-9**

Note: There are no Census Block Groups in poverty above the county average for ages >64




SR 505 Interchange / Corridor Plan
Environmental Screening

**Noise**
**Exhibit A-10**