Technical Memorandum No. 2: Existing Conditions Report

November 2007

Washington State Department of Transportation

LOCHNER

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Chapter 1
Introduction

United States Route 2 (US 2) is a 323 mile highway running east-west across the state of Washington. US 2 is one of only two routes through the Cascades connecting Eastern and Western Washington year-round.

1 Study Area Location

US 2 originates at I-5 in Everett (Snohomish County). It ascends the Cascade Range and continues eastward before exiting the state through Pend Orielle County, in the city of Newport. In Western Washington, US 2 passes through the cities of Snohomish, Monroe, Sultan, and Gold Bar, as well as the towns of Index and Skykomish (**Exhibit 1.1**), before it crosses the Cascade Mountains. It is this portion of US 2 which is currently under study.

Exhibit 1.1
US 2 Highway Location within Washington

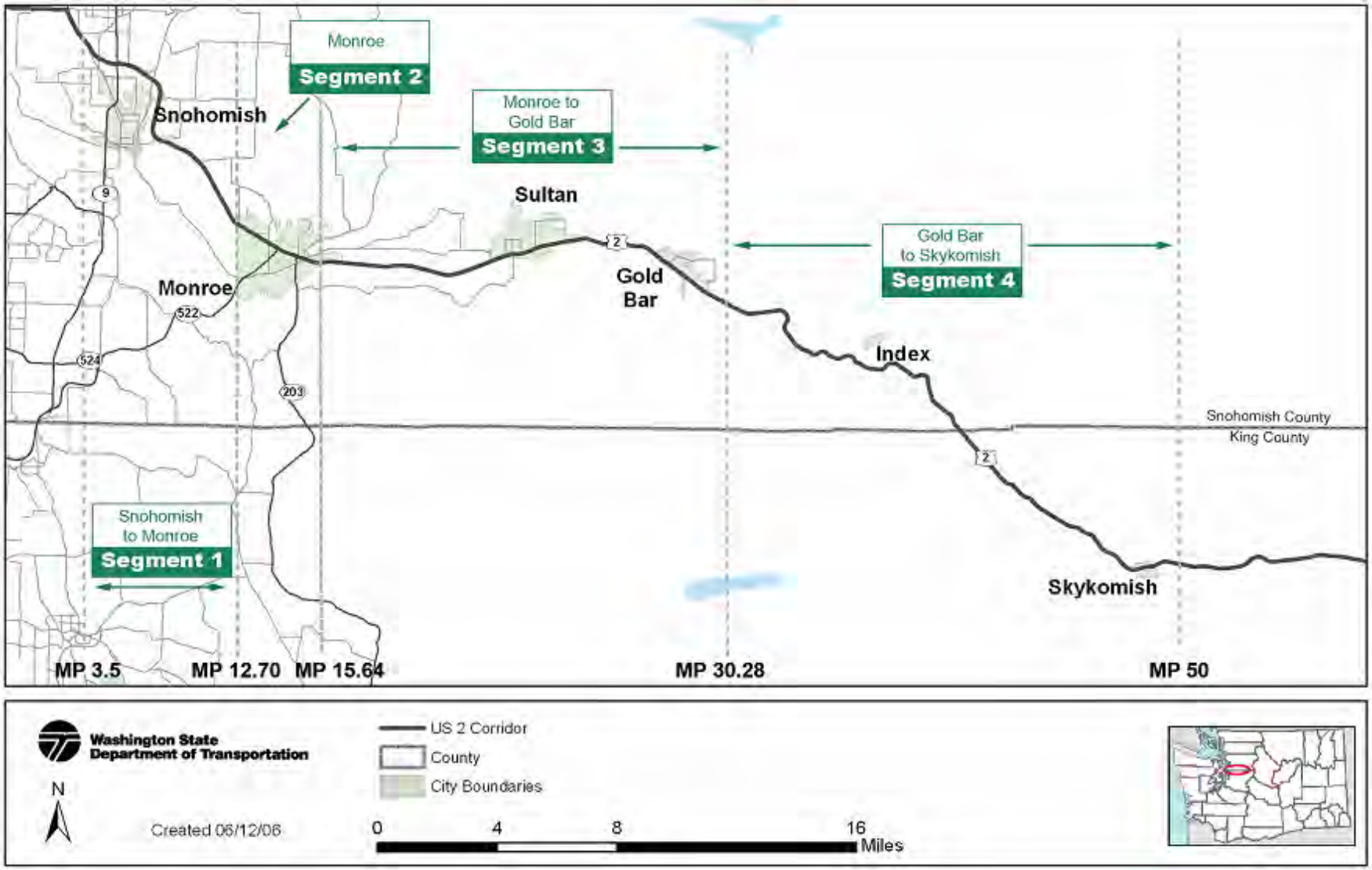
Study Area

The 47-mile study area begins at Bickford Avenue in Snohomish and ends past the eastern limits of Skykomish at Old Cascade Highway. Because the project study area is long and diverse, it was divided into four segments. Segments were demarcated from west to east according to similar characteristics and transportation needs. **Exhibit 1.2** on the following page presents the locations of these four segments. The following discussion summarizes the location and characteristics of each segment.

- Segment 1 (Snohomish to West Monroe, MP 3.50 – MP 12.70): This relatively flat segment of US 2 begins near Snohomish and continues through undeveloped land, wetlands, and farmlands.
- Segment 2 (city of Monroe, MP 12.70 – MP 15.64): Segment 2 is lined by urban development with multiple traffic signals at city intersections. These traffic signals, along with driveways that lead to houses and businesses, impede traffic flow. SR 522 intersects US 2 within this segment and is a major commuting route to the Seattle urban area.
- Segment 3 (East of Monroe to East of Gold Bar, MP 15.64 - MP 30.28): This segment is less developed and lined by forest in many locations. It includes the smaller cities of Sultan and Gold Bar. Homes and businesses along this segment are often built directly adjacent to US 2.
- Segment 4 (East of Gold Bar to Old Cascade Highway, past the eastern town limits of Skykomish MP 30.28 – MP 50.00): The final segment of the study area climbs into the Cascades. Area communities (Index, Baring, and Skykomish) are not directly adjacent to the corridor. Population

Exhibit 1.2

Study Area Map and Defined Segments



- growth and average daily traffic has remained essentially unchanged for the past fifteen years. Segment 4 is primarily rural and characterized by sharp curves and reduced sight distance.

Exhibit 1.3 provides a summary of general characteristics of each segment.

2 Roadway Function

US 2 provides, and supports, transportation functions that promote and maintain statewide travel and economic linkages. It is important to the region because it serves various interests including commuter, business, freight, neighborhood, and recreational activities. US 2 is an important connection to the Central Puget Sound urban area for the businesses and residents of the outlying communities along this route. It also serves as a primary urban arterial through some of these communities and as a significant transportation route for natural resource products carried both to the Puget Sound Region and Eastern Washington.

3 Roadway Classification

The Federal Highway Administration (FHWA) has designated US 2 as a *Highway of National Significance* (HNS) because it serves major population centers, intermodal transportation facilities and major travel destinations. Under 1998 state legislation RCW 47.06.140, US 2 is classified as a *Highway of Statewide Significance* (HSS) and is part of

Exhibit 1.3
Segment Lengths and Populations within Main Cities/Townships

Segment	1	2	3	4
Length (miles)	9.20	2.94	14.64	19.72
Population	8,700	15,920	6,310	365

Source: Washington State Office of Financial Management (2005)

the National Highway System. It is identified as a trunk road in the *WSDOT Highway System Plan* because it connects metropolitan areas with populations of at least 50,000. HSS are important to the movement of people, goods and services on a statewide basis and have beneficial effects on the welfare and economy of a state. Legislation stipulates that these facilities are to be planned at the statewide level. According to the WSDOT functional classification system, US 2 is designated a "Principal Arterial" in its entirety. Further, the cities of Snohomish, Monroe, as well as Gold Bar, Index and Skykomish have classified US 2 as a Major Arterial, Primary Arterial, and Principal Arterial, respectively. Throughout the state (as well as the study area), it changes from freeway, to four-lane divided expressway, to principal urban thoroughfare replete with traffic signals, to rural roadway.

The *Washington State Freight and Goods Transportation System* (FGTS) divides roadways into five classes according to yearly freightage. US 2 is classified as T-2 through most of the study area (MP 3.50 to MP 35.62), giving it Strategic Freight Corridor status because it transports over six million tons of freight through this stretch (2005 statistics) per year. From west of Monroe to east of Leavenworth US 2 has been designated as a Scenic and Recreational Highway. Land uses along US 2, in this area, include agricultural, wetlands, residential, commercial, suburban, rural and forest.

4 Right-of-Way and Access Control/ Management

US 2 from Everett to eastern Monroe was conceived in the 1930s and 1940s. Though envisioned to be a four-lane divided freeway, traffic volumes were not

sufficiently high to justify the cost of building a four lane corridor. However, the state of Washington did preserve sufficient land (right-of-way) along some stretches of US 2 to accommodate additional road-widening and interchange improvements. In other places along the US 2 study area the right-of-way is quite narrow; only slightly wider than the road itself. This occurs near smaller towns east of Monroe such as Gold Bar and Skykomish where the narrow right-of-way will make widening the road more challenging. Near Gold Bar, the right-of-way width ranges from seventy feet to as much as 500 feet near Monroe.

Access Control Types

As stipulated by RCW 47.50, US 2 is an access controlled/managed transportation facility. Access control/management is separated into three categories based on restrictiveness. From most to least they are: Full Control, Partial Control and Modified Control, with Modified Control being divided into five distinct classes as determined by Washington Administrative Code 468.52. Further information about access control is presented in **Exhibit 1.4**.

Exhibit 1.4
Access Control Types and Characteristics

Access control type	Characteristics
Full Control (most restrictive)	1. Access is allowed only through interchanges with selected public roads, rest areas, viewpoints or weigh stations 2. All local street intersections and driveways are prohibited
Partial Control	1. Intersections with local roads are permitted 2. Existing private driveways are permitted 3. No commercial approaches are permitted 4. No direct driveway access to highway permitted if private property has access available via an alternate public road
Modified Control (least restrictive)	1. Intersections with local roads are permitted 2. Existing private driveways are permitted 3. Commercial approaches may be permitted 4. No direct driveway access to highway permitted if private property has access available via an alternate public road

Exhibit 1.5 on the following page depicts access control/ management along US 2.

Current Access and Right-of-Way

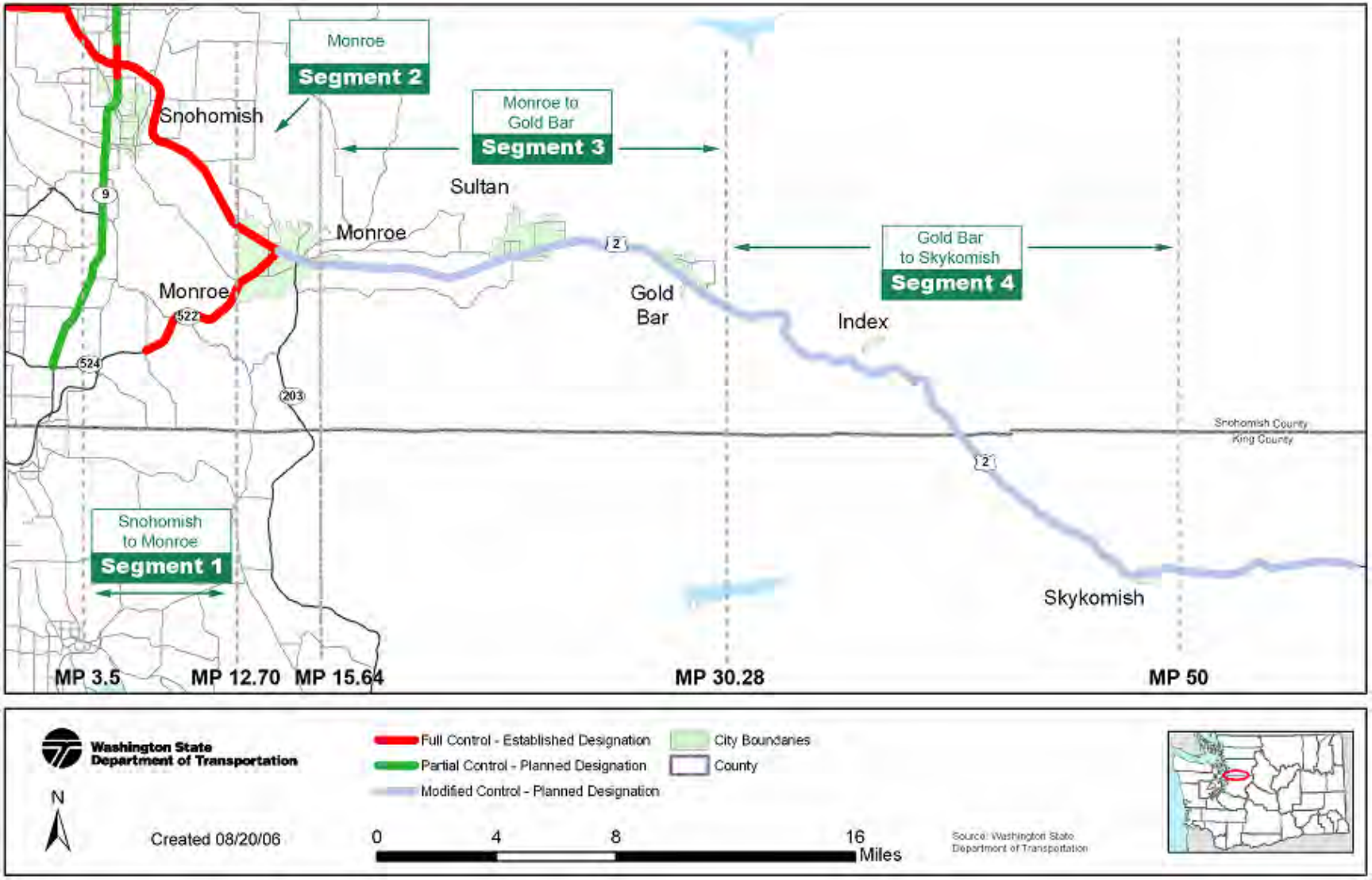
Current access along US 2 varies depending upon the types of land uses and roadway network within the immediate area. As such, the following discussion presents current access by segment.

SEGMENT 1

Between Bickford Avenue and 88th Street SE, right-of-way varies from approximately 250 feet to 500 feet in width. In certain places, right-of-way is widest along the US 2 study area; this is due to the State having purchased land in anticipation of possible interchange development. Some of the interchange locations identified in the 1930s were:

- *Bickford Avenue* (Old US 2 Hwy, MP 3.86): The State purchased land necessary for a planned grade-separated interchange, but this remains an at-grade Y-intersection.

Exhibit 1.5
Access Control Types within US 2 Study Area



- *SR 9 Interchange* (MP 5.04): The State purchased sufficient right-of-way for a full cloverleaf-shaped interchange, but this remains a diamond interchange.
- *Machias Road* (MP 6.37): The State purchased sufficient land for a half cloverleaf-shaped interchange on the west side of Machias Road away from the railroad over-crossing. However, there is currently no interchange at this location.
- *88th Street SE* (Campbell Road, MP 8.51): The State purchased right-of-way and constructed a diamond-shaped interchange.

Slightly east of 88th Street SE (Campbell Road), US 2 has kept its original alignment, having a right-of-way width of approximately 150 feet with modified access control. Farms line the north and south of US 2 for about four miles between 88th Street SE (Campbell Road) and Fryelands Boulevard (Monroe). Driveways and farm land access roads intersect with US 2 about every quarter of a mile. Highway planners in the 1930s envisioned constructing a bypass in this section that would take US 2 from where it is currently located and divert it north to a four-lane, divided highway (as originally planned).

SEGMENT 2

Road planners in the 1930's thought US 2 could realign between 88th Street SE and eastern Monroe near Woods Creek (between MP 9.00 and 15.20), which would shift it north of its current position. This concept is known as the US 2 Monroe Bypass. Though the bypass has yet to be built, the State purchased portions of land it would need for this option (comprised chiefly of the land between SR 522 and Woods Creek). The following describes right-of-way in Segment 2.

- In Segment 2, the SR 522/US 2 interchange (MP 14.27) exists as a single loop interchange, and is currently being expanded as part of a project to widen SR 522.
- In the 1940s when the State purchased land immediately north of what is now the SR 522 interchange, highway planners envisioned building a large interchange that would extend SR 522 north and link it to the Monroe Bypass.
- Between SR 522 and Woods Creek (MP 14.3 - 15.2), US 2 right-of-way width is 150 feet. Commercial driveways are located on both sides of the highway. Driveways on the south side of the highway are spaced a mere 50 feet apart in some places, while those on the north side are spaced at least 250 feet apart.

SEGMENT 3

Beginning near Woods Creek Bridge (MP 15.3 - 15.4) US 2 right-of-way width is 150 feet. From here to Sultan, land-use along US 2 is primarily rural. Access to US 2 is primarily from private farm land and residential driveways with no stop sign control. There is also stop sign controlled access to US 2 from a few rural roads. South of US 2, the highway right-of-way essentially adjoins the BNSF Railway Company's (BNSF) railway right-of-way.

From the Sultan River Bridge, through the city of Sultan, to directly east of Sultan Basin Road (MP 22.1-23.1), US 2 right-of-way is 150 feet wide. This section of the highway is directly accessible by public and private driveways. Commercial entrances/exits are spaced closely. The BNSF rail line runs along the south side of US 2, with most public/private driveways on its north side. From just east of Sultan Basin Road to

363rd Avenue SE (MP 23.1-25.7), the right-of-way is 150 feet wide. The area is predominately rural, with private driveway and farm land access located throughout.

US 2 right-of-way within the town of Startup is approximately eighty feet wide with direct access from both public and private driveways. Between Startup and Gold Bar, the US 2 right-of-way is about 108 feet wide, primarily rural, and has access to/from private driveways and farm land. West of 10th Street in the town of Gold Bar (MP 27.4 to 28.5), US 2 right-of-way is approximately 67 feet wide, while east of 10th Street it widens to approximately 100 feet. Access to US 2, in Gold Bar, is not restricted by curbs or stop controls. Due to the railway on the south of US 2, most driveways are along the north side.

SEGMENT 4

East of the town of Gold Bar, the width of US 2 right-of-way varies from 70 to 200 feet. Roads and driveways adjacent to US 2 have uncontrolled access. Intersections are located infrequently throughout the corridor east of Gold Bar.

Though US 2 does not go through the town of Index, it can be accessed from US 2 via Index-Galena Road (MP 35.62) which is stop sign controlled. East of the Index-Galena Road intersection on the north side of US 2 is a commercial driveway with two US 2 access points. From Index to Skykomish (MP 35.62 to 48.48), right-of-way width varies between seventy and 200 feet. Roads and driveways are located sporadically throughout the corridor and there are no controls over their access to/from US 2. The half-mile section of US 2 that passes through Skykomish (MP 48.48 to 48.99) is largely separated from the city by the Skykomish River.

In this segment, right-of-way width varies between 100 and 120 feet. There is no control over roads and driveways with access to/from US 2, and closely spaced commercial driveways lie directly adjacent to US 2's south shoulder.

5 Highway Project History

US 2 was built in stages between 1933 and 1949. After this time, independent projects were also constructed which included:

- a two-mile section between Everett and SR 204 widened to four lanes (two lanes in each direction) in the late 1960s;
- a bypass of Snohomish city center which opened two lanes to traffic in 1982

More recent projects, as well as potential future projects, are presented in **Exhibits 1.6** through **1.8** on the following pages. The types of projects presented in these exhibits are quite diverse, ranging from development plans and ITS measures, to channelization schemes and bridge overhauls.

Exhibit 1.6

Completed and Ongoing US 2 Projects (1994 – 2007)

Location	Project	Year(s)	Cost ($)
SR 5 to Index	design analysis	1995	107,736
Stevens Pass Greenway	sign fabrication and installation	2002	3,450
Stevens Pass Greenway	corridor management plan	2000	156,022
US 2 and SR 9 resurfacing	ACP overlay	1997, 2000	3,575,531
US 2, Old US 2 vicinity to Jct SR 522 vicinity	safety improvements and rumble strips	2004, 05	651,727
US 2, dairy farm access vicinity	channelization and safety measures	2002	101,289
179th Avenue to Woods Creek Bridge	signal and ITS measures	2005	23,874
Woods Creek Bridge to Deception Creek Bridge	methylmethacrylate striping	1996, 1997	512,776
Reiter Road vicinity	channelization	2004, 05	807,935
Sultan western city limits to 339th Avenue SE	ACP overlay	2001, 02	661,414
Sultan -Startup Road	channelization	2000, 04	797,798
Old Owen Road	signal, sidewalk, overlay	2000	3,398
Fern Bluff Road to Gold Bar vicinity	two-way left-turn lane, channelization	1999, 2001	4,374,111
Skykomish River Bridge	scour repair	1996,98, 2000	517,021
Sultan River Bridge, Wallace River Bridge	bridge painting	2000, 01	498,337
Sultan eastern city limits to Wallace River Bridge	overlay, channelization	1996	636,451
Wallace River Bridge to Proctor Creek Bridge	overlay	2001, 04	1,676,541
387th Avenue SE vicinity	culvert replacement	1993, 94	162,014
Goldbar	park & ride lot construction	1995	26,071
Skykomish River Bridge	major bridge repair, geotechnical study	1998, 99	470,862
Skykomish River Bridge	bridge painting	2002, 03	500,579
Milepost 33 to S Fk Skykomish River Bridge	overlay	1998, 99	902,164
No Name Creek vicinity	slide correction & safety	1994, 96	234,951
Anderson Creek vicinity	rock buttress construction	2002	212,631
East of Anderson Creek Bridge	slope stabilization	2003	267,236
S Fk Skykomish River Bridge to Burlington Northern RR Bridge	overlay	2003, 04	1,147,067
Index-Galena Road vicinity	reparation of embankment slippage w/drainage wall	1995, 96	1,146,579
National Forest boundary to tunnel	rockfall mitigation	1995, 96	488,789
Two miles east of Index-Galena Road	major drainage rehabilitation of sinkhole	1997, 99	544,515
West of Steven's Pass	slope stabilization	2002, 05	2,161,182
Skykomish	bridge painting	1994 - 96	391,077
SR 9 Interchange vicinity to SR 522	channelization and safety measures	2001, 07	2,344,739
5th Street	signalization	2005, 06	272,219
Barclay Creek Bridge	bridge replacement	2001, 02, 06	5,522,197

Exhibit 1.7
Potential US 2 Projects

Location	Project	Estimated Maximum Cost ($)
I-5 through SR 204	addition of EB & WB HOV lanes to SR 204, I-5/US 2 interchange modification	133,000,000
Everett to Deception Creek	capacity and safety study inc. Sultan, Gold Bar and Startup bypasses	5,390,000
SR 204 to Milepost 5.02	road-widening, limited access, and interchange (Bickford Avenue, SR 204) upgrade measures	33,280,000
Milepost 5.02 through Campbell Road (92nd Street SE)	road-widening	40,950,000
Campbell Road (92nd Street SE) through Monroe	Phase 2 – construct new 4-lane, limited access bypass w/ new interchanges at Westwick Road, SR 522, and in east Monroe, with 4 lanes to SR 522 w/additional 2 lanes added around Monroe	139,050,000
SR 522 Interchange to Monroe eastern periphery	Phase 1 - Construction of 2-lane bypass of Monroe on new alignment	36,640,000
Monroe eastern periphery to Fern Bluff Road	road-widening, access purchase for median divided highway	15,230,000
Fern Bluff Road to west of Sultan city limits	access purchase, road-widening to 4-lane, median-divided, limited-access highway to Sultan; widening to 4 lanes w/out median through Sultan eastward	46,080,000
West of Sultan city limits to Fir Road	road-widening to 4-lane, median-divided, limited-access highway (within cities provide w/out median)	55,230,000
Fir Road to Index-Galena Road	road-widening to 4-lane, median-divided, limited-access highway	34,490,000
Index-Galena Road to Beaver Road	road-widening to 4-lane, median-divided, limited-access highway	57,500,000
Beaver Creek to Skykomish eastern periphery	road-widening to 4-lane, median-divided, limited-access highway	64,400,000
Skykomish eastern periphery to Deception Creek	road-widening to 4-lane, median-divided, limited-access highway	53,640,000
East Monroe to Northwest Region boundary	purchase of access rights	27,360,000
Between 245th Avenue SE and Fern Bluff Road	installing guardrails, adding 2 signs, relocating utility poles	20,000
Milepost 31.73 to milepost 32.99 (east of Gold Bar)	realigning horizontal and vertical curves	5,340,000
U.S. Forest Service Road #62 (west of Anderson Creek)	widening shoulders, installing guardrail	1,550,000
Anderson Creek vicinity	widening shoulders, replacing bridge 2/39, removing rocks and trees	1,430,000
East of Anderson Creek	realigning horizontal and vertical curves	360,000
Mt. Index Road to S Fk Skykomish River	construction of left-turn pocket at MP 35.16	100,000
Index-Galena Road vicinity	realigning horizontal and vertical curves	2,120,000
Between Railroad Bridges	widening WB shoulders and adding concrete barrier (2000 feet)	1,430,000
Slightly west of Railroad Bridge	constructing concrete barrier to protect rock wall (0.4 mile)	80,000
Eagle Falls Creek and Barclay Creek	advisory signs	0
Milepost 43.72 to milepost 44.42 (east of Baring)	realigning horizontal curve (0.4 mile), overhauling bridge 2/106, installing 1000 feet of guardrail	1,270,000

Exhibit 1.7 (Continued)
Potential US 2 Projects

Location	Project	Estimated Maximum Cost ($)
Proctor Creek to Index-Galena Road	providing minimum 4-foot shoulders for rural bicycle touring route	2,290,000
Burlington Northern Railroad Crossing to Barclay Creek	providing minimum 4-foot shoulders for rural bicycle touring route	1,870,000
NE 194th Place to County Road vicinity	providing minimum 4-foot shoulders for rural bicycle touring route	120,000
Forest Service Road #6028 to S Fk Skykomish River	providing minimum 4-foot shoulders for rural bicycle touring route	1,910,000
Milepost 15 to milepost 104.7	interpretive panels, viewpoints, safety rest areas, traveler information	5,990,000
Total		768,120,000

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Chapter 2
Roadway Characteristics and Description

This chapter presents an overview of the general study area along the roadway, the roadway's relationship with the community, and the physical and operational features of US 2.

1 Topographic and Community Characteristics

Topography and land use can dictate how traffic will operate along a roadway. This section summarizes these characteristics within the study area.

Topography

The topography of US 2 within the study area is quite diverse. The following discussion, by segment, summarizes these characteristics.

- *Segment 1:* Throughout this segment, the terrain varies from flatlands to moderately rolling foothills and slopes.
- *Segment 2:* The area is flat on the north and south sides of US 2, with Skykomish River running along the south side of US 2 from eastern Monroe.
- *Segment 3*: Rolling hills and foothills lie within this segment, with steep slopes adjacent to Wagley

Culvert Crossing and along Wallace River (south side of US 2). In Gold Bar, the terrain is relatively flat where US 2 sits in a valley between Wallace River and Skykomish River.

- *Segment 4*: US 2 runs alongside river sections for essentially this entire segment. On both sides of US 2, the terrain is mountainous with rugged foothills, high steep drainage divides and forested areas. Skykomish is marked by steep slopes on US 2's north side. The Skykomish River parallels US 2 on the south side.

Land-use and Zoning

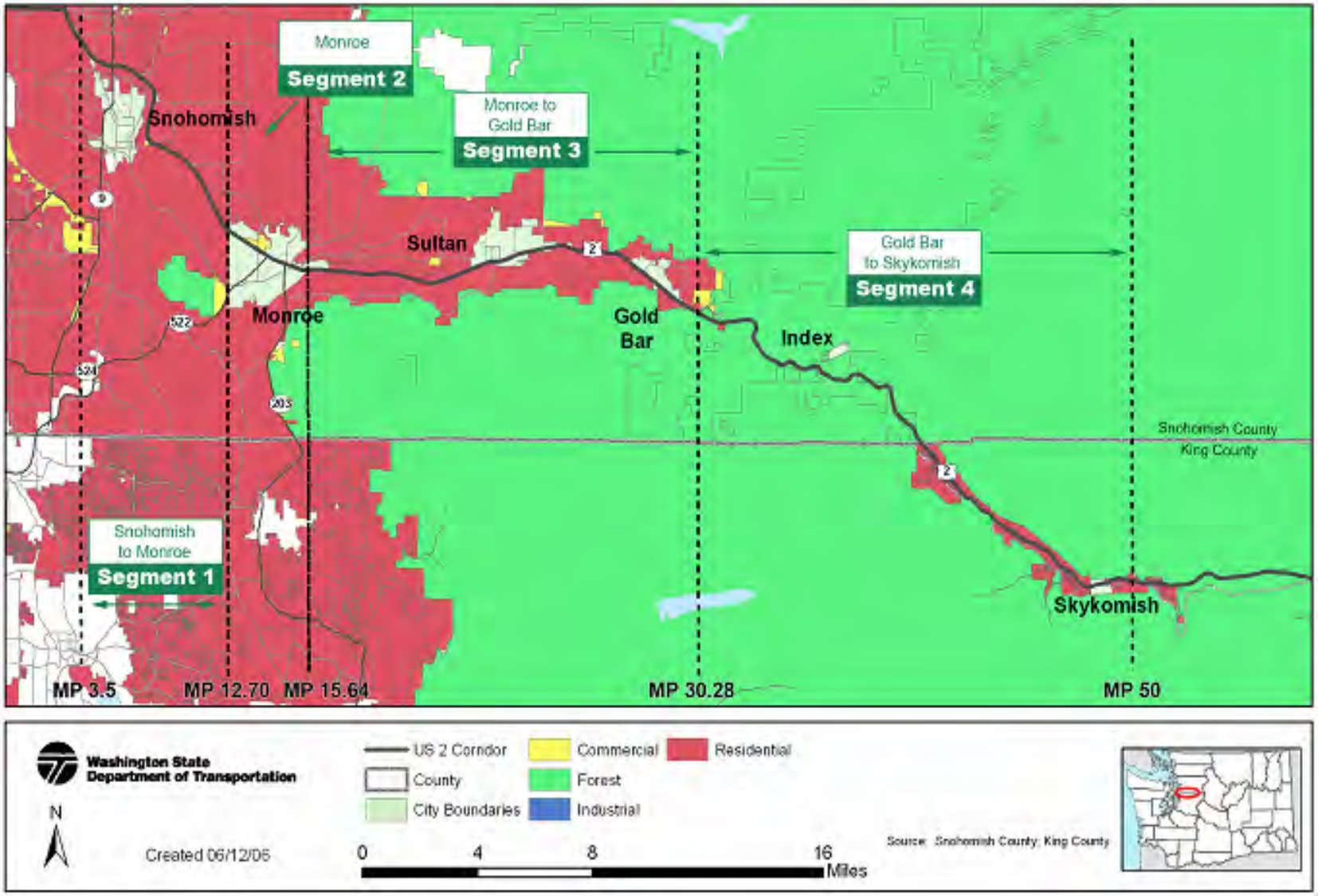
The US 2 study area is located predominately in Snohomish County, with a small portion located in King County. **Exhibit 2.1** on the following page presents the general zoning designations within the study area.

Land use along US 2 includes agricultural, forested, single-family residential, light industrial, commercial, and retail center uses. In general, *Snohomish County's Comprehensive Plan* has designated the area on the south side of US 2 as commercial farmland and the area north of US 2 as rural residential (one dwelling unit per five acres). General land use by segment is described below.

- *Segment 1 (city of Snohomish):* Current land use is comprised of School District Maintenance Operations and single-family residential use, with land zoned for business parks and single-family residences. The City's *Comprehensive Plan* has designated the area's future for business parks, single-family residential, rural residential, and agricultural use.

Exhibit 2.1

US 2 Study Area Zoning



- *Segment 2(city of Monroe):* Current land use is primarily comprised of commercial, industrial and the Evergreen State Fairgrounds, with land zoned for light industrial, general industrial, general commercial, service commercial, professional office, public open space, urban growth area, and urban residential purposes. The City's *Comprehensive Plan* has designated the area's future for industrial, general commercial, special regional use, parks/open space, professional office and commercial purposes.
- *Segment 3 (city of Sultan):* Current land use is a mix of residential, commercial, and industrial use, with land zoned for industrial, urban center, and minimal residential use. The City's *Comprehensive Plan* has designated the area's future for highway oriented industrial, urban centers, and residential purposes.
- *Segment 3 (city of Gold Bar):* Current land use is a mix of single-family residential, mobile-home, commercial and industrial use, with land zoned primarily for general commercial and community business use. A small pocket of land is zoned for residential use. The City's *Comprehensive Plan* has designated the area's future primarily for general commercial and community business with a small pocket for residential use.
- *Segment 4 (town of Index):* Current land use is comprised of two commercial properties which include a café and an espresso business, with the area zoned primarily for single-family residences, agriculture, and forest use. Neighborhood businesses are allowed along the corridor in smaller

sections. Snohomish County's *Comprehensive Plan* has designated this area's future for rural use.

- *Segment 4 (city of Skykomish):* Current land use is overwhelmingly residential with a small amount of commercial use concentrated around 5th Street. The Historical District is located on the south side of US 2 primarily in the vicinity of 5th and 6th Streets. The comprehensive plan indicates future land use adjacent to US 2 as primarily residential with some commercial use.
- *Segment 4 (Unincorporated King County):* Current land use is primarily residential. Land is generally zoned for rural-area residential or forest use which is consistent with the future designations of King County's *Comprehensive Plan*.

Community Demographics

Current and future demographic data were obtained from year 2000 U.S. Census data files as well as year 2005 Washington State Office of Financial Management data files to calculate current population, projected population, average housing cost, average income and ethnic make-up of the US 2 study area. Using GIS, a 300-foot boundary was drawn on both the north and south sides of the US 2 corridor. (Population and other data outside of city limits were taken from within this boundary.) For the entire US 2 study area, the current population is 48,374, with a median income of $53,926 and a median residence cost of $178,838. Socio-economic and socio-demographic characteristics of notable study area cities and townships are briefly described below. Areas that contain Asian, African-American and Hispanic populations greater than five percent are shown in **Exhibits 2.2** (Hispanic)**, 2.3** (African-American), and **2.4** (Asian).

- *Segment 1 (city of Snohomish):* The population of Snohomish is approximately 8,640 and is projected to increase to 13,620 by 2025 (includes city and urban growth area). Currently, 7.2 percent of the population subsists beneath the poverty level. The median income is $46,396 with a median residence cost of $180,000. Approximately 9.8 percent of the entire population are minorities. Within the city limits, there are sections in which the Hispanic population is greater than 5 percent. This is shown in Exhibit 2.2.
- *Segment 2* (*city of Monroe):* Monroe's population is approximately 15,920 and is projected to increase to 26,590 by 2025 (includes city and urban growth area). Currently, 8.9 percent of the population subsists beneath the poverty level. The median income is $50,390 with a median residence

Exhibit 2.2
US 2 Study Area Sections with Hispanic Populations above Five Percent

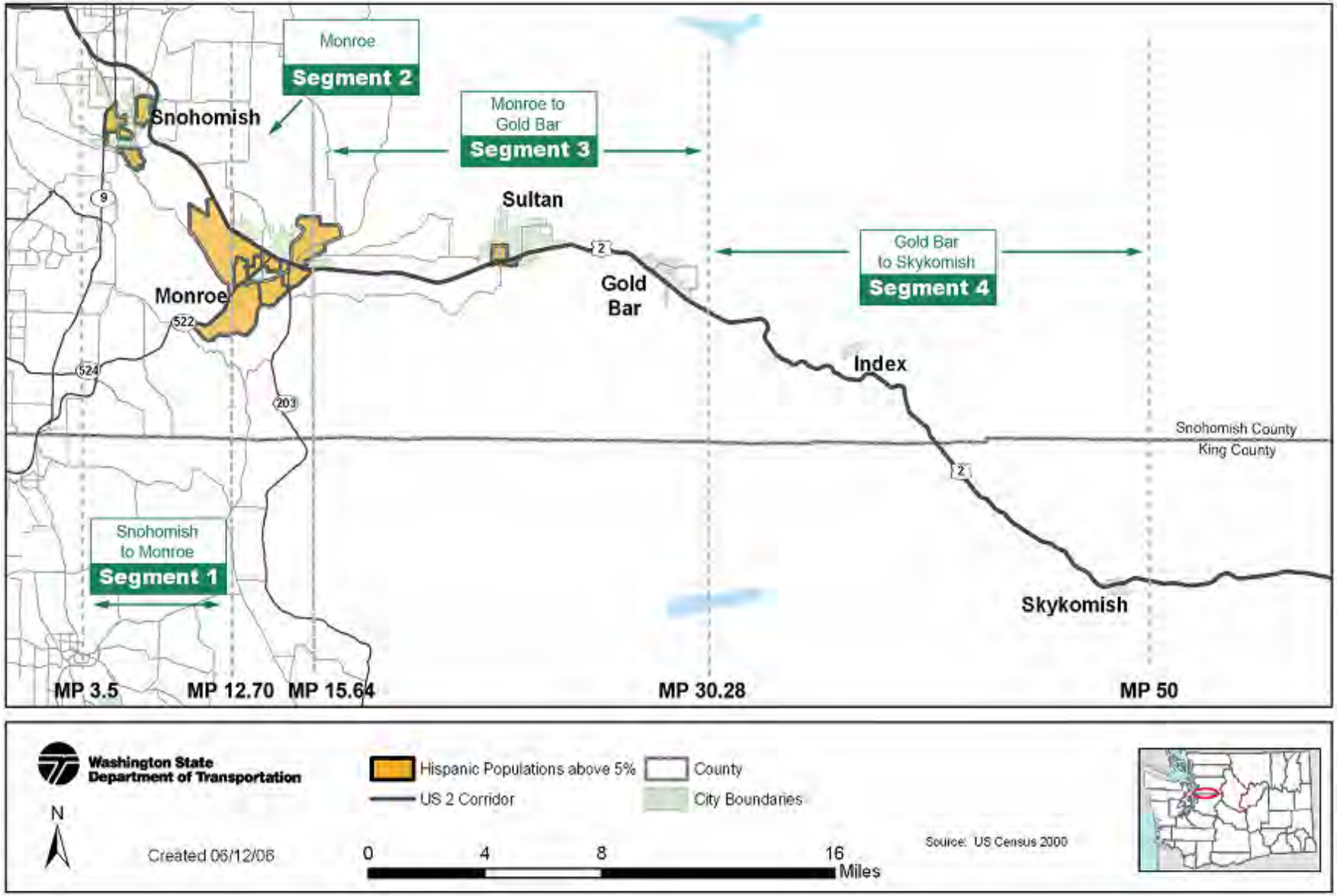


Exhibit 2.3
US 2 Study Area Sections with African-American Populations above Five Percent

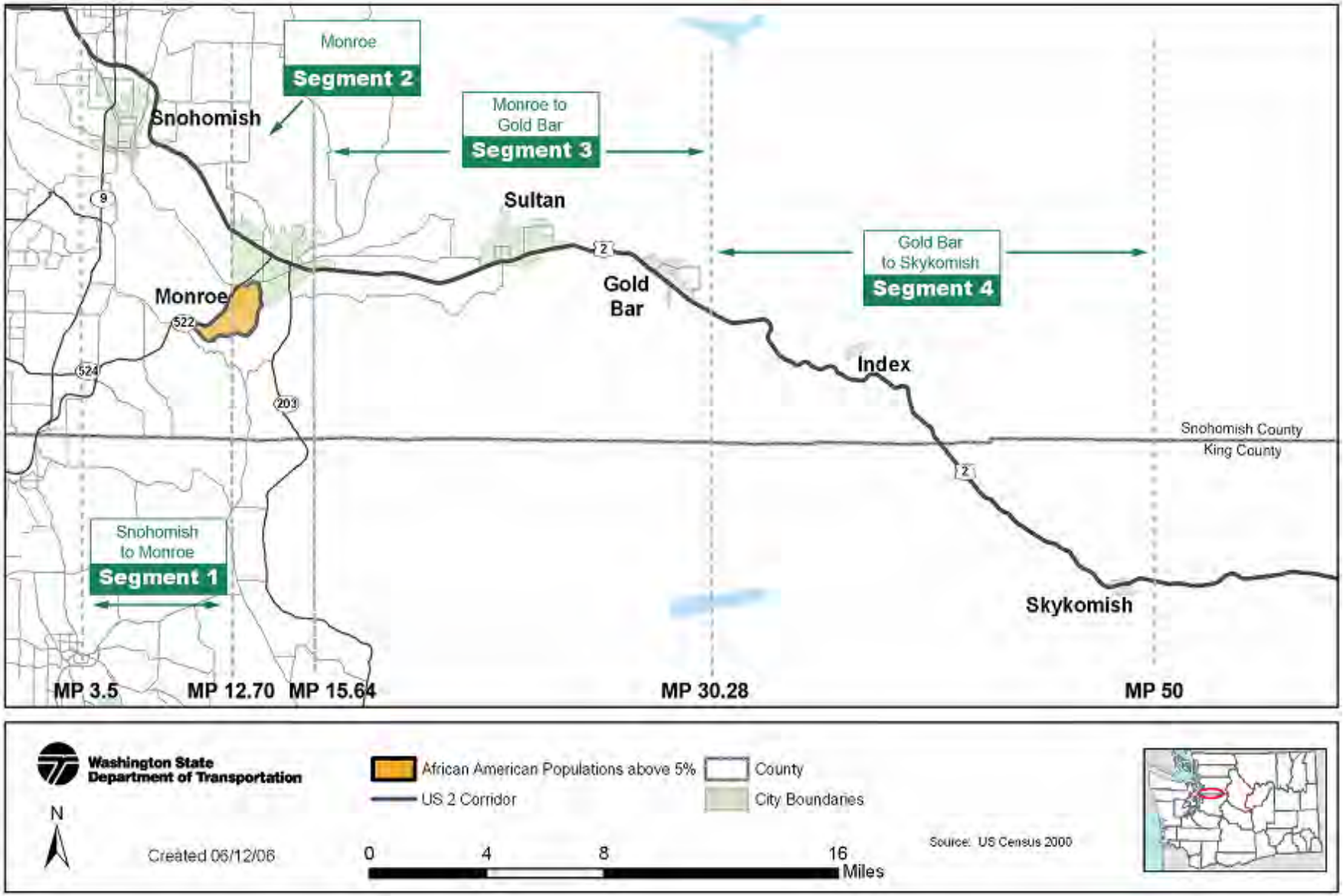
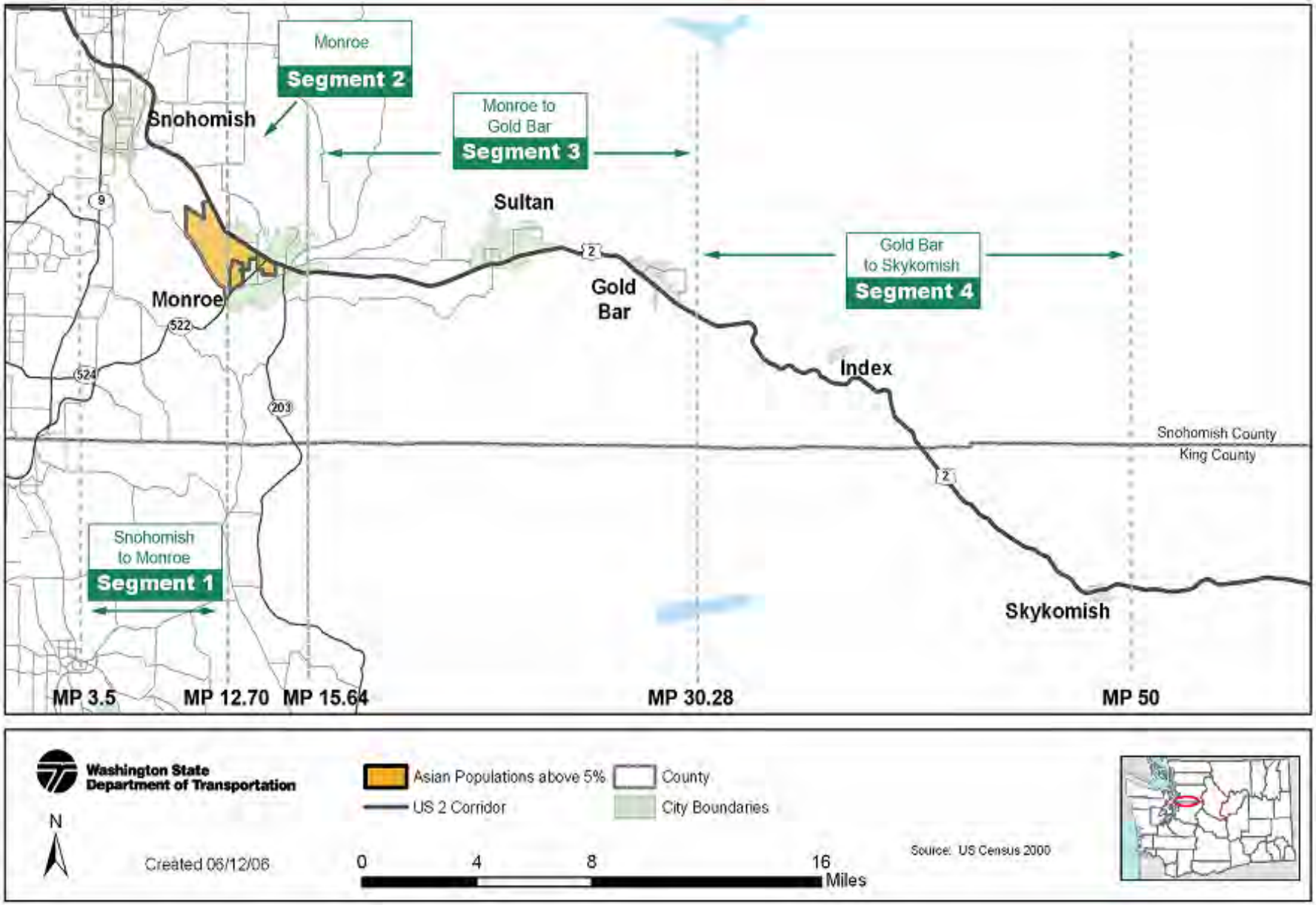


Exhibit 2.4
US 2 Study Area Sections with Asian Populations above Five Percent



cost of $251,000. Approximately 23.6 percent of the entire population are minorities. Within the city limits, there are sections in which Hispanics, Asians, and African Americans each constitute more than five percent of the population. These are shown in **Exhibits 2.2 to 2.4**.

- *Segment 3* (*city of Sultan):* The population of Sultan is approximately 3,814 and is projected to increase to 11,122 (holding capacity) by 2025. Currently, seven percent of the population subsist beneath the poverty level. The median income is $46,619 with a median residence cost of $160,000. Approximately 6.5 percent of the entire population are minorities. Within the city limits, there are sections in which Hispanics are greater than five percent of the population. This is shown in **Exhibit 2.2**.
- *Segment 3 (city of Gold Bar):* The population of Gold Bar is approximately 2,014 and is projected to increase to 5,170 by 2025. Currently, 7.1 percent of the population subsists beneath the poverty level. The median income is $45,714 with median residence cost of $148,800. Approximately 11.3 percent of the population are minorities.
- *Segment 4 (town of Index):* The population of Index is 157 and is projected to increase to 210 by 2025. Currently, 16.9 percent of the population subsists beneath the poverty level. The median income is $43,125 with a median residence cost of $109,700. The combined population of all minorities is five percent of the total.
- *Segment 4 (town of Skykomish):* The population of Skykomish is 215 and is projected to increase to 389 by 2025. Currently, nine percent of the

population subsist below the poverty level. The median income is $45,357 with a median residence cost of $87,500. Minorities represent approximately four percent of the total population.

2 Physical Configuration and Speed Limits

The US 2 study corridor is primarily a two-lane undivided roadway. For parts of Segment 1 near Snohomish and Segment 2 through Monroe, US 2 widens to four lanes (two lanes in each direction). Within Segment 4 there are small stretches of roadway designed with passing lanes in one direction (bringing the total number of lanes to three). Speed limits change throughout the study area with speed limits along most of Segments 1 and 4 at 60 mph, and those along Segments 2 and 3 falling primarily between 35 and 50 mph. **Exhibits 2.5** and **2.6** on the following page include details of the physical configuration of the study area and **Exhibit 2.7** gives a summary of study area shoulder widths.

A description of chain-fastening shoulders (sections of the roadway that allow travelers to fasten chains to the tires of their vehicles) as well as slow-vehicle lanes that exist within the study area are included in **Exhibit 2.8**. The overwhelming majority of these physical roadway features exist within Segment 4, which is a two-lane highway that climbs into the Cascades.

3 Horizontal and Vertical Alignments

Sub-standard horizontal and vertical alignment areas are described in **Exhibits 2.9** and **2.10**. All of these sub-standard alignments are located in Segments 3 and 4.

4 Intersections

The US 2 study area contains a number of intersections but very few are signalized (only eight). Some of these un-signalized intersections are controlled by two-way stop-signs but many of the roads that access the highway have minor or no stop control.

Exhibit 2.5

US 2 Study Area Physical Configuration and Speed Limits

Segment	Milepost	Location	# EB Lanes	Width (feet)	# WB Lanes	Width (feet)	Speed Limit
1	3.50(4) - 3.83	Exit to old SR 2	2	24	2	24	60
1	3.83 - 4.67	SR 2 intersection, bridge, 87th Avenue	2	24	1	12	60
1	4.67 - 5.02	On ramp, off ramp	2	24 - 18	2	24 - 18	60
1	5.02 - 5. 84	SR 9 uxing, SR 9 off/on ramp	1	12	2	24	60
1	5.84 - 12.70	Bridge (Pilchuck River), Three Lakes Road, cattle oxing, Monroe City entrance	1	12	1	12	60 (turns to 55 at MP 12.00)
2	12.70 - 14.27[a]	Roosevelt Road, County Fairgrounds	1	12 - 13	1	12 - 13	12.71 - 13.47 (55), 13.47 - 13.87 (45)
2	14.27 - 14.44[b]	SR 522 uxing, SR 522 on ramp	2	24 - 30	1	12 - 14	45
2	14.44 - 15.27[c]	Chain Lake Road, shopping center, Ann Street, Main Street	2	22	2	22	35
2,3	15.27 - 16.49	Woods Creek Bridge, Monroe City exit	1	11 - 13	1	11 - 13	15.15 - 15.37(35), 15.37 - 15.64(55)
3	16.49 - 23.55[d]	Calhoun Road, weigh station, Sultan City entrance, Sultan River, Sultan Mill Pond	1	11 - 13	1	11 - 13	15.64 - 21.39 (55), 21.39 - 23.14 (35), 23.14 - 23.32 (50)
3	23.55 - 24.22[e]	Cemetery Road	2	22	1	11	50
3	24.22 - 30.28[f]	Exit Sultan City, rest area, enter Startup, enter Gold Bar City, Stevens Pass Hwy, exit Gold Bar City	1	11 - 12	1	11 - 12	24.18 25.54 (50), 25.54 - 26.28 (35), 26.28 - 27.48 (50), 27.48 - 28.72 (40), 28.72 - 30.28 (55)
4	30.28 - 31.24	Skykomish River, Proctor Creek	1	11 - 12	1	11 - 12	55
4	31.24 - 31.46	No significant landmarks	2	22	1	12	31.24 - 31.30(55), 31.30 - 31.46 (60)
4	31.46 - 32.02	No significant landmarks	2	22	2	22	60
4	32.02 - 33.05[g]	No significant landmarks	2	22	1	12	60
4	33.05 - 50.00[h]	Anderson Creek, Index River Road, Eagle Falls Creek, Barclay Creek, Town of Baring, Beaver Creek, Money Creek Campground, City of Skykomish, Old Cascade Hwy	1	11 - 14	1	11 - 14	60

Key: a - road stretch includes turn-pockets not included in lane widths (total width is 24 - 39); b- road stretch includes turn-pockets not included in lane widths (total width is 49 - 56); c - road stretch includes turn-pockets & two-way turn lanes not included in lane widths (total width is 44 - 64); d - road stretch includes turn-pockets & two-way turn lanes not included in lane widths (total width is 22 - 57); e - road stretch includes two-way turn lanes not included in lane widths (total width is 44); f - road stretch includes turn pockets & two-way turn lanes not included in lane widths (total width is 22 - 37); g - road stretch includes chain-up lane not included in lane width (total width is 34 - 41); h - road stretch includes chain-up, slow vehicle, and two-way turn lanes not included in lane widths (total width is 22- 50)

Exhibit 2.6

US 2 Study Area Speed Limits

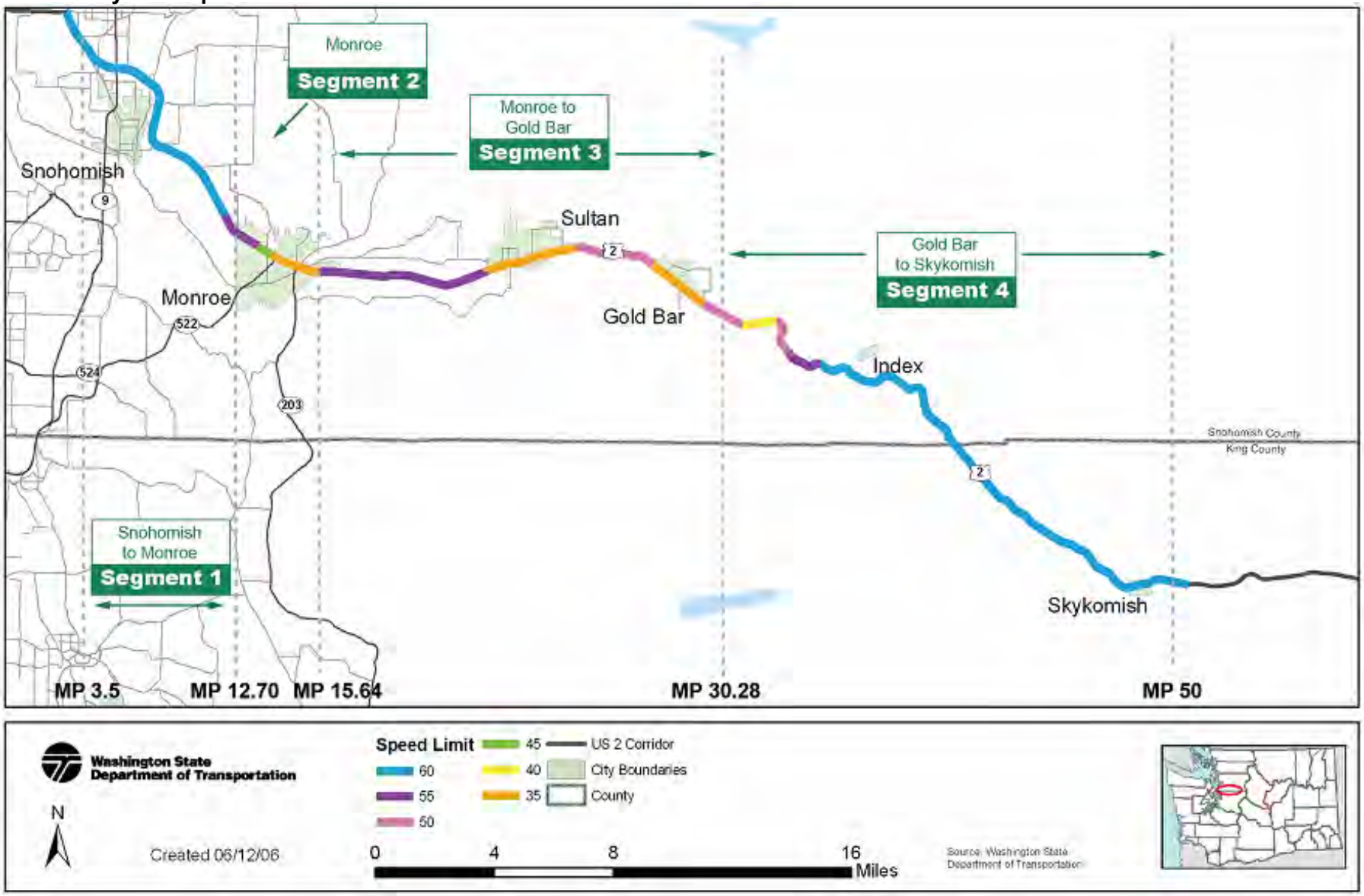


Exhibit 2.7

US 2 Study Area Shoulder Widths

Segment	Milepost	Location	EB Shoulder Width (feet)	WB Shoulder Width
1	3.50(4) - 3.83	Exit to Old SR 2	4,8	8,6
1	3.83 - 4.67	SR 2 intersection, bridge, 87th Avenue	0 -8	0 - 8
1	4.67 - 5.02	On-ramp, off-ramp	6	6
1	5.02 - 5. 84	SR 9 uxing, SR 9 off/on ramp	8	6
1	5.84 - 12.70	Bridge (Pilchuck River), Three Lakes Road, cattle oxing, end at Monroe City entrance	0 - 8	0 - 8
2	12.70 - 14.27	Roosevelt Road, County Fairgrounds	7 - 8	8 - 9
2	14.27 - 14.44	SR 522 uxing, SR 522 on-ramp	6	8 - 10
2	14.44 - 15.27	Chain Lake Road, shopping center, Ann Street	0 -12	0 - 10
2	15.27 - 16.49	Main Street, Woods Creek Bridge, Monroe City exit	0 - 8	0 - 8
3	16.49 - 23.55	Calhoun Road, weigh station, Sultan City entrance, Sultan River, Sultan Mill Pond	0 - 10	0 - 8
3	23.55 - 24.22	Cemetery Road	6	7
3	24.22 - 30.40	Exit Sultan City, rest area, enter Startup, enter Gold Bar city, Stevens Pass Hwy, exit Gold Bar city	0 - 10**	0 - 10
4	30.40 - 31.24	Skykomish River, Proctor Creek	0 - 5	0 - 5
4	31.24 - 31.46	No significant landmark	4	4
4	31.46 - 32.02	No significant landmark	4	4
4	32.02 - 33.05	No significant landmark	2 - 3	2 - 3
4	33.05 - 50.00	Anderson Creek, Index River Road, Eagle Falls Creek, Barclay Creek, Town of Baring, Beaver Creek, Money Creek Campground, City of Skykomish, Old Cascade Hwy	0 - 18**	0 - 8

**Segment 3 area contains a 0.18 mile long chain fastening section; segment 4 contains a wide shoulder adjacent Barclay Creek, and a 0.15 mile long chain fastening section

Exhibit 2.8
Chain-Fastening Shoulder Sections and Slow-Vehicle Lanes

Segment	Milepost	Location	Description
3	28.84 - 29.02	Dorman Road	EB chain-fastening section
4	33.04 - 33.16	No Name Creek area	EB chain-fastening section
4	40.11 - 40.42	Barclay Creek area	EB slow-vehicle lane
4	43.60 - 43.82	Forest Service Road #6028	EB slow-vehicle lane
4	44.96 - 45.11	681st Avenue, Money Creek Campground	WB slow-vehicle lane
4	44.99 - 45.21	681st Avenue, Money Creek Campground	EB slow-vehicle lane
4	49.40 - 49.63	Sky Lane, Beckler Road	EB slow-vehicle lane
4	49.82 - 50.15	Ranger Station	EB slow-vehicle lane
4	49.94 - 50.20	Ranger Station	WB slow-vehicle lane

Exhibit 2.9
Sub-Standard Horizontal Alignments

Milepost	Curve Length	Radius	Design Speed
24.77	1358	2865	45
25.40	801	2865	45
26.21	307	1910	45
26.43	296	1910	35
40.06	870	1433	45
43.72	539	955	35

Segment 1 contains no signalized intersections. Between 88th Street SE and Fryelands Blvd/Roosevelt Road SE, private driveways that access farms and residences intersect US 2 almost every one quarter mile. Further, there are two interchanges in this segment; the first one connects US 2 and SR 9 by a full cloverleaf-shaped interchange and the second connects US 2 and 88th Street SE by a diamond-shaped interchange.

Segment 2 contains the most signalized intersections (six), with other intersections controlled primarily by stop-signs. SR 522 and US 2 are connected by a single loop interchange. Segment 3 contains two signalized

intersections, with other intersections controlled mainly by two-way stop-signs. Segment 4 contains no signalized intersections, but contains numerous intersections controlled primarily by two-way stop-signs. Intersection locations are shown in **Exhibits 2.11** through **2.14** on the following pages.

Exhibit 2.10
Sub-Standard Vertical Alignments

Milepost	Curve Length	Design Stopping Sight Distance	Design Speed
22.88	400	444	45
30.20	350	297	35
31.71	300	385	40
33.70	150	377	40
33.74	150	223	30
34.07	150	302	35
34.62	400	342	40
35.03	250	274	35
35.16	250	363	40
35.64	700	428	45
35.87	350	317	35
36.12	500	471	45
36.88	200	383	40
37.84	1320	427	45
42.96	600	459	45
43.78	300	387	40
44.09	800	453	45
45.85	300	417	45

Signalized intersections

There are eight signalized intersections within the US 2 study area, with six located in Monroe and the remaining two in Sultan. (A signal has been proposed for Sultan Basin Road.) **Exhibit 2.15** lists the locations of signalized intersections.

Channelized intersections

Channelized intersections provide space for approaching cars to turn right or left (one or both) depending on the traffic needs of the intersection vicinity. Channelized intersections within the US 2 study area with left-turn functionality are mainly comprised of one-way, delineated left-turn pockets at high volume intersections and two-way left-turn lanes along the more urbanized segments of the route. **Exhibit 2.16** lists the intersections with left turn pockets. Almost all of the two-way (both eastbound and westbound) left-turn pockets are located in more urbanized areas where speed limits are lower.

Exhibit 2.11

US 2 Intersections along Segment 1

Exhibit 2.12

US 2 Intersections along Segment 2

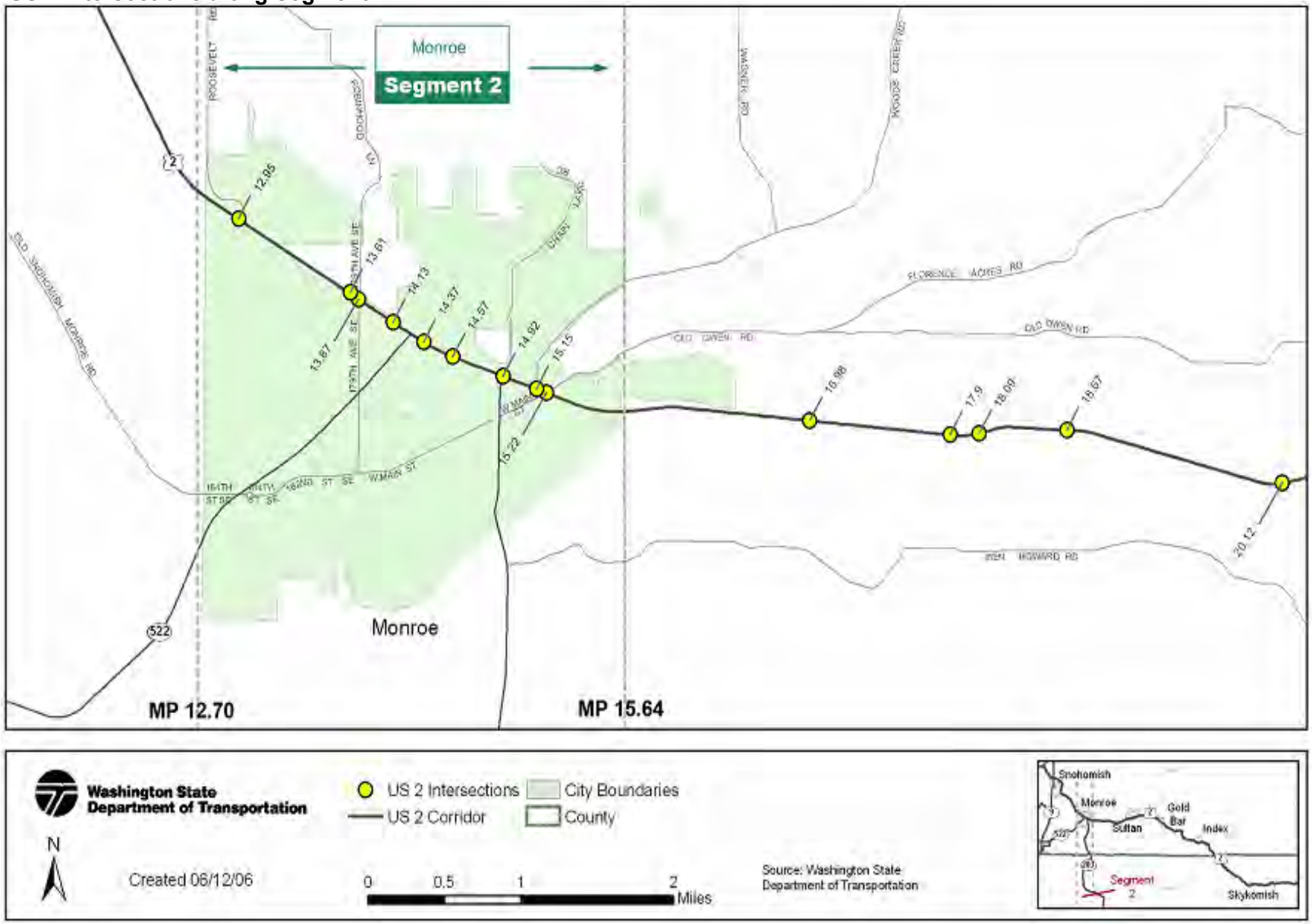


Exhibit 2.13

US 2 Intersections along Segment 3

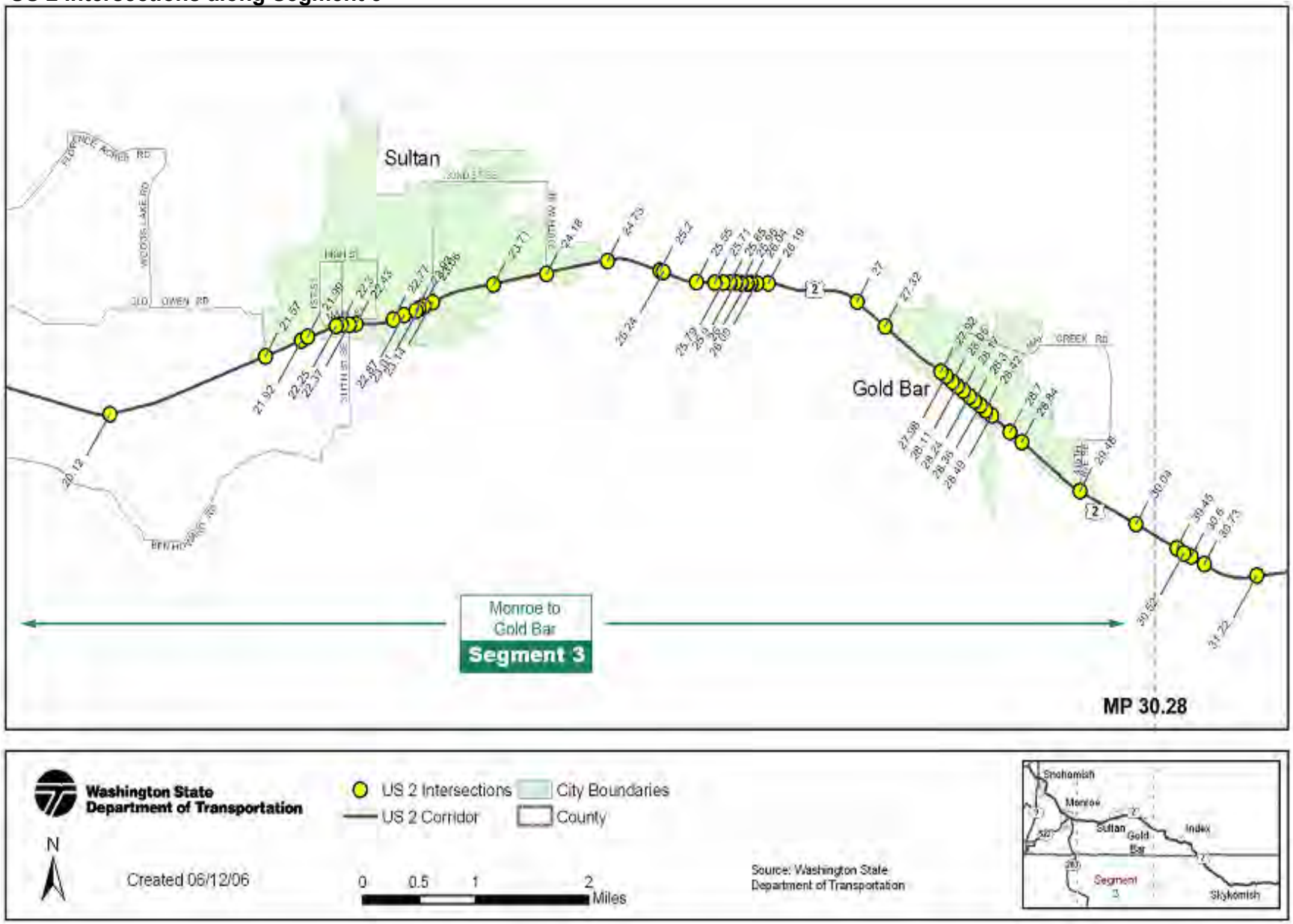


Exhibit 2.14

US 2 Intersections along Segment 4

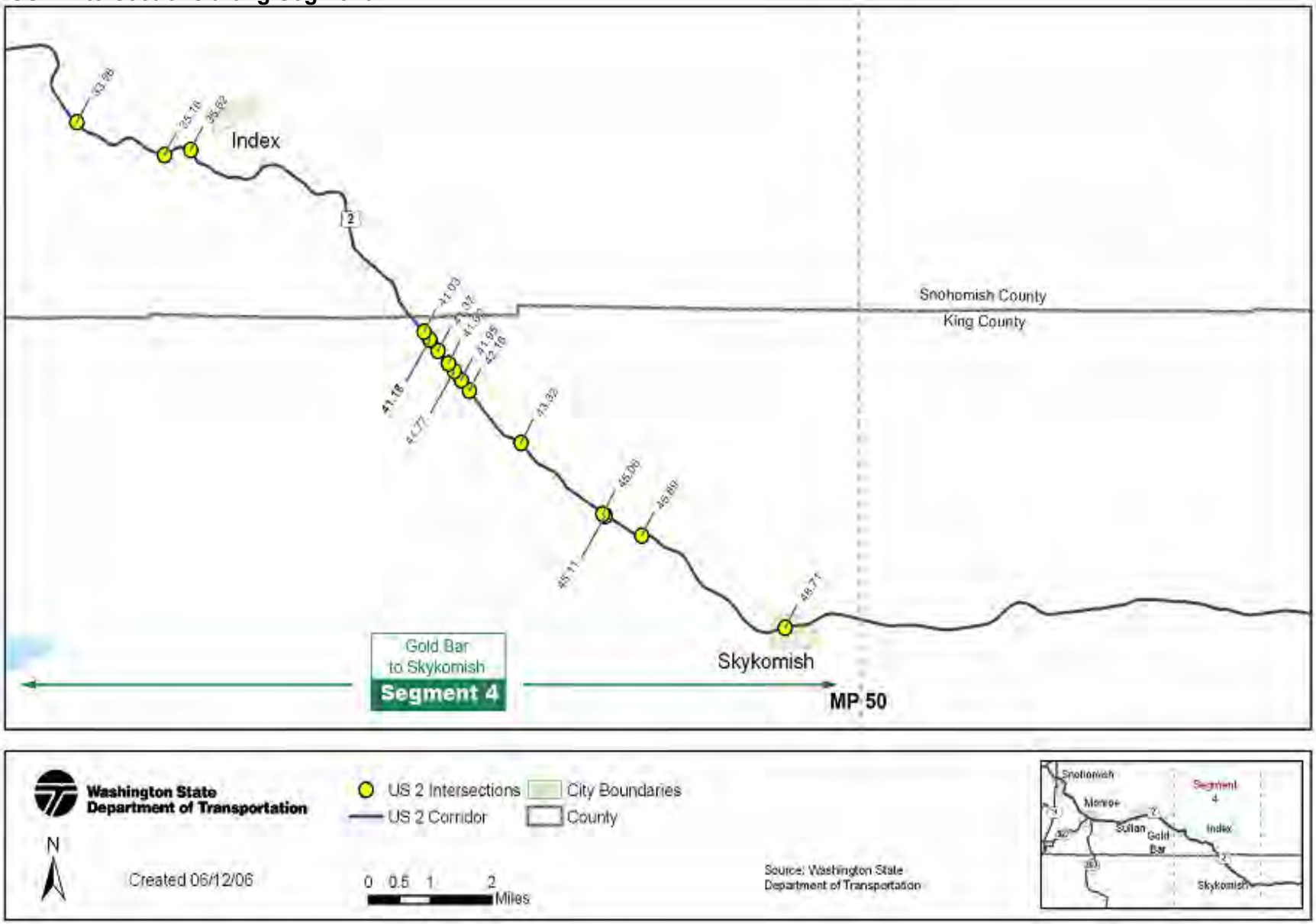


Exhibit 2.15
US 2 Signalized Intersections

Segment	Milepost	Location
2	12.95	E Roosevelt Road / 163rd Avenue SE
2	13.87	179th Avenue SE
2	14.37	SR 522
2	14.57	Kelsey Street
2	14.92	SR 203-Lewis Street / Chain Lake Road
2	15.22	Main Street / Old Owen Road
3	21.57	Old Owen Road / Fern Bluff Road
3	22.37	5th Street

Exhibit 2.16
Left-Turn Pockets along US 2

Segment	Milepost	Intersection	Speed Limit	Left turn lane in eastbound direction	Left turn lane in westbound direction
1	10.03	100th Street SE	60	yes	no
1	10.55	Roosevelt Road	60	yes	no
2	12.95	E Roosevelt Road	55	yes	yes
2	13.61	County Fairgrounds Entrance/Exit	45	yes	no
2	13.87	179th Avenue SE	45	yes	yes
2	14.13	Cascade View Dr	45	yes	no
2	14.37	On ramp to SR 522	45	yes	no
2	14.57	Kelsey Street	35	yes	yes
2	14.92	Chain Lake Road	35	yes	yes
2	15.15	Woods Creek Road/Ann Street	35	yes	no
2	15.22	Main Street/Old Owen Road	35	yes	yes
3	16.98	Sofie Road/Calhoun Road	55	yes	yes
3	18.67	Fern Bluff Road	55	yes	no
3	21.57	Old Owen Road/Fern Bluff Road	35	yes	yes
3	22.25	3rd Street	35	yes	no
3	25.23	Startup Rest Area	50	no	yes
3	25.55	Sultan Startup Road	35	yes	yes
3	26.19	Kellog Lake Road	35	yes	no
3	30.04	Reiter Road	55	yes	no
4	31.22	Co Road	55	yes	yes
4	35.62	Index-Galena Road	60	yes	no
4	48.71	5th Street (Skykomish)	60	no	yes

Exhibit 2.17 summarizes information concerning two-way turn lanes within the study area. The majority are located in Segment 3 (East Monroe to West Gold Bar), with two within Monroe and one within Skykomish.

The US 2 study area contains three interchanges, with two located in Segment 1 and the other in Segment 2. **Exhibit 2.18** briefly describes these interchanges.

Exhibit 2.17
Two-Way Turn Lanes

Segment	MP Section	Location
2	14.44 - 14.52	directly before Kelsey Street
2	14.64 - 14.87	directly after Kelsey Street
2	14.97 - 15.10	Chain Lake Road, Ann Street
3	21.62 - 21.98	Fern Bluff Road, Rest Area
3	22.27 - 22.91	3rd Street, Main Street, park & ride lot
3	23.55 - 24.22	Cemetary Road, exit Sultan
3	25.61 - 26.13	enter Startup, 369th Avenue
3	27.87 - 28.48	enter Gold Bar, 9th Street
3	28.49 - 28.61	Croft Avenue
4	48.68 - 48.81	enter Skykomish, 5th Street

Exhibit 2.18
US 2 Interchanges

Segment	Milepost	Location	Ramp Type
1	4.75	SR 9	On, WB
1	4.80	SR 9	Off
1	5.28	SR 9	Off
1	5.35	SR 9	On, EB
1	7.90	Campbell Road	On, WB
1	8.18	Campbell Road	Off
1	8.79	Campbell Road	Off
1	8.80	Campbell Road	On, EB
2	14.37	SR 522	On, WB
2	14.37	SR 522	Off

5 Bridges and Intercrossing Structures

There are numerous bridges and other structures in the US 2 study area. A considerable number of these bridges and structures were built in the 1930's and 1940's and are nearing their serviceable life expectancy (75 years). The average bridge age is 54. A complete list of US 2 bridges with their characteristics and ratings are summarized in **Exhibit 2.19** and their locations are depicted in **Exhibit 2.20**.

There are a total of four major culverts in the US 2 study area. Two are in Segment 2 and two in Segment 3. Those in Segment 2 are in the city of Snohomish with one at Cemetery Creek west of Highway 9, and the other at Bunk Foss Creek at the city's northeast corner. Of the remaining two, one is at Wagley's Creek west of Sultan Basin Road in Sultan, and the other is east of 13th Street off the Wallace River crossing in Gold Bar.

6 Crosswalks

Crosswalks are located at six intersections; five are located within Segment 2 (passing through the most populated city of Monroe), with the last located within the city of Sultan. Crosswalks coincide with signalized intersections and bridge all corners except those at milepost 15.22 (disjointed on the north and west sides). **Exhibit 2.21** provides more information about crosswalks in the study area.

7 Sidewalks

Pedestrian routes exist along US 2 within the cities of Monroe, Sultan, Gold Bar, and the unincorporated village of Startup, with sidewalks available on both sides of US 2 through most of Monroe. A curb lies

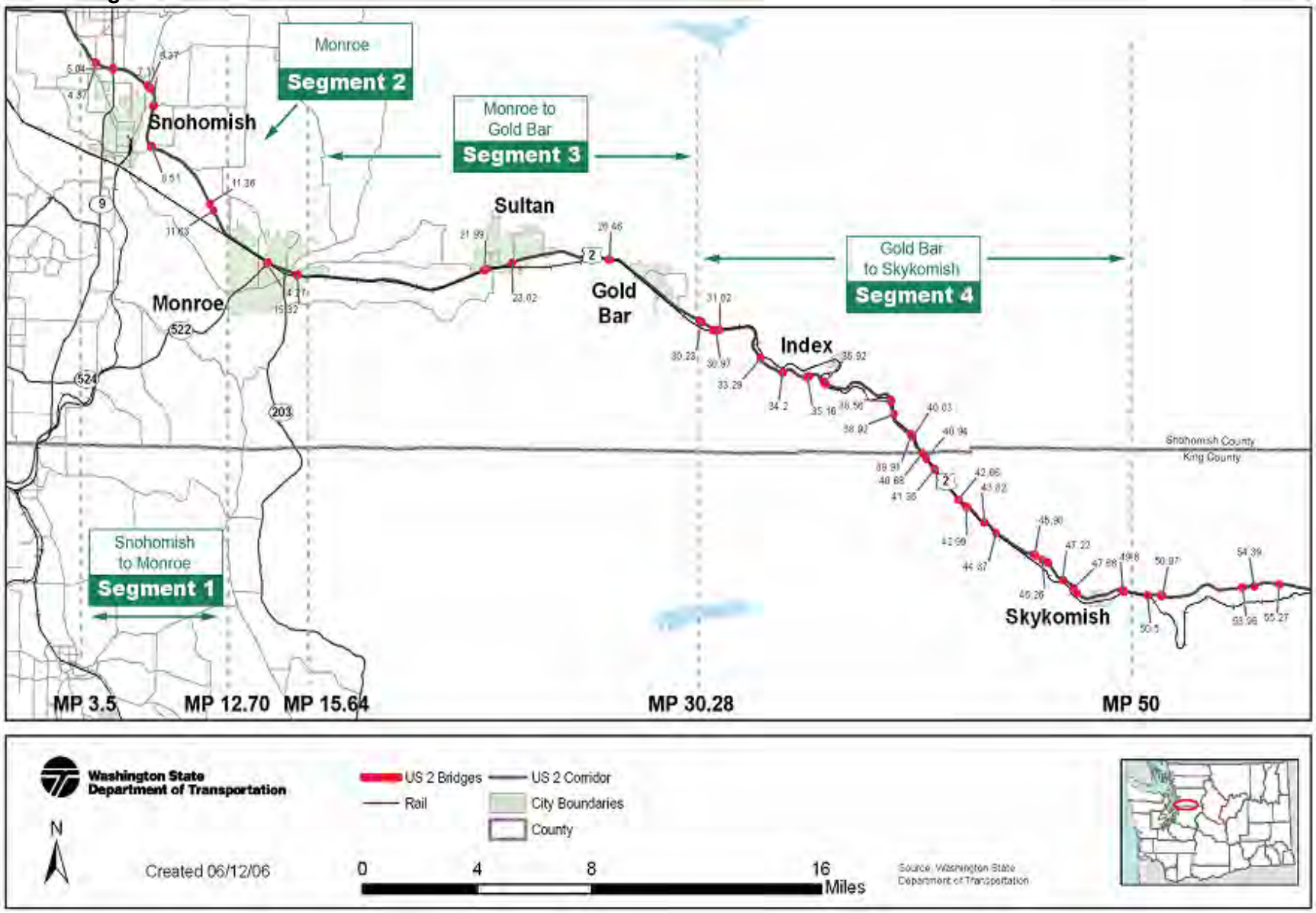
Exhibit 2.19
US 2 Bridges and Intercrossing Structures

Mile-post	Bridge #	Bridge Name	Year Built	Operating Tonnage	Sufficiency Rating*
4.37	2/9	87th Avenue Overcrossing	1982	F99	93.37
5.04	9/124.7	Junction SR 9	1979	F99	98.50
6.39	2/10N	Pilchuck River Bridge	1983	F99	86.21
7.11	2/11	Three Lakes Road Undercrossing	1983	F60	97.85
8.49	2/12	Campbell Road Undercrossing	1983	F80	97.92
11.41	2/17	French Creek Bridge	1948	F75	82.37
11.68	2/18	Farm Road Overcrossing	1948	F75	82.37
14.27	522/150	SR 522 Undercrossing	1971	F57	93.20
15.37	2/22	Woods Creek Bridge	1950	F55	74.03
22.04	2/26	Sultan River Bridge	1940	F31	44.53
23.07	2/28	Sultan Mill Pond Bridge	1952	F50	72.97
26.51	2/30	Wallace River Bridge	1940	F34	47.86
30.28	2/35	Skykomish River Bridge	1932	F49	28.99
30.97	2/36	Burlington Northern Undercrossing (GN)	1932	N60	0.00
31.07	2/37	Proctor Creek Bridge	1933	F34	48.45
33.34	2/38	No-Name Creek Bridge	1933	F63	60.00
34.25	2/39	Anderson Creek Bridge	1933	F55	58.57FO
35.21	2/40	S Fork Skykomish River Bridge	1933	F39	41.98FO
35.92	2/42	Burlington Northern Undercrossing (GN)	1963	N60	0.00
38.61	2/45	Burlington Northern Overcrossing (GN)	1936	F57	60.22FO
38.98	2/46	Eagle Falls Creek Bridge	1986	F90	77.00
39.96	2/48	Barclay Creek Bridge	1934	F96	79.00
40.08	2/49	Stream	1986	F62	80.00
40.73	2/101	Slough	1986	F99	78.00
40.99	2/102	Stream	1986	F99	78.00
41.41	2/103	Stream	1986	F99	79.00
42.66	2/104	Beaver Creek Bridge	1986	F99	79.00
43.06	2/105	Burlington Northern Overcrossing	1986	F64	80.00
43.87	2/106	Stream	1988	F99	79.00
44.42	2/107	Stream	1988	F75	75.00
45.98	2/108	Tunnel	1937	O99	0.00
46.31	2/109	Stream	1937	W47	78.08
46.49	2/110	Stream	1937	W48	67.37
46.76	2/111	Stream	1937	W47	78.08
47.27	2/112	Slough	1989	F42	86.50
47.71	2/113	Stream	1937	W47	66.54
47.91	2/114	Stream	1937	W47	78.08
48.70	2/115A	John G Henry Memorial Bridge	1939	F35	64.52
49.65	2/116	S Fork Skykomish River Bridge	1938	F29	48.70
50.55	2/118	Anthracite Creek Bridge	1940	F45	71.49

Key: *If the value in this column is <50, the structure needs replacement or repair. '**F**' – structure is made of concrete and/or steel and ratings are calculated by load factor method; '**W**' – structure is made of timber and ratings are calculated by working stress method; '**N**', '**O**' – no calculation conducted; '**FO**' – functionally obsolete

Exhibit 2.20

US 2 Bridges



on the north side of US 2 in Sultan to restrict vehicle access to properties abutting the highway and to provide a walkway for pedestrians. Further, sidewalks are provided on both sides of US 2 between Main Street and 10th Avenue (MP 22.61 to MP 22.82). There are five blocks of sidewalk on the north side of US 2 in Startup between 363rd Avenue SE and 369th Avenue SE (MP 25.80- MP 26.10), as well as 12 blocks of sidewalk on the north side of US 2 in Gold Bar from 1st Street to just west of 13th Street (MP 27.90 – MP 28.60).

Exhibit 2.21
Crosswalks along US 2

Segment	Milepost	Location	Crosswalk Presence
2	12.95	E Roosevelt Road, 163rd Avenue SE	N, S, W, E
2	13.87	179th Avenue SE	N, S, W, E
2	14.57	Kelsey Street	N, S, W, E
2	14.92	Left - Chain Lake Road, Right - SR 203, Lewis Street	N, S, W, E
2	15.22	Left - Old Owen Road, Right - Main Street	S, W
3	21.57	Left - Old Owen Road, Right - Fern Bluff Road	N, S, W, E

Key: Letters stand for crosswalks located on N-north, S-south, W-west, E-east sides of intersection

8 Bicycle Routes

The US 2 study area contains very limited bicycle facilities. There are no dedicated facilities or paths.

Segment 1 contains no bicycle facilities. In Segment 2, Fryelands Boulevard Trail connects US 2 with Main Street, and shoulders along US 2 are used by bicyclists. Segment 3 contains paved sidewalks in downtown Gold Bar between 1st Street and just west of 13th Street, and in both Sultan and Gold Bar, shoulders on US 2 are used by bicyclists. A trail has been proposed on the north side of US 2 in Sultan. As in the other segments, there are no dedicated facilities in Segment 4, but in Index and Skykomish, shoulders on US 2 are used by bicyclists.

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Chapter 3
Existing Traffic Conditions

The purpose of this chapter is to present current traffic conditions along US 2 within the project study area. Chapter 4 presents safety issues as they relate to these traffic conditions as well as the physical conditions discussed in Chapter 2 of this document.

1 Average Daily Traffic on US 2

The US 2 corridor has been, and will continue to be, impacted by continued population growth. Along with being a major link within the state of Washington for conventional trip purposes, it also serves as a primary route for seasonal recreational activities including skiing in the winter, camping and hiking in the summer, and hunting in the fall. The vast majority of US 2 (in Segments 3 and 4) is a two-lane roadway which does not always lend itself to the smooth flow of traffic, with congestion at times producing frustrated drivers and subsequent traffic collisions.

Annual Average Daily Traffic (AADT)

Vehicular traffic volumes are generally expressed using annual average daily traffic (AADT) counts. These counts are based on actual data with seasonal adjustments.

Raw traffic counts require seasonal adjustments to compensate for monthly and daily fluctuations of vehicular traffic. Seasonal adjustment factors were assigned values based on yearly volumes counted at automatic traffic recorders set up at certain locations within the road network. For the purposes of this study, these values were calculated to be between the ranges of 1.04 and 1.58 for weekdays, and 1.05 to 2.04 for weekends.

Exhibit 3.1 on the following page lists the average daily traffic counts taken at 24 different intersections along US 2. All measured locations for Segments 1 and 2 carry more traffic on the weekdays than weekends. The opposite holds true for most locations along Segments 3 and 4, where weekend traffic counts are an average of seventy percent higher for all locations along those segments, and an extraordinary 162 percent higher on the weekends for Segment 4 alone. This is in part due to the mountainous and scenic topography of particularly Segment 4 which attracts recreational travel on the weekends.

Exhibit 3.1
Average Daily Traffic Counts along US 2

Segment	Milepost	Location	Weekday AADT	Weekend AADT
1	MP 3.85	Bickford Avenue (Old SR 2)	33332	22156
1	MP 5.04	SR 9 (Ramps)	23936	16668
1	MP 8.51	Campbell Road / 88th Street SE (Ramps)	22925	18707
1	MP 10.08	100th Street SE	29093	23729
1	MP 10.55	Roosevelt Road	28247	22426
2	MP 12.95	E Roosevelt Road / 163rd Avenue SE	26690	21489
2	MP 13.87	179th Avenue SE	25031	22653
2	MP 14.37	SR 522	36058	29740
2	MP 14.57	Kelsey Street	42938	36063
2	MP 14.92	SR 203-Lewis Street / Chain Lake Road	37764	32764
2	MP 15.15	Ann Street / Woods Creek Road	27937	25298
2	MP 15.22	Main Street / Old Owen Road	23702	22258
3	MP 21.57	Old Owen Road / Fern Bulff Road	20176	29808
3	MP 22.37	311th Avenue SE / 5th Street	19230	29600
3	MP 22.77	Main Street / Old Owen Road	15410	25298
3	MP 23.14	Sultan Basin Road / Cemetery Road	13380	23780
3	MP 27.52	Nugget	12414	22560
3	MP 27.92	1st Street	26842	21790
3	MP 28.17	5th Street	11123	21056
3	MP 29.48	Gunn Road / Picklefarm Road	9048	19290
3	MP 30.04	Reiter Road	22069	14976
4	MP 35.62	Index-Galena Road	6411	16785
4	MP 48.71	5th Street	6533	17543
4	MP 48.98	Old Cascade Hwy	6400	11000

Notes: Traffic counts taken by Snohomish and King Counties Between Jan & March 2006

2 Peak Hour Traffic Movements

PM peak hour traffic movements on weekdays and weekends for the abovementioned intersections are described in **Exhibits 3.2** and **3.3**. As with the average daily traffic (ADT) counts above, the majority of locations within Segments 1 and 2 have higher weekday counts, while the opposite holds true for the majority in Segments 3 and 4. The PM peak-hour traffic movements in Segments 3 and 4 are an average of 1.4 times higher on the weekend than

Exhibit 3.2
Weekday PM Peak-Hour Intersection Traffic Movements

Segment	Milepost	Location	EB			WB			NB			SB		
			L	T	R	L	T	R	L	T	R	L	T	R
1	3.85	Bickford Avenue (83rd Avenue /Old SR 2)	434	0*	21	0*	0*	0*	0*	929	0*	0*	788	0
1	5.04	SR 9 Interchange (Nof interchange)	0*	0*	0*	89	0	173	161	851	0*	0*	433	9
1	5.04	SR 9 Interchange (S of interchange)	98	0	139	0*	0*	0*	0*	851	26	167	433	0*
1	8.51	88th Street Interchange (ramps on NE side)	0*	0*	0*	327	1	40	86	304	0*	0*	129	48
1	8.51	88th Street Interchange (ramps on SW side)	49	1	86	0*	0*	0*	0*	320	421	26	434	0*
1	10.08	Westwick Road (100th Street)	0*	0*	0*	1	0*	54	0*	1206	4	97	1034	0*
1	10.55	Roosevelt Road	0*	0*	0*	3	0*	51	0*	1132	4	84	983	0*
2	12.95	Fryelands Blvd (E Roosevelt Road)	37	821	149	44	731	85	321	129	84	82	56	73
2	13.87	179th Avenue SE	21	866	118	102	758	98	155	60	294	79	63	36
2	14.37	SR 522 Interchange	63	1143	0*	0*	873	516	0*	0*	0*	630	0*	77
2	14.57	Kelsey Street	272	1308	77	129	995	120	152	246	134	155	174	205
2	14.92	SR 203 (Chain Lake Road / Lewis Street)	171	1074	240	181	994	48	272	206	193	128	132	71
2	15.15	Woods Creek Road (Ann Street)	375	815	98	0*	841	114	0*	0*	16	0*	0*	234
2	15.22	Old Owen Road (Main Street)	236	594	8	74	492	43	281	219	239	148	168	199
3	21.57	299th Avenue SE (Old Owen/Fern Bluff Road)	53	968	0	0	511	129	1	0	6	136	1	32
3	22.37	Mann Road (311th Avenue/5th Street)	30	827	34	23	515	21	31	12	44	80	17	26
3	22.77	Main Street (Sultan)	5	747	0*	0*	543	81	0*	0*	0*	88	0*	6
3	23.14	Sultan Basin Road (323rd Avenue SE)	151	618	28	1	509	11	9	2	1	4	1	83
3	27.45	Nugget Road (Gold Bar)	7	509	0*	0*	358	0	0*	0*	0*	0	0*	3
3	27.92	1st Street (399th Avenue SE)	84	432	0*	0*	327	20	0*	0*	0*	12	0*	34
3	28.17	5th Street (Gold Bar)	9	410	0*	0*	323	15	0*	0*	0*	8	0*	19
3	29.48	Picklefarm Road (Gunn Road/415 Avenue)	126	204	1	0	237	4	1	0	0	11	0	40
3	30.04	Reiter Road (Gold Bar)	34	175	0*	0*	281	3	0*	0*	0*	4	0*	21
4	35.62	Index-Galena Road	52	134	0*	0*	316	13	0*	0*	0*	2	0*	36
4	48.71	N 5th Street (Skykomish)	0*	115	16	7	204	0*	20	0*	5	0*	0*	0*

Note: L, T, R are traffic traveling left, thru, and right, respectively. '*' indicates traffic cannot access that direction

Exhibit 3.3
Weekend PM Peak-Hour Intersection Traffic Movements

Segment	Milepost	Location	EB			WB			NB			SB		
			L	T	R	L	T	R	L	T	R	L	T	R
1	3.85	Bickford Avenue (83rd Avenue /Old SR 2)	200	0*	5	0*	0*	0*	0*	795	0*	0*	590	0
1	5.04	SR 9 Interchange (N of interchange)	0*	0*	0*	65	0	174	132	494	0*	0*	374	9
1	5.04	SR 9 Interchange (S of interchange)	60	0	107	0*	0*	0*	0*	494	30	111	374	0*
1	8.51	88th Street Interchange (ramps on NE side)	0*	0*	0*	276	5	25	66	150	0*	0*	150	34
1	8.51	88th Street Interchange (ramps on SW side)	28	0	38	0*	0*	0*	0*	193	258	18	413	0*
1	10.08	Westwick Road (100th Street)	0*	0*	0*	5	0*	61	0*	1037	13	65	776	0*
1	10.55	Roosevelt Road	0*	0*	0*	4	0*	35	0*	998	7	36	781	0*
2	12.95	Fryelands Blvd (E Roosevelt Road)	27	669	82	68	858	53	101	68	66	75	71	57
2	13.87	179th Avenue SE	25	739	57	70	891	90	93	26	104	160	36	80
2	14.37	SR 522 Interchange	69	898	0*	0*	891	748	0*	0*	0*	468	0*	41
2	14.57	Kelsey Street	236	820	66	124	1325	150	83	225	105	243	273	307
2	14.92	SR 203 (Chain Lake Road / Lewis Street)	125	848	172	130	1324	41	209	107	106	68	92	40
2	15.15	Woods Creek Road (Ann Street)	264	592	69	0*	1211	59	0*	0*	6	0*	0*	230
2	15.22	Old Owen Road (Main Street)	173	401	13	110	973	29	131	135	88	68	162	172
3	21.57	299th Avenue SE (Old Owen/Fern Bluff)	56	771	0	6	1579	125	0	3	3	157	5	38
3	22.37	Mann Road (311th Avenue/5th Street)	11	768	62	46	1499	8	54	5	45	64	22	54
3	22.77	Main Street (Sultan)	10	885	0*	0*	1718	141	0*	0*	0*	64	0*	10
3	23.14	Sultan Basin Road (323rd Avenue SE)	115	658	58	2	1573	6	26	2	2	2	0	139
3	27.45	Nugget Road (Gold Bar)	5	627	0*	0*	1486	0	0*	0*	0*	0	0*	6
3	27.92	1st Street (399th Avenue SE)	80	526	0*	0*	1427	34	0*	0*	0*	26	0*	83
3	28.17	5th Street (Gold Bar)	11	523	0*	0*	1451	5	0*	0*	0*	2	0*	3
3	29.48	Picklefarm Road (Gunn Road/415 Avenue)	112	406	8	2	1341	11	2	0	3	5	0	75
3	30.04	Reiter Road (Gold Bar)	58	344	0*	0*	1256	5	0*	0*	0*	2	0*	131
4	35.62	Index-Galena Road	49	306	0*	0*	1516	29	0*	0*	0*	10	0*	43
4	48.71	N 5th Street (Skykomish)	0*	198	5	36	1226	0*	8	0*	15	0*	0*	0*

Notes: L, T, R are left, through and right, respectively. '*' denotes traffic cannot access that direction

weekdays in the eastbound direction, surging to an average of 4.2 times higher than the weekdays in the westbound direction. As the weekend traffic counts were taken on Sunday, travelers returning from recreational activities located in Segments 3 and 4 heavily influence these numbers.

3 Level of Service (LOS)

Exhibits 3.4 through **3.7** on the following pages provide information concerning PM peak-hour LOS at the selected 24 intersections along the US 2 study area. For this study, LOS was determined using the *2000 Highway Capacity Manual* methodology published by the Transportation Research Board. Intersections were divided by signalization, with 'overall LOS' the general index used to evaluate signalized intersections and 'intersection capacity utilization rates' used for un-signalized intersections. This ICU is the sum of all time required to serve all movements at saturation divided by a reference time length. Moreover, to gain insight into the actual movements causing the deteriorating traffic conditions, the direction of the worst movement along with its LOS was determined. Worst traffic movement LOS values were not listed for intersections whose worst traffic movements were evaluated to be better than 'E'. Analogous to the ADT values and peak counts displayed previously, intersection LOS values worsen throughout the majority of Segments 3 and 4 from the weekdays to the weekends (along with a considerable increase in the utilization rate). Weekend recreational travel can be seen as a primary determinant of this result.

LOS for the study area segments was also determined using the *2000 Highway Capacity Manual* methodology published by the Transportation Research Board. The study area was divided into sections with like

characteristics and is essentially congruent to the study area initial segment classification, differing only in

Exhibit 3.4
Weekday PM Peak-Hour Signalized Intersection LOS (2006)

Segment	MP	Location	Overall LOS	Worst Movement Direction	LOS
2	12.95	E Roosevelt Road / 163rd Avenue	D	NBL, WBL	F
2	13.87	179th Avenue SE	C	NBL	F
2	14.37	SR 522	D	EBL, SBL, WBT	E
2	14.57	Kelsey Street	D	EBL, WBL, NBL, SBL	E
2	14.92	SR 203	D	WBL	F
2	15.22	Old Owen Road / Main Street	C	EBL, WBL, NEL, SWL	D
3	21.57	Fern Bluff Road/Old Owen Road (Sultan)	C	NBT, SBL	F
3	22.37	5th Street (Sultan)	B	EBT, NBT, SBT	B

Exhibit 3.5
Weekend PM Peak-Hour Signalized Intersection LOS (2006)

Segment	MP	Location	Overall LOS	Worst Movement Direction	LOS
2	12.95	E Roosevelt Road / 163rd Avenue	C	NBL, WBL, SBL	E
2	13.87	179th Avenue SE	C	SBL	F
2	14.37	SR 522	C	SBL	E
2	14.57	Kelsey Street	D	EBL, NBT, SBL	F
2	14.92	SR 203	C	WBL, NBL	E
2	15.22	Old Owen Road / Main Street	C	NEL	E
3	21.57	Fern Bluff Road/Old Owen Road (Sultan)	F	WBT, SBL	F
3	22.37	5th Street (Sultan)	D	NBT	F

Exhibit 3.6
Weekday PM Peak-Hour Un-signalized Intersection LOS (2006)

Segment	MP	Location	Utilization Rate	Worst Movement Direction	LOS
1	3.85	Bickford Avenue / Old US 2	80	NEL	F
1	8.51	WB ramps at 88th Street SE	61	WBL, WBT, WBR	F
1	8.51	EB ramps at 88th Street SE	59	EBL, EBT, EBR	D
1	10.08	Westwick Road / 100th Street SE	83	SBL, SBR	E
1	10.55	Roosevelt Road	78	WBL, WBR	E
2	15.15	Ann Street / Woods Creek Road	79	SBR	F
3	22.77	Main Street	51	SEL, SER	F
3	23.14	Sultan Basin Road / Cemetary Road	85	NBL, NBT, NBR	F
3	27.52	Nugget Road	42	SBL, SBR	B
3	27.92	1st Street (Gold Bar)	35	SBL, SBR	B
3	28.17	5th Street (Gold Bar)	32	SBL, SBR	B
3	29.48	415th Avenue SE / Gunn Road	44	NBL	C
3	30.04	Reiter Road	32	SBL, SBR	B
4	35.62	Index-Galena Road	34	SWL, SWR	B
4	48.71	N. 5th Street (Skykomish)	26	NBL	B
4	48.98	Old Cascade Highway	N/A	N/A	N/A

Exhibit 3.7
Weekend PM Peak-Hour Un-signalized Intersection LOS (2006)

Segment	MP	Location	Utilization Rate	Worst Movement Direction	LOS
1	3.85	Bickford Avenue / Old US 2	60	NEL	F
1	8.51	WB ramps at 88th Street SE	49	WBL, WBT, WBR	E
1	8.51	EB ramps at 88th Street SE	47	EBL, EBT, EBR	C
1	10.08	Westwick Road / 100th Street SE	66	SBL, SBR	D
1	10.55	Roosevelt Road	63	WBL, WBR	D
2	15.15	Ann Street / Woods Creek Road	89	SBR	F
3	22.77	Main Street	101	SEL, SER	F
3	23.14	Sultan Basin Road / Cemetary Road	153	NBL, NBT, NBR, SBL, SBR	F
3	27.52	Nugget Road	88	SBR	E
3	27.92	1st Street (Gold Bart	88	SBL, SBR	F
3	28.17	5th Street (Gold Bar)	87	SBL, SBR	F
3	29.48	415th Avenue SE / Gunn Road	113	NBL, NBR, SBL, SBR	F
3	30.04	Reiter Road	81	SBL, SBR	F
4	35.62	Index-Galena Road	92	SWL, SWR	F
4	48.71	5th Street (Skykomish)	91	NBL	E
4	48.98	Old Cascade Highway	N/A	N/A	N/A

Note: '*' denotes intersections whose worst LOS values are better than 'E'.

Segment 3 which is further sub-divided into three sections to account for the slightly varying road environment character. All sections have an LOS better than 'E' except for the city of Monroe as well as Segment 4. **Exhibit 3.8** summarizes this information.

Exhibit 3.8
PM Peak-Hour Segment LOS along US 2 Study Area (2006)

Segment	MP	Location	Direction	Weekday LOS	Weekend LOS
1	3.85 - 12.95	City of Snohomish, SR 9	WB	E	D
			EB	D	D
2	12.95 - 15.64	City of Monroe	WB	C	C
			EB	C	C
3	15.64 - 21.57	Monroe city exit to Sultan city entrance	WB	D	E
			EB	D	NC [E]
3	21.57 - 24.44	City of Sultan	WB	C	D
			EB	NC [C]	D
3	24.44 - 30.28	Town of Startup, City of Gold Bar	WB	C	D
			EB	NC [C]	D
4	30.28 - 50.00	Town of Index, City of Skykomish	WB	C	E
			EB	NC [B]	E

Key: NC[x] - LOS value not computed by software, but assessed using HCM charts.

4 Regional Transportation Network

US 2 begins in Everett and passes through a variety of jurisdictions, including the cities of Snohomish, Monroe, Sultan, Gold Bar, as well as the towns of Index and Skykomish, then climbs into the Cascade Mountains. It is a major east-west highway connector for the Puget Sound region.

SR 9 intersects US 2 on the north side of Snohomish at milepost 5.04 and has been classified as a Highway of Statewide Significance since 2004. SR 9 starts in Woodinville (King County) and ends in Arlington

(Snohomish County), and is part of the Everett couplet. The ADT for SR 9 averages 9,500 vehicles throughout the corridor with a count of 21,000 at the US 2 bridge. SR 9 connects to US 2 via an interchange with access to and from all directions, and is a two-lane highway with un-signalized left-turn pockets in the US 2 vicinity.

In addition to SR 9, major arterials that can access US 2 from the Snohomish vicinity are Bickford Avenue, 92nd Street SE/88th Street SE, Three Lakes Road and South Machias Road. SR 522 and SR 203 both intersect US 2 within the Monroe city limits, at mileposts 14.27 and 14.92, respectively.

SR 522 runs at a southwest-northeast diagonal and provides linkage between US 2 and I-5. It is also a Highway of Statewide Significance and has access to US 2 via a signalized single-loop interchange. The average ADT for the entire length of SR 522 is 38,700 vehicles with the ADT at its junction with US 2 approximately 15,000.

Though not a highway of statewide significance, SR 203 runs essentially north-south from Monroe south to Preston, King County where it intersects SR 202. The ADT along this arterial averages 10,900 with an ADT of approximately 14,000 directly before its junction with US 2. SR 203 connects to US 2 via an at-grade signalized intersection in central Monroe.

US 2 is a primary arterial serving inter-community as well as intra-metro area movements for Monroe. East of Monroe, the regional road transportation network considerably decreases in extent, with US 2 providing the primary access from the cities of Sultan, Gold Bar, Index and Skykomish to other communities in the region. For communities east of Monroe accessing the

Puget Sound Region, US 2 is the major arterial being used.

5 Public Transit

Public transit facilities and services exist within the study area including bus, park and ride, and rail.

Buses

Community Transit provides five bus routes within the study area. Three of these routes travel between the cities of Snohomish (starting at Everett) and Gold Bar via Sultan and Monroe. Routes 270 and 271 provide service throughout the day with approximately one to 1.5 hour headways between Gold Bar and the city of Everett's downtown transit center during weekday peak hours. Route 275 serves essentially the same route but terminates in Monroe. Route 271 provides additional afternoon and weekend services while the others do not. Route 277 makes three early-morning (between 3:45 and 5:00 am) inbound runs and three mid-afternoon (between 2:00 and 3:15 pm) outbound runs between Gold Bar and the Boeing Plant. Route 424 travels through a section of US 2 originating at the Snohomish Park and Ride, traveling through Monroe, and terminating in downtown Seattle via SR 522. This route has three morning peak hour and four evening peak hour runs. **Exhibit 3.9** on the following page summarizes these bus routes.

Park and Ride

There are four park and ride facilities in the study area. Of these, the park and rides in Monroe, Sultan and Gold Bar have direct access to US 2. The remaining park and ride lot is located in Snohomish at the junction of Bickford Avenue and SR 9, approximately one mile south of the US 2/SR 9 Interchange. **Exhibit 3.10** summarizes the park and ride lots within the study area.

Exhibit 3.9
Bus Routes Traveling over US 2

Route	Origin-destination	Total no. of stops
270	Everett Stn-US 2 & 1st Street (Gold Bar)	8
271	Everett Stn-US 2 & 1st Street (Gold Bar)	9
275	Everett Stn-US 2 & Kelsey Street (Monroe)	6
277	Gold Bar P&R-Boeing Gate 68 S2	9 or 10
424	Snohomish P&R-4th Street/S Jackson Street (Seattle)	8

Exhibit 3.10
Park & Ride Locations

Park & ride lot	Location	No of stalls	Utilization rate
Gold Bar	US 2 & 2nd Street	28	32%
Monroe	17433 US 2	102	63%
Snohomish	SR 9 & Bickford Avenue	104	42%
Sultan	US 2, just east of Sultan	64	16%
Average		75	38%

The *Community Transit Development Plan for 2004-2009* does not propose specific transit service improvements for the US 2 corridor. However, Community Transit has identified the potential for planning, designing and constructing new or expanded park and ride lots along US 2 if funding is available.

Rail

The BNSF Railway Company's Stevens Pass main line route parallels US 2 for most of the study area. Most of this length consists of a single track, with passing sidings located at approximately ten-mile intervals. The BNSF tracks are used by both freight and Amtrak passenger rail service, with a combined average of 23 trains per day using the facility. Amtrak maintains a passenger depot in the city of Everett (west of study area) and Wenatchee (east of study area), with no at-grade railway crossings throughout this entire stretch. However, traffic on US 2 is impacted by at-grade crossings on side streets (Kelsey and Lewis Streets); due to the fact that when crossing gates are down, left and right turning traffic must wait to make their turns. This is notably a problem at the Valley View/179th Street intersection in Monroe, slightly west of SR 522.

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Chapter 4 Safety Issues

Traffic collisions along US 2 are high in number and diverse in nature. The roadway characteristics, such as varying speed limits and roadway configuration, severe curves and slopes, as well as narrow shoulders and bridges, contribute to the collisions along this roadway.

1 Collision Analysis Approach

Traffic collisions between the seven-year period of January 1, 1999 and December 31, 2005 (with some analyses extending to Feb 28, 2006) along the 47-mile study area (MP 3.5 – MP 50.0) were reviewed. Collisions were then analyzed according to a number of subgroups including type (rear-end, head-on, etc.), segment, time, and direction. Segments are further divided into High Accident Corridors (HACs) and High Accident Locations (HALs) to allow for more precise analyses. The data is disaggregated to identify trends or patterns that could produce a better understanding of the causal nature of collisions and ultimately lead to the development of countermeasures in an efficient and cost-effective manner.

2 Collision Rates

Collision rates are calculated per million vehicle miles and are a truer indication of collision propensity than raw data because they indicate collisions in terms of standardized

ADTs and section length. **Exhibits 4.1** presents collision rates along US 2 for the years 1999 to 2004.

Exhibit 4.1
Collision Rates along US 2 (1999 - 2004)

Segment	Year					
	1999	2000	2001	2002	2003	2004
3.50 to 12.70, Snohomish to Monroe	0.71	1.19	1.17	1.04	1.07	1.07
12.71 to 15.64, Monroe	5.99	4.83	5.49	4.46	3.19	4.53
15.65 to 30.28, Monroe to Goldbar, with Sultan ADT	1.02	0.99	0.98	1.06	1.08	0.82
15.65 to 30.28, Monroe to Goldbar, with Goldbar ADT	1.28	1.56	1.39	1.59	1.62	1.30
30.29 to 50.00, Goldbar to Skykomish	1.10	1.56	1.74	1.60	1.44	1.36
Statewide Average Collision Rate (Principal Arterials)	1.25	1.26	1.17	1.21	1.13	1.11

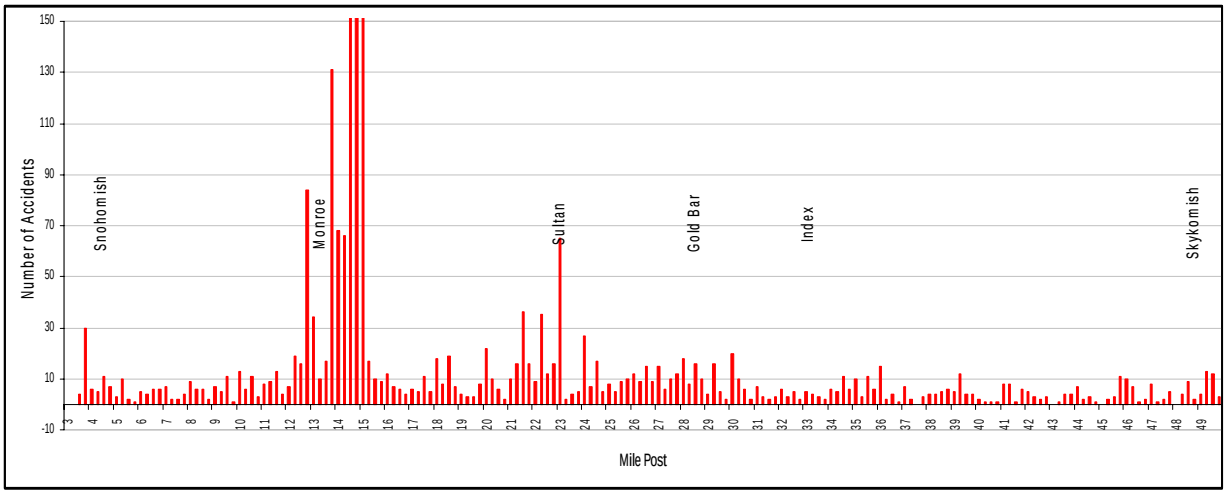
Segment Summary

Segment 1 is the only study area segment with lower collision rates than the statewide average. Collision rates for Segment 2 are higher that the statewide average for all years. Segment 2 contains the largest city in the study area and has much less free-flowing traffic than the remaining segments. The collision rate for Segment 3 is slightly lower than the statewide average when using ADT values from Sultan (located in the middle of Segment 3), while slightly higher than the statewide average when using ADT values from Gold Bar (located at the east end of Segment 3).

3 Collisions by Segment/Milepost

Exhibit 4.2 on the following page presents the total number of collisions throughout the US 2 study area. From January 1999 to February 2006, a total of 2,358 collisions occurred in this area. The data in **Exhibit 4.3** indicates that the preponderance of collisions occurred in

Exhibit 4.2
Collision Distribution by Milepost



the Monroe area (Segment 2). With 1,050 collisions, Segment 2 has almost double the collisions of the next highest segment (Segment 3). This can be attributed to the greater urban character of the city of Monroe whose population is much higher than cities and townships within the other segments. Monroe also has more intersections and commercial activities adjoining US 2, in addition to its higher ADT. The actual percentage of collisions in each segment is described in **Exhibit 4.4**.

Segment 2 accounts for almost half of all collisions within the study area and combined with Segment 3 accounts for essentially three-quarters of the total. In stark contrast, Segments 1 and 4 account for only 11 percent and 15 percent, respectively. Segment 1 is a four-lane divided highway for considerable stretches, and speed limits in Segments 1 and 4 are

Exhibit 4.3
Segment Collision Percentages

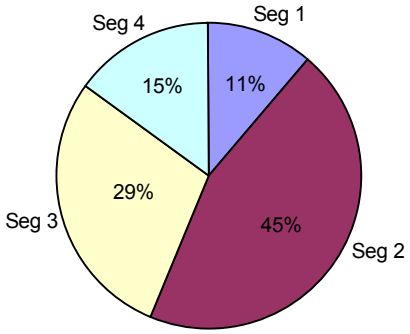


Exhibit 4.4
US 2 & Neigboring Vicinity Collisions

Segment	No of Collisions	Percent
1	403	15
2	1140	43
3	703	27
4	377	14
Total	2623	100

for most stretches set at 60 mph. Apart from a traffic signal at the SR 9 junction, there are no signalized intersections within these two segments. In addition, these two segments contain only one stretch with a two-way left turn lane which is located at the 5th Street intersection in Skykomish (Segment 4).

Exhibit 4.5
HALs along US 2 for 2006

MP Section	Vicinity
2.09 – 2.65	EB Off-Ramp to Hewitt Avenue
2.21 – 2.53	WB On-Ramp from SR 204
4.80 - 5.06	EB Off-Ramp to SR 9
5.01 - 5.28	WB Off-Ramp to SR 9
13.78 - 13.97	179th Avenue SE
14.04 - 14.22	Cascade View Dr
14.27 - 14.37	WB On-Ramp from SR 522
14.30 - 15.00	West of SR 522 to Shopping Center east of SR 203
15.08 - 15.30	West of Woods Creek Road/Ann Street to east of Old Owen Road

For collisions that include side streets and ramps in direct proximity to the US 2 corridor study area, the total number of collisions rises to 2,623 (from 2,358), however the percentages by segment are essentially the same. **Exhibit 4.4** provides more information.

4 HALs and HACs

The state of Washington conducts three types of safety deficiency analyses every two years; high accident locations (HALs), high accident corridors (HACs) and pedestrian accident locations (PALs). This US 2 existing conditions analysis considers the first two.

HAL analysis utilizes two years of historical collision data. To determine HALs, 0.1 mile of roadway is analyzed every 0.01 miles. Points are then allocated to each segment based on the number and severity of collisions that have occurred on that particular 0.01 mile segment of roadway. If the point total for that segment is greater than a pre-determined number, the segment is regarded as an HAL. The points are also used to calculate a “severity index” which is based on one million vehicles per year. The six types of highways that are analyzed are:

1. rural with full access control;
2. rural, two-lane without full-access control;
3. rural, four-lane without full-access control;
4. urban with full-access control;
5. urban, two-lane without full-access control; and
6. urban, four-lane without full-access control.

Exhibit 4.6
HACs along US 2 for 2006

MP Section	Vicinity
9.02 - 10.06	Campbell Road to 100th Street SE
16.49 - 18.48	West of Sofie Road to east of 245th Avenue SE
19.49 - 20.98	West of Fern Bluff Road to west of weigh station
24.99 - 26.48	West of Sultan Startup Road to west of Wallace River Bridge
27.49 - 28.48	Gold Bar western city limits to east of 9th Street
28.99 - 29.98	West of Picklefarm Road/Gunn Road to west of Reiter Road
29.99 - 30.98	Reiter Road to Railroad Xing
32.02 - 35.51	West of Chain-up shoulder to east of S Fork Skykomish River
37.52 – 40.01	Entrance of Mt. Baker National Forest to Barclay Creek

Exhibit 4.5 lists the high accident locations.

High accident corridors differ from high accident locations insofar as the unit of analysis is larger and the time-frame of analysis is longer. HAC analysis is done using five years of historical data and by analyzing 1 mile segments every 0.5 miles. Roadways are analyzed using the same six-group system as that for HALs. To determine whether or not any particular segment is an HAC three criteria are utilized:

1. total severity points per mile;
2. total collisions per mile; and
3. severity points per collision per mile.

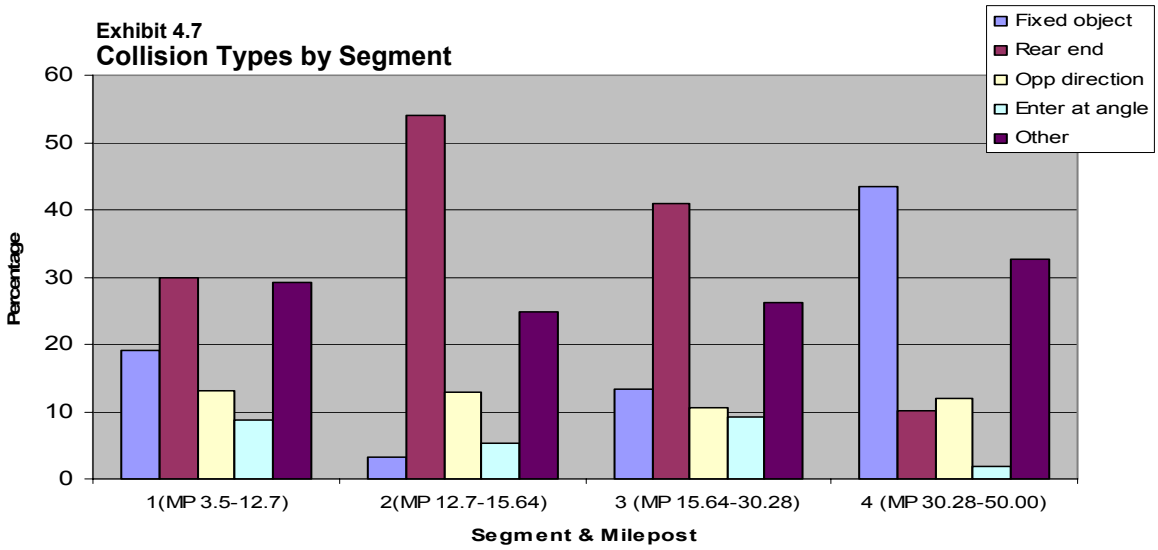
If a particular segment is above average for all three criteria, it is deemed a HAC.

5 Collision Types

Collisions were grouped according to type and segment in order to determine which segment types (roadway geometry) are more conducive to which collision types. In particular, categories used were: rear-end collisions, opposite direction collisions, fixed object collisions, entering the stream at an angle collisions, and an encompassing 'other' category which includes vehicle overturns, alcohol-related collisions, as well as pedestrian and bicycle collisions.

Collision types by segment are shown in **Exhibit 4.7**. In Segments 2 and 3, rear-end collisions account for 54 percent and 41 percent of all collisions, respectively. It could be surmised that the signalized intersections as well as other access and egress points throughout the corridor influence these numbers considerably. Segments 2 and 3 have at least two times the number of access/egress points per mile along their segments as Segments 1 and 4, with Segment 2 at three times that of Segment 1. More access/egress points produce more stopping and starting and therefore could be seen as influencing the number of rear-end collisions.

Exhibit 4.7
Collision Types by Segment



Fixed objects account for the highest percent of collisions along Segment 4, at 44 percent. The extreme curves, narrow shoulders, limited sight distance and susceptibility to adverse weather conditions all can be seen to contribute significantly to this number. Other types of collisions are relatively higher in Segments 1 and 4, at 29 percent and 33 percent, respectively.

6 Pedestrian/Bicycle Collisions

Of the 2,358 collisions that occurred during the study time-period (January 1999 to December 2005), ten of these involved pedestrians and bicyclers. These collisions are briefly described in **Exhibit 4.8**.

Exhibit 4.8
Collisions Involving Bicyclers/Pedestrians

Milepost	Location	Collision Number
14.57	Kelsey Street	4
14.92	SR 203	4
15.22	Main Street/Old Owen Road	2

Collisions involving pedestrians and bicyclers all occurred at intersections in addition to occurring essentially within the same road stretch (a less than one-mile stretch). The intersections at mileposts 14.57 and 14.92 have ADTs higher than the ADT average of the entire Segment 2 and much higher than the average ADT for the entire study area. These two intersections also carry heavy bicycle and pedestrian traffic with various commercial entrances and exits in the vicinity. Main Street/Old Owen Road is also near a number of commercial entrances and exits, plus the geometry of this intersection is skewed. These factors contribute to the collisions with pedestrians and bicyclers.

7 Fatalities

From January 1999 to June 2006, a total of 32 fatalities occurred within the study area of US 2. Head-on collisions produced the most number of fatalities (greater than ten), with sideswipe collisions producing the second most (seven). Fatality locations were uniformly distributed

throughout the study area, with the Monroe vicinity producing marginally higher fatalities than the remaining stretches. **Exhibit 4.9** summarizes fatalities within the study area.

Exhibit 4.9
US 2 Fatal Collisions (Jan 1999 to Jun 2006)

Milepost	No. of Fatalities	Comment
3.95	1	Head-on
5.37	1	Hit pedestrian
6.50	1	Head-on
7.98	1	Rear-end
9.00	3	Sideswipe
9.50	1	Head-on
14.13	1	Rear-end
15.22-15.64	4	Head-on, left turn, hit parked vehicle
17.30	1	Sideswipe
20.08	2	Head-on
21.80	1	Hit pedestrian
22.95	1	Hit pedestrian
24.50	1	Hit pedestrian
25.21	1	Fixed object
25.98	1	Sideswipe
26.40	1	Head-on
27.00	1	Rear-end
28.05	1	Fixed object
31.95	1	Other
34.29	1	Guardrail
37.40	1	Head-on
38.10	1	Overturn
39.24	1	Head-on
42.98	1	Sideswipe
47.52	1	Head-on
47.73	1	Sideswipe

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Chapter Five
Existing Environmental Inventory

An environmental inventory was conducted for the US 2 study area, with information primarily obtained from WSDOT, county, city and federal agency GIS files and associated reports. In addition, field checks and surveys were conducted along the corridor and study area. A summary of the natural resources are reviewed and discussed below.

Critical areas are shown in **Exhibits 5.1** through **5.13** at the end of this chapter. Along the US 2 study area, these maps identify locations of:

- Floodplains;
- Rivers and major creeks and streams;
- Wetlands;
- Steep slopes;
- Potential liquefaction;
- Wildlife habitats;
- Historic preservation;
- Recreational areas and parks; and
- Noise impact areas.

1 Floodplains

Large portions of the US 2 study area are located amid 100-year floodplains. Sections of US 2 within Segment 1 are situated along the 100-year Pilchuck River floodplain. Segment 2 contains a 100-year Skykomish River floodplain on the east side of Monroe. Within Segment 3 lies a 100-year floodplain stemming from Sultan River, Wagley's Creek, Wallace River, and Skykomish River. In Gold Bar, US 2 is also located within a 100-year floodplain of Wallace River and Skykomish River. Within Segment 4, US 2 is located on a 100-year floodplain along the South Fork and North Fork of Skykomish River. Finally, a floodplain and flood zone encompasses the corridor primarily in the western part of Skykomish.

2 Rivers, Major Creeks and Streams

In Segment 1, the Pilchuck River abuts the west side of US 2 in eastern Snohomish and crosses under US 2 at the northeast corner of the city. Both Bunk Foss Creek (east of SR 9) and Cemetery Creek (west of SR 9) run under US 2, and the French Creek passes under US 2 near MP 11.00. In Segment 2, Skykomish River abuts US 2 from the south in eastern Monroe. In Segment 3, the Sultan River, Wagley Creek, Woods Creek, Wallace River and Skykomish River all abut and/or cross US 2. The Wallace River and Skykomish River run through Gold Bar and access the State Fish Hatchery, with the Skykomish River abutting US 2 from the south. There are at least four other smaller, unnamed streams in this segment that cross US 2. In Segment 4, the North and South Fork Skykomish River meet near Index at US 2, with the South Fork of the Skykomish River intersecting US 2 six times. The Tye River, Proctor Creek, Anderson Creek and Barclay Creek all intersect US 2. Smaller creeks intersecting US 2 in this segment are Noname Creek and Anthracite Creek as well as

seven unnamed creeks. Near the town of Skykomish, there are two streams that cross US 2 and merge with Skykomish River.

3 Wetlands

The study area is dotted with numerous wetlands, many of which are corollary to the Skykomish River environment. In Segment 1, a Class 2 wetland exists south of US 2 extending from SR 9 to the Pilchuck River. Segment 2 contains wetlands east of Monroe and south of US 2. Wetlands exist in Segment 3 on both the north and south side of US 2 between 8th and 330th Streets, concomitant with the Skykomish River. This segment also contains wetlands along US 2 in the Wallace River vicinity. Hydric soils exist east of 13th Street. In Segment 4, where US 2 and rivers are co-terminus, wetlands are also common, but the wetlands are generally separated from US 2 by the river.

4 Steep Slopes

The US 2 study area contains a number of steep slopes with potential landslide areas. These steep slopes can limit corridor widening with required retaining walls or realignment. Detailed geotechnical studies are required to examine the impacts of conducting US 2 projects in steep slope areas. Segments 1 and 2 contain no identified steep slopes adjacent to US 2. In Segment 3, steep slopes were identified west of the Sultan Mill Pond Bridge 2/28 (MP 23.07), near the Wagley Culvert Crossing and along the Wallace River. East of Gold Bar, steep slopes were identified at various points adjacent US 2. Segment 4 contains steep slopes north of US 2 in Skykomish.

5 Potential Liquefaction

Liquefaction is the condition where soil becomes liquid-like during an earthquake. Liquefaction has been

responsible for damage to roads and bridges during the aftermath of earthquakes. The majority of the US 2 study area have been classified as moderate to high liquefaction areas. If liquefaction were to occur during an earthquake, a key risk would be to bridges within the US 2 study area. Further geotechnical studies are necessary to determine the impacts of conducting projects within liquefaction areas. To combat this, road structures must be constructed to county and state earthquake standards. Apart from a small section within Segment 4 (classified as low to moderate), the entire study area is classified as a moderate to high liquefaction area.

6 Wildlife Habitats

The presence of endangered species and priority habitat species within the study area has been documented within previous studies of WSDOT, the National Marine Fisheries Service, U.S. Fish and Wildlife Service, the Washington State Department of Fish and Wildlife, and the Washington State Department of Natural Resources. Segments 1 and 2 are classified as neither murrelet nor spotted-owl critical habitats. Segment 3 contains a murrelet critical habitat north of US 2 near Gold Bar. Segment 4 contains a spotted-owl critical habitat and active territory along US 2 west of Skykomish. It also contains a murrelet critical habitat west of Index.

The US 2 study area also contains a number of priority habitat and species areas. Species given priority are the bald eagle, Columbian black-tailed deer, harlequin duck, and mountain goat. The great blue heron, osprey and peregrine falcon have also been observed at various points within the study area. Segment 1 contains a great blue heron observation point. Segment 2 contains an area for bald eagles. Segment 3 contains five observation points for osprey and six for bald eagles. Segment 4 contains a

mountain goat habitat, as well as observation points for harlequin ducks, peregrine falcons and bald eagles.

7 Historic Preservation

Information from the Washington State Department of Archaeology and Historic Preservation was reviewed to identify sites along the US 2 study area that have been designated as historic landmarks. Official records have deemed three sites to have historical significance.

Within Segment 1, along Avenue D in Snohomish, stands the Victor Iverson Home constructed in 1906. Segments 2 and 3 contain no historical sites. Segment 4 contains two historical sites located in Skykomish. One site, located in the Rail Avenue Historic District and originally constructed in 1893, is called Maloney's General Store and lies along Railroad Avenue West. The other site was originally constructed in 1894, and is the Great Northern Depot located at the southeast corner of Railroad Avenue and 4th Street. Skykomish also has a historic district that includes a 1939 bridge adjacent to US 2. No known archeological sites were identified in the US 2 study area.

8 Recreational Areas and Parks

Several public parks, including a national park, are found adjacent to or near US 2 within the study area. These are accessible, publicly owned parks, and therefore qualify as Section 4(f) resources under federal transportation law. If federal funding is used, such projects cannot be used for transportation purposes unless the proposed preferred alternative is the only feasible and prudent alternative that exists, and all avoidance, minimization and mitigation measures have been taken. The properties that may require evaluation under Section 4(f) include the historic resources listed in the previous section (Historic Preservation) as well as the following parks and greenbelts:

- Startup Rest Area near Gold Bar;

- Big Eddy River Access;

- Centennial Trail beneath US 2;

- Buck Island Park;

- Skykomish Centennial Park;

- Sultan Woods Creek Park;

- Small park in Sultan north of US 2 on 1st Street;

- Railroad Avenue Park in Gold Bar; and

- Hiking Trailhead at Heybrooke Lookout in Index.

The US 2 study area enters the Mount Baker-Snoqualmie National Forest and Skykomish Ranger District around the demarcation point of Segments 3 and 4.

9 Noise Impacts

Noise analysis may be needed to determine project impacts to sensitive noise receptors during construction and during routine highway use. Measures to reduce or contain construction noise should be considered. Much of US 2 within the study area is devoted to farmland, agriculture and forests. Thus, these areas are not usually considered to be noise sensitive. Several potentially noise sensitive locations were noted during the project drive-through:

- In Segment 3, residential areas are located adjacent to US 2, including a mobile home park in Sultan and Gold Bar.
- In Segment 4, single-family residential homes are located along US 2 in Index and Skykomish.

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10 Corridor Preservation

Corridor preservation refers to any technique that state and local governments use to protect existing or planned transportation corridors from inconsistent development in an effort to minimize negative environmental, social or economic impacts. Corridor preservation tools might include, but are not limited to: annexation or development agreements (land-owner agreements), regulation of the use of such land (land use regulations), as well as acquisition of property rights within a corridor (land acquisition). WSDOT has not pursued corridor preservation activities within the US 2 study area. Since US 2 has been identified by WSDOT as a Highway of Statewide Significance it is a priority for funding and studies. However, there is currently no formal program for right-of-way preservation.

Exhibit 5.1

Floodplains along US 2 Study Area

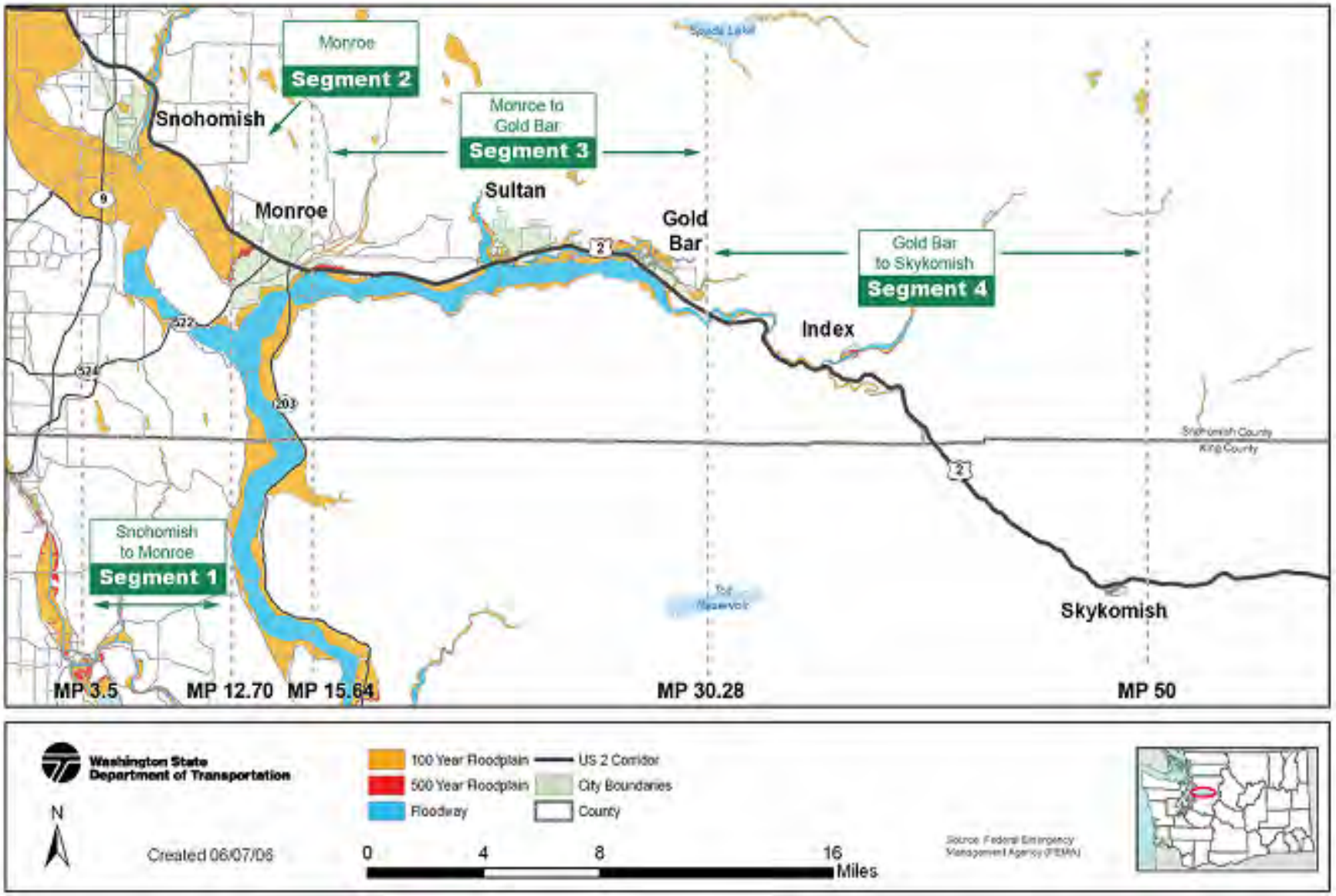


Exhibit 5.2
Rivers and Major Streams and Creeks

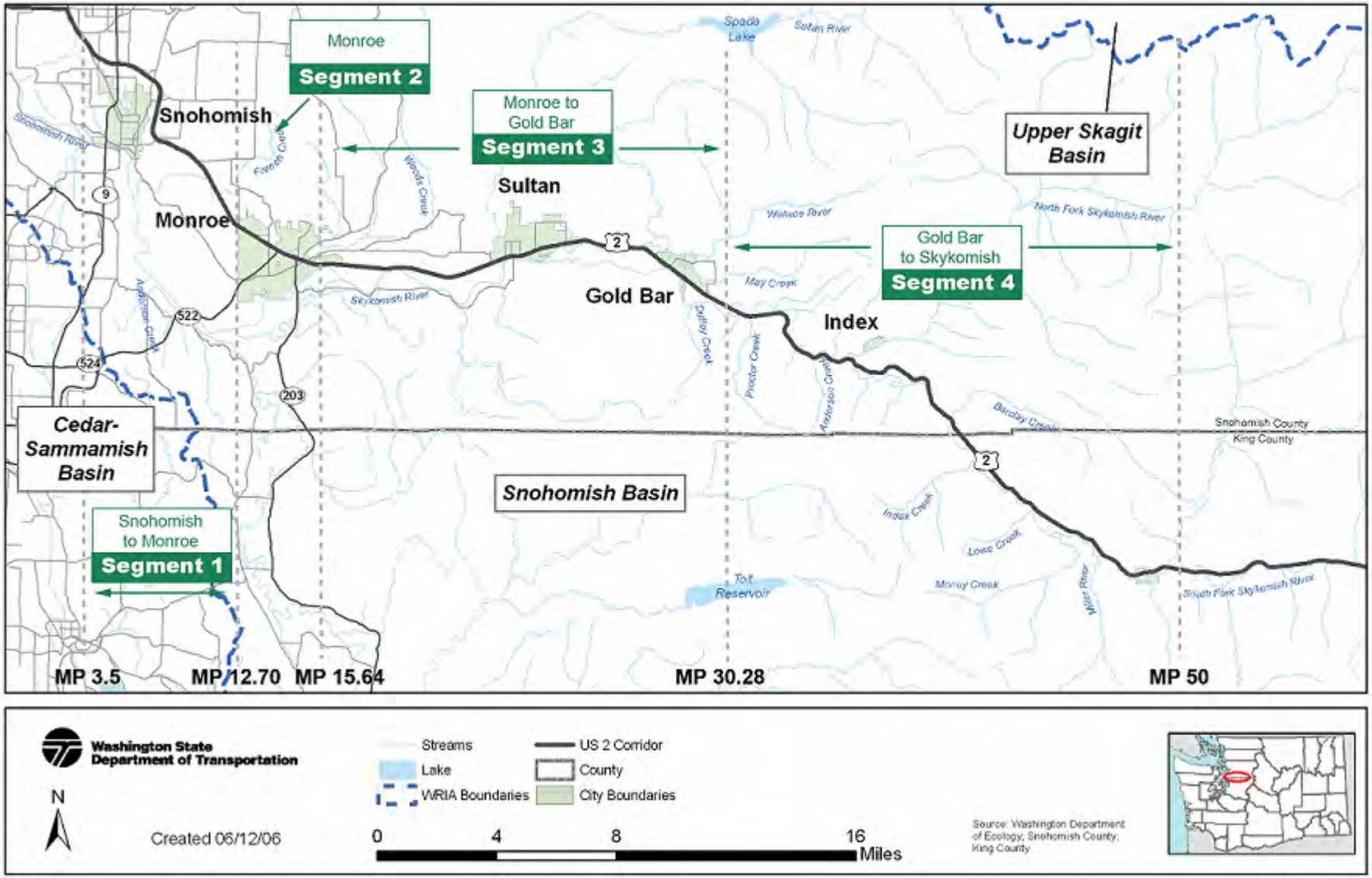


Exhibit 5.3

US 2 Study Area Wetlands

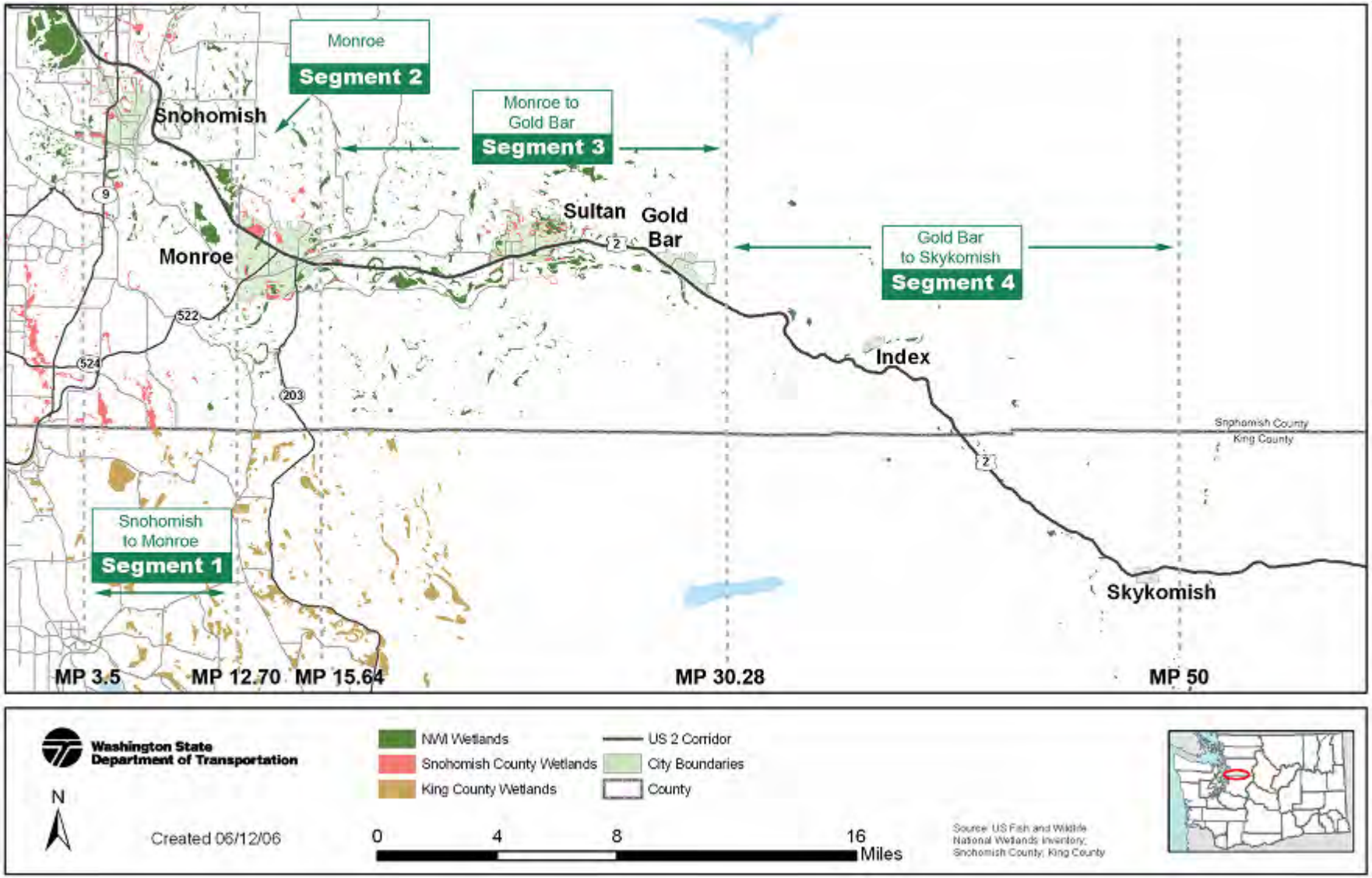


Exhibit 5.4

Segment 1 Contours

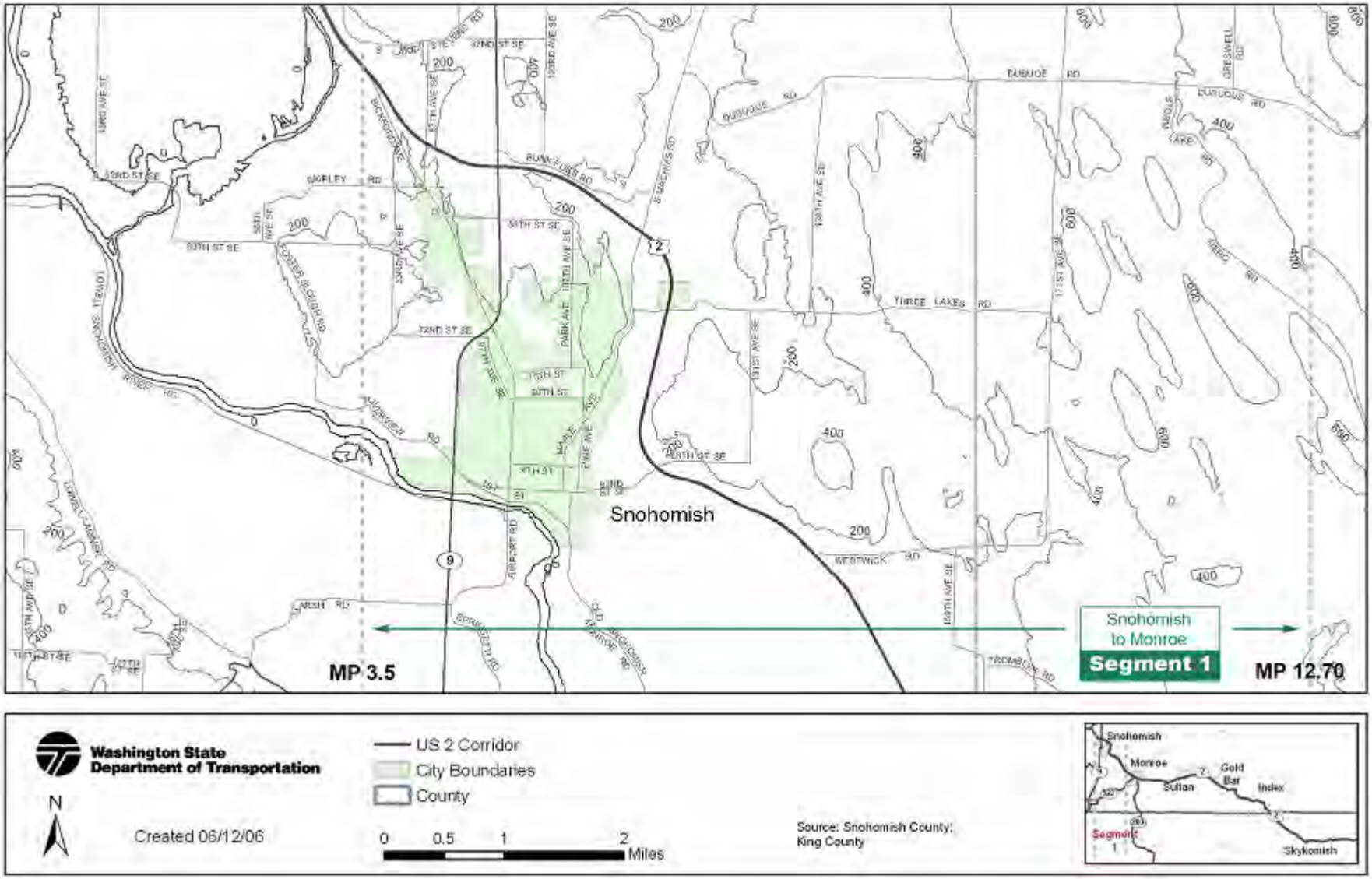


Exhibit 5.5
Segment 2 Contours

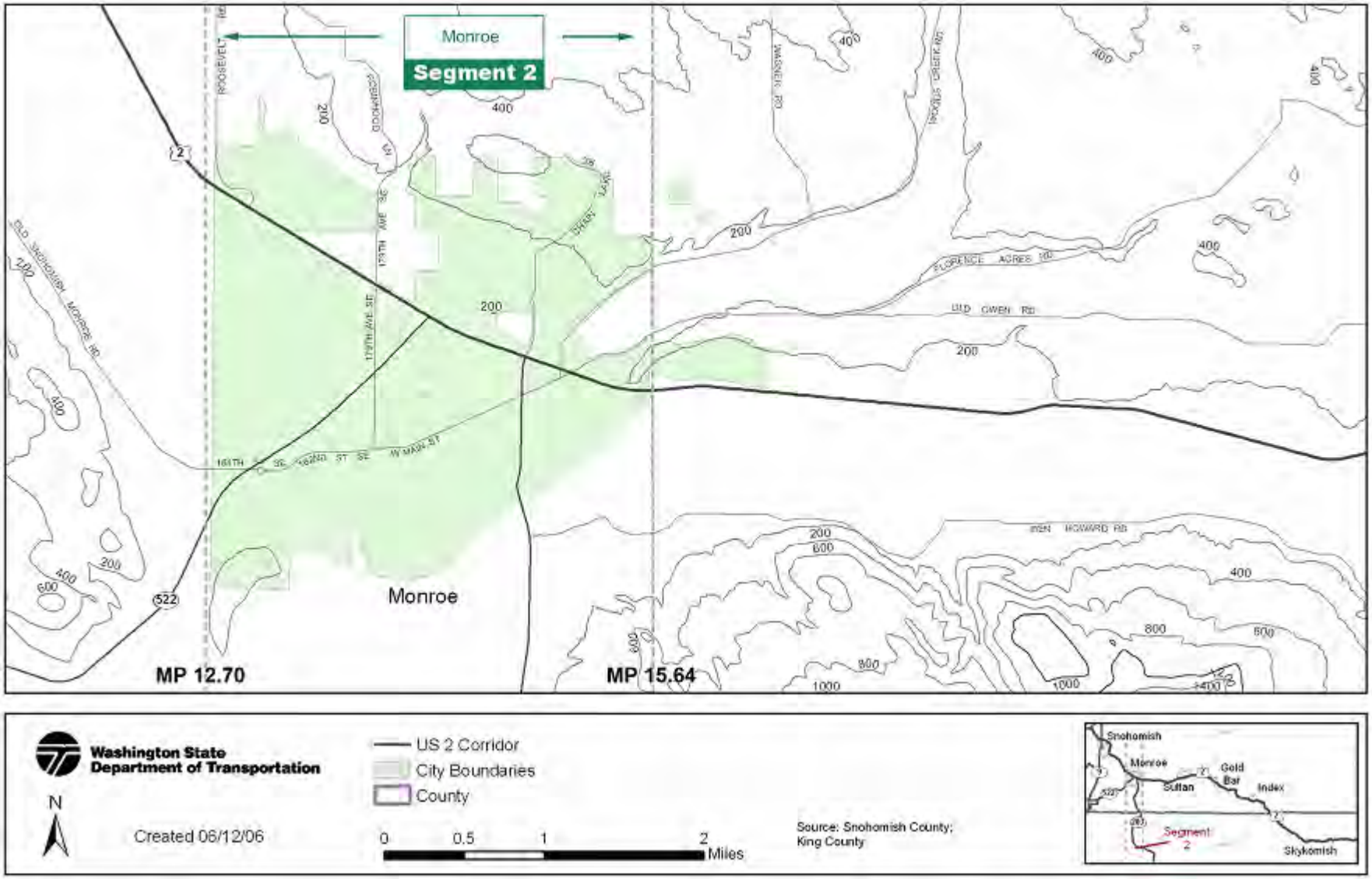


Exhibit 5.6
Segment 3 Contours

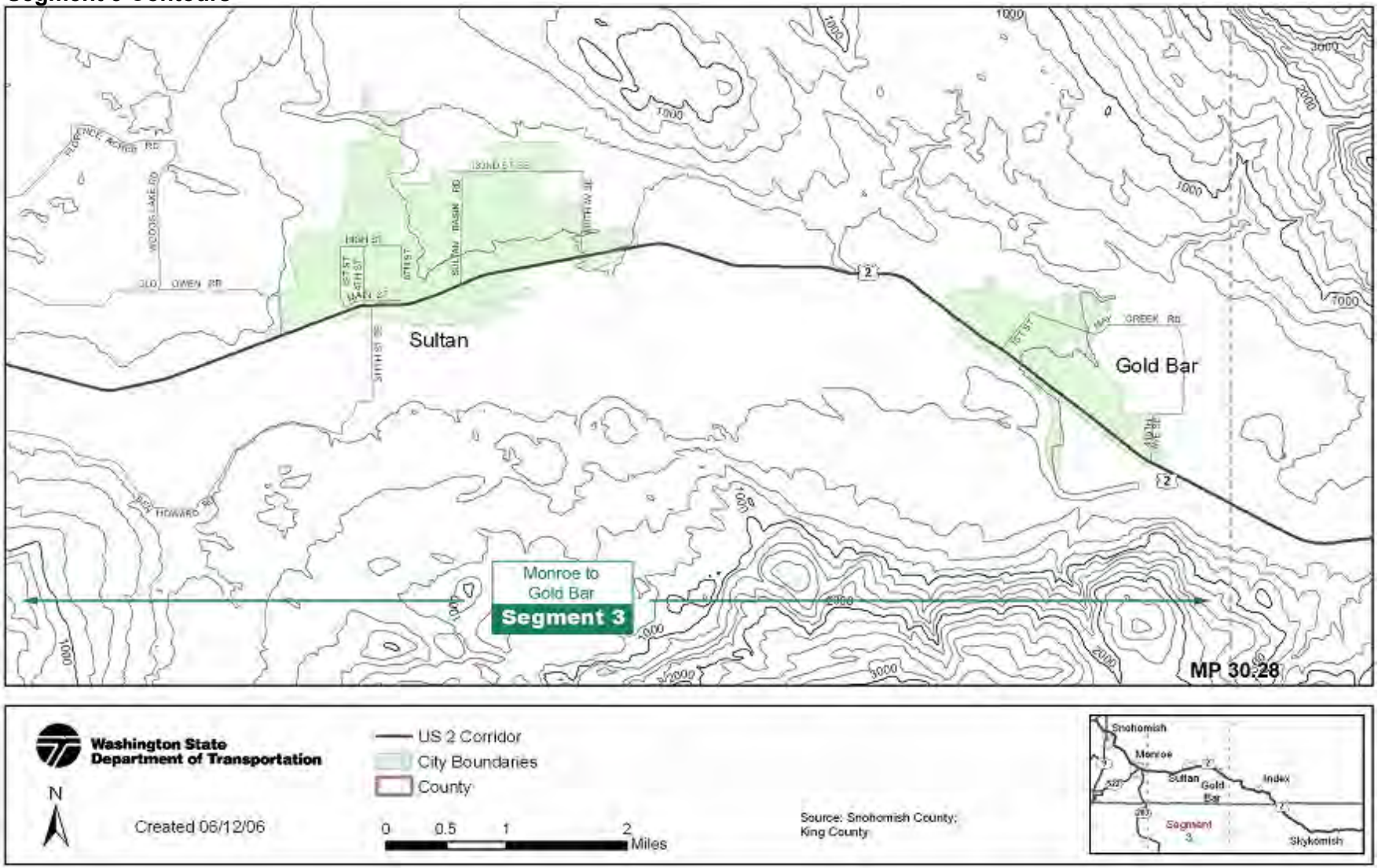


Exhibit 5.7
Segment 4 Contours

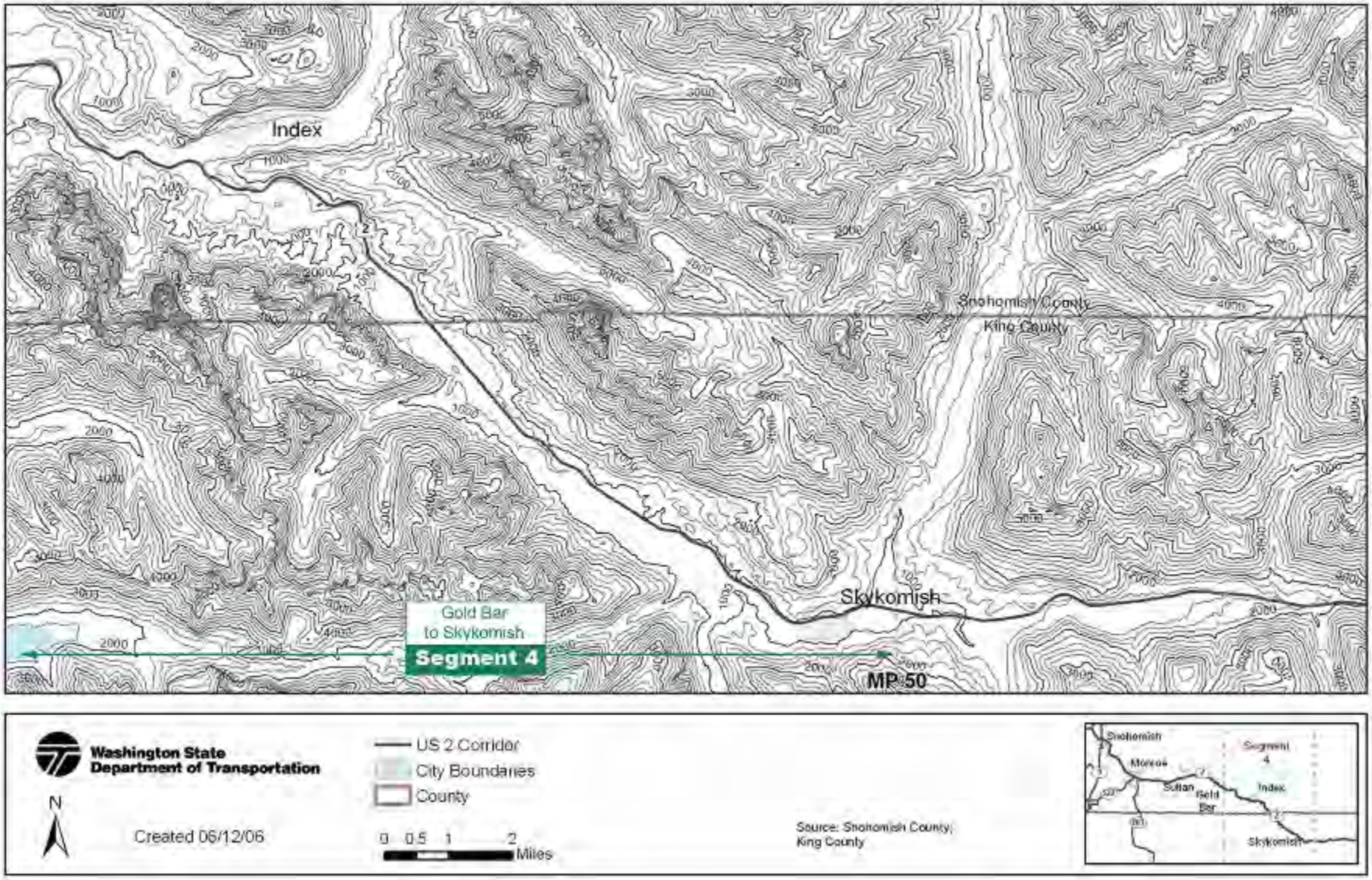


Exhibit 5.8
Potential Liquefaction Areas

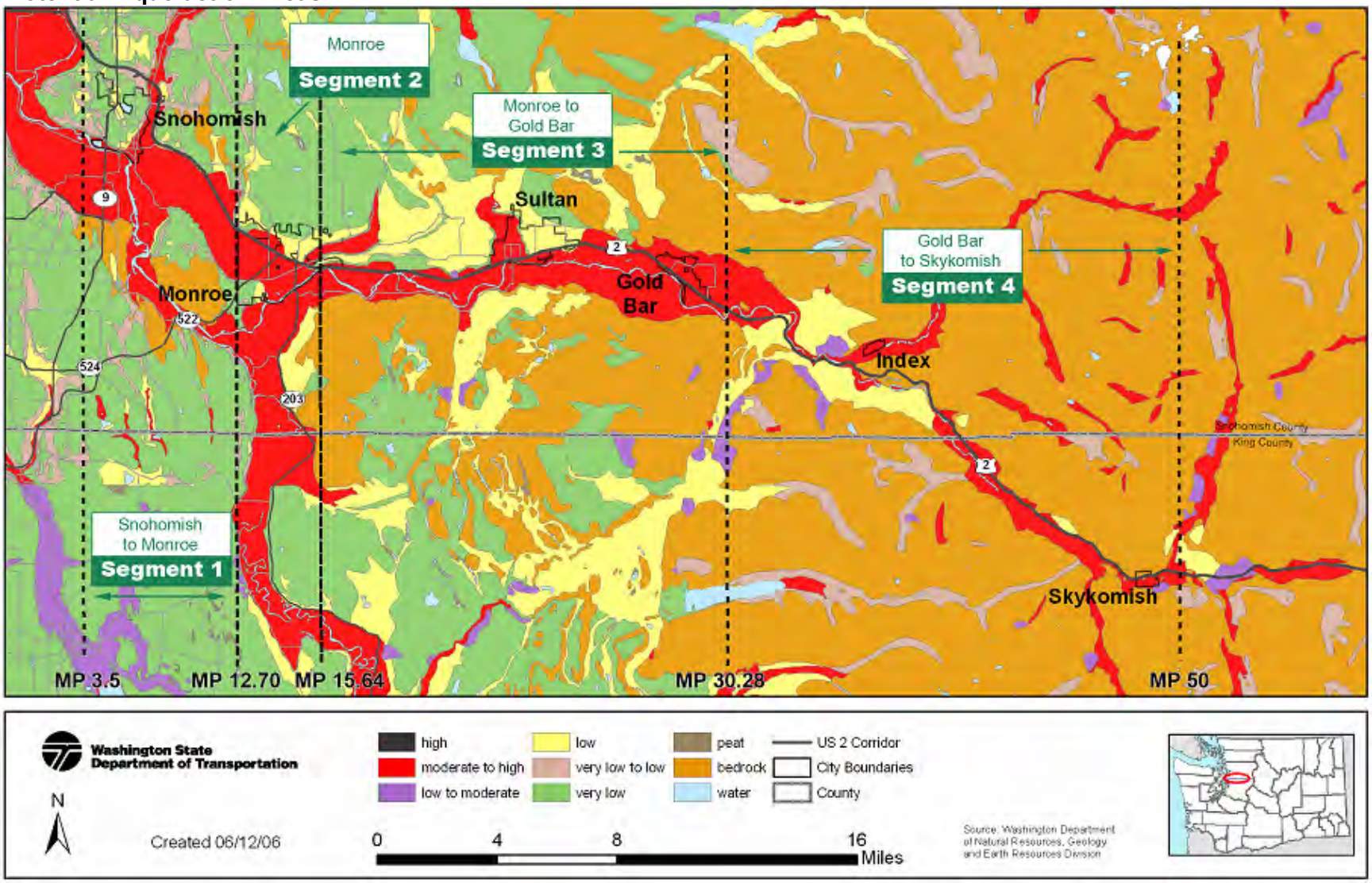


Exhibit 5.9
Murrelet and Spotted-Owl Critical Habitats

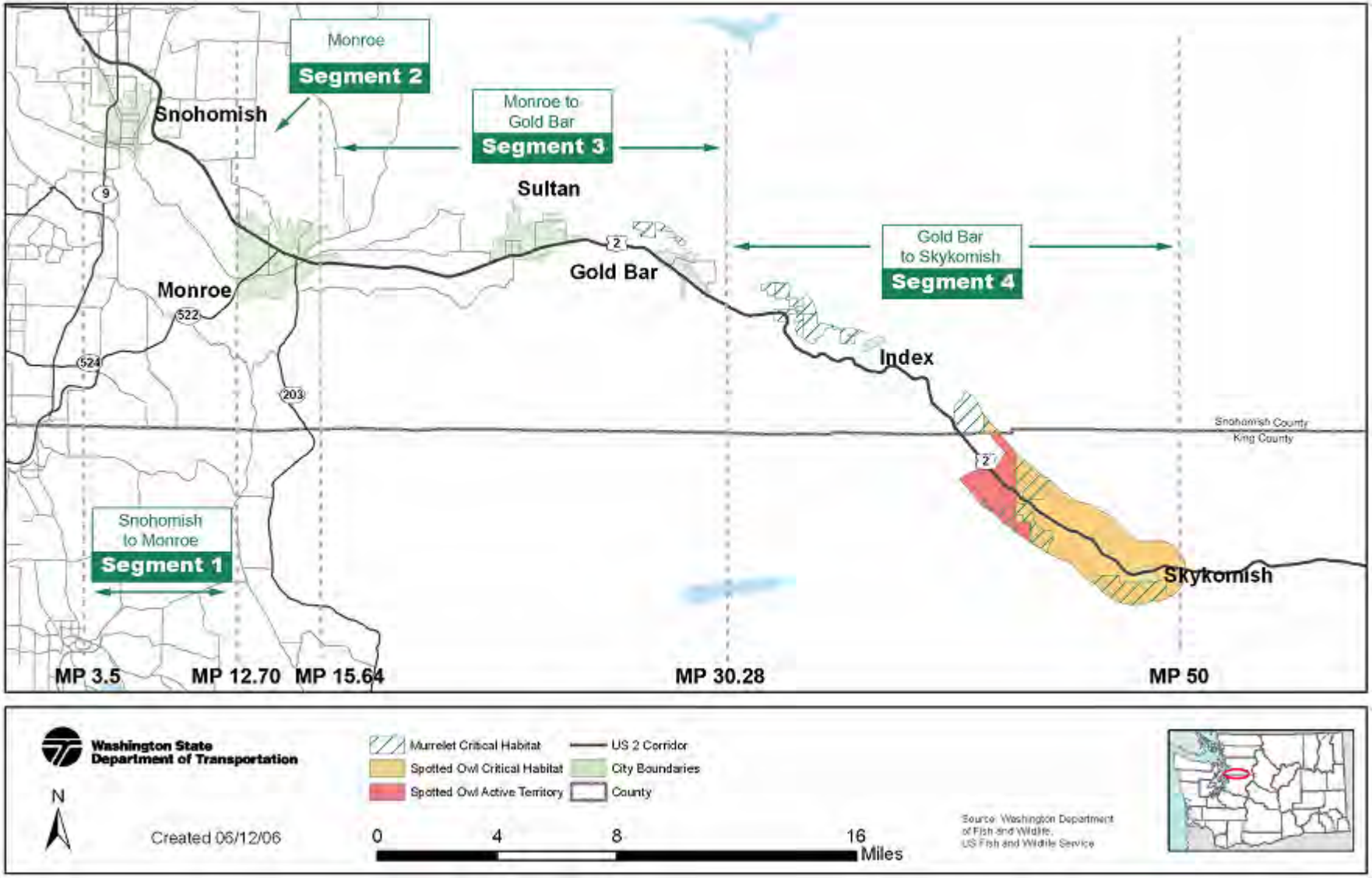


Exhibit 5.10
Priority Species and Their Habitat

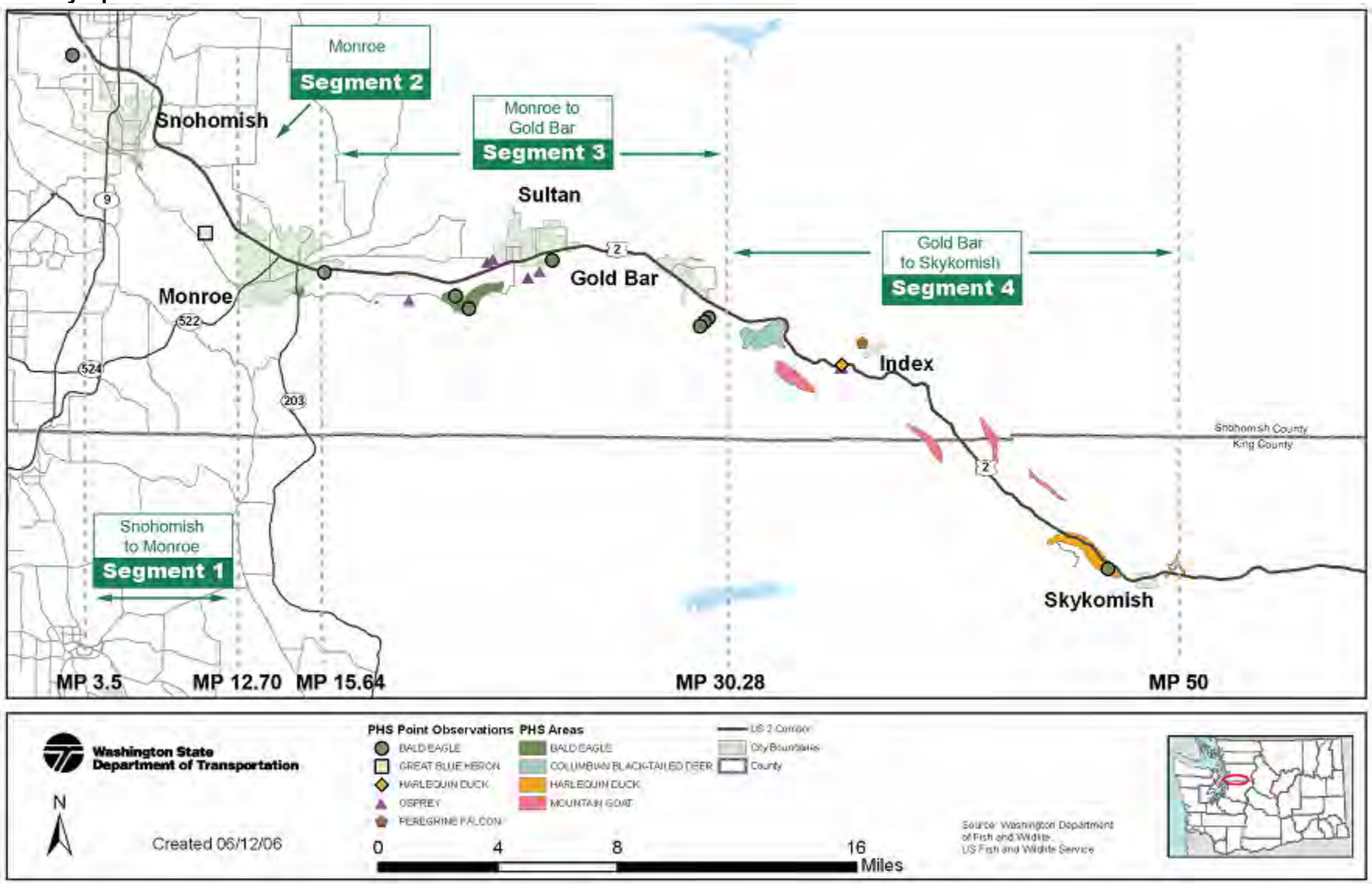


Exhibit 5.11
Historical Sites

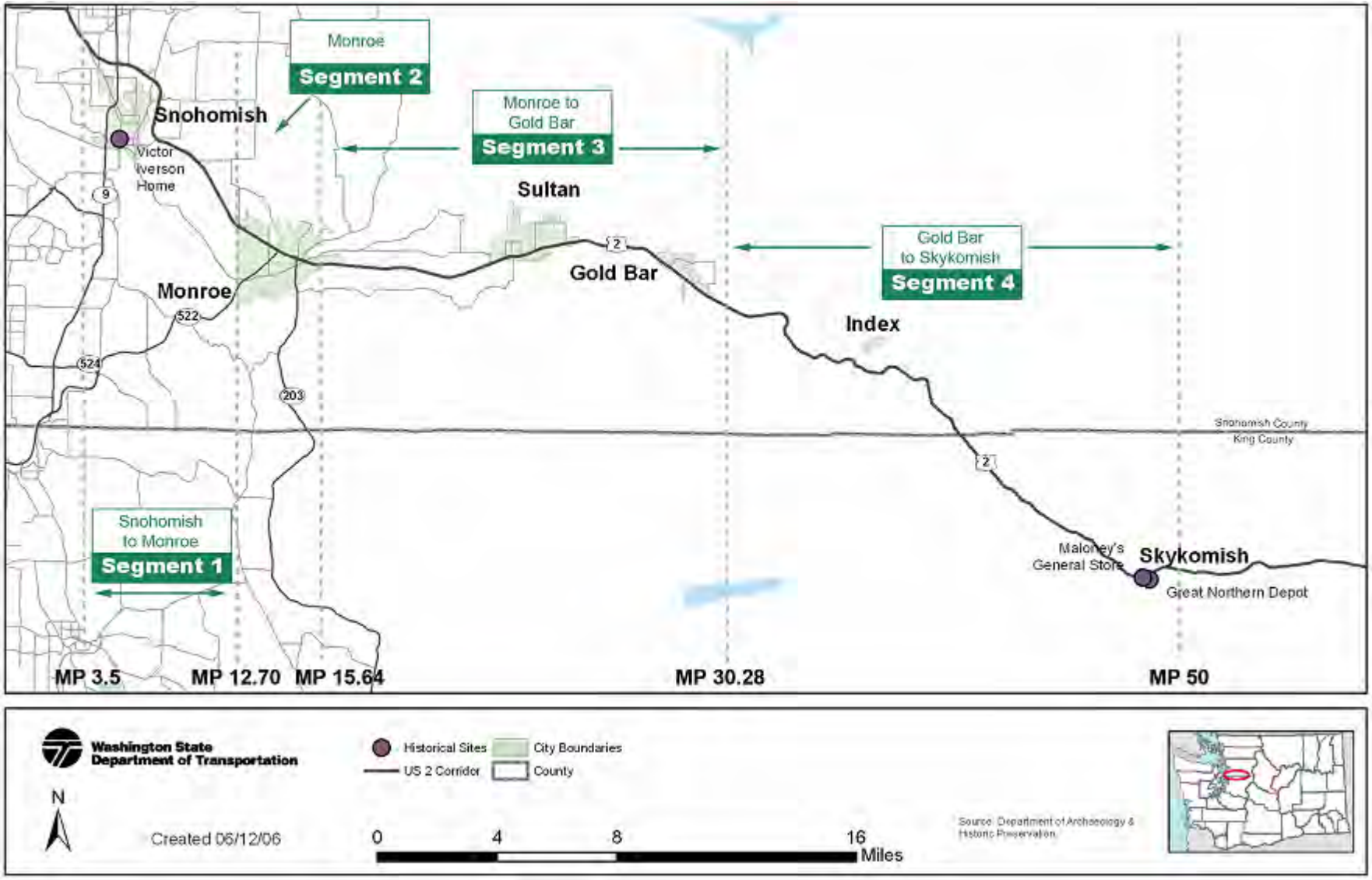


Exhibit 5.12
Recreational Areas and Parks

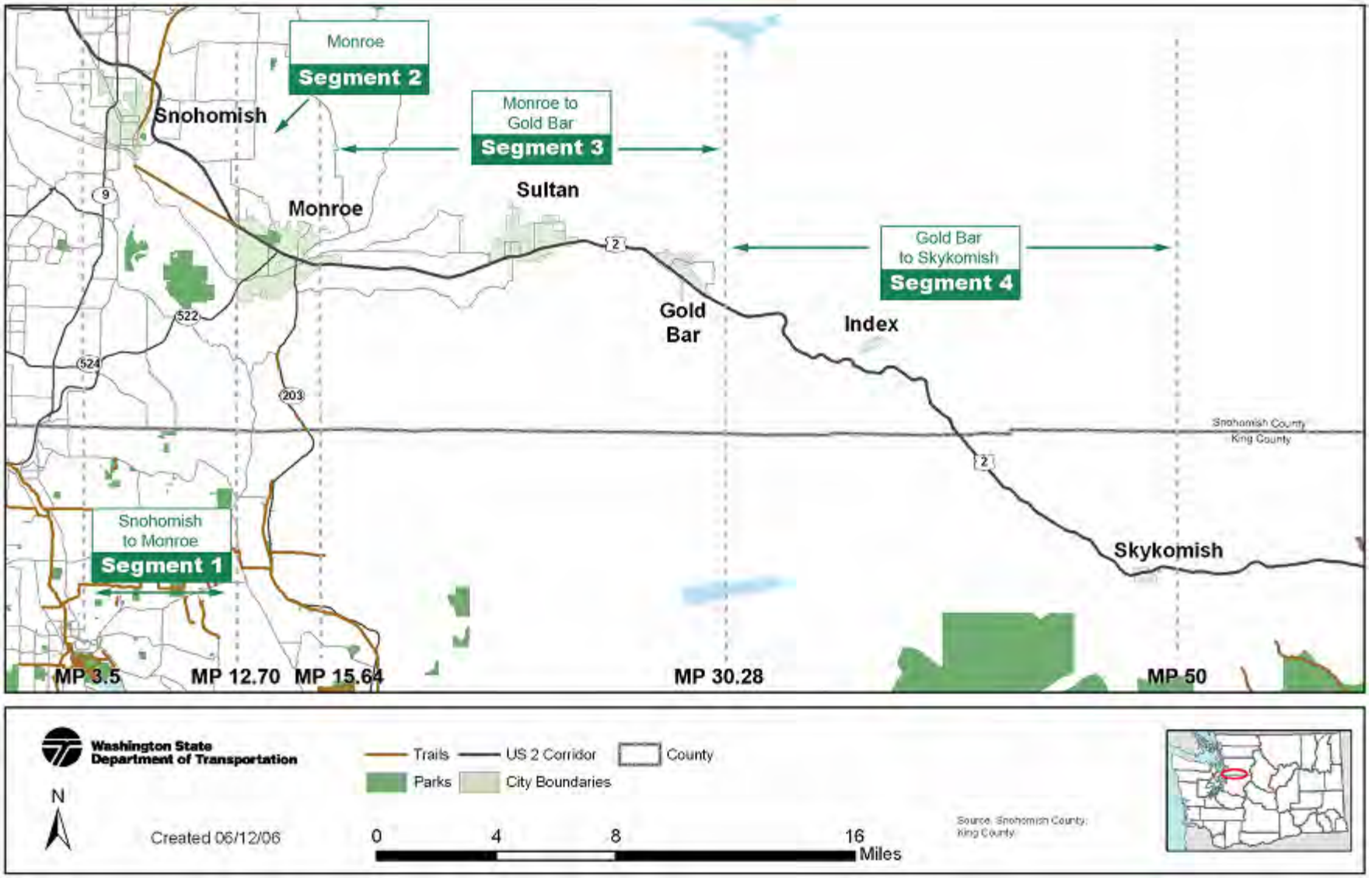
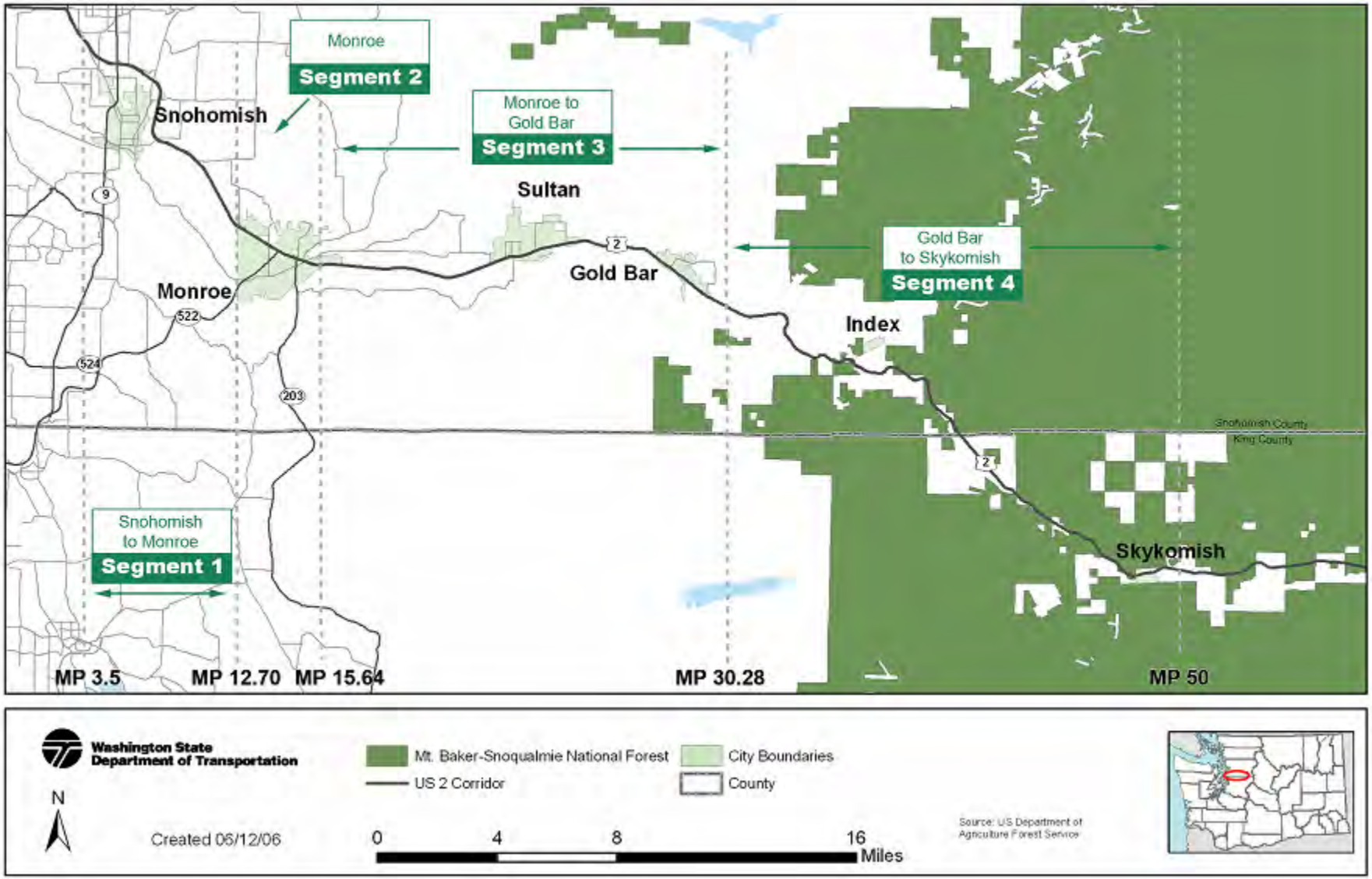


Exhibit 5.13
National Forests



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Chapter 6
Future Baseline Traffic Analysis

1 Future Baseline Traffic Volume Forecasting Methodology

Overview and Seasonal Adjustment Factors

In order to determine future operational performance of the US 2 corridor, traffic forecasts for the year 2030 were calculated. These forecasts will help in the development and evaluation congestion mitigation and safety strategies. As detailed in previous sections, WSDOT, Snohomish County, and King County staff selected key intersections along US 2 for various analyses which included turning movement forecasts.

Traffic data for the corridor, the majority of which was collected during February and March 2006, was used to predict:

1. An annual average count for *weekday* PM peak hour traffic in the year 2030; and
2. An average high-month count for *weekend* PM peak hour traffic in the year 2030.

The traffic data included average daily traffic (ADT) at 25 locations along the corridor as well as numerous counts collected on intersecting roadways and highways. Intersection turning movement data were also collected at a total of 23 key intersections. There are also two automatic traffic recorder (ATR) sites on US 2: R052 located at MP 0.26, and P038 located at

MP 50.12. These provided supplemental traffic data and seasonal variation information, which helped in calculating seasonal adjustment factors for the study.

As mentioned in Chapter 3, seasonal variation factors were developed to adjust the 2006 traffic count data. The PM peak hour traffic data collected during February and March needed to be seasonally adjusted, as this adjustment would allow WSDOT to forecast annual average weekday traffic (AAWDT), and average high-month (August) weekend traffic for the year 2030. Two different sets of factors were needed for seasonal adjustment –one to adjust for weekday traffic, and another for weekend traffic. As mentioned previously, seasonal factors ranged from 1.04 to 1.58 for the weekday, and 1.05 and 2.04 for the weekend.

Traffic Forecasting Assumptions

Two travel demand models were found to be applicable for providing 2006-2030 traffic growth rates for the US 2 study area:

1. The most current Puget Sound Regional Council travel demand model; and
2. The City of Monroe Transportation Plan Update traffic model.

Traffic forecasts for the US 2 study area were developed using data from the above two models. In doing so, the US 2 corridor was divided into three sections: one section west of Monroe, another containing Monroe, and the last east of Monroe to the end of the study area.

West of Monroe: The traffic forecasting assumptions used to develop the year 2030 annual average weekday traffic (AAWDT) PM peak hour forecasts were based on the two travel forecasting models stated above. West of Monroe, from Bickford Avenue to Roosevelt Road, the current PSRC travel forecasting model was used to develop the 2030 traffic forecasts. The model network included most of the intersecting arterials and local roadways required for intersection turning movement

forecasts, with the exception of 88th Avenue east of US 2 and Roosevelt Avenue north of US 2. For these two intersections as well as Westwick Road, it was assumed that the 2006-2030 traffic growth to/from the TAZ containing these roadways could be redistributed and added to the roadways based on the traffic distribution observed in the 2006 traffic counts. Using the Furness method, these forecasts were then post-processed to provide intersection turning movements and corridor balancing along with the rest of the corridor forecasts for the year 2030.

Monroe: A traffic model and post-processed traffic forecasts provided by the City of Monroe Transportation Plan Update were used for this section. Specifically, the plan provided 2030 turning movement data for the US 2 intersections of 179th Avenue SE, SR 522 and Kelsey Street. The plan also provided year 2025 traffic volume and turning movement forecasts for Fryelands Boulevard, SR 203, Woods Creek Road, and Old Owen Road, along with a 1% annual growth factor which was applied to extend them to 2030.

East of Monroe: From 299th Avenue SE to N 5th Street in Skykomish, the current PSRC travel forecasting model was used to develop the 2030 traffic forecasts. Since the PSRC model had a limited network in this area which only included US 2 and no intersecting arterials, the corridor was divided into four sections each reflecting (determined by) the PSRC model's specific forecast of 2006-2030 directional growth rates. These section-specific growth rates were then applied to the seasonally adjusted 2006 PM peak hour traffic counts and intersection approach volumes. To calculate approach volume forecasts on the intersecting arterials and local roadways not coded in the PSRC's model, the US 2 Corridor directional growth rates were simply averaged and applied to the through movements, while left and right turns were forecasted by applying the appropriate US 2 directional growth rate. Starting with 299th Avenue SE, 11 intersections were analyzed ending at North 5th Street in Skykomish. Eastbound directional

growth factors ranged from 1.17 to 1.93, while westbound factors ranged from 1.35 to 1.66 with the smallest growth factors in Segment 4 for both directions.

Weekend Forecasts

Neither of the two travel forecasting models provided weekend traffic predictions. Forecasts for US 2 and its intersecting roadways were calculated using the average weekend PM peak hour traffic in a peak month (August) for the year 2030. This was done without weekend forecasts from the models.

The traffic forecast was developed by first calculating the ratio of the 2006 adjusted weekday PM peak hour traffic counts to the 2006 adjusted weekend PM peak hour traffic counts, then applying that ratio to the post processed 2030 average weekday PM peak hour forecasts:

2030 Weekend High Month Average PM Pk Hr Forecast =

{2030 Annual Average Weekday PM Pk Hr x (2006 High Month Average Weekend PM Pk / 2006 Annual Average Weekday PM Pk)}

It is standard practice to build off of a future weekday traffic forecast based on the observed ratio of weekday to weekend traffic count data. This formula was applied consistently across the US 2 Corridor to calculate volumes and intersection turning movement forecasts for the year 2030. However, two exceptions to this method were made – first on US 2 east of Bickford Avenue, and also on SR 522 north of US 2. At these two locations, high traffic growth increases projected by both the PSRC and the City of Monroe forecasting models caused an unrealistic reversal in the peak directional weekend traffic flows. Here, the volumes were reduced by post processing to better reflect a more balanced directional traffic forecast. **Exhibits 6.1 and 6.2** show traffic forecasts for weekdays and weekends, respectively.

Exhibit 6.1

PM Peak-Hour Traffic Movement Forecast for Weekdays (2030 Average Monthly High)

Segment	Milepost	Location	EB			WB			NB			SB		
			L	T	R	L	T	R	L	T	R	L	T	R
1	3.85	Bickford Avenue (83rd Avenue /Old SR 2)	611	0*	74	0*	0*	0*	0*	1216	0*	0*	1681	904
1	5.04	SR 9 Interchange	481	1060	214	169	1018	728	180	1,601	40	340	780	18
1	8.51	88th Street Interchange (2nd Street)	104	1187	129	524	1754	127	85	260	446	60	164	76
1	10.08	Westwick Road (100th Street)	0*	0*	0*	3	0*	139	0*	2266	16	188	1505	0*
1	10.55	Roosevelt Road	0*	0*	0*	7	0*	58	0*	2224	19	118	1390	0*
2	12.95	Fryelands Blvd (E Roosevelt Road)	66	1076	235	49	1404	119	722	290	73	83	91	117
2	13.87	179th Avenue SE	110	1230	110	170	1410	150	320	140	410	170	60	30
2	14.37	SR 522 Interchange	80	1610	0*	0*	1530	630	0*	0*	0*	1360	0*	220
2	14.57	Kelsey Street	630	1810	210	190	1210	70	250	230	110	210	240	510
2	14.92	SR 203 (Chain Lake Road / Lewis Street)	512	1496	226	263	978	53	478	330	164	434	355	114
2	15.15	Woods Creek Road (Ann Street)	878	1158	102	0*	1120	116	0*	0*	37	0*	0*	405
2	15.22	Old Owen Road (Main Street)	290	1135	15	109	841	43	367	178	476	199	159	275
3	21.57	299th Avenue SE (Old Owen/Fern Bluff)	103	1888	0	0	960	242	2	0	12	266	2	61
3	22.37	Mann Road (311th Avenue/5th Avenue)	59	1612	67	43	970	39	59	24	85	156	32	49
3	22.77	Main Street (Sultan)	10	1456	0*	0*	1021	153	0*	0*	0*	172	0*	12
3	23.14	Sultan Basin Road (323rd Avenue SE)	294	1205	55	2	956	22	18	4	2	8	2	156
3	27.45	Nugget Road (Gold Bar)	13	941	0*	0*	587	0	0*	0*	0*	0	0*	5
3	27.92	First Street (399th Avenue SE)	156	798	0*	0*	536	32	0*	0*	0*	23	0*	56
3	28.17	5th Street (Gold Bar)	17	758	0*	0*	530	24	0*	0*	0*	15	0*	31
3	29.48	Picklefarm Road (Gunn Road/415 Avenue)	233	377	2	0	389	7	2	0	0	21	0	65
3	30.04	Rieter Road (Gold Bar)	65	328	0*	0*	483	5	0*	0*	0*	8	0*	36
4	35.62	Index-Galena Road	61	157	0*	0*	426	17	0*	0*	0*	2	0*	49
4	48.71	N 5th Street (Skykomish)	0*	135	19	9	276	0*	27	0*	6	0*	0*	0*

Note: L, T, R are traffic traveling left, thru, and right, respectively. '*' indicates cannot access that direction

Exhibit 6.2

PM Peak-Hour Traffic Movement Forecast for Weekends (2030 High-Month Average)

Segment	Milepost	Location	EB			WB			NB			SB		
			L	T	R	L	T	R	L	T	R	L	T	R
1	3.85	Bickford Avenue (83rd Avenue /Old SR 2)	281	0*	19	0*	0*	0*	0*	1041	0*	0*	1,052	403
1	5.04	SR 9 Interchange	116	814	122	123	877	735	148	929	47	226	674	18
1	8.51	88th Street Interchange (2nd Street)	55	980	56	443	1,561	81	69	135	273	40	210	53
1	10.08	Westwick Road (100th Street)	0*	0*	0*	15	0*	156	0*	1,949	48	127	1,130	0*
1	10.55	Roosevelt Road	0*	0*	0*	10	0*	40	0*	1,961	33	50	1,105	0*
2	12.95	Fryelands Blvd (E Roosevelt Road)	48	877	130	77	1,648	73	226	154	57	75	116	91
2	13.87	179th Avenue SE	133	1,050	53	117	1,658	139	193	61	145	343	34	67
2	14.37	SR 522 Interchange	87	1,265	0*	0*	1,563	913	0*	0*	0*	562	0*	62
2	14.57	Kelsey Street	546	1,135	181	183	1,611	88	137	210	86	329	377	763
2	14.92	SR 203 (Chain Lake Road / Lewis Street)	375	1,181	162	189	1,303	45	367	172	90	232	249	64
2	15.15	Woods Creek Road (Ann Street)	616	841	72	0*	1,612	59	0*	0*	15	0*	0*	398
2	15.22	Old Owen Road (Main Street)	213	767	22	163	1,664	30	171	110	176	92	152	239
3	21.57	299th Avenue SE (Old Owen/Fern Bluff)	109	1,504	0	12	2,969	235	0	6	6	306	9	72
3	22.37	Mann Road (311th Avenue/5th Avenue)	22	1,498	122	87	2,818	15	102	9	87	125	43	102
3	22.77	Main Street (Sultan)	19	1,725	0*	0*	3,231	265	0*	0*	0*	125	0*	18
3	23.14	Sultan Basin Road (323rd Avenue SE)	225	1,282	112	3	2,957	12	48	3	3	3	0	262
3	27.45	Nugget Road (Gold Bar)	9	1,160	0*	0*	2,438	0	0*	0*	0*	0	0*	10
3	27.92	First Street (399th Avenue SE)	148	974	0*	0*	2,341	55	0*	0*	0*	47	0*	136
3	28.17	5th Street (Gold Bar)	21	968	0*	0*	2,380	8	0*	0*	0*	3	0*	5
3	29.48	Picklefarm Road (Gunn Road/415 Avenue)	207	752	15	3	2,199	18	3	0	6	9	0	123
3	30.04	Rieter Road (Gold Bar)	108	647	0*	0*	2,160	8	0*	0*	0*	3	0*	226
4	35.62	Index-Galena Road	57	357	0*	0*	2,042	38	0*	0*	0*	12	0*	58
4	48.71	N 5th Street (Skykomish)	0*	232	6	48	1,661	0*	11	0*	17	0*	0*	0*

Note: L, T, R are traffic traveling left, thru, and right, respectively. '*' indicates cannot access that direction

2 Future Baseline Intersection LOS

Based on the forecasted 2030 weekday and weekend intersection traffic movements, their corresponding LOS values were calculated for both signalized and un-signalized intersections. As in Chapter 3, LOS was determined using the 2000 *Highway Capacity Manual* methodology published by the Transportation Research Board, with 'overall LOS' the general index used to evaluate signalized intersections and 'utilization rate' used for un-signalized intersections. For signalized intersections, the overall LOS of every intersection has degraded with most degrading to the level of 'F'. In addition, multiple worst movement directions exist during both weekdays and weekends for all signalized intersections except two, and their LOS values are at 'F' in all cases except one. For un-signalized intersections, weekday utilization rates rise from an average of 55.6 percent in 2006 to 86.6 percent in 2030, while weekend rates rise from 84.4 percent in 2006 to exceed capacity at 129.9 percent in 2030. Disaggregating these averages shows that for Segments 3 and 4 alone, the average utilization rate on the weekend rises markedly from 99.1 percent in 2006 to 153.8 percent in 2030. Weekend recreational travel along Segments 3 and 4 is a salient issue. **Exhibits 6.3** to **6.6** enumerate intersection LOS details.

Exhibit 6.3

Weekday PM Peak-Hour Signalized Intersection LOS (2030)

Segment	MP	Location	Overall LOS	Worst Movement Direction	LOS
2	12.95	E Roosevelt Road / 163rd Avenue	F	NBL, EBL, EBT, WBL, WBT, SBL	F
2	13.87	179th Avenue SE	F	EBL, WBL, WBT, NBL, NBT, SBL	F
2	14.37	SR 522	F	EBL, WBT, SBL	F
2	14.57	Kelsey Street	F	EBL, EBT, WBL, WBT, NBL, NBT, SBL, SBT	F
2	14.92	SR 203	F	EBL, EBT, WBL, WBT, NBL, NBT, SBL, SBT	F
2	15.22	Old Owen Road / Main Street	D	SWL	F
3	21.57	Fern Bluff Road/Old Owen Road (Sultan)	F	EBL, EBT, NBT, SBL	F
3	22.37	5th Street (Sultan)	C	EBT, WBL, NBT, SBT	E

Exhibit 6.4

Weekend PM Peak-Hour Signalized Intersection LOS (2030)

Segment	MP	Location	Overall LOS	Worst Movement Direction	LOS
2	12.95	E Roosevelt Road / 163rd Avenue	F	EBL, WBL, WBT, NBL, SBL, SBT	F
2	13.87	179th Avenue SE	F	EBL, WBT, NBL, NBT, SBL	F
2	14.37	SR 522	F	EBL, WBT, SBL	F
2	14.57	Kelsey Street	F	EBL, EBT, WBL, WBT, NBL, NBT, SBL, SBT, SBR	F
2	14.92	SR 203	F	EBL, WBL, WBT, NBL, SBT	F
2	15.22	Main Street (Monroe)	D	NEL	F
3	21.57	Fern Bluff Road/Old Owen Road (Sultan)	F	EBT, WBT, SBL	F
3	22.77	Main Street (Sultan)	F	EBT, WBT, WBL, NBT, SBT	F

Exhibit 6.5

Weekday PM Peak-Hour Un-Signalized Intersection LOS (2030)

Segment	MP	Location	Utilization Rate	Worst Movement Direction	Its LOS
1	3.85	Bickford Avenue / Old US 2	129	NEL, NER	F
1	8.51	WB ramps at 88th Street SE	78	WBL, WBR	F
1	8.51	EB ramps at 88th Street SE	77	EBL, EBR	D
1	10.08	Westwick Road / 100th Street SE	149	EBL, SBL, SBR	F
1	10.55	Roosevelt Road	129	WBL, WBR	F
2	15.15	Ann Street / Woods Creek Road	121	EBL, SBR	F
3	22.77	Main Street	93	SEL, SER	F
3	23.14	Sultan Basin Road / Cemetary Road	147	NBL, NBT, NBR, SBL, SBT, SBR	F
3	27.52	Nugget Road	70	SBR	B
3	27.92	1st Street (Gold Bar)	53	SBL, SBR	F
3	28.17	5th Street (Gold Bar)	50	SBL, SBR	C
3	29.48	415th Avenue SE / Gunn Road	68	NBL	F
3	30.04	Reiter Road	42	SBL, SBR	B
4	35.62	Index-Galena Road	40	SWL, SWR	B
4	48.71	5th Street	32	NBL	B
4	48.98	Old Cascade Highway	N/A	N/A	N/A

Exhibit 6.6

Weekend PM Peak-Hour Un-Signalized Intersection LOS (2030)

Segment	MP	Location	Utilization Rate	Worst Movement Direction	Its LOS
1	3.85	Bickford Avenue / Old US 2	78	NEL	F
1	8.51	EB ramps at 88th Street SE	65	WBL, WBR	F
1	8.51	EB ramps at 88th Street SE	54	EBL, EBR	B
1	10.08	Westwick Road / 100th Street SE	123	SBL, SBR	F
1	10.55	Roosevelt Road	115	WBL, WBR	F
2	15.15	Ann Street / Woods Creek Road	129	EBL, SBR	F
3	22.77	Main Street	165	EBL, SEL, SER	F
3	23.14	Sultan Basin Road / Cemetary Road	255	EBL, EBT, EBR, WBL, NBT, NBR, SBL, SBR	F
3	27.52	Nugget Road	138	SBR	F
3	27.92	1st Street (Gold Bar)	141	EBL, SBL, SBR	F
3	28.17	5th Street (Gold Bar)	135	SBL, SBR	F
3	29.48	415th Avenue SE / Gunn Road	185	EBL, EBT, NBL, NBR, SBL, SBR	F
3	30.04	Reiter Road	135	EBL, SBL, SBR	F
4	35.62	Index-Galena Road	121	SWL, SWR	F
4	48.71	5th Street	116	NBL	F
4	48.98	Old Cascade Highway	N/A	N/A	N/A

Note: '*' denotes intersections whose worst traffic movement value is better than 'E'.

3 Future Baseline Segment LOS

Segment LOS was calculated for the study area using the same section classification presented in Chapter Three, based on the future traffic counts produced in an earlier part of this chapter. Weekend LOS degrades to 'E' or 'F' for every section in the study area. During weekdays, however, LOS degrades to 'E' or 'F' for the first three sections (Snohomish to Sultan city entrance) and remains under capacity for the last three. In fact, under the do-nothing scenario, the weekend LOS for the city of Monroe alone, drops three levels from 'C' to 'F' for both eastbound and westbound directions. Segment LOS values for the first three sections in the westbound direction on weekends is at 'F'. Weekend

recreational travel return trips can be seen to have an overspill effect on these sections as well. **Exhibit 6.7** presents future baseline segment LOS.

Exhibit 6.7

2030 Segment LOS within US 2 Study Area

Segment	MP	Location	Direction	Weekday LOS	Weekend LOS
1	3.85 - 12.95	City of Snohomish, SR 9	WB	E	F
			EB	F	E
2	12.95 - 15.64	City of Monroe	WB	F	F
			EB	F	F
3	15.64 - 21.57	Monroe city exit to Sultan city entrance	WB	E	F
			EB	F	NC[F]
3	21.57 - 24.44	City of Sultan	WB	C	E
			EB	D	F
3	24.44 - 30.28	Town of Startup, City of Gold Bar	WB	D	F
			EB	D	F
4	30.28 - 50.00	Town of Index, City of Skykomish	WB	C	E
			EB	C	E

Key: NC[x] - LOS value not computed by software, but assessed using HCM charts.