

Project Analysis

**US 97 / Satus Creek Bridge -
Bridge Replacement**

MP 44.50 to MP 46.45

XL-1043



Project Analysis Approval Recommended



Jeff Minick
Development Branch Project Engineer

7-27-11
Date

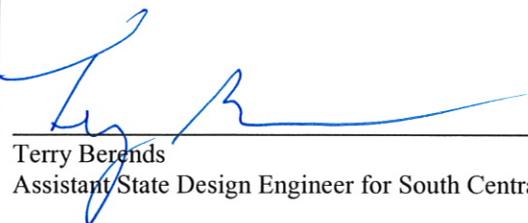
Project Analysis Approval Recommended



Brian White
Assistant Regional Administrator for Project Development, and
I-90 Construction

8/1/11
Date

Project Analysis Approved



Terry Berends
Assistant State Design Engineer for South Central Region

8/3/11
Date

Project Analysis

**US 97 / Satus Creek Bridge -
Bridge Replacement
MP 44.50 to MP 46.45**

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Project Analysis

US 97 / Satus Creek Bridge - *Bridge Replacement*

MP 44.50 to MP 46.45

Shoulder Width & Shy Distance Variance

PROJECT OVERVIEW

The US 97 / Satus Creek Bridge - Bridge Replacement project combines three PINs, (509703L) bridge replacement, (509702N) paving, and (509702O) safety to form one project. The combined project will be funded through the following programs: (P2) Structure Preservation, (I2) Safety Improvements, and (P1) Roadway Preservation.

Satus Creek Bridge #97/106, built in 1942 with steel-rolled beams and creosote-treated timbers, is ranked number 2 in the 2011-2013 Bridge Preservation – Replacement / Rehabilitation program. The bridge is considered Functionally Obsolete by the Bridge and Structures Office, and has a Sufficiency Rating of 44.48 out of 100.

The project will be designed to full WSDOT Design Manual (DM) December 2009 standards as shown in Design Matrix 3: Main Line NHS Routes (Except Interstate), Row 4. See Appendix A, WSDOT Design Manual Exhibit 1100-6, Design Matrix 3: Main Line NHS Routes (Except Interstate). US 97 is a 2 lane highway that runs through a fairly flat rural area. The highway classification for this section of US 97 is rural, principal arterial. The design classification is P-3, Rural. See Appendix B, WSDOT Design Manual Exhibit 1140-6, Geometric Design Data: Principle Arterial, December 2009. The current ADT is 3300 with 25% trucks and an ADT of 4107 with 25% trucks for the design year.

The Route Development Plan titled “SR 97, MP 33.52 to MP 61.34, Klickitat County Line to Jct. SR22” approved July 1, 1992 encompasses this section of US 97. The Route Development Plan’s recommendation is to construct 12 ft. lanes and 6 ft. shoulders. The planned improvements of the Route Development plan have been realized with the exception of the Satus Creek Bridge Replacement project limits. See Appendix C, Route Development Plan.

Bridge: Satus Creek Bridge will be replaced with a wider bridge. Existing Bridge lane widths will be increased from 11 ft. to 12 ft. Existing Bridge shoulder widths will be increased from 2 ft. to 6 ft. The Bridge height will be increased to provide adequate freeboard for the 100-year event and improve maintenance access.

Roadway: US 97 safety improvements extending from each end of Satus Creek Bridge to the project limits will widen the roadway from existing 11 ft. lanes and 4 ft. shoulders to 12 ft. lanes and 6 ft. shoulders. Additional safety improvements will be realized throughout the project by adding guardrail, and flattening slopes where possible. Four horizontal curves located within

the project limits will be improved by increasing the radius of each. The result will be increased sight distance and longer superelevation transitions.

ROUTE DESCRIPTION

The US 97 / Satus Creek Bridge - Bridge Replacement project is located within the confines of the Yakama Nation in Yakima County on US 97 between MP 44.50, and MP 46.45. The route lies within a fairly flat rural area.

The Freight and Goods Transportation System rates US 97 as a T-2 Route Classification based on the annual freight tonnage carried per year. US 97 averages over 4 million freight tons transported annually.

The project area travels through property managed by the Bureau of Indian Affairs, the Yakama Nation, and several private property owners. This route roughly parallels Satus Creek and contains wetlands and culturally sensitive areas within the project limits.

The posted speed is 65 mph, however, an advisory speed of 55 mph is posted on the horizontal curve encompassing the bridge.



COLLISIONS

There were 15 collisions within the project limits between 2004 and 2009. Seven of the 15 collisions were attributed to driver inattention. Of the remaining eight collisions, contributing circumstances ranged from exceeding reasonable speed to driver impairment due to alcohol consumption and falling asleep at the wheel. Three of the collisions occurred within the horizontal curve containing the bridge. Contributing circumstances were drunk driving, speeding in inclement weather, and no cause. Notes in the collision report indicate that the

safety improvements planned, for example adding guardrail, will likely decrease the severity of collisions in the future. 55 mph advisory speed limit signs are currently posted on either side of the horizontal curve located at the bridge (MP 45.86) based on ball-banking, and traffic information.

DESIGN LEVEL CHANGE JUSTIFICATION

Shoulder Width: Currently, there is minimal shoulder width throughout the project; existing roadway shoulder widths vary from 2 ft. to 4 ft. The shoulder width of the existing bridge is approximately 2 ft.

The P-3, Full Design Level standard, indicates 8 ft. shoulders are appropriate for both the proposed roadway and replacement bridge. See Appendix B, WSDOT Design Manual Exhibit 1140-6, Geometric Design Data: Principle Arterial, December 2009.

Design Matrix 3: Main Line NHS Routes (Except Interstate), DM Exhibit 1100-6, Row 4, note #2 for shoulder width states; Modified Design Level may apply based on a corridor or project analysis. Based on current ADT a Modified Design Level of MDL-13 could be used which requires 11 ft. lanes and 3 ft. shoulders. See Appendix D, WSDOT Design Manual Exhibit 1130-11, Geometric Design Data: Principle Arterial, June 2009.

Based on the “SR 97, MP 33.52 to MP 61.34, Klickitat County Line to Jct. SR22” Route Development Plan, right-of-way constraints, impacts to Satus Creek, impacts to wet lands, and increased potential of an unanticipated discovery of cultural resources we recommend the use of 12 ft. lanes and 6 ft. shoulders for both the roadway and replacement structure.

Shy Distance: Within the project limits shy distance is not provided for existing guardrail. Full Design Level standards indicate 2 ft. of additional widening for shy distance when barrier is to be installed in areas where the roadway is widened and the shoulder width will be less than 8 feet. See Appendix E, WSDOT Design Manual, December 2009, Section 1610.05(1) Shy Distance, page 1610-6.

Achieving full design standards is made challenging due to unavailability of right-of-way , increased risk of unanticipated discovery of cultural resources, wetland impacts, and impacts to the Satus Creek riparian environment. The SC Region recommends the use of 6 ft. roadway shoulders with out 2 ft. of additional widening for shy distance at the following guardrail locations:

MP 44.88 to MP 45.08 (LT.)
MP 45.04 to MP 45.86 (RT.)
MP 45.53 to MP 45.64 (LT.)
MP 45.82 to MP 45.86 (LT.)
MP 45.91 to MP 46.10 (LT.)
MP 45.91 to MP 45.97 (RT.).

WSDOT Design Manual, Section 1140.14 Structure Width, does not recommend additional width for shy to barrier on structures. A constant roadway width is desirable. See Appendix F, Section 1140.14 Structure Width, page 1140-13 of the WSDOT Design Manual, December 2009.

SUMMARY

The following table summarizes the geometric differences of the four conditions discussed.

Table 1: Geometrics

	Lane Width	Shoulder Width	Shy to Barrier	Total Width
Existing	11 ft.	2 ft. – 4 ft.	0 ft.	26 ft. – 30 ft.
Modified Design Standards	11 ft.	3 ft.	2 ft.	32 ft.
Proposed	12 ft.	6 ft.	0 ft.	36 ft.
Full Design Standards	12 ft.	8 ft.	0 ft.	40 ft.

Full Design Standards are impractical due to project constraints. The Proposed geometry provides 2 ft. less shoulder width than Full Design Standards, fits within the existing easement, and, improves the existing condition and geometrics.

CONCLUSION

Reduced shoulder widths, and not providing shy distance to roadside barrier is recommended due to right-of-way availability issues, increased risk of unanticipated discovery of cultural resources, wetland impacts, and impacts to the Satus Creek riparian environment.

The Route Development Plan titled “SR 97, MP 33.52 to MP 61.34, Klickitat County Line to Jct. SR22” approved July 1, 1992 addressed these project delivery issues and made the following recommendations as stated in the Executive Summary. SC Region projects programmed to improve SR 97 after July 1, 1992 have followed these recommendations.

“The current practice of constructing 12 foot lanes and 6 foot shoulders should be continued.”

“The vertical and horizontal alignments should be improved where possible in the 17.67 mile segment.”

“The recommendations, and their implementation, are limited by the environmentally and culturally sensitive areas along Satus Creek.”

The SC Region recommends approval of this Project Analysis. 12 ft. lanes and 6 ft. shoulders without shy distance accomplish the Regions planned improvement for this 2 mile section of US97.

Appendix A
Design Matrix 3

Project Type	Main Line											Bridges ⁽¹¹⁾				Intersections			Barriers															
	Horizontal Alignment	Vertical Alignment	Lane Width	Shoulder Width	Lane Transition	On / Off Connection	Median Width	Cross Slope Lane	Cross Slope Shoulder	Fill / Ditch Slopes	Access ⁽³⁾	Clear Zone ⁽¹⁸⁾	Sign, Del., Illum., & ITS	Basic Safety	Bike & Ped.	Lane Width	Shoulder Width	Vertical Clearance	Structural Capacity	Turn Radii	Angle	I/S Sight Distance	Term. & Trans. Section ⁽¹²⁾	Standard Run	Bridge Rail ⁽¹⁴⁾ (19)									
Preservation																																		
Roadway																																		
(3-1) Non-Interstate Freeway	DEF	DEF	DEF	DEF	DEF	DEF	DEF	DEF	DEF	DEF	DEF	B	B	B	DEF	DEF	DEF	F																
(3-2) HMA/PCC/PBST Overlays	DEM	DEM	DEM	DEM	DEF	DEF	DEM	DEM	DEM	DEM					DEM	DEM	DEM	F																
(3-3) Replace HMA w/PCCP at I/S	DEM	DEM	DEM	EUM	DEF	DEF	DEM	DEM	DEM	DEM					DEM	DEM	DEM	F																
Structures																																		
(3-4) Bridge Replacement	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F	F	F	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F	F ⁽²⁾	F ⁽²⁾	F	F	F	F	F	F	F	F					
(3-5) Bridge Deck Rehab.																																		
Improvements⁽¹⁶⁾																																		
Mobility																																		
(3-6) Non-Interstate Freeway	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F				
(3-7) Urban	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F	F	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F	F ⁽²⁾	F ⁽²⁾	F	F	F	F	F	F	F	F	F	F			
(3-8) Rural	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F	F	F	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F	F ⁽²⁾	F ⁽²⁾	F	F	F	F	F	F	F	F	F	F	F		
(3-9) HOV	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F	F	F	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F	F ⁽²⁾	F ⁽²⁾	F	F	F	F	F	F	F	F	F	F	F		
(3-10) Bike/Ped. Connectivity	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]	[5]		
Safety																																		
(3-11) Non-Interstate Freeway	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F			
(3-12) Intersection ⁽¹⁾																																		
(3-13) Corridor ⁽¹⁾⁽²⁴⁾	M ⁽⁴⁾	M ⁽⁴⁾	M ⁽⁴⁾	M ⁽⁴⁾	F	F ⁽¹⁷⁾	M ⁽⁴⁾	M ⁽⁴⁾	M ⁽⁴⁾	M ⁽⁴⁾																								
(3-14) Median Barrier																																		
(3-15) Guardrail Upgrades																																		
(3-16) Bridge Rail Upgrades																																		
(3-17) Risk: Roadside																																		
(3-18) Risk: Sight Distance	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F ⁽²¹⁾	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F	F	F	F	F	F ⁽²¹⁾	F ⁽²¹⁾	F	F	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F ⁽²¹⁾	F	F	F	F	F	F	F	F	F	F	F	
(3-19) Risk: Roadway Width	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F ⁽²¹⁾	F ⁽²¹⁾	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F	F	F	F	F	F ⁽²¹⁾	F ⁽²¹⁾	F	F	F/M ⁽²¹⁾	F/M ⁽²¹⁾	F ⁽²¹⁾	F	F	F	F	F	F	F	F	F	F	F	
(3-20) Risk: Realignment	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F	F	F	F	F ⁽²⁾	F ⁽²⁾	F	F	F ⁽²⁾	F ⁽²⁾	F	F	F	F	F	F	F	F	F	F	F	F	
(3-21) Collision Analysis Locations																																		
Economic Development																																		
(3-22) Freight & Goods (Frost Free) ⁽⁶⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F	F	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
(3-23) Four-Lane Trunk System	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
(3-24) Rest Areas (New)	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
(3-25) Bridge Restrictions	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F ⁽²⁾	F	F	F	F	F	F ⁽²⁾	F ⁽²⁾	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
(3-26) Bike Routes (Shldr)																																		

Design Elements determined based on a Project Analysis⁽²¹⁾

Design Matrix 3: Main Line NHS Routes (Except Interstate)
Exhibit 1100-5

Appendix B

P-3, Full Design Level Data

Appendix C

Route Development Plan



Date: July 1, 1992

From: James P. Toohey

James P. Toohey
AM

Subject:

SR 97, MP 33.52 to MP 61.34
Klickitat County Line to Jct SR 22
Route Development Plan

To: Richard L. Larson

Attached is the approved route development plan for the subject area. It was approved without comment. Please commend your staff for a job well done.

CEH:dn
Attachments
cc: C. Howard

*Good job
Kerry,
Bob
& Steve
Lund*

DEPARTMENT OF TRANSPORTATION DISTRICT 5 MAIL ROOM JUL 07 '92		
DIST. ADMINISTRATOR	UT	TRAFFIC ENGR
SECRETARY		UTILITIES ENGR
LOCAL PROGRAM	AT	PLANNING ENGR
ASST LOCAL PROG		ENVIRONMENTAL
REAL ESTATE SERV		RMP/SHARING
PROGRAM MGMT		OPERATIONS ENGR
PROJ CONTROL		OPFR ASST CONST
INFO SYSTEMS		MATERIALS ENGR
ACCOUNTING		INSP/TRAINING
ADMIN OFFICER		OPER ASST MAINT
SUPPLY		MAINT ANALYST
SAFETY		FAC PLANNER
PERSONNEL ASST		PERMITS
PROJ DEV ENGR	BT	SPEC CHECKS
ASST P.O. ENGR		SIGN ENGR
CONSULTANT		EQUIP SUPT
DEV BRANCH ENGR	BT	T.S.F. ACCT
ASST DEV BR ENGR		FILE
ASST DEV BR ENGR		DISCARD
RECORDS		

(176) *(37)*

MAY 18 1992



Washington State
Department of Transportation

INTRA-DEPARTMENTAL COMMUNICATION

Date: April 16, 1992

From: Richard L. Larson

A handwritten signature in cursive script, likely belonging to Richard L. Larson.

RE: SR 97, MP 33.52 to MP 61.34
Klickitat County Line to Jct
SR 22. Route Development
Plan

To: James P. Toohey
Mail Stop: KF-01

Attached for your review and approval is the Route Development plan for SR 97 from the Klickitat County Line to the junction of SR 22, near the City of Toppenish.

This Route Development Plan is intended to identify the improvements needed for this section of US 97 to provide the necessary capacity until the year 2012. The plan encompasses a myriad of factors distilled into a recommended highway design. When it is approved, this long range plan will provide guidance for the development of the Districts program of projects as well as guiding the District Planning Office in defining developer impact mitigation measures.

The Technical Advisory Committee of the Yakima Valley Conference of Governments concurs that this plan is consistent with the zoning, land use, and comprehensive plans within Yakima County. Yakima County does not have a Regional Transportation Plan that we could review this RDP against for concurrence.

This RDP has been reviewed by the Yakima Indian Agency, and their comments have been incorporated into the plan.

We recommend approval of this plan. It accomplishes the Districts goals of maintaining the current LOS on SR 97 and providing a reasonable facility for future use. The recommendations made are consistent with any improvements that might be necessary beyond the 20 year design frame of this plan.

Route Development Plan

SR 97
Klickitat County Line to Jct. SR 22
Milepost 33.52 to 61.34

April 1992

Washington State
Department of Transportation
District 5
2809 Main Street
Post Office Box 12560
Yakima, Washington

R. L. Larson, P.E.
District Administrator

Washington State Department of Transportation
Route Development Plan

SR 97 MP 33.52 to MP 61.34

KLICKITAT COUNTY LINE TO JCT. SR 22

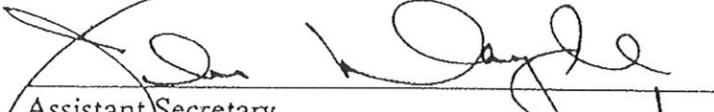
TITLE

APPROVED BY:


District Administrator, District 5

5/15/92
Date

APPROVED BY:


Assistant Secretary
Planning, Research and Public Transportation *for*

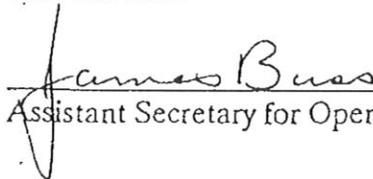
7-1-92
Date

CONCURRENCE:


State Design Engineer

6/24/92
Date

REVIEWED:


Assistant Secretary for Operations

6/29/92
Date

EXECUTIVE SUMMARY

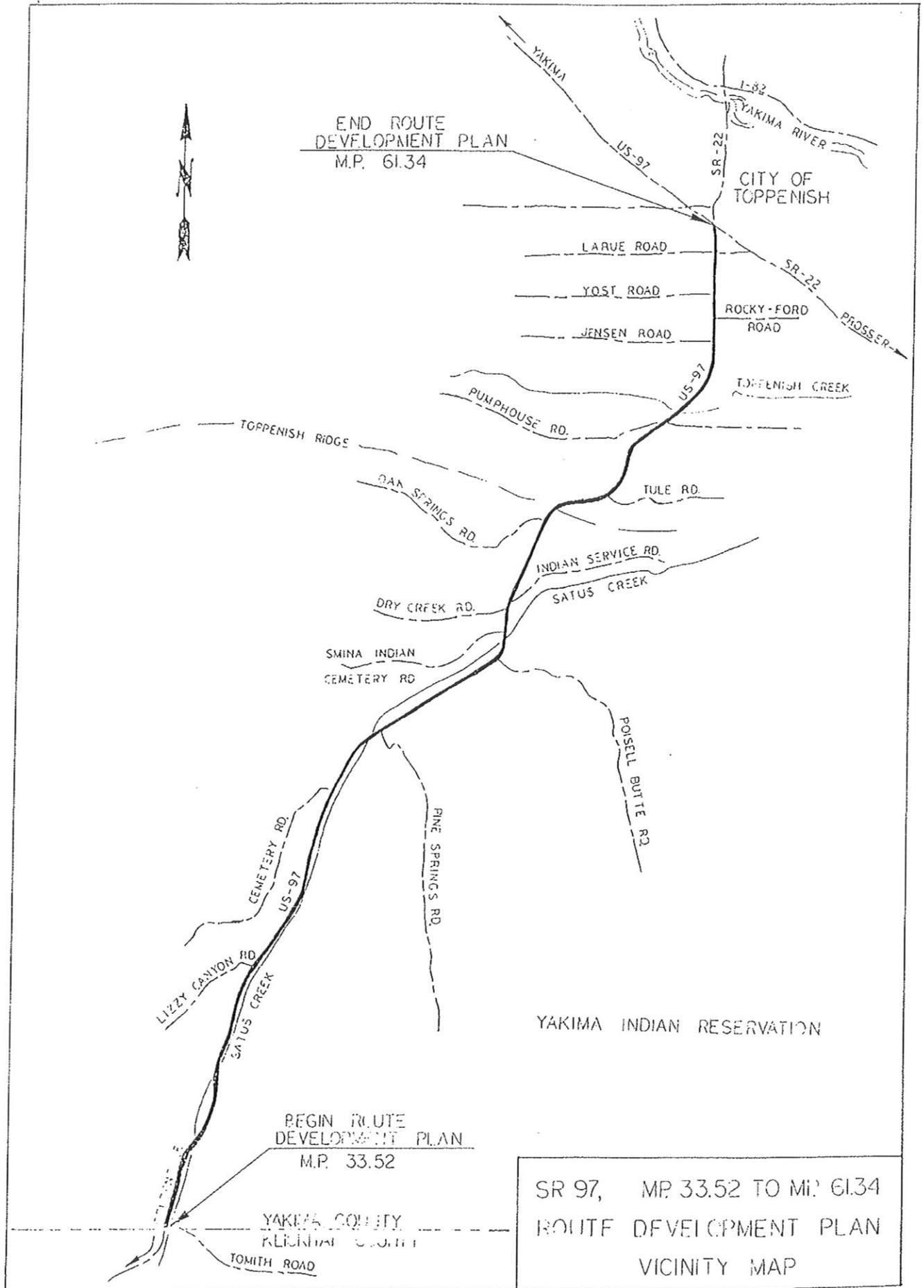
U.S. 97 is a two lane principal arterial that runs north/south from the Oregon State Line, near Goldendale in Klickitat County, to the Canadian Border, near Osoyoos Lake in Okanagan County.

This report covers a section of SR 97 that lies within Yakima County, beginning at the Klickitat County Line, MP 33.52, District 5 Boundary, and ending at the junction of SR 22, MP 61.34, near the City of Toppenish. The primary user of SR 97 through the report section is interstate traffic from Oregon and Southwest Washington going to Central Washington. The traffic includes 23% trucks and 4% recreational vehicles. The current Level of Service (LOS) is A (5.66 miles) and C (22.16 miles) for the report section. The LOS by year 2012 will be A (5.66 miles), C (4.49 miles), and D (17.67 miles) if no improvements are made.

The report recommends the following:

1. An acceptable LOS for SR 97 is "C".
2. The current practice of constructing 12 foot lanes and 6 foot shoulders should be continued.
3. Partial access control should be established through out the report section.
4. The vertical and horizontal alignments should be improved where possible in the 17.67 mile segment.
5. At least 6 - 2 mile long passing lanes (3 for each direction of travel) should be added to the 17.67 mile segment.

These recommendations will maintain a LOS of C or better through the design year (2012). The recommendations, and their implementation, are limited by the environmentally and culturally sensitive areas along Satus Creek.



SR 97, MP 33.52 TO Mi. 61.34
 ROUTE DEVELOPMENT PLAN
 VICINITY MAP

PRESENT PURPOSE AND FUNCTION

SR 97 is a north/south U.S. Route that traverses Washington State entering at the Columbia River, in Klickitat County, near the town of Goldendale, and leaving Washington State at Osoyoos Lake in Okanogan County. This report applies to the section of SR 97 that begins at the Klickitat County Line (M.P. 33.52) and ends at the City of Toppenish (M.P. 61.34). The report section lies within Yakima County and the Yakima Indian Reservation. The roadway serves interstate movements from western and central Oregon to central Washington and intrastate movement between southwest Washington and central Washington.

This section of roadway has a functional classification of Principal Arterial, and is categorized as "Design Standards" in the 1990 State Highways Level of Development Plan. The design hourly volume (DHV) count of 523 vehicles places this section within the P-3 design class. The functional classification is consistent with the origin, nature, and amount of traffic that use this road.

A prior Route Development Plan (attached) for this section sought and received approval for 12 foot lanes and 6 foot shoulders, rather than 12 foot lanes and 8 foot shoulders as required for the P-3 design class. The reasons sited for the request were the close proximity of sensitive archaeological and environmental areas to the roadway, and restricted funds and budgetary constraints.

WSDOT has planned Partial Access Control from the Klickitat County line (M.P. 33.52) to Dry Creek (M.P.50.52), has established Partial Access Control from Dry Creek (M.P. 50.52) to Toppenish Creek (M.P. 57.06), and has planned Modified Access Control from Toppenish Creek (M.P. 57.06) to the City of Toppenish (M.P. 61.34). Current WSDOT design standards recommend no more than 2 property access points per side per mile and 1 mile crossroad spacing for the segments from Klickitat County to Toppenish Creek. Access from Toppenish Creek to the City of Toppenish should be limited to one access per property and joint use of access approaches where feasible.

DESCRIPTION OF EXISTING FACILITIES

U.S. 97, from M.P. 33.52 to M.P. 61.34, is a two lane highway. Travel lanes, auxiliary lanes, and shoulder widths are tabulated below:

M.P.	to M.P.	Lanes	Shoulders
33.52	35.36	11' ACP	6'-8' Gravel
35.36	41.28	12' ACP	6' ACP
41.28	50.72	11' ACP	6'-8' Gravel
50.72	51.19	12' ACP	6' ACP
51.19	53.41	11' ACP with 10' Climbing Lane right	6' ACP left 3' ACP right
53.41	53.73	11' ACP with 10' Climbing Lanes left and right	3' ACP left 3' ACP right
53.73	56.85	11' ACP with 10' Climbing Lane left	3' ACP left 6' ACP right
56.85	61.34	12' ACP	7' ACP

SR 97 has 15 at-grade intersections with County Roads or Yakima Indian Nation Roads. Additionally, there is a rest stop pull out at M.P. 45.90 and a Weigh Station exit and entrance at M.P. 56.83 and 56.98, respectively. The present Average Daily Traffic (ADT) for crossroad traffic is well below 2000 vehicles at all intersections within this report. This report terminates just prior to a signalized intersection at the junction of SR 97 and SR 22 (M.P. 61.44).

The number of private road approaches per mile exceed the guideline for road approaches set forth in the WSDOT Design Manual for the partial access control segment from Klickitat County line to Dry Creek. There are no road approaches on the section from Dry Creek to Toppenish Creek.

The bridges included within this report are:

Bridge Title	Bridge Number	M.P.	Width	Useful Life
Satus Cr. 4th Xing	97/102	35.89	36'	2042
Satus Cr. 3rd Xing	97/103	37.46	40'	2050
Satus Cr. 2nd Xing	97/106	45.84	28'	1999
Trestle #3	97/108	47.02	28'	1999
Trestle #2	97/109	48.00	28'	1998
Trestle #1	97/110	49.16	28'	1998
Satus Cr. 1st Xing	97/111	49.56	28'	1993
Dry Creek	97/112	50.93	36'	2040
Toppenish Creek	97/116	57.06	24'	2006
Drain Canal	97/118	58.26	33'	2006
Canal Drain Ditch	97/120	60.82	40'	2006

The general terrain is mountainous from the Klickitat County Line to Toppenish Creek and level from Toppenish Creek to the City of Toppenish. The vertical profile grade of SR 97 from Klickitat County Line is generally less than 2% with short sections up to 4%. The average profile grade from Dry Creek to Toppenish Ridge is 3.16%, and from Toppenish Ridge to Toppenish Creek is 3.80%. The profile grade from Toppenish Creek to the City of Toppenish averages 0.5%.

The land use within the section from Klickitat County Line to Toppenish Creek is primarily range land grazing. The land use from Toppenish Creek to the City of Toppenish is primarily agricultural with secondary small retail and recreational uses. There is a wildlife refuge located between M.P. 56.75 and M.P. 57.70 on the left. Houses within the report section are sparsely distributed. Yakima County does not expect this area to have any significant changes in land use patterns for the next 20 years.

PRESENT OPERATING CONDITIONS

The base year for this report is 1992. The traffic conditions for this year are as follows:

M.P. to	M.P.	1992 ADT	v/c Ratio	LOS	Accident Rate
33.52	35.36	3500	0.46	C	1.0
35.36	41.28	3500	0.41	C	1.0
41.28	50.72	3500	0.45	C	1.0
50.72	51.19	3500	0.40	C	1.0
51.19	53.41	3500	0.24	A	1.0
53.41	53.73	3500	0.14	A	1.0
53.41	56.85	3500	0.24	A	1.0
56.85	61.34	3500	0.31	C	1.0

The volume/capacity (v/c) Ratio and Level of Service (LOS) were determined using the Washington State Design Manual and the Highway Capacity Manual (Transportation Research Board, Special Report 209). Because of the rural setting and the low population density of the study area, there is not a well-defined AM or PM peak operating condition. The peak traffic flows are due to weekend vacation traffic and usually occur either Sunday PM or Monday AM.

The 1990 statewide accident rate for all highways was 1.9, the 1990 statewide accident rate for principal arterials was 1.44, and the 1990 accident rate for District 5 was 1.1. The accident rate for this section of SR 97 is below the state average and district average accident rates. There

are no locations where the number of accidents indicate there is an accident problem, however, this entire section has been designated a daylight headlight driving area at the request of Yakima County.

The following projects have been identified on the 1992 to 1997 6-year Transportation Improvement Program (TIP).

SR 97/220 Paving - M.P. 58.28 to M.P. 59.26 - ACP overlay and safety improvements.

Vic. Br. 97/106 to Br. 97/111 - M.P. 46.40 to M.P. 49.00 - Reconstruct existing roadway and replace bridges 97/108 and 97/109.

Br. 97/111 to Dry Creek Br. - M.P. 49.00 to M.P. 50.71 - Reconstruct existing roadway and replace bridge 97/111.

M.P. 41.28 to Vic. Br. 97/106 - M.P. 41.28 to M.P. 46.40 - Reconstruct existing roadway and replace bridge 97/106.

These projects will improve the v/c ratio slightly.

ROUTE DEVELOPMENT PLAN

This section of U.S. 97 currently operates at a Level of Service (LOS) C with the exception of the segment from Dry Creek to Toppenish Creek which is at LOS A. By the year 2012 (20 year hence) the LOS will have dropped to D in the section from Klickitat County to Dry Creek, B in the section from Dry Creek to Toppenish Creek, and will remain C from Toppenish Creek to the City of Toppenish. The 2012 ADT is based on an estimated growth rate of 3%. The 2012 ADT will be 5500 except in the immediate vicinity of the City of Toppenish where it will be 6880.

The WSDOT Design Manual suggests that an appropriate LOS for a Principal Arterial is "B". However, because the expansion of U.S. 97 is constrained by sensitive archaeological and environmental areas and U.S. 97 is currently operating at an acceptable level of service, we feel the appropriate LOS should be lowered to C. Steps should be taken to maintain or increase the capacity of this section of SR 97. These steps should include:

Klickitat County line to Dry Creek (M.P. 33.52 to M.P. 51.19)

1. Add passing lane sections where feasible.
2. Improve the vertical and horizontal alignment to decrease the number of no passing zones.

Item number one, adding 6 passing lane sections (3 for each direction of travel) improves the 2012 LOS to C by allowing more passing opportunities and separating truck traffic from passenger cars. Item number 2, would improve the v/c ratio but not enough to raise the LOS. It would make the congestion seem more tolerable.

Klickitat County line to Dry Creek (M.P. 33.52 to M.P. 51.19) and Toppenish Creek to the City of Toppenish (M.P. 56.85 to M.P. 61.34).

1. Limit the number of private road approaches
2. Reduce the number of County road intersections
3. Purchase access rights to establish access control, and fence the right of way.

Items #1, #2, and #3 will help to preserve the LOS but will not change it. These should make any future congestion improvements easier to accomplish and will help to delay the need for those improvements.

There are 15 at-grade intersections within the report section.

M.P.		Name
33.54	Right	Tomith Road
40.14	Left	Lizzy Road
44.29	Left	Cemetery Road
45.91	Right	Pine Springs Road
49.12	Right	Poisell Butte Road
49.37	Left	Smina Indian Cemetery Road
49.80	Left	Dry Creek Road
51.04	Right	Indian Service Road
51.04	Left	Oak Springs Road
54.18	Right	Tule Road
56.74	Left & Right	Pumphouse Road

58.76	Left	Jensen Road
59.26	Right	Rocky / Ford Road
59.75	Left	Yost Road
60.77	Left & Right	Larue Road

The crossroads are proposed to remain as at-grade crossings under stop sign controls.

SUMMARY

The probable operating conditions for year 2012 is

Level of Service	B, C, D
------------------	---------

Average Travel Speed	55, 45, 40
----------------------	------------

The route development projects should include:

Short Range (1991 - 1997)

1. SR 97/220 Paving - M.P. 58.28 to M.P. 59.26 - ACP overlay and safety improvements.
2. Vic. Br. 97/106 to Br. 97/111 - M.P. 46.40 to M.P. 49.00- Reconstruct existing roadway and replace bridges 97/108 and 97/109.
3. Br. 97/111 to Dry Creek Br. - M.P. 49.00 to M.P. 50.71 - Reconstruct existing roadway and replace bridge 97/111.
4. M.P. 41.28 to Vic. Br. 97/106 - M.P. 41.28 to M.P. 46.40 - Reconstruct existing roadway and replace bridge 97/106.

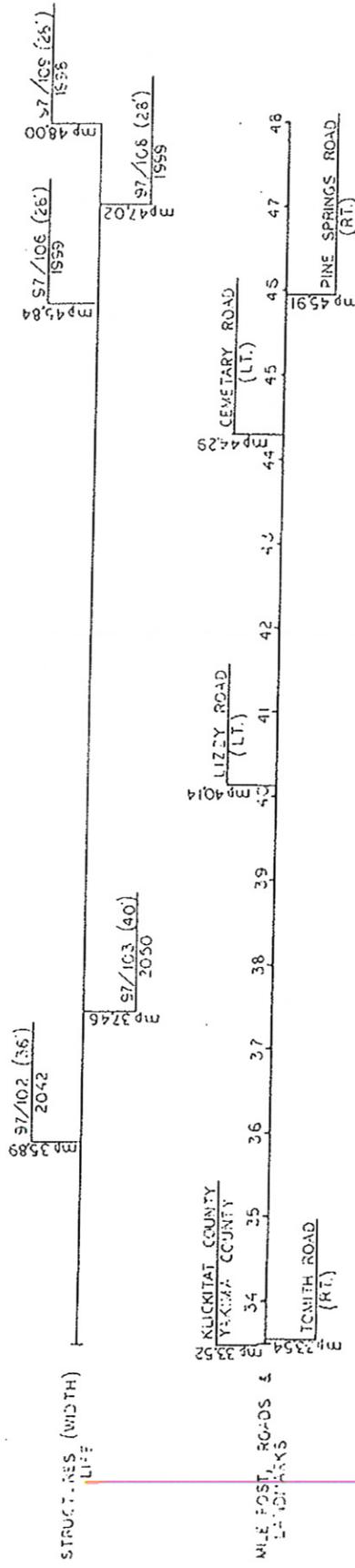
Medium Range (1998 - 2003)

ACP overlays and safety improvements

Long Range (2004 - 2011)

1. Improve the horizontal and vertical alignments to decrease the no passing zones (M.P. 33.52 to M.P. 51.19).
2. Add passing lane sections (M.P. 33.52 to M.P. 51.19), needs to be accomplished by year 2005.

CLASSIFICATION CLASS. ————— PRINCIPAL ARTERIAL
 DESIGN CLASSIFICATION MODIFIED DESIGN STANDARDS (P-3 DESIGN CLASS)



STRUCTURES (WIDTH) —————
 LIFE —————
 MILE POST, ROADS & DISTRICTS —————
 ADT (DAY) ————— 3500 (450)
 % TRUCKS (% RV'S) ————— 23% (4%)
 2012 ————— 5500 (770)

LEVEL OF SERVICE ————— C
 2012 ————— D
 WITH IMPROVEMENTS 2012 ————— C

MASTER PLAN ACCESS ————— PLANNED PARTIAL ACCESS CONTROL
 CONTROL —————
 DISTRICT PLAN ————— PLANNED PARTIAL ACCESS CONTROL
 ACCESS CONTROL —————

TRAVELED WAY 1992 ————— 2 - 11' (6' to 8')
 LANES (SHOULDERS) 2012 ————— 2 - 12' (6')

FUNCTIONAL CLASSIFICATION

LEVEL OF DEVELOPMENT

PRINCIPAL ARTERIAL
MODIFIED DESIGN STANDARDS (P-3 DESIGN CLASS)

STRUCTURES (WIDTH)
LIFE



POISEL BUTTE ROAD (RT)

DRY CREEK ROAD (LT)

OAK SPRING ROAD (LT)

JENSEN ROAD (LT)

PLAYHOUSE ROAD (LT & RT)

WENCH STATION ENTER & EXIT (RT)

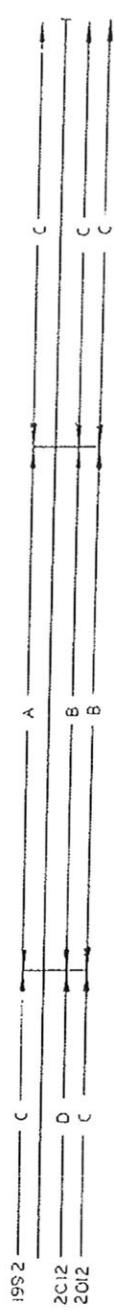
BROOKLY FORD ROAD (RT)

MILE POSTS, ROADS & LANDMARKS

ADT (LHV)
% TRUCKS (%RV'S)

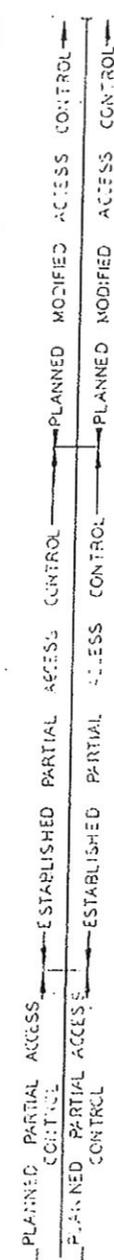


LEVEL OF SERVICE
WITH IMPROVEMENTS

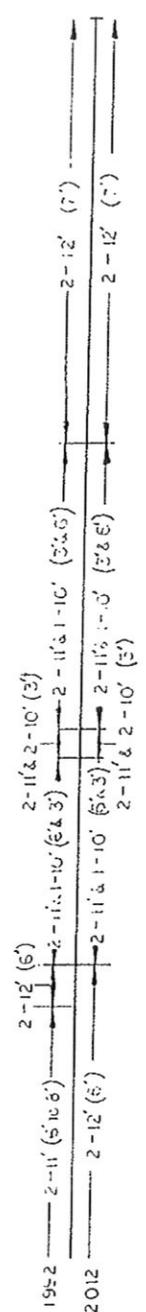


MASTER PLAN ACCESS CONTROL

DISTRICT PLAN ACCESS CONTROL



TRAVELED WAY
LANES (SHOULDERS)





Washington State
Department of Transportation

DISTRICT NO. 5	
DESIGN SECTION	
INTRA-DEPARTMENTAL COMMUNICATION	
NOTED	COPIES
<i>[Signature]</i>	TO:
<i>Boyle PCB</i>	
<i>Boyle PCB</i>	
SR 97	DR.
Klickitat County Line to	FILE
Toppenish	
Route Development Plan	

DATE: July 5, 1988

FROM: T. E. Lyon/J. R. Buss

PHONE:

SUBJECT:

✓ CC: L8472 (Design File)
TO: *Dean Moor*

This IDC is a Route Development Plan for the above referenced portion of SR 97. The Design Standard Roadway width is 40 ft., consisting of 12 ft. lanes and 8 ft. shoulders under the P-3 designation. We are proposing a roadway width of 36 ft., consisting of 12 ft. lanes and 6 ft. shoulders. This is to include any bridges that are to be replaced. Justification for this request is as follows.

Two complex issues face the W.S.D.O.T. when trying to reconstruct or upgrade this portion of SR 97. First, all of this section of SR 97 lies within the boundaries of the expansive Yakima Indian Reservation, crossing and running next to the Satus Creek at various locations. Secondly, there is a definite need to upgrade this primary arterial in a time of restricted funds and budget cutbacks.

In negotiating with the Yakima Indian Nation, there are many sensitive archeological and environmental issues that will have to be dealt with. In the past, we have found this to be very time consuming and costly. Attempting to widen the roadway and flatten slopes to full Design Standards not only increases the problems with the sensitive areas mentioned, but also requires the purchase of a much larger amount of right of way within the Reservation. This means not only dealing with the Yakima Indian Nation as a whole, but also individual tribal members who have been allotted land. In many cases there are 20 or more allottee's per parcel of land. Our right-of-way agents have found in previous dealings that this is very time consuming and costly, or simply not possible to obtain; since we don't have the right of eminent domain over the Yakima Indian Nation.

The existing roadway consists of 11 ft. lanes, with shoulders ranging from 3 ft. to 8 ft. Thirty-Seven percent of the roadway from the county line to Dry Creek is only 28 ft. wide. For the most part, the roadway has been widened adequately to accommodate a 36 ft. width, but not a 40 ft. width. In general, much of the existing shoulder has only a partial bituminous surface treatment. The outer 2 ft. to 6 ft. being untreated surfacing.

July 5, 1988
S. A. Moon
Page 2

Thus, the actual usable, year around width of the roadway is considerably less than that shown in the road log. Also, the slopes into the roadway ditches often are 3:1 or steeper adjacent to a rough rock backslope. Where the Satus Creek is in close proximity to the roadway, additional problems arise in any widening for additional shoulder width or for guardrail placement.

We have estimated that the costs involved in attaining the full Design Standard roadway from Klickitat Cty. Line to M.P. 41.28 to be in excess of one-million dollars more than for a 36 ft. roadway.

The existing roadway, both north and south of this project, is also less than 40 ft. in width, and is not likely to be widened in the foreseeable future. District 4 just recently completed construction on contract 2997, Biggs Rapids to Yakima County Line. All roadway sections being constructed north of the Satus Pass Summit to the Yakima County Line are 36 ft. wide, using a 6 ft. shoulder, except where deviations were necessary. To the north of Dry Creek (M.P. 50.95), SR 97 passes over Toppenish Ridge. This section has truck climbing lanes, with the downhill shoulder being 6 ft. wide. Therefore; the predominate shoulder width from Satus Pass to the edge of the valley floor, near M.P. 56.7, is 6 ft. for the reconstructed portions.

Therefore; it is this District's proposal that any reconstruction of SR 97 between Klickitat County Line and the edge of the Yakima Valley floor be done to a width of 36 ft. including bridges. We feel this would accomplish two objectives. One, it would lessen the impact on the sensitive areas and decrease the need for a large amount of R/W within the Yakima Indian Reservation. Secondly, we will be able to provide a much safer roadway at a an earlier time than we could accomplish by trying to upgrade this portion of SR 97 to a 40 ft. Design Std.

It is our intention to use Design Standards on slopes and vertical and horizontal alignment whenever practical (see Plan of Development request sent earlier). Also, due to the high percentage of truck and R.V. traffic on this roadway, we propose to build turnouts for parking where practical for us, and permitted by the Indians.

Your approval of this Route Development Plan is requested.

RAH/eth



INTRA-DEPARTMENTAL COMMUNICATION

DATE: July 25, 1988

FROM: S. A. Moon

S.A. Moon

PHONE:

SUBJECT: SR 97

Klickitat County Line to Toppenish
Route Development Plan
MP 33.52 to MP 61.44

TO: J. R. Buss, Dist. 5

Your route development plan as presented by yourself and L. D. Pittman in memorandums dated June 30 and July 5, 1988, has been reviewed and is approved for the reasons furnished in these memos. The principal reasons are route continuity and Yakima Indian sensitivities.

We have prepared the attached typical roadway section. This approved drawing complies with your route continuity plan.

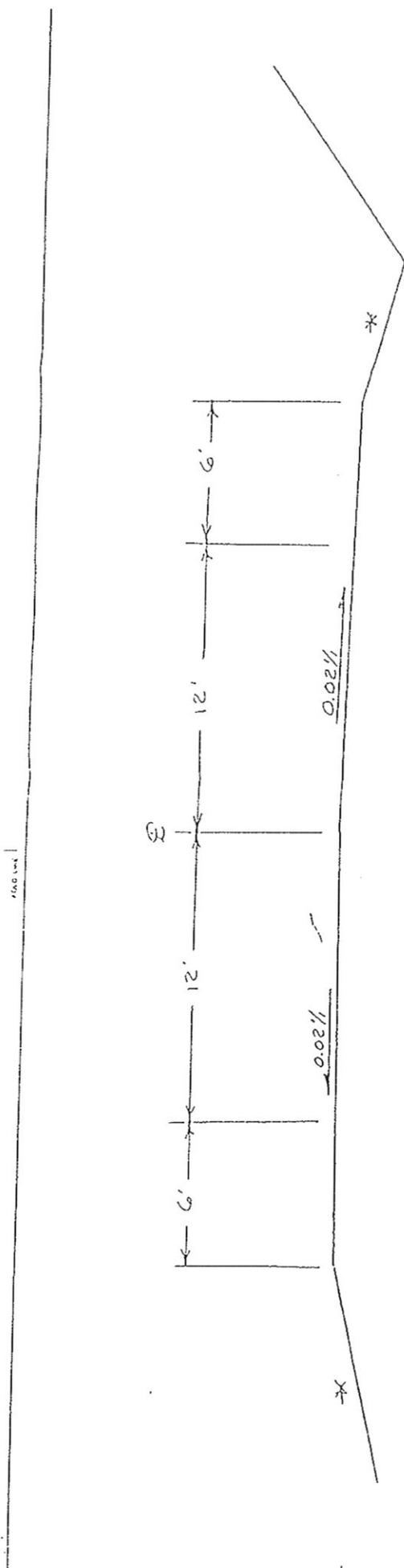
SAM:gv/A54
CSM (DR)

Attachment

cc: T. L. McLain, Program Dev., w/attachment
K. E. Ahola, Dist. 4, w/attachment

DEPARTMENT OF TRANSPORTATION
DISTRICT 5
REAR ROOM
JUL 27 '88

DIST ADMIN			UTIL ENGR
MGMT SVCS			L/SCAPE-EXTNSN
TRCL DEV. ENGR.	<i>MP</i>		TRPCE SHAPING
CONST ENGR			RECORDS ENGR
MAINT ENGR			DOCUMENT ENGR
ADMIN OFF			ASST ST AND ENGR
LAND ACQUIS SHPT			
SEAL AND ENGR			
ASST CONST ENGR			EQUIP SHPT
ASST P.E. ENGR	<i>MP</i>		MAINT ANALYST
ASST TRICE ENGR	<i>MP</i>		PERSONNEL
DESIGN ENGR	<i>MP</i>		ACCOUNTING
DEV. BRANCH ENGR	<i>MP</i>		SAFETY
MATERIALS ENGR			SUPPLY
TRAFFIC ENGR			SECRETARY
INFO SYSTEMS			FILE



ROUTE DEVELOPMENT PLAN
 TYPICAL ROADWAY SECTION
 SR 97
 KLIKITAT C/L TO JUNCTION WITH SR22
 MP 33.52 TO MP 61.44

* SLOPES TO BE ADDRESSED
 IN DESIGN REPORTS FOR
 PROJECTS BEING DEVELOPE

NOTE:
 EXISTING CHANNELIZATION AND/OR
 INTERSECTION WIDENING AND
 TRUCK CLIMBING LANES ARE NOT
 DEPICTED ON THIS GENERAL
 ROADWAY SECTION. FUTURE NEEDS
 FOR ADDITIONAL INTERSECTION, CHANNELIZATION,
 TRUCK CLIMBING LAWE OR OTHER TYPES OF
 WIDENING WILL BE ADDRESSED IN DESIGN REPORTS
 FOR PROJECTS BEING DEVELOPED.

NOTE: Where "New" is superimposed over "Existing" delineate relationship.

GEOMETRIC DESIGN DATA	
Functional Class of Highway	
Level of Development Proposed	
Design Speed (mi/h)	
A.B.T. No.	
Year	
Design Year (Y)	
Design Year (B)	
Travel (Road Travel) in Day (M)	

BRIDGE DATA	
Bridge No.	
Bridge Name	
Address, Sta.	
Proposed Bridges	
Name of Contractor	
Address, Sta.	

DATE	REVISION	BY	APPROVED

APPROVED BY:
 STATE LOCATION-DESIGN ENGINEER
 DISTRICT PROJECT DEVELOPMENT ENGINEER
 DISTRICT ADMINISTRATOR

7/22/88
 DATE
 J. A. Mason
 SIGNATURE

ROADWAY SECTION	97
PROJECT TITLE	ROUTE DEVELOPMENT PLAN
LOCATION NO.	KLIKITAT C/L TO JCT W/SR22
DATE	7/15/88
PROJECT NO.	
DISTRICT NO.	5
SHEET	1 OF 1 SHEETS

Appendix D

MDL-13, Modified Design Level Data

Design Class	Two-Lane Highways					
	Trucks Under 10%			Trucks 10% and Over		
Design Class	MDL-9	MDL-10	MDL-11	MDL-12	MDL-13	MDL-14
Current ADT ^[1]	Under 1000	1000-4000	Over 4000	Under 1000	1000-4000	Over 4000
Design Speed	See Exhibit 1130-1					
Traffic Lane Width ^[2]	11 ft	11 ft	11 ft	11 ft	11 ft	12 ft
Shoulder Width ^[4]	2 ft	3 ft ^[5]	4 ft	2 ft	3 ft ^[5]	4 ft
Parking Lanes Urban	8 ft	8 ft	8 ft ^[3]	8 ft	8 ft	8 ft ^[3]
Minimum Width for Bridges to Remain in Place ^{[6][7]}	22 ft ^[8]	24 ft	28 ft	22 ft ^[8]	24 ft	28 ft
Minimum Width for Rehabilitation of Bridges to Remain in Place ^{[7][9]}	28 ft ^[10]	32 ft	32 ft	28 ft ^[10]	32 ft	32 ft
Minimum Width for Replacement Bridges	Full Design Level Applies ^[11]					
Access Control	For limited access highways, see Chapters 530 and 540 and the Limited Access and Managed Access Master Plan, or WAC 468-52 and the region's Highway Management Classification Report.					
Notes:						
[1] If current ADT is approaching a borderline condition, consider designing for the higher classification.						
[2] For turning roadways, see Exhibits 1130-12a and 1130-12b.						
[3] Parking restrictions are desirable when ADT exceeds 7500.						
[4] When a curb section is used, the minimum shoulder width from the edge of traveled way to the face of curb is 4 ft. In urban areas, see Chapter 1140. On a route identified as a local, state, or regional significant bicycle route, the minimum shoulder width is 4 ft (see Chapter 1520).						
[5] For design speeds of 50 mph or less on roads of 2000 ADT or less, width may be reduced by 1 ft, with justification.						
[6] Use these widths for bridge deck treatment or thrie beam retrofit only.						
[7] Width is the clear distance between curbs or rails, whichever is less.						
[8] 20 ft when ADT is 250 or less.						
[9] Use these widths when a for any bridge work beyond the treatment of the deck, such as bridge rail replacement, deck replacement, or widening.						
[10] 26 ft when ADT is 250 or less.						
[11] Modified design level lane and shoulder widths may be used, when justified, with a corridor or project analysis.						

Two-Lane Highways and Bridges: Modified Design Level
Exhibit 1130-11

Appendix E

Shy Distance, Design Criteria

Maintenance costs for concrete barrier are lower than for other barrier types. In addition, deterioration due to weather and vehicle impacts is less than most other barrier systems. Unanchored precast concrete barrier can usually be realigned or repaired when moved from its alignment. However, heavy equipment may be necessary to reposition or replace barrier segments. Therefore, in medians, consider the shoulder width and the traffic volume when determining the acceptability of unanchored precast concrete barrier versus rigid concrete barrier.

Drainage, alignment, and drifting snow or sand are considerations that can influence the selection of barrier type. Beam guardrail and concrete barrier can contribute to snow drifts. Consider long-term maintenance costs associated with snow removal at locations prone to snow drifting. Slope flattening is recommended when the safety benefit justifies the additional cost to eliminate the need for the barrier. Cable barrier is not an obstruction to drifting snow and can be used if slope flattening is not feasible.

With some systems, such as concrete and beam guardrail, additional shoulder widening or slope flattening is common. However, selection of these types of barriers is sometimes limited due to the substantial environmental permitting and highway reconstruction needs. Permits issued under the SEPA and NEPA processes may lead to the use of a barrier design such as cable barrier, which has fewer potential environmental impacts and costs.

When designing a barrier for use on a Scenic Byway, consider barriers that are consistent with the recommendations in the associated corridor management plan (if one is available). Contact the region Landscape Architect or the Scenic Byways Coordinator in the HQ Highways and Local Programs Office to determine whether the project is on such a designated route. Low-cost options, such as using weathering steel beam guardrail (see 1610.06) or cable barrier (see 1610.07), might be feasible on many projects. Higher-cost options, such as steel-backed timber rail and stone guardwalls (see 1610.09), might necessitate a partnering effort to fund the additional costs. Grants might be available for this purpose if the need is identified early in the project definition phase (see Chapter 120).

(1) Shy Distance

Provide 2 feet of additional widening for shy distance when a barrier is to be installed in areas where the roadway is to be widened and the shoulder width will be less than 8 feet. This shy distance is not needed when the section of roadway is not being widened or the shoulders are at least 8 feet wide. (See criteria in Chapter 1140 for exceptions.)

(2) Barrier Deflections

Expect all barriers except rigid barriers (such as concrete bridge rails) to deflect when hit by an errant vehicle. The amount of deflection is primarily dependent on the stiffness of the system. However, vehicle speed, angle of impact, and weight also affect the amount of barrier deflection. For flexible and semirigid roadside barriers, the deflection distance is designed to help prevent the impacting vehicle from striking the object being shielded. For unrestrained rigid systems (unanchored precast concrete barrier), the deflection distance is designed to help prevent the barrier from being knocked over the side of a drop-off or steep fill slope (2H:1V or steeper).

Appendix F

Structures, Shy to Barrier

1140.12 Parking

In urban design areas and rural communities, land use might make parking along the highway desirable. In general, on-street parking decreases capacity, increases accidents, and impedes traffic flow; therefore, it is desirable to prohibit parking.

Although design data for parking lanes are included in Exhibits 1140-6 through 1140-9, consider them only in cooperation with the municipality involved. The lane widths given are the minimum for parking; provide wider widths when feasible.

Angle parking is not permitted on any state route without WSDOT approval (RCW 46.61.575). This approval is delegated to the State Traffic Engineer. Angle parking approval is to be requested through the Headquarters (HQ) Design Office. Provide an engineering study, approved by the region Traffic Engineer, with the request documenting that the parking will not unduly reduce safety and that the roadway is of sufficient width that parking will not interfere with the normal movement of traffic.

1140.13 Pavement Type

The pavement types given in Exhibits 1140-5 through 1140-8 are those recommended for each design class. (See Chapter 620 for information on pavement type selection.) When a roadway is to be widened and the existing pavement will remain, the new pavement type may be the same as the existing without a pavement type determination.

1140.14 Structure Width

Provide a clear width between curbs or barrier on a structure not less than the approach roadway width (lanes plus shoulders). The structure widths given in Exhibits 1140-5 through 1140-9 are the minimum structure widths for each design class.

Additional width for shy to barriers is not normally added to the roadway width on structures. When a structure is in a run of roadside barrier with the added width, consider adding the width on shorter structures to keep a constant roadway width.

1140.15 Right of Way Width

Provide right of way width sufficient to accommodate roadway elements and appurtenances for the current design and known future improvements. To allow for construction and maintenance activities, provide 10 feet desirable, 5 feet minimum, wider than the slope stake for fill and slope treatment for cut. For slope treatment information, see Chapter 1230 and the *Standard Plans*.

The right of way widths given in Exhibits 1140-5 through 1140-8 are desirable minimums for new alignment requiring purchase of new right of way. For additional information on right of way acquisition, see Chapter 510.