

Restoring habitat function and floodplain connectivity on the Skagit River in the vicinity of Mill and Savage Creeks

Initial Project Scoping

DRAFT 3/27/2012

In 2010, Seattle City Light (SCL) acquired approximately 212 acres of property on the left bank of the Skagit River in the vicinity of Mill and Savage Creeks in order to implement habitat restoration and protect the property for conservation purposes (see map). Since that time, SCL has been working with Skagit River System Cooperative (SRSC) and Skagit County to restore the property, which has included building demolition, riparian and floodplain plantings, and culvert removals. In addition to funds from SCL, the project has been primarily funded through the Salmon Recovery Funding Board (SRF Board, project #09-1450) and several additional sources.

Unfortunately, a portion of the acquired property is heavily degraded by the South Skagit Highway, which disconnects the Skagit River from the floodplain and degrades a variety of existing tributary and wetland habitats. For this reason, an initial scoping effort was conducted to evaluate possibilities for large scale floodplain restoration, such as realigning the highway outside the existing floodplain. Funds were limited for this purpose, so information was gathered using existing or readily available sources. The primary objective was to determine if a feasible alternative existed that would provide enough habitat benefits to warrant pursuing additional funds to design a restoration project. Organizations involved included Seattle City Light, Skagit County, and Skagit River System Cooperative. Road engineering expertise was provided by Andy Blachly, PLS, PE from Longview Timber, and cost estimates based on Washington State Department of Transportation (WSDOT) standards were provided by Khashayar Nikzad, PhD, PE from Trantech Engineering.

Existing habitat conditions

Based on aerial photograph information and several field visits, the current alignment of South Skagit Highway disconnects the mainstem Skagit River from approximately 62 acres of floodplain in the project area, and also has direct impacts on existing habitat conditions (see attached map). The highway completely disconnects and blocks fish access to 5.2 acres of wetlands. An additional 21.7 acres of slough and wetland habitat have at least partial fish access but hydrologic connectivity with the river is significantly degraded by the highway. Approximately 900 feet of Savage Creek currently runs in the highway ditch which requires dredging and routine maintenance, and Savage Slough flows under the highway through an undersized culvert that can be blocked by sediment from Mill Creek during floods. The highway crosses an alluvial fan on Mill Creek with an undersized bridge, so the channel is prone to migration, avulsion and erosion at this location. As a result, the channel has been subject to numerous maintenance projects to

protect the highway over the course of many years, including dredging and channelization.

Restoration Alternative Evaluation

Several alternatives were developed to address the habitat impacts described above. Information about each alternative was collected from aerial photographs, LiDAR elevation data, and field visits. Each alternative was evaluated based on whether it could meet engineering and transportation needs for a county highway, whether it would address the habitat problems, what future maintenance requirements there would be, and estimated costs of the project. The results are described below and maps are attached for each alternative.

Alternative 1 - Highway Realignment, Southern route

Alternative 1 (as originally proposed in the Savage Slough grant proposal) included a new alignment that was based on utilizing existing forest roads on the east and west sides and then extending far enough south to cross Mill Creek where the channel was sufficiently confined to allow for a relatively short bridge span. Upon more careful review of LiDAR elevation data and a field reconnaissance, it was determined that construction in that location would include road gradients that were too steep to meet engineering and transportation requirements for a county highway.

This alternative was rejected as not feasible, so no further evaluation of habitat benefits, maintenance, or costs was conducted.

Alternative 2 - Highway Realignment, Central route

After rejecting Alternative 1, several additional alignment locations were considered. Alignments that were too far to the north would begin to overlap with the Skagit River floodplain or the Mill Creek channel migration zone. These locations would provide fewer habitat benefits and might create unacceptable maintenance requirements for the new highway. Eventually an alignment was identified that was outside the Skagit River floodplain, had acceptable finished highway grades, and could provide reasonable crossings for both Mill and Savage Creeks. This alternative differs from Alternative 1 by including smoother transitions with the existing highway, and it is offset from the existing logging road on the west side in order to maintain low enough grades and a smooth turning radius. Realignment would occur from MP 17.8 to MP 19.4 on the existing highway. This alternative includes a 240 foot span bridge with one pier in the middle to cross the channel migration zone of Mill Creek and a 60 foot span bridge to cross Savage Creek.

Habitat: This alternative would restore the functionality of all existing habitat features, but does not restore full connectivity between Skagit River and the floodplain unless Savage Road could also be removed or relocated.

Maintenance: This would eliminate maintenance requirements associated with Savage Creek flowing in the highway ditch and with the existing Mill and Savage Creek crossings. There would be some maintenance requirements with the new bridges, but they would be very limited because the new bridges would be located out of the

floodplain and could span nearly all of the channel migration area of Mill and Savage Creeks.

Cost: Based on WSDOT cost estimation standards, the cost for elevated structures in a rural location that does not require traffic control is \$350 per square foot and for new highway construction is \$20 per square foot. For a 40 foot roadway width, this calculates to approximately \$4.2 million for the two bridges and \$6 million for new highway construction, for a total of \$10.2 million.

Alternative 3 - Current Highway Alignment with New Crossings

The last alternative maintained the existing road alignment while providing sufficient bridge and culvert crossings to restore connectivity with existing floodplain habitats and adequately span the Mill Creek alluvial fan. This would be a complex undertaking that would need more detailed design work to fully evaluate. But for scoping purposes and to compare to other alternatives, the project elements were assumed to be the following:

- Construct a multi-span trestle type bridge with a total length of 800 feet where Mill and Savage Creeks currently cross the highway
- Install 3 culverts or small bridges to connect 5.2 acres of wetlands across the highway (total span length estimated at 140 feet)
- Install at least one 60 foot bridge for the outlet channel from the large pond on the SE portion of the project area

Habitat: This alternative would restore the functionality of most existing habitat features, but does not restore full connectivity between Skagit River and the floodplain, and would not restore that functionality even if Savage Road could be removed.

Maintenance: This would substantially reduce maintenance requirements compared to the existing Mill Creek bridge, and the large trestle crossing would allow Mill and Savage creeks to migrate much more freely. But large woody debris might rack up on the trestle structure and channels may still move to locations on the highway that do not have bridges or culverts, requiring additional maintenance activities.

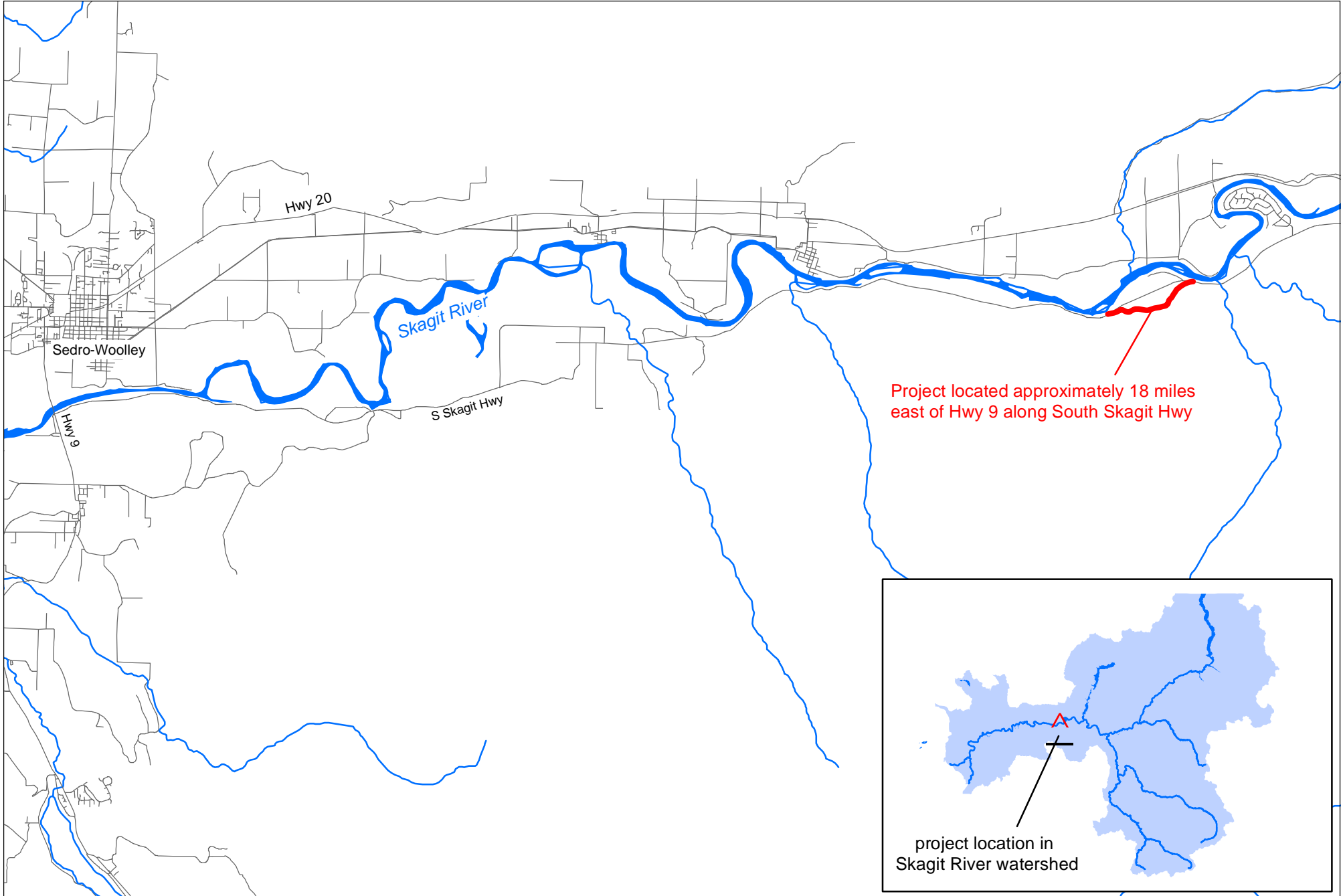
Cost: Based on WSDOT cost estimation standards, the cost for elevated structures in a rural location that requires traffic control and construction phasing is approximately \$400 per square foot. For a roadway width of 40 feet, this calculates to approximately \$16,000 per lineal foot of elevated structure, or \$16 million for approximately 1,000 lineal feet of new bridges and culverts.

Conclusion

Field reconnaissance and an evaluation of LiDAR elevations indicate that while slopes are too steep in some locations it is feasible to construct a new alignment for South Skagit Highway between MP 17.8 to MP 19.4 that is outside the Skagit River floodplain and channel migration zone for Mill Creek but still meets engineering and transportation standards for a county highway. It is also feasible to maintain the existing road location and install new and upgraded stream and wetland crossing structures to reduce maintenance and improve habitat conditions.

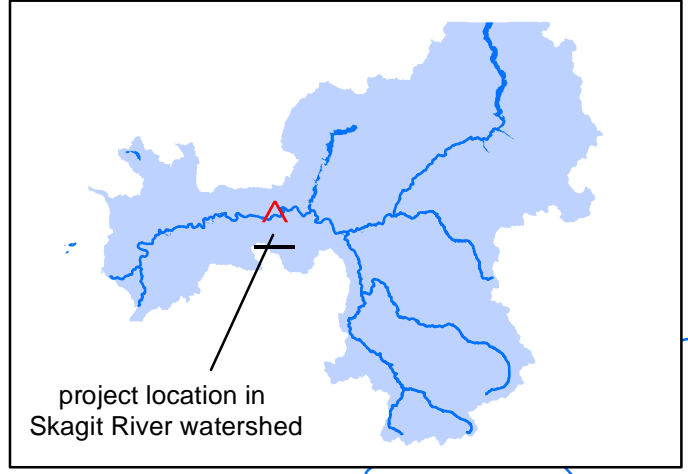
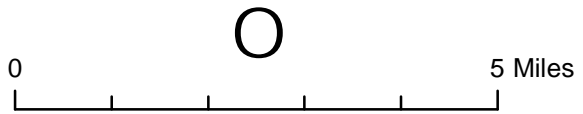
In selecting a preferred alternative, Alternative 1 was rejected because it was not feasible. Of the remaining alternatives, Alternative 2 is the preferred alternative because it is

feasible, it costs substantially less than Alternative 3, has greater overall habitat benefits, and likely less future maintenance. After selecting this alternative, Skagit County prepared a more detailed but still very preliminary design drawing and cost estimate for this alternative, and came up with a cost very similar to the \$10.2 million estimate developed by Trantech (see attached).



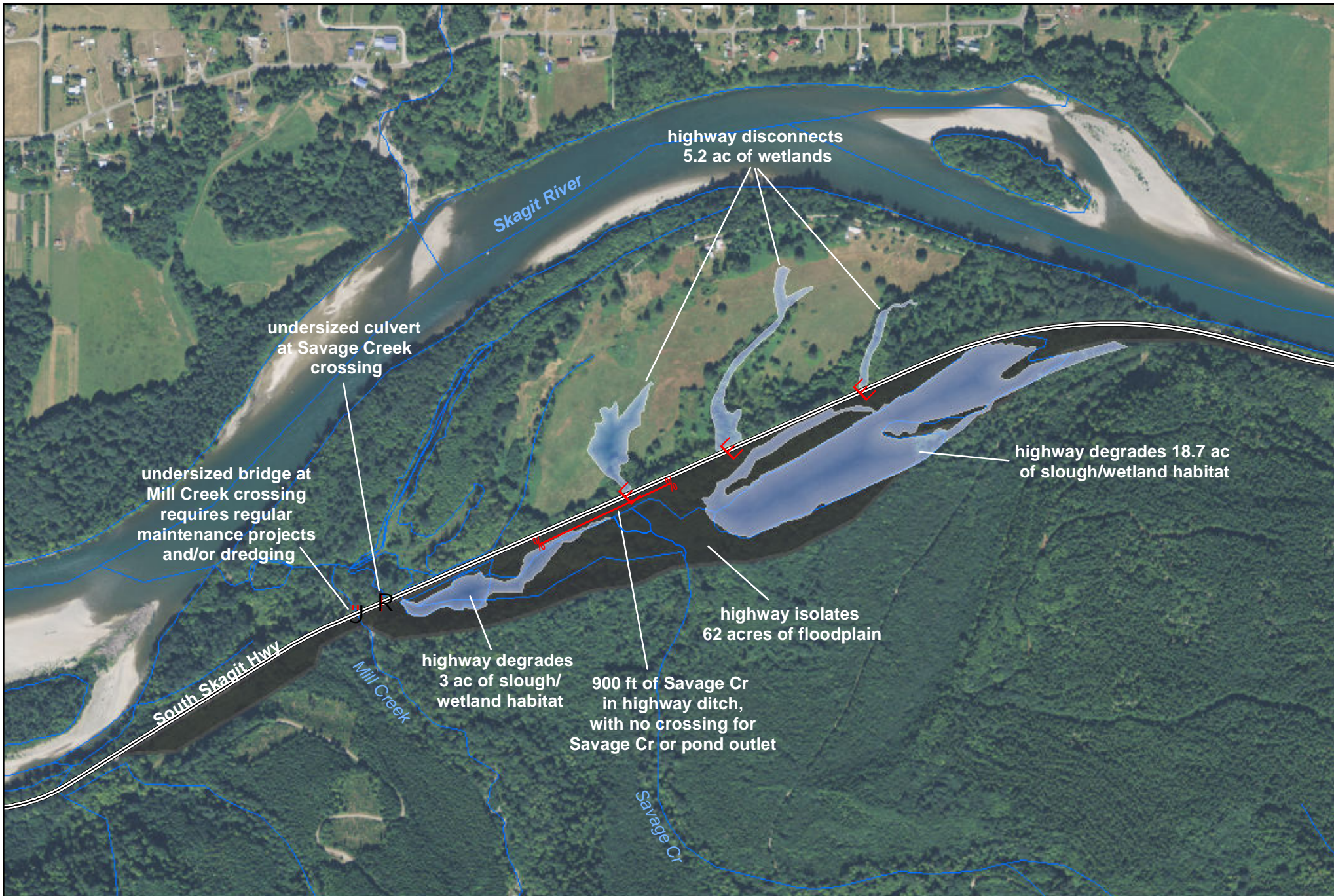
South Skagit Highway Road Relocation

- Proposed road location
- Hydrography



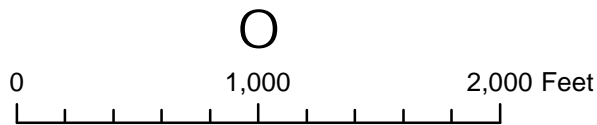
Prepared by Kate Ramsden, February 22, 2012
 Skagit River System Cooperative
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South Skagit Highway Habitat Impacts

- E no highway crossing
- hydrography
- slough/wetland
- isolated floodplain
- J undersized bridge
- R undersized culvert

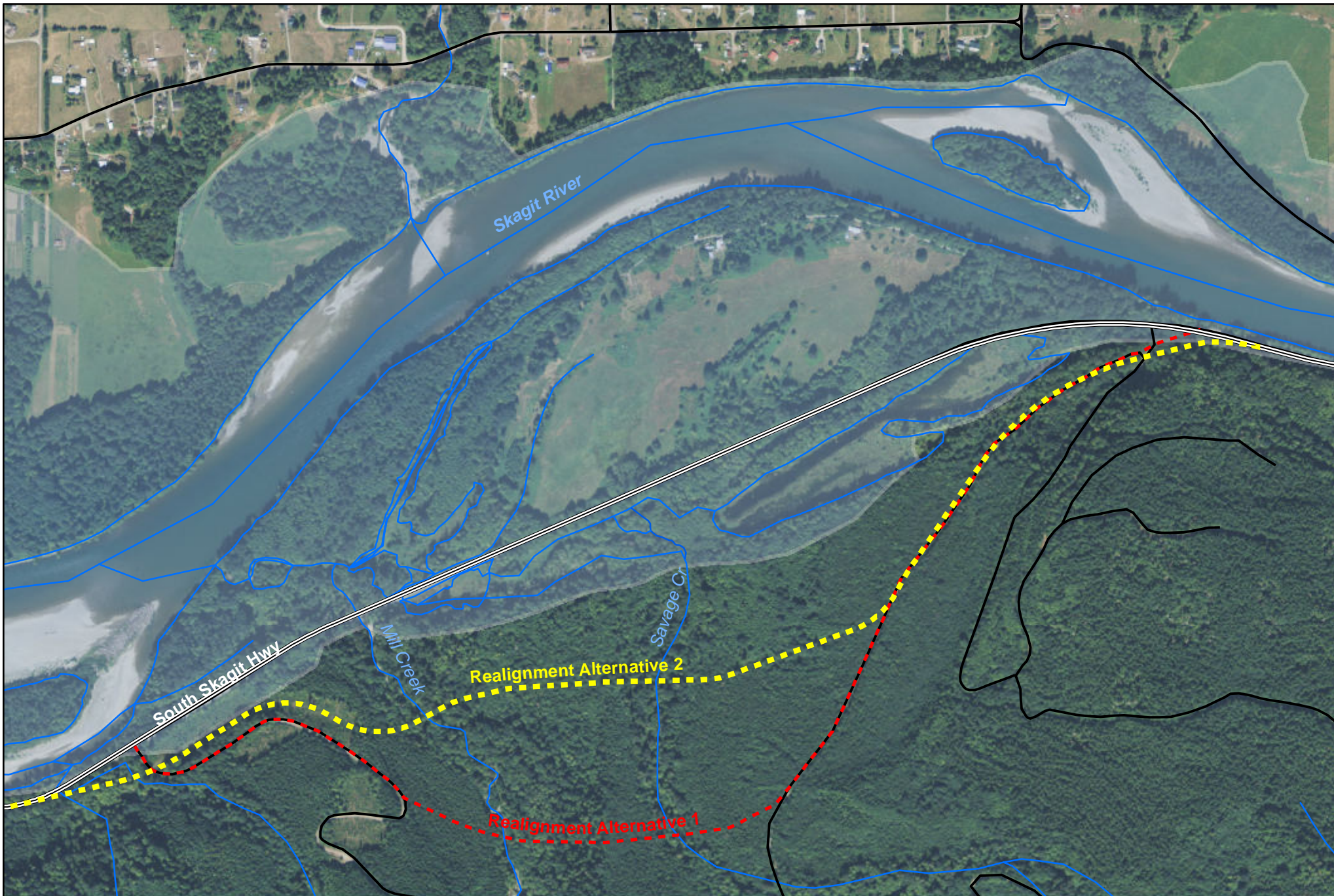


2011 Photo: USDA-NAIP

Prepared by Kate Ramsden, March 28, 2012
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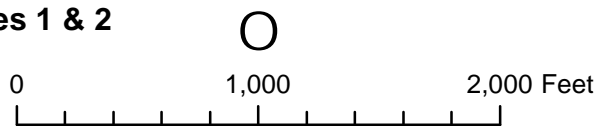


Skagit River
 System Cooperative



South Skagit Highway Road Realignment Alternatives 1 & 2

- - - Alternative 1
- - - Alternative 2
- Existing roads
- Hydrography
- Skagit River floodplain

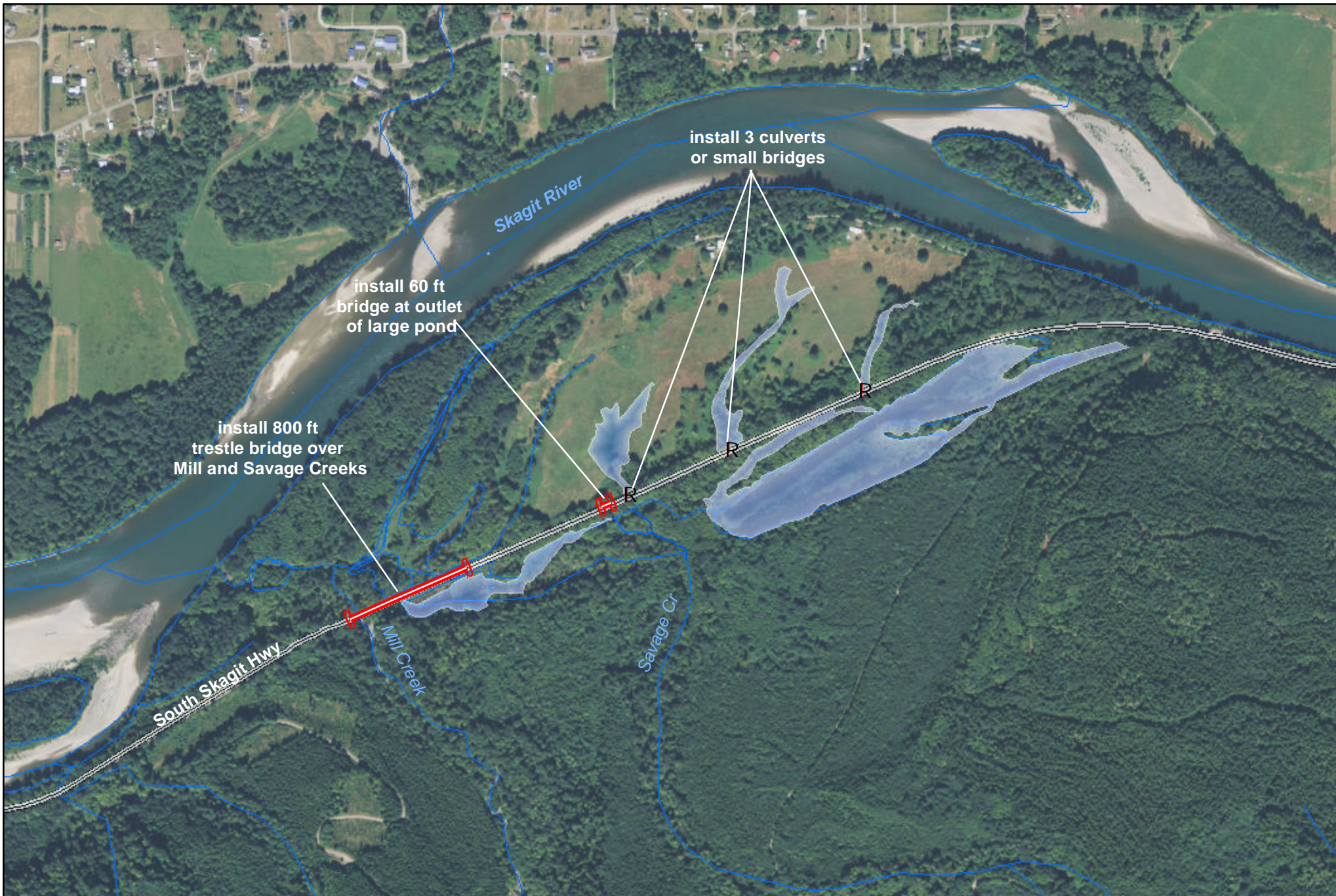


2011 Photo: USDA-NAIP

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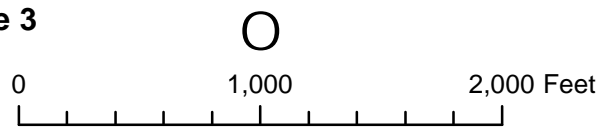


Skagit River
 System Cooperative



South Skagit Highway Road Realignment Alternative 3

- R install culverts
- install bridges
- hydrography
- slough/wetland

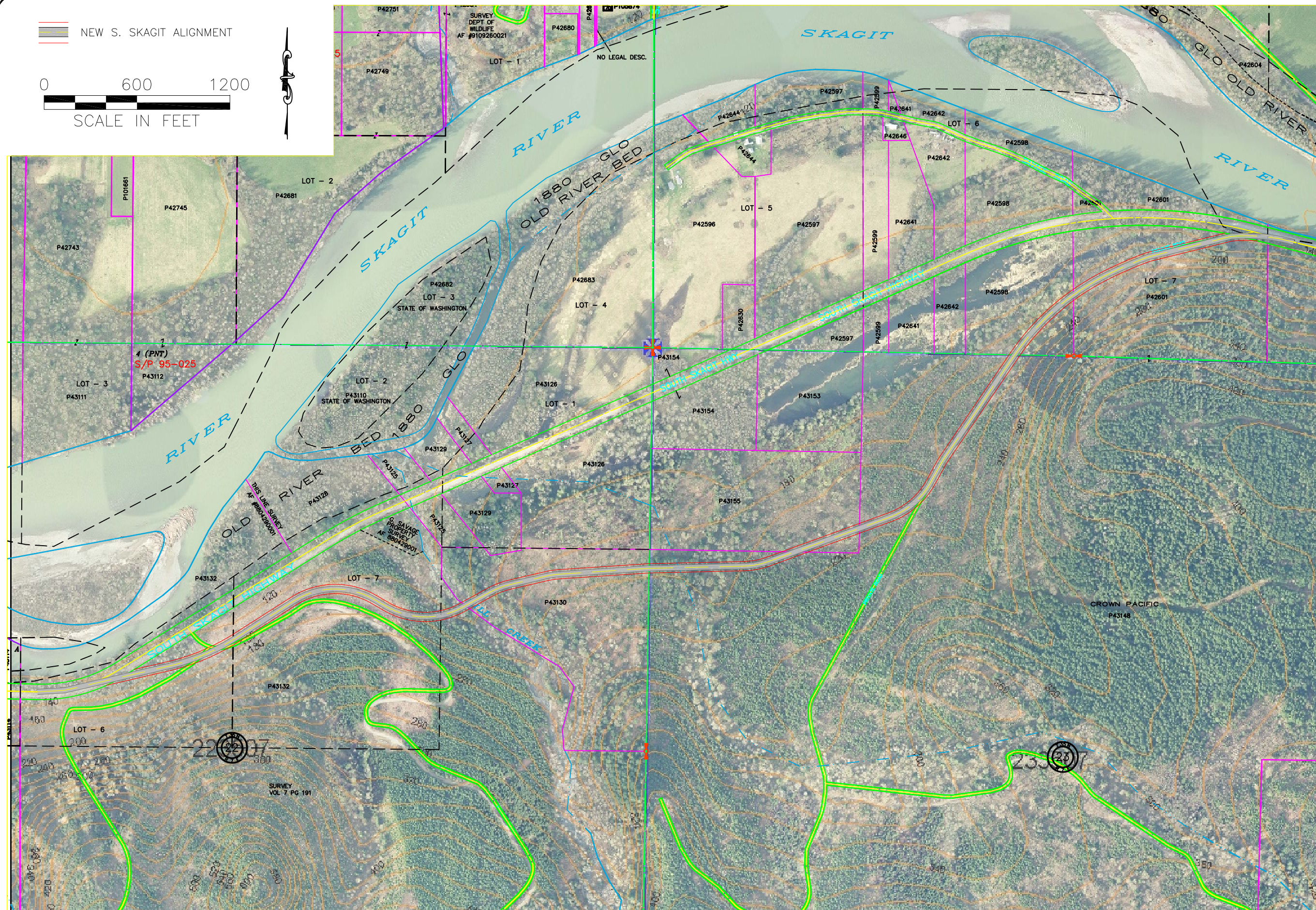


2011 Photo: USDA-NAIP

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NEW S. SKAGIT ALIGNMENT



SKAGIT COUNTY PUBLIC WORKS
 1800 CONTINENTAL PLACE
 MOUNT VERNON, WA 98273-5625
 (360) 336-9400 FAX (360) 336 9478

NO.	REVISIONS	DATE

PROJECT No. -	
FED. AID No. -	
DESIGNED BY: FUJN	DRAWN BY: TN
CHECKED BY: -	APPROVED BY: -
PROJECT LOCATED NEAR: MP 18.3 S 14, 22, 23, T 35N, R 7E	

SOUTH SKAGIT HIGHWAY REALIGNMENT

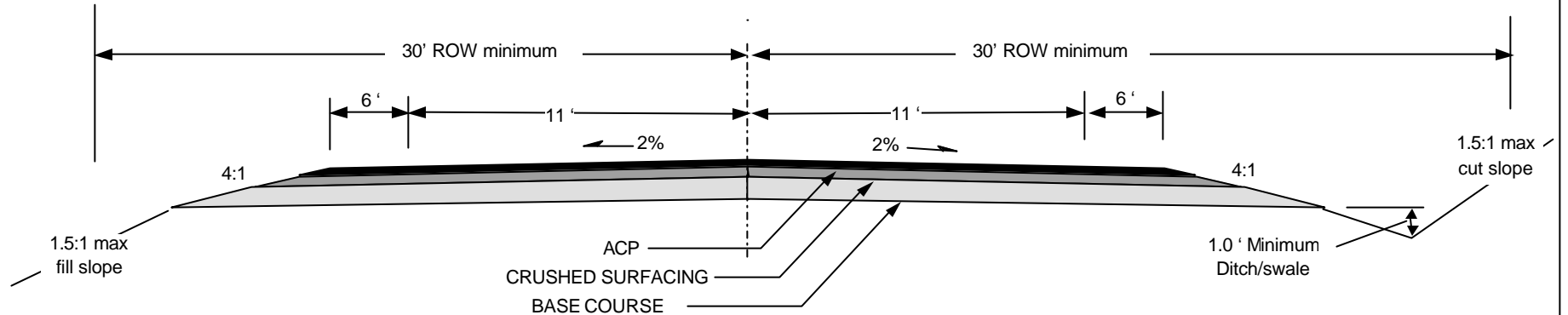
PRELIMINARY DESIGN

1 INCH SCALE BAR
ADJUST SCALE ACCORDINGLY

SHEET
1 OF 1

RURAL AREA ROADWAY DESIGN STANDARDS

ROADWAY CLASSIFICATION: MAJOR & MINOR COLLECTORS
 20-YR PROJECTED AVERAGE DAILY TRAFFIC (ADT): 401 - 2000



DESIGN SPEED (MPH)	Flat=50; Rolling=40; Mountainous=30
MAXIMUM ROAD GRADE (Percent)	Flat=6; Rolling=8; Mountainous=10
MINIMUM ROAD GRADE (Percent)	0.5
MINIMUM ROADWAY WIDTH (Ft)	34
MINIMUM SURFACING WIDTH (Ft)	34
MINIMUM DESIGN LOAD	HS 20-44
MINIMUM RIGHT-OF-WAY WIDTH (Ft)	60
MINIMUM REQUIRED SURFACING:	
ACP	ACP = 2" compacted depth
CRUSHED SURFACING TOP COURSE	2" compacted depth
GRAVEL BASE	10" compacted depth
VERTICAL CLEARANCE	16.5 ft.

Collector401-2000.doc



SKAGIT COUNTY
 DEPARTMENT OF
 PUBLIC WORKS

REVISIONS	DATE

ROADWAY
 STANDARDS

RURAL MAJOR & MINOR
 COLLECTOR ROADWAY
 SECTION ADT 401 - 2000
 FIGURE B - 6

6/26/2000

PRELIMINARY COST ESTIMATE

SOUTH SKAGIT HIGHWAY REALIGNMENT AT MILL CREEK

Prepared by: Torey Nelson, Transportation Programs

PRE CONSTRUCTION					
	PS&E	1	LS	\$1,014,973	
	ENVIRONMENTAL	1	LS	\$150,000	
	RIGHT OF WAY (12.56 ACRES @ \$2,800/ACRE)		DONATED	\$35,168	
				\$0	
			SUBTOTAL:	\$1,164,973	
CONSTRUCTION					
ROADWAY					
		Quantity	Unit	Unit Amount	Total
1	MOBILIZATION	1	LS	\$750,000	\$750,000
2	TRAFFIC CONTROL SUPERVISOR	160	HR	\$45.00	\$7,200
3	OTHER TRAFFIC CONTROL LABOR	1	LS	\$1,500	\$1,500
4	OTHER TEMPORARY TRAFFIC CONTROL	1	LS	\$3,000	\$3,000
5	ESC LEAD	200	WD	\$60.00	\$12,000
6	SILT FENCE	30,000	LF	\$2.50	\$75,000
7	CLEARING AND GRUBBING	6	AC	\$3,800.00	\$22,800
8	REMOVAL OF STRUCTURE (Mill Creek Bridge)	1,230	SY	\$40.00	\$49,200
9	CONTAINMENT	1	LS	\$30,000	\$30,000
10	REMOVAL OF EXISTING ROAD SURFACE	17,111	SY	\$3.50	\$59,889
11	REMOVAL OF EXISTING ROAD BASE	23,333	CY	\$10.00	\$233,333
12	ROADWAY EXCAVATION, INCL. HAUL	26,667	CY	\$10.00	\$266,667
13	DITCH EXCAVATION, INCL. HAUL	4,000	CY	\$17.00	\$68,000
14	WATER	150	MGAL	\$30.00	\$4,500
15	CONSTRUCTION GEOTEXTILE FOR SOIL STABILIZATION	50,000	SY	\$1.50	\$75,000
16	EMBANKMENT COMPACTION	10,000	CY	\$2.00	\$20,000
17	RETAINING WALL	7,000	SF	\$30.00	\$210,000
18	GRAVEL BORROW, INCL. HAUL	22,000	TN	\$10.00	\$220,000
19	QUARRY SPALLS	500	TN	\$25.00	\$12,500
20	CRUSHED SURFACING BASE COURSE	23,350	TN	\$17.00	\$396,950
21	CRUSHED SURFACING TOP COURSE	4,300	TN	\$26.00	\$111,800
22	HMA, CL B, PG 58-22	4,500	TN	\$75.00	\$337,500
23	GALVANIZED STEEL CULVERT PIPE, 12 GAGE, 96-IN	60	LF	\$350.00	\$21,000
24	CORRUGATED POLYETHYLENE STORM SEWER PIPE, 18-IN.	500	LF	\$35.00	\$17,500
25	EROSION/WATER POLLUTION CONTROL	1	FA	\$20,000	\$20,000
26	SEEDING, FERTILIZING AND MULCHING	15	AC	\$3,000.00	\$45,900
27	TRIMMING AND CLEANUP	1	LS	\$15,000	\$15,000
28	BEAM GUARDRAIL, TYPE 31	1,800	LF	\$23.00	\$41,400
29	BEAM GAURDRAIL, NON-FLARED TERMINAL	6	EA	\$2,000.00	\$12,000
30	PERMANENT SIGNING	1	LS	\$3,000	\$3,000
31	RECESSED PAVEMENT MARKINGS	2.25	HUND	\$1,400.00	\$3,150
32	PAINT LINE	27,600	LF	\$0.75	\$20,700
33	UNANTICIPATED SITE WORK	EST	DOL	\$1.00	\$5,000
			SUBTOTAL:		\$3,166,489
BRIDGES					
34	SAVAGE CREEK BRIDGE (50' x 40' SINGLE SPAN)	1	LS	\$600,000	\$600,000
35	MILL CREEK BRIDGE (240' x 40' DOUBLE SPAN)	1	LS	\$3,000,000	\$3,000,000
			SUBTOTAL:		\$3,600,000
			ESTIMATED CONSTRUCTION COST		\$6,766,489
			ESTIMATED PRE CONSTRUCTION COST		\$1,164,973
			SALES TAX @ 8.2%		\$650,380
			CONTINGENCY (25%)		\$1,982,866
			TOTAL:		\$10,564,708