

SR 6 South Fork Chehalis River Bridge Replacement Project Mitigation Site

USACE NWS-2007-1966

Southwest Region

2010 MONITORING REPORT

Wetland Assessment and Monitoring Program

Issued March 2011



**Washington State
Department of Transportation**

Environmental Services Office

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SR 6 South Fork Chehalis River Bridge Replacement Project Mitigation Site

USACE NWS-2007-1966



General Site Information		
USACE Number	NWS-2007-1966	
Mitigation Location	Bridge across the South Fork of the Chehalis River on SR 6 in Lewis Co.	
Construction Date	2008-2009	
Monitoring Period	2010-2014	
Year of Monitoring	1 of 5	
Type of Impact¹	Wetland Buffer	Stream Buffer
Area of Project Impact	0.85 acre	0.31 acre
Type of Mitigation	Wetland Buffer Enhancement	Stream Buffer Enhancement
Area of Mitigation	0.5 acre	0.7 acre

¹ Wetland impact for this project is 0.26 acre. WSDOT shall debit a total of 0.26 wetland mitigation credits from the North Fork Newaukum Bank credit ledger to compensate for this impact.

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Summary of Monitoring Results and Management Activities (2010)

Performance Standards	2010 Results	Management Activities
90% survival of woody vegetation identified on the planting plan	100% survival in wetland buffer 31% survival in riparian buffer	Target replanting in the fall of 2011.
Blackberry Species and other specific invasive species will not exceed 15%.	Less than 1%	On-going weed control including pre-emergent control in bark mulch blanket areas.
Reed Canarygrass in the mitigation site will be managed at a threshold 10% below the existing baseline conditions	See results section	On-going weed control
Japanese Knotweed shall not be present	Not present onsite	

Report Introduction

This report summarizes Year-1 monitoring activities at the State Route (SR) 6 Chehalis River Bridge Mitigation Site. Included are a site description, the performance standards, an explanation of monitoring methods, and an evaluation of site development. Monitoring activities included vegetation surveys and photo-documentation on August 8th, 2010.

What is the SR 6 Chehalis River Bridge Mitigation Site?

This 1.2-acre wetland buffer and stream buffer mitigation site (Figure 1) is made up of approximately 0.5 acre of established wetland buffer and 0.7 acre of enhanced stream buffer to compensate for the loss of functions due to the construction of a new bridge across the south fork of the Chehalis River. These buffer areas are designed to provide mitigation for lost buffer functions including slope stabilization, water quality, shade, wildlife habitat, and visual/glare screening.

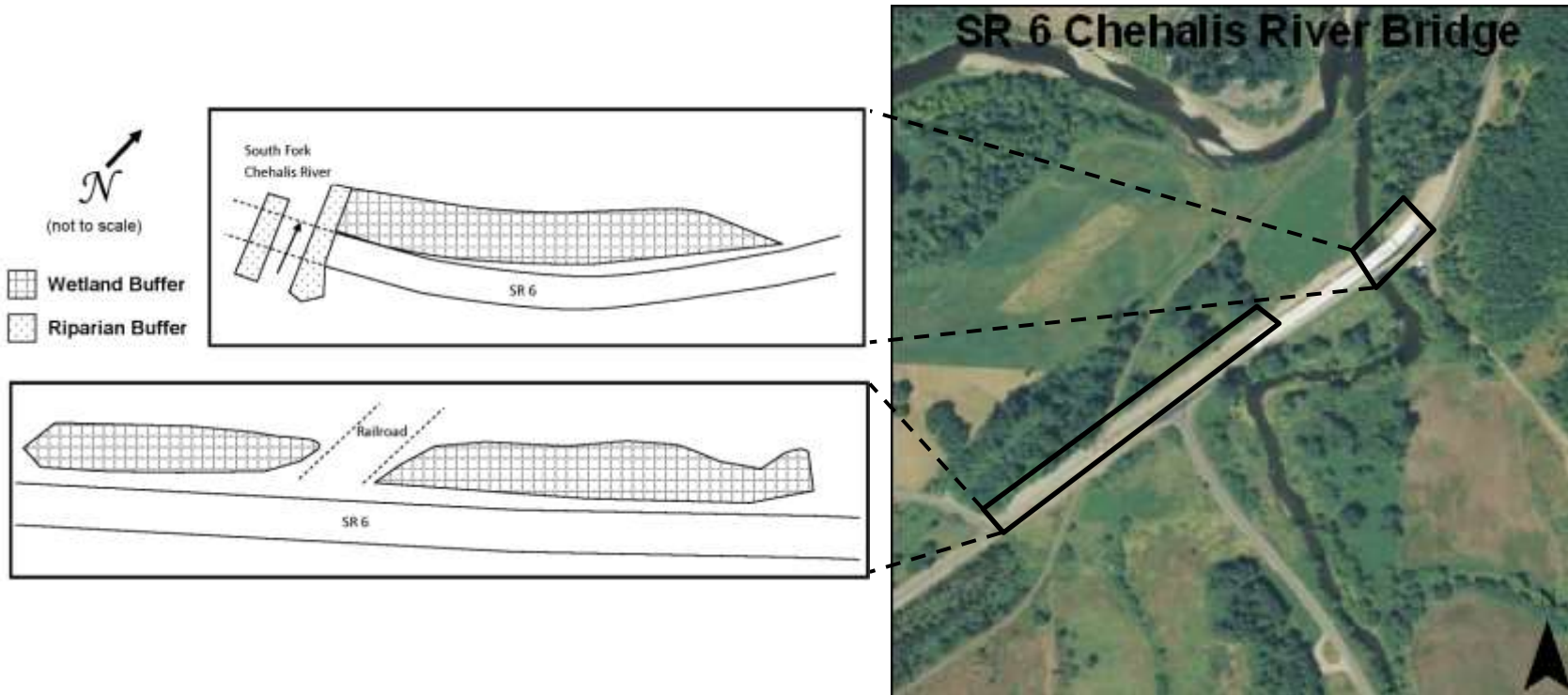


Figure 1 Site Sketch

The SR 6 Chehalis River Bridge Mitigation Site contains a riparian buffer directly adjacent to the east and west river banks and a wetland buffer on the north side of SR 6. Plantings include shrubs in the riparian zone and the wetland buffer area that is bisected by the railroad. The wetland buffer located in the northern most section of the site is a forested community that includes conifers.

What are the performance standards for this site?

Performance Standard 1

At monitoring year 1, there will be a minimum survival rate of 90% in areas identified on the Planting Plan.

Performance Standard 2

The aerial extent of Blackberry Species and other specific invasive species will not exceed 15% in the combined scrub shrub and forest planting areas of the onsite mitigation area.

Performance Standard 3

The aerial extent of Reed Canarygrass in the mitigation site will be managed at a threshold 10% below the existing baseline conditions established in Performance Standard 6A.

Performance Standard 4

Japanese Knotweed shall not be present in any amount within the mitigation site.

Appendix 1 provides the complete text of the performance standards for this project, and Appendix 2 shows the as-built planting plan (Corlett 2010).

How were the performance standards evaluated?

To evaluate standards for vegetation in the wetland buffer, a 340 meter segmented baseline was established parallel to SR 6 (Figure 2). Thirty-one one-meter wide sampling units were placed on transects that were randomly located perpendicular to the baseline using the systematic random method. The unequal belt transect method was used to determine woody survival. The riparian buffer was evaluated separately using a total count of live species present (Performance Standard 1).

The cover of specific invasive species was evaluated qualitatively (Performance Standards 2, 3, 4).

Photographs were taken to evaluate tree and shrub growth in the wetland and riparian buffers.

For additional details on the methods, view the [WSDOT Wetland Mitigation Site Monitoring Methods Paper](#) (WSDOT 2008).

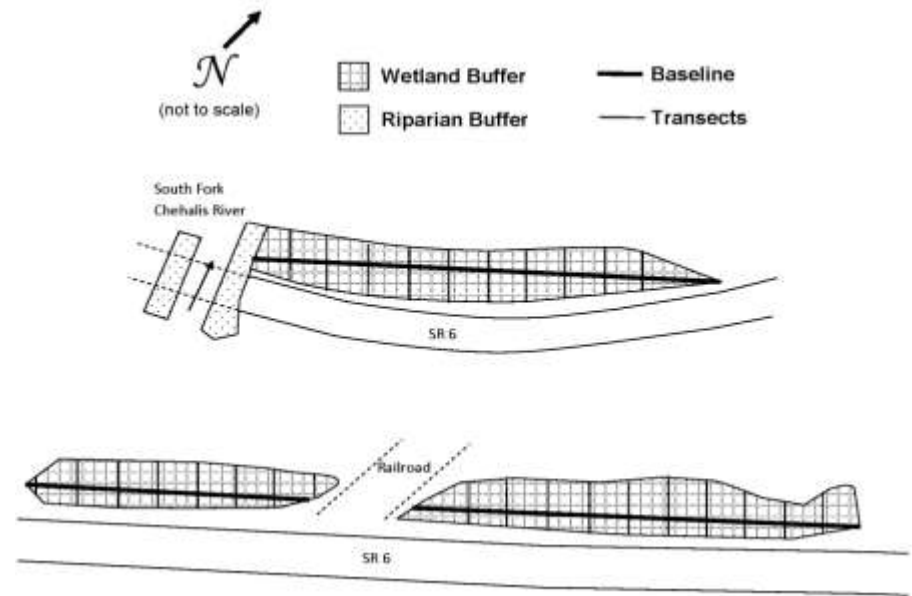


Figure 2 Site Sampling Design (2010)

How is the site developing?

This site is developing according to plan. The planted species in the wetland buffer have a high survival rate and are on track to achieve the Year-3 density performance standards. The functions associated with wetland buffers; primarily sediment and nutrient removal, general habitat suitability and screening from the road, will be supported as the plantings become more established.

The riparian buffer has a higher mortality than the wetland buffer and appears to have more difficulty becoming established. The banks of the South Fork of the Chehalis are very steep and undercut in areas making it difficult to monitor. There may be plantings that the monitoring team was unable to count due to safety concerns.

Several species of birds and signs of wildlife were observed during the monitoring visit. Coyote scat, signs of predation and herbivory, bear and raccoon tracks, mole hills, and fish jumping in the river are some of the observations made.

Results for Performance Standard 1

(At least 90% survival of woody vegetation identified on the planting plan):

In the wetland buffer, identified on the planting plan as Shrub Mix A (SMA), survival of planted species is 100 percent (Photo 1). The dominant species include snowberry (*Symphoricarpos albus*), cluster rose (*Rosa pisocarpa*), bigleaf maple (*Acer macrophyllum*), and redosier dogwood (*Cornus sericea*). Height of the planted species ranges from 0.5 to 2 meters tall.

The riparian buffer, identified on the planting plan as Shrub Mix B, has a survival of 31 percent. The plants in this area have suffered a higher mortality possibly due to the steepness of the banks, shade from the bridge, and competition from grasses (Photo 2). Dominant species in this area include redosier dogwood (*Cornus sericea*) and twinberry honeysuckle (*Lonicera involucrata*) at approximately 0.5 meters tall.

Results for Performance Standard 2

(Blackberry Species and other specific invasive species will not exceed 15%):

The cover of invasive species is qualitatively estimated at less than one percent. The presence of a mulch layer has inhibited the colonization of these weed species. However, small amounts of reed canarygrass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus armeniacus*) were observed onsite, while several other species were observed on the borders of the planting area.



Photo 1
Woody cover in the wetland buffer (August 2010)



Photo 2
Woody cover in the east stream buffer (August 2010)

Results for Performance Standard 3

(Reed Canarygrass will be managed at a threshold 10% below the existing baseline conditions):

The cover of reed canarygrass (*Phalaris arundinacea*) observed onsite is qualitatively estimated at less than one percent (Photo 3). The floodplain area was a complete monoculture of Reed Canarygrass (*Phalaris arundinacea*) prior to construction, with the monoculture also dominating adjacent properties and the South Fork Chehalis Floodplain.

Results for Performance Standard 4

(Japanese Knotweed shall not be present):

Japanese knotweed (*Polygonum cuspidatum*) was not observed in or near the planting area at the time of this monitoring visit.



**Photo 3
Reed canarygrass cover in Wetland Buffer
(August 2010)**

What is planned for this site?

Weed control will be on-going throughout 2011 including a pre-emergent application in bark mulch blanket (buffer) areas early in the growing season. Floodplain areas within the monitoring zone will be spot treated as needed to ensure plant survival and growth.

Appendix 1 – Goals and Performance Standards

The following excerpt is from the *SR 6 South Fork Chehalis River Bridge Replacement Project Final Wetland and Riparian Mitigation Plan* (WSDOT 2007). The performance standards addressed this year are identified in **bold** font.

GOALS AND OBJECTIVES

Goals

The goal of the proposed compensatory mitigation is to replace and enhance wetland buffer and stream buffer functions which will be lost due to wetland impacts associated with the proposed project. The mitigation areas are anticipated to provide the following functions:

- Provide opportunities for nutrient and sediment removal
- Provide visual/glare screening to adjacent wetlands
- Provide general forest and riparian habitat
- Provide improved floodplain function

Functions and Values

The following is an itemized list of functions and values that will likely be provided by the onsite mitigation areas:

Nutrient and Sediment Removal Upstream agricultural practice and continuing large-scale forestry operations throughout the watershed will likely produce a steady load nutrient and sediment in the South Fork Chehalis River. The existing floodplain area that bisects the project area provides the ability to slow floodwaters and naturally trap suspended sediments from seasonal high flows passing through the site.

Wildlife Habitat/ Riparian Function Dense plantings within the onsite mitigation areas will increase overall habitat for numerous upland and wetland wildlife species and will provide improved corridor continuity within a larger riparian network. The interspersed wetland, riparian, and upland habitats will create areas for nesting and foraging, cover, movement, food chain support, and connectivity to the larger South Fork Chehalis River watershed. The site will also provide increased floodplain roughness, large woody debris, and stream shading opportunities.

Conceptual Objectives, Performance Measures, and Success Standards

The following list of objectives describes the proposed mitigation at on site mitigation areas:

1. Create/enhance 0.5 acres of wetland buffer adjacent to impacted wetlands in the project area.
2. Create/enhance 0.35 acres of riparian forest (floodplain position) on the west bank of the South Fork Chehalis River by establishing a mosaic of scrub shrub and forested riparian habitats suitable for floodplain areas by promoting the development of dense native plant communities.
3. Create/enhance 0.35 acres of riparian forest (upland position) on the east bank of the South Fork Chehalis River by establishing a mosaic of upland forest and scrub shrub habitats suitable for upland areas by promoting the development of dense native plant communities.
4. Promote the development of native plant communities by limiting the growth and spread of noxious and nuisance vegetation, including Reed Canarygrass.

Objective 1: Create/enhance 0.5 acres of wetland buffer, 0.35 acres of riparian forest (floodplain position), and 0.35 acres of riparian forest (upland position) of various Cowardin vegetation classes within the onsite mitigation areas.

Performance Standards	Monitoring Methods
1A. Interim Performance Measure Wetland buffer and riparian areas will be qualitatively assessed at monitoring year 2.5 to assess the development of estimated conditions.	Conduct informal qualitative visual survey at year 2.5.
1B. Success Standard (final year of monitoring) At monitoring year 5, the onsite mitigation areas will be surveyed to demonstrate that the mitigation areas contain 0.5 acres of total wetland buffer and 0.7 acres of combined riparian area in compliance with the estimated acreages of Table 2. Visual acreage estimates of the various Cowardin vegetation classes will be conducted to document the development of plant communities on the site.	Conduct a GPS survey at year 5 to provide documentation of mitigation acreage and make visual observations of Cowardin vegetation classes.

Contingency: If surveyed acreages or visual estimates of Cowardin vegetation classes fall significantly short of the estimated acreages of Table 2 at year 5, WSDOT will consult the various resource agencies for the development of appropriate adaptive management or remedial procedures.

Objective 2: Enhance wetland buffer and stream buffer function by creating/enhancing a mosaic of scrub shrub, forested riparian and upland habitats suitable for floodplain and adjacent upland areas by promoting the development of dense native plant communities.

Performance Standards	Monitoring Methods
<p>2A Success Standard The onsite mitigation areas will be planted in accordance with the final mitigation planting plan,</p>	<p>As-built plans documenting that the onsite mitigation areas have been planted according to the planting plan will be submitted within year 1.</p>
<p>2B Success Standard At monitoring year 1, there will be a minimum survival rate of 90% in area identified on the Planting Plan.</p>	<p>Conduct major plant assessment of contract-installed vegetation (plant counts based on as-built plans).</p>
<p>2C Success Standard At monitoring year 3, there will be a minimum density of native trees and/or shrubs in Forested and Scrub Shrub areas as follows:</p> <p>Forested Areas:</p> <ul style="list-style-type: none"> • minimum density of 400 living native <i>trees</i> per acre • minimum density of 4,000 living native <i>shrubs</i> per acre • at least 2 species of native trees and 4 species of native shrubs will be present in the forested area. No single species will provide more 60% total aerial cover. <p>Scrub Shrub Areas:</p> <ul style="list-style-type: none"> • minimum density of 4,000 living native <i>shrubs</i> per acre • at least 4 species of native shrubs will be present in the Scrub Shrub area. <p>No single species will provide more 60% total aerial cover.</p>	<p>Use current monitoring protocols (see Monitoring Plan) to determine density (number of living trees per acre) and species diversity in scrub shrub, forested, and buffer areas.</p>

<p>2E. Success Standard (final year monitoring) At monitoring year 5, there will be a minimum density of native trees and/or shrubs in Forested and Scrub Shrub areas as follows:</p> <p>Forested Areas:</p> <ul style="list-style-type: none"> • minimum density of 3000 living native trees per acre • minimum density of 3,000 living native shrubs per acre • At least 2 species of native trees and 4 species of native shrubs will be present in the forested area. No single species will provide more than 60% total aerial cover. <p>Scrub Shrub Areas:</p> <ul style="list-style-type: none"> • minimum density of 3,000 living native shrubs per acre • At least 4 species of native shrubs will be present in the Scrub Shrub area. No single species will provide more 60% total aerial cover. 	<p>Use current monitoring protocols (see Monitoring Plan) to determine density (number of living trees per acre) and species diversity in scrub shrub, forested, and buffer areas.</p>
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Contingency: If the monitoring reports indicate insufficient establishment and/or plant survival, those areas not meeting current-year standard(s) will be replanted to bring them in compliance with the failing current-year standard(s).

Objective 3: Promote the development of native riparian and upland plant communities by limiting the growth and spread of noxious and nuisance vegetation, including Reed Canarygrass.

Performance Standards	Monitoring Methods
<p>6A. Performance Standard Conduct a pre-construction survey of the existing extent of invasive vegetation including Reed Canarygrass, Blackberry Species, and Japanese Knotweed, to establish a baseline for invasive species monitoring and management at years 1, 3 and 5.</p>	<p>Provide photographic and map (GPS or notations on plan sheets) documentation of existing stands of Reed Canarygrass, Blackberry species, and Japanese Knotweed.</p>
<p>6B. Performance Standard At monitoring years 1, 3 and 5, Invasive Species will be managed as follows: The aerial extent of Blackberry Species and Class A noxious weeds will not exceed 15% in the combined scrub shrub and forest planting areas of the onsite mitigation area.</p> <p>The aerial extent of Reed Canarygrass in the mitigation site will</p>	<p>Observe and map (notations on plan sheets) locations of Reed Canarygrass, Blackberry Species, and Japanese Knotweed as part of annual vegetation surveys using current monitoring techniques. For larger stands, GPS measurements of stand perimeters will be provided to measure the extent of change over time. Observations will form the basis of</p>

<p>be managed at a threshold 10% below the existing baseline conditions established in Performance Standard 6A.</p> <p>In monitoring year 5 (final year of monitoring), Reed Canarygrass will exist as an understory component that does not out compete the dominant native tree and shrub species or exceed existing baseline conditions.</p> <p>Japanese Knotweed shall not be present in any amount within the mitigation site.</p>	<p>on-going site management and integrated vegetation management activities.</p>
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Contingency: Implement a long-term integrated vegetation management plan to maintain the aerial extent of invasive species at or below the established thresholds. Weed management activities may be conducted in all monitoring years.

Japanese Knotweed discovered during monitoring or routine site visits and maintenance, it shall be immediately removed and chemically treated for elimination.

Monitoring Plan The monitoring objective for the mitigation areas is to achieve the prescribed standards unless WSDOT, in consultation with the regulatory agencies, establish replacement standards based on circumstances and conditions observed at the mitigation site.

A monitoring plan will be developed that addresses the success standards listed in this plan. The site will be monitored in years 1, 3 and 5 by the WSDOT Wetland Mitigation Monitoring Program to evaluate compliance with performance standards, formal monitoring. In formal monitoring years, years 1, 3 and 5, reports of the formal monitoring will be prepared and submitted to the Corps of Engineers, Ecology, and Lewis County. Additional informal monitoring will occur in intervening non-report years in order to inform and guide site development activities. Successful mitigation will be measured by attainment of the performance standards described in the mitigation plan. In addition, annual monitoring reports of the North Fork Newaukum Mitigation Bank will be submitted to the resource agencies to document continuing development and management progress at the bank.

The Wetland Mitigation Monitoring Program uses objective-based monitoring to document the condition of WSDOT’s wetland mitigation sites. Monitoring protocols are selected based on objectives specified in the mitigation plan, and evaluation of current site conditions. Quantitative data collection techniques presently in use are based on standard ecological and biostatistical methods described in Bonham (1989), Elzinga et al. (1998), Krebs (1999), Zar (1999), and other sources. The Wetland Program’s current monitoring methods include the key concepts of objective-based monitoring, adaptive management, and statistical rigor.

Quantitative monitoring methods employed involve sample size analyses and may include the point-line, point-frame, quadrat, and line-intercept methods as defined by the works cited above.

Formal and informal monitoring of the mitigation site will occur over the 5-year monitoring period. Table 5 lists the monitoring schedule for the mitigation site. Successful mitigation will be measured by attainment of the performance standards described in this mitigation plan document. Monitoring and establishment/contingency activities will cease as soon as all success standards have been attained.

Table 5. Monitoring Schedule.

<i>Monitoring Year</i>	<i>Type of Monitoring</i>	
	<i>Formal</i>	<i>Informal</i>
1	Yes	quarterly site visits
2	No	quarterly site visits
3	Yes	quarterly site visits
4	No	quarterly site visits
5	Yes	quarterly site visits

Appendix 2 – As-Built Planting Plan


(from Corlett 2010)

ROADSIDE RESTORATION PLANT MATERIAL SCHEDULE

Plant Code	Botanical Name	Common Name	Height	Root Type	A.S.N.S.	Spacing	Layout	Notes	Percent of mix	BRIT NO. N22	Total N22 in mix
TMR - TREE MIX ROADSIDE	Acer macrophyllum	Big Leaf Maple	#2	cont	1.4	10' o.c.	triangle		NA	0	20
	Persea monticola	Douglas Fir	#5	cont	5.1,2.4 type 4	10' o.c.	triangle		NA	0	30
	Thuja plicata	Western Red Cedar	#5	cont	1.1,3.1	10' o.c.	triangle		NA	0	15
SMA - SHRUB MIX A ROADSIDE	Cornus stolonifera	Red Osier Dogwood	10' - 24"	b.r.	2.1,3.4	4' o.c.	triangle		20%	510	180
	holboellii	Ocean spray	10' - 24"	b.r.	2.1,3.4	4' o.c.	triangle		15%	300	140
	Mahonia aquifolium	Tall Oregon Grape	#1	cont	4.1,2.4	4' o.c.	triangle		15%	300	140
	Rosa pisocarpa	Cluster Rose	10' - 24"	b.r.	2.1,3.4	4' o.c.	triangle		10%	205	85
	Rubus spectabilis	Salmalberry	10' - 24"	b.r.	2.1,3.4	4' o.c.	triangle		10%	200	140
	Symphoricarpos albus	Common Snowberry	10' - 24"	b.r.	2.1,3.4	4' o.c.	triangle		25%	645	245
SMB - SHRUB MIX B RIPARIAN BUFFER	Cornus stolonifera	Red Osier Dogwood	10' - 24"	b.r.	2.1,3.4	5' o.c.	triangle		50%	0	280
	Lonicera involucrata	Black Twinkberry	10' - 24"	b.r.	2.1,3.4	5' o.c.	triangle		50%	0	280
	Salix lasioandra	Pacific Willow	10' - 24"	b.r.	1.2	5' o.c.	triangle		20%	0	255
	Salix alba	White Willow	10' - 24"	b.r.	1.2	5' o.c.	triangle		15%	0	145

AS-BUILT PLANS

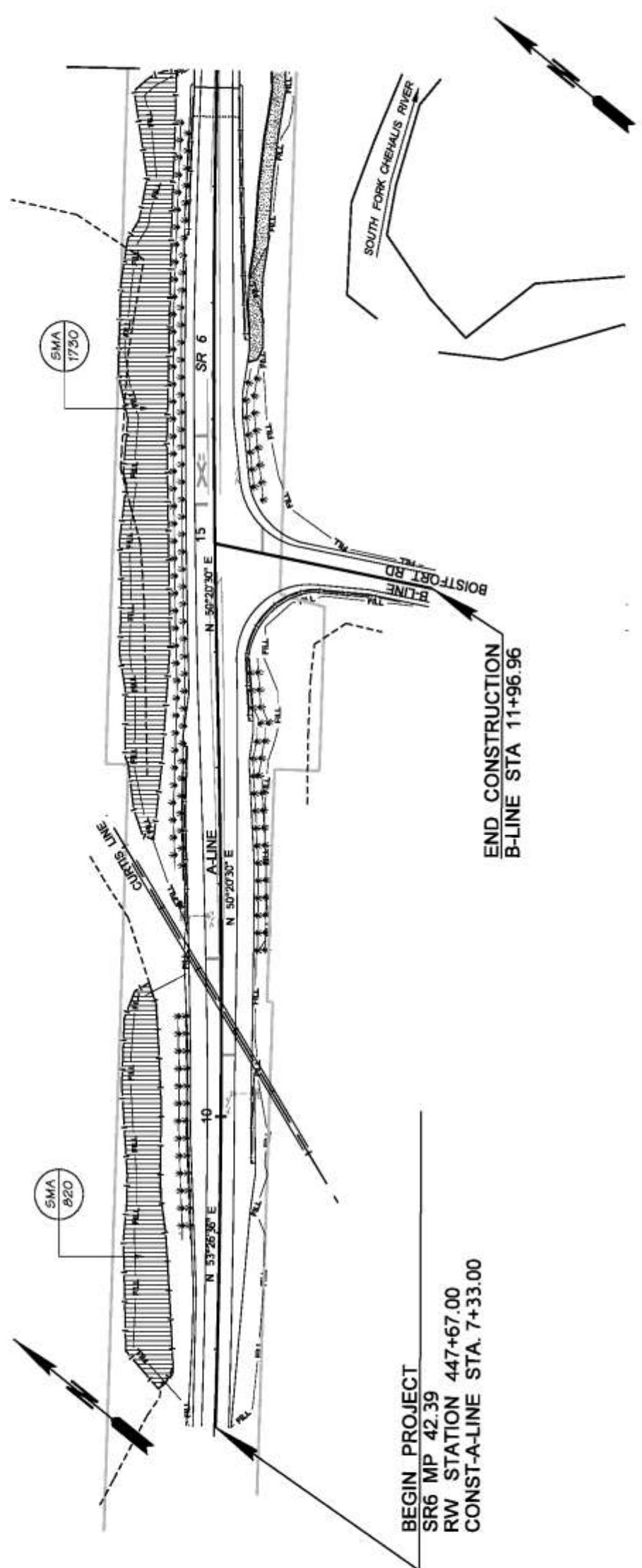
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PROJ. ENGR. C. NEWELL			
REGIONAL ADM. B. GERHART			



Washington State
Department of Transportation

SR 6 SO. FORK CHEHALIS RIVER BRIDGE	SOIL PREPARATION AND SEEDING
PLOT 1	NB1

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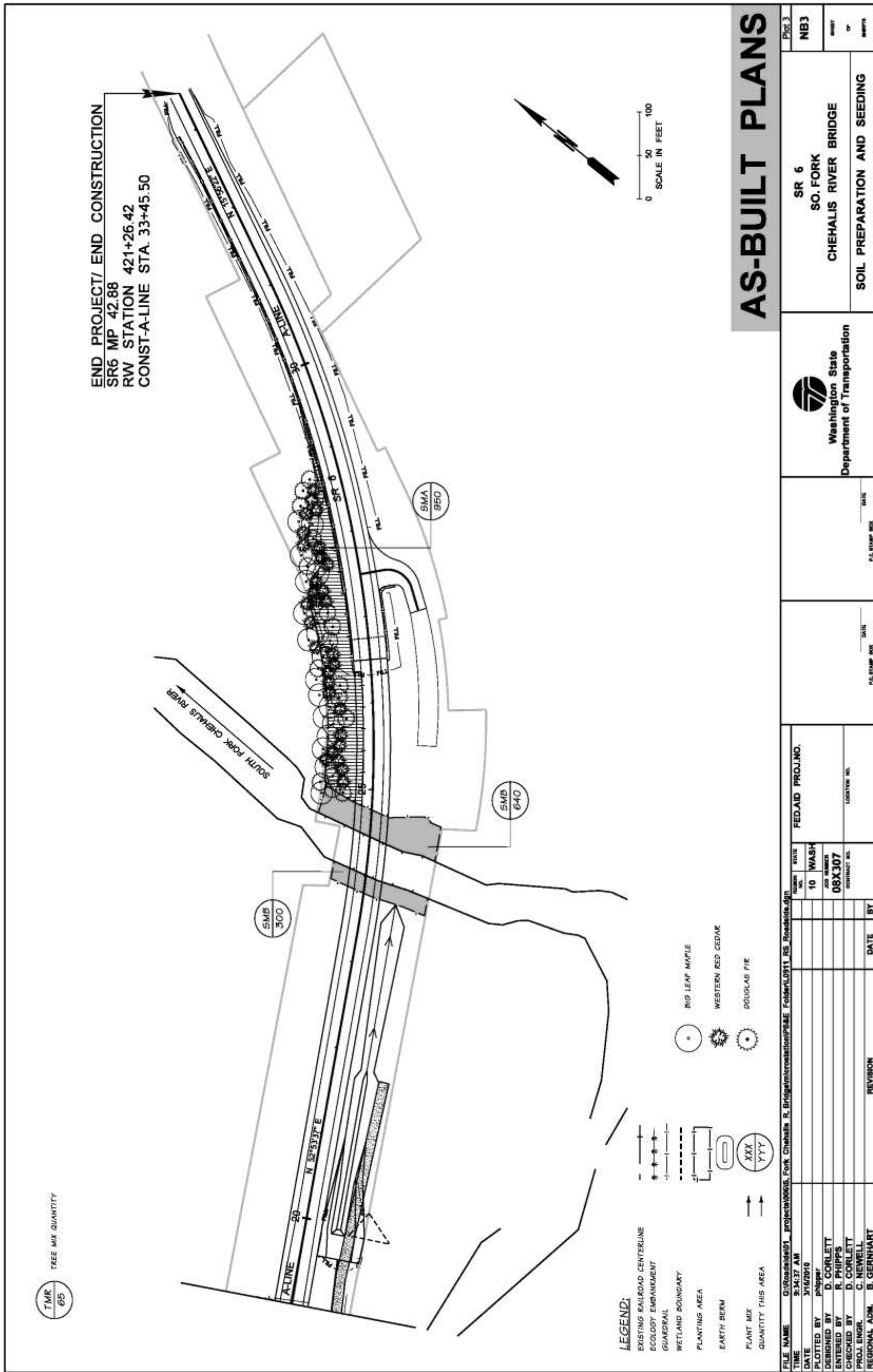


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END CONSTRUCTION
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AS-BUILT PLANS

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REGIONAL ADM. B. GERNHART	REVISION	DATE	BY
SR 6		SO. FORK CHEHALIS RIVER BRIDGE	
Washington State Department of Transportation		SOIL PREPARATION AND SEEDING	
SR 6		NB2	
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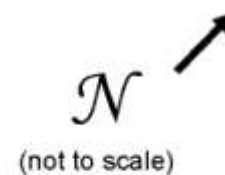


AS-BUILT PLANS

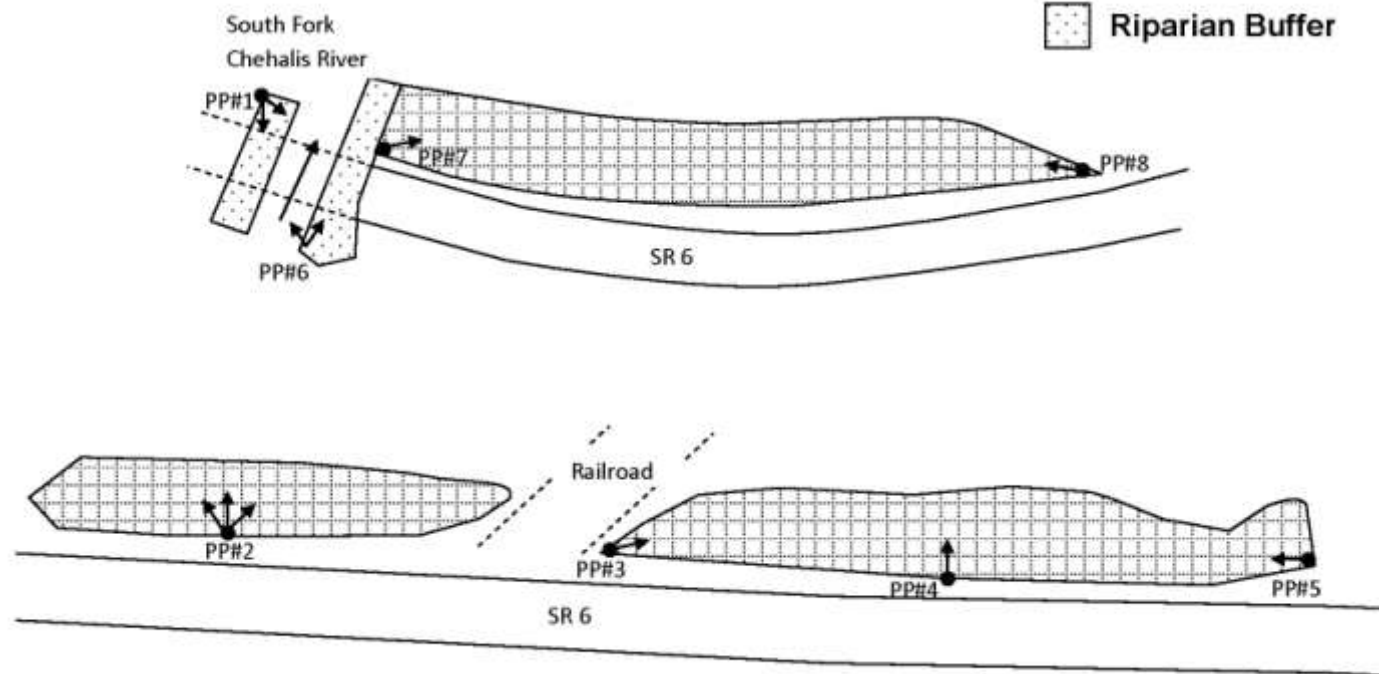
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Appendix 3 – Photo Points

SR 6 Chehalis River Bridge Photo Points



-  Wetland Buffer
-  Riparian Buffer



The photographs below were taken from permanent photo-points on August 8th, 2010 and document current site development.



Photo Point 1a



Photo Point 1b



Photo Point 2a



Photo Point 2b



Photo Point 2c



Photo Point 3



Photo Point 4



Photo Point 5



Photo Point 6a



Photo Point 6b



Photo Point 7



Photo Point 8

Literature Cited

1. Corlett, D. 2010. SR-6 South Fork Chehalis River Bridge Replacement Project Riparian As-Built Planting Plan. WSDOT SW Region Environmental Services Office. Vancouver, WA.
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3. Washington State Department of Transportation (WSDOT), 2007. SR-6 South Fork Chehalis River Bridge Replacement Project Final Wetland and Riparian Mitigation Plan. WSDOT SW Region Environmental Services Office. Vancouver, WA.
4. Washington State Department of Transportation (WSDOT) WSDOT Wetland Mitigation Site Monitoring Methods (12 June 2008). <http://www.wsdot.wa.gov/NR/rdonlyres/C211AB59-D5A2-4AA2-8A76-3D9A77E01203/0/MethodsWhitePaper052004.pdf>