

**Interstate 90 Seismic Retrofit**  
WIN A09051N  
**NWP (25) 200300122**

**Northwest Region**

**2010 MONITORING REPORT**

**Wetland Assessment and Monitoring Program**

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**Washington State  
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# I-90 Seismic Retrofit Mitigation Site

NWP (25) 200300122



General Site Information		
Mitigation Location	Underneath west-bound I-90, just west of I-405/I-90 interchange	
USACE NWP Number	200300122	
LLID Number	1221792475808	
Construction Date	Spring 2006	
Monitoring Period	2006-2010	
Year of Monitoring	5 of 5	
Area of Project Impact	Temporary Wetland	Permanent Buffer
	0.69 acre	8 ft <sup>2</sup>
Type of Mitigation	Wetland Enhancement	
Area of Mitigation	0.25 acre	

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## Summary of Monitoring Results and Management Activities (2010)

Performance Standards	2010 Results <sup>1</sup>	Management Activities
The native vegetation in the enhancement areas shall exceed 50 percent cover	72% (CI <sub>90%</sub> = 58-87% cover)	.Replanted Feb. 2010
Non-native invasive plants will not exceed 15 percent cover	39% (CI <sub>80%</sub> = 32-46% cover)	Manual weed Control in May, June, July, Aug., Sept., and Oct. and herbicide application in July 2010.

### Report Introduction

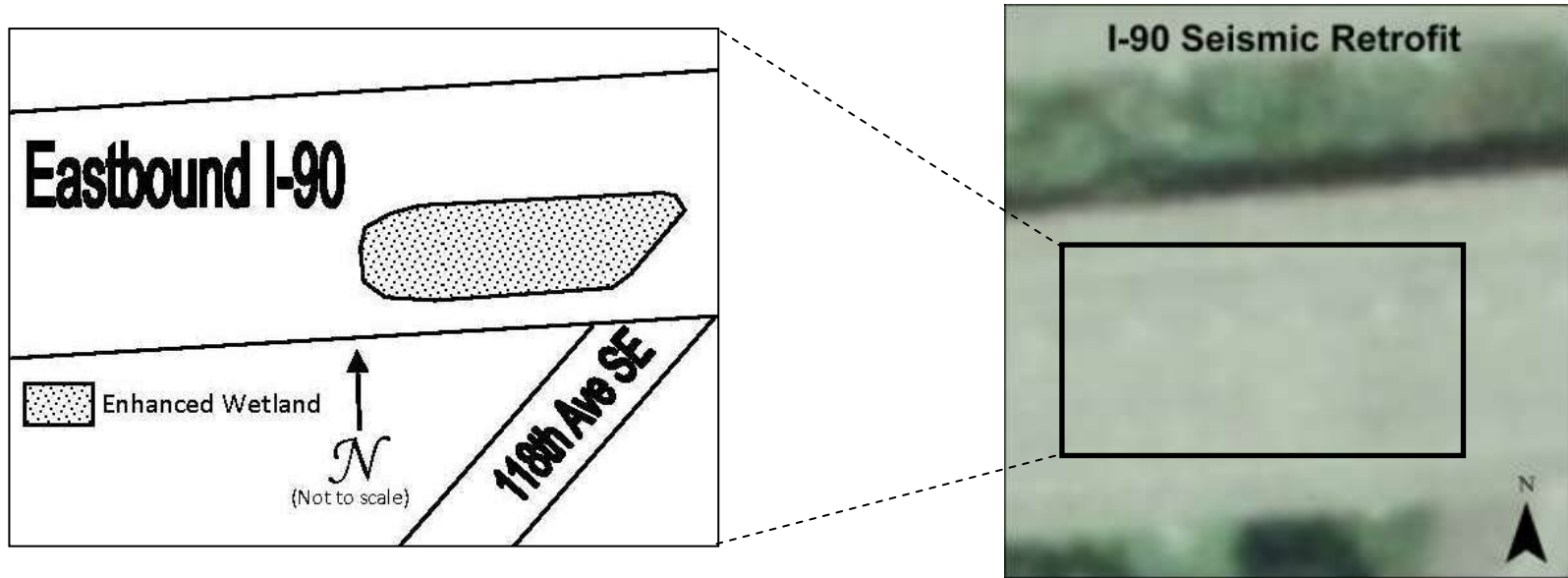
This report summarizes final-year (Year-5) monitoring activities at the Interstate (I) 90 Seismic Retrofit Mitigation Site. Included are a site description, the performance standards, an explanation of monitoring methods, and an evaluation of site success. Monitoring activities occurred on August 9<sup>th</sup> and 10<sup>th</sup> of 2010 and included vegetation surveys and photo-documentation.

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<sup>1</sup> Estimated values are presented with their corresponding statistical confidence interval. For example, 72% (CI<sub>90%</sub> = 58-87% cover) means we are 90% confident that the true aerial cover value is between 58% and 87%.

## What is the I 90 Seismic Retrofit Wetland Mitigation Site

This 0.25-acre mitigation site (Figure 1) is located directly underneath I-90 and consists of a scrub-shrub planting area with an herbaceous understory of colonizing emergent vegetation. The purpose of the project was to reduce the potential for earthquake damage to the bridge by installing steel jackets around the bridge piers. Thirty-six of these piers were located in wetland areas.



**Figure 1** Site Sketch

The I-90 Seismic Retrofit Wetland Mitigation Site occupies a small area of a large wetland complex associated with Mercer Slough and Lake Washington. The site is underneath the westbound I-90 bridge and not visible in the low quality aerial photo.

## **What are the performance standards for this site?**

### Performance Standard 1

The native vegetation in the enhancement areas shall exceed 50 percent cover

### Performance Standard 2

Non-native invasive plants will not exceed 15 percent cover

Appendix 1 provides the complete text of the performance standards for this project, and Appendix 2 shows the planting plan (WSDOT 2004).

## How were the performance standards evaluated?

To evaluate standards for vegetative cover, a baseline was established through the center of the site (Figure 2). Thirteen sampling transects were randomly placed perpendicular to the baseline using a restricted random sampling method. The point intercept method was used to determine native (Performance Standard 1) as well as invasive cover (Performance Standard 2). For both data sets, 13 randomly positioned 8-meter point-line sample units (32 points each) were placed along sampling transects across the site.

Sample size analysis confirmed sufficient sampling had been completed based on site sampling objectives and the desired level of statistical confidence. The sample size equation shown here (below) was used to perform the analysis on data collected (Performance Standards 1 and 2). In this equation, the precision level ( $B$ ) equals half the maximum acceptable confidence interval width multiplied by the sample mean.

$$n = \frac{(z)^2 (s)^2}{(B)^2}$$

$n$  = unadjusted sample size  
 $z$  = standard normal deviate  
 $s$  = sample standard deviation  
 $B$  = precision level

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

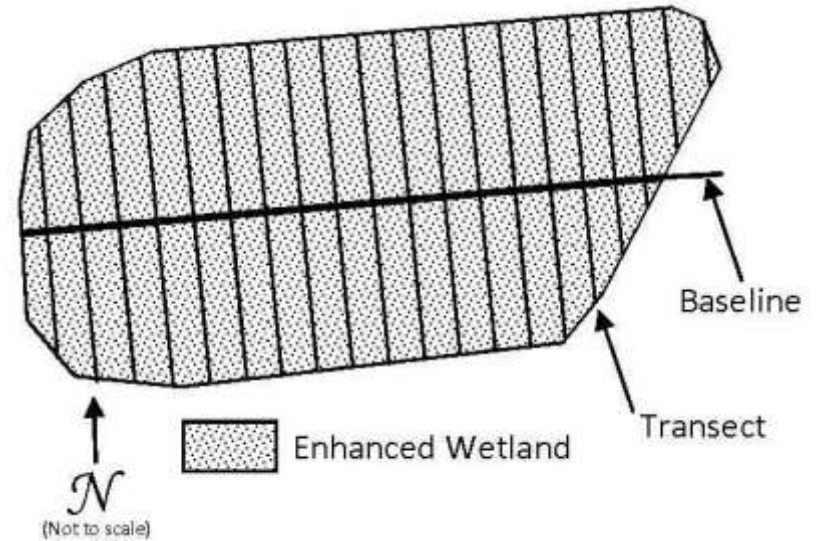


Figure 2 Site Sampling Design (2010)

## Is this site a success?

Recently installed woody plants on this site have developed rapidly over the past growing season. The native emergent vegetation has filled in the areas between the woody plants and consists of several native species including American skunkcabbage (*Lysichiton americanus*), slough sedge (*Carex obnupta*), soft rush (*Juncus effusus*), and common ladyfern (*Athyrium filix-femina*). Most of these native herbaceous species are what remains of the original plantings. The newly planted woody species were planted as adaptive management of this site and appear to be much more successful.

Habitat functions provided by this mitigation site have likely increased as a result of the presence of the shrub-scrub community and the reduction of cover provided non-native invasive species.

Invasive species have been challenging on the site. Remedial efforts have been extensive and have focused on the removal of invasive species. Field bindweed has been hand-pulled six times in the 2010 calendar year.

Results for Performance Standard 1

(The native vegetation in the enhancement areas shall exceed 50 percent cover):

Aerial cover of native species in the enhanced wetland is estimated to be 72% (CI<sub>90%</sub> = 58-87%) (Photo 1). This estimate exceeds the performance standard target. Dominant woody species observed included Sitka willow (*Salix sitchensis*), Pacific willow (*Salix lucida* ssp. *lasiandra*) and redosier dogwood (*Cornus sericea*). These plants are generally between 1.5 to 2 meters in height. Dominant native herbaceous plants observed included small-fruited bulrush (*Scirpus microcarpus*), soft rush (*Juncus effusus*), fringed willowherb (*Epilobium ciliatum*), and common ladyfern (*Athyrium filix-femina*).

Results for Performance Standard 2

(Non-native invasive plants will not exceed 15 percent cover):

Aerial cover of non-native invasive species in the enhanced wetland is estimated to be 39% (CI<sub>80%</sub> = 32-46%). This cover value exceeds the performance standard threshold. Invasive species observed on-site included field bindweed (*Convolvulus arvensis*), Himalayan blackberry (*Rubus armeniacus*), and climbing nightshade (*Solanum dulcamara*). Although there are several invasive species present, the vast majority of cover is provided by field bindweed.



**Photo 1**  
**Native cover in the enhanced wetland (August 2010)**

**What is planned for this site?**

The climbing non-native invasive species are well established in adjacent areas and will likely continue to present an ongoing challenge to control throughout this site. Weed control is planned through the 2011 growing season to minimize the competition and provide a better establishment period for the wood species recently planted. Weed control focusing on eradicating the remaining invasive species will continue in 2011.

# Appendix 1 –Performance Standards

The following excerpt is from the *Interstate 90 – Seismic Retrofit Final Conceptual Wetland Mitigation Plan* (WSDOT 2003). The portion that applies to the wetland enhancement areas has been included below. Standards addressed this year appear in **bold** font.

## Monitoring

Monitoring shall occur for two years in restoration areas and for five years in the enhancement areas. Monitoring for adaptive management purposes will be conducted each year. Performance Standards refer to milestones useful for adaptive management. Success standards refer to the final standard on which the mitigation is evaluated. Monitoring reports will be prepared and submitted for the restoration areas on year two and for the enhancement areas on year one, three and five.

### Enhancement Success and Performance Standards

#### Enhancement Re-growth Success and Performance Standard:

**The native vegetation in the enhancement areas shall exceed 50% cover by year five.** Annual performance standards for percent cover in year one and three shall exceed 10% and 25% respectively.

#### Enhancement Non-native Success and Performance Standard:

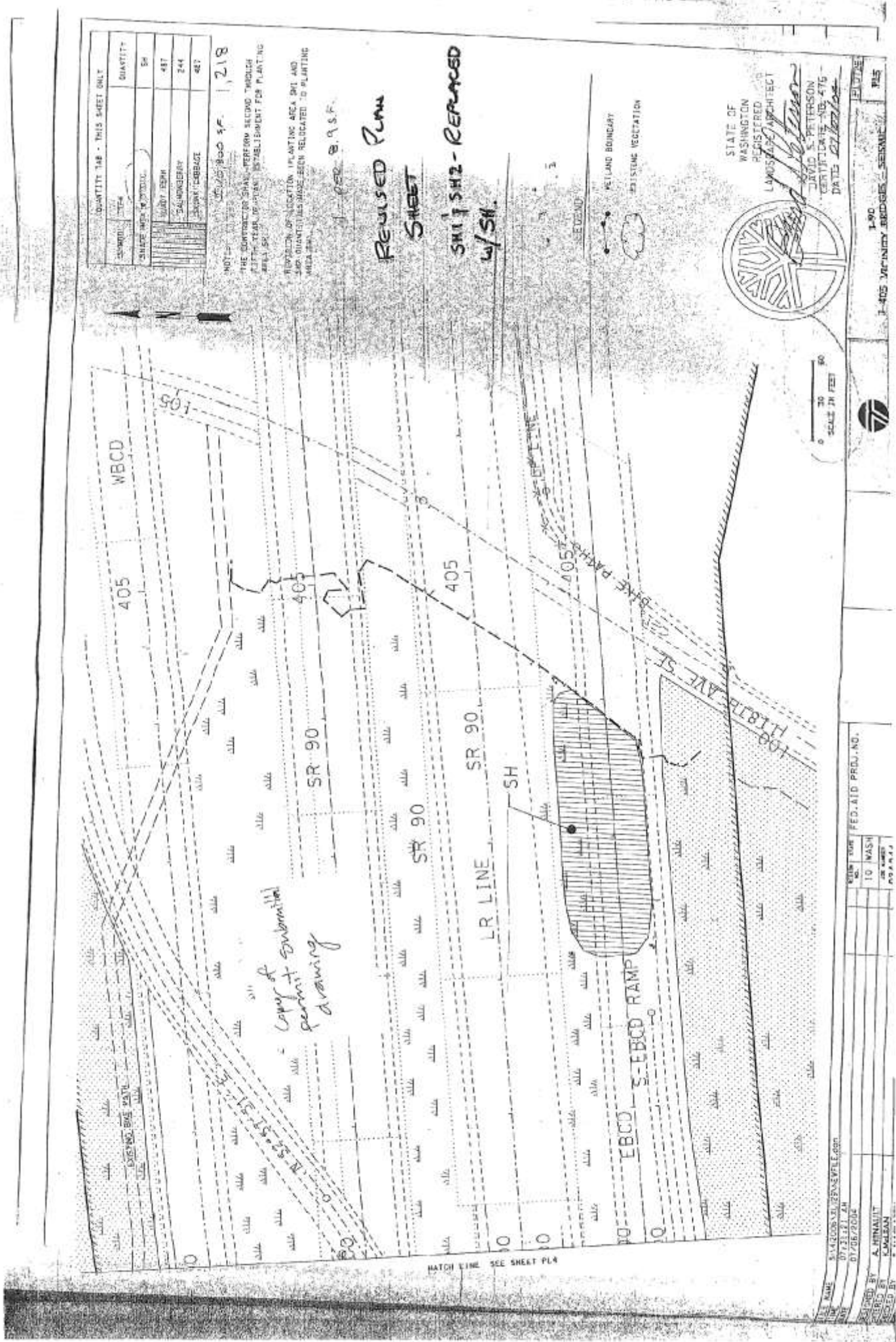
**Non-native invasive plants (specifically reed canarygrass, Himalayan blackberry, and purple loostrife) combined aerial percent cover will not exceed 15% cover on year Five.** Performance standards for percent cover of non-native invasive plants will not exceed 15% on years one and three.

### Monitoring Plan

WSDOT staff will monitor the restored and enhanced wetland areas. The monitoring will determine if the success and performance standards have been met. Monitoring reports will be submitted to the Corps of Engineers, Washington State Department of Ecology and the city of Bellevue – two and three years after construction for review and comment.

# Appendix 2 – Planting Plan

(WSDOT 2004)



## Appendix 3 – Photo Points

The photographs below were taken from permanent photo-points on August 10<sup>th</sup>, 2010 and document current site development.



**Photo Point 1**



**Photo Point 2**

## Literature Cited

1. United States Army Corps of Engineers. 2005. Department of the Army Nation Wide 25 Permit Number 200300122.
2. Washington State Department of Transportation (WSDOT). 2003. *Interstate 90 – Seismic Retrofit Final Conceptual Wetland Mitigation Plan*. Washington State Department of Transportation, Northwest Region, Seattle, WA.
3. 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>