

**SR 410 – Junction 241st / Mud Mountain Road (MP 22.17 to
22.35) Buffer Mitigation Site
C6282**

King County DDES Project Number: L01CG463

Northwest Region

2007 MONITORING REPORT

Wetland Assessment and Monitoring Program

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SR 410 – Junction 241st / Mud Mountain Road (MP 22.17 to 22.35) (Boise Creek 2) Buffer Mitigation Site

King County DDES Project Number: L01CG463



General Site Information	
King County DDES Project Number	L01CG463
Mitigation Location	Intersection of SR 410 and SE 252 nd Ave., King County
Construction Date	2002
Monitoring Period	2003-2007
Year of Monitoring ¹	5 of 5
Area of Project Impact	1,055 ft ²
Type of Mitigation	Buffer enhancement
Area of Mitigation	1,922 ft ²

¹ Due to cancellation of contract with the subcontractor that managed the site, insurance for the site was terminated for 2003 and 2004. Subsequently, monitoring data were not collected in years three or four and a report was not issued in those years due to limited accessibility to the site. This report addresses standards from monitoring years three and five.

Summary of Monitoring Results and Management Activities (2007)

Success Standards	2007 Results ^{2, 3}	Management Activities
85% survival of planted material	90% (total count)	Site Replanted in November 2007
Aerial cover of planted shrubs will be greater than 60%	53% (CI _{80%} = 44-62%)	Site Replanted in November 2007
No more than 20% aerial cover of any stratum can be comprised of desirable native volunteers	4% (CI _{80%} = 1-7%)	
No more than 10% cover of non-native or other invasive species	20% (CI _{80%} = 14-26%)	Weed control

Report Introduction

This report summarizes final-year (Year-5) monitoring activities at the State Route (SR) 410 – Junction 241st / Mud Mountain Road (MP 22.17 to 22.35) (Boise Creek 2) Buffer Mitigation Site. Included are a site description, the success standards, an explanation of monitoring methods, and an evaluation of site success. Monitoring activities in 2007 included vegetation surveys and photo-documentation.

² Estimated values are presented with their corresponding statistical confidence interval. For example, 53% (CI_{80%} = 44-62% cover) means we are 80% confident that the true aerial cover value is between 44% and 62%.

³ Monitoring results represent data collected before a portion of the mitigation site was inadvertently mowed by Tacoma Power in September 2007. Mowed areas were replanted in November 2007.

What is the SR 410 Boise Creek Buffer Mitigation Site?

This mitigation site (Figure 1) includes areas of stream and wetland buffer enhancement. This site was created to compensate for the loss of 1,055 square feet of King County class two wetland buffers due to road improvements along SR 410. The stream buffer is designed to provide mitigation for lost wetland buffer functions including water quality and wildlife habitat functions.

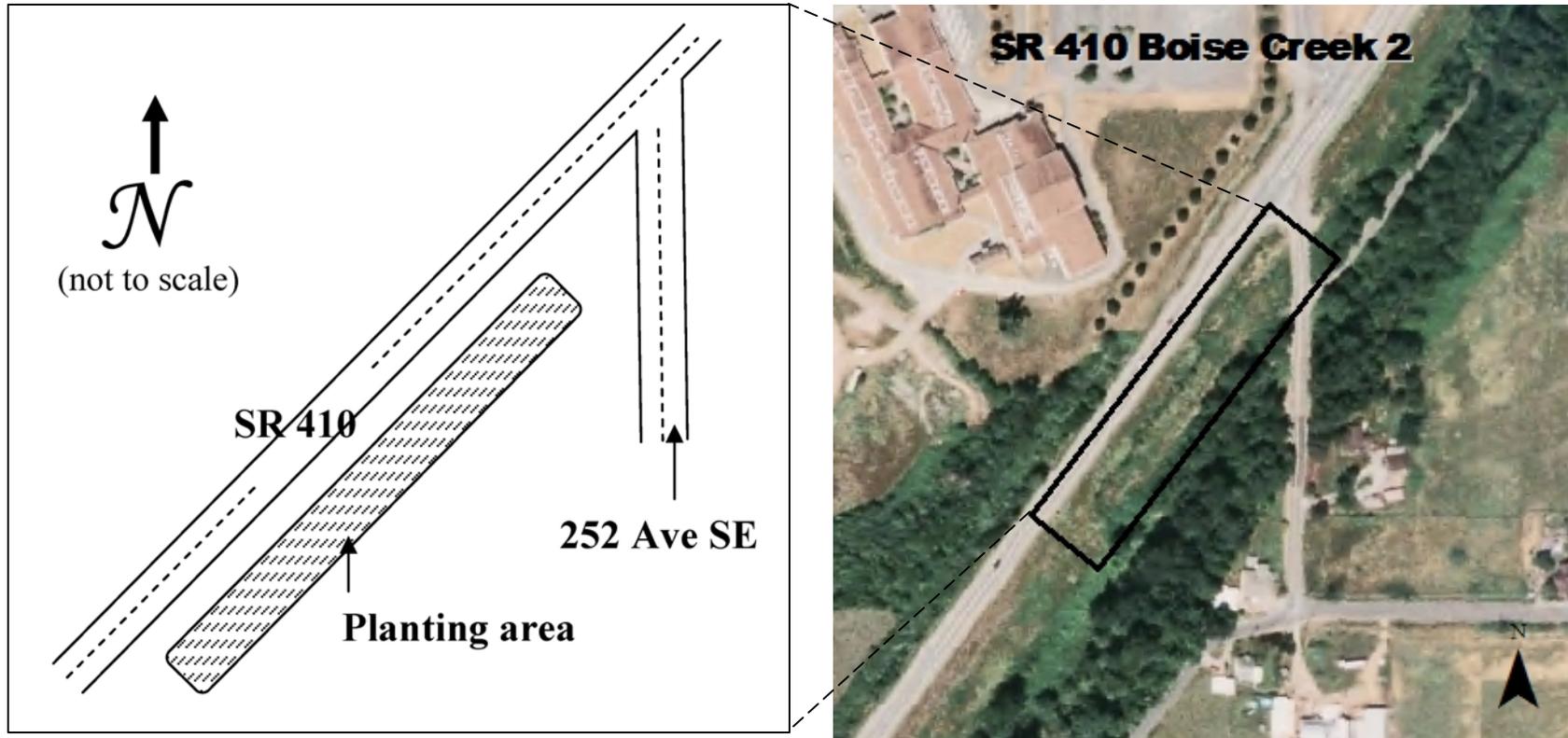


Figure 1 Site Sketch

The SR 410 Boise Creek 2 Mitigation Site is comprised of an enhanced stream and wetland buffer.

What are the success standards for this site?

Success Standard 1

Three years after planting 85 percent of the planted material will be alive and healthy.

Success Standard 2

Aerial cover of planted shrubs will be greater than 60 percent.

Success Standard 3

Up to 20 percent of any stratum can be composed of desirable native volunteers when measuring cover.

Success Standard 4

No more than 10 percent cover of non-native or other invasives, e.g., Himalayan blackberry, Japanese knotweed, evergreen blackberry, reed canary grass, Scots broom, English ivy, morning glory, etc. will be permissible in any monitoring year.

Appendix 1 provides the complete text of the success standards for this project, and Appendix 3 shows the planting plan (Cooley 2001).

How were the success standards evaluated?

To estimate survival of planted woody species, a total count of living and dead stems was completed (Success Standard 1).

To evaluate standards for vegetative cover, a baseline was established parallel to SR 410 (Figure 2). Twenty-seven sampling transects were randomly placed perpendicular to the baseline. The line intercept method was used to estimate woody cover (Success Standards 2 and 3), and the point intercept method was used to estimate invasive species cover (Success Standard 4).

For additional details on the methods, see Appendix 2 of this report or view the [WSDOT Wetland Mitigation Site Monitoring Methods Paper](#) (WSDOT 2007).

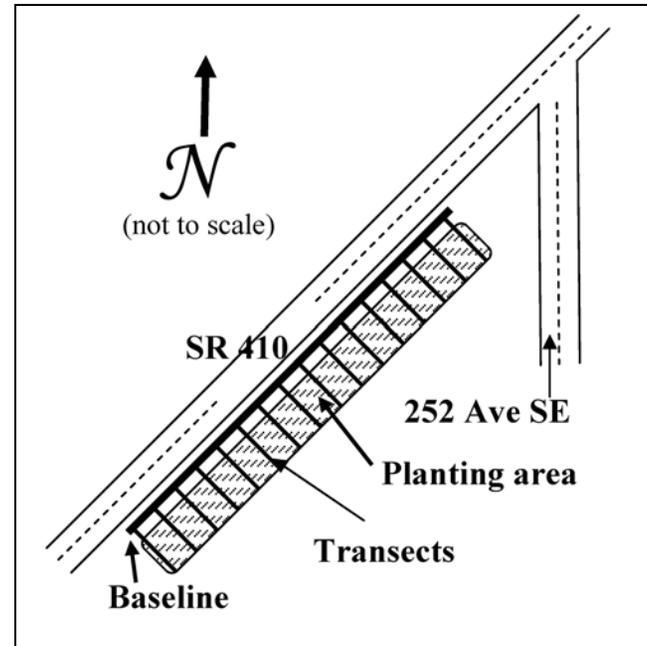


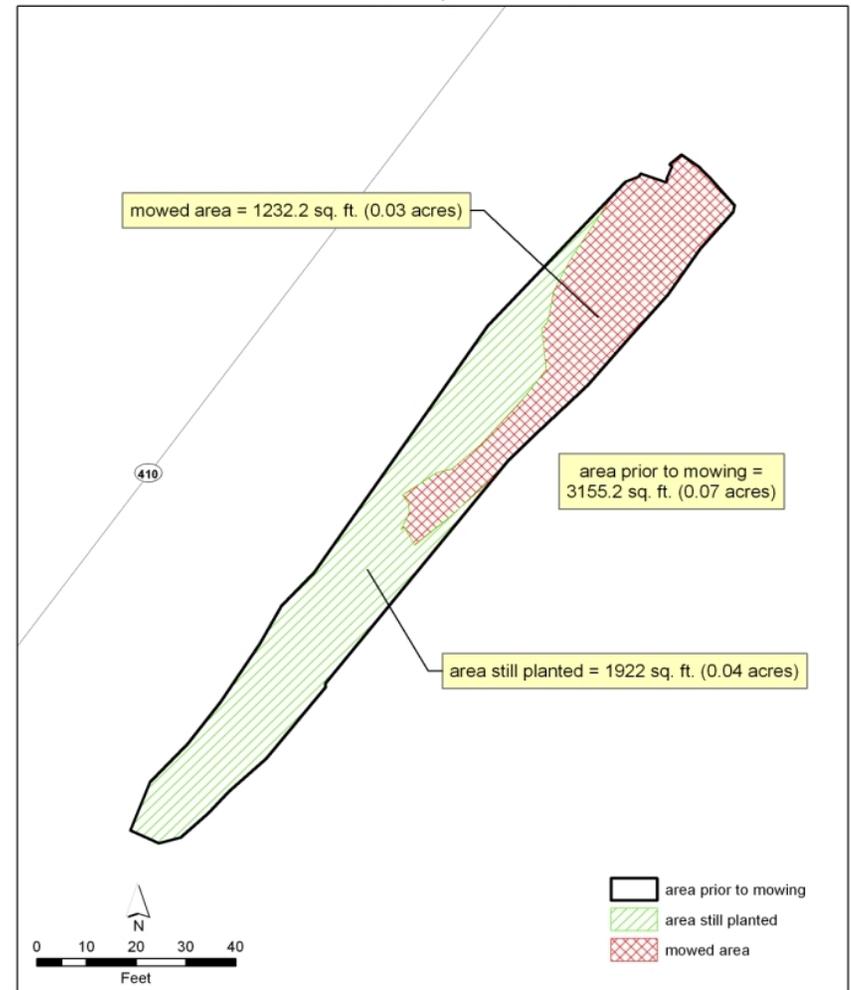
Figure 2 Site Sampling Design (2007)

Is this site a success?

At the time of monitoring this site was developing fairly well. Planted woody species surpassed the 85 percent requirement for survival, and the native woody species canopy was close to meeting the 60 percent threshold for aerial cover (Success Standards 1, 2, and 3). Although cover of invasive species exceeded the 10 percent threshold (Success Standard 4), recent weed control measures have been effective at reducing aerial cover of these species.

After monitoring was completed, it appears Tacoma Power inadvertently mowed a portion of the mitigation site. Mowing affected approximately 40 percent of the site, leaving just 1,922 of the original 3,155 square feet of mitigation intact (Figure 3). However, according to the mitigation report, only a minimum of 1,055 square feet is required to compensate for impacts to stream and wetland buffer. The remaining planted area (1,922 square feet) surpasses this threshold.

GPS Data - SR 410 Boise Creek 2, 10/8/2007



Oct. 10, 2007

Figure 3

GIS map of planting area after mowing.

Results for Success Standard 1
(85% survival of planted material):

Prior to mowing, survival of planted trees and shrubs across the mitigation site was 90 percent (total count). Mowed areas were replanted in November 2007. Ninety plantings were installed including 30 *Symphoricarpos albus* (snowberry), 30 *Salix sitchensis* (Sitka willow), and 30 *Cornus sericea* (redosier dogwood).

To prevent future impacts to the mitigation site, signs have been posted to clearly identify site boundaries (Photo 1).

Results for Success Standard 2
(Aerial cover of planted shrubs will be greater than 60%):

Aerial cover of planted shrubs was 53% ($CI_{80\%} = 44-62\%$). This estimate, collected prior to mowing, suggests shrub cover was close to meeting requirements at the time of monitoring. Recent planting and current weed control efforts will improve chances for successful plant establishment in mowed areas of the mitigation site.



Photo 1
Replanted area with posted signs (November 2007)

Results for Success Standard 3

(Up to 20% aerial cover of any stratum can be comprised of desirable native volunteers):

Aerial cover of volunteer shrubs was just 4% ($CI_{80\%} = 1-7\%$) across the mitigation site. This estimate falls well below the threshold of 20 percent required in the standard. A limited number of naturally colonizing *Symphoricarpos albus* (snowberry) and *Rubus parviflorus* (thimbleberry) shrubs were present in the stream and wetland buffer.

Results for Success Standard 4

(No more than 10% cover of non-native or other invasive):

Aerial cover of invasive species is 20% ($CI_{80\%} = 14-26\%$). Although weed control efforts are ongoing, this estimate exceeds the 10 percent threshold in the standard. Recent weed control efforts have focused specifically on the south end of the site where there is greater cover of *Phalaris arundinacea* (reed canarygrass). Continued weed control is recommended to improve conditions for successful plant establishment in the replanted areas of the mitigation site.

Appendix 1 – Goals and Success Standards

The following excerpt is from the *Wetland Buffer Mitigation SR 410 – Junction 241st / Mud Mountain Road (MP 22.17 to 22.35)* (Leonard 2001). The success standards addressed this year are identified in **bold** font.

MITIGATION GOALS

The White River basin, which includes the Boise creek sub-basin, provides important wetland and stream functions, and is a high quality system despite the surrounding levels of development. The White River basin provides significant wildlife habitat, including habitat for migration/travel, escape, resting, forage, and reproduction.

While the White River system currently provides significant wildlife and fish habitat, the overall quality and quantity of functioning habitat could be improved using restoration and enhancement of degraded wetland and stream areas in that system. The proposed compensatory mitigation for this project is intended to replace wetland buffer functions that will be lost due to project construction. Proposed mitigation is anticipated to mitigate loss of the functions described in the impacts section of this report. This will be accomplished as follows:

Water Quality:

Currently the buffer of the tributary is primarily vegetated with grasses. The planted shrubs will provide more slope stabilization and increased slowdown of runoff to improve water quality.

Hydrology:

The planted vegetation will help to intercept more rainfall, which preserves soil composition so that infiltration is not impaired (Dunne, 1978).

Fish and Wildlife Habitat:

The plantings will help to increase the diversity of native vegetation on the site and will shade out noxious weeds. This will enhance habitat for wildlife. In addition, planted shrubs will provide more shade for cooler water temperatures, which are beneficial to fish. Woody vegetation will also provide more detritus, which will in turn bring more microorganisms to the site for fish to feed on.

OBJECTIVE, STANDARDS OF SUCCESS AND MONITORING SCHEDULE

Objective

The mitigation program is intended to enhance 1,055 square feet of degraded stream/wetland buffer. The mitigation area is expected to be dominated by native plant species and succeeding toward the intended shrub community.

Standards of Success

Year 1:

At the end of the first growing season all planted material shall be alive and healthy (all dead material will be replaced). Areal cover of planted material will be 10%. Close, 3-foot spacing of the Salix and Cornus will ensure very quick coverage by these fast-growing species.

Year 3:

Three years after planting 85% of the planted material will be alive and healthy. Areal cover of planted shrubs will be greater than 60%.

Year 5:

Five years after planting the mitigation area will still be upholding or surpassing the performance standards of monitoring year 3.

MONITORING SCHEDULE

Mitigation plantings will be monitored for 5 years by census or sampling of surviving plants. The initial monitoring will occur one year after planting in order to implement the one-year plant survival warranty to be provided by the landscape contractor.

Up to 20% of any stratum can be composed of desirable native volunteers when measuring cover. No more than 10% cover of non-native of other invasives, e.g., Himalayan blackberry, Japanese knotweed, evergreen blackberry, reed canary grass, Scots broom, English ivy, morning glory, etc. will be permissible in any monitoring year. Vegetation monitoring will occur during summer in the third and fifth years.

POTENTIAL CONTINGENCY ACTIONS

Before the beginning of monitoring year one, all dead or unhealthy plants will be replaced.

If the site does not meet performance standards for monitoring years three and five additional planting will be conducted. Live, containerized plant material will be replanted and monitored to assure that coverage meets performance standards.

Appendix 2 - Methods

A total count of living and dead stems was conducted to estimate survival of planted woody species (Success Standard 1).

To assess vegetation standards, a 55-meter baseline was established parallel to SR 410. Twenty-seven temporary sampling transects were placed perpendicular to the baseline using a systematic random sampling method (Figure 2). Aerial cover of woody species (Success Standards 2 and 3) was assessed using the line intercept method. Twenty-seven 3-meter line-segment sample units were randomly positioned along sampling transects across the site. The point intercept method was used to estimate aerial cover of invasive species (Success Standards 4). Twenty-seven randomly positioned 3-meter point-line sample units (20 points each) were placed along the sampling transects.

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. In this equation, the precision level (B) equals half the maximum acceptable confidence interval width multiplied by the sample mean.

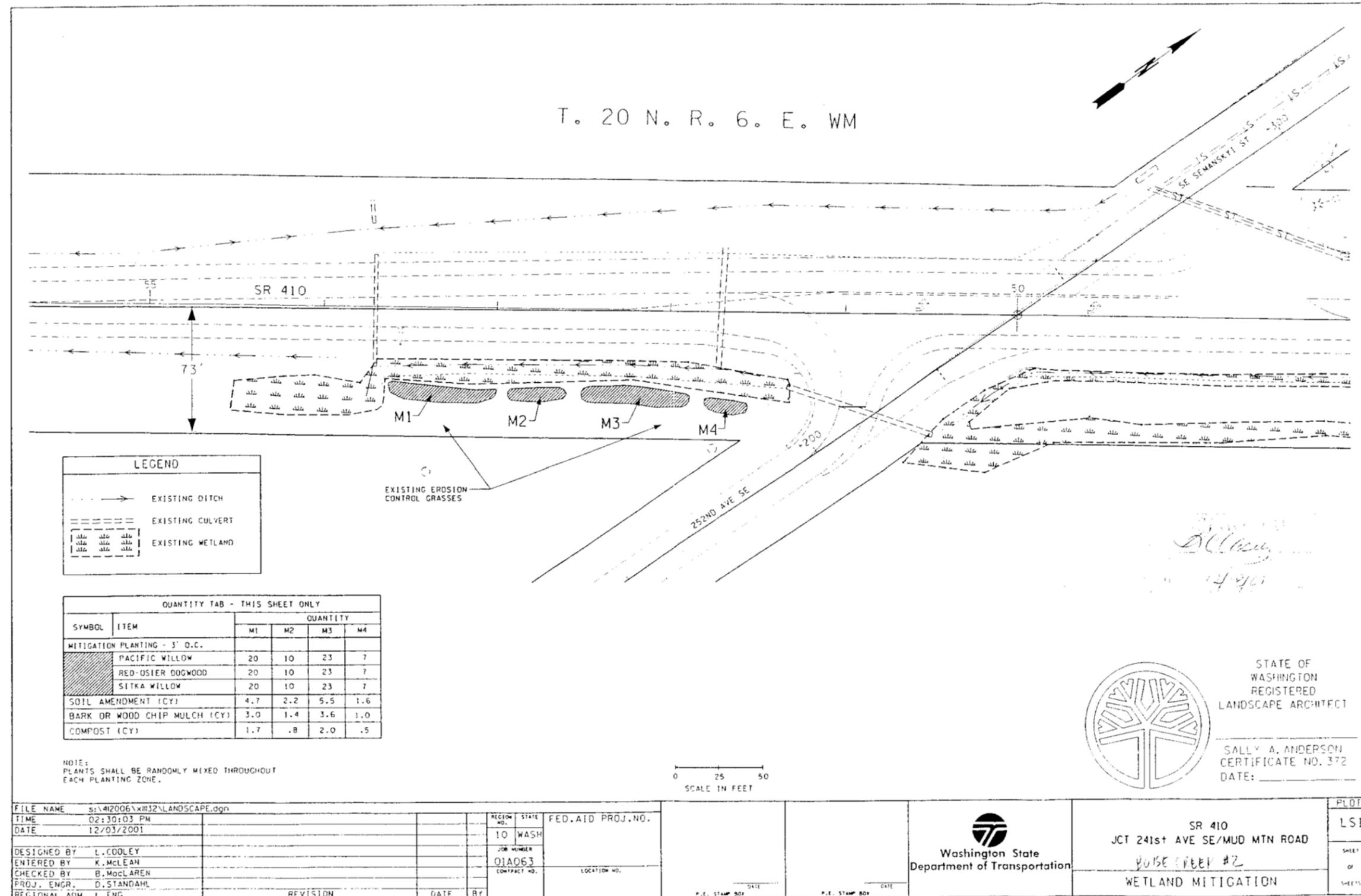
$$n = \frac{(z)^2 (s)^2}{(B)^2}$$

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 2007).

Appendix 3 – Planting Plan

(from Cooley 2001)



Literature Cited

1. King County Department of Development and Environmental Services (KCDDDES). 2002. KCDDDES Grading Permit Conditions Project No: L01CG463.
2. Leonard, E. 2001. Wetland Buffer Mitigation SR 410 – Junction 241st / Mud Mountain Road (MP 22.17 to 22.35). Washington State Department of Transportation, Northwest Region, Seattle, WA
3. Cooley, L. 2001. SR 410 – Junction 241st / Mud Mountain Road Planting Plan. Washington State Department of Transportation, Northwest Region, Seattle, WA.
4. Washington State Department of Transportation (WSDOT) WSDOT Wetland Mitigation Site Monitoring Methods (30 November 2007). <http://www.wsdot.wa.gov/NR/rdonlyres/C211AB59-D5A2-4AA2-8A76-3D9A77E01203/0/MethodsWhitePaper052004.pdf>