

I-405 Thunder Hills Creek Mitigation Fish Barrier Retrofit (Panther Creek) Mitigation Site

USACE NWP (23) NWS-2008-87

Northwest Region

2015 MONITORING REPORT

Wetlands Program

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Author:

Sean Patrick

Editor:

Doug Littauer

For additional information about this report or the WSDOT Wetlands Program, please contact:

Doug Littauer, Wetlands Program
WSDOT, Environmental Services Office
P. O. Box 47332, Olympia, WA 98504
Phone: 360-570-2579 E-mail: littaud@wsdot.wa.gov

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General Site Information	
USACE NWP 23 Number	NWS-2008-87
WDFW HPA Number	125910-2
Mitigation Location	Along Panther creek near SR 167 in Kent, King County
LLID Number	1222159474448
Construction Date	2012
Monitoring Period	2013-2017
Year of Monitoring	3 of 5
Project Impact¹	Emergency Culvert Replacement
Type of Mitigation	Stream Realignment and Culvert Replacement

¹ Specific acreages are not included in this table. A USACE permit was acquired to complete emergency repairs on a culvert running under I-405. Included in that permit are requirements to replace an additional culvert and realign Panther creek along SR 167. There are no acreage requirements for this project.

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Summary of Monitoring Results and Management Activities (2015)

Performance Standards	2015 Results ²	Management Activities
Native woody species will achieve an average density of at least four plants per 100 square feet in the planting areas.	Stream Realignment: 17 plants/100ft ² (CI _{80%} = 14-20) Culvert Replacement: 4 plants/100ft ² (visual estimate)	
Class A noxious weeds will be eradicated and the cover of specified invasive species will not exceed 20 percent.	No Class A noxious weeds observed on-site. 1% cover of specified species (visual estimate)	Weed control (5/4, 5/13, and 7/23/2015)
HPA: 80 percent survival for 5 years	92% survival	

Report Introduction

This report summarizes third-year (Year-3) monitoring activities at the Interstate (I) 405 Panther Creek 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. Monitoring occurred on August 3 and 4, 2015.

² Estimated values are presented with their corresponding statistical confidence interval. For example, 17 plants/100ft² (CI_{80%} = 14-20) means we are 80% confident that the true density value is between 14 and 20 plants per 100 square feet.

What is the I-405 Panther Creek Stream Realignment?

This stream realignment (Figure 1) is a restored reach of Panther Creek that connects to a recently replaced culvert that goes under SR 167. Both the stream realignment of Panther Creek and the culvert replacement were included as a special condition of the USACE permit that was obtained to complete the emergency replacement of a culvert that carried Thunder Hills Creek under I-405 in October 2008.

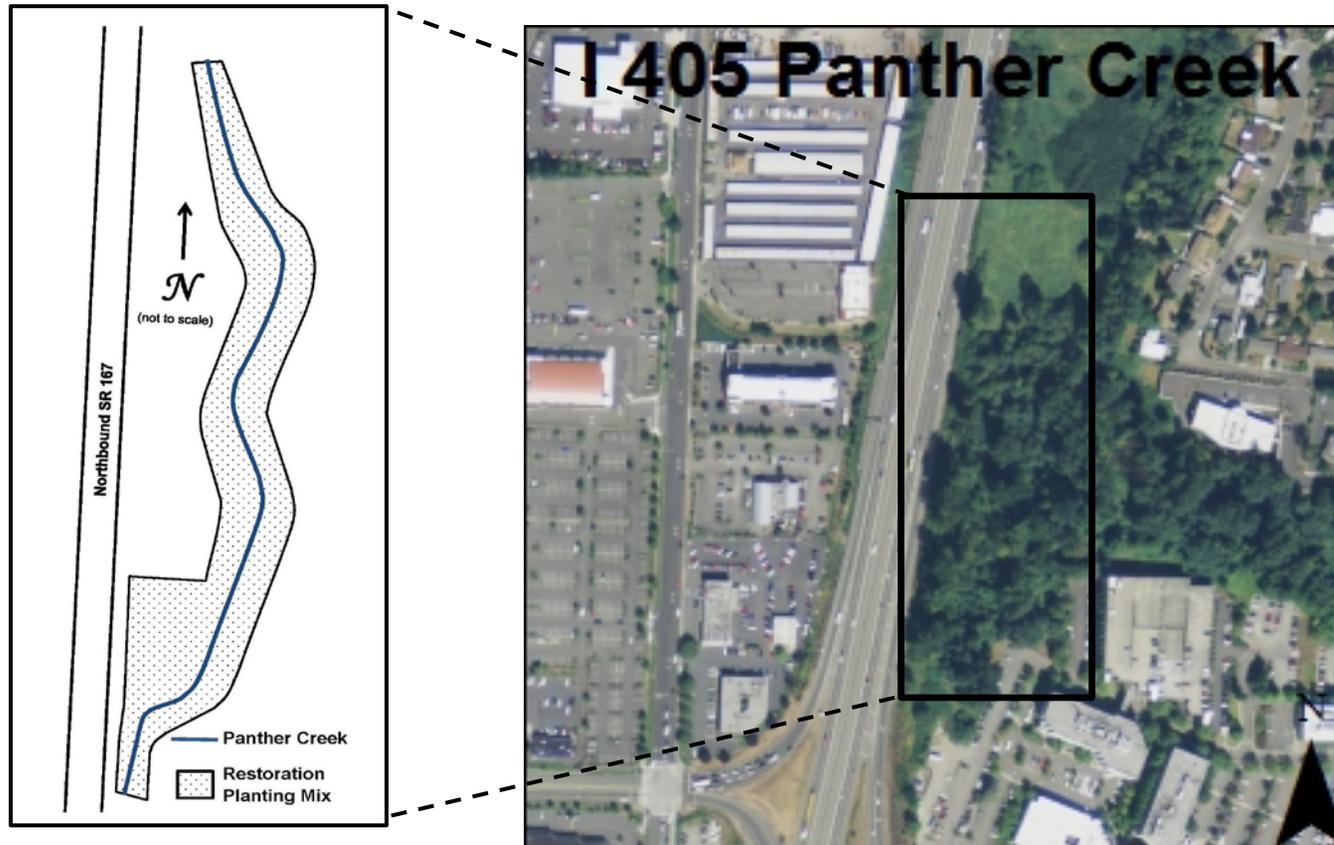


Figure 1 Site Sketch

The I-405 Panther Creek mitigation site includes riparian bank plantings and riparian buffer plantings. The culvert goes under SR 167 and is located just a mile north of the stream realignment. Appendix 1 includes site directions.

What are the performance criteria for this site?

Year-3

Permit Requirement 1 (special condition e from USACE 2012)

In Years 1 and 3, native woody species will achieve an average density of at least four plants per 100 square feet in the planting areas.

Permit Requirement 2 (special condition g from USACE 2012)

In all Years, Washington State-listed, King County-listed Class A weeds designated for control by the King County weed board, and non-native knotweeds (*Polygonum cuspidatum* and *P. polystachyum*) must be eradicated. The combined cover of non-native blackberries (*Rubus laciniatus* and *R. armeniacus*), Scot's broom (*Cytisus scoparius*), thistles (*Cirsium arvense*, *C. vulgare*, *Carduus nutans*, and *Onopordum acanthium*), reed canarygrass (*Phalaris arundinacea*), and purple loosestrife (*Lythrum salicaria*) will not exceed 20 percent in the planted areas.

Permit Requirement 3 (provision 51 from WDFW 2012)

Alteration or disturbance of the bank and bank vegetation shall be limited to that necessary to construct the project. Throughout this project, all disturbed areas shall be protected from erosion using vegetation or other means. Within one year of project completion, the disturbed stream banks and associated floodplain and wetland areas shall be revegetated with native or other approved woody species. Vegetative cuttings (all approved woody species) shall be maintained as necessary for five years to ensure 80 percent survival.

Year-5

Permit Requirement 4 (special condition f from USACE 2012)

In Year 5, native woody species will provide at least 35 percent cover in the planting areas.

Appendix 1 shows the planting plans (WSDOT 2012).

How were the performance standards evaluated?

The table below documents the sampling methodology utilized for the permit requirements (PR). For additional details on the methods see the [WSDOT Wetland Mitigation Site Monitoring Methods Paper](#) (WSDOT 2008).

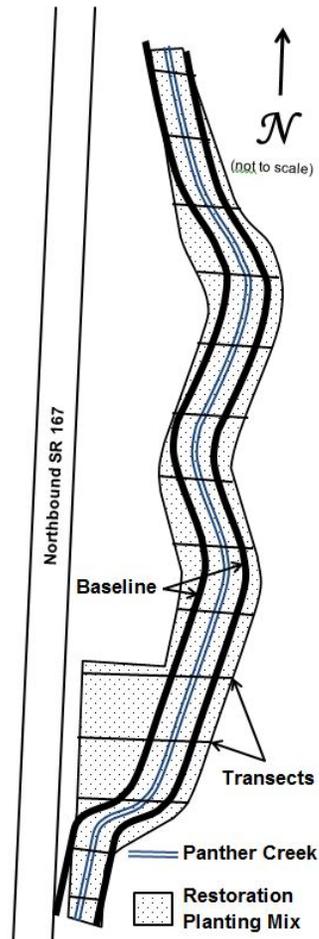


Figure 2 Site Sampling Design (2015)

Placement of Baseline: One segment on each side of Panther Creek, following the contours of the creek channel, for a total length of 393 meters.

	PR 1	PR 2	PR 3	PR 4
Attribute	Density	Presence/Absence & Cover	Survival	Cover
Target pop.	Native Woody	Noxious Weeds	Woody Plantings	Native Woody
Zone	Entire site	Entire site	Entire Site	Entire site
Sample method	UBT	Visual Estimates	Total Count (Culvert) and Visual Estimate (Stream Realignment)	Line Intercept
SU length				4 m
SU width	1 m			
Total # of SU	20			20

How is the site developing?

In general, this site has developed quite well and is meeting all of its current and final-year (year-5) permit requirements. At the stream realignment site, willows (*Salix spp.*) have developed dense cover along the immediate stream banks, providing ample shading of the creek and stabilization of the banks. Outside of this, a healthy mix of other native trees and shrubs has also developed well. Deer have been utilizing the site, as evidenced by scat and heavily browsed Pacific ninebark (*Physocarpus capitatus*) plantings.

At the western culvert planting area, the woody plantings have grown quickly, due to abundant available water and nutrients, and have achieved nearly 100% cover. The plantings on the eastern side of the culvert have developed much more slowly because the majority of this area is relatively steep and dry. Even in this area, however, the density of native woody plants is adequate. It will just take more time to develop.

Results for Permit Requirement 1

(Native woody density of at least 4 plants/100 ft²):

The density of native woody species at the stream realignment site (Photo 1) is estimated at 17 plants/100ft² (CI_{80%} = 14-20). The density of native woody species at the culvert replacement site was visually estimated at 4 plants/100 ft².

Results for Permit Requirement 2

(Class A noxious weeds will be eradicated and the cover of specified invasive species will not exceed 20 percent):

No Class A noxious weeds were observed on-site. The cover of invasive species was visually estimated at less than 1% for the stream realignment site and 1-2% for the culvert replacement site. Of the invasive species listed in the permit requirement, reed canarygrass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus armeniacus*) were present at both sites, and bull thistle (*Cirsium vulgare*) was present at the culvert replacement site. Also present at the culvert replacement site, but not specified in the permit requirement, was paleyellow iris (*Iris pseudacorus*).

Results for Permit Requirement 3

(HPA: 80 percent survival for 5 years):

Survival of woody plantings at the culvert replacement site was determined to be 92% by a total count of all live and dead plants present. At the stream realignment site, the survival of woody plantings was visually estimated to be greater than 80% and a rough extrapolation from the density data collected for this area, compared to the original planting numbers, indicates a survival rate of 80%.



Photo 1
Woody density at the stream realignment site
(August 2015)

Results for Permit Requirement 4
(Native woody cover of at least 35%):

The cover of native woody species at the stream realignment site (Photo 2) is estimated at 76% (CI_{80%} = 69-83%). The dominant species are willows (*Salix spp.*), Nootka rose (*Rosa nutkana*), and twinberry honeysuckle (*Lonicera involucrata*). The cover of native woody species at the culvert replacement site (Photo 3) was visually estimated at 60%. The dominant species in this area are Pacific ninebark (*Physocarpus capitatus*), Nootka rose (*Rosa nutkana*), and willows (*Salix spp.*).



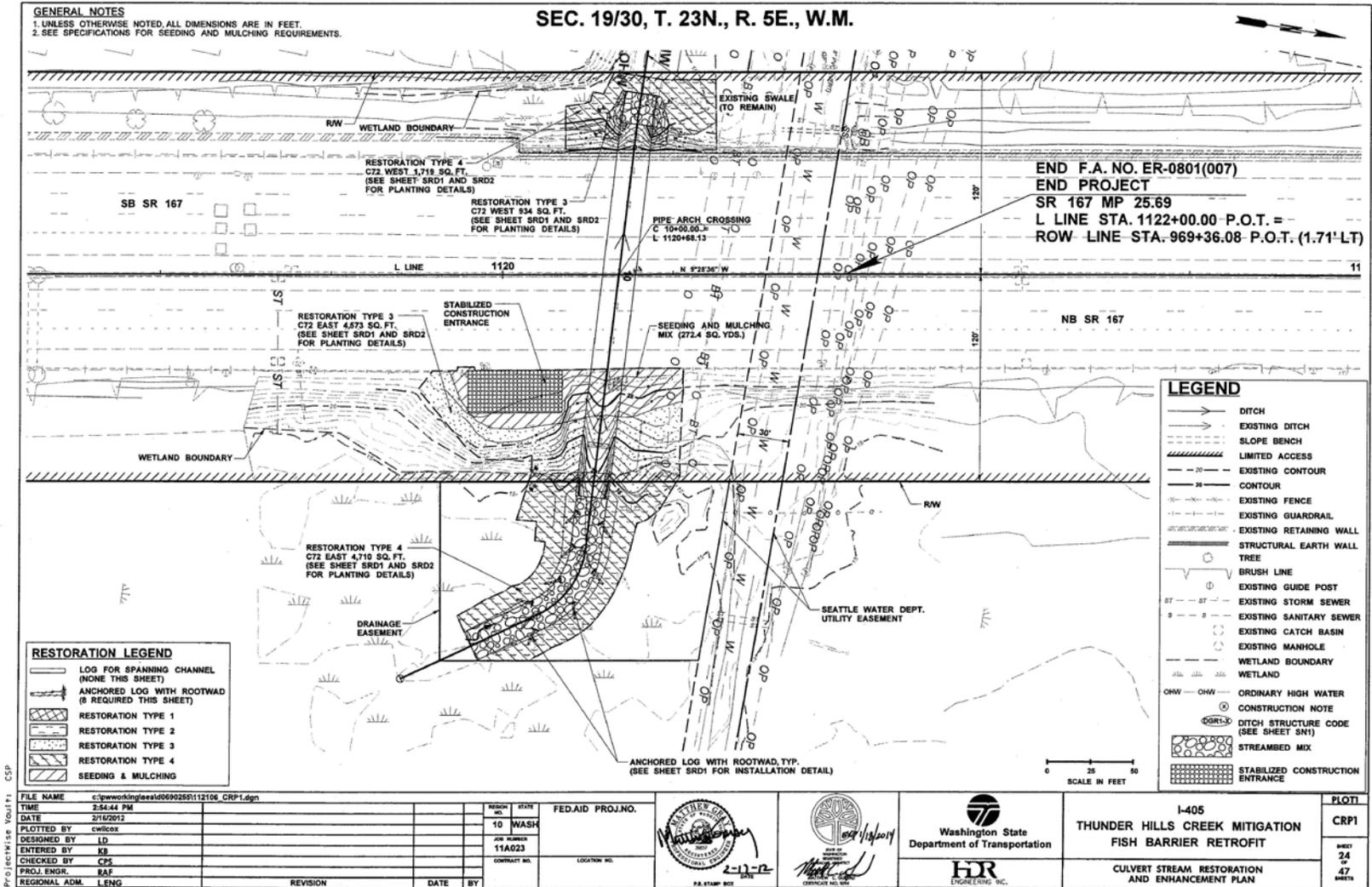
Photo 2
Woody cover at the stream realignment site
(August 2015)



Photo 3
Woody cover at the west culvert site (August 2015)

Appendix 1 – Planting Plans

(from WSDOT 2012)

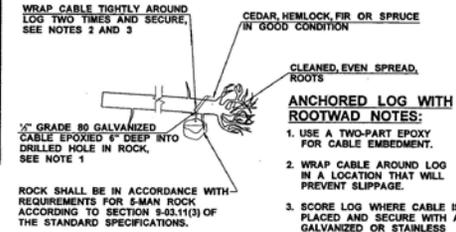
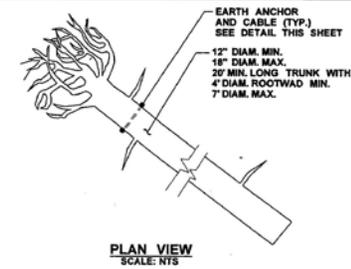


PLANTING NOTES

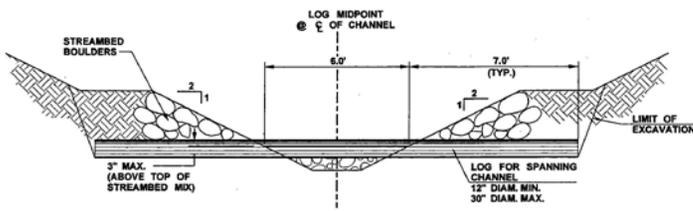
1. PLANTING OF CONTAINERIZED PLANTS IS TO OCCUR DURING THE COOL SEASON MONTHS (OCT 1-MARCH 1). PLANTS IN TYPE 4 RESTORATION AREAS NEED TO BE INSTALLED BY MID-OCTOBER. OTHER PLANTING TIMES MUST HAVE PRIOR AUTHORIZATION FROM THE ENGINEER. HYDROSEEDING SHALL BE DONE FROM APRIL 1 TO MAY 31 OR FROM SEPTEMBER 1 TO OCTOBER 31.
2. SELECTED PLANTS, PLANTING ACTIVITIES SHALL CONFORM WITH THE CODE OF STANDARDS OF THE AMERICAN ASSOCIATION OF NURSERYMEN. PLANT MATERIALS TO BE USED WILL BE NATIVE TO THE PACIFIC NORTHWEST, IN ACCORDANCE WITH STANDARD SPECIFICATION 9-14.6(2) PLANT MATERIAL SHALL MEET THE GRADES ESTABLISHED IN THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z66.1).
3. A SEED DRILL EQUIPPED WITH A CULTIPACKER IS PREFERRED FOR APPLICATION BUT BROADCAST OR HYDROSEEDING CAN BE USED AT DOUBLE THE RECOMMENDED SEEDING RATES. WHERE BROADCAST SEEDING IS USED, FIRM SEEDED WITH CULTIPACKER OR ROLLER AFTER SEEDING.
4. FERTILIZERS SHALL NOT BE APPLIED.
5. EXISTING SOIL ON THE SITE SHALL BE USED FOR TOPSOIL AND PLANTING SOIL REQUIREMENTS, AND SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATION 9-02.3(4) TOPSOIL TYPE B.
6. INSTALL CONTAINERIZED PLANTS AND CUTTINGS AS SHOWN ON THE TYPICAL PLANTING DETAILS, SHEET SRD2.

PLANTING SCHEDULE

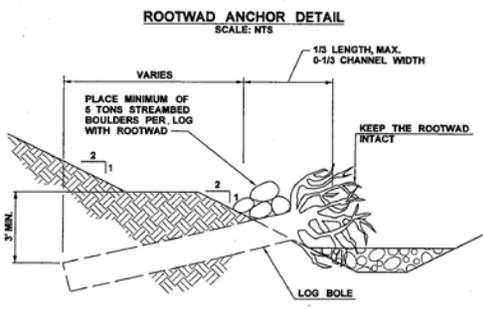
THUNDER HILLS CREEK MITIGATION FISH BARRIER RETROFIT PLANT SCHEDULE										
Restoration/ Enhancement Type	Common Name	Scientific Name	Spacing	Condition	Min. Size	S.F.:	Plant Quantities			Total Plants
							C66/C66 Ditch	C72 East	C72 West	
RESTORATION TYPE 1	PSIPE Redtwig dogwood	<i>Cornus sericea</i>	2' O.C.	live stake	3' length	S.F.: 10,486	1311	--	--	1311
	PSIPE Sitka willow	<i>Salix sitchensis</i>	2' O.C.	live stake	3' length	1311	--	--	1311	
	PSIPE Pacific willow	<i>Salix lucida</i>	3' O.C.	live stake	3' length	1164	--	--	1164	
RESTORATION TYPE 2	PSIPE Black Cottonwood	<i>Populus balsamifera</i>	8' O.C.	#1 cont.	18"	S.F.: 8,722	47	--	--	47
	PSIPE Western redcedar	<i>Thuja plicata</i>	8' O.C.	#2 cont.	18"	47	--	--	47	
	PSIPE Sitka spruce	<i>Picea sitchensis</i>	8' O.C.	#2 cont.	18"	47	--	--	47	
	PSIPE Nootka rose	<i>Rosa nutkana</i>	4' O.C.	#1 cont.	18"	549	--	--	549	
RESTORATION TYPE 3	PSIPE Black twinberry	<i>Lonicera involucrata</i>	4' O.C.	#1 cont.	18"	S.F.: 29,798	626	96	20	741
	PSIPE Nootka rose	<i>Rosa nutkana</i>	4' O.C.	#1 cont.	18"	626	96	20	741	
	PSIPE Pacific ninebark	<i>Physocarpus capitatus</i>	4' O.C.	#1 cont.	18"	626	96	20	741	
RESTORATION TYPE 4	PSIPE Pacific willow	<i>Salix lucida</i>	8' O.C.	#1 cont.	18"	S.F.: 2,600	21	38	14	72
	PSIPE Oregon ash	<i>Fraxinus latifolia</i>	8' O.C.	#1 cont.	18"	21	38	14	72	
	PSIPE Sitka willow	<i>Salix sitchensis</i>	4' O.C.	#1 cont.	18"	82	148	54	270	
	PSIPE Clustered wild rose	<i>Rosa pisocarpa</i>	4' O.C.	#1 cont.	18"	82	148	54	270	



- NOTES:**
1. PLACE MINIMUM OF 2 TONS STREAMBED BOULDERS AT EACH END OF LOG FOR SPANNING CHANNEL.



LOG FOR SPANNING CHANNEL DETAIL
SCALE: NTS



ROOTWAD ANCHOR DETAIL
SCALE: NTS

FILE NAME c:\pwworking\ssad\0660478\112106_SRD1.dgn	REGION NO. 10	STATE WASH	FED.AID PROJ.NO.			I-405 THUNDER HILLS CREEK MITIGATION FISH BARRIER RETROFIT	STREAM /DITCH RESTORATION AND ENHANCEMENT DETAILS	PLOTT SRD1 SHEET 26 OF 47 SHEETS
DATE 2/16/2012	DATE 2-17-12	CONTRACT NO. 11A023	LOCATION NO.					
DESIGNED BY LD	PROJECT NO.	DATE	BY	PROJECT NO. 11A023 LOCATION NO.				
ENTERED BY KS	DATE	BY		PROJECT NO. 11A023 LOCATION NO.				
CHECKED BY CPS	DATE	BY		PROJECT NO. 11A023 LOCATION NO.				
PROJ. ENGR. RAP	DATE	BY		PROJECT NO. 11A023 LOCATION NO.				
REGIONAL ADM. LENG	DATE	BY		PROJECT NO. 11A023 LOCATION NO.				

Driving Directions:**Panther Creek Stream Realignment:**

From Olympia, take I-5 north to SR 18. Take exit 142A for SR 18 east. Drive for approximately three miles until you reach SR 167. Take the ramp to connect to north bound SR 167 and drive approximately ten miles. Take the exit ramp towards S. 180th street/SW 43rd Street. Do not turn but get back on SR 167 and pull over to the right side of the road towards the end of the on ramp. There is a parking pad to pull over on and you will see the stream right next to the road.

Culvert Replacement Northbound 167:

The plantings on the east side of the culvert are approximately one mile northbound on SR 167. You will see a black electronic sign that spans the highway. Pull over right after you see that sign coming up. There is a parking pad on the side of the road to pull over on.

Culvert Replacement Southbound 167:

In order to access the other side of the culvert, pull back onto SR 167 and head north. You will go under I-405 towards Grady Way. Turn Left onto SW Grady Way and left again onto Lind Ave SW. Turn left again onto SW 16th St and it turns into E Valley Road. Pull off right before you reach SW 23rd St.

Literature Cited

1. [USACE] US Army Corps of Engineers. 2012. Department of the Army Individual Permit Number NWS-2008-87.
2. [WDFW] Washington Department of Fish and Wildlife. 2012. Hydraulic Project Approval Control Number 125910-2.
3. [WSDOT] Washington State Department of Transportation. 2012. I-405 Thunder Hills Creek Mitigation Fish Barrier Retrofit Culvert Stream Restoration and Enhancement Plan.
4. [WSDOT] Washington State Department of Transportation. 2008. WSDOT Wetland Mitigation Site Monitoring Methods. <http://www.wsdot.wa.gov/NR/rdonlyres/C211AB59-D5A2-4AA2-8A76-3D9A77E01203/0/MethodsWhitePaper052004.pdf>