FINAL REPORT
Bank Stabilization and, Beach Nourishment at Weaverling Spit
Samish Indian Nation

October, 2009

Project Title: Bank Stabilization and Beach Nourishment at Weaverling Spit
Description: *The Samish Indian Nation will restore 550 feet of eroding shoreline with an engineered soft shore stabilization project; protect an archeological site that is in danger of eroding onto the beach; provide habitat for forage fish spawning along with vegetation for shade of habitat; and restore the shoreline along the Tommy Thompson Trail in Anacortes that is currently being impacted by erosion.*

On September 1, 2009, work began with Shoreline Excavation and Construction Inc. on this project. The project was monitored for archeological requirements by Equinox Research and Consulting International Inc. (ERCI). The permitted project design was completed by Tom Slocum, Skagit County Conservation District and Coastal Geologic Services Inc. Project oversight was completed by Christine Woodward, Director of Natural Resources, and Diana Barg, Cultural Resources Manager for the Samish Indian Nation. This project took approximately six weeks to complete.

Before Project. January of 2009. This area is located in front of the condos on Fidalgo Bay Road. It also abuts the Tribal owned RV Park.
At least 5-7 feet of bank has been lost over an 8 year span.

Photo #1

Photo #2

Photo #3

West end of the project along Tommy Thompson Trail. Note higher bank. The railroad trestle is falling through. The trestle and all of its components are historical so we had to be very careful to work around them and not damage any of the failing timbers.

Thanks to the Northwest Straits Commission and Department of Ecology and their generous donation of $20,000.00, we were able to put the project money to work stabilizing the bank. Approximately 1982 tons of rock, 8 large root wads and 4 25-30 foot sections of trees were used to stabilize the bank and form drift sills to help keep the bank and the rock in place.

Work Program:

Task 1: Removal of failed armoring and other debris

Close to 30 concrete cylinders and numerous angular, remnant rip rap were removed from the beach. Jute fabric from a prior project was largely in a state of rot so was removed when it was encountered. Some areas of mat were left so as not to disturb the soils and bank. Two sections of large 21" concrete storm drain from the far west side were removed and a scour apron was constructed. It is now a day lighted gradual seep across the beach entering Fidalgo Bay. The second storm drain from in front of the condos was also renovated. Removing the black plastic pond shown in Figure 1.

Photo# 4

First few days were cleaning up the beach.

Photo #5

Task 2: Soft shore stabilization
Implemented the construction of a stabilization project that installed 8 large root wads one end facing bank and other the Bay with a 25-30’ long log in the middle. These were placed at designated locations according to the project plan, to interrupt along-shore transport of gravel. Each log is chained to an ecology block buried into the beach.

Moving root wad into place. Photo #6

Ecology block with chain to hold logs in place. Photo # 7

It took a few weeks to get all the way down to the west end of the project. Due to the soft beach, we had to build a path for the excavator to walk down so that we could get the work started on the far end. We could not construct the drift sills until this path was made. Not only could we not move the logs into place but the long logs would have stuck out into the path so we built the sills and the logs left out until the end. All beach material was staged for the first few weeks at the far east end on the Tribe's property. This was our designated dump site for all material. Several weeks into the project when our path was built, we could then load a small 5 yard truck and dump materials at a second staging area at the end of the condo property.

Photo # 8

1,475 tons of 3-3.75" rock was placed as the base of the new beach. This was followed with 375 tons of pea gravel and a final layer of 132 tons of washed sand. Once the path was built, a smaller tracked cat was brought in to transport material. One of the biggest time factors was waiting for the delivery of beach material and having to work around the tides. There were many early mornings and late evenings and some days no work at all due to this. There were several voids in the bank mainly under the larger trees and trees that had been removed, that took a substantial amount of rock to fill. Our biggest void was 14' long! When the first layer of rock was in place, we found we needed more rock. This was mainly due to the fact that more bank was lost since the actual project plans were accepted four years earlier. We had to secure additional funds for delivery and placement of five more loads of rock. This added close to $5,000.00 in project costs.

West end complete Photo # 9

Compare to photo # 1. This bank is complete Photo # 10

Final work was on Monday the 5th of October at noon. By 2:00 A.M., surf smelt were present at the high tide line.

Task 3: Plant native plants for shading

The Samish Indian Nation will plant native shrubs and trees along the bank in the City of Anacortes right of way. A total of 1,000 native grasses, 100 shrubs/bushes and 7 trees greater than ten feet tall will be planted and maintained until established.

This task will take place in the spring of next year. Many components changed the date from fall planting. The Homeowners at the condo and the City of Anacortes are in negotiations to add topsoil onto the area from the trail to the beach. This would better allow plantings to take hold. We also want to give the project a winter to settle and see what happens with storms this coming winter. We also feel there will be a better survival rate in spring.

Funds provided by the Department of Ecology through the Northwest Straits Commission were used for the material to build the beach and the contractor. We will use other funding sources for the plants and planting.

Initial Budget

Contractor	$88,236.00
Archeologist	$13,340.00
Engineer	$2000.00
(Already donated all his time for the engineered plans)	
Plants	$3500.00
Total Project	**$107,076.00**

Match from the Department of Archeology and Historic Preservation	$65,000.00
Match from Shell Refinery	$ 5,000.00
Match from NWSC Tribal Fund	$20,000.00
Total Match	**$90,000.00**

Actual Budget

Contractor	$91,165.80
Archeologist	$13,340.00
Engineer	$0
Plants	$3,500.00
Total Project	**$108,005.80**

Funding Sources

Department of Archeology and Historic Preservation	$65,000.00
Shell Refinery	$5,000.00
NWSC Tribal Fund	$20,000.00
Port of Anacortes	$2,500.00
Samish Indian Nation	$15,505.80

Project Partners:
There were many partners for this project. Here is the list of those that were directly or indirectly related to the project either by their relationship to the project, donating funds to the project or provided the work for the project.

Tom Slocum, Skagit Conservation District
Coastal Geologic Services
City of Anacortes
Cove at Fidalgo Homeowners Association
Shoreline Excavation and Construction Inc.
Equinox Research and Consulting International Inc
Samish Indian Nation
Department of Archeology and Historic Preservation
Shell Refinery
NWSC Tribal Fund
Port of Anacortes

During the six weeks working on the job there were thousands of people walking, jogging, wandering and riding bikes on the trail that we had an opportunity to talk with about the work that was being done at this site. The educational component for the public has been enormous. Questions ranged from building a bulkhead to construction of a marina. Being onsite allowed for the interface with the public about what work was being done and how the trail they were using will be secure and that habitat for forage fish is being enhanced. It also gave us the venue to share the importance of this type of cooperative effort in Fidalgo Bay and how everyone wins with the work being done. Without all of the people and organizations listed about, we could never have completed or even started this project.

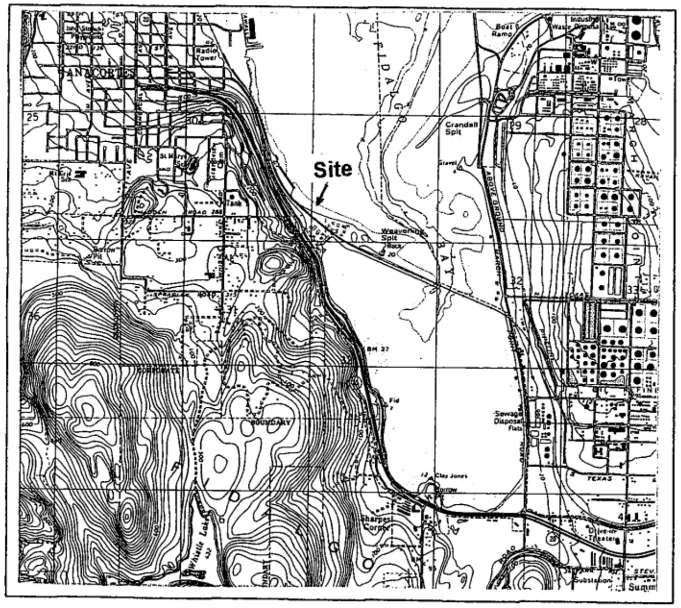
Fidalgo Bay Beach Nourishment and Shoreline Stabilization

The Cove at Fidalgo Bay, LLC
4501 Fidalgo Bay Road, Anacortes WA 98221

Project Description and Purpose:

The project will stabilize about 550 feet of eroding shoreline by reconstructing a sloping gravel beach, installing four drift sills using large wood debris, and planting about 0.3 acres of shoreline in native plants.

Site Location



SE1/4 Sec. 30, T 35N, R 2E, Skagit Co. Wash., Lat. 48.485°N, Lon. 122.592°W

Directions to the Project Site
From I-5, take SR20 west to Anacortes and exit at Fidalgo Bay Road. Drive north about 1.2 miles to "The Cove at Fidalgo Bay" condominium building at 4501 Fidalgo Bay Road.

Index of Drawings

General Notes

The project shall be constructed to the lines, grades and specifications shown in these drawings. Construction activities shall follow the general plan listed in Sheets 10 and 11. Estimated quantities of work and materials are listed in the following table. These estimates may be used for bid purposes but may not necessarily represent the actual as-built quantities for the completed project.

List of Quantities

Truck access road	per contractor's design
Remove riprap and concrete debris	40 cy
Remove culvert from beach	16 LF
Remove then replace drift logs	about 15 pcs.
Construct 4 drift sills: LWD & anchors	12 ea.
Scour aprons w/ salvaged riprap	6 cy
Fill and re-grade beach:	
3/4" - 3" rounded gravel	900 cy
1/4" - 3/4" rounded gravel	300 cy
Coarse sand	100 cy
Temporary grass seeding	about 0.2 ac
Final planting	per plan Sheet 12

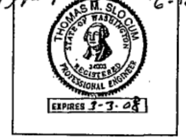
Project Designed By:

Skagit Conservation District
2021 E. College Way, Ste. 203, Mount Vernon WA 98273
Tel. (360) 428-4313, tom@skagitcd.org

Coastal Geologic Services, Inc.
701 Wilson Ave., Bellingham WA 98225
Tel. (360) 647-6654, jim@coastalgeo.com

Mactec Engineering and Consulting, Inc.
1310 11th St., Anacortes WA 98221
Tel. (360) 293-8690, jldudley@mactec.com

6-12-06



Proposal: Beach nourishment and LWD sills
Purpose: Stabilize eroding shoreline
Datum: MLLW = 0.0'
Proposed in:
Fidalgo Bay, Anacortes, Skagit Co. Wash.
SE 1/4 Sec. 30 T35N R2E
Lat. 48.4846° N, Lon. 122.5922° W.

USACE Ref. No. 200601022

Cover Sheet

Application by:
The Cove at Fidalgo Bay,LLC , c/o Ken Knight
11917 Marine View Dr., Edmonds WA 98026
tel. (206) 742-7131

Property owner:
The Cove at Fidalgo Bay,LLC (Lots B, C, D)
City of Anacortes (trail ROW)
Adjacent property owners:
Samish Indian Nation
Joseph and Carolyn Grimm
Sheet No. 1 of 11 Date: 6-9-06

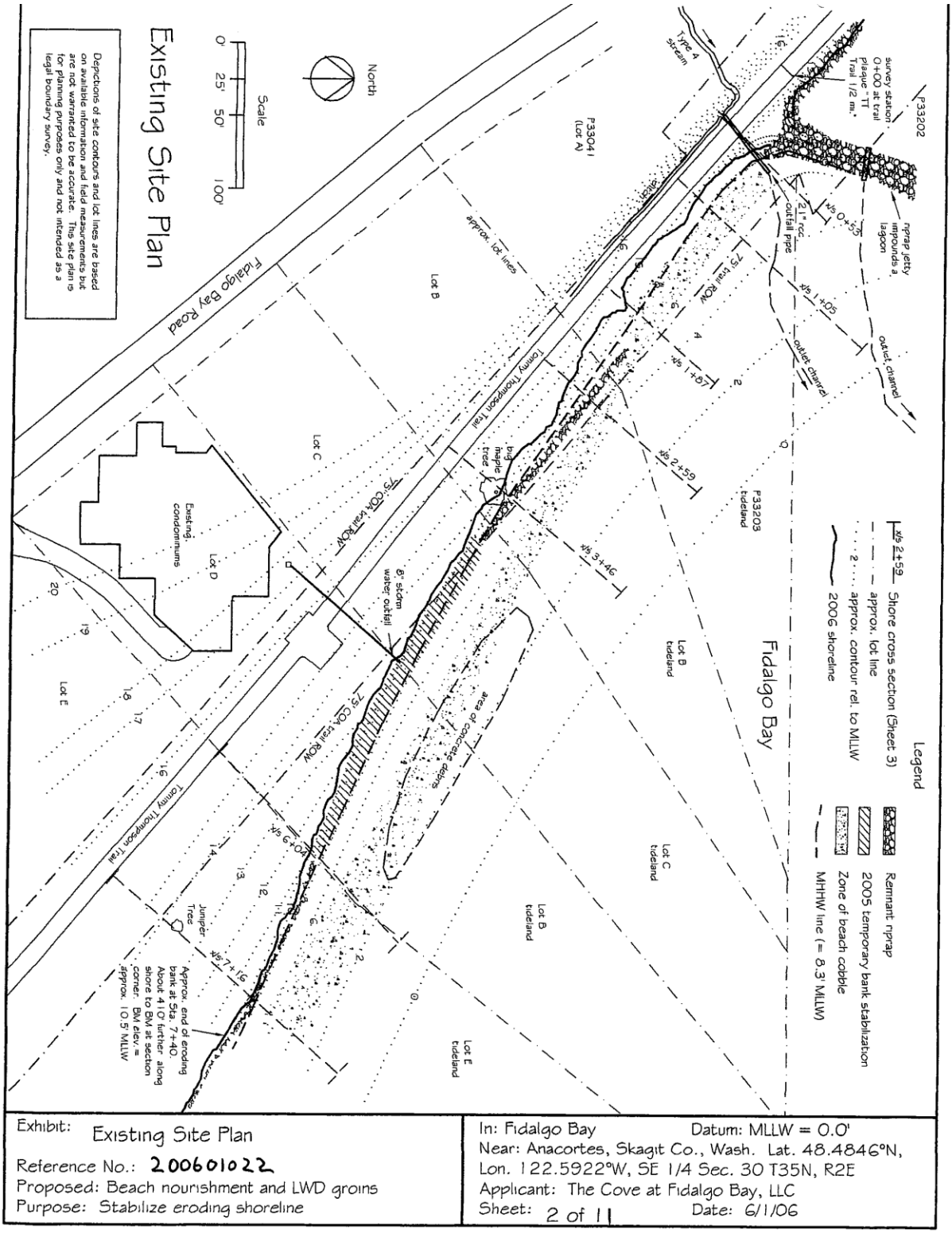

Existing Site Plan
Fidalgo Bay Road
Fidalgo Bay
Tommy Thompson Trail
75' COA trail ROW
Lot A
Lot B
Lot C
Lot D
Lot E
Existing condominiums
P33202
P33041 (Lot A)
P33203 tideland
Type 4 stream
survey station 0+00 at trail plaque "TT Trail 1/2 mi."
riprap jetty impounds a lagoon
21" rcc outfall pipe
outlet channel
big maple tree
8" storm water outfall
area of concrete debris
Juniper Tree
Approx. end of eroding bank at Sta. 7+40. About 410' further along shore to BM at section corner. BM elev. = approx. 10.5' MLLW
Depictions of site contours and lot lines are based on available information and field measurements but are not warranted to be accurate. This site plan is for planning purposes only and not intended as a legal boundary survey.
Scale
0' 25' 50' 100'
North
Legend
Shore cross section (Sheet 3)
approx. lot line
approx. contour rel. to MLLW
2006 shoreline
Remnant riprap
2005 temporary bank stabilization
Zone of beach cobble
MHHW line (= 8.3' MLLW)
Exhibit: Existing Site Plan
Reference No.: 200601022
Proposed: Beach nourishment and LWD groins
Purpose: Stabilize eroding shoreline
In: Fidalgo Bay Datum: MLLW = 0.0'
Near: Anacortes, Skagit Co., Wash. Lat. 48.4846°N, Lon. 122.5922°W, SE 1/4 Sec. 30 T35N, R2E
Applicant: The Cove at Fidalgo Bay, LLC
Sheet: 2 of 11 Date: 6/1/06

Exhibit: Existing Shore Cross Sections

Reference No.: 200601022

Proposed: Beach nourishment and LWD groins

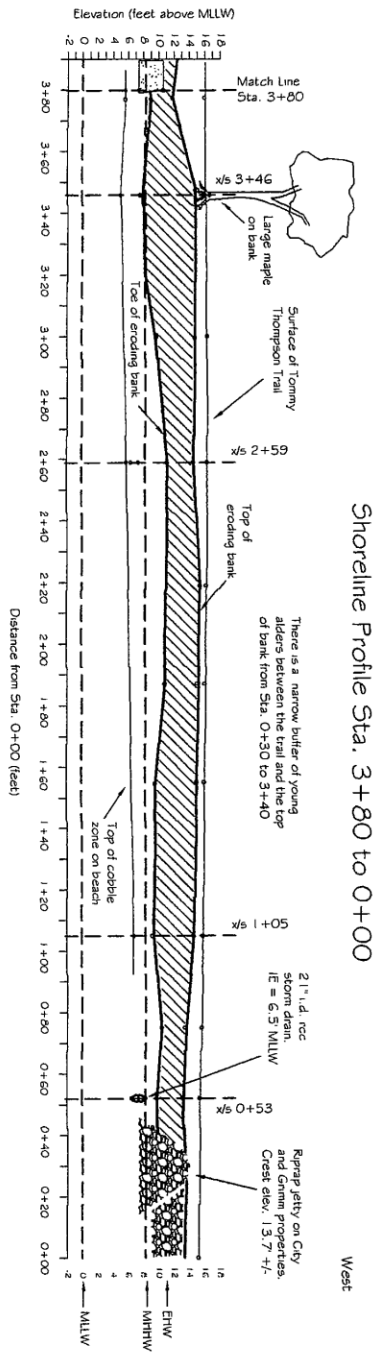
Purpose: Stabilize eroding shoreline

In: Fidalgo Bay Datum: MLLW = 0.0'

Near: Anacortes, Skagit Co., Wash. Lat. 48.4846°N, Lon. 122.5922°W, SE 1/4 Sec. 30 T35N, R2E

Applicant: The Cove at Fidalgo Bay, LLC

Sheet: 3 of 11 Date: 6/1/06



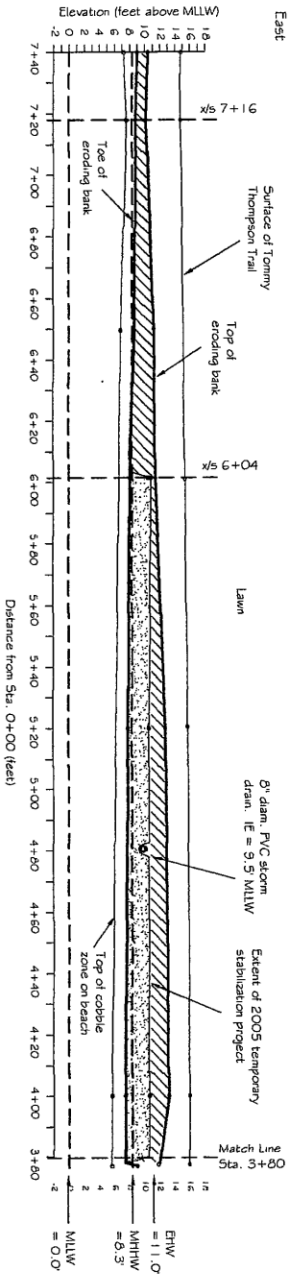
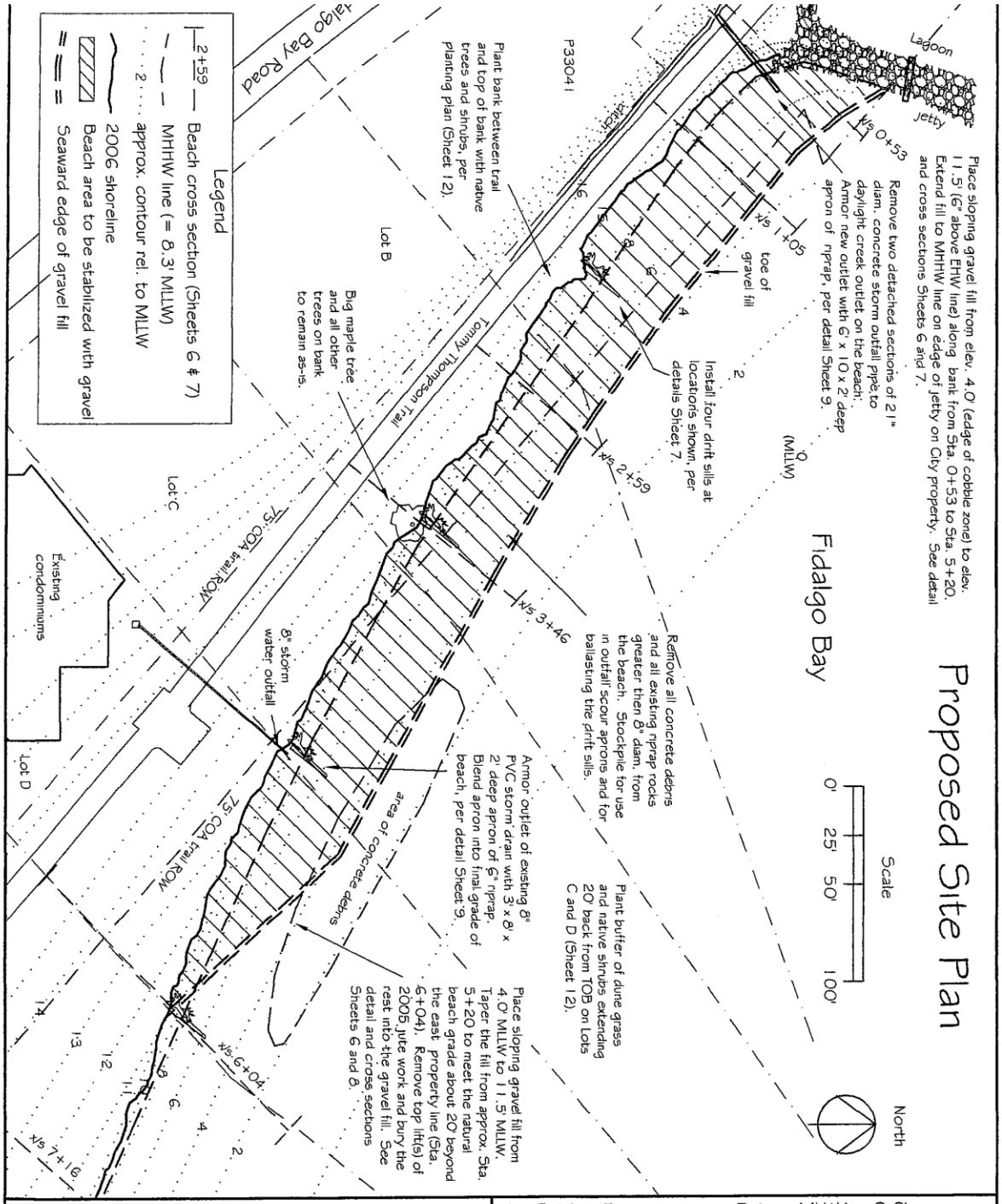


Exhibit:
Existing Shore Profile Views
Reference No.: 2006010122
Proposed: Beach nourishment and LWD groins
Purpose: Stabilize eroding shoreline

In: Fidalgo Bay Datum: MLLW = 0.0'
Near: Anacortes, Skagit Co., Wash. Lat. 48.4846°N, Lon. 122.5922°W, SE 1/4 Sec. 30 T35N, R2E
Applicant: The Cove at Fidalgo Bay, LLC
Sheet: 4 of 11 Date: 6/1/06


Proposed Site Plan
Fidalgo Bay
Scale
0' 25' 50' 100'
North
Legend
2+59 — Beach cross section (Sheets 6 & 7)
MHHW line (= 8.3' MLLW)
2 approx. contour rel. to MLLW
2006 shoreline
Beach area to be stabilized with gravel
Seaward edge of gravel fill
Fidalgo Bay Road
Tommy Thompson Trail
P33041
Lot B
Lot C
Lot D
75' COA trail ROW
Existing condominiums
Big maple tree and all other trees on bank to remain as-is.
Plant bank between trail and top of bank with native trees and shrubs, per planting plan (Sheet 12).
Remove two detached sections of 21" diam. concrete storm outfall pipe to daylight creek outlet on the beach.
Armor new outlet with 6' x 10' x 2' deep apron of riprap, per detail Sheet 9.
toe of gravel fill
Install four drift sills at locations shown, per details Sheet 7.
Remove all concrete debris and all existing riprap rocks greater then 8" diam. from the beach. Stockpile for use in outfall scour aprons and for ballasting the drift sills.
Plant buffer of dune grass and native shrubs extending 20' back from TOB on Lots C and D (Sheet 12).
8" storm water outfall
Armor outlet of existing 8" PVC storm drain with 3' x 8' x 2' deep apron of 6" riprap. Blend apron into final grade of beach, per detail Sheet 9.
area of concrete debris
Place sloping gravel fill from 4.0' MLLW to 11.5' MLLW. Taper the fill from approx. Sta. 5+20 to meet the natural beach grade about 20' beyond the east property line (Sta. 6+04). Remove top lift(s) of 2005 jute work and bury the rest into the gravel fill. See detail and cross sections Sheets 6 and 8.
Lagoon
jetty
Place sloping gravel fill from elev. 4.0' (edge of cobble zone) to elev. 11.5' (6" above EHW line) along bank from Sta. 0+53 to Sta. 5+20. Extend fill to MHHW line on edge of jetty on City property. See detail and cross sections Sheets 6 and 7.
Exhibit: Proposed Site Plan
Reference No.: 200601022
Proposed: Beach nourishment and LWD groins
Purpose: Stabilize eroding shoreline
In: Fidalgo Bay Datum: MLLW = 0.0'
Near: Anacortes, Skagit Co., Wash. Lat. 48.4846°N, Lon. 122.5922°W, SE 1/4 Sec. 30 T35N, R2E
Applicant: The Cove at Fidalgo Bay, LLC
Sheet: 5 of 11 Date: 6/1/06

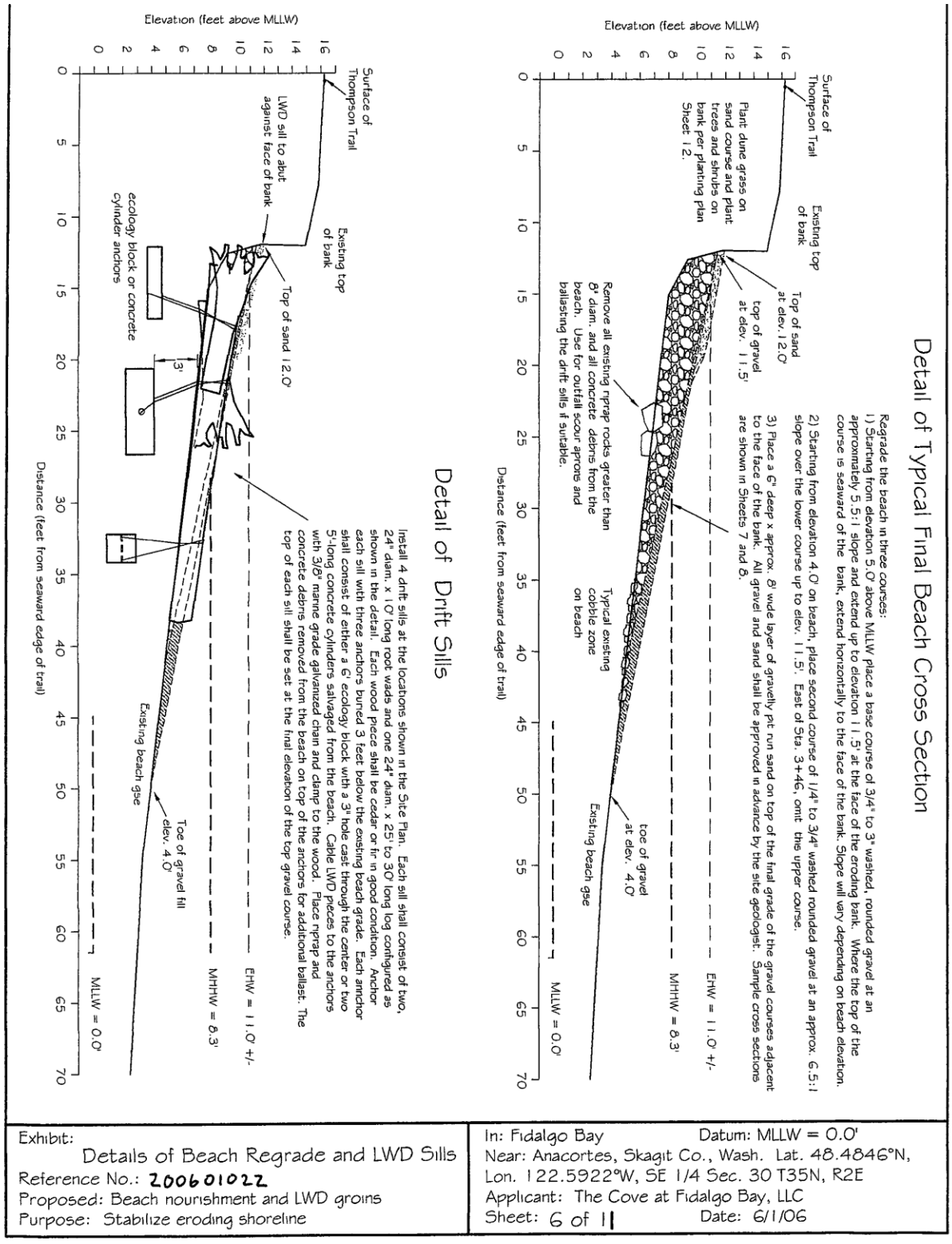
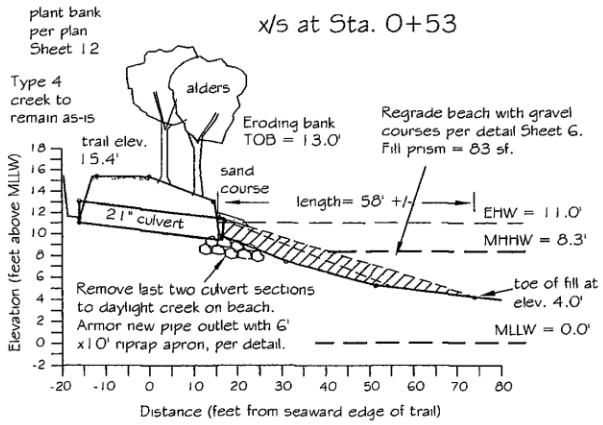


Exhibit:
Details of Beach Regrade and LWD Sills
Reference No.: 200601022
Proposed: Beach nourishment and LWD groins
Purpose: Stabilize eroding shoreline

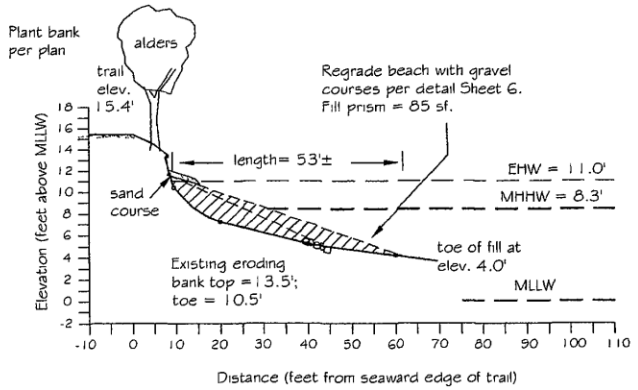
In: Fidalgo Bay Datum: MLLW = 0.0'
Near: Anacortes, Skagit Co., Wash. Lat. 48.4846°N, Lon. 122.5922°W, SE 1/4 Sec. 30 T35N, R2E
Applicant: The Cove at Fidalgo Bay, LLC
Sheet: 6 of 11 Date: 6/1/06

Final Beach Cross Sections - Sta. 0+53 to 1+87

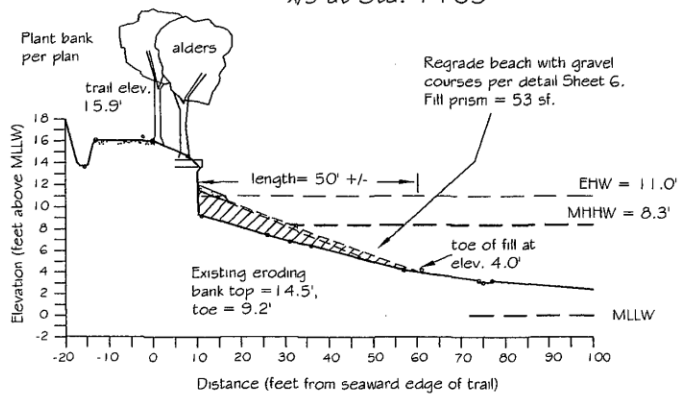
x/s at Sta. 0+53



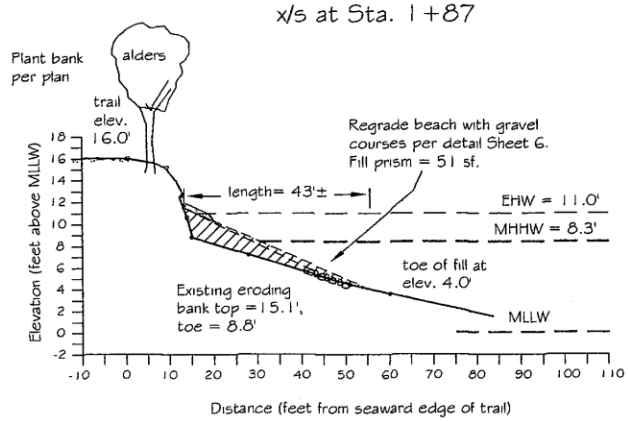
x/s at Sta. 0+75



x/s at Sta. 1+05



x/s at Sta. 1+87



In: Fidalgo Bay Datum: MLLW = 0.0'
Near: Anacortes, Skagit Co., Wash. Lat. 48.4846°N, Lon. 122.5922°W, SE 1/4 Sec. 30 T35N, R2E
Applicant: The Cove at Fidalgo Bay, LLC
Sheet: 7 of 11 Date: 6/1/06

Exhibit: Final Beach Cross Sections
Reference No.: 20060102
Proposed: Beach nourishment and LWD groins
Purpose: Stabilize eroding shoreline

Final Beach Cross Sections Sta. 2+59 to 6+04

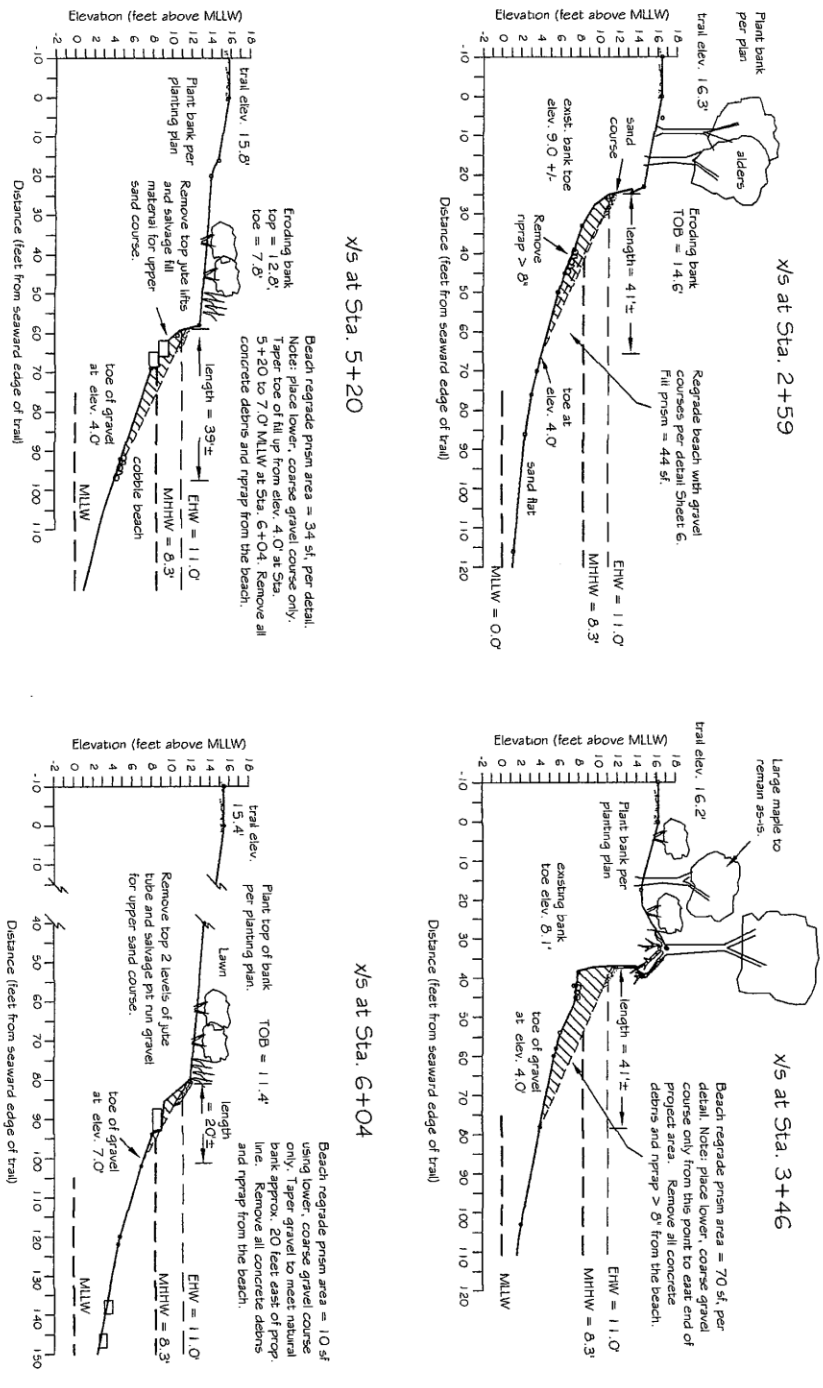


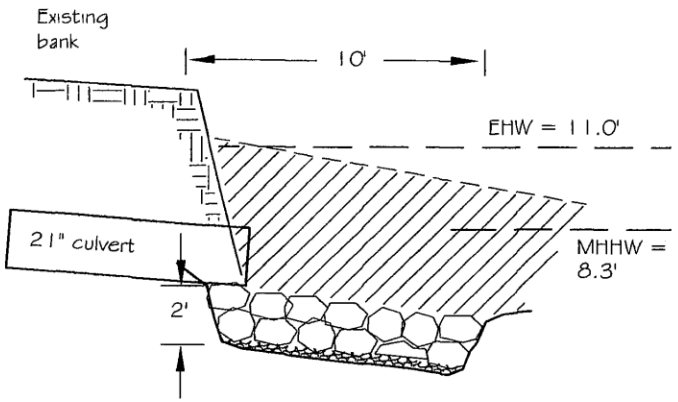
Exhibit: Final Beach Cross Sections Reference No.: 200601022 Proposed: Beach nourishment and LWD groins Purpose: Stabilize eroding shoreline	In: Fidalgo Bay Datum: MLLW = 0.0' Near: Anacortes, Skagit Co., Wash. Lat. 48.4846°N, Lon. 122.5922°W, SE 1/4 Sec. 30 T35N, R2E Applicant: The Cove at Fidalgo Bay, LLC Sheet: 8 of 11 Date: 6/1/06

Detail - Stormwater Outfall Scour Aprons

Construct scour protection aprons at the outlets of the 21" stormwater outfall at Sta. 0+53 and the 8" outfall at Sta. 4+80. Set the base of the scour aprons are 2' below the culvert inverts.

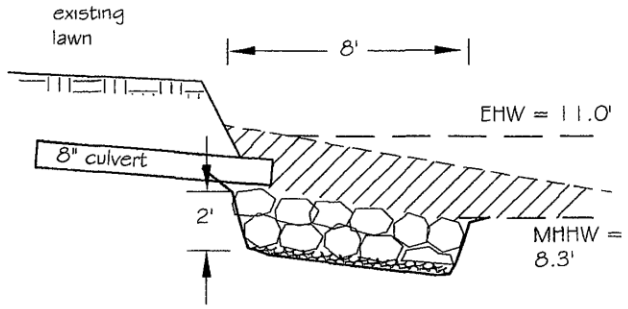
Place geotextile covered with 3" layer of gravel for a base for the rock armor. Geotextile is Permeatex 4100 or equivalent. Carefully place the rock (to avoid tearing the fabric) up to about 3" below the invert elev. Backfill around the rock with 3/4" - 3" gravel up to final beach elevation, except leave an approx. 18" wide x 12" deep channel at the outlets.

21" Outfall at Sta. 0+53



For 21" outfall, the apron dimensions are 6' wide x 10' long. Use riprap salvaged from the beach with average dimensions 8" to 12". (The final two damaged sections of the culvert are to be removed from the beach).

8" Outfall at Sta. 4+80



For 8" outfall, the apron dimensions are 3' wide x 8' long. Use salvaged riprap with average dimensions 6" to 10".

In: Fidalgo Bay Datum: MLLW = 0.0'
Near: Anacortes, Skagit Co., Wash. Lat. 48.4846°N,
Lon. 122.5922°W, SE 1/4 Sec. 30 T35N, R2E
Applicant: The Cove at Fidalgo Bay, LLC
Sheet: 9 of 11 Date: 6/1/06

Exhibit: Detail of Outfall Scour Aprons
Reference No.: 200601022
Proposed: Beach nourishment and LWD groins
Purpose: Stabilize eroding shoreline

Construction Plan and Temporary Sediment and Erosion Control Plan

1.0 General BMPs

1.1 All work shall be done during low tide periods between mid July and mid September in accordance with the WDFW HPA and US Army COE Section 404 permits.

1.2 The site engineer or geologist will flag all lines and grades prior to construction.

2.0 Construction Equipment and Access

2.1 All vehicle traffic is restricted to the construction area boundaries outlined in the drawing below. Dump trucks will be used to transport all construction materials to the site. Truck access will be from Fidalgo Bay Road, via a temporary access road across Lot E. Alternatively a haul road may be graded across Lot B during the Phase 2 condominium construction project. Trucks will back across the Tommy Thompson Trail and dump material over the bank at the location shown in the drawing, which is about the midpoint of the construction area. The trail will be closed to the public during trucking of materials. Steel plate will be placed across the trail to protect the pavement. The contractor will take special care to not damage the large maple tree located on the bank near the dump site.

2.2 A bulldozer and front end loader will be used to grade the gravel berms. A tracked excavator will be used to construct the LWD drift sills and to remove the riprap and concrete debris from the beach. These vehicles will access the beach via the concrete boat ramp at the Samish RV park located about 1,000 feet east of the site and will drive across the upper beach.

3.0 Water Quality Protection

3.1 All construction work and all vehicle operation on the beach will occur when the tide level is seaward of the toe of the gravel berm (i.e. below 4.0' MLLW). Because the gravel fill is intended to be exposed to the tide, no other sediment control measures are planned.

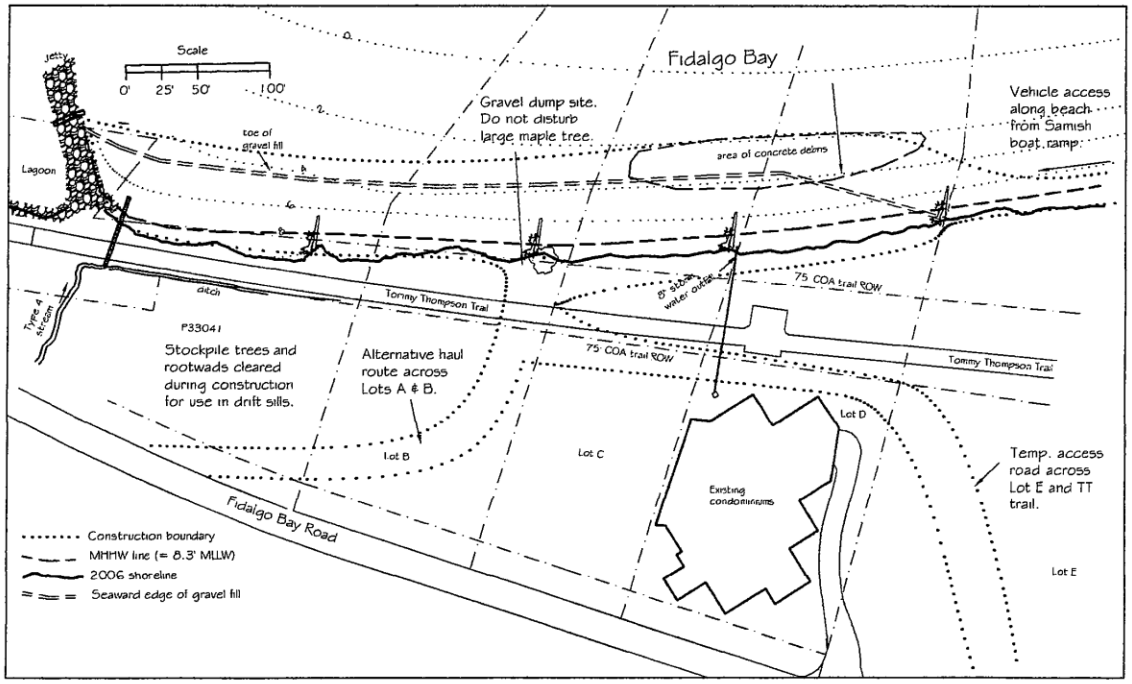


Exhibit: Construction and TESC Plan	In: Fidalgo Bay Datum: MLLW = 0.0'
Reference No.: 200601022	Near: Anacortes, Skagit Co., Wash. Lat. 48.4846°N,
Proposed: Beach nourishment and LWD groins	Lon. 122.5922°W, SE 1/4 Sec. 30 T35N, R2E
Purpose: Stabilize eroding shoreline	Applicant: The Cove at Fidalgo Bay, LLC
	Sheet: 10 of 11 Date: 6/1/06

Planting Plan

Objectives

Land adjacent to the shoreline stabilization work will be planted with native plants to promote four objectives: 1) stabilization of soil with the root mass, 2) provide shading of herring and surf smelt intertidal spawning habitat, 3) provide habitat functions for birds and other small animals, and 4) promote the aesthetic scenery along the Thompson Trail and condominium frontage.

Planting Zones

Three distinct zones will be planted:

Zone 1 is the forest verge between the north edge of the Tommy Thompson Trail pavement and the edge of the eroded bank. This area extends about 330 lineal feet from the edge of the riprap jetty to the Lot C eastern lot line, at the edge of the condominium lawn. The area of the zone is about 4,600 sf. Elevation of this zone is between 14 and 16 feet above MLLW.

Zone 2 is a twenty-foot wide buffer setback from the EHW line along about 230 linear feet of the condominium lawn from the west boundary of Lot C to the east boundary of Lot D. All of this area lies within Archeology Site No. 45SK43. The area of this zone is approximately 5,400 sf and ground elevations ranges from 11.5 to 13 feet above MLLW

Zone 3 is an approximately 8-foot wide strip of sand that will be placed at the upper edge of the beach gravel re-grade project, roughly between elevations 10.0 and 11.5 feet above MLLW. The area is about 4,400 sf.

Site Preparation and Planting

Invasive blackberry plants will be cut and dug out by hand at Zone 1 before planting. Zone 2 requires no site preparation before planting. Zone 3 will be constructed during the beach re-grading work and will use sandy soil that is suitable to support the planting design. Planting will be done by hand during late February or early March.

Plant Types and and Distribution

In Zone 1 bare root seedlings of native trees and shrubs will be interplanted among the existing immature alders and cedars that are already present. Planting will be done by hand at a coverage of about 500 stems per acre. All seedlings will be protected with plastic stem protectors.

Zone 2 will consist of bare root seedlings of native herbaceous plants and shrubs. Shrubs will be planted at a spacing of 36" o.c. Herbaceous species will be interplanated among the shrubs at the seaward half of the zone at a coverage of approximately 8,000 stems per acre. Planting will be done by hand with care taken to minimize impacts to the underlying shellfish midden.

Zone 3 will consist of native herbaceous plants that are adapted to the high tide range. Plants will be spaced 12" o.c. Planting will be done by hand and will include application of dry fertilizer.

Species Inventory (numbers are approximate)

Zone 1

Snowberry - 30 Big leaf maple - 10 Sitka spruce - 10 Madrona - 10 Salal - 100

Zone 2

Nootka Rose - 250 Snowberry - 250 Baltic rush (Juncus balticus) - 500

Zone 3

Lyngby's sedge (Carex lyngbyei) - 1,000 Seashore saltgrass (Distichlis spicata) - 1,000

Basket rush (Scirpus maritimus) - 1,000 Baltic rush (Juncus balticus) - 500

Monitoring and Maintenance

All plantings will be watered at least twice during the first summer. Plants will be inventoried each year for three years. Dead plants will be replaced to ensure 90 percent survival after three years. Blackberries and other invasives will be removed.

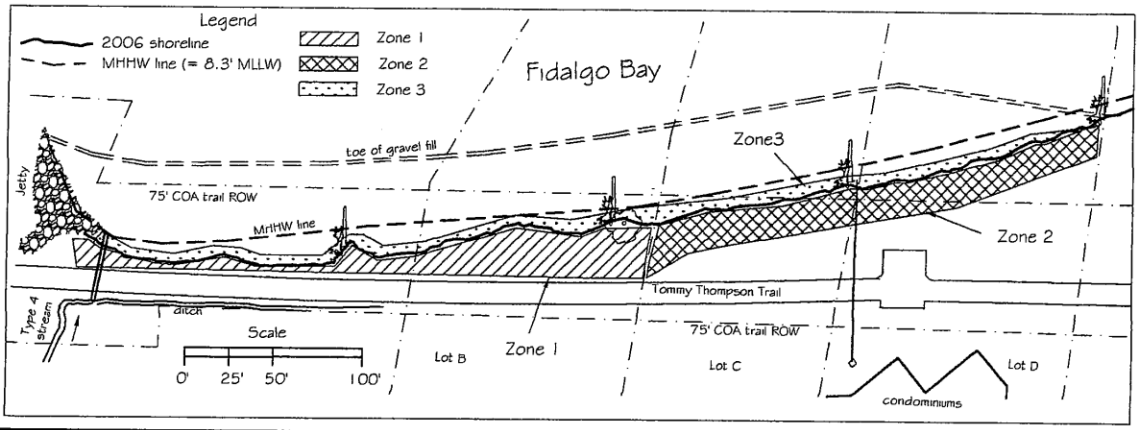


Exhibit: Planting Plan	In: Fidalgo Bay Datum: MLLW = 0.0'
Reference No.: 2006 01022	Near: Anacortes, Skagit Co., Wash. Lat. 48.4846°N,
Proposed: Beach nourishment and LWD groins	Lon. 122.5922°W, SE 1/4 Sec. 30 T35N, R2E
Purpose: Stabilize eroding shoreline	Applicant: The Cove at Fidalgo Bay, LLC
	Sheet: 11 of 11 Date: 6/1/06