

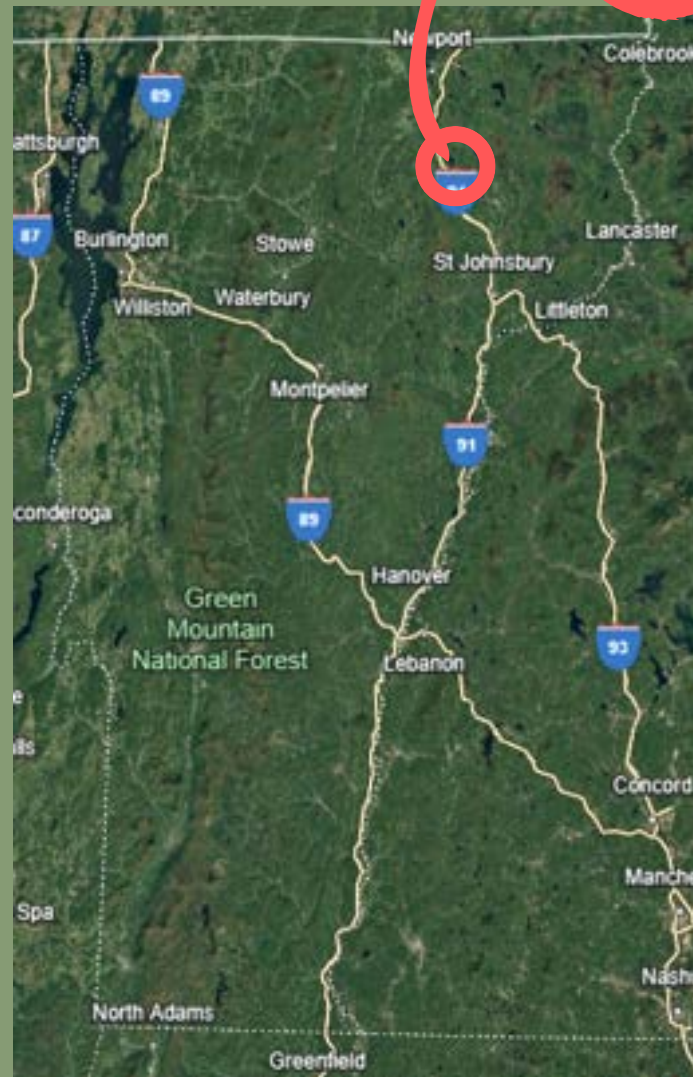
CRYSTAL LAKE SHORELINE RESTORATION

CASE STUDY

COMPILED BY: MEG CARTER

PROJECT PARTNERS: ORLEANS COUNTY NRCD, VT
DEPARTMENT OF ENVIRONMENTAL CONSERVATION, VT
DEPARTMENT OF FORESTS, PARKS, AND RECREATION, VT
HOUSING & CONSERVATION BOARD, & NORTHWOODS
STEWARDSHIP CENTER

WHERE ARE WE?





BEFORE



AFTER

PHOTO CREDIT: ETHAN SWIFT, VT DEC

POINTS TO REVIEW

LEAD UP & PARTNERS

DESIGN

IMPLEMENTATION

BUDGET

OUTCOMES



PHOTO CREDIT: ORLEANS COUNTY NRC

HOW DID WE GET HERE?



LAKewise
ASSESSMENT



PROJECT IDEA
& PLANNING



DESIGN &
PERMITTING



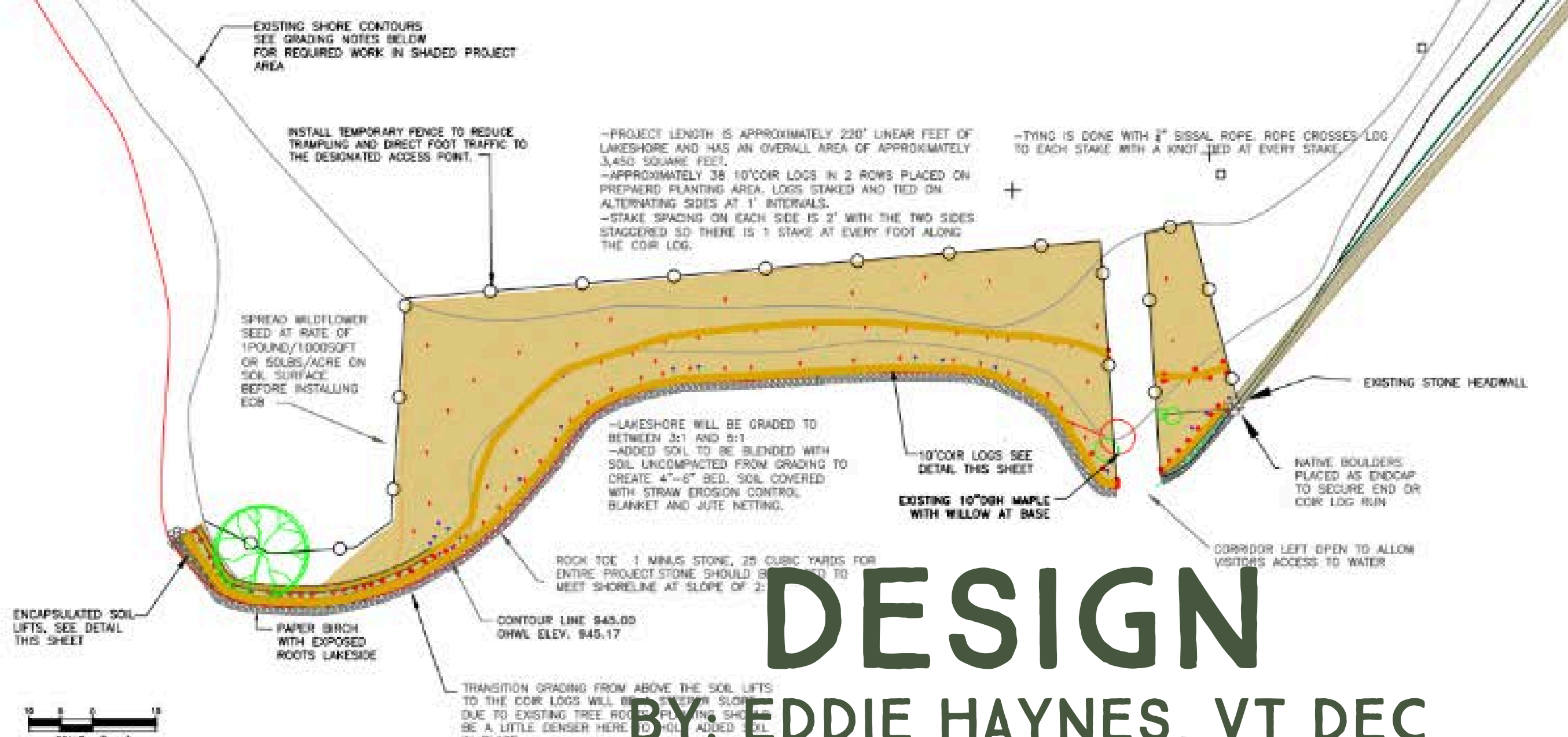
IMPLEMENTATION

PROJECT PARTNERS



PROJECT FUNDER



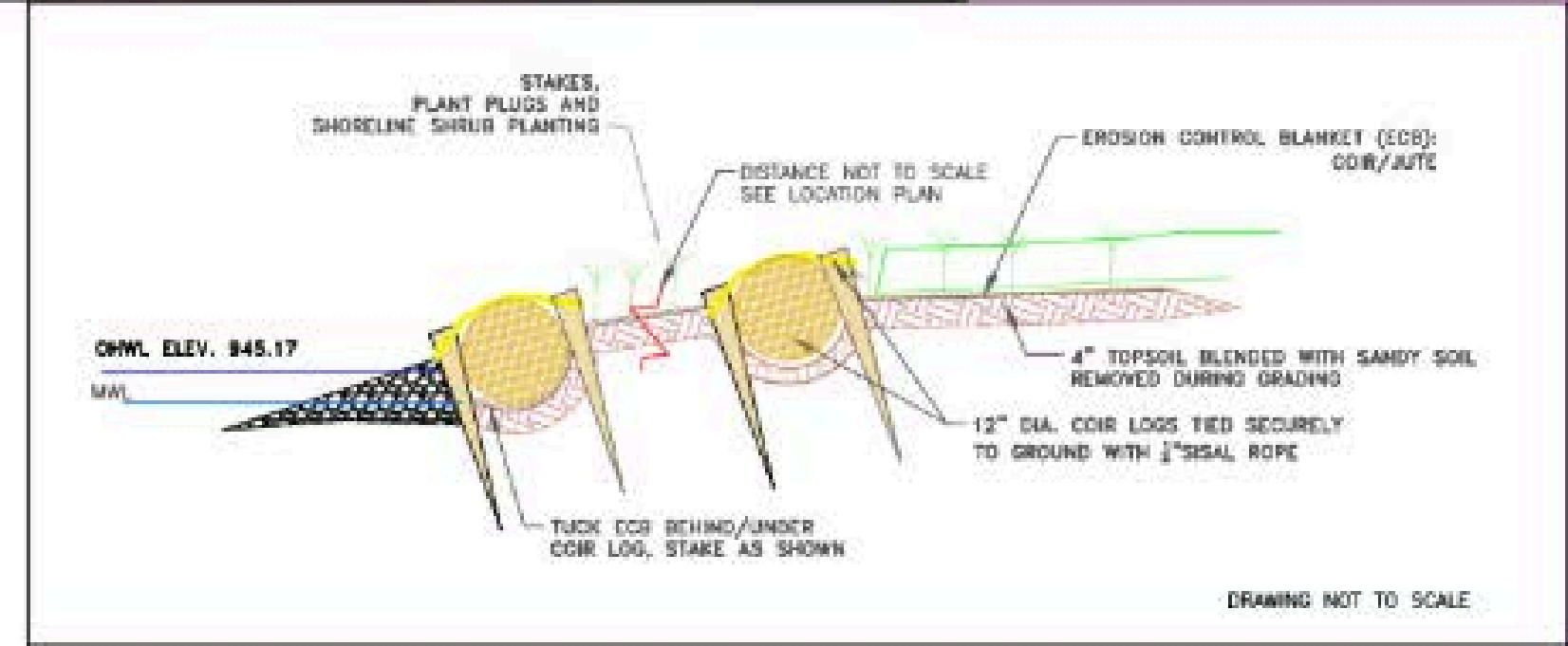
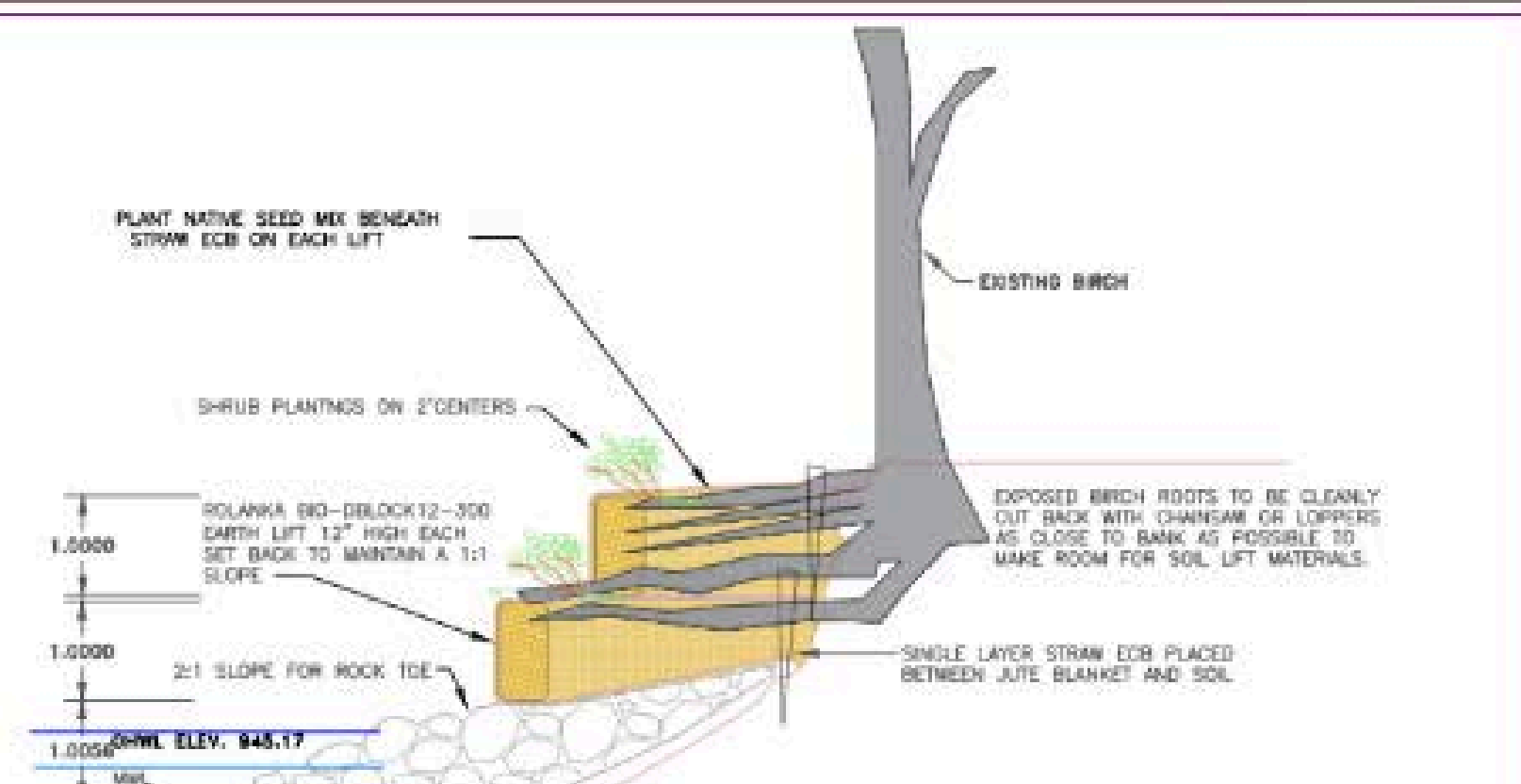


LEGEND

	ROCK TOE
	JUTE TEXTILE
	SOIL LIFT W/ BIO-BLOCK
	COIR LOG
	SALIX DISCOLOR, PUSSYWILLOW 1 GALLON
	CORNUS SERICEA, REDOSIER DOGWOOD 1 GALLON
	CORNUS SERICEA, REDOSIER DOGWOOD, TUBESTOCK
	SAMBUCUS CANADENSIS, AMERICAN ELDERBERRY
	PANICUM VIRGATUM, SWITCHGRASS PLUG
	TEMPORARY FENCING

DESIGN

BY: EDDIE HAYNES, VT DEC



ENCAPSULATED SOIL LIFTS

&

FIBER COIR ROLLS

ENCAPSULATED SOIL LIFTS

1

SOIL MANEUVERS

2

GEOTEXTILE & STONE TOE

3

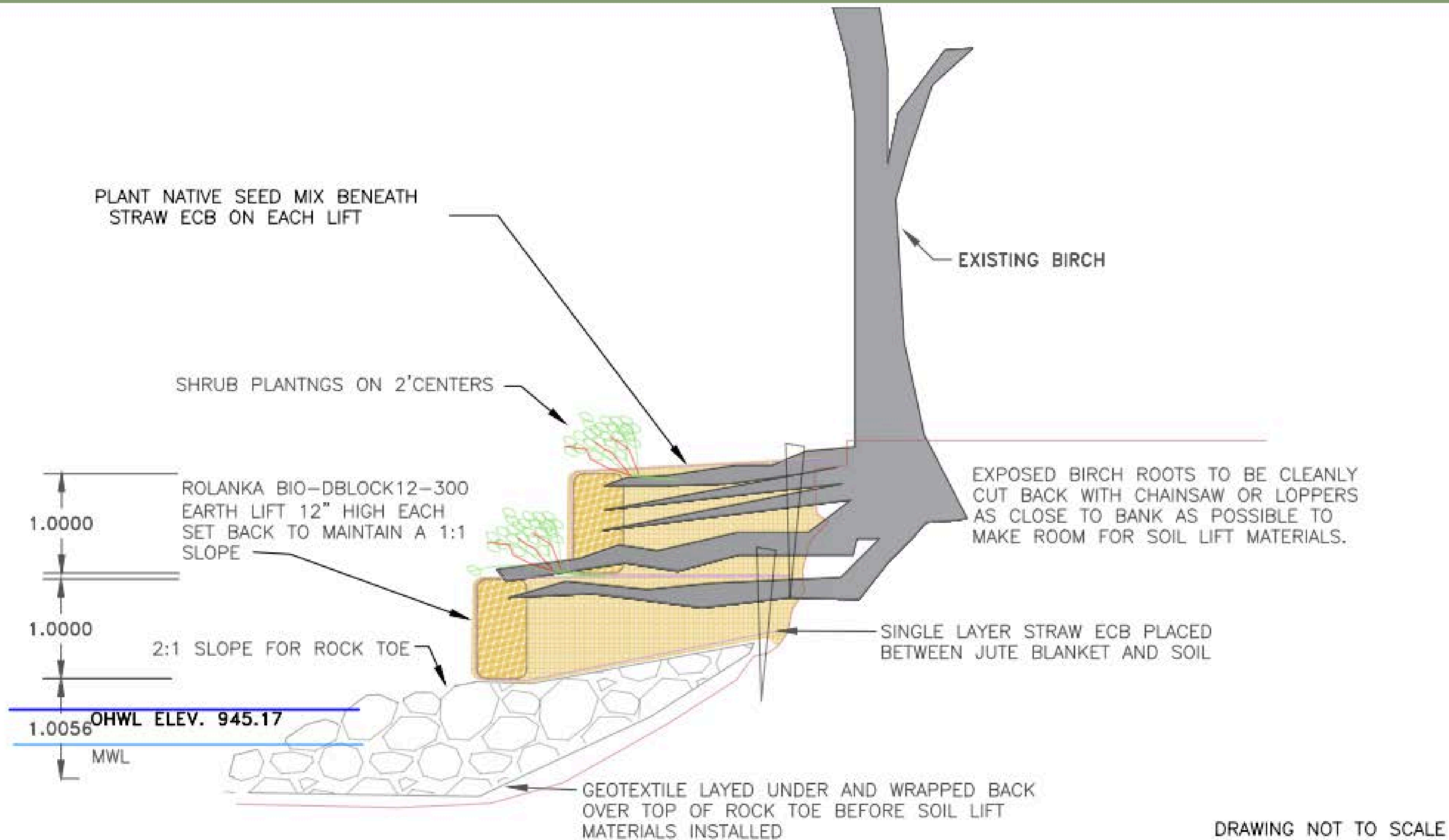
BLOCKS & BLANKETS & SOIL & TUCKING & FOLDING & STAKING

4

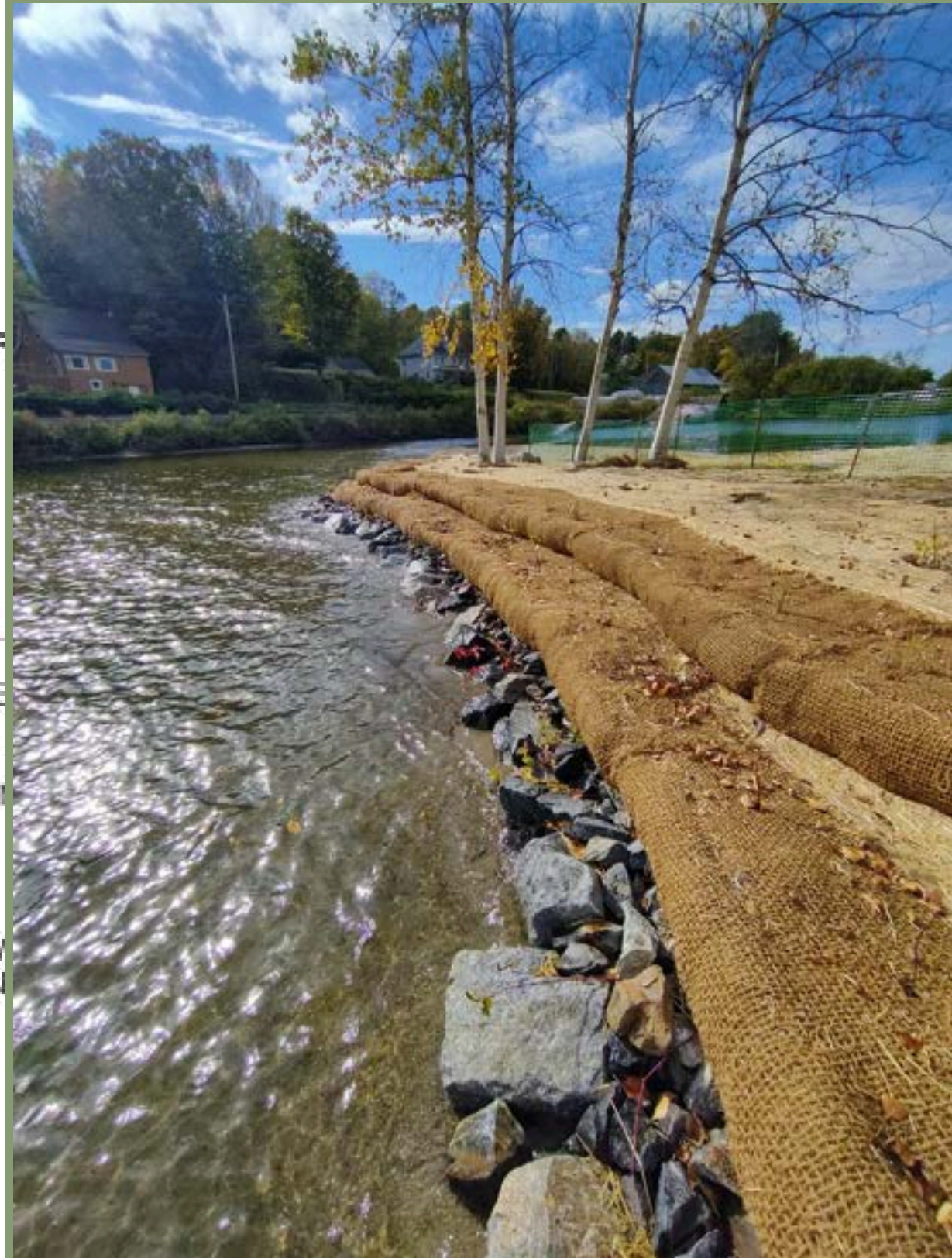
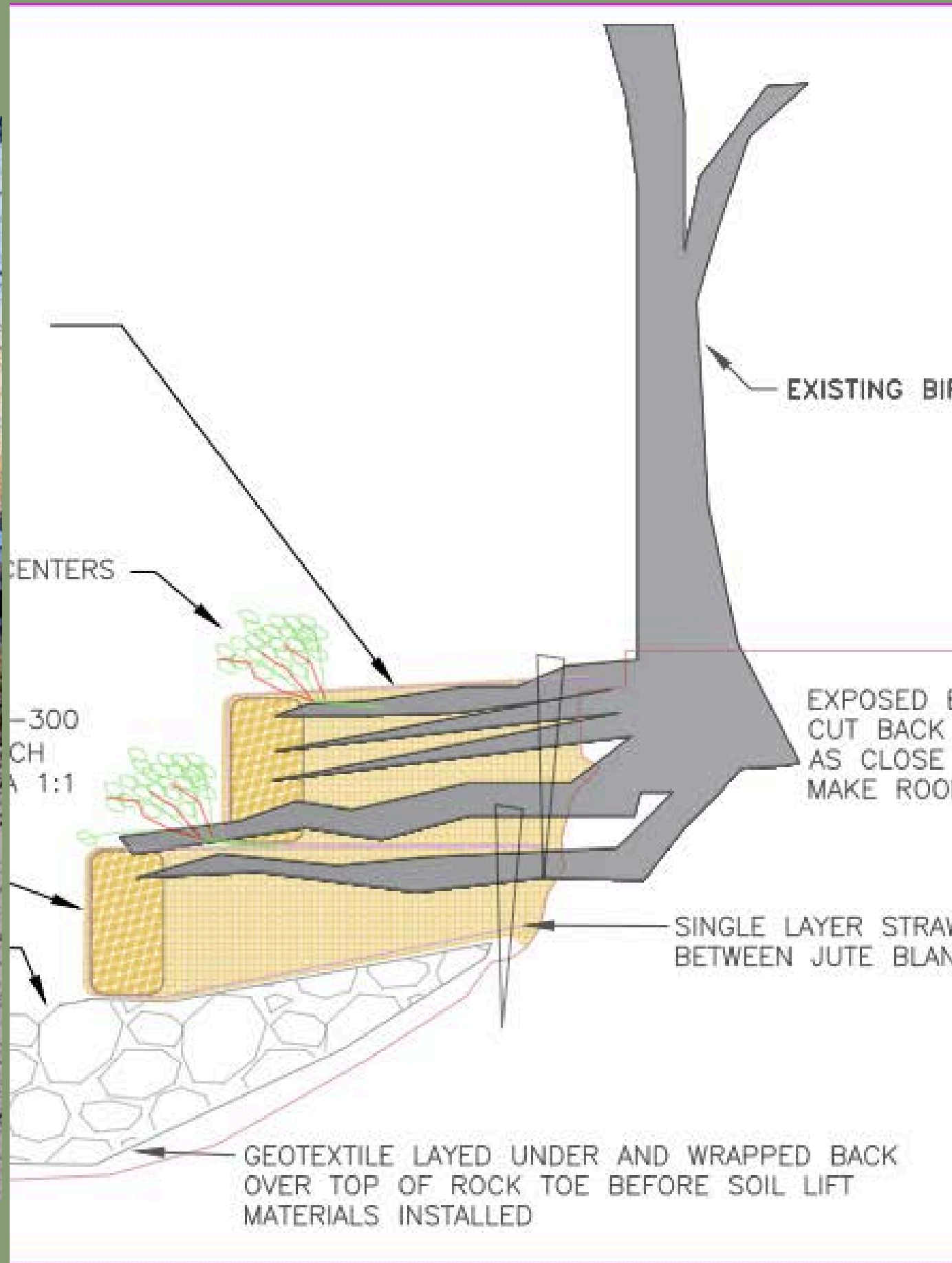
REPEAT

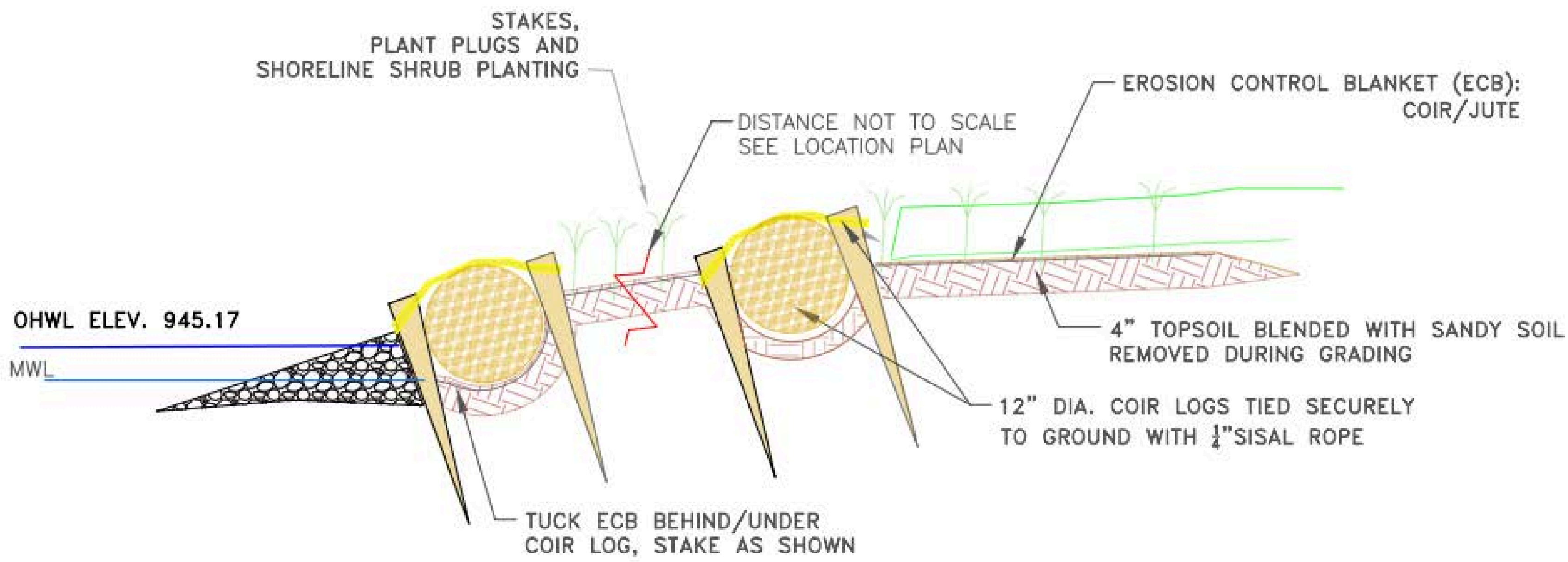
5

PLANTING & SEEDING & WATERING & FENCING



DRAWING NOT TO SCALE

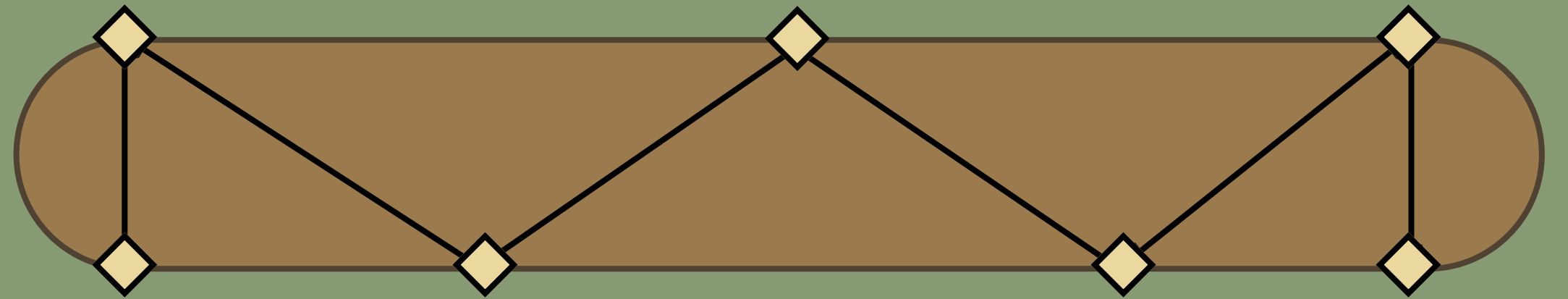




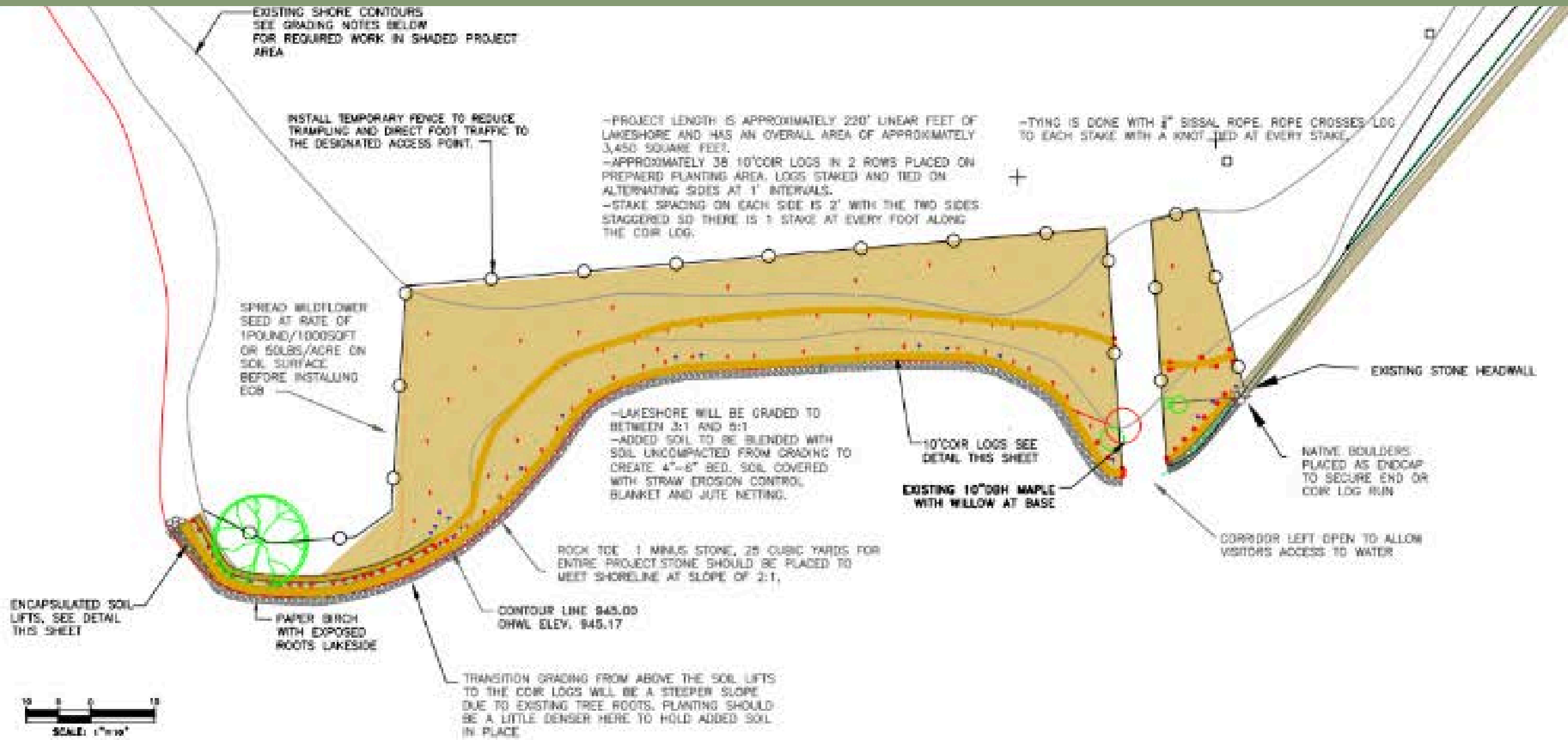
DRAWING NOT TO SCALE



COIR LOG

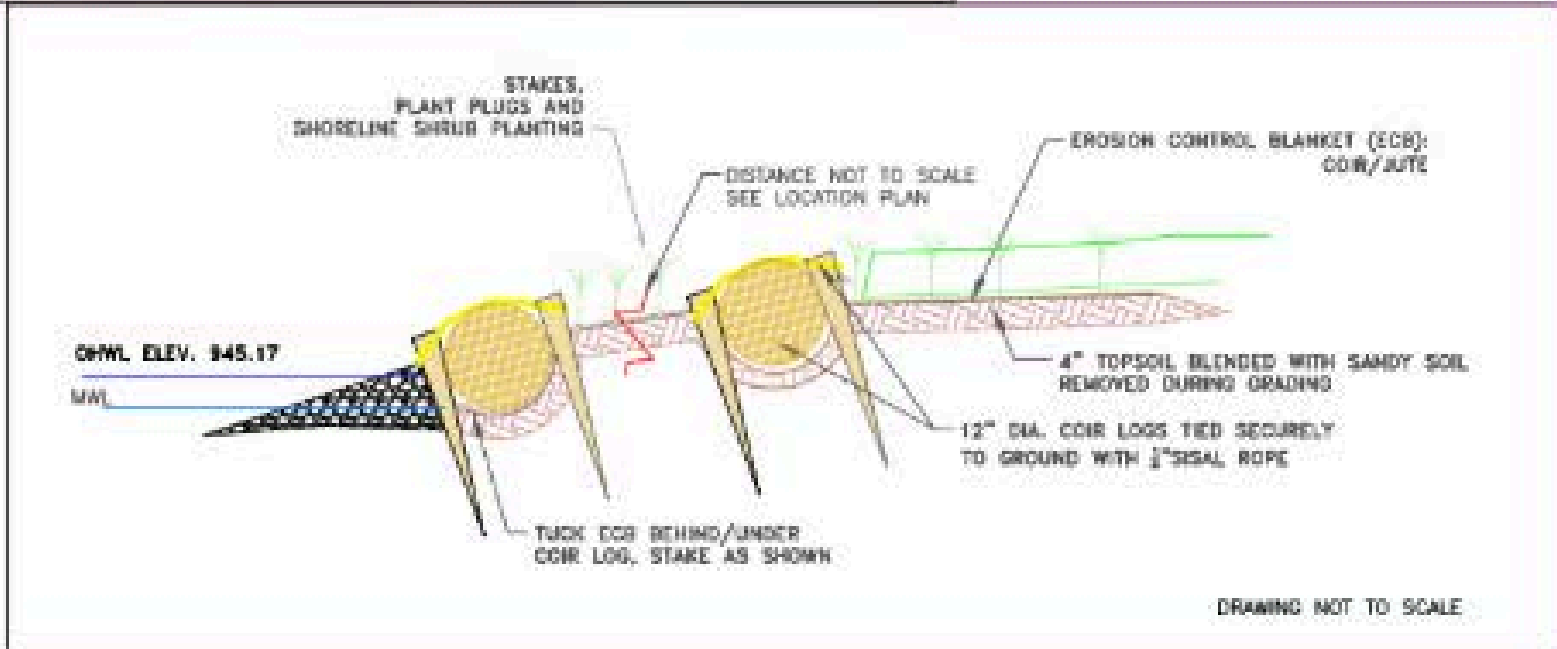
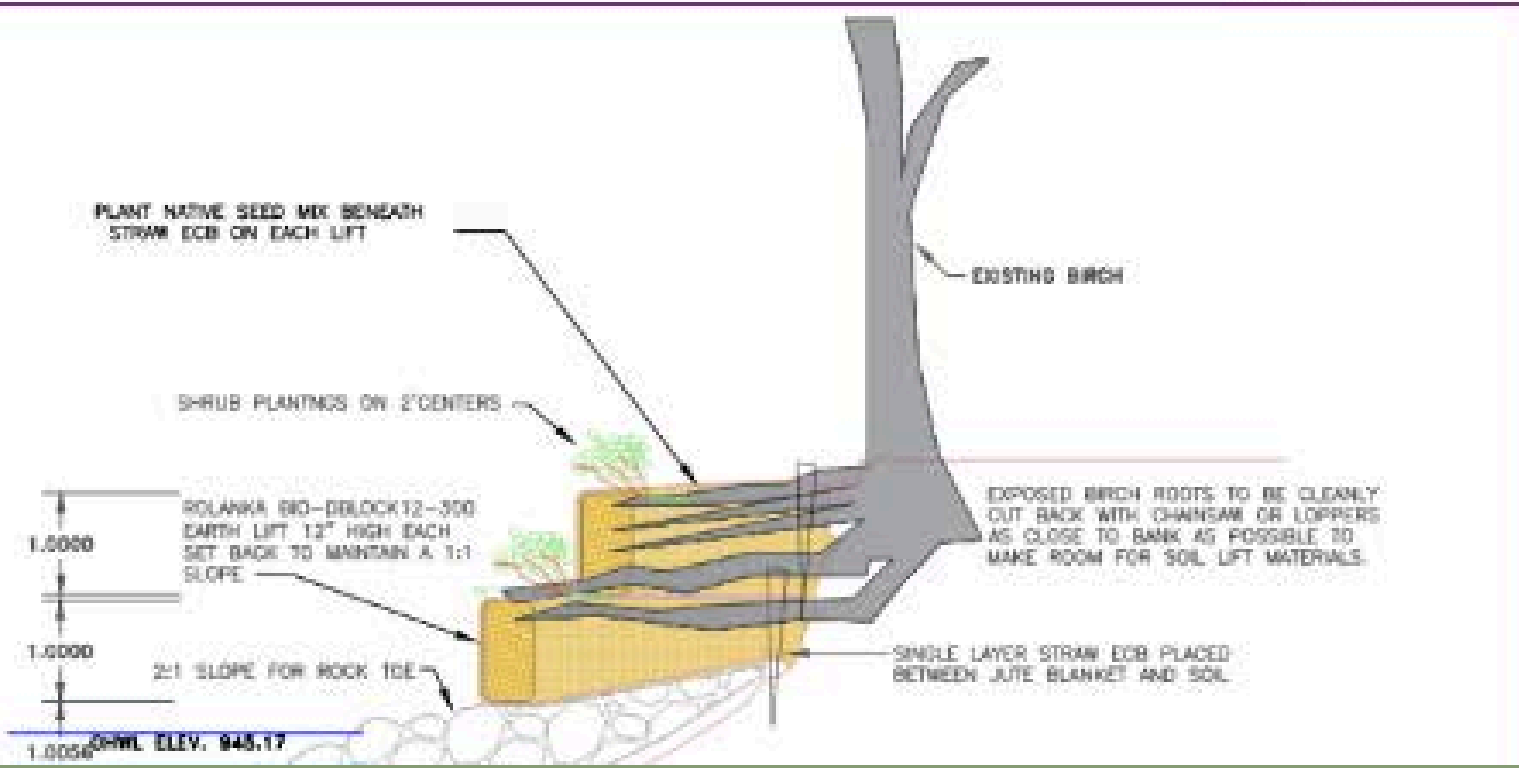






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	FANICUM VIRGATUM, SWITCHGRASS PLUG
	TEMPORARY FENCING



STATE OF VERMONT
 AGENCY OF NATURAL RESOURCES
 DEPARTMENT OF ENVIRONMENTAL CONSERVATION
 WATER INVESTMENT DIVISION - AGENCY FACILITIES
 BOSTON, VERMONT 05602-2510



BUDGET/COSTS



**OCNRCD
PROJECT
MANAGEMENT &
PERMITTING**



**NORTHWOODS
CREW COSTS
HAND TOOLS &
OVERSIGHT**



**VT STATE:
PARKS & WID
DESIGN &
EARTH WORK**



**MATERIALS &
EQUIPMENT**

Crystal State Park Lakeshore Restoration Estimated Budget Estimate						
	Cost Units	Cost per Unit	Units	Match	Memph CWSP	Total Project Costs
Material						
Coir log 12"x 10'	\$73/log	\$ 73.00	59		\$ 4,307.00	\$ 4,307.00
2"x 2" x 3' 12 per log	\$1.15/per	\$ 1.15	528		\$ 607.20	\$ 607.20
Straw ECB? YES	\$67/roll	\$ 67.00	6		\$ 402.00	\$ 402.00
BioD-Block	\$162.5/per	\$ 162.50	20		\$ 3,250.00	\$ 3,250.00
Jute Roll 4'x 225'	\$90 per roll	\$ 90.00	6		\$ 540.00	\$ 540.00
6" sod staples 1,000/box	\$43.50	\$ 43.50	1		\$ 43.50	\$ 43.50
1' minus TYPE 1 rock for rock toe	\$14/ton	\$ 14.00	30		\$ 420.00	\$ 420.00
1/4" sisal rope ≈ 30'/10' log	\$11/roll	\$ 11.00	8		\$ 88.00	\$ 88.00
Top Soil (delivery not included)	\$23/ton*	\$ 23.00	42		\$ 966.00	\$ 966.00
Assumed Soil Delivery					\$ 690.00	\$ 690.00
Pussy willow, <i>S. discolor</i> 1 gallon	\$18 each	\$ 18.00	20		\$ 360.00	\$ 360.00
Redosier dogwood, <i>C. sericea</i> 1 gallon	\$12 each	\$ 12.00	35		\$ 420.00	\$ 420.00
Redosier dogwood, <i>C. seicea</i> tubestock	\$3 each	\$ 3.00	81		\$ 243.00	\$ 243.00
Switchgrass <i>P. virgatum</i> , 2" plugs	\$0.90 each	\$ 0.90	120		\$ 108.00	\$ 108.00
Northeast Native Wildflower Seed from Vermont wildflower farm	\$285/3 lbs	\$ 285.00	1		\$ 285.00	\$ 285.00
Communty engagement sign	\$130/sign	\$ 130.00	1		\$ 130.00	\$ 130.00
Labor						
VT State Parks - Agency Facilities Design Cost				\$ 5,000.00		\$ 5,000.00
1 week of Labor Provided by Northwoods stewardship center					\$ 7,900.00	\$ 7,900.00
Project oversight - David Webb	\$130/hr	\$ 130.00	12	\$ 1,560.00		\$ 1,560.00
Project oversight - Edward Haynes	\$60/hr	\$ 60.00	20	\$ 1,200.00		\$ 1,200.00
OCNRCD Project Management and volunteer planting corridination and engagements	\$65/hr	\$ 65.00	30		\$ 1,950.00	\$ 1,950.00
OCNRCD Community Engagment sign design	\$65/hr	\$ 65.00	8		\$ 520.00	\$ 520.00
Equipment						
FPR to Provide Mini Excavator	\$1200/day	\$ 1,200.00	1	\$ 1,200.00		\$ 1,200.00
Floating silt fence/turbidity curtain				\$ 500.00		\$ 500.00
Permit Costs						
Permitting Budget- Encroachment					\$ 155.00	\$ 155.00
Permitting Budget SPA					\$ 125.00	\$ 125.00
				\$9,460.00	\$ 23,229.70	\$ 32,969.70

Partner	Category	Item	Units	Cost per Unit	Amount	Item Cost (Grant)	Item Match	Total Project Cost
NorthWoods	Staff Time	Director Supervision/Presentation	hours	\$58.00	6	\$350.00		\$350.00
NorthWoods	Staff Time	Cons Services Crew	days	\$1,580.00	5	\$7,900.00		\$7,900.00
NorthWoods	Materials	Shrubs (bare root, tube stock, ball & burlap)	per plant	\$6.79	173	\$1,174.50		\$1,174.50
NorthWoods	Materials	1/4" sisal rope	per roll	\$89.99	2	\$179.98		\$179.98
NorthWoods	Materials	coir logs	per log	\$81.25	20	\$1,625.00		\$1,625.00
NorthWoods	Materials	erosion control blanket	per roll	\$60.00	6	\$360.00		\$360.00
NorthWoods	Materials	hardwood notched stakes	per stake	\$1.35	300	\$405.00		\$405.00
NorthWoods	Materials	northeast native wildflower seed mix	per lb	\$80.55	3	\$241.64		\$241.64
NorthWoods	Materials	bio-d blocks	per log	\$162.50	12	\$1,950.00		\$1,950.00
NorthWoods	Materials	native grass plugs	per plug	\$1.21	120	\$145.00		\$145.00
NorthWoods	Materials	sod staples	per 1000 box	\$43.50	1	\$43.50		\$43.50
NorthWoods	Equipment Rental	Turbidity Curtain					\$0.00	\$0.00
VT Parks	Staff Time	2 staff, full project					\$4,374.70	\$4,374.70
VT Parks	Materials	Includes all stone and topsoil					\$5,697.03	\$5,697.03
VT Parks	Equipment Rental	Mini Excavator						
VT Water Investment Div	Staff Time	Design & Field Oversight & Permit Applications					\$7,760.00	\$7,760.00
OCNRCD	Staff Time	Project Management				\$2,470.00		\$2,470.00
OCNRCD	Materials	Educational Sign				\$130.00		\$130.00
OCNRCD	Permitting	Permit Fees				\$280.00		\$280.00
						\$17,254.62	\$17,831.73	\$35,086.35

Partner	Category	Budget	Actual	Difference
NorthWoods	Staff Time	\$7,900.00	\$8,250.00	-\$350.00
NorthWoods	Materials	\$10,653.70	\$6,124.62	\$4,529.08
NorthWoods	Equipment Rental	\$500.00	\$0.00	\$500.00
VT Parks	Staff Time		\$4,374.70	-\$4,374.70
VT Parks	Materials	\$2,076.00	\$5,697.03	-\$2,421.03
VT Parks	Equipment Rental	\$1,200.00		
<i>VT Water Investment Div</i>	<i>Staff Time</i>	<i>\$7,760.00</i>	<i>\$7,760.00</i>	<i>\$0.00</i>
<i>OCNRCD</i>	<i>Staff Time</i>	<i>\$2,470.00</i>	<i>\$2,470.00</i>	<i>\$0.00</i>
<i>OCNRCD</i>	<i>Materials</i>	<i>\$130.00</i>	<i>\$130.00</i>	<i>\$0.00</i>
<i>OCNRCD</i>	<i>Permitting</i>	<i>\$280.00</i>	<i>\$280.00</i>	<i>\$0.00</i>
		\$32,969.70	\$35,086.35	-\$2,116.65

LESSONS LEARNED



TIMING & PROJECT FLOW

TUESDAY MORNING EDUCATIONAL WORKSHOP
TURBIDITY CURTAIN INSTALL & REMOVAL
STARTING EXCAVATION BEFORE HAND TOOL CREW
USING GAS-POWERED POST POUNDERS

MATERIALS

ORDER EXTRA (BUT NOT THAT MUCH EXTRA)
DON'T PANIC ABOUT YOUR PILE OF ROCK
BE FLEXIBLE WITH PLANTS, REVIEW GUIDANCE

BUDGETING IN EXTRA

CREATING CONSERVATIVE ESTIMATES 1 YR OUT
CONTINGENCY FUND

RUMORS OF DREDGING

THANK YOU!

