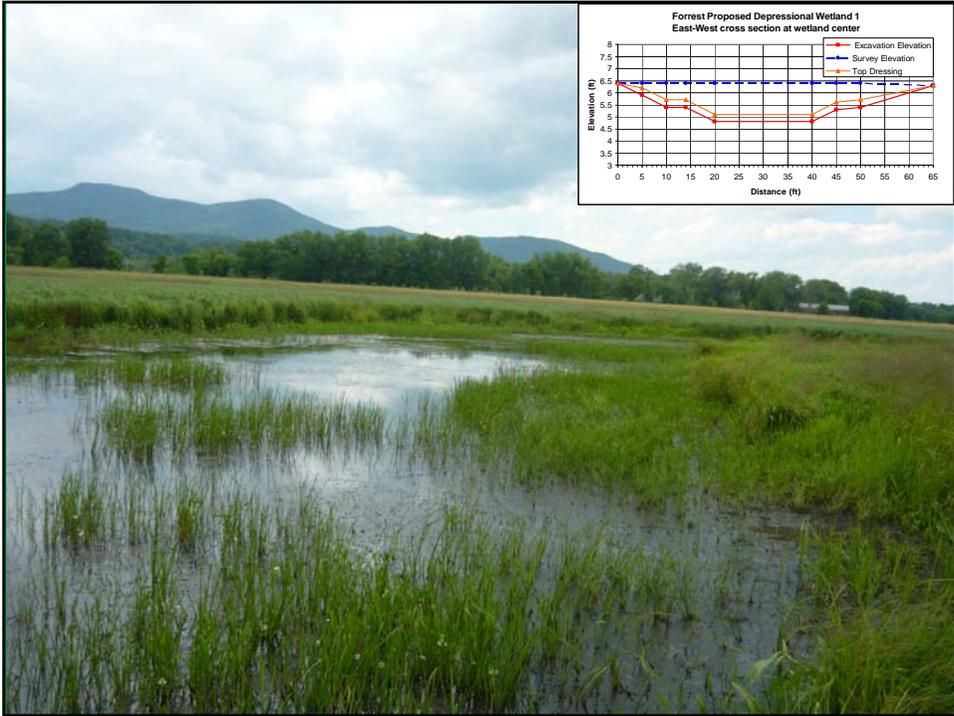




Calculating Volumes



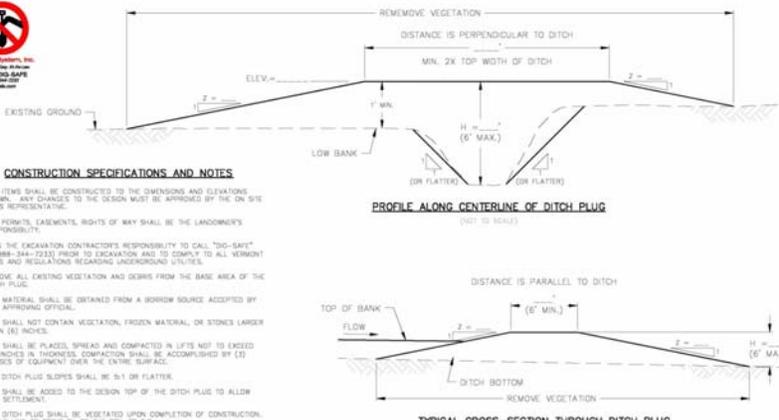
Ditch Plugs



CONSTRUCTION SPECIFICATIONS AND NOTES

1. ALL ITEMS SHALL BE CONSTRUCTED TO THE DIMENSIONS AND ELEVATIONS SHOWN. ANY CHANGES TO THE DESIGN MUST BE APPROVED BY THE ON SITE NRC REPRESENTATIVE.
2. ALL POINTS, EASEMENTS, RIGHTS OF WAY SHALL BE THE LANDOWNER'S RESPONSIBILITY.
3. IT IS THE EXCAVATION CONTRACTOR'S RESPONSIBILITY TO CALL "DIG-SAFE" (1-888-844-7333) PRIOR TO EXCAVATION AND TO COMPLY TO ALL NEWMONT LAWS AND REGULATIONS REGARDING UNDERGROUND UTILITIES.
4. REMOVE ALL EXISTING VEGETATION AND DEBRIS FROM THE BASE AREA OF THE DITCH PLUG.
5. FILL MATERIAL SHALL BE OBTAINED FROM A BORROW SOURCE ACCEPTED BY THE APPROVING OFFICIAL.
6. FILL SHALL NOT CONTAIN VEGETATION, FROZEN MATERIAL, OR STONES LARGER THAN (8) INCHES.
7. FILL SHALL BE PLACED, SPREAD AND COMPACTED IN LIFTS NOT TO EXCEED (6) INCHES IN THICKNESS. COMPACTION SHALL BE ACCOMPLISHED BY (3) PASSES OF EQUIPMENT OVER THE ENTIRE SURFACE.
8. ALL DITCH PLUG SLOPES SHALL BE 5:1 OR FLATTER.
9. TOP SHALL BE ADDED TO THE DESIGN TOP OF THE DITCH PLUG TO ALLOW FOR SETTLEMENT.
10. THE DITCH PLUG SHALL BE VEGETATED UPON COMPLETION OF CONSTRUCTION. APPLY LIME TO BRING PH OF THE SOIL TO 6.5.
- UNLESS OTHERWISE SPECIFIED, APPLY FERTILIZER AT THE FOLLOWING RATES:
 NITROGEN 30 LBS./AC. _____ LBS. TOTAL
 PHOSPHORUS 80 LBS./AC. _____ LBS. TOTAL
 POTASSIUM 80 LBS./AC. _____ LBS. TOTAL
- UNLESS OTHERWISE SPECIFIED, APPLY SEED AT THE FOLLOWING RATES:
 CRISPING RED PEGGLE (DNRPLVA) 20 LBS./AC. _____ LBS. TOTAL
 RED TOP (COMMON) 3 LBS./AC. _____ LBS. TOTAL
 BIRDFOOT TROFOL (BMPNFC) 8 LBS./AC. _____ LBS. TOTAL
11. MULCH SHALL BE SMALL DRAIN STRAW OR HAY AND APPLIED AT A RATE OF (2) TONS/AC.

ADAPTED FROM NEW YORK STATE DECISION 81-00004-0210, (December 2000) AND 800-23507



PROFILE ALONG CENTERLINE OF DITCH PLUG
(NOT TO SCALE)

TYPICAL CROSS-SECTION THROUGH DITCH PLUG
(NOT TO SCALE)

NRC

NATIONAL RESTORATION CENTER
1100 W. BROADWAY, SUITE 100
ANN ARBOR, MI 48106-1500

NAME: _____
JOB NO.: _____
DATE: _____

**METLAND RESTORATION
DITCH PLUG DETAILS**

BILL OF MATERIALS

ITEM #	ITEM	QUANTITY	UNIT	CONSTRUCTION SPECIFICATIONS
1.	EXCAVATION		C.Y.	5, 11
2.	FILL		C.Y.	5, 11
3.	SEEDING & MULCHING		ACRE	32

B.M. ELEV. _____
B.M. DISC. _____

Ditch Plug Site Preparation



Wetland Assessment, Restoration and Management

U.S. Fish and Wildlife Service, National Conservation Training Center

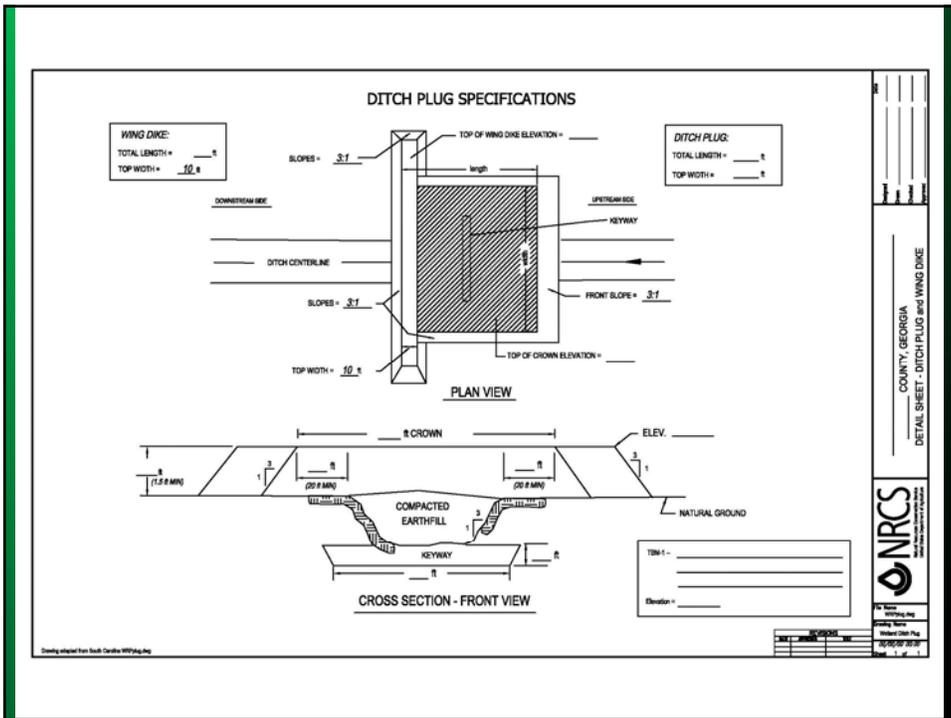
300 - 5

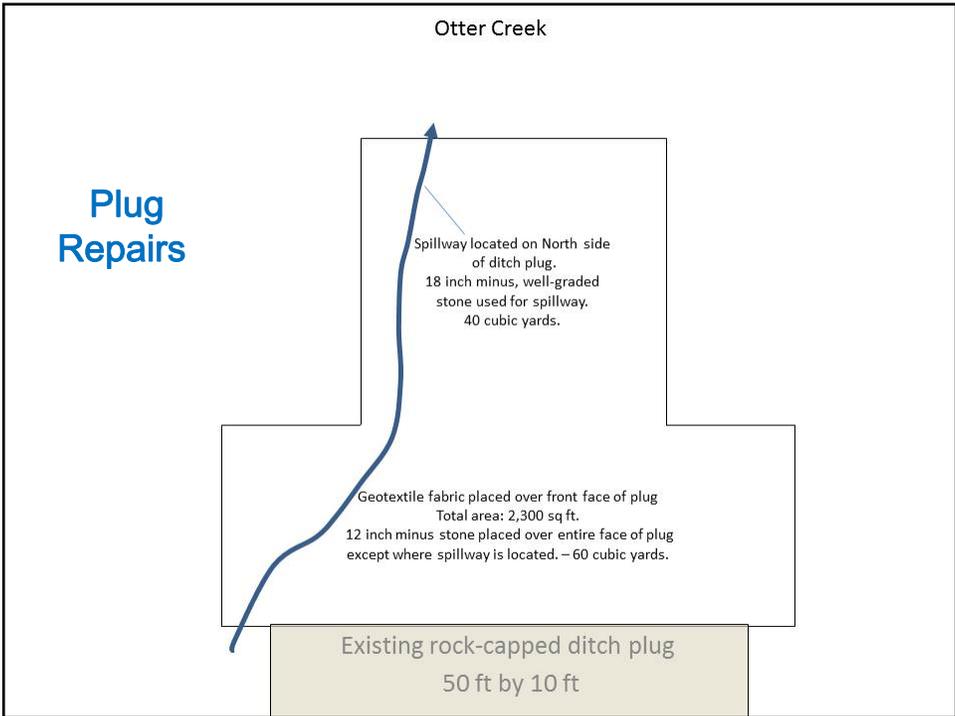
Table 1 - Minimum Design Criteria for Dikes

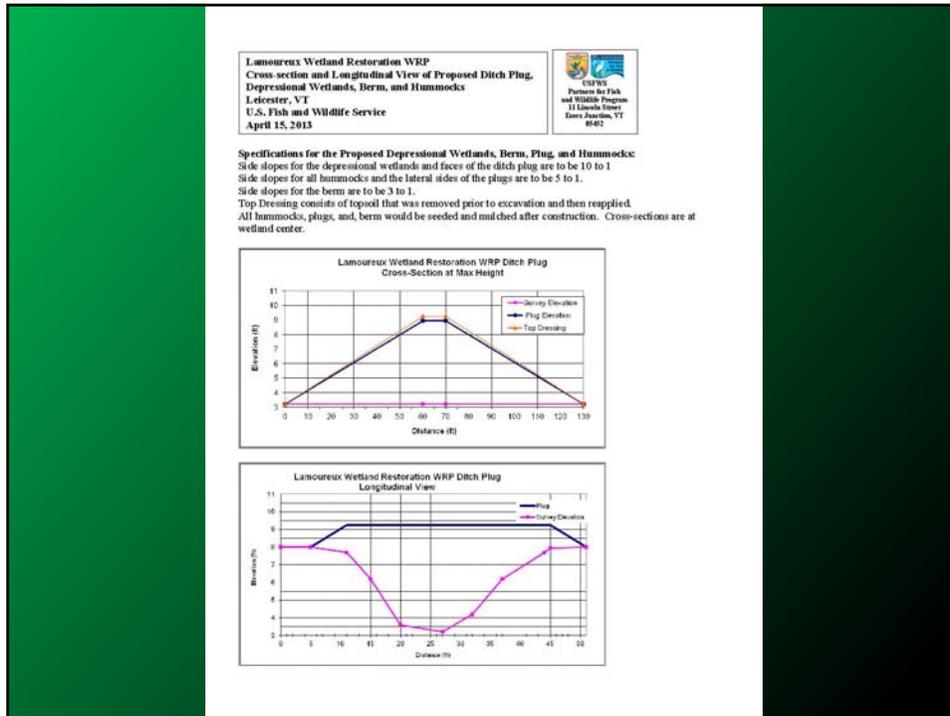
Classification	Material ^{2f}	Height (H) in Feet ^{2c}	Minimum Storm Design Frequency in Years	Minimum Freeboard in Feet	Minimum Top Width in Feet	Minimum Side Slope Ratio ^{2d} (H:V)	Berm Width in Feet
Class I	Earth	0 to 6	100	H/3	10	2:1	12
		>6 to 12	100	2	10	Note ^{2e}	Note ^{2e}
		>12 to 25	100	3	12	Note ^{2e}	Note ^{2e}
		>25	100	3	14	Note ^{2e}	Note ^{2e}
	Manufactured	0 to 8	100	H/4	N/A	N/A	Note ^{2e}
		>8 to 12	100	2	N/A	N/A	Note ^{2e}
Class II	Earth	0 to 6	25	H/3	6	2:1	12
		>6 to 12	25	2	8	2:1	15
		>12	100	3	N/A	N/A	Note ^{2e}
	Manufactured	0 to 8	25	H/4	N/A	N/A	Note ^{2e}
		>8 to 12	25	2	N/A	N/A	Note ^{2e}
		>12	100	3	N/A	N/A	Note ^{2e}
Class III	Mineral Soils	0 to 3	10	H/3	4	2:1	8
		>3 to 6	10	1	6	2:1	8
		>6 to 12	25	2	8	2:1	8
	Organic Soils ^{2f}	0 to 2	10	H/2	4	2:1	10
		>2 to 4	10	1	6	2:1	10
		>4 to 6	10	2	8	2:1	15

^{1f} Earth includes rock. Manufactured materials are erosion resistant materials such as concrete, PVC and steel that provides the structural strength for the dike.
^{2c} Height is the difference between normal ground elevation at the dike centerline and the design high water elevation. When determining normal ground elevation, exclude crossings of channels, sloughs, small low areas, small ridges, swales, or gullies.
^{2d} Minimum side slope ratios are for compacted earth fill. Dumped earth fill without compaction will be flatter.
^{2e} Side slope ratios and berm widths shall be determined by a stability analysis.
^{2f} Organic soils are permitted only for Class III dikes 6 feet or less in height. Higher dike heights result in excessive settlement and decomposition.

NRCS, NHCP
November 2002



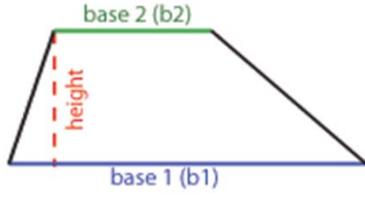




Calculating the area of berm

Area of a trapezoid
 A trapezoid has one pair of parallel sides.

$$A = \frac{(b1 + b2) \times h}{2}$$



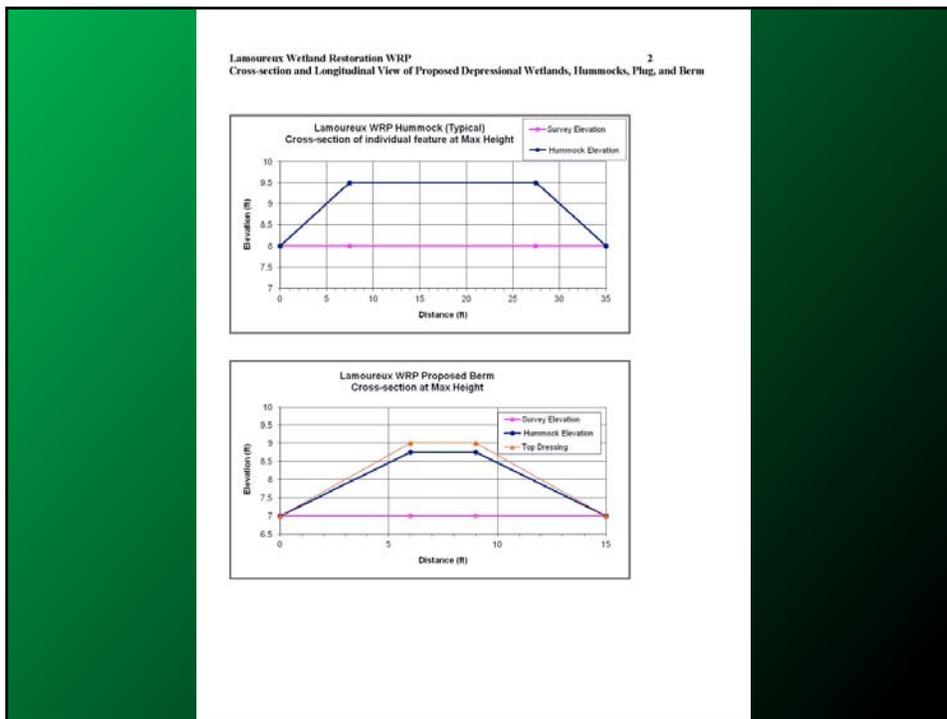
Where **A** is area, **b1** is base 1, **b2** is base 2 and **h** is height

Example: if **b1=7**; **b2=5**; **h=3** then **A=?**

$$A = \frac{(b1 + b2) \times h}{2} = \frac{(7 + 5) \times 3}{2} = \frac{12 \times 3}{2} = \frac{36}{2} = 18 \text{ square units}$$

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Wetland Assessment, Restoration and Management U.S. Fish and Wildlife Service, National Conservation Training Center



Fill Charts - Levee

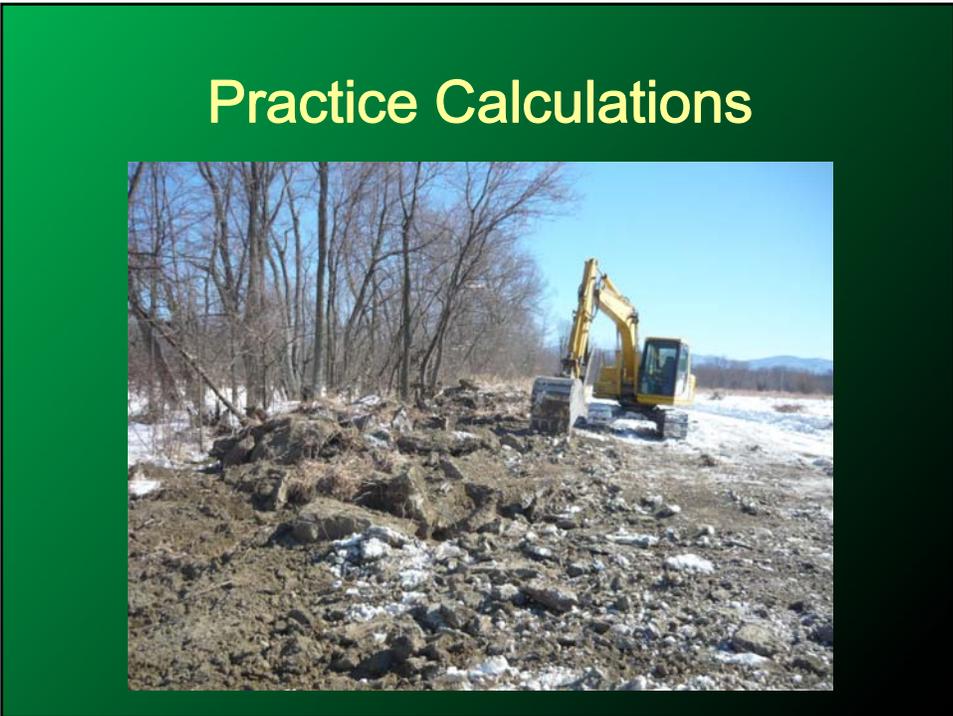
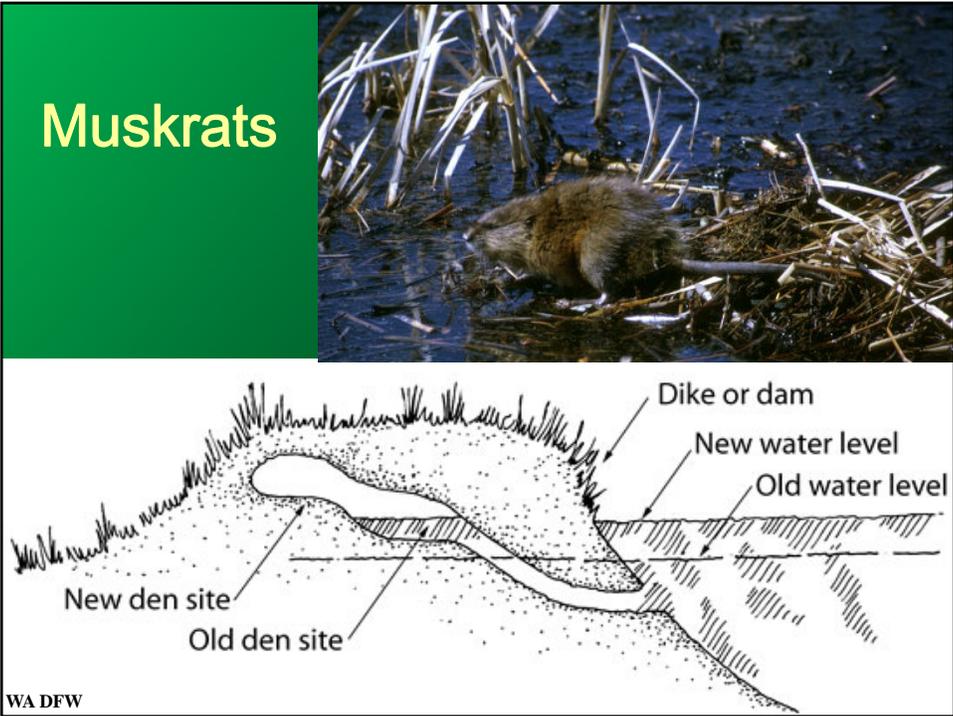
Colusa Indian Community											
Fill Yards											
South Unit											
Levee	Distance (ft)	Levee El. Planned	Levee El. Current	Difference	Levee Width Planned (ft)	Levee Width Planned (5:1)	Levee Slopes Planned (5:1)	Total Dirtwork (ft ²)	cy/ft	Cy	Total Yds w/ 50% comp
SW Levee	1400	10.2	8.70	1.5	14.0	21.0	5.6	26.6	0.986	1381	2070.83
SE Levee	340	10.2	9.56	0.6	14.0	9.0	1.0	10.0	0.370	126	188.59
N Levee	120	10.2	9.67	0.5	14.0	7.4	0.7	8.1	0.301	36	54.15
										2313.57	
Leveling											
Southwest Unit											
		Ground Surface									
	Acres	Planned	Current	Difference							
Fill	8.34	8.3	7.32	0.98	13186						
	8.34										13186
	Size (ac)	Height (ft)									
Penninsulas	0.2	1.0	242								
Islands	0.15	1.0	242								
					484.0						
Total Fill=					15984						

Colusa Indian Community Cut Yards										
Swales <i>avg 1.0' cut</i>										
Swale	Distance	Ground Surface			Area		Total (ft ² /ft)	CY Total		
		Planned	Current	Difference	Slope (6:1)	Swale				
0	416	1.9	2.9	1.00	6.0	14.0	20.0	308.1		
1	302	2.3	3.3	1.00	6.0	14.0	20.0	223.7		
2	500	2.3	3.3	1.00	6.0	14.0	20.0	370.4		
3	231	2.3	3.3	1.00	6.0	14.0	20.0	171.1		
4	334	2.3	3.3	1.00	6.0	14.0	20.0	247.4		
5	260	2.3	3.3	1.00	6.0	14.0	20.0	192.6		
6	364	2.3	3.3	1.00	6.0	14.0	20.0	269.6		
	2407									
							Swale Total	1783		
Potholes <i>avg 3/4' cut</i>										
	Acres	Ground Surface			Area		Total (ft ²)	CY Total		
		Planned	Current	Difference	(ft)					
4 total	1.00	0.75	0.00	0.75				1210.0		
							Pothole Total	1210		
Road Removal										
<i>N/S Road</i>										
Levee	Distance	Levee El.			Levee Width		Levee Slopes		Total Dirtwork	
	(ft)	Planned	Current	Difference	(ft)	Levee	(2:1)	(ft ²)	cy/ft	Cy
	1020	8.3	10.27	2.0	12.0	23.6	7.8	31.4	1.163	1186
<i>E/W road</i>										
Levee	Distance	Levee El.			Levee Width		Levee Slopes		Total Dirtwork	
	(ft)	Planned	Current	Difference	(ft)	Levee	(2:1)	(ft ²)	cy/ft	Cy
	527	8.3	10.37	2.1	12.0	24.8	8.6	33.4	1.237	652
Leveling										
<i>North Unit</i>										
	Acres	Ground Surface			Area		Total (ft ²)	CY Total		
		Planned	Current	Difference	(ft)					
Cut	7.35	8.3	8.95	0.65				7707.7		
							Total	7708		
<i>Southwest Unit</i>										
	Acres	Ground Surface			Area		Total (ft ²)	CY Total		
		Planned	Current	Difference	(ft)					
Cut	6.00	8.3	8.69	0.39				3775.2		
							Total	3775		
				Total Cut =	16314					

Cut Charts

Balancing your material budget



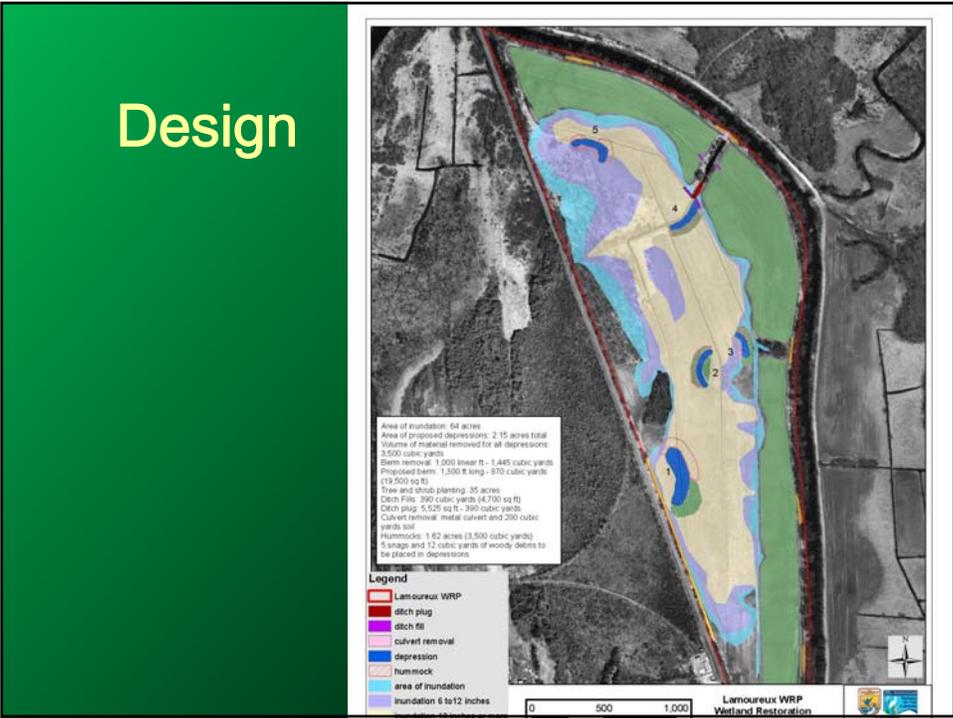


Cost Estimates

Colusa Indian Community					
Cost Estimate					
Dirtwork					
		Quantity	Units	Cost	Total
Earthwork	Cut and Fill	16,500	cubic yards	\$1.70/cyd	\$28,050.00
	Tree Ditch				\$1,500.00
	Site Prep	Disking and Structure Removal			\$2,000.00
Water Control Structures					
Structures	24"x3"x4" Flash Board Riser	1		\$320	\$320.00
Pipe	24" Diameter Plastic	30	feet	\$21/ft	\$630.00
Delivery					\$350.00
Backhoe	(structure installation)	6	hours	\$100/hr	\$600.00
Vegetation					
Tules		30	hours	\$100/hr.	\$3,000.00
Trees		1,500	cuttings	\$1.50/cutting	\$2,250.00
Native Grasses		2	acres	\$550	\$1,200.00
Materials					
Pump	rehab				\$15,000.00
				Project Grand Total =	\$54,900.00







Local Lessons Learned

