Interesting Case Studies for Helical Piles and Tiebacks

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Anahuac TXDOT Tiebacks
Shoveler Pond Road

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Beauty

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…..and the Beast

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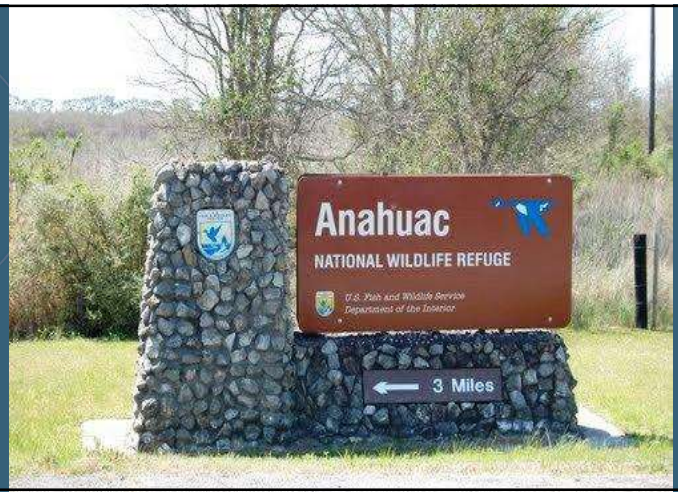

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- Scenic roadway damaged by Hurricane Ike
- Six pullover viewing areas required shoring along a 2.5-mile stretch

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Proof Test Load Sequence

Test Load Increment							
A	0.25D	0.50D	0.75D	1.00D	1.20D	1.33D	Reduce to Lock-Off Load
•	•	•	•	•	•	•	•

Note: A = Alignment load; D = Design load.

(a) After a 10-minute hold, the ground anchor carries the maximum test load with less than 0.04 inches of movement between 1 and 10 minutes and the total movement at the maximum test load exceeds 80 percent of the theoretical elastic elongation of the unbonded length.

(b) After a 60-minute hold, the ground anchor carries the maximum test load with a creep rate that does not exceed 0.08 inches per log cycle of time and the total movement at the maximum test load exceeds 80 percent of the theoretical elastic elongation of the unbonded length.

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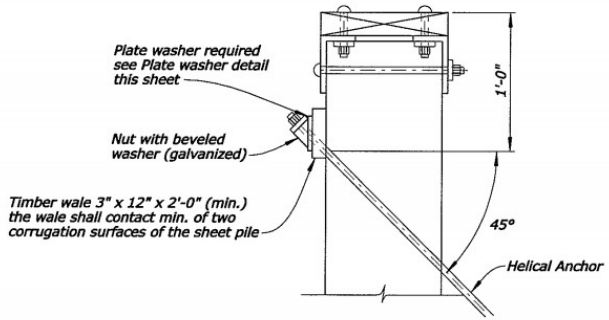

HELICAL ANCHOR CONNECTION DETAIL

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Project Specifications:

- Design tension capacity=12.5 kips
- Ultimate tension capacity=25 kips (FOS=2)
- We opted to use a FOS=2.5 to limit deflection
- New ultimate tension capacity=32 kips
- Tieback lock off load=2 kips
- Minimum anchor length=40 feet
- Minimum termination torque=3200 ft-lb

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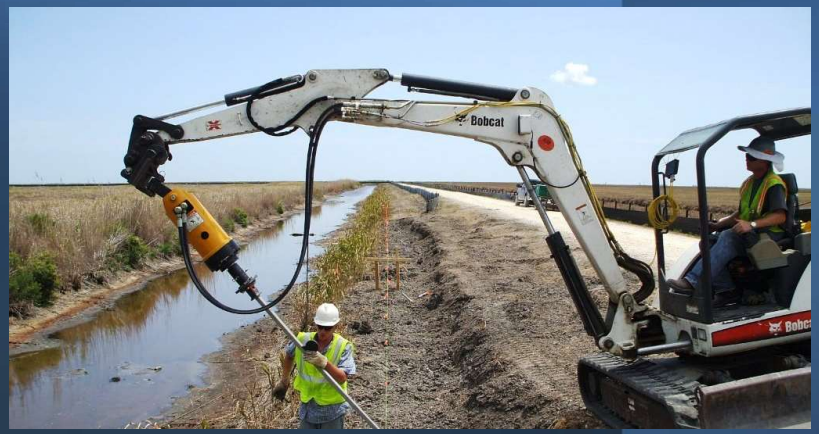

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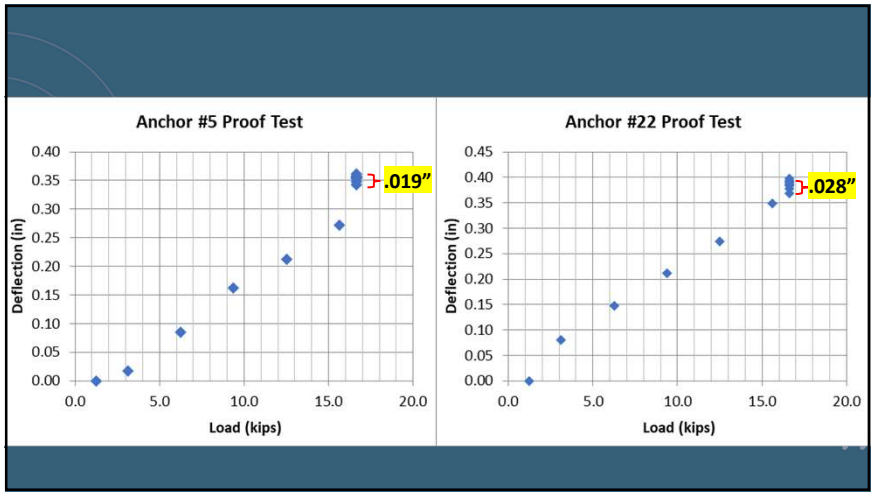
Anchor #5 Proof Test
Deflection (in)
Load (kips)
.019"
Anchor #22 Proof Test
Deflection (in)
Load (kips)
.028"

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JORDAN

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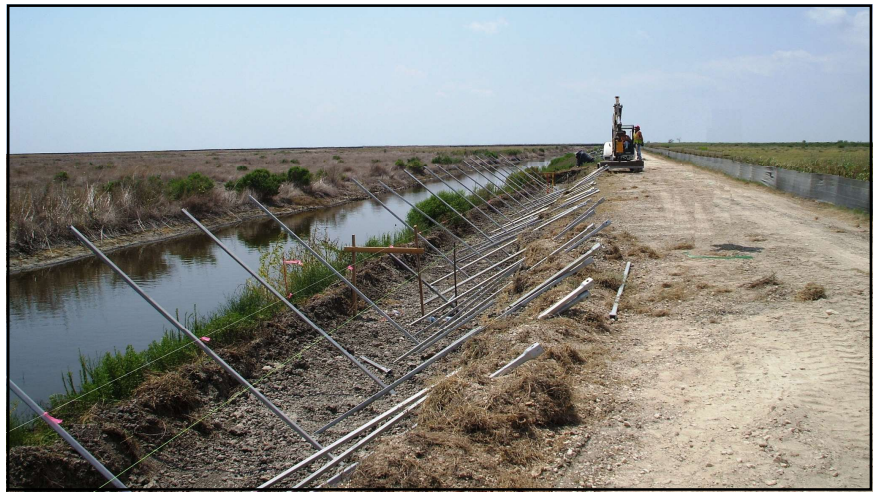

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Camp Pendleton
O'Neill Diversion Dam

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- Located inside Camp Pendleton North near Oceanside CA
- 10.5 miles upstream from Santa Margarita River entry into the Pacific Ocean

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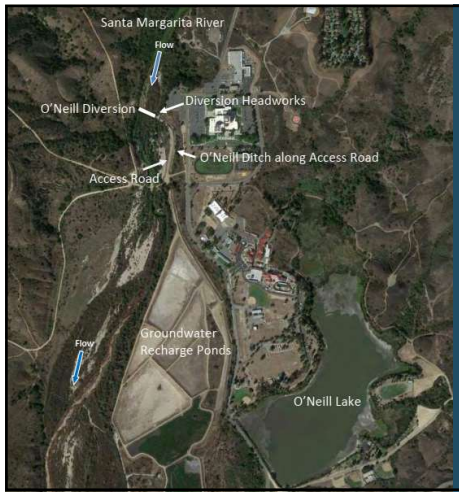

Before Operations:

- Water is diverted from the Santa Margarita River to the O'Neill Ditch
- Santa Margarita River
- System has adequate capacity to deliver O'Neill Ditch and sedimentation issue

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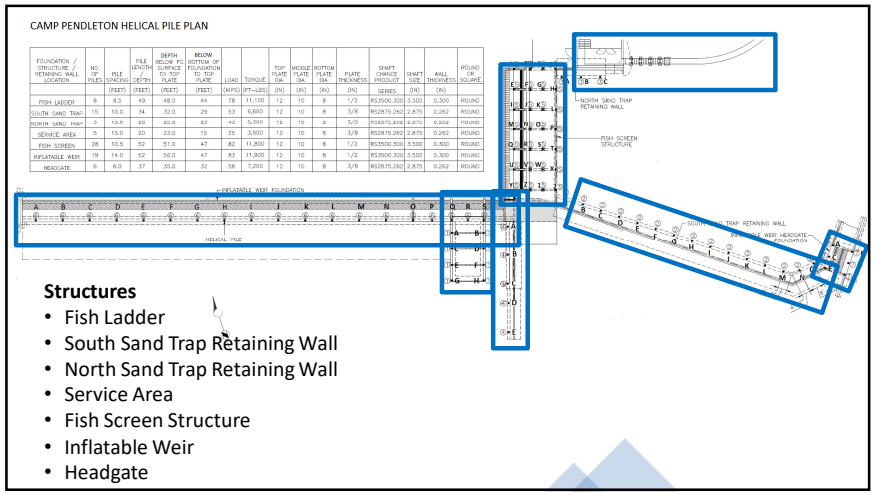

FOUNDATION / STRUCTURE / RETAINING WALL LOCATION	NO. PILES	PILE SPACING (FEET)	PILE LENGTH (FEET)	DEPTH BELOW FG SURFACE TO PLATE (FEET)	BELOW BOTTOM OF FOUNDATION TO PLATE (FEET)	LOAD (KIPS)	TORQUE (FT-LBS)	TOP PLATE DIA. (IN)	MIDDLE PLATE DIA (IN)	BOTTOM PLATE DIA (IN)	PLATE THICKNESS (IN)	SHAFT CHANGE PRODUCT SERIES	SHAFT SIZE (IN)	WALL THICKNESS (IN)	ROUND OR SQUARE
FISH LADDER	8	8.5	49	48.0	44	78	11,100	12	10	8	1/2	RS3500.300	3.500	0.300	ROUND
SOUTH SAND TRAP	15	10.0	34	32.0	29	53	6,600	12	10	8	3/8	RS2875.262	2.875	0.262	ROUND
NORTH SAND TRAP	5	10.0	22	20.0	23	43	5,300	12	10	6	3/0	RS1875.262	2.075	0.262	ROUND
SERVICE AREA	5	15.0	20	23.0	15	25	3,500	12	10	8	3/8	RS2875.262	2.875	0.262	ROUND
FISH SCREEN	28	10.5	52	51.0	47	82	11,800	12	10	8	1/2	RS3500.300	3.500	0.300	ROUND
INFLATABLE WEIR	19	14.0	52	56.0	47	83	11,900	12	10	8	1/2	RS3500.300	3.500	0.300	ROUND
HEADGATE	6	6.0	37	35.0	32	58	7,200	12	10	8	3/8	RS2875.262	2.875	0.262	ROUND

Structures

- Fish Ladder
- South Sand Trap Retaining Wall
- North Sand Trap Retaining Wall
- Service Area
- Fish Screen Structure
- Inflatable Weir
- Headgate

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Load Tests

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Fish Ladder and Service Area

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Fish Screen

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South Sand Trap Retaining Wall

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Inflatable Weir

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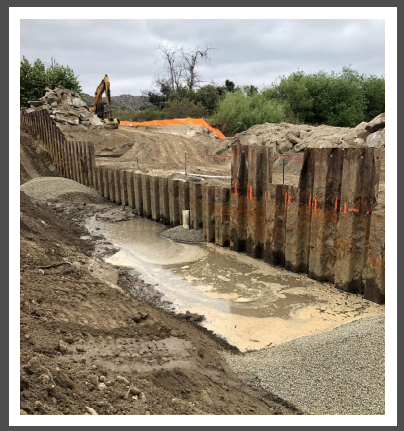

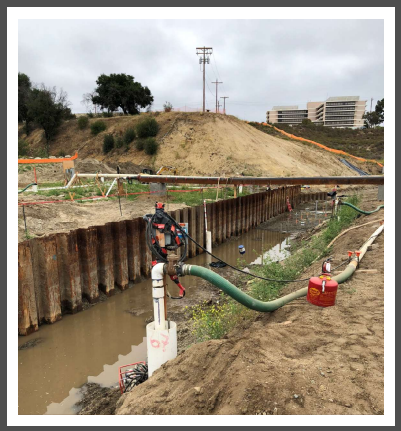

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Finished Project

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