

Joint Venture

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July 8, 2016

TO: Denis Roznowski and Steve Garbaciak

FR: Mitch Vanderydt and Jim Hutchison

RE: Ashland Shoreline Sheet Pile Global Stability Revised Assessment at SB-181
Ashland/NSP Lakefront Site

Introduction

This memo presents a revised stability analysis carried out for the anchored sheet pile wall along the shoreline at the Ashland/NSP Lakefront Site (Site). Previous revisions of the analysis for the entire alignment of the sheet pile wall were provided in Foth Infrastructure & Environment/Envirocon Joint Venture's memo dated August 3, 2015 (FE JV, 2015). As determined during Wet Dredge Pilot Study (Pilot Study) operation, the target dredging depth near boring SB-181 has increased, which triggered this revision for the critical wet dredge, long-term scenario. This stability analysis is applicable for the rest of the sheet pile wall due to the fact subgrade soil conditions identified at SB-181 and the cross-section extending into the lake are "worst case" conditions as compared to the boring locations SB-165 and SB-185, also analyzed in the August 3, 2015 memo. The sheet pile wall has been installed and anchored using helical pier anchors.

Background

The stability of the shoreline sheet pile wall was evaluated under static conditions. Stability analyses were conducted using a limit equilibrium method with the commercially available software SLOPE/W (November 2012 Release). An optimized circular slip surface was selected and the minimum factor of safety against slope failure was calculated using the Morgenstern-Price method. A minimum factor of safety criterion is established as 1.5 under both short-term conditions and long-term conditions, consistent with previous wet dredge stability analysis performed for the Site.

Material parameters used in the stability analyses are based on geotechnical field and laboratory testing (FE JV, 2013), experience, and the results of confirmation testing of helical pier anchors at the Site. The soil properties are presented on Figures 1 and 2 (Attachment 1). The helical anchors were assumed as 26 to 30 foot long, 12-inch diameter columns of soil inclined at 30 degrees with a skin friction applied parallel to the anchors.

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The skin friction and fill strengths were back-calculated based on the results of confirmation testing of the helical piers carried out on Site. Testing involved applying a tensional force of 51,300 lbs at the top of the anchor. The length of the anchor in the calculation was assumed to be 30 feet to be conservative. The strengths were calculated as follows:

$$\text{Fill shear strength} = \text{anchor friction} = 51,300 \text{ lbs} / [2 * \pi * (0.5 \text{ feet}) * (30 \text{ feet})] = 544 \text{ psf}$$

The critical cross section identified near SB-181 for the wet dredge alternative was the long term, effective stress scenario (FE JV, 2015). Soil parameters identified in SB-181 are assumed to be representative of the western portion of the sheet pile wall. The uplift pressures caused by the artesian pressures that exist in the Copper Falls Formation soil layer were modeled by reducing the unit weight of the Miller Creek Formation soil layer. This serves to reduce resisting forces by minimizing dead weight on the lake side of the sheet pile wall and also reduces shear strength during long-term analysis. Unit weights were reduced according to a linear distribution. That is, lower Miller Creek unit weights were significantly reduced and upper Miller Creek unit weights were reduced just slightly, thereby modeling the increasing artesian pressures with depth in the Miller Creek Formation soil layer. The artesian pressure in the Copper Falls formation was based on the maximum artesian pressure measured in MW-24 (near SB-181), El. 616.66 feet. These assumptions are consistent with FE JV, 2015.

The elevation of the top of the Miller Creek Formation (beach sand) identified in SB-181 and used in previous analyses (FE JV, 2015) as the depth of excavation on the lake side of the sheet pile wall was 589.5 feet. Results obtained during the Pilot Study indicate potential excavation deeper than 589.5 feet. Boring AQ-SB-01 reports the top of Copper Falls Formation at a greater depth than previously assumed. AQ-SB-01 was not used in the previous analysis (FE JV, 2015), but has been used herein. The Copper Falls formation was encountered at El. 552.3 feet in AQ-SB-01, which is approximately 200 feet from the shoreline. Revised target dredging depths and Copper Falls' depths are included in this analysis.

Additional analyses of the sheet pile section using a conservative soil profile were performed by Skyline Steel, as shown in Attachments 2 and 3. In a similar fashion to the analyses described above, Skyline Steel revisited their original calculations, using the AMRetain software package to calculate the loads and forces on the sheet pile if the excavation elevation is 587.5.

Results

The results of the analyses are presented on Figures 1 and 2 for target dredging depths of El. 587.5 feet and El. 588.0 feet, respectively. The calculated factors of safety are 1.5 and 1.6, respectively, under long-term static conditions. **The results indicate that the stability of the shoreline sheet pile wall satisfies the global stability criterion if final dredge elevations in the Pilot Study areas do not extend below 587.5 feet.** The critical slip surface that was identified extends approximately 45 feet into Kreher Park from the sheet pile wall. Stockpiling of material within this distance from the sheet pile wall would therefore reduce the calculated factor of safety for the critical slip surfaces identified. In

addition, the analyses by Skyline Steel confirm that the installed sheet pile section provides a factor of safety of 1.7 when the target dredging depth is El. 587.5.

The lakebed is currently being dredged for the Pilot Study dredge project. It is worth noting that the weight of the water over the dredged sediment during wet dredging helps resist forces that are driving failure. This allows deeper removal of sediment as compared to dry dredging which removes this weight during dewatering of the lake. Also, in the event dry dredging were to be implemented after the Pilot Study, it would likely require backfilling over deeper dredged areas to meet appropriate factor of safety requirements and may preclude the removal of deeper contaminated sediments.

References

Foth Infrastructure & Environment/Envirocon Joint Venture, 2012. Geotechnical Investigation Report – Ashland/NSP Lakefront Site. May 2013.

Foth Infrastructure & Environment/Envirocon Joint Venture, 2015. Ashland Shoreline Sheet Pile Global Stability Assessment - Ashland/NSP Lakefront Site. Memorandum dated August 3, 2015.

Attachments

Attachment 1
Figures

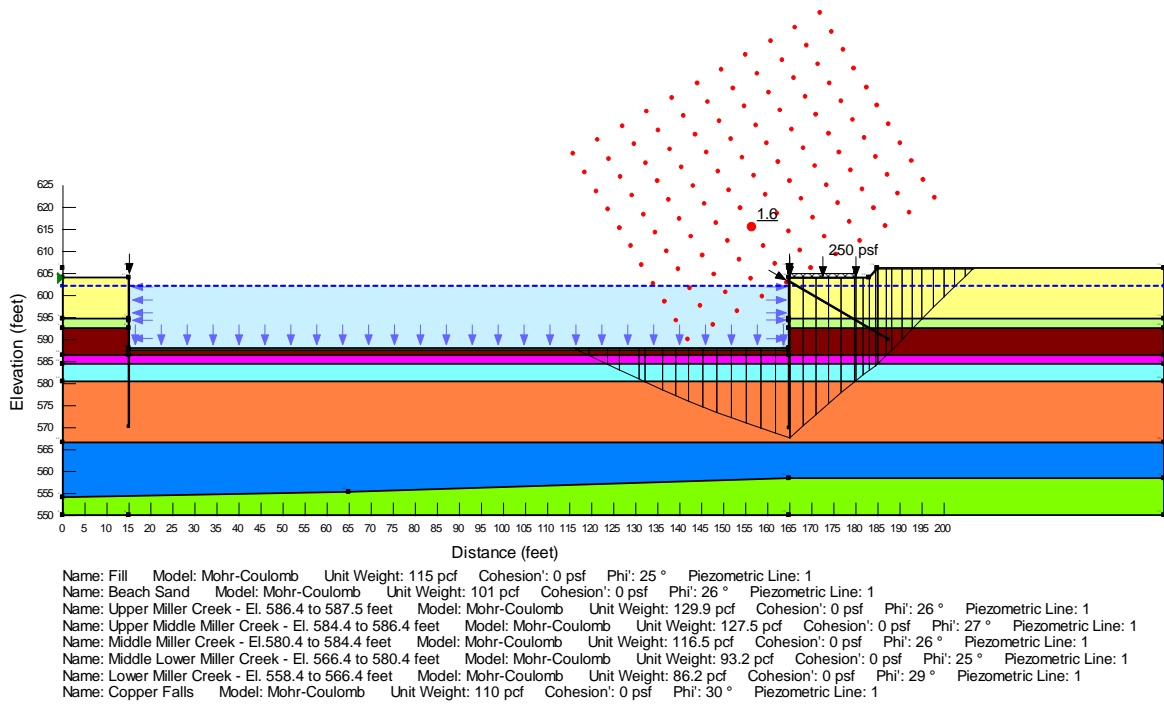


Figure 1 –Wet Dredge to El. 588.0 feet at SB-181 (West end) – Long term / Effective Stress

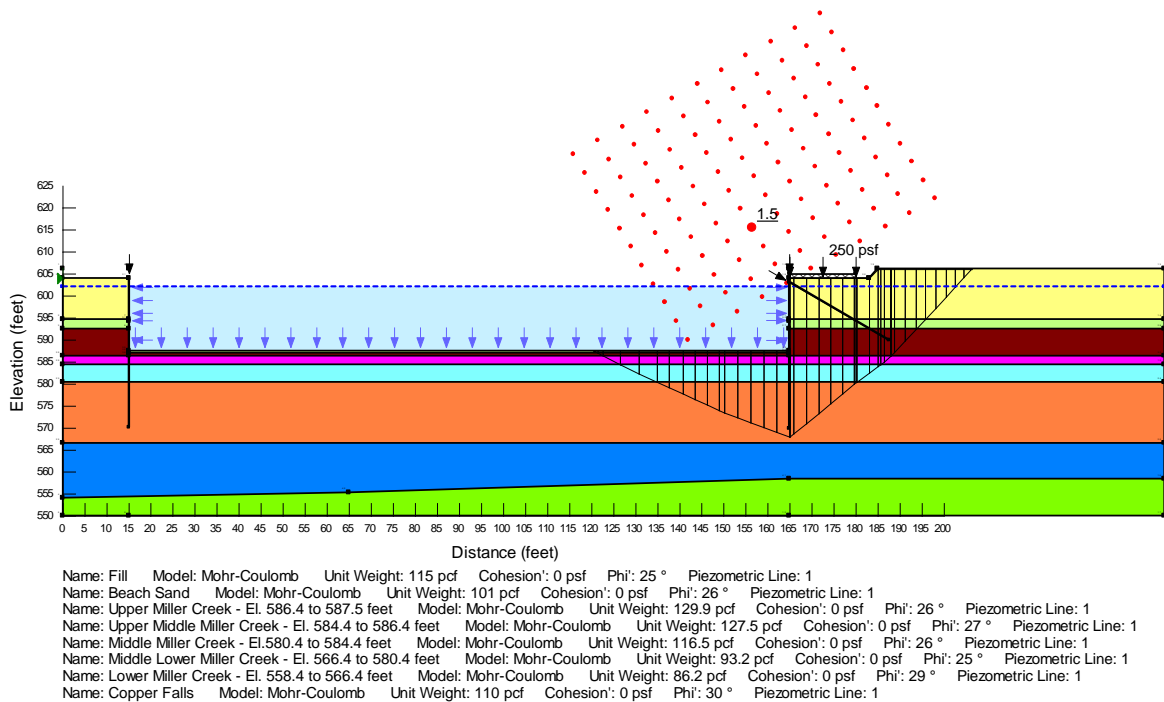


Figure 2 –Wet Dredge to El. 587.5 feet at SB-181 (West end) – Long term / Effective Stress

Attachment 2
Design Summary for Sheet Pile Wall Support



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Name: Ong Chi Li
Company: Skyline Steel, LLC
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Salesperson: Robert Lansdown

Salesperson Phone: (708) 444-0999

Project Number: 080-10958

Subject: NSPW – Ashland, WI

The following is a design recommendation for a new shoreline wall for NSPW in Ashland, WI.

The geotechnical conditions at the site were determined by 13 borings, and a characteristic soil profile provided to Skyline Steel was used to perform the design calculations. The site is underlain by a layer of clayey sand, with wood particles. Below this layer, there is a small layer of loose sand, and then multiple layers of silt/clay with varying strengths (the Miller Creek clay formation).

Design Calculations:

The soil was modeled in accordance with boring information provided by the Engineer as previously described. A summary of the soil parameters used in modelling the existing soil conditions is provided in the table below.

Design Soil Properties (based on typical profile)					
Layer	EL, Tip [ft]	γ [lb/ft ³]	γ' [lb/ft ³]	ϕ [°]	C [psf]
Clay/Sand/Wood	604.0	115	53	25	0
Sand	591.5	101	40	26	0
Silty Clay_1	589.5	120	58	0	4000
Silty Clay_2	574.5	110	48	0	2000
Silty Clay_3	566.5	110	48	0	2000
Silty Clay_4	561.5	128	66	28	0

Water Level: EL. 601.0

Surcharge Load: 250 psf (Construction Loads)

- The design calculations were performed using the AMRetain software program. The complete output files from AMRetain are attached for review.
- AMRetain calculates the pressures, moments, and deflections based on the stiffness of the system for each phase of construction

Staging Notes:

1. Install 30 foot sheet pile wall at top EL. 604 (Step back from EL. 606 +/- 20 ft from wall).
2. Dredge sediment layer from EL. 604.0 to EL. 594.5 to allow for installation of anchor rods.
3. Install anchor rods at EL. 604 at an angle of inclination of 30°.
4. Dredge sediment layer from EL. 594.5 to EL. 587.5.

Results:*Recommended System*

Sheet:	AZ 38-700N
Length:	30 ft
Sheet Width:	27.56 in
Sheet Inertia:	694.5 in ⁴ /ft
Sheet Section Modulus:	70.6 in ³ /ft
Max. Moment (design):	27.69 k-ft/ft
Max. Deflection:	0.57 in
Anchor Load (design):	1.12 k/ft

Pile Check

$$S_{x,req} = \frac{M_{max}}{f_y} = \frac{\left(27.69 \frac{\text{kip}\cdot\text{ft}}{\text{ft}}\right) \left(12 \frac{\text{in}}{\text{ft}}\right)}{30 \text{ ksi}} = 11.07 \frac{\text{in}^3}{\text{ft}} \quad \text{OK}$$

Anchor Calculation

Choose **#9 Gr 75 bar**, $A_s = 1.00 \text{ in}^2$, Spa. At Every Double Pile (4.9 ft O.C.)

Anchor Load: $1.12 \text{ k/ft} * 4.9 \text{ ft} = 5.488 \text{ kips}$

Factored Stress: $75 \text{ ksi} * 0.6 = 45 \text{ ksi}$

Stress = $P/A = 5.488 \text{ kips} / 1.00 \text{ in}^2 = 5.488 \text{ ksi} < 45 \text{ ksi}$ **OK**

Summary:

The AZ 38-700N was chosen based on its stiffness in order to control deflection. Therefore the section modulus for this section is higher than that required for the moments experienced providing greater factor of safety against bending moment stresses. A summary of the design is provided below.

Sheet Pile Recommendation:	AZ 38-700N
Sheet Pile Length:	30 ft
No. of Rows of Tiebacks:	1
Threaded Bar:	#9 Grade 75 Bar

Attachment 3
Sheet Pile Wall Support Calculations

DATA

GENERAL SETTINGS:

Units system: Kips, KsF, Ft
 Water weight: 0.062 KcF
 Number of iterations per phase: 50
 Calculation step: 1.000

Accounting for 2nd order moments: no
 Definition of the project in: elevation

CHARACTERISTICS OF SOIL LAYERS:

Layer	z [Ft]	zw [Ft]	γ [KcF]	γ' [KcF]	ϕ [°]	c [KsF]	dc [KsF]	k0	kay	kpy	kd	kr	kac	kpc	kh [KcF]	dkh [KcF]
CLAYEY SAND	604.000	601.000	0.115	0.053	25.00	0.000	0.000	0.577	0.381	3.073	0.577	0.577	0.000	0.000	15	0
SAND	591.500	601.000	0.101	0.040	26.00	0.000	0.000	0.562	0.358	3.259	0.562	0.562	1.313	4.404	127	0
SILTY CLAY 1	589.500	601.000	0.120	0.058	0.10	4.000	0.000	0.998	1.000	1.000	0.998	0.998	2.277	2.287	200	0
SILTY CLAY 2	574.500	601.000	0.110	0.048	0.10	2.000	0.000	0.998	1.000	1.000	0.998	0.998	2.277	2.287	200	0
SILTY CLAY 3	566.500	601.000	0.110	0.048	0.10	2.000	0.000	0.998	1.000	1.000	0.998	0.998	2.277	2.287	200	0
SILTY CLAY 4	561.500	601.000	0.128	0.066	28.00	0.000	0.000	0.531	0.339	3.600	0.531	0.531	0.000	0.000	72	0

WALL PROPERTIES:

Section	z0 [Ft]	EI [Kips.Ft ²]	L [Ft]	B _D
1. AZ 38-700N	604.000	146900	1.000	1.00

zf = 576.000 Ft

OPTIONS:

Caquot surcharge on the ground surface: 0.25 KsF.

DATA

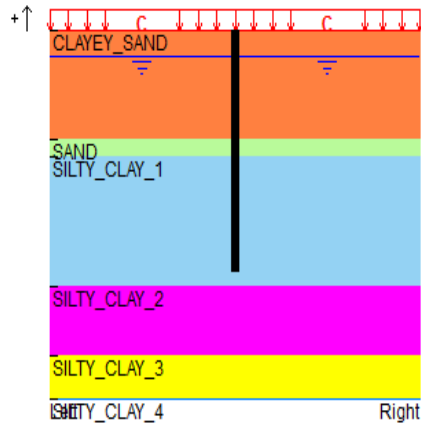
BOUSSINESQ SURCHARGE	Phase	z [Ft]	x [Ft]	L [Ft]	q [KsF]
1	1	604.000	-20.000	200.000	0.23

HORIZONTAL LOAD	Phase	zt [Ft]	zb [Ft]	qht [KsF]	qhb [KsF]
1	4	601.000	599.000	0.00	-0.13
2	4	599.000	576.000	-0.13	-0.13
3	4	601.000	599.000	0.00	0.05

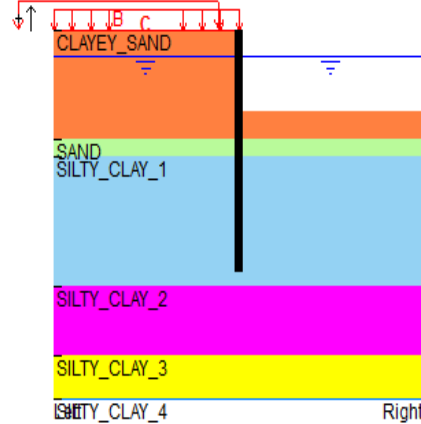
ANCHOR	Phase	za [Ft]	K [Kips/Ft]	P [Kips]	α [°]	Lu [Ft]	Ls [Ft]
1	2	604.000	200.00	0.00	-30.00	50	0

STAGED CONSTRUCTION SYNTHESIS

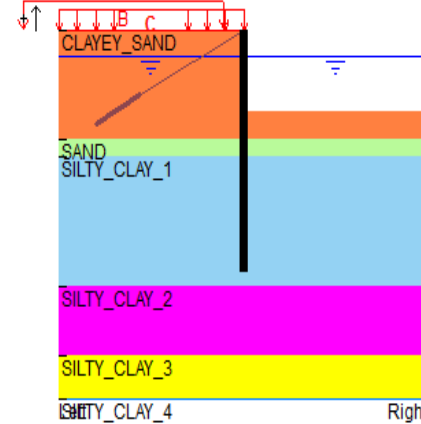
INITIAL PHASE



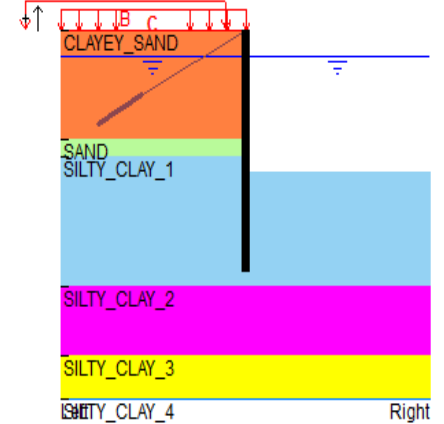
PHASE 1



PHASE 2



PHASE 3



Short Term - Undredged

Undredged - Anchor 2

Dewater - Lake

- Caquot surcharge: q [KsF] = 0.25

- excavation (right): z_h [Ft] = 594.500
 z_w [Ft] = 601.000
 - Boussinesq surcharge : z [Ft] = 604.000
 x [Ft] = -20.000
 L [Ft] = 200.000
 q [KsF] = 0.23

- installation of anchor: n° 1
 z_a [Ft] = 604.000
 K [Kips/Ft] = 200
 P [Kips] = 0
 α [°] = -30.00
 L_u [Ft] = 50
 L_s [Ft] = 0

- excavation (right): z_h [Ft] = 587.500
 z_w [Ft] = 601.000

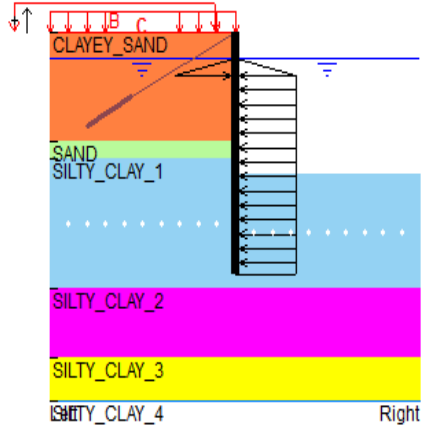


Calculated by: **AMRetain**



STAGED CONSTRUCTION SYNTHESIS

PHASE 4



Long Term - Dredged - Drained

added horizontal pressures to simulate lower water on retained side.

- new soil properties: SILTY_CLAY_1
on left side

z [Ft] = 589.500 kac = 1.341
 ϕ [°] = 25.00 kpy = 3.072
 c [KsF] = 0.200 kpc = 4.274
 kh [KcF] = 200 k0 = 0.577
 dkh [KcF] = 0 kd = 0.577
 kay = 0.381 kr = 0.577

- new soil properties: SILTY_CLAY_1
on right side

z [Ft] = 587.500 kac = 1.341
 ϕ [°] = 25.00 kpy = 3.073
 c [KsF] = 0.200 kpc = 4.274
 kh [KcF] = 200 k0 = 0.577
 dkh [KcF] = 0 kd = 0.577
 kay = 0.381 kr = 0.577

- horizontal load on wall : zt [Ft] = 601.000
 zb [Ft] = 599.000
 qht [KsF] = 0.00
 qhb [KsF] = -0.13
 - horizontal load on wall : zt [Ft] = 599.000
 zb [Ft] = 576.000
 qht [KsF] = -0.13
 qhb [KsF] = -0.13
 - horizontal load on wall : zt [Ft] = 601.000
 zb [Ft] = 599.000
 qht [KsF] = 0.00
 qhb [KsF] = 0.05



Calculated by: **AMRetain**



RESULTS

PHASE 1 - Short Term - Undredged

- excavation (right): zh [Ft] = 594.500 zw [Ft] = 601.000
- Boussinesq surcharge : z [Ft] = 604.000 x [Ft] = -20.000 L [Ft] = 200.000 q [KsF] = 0.23

Calculation converged after 3 iterations.

Level [Ft]	Rotation [rad]	Displ. [In]	Moment		Shear force		Soil status		Earth pressure		Water pressure		Vertical pressure		limiting active pressure		limiting passive		Diff. pressures	
			M.k [Kips.Ft]	M.d [Kips.Ft]	V.k [Kips]	V.d [Kips]	left	right	left [KsF]	right [KsF]	left [KsF]	right [KsF]	left [KsF]	right [KsF]	left [KsF]	right [KsF]	left [KsF]	right [KsF]	P.k [KsF]	P.d [KsF]
604.00	-0.00237	0.49	0.00	-	0.00	-	active press.	excavation	0.10	0.00	0.00	0.00	0.25	0.00	0.10	0.00	0.77	0.00	-0.10	-
603.05	-0.00237	0.46	0.05	-	0.11	-	active press.	excavation	0.14	0.00	0.00	0.00	0.37	0.00	0.14	0.00	1.14	0.00	-0.14	-
602.10	-0.00237	0.44	0.23	-	0.27	-	active press.	excavation	0.19	0.00	0.00	0.00	0.49	0.00	0.19	0.00	1.52	0.00	-0.19	-
601.15	-0.00237	0.41	0.58	-	0.47	-	active press.	excavation	0.23	0.00	0.00	0.00	0.62	0.00	0.23	0.00	1.89	0.00	-0.23	-
600.20	-0.00236	0.38	1.13	-	0.71	-	active press.	excavation	0.26	0.00	0.05	0.05	0.69	0.00	0.26	0.00	2.11	0.00	-0.26	-
599.25	-0.00235	0.36	1.92	-	0.97	-	active press.	excavation	0.29	0.00	0.11	0.11	0.75	0.00	0.29	0.00	2.30	0.00	-0.29	-
598.30	-0.00234	0.33	2.97	-	1.25	-	active press.	excavation	0.31	0.00	0.17	0.17	0.81	0.00	0.31	0.00	2.49	0.00	-0.31	-
597.35	-0.00231	0.30	4.30	-	1.55	-	active press.	excavation	0.33	0.00	0.23	0.23	0.87	0.00	0.33	0.00	2.68	0.00	-0.33	-
596.40	-0.00228	0.28	5.93	-	1.88	-	active press.	excavation	0.35	0.00	0.29	0.29	0.93	0.00	0.36	0.00	2.86	0.00	-0.35	-
595.45	-0.00223	0.25	7.87	-	2.22	-	active press.	excavation	0.38	0.00	0.35	0.35	0.99	0.00	0.38	0.00	3.04	0.00	-0.38	-
594.50	-0.00218	0.23	10.16	-	2.59	-	active press.	passive press.	0.40	0.00	0.41	0.41	1.05	0.00	0.40	0.00	3.22	0.00	-0.40	-
593.50	-0.00210	0.20	12.93	-	2.92	-	active press.	passive press.	0.42	0.16	0.47	0.47	1.11	0.05	0.42	0.02	3.41	0.16	-0.26	-
592.50	-0.00200	0.18	15.97	-	3.14	-	elastic	elastic	0.46	0.28	0.53	0.53	1.17	0.11	0.45	0.04	3.60	0.33	-0.17	-
591.50	-0.00188	0.15	19.21	-	3.35	-	elastic	elastic	0.52	0.28	0.59	0.59	1.23	0.16	0.47	0.06	3.78	0.49	-0.24	-
591.50	-0.00188	0.15	19.21	-	3.35	-	active press.	passive press.	0.44	0.52	0.59	0.59	1.23	0.16	0.44	0.06	4.01	0.52	0.08	-
590.50	-0.00174	0.13	22.50	-	3.21	-	active press.	passive press.	0.46	0.65	0.66	0.66	1.28	0.20	0.46	0.07	4.16	0.65	0.19	-
589.50	-0.00157	0.11	25.59	-	2.96	-	active press.	passive press.	0.47	0.78	0.72	0.72	1.32	0.24	0.47	0.09	4.30	0.78	0.31	-
589.50	-0.00157	0.11	25.59	-	2.96	-	not linked	elastic	0.00	2.08	0.72	0.72	1.32	0.24	0.00	0.00	10.47	9.39	2.08	-
588.50	-0.00139	0.09	27.55	-	1.00	-	not linked	elastic	0.00	1.84	0.78	0.78	1.38	0.30	0.00	0.00	10.53	9.45	1.84	-
587.50	-0.00120	0.08	27.69	-	-0.67	-	elastic	elastic	0.16	1.64	0.84	0.84	1.45	0.36	0.00	0.00	10.59	9.50	1.49	-
586.54	-0.00103	0.06	26.44	-	-1.88	-	elastic	elastic	0.43	1.48	0.90	0.90	1.51	0.41	0.00	0.00	10.65	9.56	1.06	-
585.58	-0.00086	0.05	24.20	-	-2.72	-	elastic	elastic	0.67	1.36	0.96	0.96	1.56	0.47	0.00	0.00	10.71	9.61	0.69	-
584.63	-0.00071	0.04	21.33	-	-3.24	-	elastic	elastic	0.88	1.26	1.02	1.02	1.62	0.52	0.00	0.00	10.77	9.67	0.39	-
583.67	-0.00059	0.04	18.09	-	-3.49	-	elastic	elastic	1.06	1.19	1.08	1.08	1.68	0.58	0.00	0.00	10.83	9.73	0.14	-
582.71	-0.00048	0.03	14.71	-	-3.52	-	elastic	elastic	1.22	1.15	1.14	1.14	1.74	0.63	0.00	0.00	10.89	9.78	-0.07	-
581.75	-0.00039	0.03	11.40	-	-3.37	-	elastic	elastic	1.36	1.12	1.20	1.20	1.79	0.69	0.00	0.00	10.94	9.84	-0.24	-
580.79	-0.00033	0.02	8.30	-	-3.07	-	elastic	elastic	1.48	1.11	1.26	1.26	1.85	0.74	0.00	0.00	11.00	9.89	-0.38	-
579.83	-0.00028	0.02	5.55	-	-2.65	-	elastic	elastic	1.60	1.10	1.32	1.32	1.91	0.80	0.00	0.00	11.06	9.95	-0.50	-
578.88	-0.00026	0.02	3.25	-	-2.13	-	elastic	elastic	1.71	1.11	1.38	1.38	1.96	0.86	0.00	0.00	11.11	10.00	-0.60	-
577.92	-0.00024	0.01	1.50	-	-1.51	-	elastic	elastic	1.81	1.12	1.44	1.44	2.02	0.91	0.00	0.00	11.17	10.06	-0.70	-
576.96	-0.00023	0.01	0.39	-	-0.80	-	elastic	elastic	1.91	1.13	1.50	1.50	2.08	0.97	0.00	0.00	11.23	10.11	-0.79	-
576.00	-0.00023	0.01	0.00	-	0.00	-	elastic	elastic	2.01	1.14	1.56	1.56	2.13	1.02	0.00	0.00	11.28	10.17	-0.88	-

limiting earth resistance [Kips] =134

mobilised earth resistance [Kips] =19

ratio (1) =

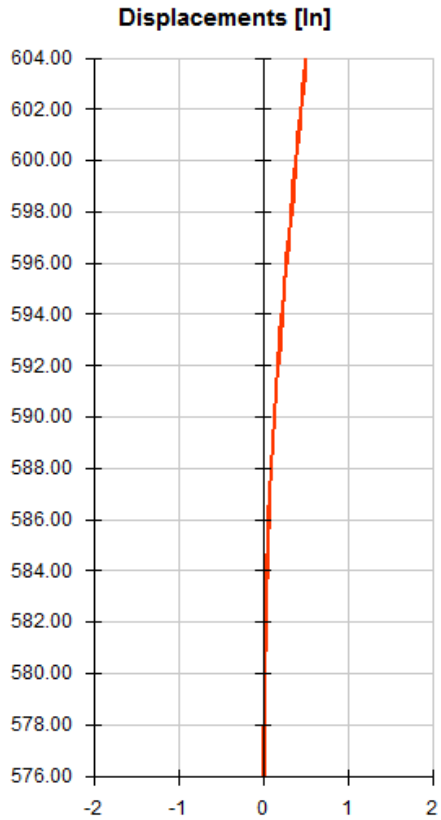
6.877



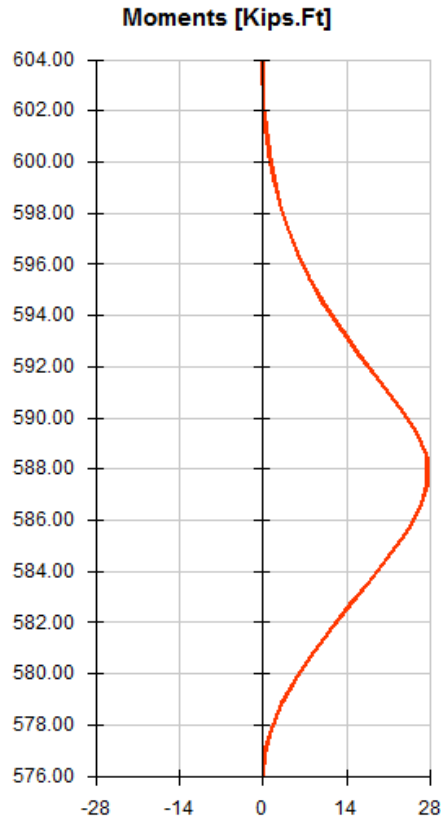
Calculated by: **AMRetain**



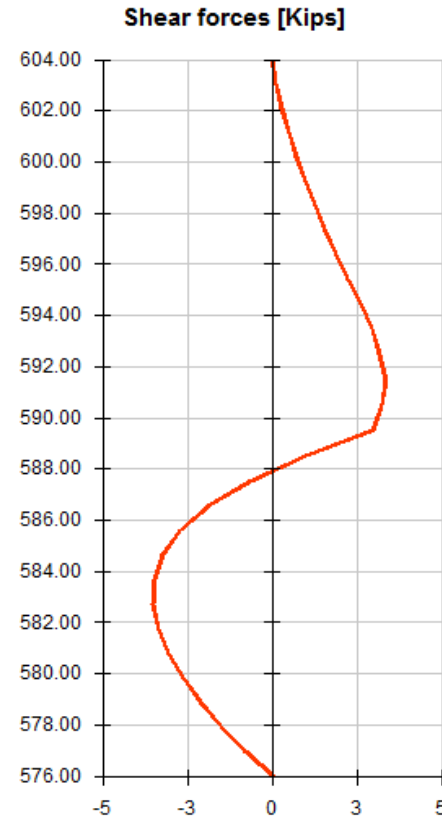
RESULTS (Phase 1)



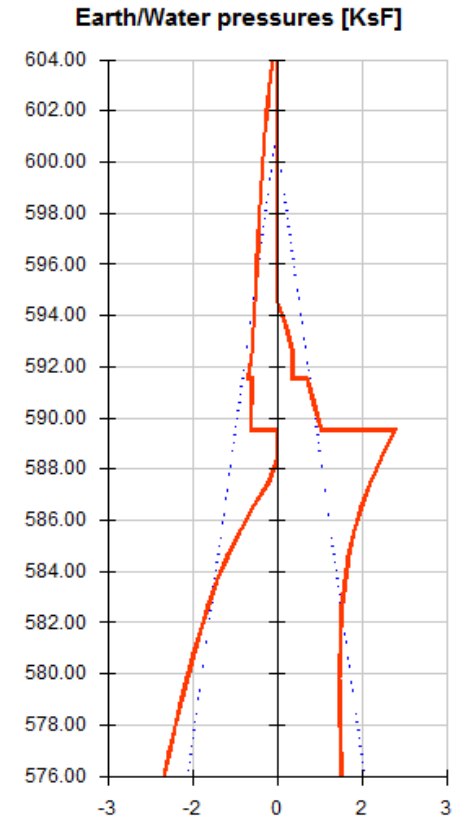
Dmax = 0.491
Dmin = 0.007



M.k max = 27.692
M.k min = 0.000



V.k max = 3.347
V.k min = -3.517



P max = 2.083
P min = -2.013
Pw max = 1.560
Pw min = -1.560



Calculated by: **AMRetain**



RESULTS

PHASE 2 - Undredged - Anchor 2

- installation of anchor : n° 1 za[Ft] = 604.000 K [Kips/Ft] = 200 P [Kips] = 0 α [°] = -30.00 Lu [Ft] = 50 Ls [Ft] = 0

Calculation converged after 2 iterations.

Level [Ft]	Rotation [rad]	Displ. [In]	Moment		Shear force		Soil status		Earth pressure		Water pressure		Vertical pressure		limiting active pressure		limiting passive		Diff. pressures	
			M.k [Kips.Ft]	M.d [Kips.Ft]	V.k [Kips]	V.d [Kips]	left	right	left [KsF]	right [KsF]	left [KsF]	right [KsF]	left [KsF]	right [KsF]	left [KsF]	right [KsF]	left [KsF]	right [KsF]	P.k [KsF]	P.d [KsF]
604.00	-0.00237	0.49	0.00	-	0.00	-	elastic	excavation	0.10	0.00	0.00	0.00	0.25	0.00	0.10	0.00	0.77	0.00	-0.10	-
603.05	-0.00237	0.46	0.05	-	0.11	-	elastic	excavation	0.14	0.00	0.00	0.00	0.37	0.00	0.14	0.00	1.14	0.00	-0.14	-
602.10	-0.00237	0.44	0.23	-	0.27	-	elastic	excavation	0.19	0.00	0.00	0.00	0.49	0.00	0.19	0.00	1.52	0.00	-0.19	-
601.15	-0.00237	0.41	0.58	-	0.47	-	elastic	excavation	0.23	0.00	0.00	0.00	0.62	0.00	0.23	0.00	1.89	0.00	-0.23	-
600.20	-0.00236	0.38	1.13	-	0.71	-	elastic	excavation	0.26	0.00	0.05	0.05	0.69	0.00	0.26	0.00	2.11	0.00	-0.26	-
599.25	-0.00235	0.36	1.92	-	0.97	-	elastic	excavation	0.29	0.00	0.11	0.11	0.75	0.00	0.29	0.00	2.30	0.00	-0.29	-
598.30	-0.00234	0.33	2.97	-	1.25	-	elastic	excavation	0.31	0.00	0.17	0.17	0.81	0.00	0.31	0.00	2.49	0.00	-0.31	-
597.35	-0.00231	0.30	4.30	-	1.55	-	elastic	excavation	0.33	0.00	0.23	0.23	0.87	0.00	0.33	0.00	2.68	0.00	-0.33	-
596.40	-0.00228	0.28	5.93	-	1.88	-	elastic	excavation	0.35	0.00	0.29	0.29	0.93	0.00	0.36	0.00	2.86	0.00	-0.35	-
595.45	-0.00223	0.25	7.87	-	2.22	-	elastic	excavation	0.38	0.00	0.35	0.35	0.99	0.00	0.38	0.00	3.04	0.00	-0.38	-
594.50	-0.00218	0.23	10.16	-	2.59	-	elastic	not linked	0.40	0.00	0.41	0.41	1.05	0.00	0.40	0.00	3.22	0.00	-0.40	-
593.50	-0.00210	0.20	12.93	-	2.92	-	elastic	elastic	0.42	0.16	0.47	0.47	1.11	0.05	0.42	0.02	3.41	0.16	-0.26	-
592.50	-0.00200	0.18	15.97	-	3.14	-	elastic	elastic	0.46	0.28	0.53	0.53	1.17	0.11	0.45	0.04	3.60	0.33	-0.17	-
591.50	-0.00188	0.15	19.21	-	3.35	-	elastic	elastic	0.52	0.28	0.59	0.59	1.23	0.16	0.47	0.06	3.78	0.49	-0.24	-
591.50	-0.00188	0.15	19.21	-	3.35	-	elastic	elastic	0.44	0.52	0.59	0.59	1.23	0.16	0.44	0.06	4.01	0.52	0.08	-
590.50	-0.00174	0.13	22.50	-	3.21	-	elastic	elastic	0.46	0.65	0.66	0.66	1.28	0.20	0.46	0.07	4.16	0.65	0.19	-
589.50	-0.00157	0.11	25.59	-	2.96	-	elastic	elastic	0.47	0.78	0.72	0.72	1.32	0.24	0.47	0.09	4.30	0.78	0.31	-
589.50	-0.00157	0.11	25.59	-	2.96	-	not linked	elastic	0.00	2.08	0.72	0.72	1.32	0.24	0.00	0.00	10.47	9.39	2.08	-
588.50	-0.00139	0.09	27.55	-	1.00	-	not linked	elastic	0.00	1.84	0.78	0.78	1.38	0.30	0.00	0.00	10.53	9.45	1.84	-
587.50	-0.00120	0.08	27.69	-	-0.67	-	elastic	elastic	0.16	1.64	0.84	0.84	1.45	0.36	0.00	0.00	10.59	9.50	1.49	-
586.54	-0.00103	0.06	26.44	-	-1.88	-	elastic	elastic	0.43	1.48	0.90	0.90	1.51	0.41	0.00	0.00	10.65	9.56	1.06	-
585.58	-0.00086	0.05	24.20	-	-2.72	-	elastic	elastic	0.67	1.36	0.96	0.96	1.56	0.47	0.00	0.00	10.71	9.61	0.69	-
584.63	-0.00071	0.04	21.33	-	-3.24	-	elastic	elastic	0.88	1.26	1.02	1.02	1.62	0.52	0.00	0.00	10.77	9.67	0.39	-
583.67	-0.00059	0.04	18.09	-	-3.49	-	elastic	elastic	1.06	1.19	1.08	1.08	1.68	0.58	0.00	0.00	10.83	9.73	0.14	-
582.71	-0.00048	0.03	14.71	-	-3.52	-	elastic	elastic	1.22	1.15	1.14	1.14	1.74	0.63	0.00	0.00	10.89	9.78	-0.07	-
581.75	-0.00039	0.03	11.40	-	-3.37	-	elastic	elastic	1.36	1.12	1.20	1.20	1.79	0.69	0.00	0.00	10.94	9.84	-0.24	-
580.79	-0.00033	0.02	8.30	-	-3.07	-	elastic	elastic	1.48	1.11	1.26	1.26	1.85	0.74	0.00	0.00	11.00	9.89	-0.38	-
579.83	-0.00028	0.02	5.55	-	-2.65	-	elastic	elastic	1.60	1.10	1.32	1.32	1.91	0.80	0.00	0.00	11.06	9.95	-0.50	-
578.88	-0.00026	0.02	3.25	-	-2.13	-	elastic	elastic	1.71	1.11	1.38	1.38	1.96	0.86	0.00	0.00	11.11	10.00	-0.60	-
577.92	-0.00024	0.01	1.50	-	-1.51	-	elastic	elastic	1.81	1.12	1.44	1.44	2.02	0.91	0.00	0.00	11.17	10.06	-0.70	-
576.96	-0.00023	0.01	0.39	-	-0.80	-	elastic	elastic	1.91	1.13	1.50	1.50	2.08	0.97	0.00	0.00	11.23	10.11	-0.79	-
576.00	-0.00023	0.01	0.00	-	0.00	-	elastic	elastic	2.01	1.14	1.56	1.56	2.13	1.02	0.00	0.00	11.28	10.17	-0.88	-

Anchor n° 1 elevation 604 axial force 0.00 Kips

limiting earth resistance [Kips] =134

mobilised earth resistance [Kips] =19

ratio (1) = 6.877

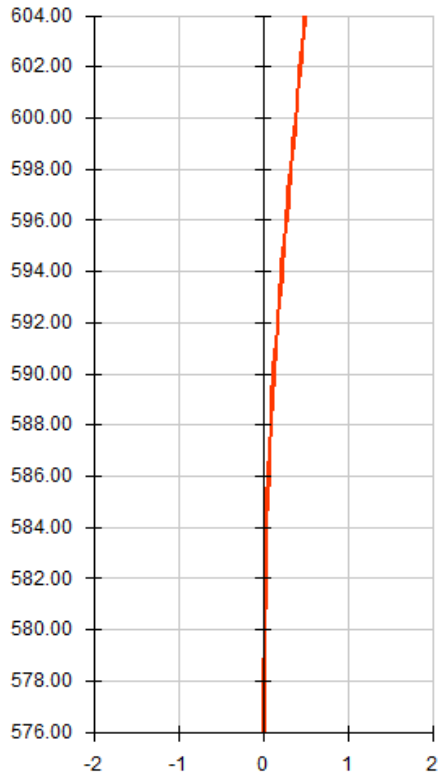


Calculated by: **AMRetain**



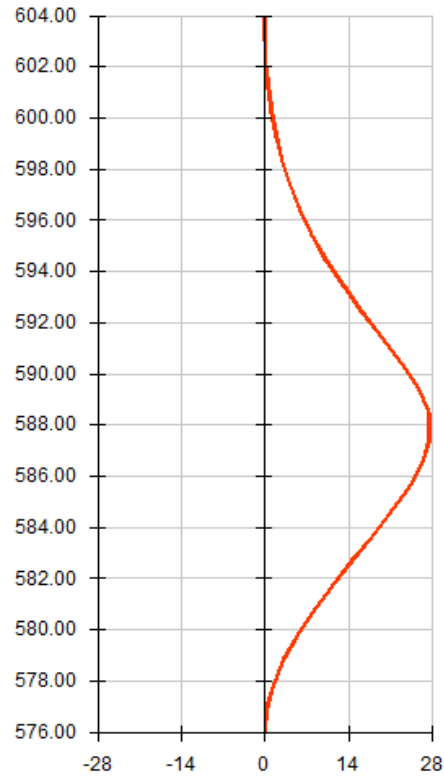
RESULTS (Phase 2)

Displacements [In]



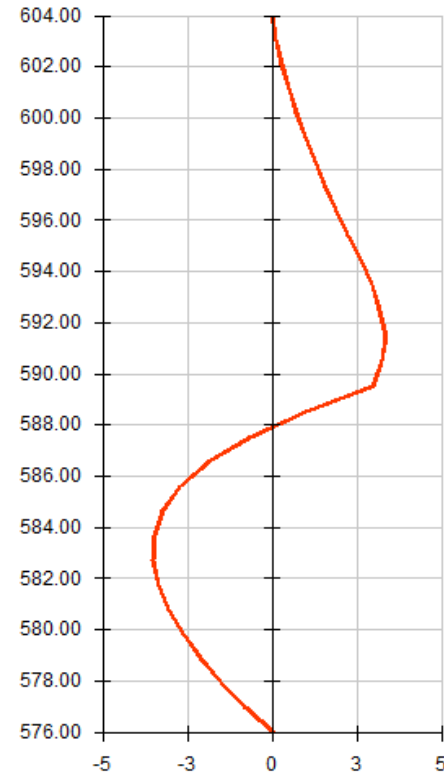
Dmax = 0.491
Dmin = 0.007

Moments [Kips.Ft]



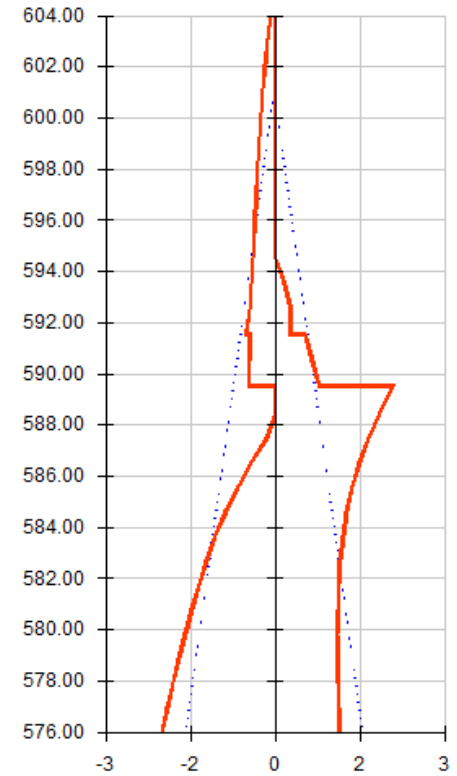
M.k max = 27.692
M.k min = 0.000

Shear forces [Kips]



V.k max = 3.347
V.k min = -3.517

Earth/Water pressures [KsF]



P max = 2.083
P min = -2.013
Pw max = 1.560
Pw min = -1.560



Calculated by: **AMRetain**



RESULTS

PHASE 3 - Dewater - Lake

- excavation (right): zh [Ft] = 587.500 zw [Ft] = 601.000

Calculation converged after 3 iterations.

Level [Ft]	Rotation [rad]	Displ. [In]	Moment		Shear force		Soil status		Earth pressure		Water pressure		Vertical pressure		limiting active pressure		limiting passive		Diff. pressures	
			M.k [Kips.Ft]	M.d [Kips.Ft]	V.k [Kips]	V.d [Kips]	left	right	left [KsF]	right [KsF]	left [KsF]	right [KsF]	left [KsF]	right [KsF]	left [KsF]	right [KsF]	left [KsF]	right [KsF]	P.k [KsF]	P.d [KsF]
604.00	-0.00216	0.57	0.00	-	-0.97	-	active press.	excavation	0.10	0.00	0.00	0.00	0.25	0.00	0.10	0.00	0.77	0.00	-0.10	-
603.05	-0.00216	0.54	-0.87	-	-0.86	-	active press.	excavation	0.14	0.00	0.00	0.00	0.37	0.00	0.14	0.00	1.14	0.00	-0.14	-
602.10	-0.00217	0.52	-1.61	-	-0.70	-	active press.	excavation	0.19	0.00	0.00	0.00	0.49	0.00	0.19	0.00	1.52	0.00	-0.19	-
601.15	-0.00218	0.49	-2.19	-	-0.50	-	active press.	excavation	0.23	0.00	0.00	0.00	0.62	0.00	0.23	0.00	1.89	0.00	-0.23	-
600.20	-0.00219	0.47	-2.55	-	-0.26	-	active press.	excavation	0.26	0.00	0.05	0.05	0.69	0.00	0.26	0.00	2.11	0.00	-0.26	-
599.25	-0.00221	0.44	-2.68	-	0.00	-	active press.	excavation	0.29	0.00	0.11	0.11	0.75	0.00	0.29	0.00	2.30	0.00	-0.29	-
598.30	-0.00223	0.42	-2.55	-	0.28	-	active press.	excavation	0.31	0.00	0.17	0.17	0.81	0.00	0.31	0.00	2.49	0.00	-0.31	-
597.35	-0.00224	0.39	-2.15	-	0.58	-	active press.	excavation	0.33	0.00	0.23	0.23	0.87	0.00	0.33	0.00	2.68	0.00	-0.33	-
596.40	-0.00225	0.37	-1.44	-	0.91	-	active press.	excavation	0.35	0.00	0.29	0.29	0.93	0.00	0.36	0.00	2.86	0.00	-0.35	-
595.45	-0.00226	0.34	-0.41	-	1.26	-	active press.	excavation	0.38	0.00	0.35	0.35	0.99	0.00	0.38	0.00	3.04	0.00	-0.38	-
594.50	-0.00226	0.32	0.95	-	1.62	-	active press.	excavation	0.40	0.00	0.41	0.41	1.05	0.00	0.40	0.00	3.22	0.00	-0.40	-
593.50	-0.00225	0.29	2.78	-	2.04	-	active press.	excavation	0.42	0.00	0.47	0.47	1.11	0.00	0.42	0.00	3.41	0.00	-0.42	-
592.50	-0.00222	0.26	5.03	-	2.47	-	active press.	excavation	0.45	0.00	0.53	0.53	1.17	0.00	0.45	0.00	3.60	0.00	-0.45	-
591.50	-0.00218	0.24	7.73	-	2.93	-	active press.	excavation	0.47	0.00	0.59	0.59	1.23	0.00	0.47	0.00	3.78	0.00	-0.47	-
591.50	-0.00218	0.24	7.73	-	2.93	-	active press.	excavation	0.44	0.00	0.59	0.59	1.23	0.00	0.44	0.00	4.01	0.00	-0.44	-
590.50	-0.00211	0.21	10.88	-	3.38	-	active press.	excavation	0.46	0.00	0.66	0.66	1.28	0.00	0.46	0.00	4.16	0.00	-0.46	-
589.50	-0.00203	0.19	14.48	-	3.84	-	active press.	excavation	0.47	0.00	0.72	0.72	1.32	0.00	0.47	0.00	4.30	0.00	-0.47	-
589.50	-0.00203	0.19	14.48	-	3.84	-	not linked	excavation	0.00	0.00	0.72	0.72	1.32	0.00	0.00	0.00	10.47	0.00	0.00	-
588.50	-0.00192	0.16	18.32	-	3.84	-	not linked	excavation	0.00	0.00	0.78	0.78	1.38	0.00	0.00	0.00	10.53	0.00	0.00	-
587.50	-0.00178	0.14	22.16	-	3.84	-	not linked	excavation	0.00	2.33	0.84	0.84	1.45	0.00	0.00	0.00	10.59	9.15	2.33	-
586.54	-0.00162	0.12	24.81	-	1.74	-	not linked	elastic	0.00	2.06	0.90	0.90	1.51	0.06	0.00	0.00	10.65	9.20	2.06	-
585.58	-0.00146	0.10	25.57	-	-0.12	-	not linked	elastic	0.00	1.82	0.96	0.96	1.56	0.11	0.00	0.00	10.71	9.26	1.82	-
584.63	-0.00130	0.09	24.68	-	-1.68	-	elastic	elastic	0.17	1.61	1.02	1.02	1.62	0.17	0.00	0.00	10.77	9.32	1.44	-
583.67	-0.00114	0.07	22.48	-	-2.83	-	elastic	elastic	0.47	1.43	1.08	1.08	1.68	0.22	0.00	0.00	10.83	9.37	0.97	-
582.71	-0.00101	0.06	19.38	-	-3.56	-	elastic	elastic	0.73	1.28	1.14	1.14	1.74	0.28	0.00	0.00	10.89	9.43	0.55	-
581.75	-0.00089	0.05	15.77	-	-3.92	-	elastic	elastic	0.97	1.16	1.20	1.20	1.79	0.33	0.00	0.00	10.94	9.48	0.19	-
580.79	-0.00080	0.04	11.98	-	-3.94	-	elastic	elastic	1.19	1.05	1.26	1.26	1.85	0.39	0.00	0.00	11.00	9.54	-0.14	-
579.83	-0.00073	0.03	8.31	-	-3.67	-	elastic	elastic	1.39	0.96	1.32	1.32	1.91	0.45	0.00	0.00	11.06	9.59	-0.43	-
578.88	-0.00069	0.02	5.03	-	-3.13	-	elastic	elastic	1.58	0.88	1.38	1.38	1.96	0.50	0.00	0.00	11.11	9.65	-0.70	-
577.92	-0.00067	0.01	2.39	-	-2.33	-	elastic	elastic	1.77	0.80	1.44	1.44	2.02	0.56	0.00	0.00	11.17	9.70	-0.96	-
576.96	-0.00066	0.01	0.64	-	-1.29	-	elastic	elastic	1.95	0.73	1.50	1.50	2.08	0.61	0.00	0.00	11.23	9.76	-1.22	-
576.00	-0.00065	0.00	0.00	-	0.00	-	elastic	elastic	2.13	0.66	1.56	1.56	2.13	0.67	0.00	0.00	11.28	9.82	-1.47	-

Anchor n° 1 elevation 604 axial force -1.12 Kips

limiting earth resistance [Kips] =109

mobilised earth resistance [Kips] =15

ratio (1) = 7.446

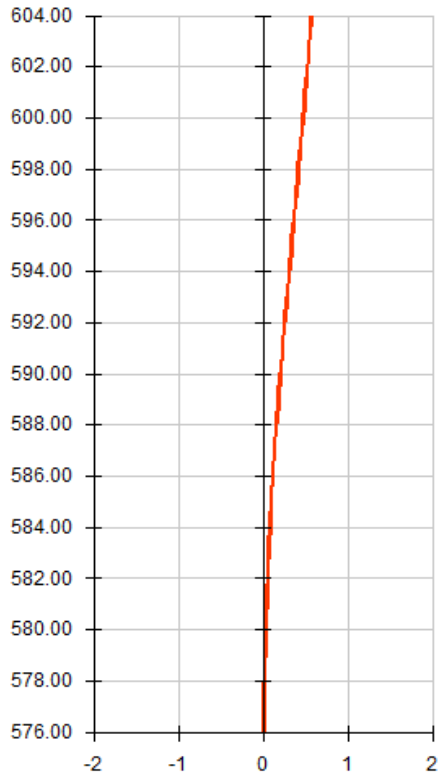


Calculated by: **AMRetain**



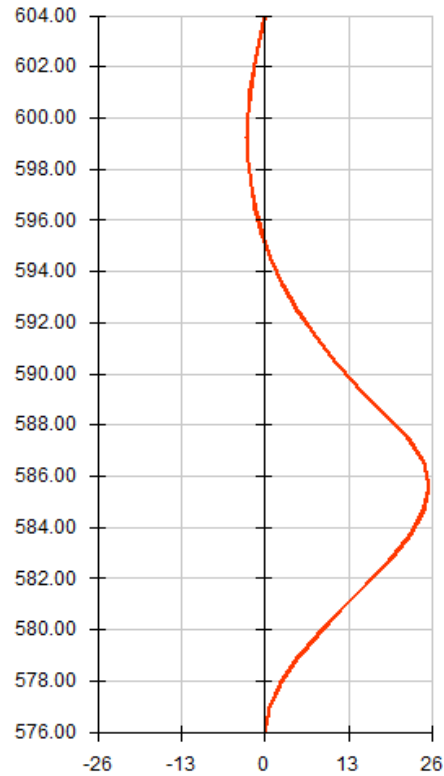
RESULTS (Phase 3)

Displacements [In]



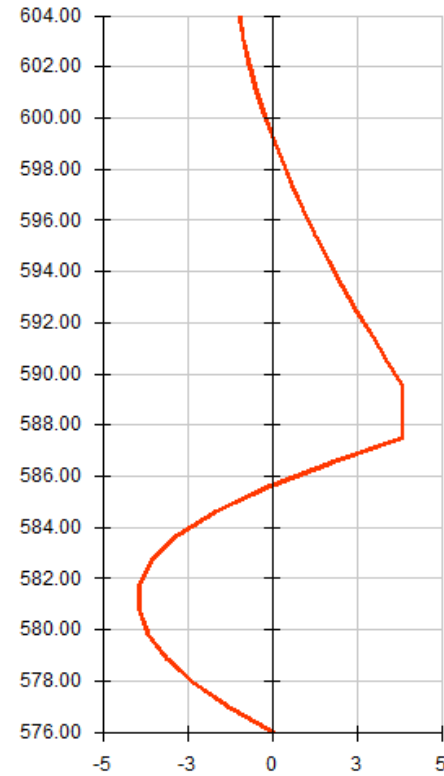
Dmax = 0.569
Dmin = 0.000

Moments [Kips.Ft]



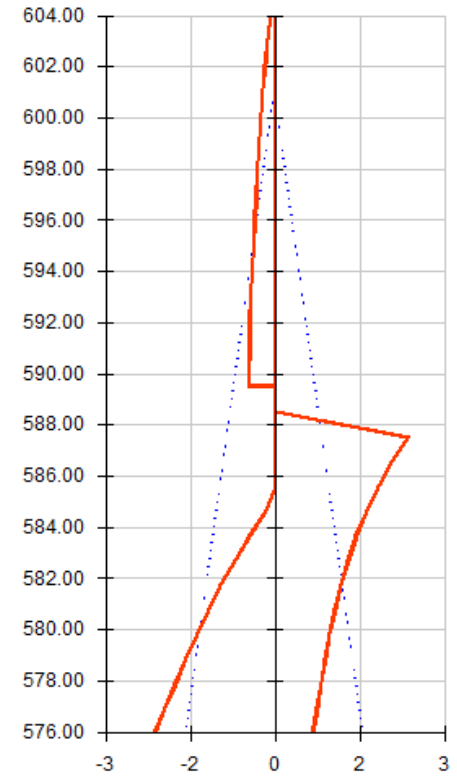
M.k max = 25.570
M.k min = -2.681

Shear forces [Kips]



V.k max = 3.840
V.k min = -3.944

Earth/Water pressures [KsF]



P max = 2.330
P min = -2.132
Pw max = 1.560
Pw min = -1.560



Calculated by: **AMRetain**



RESULTS

PHASE 4 - Long Term - Dredged - Drained

- soil layer modification: SILTY_CLAY_1 on side left z [Ft] = 589.500 φ [°] = 25.00 c [KsF] = 0.200 dc [KsF] = 0.000 kh [KcF] = 200 dkh [KcF] = 0
 kay = 0.381 kac = 1.341 kpy = 3.072 kpc = 4.274 k0 = 0.577 kd = 0.577 kr = 0.577
 - soil layer modification: SILTY_CLAY_1 on side right z [Ft] = 587.500 φ [°] = 25.00 c [KsF] = 0.200 dc [KsF] = 0.000 kh [KcF] = 200 dkh [KcF] = 0
 kay = 0.381 kac = 1.341 kpy = 3.073 kpc = 4.274 k0 = 0.577 kd = 0.577 kr = 0.577
 -horizontal load on wall horizontal load on wall : zt [Ft] = 601.000 zb [Ft] = 599.000 qht [KsF] = 0.00 qhb [KsF] = -0.13
 -horizontal load on wall horizontal load on wall : zt [Ft] = 599.000 zb [Ft] = 576.000 qht [KsF] = -0.13 qhb [KsF] = -0.13
 -horizontal load on wall horizontal load on wall : zt [Ft] = 601.000 zb [Ft] = 599.000 qht [KsF] = 0.00 qhb [KsF] = 0.05

Calculation converged after 5 iterations.

Level [Ft]	Rotation [rad]	Displ. [In]	Moment		Shear force		Soil status		Earth pressure		Water pressure		Vertical pressure		limiting active pressure		limiting passive		Diff. pressures	
			M.k [Kips.Ft]	M.d [Kips.Ft]	V.k [Kips]	V.d [Kips]	left	right	left [KsF]	right [KsF]	left [KsF]	right [KsF]	left [KsF]	right [KsF]	left [KsF]	right [KsF]	left [KsF]	right [KsF]	P.k [KsF]	P.d [KsF]
604.00	-0.00200	0.56	0.00	-	-0.91	-	elastic	excavation	0.10	0.00	0.00	0.00	0.25	0.00	0.10	0.00	0.77	0.00	-0.10	-
603.05	-0.00200	0.54	-0.81	-	-0.79	-	elastic	excavation	0.15	0.00	0.00	0.00	0.37	0.00	0.14	0.00	1.14	0.00	-0.15	-
602.10	-0.00201	0.52	-1.49	-	-0.63	-	elastic	excavation	0.19	0.00	0.00	0.00	0.49	0.00	0.19	0.00	1.52	0.00	-0.19	-
601.15	-0.00202	0.50	-1.99	-	-0.43	-	active press.	excavation	0.23	0.00	0.00	0.00	0.62	0.00	0.23	0.00	1.89	0.00	-0.23	-
600.20	-0.00203	0.47	-2.29	-	-0.21	-	active press.	excavation	0.26	0.00	0.05	0.05	0.69	0.00	0.26	0.00	2.11	0.00	-0.26	-
599.25	-0.00205	0.45	-2.39	-	0.01	-	active press.	excavation	0.29	0.00	0.11	0.11	0.75	0.00	0.29	0.00	2.30	0.00	-0.29	-
598.30	-0.00206	0.43	-2.30	-	0.18	-	active press.	excavation	0.31	0.00	0.17	0.17	0.81	0.00	0.31	0.00	2.49	0.00	-0.31	-
597.35	-0.00207	0.40	-2.04	-	0.36	-	active press.	excavation	0.33	0.00	0.23	0.23	0.87	0.00	0.33	0.00	2.68	0.00	-0.33	-
596.40	-0.00209	0.38	-1.61	-	0.56	-	active press.	excavation	0.35	0.00	0.29	0.29	0.93	0.00	0.36	0.00	2.86	0.00	-0.35	-
595.45	-0.00209	0.35	-0.97	-	0.79	-	active press.	excavation	0.38	0.00	0.35	0.35	0.99	0.00	0.38	0.00	3.04	0.00	-0.38	-
594.50	-0.00210	0.33	-0.11	-	1.03	-	active press.	excavation	0.40	0.00	0.41	0.41	1.05	0.00	0.40	0.00	3.22	0.00	-0.40	-
593.50	-0.00210	0.31	1.06	-	1.31	-	active press.	excavation	0.42	0.00	0.47	0.47	1.11	0.00	0.42	0.00	3.41	0.00	-0.42	-
592.50	-0.00208	0.28	2.52	-	1.62	-	active press.	excavation	0.45	0.00	0.53	0.53	1.17	0.00	0.45	0.00	3.60	0.00	-0.45	-
591.50	-0.00206	0.26	4.30	-	1.94	-	active press.	excavation	0.47	0.00	0.59	0.59	1.23	0.00	0.47	0.00	3.78	0.00	-0.47	-
591.50	-0.00206	0.26	4.30	-	1.94	-	active press.	excavation	0.44	0.00	0.59	0.59	1.23	0.00	0.44	0.00	4.01	0.00	-0.44	-
590.50	-0.00202	0.23	6.40	-	2.26	-	active press.	excavation	0.46	0.00	0.66	0.66	1.28	0.00	0.46	0.00	4.16	0.00	-0.46	-
589.50	-0.00197	0.21	8.83	-	2.60	-	active press.	excavation	0.47	0.00	0.72	0.72	1.32	0.00	0.47	0.00	4.30	0.00	-0.47	-
589.50	-0.00197	0.21	8.83	-	2.60	-	active press.	excavation	0.23	0.00	0.72	0.72	1.32	0.00	0.24	0.00	4.91	0.00	-0.23	-
588.50	-0.00190	0.18	11.48	-	2.71	-	active press.	excavation	0.26	0.00	0.78	0.78	1.38	0.00	0.26	0.00	5.11	0.00	-0.26	-
587.50	-0.00181	0.16	14.26	-	2.85	-	active press.	passive press.	0.28	0.85	0.84	0.84	1.45	0.00	0.28	0.00	5.30	0.86	0.57	-
586.54	-0.00171	0.14	16.65	-	2.11	-	active press.	passive press.	0.31	1.03	0.90	0.90	1.51	0.06	0.31	0.00	5.48	1.03	0.72	-
585.58	-0.00160	0.12	18.26	-	1.22	-	active press.	passive press.	0.33	1.20	0.96	0.96	1.56	0.11	0.33	0.00	5.66	1.20	0.87	-
584.63	-0.00148	0.10	18.95	-	0.19	-	active press.	passive press.	0.35	1.37	1.02	1.02	1.62	0.17	0.35	0.00	5.84	1.37	1.02	-
583.67	-0.00136	0.09	18.59	-	-0.98	-	active press.	passive press.	0.37	1.54	1.08	1.08	1.68	0.22	0.37	0.00	6.01	1.54	1.17	-
582.71	-0.00124	0.07	17.09	-	-2.13	-	elastic	elastic	0.52	1.49	1.14	1.14	1.74	0.28	0.39	0.00	6.19	1.71	0.97	-
581.75	-0.00114	0.06	14.61	-	-2.96	-	elastic	elastic	0.80	1.32	1.20	1.20	1.79	0.33	0.42	0.00	6.37	1.88	0.51	-
580.79	-0.00105	0.05	11.55	-	-3.38	-	elastic	elastic	1.07	1.17	1.26	1.26	1.85	0.39	0.44	0.00	6.54	2.05	0.09	-
579.83	-0.00099	0.03	8.27	-	-3.40	-	elastic	elastic	1.32	1.03	1.32	1.32	1.91	0.45	0.46	0.00	6.72	2.22	-0.30	-
578.88	-0.00094	0.02	5.14	-	-3.07	-	elastic	elastic	1.56	0.90	1.38	1.38	1.96	0.50	0.48	0.00	6.89	2.39	-0.67	-
577.92	-0.00092	0.01	2.50	-	-2.38	-	elastic	elastic	1.80	0.77	1.44	1.44	2.02	0.56	0.50	0.00	7.06	2.56	-1.02	-



Calculated by: **AMRetain**



RESULTS

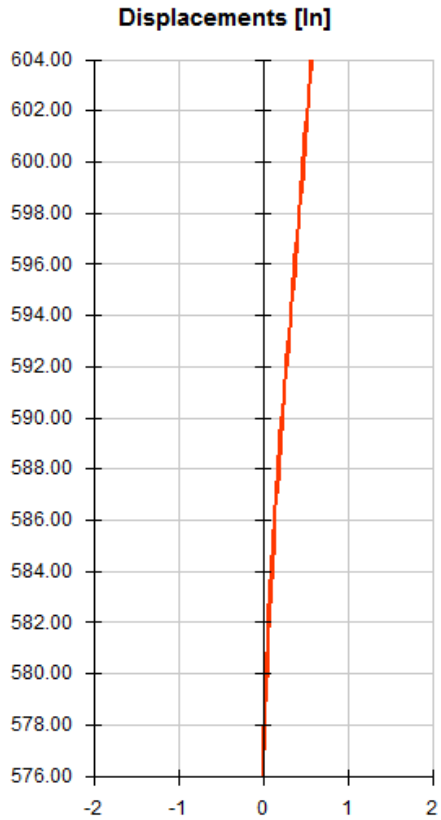
PHASE 4 - Long Term - Dredged - Drained

Level [Ft]	Rotation [rad]	Displ. [In]	Moment		Shear force		Soil status		Earth pressure		Water pressure		Vertical pressure		limiting active pressure		limiting passive		Diff. pressures	
			M.k [Kips.Ft]	M.d [Kips.Ft]	V.k [Kips]	V.d [Kips]	left	right	left	right	left	right	left	right	left	right	left	right	P.k [KsF]	P.d [KsF]
576.96	-0.00091	0.00	0.68	-	-1.36	-	elastic	elastic	2.03	0.65	1.50	1.50	2.08	0.61	0.52	0.00	7.24	2.73	-1.37	-
576.00	-0.00091	-0.01	0.00	-	0.00	-	elastic	elastic	2.26	0.54	1.56	1.56	2.13	0.67	0.54	0.00	7.41	2.90	-1.72	-

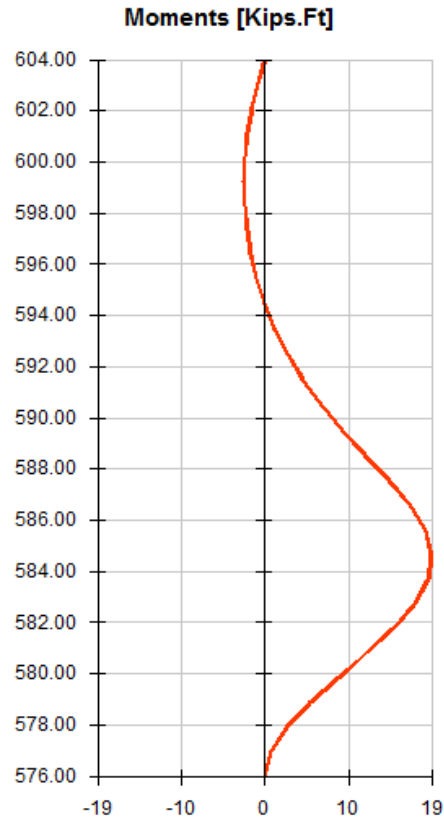
Anchor n° 1 elevation 604 axial force -1.05 Kips

limiting earth resistance [Kips] =22 mobilised earth resistance [Kips] =13 ratio (1) = 1.715

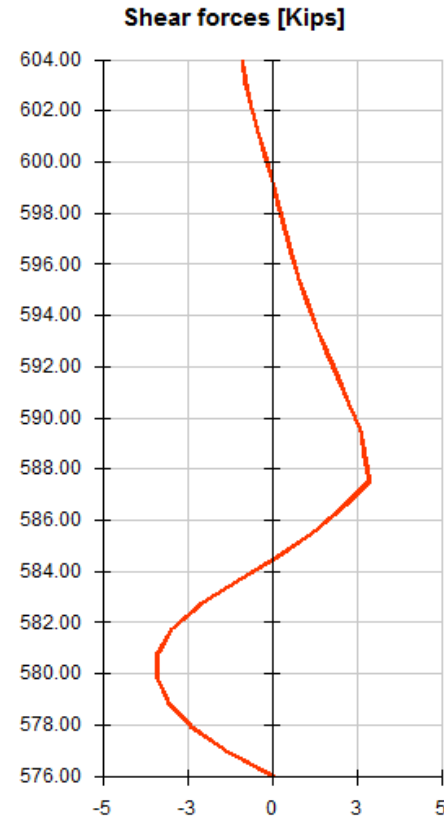
RESULTS (Phase 4)



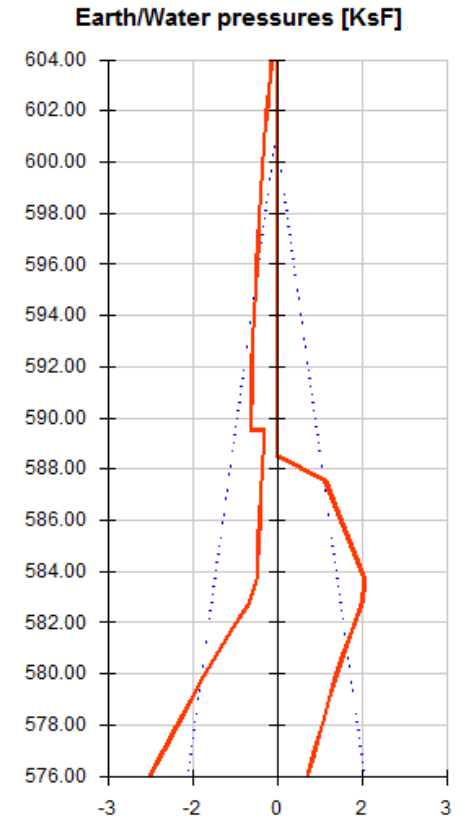
Dmax = 0.564
Dmin = -0.008



M.k max = 18.951
M.k min = -2.386



V.k max = 2.854
V.k min = -3.405



P max = 1.538
P min = -2.258
Pw max = 1.560
Pw min = -1.560



Calculated by: **AMRetain**



RESULTS (Synthesis)

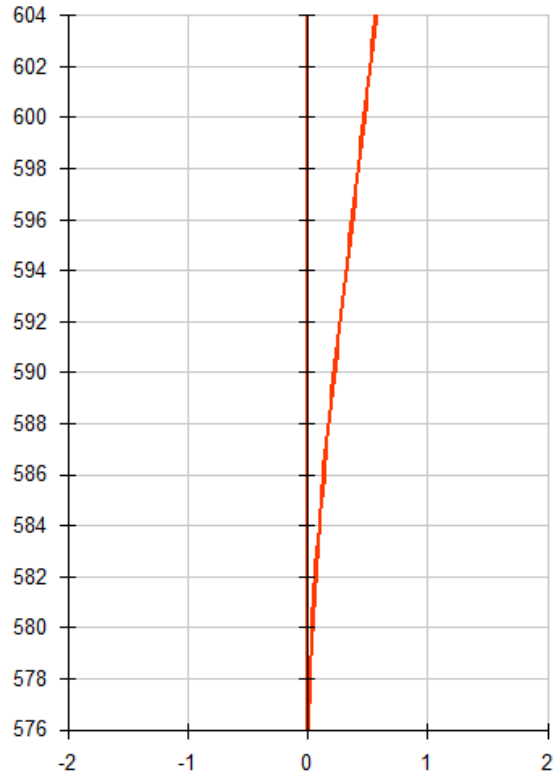
Phase N°	Displac. Head In	Displac. max In	Moment max Kips.Ft	Shear force max Kips	Ratio Earth resist.	Anchor 1 Kips
1	0.49	0.49	27.69	-3.52	6.877	-
2	0.49	0.49	27.69	-3.52	6.877	0.000
3	0.57	0.57	25.57	-3.94	7.446	-1.119
4	0.56	0.56	18.95	-3.40	1.715	-1.047
Extrema	0.57	0.57	27.69	-3.94	1.715	-1.119

RESULTS (Envelope phases 1 to 4)

Level [Ft]	Moment		Shear force		Displacement	
	min [Kips.Ft]	max [Kips.Ft]	min [Kips]	max [Kips]	min [In]	max [In]
0.000	0.00	0.00	0.00	0.00	0.00	0.00
604.000	0.00	0.00	-0.97	0.00	0.00	0.57
603.050	-0.87	0.05	-0.86	0.11	0.00	0.54
602.100	-1.61	0.23	-0.70	0.27	0.00	0.52
601.150	-2.19	0.58	-0.50	0.47	0.00	0.50
600.200	-2.55	1.13	-0.26	0.71	0.00	0.47
599.250	-2.68	1.92	0.00	0.97	0.00	0.45
598.300	-2.55	2.97	0.00	1.25	0.00	0.43
597.350	-2.15	4.30	0.00	1.55	0.00	0.40
596.400	-1.61	5.93	0.00	1.88	0.00	0.38
595.450	-0.97	7.87	0.00	2.22	0.00	0.35
594.500	-0.11	10.16	0.00	2.59	0.00	0.33
593.500	0.00	12.93	0.00	2.92	0.00	0.31
592.500	0.00	15.97	0.00	3.14	0.00	0.28
591.500	0.00	19.21	0.00	3.35	0.00	0.26
591.500	0.00	19.21	0.00	3.35	0.00	0.26
590.500	0.00	22.50	0.00	3.38	0.00	0.23
589.500	0.00	25.59	0.00	3.84	0.00	0.21
589.500	0.00	25.59	0.00	3.84	0.00	0.21
588.500	0.00	27.55	0.00	3.84	0.00	0.18
587.500	0.00	27.69	-0.67	3.84	0.00	0.16
586.542	0.00	26.44	-1.88	2.11	0.00	0.14
585.583	0.00	25.57	-2.72	1.22	0.00	0.12
584.625	0.00	24.68	-3.24	0.19	0.00	0.10
583.667	0.00	22.48	-3.49	0.00	0.00	0.09
582.708	0.00	19.38	-3.56	0.00	0.00	0.07
581.750	0.00	15.77	-3.92	0.00	0.00	0.06
580.792	0.00	11.98	-3.94	0.00	0.00	0.05
579.833	0.00	8.31	-3.67	0.00	0.00	0.03
578.875	0.00	5.14	-3.13	0.00	0.00	0.02
577.917	0.00	2.50	-2.38	0.00	0.00	0.01
576.958	0.00	0.68	-1.36	0.00	0.00	0.01
576.000	0.00	0.00	0.00	0.00	-0.01	0.01

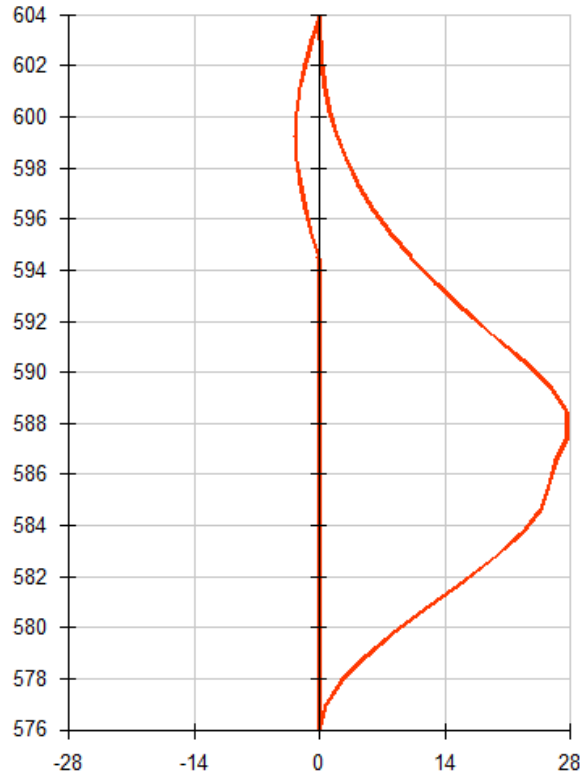
RESULTS (Envelope phases 1 to 4)

Displacements [In]



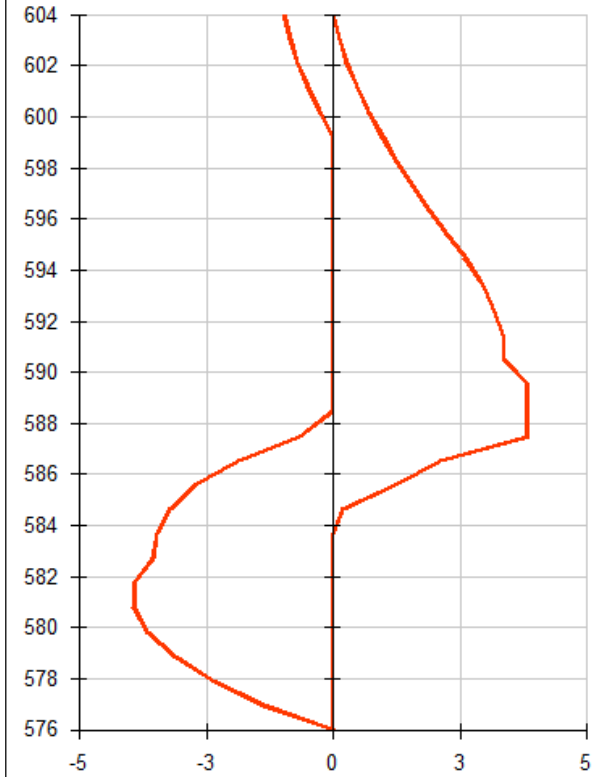
Max = 0.57
Min = -0.01

Moments [Kips.Ft]



Max = 27.69
Min = -2.68

Shear forces [Kips]



Max = 3.84
Min = -3.94



Calculated by: **AMRetain**

