STRUCTURE GEOTECHNICAL REPORT

068-0512

Existing SN 068-0026

FAP 777 (IL 185) over McDavid Branch
Section 405 B-1
Montgomery County

D-96-109-09

Contract 72D08

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217-782-6703

Date: *June 28, 2013*

Checked By: BKL

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Date: *September 24, 2013*

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Attachments:
Preliminary TSL
Subsurface Profile
Boring Logs
Special Provisions
Graphs

This Report has been prepared based on a preliminary TSL dated November 2011. Contact the author if there are any questions regarding this Report or if there are modifications to structure location, size, geometry, or vertical alignment.

Electronic copies of boring logs are available upon request for inclusion in the plans.

This Report has been prepared according to the 2008 IDOT Bureau of Bridges and Structures Bridge Manual and AASHTO LRFD Bridge Design Specifications 5th Edition – 2010 with 2008, 2009 Interims.

Project Description and Proposed Structure Information

The project includes replacing an existing 43± ft long single span closed abutment structure carrying IL 185 over McDavid Branch with a new 71± ft long and 35± ft wide, single span structure. The proposed structure includes integral abutments. Work will be completed under staged construction.

Site Investigation

The existing structure is located in rolling terrain on 15± ft of fill. Primary land use is a mix of rural residential and agriculture. Near the structure embankment slopes are 2H: 1V or flatter. No slope stability problems were observed along the embankment. The side slopes of the channel banks are 1H: 1V or steeper and show signs of sloughing. No signs of pavement settlement are visible.

The existing structure was originally constructed in 1930 and reconstructed in 1982. The existing abutments are founded on timber piles. No pile driving data is available.

Borings were advanced by the District 6 drill crew using hollow stem auger methods according to AASHTO T 206 and the IDOT Geotechnical Manual. Borings were obtained at the proposed abutment locations on the existing IL 185 lanes. The boring data indicates layers of Silty Clay, Silty Clay Loam and Clay Loam over 20ft of Sand over a Silty Clay Till.

Borings were filled with cuttings immediately after drilling to allow traffic on the roadway. Ground water was encountered during drilling at the east abutment at an elevation of 586± ft, and an elevation of 591±ft at the west abutment.

Geotechnical Evaluation

Settlement. Settlement is not anticipated to be a problem since no change in grade is proposed.

Slope Stability. The slope stability analysis models a 2H:1V end slope at the east abutment between elevation 584.7 ft and 604.4 ft which corresponds to the pavement elevation and the bottom of rock elevation. The analysis is based on the more critical Boring 2 E. Abut data. The resulting factor of safety is 1.9. No slope stability problems are anticipated.

Seismic Considerations. The following table shows recommended seismic design data based on a 1000 year return period event.

Seismic Performance Zone (SPZ)	3
Spectral Acceleration at 1 second (S_{D1})	0.305g
Design Spectral Acceleration at 0.2 Seconds (S_{DS})	0.694g
Soil Site Class	E

Seismic Performance Zone 3 requires liquefaction and seismic slope stability analysis to be performed.

Liquefaction. In general the liquefiable layers are interbedded with non-liquefiable layers beginning at elevation 583±ft and terminating at 570±ft at the east abutment. At the west abutment liquefiable layers begin at 588±ft and terminate at 565±ft. The individual layers are approximately 2.5 ft thick.

Seismic Settlement. The potential liquefaction induced settlement at the east abutment is 8 inches and 6 inches at the west abutment based on Geotechnical Engineering Circular No. 3 Figure 62. The liquefiable layers are at depths of 20ft and 30ft below the bottom of abutment. The magnitude of settlement would permit the structure to remain in service with some restrictions. As such, no remedial action is warranted.

Seismic Slope Stability. The stability of a 2:1 end slope using a peak horizontal ground acceleration of 0.111g with a return period of 5% in 50 years has been analyzed at the east and west abutments. The factor-of-safety is 1.4 at the east abutment and 2.4 at the west abutment. Slope stability problems are not anticipated following a seismic event.

Scour. The design scour elevation at each abutment is equal to the bottom of the abutment elevation shown on the TSL; adjustments may be made during final design.

Mining Activity. ISGS records indicate no mines located near the proposed project location.

Foundation Evaluation

Axial Loading

Preliminary maximum factored loads, provided by the structure designer, are approximately 945 kips vertical at the abutments. Spread footings will not be evaluated because of inadequate bearing capacity. Drilled shafts will not be evaluated because the required shaft depth would make them uneconomical when compared to driven piles. A driven pile foundation is recommended at each substructure.

Because bedrock was not encountered; Metal Shell and H-Piles were analyzed. Medium to hard driving may occur from elevation +/- 562.00' to +/-556.00' on the West Abutment. Metal Shell pile shoes are recommended at the West Abutment.

H-Piles penetrate this layer and will require an additional 25-30ft of pile to reach sufficient bearing. Therefore we recommend the use of Metal Shell piles.

Piles lengths should be determined by using the Factored Resistance Available (FRA), and/or Seismic Resistance Available (SRA) for each pile type at each location (*see Pile Bearing vs. Estimated Length graphs*). Integral abutments are proposed.

The following table shows Max. Nominal Required Bearing (NRB), Max.Factored Resistance Available (FRA) and Max. Seismic Resistance Available (SRA) for each pile size.

West Abutment (Maximums)

Pile Section	NRB, kips	FRA, kips	Seismic Downdrag, kips	SRA, kips
MS-12" w/0.25" wall	353	194	101	252
MS-14" w/0.25" wall	413	227	117	296
MS-14" w/0.312" wall	513	282	117	396
HP 10x42	335	184	41	294
HP 12x53	419	230	49	370
HP 12x63	497	273	49	448
HP 14x73	578	318	58	520
HP 14x89	705	388	58	647

East Abutment (Maximums)

Pile Section	NRB, kips	FRA, kips	Seismic Downdrag, kips	SRA, kips
MS-12" w/0.25" wall	353	194	73	280
MS-14" w/0.25" wall	413	227	85	328
MS-14" w/0.312" wall	513	282	85	428
HP 10x42	335	184	48	287
HP 12x53	419	230	58	361
HP 12x63	497	273	58	439
HP 14x73	578	318	69	509
HP 14x89	705	388	69	636

Pile Cutoff Table

Location	SN 068-0512	
	Ground Surface Elev. During Driving	Cutoff Elev.
West Abutment	596.95	598.95
East Abutment	596.86	598.86

Lateral Loading

The pile response to lateral loads at abutments has been analyzed using the Reese COM624 method (AllPile software). The analysis models a single vertical pile with a fixed connection between the pile and abutment. A horizontal load is applied to the top of pile modeling superstructure expansion. No P-Multiplier has been used in this analysis. The passive resistance of abutment backfill is not included in the abutment analysis.

Lateral analysis for the abutment was modeled by applying a 10 kip (horizontal) load on the pile 2ft. above the bottom of the abutment towards the embankment under *Fixed Head* conditions.

Soil inputs have been provided to facilitate a more detailed analysis by the structural engineer.

West Abutment (COM624 Input Data)								
Bottom Elevation, ft	Soil	γ', pcf	ϕ°	c, ksf	k, psi	E_{50}	D_r	N-spt
593.2	Clay Loam Fill	115	–	1.1	279	0.0086		5
591.7	Silty Clay Loam	105	–	2.0	27.7	0.02		2
586.2	Sand/Gravel	57.6	30	0	29		30	8
583.7	Silty Clay	47.6	–	0.8	120	0.0098		4
561.7	Sand/Gravel	57.6	33	0	29		36	11
553.7	Stiff Clay	67.6	–	5.0	1635	0.0039		37
534.7	Stiff Clay	57.6	–	3.8	1247	0.0047		15
East Abutment (COM624 Input Data)								
Bottom Elevation, ft	Soil	γ', pcf	ϕ°	c, ksf	k, psi	E_{50}	D_r	N-spt
583.3	Soft Clay	110	–	0.5	50	0.016		2
580.8	Med Sand	42.6	26	0	10		7	2
579.3	Loam	47.6	–	0.6	70	0.014		4
576.8	Med Sand	42.6	26	0	10		7	2
574.3	Loam	52.6	–	1.1	270	0.009		7
562.3	Sand	62.6	33	0	70		58	23
519.8	Stiff Clay	62.6	–	4.3	1433	0.0045		20

$\gamma' = \gamma - \gamma_w$
γ' = effective unit wt. of soil
γ = dry unit wt. of soil
γ_w = unit wt. of water (62.4 pcf)
c = cohesion
ϕ = phi angle
k = subgrade modulus
E_{50} = strain at 50% deflection in p-y curve
D_r = relative density
N = blow count for standard penetration test (average for the layer)

The structure designer should be aware that the information shown in the graphs is based on simplified models, and it should only be used for preliminary pile sizing and layout. The fixity elevations for both abutments are shown in the following graphs, (Lateral Load vs. Deflection & Max. Moment) and (Pile Deflection & Force vs. Depth) for each pile type.

Approach Pavement

Foundation conditions beneath proposed approach pavement footings have been reviewed, based on available boring data, the available bearing capacity is greater than required. For structure replacement projects experience indicates approach pavement footings do not experience excessive settlement when there is no new fill beneath the footing and it is constructed on undisturbed soil. No remedial action in required. *Do not show the maximum applied service bearing pressure (Qmax) on the structure plans.*

Construction Considerations

Stage Construction: Temporary soil retention will be needed to facilitate excavating at abutments during stage I construction. The maximum retained height is approximately 14 ft. At the abutments the piling will encounter low strength silty clay and sand before reaching a high strength till and will be unable to achieve the required embedment. Therefore, a temporary cantilevered sheet pile wall is not feasible. The special provision (GBSP 44) for Temporary Soil Retention System should be used.

Ground Improvement: No ground improvement is required.

Earthwork: No unusual construction conditions are expected.

Foundation Construction: No unusual construction conditions are anticipated. It does not appear there are any conflicts with the existing foundation. Test piles are recommended at each substructure farthest from the boring locations. Shoes are required with the use of Metal Shell piles (West Abutment only).

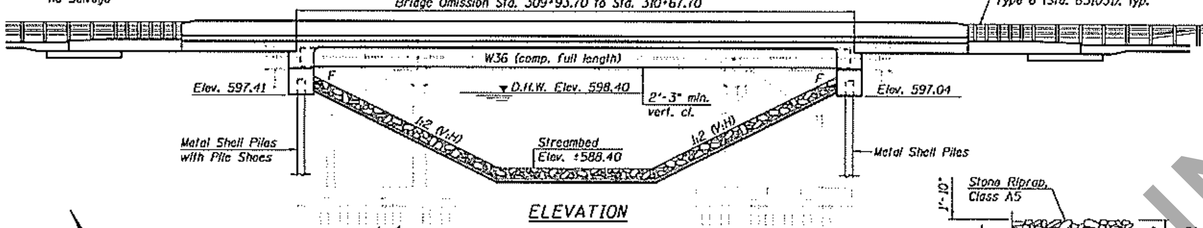
The following is a list of spreadsheets and software programs that were used in the geotechnical analysis:

- *Slide5.0* by Rocscience
- Seismic Site Class Determination Spreadsheet by BBS (Modified 12/10/10)
- AASHTO Guide Specifications for LRFD Seismic Bridge Design 2007
- IDOT Static Method of Estimating Pile Length by BBS (Modified 10/18/11)
- *AllPile* by Civil Tech

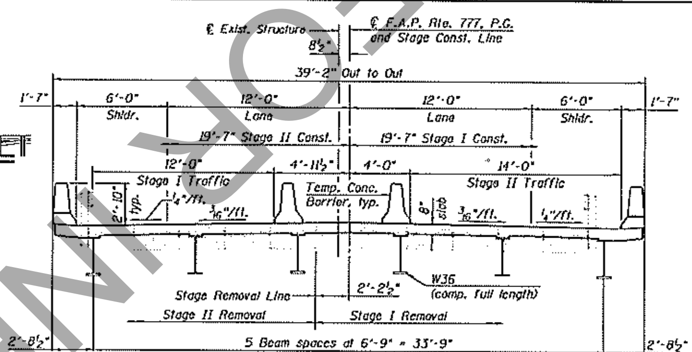
Bench Mark: Chiseled "□" in the north end of east concrete approach slab set in N.E. corner of bridge S.N. 068-0026. Elev. 604.176.

Existing Structure: S.N. 068-0026 was originally built in 1930 as SA RT9, Section 1-A.M.F.T. and reconstructed in 1982 as F.A. Route 777, Section 405 BR at Station 310+30.70. The existing structure consists of single span PPC deck beams on closed abutments. 43'-0" bk. to bk. of abutments and 33'-0" out to out of deck. The structure is to be removed and replaced. Traffic to be maintained utilizing stage construction.

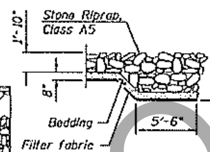
No Salvage



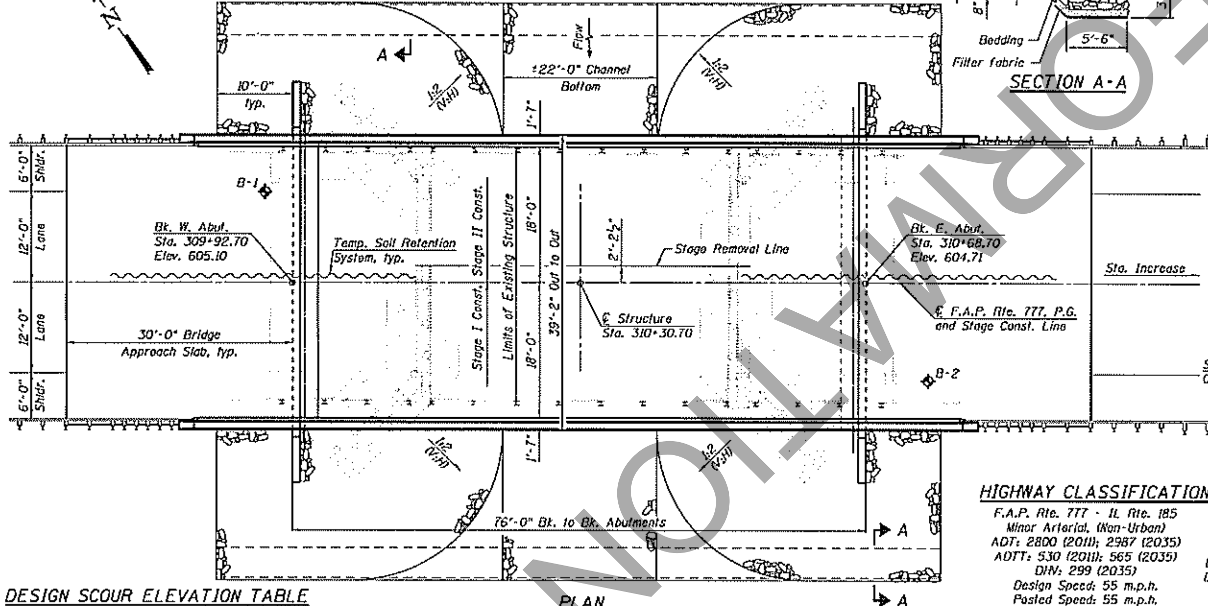
ELEVATION



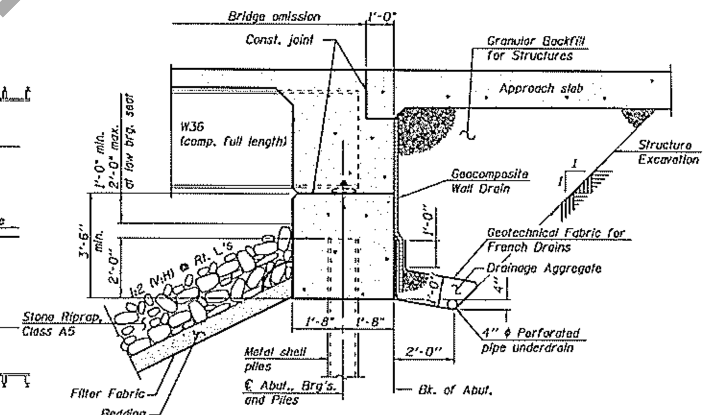
CROSS SECTION
(Looking East)



SECTION A-A



PLAN



SECTION THRU INTEGRAL ABUTMENT

HIGHWAY CLASSIFICATION

F.A.P. Rte. 777 - IL Rte. 185
Minor Arterial, (Non-Urban)
ADT: 2800 (2011); 2987 (2035)
ADTT: 530 (2011); 565 (2035)
DHV: 299 (2035)
Design Speed: 55 m.p.h.
Posted Speed: 55 m.p.h.
Two-Way Traffic
Directional Distribution: 50/50

LOADING HL-93

Allow 50#/sq. ft. for future wearing surface.

DESIGN SPECIFICATIONS

2013 Interim Revisions to AASHTO LRFD Bridge Design Specifications, 6th Edition

DESIGN STRESSES

FIELD UNITS

f'c = 3,500 psi
fy = 60,000 psi (Reinforcement)
fy = 50,000 psi (M270 Grade 50W)

SEISMIC DATA

Seismic Performance Zone (SPZ) = 3
Design Spectral Acceleration at 1.0 sec. (S_{D1}) = 0.305g
Design Spectral Acceleration at 0.2 sec. (S_{DS}) = 0.694g
Soil Site Class = E

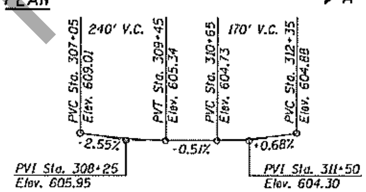
DESIGN SCOUR ELEVATION TABLE

	Design Scour Elevations (ft.)	
	W. Abut.	E. Abut.
Q100	597.41	597.04
Q500	597.41	597.04

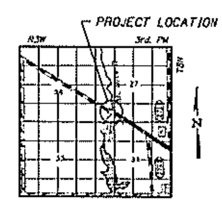
WATERWAY INFORMATION

Drainage Area = 4.8 sq. mi.
Exist. Low Grade Elev. = 604.35 @ Sta. 311+00
Prop. Low Grade Elev. = 604.40 @ Sta. 311+00

Flood	Freq. Yr.	Q C.F.S.	Opening Sq. Ft. Exist.	Opening Sq. Ft. Prop.	Nat. H.W.E.	Head - Ft. Exist.	Head - Ft. Prop.	Headwater El. Exist.	Headwater El. Prop.
	10	1540	220	280	597.30	0.7	0.4	598.00	597.70
Design	50	2510	265	340	598.40	1.4	0.7	599.80	599.10
Base	100	2950	280	370	598.80	1.8	0.9	600.60	599.80
Max. Calc.	500	4050	320	420	599.80	4.5	2.3	604.30	602.10



PROFILE GRADE
(Along ℄ of roadway)



LOCATION SKETCH

GENERAL PLAN AND ELEVATION
ILLINOIS ROUTE 185 OVER McDAVID BRANCH
F.A.P. RTE. 777 - SEC. 405B-1
MONTGOMERY COUNTY
STATION 310+30.70
STRUCTURE NO. 068-0512

wbks

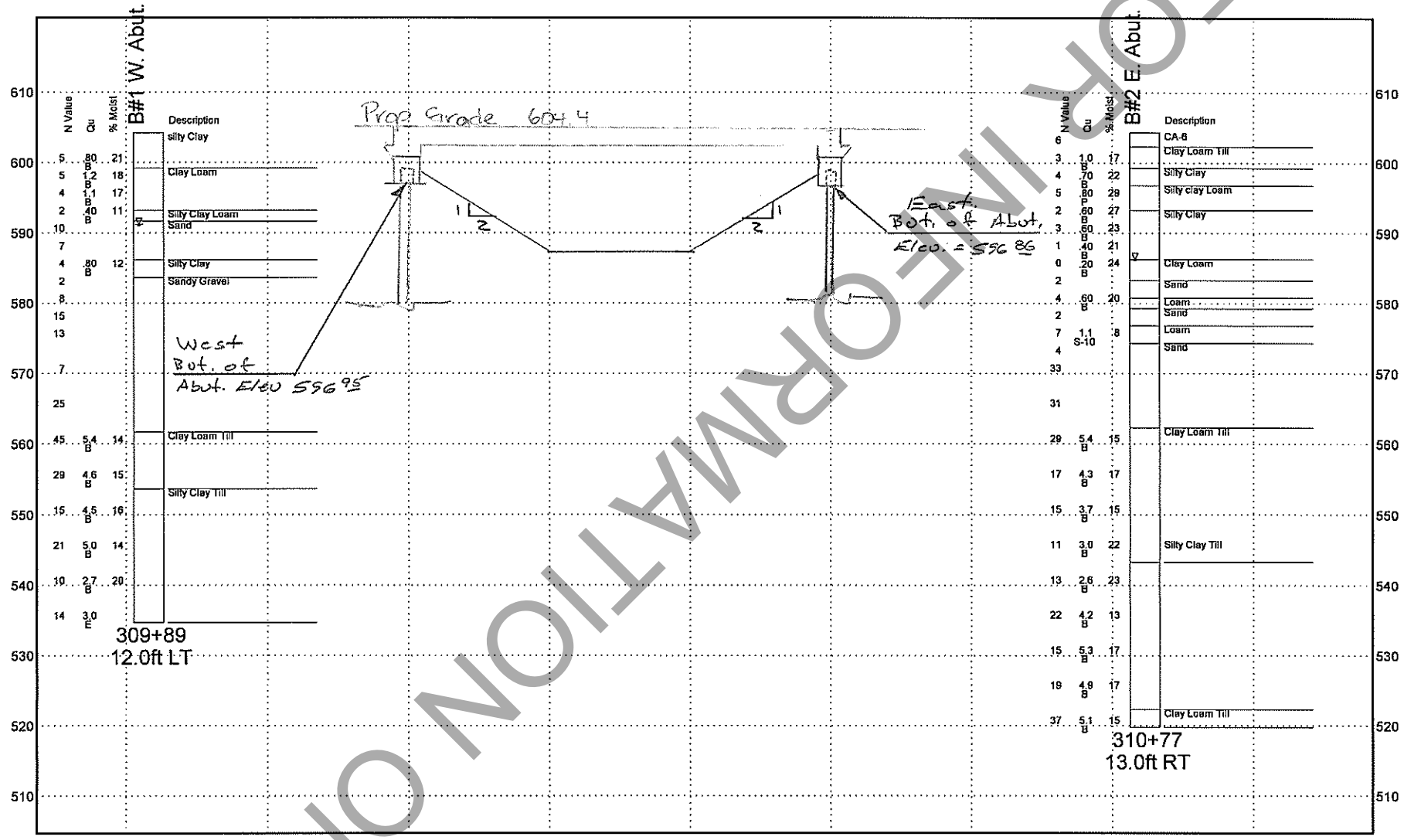
USER NAME =	DESIGNED - BRD	REVISED	
FILE NAME =	CHECKED - CWC	REVISED	
PLOT DATE =	DRAWN - DLH	REVISED	
PLOT DATE = 10/29/2013	CHECKED - BRD	REVISED	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

GENERAL PLAN
STRUCTURE NO. 068-0512
SHEET NO. 1 OF 1 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
777	405B-1	MONTGOMERY	1	1
		CONTRACT NO. 72D08		
	ILLINOIS FED. AID PROJECT			

Structure Number 068-0026 over McDavid Branch Creek
Located in the SW 1/4 of Section 27, Township 8N, Range 3W of the 3 P.M.



NOT TO HORIZONTAL SCALE

Illinois Department of Transportation
Division of Highways
I DOT

VARIATIONS IN SUBSURFACE CONDITIONS MAY EXIST BETWEEN BORINGS

Groundwater
- First Encounter
- Completion
- after (refer to log) hours

Abbreviations
WOH - Sampler Advanced by Weight of Hammer, WOP - Weight of Pipe
B.S. - Before Seating

SUBSURFACE DATA PROFILE

Route: IL-185
Section: 405B-1
County: Montgomery

SUBSURFACE DATA PROFILE 068-0026.GPJ D6TEMPLT.GDT 6/26/13

SUBSURFACE DATA PROFILE 068-0026.GPJ D6TEMPLT.GDT 6/26/13

Illinois Department of Transportation

Division of Highways
District 6

SOIL BORING LOG

Date 2/21/12

ROUTE IL-185 DESCRIPTION over McDavid Branch Creek LOGGED BY M. Tappan

SECTION 405B-1 LOCATION SW 1/4, SEC. 27, TWP. 8N, RNG. 3W, 3 PM

COUNTY Montgomery DRILLING METHOD HSA HAMMER TYPE 140 # AUTO

STRUCT. NO. 068-0026
Station 310+31

BORING NO. 1 W. Abut.
Station 309+89
Offset 12.0ft LT
Ground Surface Elev. 604.2 ft

Surface Water Elev. 590.2 ft
Stream Bed Elev. 589.2 ft

Groundwater Elev.:
▽ First Encounter 591.2 ft
▽ Upon Completion Washed ft
▼ After Plugged Hrs. ft

DEPTH (ft)	BLOWS /6"	UCS Qu (tsf)	MOIST (%)	Material
				Brown and Olive Gray Moist SILTY CLAY (Fill)
	1			
	2	.80	21	
	3	B		
599.20				
-5				
				Olive Brown and Gray Moist CLAY LOAM (Till) (Fill)
	2			
	2	1.2	18	
	3	B		
	1			
	2	1.1	17	
	2	B		
-10				
	0			
593.20				
	1	.40	11	Dark Gray Moist LOAM to SILTY CLAY LOAM
	1	B		
591.70				
				Gray Dirty Medium SAND ▽
	1			
	4			
	6			
-15				
	1			
	2			Brown Medium to Coarse SAND
	5			
586.20				
	4			Brown and Gray Moist SILTY CLAY
	2	.80	12	
	2	B		Washed
-20				

DEPTH (ft)	BLOWS /6"	UCS Qu (tsf)	MOIST (%)	Material
583.70				
	0			Gray Medium SANDY GRAVEL
	1			Washed
	1			
	2			Gray Dirty Fine SAND
	2			Washed
	6			
-25				
	2			Gray Medium SANDY GRAVEL
	6			Washed
	9			
	3			Washed
	4			
	9			
-30				
	1			
	3			Washed
	4			
-35				
	7			Washed
	10			
	15			
-40				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer, E-Estimated)
Abbreviations W.O.H - Sampler Advanced By Weight of Hammer, W.O.P - Advanced by Weight of Pipe, B.S. - Before Seating
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) BBS, from 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
District 6

SOIL BORING LOG

Date 2/21/12

ROUTE IL-185 DESCRIPTION over McDavid Branch Creek LOGGED BY M. Tappan

SECTION 405B-1 LOCATION SW 1/4, SEC. 27, TWP. 8N, RNG. 3W, 3 PM

COUNTY Montgomery DRILLING METHOD HSA HAMMER TYPE 140 # AUTO

STRUCT. NO. 068-0026
Station 310+31

BORING NO. 1 W. Abut.
Station 309+89
Offset 12.0ft LT
Ground Surface Elev. 604.2 ft

Surface Water Elev. 590.2 ft
Stream Bed Elev. 589.2 ft

Groundwater Elev.:
▽ First Encounter 591.2 ft
▽ Upon Completion Washed ft
▼ AfterPluggedHrs. ft

DEPTH (ft)	BLOWS /6"	UCS Qu (tsf)	MOIST (%)	Description
				Gray Medium SANDY GRAVEL *(continued)*
561.70				
	8			Grayish Brown Moist CLAY LOAM (Till)
	15	5.4	14	Drilled stiff at 42.5'
	30	B		Washed
-45				
	8			Brown and Gray Moist CLAY LOAM (Till)
	12	4.6	15	Washed
	17	B		
-50				
553.70				
				Gray Moist SILTY CLAY (Till)
	0			Washed
	5	4.5	16	
	10	B		
-55				
	10			Washed
	8	5.0	14	
	13	B		
-60				

DEPTH (ft)	BLOWS /6"	UCS Qu (tsf)	MOIST (%)	Description
				Gray Moist SILTY CLAY (Till) *(continued)*
	1			Washed
	4	2.7	20	
	6	B		
-65				
	2			Washed
	6	3.0		
	8	E		
534.70				
-70				Boring Completed
				Ref. Sta. to Centerline of Ex. Structure = 310+31 Sta. Increase to East
				Ref. Elev. to Chsld Square on NE Approach Slab = 604.2
-75				
-80				

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Illinois Department of Transportation
Division of Highways
District 6

SOIL BORING LOG

Date 2/17/12

ROUTE IL-185 DESCRIPTION over McDavid Branch Creek LOGGED BY M. Tappan

SECTION 405B-1 LOCATION SW 1/4, SEC. 27, TWP. 8N, RNG. 3W, 3 PM

COUNTY Montgomery DRILLING METHOD HSA HAMMER TYPE 140 # AUTO

STRUCT. NO. 068-0026
Station 310+31

BORING NO. 2 E. Abut.
Station 310+77
Offset 13.0ft RT
Ground Surface Elev. 604.3 ft

Surface Water Elev. 590.2 ft
Stream Bed Elev. 589.2 ft

Groundwater Elev.:
▽ First Encounter 586.3 ft
▽ Upon Completion Washed ft
▼ AfterPluggedHrs. ft

DEPTH (ft)	BLOWS /6"	UCS Qu (tsf)	MOIST (%)	Description
	1			Brown to Black Moist CA-6 with CINDERS (Fill)
	3			
602.30	3			
				Olive Brown and Light Blue Gray Moist CLAY LOAM (Till) (Fill)
	1			
	1	1.0	17	
599.30 -5	2	B		
				Gray Very Moist SILTY CLAY (Fill)
	1			
	2	.70	22	
596.80	2	B		
				Gray Dirty Medium SAND to Gray Moist SILTY CLAY LOAM (Fill)
	1			
	3	.80	29	
-10	2	P		
593.30	0			
	1	.60	27	Very Dark Gray Moist SILTY CLAY
	1	B		
	0			
	1	.60	23	Gray Moist SILTY CLAY
	2	B		
-15				
	0			
	0	.40	21	Light Olive Brown and Gray Moist SILTY CLAY with Very Wet Seam at 16.5 - 17.5
	1	B		
▽ 586.30				
	0			Gray Wet SANDY CLAY LOAM
	0	.20	24	
	0	B		
-20	WOH			

DEPTH (ft)	BLOWS /6"	UCS Qu (tsf)	MOIST (%)	Description
	0			Gray Wet SANDY CLAY LOAM *(continued)*
583.30				
	1			Light Brown Dirty Medium SAND with Some Pea GRAVEL
	1			
580.80	0			
	0	.60	20	Gray Moist LOAM
	4	B		
579.30 -25				
	1			Brown Medium SAND
	1			
	1			
576.80	1			
				Gray Moist LOAM Washed
	4			
	4	1.1	8	
	3	S-10		
574.30 -30				
	0			Tan Medium to Coarse SAND
	1			Washed
	3			
	4			Washed
	12			Tan Fine SAND
	21			
-35				
	6			Brown Medium to Coarse SAND with Some Medium Pea GRAVEL Washed
	16			
	15			
-40				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer, E-Estimated)
Abbreviations W.O.H - Sampler Advanced By Weight of Hammer, W.O.P - Advanced by Weight of Pipe, B.S. - Before Seating
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Illinois Department of Transportation
Division of Highways
District 6

SOIL BORING LOG

Date 2/17/12

ROUTE IL-185 DESCRIPTION over McDavid Branch Creek LOGGED BY M. Tappan

SECTION 405B-1 LOCATION SW 1/4, SEC. 27, TWP. 8N, RNG. 3W, 3 PM

COUNTY Montgomery DRILLING METHOD HSA HAMMER TYPE 140 # AUTO

STRUCT. NO. 068-0026
Station 310+31

BORING NO. 2 E. Abut.
Station 310+77
Offset 13.0ft RT
Ground Surface Elev. 604.3 ft

Surface Water Elev. 590.2 ft
Stream Bed Elev. 589.2 ft

Groundwater Elev.:
▽ First Encounter 586.3 ft
▽ Upon Completion Washed ft
▼ After Plugged Hrs. ft

DEPTH (ft)	BLOWS /6"	UCS Qu (tsf)	MOIST (%)	Description
				Tan Medium to Coarse SAND *(continued)*
				562.30
				Brown and Gray Moist CLAY LOAM (Till)
				Drilled Stiff at 42'
	8			Washed
	14	5.4	15	
	15	B		
-45				
	2			Gray Moist CLAY LOAM (Till)
				Washed
	7	4.3	17	
	10	B		
-50				
	4			Washed
	5	3.7	15	
	10	B		
-55				
	3			Washed
	4	3.0	22	
	7	B		
-60				
				543.30
				Brown and Olive Gray Moist SILTY CLAY (Till)
	2			Washed
	5	2.6	23	
	8	B		
-65				
	5			Washed
	9	4.2	13	
	13	B		
-70				
				Brown and Olive Gray Moist SILTY CLAY (Till)
	2			Washed
	5	5.3	17	
	10	B		
-75				
	3			Washed
	8	4.9	17	
	11	B		
-80				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer, E-Estimated)
Abbreviations W.O.H - Sampler Advanced By Weight of Hammer, W.O.P - Advanced by Weight of Pipe, B.S. - Before Seating
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) BBS, from 137 (Rev. 8-99)

Illinois Department of Transportation
Division of Highways
District 6

SOIL BORING LOG

Date 2/17/12

ROUTE IL-185 DESCRIPTION over McDavid Branch Creek LOGGED BY M. Tappan

SECTION 405B-1 LOCATION SW 1/4, SEC. 27, TWP. 8N, RNG. 3W, 3 PM

COUNTY Montgomery DRILLING METHOD HSA HAMMER TYPE 140 # AUTO

STRUCT. NO. 068-0026
Station 310+31

BORING NO. 2 E. Abut.
Station 310+77
Offset 13.0ft RT
Ground Surface Elev. 604.3 ft

Surface Water Elev. 590.2 ft
Stream Bed Elev. 589.2 ft

Groundwater Elev.:
▽ First Encounter 586.3 ft
▼ Upon Completion Washed ft
▼ After Plugged Hrs. ft

DEPTH (ft)	BLOWS /6"	UCS Qu (tsf)	MOIST (%)	
Brown and Olive Gray Moist SILTY CLAY (Till) *(continued)*				
522.30				
Gray Moist CLAY LOAM (Till) with 6" SAND LOAM Seam				
Washed	5			
	19	5.1	15	
519.80	18	B		
Boring Completed				
-85				
Ref. Sta. to Centerline of Ex. Structure = 310+31 Sta. Increase to East				
Ref. Elev. to Chsld Square on NE Approach Slab = 604.2				
-90				
-95				
-100				

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer, E-Estimated)
Abbreviations W.O.H - Sampler Advanced By Weight of Hammer, W.O.P - Advanced by Weight of Pipe, B.S. - Before Seating
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) BBS, from 137 (Rev. 8-99)

File Name S:\SOILS\GINT FILES\MONTGOMERY\068-0026.GPJ Data Template D6TEMPLT.GDT Date Printed 6/26/13
Latitude 39.06.146N Longitude 89.24.901W Datum NAD83 Job Number D-96-109-09

TEMPORARY SOIL RETENTION SYSTEM
Effective: December 30, 2002
Revised : May 11, 2009

Description. This work shall consist of designing, furnishing, installing, adjusting for stage construction when required and subsequent removal of the temporary soil retention system according to the dimensions and details shown on the plans and in the approved design submittal.

General. The temporary soil retention system shall be designed by the Contractor as a minimum, to retain the exposed surface area specified in the plans or as directed by the Engineer.

The design calculations and details for the temporary soil retention system proposed by the Contractor shall be submitted to the Engineer for approval. The calculations shall be prepared and sealed by an Illinois Licensed Structural Engineer. This approval will not relieve the Contractor of responsibility for the safety of the excavation. Approval shall be contingent upon acceptance by all involved utilities and/or railroads.

Construction. The Contractor shall verify locations of all underground utilities before installing any of the soil retention system components or commencing any excavation. Any disturbance or damage to existing structures, utilities or other property, caused by the Contractor's operation, shall be repaired by the Contractor in a manner satisfactory to the Engineer at no additional cost to the Department. The soil retention system shall be installed according to the Contractor's approved design, or as directed by the Engineer, prior to commencing any related excavation. If unable to install the temporary soil retention system as specified in the approved design, the Contractor shall have the adequacy of the design re-evaluated. Any reevaluation shall be submitted to the Engineer for approval prior to commencing the excavation adjacent to the area in question. The Contractor shall not excavate below the maximum excavation line shown in the approved design without the prior permission of the Engineer. The temporary soil retention system shall remain in place until the Engineer determines it is no longer required.

The temporary soil retention system shall be removed and disposed of by the Contractor when directed by the Engineer. When allowed, the Contractor may elect to cut off a portion of the temporary soil retention system leaving the remainder in place. The remaining temporary soil retention system shall be removed to a depth which will not interfere with the new construction, and as a minimum, to a depth of 12 in. (300 mm) below the finished grade, or as directed by the Engineer. Removed system components shall become the property of the Contractor.

When an obstruction is encountered, the Contractor shall notify the Engineer and upon concurrence of the Engineer, the Contractor shall begin working to break up, push aside, or remove the obstruction. An obstruction shall be defined as any object (such as but not limited to, boulders, logs, old foundations etc.) where its presence was not obvious or specifically noted on the plans prior to bidding, that cannot be driven or installed through or around, with normal driving or installation procedures, but requires additional excavation or other procedures to remove or miss the obstruction.

Method of Measurement. The temporary soil retention system furnished and installed according to the Contractor's approved design or as directed by the Engineer will be measured for payment in place, in square feet (square meters). The area measured shall be the vertical exposed surface area envelope of the excavation supported by temporary soil retention system. Portions of the temporary soil retention system left in place for reuse in later stages of construction shall only be measured for payment once.

Any temporary soil retention system installed beyond those dimensions shown on the contract plans or the approved contractor's design without the written permission of the Engineer, shall not be measured for payment but shall be done at the contractor's own expense.

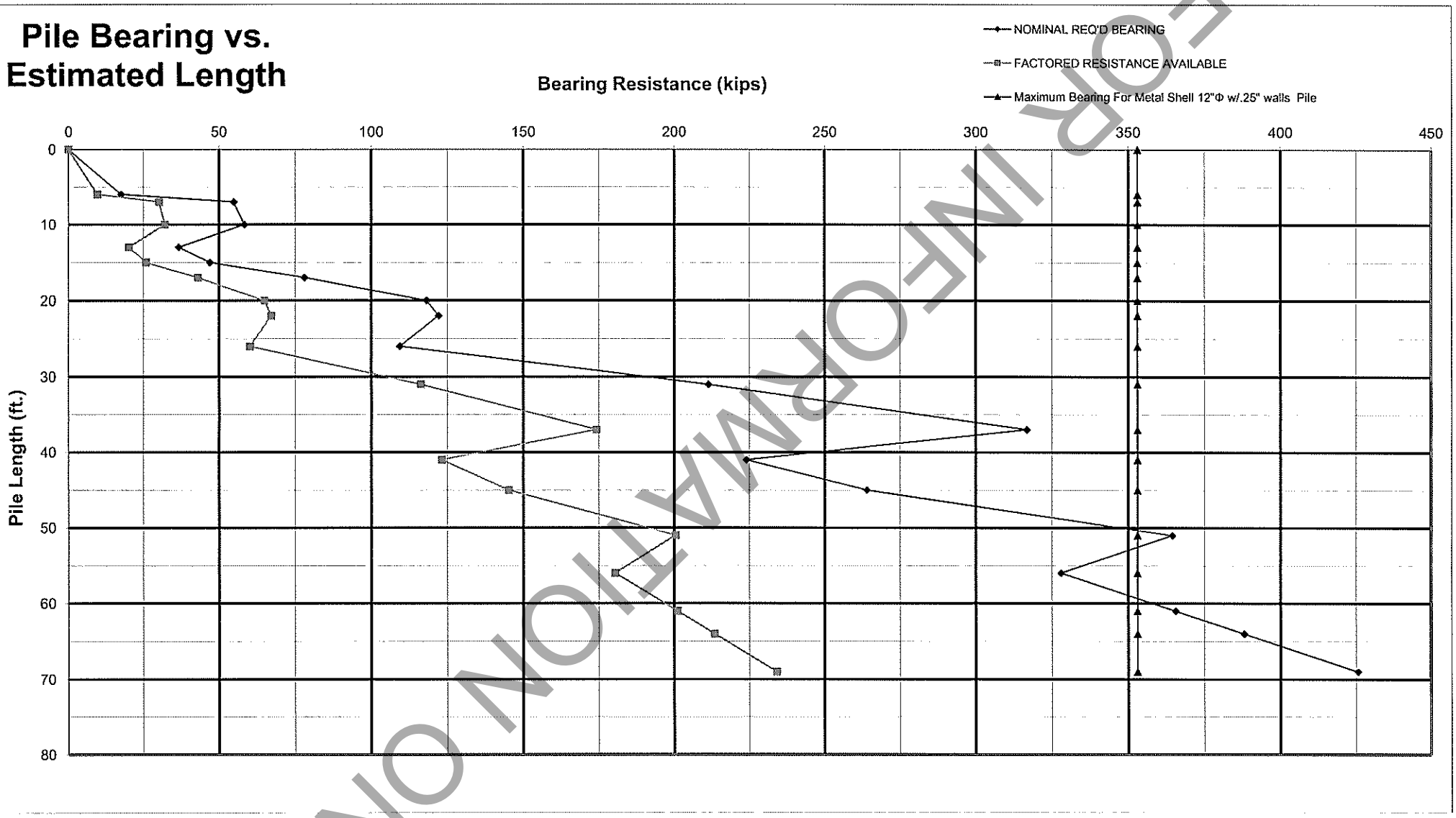
Basis of Payment. This work will be paid for at the contract unit price per square foot (square meter) for TEMPORARY SOIL RETENTION SYSTEM.

Payment for any excavation, related solely to the installation and removal of the temporary soil retention system and/or its components, shall not be paid for separately but shall be included in the unit bid price for TEMPORARY SOIL RETENTION SYSTEM. Other excavation, performed in conjunction with this work, will not be included in this item but shall be paid for as specified elsewhere in this contract.

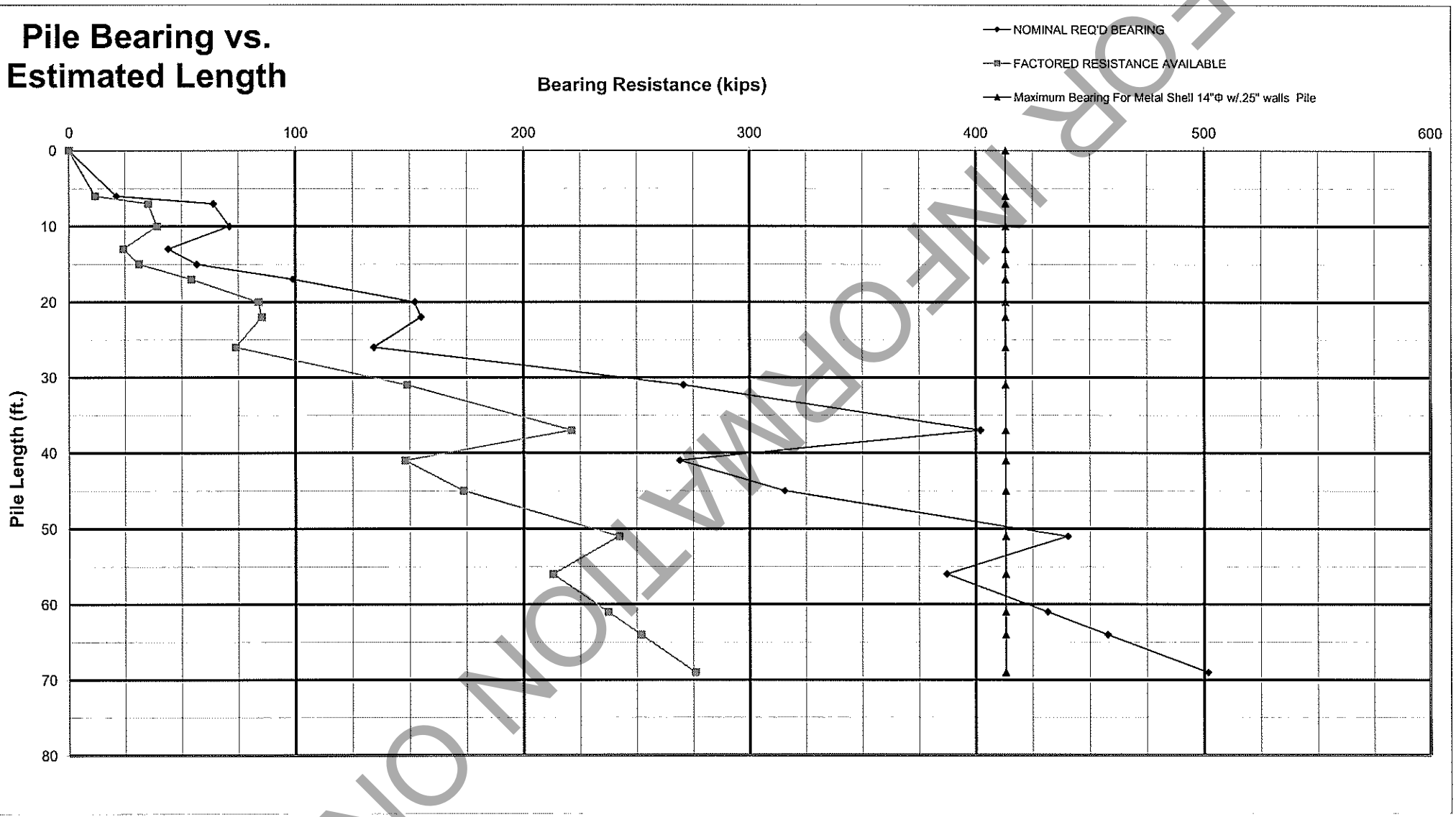
Obstruction mitigation shall be paid for according to Article 109.04 of the Standard Specifications.

SN 068-0512
West Abutment
(Static Bearing Analysis)

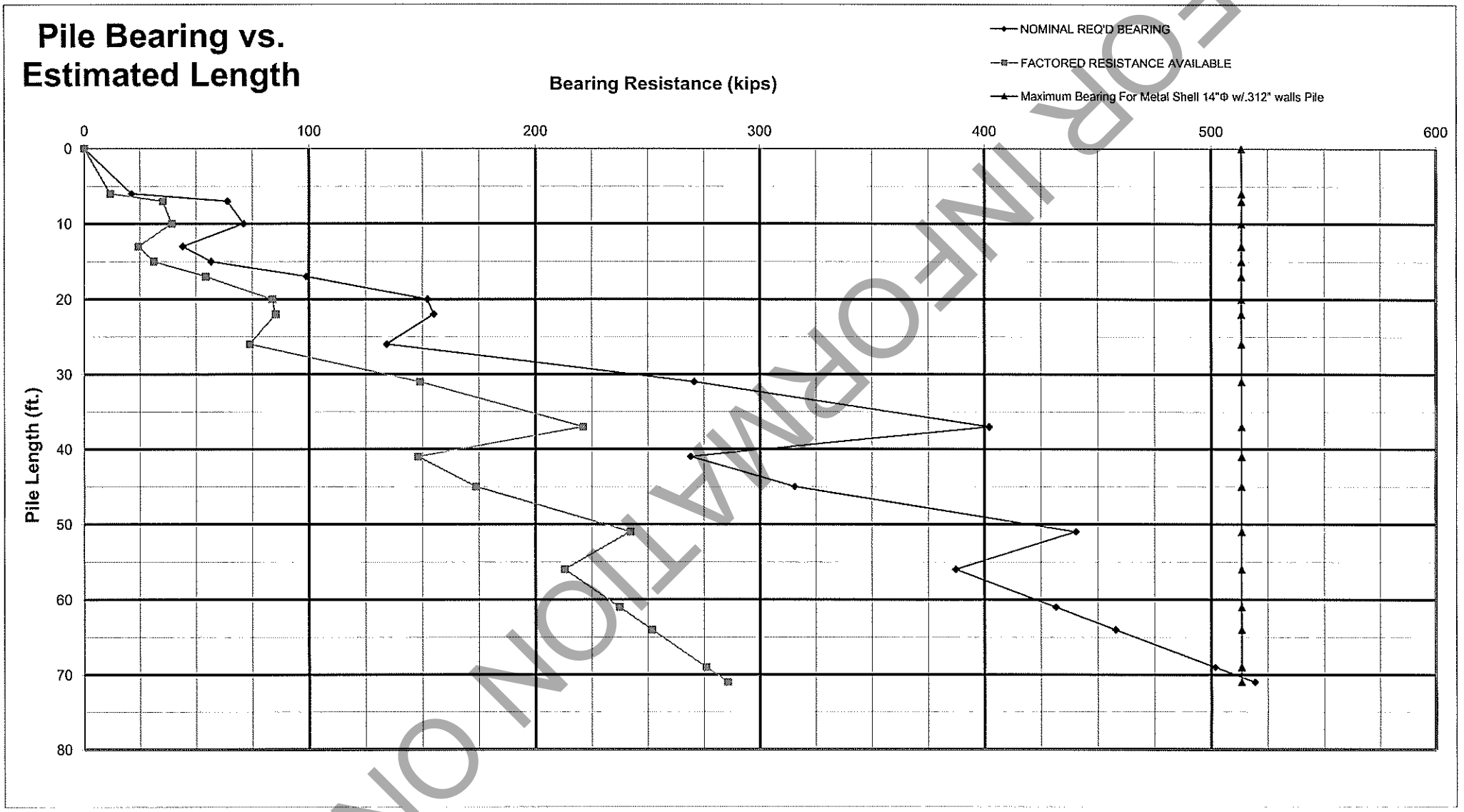
Pile Bearing vs. Estimated Length



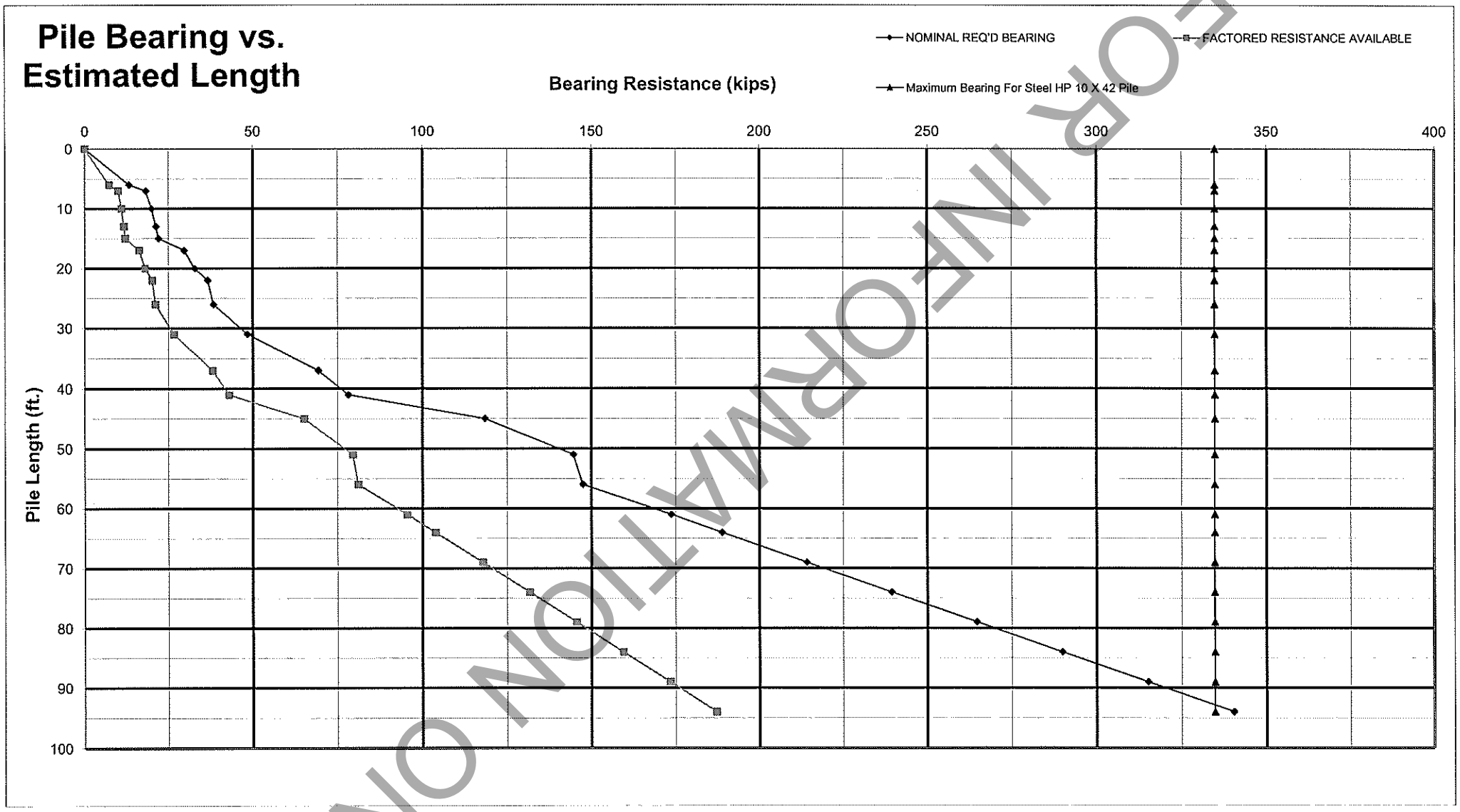
Pile Bearing vs. Estimated Length



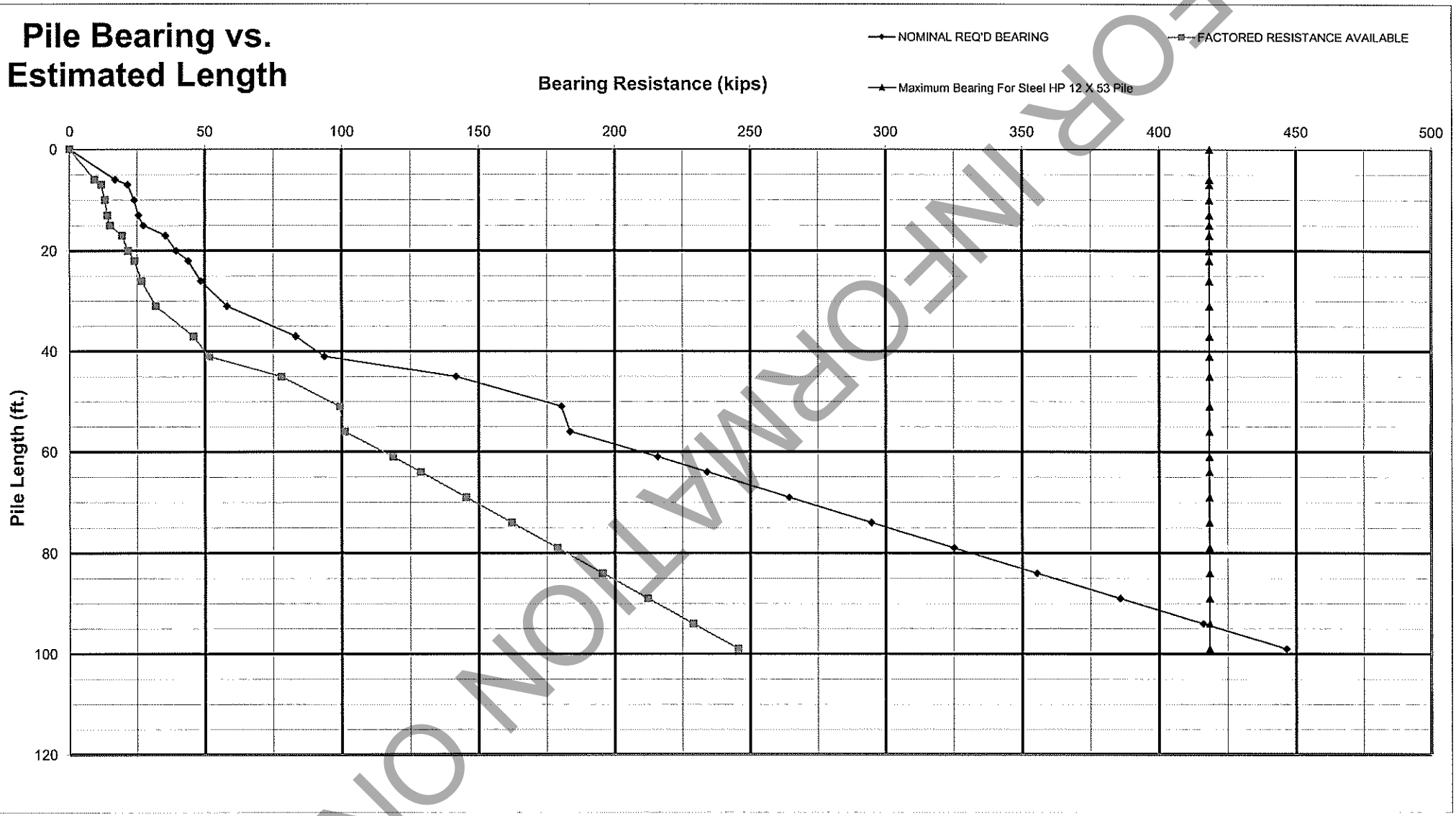
Pile Bearing vs. Estimated Length



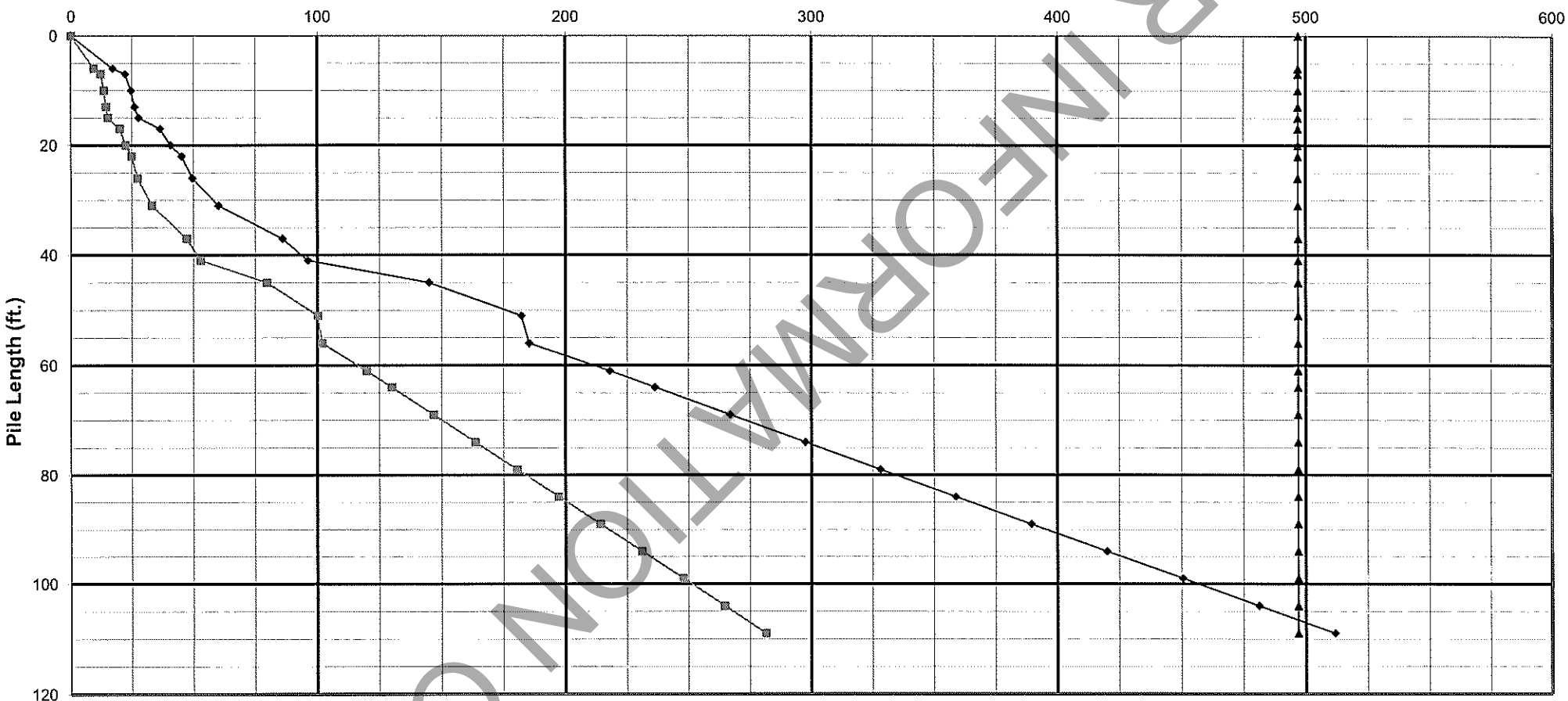
Pile Bearing vs. Estimated Length



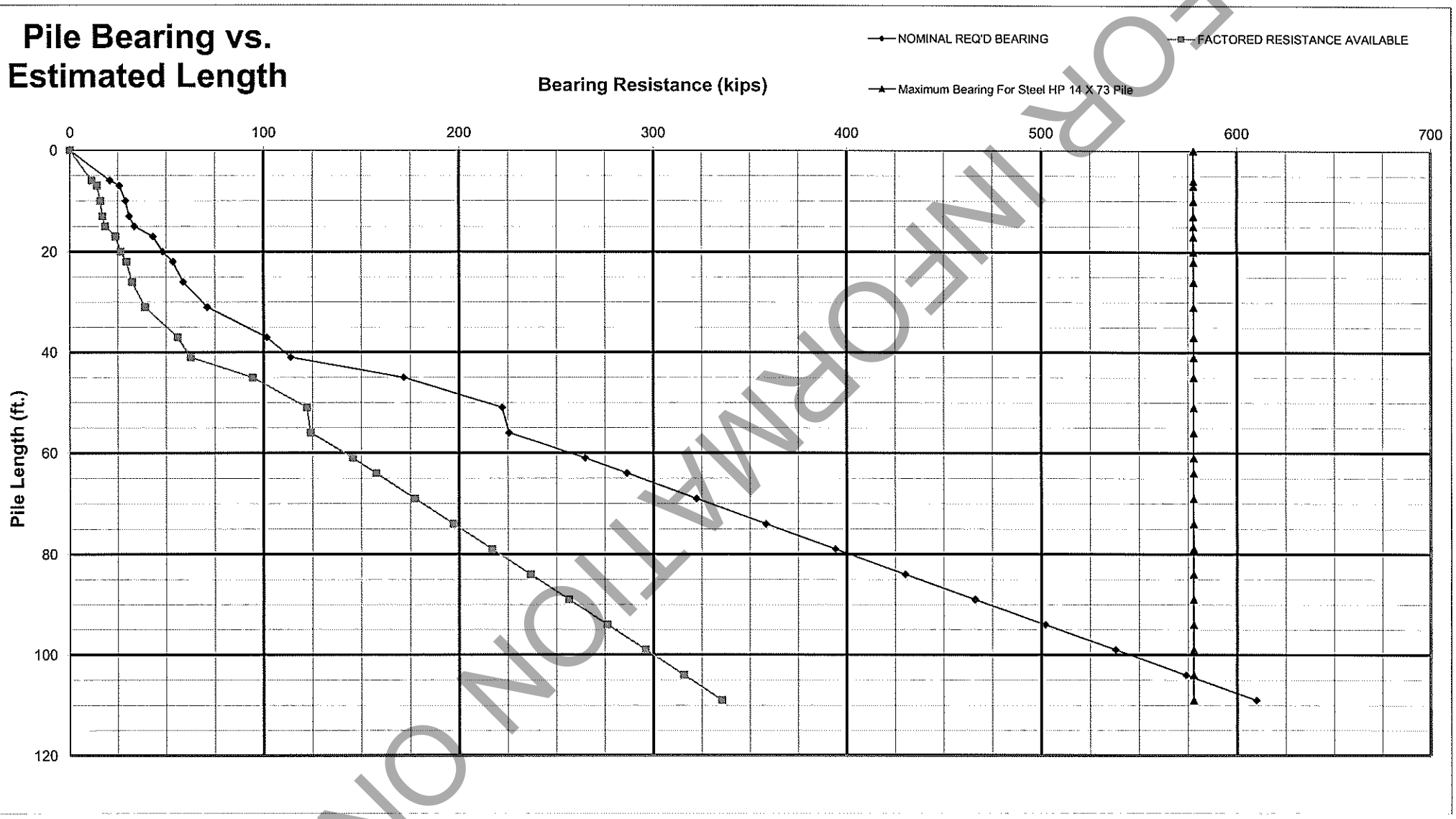
Pile Bearing vs. Estimated Length



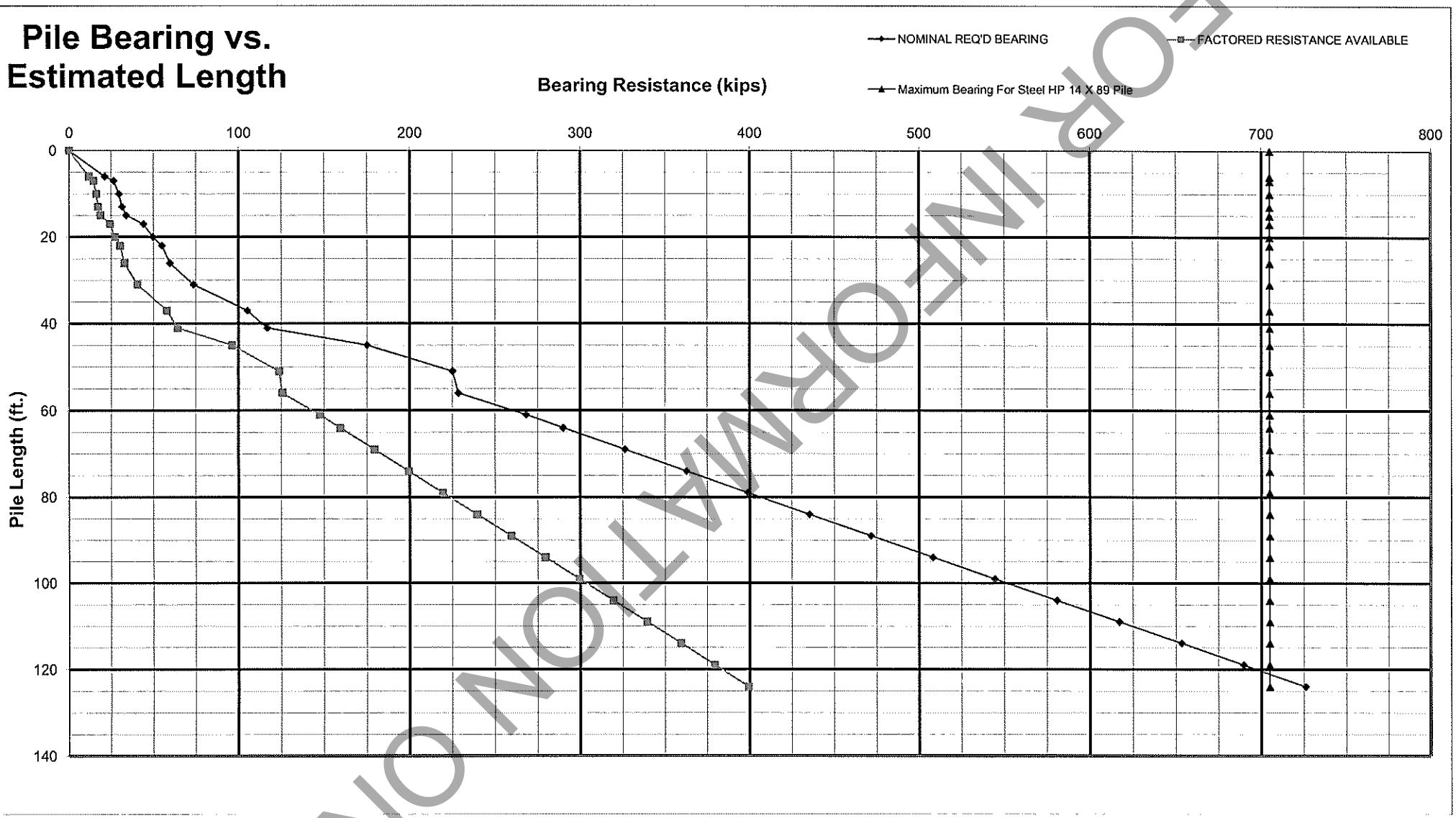
Pile Bearing vs. Estimated Length



Pile Bearing vs. Estimated Length

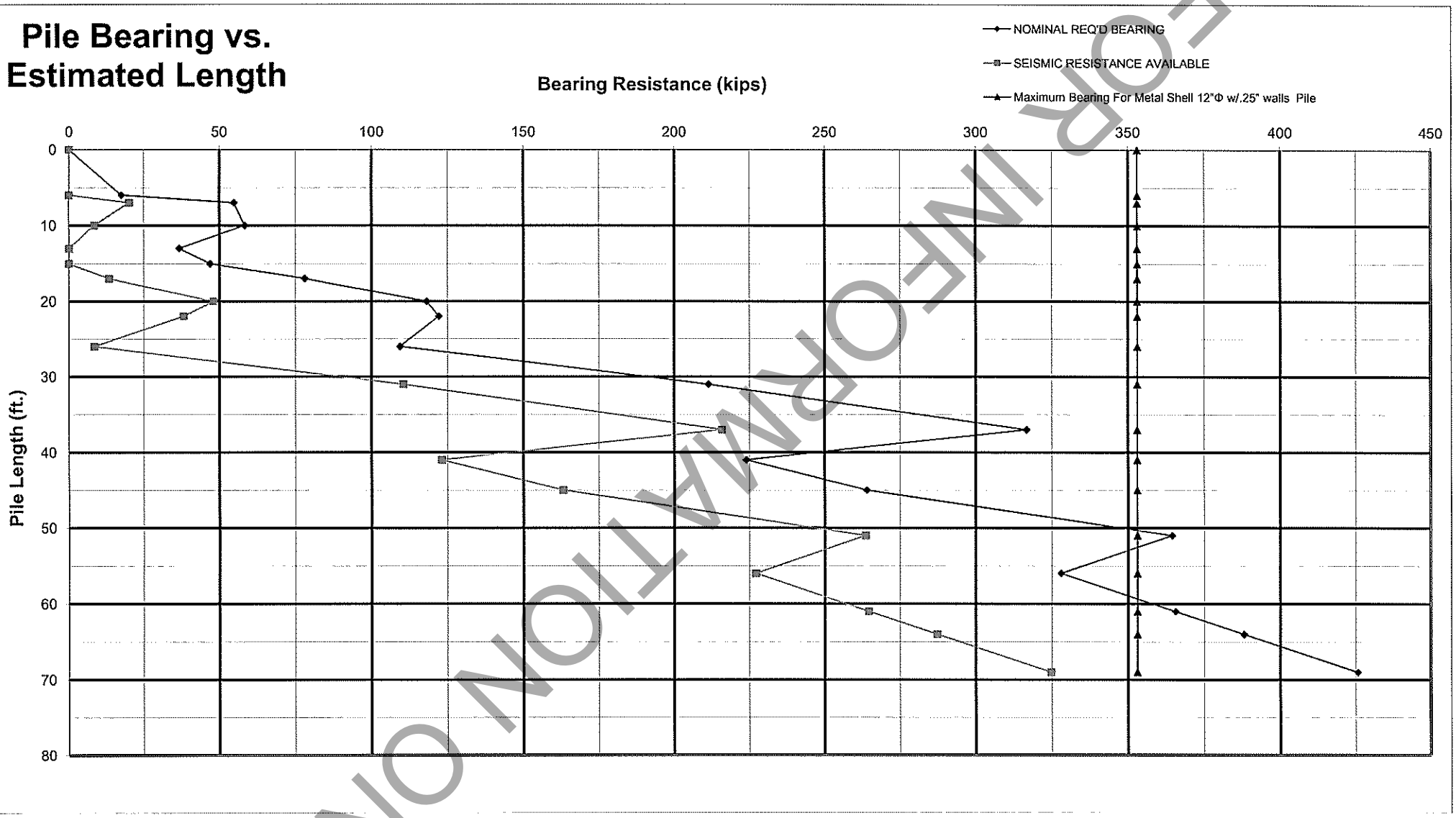


Pile Bearing vs. Estimated Length

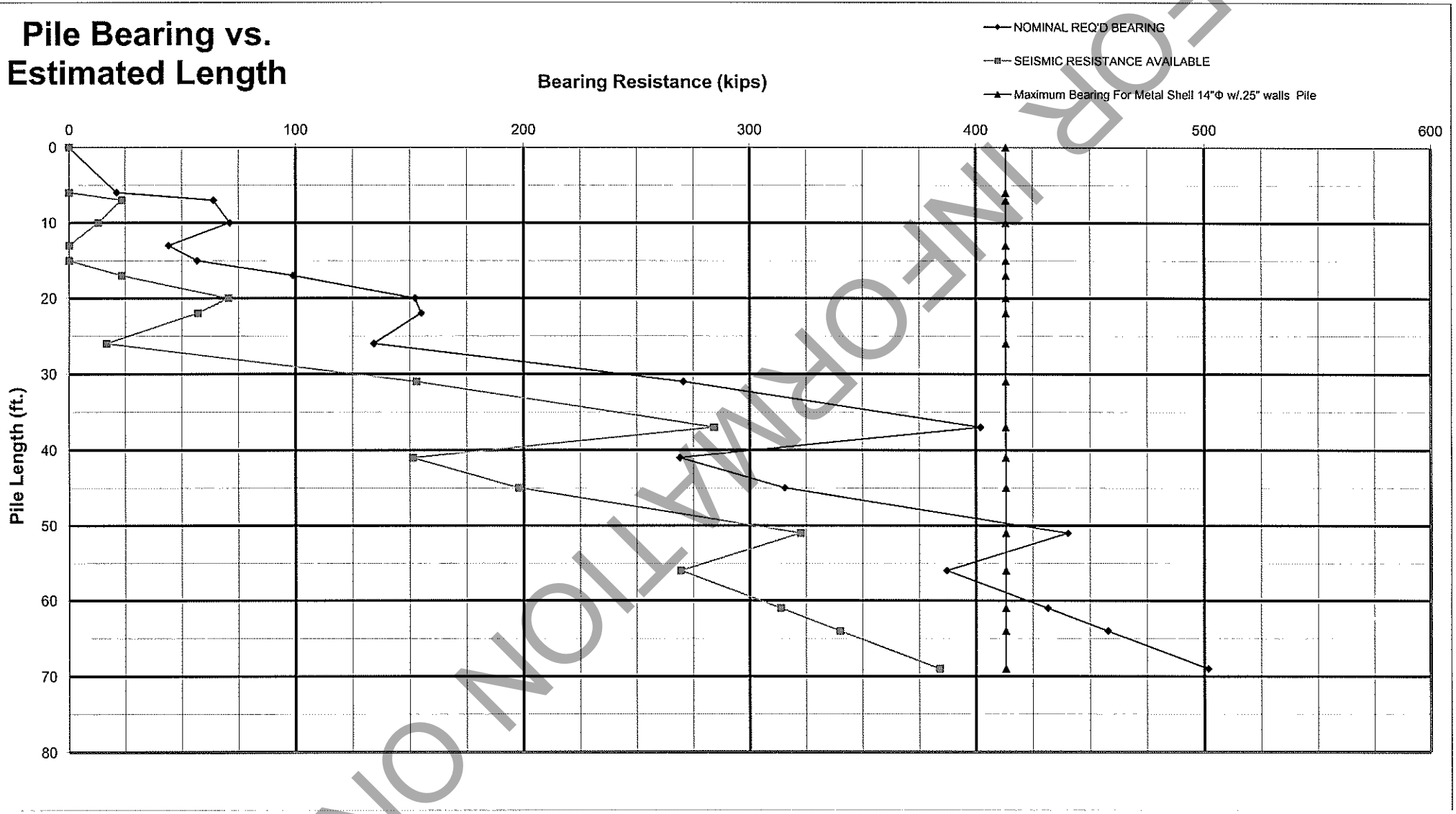


SN 068-0512
West Abutment
(Seismic Bearing Analysis)

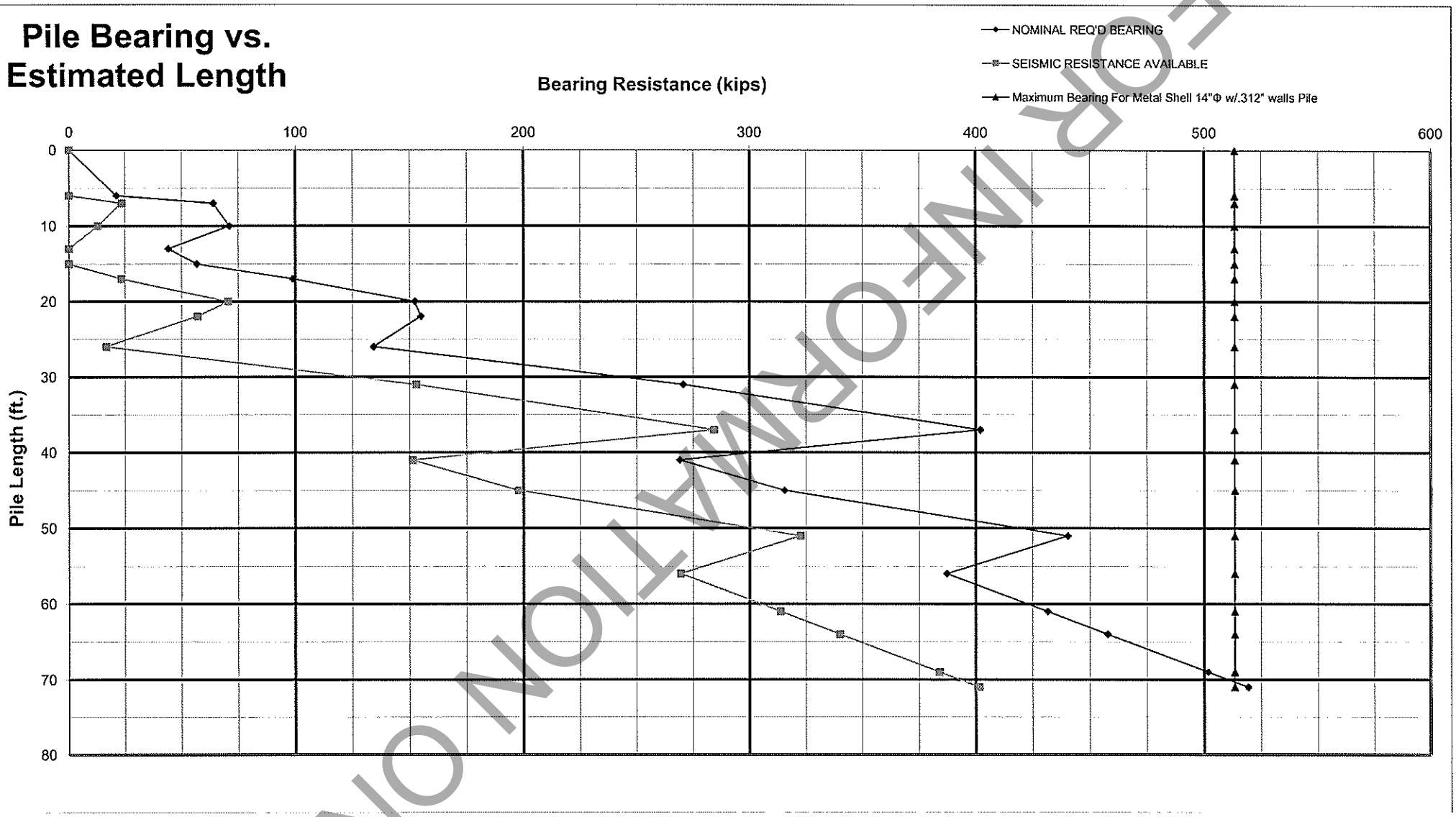
Pile Bearing vs. Estimated Length



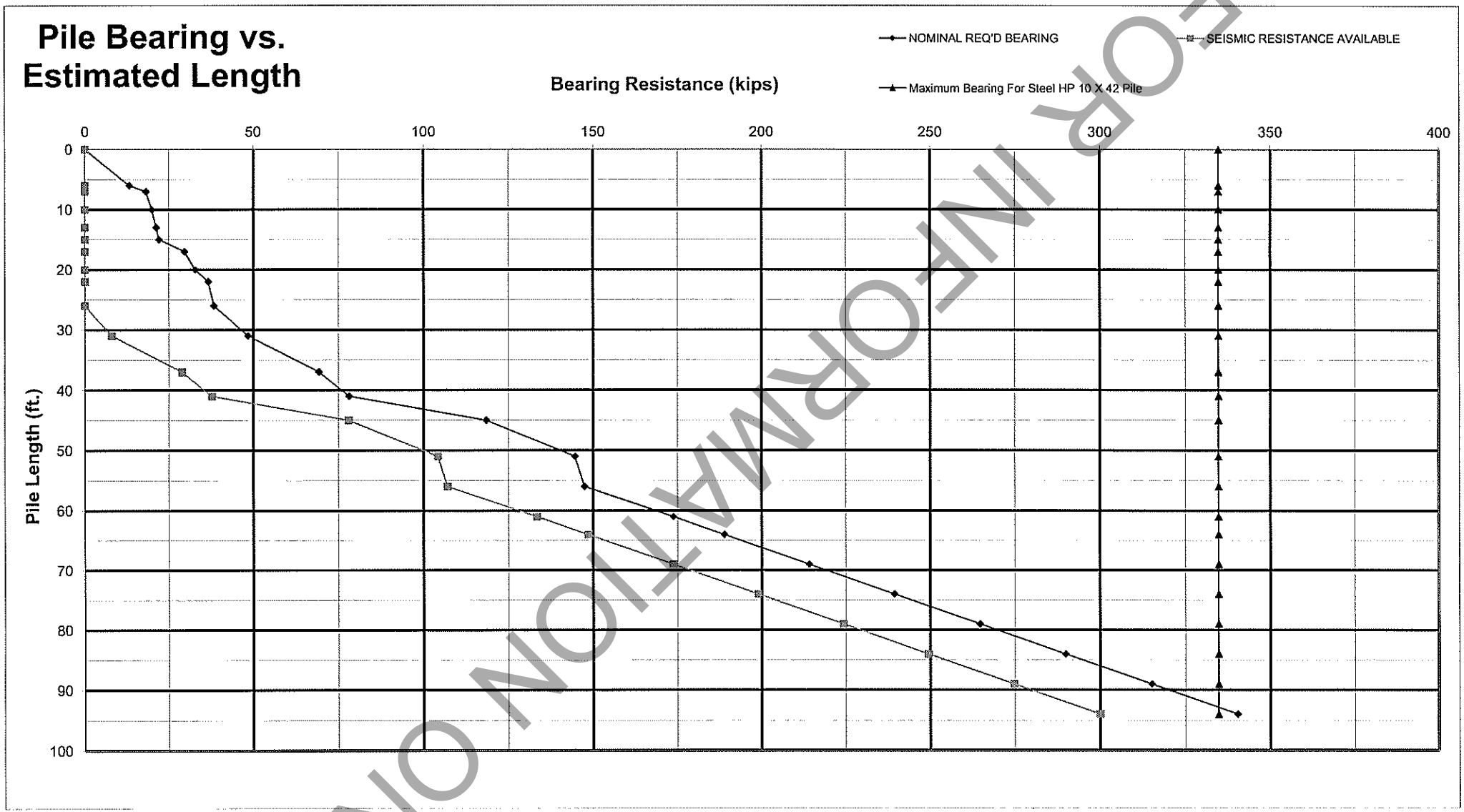
Pile Bearing vs. Estimated Length



Pile Bearing vs. Estimated Length



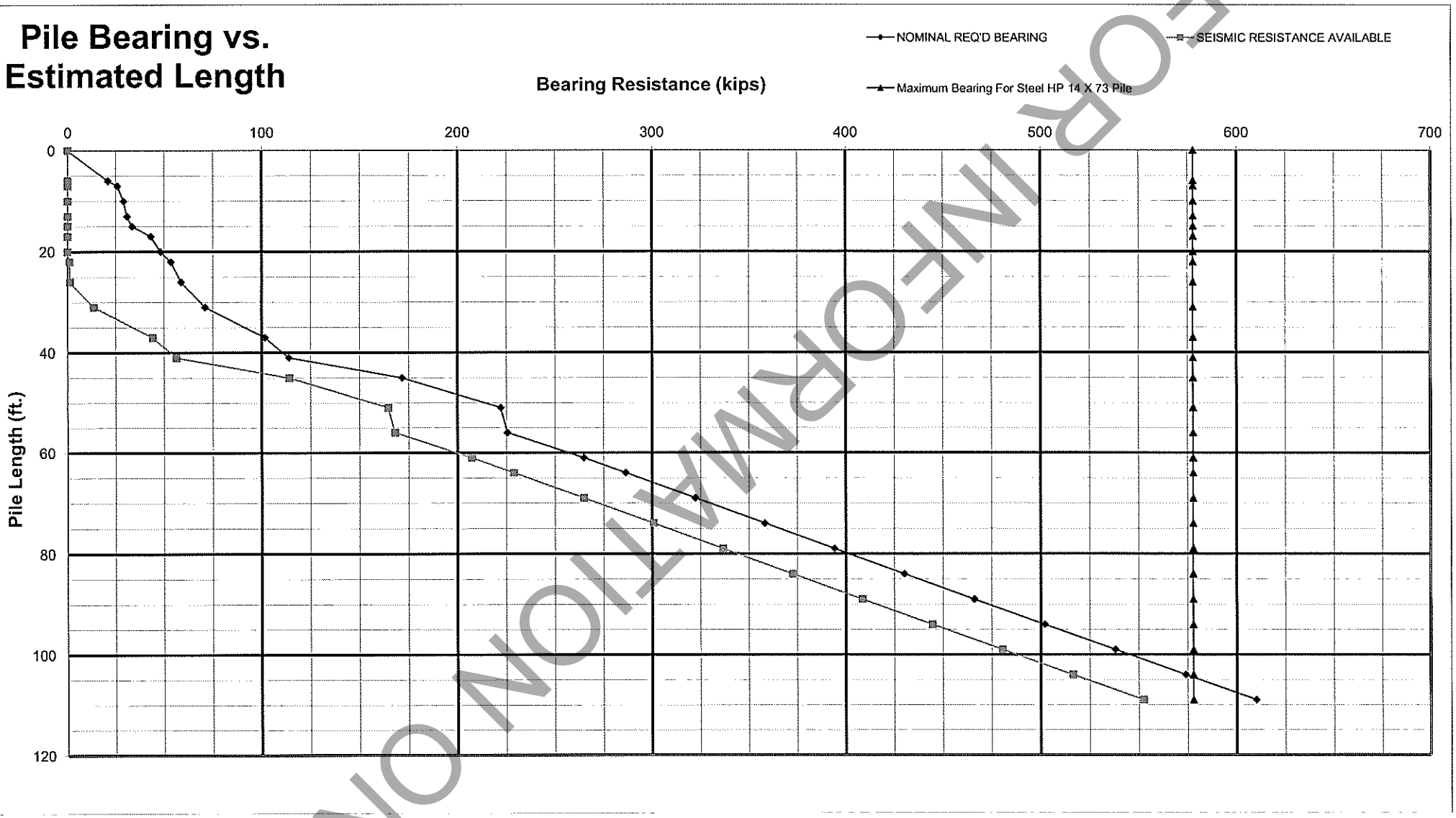
Pile Bearing vs. Estimated Length



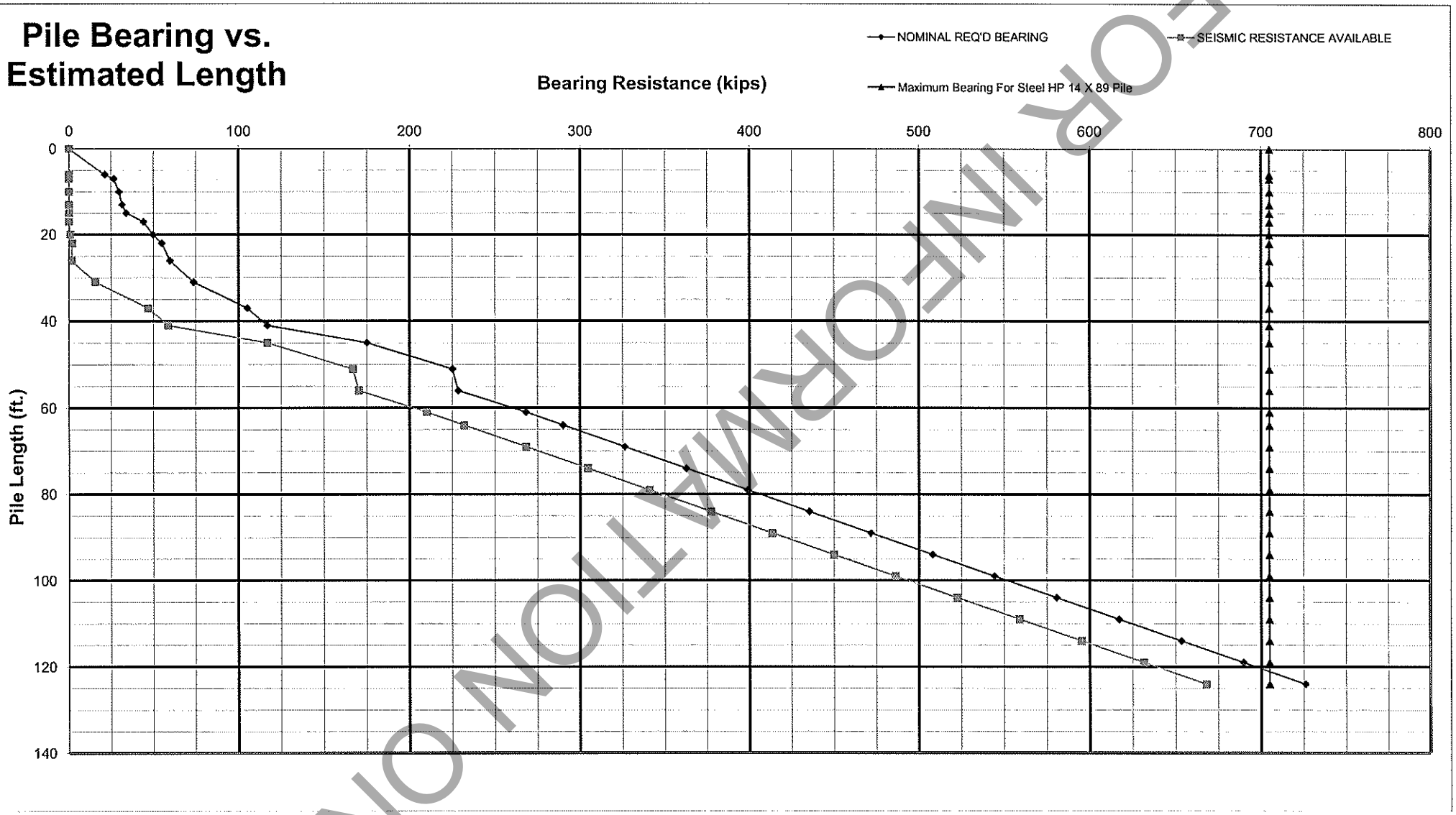
Pile Bearing vs. Estimated Length

Pile Bearing vs. Estimated Length

Pile Bearing vs. Estimated Length



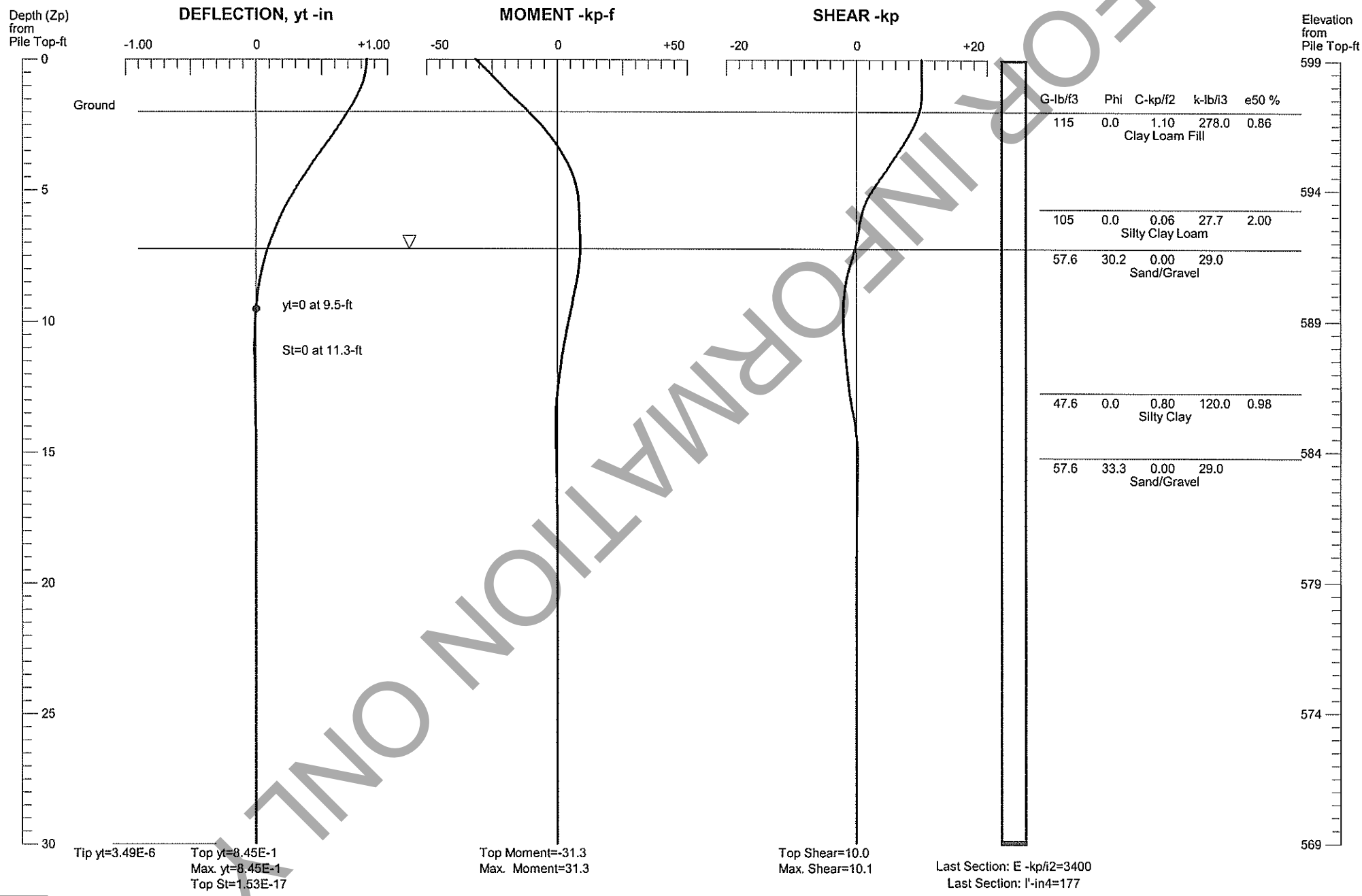
Pile Bearing vs. Estimated Length



SN 068-0512
West Abutment
(Lateral Analysis)

PILE DEFLECTION & FORCE vs DEPTH

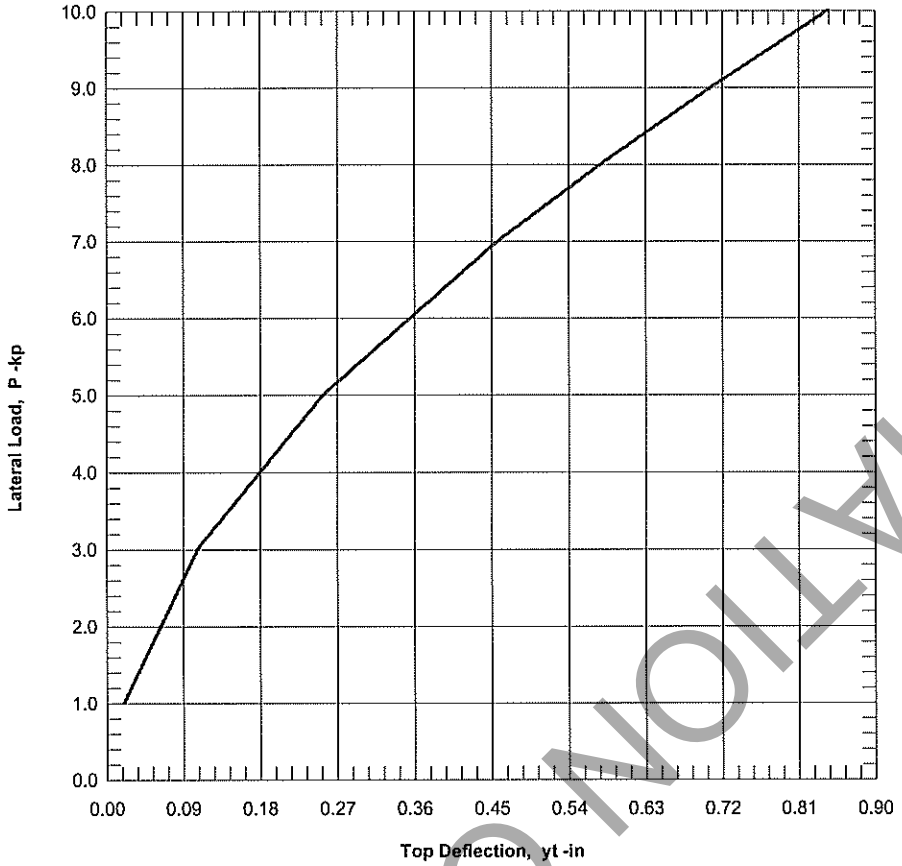
Single Pile, Khead=5, Kbc=2

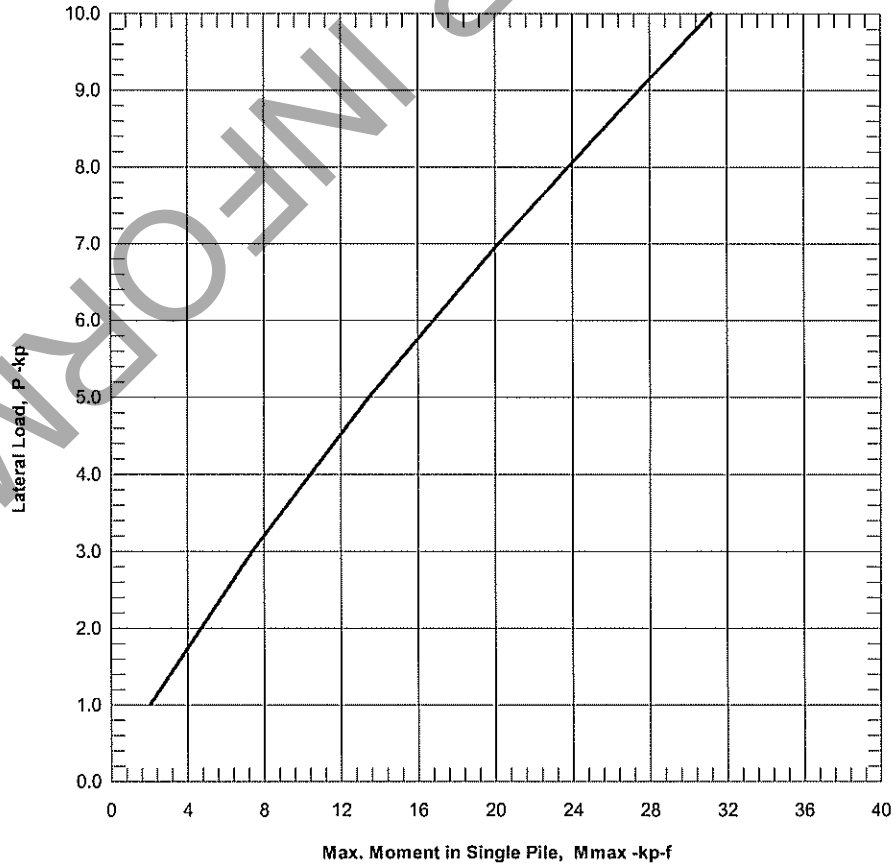


CivilTech Software

IL 185 over McDavid Branch SN 068-0512
West Abutment (MS-12 w/0.250" wall) Boring #1

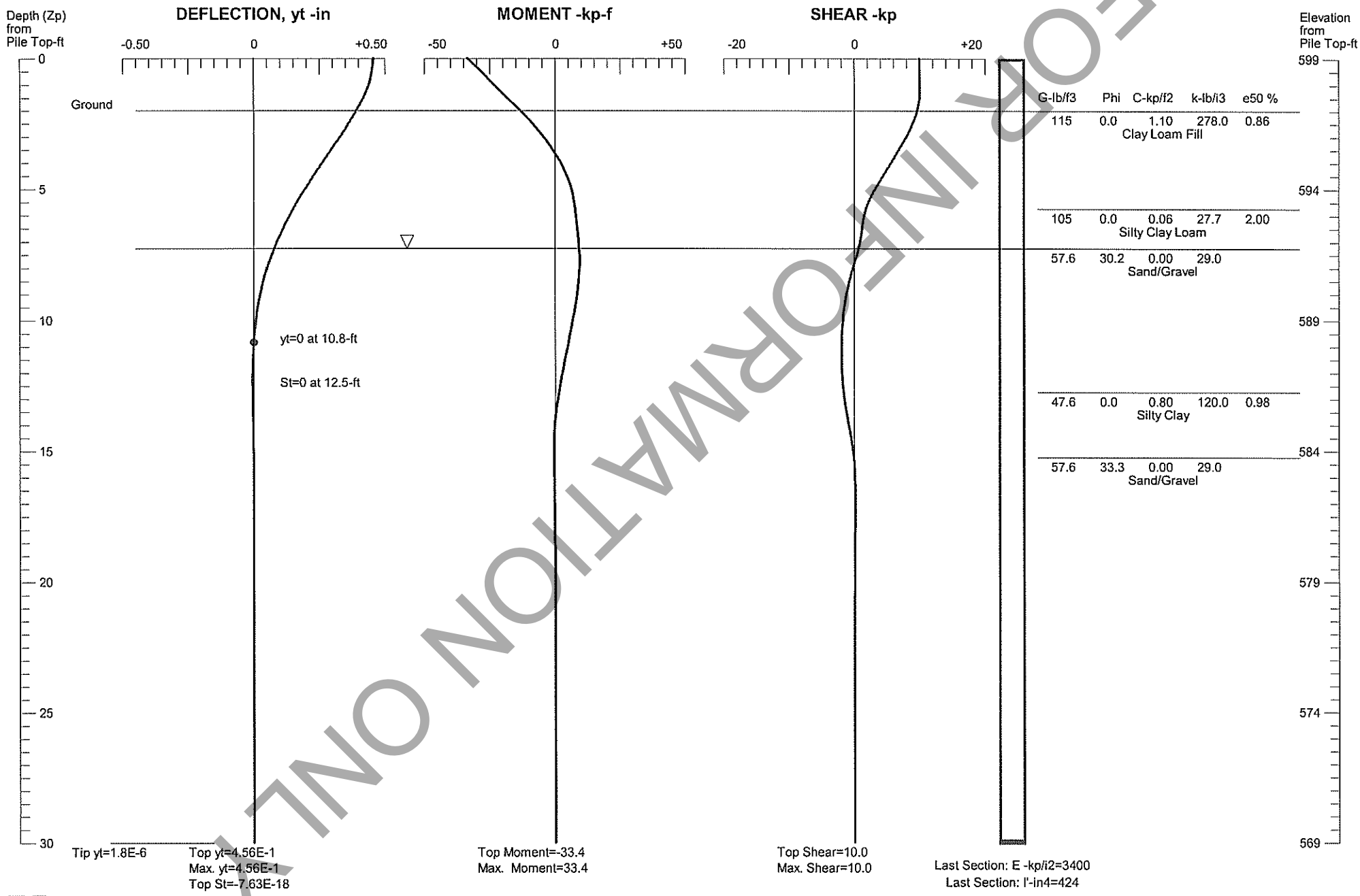
LATERAL LOAD vs DEFLECTION & MAX. MOMENT





PILE DEFLECTION & FORCE vs DEPTH

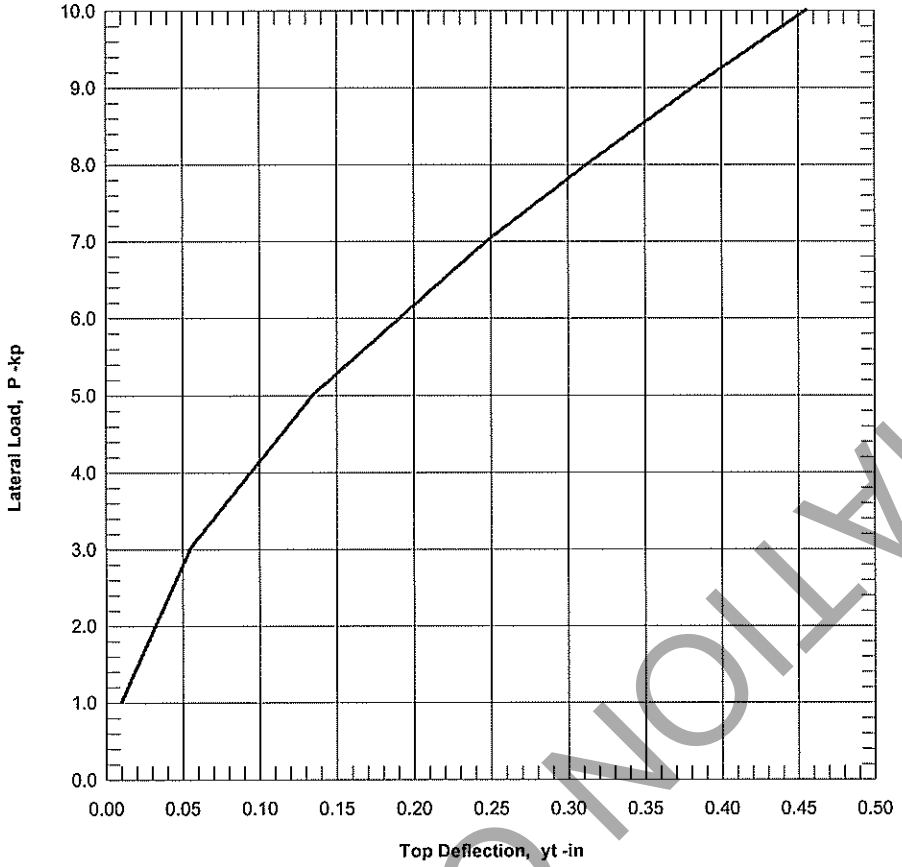
Single Pile, Khead=5, Kbc=2

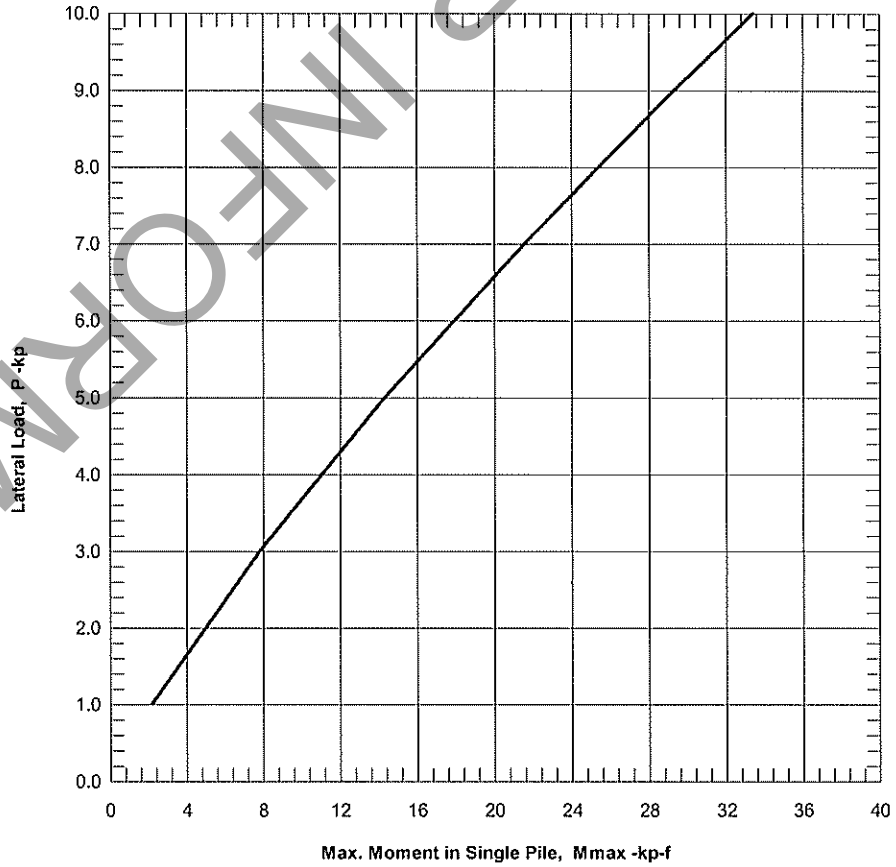


CivilTech Software

IL 185 over McDavid Branch SN 068-0512
West Abutment (MS-14 w/0.250" wall) Boring #1

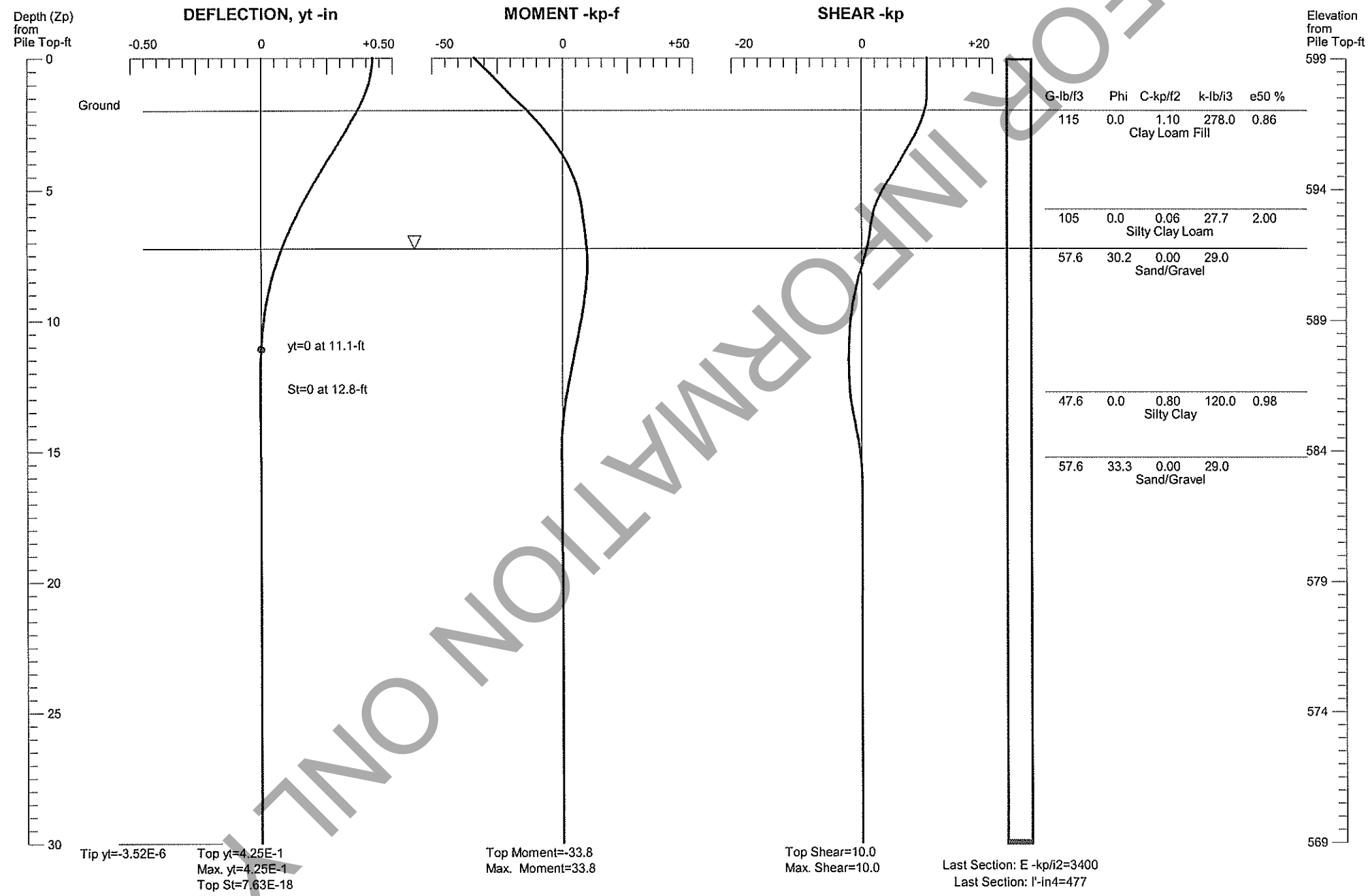
LATERAL LOAD vs DEFLECTION & MAX. MOMENT





PILE DEFLECTION & FORCE vs DEPTH

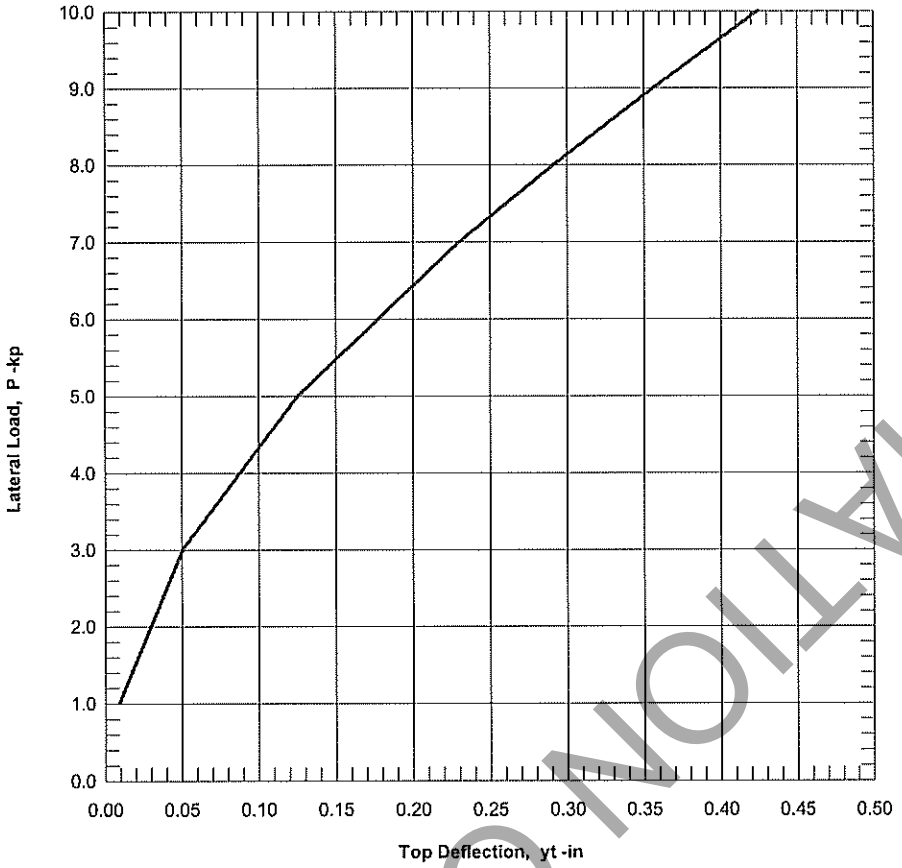
Single Pile, Khead=5, Kbc=2

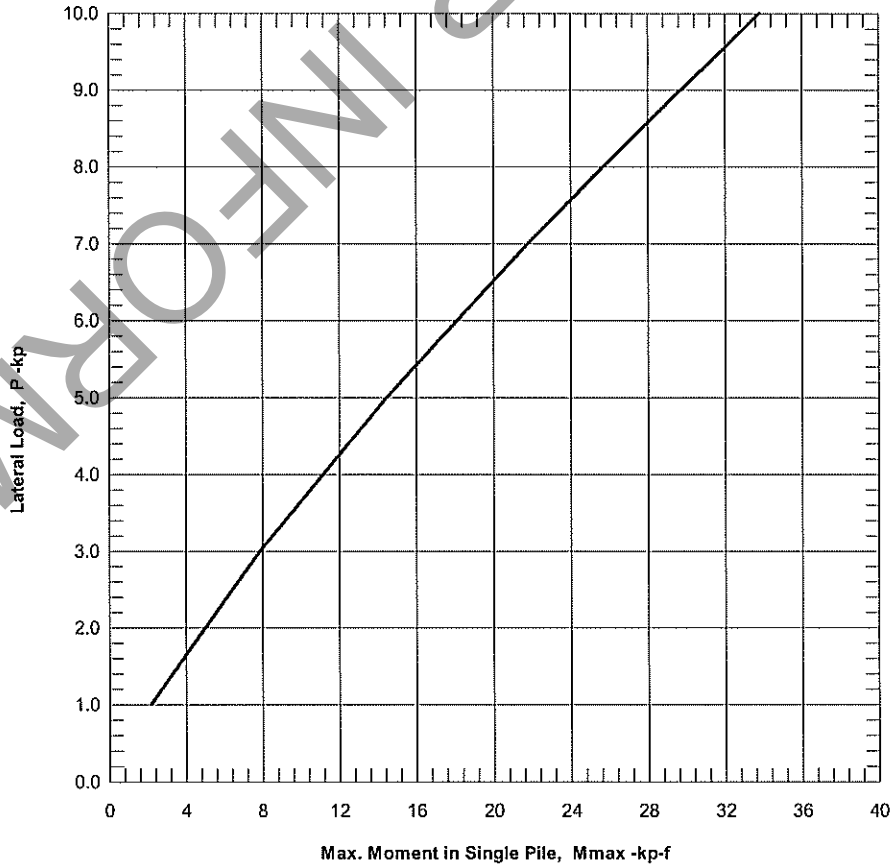


CivilTech Software

IL 185 over McDavid Branch SN 068-0512
West Abutment (MS-14 w/0.312" wall) Boring #1

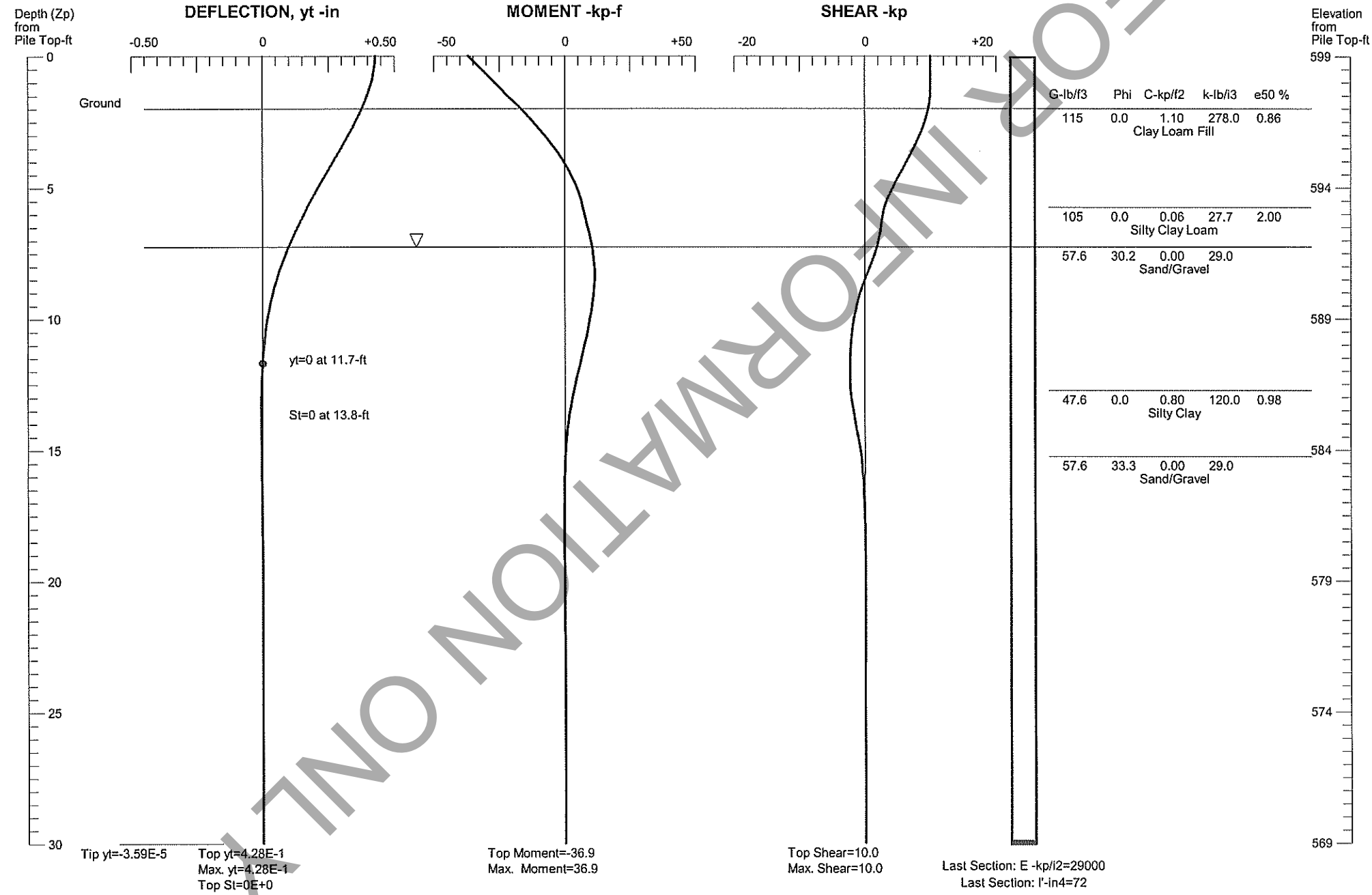
LATERAL LOAD vs DEFLECTION & MAX. MOMENT





PILE DEFLECTION & FORCE vs DEPTH

Single Pile, Khead=5, Kbc=2

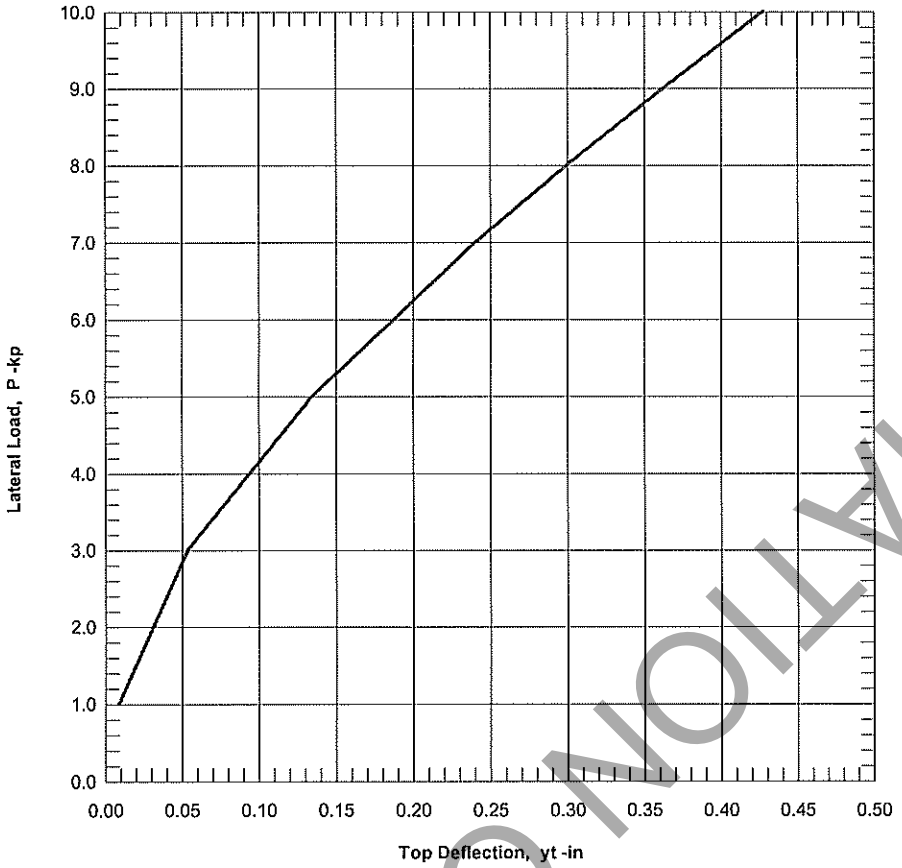


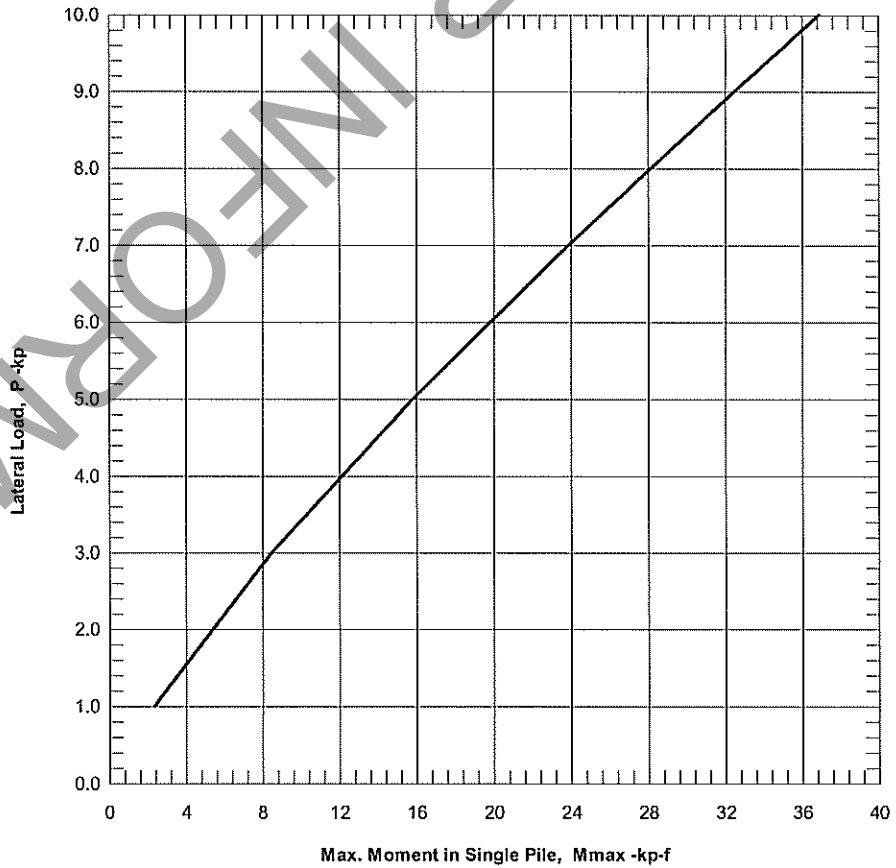
CivilTech Software

IL 185 over McDavid Branch SN 068-0512
West Abutment (HP 10 X 42)

Boring #1

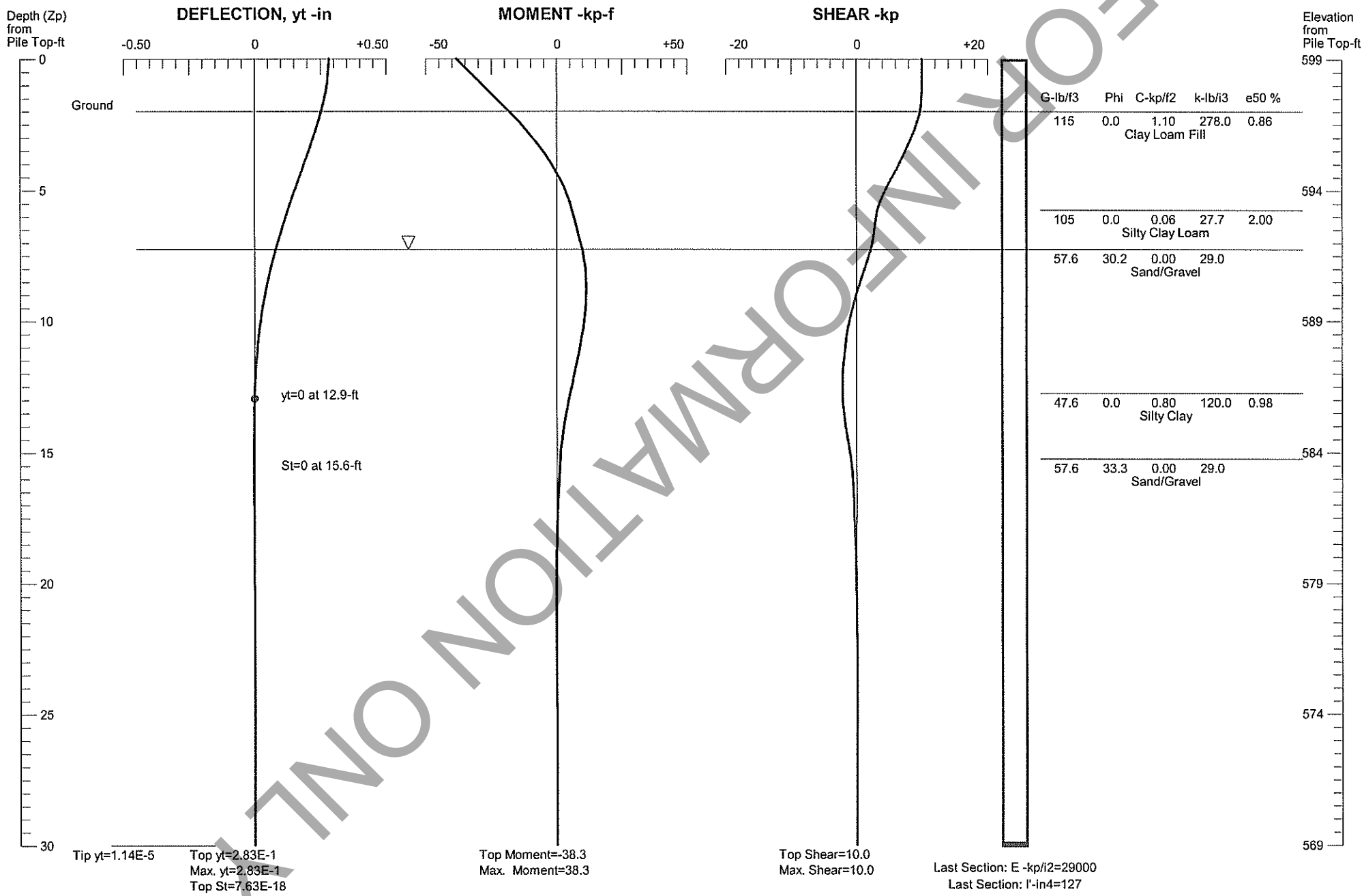
LATERAL LOAD vs DEFLECTION & MAX. MOMENT





PILE DEFLECTION & FORCE vs DEPTH

Single Pile, Khead=5, Kbc=2

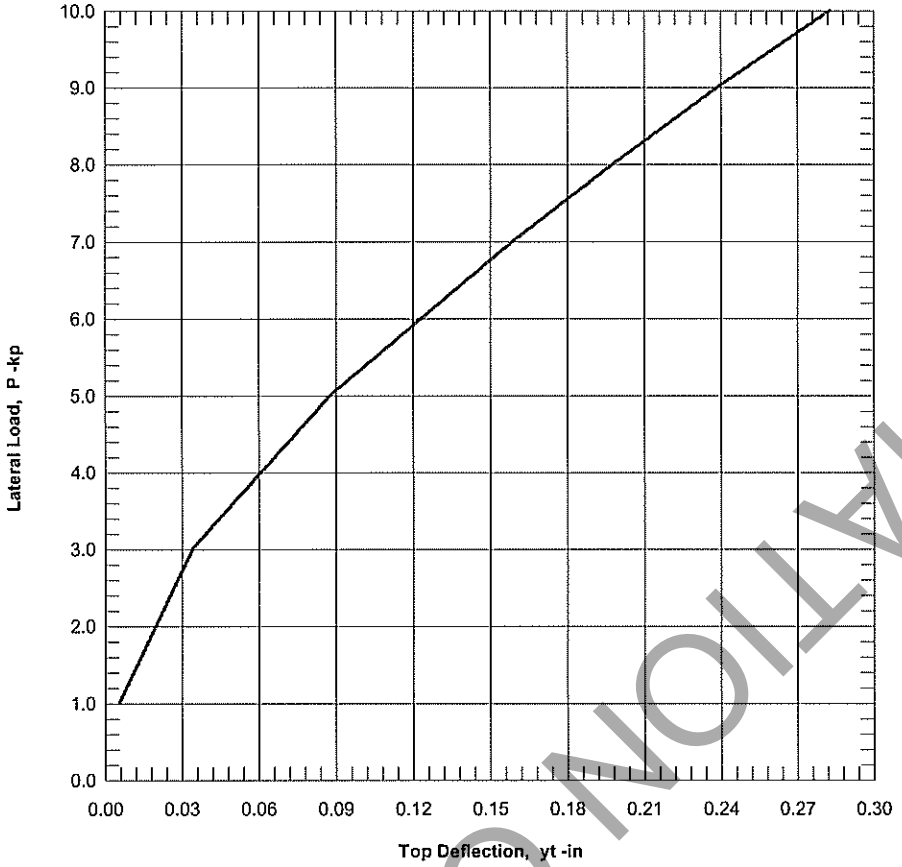


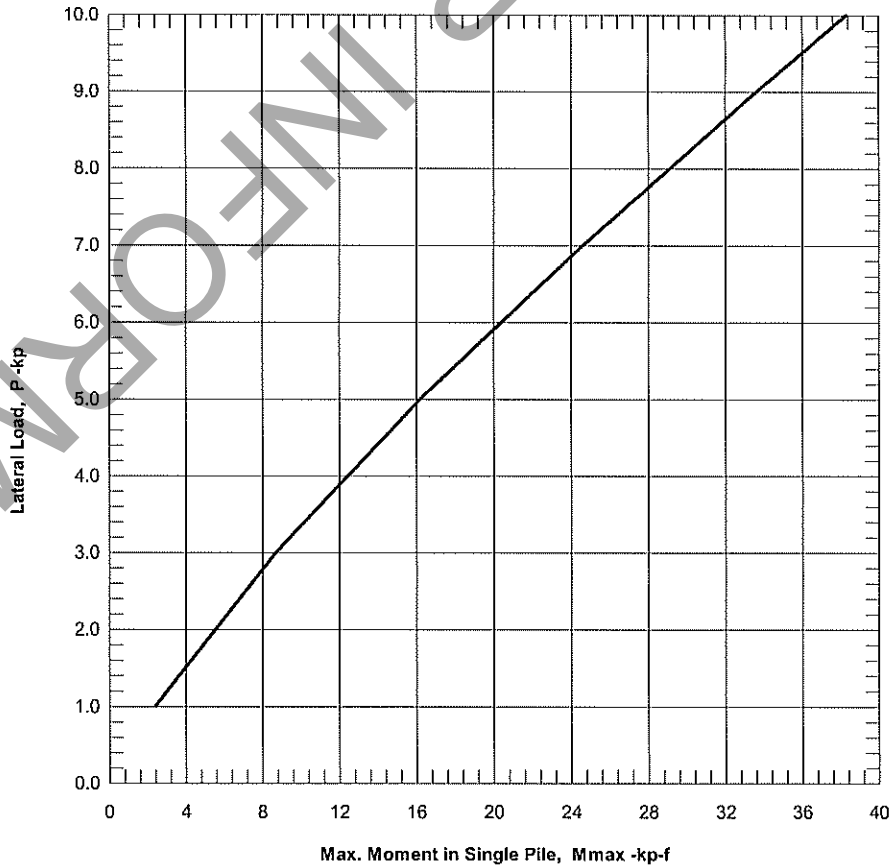
CivilTech Software

IL 185 over McDavid Branch SN 068-0512
West Abutment (HP 12 X 53)

Boring #1

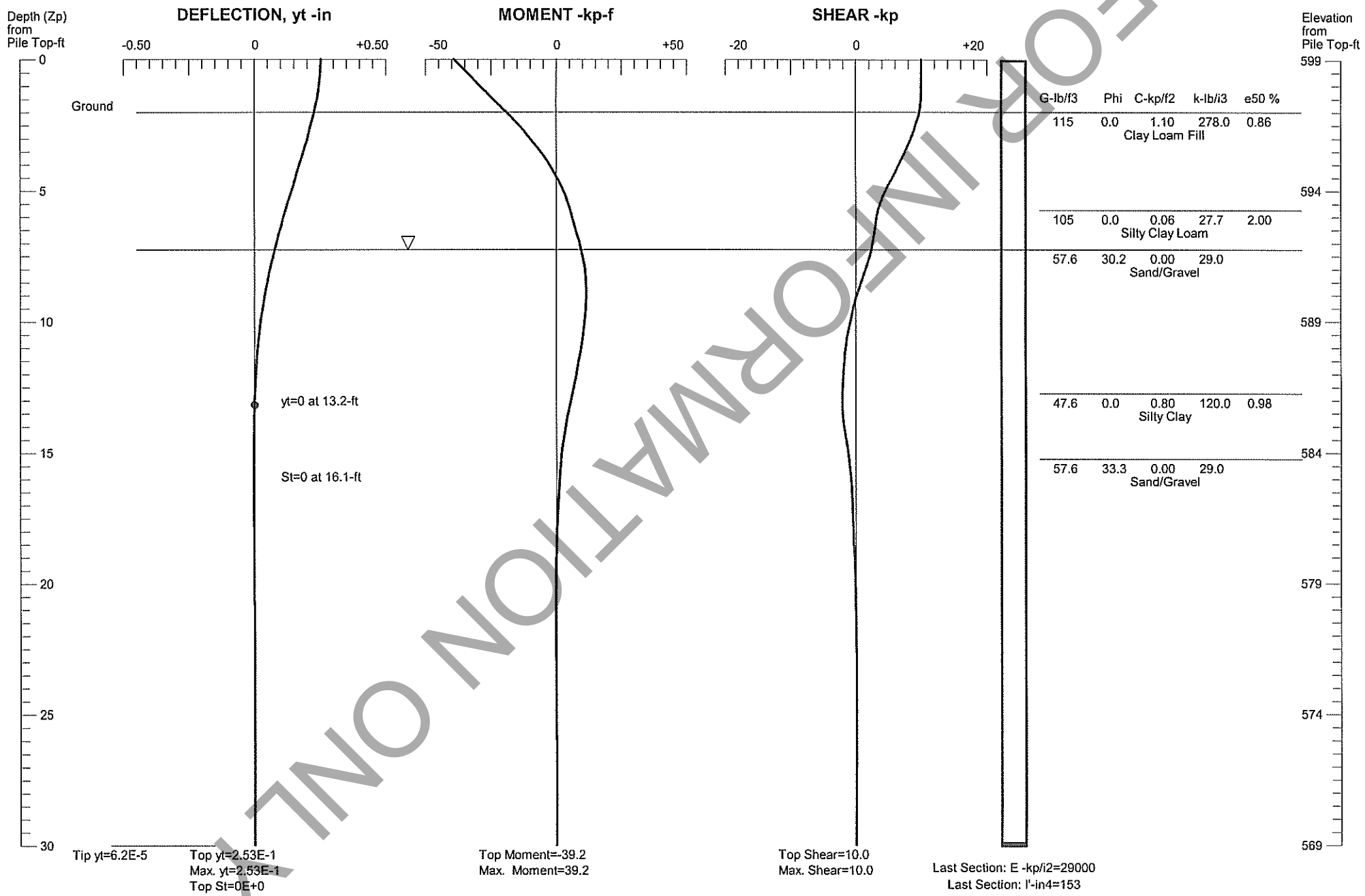
LATERAL LOAD vs DEFLECTION & MAX. MOMENT





PILE DEFLECTION & FORCE vs DEPTH

Single Pile, Khead=5, Kbc=2

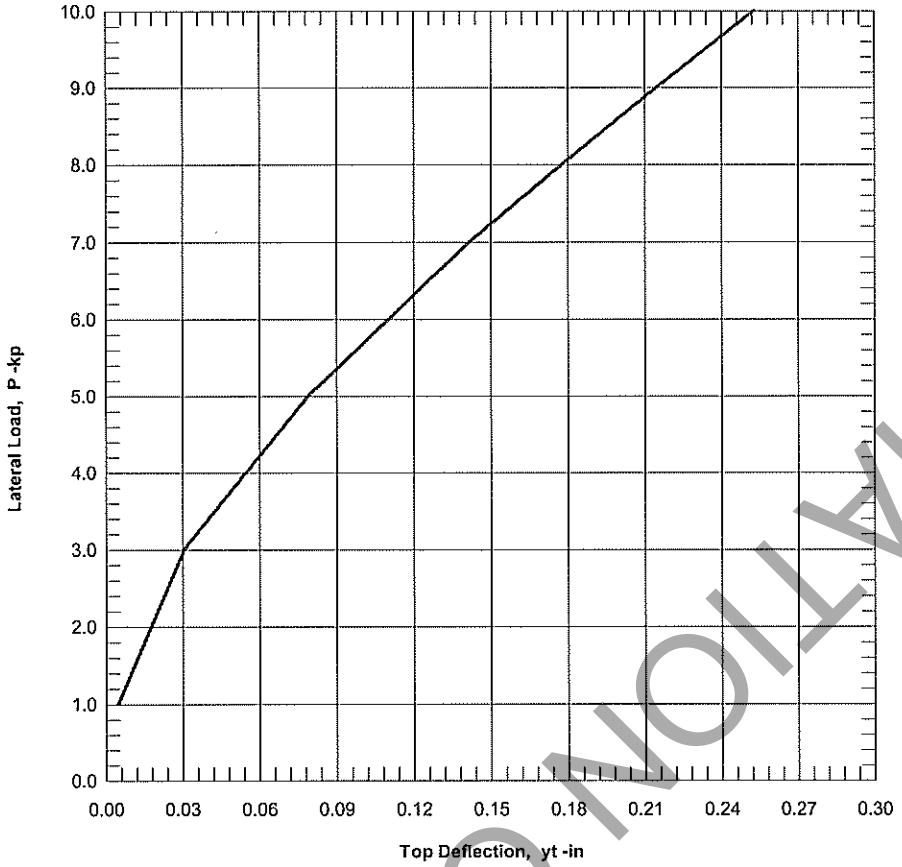


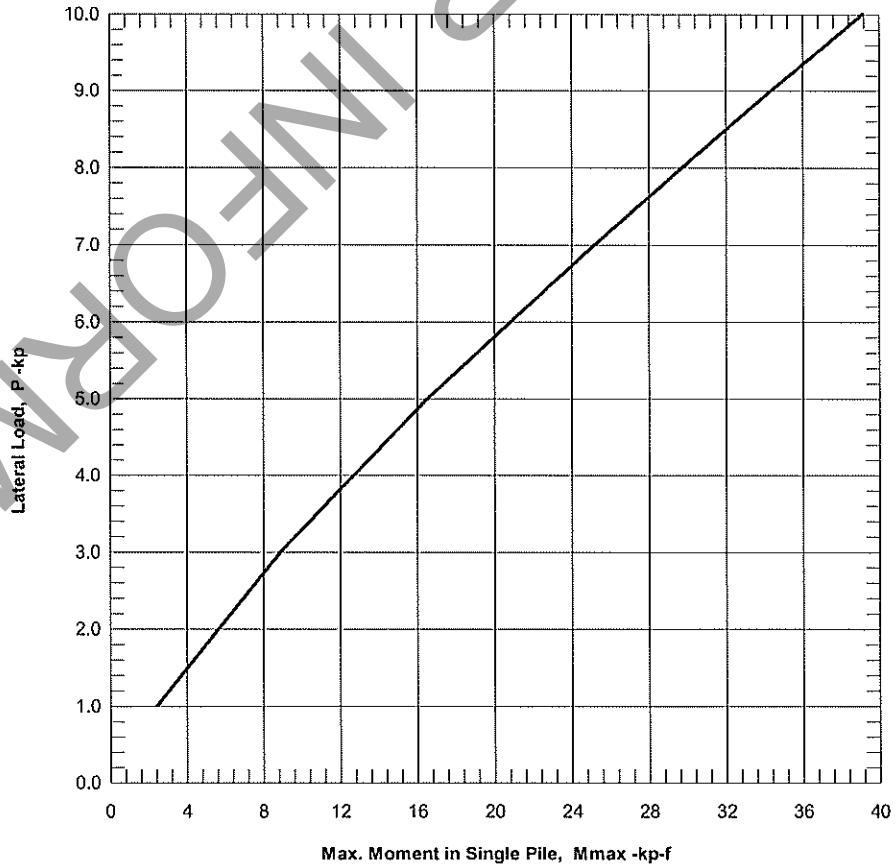
CivilTech Software

IL 185 over McDavid Branch SN 068-0512
West Abutment (HP 12 X 63)

Boring #1

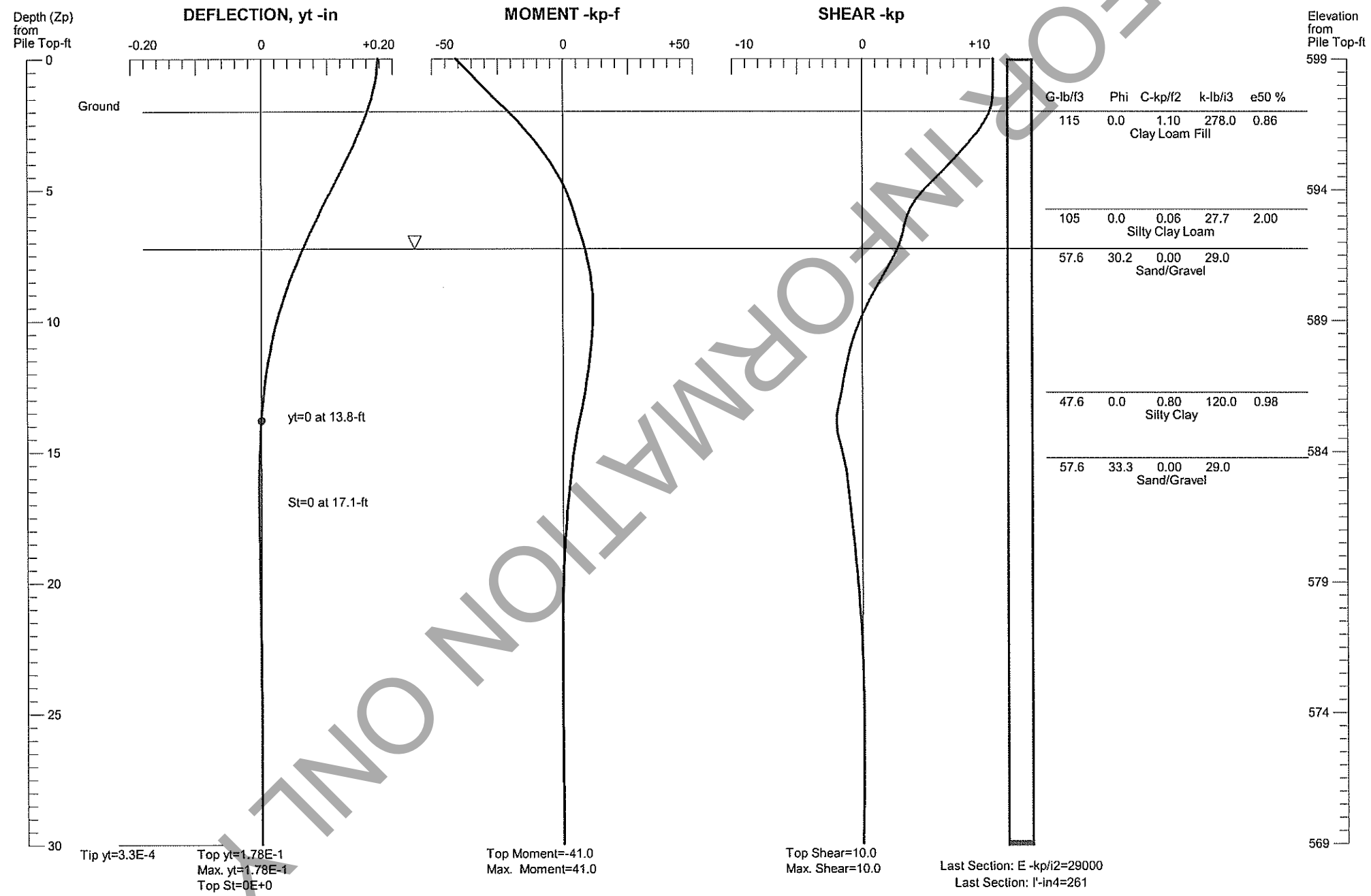
LATERAL LOAD vs DEFLECTION & MAX. MOMENT





PILE DEFLECTION & FORCE vs DEPTH

Single Pile, Khead=5, Kbc=2

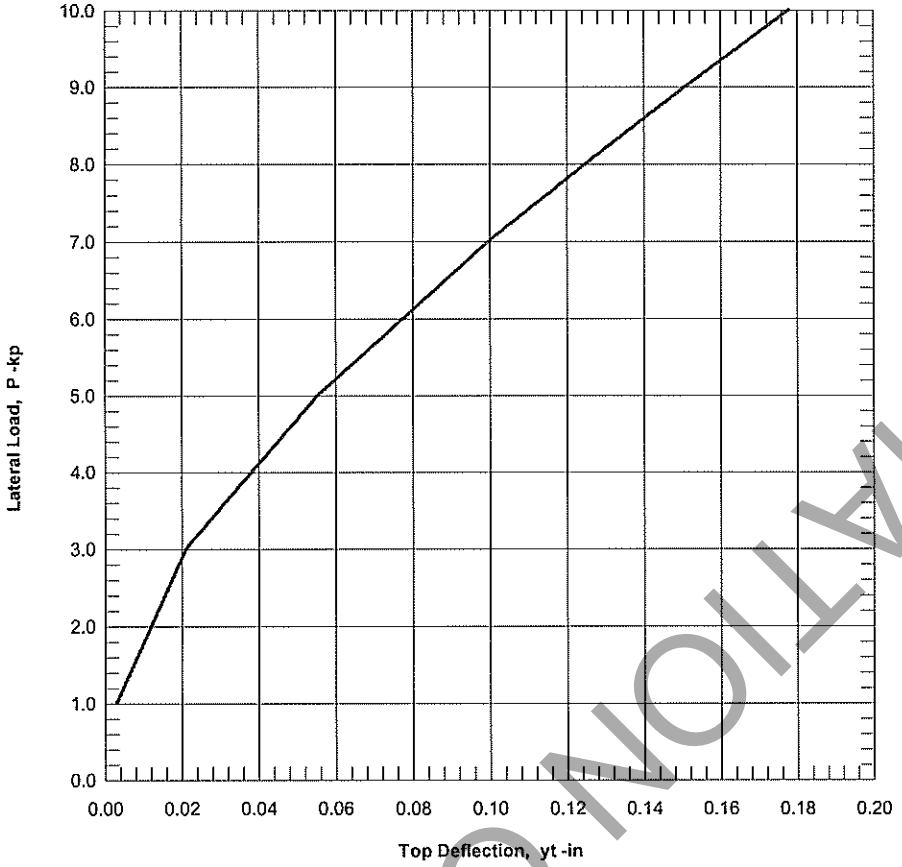


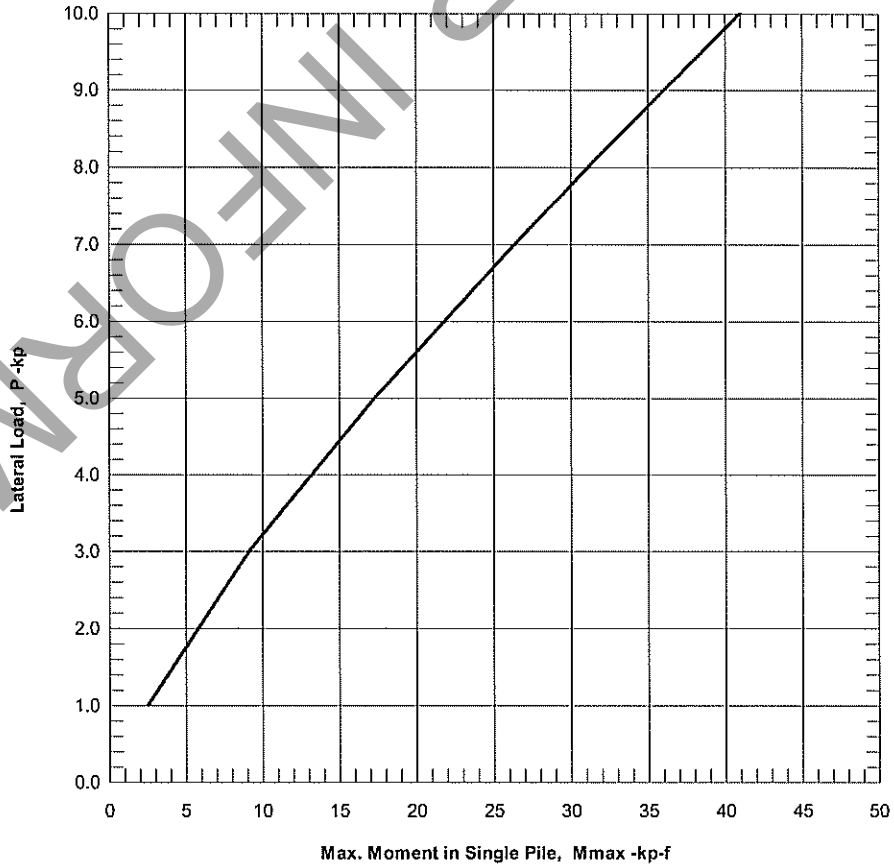
CivilTech Software

IL 185 over McDavid Branch SN 068-0512
West Abutment (HP 14 X 73)

Boring #1

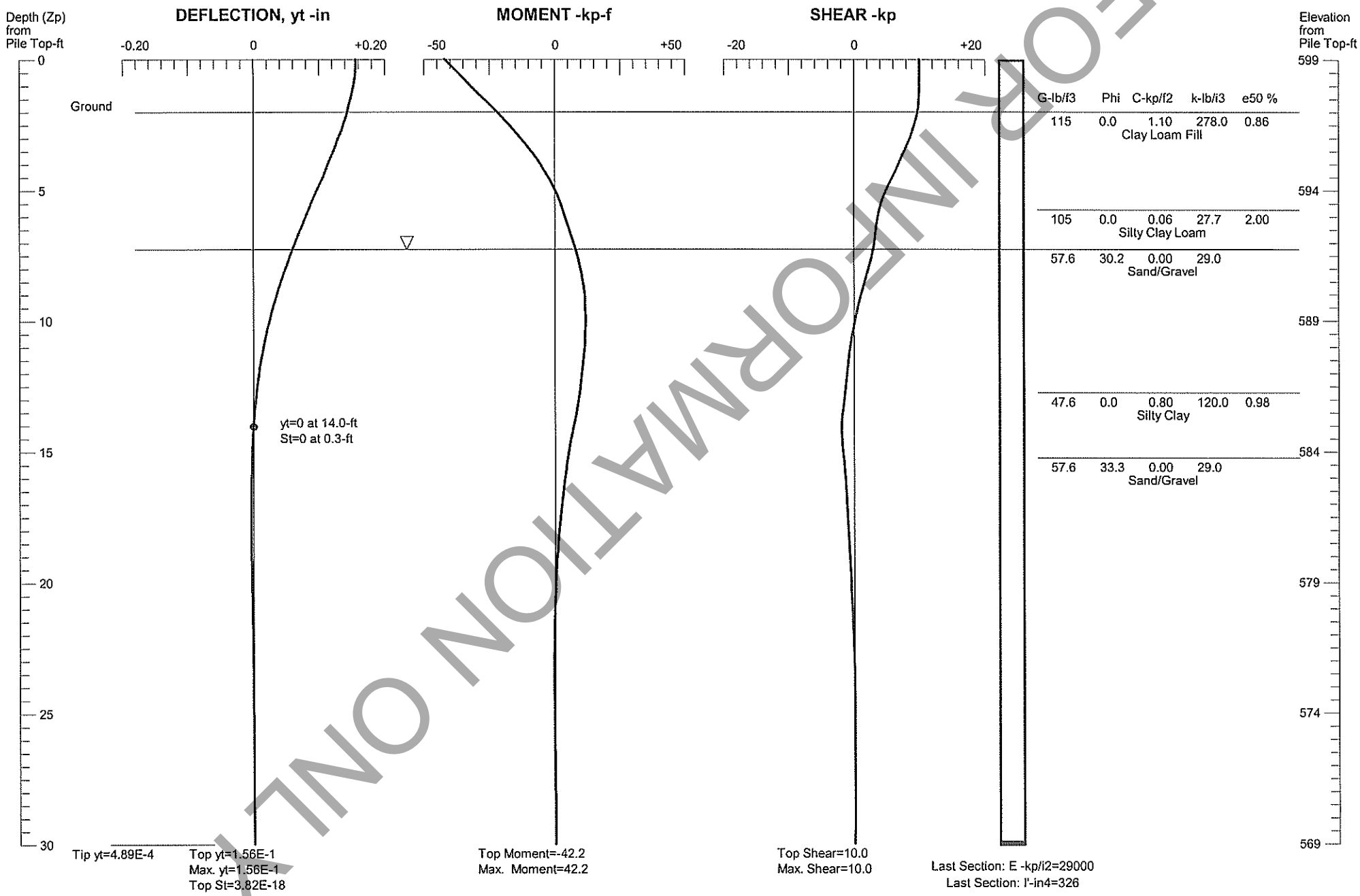
LATERAL LOAD vs DEFLECTION & MAX. MOMENT





PILE DEFLECTION & FORCE vs DEPTH

Single Pile, Khead=5, Kbc=2

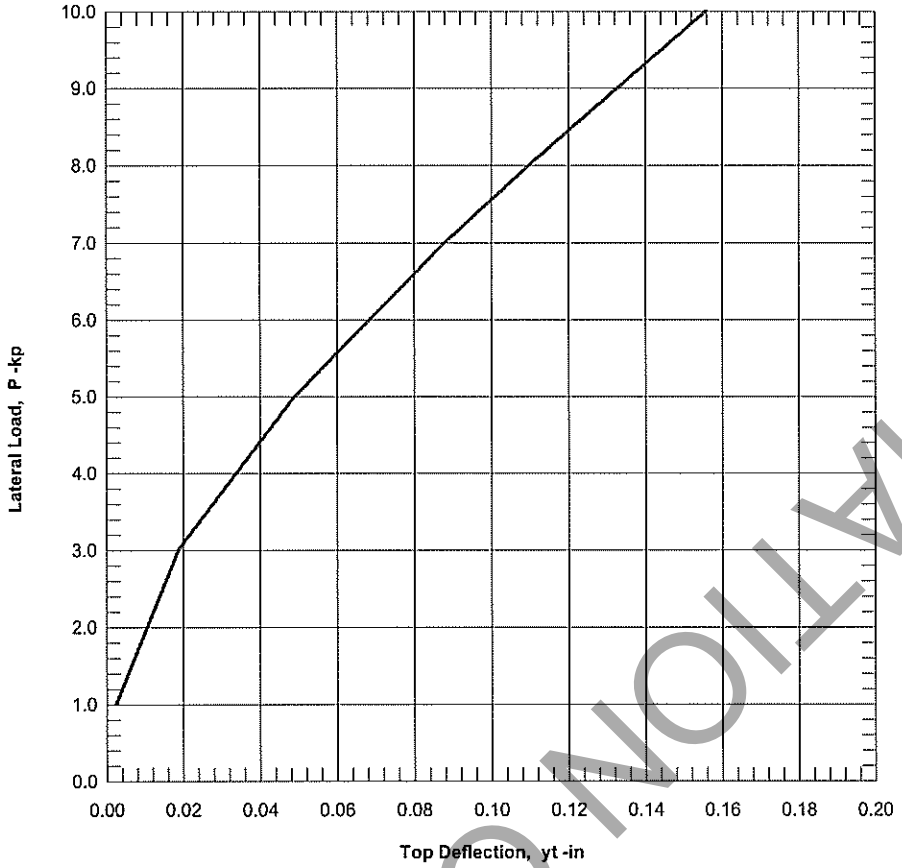


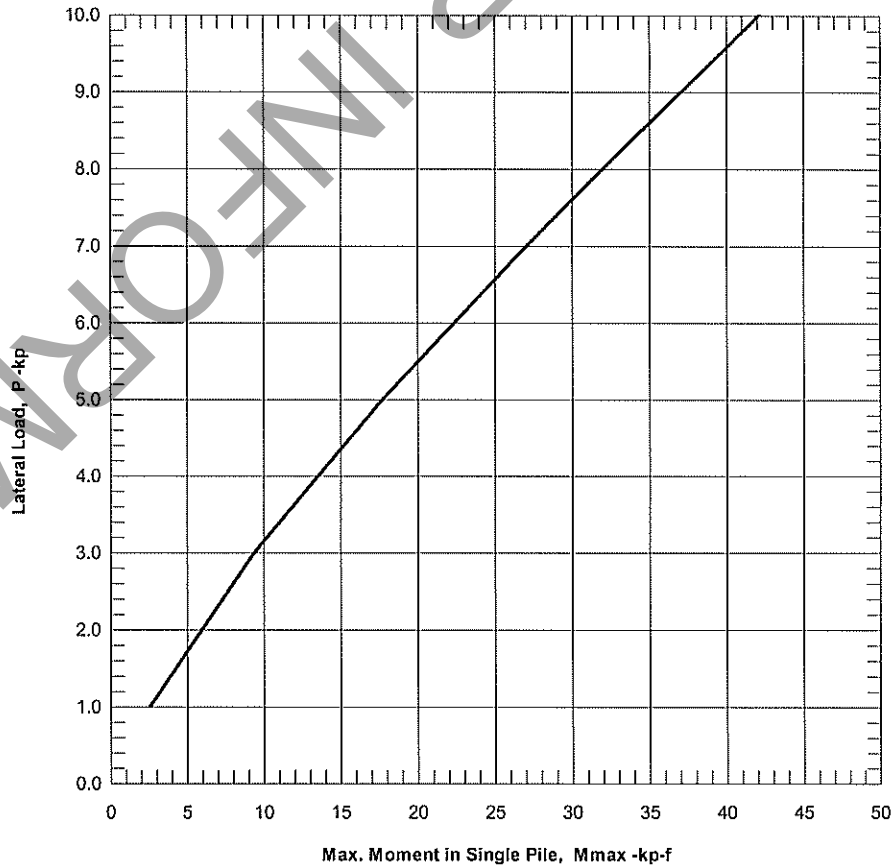
CivilTech Software

IL 185 over McDavid Branch SN 068-0512
West Abutment (HP 14 X 89)

Boring #1

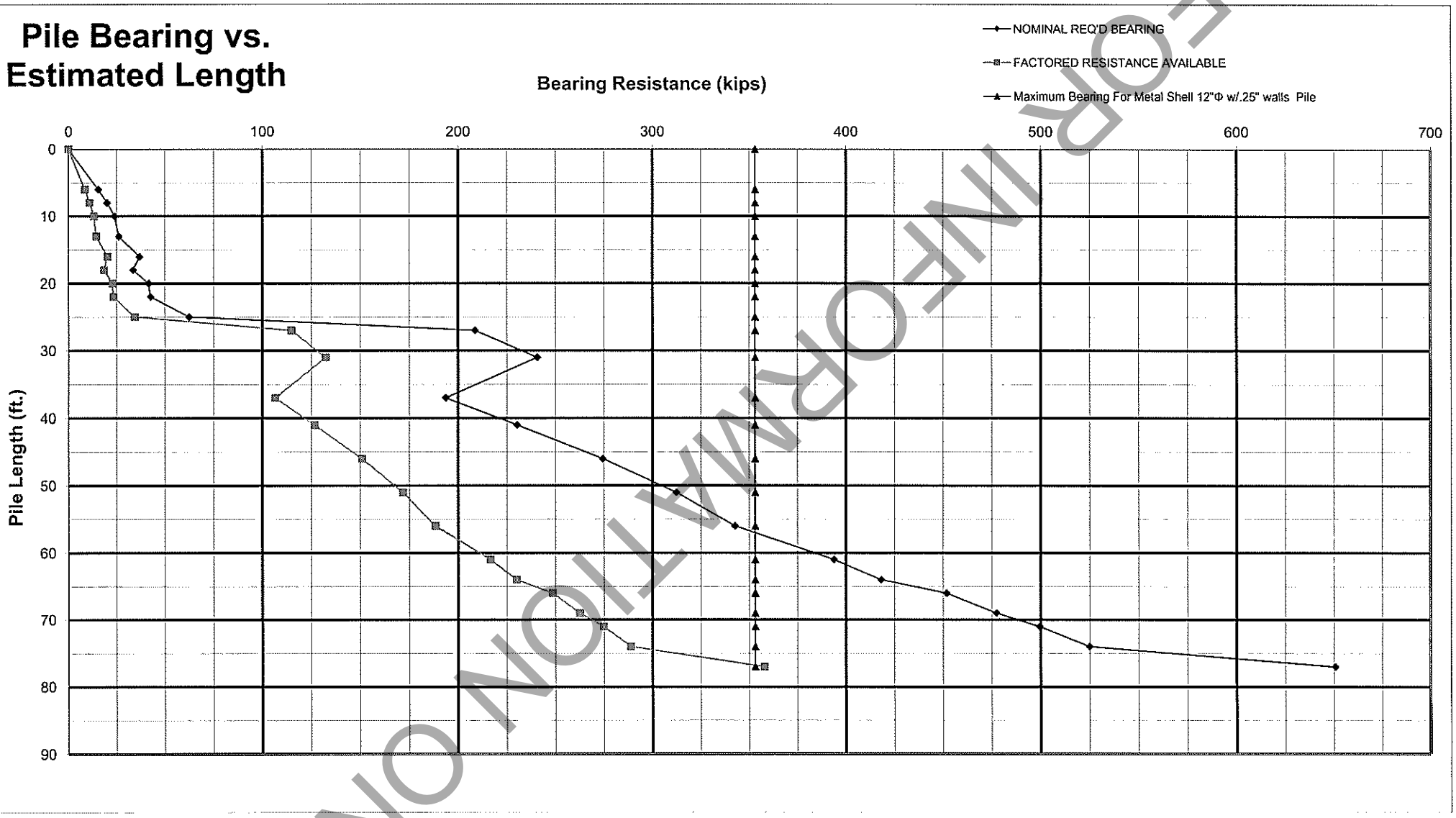
LATERAL LOAD vs DEFLECTION & MAX. MOMENT



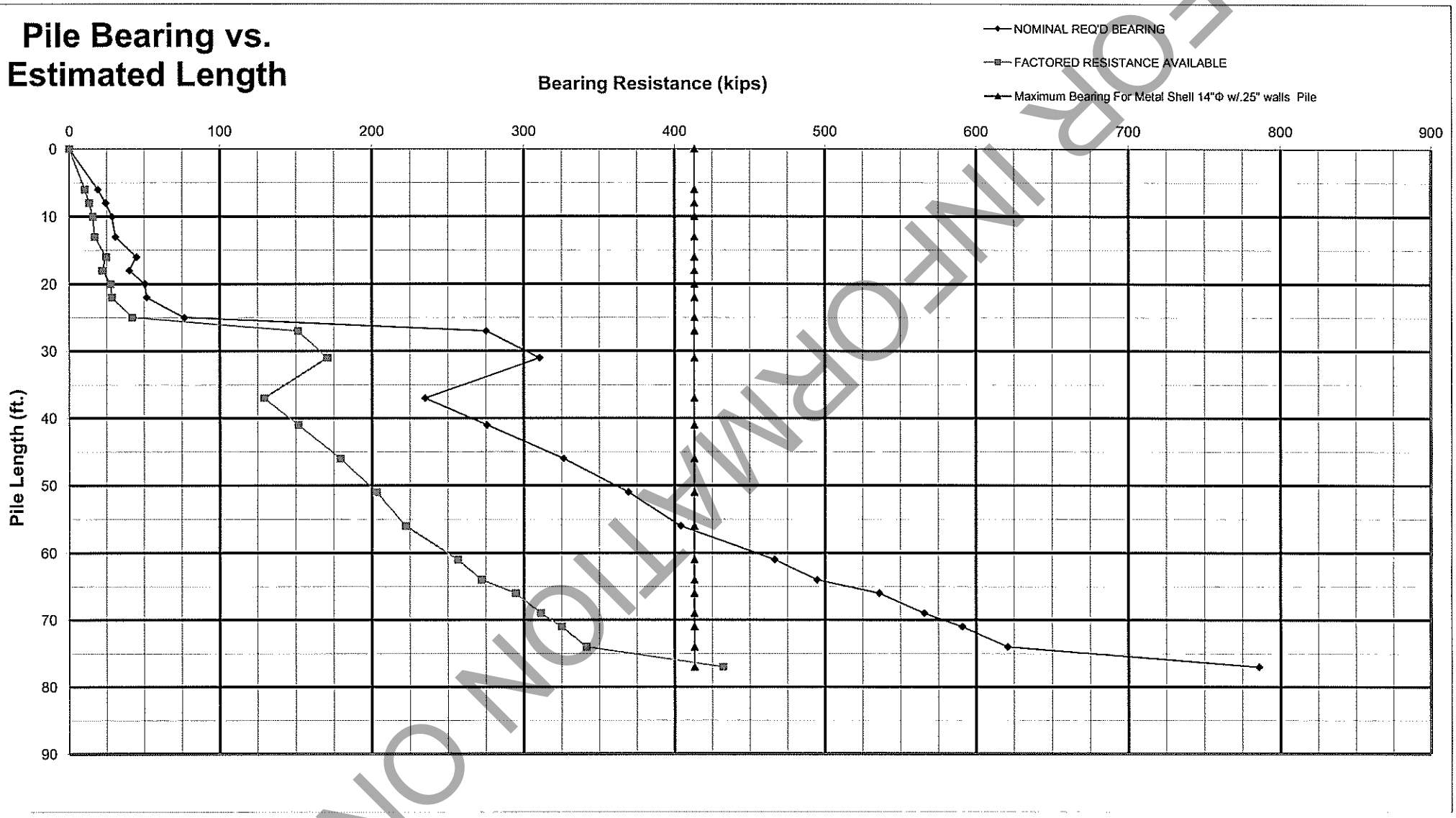


SN 068-0512
East Abutment
(Static Bearing Analysis)

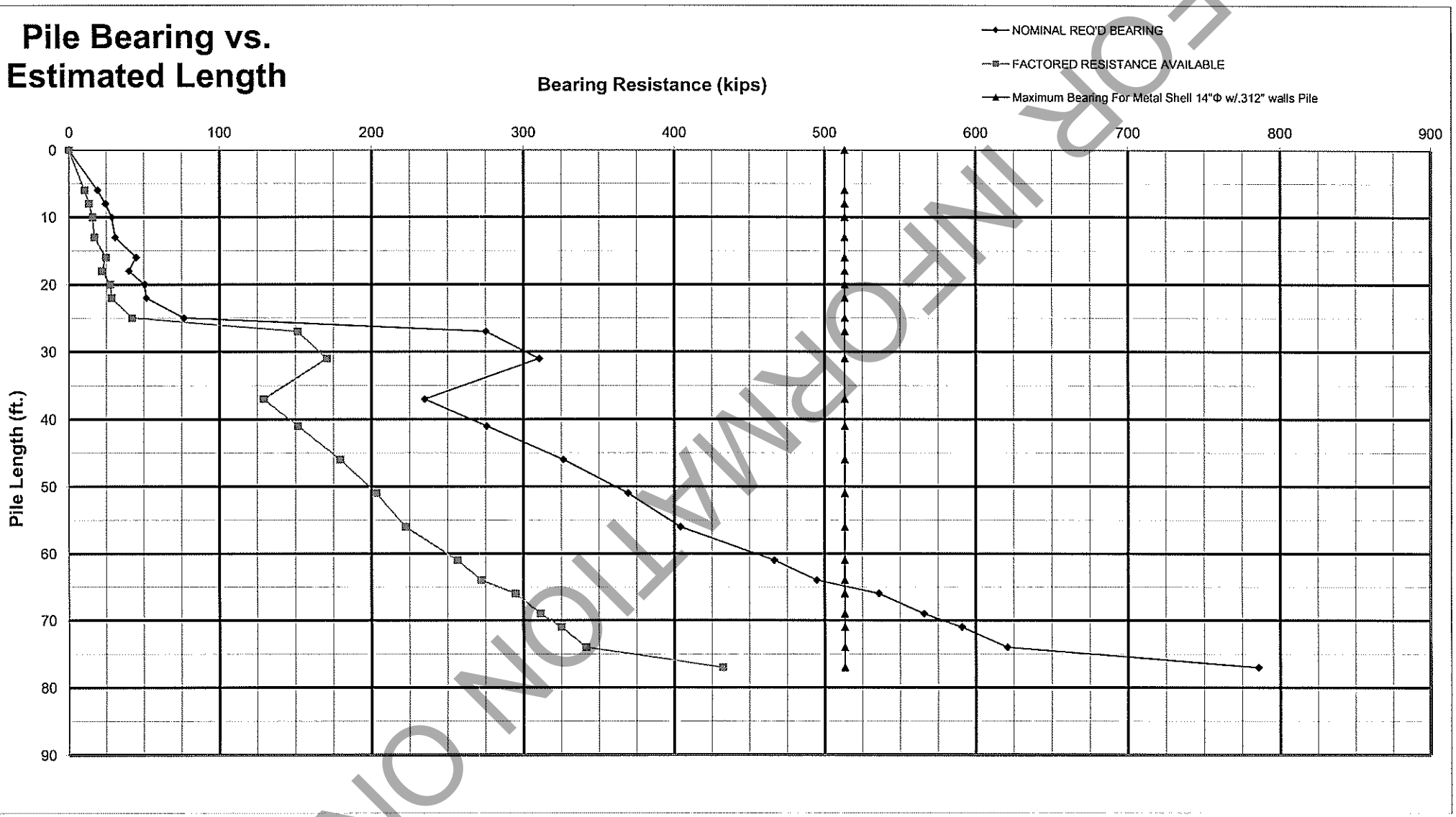
Pile Bearing vs. Estimated Length



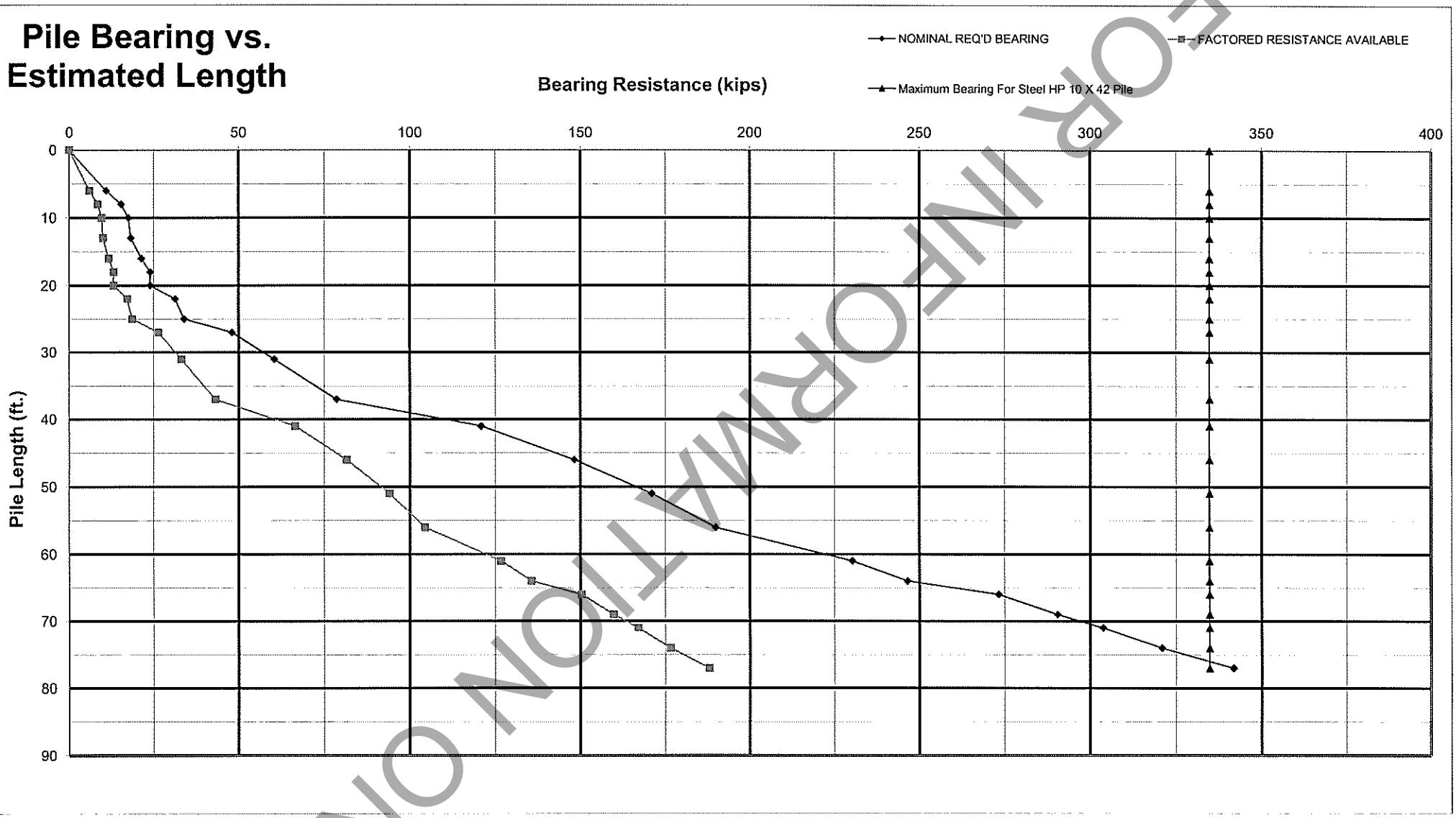
Pile Bearing vs. Estimated Length



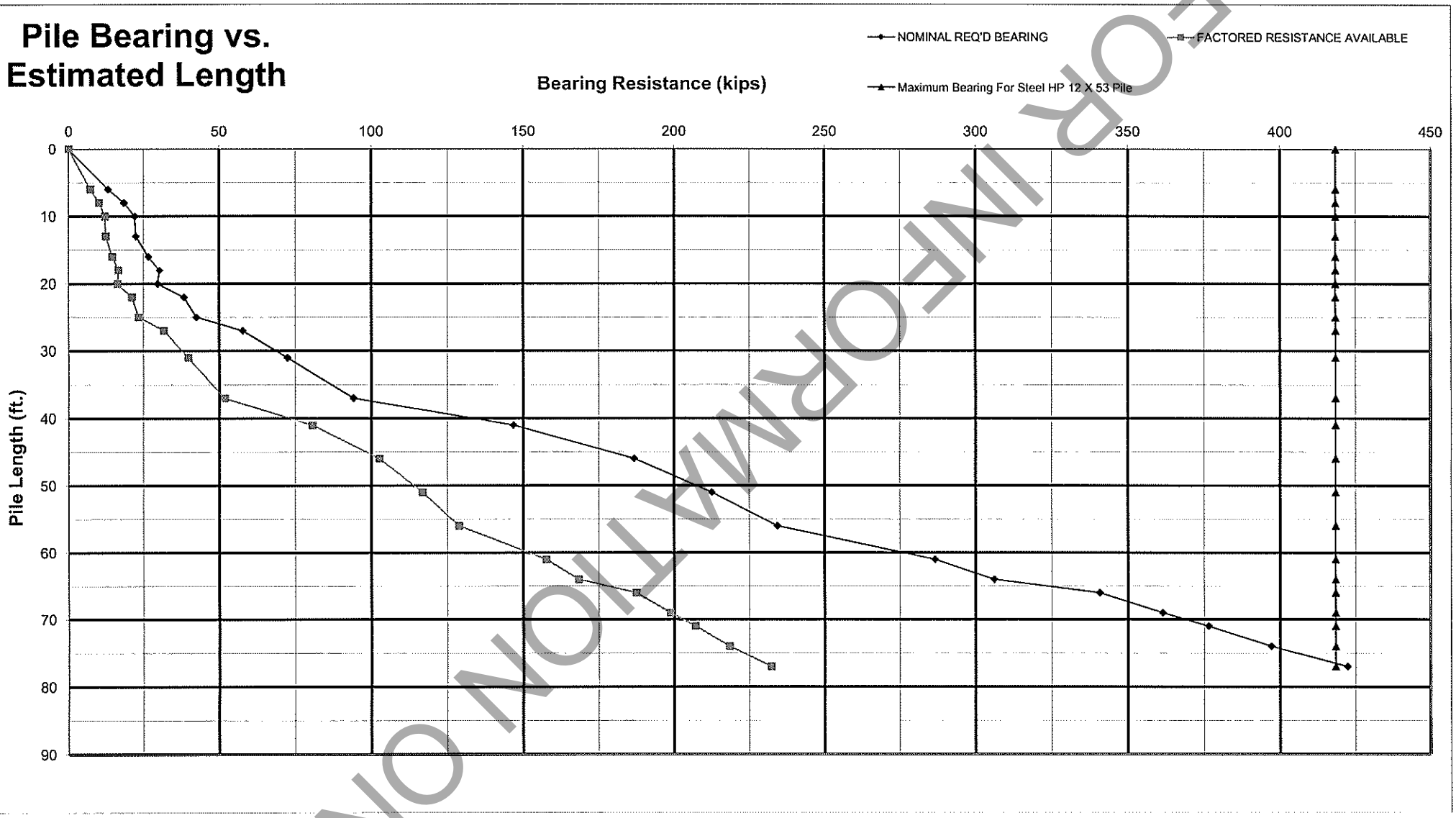
Pile Bearing vs. Estimated Length



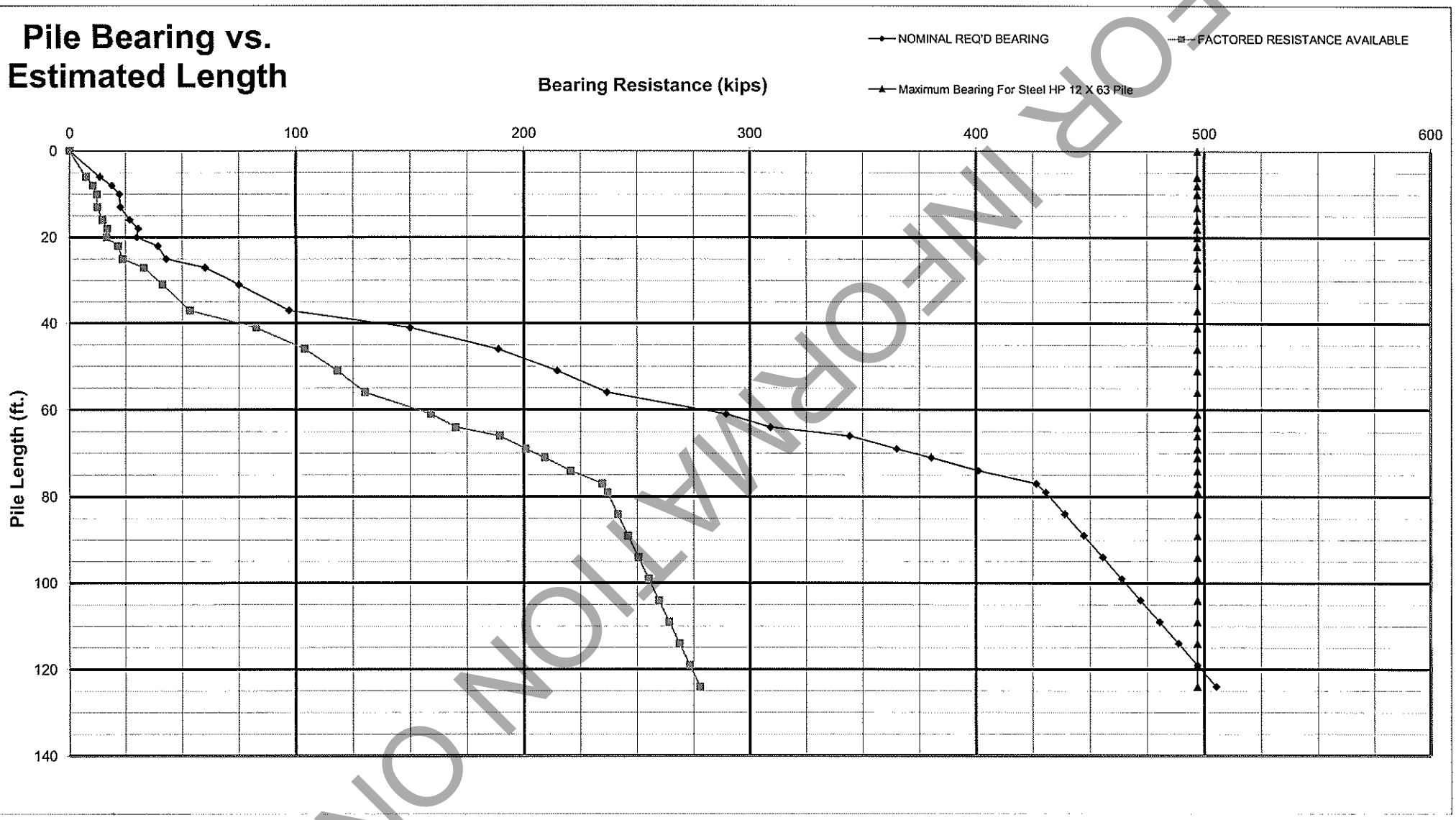
Pile Bearing vs. Estimated Length



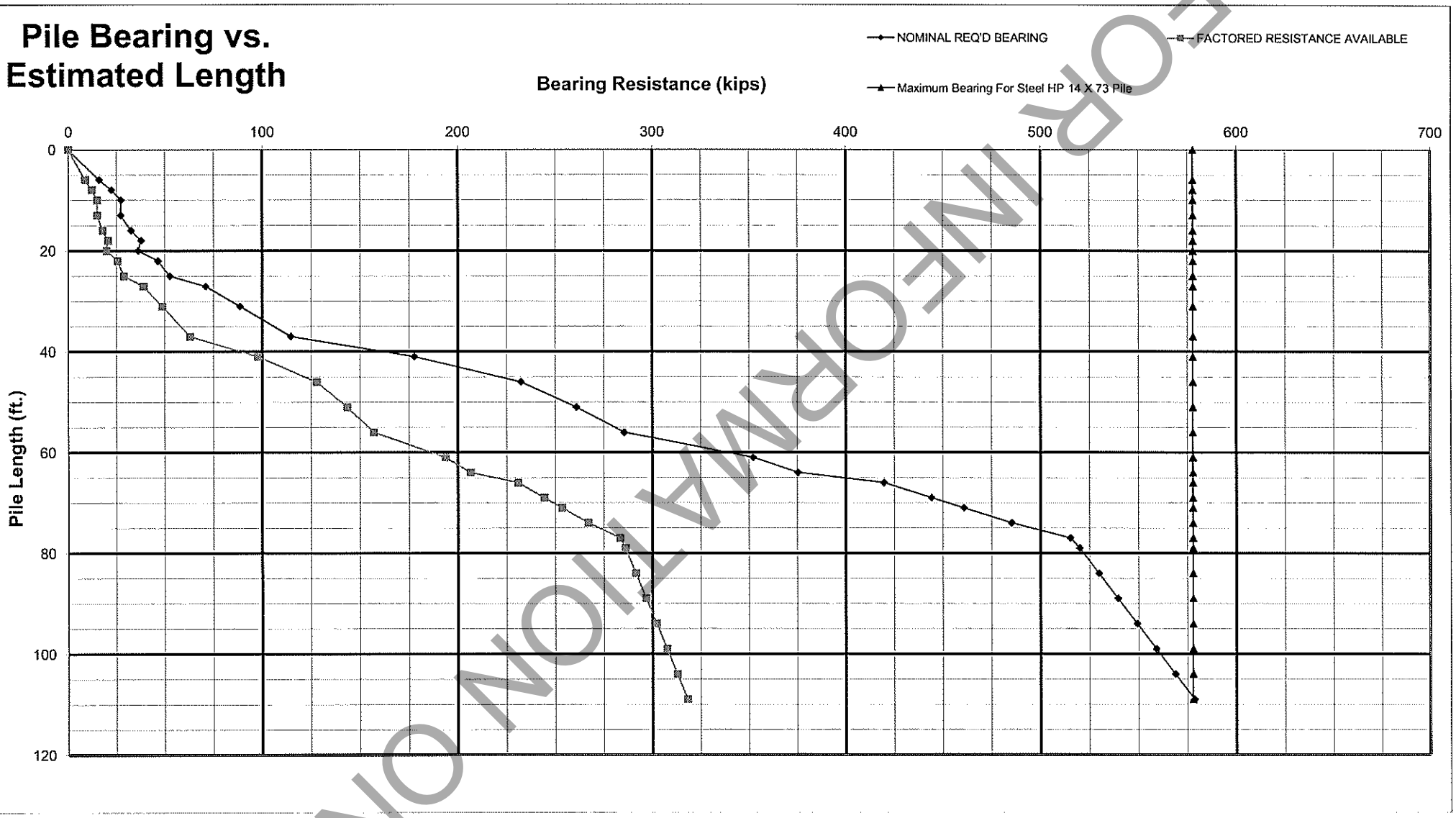
Pile Bearing vs. Estimated Length



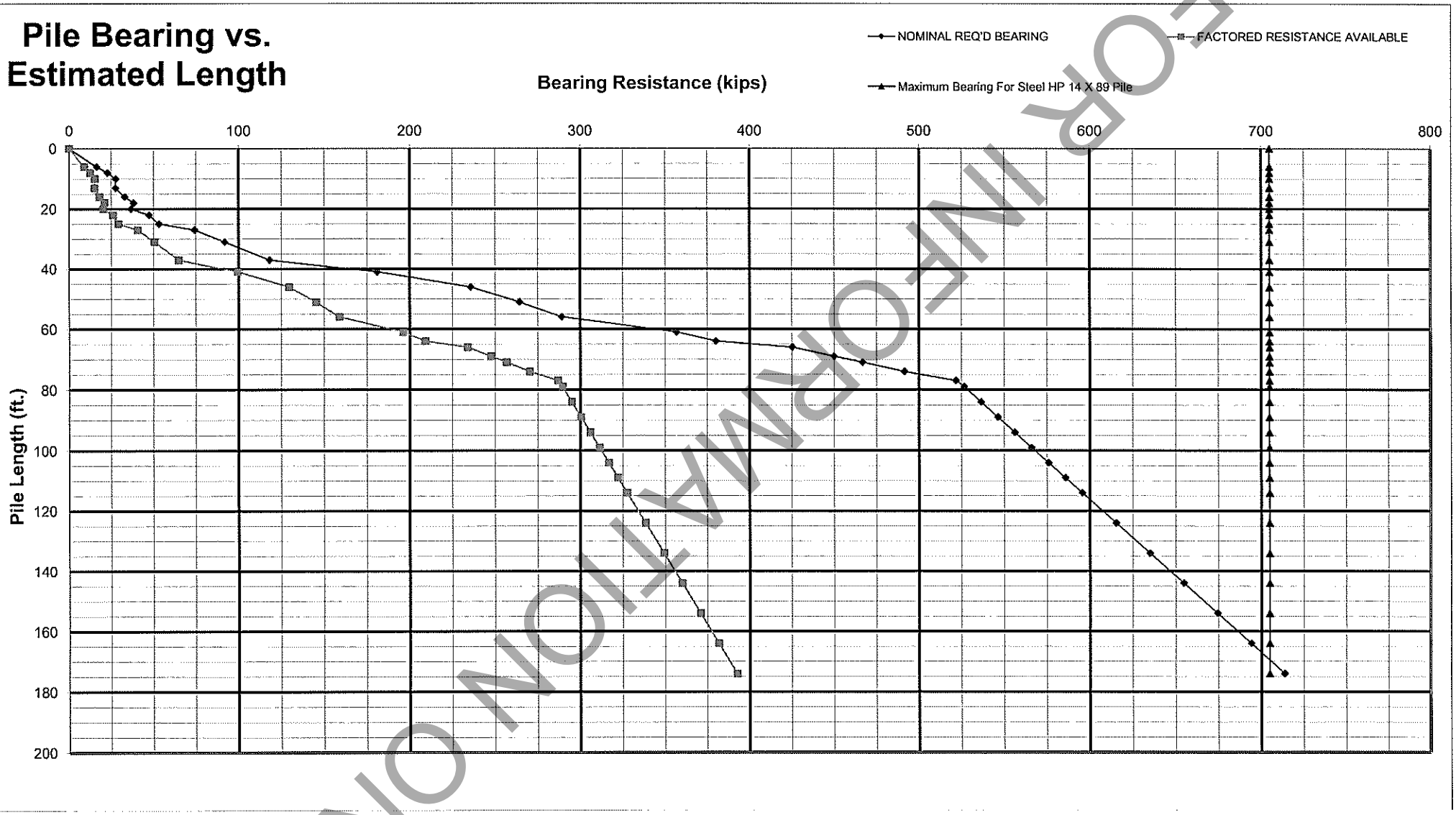
Pile Bearing vs. Estimated Length



Pile Bearing vs. Estimated Length

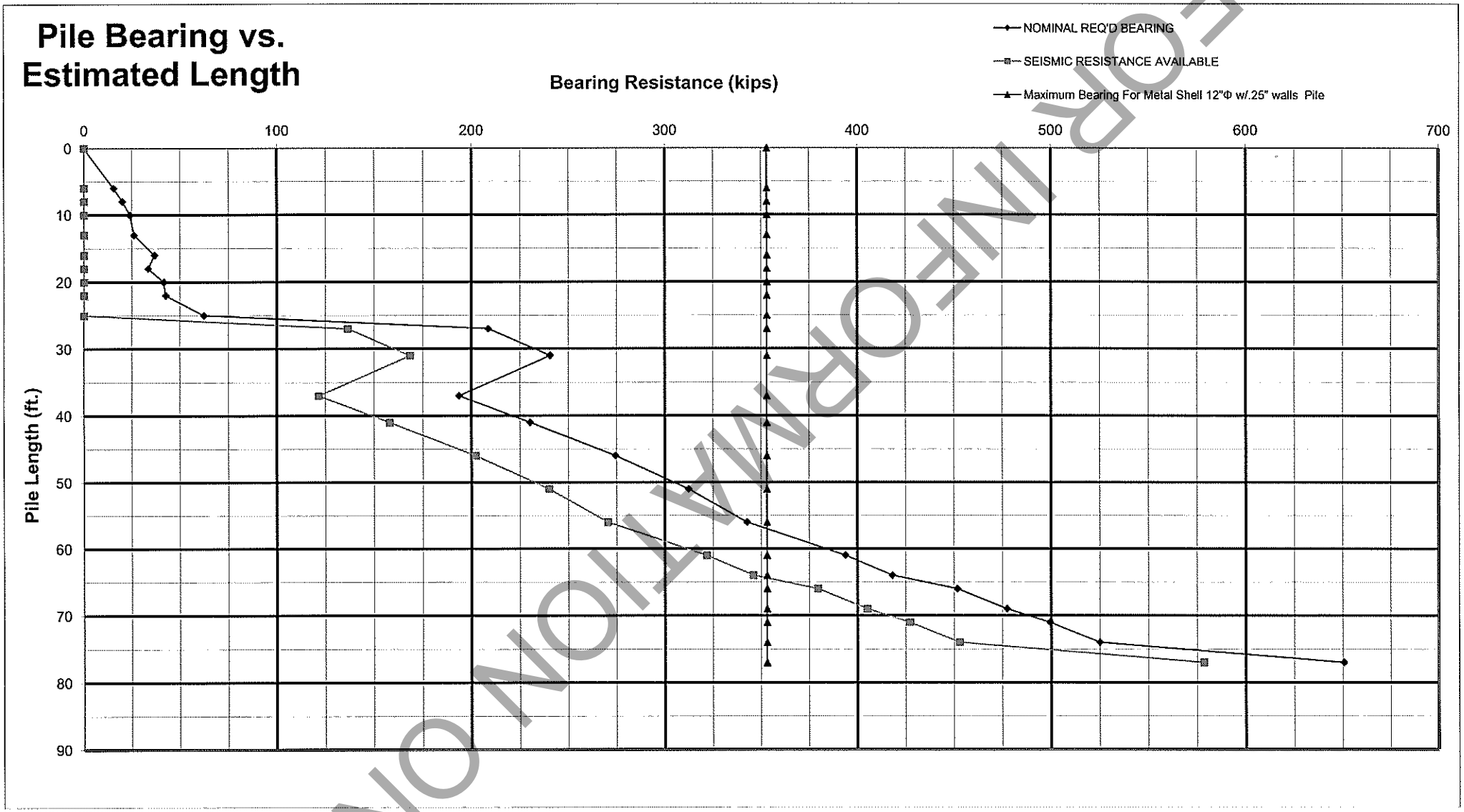


Pile Bearing vs. Estimated Length

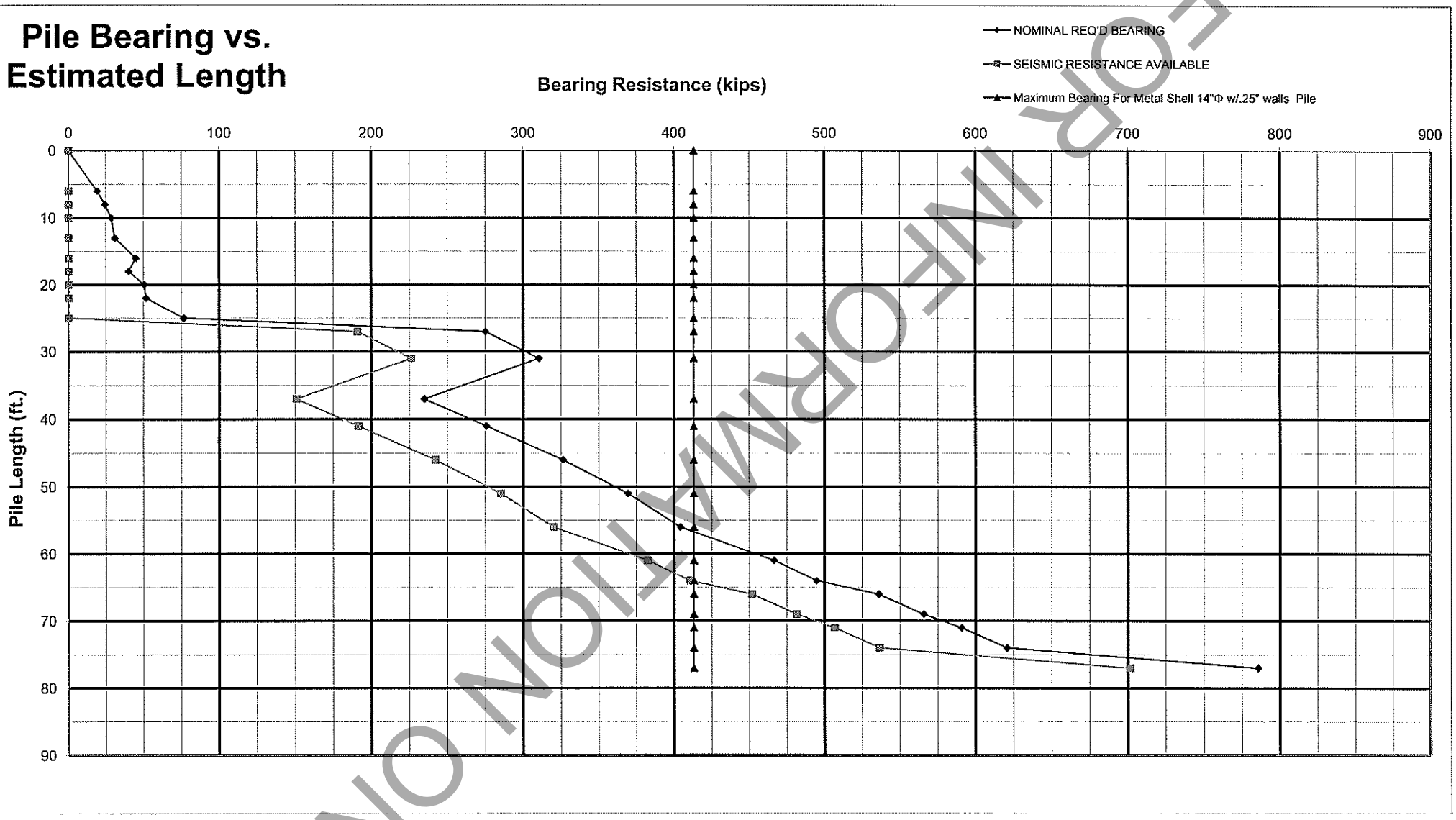


SN 068-0512
East Abutment
(Seismic Bearing Analysis)

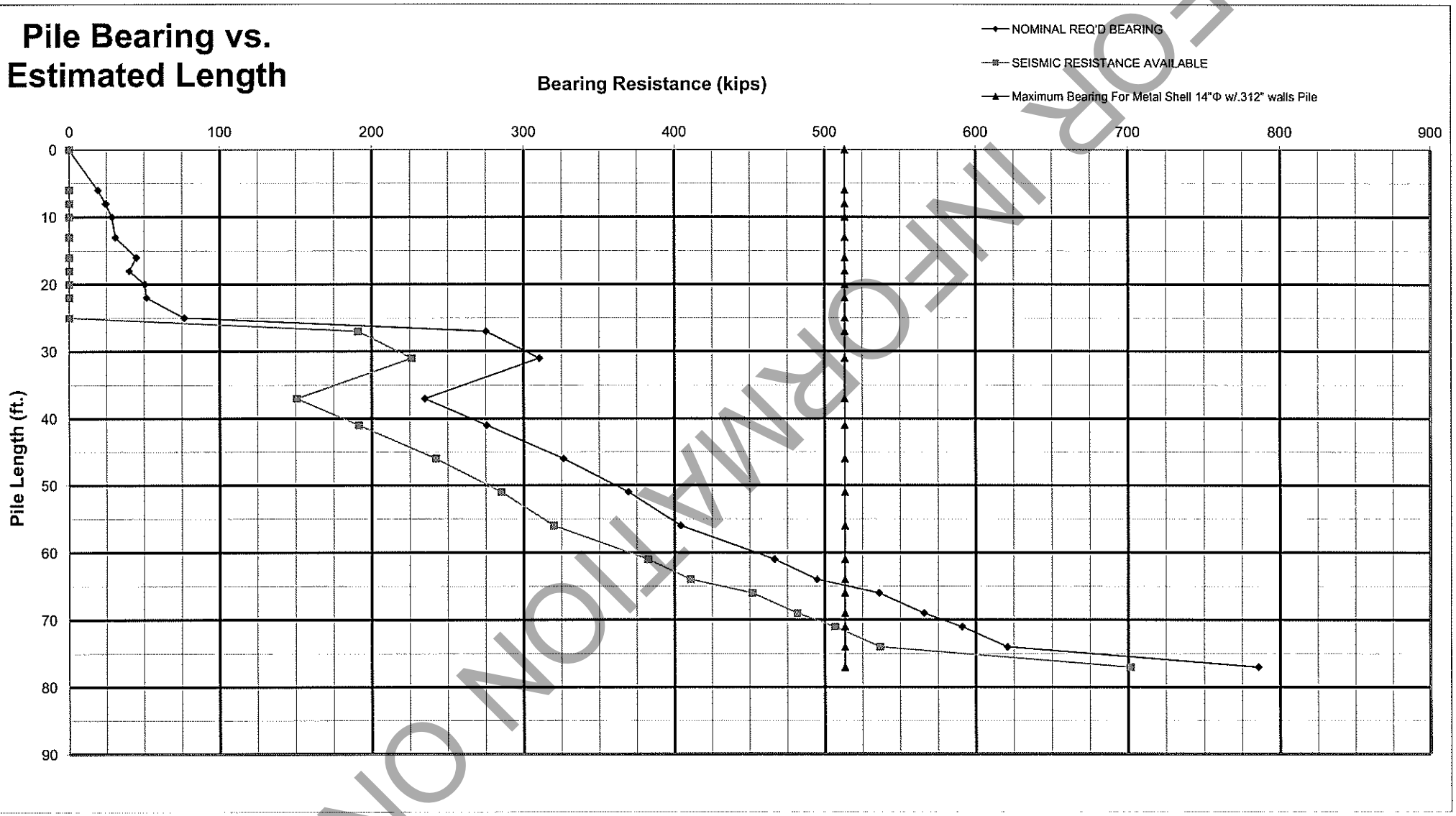
Pile Bearing vs. Estimated Length



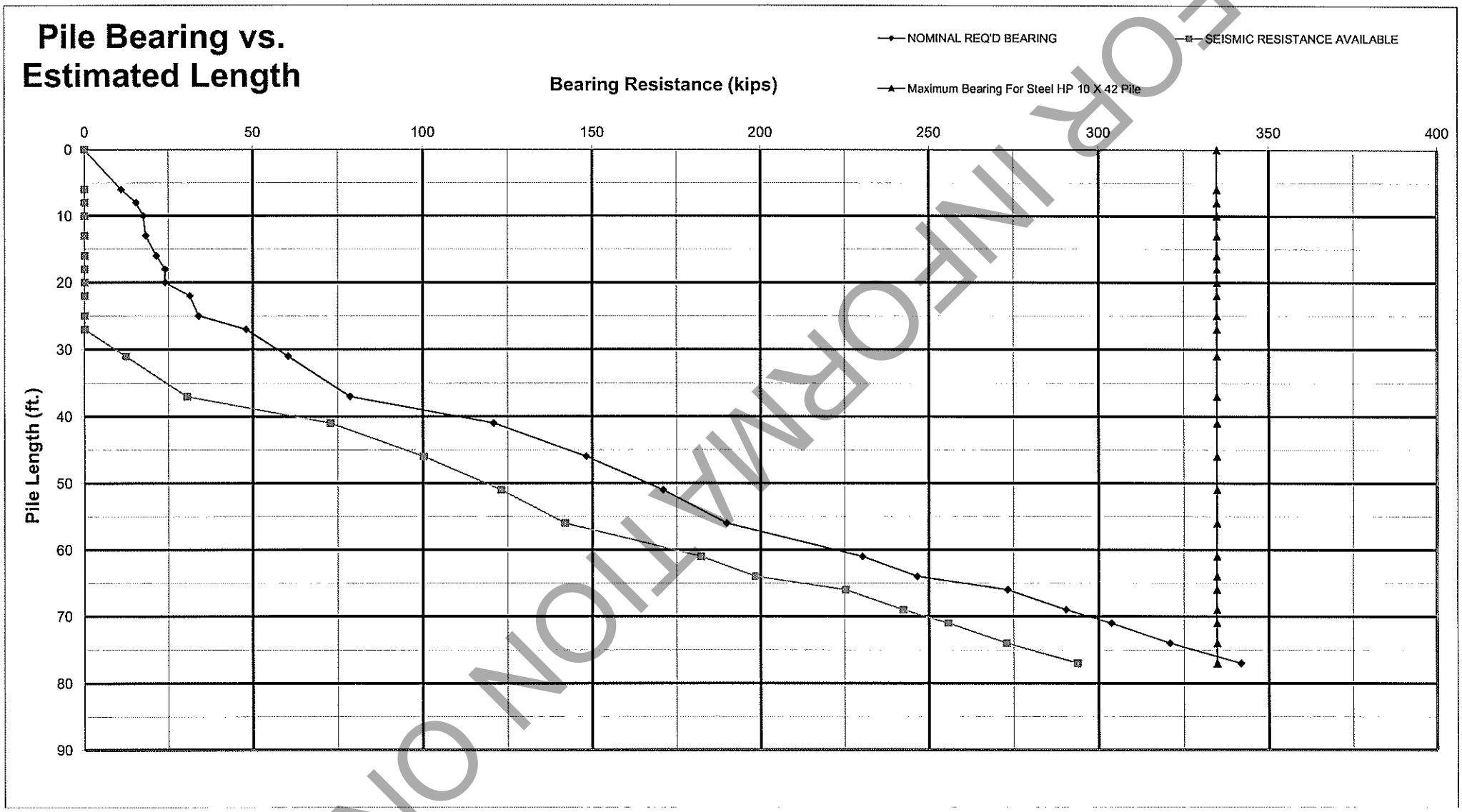
Pile Bearing vs. Estimated Length



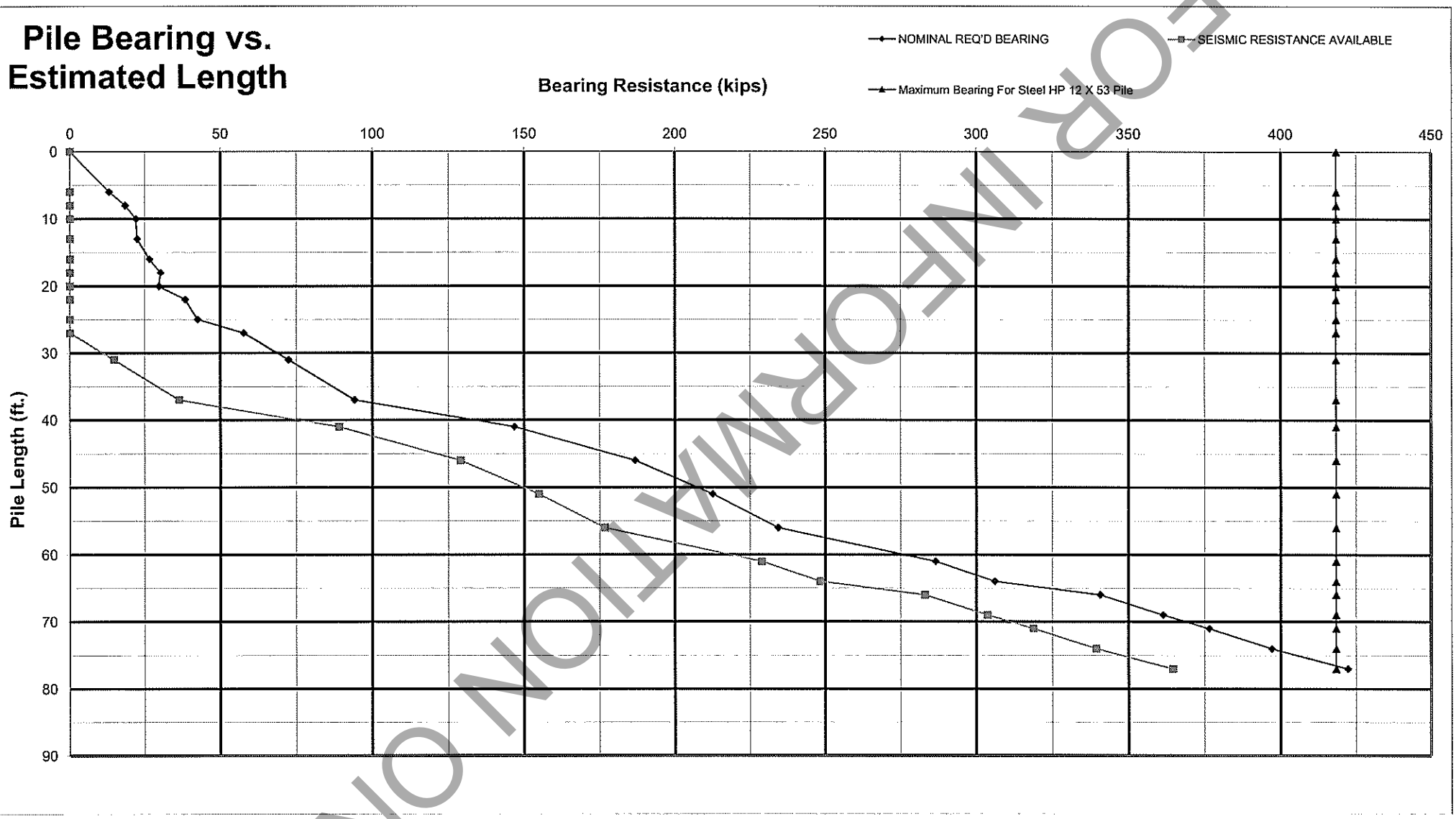
Pile Bearing vs. Estimated Length



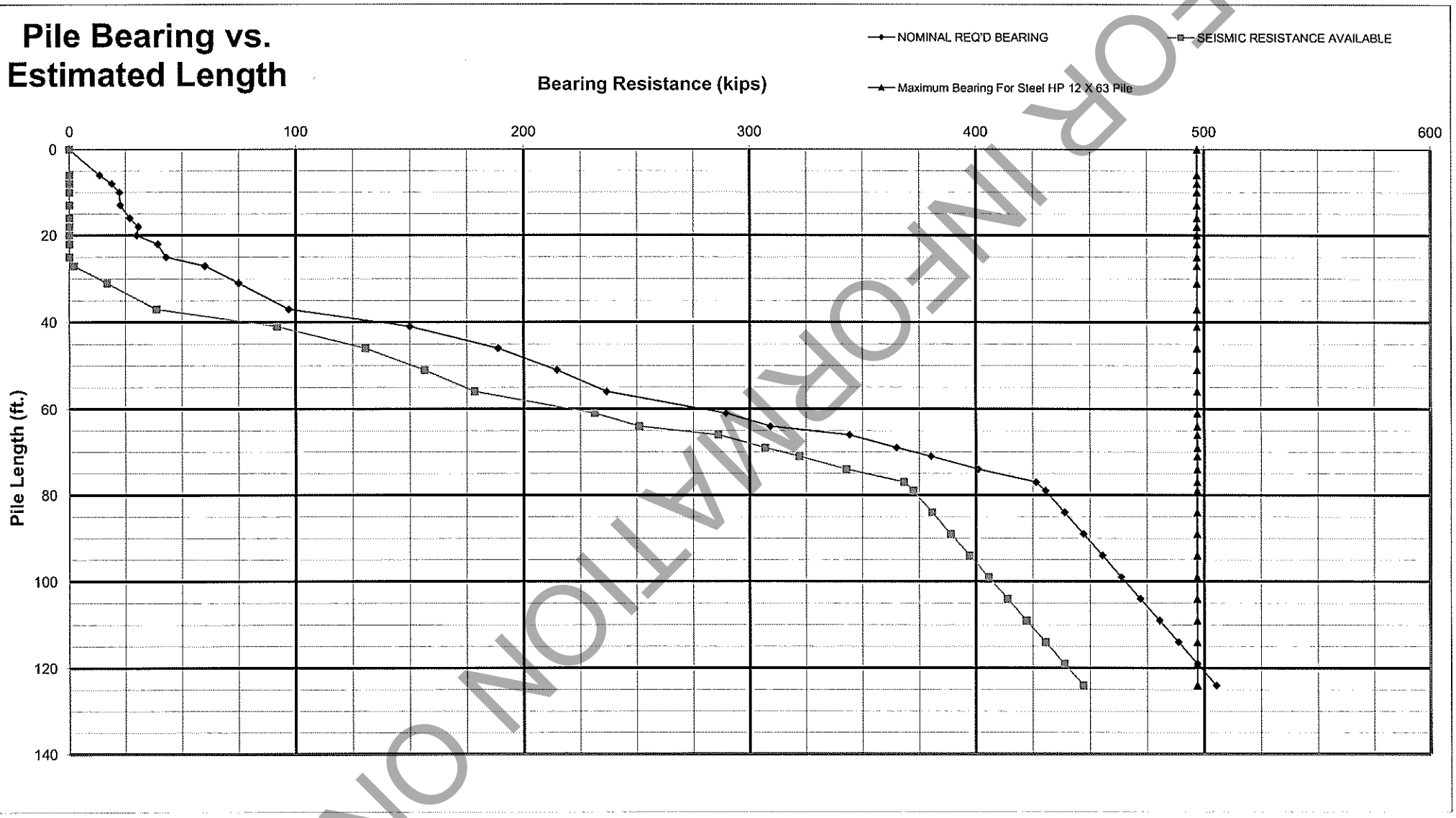
Pile Bearing vs. Estimated Length



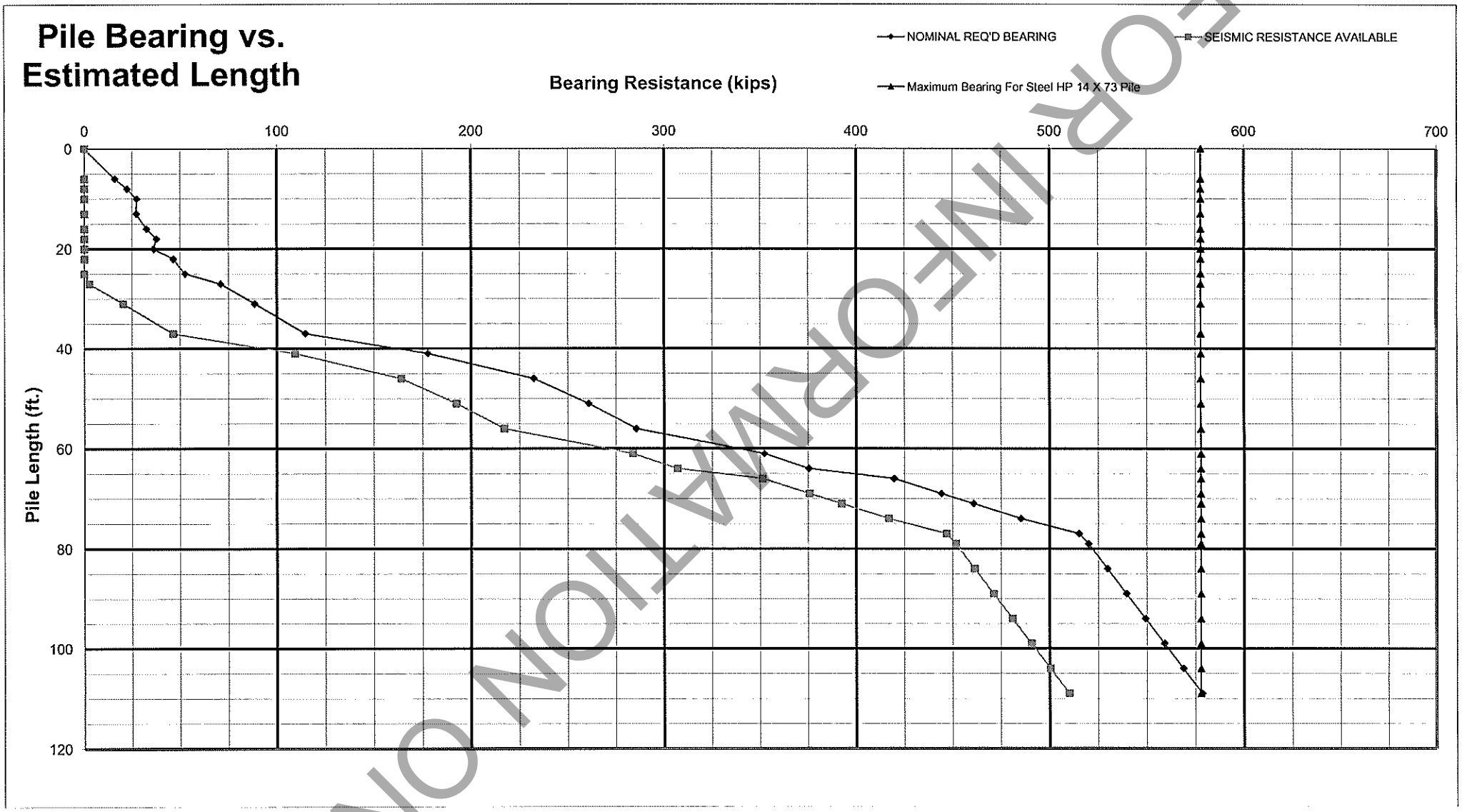
Pile Bearing vs. Estimated Length



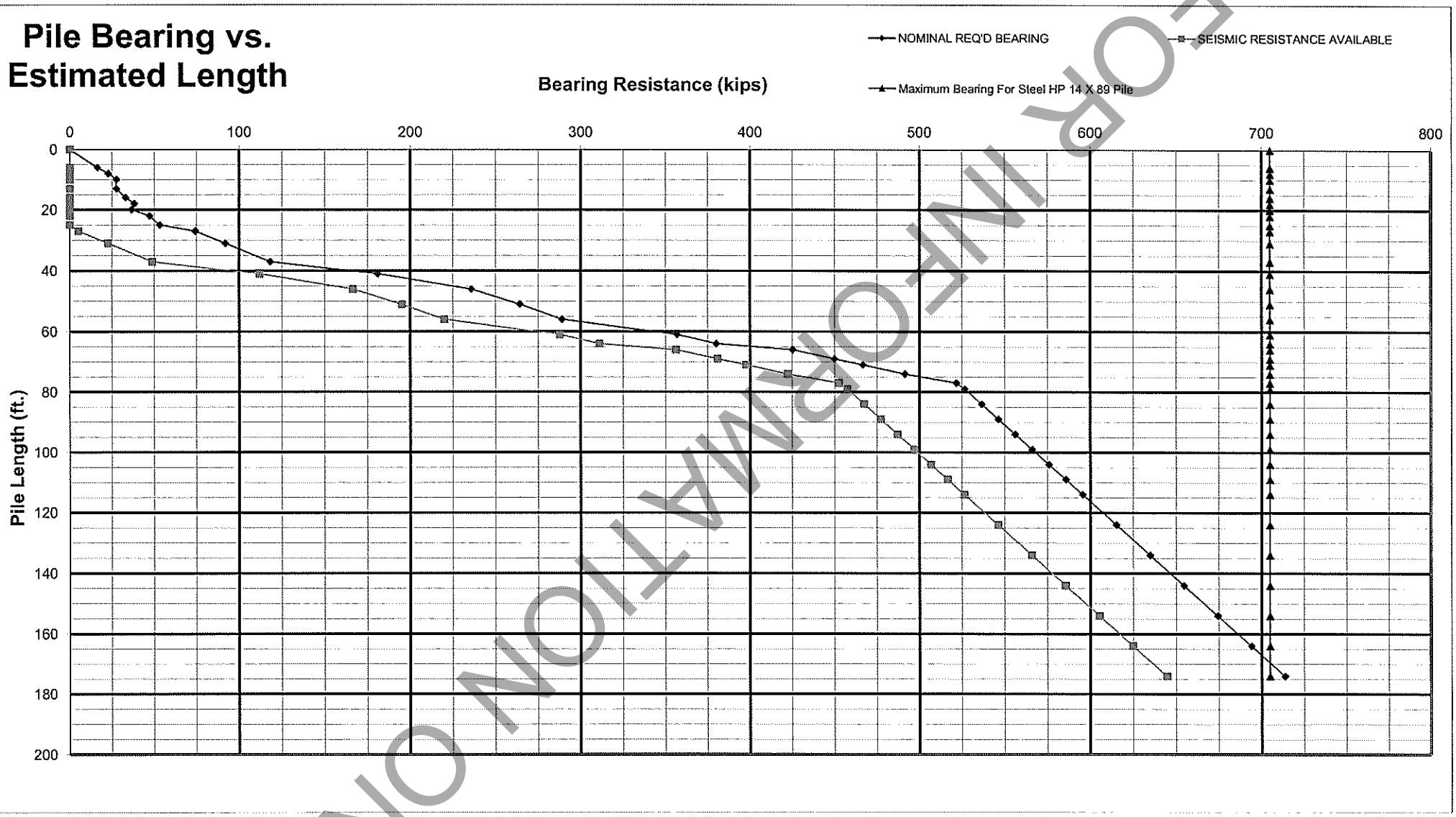
Pile Bearing vs. Estimated Length



Pile Bearing vs. Estimated Length



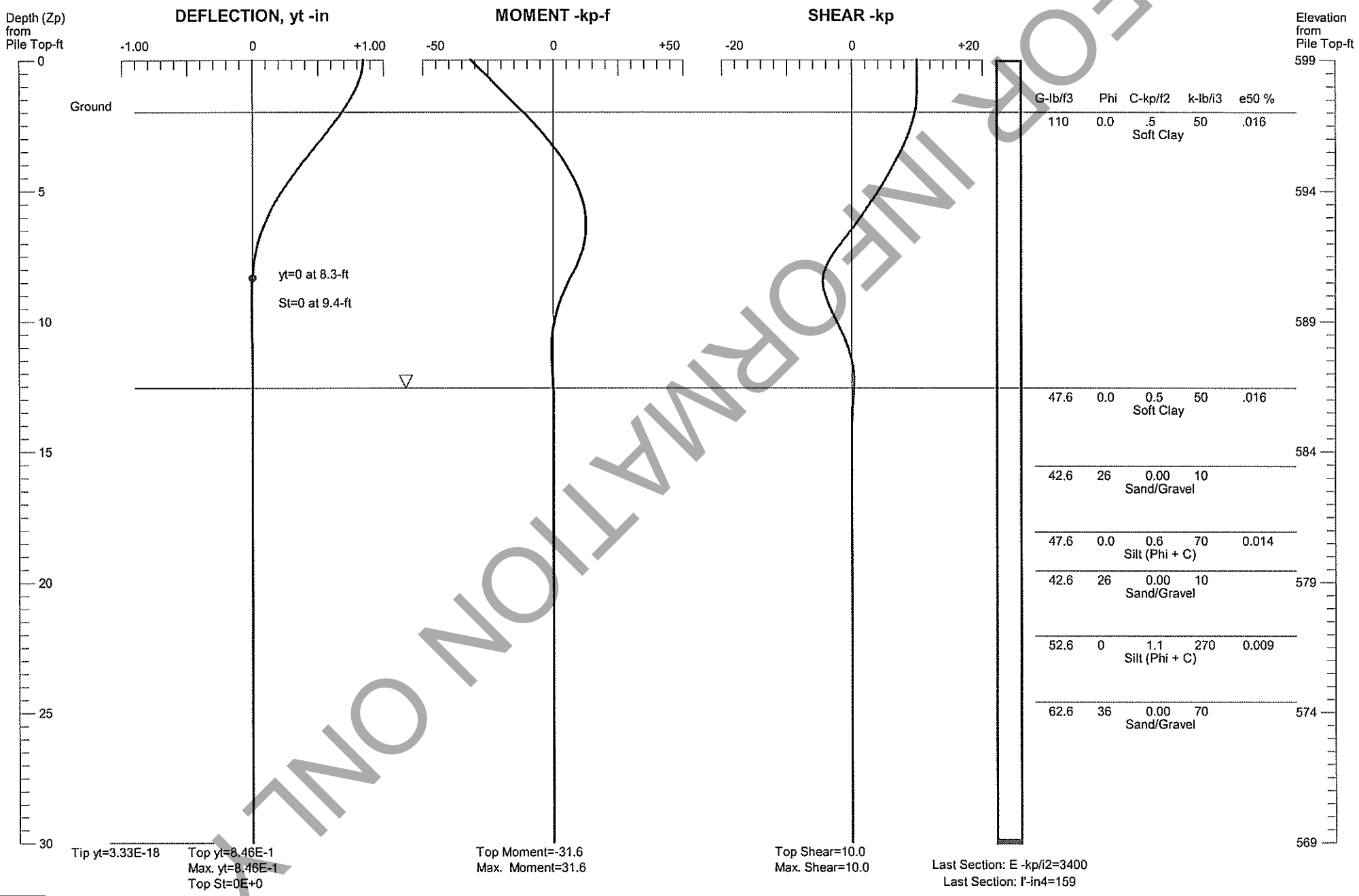
Pile Bearing vs. Estimated Length



SN 068-0512
East Abutment
(Lateral Analysis)

PILE DEFLECTION & FORCE vs DEPTH

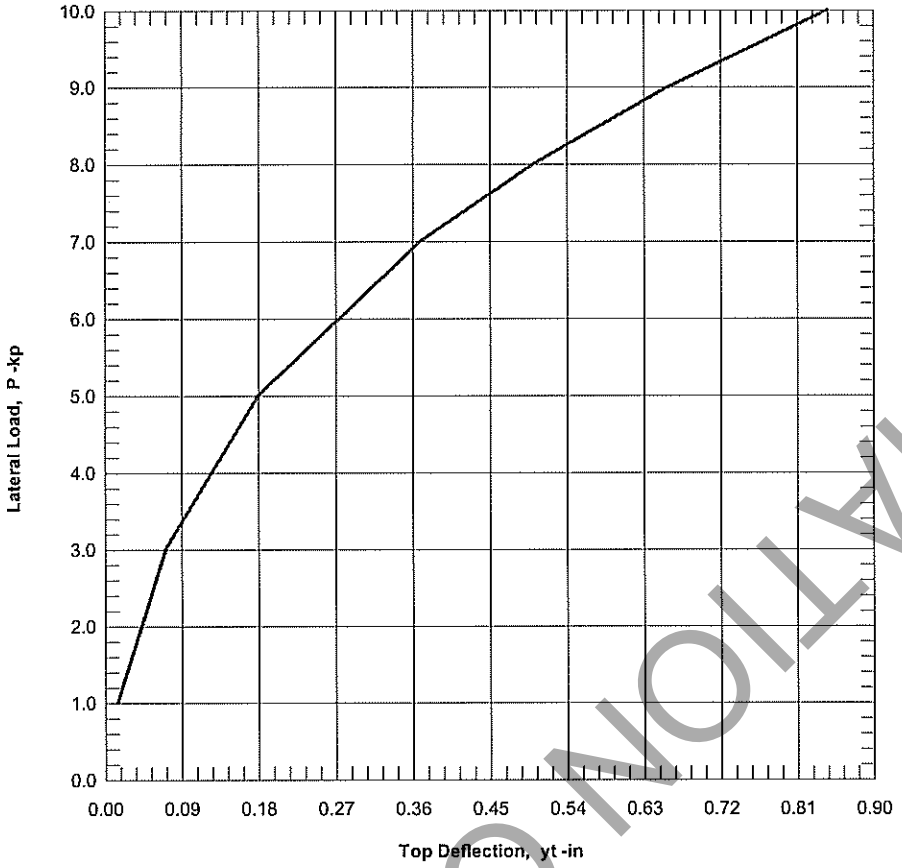
Single Pile, Khead=5, Kbc=2

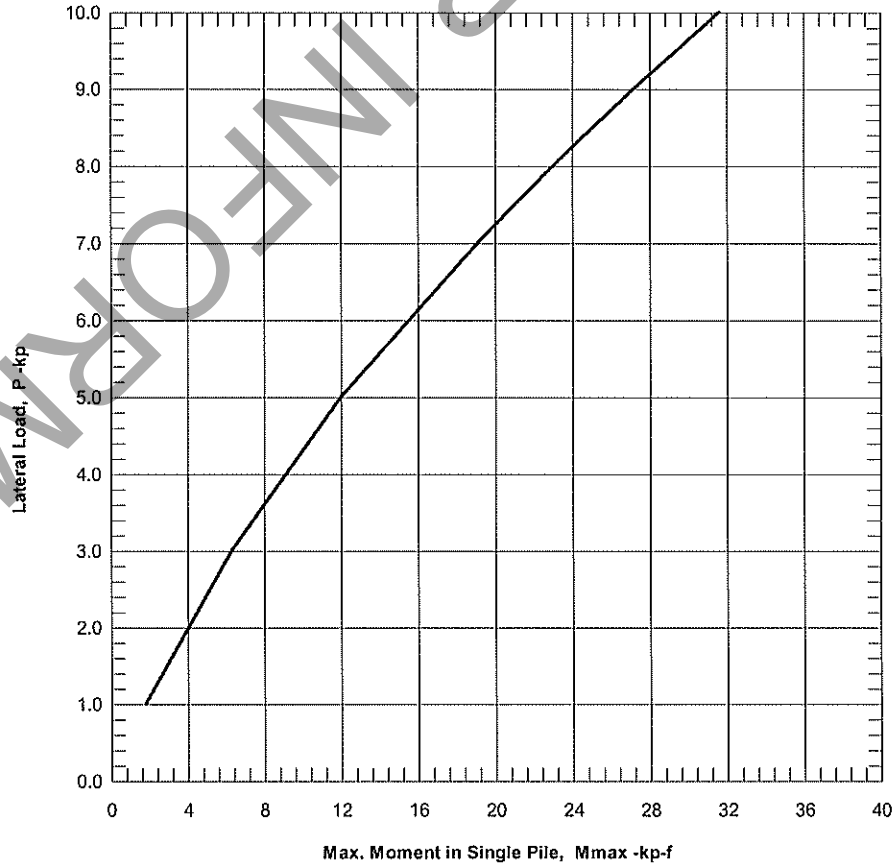


CivilTech Software

IL 185 over McDavid Branch SN 068-0512
East Abutment (MS-12 w/0.250" wall) Boring #2

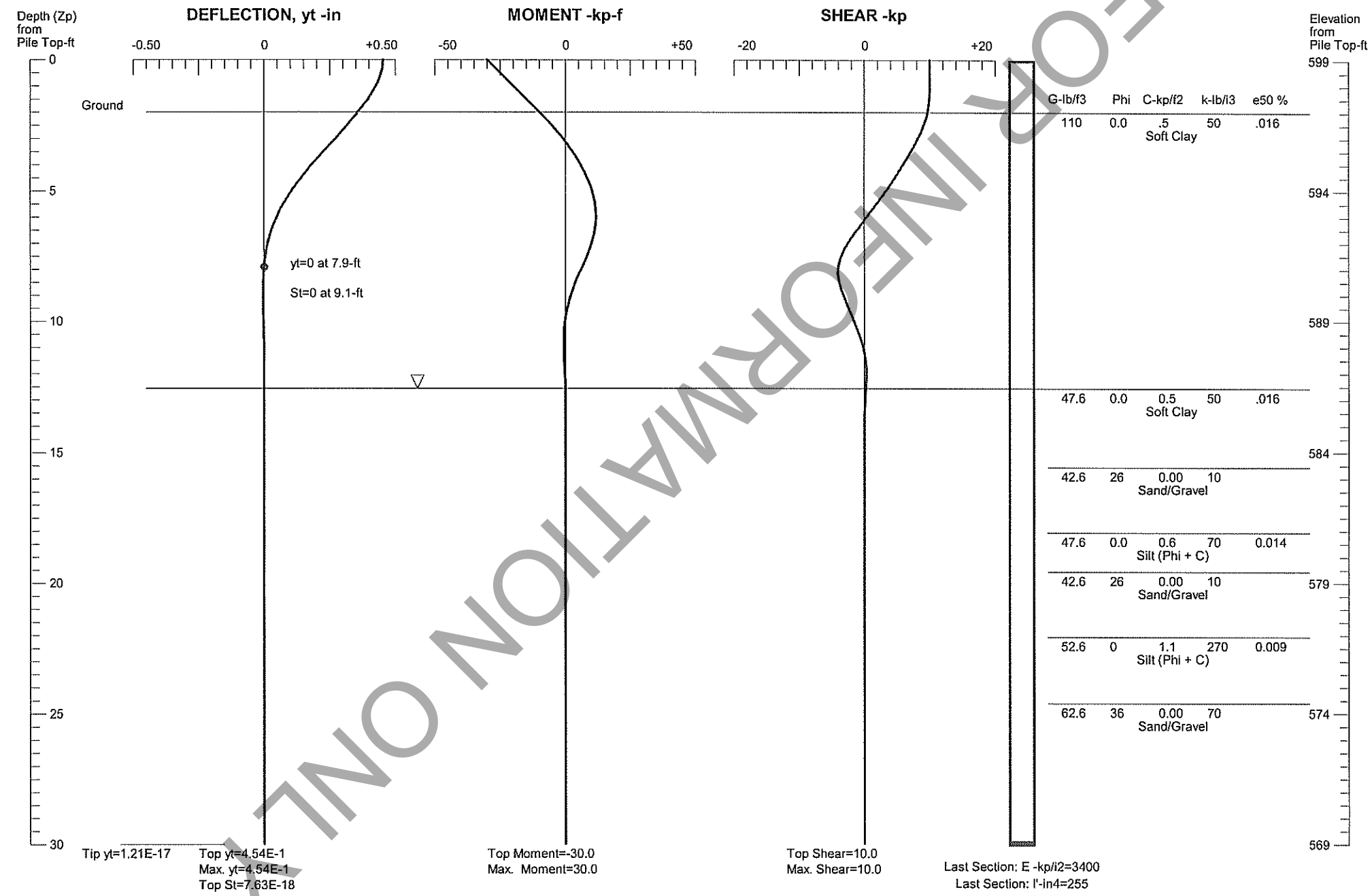
LATERAL LOAD vs DEFLECTION & MAX. MOMENT





PILE DEFLECTION & FORCE vs DEPTH

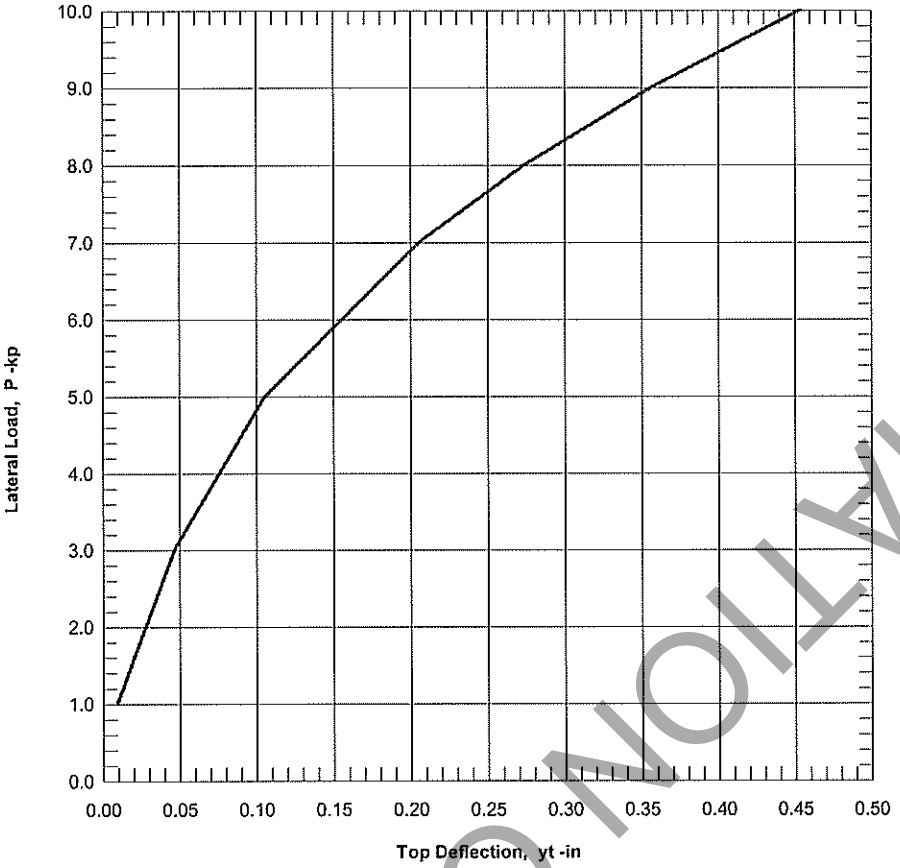
Single Pile, Khead=5, Kbc=2

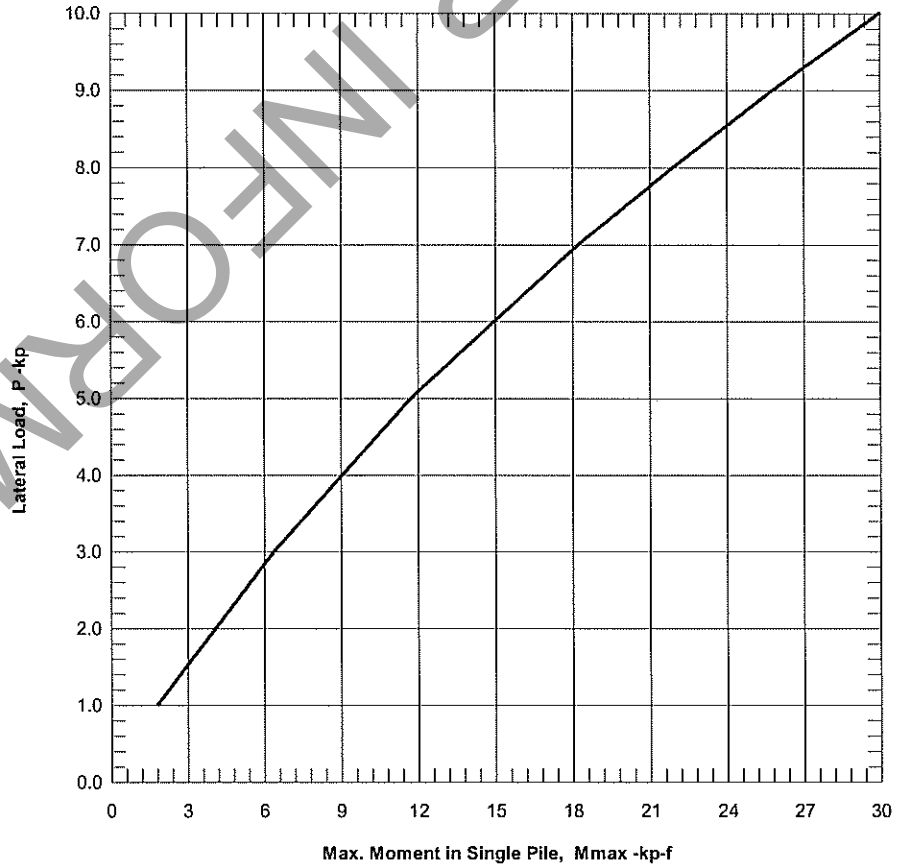


CivilTech Software

IL 185 over McDavid Branch SN 068-0512
East Abutment (MS-14 w/0.250" wall) Boring #2

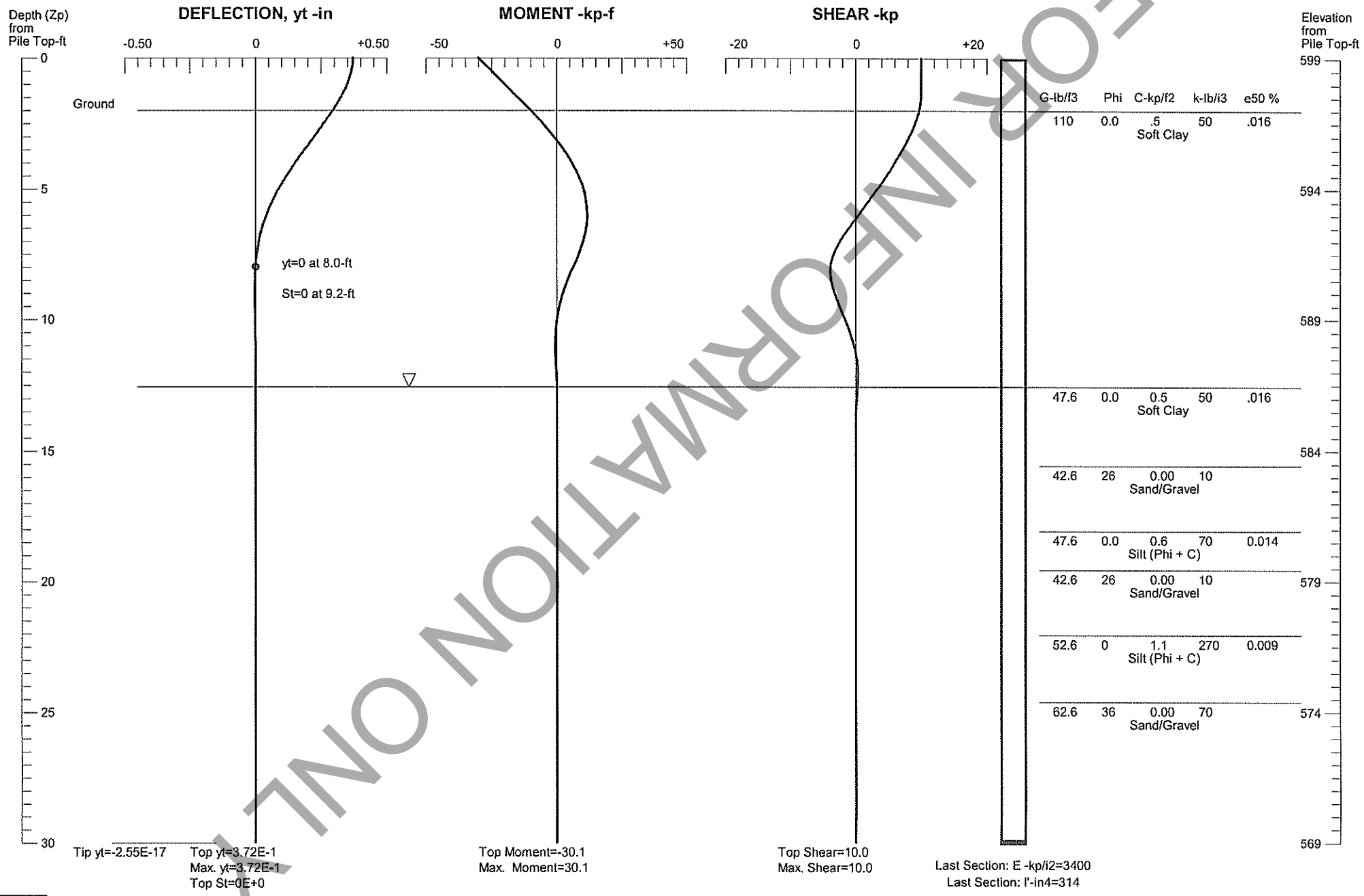
LATERAL LOAD vs DEFLECTION & MAX. MOMENT





PILE DEFLECTION & FORCE vs DEPTH

Single Pile, Khead=5, Kbc=2

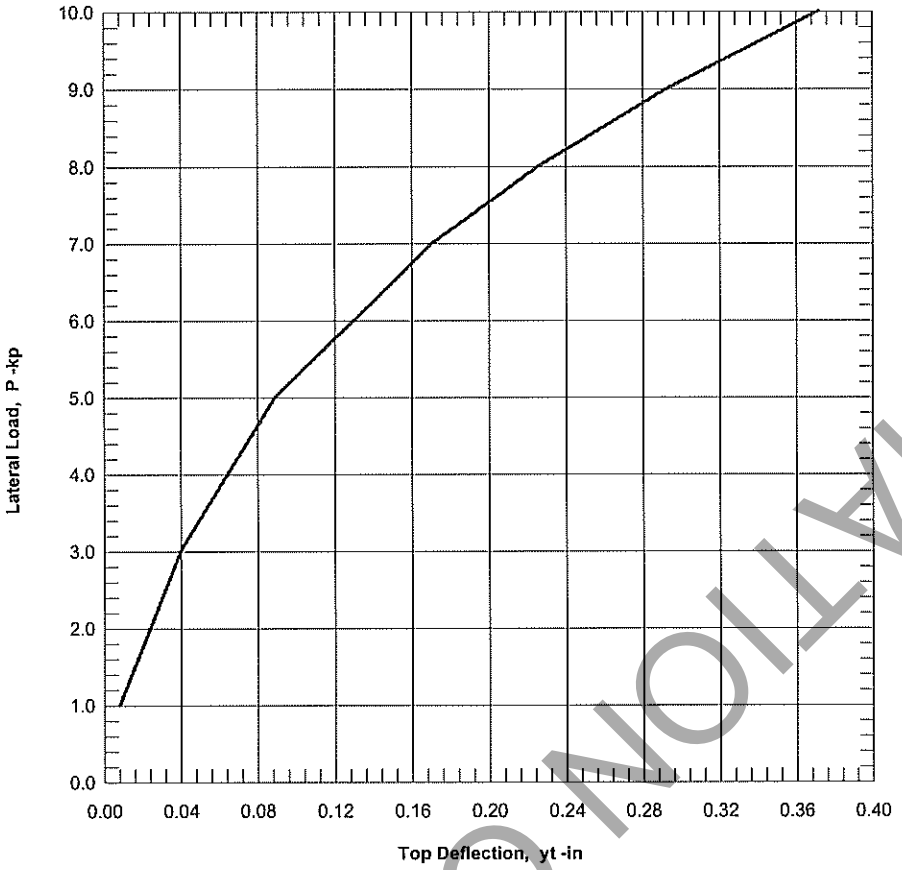


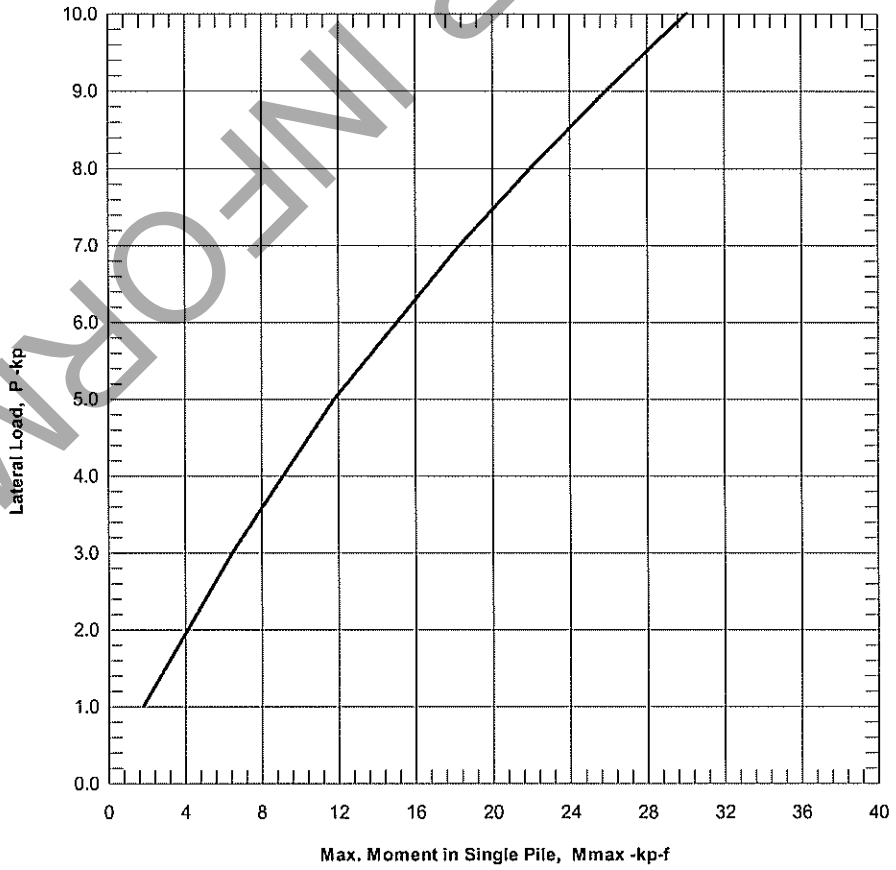
CivilTech Software

IL 185 over McDavid Branch SN 068-0512
East Abutment (MS-14 w/0.312" wall)

Boring #2

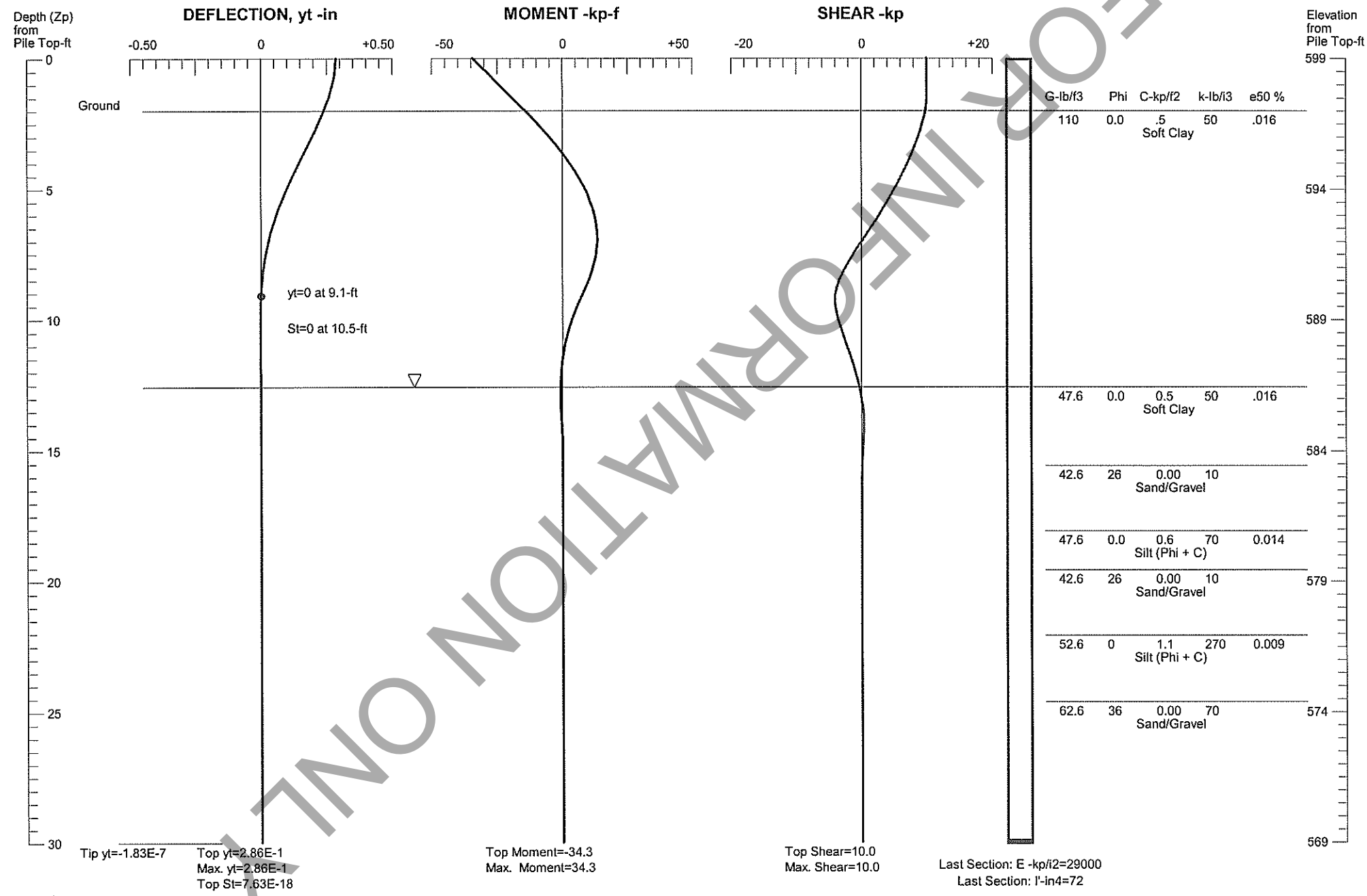
LATERAL LOAD vs DEFLECTION & MAX. MOMENT





PILE DEFLECTION & FORCE vs DEPTH

Single Pile, Khead=5, Kbc=2

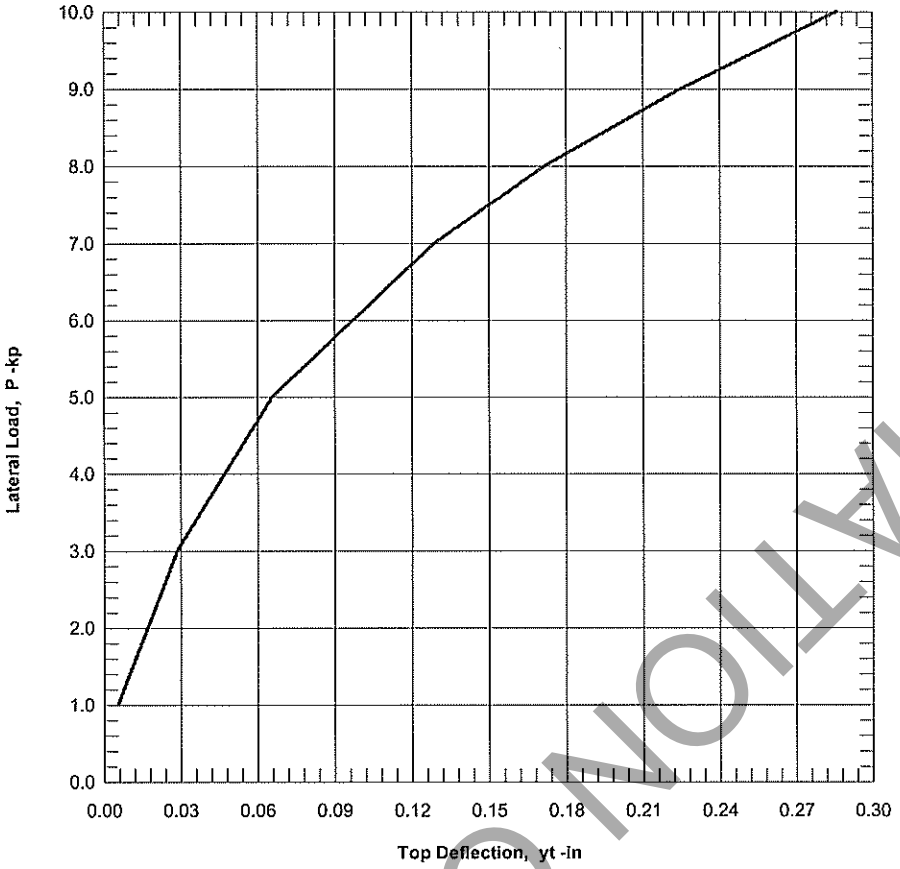


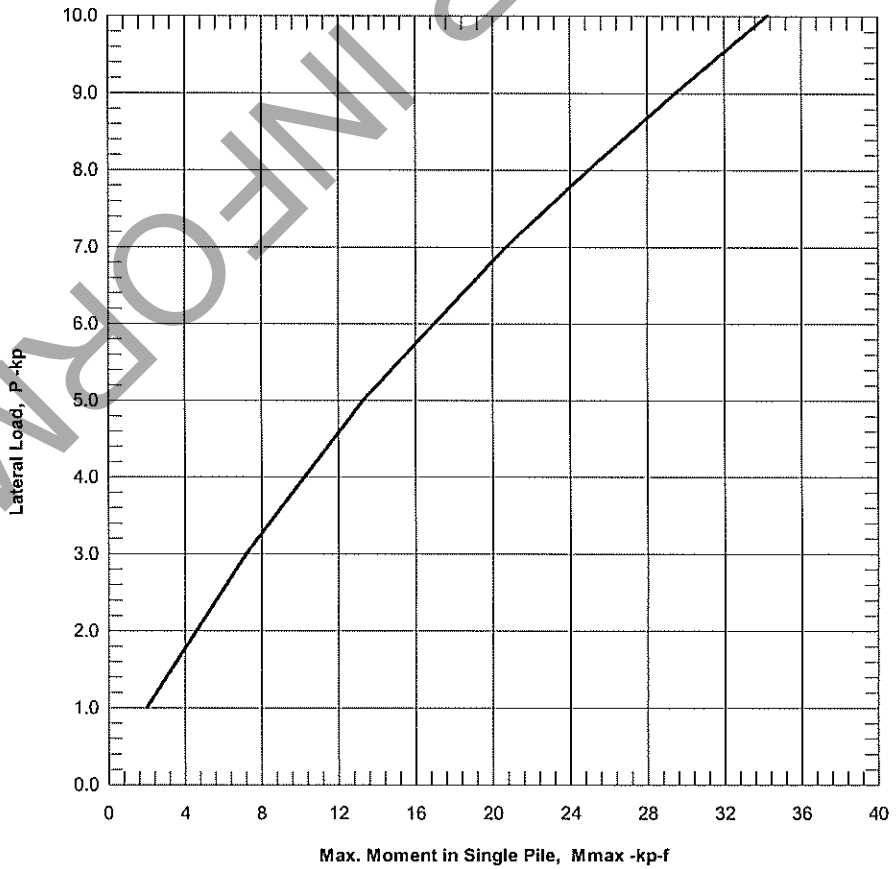
CivilTech Software

IL 185 over McDavid Branch SN 068-0512
East Abutment (HP 10 X 42)

Boring #2

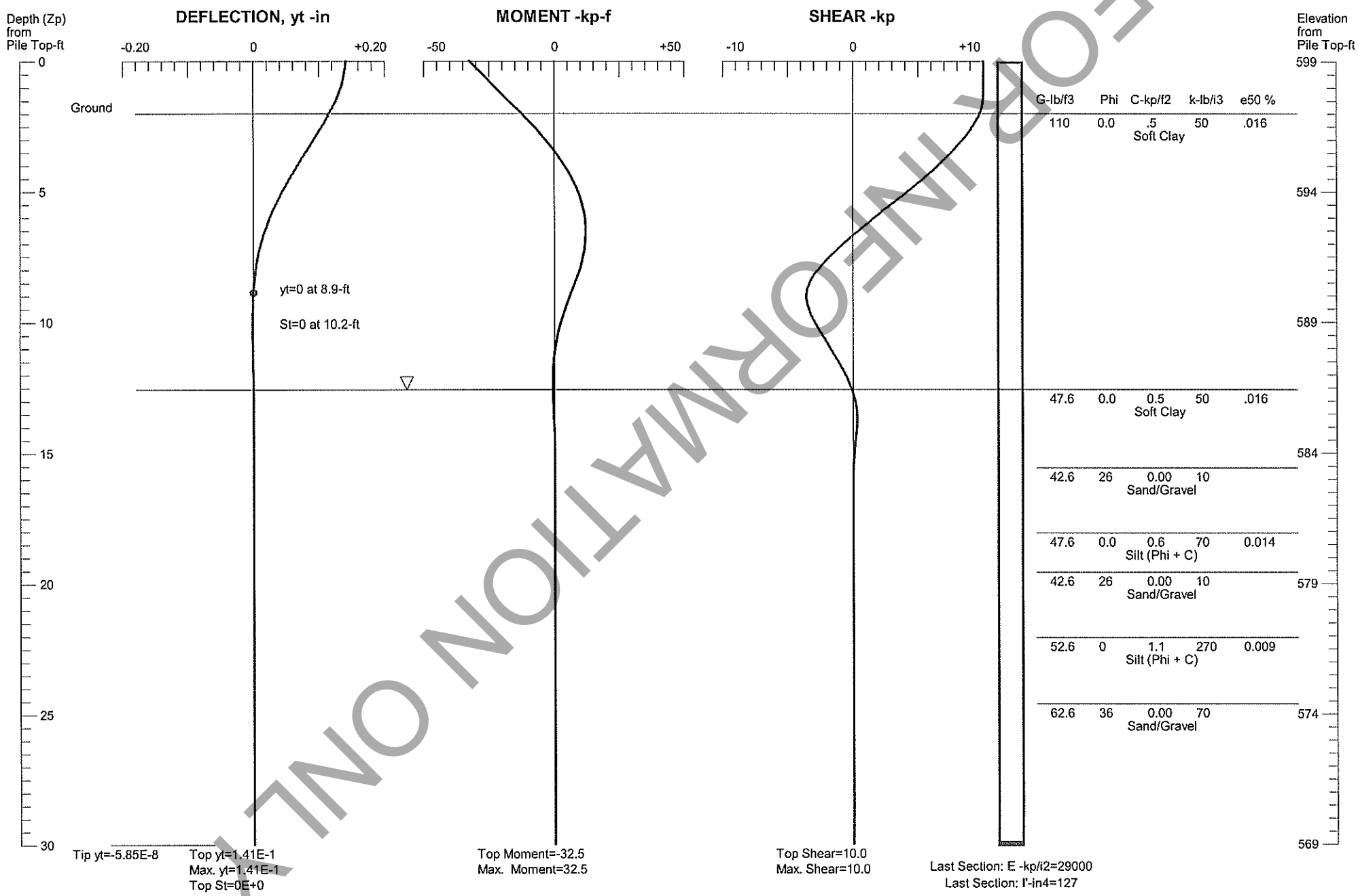
LATERAL LOAD vs DEFLECTION & MAX. MOMENT





PILE DEFLECTION & FORCE vs DEPTH

Single Pile, Khead=5, Kbc=2

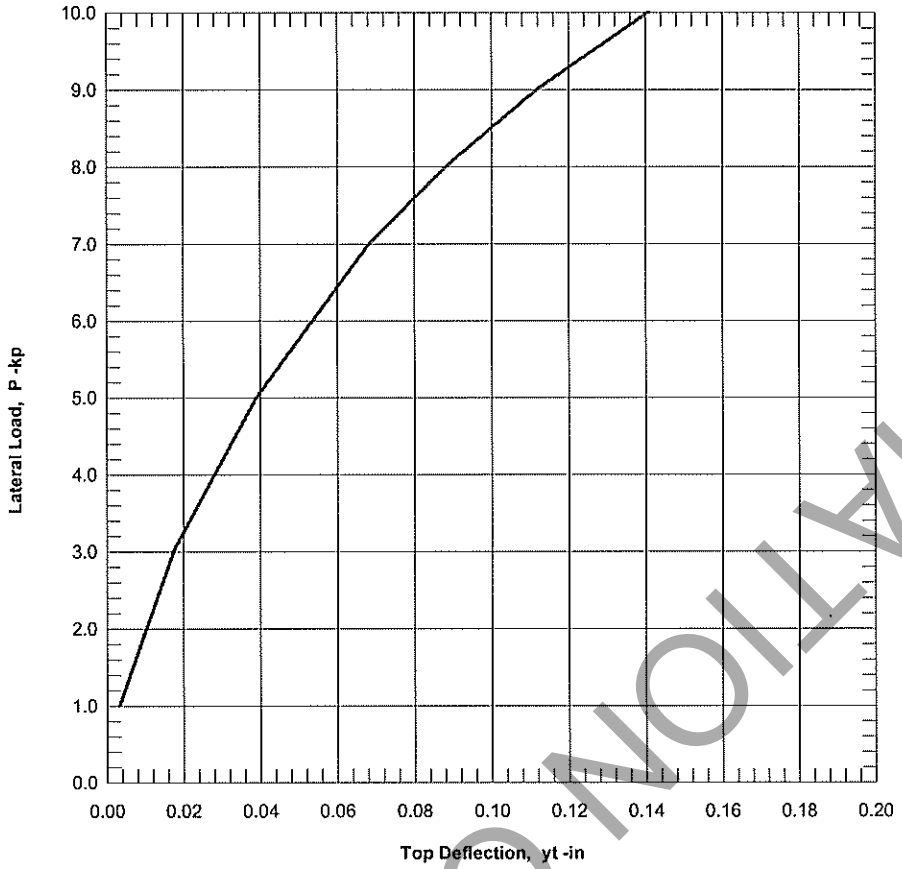


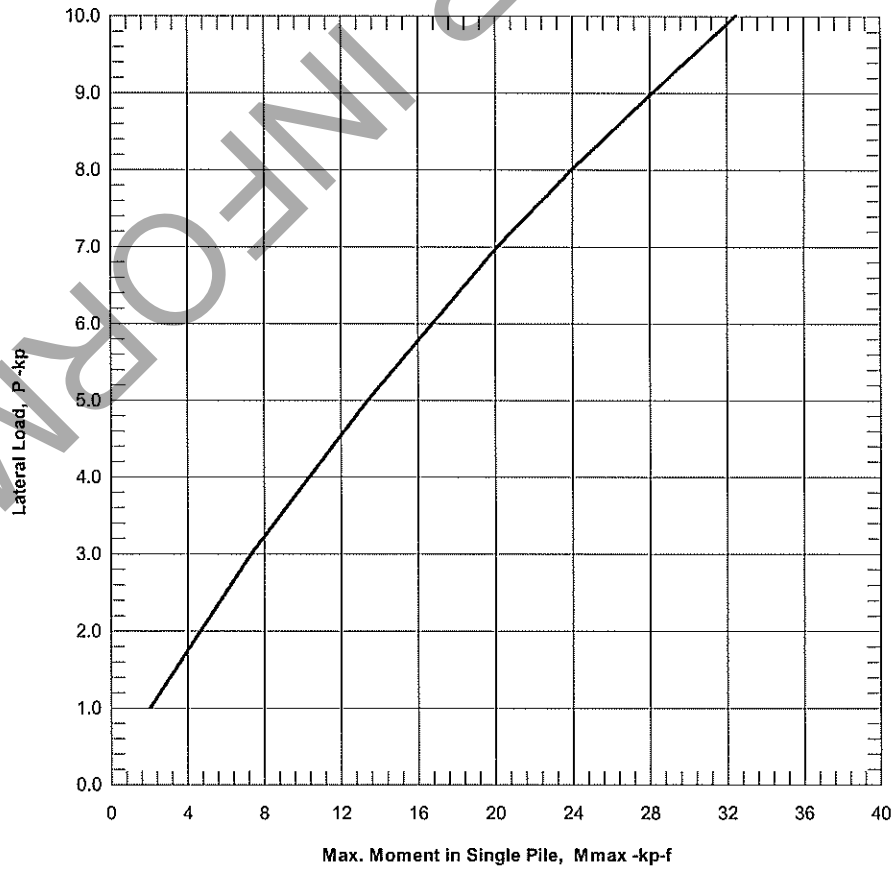
CivilTech Software

IL 185 over McDavid Branch SN 068-0512
East Abutment (HP 12 X 53)

Boring #2

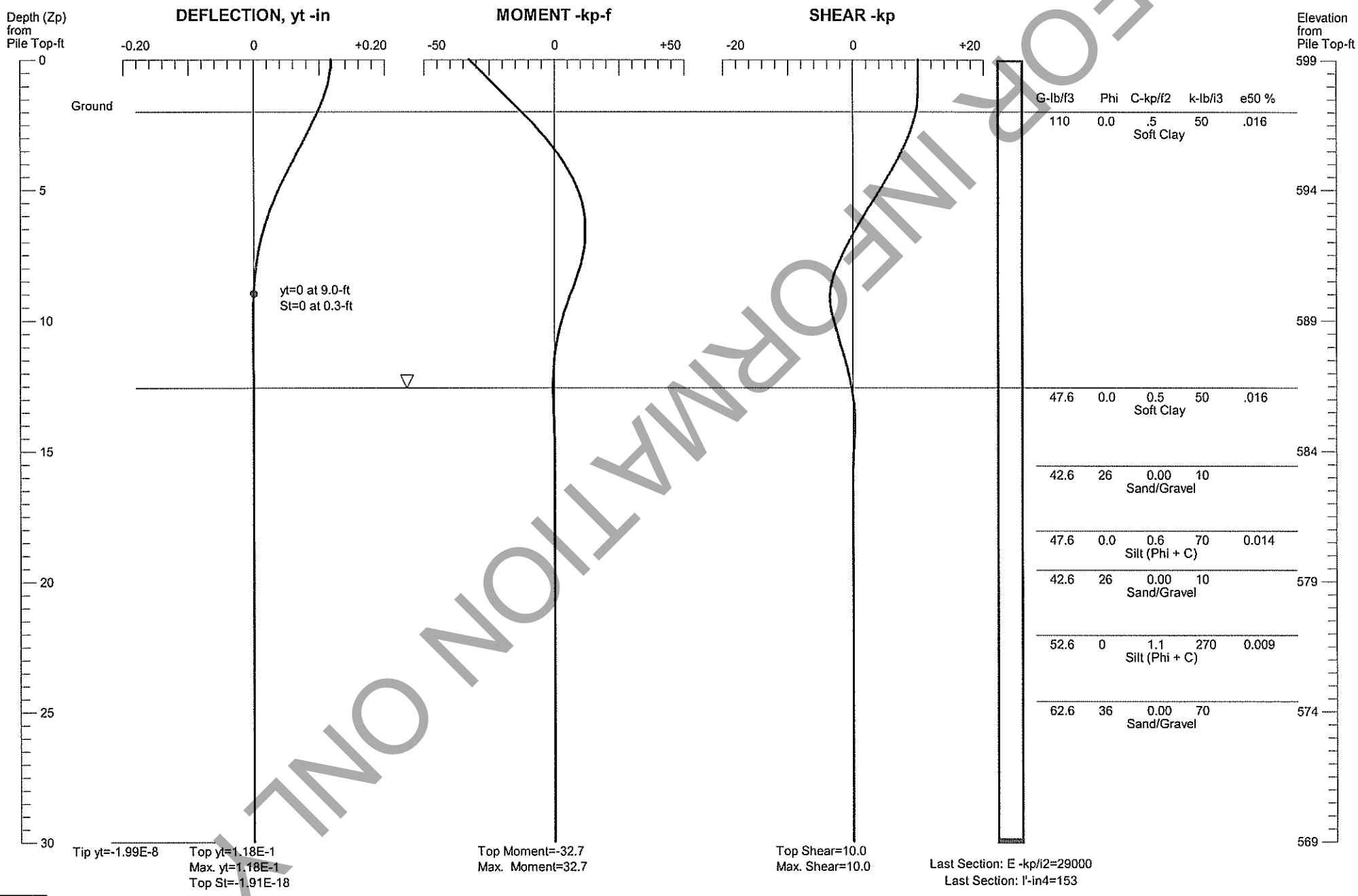
LATERAL LOAD vs DEFLECTION & MAX. MOMENT





PILE DEFLECTION & FORCE vs DEPTH

Single Pile, Khead=5, Kbc=2

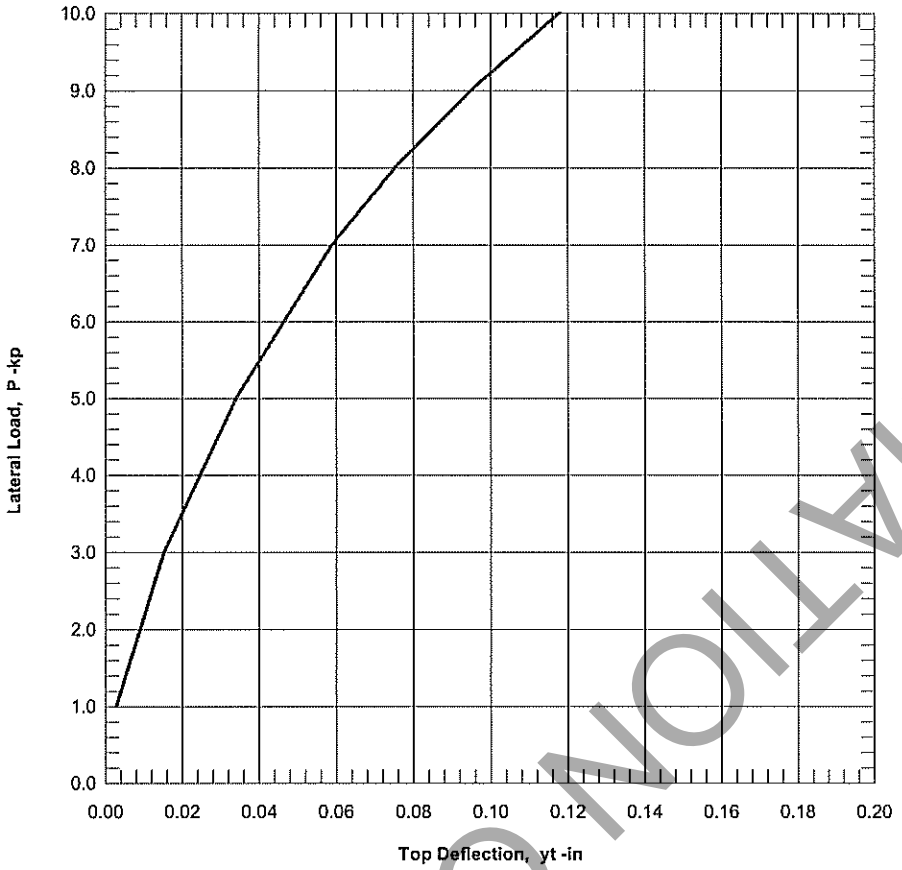


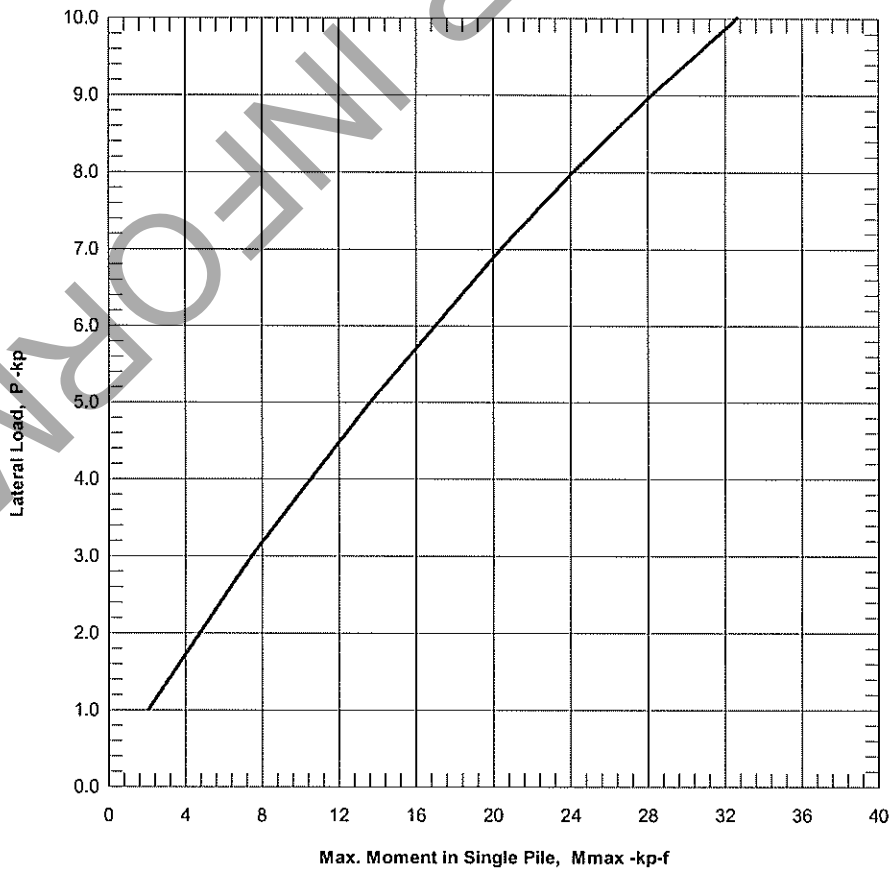
CivilTech Software

IL 185 over McDavid Branch SN 068-0512
East Abutment (HP 12 X 63)

Boring #2

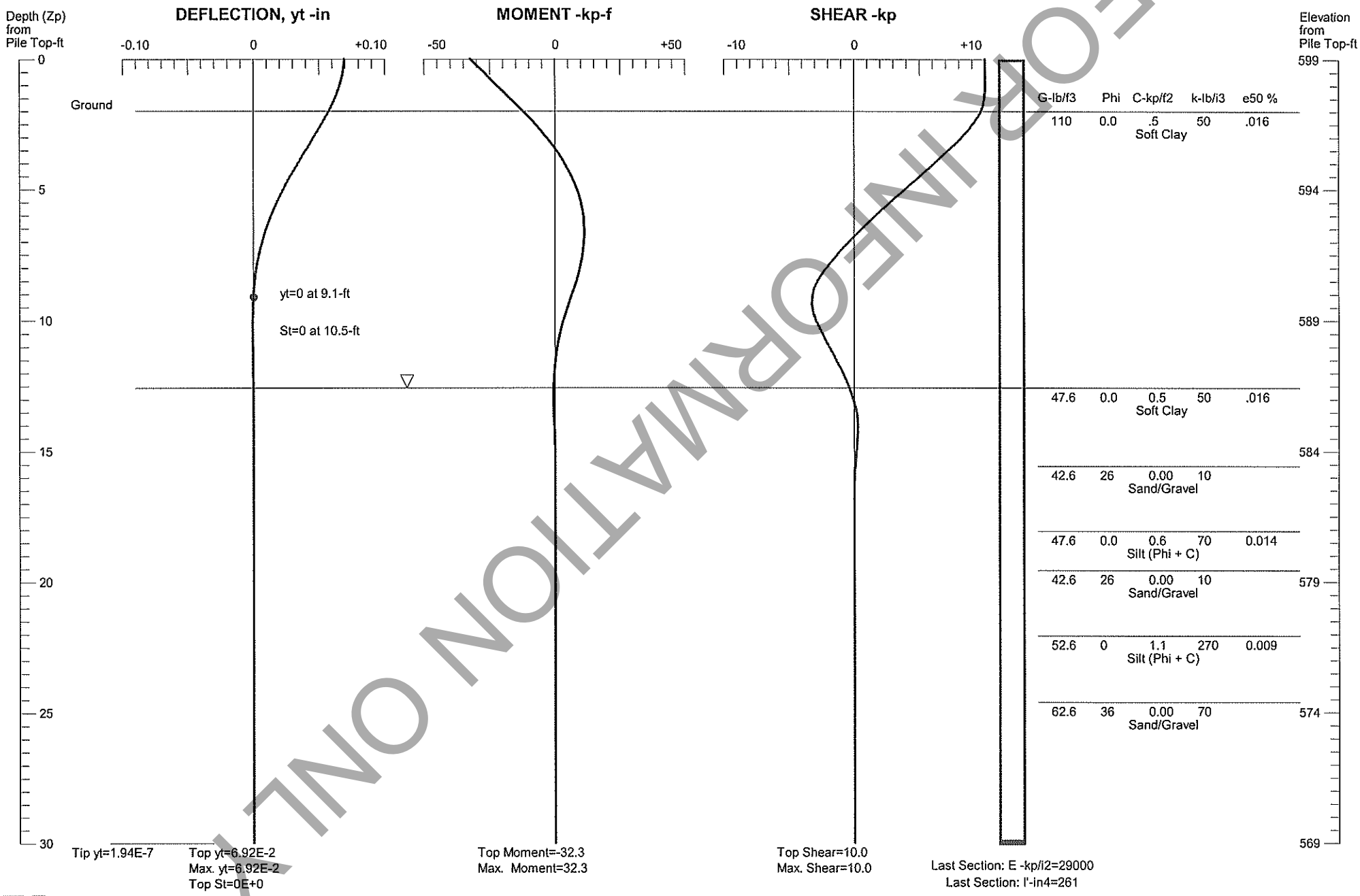
LATERAL LOAD vs DEFLECTION & MAX. MOMENT





PILE DEFLECTION & FORCE vs DEPTH

Single Pile, Khead=5, Kbc=2

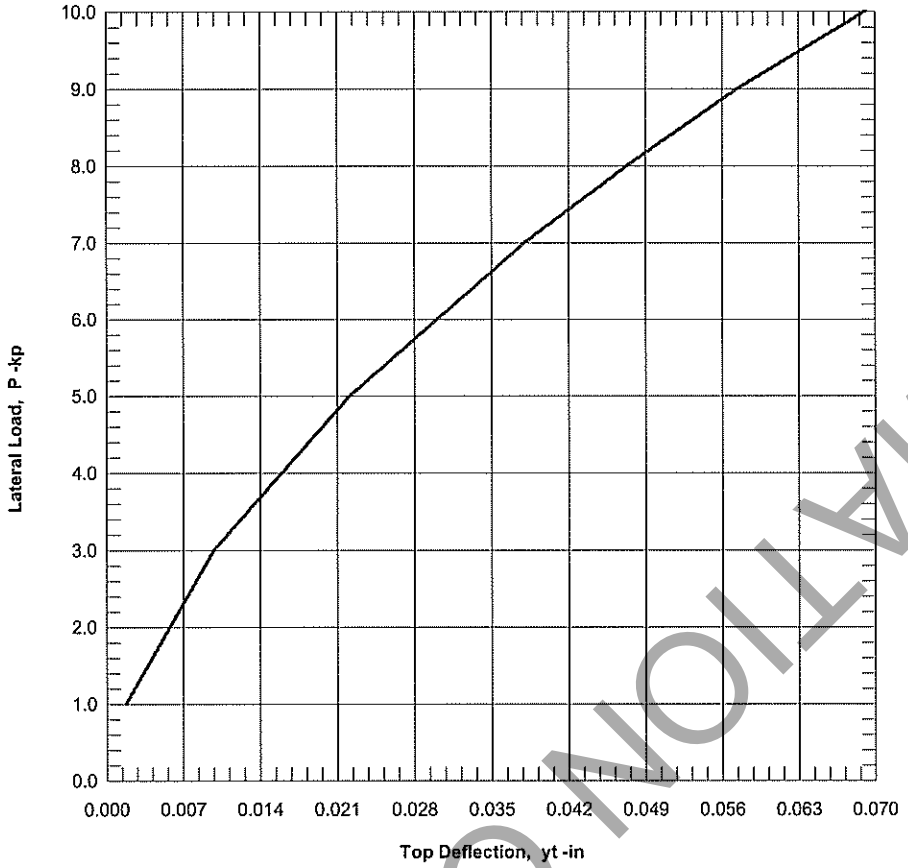


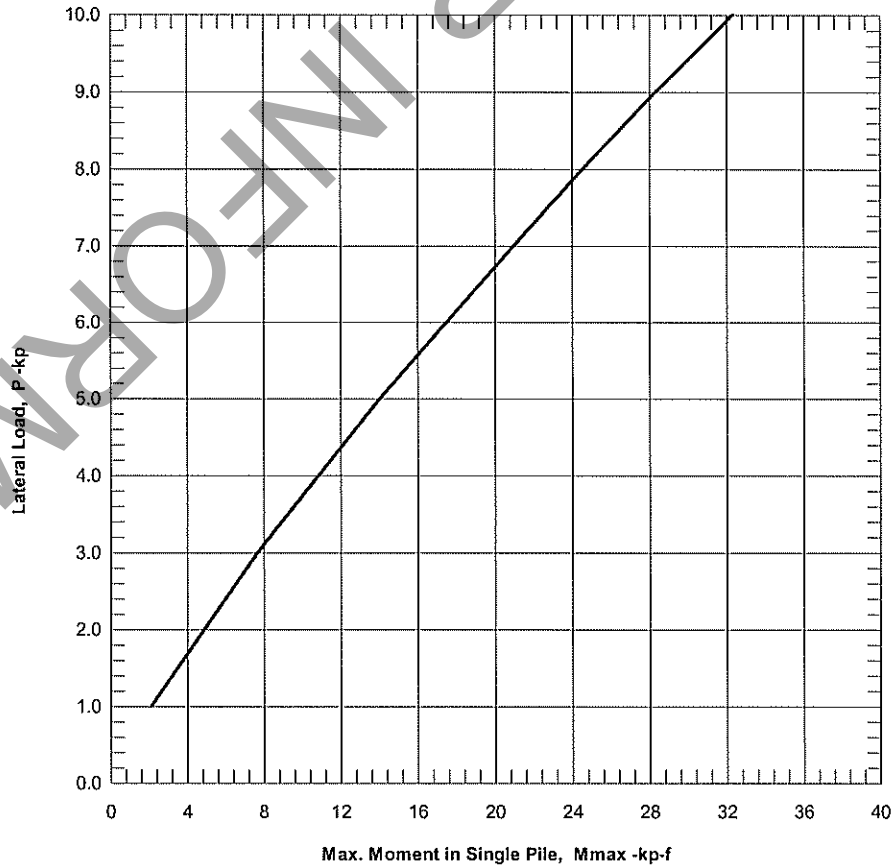
CivilTech Software

IL 185 over McDavid Branch SN 068-0512
East Abutment (HP 14 X 73)

Boring #2

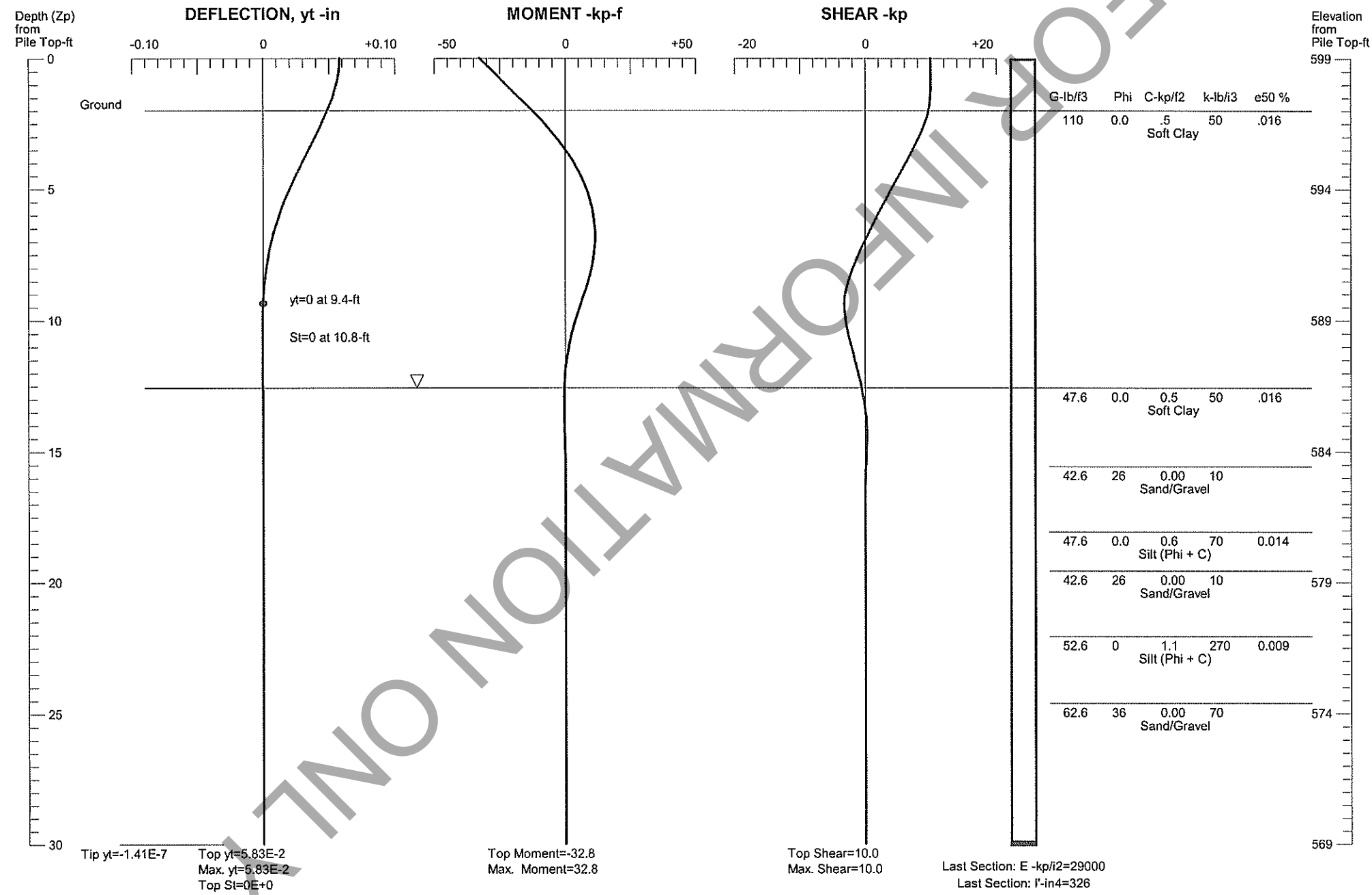
LATERAL LOAD vs DEFLECTION & MAX. MOMENT





PILE DEFLECTION & FORCE vs DEPTH

Single Pile, Khead=5, Kbc=2



CivilTech Software

IL 185 over McDavid Branch SN 068-0512
East Abutment (HP 14 X 89)

Boring #2

LATERAL LOAD vs DEFLECTION & MAX. MOMENT