TBWall Report

Project Information

Designed By	
Organization	
Date	11/27/2012
Project	3 level strut example
Job #	
Client	

or Struts

Number of Tieback Levels	**Three**
Units System	**ft**

Geometry

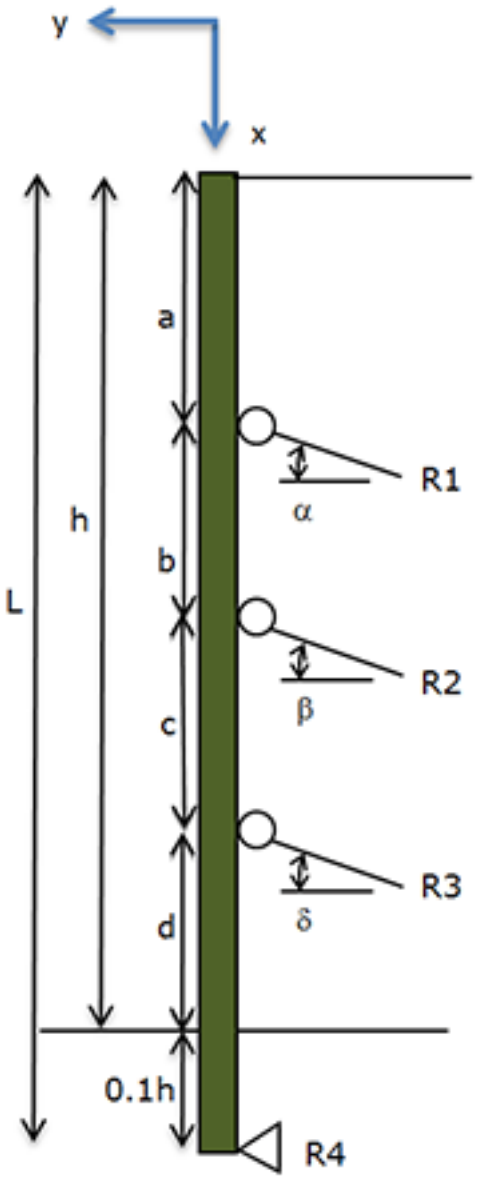
a	3.0 ft
b	6.0 ft
c	6.0 ft
d	5.0 ft
h	20.0 ft
L	22.0 ft

Properties

E	29000 ksi
fy	50 ksi
Max. Deflection	**0.5 in**
Beam Shape	**W14X68**

Tieback Data

Angle1	0
Angle2	0
Angle3	0



Design Philosophy

The analysis is based on "Equivalent Beam Method" first proposed by Blum and explained in detail in "Foundation Design" Teng, 1962, 1st & only edition or in "Foundation Engineering" Jumikis, 1987 2nd ed.

The design is based on classical structural analysis:

* This program uses classic-beam-theory beam elements to solve the multispan tieback design.

* The equivalent nodal loads for each span are determined by numerical integration of the beam equations to allow for the non uniform loads.

* The equivalent nodal loads, the stiffness matrix, and the support conditions are used to solve for the support reactions and the support rotations.

* The support reactions are then used to numerically integrate the entire span for values to display in the plots, and to find the max/min values.

* Steel Shapes only include compact sections, If noncompact sections are desired, additional design checks are required.

* The deflection output is based on structural analysis but an independent check should be made by Finite Element method or by site surveying.

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Upper Strut | Middle Strut | Lower Strut | @0.1H below ground- only for tiebacks.

Reaction 1	Reaction 2	Reaction 3	Reaction 4
-13.14 kips	-23.42 kips	-21.19 kips	-2.70 kips

Maximum Shear	12.2 kip at 9.00 ft
Maximum Moment	12.3 kip-at 9.00 ft
Maximum Deflection	-0.0019 in at 18.82 ft

Required Aw	0.61 in2	Adequate for Shear
Required Zx	4.94 in3	Adequate for Bending
Utilized Ix	0%	Adequate for Deflection

	R1	R2	R3
Tieback Force	13.1 kips	23.4 kips	21.2 kips
Unbonded Tieback Length	15.0 ft	15.0 ft	15.0 ft
Test Load	17.5 kips	31.1 kips	28.2 kips

Lateral Torsional Buckling Check

Lb	72 in
Cb	1
ry	2.46 in
Iy	121.00 in4
h0	13.28 in
J	3.01 in4
rts	2.8 in
Lp	104.3 in
Lr	350.5 in
Fcr	455 ksi
Mn/Q	287 kip-ft

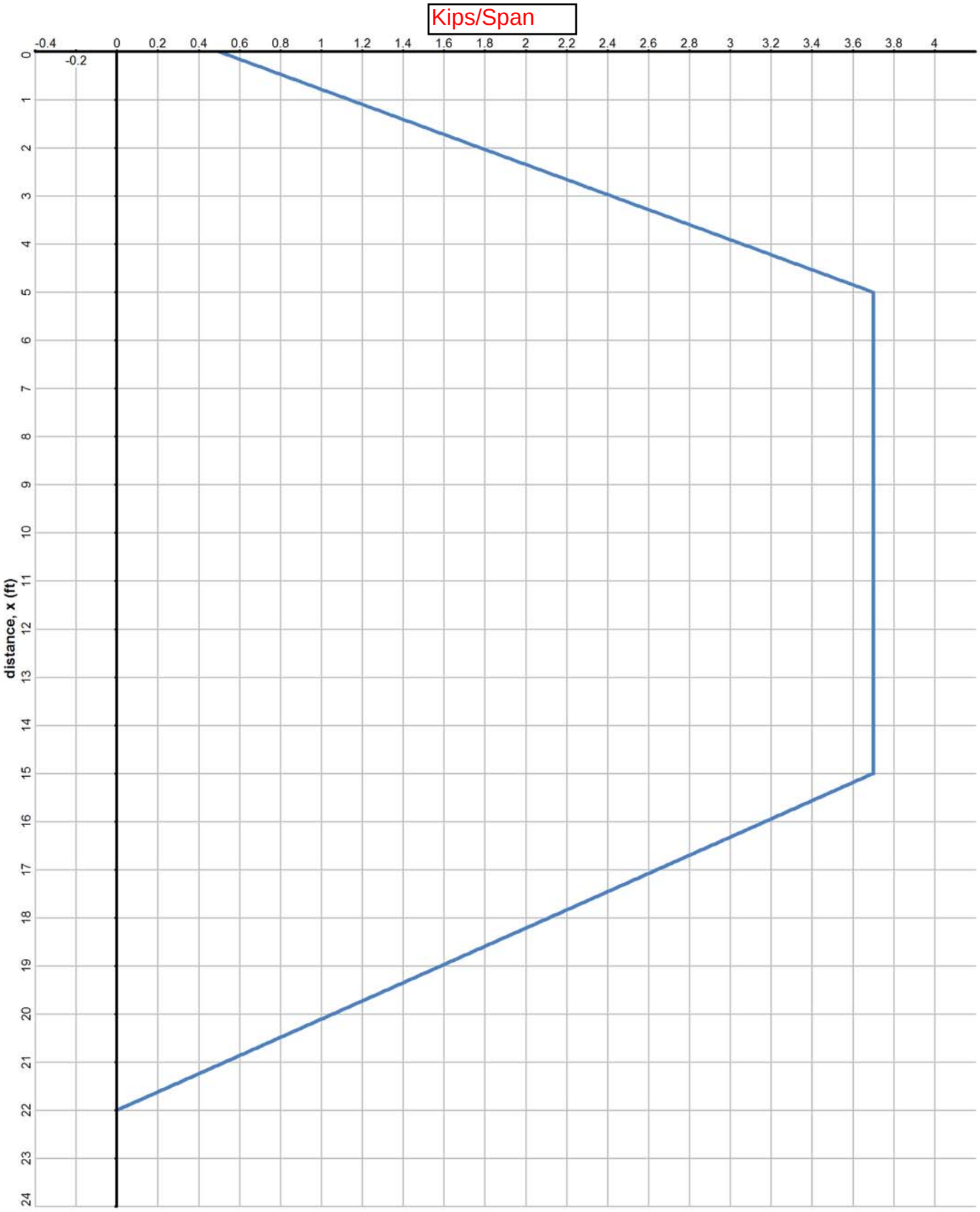
Axially-Loaded Member Check

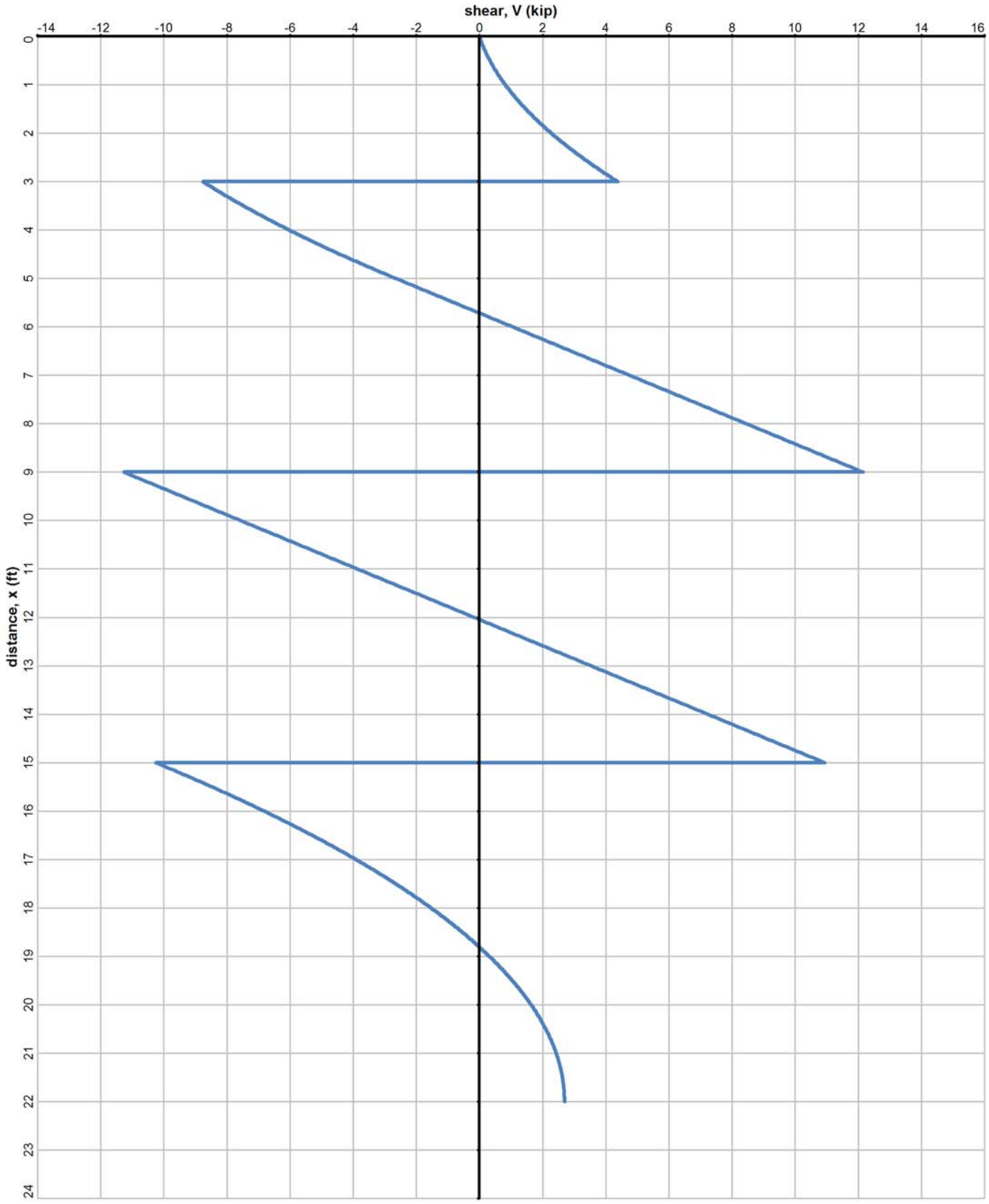
P	6 kips
L	5 ft
K	0.8
A	20.0 in2
KL/r	19.5
Fe	752 ksi
Fcr	49 ksi
Pn/Q	582 kips

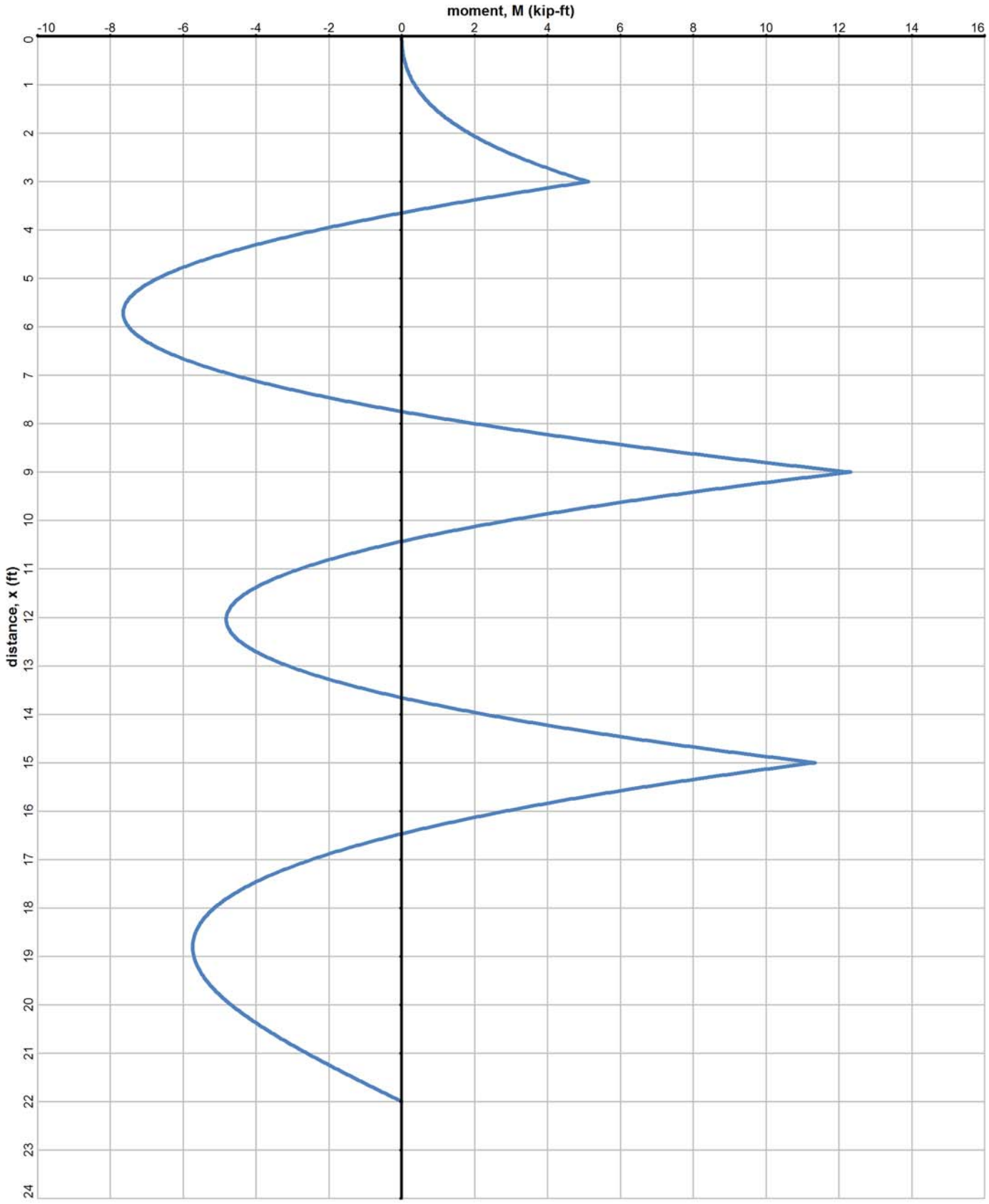
Required Embedment	12.20 ft
Tschebotarioff Check	10.60 ft

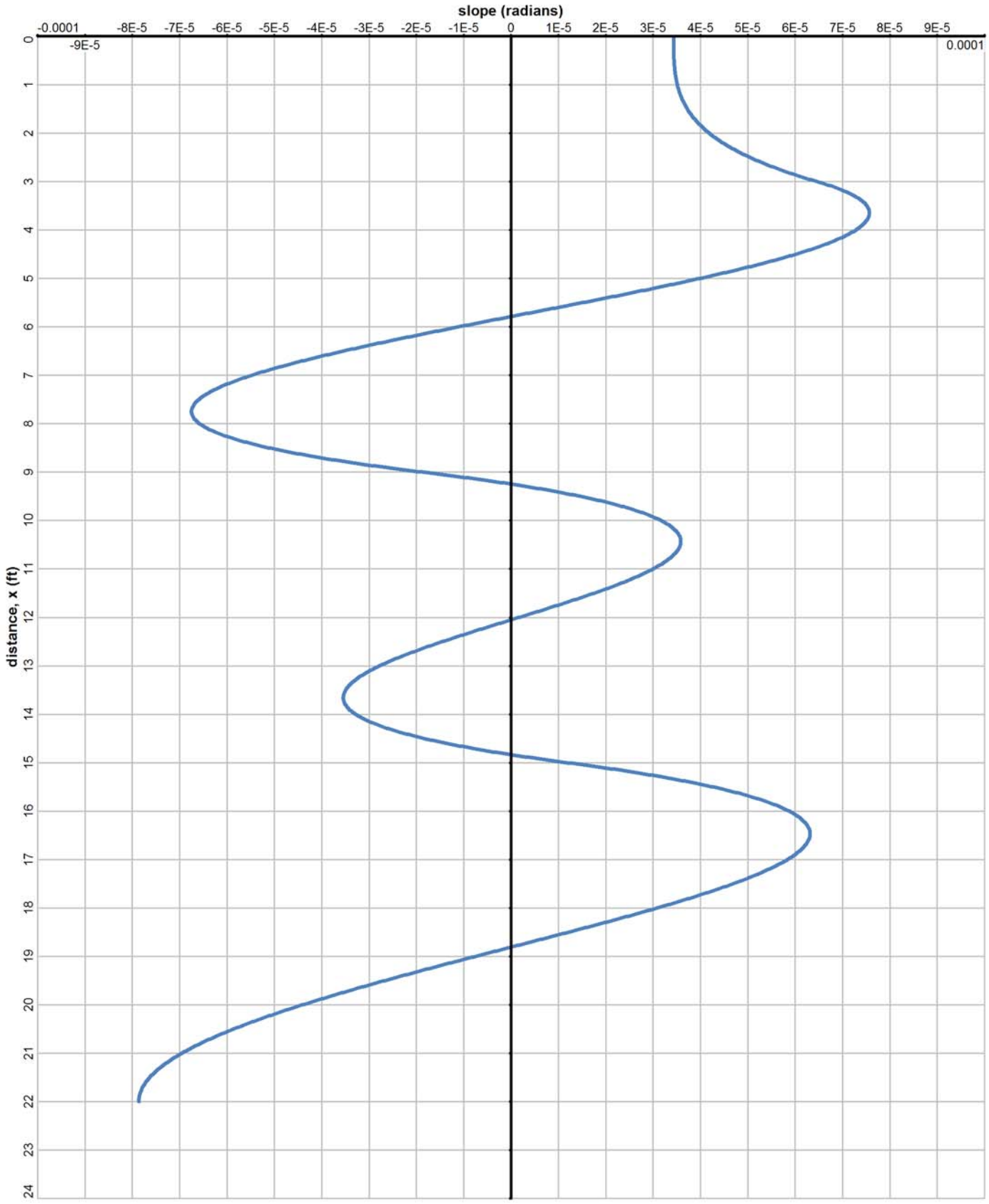
Braced Excavation will require less embedment

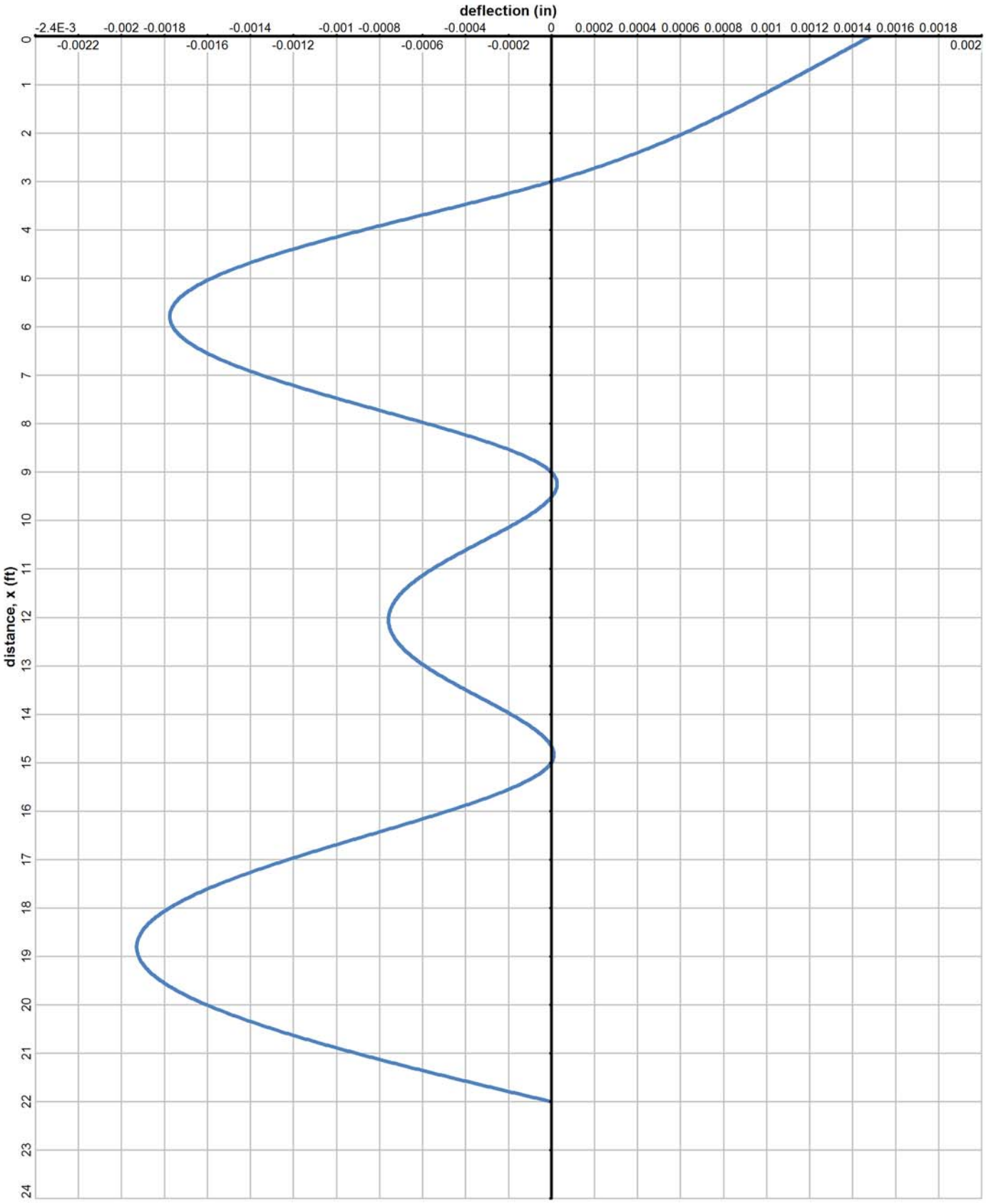
Combined Forces Utilization 5%


Kips/Span
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
distance, x (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24


shear, V (kip)
-14 -12 -10 -8 -6 -4 -2 0 2 4 6 8 10 12 14 16
distance, x (ft)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24


moment, M (kip-ft)
-10
-8
-6
-4
-2
0
2
4
6
8
10
12
14
16
distance, x (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24


slope (radians)
-0.0001
-9E-5
-8E-5
-7E-5
-6E-5
-5E-5
-4E-5
-3E-5
-2E-5
-1E-5
0
1E-5
2E-5
3E-5
4E-5
5E-5
6E-5
7E-5
8E-5
9E-5
0.0001
distance, x (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24


deflection (in)
-2.4E-3 -0.002 -0.0018 -0.0014 -0.001 -0.0008 -0.0004 0 0.0002 0.0004 0.0006 0.0008 0.001 0.0012 0.0014 0.0016 0.0018
-0.0022 -0.0016 -0.0012 -0.0006 -0.0002 0.002
distance, x (ft)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24