



FB-MultiPier



## Units Comparison

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English vs. SI Units

## **EXECUTIVE SUMMARY**

This report summarizes comparisons between the English and Metric unit systems within FB-MultiPier (v6.0.0).

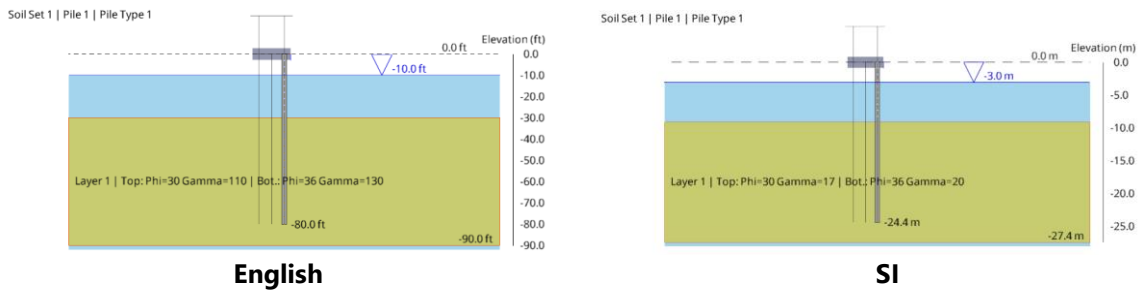
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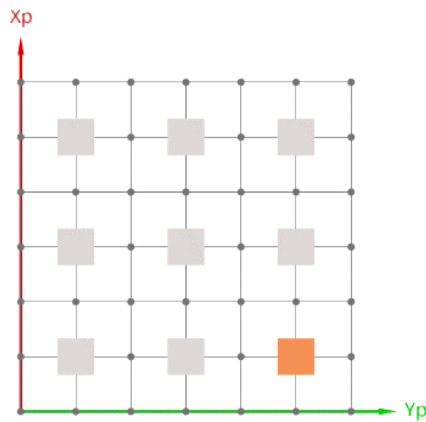
## Example 1: Pier

**Problem Description:** Compare the FB-MultiPier output for a pier in English and Metric units. Also compare plots of shear, moment, axial force, and demand to capacity ratio.

### Soil Elevation View:



### Pile Plan View:



**File(s):** *USC\_Example\_01.in, SI\_Example\_01.in*

Substructure 1								
Demand Type	English		SI		SI -> English		% Diff	
	Value	Units	Value	Units	Value	Units		
<b>Pile Demands</b>	Max axial force	3.43E+01	kips	1.54E+02	kN	3.47E+01	kips	1.14%
	Min axial force	-1.81E+02	kips	-8.04E+02	kN	-1.81E+02	kips	0.00%
	Max shear in 2 direction	1.18E+01	kips	5.24E+01	kN	1.18E+01	kips	0.01%
	Min shear in 2 direction	-1.54E+01	kips	-6.88E+01	kN	-1.55E+01	kips	0.00%
	Max shear in 3 direction	4.64E-02	kips	2.07E-01	kN	4.65E-02	kips	0.32%
	Min shear in 3 direction	-4.64E-02	kips	-2.07E-01	kN	-4.65E-02	kips	0.00%
	Max moment about 2 axis	1.32E+00	kip-ft	1.79E+00	kN-m	1.32E+00	kip-ft	0.08%
	Min moment about 2 axis	-1.32E+00	kip-ft	-1.79E+00	kN-m	-1.32E+00	kip-ft	0.00%
	Max moment about 3 axis	2.11E+02	kip-ft	2.86E+02	kN-m	2.11E+02	kip-ft	0.01%
	Min moment about 3 axis	-1.92E+02	kip-ft	-2.60E+02	kN-m	-1.92E+02	kip-ft	0.00%
	Max torsional force	1.13E-02	kip-ft	1.53E-02	kN-m	1.13E-02	kip-ft	0.16%
	Min torsional force	-1.13E-02	kip-ft	-1.53E-02	kN-m	-1.13E-02	kip-ft	0.00%
Max demand/capacity ratio	3.34E-01	-	3.35E-01	-	3.35E-01	-	0.12%	
<b>Soil Demands</b>	Max Zp soil force	3.42E+01	kips	1.54E+02	kN	3.46E+01	kips	1.16%
	Min Zp soil force	-4.41E-01	kips	-2.05E+00	kN	-4.61E-01	kips	0.00%
	Max Xp soil force	1.02E+01	kips	4.60E+01	kN	1.03E+01	kips	0.97%
	Min Xp soil force	-4.81E+00	kips	-2.13E+01	kN	-4.78E+00	kips	0.00%
	Max Yp soil force	2.64E-02	kips	1.18E-01	kN	2.65E-02	kips	0.21%
	Min Yp soil force	-2.64E-02	kips	-1.18E-01	kN	-2.65E-02	kips	0.00%
	Max torsional soil force	1.65E-03	kip-ft	2.24E-03	kN-m	1.66E-03	kip-ft	0.08%
<b>Pile Displacements</b>	Max Z displacement	2.60E-01	in.	6.70E-03	m	2.64E-01	in.	1.39%
	Min Z displacement	-1.08E-02	in.	-2.81E-04	m	-1.11E-02	in.	0.00%
	Max X displacement	1.59E+00	in.	4.07E-02	m	1.60E+00	in.	0.94%
	Min X displacement	-9.38E-03	in.	-2.37E-04	m	-9.34E-03	in.	0.00%
	Max Y displacement	1.38E-03	in.	3.52E-05	m	1.39E-03	in.	0.35%
	Min Y displacement	-1.38E-03	in.	-3.52E-05	m	-1.39E-03	in.	0.00%
<b>Column Demands</b>	Max axial force	-9.57E+01	kips	-4.26E+02	kN	-9.58E+01	kips	0.00%
	Min axial force	-2.50E+02	kips	-1.11E+03	kN	-2.50E+02	kips	0.00%
	Max shear in 2 direction	6.24E+01	kips	2.78E+02	kN	6.24E+01	kips	0.04%
	Min shear in 2 direction	-1.18E+01	kips	-5.25E+01	kN	-1.18E+01	kips	0.00%
	Max shear in 3 direction	1.17E-07	kips	1.02E-08	kN	2.29E-09	kips	0.00%
	Min shear in 3 direction	-1.40E-07	kips	-2.87E-09	kN	-6.46E-10	kips	0.00%
	Max moment about 2 axis	1.53E-06	kip-ft	4.17E-08	kN-m	3.08E-08	kip-ft	0.00%
	Min moment about 2 axis	-2.25E-06	kip-ft	-1.47E-08	kN-m	-1.08E-08	kip-ft	0.00%
	Max moment about 3 axis	5.48E+02	kip-ft	7.44E+02	kN-m	5.48E+02	kip-ft	0.09%
	Min moment about 3 axis	-5.79E+02	kip-ft	-7.86E+02	kN-m	-5.80E+02	kip-ft	0.00%
	Max torsional force	3.11E-07	kip-ft	3.69E-08	kN-m	2.72E-08	kip-ft	0.00%
Min torsional force	-3.11E-07	kip-ft	-3.69E-08	kN-m	-2.72E-08	kip-ft	0.00%	
<b>Pier Cap Demands</b>	Max axial force	1.18E+01	kips	5.25E+01	kN	1.18E+01	kips	0.00%
	Min axial force	-1.00E+02	kips	-4.45E+02	kN	-1.00E+02	kips	0.00%
	Max shear in 2 direction	1.05E+02	kips	4.69E+02	kN	1.05E+02	kips	0.00%
	Min shear in 2 direction	-1.26E+02	kips	-5.61E+02	kN	-1.26E+02	kips	0.00%
	Max shear in 3 direction	3.70E-10	kips	1.01E-08	kN	2.27E-09	kips	0.00%
	Min shear in 3 direction	-1.29E-07	kips	-7.46E-10	kN	-1.68E-10	kips	0.00%
	Max moment about 2 axis	3.28E-07	kip-ft	2.20E-08	kN-m	1.63E-08	kip-ft	0.00%
	Min moment about 2 axis	-6.51E-07	kip-ft	-3.99E-08	kN-m	-2.94E-08	kip-ft	0.00%
	Max moment about 3 axis	1.38E+02	kip-ft	1.87E+02	kN-m	1.38E+02	kip-ft	0.13%
	Min moment about 3 axis	-6.75E+02	kip-ft	-9.16E+02	kN-m	-6.76E+02	kip-ft	0.00%
	Max torsional force	1.50E-07	kip-ft	1.16E-08	kN-m	8.54E-09	kip-ft	0.00%
Min torsional force	-1.50E-07	kip-ft	-1.16E-08	kN-m	-8.54E-09	kip-ft	0.00%	

Table 1.1 – Comparison of Max/Min Results Between English and SI Units for Example 1

# Results from FB-MultiPier Output File (USC\_Example\_01.out, SI\_Example\_01.out):

* SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *						* SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *					
<b>File demands</b>						<b>File demands</b>					
Demand type	Value	Unit	Load case	Load comb.	File	Demand type	Value	Unit	Load case	Load comb.	File
Max axial force (tension is +)	3.4270E+01	kips	2	0	7	Max axial force (tension is +)	1.5419E+02	kN	2	0	1
Min axial force	-1.8087E+02	kips	2	0	6	Min axial force	-8.0404E+02	kN	2	0	6
Max shear in 2 direction	1.1786E+01	kips	2	0	1	Max shear in 2 direction	5.2434E+01	kN	2	0	7
Min shear in 2 direction	-1.5437E+01	kips	2	0	1	Min shear in 2 direction	-6.8761E+01	kN	2	0	7
Max shear in 3 direction	4.6355E-02	kips	2	0	9	Max shear in 3 direction	2.0686E-01	kN	2	0	9
Min shear in 3 direction	-4.6360E-02	kips	2	0	3	Min shear in 3 direction	-2.0686E-01	kN	2	0	3
Max moment about 2 axis	1.3222E+00	kip-ft	2	0	3	Max moment about 2 axis	1.7913E+00	kN-m	2	0	3
Min moment about 2 axis	-1.3221E+00	kip-ft	2	0	9	Min moment about 2 axis	-1.7913E+00	kN-m	2	0	9
Max moment about 3 axis	2.1092E+02	kip-ft	2	0	1	Max moment about 3 axis	2.8593E+02	kN-m	2	0	7
Min moment about 3 axis	-1.9188E+02	kip-ft	2	0	1	Min moment about 3 axis	-2.6025E+02	kN-m	2	0	7
Max torsional force	1.1334E-02	kip-ft	2	0	7	Max torsional force	1.5343E-02	kN-m	2	0	1
Min torsional force	-1.1334E-02	kip-ft	2	0	7	Min torsional force	-1.5343E-02	kN-m	2	0	1
Max demand/capacity ratio	3.3425E-01		2	0	3	Max demand/capacity ratio	3.3465E-01		2	0	9
<b>Soil demands</b>						<b>Soil demands</b>					
Demand type	Value	Unit	Load case	Load comb.	File	Demand type	Value	Unit	Load case	Load comb.	File
Max Zp soil force	3.4174E+01	kips	2	0	6	Max Zp soil force	1.5379E+02	kN	2	0	6
Min Zp soil force	-4.4069E-01	kips	2	0	7	Min Zp soil force	-2.0497E+00	kN	2	0	1
Max Xp soil force	1.0248E+01	kips	2	0	1	Max Xp soil force	4.6028E+01	kN	2	0	7
Min Xp soil force	-4.8050E+00	kips	2	0	1	Min Xp soil force	-2.1263E+01	kN	2	0	7
Max Yp soil force	2.6405E-02	kips	2	0	3	Max Yp soil force	1.1770E-01	kN	2	0	3
Min Yp soil force	-2.6401E-02	kips	2	0	9	Min Yp soil force	-1.1770E-01	kN	2	0	9
Max torsional soil force	1.6541E-03	kip-ft	2	0	1	Max torsional soil force	2.2444E-03	kN-m	2	0	1
<b>File displacements</b>						<b>File displacements</b>					
Displacement type	Value	Unit	Load case	Load comb.	File	Displacement type	Value	Unit	Load case	Load comb.	File
Max Z displacement	2.6004E-01	in	2	0	6	Max Z displacement	6.6976E-03	m	2	0	6
Min Z displacement	-1.0778E-02	in	2	0	7	Min Z displacement	-2.8083E-04	m	2	0	1
Max X displacement	1.5860E+00	in	2	0	4	Max X displacement	4.0666E-02	m	2	0	4
Min X displacement	-9.3847E-03	in	2	0	1	Min X displacement	-2.3714E-04	m	2	0	7
Max Y displacement	1.3826E-03	in	2	0	3	Max Y displacement	3.5242E-05	m	2	0	3
Min Y displacement	-1.3823E-03	in	2	0	9	Min Y displacement	-3.5242E-05	m	2	0	9
<b>Column demands</b>						<b>Column demands</b>					
Demand type	Value	Unit	Load case	Load comb.	Col.	Demand type	Value	Unit	Load case	Load comb.	Col.
Max axial force	-9.5695E+01	kips	2	0	1	Max axial force	-4.2599E+02	kN	2	0	1
Min axial force	-2.4987E+02	kips	2	0	2	Min axial force	-1.1113E+03	kN	2	0	2
Max shear in 2 direction	6.2367E+01	kips	2	0	1	Max shear in 2 direction	2.7753E+02	kN	2	0	1
Min shear in 2 direction	-1.1810E+01	kips	1	0	2	Min shear in 2 direction	-5.2532E+01	kN	1	0	2
Max shear in 3 direction	1.1726E-07	kips	2	0	2	Max shear in 3 direction	1.0188E-08	kN	2	0	1
Min shear in 3 direction	-1.3977E-07	kips	2	0	1	Min shear in 3 direction	-2.8720E-09	kN	2	0	2
Max moment about 2 axis	1.5340E-06	kip-ft	2	0	2	Max moment about 2 axis	4.1714E-08	kN-m	2	0	1
Min moment about 2 axis	-2.2454E-06	kip-ft	2	0	1	Min moment about 2 axis	-1.4676E-08	kN-m	1	0	2
Max moment about 3 axis	5.4790E+02	kip-ft	2	0	1	Max moment about 3 axis	7.4350E+02	kN-m	2	0	1
Min moment about 3 axis	-5.7899E+02	kip-ft	2	0	1	Min moment about 3 axis	-7.8579E+02	kN-m	2	0	1
Max torsional force	3.1124E-07	kip-ft	2	0	2	Max torsional force	3.6928E-08	kN-m	2	0	2
Min torsional force	-3.1124E-07	kip-ft	2	0	2	Min torsional force	-3.6928E-08	kN-m	2	0	2
<b>Pier cap demands</b>						<b>Pier cap demands</b>					
Demand type	Value	Unit	Load case	Load comb.		Demand type	Value	Unit	Load case	Load comb.	
Max axial force	1.1810E+01	kips	1	0		Max axial force	5.2532E+01	kN	1	0	
Min axial force	-1.0000E+02	kips	2	0		Min axial force	-4.4482E+02	kN	2	0	
Max shear in 2 direction	1.0540E+02	kips	1	0		Max shear in 2 direction	4.6986E+02	kN	1	0	
Min shear in 2 direction	-1.2610E+02	kips	2	0		Min shear in 2 direction	-5.6088E+02	kN	2	0	
Max shear in 3 direction	3.7028E-10	kips	1	0		Max shear in 3 direction	1.0097E-08	kN	2	0	
Min shear in 3 direction	-1.2868E-07	kips	2	0		Min shear in 3 direction	-7.4550E-10	kN	2	0	
Max moment about 2 axis	3.2839E-07	kip-ft	2	0		Max moment about 2 axis	2.2046E-08	kN-m	2	0	
Min moment about 2 axis	-6.5136E-07	kip-ft	2	0		Min moment about 2 axis	-3.9913E-08	kN-m	2	0	
Max moment about 3 axis	1.3785E+02	kip-ft	2	0		Max moment about 3 axis	1.8715E+02	kN-m	2	0	
Min moment about 3 axis	-6.7522E+02	kip-ft	2	0		Min moment about 3 axis	-9.1617E+02	kN-m	2	0	
Max torsional force	1.5041E-07	kip-ft	2	0		Max torsional force	1.1582E-08	kN-m	2	0	
Min torsional force	-1.5041E-07	kip-ft	2	0		Min torsional force	-1.1582E-08	kN-m	2	0	

**English**

**SI**

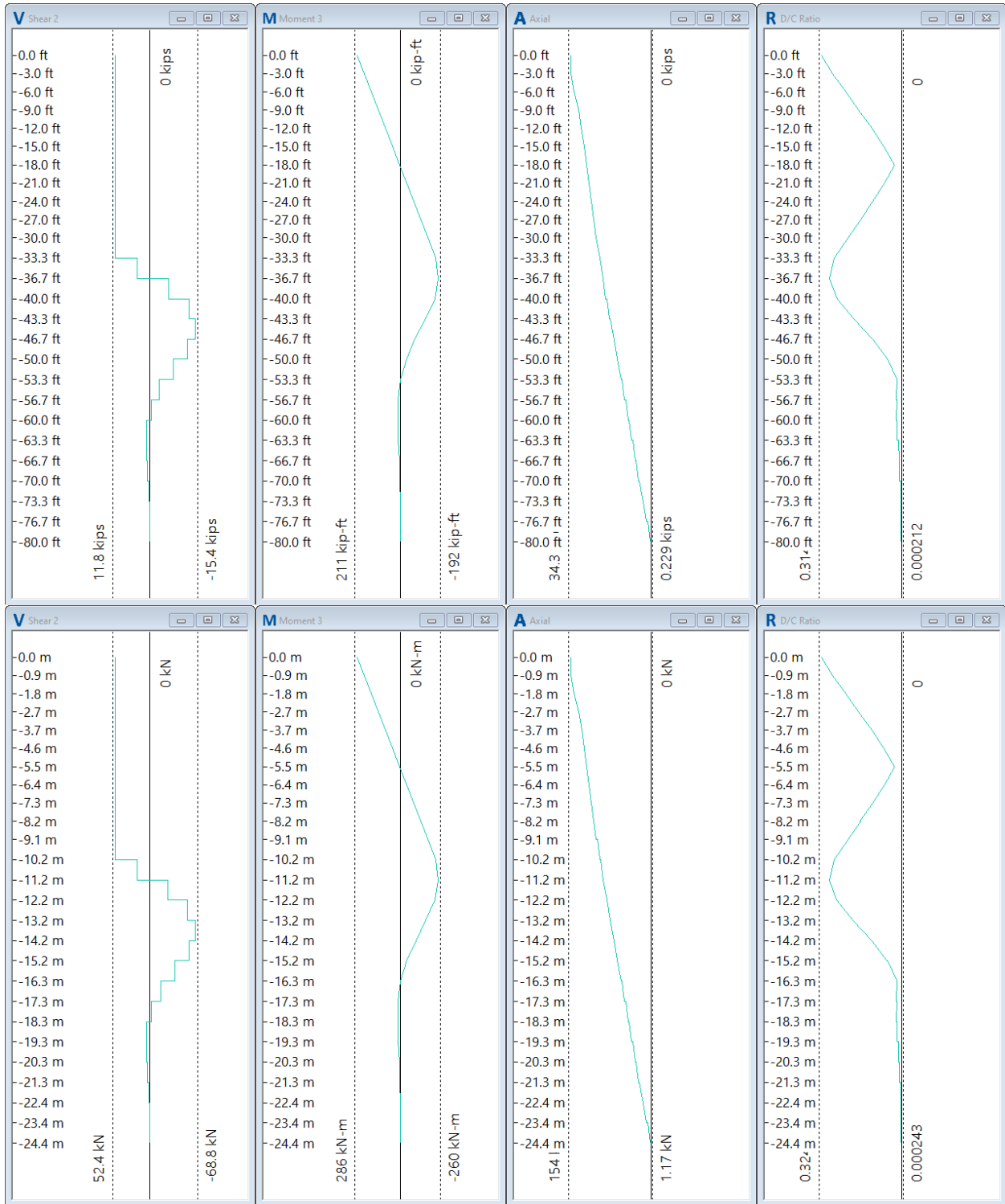


Figure 1.1 – Comparison of Load Case 2 Pile Result Plots Between English (Top) and SI Units (Bottom) for Example 1

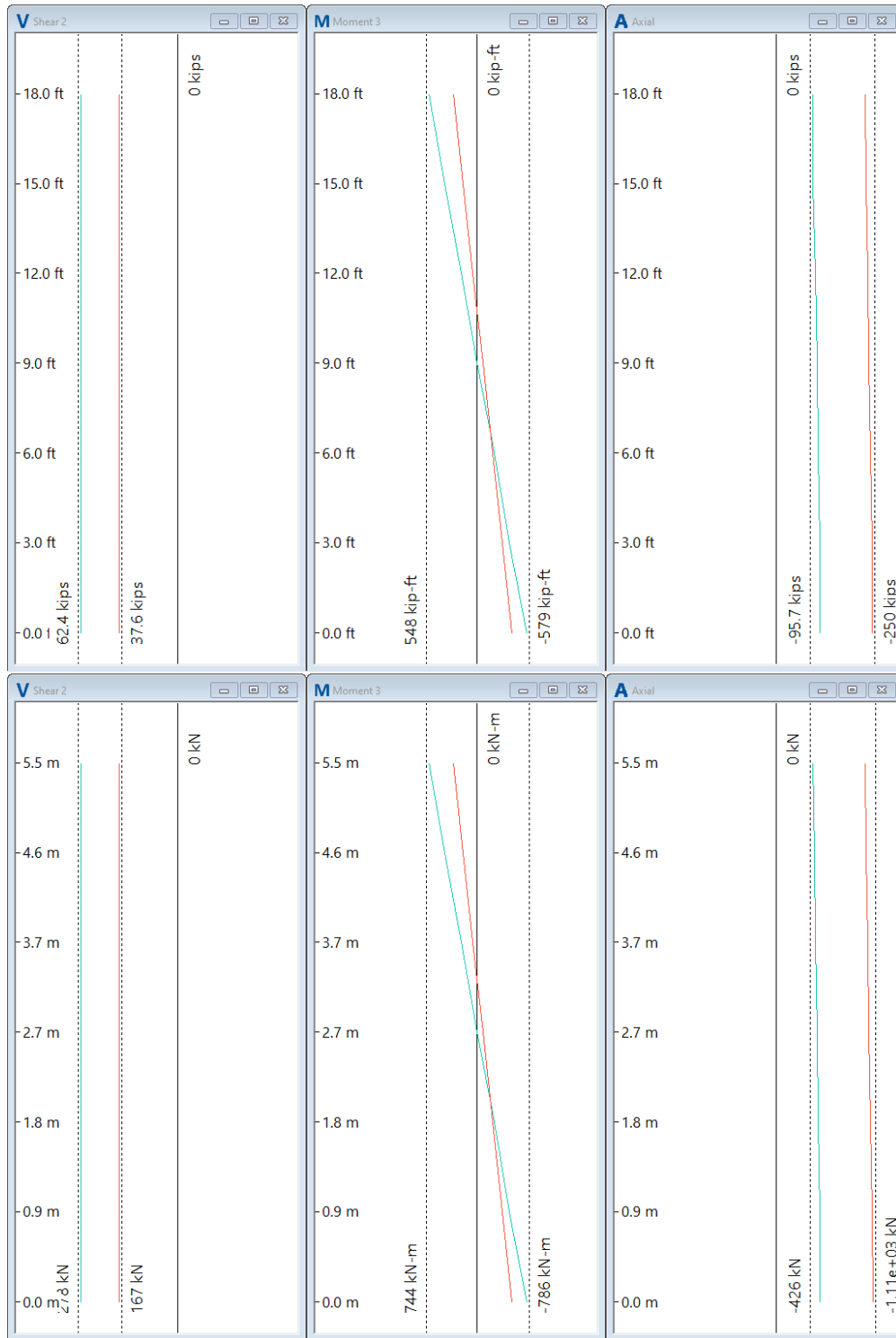


Figure 1.2 – Comparison of Load Case 2 Pier Column Result Plots Between English (Top) and SI Units (Bottom) for Example 1



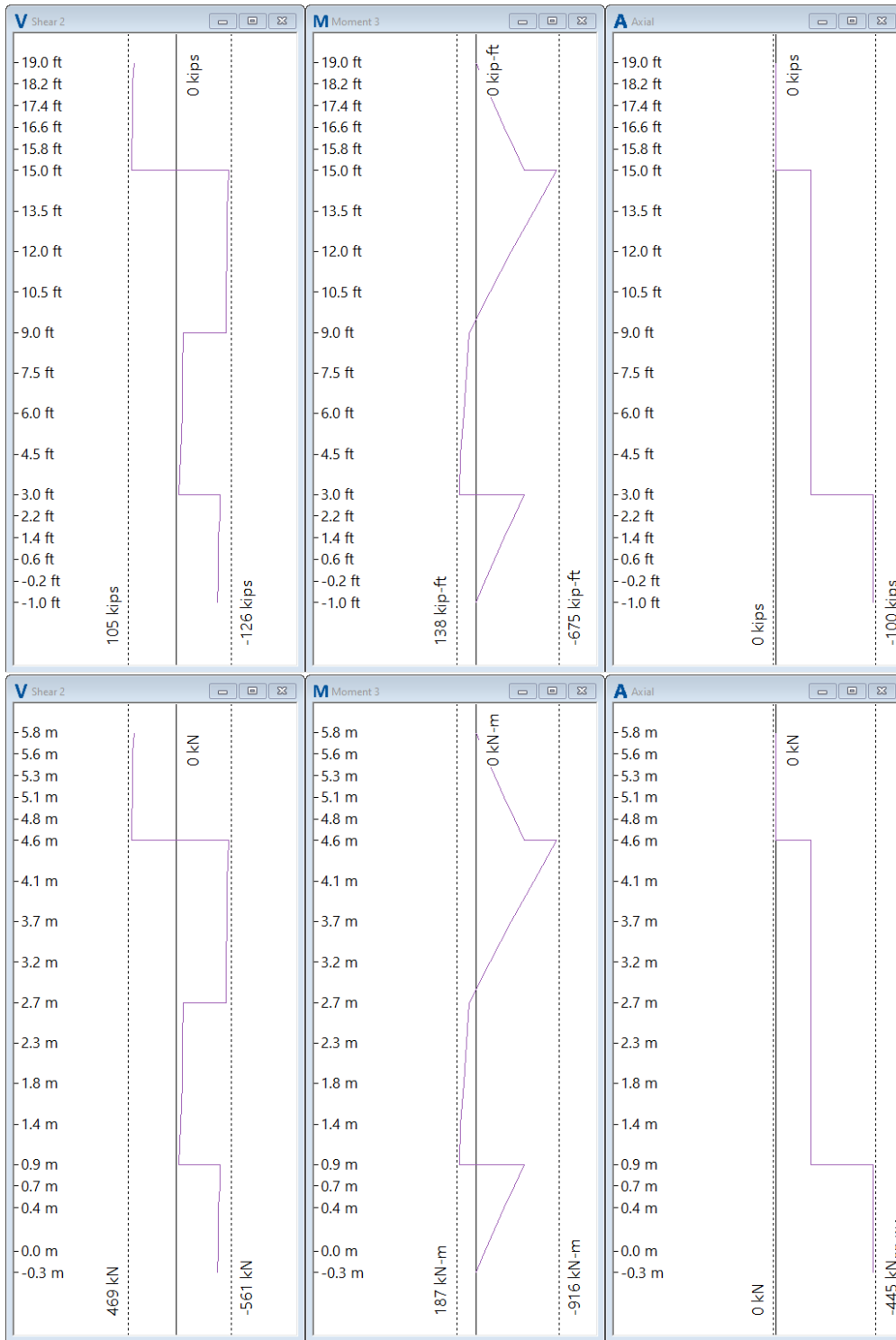
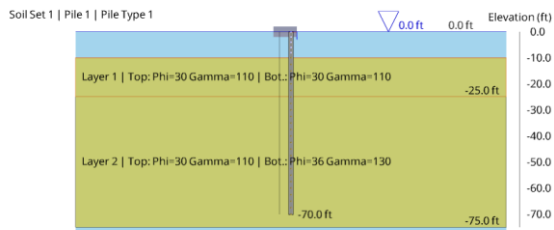


Figure 1.3 – Comparison of Load Case 2 Pier Cap Result Plots Between English (Top) and SI Units (Bottom) for Example 1

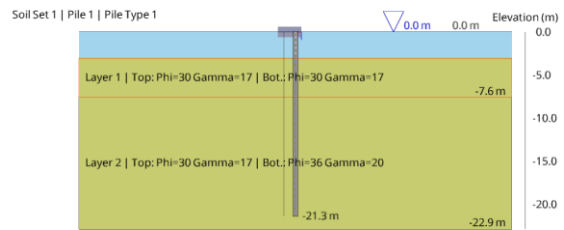
## Example 2: Pile and Cap

**Problem Description:** Compare the FB-MultiPier output for a pile and cap in English and Metric units. Also compare plots of shear, moment, axial force, and demand to capacity ratio.

### Soil Elevation View:

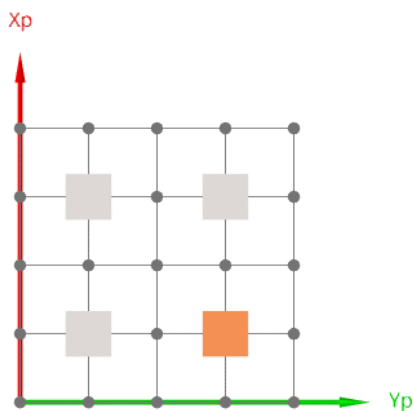


English



SI

### Pile Plan View:



**File(s):** USC\_Example\_02.in, SI\_Example\_02.in

Substructure 1								
Demand Type		English		SI		SI -> English		% Diff
		Value	Units	Value	Units	Value	Units	
Pile Demands	Max axial force	-1.58E-01	kips	-6.75E-01	kN	-1.52E-01	kips	0.00%
	Min axial force	-7.07E+01	kips	-3.15E+02	kN	-7.07E+01	kips	0.00%
	Max shear in 2 direction	1.45E+01	kips	6.48E+01	kN	1.46E+01	kips	0.08%
	Min shear in 2 direction	-1.29E+01	kips	-5.73E+01	kN	-1.29E+01	kips	0.00%
	Max shear in 3 direction	1.61E-02	kips	7.14E-02	kN	1.61E-02	kips	0.35%
	Min shear in 3 direction	-1.61E-02	kips	-7.14E-02	kN	-1.61E-02	kips	0.00%
	Max moment about 2 axis	2.32E-01	kip-ft	3.14E-01	kN-m	2.32E-01	kip-ft	0.12%
	Min moment about 2 axis	-2.32E-01	kip-ft	-3.14E-01	kN-m	-2.32E-01	kip-ft	0.00%
	Max moment about 3 axis	9.59E+01	kip-ft	1.30E+02	kN-m	9.61E+01	kip-ft	0.18%
	Min moment about 3 axis	-1.33E+02	kip-ft	-1.80E+02	kN-m	-1.33E+02	kip-ft	0.00%
	Max torsional force	8.44E-03	kip-ft	1.14E-02	kN-m	8.44E-03	kip-ft	0.10%
	Min torsional force	-8.44E-03	kip-ft	-1.14E-02	kN-m	-8.44E-03	kip-ft	0.00%
Max demand/capacity ratio	5.57E-01	-	5.58E-01	-	5.58E-01	-	0.17%	
Soil Demands	Max Zp soil force	4.05E+01	kips	1.80E+02	kN	4.05E+01	kips	0.01%
	Min Zp soil force	1.41E-01	kips	6.25E-01	kN	1.40E-01	kips	0.12%
	Max Xp soil force	5.92E+00	kips	2.63E+01	kN	5.92E+00	kips	0.03%
	Min Xp soil force	-3.48E+00	kips	-1.55E+01	kN	-3.47E+00	kips	0.00%
	Max Yp soil force	3.88E-03	kips	1.74E-02	kN	3.91E-03	kips	0.88%
	Min Yp soil force	-3.88E-03	kips	-1.74E-02	kN	-3.91E-03	kips	0.00%
	Max torsional soil force	1.25E-03	kip-ft	1.69E-03	kN-m	1.25E-03	kip-ft	0.08%
Pile Displacements	Max Z displacement	4.37E-01	in.	1.11E-02	m	4.37E-01	in.	0.01%
	Min Z displacement	6.07E-02	in.	1.54E-03	m	6.07E-02	in.	0.10%
	Max X displacement	1.77E+00	in.	4.49E-02	m	1.77E+00	in.	0.08%
	Min X displacement	-1.77E-02	in.	-4.48E-04	m	-1.76E-02	in.	0.00%
	Max Y displacement	2.67E-04	in.	6.79E-06	m	2.67E-04	in.	0.00%
	Min Y displacement	-2.67E-04	in.	-6.79E-06	m	-2.67E-04	in.	0.00%

Table 2.1 – Comparison of Max/Min Results Between English and SI Units for Example 2

## Results from FB-MultiPier Output File (USC\_Example\_02.out, SI\_Example\_02.out):

***** * SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES * *****							***** * SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES * *****						
File demands							File demands						
Demand type	Value	Unit	Load case	Load comb.	File		Demand type	Value	Unit	Load case	Load comb.	File	
Max axial force (tension is +)	-1.5841E+01	kips	1	0	1		Max axial force (tension is +)	-6.7492E+01	kN	1	0	3	
Min axial force	-7.0717E+01	kips	1	0	4		Min axial force	-3.1463E+02	kN	1	0	4	
Max shear in 2 direction	1.4547E+01	kips	1	0	2		Max shear in 2 direction	6.4759E+01	kN	1	0	4	
Min shear in 2 direction	-1.2899E+01	kips	1	0	2		Min shear in 2 direction	-5.7284E+01	kN	1	0	4	
Max shear in 3 direction	1.6113E+02	kips	1	0	3		Max shear in 3 direction	7.1427E+02	kN	1	0	3	
Min shear in 3 direction	-1.6105E+02	kips	1	0	1		Min shear in 3 direction	-7.1429E+02	kN	1	0	1	
Max moment about 2 axis	2.3164E-01	kip-ft	1	0	1		Max moment about 2 axis	3.1444E-01	kN-m	1	0	1	
Min moment about 2 axis	-2.3172E-01	kip-ft	1	0	3		Min moment about 2 axis	-3.1444E-01	kN-m	1	0	3	
Max moment about 3 axis	9.5933E+01	kip-ft	1	0	2		Max moment about 3 axis	1.3030E+02	kN-m	1	0	4	
Min moment about 3 axis	-1.3282E+02	kip-ft	1	0	2		Min moment about 3 axis	-1.8013E+02	kN-m	1	0	4	
Max torsional force	8.4443E-03	kip-ft	1	0	3		Max torsional force	1.1437E-02	kN-m	1	0	1	
Min torsional force	-8.4443E-03	kip-ft	1	0	3		Min torsional force	-1.1437E-02	kN-m	1	0	1	
Max demand/capacity ratio	5.5679E-01		1	0	2		Max demand/capacity ratio	5.5776E-01		1	0	4	
Soil demands							Soil demands						
Demand type	Value	Unit	Load case	Load comb.	File		Demand type	Value	Unit	Load case	Load comb.	File	
Max Zp soil force	4.0518E+01	kips	1	0	4		Max Zp soil force	1.8025E+02	kN	1	0	4	
Min Zp soil force	1.4063E-01	kips	1	0	1		Min Zp soil force	6.2482E-01	kN	1	0	3	
Max Xp soil force	5.9204E+00	kips	1	0	2		Max Xp soil force	2.6342E+01	kN	1	0	4	
Min Xp soil force	-3.4848E+00	kips	1	0	2		Min Xp soil force	-1.5455E+01	kN	1	0	4	
Max Yp soil force	3.8759E+03	kips	1	0	1		Max Yp soil force	1.7394E+02	kN	1	0	1	
Min Yp soil force	-3.8779E+03	kips	1	0	3		Min Yp soil force	-1.7394E+02	kN	1	0	3	
Max torsional soil force	1.2480E-03	kip-ft	1	0	1		Max torsional soil force	1.6934E-03	kN-m	1	0	1	
File displacements							File displacements						
Displacement type	Value	Unit	Load case	Load comb.	File		Displacement type	Value	Unit	Load case	Load comb.	File	
Max Z displacement	4.3671E-01	in	1	0	4		Max Z displacement	1.1093E-02	m	1	0	4	
Min Z displacement	6.0725E-02	in	1	0	1		Min Z displacement	1.5408E-03	m	1	0	3	
Max X displacement	1.7658E+00	in	1	0	1		Max X displacement	4.4887E-02	m	1	0	3	
Min X displacement	-1.7677E-02	in	1	0	2		Min X displacement	-4.4766E-04	m	1	0	4	
Max Y displacement	2.6657E-04	in	1	0	1		Max Y displacement	6.7894E-06	m	1	0	1	

**English**

**SI**

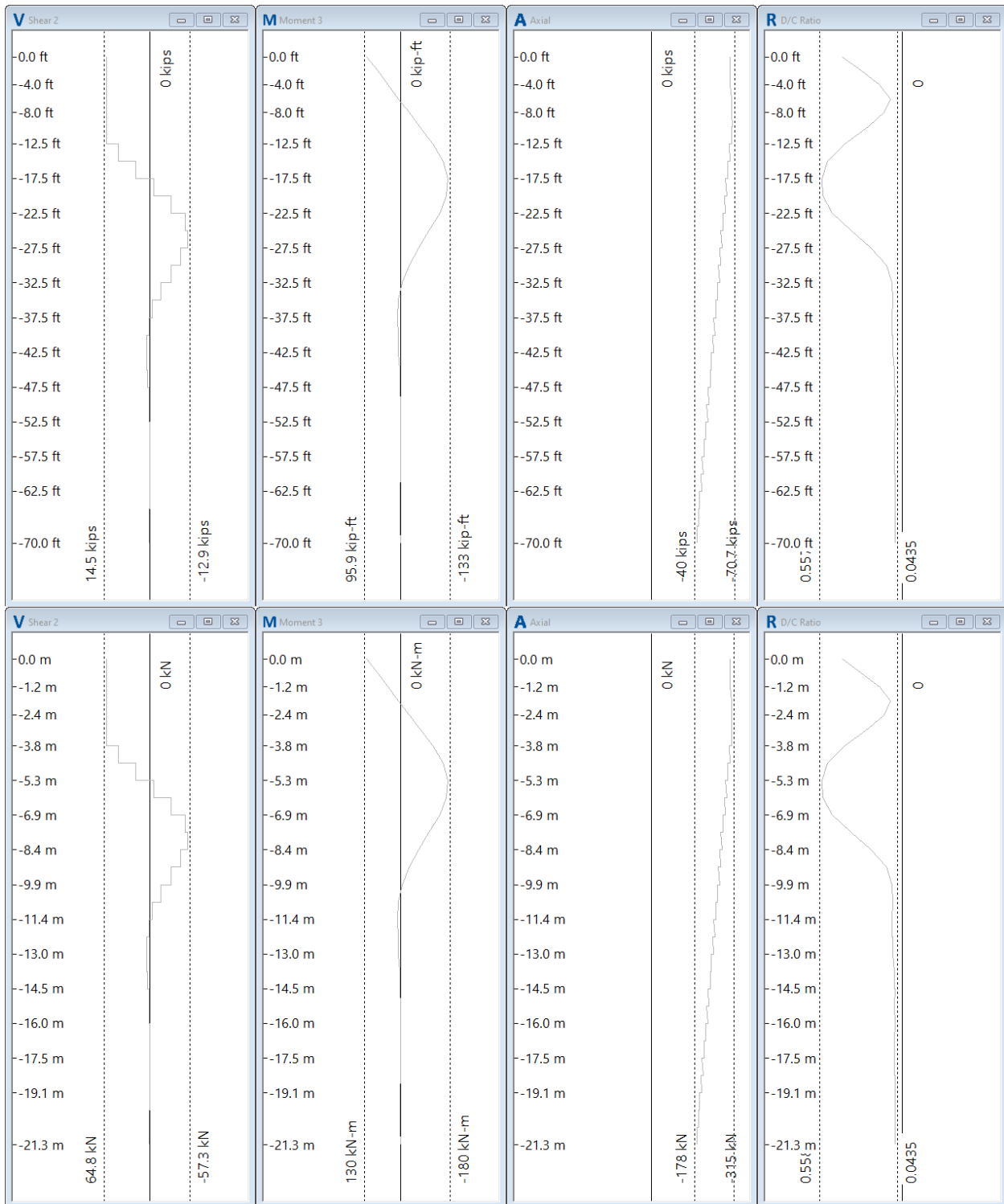
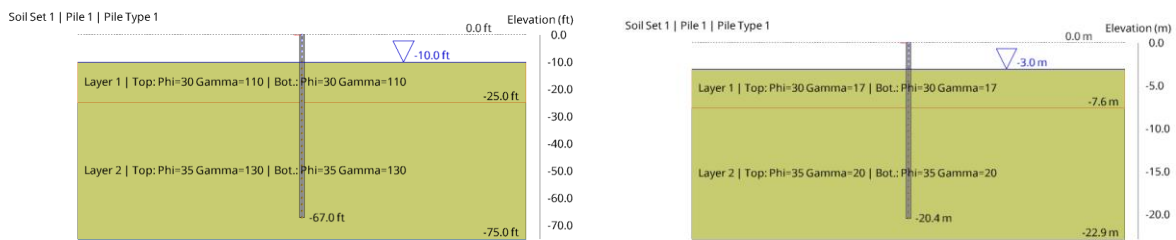


Figure 2.1 – Comparison of Pile Result Plots Between English (Top) and SI Units (Bottom) for Example 2

### Example 3: Pile

**Problem Description:** Compare the FB-MultiPier output for a pile in English and Metric units. Also compare plots of shear, moment, axial force, and demand to capacity ratio.

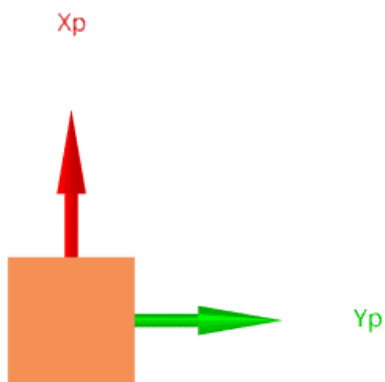
#### Soil Elevation View:



English

SI

#### Pile Plan View:



**File(s):** USC\_Example\_03.in, SI\_Example\_03.in

Substructure 1								
Demand Type		English		SI		SI -> English		% Diff
		Value	Units	Value	Units	Value	Units	
Pile Demands	Max axial force	-3.31E+01	kips	-1.47E+02	kN	-3.31E+01	kips	0.00%
	Min axial force	-5.34E+01	kips	-2.37E+02	kN	-5.34E+01	kips	0.00%
	Max shear in 2 direction	1.00E+01	kips	4.45E+01	kN	1.00E+01	kips	0.00%
	Min shear in 2 direction	-1.45E+01	kips	-6.43E+01	kN	-1.45E+01	kips	0.00%
	Max shear in 3 direction	1.53E-12	kips	2.29E-12	kN	5.15E-13	kips	0.00%
	Min shear in 3 direction	-1.48E-12	kips	-3.79E-12	kN	-8.52E-13	kips	0.00%
	Max moment about 2 axis	6.66E-13	kip-ft	1.01E-12	kN-m	7.47E-13	kip-ft	0.00%
	Min moment about 2 axis	-1.48E-11	kip-ft	-6.89E-12	kN-m	-5.08E-12	kip-ft	0.00%
	Max moment about 3 axis	5.78E+00	kip-ft	7.83E+00	kN-m	5.78E+00	kip-ft	0.02%
	Min moment about 3 axis	-1.43E+02	kip-ft	-1.94E+02	kN-m	-1.43E+02	kip-ft	0.00%
	Max torsional force	0.00E+00	kip-ft	0.00E+00	kN-m	0.00E+00	kip-ft	0.00%
	Min torsional force	0.00E+00	kip-ft	0.00E+00	kN-m	0.00E+00	kip-ft	0.00%
	Max demand/capacity ratio	5.78E-01	-	5.80E-01	-	5.80E-01	-	0.46%
Soil Demands	Max Zp soil force	3.92E+01	kips	1.74E+02	kN	3.92E+01	kips	0.01%
	Min Zp soil force	4.72E-01	kips	2.10E+00	kN	4.72E-01	kips	0.01%
	Max Xp soil force	6.04E+00	kips	2.68E+01	kN	6.04E+00	kips	0.05%
	Min Xp soil force	-4.86E+00	kips	-2.16E+01	kN	-4.87E+00	kips	0.00%
	Max Yp soil force	6.02E-13	kips	1.50E-12	kN	3.37E-13	kips	0.00%
	Min Yp soil force	-5.14E-13	kips	-7.32E-13	kN	-1.65E-13	kips	0.00%
	Max torsional soil force	0.00E+00	kip-ft	0.00E+00	kN-m	0.00E+00	kip-ft	0.00%
Pile Displacements	Max Z displacement	2.74E-01	in.	6.97E-03	m	2.74E-01	in.	0.01%
	Min Z displacement	2.09E-01	in.	5.30E-03	m	2.09E-01	in.	0.01%
	Max X displacement	1.76E+00	in.	4.47E-02	m	1.76E+00	in.	0.10%
	Min X displacement	-9.80E-03	in.	-2.49E-04	m	-9.80E-03	in.	0.00%
	Max Y displacement	1.73E-13	in.	1.56E-15	m	6.15E-14	in.	0.00%
	Min Y displacement	-1.09E-15	in.	-7.16E-18	m	-2.82E-16	in.	0.00%

Table 3.1 – Comparison of Max/Min Results Between English and SI Units for Example 3

## Results from FB-MultiPier Output File (USC\_Example\_03.out, SI\_Example\_03.out):

* SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *							* SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *						
<b>File demands</b>							<b>File demands</b>						
Demand type	Value	Unit	Load case	Load comb.	File		Demand type	Value	Unit	Load case	Load comb.	File	
Max axial force (tension is +)	-1.0269E+01	kips	2	0	1		Max axial force (tension is +)	-4.5620E+01	kN	2	0	1	
Min axial force	-5.3375E+01	kips	1	0	1		Min axial force	-2.3742E+02	kN	1	0	1	
Max shear in 2 direction	1.0000E+01	kips	2	0	1		Max shear in 2 direction	4.4482E+01	kN	2	0	1	
Min shear in 2 direction	-1.4441E+01	kips	2	0	1		Min shear in 2 direction	-6.4247E+01	kN	2	0	1	
Max shear in 3 direction	3.1356E-13	kips	2	0	1		Max shear in 3 direction	5.3079E-12	kN	2	0	1	
Min shear in 3 direction	-4.1255E-13	kips	2	0	1		Min shear in 3 direction	-5.5436E-12	kN	2	0	1	
Max moment about 2 axis	2.7211E-13	kip-ft	2	0	1		Max moment about 2 axis	1.6451E-11	kN-m	2	0	1	
Min moment about 2 axis	-3.3004E-12	kip-ft	2	0	1		Min moment about 2 axis	-7.1993E-13	kN-m	2	0	1	
Max moment about 3 axis	5.7650E+00	kip-ft	2	0	1		Max moment about 3 axis	7.8152E+00	kN-m	2	0	1	
Min moment about 3 axis	-1.4305E+02	kip-ft	2	0	1		Min moment about 3 axis	-1.9396E+02	kN-m	2	0	1	
Max torsional force	0.0000E+00	kip-ft	1	0	1		Max torsional force	0.0000E+00	kN-m	1	0	1	
Min torsional force	0.0000E+00	kip-ft	1	0	1		Min torsional force	0.0000E+00	kN-m	1	0	1	
Max demand/capacity ratio	5.7725E-01		2	0	1		Max demand/capacity ratio	5.7992E-01		2	0	1	
<b>Soil demands</b>							<b>Soil demands</b>						
Demand type	Value	Unit	Load case	Load comb.	File		Demand type	Value	Unit	Load case	Load comb.	File	
Max Zp soil force	1.2052E+01	kips	1	0	1		Max Zp soil force	6.9812E+01	kN	1	0	1	
Min Zp soil force	7.4142E-01	kips	2	0	1		Min Zp soil force	3.3137E+00	kN	2	0	1	
Max Xp soil force	6.0349E+00	kips	2	0	1		Max Xp soil force	2.6832E+01	kN	2	0	1	
Min Xp soil force	-4.8580E+00	kips	2	0	1		Min Xp soil force	-2.1620E+01	kN	2	0	1	
Max Yp soil force	2.9584E-14	kips	2	0	1		Max Yp soil force	1.8518E-12	kN	2	0	1	
Min Yp soil force	-1.3334E-13	kips	2	0	1		Min Yp soil force	-2.1504E-12	kN	2	0	1	
Max torsional soil force	0.0000E+00	kip-ft	1	0	1		Max torsional soil force	0.0000E+00	kN-m	1	0	1	
<b>File displacements</b>							<b>File displacements</b>						
Displacement type	Value	Unit	Load case	Load comb.	File		Displacement type	Value	Unit	Load case	Load comb.	File	
Max Z displacement	8.1885E-02	in	1	0	1		Max Z displacement	2.6438E-03	m	1	0	1	
Min Z displacement	5.5432E-02	in	2	0	1		Min Z displacement	1.4171E-03	m	2	0	1	
Max X displacement	1.7569E+00	in	2	0	1		Max X displacement	4.4673E-02	m	2	0	1	
Min X displacement	-9.7739E-03	in	2	0	1		Min X displacement	-2.4819E-04	m	2	0	1	
Max Y displacement	2.5849E-14	in	2	0	1		Max Y displacement	4.5148E-17	m	1	0	1	

**English**

**SI**



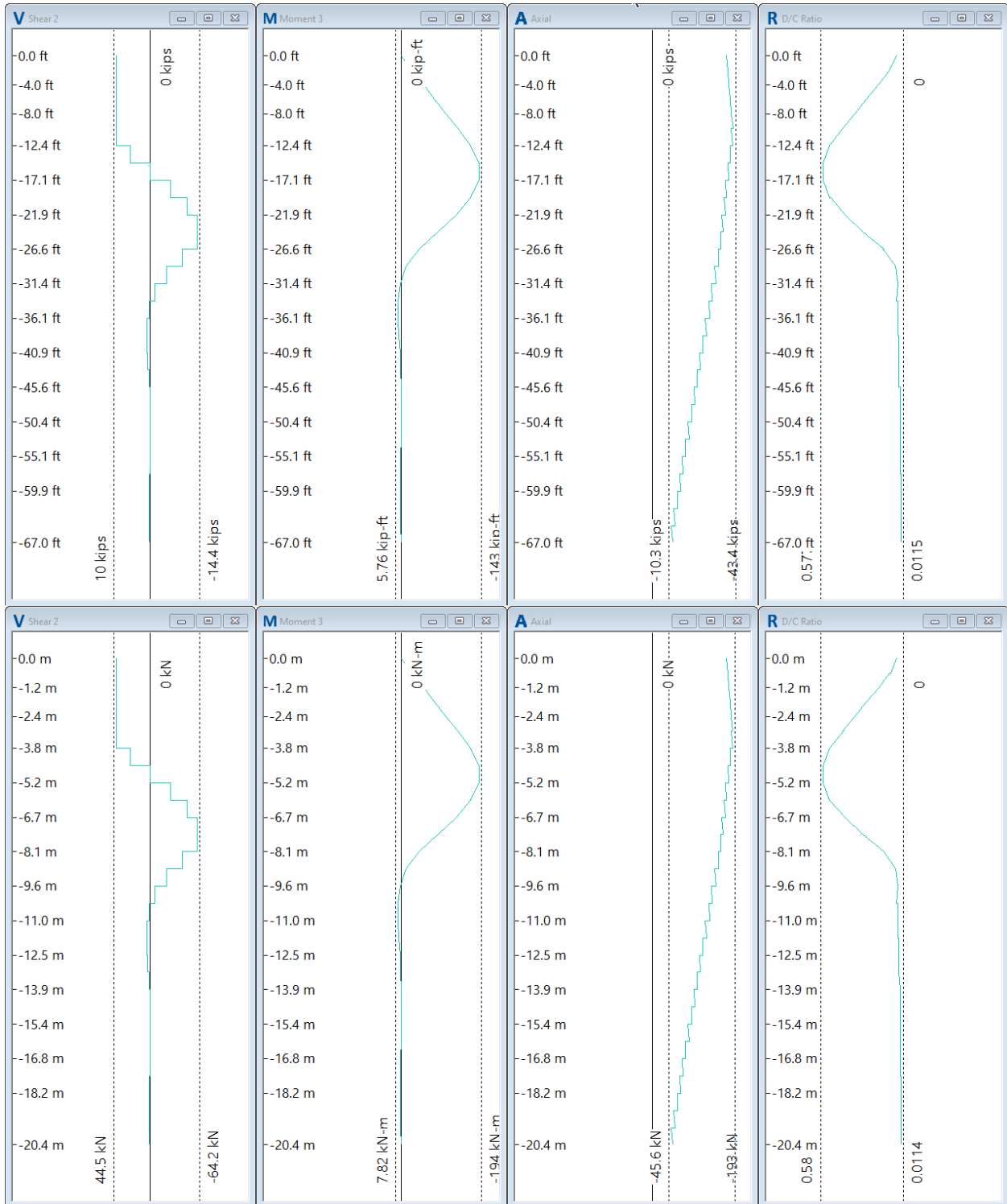


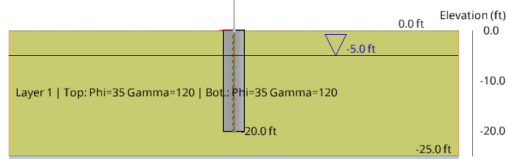
Figure 3.1 – Comparison of Load Case 2 Pile Result Plots Between English (Top) and SI Units (Bottom) for Example 3

## Example 4: High Mast Lighting/Sign

**Problem Description:** Compare the FB-MultiPier output for a sign in English and Metric units. Also compare plots of shear, moment, axial force, and demand to capacity ratio.

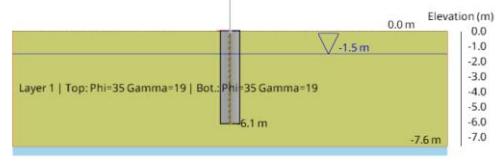
### Soil Elevation View:

Soil Set 1 | Pile 1 | Pile Type 1



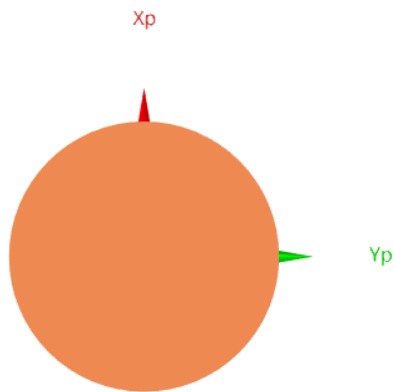
English

Soil Set 1 | Pile 1 | Pile Type 1



SI

### Pile Plan View:



**File(s):** USC\_Example\_04.in, SI\_Example\_04.in

Substructure 1								
Demand Type	English		SI		SI -> English		% Diff	
	Value	Units	Value	Units	Value	Units		
<b>Pile Demands</b>	Max axial force	-4.93E+00	kips	-2.19E+01	kN	-4.93E+00	kips	0.00%
	Min axial force	-1.45E+01	kips	-6.45E+01	kN	-1.45E+01	kips	0.00%
	Max shear in 2 direction	6.24E+00	kips	2.78E+01	kN	6.24E+00	kips	0.00%
	Min shear in 2 direction	4.50E-04	kips	2.00E-03	kN	4.50E-04	kips	0.00%
	Max shear in 3 direction	4.51E+00	kips	2.01E+01	kN	4.51E+00	kips	0.00%
	Min shear in 3 direction	-1.99E+00	kips	-8.86E+00	kN	-1.99E+00	kips	0.00%
	Max moment about 2 axis	9.33E-10	kip-ft	1.27E-09	kN-m	9.35E-10	kip-ft	0.00%
	Min moment about 2 axis	-4.54E+01	kip-ft	-6.15E+01	kN-m	-4.54E+01	kip-ft	0.00%
	Max moment about 3 axis	7.37E+01	kip-ft	9.99E+01	kN-m	7.37E+01	kip-ft	0.00%
	Min moment about 3 axis	-1.12E-09	kip-ft	-1.55E-09	kN-m	-1.14E-09	kip-ft	0.00%
	Max torsional force	4.13E+01	kip-ft	5.59E+01	kN-m	4.13E+01	kip-ft	0.00%
	Min torsional force	-4.13E+01	kip-ft	-5.59E+01	kN-m	-4.13E+01	kip-ft	0.00%
Max demand/capacity ratio	3.86E-02	-	3.86E-02	-	3.86E-02	-	0.05%	
<b>Soil Demands</b>	Max Zp soil force	6.28E+00	kips	2.79E+01	kN	6.28E+00	kips	0.02%
	Min Zp soil force	7.79E-07	kips	1.98E-08	kN	4.46E-09	kips	0.00%
	Max Xp soil force	1.80E+00	kips	8.02E+00	kN	1.80E+00	kips	0.00%
	Min Xp soil force	-9.59E-01	kips	-4.27E+00	kN	-9.59E-01	kips	0.00%
	Max Yp soil force	9.19E-01	kips	4.09E+00	kN	9.19E-01	kips	0.00%
	Min Yp soil force	-1.43E+00	kips	-6.36E+00	kN	-1.43E+00	kips	0.00%
	Max torsional soil force	-1.16E+00	kip-ft	-1.58E+00	kN-m	-1.16E+00	kip-ft	0.00%
<b>Pile Displacements</b>	Max Z displacement	1.56E-02	in.	3.96E-04	m	1.56E-02	in.	0.00%
	Min Z displacement	1.52E-02	in.	3.86E-04	m	1.52E-02	in.	0.00%
	Max X displacement	4.85E-03	in.	1.23E-04	m	4.85E-03	in.	0.00%
	Min X displacement	-1.74E-02	in.	-4.42E-04	m	-1.74E-02	in.	0.00%
	Max Y displacement	1.50E-02	in.	3.81E-04	m	1.50E-02	in.	0.00%
	Min Y displacement	-3.98E-03	in.	-1.01E-04	m	-3.98E-03	in.	0.00%
<b>Column Demands</b>	Max axial force	-2.44E+00	kips	-1.08E+01	kN	-2.44E+00	kips	0.00%
	Min axial force	-7.24E+00	kips	-3.22E+01	kN	-7.24E+00	kips	0.00%
	Max shear in 2 direction	8.19E-12	kips	8.00E-11	kN	1.80E-11	kips	0.00%
	Min shear in 2 direction	-1.82E-11	kips	-8.73E-11	kN	-1.96E-11	kips	0.00%
	Max shear in 3 direction	-1.44E+00	kips	-6.41E+00	kN	-1.44E+00	kips	0.00%
	Min shear in 3 direction	-1.99E+00	kips	-8.86E+00	kN	-1.99E+00	kips	0.00%
	Max moment about 2 axis	-4.43E-12	kip-ft	-1.21E-11	kN-m	-8.92E-12	kip-ft	0.00%
	Min moment about 2 axis	-3.95E+01	kip-ft	-5.35E+01	kN-m	-3.95E+01	kip-ft	0.00%
	Max moment about 3 axis	7.37E+01	kip-ft	9.99E+01	kN-m	7.37E+01	kip-ft	0.00%
	Min moment about 3 axis	7.37E+01	kip-ft	9.99E+01	kN-m	7.37E+01	kip-ft	0.00%
	Max torsional force	4.32E+01	kip-ft	5.86E+01	kN-m	4.32E+01	kip-ft	0.00%
Min torsional force	-4.32E+01	kip-ft	-5.86E+01	kN-m	-4.32E+01	kip-ft	0.00%	
<b>Pier Cap Demands</b>	Max axial force	3.64E-12	kips	2.91E-11	kN	6.54E-12	kips	0.00%
	Min axial force	-1.82E-12	kips	0.00E+00	kN	0.00E+00	kips	0.00%
	Max shear in 2 direction	2.09E-12	kips	-6.27E-12	kN	-1.41E-12	kips	0.00%
	Min shear in 2 direction	-2.44E+00	kips	-1.08E+01	kN	-2.44E+00	kips	0.00%
	Max shear in 3 direction	1.44E+00	kips	6.41E+00	kN	1.44E+00	kips	0.00%
	Min shear in 3 direction	-5.46E-12	kips	-9.91E-12	kN	-2.23E-12	kips	0.00%
	Max moment about 2 axis	-5.67E-12	kip-ft	3.94E-12	kN-m	2.91E-12	kip-ft	0.00%
	Min moment about 2 axis	-4.32E+01	kip-ft	-5.86E+01	kN-m	-4.32E+01	kip-ft	0.00%
	Max moment about 3 axis	1.97E-12	kip-ft	7.59E-12	kN-m	5.60E-12	kip-ft	0.00%
	Min moment about 3 axis	-7.37E+01	kip-ft	-9.99E+01	kN-m	-7.37E+01	kip-ft	0.00%
	Max torsional force	3.32E-14	kip-ft	1.42E-14	kN-m	1.05E-14	kip-ft	0.00%
Min torsional force	-3.32E-14	kip-ft	-1.42E-14	kN-m	-1.05E-14	kip-ft	0.00%	

Table 4.1 – Comparison of Max/Min Results Between English and SI Units for Example 4

# Results from FB-MultiPier Output File (USC\_Example\_04.out, SI\_Example\_04.out):

* SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *							* SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *						
File demands							File demands						
Demand type	Value	Unit	Load case	Load comb.	File		Demand type	Value	Unit	Load case	Load comb.	File	
Max axial force (tension is +)	-4.9324E+00	kips	1	0	1		Max axial force (tension is +)	-2.1938E+01	kN	1	0	1	
Min axial force	-1.4506E+01	kips	1	0	1		Min axial force	-6.4527E+01	kN	1	0	1	
Max shear in 2 direction	6.2397E+00	kips	1	0	1		Max shear in 2 direction	2.7756E+01	kN	1	0	1	
Min shear in 2 direction	4.4955E-04	kips	1	0	1		Min shear in 2 direction	1.9998E-03	kN	1	0	1	
Max shear in 3 direction	4.5126E+00	kips	1	0	1		Max shear in 3 direction	2.0073E+01	kN	1	0	1	
Min shear in 3 direction	-1.9916E+00	kips	1	0	1		Min shear in 3 direction	-8.8590E+00	kN	1	0	1	
Max moment about 2 axis	9.3310E-10	kip-ft	1	0	1		Max moment about 2 axis	1.2676E-09	kN-m	1	0	1	
Min moment about 2 axis	-4.5353E+01	kip-ft	1	0	1		Min moment about 2 axis	-6.1489E+01	kN-m	1	0	1	
Max moment about 3 axis	7.3659E+01	kip-ft	1	0	1		Max moment about 3 axis	9.9869E+01	kN-m	1	0	1	
Min moment about 3 axis	-1.1240E-09	kip-ft	1	0	1		Min moment about 3 axis	-1.5484E-09	kN-m	1	0	1	
Max torsional force	4.1261E+01	kip-ft	1	0	1		Max torsional force	5.5942E+01	kN-m	1	0	1	
Min torsional force	-4.1261E+01	kip-ft	1	0	1		Min torsional force	-5.5942E+01	kN-m	1	0	1	
Max demand/capacity ratio	3.8605E-02		1	0	1		Max demand/capacity ratio	3.8625E-02		1	0	1	
Soil demands							Soil demands						
Demand type	Value	Unit	Load case	Load comb.	File		Demand type	Value	Unit	Load case	Load comb.	File	
Max Zp soil force	6.2795E+00	kips	1	0	1		Max Zp soil force	2.7927E+01	kN	1	0	1	
Min Zp soil force	7.7846E-07	kips	1	0	1		Min Zp soil force	1.9817E-08	kN	1	0	1	
Max Xp soil force	1.8027E+00	kips	1	0	1		Max Xp soil force	8.0187E+00	kN	1	0	1	
Min Xp soil force	-9.5907E-01	kips	1	0	1		Min Xp soil force	-4.2663E+00	kN	1	0	1	
Max Yp soil force	9.1892E-01	kips	1	0	1		Max Yp soil force	4.0875E+00	kN	1	0	1	
Min Yp soil force	-1.4296E-00	kips	1	0	1		Min Yp soil force	-6.3589E+00	kN	1	0	1	
Max torsional soil force	-1.1619E+00	kip-ft	1	0	1		Max torsional soil force	-1.5753E+00	kN-m	1	0	1	
File displacements							File displacements						
Displacement type	Value	Unit	Load case	Load comb.	File		Displacement type	Value	Unit	Load case	Load comb.	File	
Max Z displacement	1.5604E-02	in	1	0	1		Max Z displacement	3.9634E-04	m	1	0	1	
Min Z displacement	1.5205E-02	in	1	0	1		Min Z displacement	3.8621E-04	m	1	0	1	
Max X displacement	4.8543E-03	in	1	0	1		Max X displacement	1.2330E-04	m	1	0	1	
Min X displacement	-1.7412E-02	in	1	0	1		Min X displacement	-4.4228E-04	m	1	0	1	
Max Y displacement	1.4983E-02	in	1	0	1		Max Y displacement	3.8057E-04	m	1	0	1	
Min Y displacement	-3.9806E-03	in	1	0	1		Min Y displacement	-1.0110E-04	m	1	0	1	
Column demands							Column demands						
Demand type	Value	Unit	Load case	Load comb.	Col.		Demand type	Value	Unit	Load case	Load comb.	Col.	
Max axial force	-2.4362E+00	kips	1	0	1		Max axial force	-1.0837E+01	kN	1	0	1	
Min axial force	-7.2378E+00	kips	1	0	1		Min axial force	-3.2196E+01	kN	1	0	1	
Max shear in 2 direction	8.1855E-12	kips	1	0	1		Max shear in 2 direction	8.0036E-11	kN	1	0	1	
Min shear in 2 direction	-1.8190E-11	kips	1	0	1		Min shear in 2 direction	-8.7311E-11	kN	1	0	1	
Max shear in 3 direction	-1.4400E+00	kips	1	0	1		Max shear in 3 direction	-6.4054E+00	kN	1	0	1	
Min shear in 3 direction	-1.9920E+00	kips	1	0	1		Min shear in 3 direction	-8.8608E+00	kN	1	0	1	
Max moment about 2 axis	-4.4299E-12	kip-ft	1	0	1		Max moment about 2 axis	-1.2089E-11	kN-m	1	0	1	
Min moment about 2 axis	-3.9468E+01	kip-ft	1	0	1		Min moment about 2 axis	-5.3511E+01	kN-m	1	0	1	
Max moment about 3 axis	7.3657E+01	kip-ft	1	0	1		Max moment about 3 axis	9.9867E+01	kN-m	1	0	1	
Min moment about 3 axis	7.3657E+01	kip-ft	1	0	1		Min moment about 3 axis	9.9867E+01	kN-m	1	0	1	
Max torsional force	4.3200E+01	kip-ft	1	0	1		Max torsional force	5.8571E+01	kN-m	1	0	1	
Min torsional force	-4.3200E+01	kip-ft	1	0	1		Min torsional force	-5.8571E+01	kN-m	1	0	1	
Pier cap demands							Pier cap demands						
Demand type	Value	Unit	Load case	Load comb.			Demand type	Value	Unit	Load case	Load comb.		
Max axial force	3.6380E-12	kips	1	0			Max axial force	2.9104E-11	kN	1	0		
Min axial force	-1.8190E-12	kips	1	0			Min axial force	0.0000E+00	kN	1	0		
Max shear in 2 direction	2.0937E-12	kips	1	0			Max shear in 2 direction	-6.2729E-12	kN	1	0		
Min shear in 2 direction	-2.4362E+00	kips	1	0			Min shear in 2 direction	-1.0837E+01	kN	1	0		
Max shear in 3 direction	1.4400E+00	kips	1	0			Max shear in 3 direction	6.4054E+00	kN	1	0		
Min shear in 3 direction	-5.4557E-12	kips	1	0			Min shear in 3 direction	-9.9140E-12	kN	1	0		
Max moment about 2 axis	-5.6729E-12	kip-ft	1	0			Max moment about 2 axis	3.9395E-12	kN-m	1	0		
Min moment about 2 axis	-4.3200E+01	kip-ft	1	0			Min moment about 2 axis	-5.8571E+01	kN-m	1	0		
Max moment about 3 axis	1.9697E-12	kip-ft	1	0			Max moment about 3 axis	7.5916E-12	kN-m	1	0		
Min moment about 3 axis	-7.3657E+01	kip-ft	1	0			Min moment about 3 axis	-9.9867E+01	kN-m	1	0		
Max torsional force	3.3159E-14	kip-ft	1	0			Max torsional force	1.4211E-14	kN-m	1	0		
Min torsional force	-3.3159E-14	kip-ft	1	0			Min torsional force	-1.4211E-14	kN-m	1	0		

English

SI

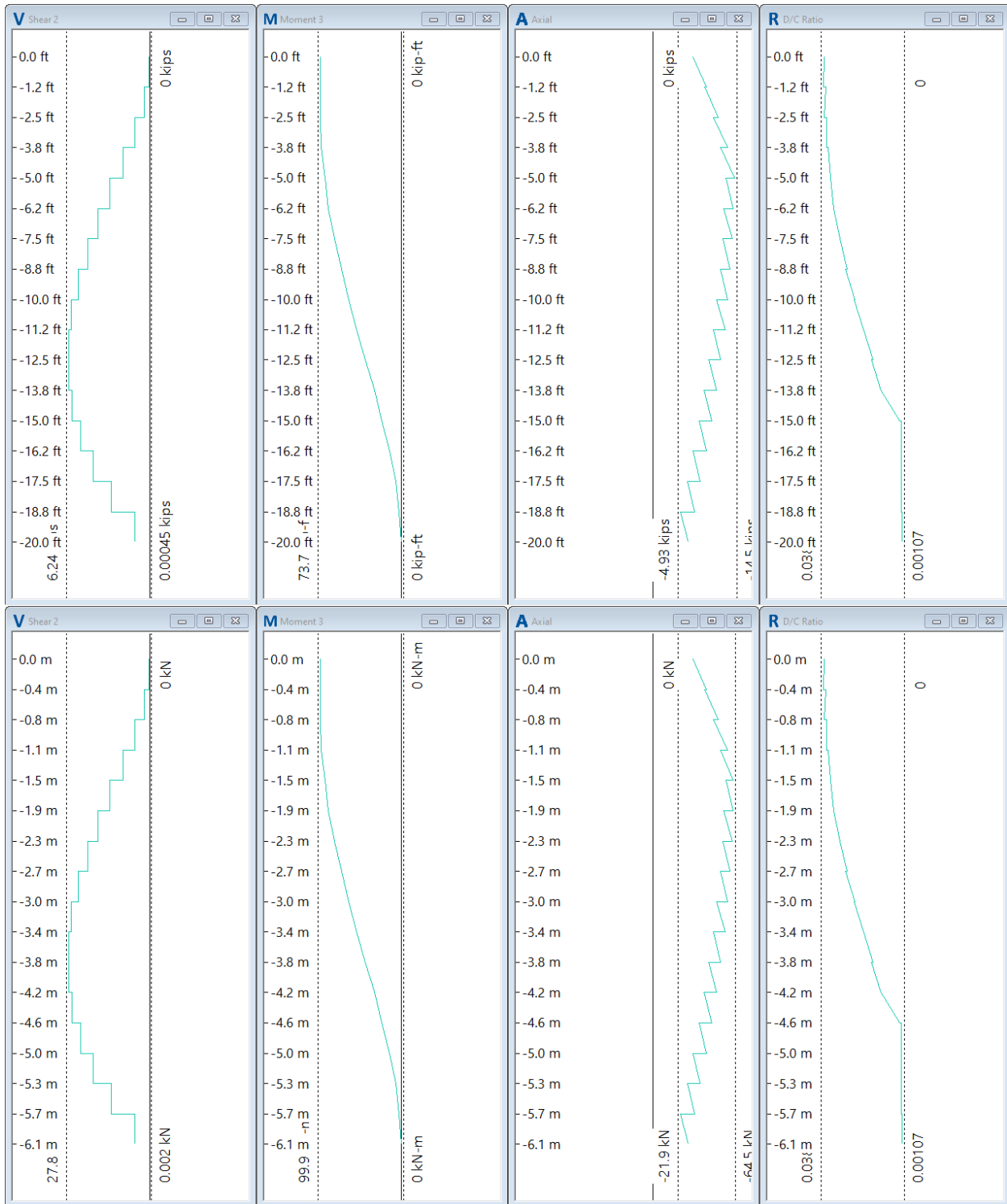


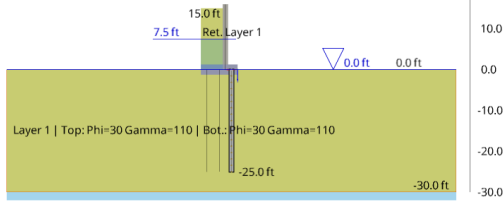
Figure 4.1 – Comparison of Pile Result Plots Between English (Top) and SI Units (Bottom) for Example 4

## Example 5: Retaining Wall

**Problem Description:** Compare the FB-MultiPier output for a retaining wall in English and Metric units. Also compare plots of shear, moment, axial force, and demand to capacity ratio.

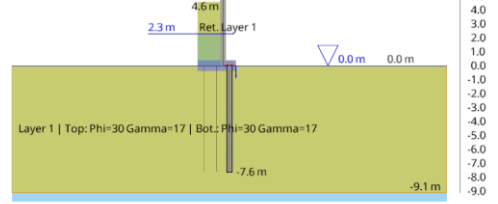
### Soil Elevation View:

Soil Set 1 | Pile 1 | Pile Type 1



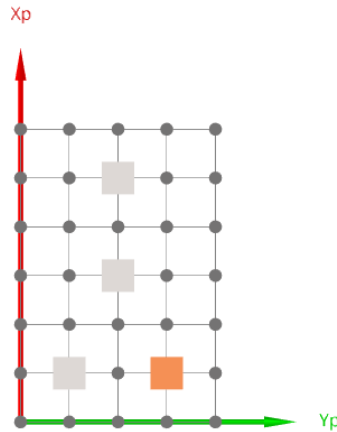
English

Soil Set 1 | Pile 1 | Pile Type 1



SI

### Pile Plan View:



**File(s):** *USC\_Example\_05.in, SI\_Example\_05.in*

Substructure 1								
Demand Type	English		SI		SI -> English		% Diff	
	Value	Units	Value	Units	Value	Units		
<b>Pile Demands</b>	<b>Max axial force</b>	-6.17E-01	kips	-4.03E-02	kN	-9.06E-03	kips	0.00%
	<b>Min axial force</b>	-2.98E+01	kips	-1.32E+02	kN	-2.97E+01	kips	0.00%
	<b>Max shear in 2 direction</b>	2.98E+00	kips	1.33E+01	kN	2.98E+00	kips	0.19%
	<b>Min shear in 2 direction</b>	-6.24E+00	kips	-2.77E+01	kN	-6.24E+00	kips	0.00%
	<b>Max shear in 3 direction</b>	5.41E-02	kips	1.09E+00	kN	2.46E-01	kips	127.85%
	<b>Min shear in 3 direction</b>	-5.41E-02	kips	-4.70E-02	kN	-1.06E-02	kips	0.00%
	<b>Max moment about 2 axis</b>	2.22E-01	kip-ft	9.66E-02	kN-m	7.12E-02	kip-ft	102.89%
	<b>Min moment about 2 axis</b>	-2.22E-01	kip-ft	-2.12E+00	kN-m	-1.56E+00	kip-ft	0.00%
	<b>Max moment about 3 axis</b>	1.92E+01	kip-ft	2.61E+01	kN-m	1.93E+01	kip-ft	0.15%
	<b>Min moment about 3 axis</b>	-8.42E-01	kip-ft	-1.14E+00	kN-m	-8.44E-01	kip-ft	0.00%
	<b>Max torsional force</b>	1.55E-04	kip-ft	3.38E-04	kN-m	2.50E-04	kip-ft	0.00%
	<b>Min torsional force</b>	-1.55E-04	kip-ft	-3.38E-04	kN-m	-2.50E-04	kip-ft	0.00%
<b>Max demand/capacity ratio</b>	3.09E-01	-	3.14E-01	-	3.14E-01	-	1.81%	
<b>Soil Demands</b>	<b>Max Zp soil force</b>	1.11E+01	kips	4.91E+01	kN	1.10E+01	kips	0.69%
	<b>Min Zp soil force</b>	1.04E-01	kips	2.63E-01	kN	5.91E-02	kips	55.34%
	<b>Max Xp soil force</b>	7.19E-01	kips	3.20E+00	kN	7.20E-01	kips	0.13%
	<b>Min Xp soil force</b>	-5.57E+00	kips	-2.48E+01	kN	-5.57E+00	kips	0.00%
	<b>Max Yp soil force</b>	1.38E-02	kips	5.32E-01	kN	1.20E-01	kips	158.72%
	<b>Min Yp soil force</b>	-1.38E-02	kips	-2.67E-01	kN	-5.99E-02	kips	0.00%
	<b>Max torsional soil force</b>	1.02E-05	kip-ft	2.25E-05	kN-m	1.66E-05	kip-ft	0.00%
<b>Pile Displacements</b>	<b>Max Z displacement</b>	1.74E-01	in.	4.38E-03	m	1.73E-01	in.	0.94%
	<b>Min Z displacement</b>	7.66E-03	in.	1.11E-04	m	4.39E-03	in.	54.28%
	<b>Max X displacement</b>	7.66E-03	in.	1.95E-04	m	7.67E-03	in.	0.13%
	<b>Min X displacement</b>	-9.87E-02	in.	-2.51E-03	m	-9.87E-02	in.	0.00%
	<b>Max Y displacement</b>	1.47E-04	in.	6.49E-05	m	2.55E-03	in.	178.24%
<b>Min Y displacement</b>	-1.47E-04	in.	-1.62E-05	m	-6.39E-04	in.	0.00%	

Table 5.1 – Comparison of Max/Min Results Between English and SI Units for Example 5

# Results from FB-MultiPier Output File (USC\_Example\_05.out, SI\_Example\_05.out):

***** * SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES * *****						***** * SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES * *****					
File demands						File demands					
Demand type	Value	Unit	Load case	Load comb.	File	Demand type	Value	Unit	Load case	Load comb.	File
Max axial force (tension is +)	-6.1680E-01	kips	1	0	3	Max axial force (tension is +)	-4.0305E-02	kN	1	0	3
Min axial force	-2.9847E+01	kips	1	0	1	Min axial force	-1.3233E+02	kN	1	0	1
Max shear in 2 direction	2.9770E+00	kips	1	0	1	Max shear in 2 direction	1.3268E+01	kN	1	0	4
Min shear in 2 direction	-6.2364E+00	kips	1	0	3	Min shear in 2 direction	-2.7740E+01	kN	1	0	3
Max shear in 3 direction	5.4090E-02	kips	1	0	4	Max shear in 3 direction	1.0933E+00	kN	1	0	4
Min shear in 3 direction	-5.4072E-02	kips	1	0	1	Min shear in 3 direction	-4.7032E-02	kN	1	0	4
Max moment about 2 axis	2.2221E-01	kip-ft	1	0	1	Max moment about 2 axis	9.6588E-02	kN-m	1	0	4
Min moment about 2 axis	-2.2232E-01	kip-ft	1	0	4	Min moment about 2 axis	-2.1161E+00	kN-m	1	0	4
Max moment about 3 axis	1.9224E+01	kip-ft	1	0	3	Max moment about 3 axis	2.6104E+01	kN-m	1	0	3
Min moment about 3 axis	-8.4207E-01	kip-ft	1	0	1	Min moment about 3 axis	-1.1437E+00	kN-m	1	0	4
Max torsional force	1.5456E-04	kip-ft	1	0	1	Max torsional force	3.3836E-04	kN-m	1	0	4
Min torsional force	-1.5456E-04	kip-ft	1	0	1	Min torsional force	-3.3836E-04	kN-m	1	0	4
Max demand/capacity ratio	3.0855E-01		1	0	3	Max demand/capacity ratio	3.1420E-01		1	0	3
Soil demands						Soil demands					
Demand type	Value	Unit	Load case	Load comb.	File	Demand type	Value	Unit	Load case	Load comb.	File
Max Zp soil force	1.1109E+01	kips	1	0	1	Max Zp soil force	4.9075E+01	kN	1	0	1
Min Zp soil force	1.0433E-01	kips	1	0	3	Min Zp soil force	2.6293E-01	kN	1	0	3
Max Xp soil force	7.1856E-01	kips	1	0	3	Max Xp soil force	3.2006E+00	kN	1	0	3
Min Xp soil force	-5.5677E+00	kips	1	0	3	Min Xp soil force	-2.4779E+01	kN	1	0	3
Max Yp soil force	1.3774E-02	kips	1	0	1	Max Yp soil force	5.3242E-01	kN	1	0	3
Min Yp soil force	-1.3777E-02	kips	1	0	4	Min Yp soil force	-2.6652E-01	kN	1	0	4
Max torsional soil force	1.0231E-05	kip-ft	1	0	4	Max torsional soil force	2.2474E-05	kN-m	1	0	4
File displacements						File displacements					
Displacement type	Value	Unit	Load case	Load comb.	File	Displacement type	Value	Unit	Load case	Load comb.	File
Max Z displacement	1.7422E-01	in	1	0	1	Max Z displacement	4.3836E-03	m	1	0	1
Min Z displacement	7.6589E-03	in	1	0	3	Min Z displacement	1.1148E-04	m	1	0	3
Max X displacement	7.6646E-03	in	1	0	3	Max X displacement	1.9494E-04	m	1	0	3
Min X displacement	-9.8667E-02	in	1	0	2	Min X displacement	-2.5076E-03	m	1	0	2
Max Y displacement	1.4692E-04	in	1	0	1	Max Y displacement	6.4857E-05	m	1	0	3
Min Y displacement	-1.4696E-04	in	1	0	4	Min Y displacement	-1.6233E-05	m	1	0	4
Column demands						Column demands					
Demand type	Value	Unit	Load case	Load comb.	Col.	Demand type	Value	Unit	Load case	Load comb.	Col.
Max axial force	1.1946E-13	kips	1	0	1	Max axial force	-3.3626E-11	kN	1	0	1
Min axial force	-1.8143E+01	kips	1	0	1	Min axial force	-8.0708E+01	kN	1	0	1
Max shear in 2 direction	-2.0000E+00	kips	1	0	1	Max shear in 2 direction	-8.8964E+00	kN	1	0	1
Min shear in 2 direction	-4.2955E+01	kips	1	0	1	Min shear in 2 direction	-1.9108E+02	kN	1	0	1
Max shear in 3 direction	1.8941E-09	kips	1	0	1	Max shear in 3 direction	9.5213E-10	kN	1	0	1
Min shear in 3 direction	4.7066E-12	kips	1	0	1	Min shear in 3 direction	-1.3184E-04	kN	1	0	1
Max moment about 2 axis	6.7271E-09	kip-ft	1	0	1	Max moment about 2 axis	7.1163E-12	kN-m	1	0	1
Min moment about 2 axis	-1.2438E-10	kip-ft	1	0	1	Min moment about 2 axis	-2.2272E-02	kN-m	1	0	1
Max moment about 3 axis	2.6517E+02	kip-ft	1	0	1	Max moment about 3 axis	3.5953E+02	kN-m	1	0	1
Min moment about 3 axis	1.1817E-11	kip-ft	1	0	1	Min moment about 3 axis	-1.6551E-10	kN-m	1	0	1
Max torsional force	0.0000E+00	kip-ft	1	0	1	Max torsional force	2.0674E-16	kN-m	1	0	1
Min torsional force	0.0000E+00	kip-ft	1	0	1	Min torsional force	-2.0674E-16	kN-m	1	0	1
Pier cap demands						Pier cap demands					
Demand type	Value	Unit	Load case	Load comb.		Demand type	Value	Unit	Load case	Load comb.	
Max axial force	0.0000E+00	kips	0	0		Max axial force	0.0000E+00	kN	0	0	
Min axial force	0.0000E+00	kips	0	0		Min axial force	0.0000E+00	kN	0	0	
Max shear in 2 direction	0.0000E+00	kips	0	0		Max shear in 2 direction	0.0000E+00	kN	0	0	
Min shear in 2 direction	0.0000E+00	kips	0	0		Min shear in 2 direction	0.0000E+00	kN	0	0	
Max shear in 3 direction	0.0000E+00	kips	0	0		Max shear in 3 direction	0.0000E+00	kN	0	0	
Min shear in 3 direction	0.0000E+00	kips	0	0		Min shear in 3 direction	0.0000E+00	kN	0	0	
Max moment about 2 axis	0.0000E+00	kip-ft	0	0		Max moment about 2 axis	0.0000E+00	kN-m	0	0	
Min moment about 2 axis	0.0000E+00	kip-ft	0	0		Min moment about 2 axis	0.0000E+00	kN-m	0	0	
Max moment about 3 axis	0.0000E+00	kip-ft	0	0		Max moment about 3 axis	0.0000E+00	kN-m	0	0	
Min moment about 3 axis	0.0000E+00	kip-ft	0	0		Min moment about 3 axis	0.0000E+00	kN-m	0	0	
Max torsional force	0.0000E+00	kip-ft	0	0		Max torsional force	0.0000E+00	kN-m	0	0	
Min torsional force	0.0000E+00	kip-ft	0	0		Min torsional force	0.0000E+00	kN-m	0	0	

English

SI



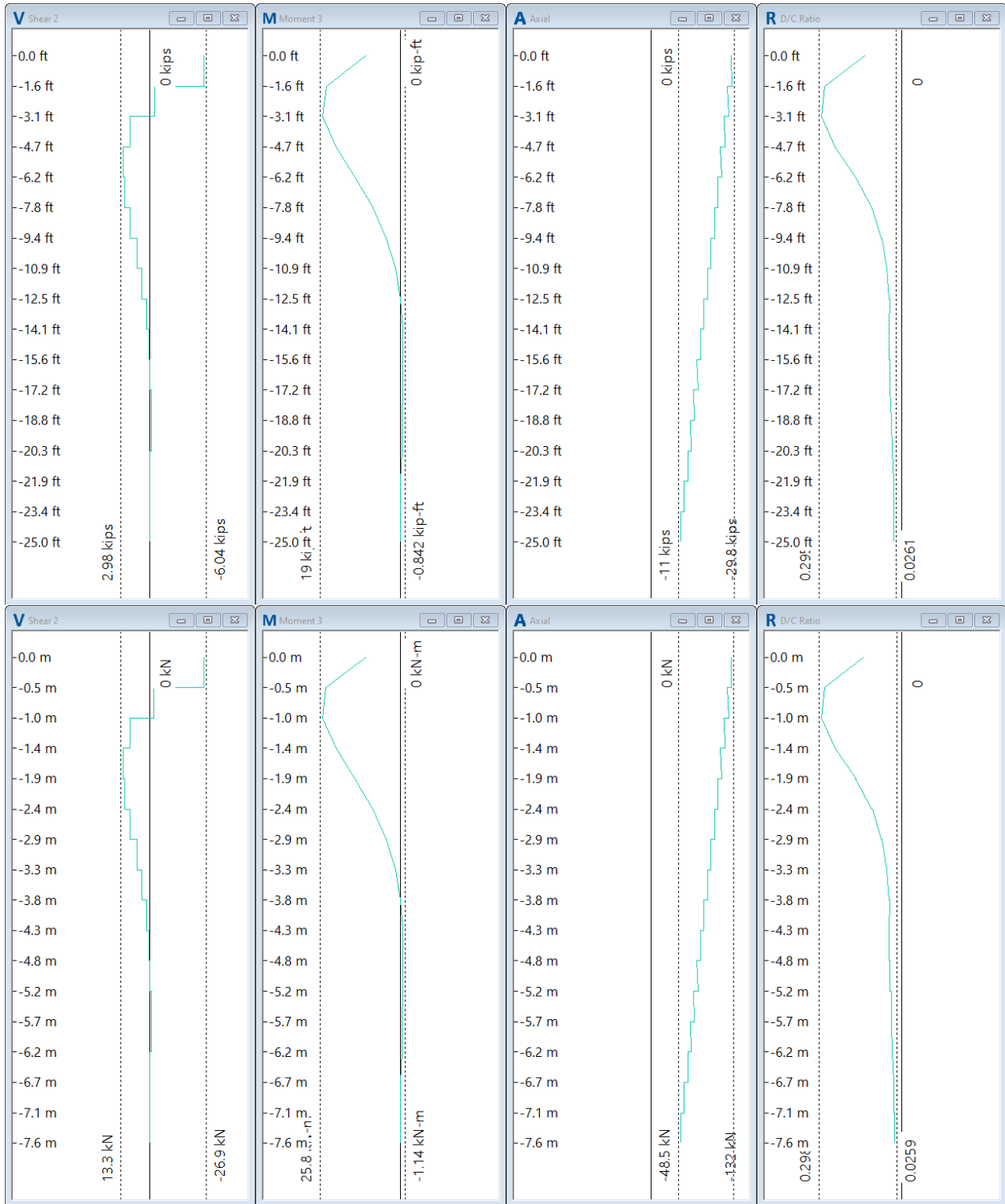


Figure 5.1 – Comparison of Pile Result Plots Between English (Top) and SI Units (Bottom) for Example 5

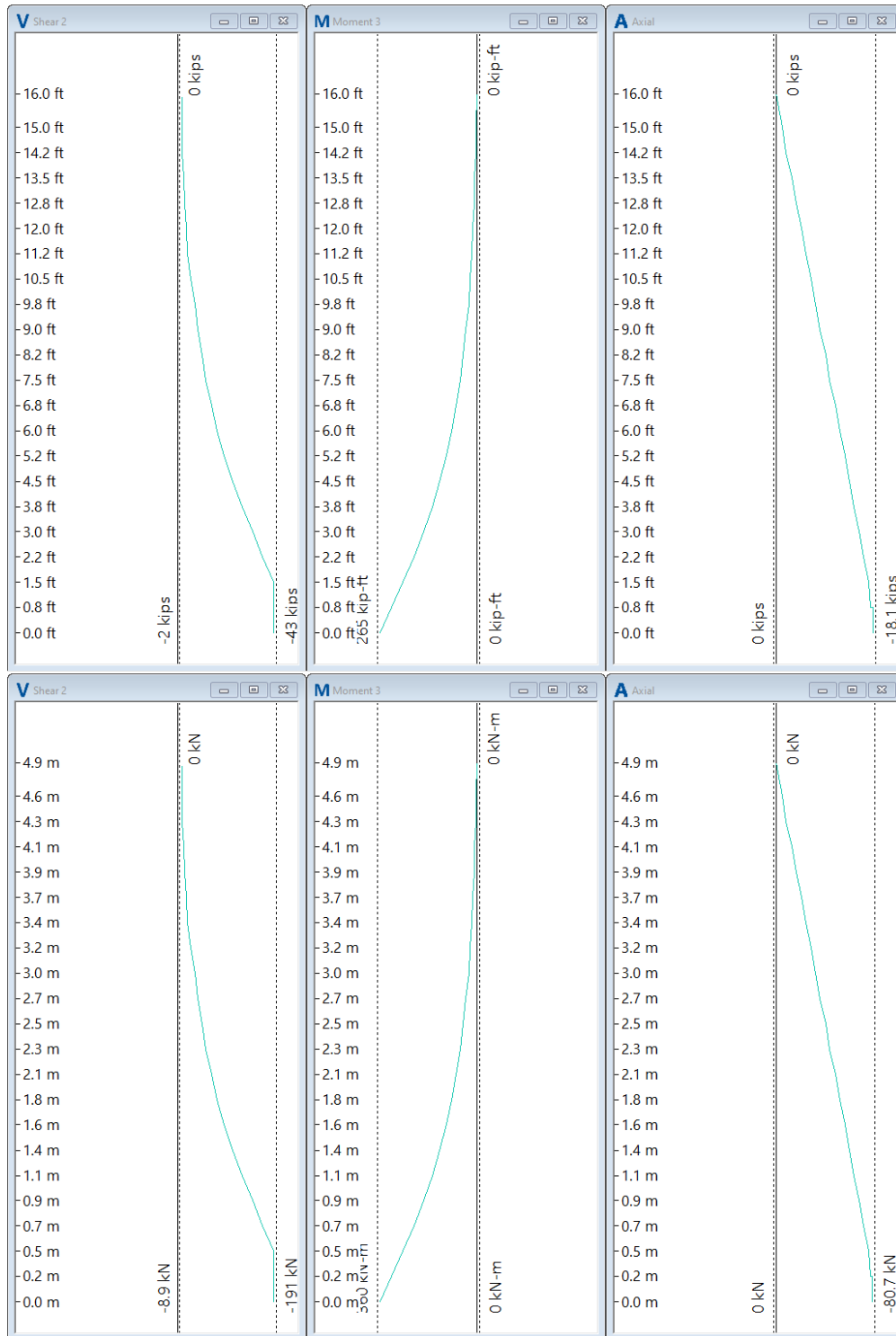
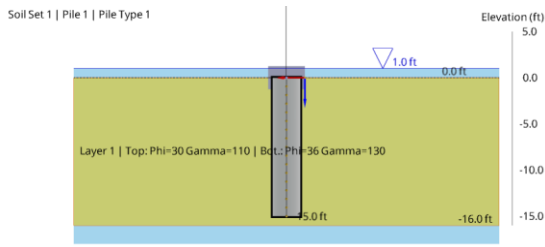


Figure 5.2 – Comparison of Wall Structure Result Plots Between English (Top) and SI Units (Bottom) for Example 5

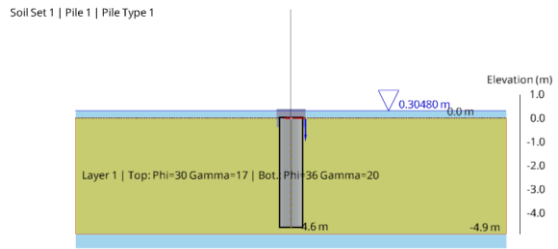
## Example 6: Sound Wall

**Problem Description:** Compare the FB-MultiPier output for a sound wall in English and Metric units. Also compare plots of shear, moment, axial force, and demand to capacity ratio.

### Soil Elevation View:

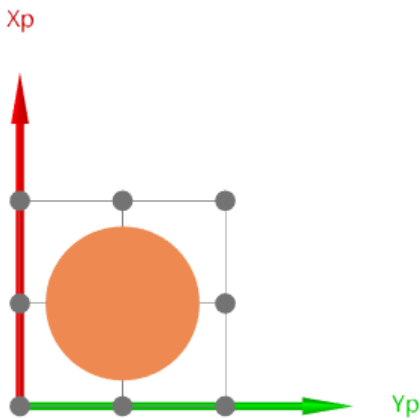


English



SI

### Pile Plan View:



**File(s):** USC\_Example\_06.in, SI\_Example\_06.in

Substructure 1								
Demand Type	English		SI		SI -> English		% Diff	
	Value	Units	Value	Units	Value	Units		
<b>Pile Demands</b>	Max axial force	-1.64E+01	kips	-7.31E+01	kN	-1.64E+01	kips	0.00%
	Min axial force	-3.06E+01	kips	-1.36E+02	kN	-3.06E+01	kips	0.00%
	Max shear in 2 direction	7.50E+00	kips	3.34E+01	kN	7.50E+00	kips	0.04%
	Min shear in 2 direction	-1.30E+01	kips	-5.77E+01	kN	-1.30E+01	kips	0.00%
	Max shear in 3 direction	1.21E-08	kips	1.48E-08	kN	3.32E-09	kips	0.00%
	Min shear in 3 direction	-7.59E-09	kips	-1.69E-08	kN	-3.79E-09	kips	0.00%
	Max moment about 2 axis	3.85E-08	kip-ft	4.03E-12	kN-m	2.97E-12	kip-ft	0.00%
	Min moment about 2 axis	-1.71E-08	kip-ft	-2.50E-08	kN-m	-1.84E-08	kip-ft	0.00%
	Max moment about 3 axis	7.13E-09	kip-ft	9.71E-09	kN-m	7.16E-09	kip-ft	0.00%
	Min moment about 3 axis	-8.11E+01	kip-ft	-1.10E+02	kN-m	-8.12E+01	kip-ft	0.00%
	Max torsional force	1.29E-08	kip-ft	2.27E-08	kN-m	1.67E-08	kip-ft	0.00%
	Min torsional force	-1.29E-08	kip-ft	-2.27E-08	kN-m	-1.67E-08	kip-ft	0.00%
Max demand/capacity ratio	1.35E-01	-	1.35E-01	-	1.35E-01	-	0.03%	
<b>Soil Demands</b>	Max Zp soil force	1.70E+01	kips	7.56E+01	kN	1.70E+01	kips	0.05%
	Min Zp soil force	2.74E-05	kips	8.39E-07	kN	1.89E-07	kips	0.00%
	Max Xp soil force	2.76E+00	kips	1.23E+01	kN	2.76E+00	kips	0.02%
	Min Xp soil force	-3.98E+00	kips	-1.77E+01	kN	-3.98E+00	kips	0.00%
	Max Yp soil force	2.63E-09	kips	4.16E-09	kN	9.35E-10	kips	0.00%
	Min Yp soil force	-2.53E-09	kips	-4.91E-09	kN	-1.10E-09	kips	0.00%
	Max torsional soil force	-2.48E-10	kip-ft	-4.36E-10	kN-m	-3.22E-10	kip-ft	0.00%
<b>Pile Displacements</b>	Max Z displacement	3.96E-02	in.	1.01E-03	m	3.97E-02	in.	0.07%
	Min Z displacement	3.85E-02	in.	9.79E-04	m	3.86E-02	in.	0.07%
	Max X displacement	1.49E-01	in.	3.79E-03	m	1.49E-01	in.	0.04%
	Max Y displacement	3.46E-11	in.	1.18E-12	m	4.64E-11	in.	0.00%
	Min Y displacement	-1.21E-10	in.	-3.61E-13	m	-1.42E-11	in.	0.00%
	<b>Column Demands</b>	Max axial force	-6.87E-13	kips	-1.60E-12	kN	-3.59E-13	kips
Min axial force		-4.36E+00	kips	-1.94E+01	kN	-4.36E+00	kips	0.00%
Max shear in 2 direction		7.79E+00	kips	3.47E+01	kN	7.79E+00	kips	0.00%
Min shear in 2 direction		1.64E-11	kips	-4.34E-11	kN	-9.75E-12	kips	0.00%
Max shear in 3 direction		4.59E-12	kips	2.86E-11	kN	6.42E-12	kips	0.00%
Min shear in 3 direction		-2.93E-12	kips	-1.24E-10	kN	-2.79E-11	kips	0.00%
Max moment about 2 axis		1.28E-11	kip-ft	4.99E-11	kN-m	3.68E-11	kip-ft	0.00%
Min moment about 2 axis		-4.48E-12	kip-ft	-7.81E-14	kN-m	-5.76E-14	kip-ft	0.00%
Max moment about 3 axis		7.99E-12	kip-ft	-7.22E-12	kN-m	-5.33E-12	kip-ft	0.00%
Min moment about 3 axis		-5.66E+01	kip-ft	-7.68E+01	kN-m	-5.66E+01	kip-ft	0.00%
Max torsional force		0.00E+00	kip-ft	3.34E-23	kN-m	2.46E-23	kip-ft	0.00%
Min torsional force	0.00E+00	kip-ft	-3.34E-23	kN-m	-2.46E-23	kip-ft	0.00%	

Table 6.1 – Comparison of Max/Min Results Between English and SI Units for Example 6

# Results from FB-MultiPier Output File (USC\_Example\_06.out, SI\_Example\_06.out):

* SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *						* SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *					
<b>File demands</b>						<b>File demands</b>					
Demand type	Value	Unit	Load case	Load comb.	File	Demand type	Value	Unit	Load case	Load comb.	File
Max axial force (tension is +)	-1.6436E+01	kips	1	0	1	Max axial force (tension is +)	-7.3149E+01	kN	1	0	1
Min axial force	-3.0567E+01	kips	1	0	1	Min axial force	-1.3599E+02	kN	1	0	1
Max shear in 2 direction	7.4994E+00	kips	1	0	1	Max shear in 2 direction	3.3373E+01	kN	1	0	1
Min shear in 2 direction	-1.2974E+01	kips	1	0	1	Min shear in 2 direction	-5.7725E+01	kN	1	0	1
Max shear in 3 direction	1.2074E+08	kips	1	0	1	Max shear in 3 direction	1.4765E+08	kN	1	0	1
Min shear in 3 direction	-7.5850E-09	kips	1	0	1	Min shear in 3 direction	-1.6863E-08	kN	1	0	1
Max moment about 2 axis	3.8493E-08	kip-ft	1	0	1	Max moment about 2 axis	4.0303E-12	kN-m	1	0	1
Min moment about 2 axis	-1.7056E-08	kip-ft	1	0	1	Min moment about 2 axis	-2.4983E-08	kN-m	1	0	1
Max moment about 3 axis	7.1348E-09	kip-ft	1	0	1	Max moment about 3 axis	9.7085E-09	kN-m	1	0	1
Min moment about 3 axis	-8.1136E+01	kip-ft	1	0	1	Min moment about 3 axis	-1.1004E+02	kN-m	1	0	1
Max torsional force	1.2891E-08	kip-ft	1	0	1	Max torsional force	2.2656E-08	kN-m	1	0	1
Min torsional force	-1.2891E-08	kip-ft	1	0	1	Min torsional force	-2.2656E-08	kN-m	1	0	1
Max demand/capacity ratio	1.3506E-01		1	0	1	Max demand/capacity ratio	1.3510E-01		1	0	1
<b>Soil demands</b>						<b>Soil demands</b>					
Demand type	Value	Unit	Load case	Load comb.	File	Demand type	Value	Unit	Load case	Load comb.	File
Max Zp soil force	1.6982E+01	kips	1	0	1	Max Zp soil force	7.5576E+01	kN	1	0	1
Min Zp soil force	2.7414E+05	kips	1	0	1	Min Zp soil force	8.3869E+07	kN	1	0	1
Max Xp soil force	2.7587E+00	kips	1	0	1	Max Xp soil force	1.2274E+01	kN	1	0	1
Min Xp soil force	-3.9774E+00	kips	1	0	1	Min Xp soil force	-1.7688E+01	kN	1	0	1
Max Yp soil force	2.6313E-09	kips	1	0	1	Max Yp soil force	4.1584E-09	kN	1	0	1
Min Yp soil force	-2.5323E-09	kips	1	0	1	Min Yp soil force	-4.9061E-09	kN	1	0	1
Max torsional soil force	-2.4809E-10	kip-ft	1	0	1	Max torsional soil force	-4.3603E-10	kN-m	1	0	1
<b>File displacements</b>						<b>File displacements</b>					
Displacement type	Value	Unit	Load case	Load comb.	File	Displacement type	Value	Unit	Load case	Load comb.	File
Max Z displacement	3.9643E-02	in	1	0	1	Max Z displacement	1.0076E-03	m	1	0	1
Min Z displacement	3.8524E-02	in	1	0	1	Min Z displacement	9.7918E-04	m	1	0	1
Max X displacement	1.4897E-01	in	1	0	1	Max X displacement	3.7852E-03	m	1	0	1
Min X displacement	-4.9693E-02	in	1	0	1	Min X displacement	-1.2634E-03	m	1	0	1
Max Y displacement	3.4584E-11	in	1	0	1	Max Y displacement	1.1790E-12	m	1	0	1
Min Y displacement	-1.2073E-10	in	1	0	1	Min Y displacement	-3.6121E-13	m	1	0	1
<b>Column demands</b>						<b>Column demands</b>					
Demand type	Value	Unit	Load case	Load comb.	Col.	Demand type	Value	Unit	Load case	Load comb.	Col.
Max axial force	-6.8678E-13	kips	1	0	1	Max axial force	-1.5959E-12	kN	1	0	1
Min axial force	-4.3566E+00	kips	1	0	1	Min axial force	-1.9379E+01	kN	1	0	1
Max shear in 2 direction	7.7946E+00	kips	1	0	1	Max shear in 2 direction	3.4672E+01	kN	1	0	1
Min shear in 2 direction	1.6435E-11	kips	1	0	1	Min shear in 2 direction	-4.3351E-11	kN	1	0	1
Max shear in 3 direction	4.5918E-12	kips	1	0	1	Max shear in 3 direction	2.8577E-11	kN	1	0	1
Min shear in 3 direction	-2.9279E-12	kips	1	0	1	Min shear in 3 direction	-1.2394E-10	kN	1	0	1
Max moment about 2 axis	1.2801E-11	kip-ft	1	0	1	Max moment about 2 axis	4.9910E-11	kN-m	1	0	1
Min moment about 2 axis	-4.4799E-12	kip-ft	1	0	1	Min moment about 2 axis	-7.8142E-14	kN-m	1	0	1
Max moment about 3 axis	7.9922E-12	kip-ft	1	0	1	Max moment about 3 axis	-7.2247E-12	kN-m	1	0	1
Min moment about 3 axis	-5.6612E+01	kip-ft	1	0	1	Min moment about 3 axis	-7.6785E+01	kN-m	1	0	1
Max torsional force	0.0000E+00	kip-ft	1	0	1	Max torsional force	3.3382E-23	kN-m	1	0	1
Min torsional force	0.0000E+00	kip-ft	1	0	1	Min torsional force	-3.3382E-23	kN-m	1	0	1
<b>Pier cap demands</b>						<b>Pier cap demands</b>					
Demand type	Value	Unit	Load case	Load comb.		Demand type	Value	Unit	Load case	Load comb.	
Max axial force	0.0000E+00	kips	0	0		Max axial force	0.0000E+00	kN	0	0	
Min axial force	0.0000E+00	kips	0	0		Min axial force	0.0000E+00	kN	0	0	
Max shear in 2 direction	0.0000E+00	kips	0	0		Max shear in 2 direction	0.0000E+00	kN	0	0	
Min shear in 2 direction	0.0000E+00	kips	0	0		Min shear in 2 direction	0.0000E+00	kN	0	0	
Max shear in 3 direction	0.0000E+00	kips	0	0		Max shear in 3 direction	0.0000E+00	kN	0	0	
Min shear in 3 direction	0.0000E+00	kips	0	0		Min shear in 3 direction	0.0000E+00	kN	0	0	
Max moment about 2 axis	0.0000E+00	kip-ft	0	0		Max moment about 2 axis	0.0000E+00	kN-m	0	0	
Min moment about 2 axis	0.0000E+00	kip-ft	0	0		Min moment about 2 axis	0.0000E+00	kN-m	0	0	
Max moment about 3 axis	0.0000E+00	kip-ft	0	0		Max moment about 3 axis	0.0000E+00	kN-m	0	0	
Min moment about 3 axis	0.0000E+00	kip-ft	0	0		Min moment about 3 axis	0.0000E+00	kN-m	0	0	
Max torsional force	0.0000E+00	kip-ft	0	0		Max torsional force	0.0000E+00	kN-m	0	0	
Min torsional force	0.0000E+00	kip-ft	0	0		Min torsional force	0.0000E+00	kN-m	0	0	

English

SI

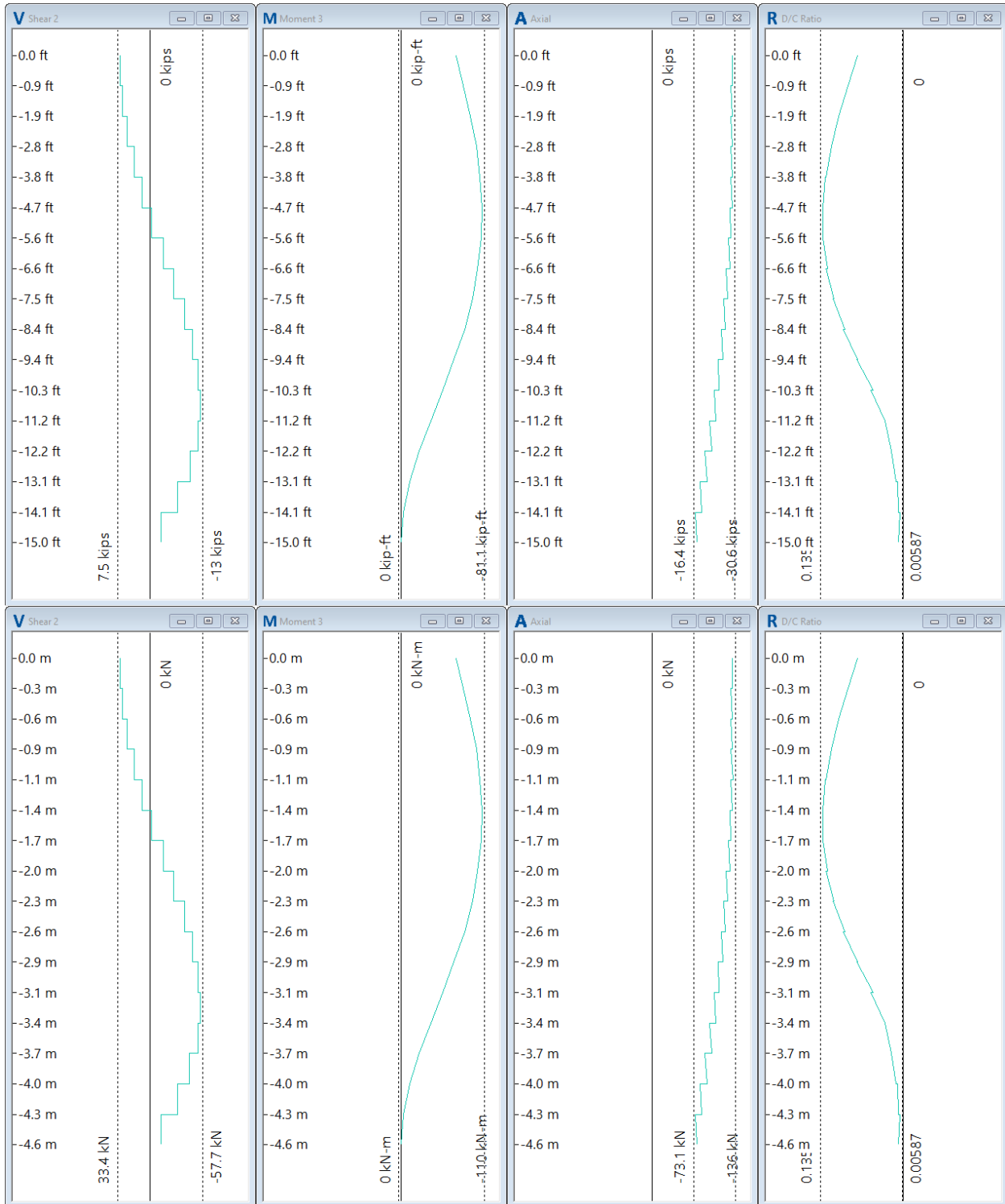


Figure 6.1 – Comparison of Pile Result Plots Between English (Top) and SI Units (Bottom) for Example 6

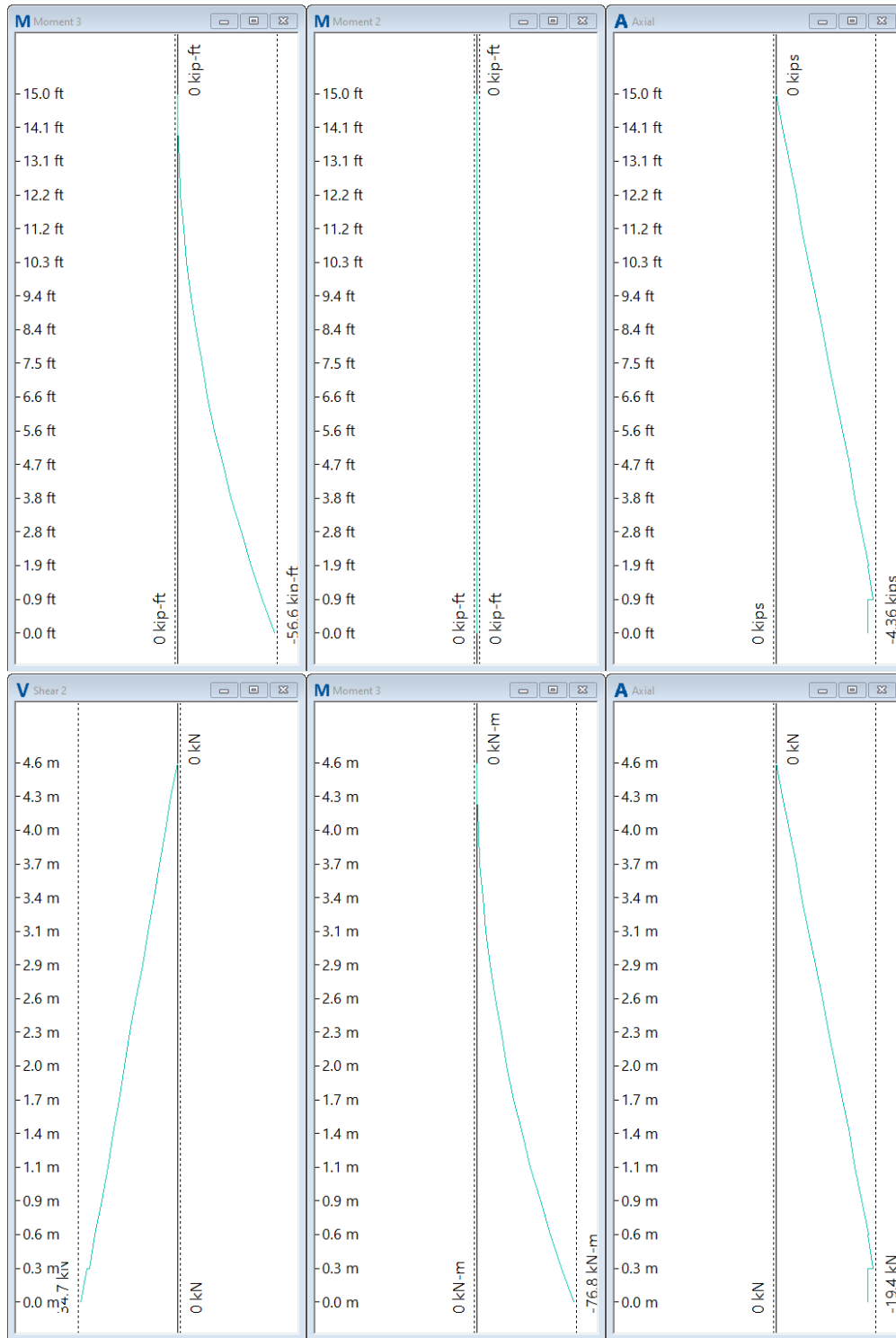
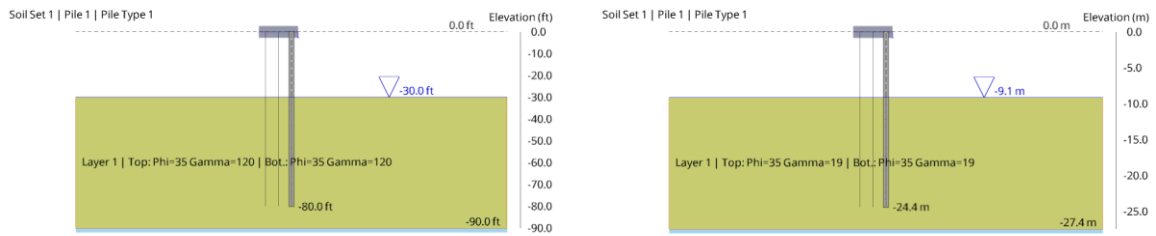


Figure 6.2 – Comparison of Wall Structure Result Plots Between English (Top) and SI Units (Bottom) for Example 6

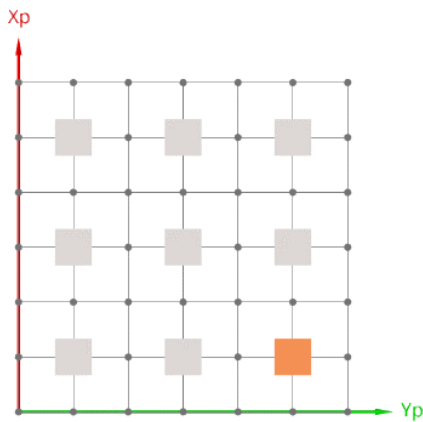
## Example 7: Stiffness

**Problem Description:** Compare the FB-MultiPier output for a stiffness model in English and Metric units. Also compare plots of shear, moment, axial force, and demand to capacity ratio.

### Soil Elevation View:



### Pile Plan View:



**File(s):** USC\_Example\_07.in, SI\_Example\_07.in



Substructure 1								
Demand Type	English		SI		SI -> English		% Diff	
	Value	Units	Value	Units	Value	Units		
<b>Pile Demands</b>	<b>Max axial force</b>	-4.61E+00	kips	-2.04E+01	kN	-4.59E+00	kips	0.00%
	<b>Min axial force</b>	-2.63E+02	kips	-1.17E+03	kN	-2.63E+02	kips	0.00%
	<b>Max shear in 2 direction</b>	1.26E+01	kips	5.59E+01	kN	1.26E+01	kips	0.01%
	<b>Min shear in 2 direction</b>	-1.89E+01	kips	-8.31E+01	kN	-1.87E+01	kips	0.00%
	<b>Max shear in 3 direction</b>	1.93E+01	kips	8.49E+01	kN	1.91E+01	kips	1.00%
	<b>Min shear in 3 direction</b>	-1.25E+01	kips	-5.54E+01	kN	-1.25E+01	kips	0.00%
	<b>Max moment about 2 axis</b>	2.52E+02	kip-ft	3.42E+02	kN-m	2.52E+02	kip-ft	0.10%
	<b>Min moment about 2 axis</b>	-2.09E+02	kip-ft	-2.83E+02	kN-m	-2.09E+02	kip-ft	0.00%
	<b>Max moment about 3 axis</b>	2.55E+02	kip-ft	3.46E+02	kN-m	2.55E+02	kip-ft	0.16%
	<b>Min moment about 3 axis</b>	-2.04E+02	kip-ft	-2.76E+02	kN-m	-2.04E+02	kip-ft	0.00%
	<b>Max torsional force</b>	7.45E-01	kip-ft	1.01E+00	kN-m	7.45E-01	kip-ft	0.08%
	<b>Min torsional force</b>	-7.45E-01	kip-ft	-1.01E+00	kN-m	-7.45E-01	kip-ft	0.00%
<b>Max demand/capacity ratio</b>	7.26E-01	-	7.27E-01	-	7.27E-01	-	0.10%	
<b>Soil Demands</b>	<b>Max Zp soil force</b>	3.99E+01	kips	1.78E+02	kN	4.00E+01	kips	0.20%
	<b>Min Zp soil force</b>	1.40E+00	kips	6.20E+00	kN	1.39E+00	kips	0.29%
	<b>Max Xp soil force</b>	1.11E+01	kips	4.98E+01	kN	1.12E+01	kips	0.59%
	<b>Min Xp soil force</b>	-6.89E+00	kips	-3.04E+01	kN	-6.84E+00	kips	0.00%
	<b>Max Yp soil force</b>	1.13E+01	kips	5.07E+01	kN	1.14E+01	kips	0.58%
	<b>Min Yp soil force</b>	-7.04E+00	kips	-3.09E+01	kN	-6.95E+00	kips	0.00%
	<b>Max torsional soil force</b>	1.37E-01	kip-ft	1.86E-01	kN-m	1.37E-01	kip-ft	0.08%
<b>Pile Displacements</b>	<b>Max Z displacement</b>	5.01E-01	in.	1.28E-02	m	5.02E-01	in.	0.20%
	<b>Min Z displacement</b>	4.94E-02	in.	1.25E-03	m	4.92E-02	in.	0.49%
	<b>Max X displacement</b>	1.78E+00	in.	4.54E-02	m	1.79E+00	in.	0.34%
	<b>Min X displacement</b>	-7.72E-03	in.	-1.92E-04	m	-7.57E-03	in.	0.00%
	<b>Max Y displacement</b>	1.83E+00	in.	4.67E-02	m	1.84E+00	in.	0.34%
	<b>Min Y displacement</b>	-7.89E-03	in.	-1.96E-04	m	-7.73E-03	in.	0.00%

Table 7.1 – Comparison of Max/Min Results Between English and SI Units for Example 7

# Results from FB-MultiPier Output File (USC\_Example\_07.out, SI\_Example\_07.out):

```
***** SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *****
*****
File demands
Demand type          Value      Unit  Load case  Load comb.  Pile
Max axial force (tension is +)  -4.6978E+00  kips  1  0  3
Min axial force              -2.6038E+02  kips  1  0  3
Max shear in 2 direction      1.2572E+01  kips  1  0  9
Min shear in 2 direction     -1.8722E+01  kips  1  0  3
Max shear in 3 direction      1.9272E+01  kips  1  0  3
Min shear in 3 direction     -2.2407E+01  kips  1  0  3
Max moment about 2 axis       2.5192E+02  kip-ft  1  0  3
Min moment about 2 axis     -2.8977E+02  kip-ft  1  0  3
Max moment about 3 axis       2.5400E+02  kip-ft  1  0  3
Min moment about 3 axis     -2.4403E+02  kip-ft  1  0  3
Max torsional force           7.4457E+01  kip-ft  1  0  1
Min torsional force         -7.4457E+01  kip-ft  1  0  1
Max demand/capacity ratio     7.4622E-01  1  0  3

Soil demands
Demand type          Value      Unit  Load case  Load comb.  Pile
Max tp soil force          3.9847E+01  kips  1  0  3
Min tp soil force         -1.9372E+00  kips  1  0  7
Max xp soil force          1.1132E+01  kips  1  0  3
Min xp soil force         -6.8882E+00  kips  1  0  3
Max yp soil force          1.1328E+01  kips  1  0  3
Min yp soil force         -7.0771E+00  kips  1  0  3
Max torsional soil force    1.4988E+01  kip-ft  1  0  1

File displacements
Displacement type      Value      Unit  Load case  Load comb.  Pile
Max Z displacement      5.0108E-03  in  1  0  3
Min Z displacement      4.9444E-02  in  1  0  7
Max X displacement      -1.7794E+00  in  1  0  7
Min X displacement      -7.7230E-03  in  1  0  1
Max Y displacement      1.8332E+00  in  1  0  3
Min Y displacement      -7.8678E-03  in  1  0  9

***** Unaveraged Flexibility in FB-MultiPier global coord. system *****
*****
Translations:  in/Rot.  Rotations:  rad/Arc

Delta      Fx          Fy          Fz          Mx          My          Mz
Delta 1.67843427E-02  3.52000239E-04  1.67849318E-02  6.06881322E-05  1.28328330E-05  -1.28179787E-05  5.16136775E-08
Delta 3.52000239E-04  1.67849318E-02  6.06881322E-05  1.28328330E-05  -1.28179787E-05  5.16136775E-08
Delta 5.50303714E-05  6.06881322E-05  1.81406932E-04  1.93234688E-07  -1.44689208E-07  -5.21824402E-10
Theta 6.95041884E-08  1.28328330E-05  1.53234688E-07  4.92229937E-08  -1.86123658E-10  -5.21244600E-10
Theta -1.28179787E-05  -6.6317236E-08  -1.24689208E-07  -1.86123658E-10  4.91933558E-08  -4.90390578E-10
Theta 5.16136775E-08  -6.6807833E-08  -1.18654028E-10  -5.21244600E-10  -4.90390578E-10  5.06324783E-08

***** Averaged Flexibility in FB-MultiPier global coord. system *****
*****
Translations:  in/Rot.  Rotations:  rad/Arc

Delta      Fx          Fy          Fz          Mx          My          Mz
Delta 1.67843427E-02  3.52000239E-04  1.67849318E-02  6.06881322E-05  1.28328330E-05  -1.28179787E-05  5.16136775E-08
Delta 3.52000239E-04  1.67849318E-02  6.06881322E-05  1.28328330E-05  -1.28179787E-05  5.16136775E-08
Delta 5.50303714E-05  6.06881322E-05  1.81406932E-04  1.93234688E-07  -1.44689208E-07  -5.21824402E-10
Theta 6.95041884E-08  1.28328330E-05  1.53234688E-07  4.92229937E-08  -1.86123658E-10  -5.21244600E-10
Theta -1.28179787E-05  -6.6317236E-08  -1.24689208E-07  -1.86123658E-10  4.91933558E-08  -4.90390578E-10
Theta 5.16136775E-08  -6.6807833E-08  -1.18654028E-10  -5.21244600E-10  -4.90390578E-10  5.06324783E-08

***** Condensed Stiffness in FB-MultiPier global coord. system *****
*****
Translations:  kip/in  Rotations:  kip-in/rad

Delta      Delta      Delta      Delta      Theta      Theta      Theta
Fx 7.44368749E+01  -1.81505168E+01  -8.19178848E+00  4.65300844E+02  1.93725107E+04  1.13358885E+01
Fy -1.81050168E+00  7.44807564E+01  -8.25251608E+00  -1.93961348E+04  -4.67270644E+02  -7.47535014E+00
Fz -8.19178848E+00  -8.25251608E+00  5.14007888E+03  -1.50148714E+04  2.12657530E+04  2.17851896E+00
Mx 4.65300844E+02  -1.93961348E+04  -5.10148714E+04  2.84207368E+07  1.50311863E+05  2.29281449E+04
My 1.93725107E+04  -4.67270644E+02  1.29637936E+04  1.50311863E+05  2.84116438E+07  2.12726633E+04
Mz 1.13358885E+01  -7.47535014E+00  2.17851896E+00  2.29281449E+04  2.12726633E+04  1.97543826E+06

***** Condensed Stiffness in standard coordinate system *****
*****
(PB-MultiPier -> Standard: X -> X; Y -> Y; Z -> Z)
Translations:  kip/in  Rotations:  kip-in/rad

Delta      Delta      Delta      Delta      Theta      Theta      Theta
Fx 7.44368749E+01  8.19178848E+00  -1.81050168E+00  4.65300844E+02  -1.13358885E+01  1.93725107E+04  8.60981238E+04
Fy -1.81050168E+00  5.40078888E+03  7.44807564E+01  -1.93961348E+04  -2.17851896E+00  -4.67270644E+02  -1.81050168E+00
Fz -8.19178848E+00  -8.25251608E+00  5.14007888E+03  -1.50148714E+04  2.12657530E+04  2.17851896E+00  5.14007888E+03
Mx 4.65300844E+02  -1.93961348E+04  -5.10148714E+04  2.84207368E+07  1.50311863E+05  2.29281449E+04  2.29281449E+04
My 1.93725107E+04  -4.67270644E+02  1.29637936E+04  1.50311863E+05  2.84116438E+07  2.12726633E+04  2.12726633E+04
Mz 1.13358885E+01  -7.47535014E+00  2.17851896E+00  2.29281449E+04  2.12726633E+04  1.97543826E+06  1.97543826E+06

*****
*****
*****
```

English

```
***** SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *****
*****
File demands
Demand type          Value      Unit  Load case  Load comb.  Pile
Max axial force (tension is +)  -2.0418E+01  kN  1  0  3
Min axial force              -1.1698E+03  kN  1  0  3
Max shear in 2 direction      5.0939E+01  kN  1  0  9
Min shear in 2 direction     -8.2082E+01  kN  1  0  3
Max shear in 3 direction      8.4874E+01  kN  1  0  3
Min shear in 3 direction     -2.3298E+01  kN  1  0  1
Max moment about 2 axis       3.4191E+02  kN-m  1  0  3
Min moment about 2 axis     -2.8290E+02  kN-m  1  0  3
Max moment about 3 axis       3.4561E+02  kN-m  1  0  3
Min moment about 3 axis     -2.7447E+02  kN-m  1  0  3
Max torsional force           1.1010E+02  kN-m  1  0  1
Min torsional force         -1.1010E+02  kN-m  1  0  1
Max demand/capacity ratio     7.4622E-01  1  0  3

Soil demands
Demand type          Value      Unit  Load case  Load comb.  Pile
Max tp soil force          1.7804E+02  kN  1  0  3
Min tp soil force         -1.9372E+00  kN  1  0  7
Max xp soil force          4.9811E+01  kN  1  0  3
Min xp soil force         -3.9441E+01  kN  1  0  3
Max yp soil force          5.0681E+01  kN  1  0  3
Min yp soil force         -3.0892E+01  kN  1  0  3
Max torsional soil force    1.8587E+01  kN-m  1  0  1

File displacements
Displacement type      Value      Unit  Load case  Load comb.  Pile
Max Z displacement      1.2730E-02  m  1  0  3
Min Z displacement      1.2498E-03  m  1  0  7
Max X displacement      -4.5311E-02  m  1  0  7
Min X displacement      -1.6233E-04  m  1  0  1
Max Y displacement      4.6732E-02  m  1  0  3
Min Y displacement      -1.9628E-04  m  1  0  9

***** Unaveraged Flexibility in FB-MultiPier global coord. system *****
*****
Translations:  m/Rot.  Rotations:  rad/Arc

Delta      Fx          Fy          Fz          Mx          My          Mz
Delta 5.94476309E-03  2.01005524E-06  3.18222613E-07  1.51820000E-08  -2.87917691E-06  1.07595632E-08
Delta 2.01005524E-06  5.94496398E-03  3.47691484E-07  2.88329257E-06  -1.44209551E-08  -1.66418943E-08
Delta 2.01005524E-06  5.94496398E-03  3.47691484E-07  2.88329257E-06  -1.44209551E-08  -1.66418943E-08
Delta 1.18222613E-07  3.47691484E-07  1.03989354E-06  3.47974748E-08  -3.02020908E-07  -1.78084898E-09  -4.60767049E-09
Theta 1.51820000E-08  2.88329257E-06  3.47974748E-08  4.10202090E-07  -1.78084898E-09  -4.60767049E-09  -4.60767049E-09
Theta -2.87917691E-06  -1.44209551E-08  -3.02020908E-07  -1.78084898E-09  4.10202090E-07  -4.60767049E-09  -4.60767049E-09
Theta 1.07595632E-08  -1.66418943E-08  -1.66829331E-10  -1.66829331E-10  -4.60767049E-09  -4.60767049E-09  4.61339390E-06

***** Averaged Flexibility in FB-MultiPier global coord. system *****
*****
Translations:  m/Rot.  Rotations:  rad/Arc

Delta      Fx          Fy          Fz          Mx          My          Mz
Delta 5.94476309E-03  2.01005524E-06  3.18222613E-07  1.51820000E-08  -2.87917691E-06  1.07595632E-08
Delta 2.01005524E-06  5.94496398E-03  3.47691484E-07  2.88329257E-06  -1.44209551E-08  -1.66418943E-08
Delta 2.01005524E-06  5.94496398E-03  3.47691484E-07  2.88329257E-06  -1.44209551E-08  -1.66418943E-08
Delta 1.18222613E-07  3.47691484E-07  1.03989354E-06  3.47974748E-08  -3.02020908E-07  -1.78084898E-09  -4.60767049E-09
Theta 1.51820000E-08  2.88329257E-06  3.47974748E-08  4.10202090E-07  -1.78084898E-09  -4.60767049E-09  -4.60767049E-09
Theta -2.87917691E-06  -1.44209551E-08  -3.02020908E-07  -1.78084898E-09  4.10202090E-07  -4.60767049E-09  -4.60767049E-09
Theta 1.07595632E-08  -1.66418943E-08  -1.66829331E-10  -1.66829331E-10  -4.60767049E-09  -4.60767049E-09  4.61339390E-06

***** Condensed Stiffness in FB-MultiPier global coord. system *****
*****
Translations:  kN/m  Rotations:  kN-m/rad

Delta      Delta      Delta      Delta      Theta      Theta      Theta
Fx 1.30169592E+04  -3.16833808E+02  -1.43452788E+03  2.07244278E+03  8.60981238E+04  5.27853732E+01
Fy -3.16833808E+02  1.30245913E+04  -1.45786524E+03  -8.42014154E+04  -2.08143333E+03  -3.17401439E+01
Fz -1.43452788E+03  1.45786524E+03  9.10283782E+05  -6.71964450E+04  3.80587038E+04  9.74544545E+00
Mx 2.07244278E+03  -8.42014154E+04  -6.71964450E+04  2.87524206E+06  1.62623606E+04  2.60702248E+03
My 8.60981238E+04  -2.08143333E+03  3.80587038E+04  1.62623606E+04  2.87476182E+06  2.88249488E+03
Mz 5.27853732E+01  -3.17401439E+01  9.74544545E+00  2.60702248E+03  2.88249488E+03  2.31494078E+05

***** Condensed Stiffness in standard coordinate system *****
*****
(PB-MultiPier -> Standard: X -> X; Y -> Y; Z -> Z)
Translations:  kN/m  Rotations:  kN-m/rad

Delta      Delta      Delta      Delta      Theta      Theta      Theta
Fx 1.30169592E+04  1.43452788E+03  -3.16833808E+02  2.07244278E+03  -5.27853732E+01  8.60981238E+04  8.60981238E+04
Fy -3.16833808E+02  9.72263782E+05  1.45786524E+03  -8.42014154E+04  -2.08143333E+03  -3.17401439E+01  -3.17401439E+01
Fz -1.43452788E+03  1.45786524E+03  9.10283782E+05  -6.71964450E+04  3.80587038E+04  9.74544545E+00  9.74544545E+00
Mx 2.07244278E+03  -8.42014154E+04  -6.71964450E+04  2.87524206E+06  1.62623606E+04  2.60702248E+03  2.60702248E+03
My 8.60981238E+04  -2.08143333E+03  3.80587038E+04  1.62623606E+04  2.87476182E+06  2.88249488E+03  2.88249488E+03
Mz 5.27853732E+01  -3.17401439E+01  9.74544545E+00  2.60702248E+03  2.88249488E+03  2.31494078E+05  2.31494078E+05

*****
*****
*****
```

SI

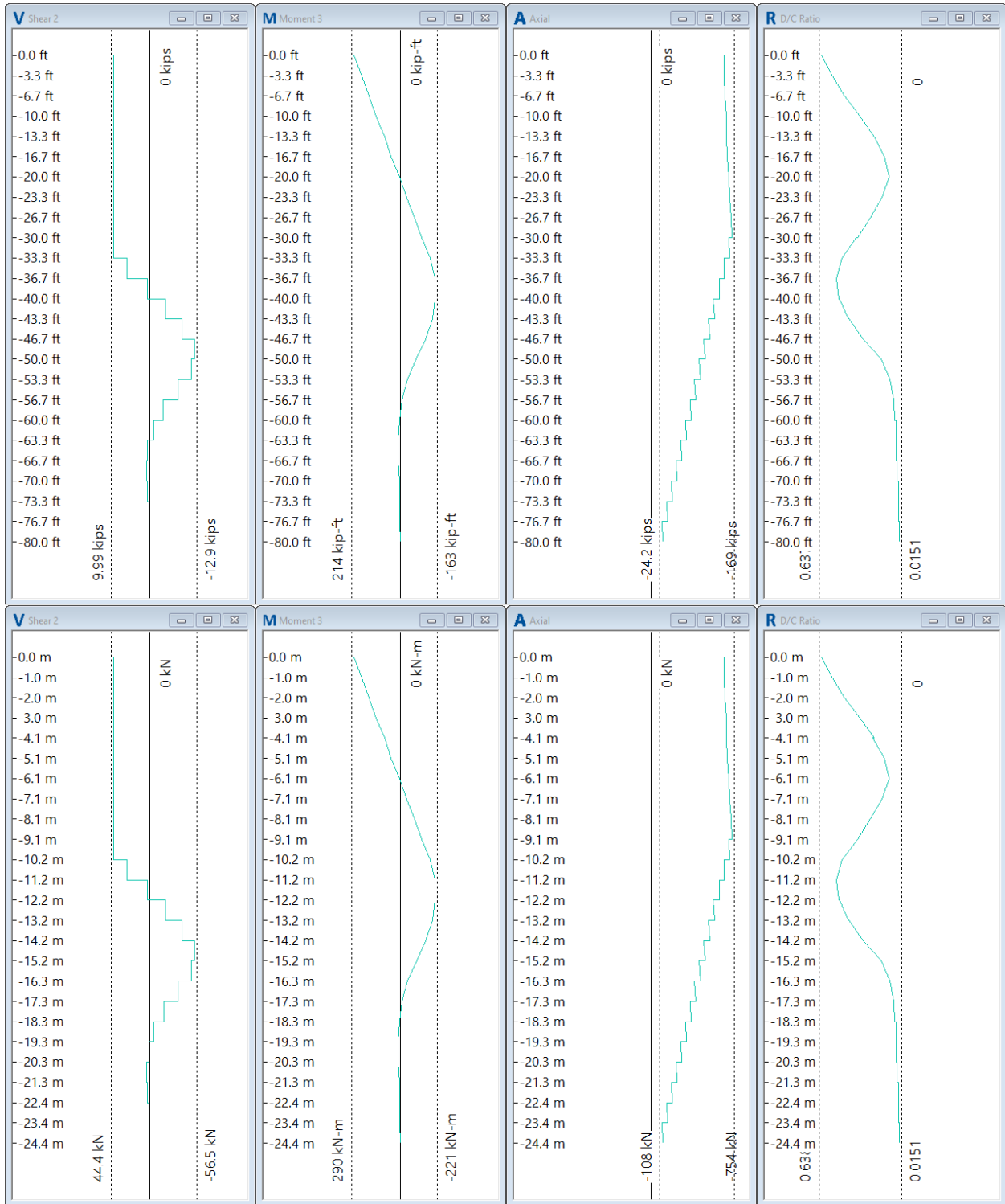
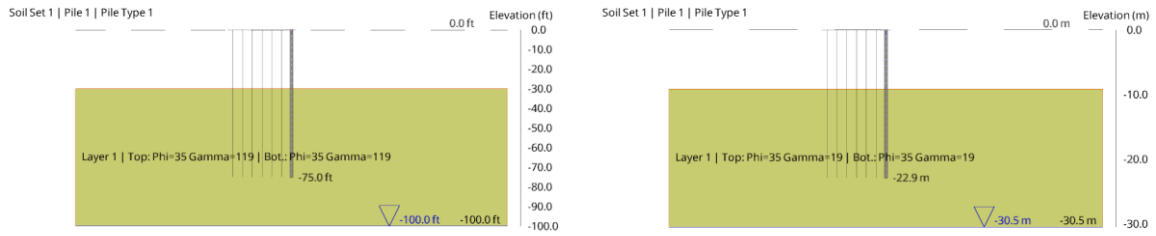


Figure 7.1 – Comparison of Pile Result Plots Between English (Top) and SI Units (Bottom) for Example 7

## Example 8: Pile Bent

**Problem Description:** Compare the FB-MultiPier output for a pile bent in English and Metric units. Also compare plots of shear, moment, axial force, and demand to capacity ratio.

### Soil Elevation View:



### Pile Plan View:



**File(s):** USC\_Example\_08.in, SI\_Example\_08.in

Substructure 1								
Demand Type	English		SI		SI -> English		% Diff	
	Value	Units	Value	Units	Value	Units		
<b>Pile Demands</b>	Max axial force	-9.33E-01	kips	-4.42E+00	kN	-9.94E-01	kips	0.00%
	Min axial force	-4.57E+01	kips	-2.03E+02	kN	-4.56E+01	kips	0.00%
	Max shear in 2 direction	2.07E+00	kips	9.19E+00	kN	2.07E+00	kips	0.10%
	Min shear in 2 direction	-4.13E+00	kips	-1.83E+01	kN	-4.12E+00	kips	0.00%
	Max shear in 3 direction	8.45E-11	kips	7.16E-11	kN	1.61E-11	kips	0.00%
	Min shear in 3 direction	-3.85E-11	kips	-5.96E-11	kN	-1.34E-11	kips	0.00%
	Max moment about 2 axis	3.25E-10	kip-ft	1.28E-10	kN-m	9.44E-11	kip-ft	0.00%
	Min moment about 2 axis	-5.58E-10	kip-ft	-1.55E-10	kN-m	-1.15E-10	kip-ft	0.00%
	Max moment about 3 axis	4.21E+01	kip-ft	5.70E+01	kN-m	4.20E+01	kip-ft	0.10%
	Min moment about 3 axis	-2.77E+01	kip-ft	-3.75E+01	kN-m	-2.77E+01	kip-ft	0.00%
	Max torsional force	2.56E-10	kip-ft	1.48E-10	kN-m	1.09E-10	kip-ft	0.00%
	Min torsional force	-2.56E-10	kip-ft	-1.48E-10	kN-m	-1.09E-10	kip-ft	0.00%
Max demand/capacity ratio	4.61E-01	-	4.60E-01	-	4.60E-01	-	0.10%	
<b>Soil Demands</b>	Max Zp soil force	4.01E+01	kips	1.78E+02	kN	4.01E+01	kips	0.10%
	Min Zp soil force	1.41E-01	kips	6.28E-01	kN	1.41E-01	kips	0.39%
	Max Xp soil force	5.19E+00	kips	2.31E+01	kN	5.18E+00	kips	0.08%
	Min Xp soil force	-2.00E+00	kips	-8.90E+00	kN	-2.00E+00	kips	0.00%
	Max Yp soil force	9.75E-11	kips	7.40E-11	kN	1.66E-11	kips	0.00%
	Min Yp soil force	-4.67E-11	kips	-4.35E-11	kN	-9.78E-12	kips	0.00%
	Max torsional soil force	8.18E-11	kip-ft	4.78E-11	kN-m	3.53E-11	kip-ft	0.00%
<b>Pile Displacements</b>	Max Z displacement	2.71E-01	in.	6.88E-03	m	2.71E-01	in.	0.11%
	Min Z displacement	6.49E-02	in.	1.65E-03	m	6.51E-02	in.	0.38%
	Max X displacement	7.16E-01	in.	1.82E-02	m	7.16E-01	in.	0.04%
	Min X displacement	-3.43E-03	in.	-8.72E-05	m	-3.43E-03	in.	0.00%
	Max Y displacement	2.47E-11	in.	1.08E-13	m	4.25E-12	in.	0.00%
	Min Y displacement	-8.48E-12	in.	-1.12E-15	m	-4.41E-14	in.	0.00%
<b>Bent Cap Demands</b>	Max axial force	2.91E-11	kips	2.33E-10	kN	5.23E-11	kips	0.00%
	Min axial force	-7.95E+00	kips	-3.54E+01	kN	-7.95E+00	kips	0.00%
	Max shear in 2 direction	1.35E+01	kips	6.05E+01	kN	1.36E+01	kips	0.61%
	Min shear in 2 direction	-2.28E+01	kips	-1.02E+02	kN	-2.29E+01	kips	0.00%
	Max shear in 3 direction	2.05E-11	kips	1.99E-20	kN	4.47E-21	kips	0.00%
	Min shear in 3 direction	-1.39E-11	kips	-4.34E-11	kN	-9.75E-12	kips	0.00%
	Max moment about 2 axis	6.52E-10	kip-ft	1.22E-09	kN-m	9.01E-10	kip-ft	0.00%
	Min moment about 2 axis	-9.01E-10	kip-ft	-1.94E-09	kN-m	-1.43E-09	kip-ft	0.00%
	Max moment about 3 axis	4.08E+01	kip-ft	5.52E+01	kN-m	4.07E+01	kip-ft	0.15%
	Min moment about 3 axis	-7.79E+01	kip-ft	-1.06E+02	kN-m	-7.85E+01	kip-ft	0.00%
Max torsional force	7.05E-10	kip-ft	1.13E-10	kN-m	8.32E-11	kip-ft	0.00%	
Min torsional force	-7.05E-10	kip-ft	-1.13E-10	kN-m	-8.32E-11	kip-ft	0.00%	

Table 8.1 – Comparison of Max/Min Results Between English and SI Units for Example 8

# Results from FB-MultiPier Output File (USC\_Example\_08.out, SI\_Example\_08.out):

***** SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *****						***** SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *****					
<b>File demands</b>						<b>File demands</b>					
Demand type	Value	Unit	Load case	Load comb.	File	Demand type	Value	Unit	Load case	Load comb.	File
Max axial force (tension is +)	-9.3343E-01	kips	1	0	4	Max axial force (tension is +)	-4.4195E+00	kN	1	0	4
Min axial force	-4.5667E+01	kips	1	0	7	Min axial force	-2.0290E+02	kN	1	0	7
Max shear in 2 direction	2.0684E+00	kips	1	0	2	Max shear in 2 direction	9.1912E+00	kN	1	0	2
Min shear in 2 direction	-4.1278E+00	kips	1	0	1	Min shear in 2 direction	-1.8348E+01	kN	1	0	1
Max shear in 3 direction	8.4531E-11	kips	1	0	7	Max shear in 3 direction	7.1625E-11	kN	1	0	7
Min shear in 3 direction	-3.8546E-11	kips	1	0	1	Min shear in 3 direction	-5.9628E-11	kN	1	0	1
Max moment about 2 axis	3.2474E-10	kip-ft	1	0	7	Max moment about 2 axis	1.2795E-10	kN-m	1	0	7
Min moment about 2 axis	-5.5771E-10	kip-ft	1	0	7	Min moment about 2 axis	-1.5537E-10	kN-m	1	0	7
Max moment about 3 axis	4.2076E+01	kip-ft	1	0	1	Max moment about 3 axis	5.6988E+01	kN-m	1	0	1
Min moment about 3 axis	-2.7708E+01	kip-ft	1	0	2	Min moment about 3 axis	-3.7538E+01	kN-m	1	0	2
Max torsional force	2.5609E-10	kip-ft	1	0	6	Max torsional force	1.4826E-10	kN-m	1	0	7
Min torsional force	-2.5609E-10	kip-ft	1	0	6	Min torsional force	-1.4826E-10	kN-m	1	0	7
Max demand/capacity ratio	4.6084E-01		1	0	1	Max demand/capacity ratio	4.6037E-01		1	0	1
<b>Soil demands</b>						<b>Soil demands</b>					
Demand type	Value	Unit	Load case	Load comb.	File	Demand type	Value	Unit	Load case	Load comb.	File
Max Zp soil force	4.0122E+01	kips	1	0	7	Max Zp soil force	1.7830E+02	kN	1	0	7
Min Zp soil force	1.4073E-01	kips	1	0	4	Min Zp soil force	6.2842E-01	kN	1	0	4
Max Xp soil force	5.1865E+00	kips	1	0	1	Max Xp soil force	2.3053E+01	kN	1	0	1
Min Xp soil force	-2.0031E+00	kips	1	0	1	Min Xp soil force	-8.9028E+00	kN	1	0	1
Max Yp soil force	9.7545E-11	kips	1	0	7	Max Yp soil force	7.3975E-11	kN	1	0	7
Min Yp soil force	-4.6711E-11	kips	1	0	1	Min Yp soil force	-4.3523E-11	kN	1	0	7
Max torsional soil force	8.1838E-11	kip-ft	1	0	6	Max torsional soil force	4.7794E-11	kN-m	1	0	7
<b>File displacements</b>						<b>File displacements</b>					
Displacement type	Value	Unit	Load case	Load comb.	File	Displacement type	Value	Unit	Load case	Load comb.	File
Max Z displacement	2.7104E-01	in	1	0	7	Max Z displacement	6.8767E-03	m	1	0	7
Min Z displacement	6.4859E-02	in	1	0	4	Min Z displacement	1.6537E-03	m	1	0	4
Max X displacement	7.1585E-01	in	1	0	1	Max X displacement	1.8175E-02	m	1	0	1
Min X displacement	-3.4347E-03	in	1	0	1	Min X displacement	-8.7167E-05	m	1	0	1
Max Y displacement	2.4708E-11	in	1	0	7	Max Y displacement	1.0804E-13	m	1	0	7
Min Y displacement	-8.4785E-12	in	1	0	1	Min Y displacement	-1.1197E-15	m	1	0	4
<b>Bent cap demands</b>						<b>Bent cap demands</b>					
Demand type	Value	Unit	Load case	Load comb.		Demand type	Value	Unit	Load case	Load comb.	
Max axial force	2.9104E-11	kips	1	0		Max axial force	2.3283E-10	kN	1	0	
Min axial force	-7.9454E+00	kips	1	0		Min axial force	-3.5351E+01	kN	1	0	
Max shear in 2 direction	1.3515E+01	kips	1	0		Max shear in 2 direction	6.0487E+01	kN	1	0	
Min shear in 2 direction	-2.2790E+01	kips	1	0		Min shear in 2 direction	-1.0157E+02	kN	1	0	
Max shear in 3 direction	2.0534E-11	kips	1	0		Max shear in 3 direction	1.9905E-20	kN	1	0	
Min shear in 3 direction	-1.3894E-11	kips	1	0		Min shear in 3 direction	-4.3384E-11	kN	1	0	
Max moment about 2 axis	6.5150E-10	kip-ft	1	0		Max moment about 2 axis	1.2221E-09	kN-m	1	0	
Min moment about 2 axis	-9.0081E-10	kip-ft	1	0		Min moment about 2 axis	-1.9389E-09	kN-m	1	0	
Max moment about 3 axis	4.0783E+01	kip-ft	1	0		Max moment about 3 axis	5.5214E+01	kN-m	1	0	
Min moment about 3 axis	-7.7938E+01	kip-ft	1	0		Min moment about 3 axis	-1.0637E+02	kN-m	1	0	
Max torsional force	7.0541E-10	kip-ft	1	0		Max torsional force	1.1285E-10	kN-m	1	0	
Min torsional force	-7.0541E-10	kip-ft	1	0		Min torsional force	-1.1285E-10	kN-m	1	0	

English

SI

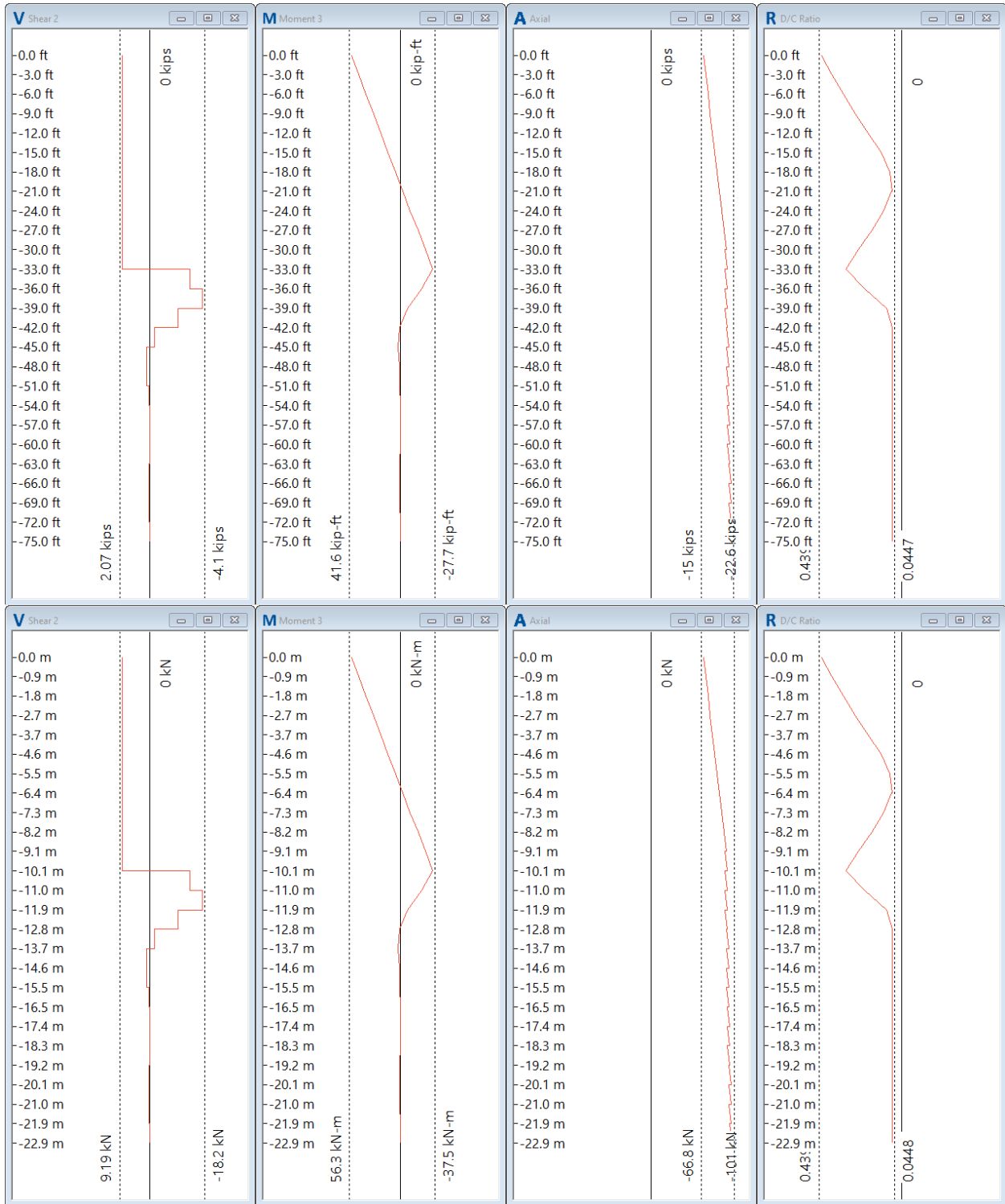
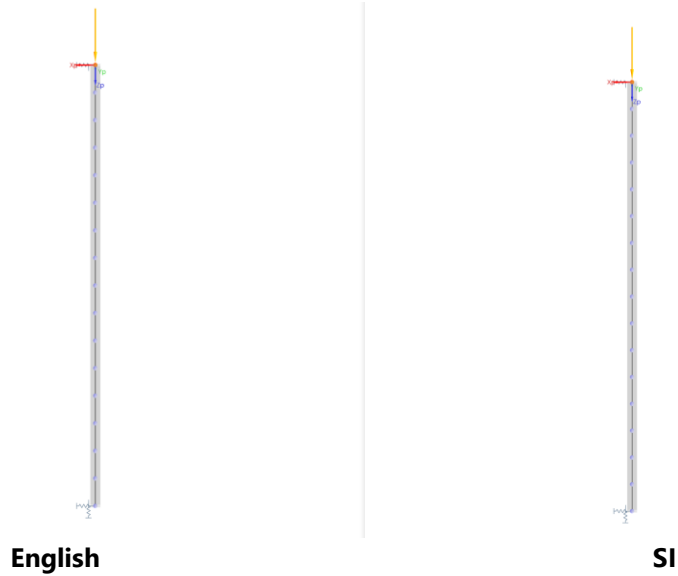


Figure 8.1 – Comparison of Pile Result Plots Between English (Top) and SI Units (Bottom) for Example 8

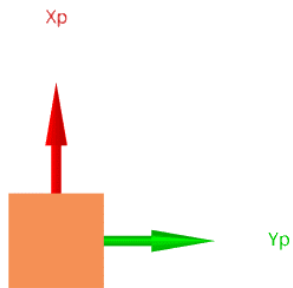
## Example 9: Column

**Problem Description:** Compare the FB-MultiPier output for a column in English and Metric units. Also compare plots of shear, moment, axial force, and demand to capacity ratio.

### Soil Elevation View:



### Pile Plan View:



**File(s):** *USC\_Example\_09.in, SI\_Example\_09.in*



Substructure 1								
Demand Type	English		SI		SI -> English		% Diff	
	Value	Units	Value	Units	Value	Units		
<b>Pile Demands</b>	<b>Max axial force</b>	-9.39E+01	kips	-4.18E+02	kN	-9.39E+01	kips	0.00%
	<b>Min axial force</b>	-1.41E+02	kips	-6.28E+02	kN	-1.41E+02	kips	0.00%
	<b>Max shear in 2 direction</b>	6.12E-02	kips	2.72E-01	kN	6.12E-02	kips	0.00%
	<b>Min shear in 2 direction</b>	-5.31E-14	kips	-1.77E-13	kN	-3.97E-14	kips	0.00%
	<b>Max shear in 3 direction</b>	1.58E-01	kips	7.03E-01	kN	1.58E-01	kips	0.00%
	<b>Min shear in 3 direction</b>	-6.83E-15	kips	-4.76E-14	kN	-1.07E-14	kips	0.00%
	<b>Max moment about 2 axis</b>	2.50E-13	kip-ft	1.92E-13	kN-m	1.41E-13	kip-ft	0.00%
	<b>Min moment about 2 axis</b>	-1.03E+01	kip-ft	-1.39E+01	kN-m	-1.03E+01	kip-ft	0.00%
	<b>Max moment about 3 axis</b>	3.93E+00	kip-ft	5.33E+00	kN-m	3.93E+00	kip-ft	0.00%
	<b>Min moment about 3 axis</b>	-1.79E-13	kip-ft	-7.86E-13	kN-m	-5.80E-13	kip-ft	0.00%
	<b>Max torsional force</b>	0.00E+00	kip-ft	0.00E+00	kN-m	0.00E+00	kip-ft	0.00%
	<b>Min torsional force</b>	0.00E+00	kip-ft	0.00E+00	kN-m	0.00E+00	kip-ft	0.00%
<b>Max demand/capacity ratio</b>	1.51E-01	-	1.51E-01	-	1.51E-01	-	0.00%	
<b>Pile Displacements</b>	<b>Max Z displacement</b>	7.16E-02	in.	1.82E-03	m	7.16E-02	in.	0.00%
	<b>Min Z displacement</b>	1.17E-14	in.	2.96E-16	m	1.16E-14	in.	0.00%
	<b>Max X displacement</b>	6.07E-02	in.	1.54E-03	m	6.07E-02	in.	0.00%
	<b>Min X displacement</b>	-5.82E-18	in.	-2.02E-16	m	-7.94E-15	in.	0.00%
	<b>Max Y displacement</b>	6.49E-15	in.	6.02E-17	m	2.37E-15	in.	0.00%
	<b>Min Y displacement</b>	-1.56E-01	in.	-3.96E-03	m	-1.56E-01	in.	0.00%

*Table 9.1 – Comparison of Max/Min Results Between English and SI Units for Example 9*

## Results from FB-MultiPier Output File (USC\_Example\_09.out, SI\_Example\_09.out):

***** * SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *							***** * SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *						
Column demands							Column demands						
Demand type	Value	Unit	Load case	Load comb.	Col.		Demand type	Value	Unit	Load case	Load comb.	Col.	
Max axial force (tension is +)	-9.3907E+01	kips	2	0	1		Max axial force (tension is +)	-4.1772E+02	kN	2	0	1	
Min axial force	-1.4120E+02	kips	1	0	1		Min axial force	-6.2809E+02	kN	1	0	1	
Max shear in 2 direction	6.1231E-02	kips	2	0	1		Max shear in 2 direction	2.7236E-01	kN	2	0	1	
Min shear in 2 direction	-5.3104E-14	kips	1	0	1		Min shear in 2 direction	-1.7651E-13	kN	1	0	1	
Max shear in 3 direction	1.5812E-01	kips	2	0	1		Max shear in 3 direction	7.0337E-01	kN	2	0	1	
Min shear in 3 direction	-6.8265E-15	kips	1	0	1		Min shear in 3 direction	-4.7578E-14	kN	1	0	1	
Max moment about 2 axis	2.4982E-13	kip-ft	1	0	1		Max moment about 2 axis	1.9163E-13	kN-m	1	0	1	
Min moment about 2 axis	-1.0268E+01	kip-ft	2	0	1		Min moment about 2 axis	-1.3921E+01	kN-m	2	0	1	
Max moment about 3 axis	3.9347E+00	kip-ft	2	0	1		Max moment about 3 axis	5.3347E+00	kN-m	2	0	1	
Min moment about 3 axis	-1.7933E-13	kip-ft	1	0	1		Min moment about 3 axis	-7.8643E-13	kN-m	1	0	1	
Max torsional force	0.0000E+00	kip-ft	1	0	1		Max torsional force	0.0000E+00	kN-m	1	0	1	
Min torsional force	0.0000E+00	kip-ft	1	0	1		Min torsional force	0.0000E+00	kN-m	1	0	1	
Max demand/capacity ratio	1.5135E-01		1	0	1		Max demand/capacity ratio	1.5135E-01		1	0	1	
Column displacements							Column displacements						
Displacement type	Value	Unit	Load case	Load comb.	Col.		Displacement type	Value	Unit	Load case	Load comb.	Col.	
Max Z displacement	7.1555E-02	in	1	0	1		Max Z displacement	1.8175E-03	m	1	0	1	
Min Z displacement	1.1650E-14	in	2	0	1		Min Z displacement	2.9591E-16	m	2	0	1	
Max X displacement	6.0713E-02	in	2	0	1		Max X displacement	1.5421E-03	m	2	0	1	
Min X displacement	-5.8245E-18	in	2	0	1		Min X displacement	-2.0162E-16	m	1	0	1	
Max Y displacement	6.4937E-15	in	1	0	1		Max Y displacement	6.0177E-17	m	1	0	1	
Min Y displacement	-1.5583E-01	in	2	0	1		Min Y displacement	-3.9580E-03	m	2	0	1	

**English**

**SI**

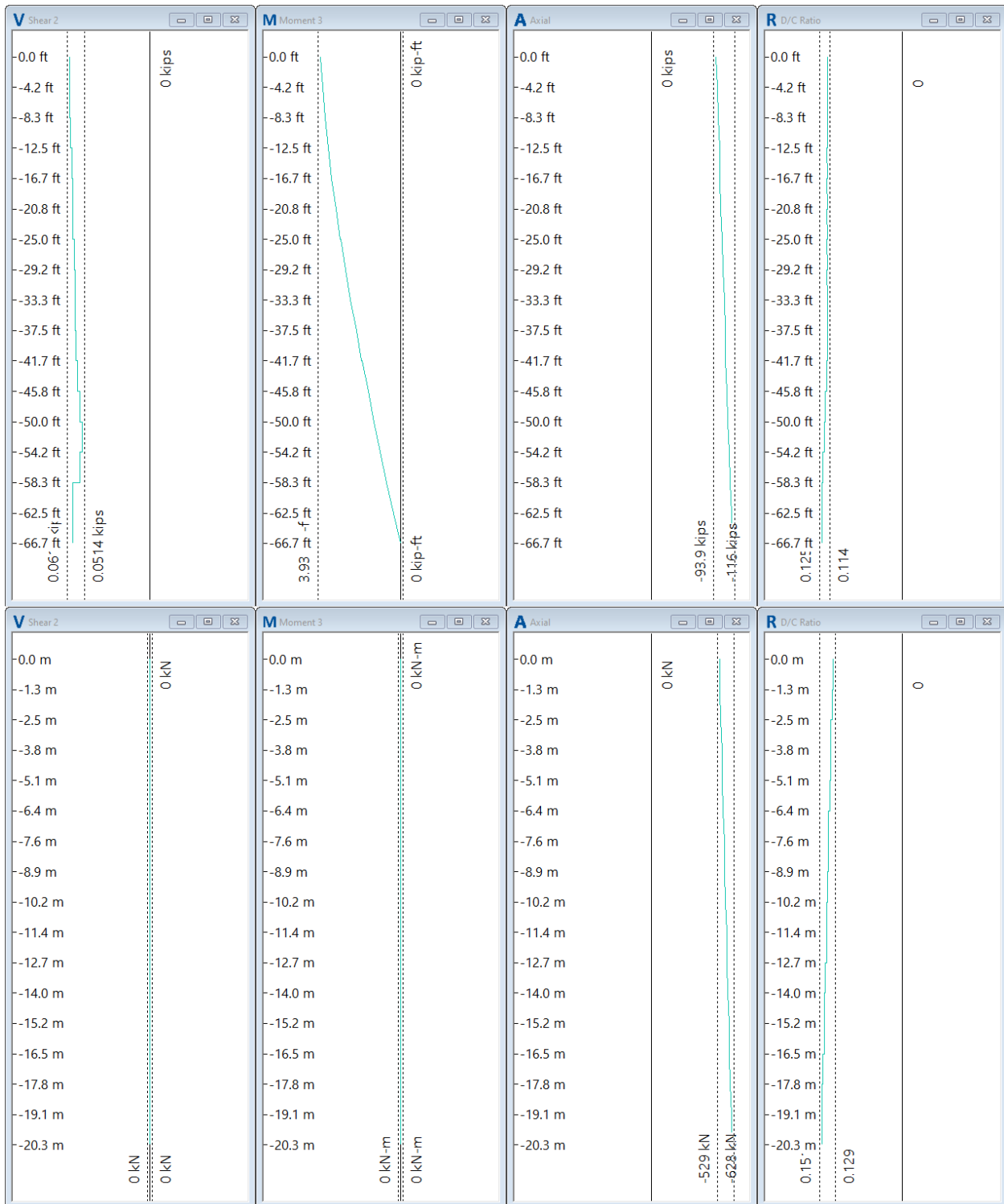
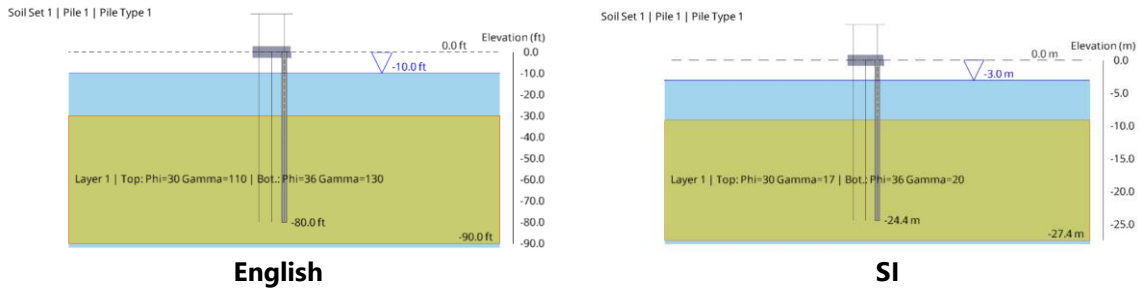


Figure 9.1 – Comparison of Pile Result Plots Between English (Top) and SI Units (Bottom) for Example 9

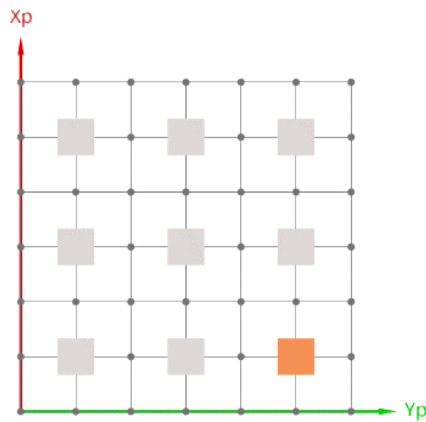
## Example 10: Bridge

**Problem Description:** Compare the FB-MultiPier output for a bridge in English and Metric units. Also compare plots of shear, moment, axial force, and demand to capacity ratio.

### Soil Elevation View (Typical):



### Pile Plan View (Typical):



**File(s):** USC\_Example\_10.in, SI\_Example\_10.in

Substructure 2								
Demand Type	English		SI		SI -> English		% Diff	
	Value	Units	Value	Units	Value	Units		
<b>Pile Demands</b>	Max axial force	-2.73E+01	kips	-1.21E+02	kN	-2.73E+01	kips	0.00%
	Min axial force	-1.51E+02	kips	-6.68E+02	kN	-1.50E+02	kips	0.00%
	Max shear in 2 direction	6.45E-02	kips	2.84E-01	kN	6.38E-02	kips	1.07%
	Min shear in 2 direction	-6.45E-02	kips	-2.84E-01	kN	-6.38E-02	kips	0.00%
	Max shear in 3 direction	1.08E-01	kips	4.73E-01	kN	1.06E-01	kips	1.05%
	Min shear in 3 direction	-1.08E-01	kips	-4.73E-01	kN	-1.06E-01	kips	0.00%
	Max moment about 2 axis	3.04E+00	kip-ft	4.08E+00	kN-m	3.01E+00	kip-ft	1.04%
	Min moment about 2 axis	-3.04E+00	kip-ft	-4.08E+00	kN-m	-3.01E+00	kip-ft	0.00%
	Max moment about 3 axis	1.82E+00	kip-ft	2.45E+00	kN-m	1.80E+00	kip-ft	1.07%
	Min moment about 3 axis	-1.82E+00	kip-ft	-2.45E+00	kN-m	-1.80E+00	kip-ft	0.00%
	Max torsional force	2.95E-03	kip-ft	3.98E-03	kN-m	2.94E-03	kip-ft	0.34%
	Min torsional force	-2.95E-03	kip-ft	-3.98E-03	kN-m	-2.94E-03	kip-ft	0.00%
Max demand/capacity ratio	9.03E-02	-	8.96E-02	-	8.96E-02	-	0.80%	
<b>Soil Demands</b>	Max Zp soil force	2.87E+01	kips	1.30E+02	kN	2.91E+01	kips	1.40%
	Min Zp soil force	3.11E+00	kips	1.41E+01	kN	3.17E+00	kips	1.64%
	Max Xp soil force	3.63E-02	kips	1.60E-01	kN	3.59E-02	kips	1.09%
	Min Xp soil force	-3.63E-02	kips	-1.60E-01	kN	-3.59E-02	kips	0.00%
	Max Yp soil force	6.05E-02	kips	2.66E-01	kN	5.98E-02	kips	1.05%
	Min Yp soil force	-6.05E-02	kips	-2.66E-01	kN	-5.98E-02	kips	0.00%
	Max torsional soil force	4.31E-04	kip-ft	5.84E-04	kN-m	4.31E-04	kip-ft	0.00%
<b>Pile Displacements</b>	Max Z displacement	2.12E-01	in.	5.48E-03	m	2.16E-01	in.	1.77%
	Min Z displacement	1.68E-01	in.	4.36E-03	m	1.72E-01	in.	2.42%
	Max X displacement	1.74E-03	in.	4.36E-05	m	1.72E-03	in.	1.11%
	Min X displacement	-1.74E-03	in.	-4.36E-05	m	-1.72E-03	in.	0.00%
	Max Y displacement	2.89E-03	in.	7.25E-05	m	2.86E-03	in.	1.05%
	Min Y displacement	-2.89E-03	in.	-7.25E-05	m	-2.86E-03	in.	0.00%
<b>Column Demands</b>	Max axial force	-4.72E+02	kips	-2.08E+03	kN	-4.67E+02	kips	0.00%
	Min axial force	-4.90E+02	kips	-2.16E+03	kN	-4.85E+02	kips	0.00%
	Max shear in 2 direction	1.30E+01	kips	5.76E+01	kN	1.29E+01	kips	0.26%
	Min shear in 2 direction	-1.30E+01	kips	-5.76E+01	kN	-1.29E+01	kips	0.00%
	Max shear in 3 direction	1.25E-10	kips	3.26E-06	kN	7.32E-07	kips	0.00%
	Min shear in 3 direction	-5.24E-10	kips	-3.05E-06	kN	-6.86E-07	kips	0.00%
	Max moment about 2 axis	4.83E-08	kip-ft	5.34E-06	kN-m	3.94E-06	kip-ft	0.00%
	Min moment about 2 axis	3.69E-08	kip-ft	-1.25E-05	kN-m	-9.22E-06	kip-ft	0.00%
	Max moment about 3 axis	1.43E+02	kip-ft	1.93E+02	kN-m	1.42E+02	kip-ft	0.11%
	Min moment about 3 axis	-1.43E+02	kip-ft	-1.93E+02	kN-m	-1.42E+02	kip-ft	0.00%
	Max torsional force	3.44E-09	kip-ft	2.76E-06	kN-m	2.03E-06	kip-ft	0.00%
Min torsional force	-3.44E-09	kip-ft	-2.76E-06	kN-m	-2.03E-06	kip-ft	0.00%	
<b>Pier Cap Demands</b>	Max axial force	5.56E-01	kips	2.50E+00	kN	5.62E-01	kips	1.18%
	Min axial force	-1.26E-10	kips	-1.64E-10	kN	-3.69E-11	kips	0.00%
	Max shear in 2 direction	1.05E+02	kips	4.69E+02	kN	1.05E+02	kips	0.00%
	Min shear in 2 direction	-1.05E+02	kips	-4.69E+02	kN	-1.05E+02	kips	0.00%
	Max shear in 3 direction	1.20E-10	kips	3.99E-10	kN	8.98E-11	kips	0.00%
	Min shear in 3 direction	-2.30E-11	kips	-2.08E-07	kN	-4.69E-08	kips	0.00%
	Max moment about 2 axis	3.71E-10	kip-ft	3.76E-07	kN-m	2.77E-07	kip-ft	0.00%
	Min moment about 2 axis	-2.63E-10	kip-ft	-3.86E-07	kN-m	-2.85E-07	kip-ft	0.00%
	Max moment about 3 axis	5.65E+01	kip-ft	7.68E+01	kN-m	5.66E+01	kip-ft	0.19%
	Min moment about 3 axis	-4.11E+02	kip-ft	-5.57E+02	kN-m	-4.11E+02	kip-ft	0.00%
	Max torsional force	4.68E-11	kip-ft	7.51E-08	kN-m	5.54E-08	kip-ft	0.00%
Min torsional force	-4.68E-11	kip-ft	-7.51E-08	kN-m	-5.54E-08	kip-ft	0.00%	

Table 10.1 – Comparison of Pier 2 Max/Min Results Between English and SI Units for Example 10

## Pier 2 Results from FB-MultiPier Output File (USC\_Example\_10.out, SI\_Example\_10.out):

* SUBSTRUCTURE 2 MAX/MIN RESPONSES FOR ALL LOAD CASES *							* SUBSTRUCTURE 2 MAX/MIN RESPONSES FOR ALL LOAD CASES *						
<b>File demands</b>							<b>File demands</b>						
Demand type	Value	Unit	Load case	Load comb.	File		Demand type	Value	Unit	Load case	Load comb.	File	
Max axial force (tension is +)	-2.7292E+01	kips	1	0	8		Max axial force (tension is +)	-1.2146E+02	kN	1	0	8	
Min axial force	-1.5142E+02	kips	1	0	4		Min axial force	-6.6821E+02	kN	1	0	4	
Max shear in 2 direction	6.4489E-02	kips	1	0	4		Max shear in 2 direction	2.8380E-01	kN	1	0	4	
Min shear in 2 direction	-6.4489E-02	kips	1	0	6		Min shear in 2 direction	-2.8379E-01	kN	1	0	6	
Max shear in 3 direction	1.0755E-01	kips	1	0	9		Max shear in 3 direction	4.7341E-01	kN	1	0	7	
Min shear in 3 direction	-1.0755E-01	kips	1	0	1		Min shear in 3 direction	-4.7341E-01	kN	1	0	1	
Max moment about 2 axis	3.0440E+00	kip-ft	1	0	1		Max moment about 2 axis	4.0844E+00	kN-m	1	0	1	
Min moment about 2 axis	-3.0440E+00	kip-ft	1	0	7		Min moment about 2 axis	-4.0844E+00	kN-m	1	0	7	
Max moment about 3 axis	1.8240E+00	kip-ft	1	0	4		Max moment about 3 axis	2.4468E+00	kN-m	1	0	4	
Min moment about 3 axis	-1.8240E+00	kip-ft	1	0	6		Min moment about 3 axis	-2.4465E+00	kN-m	1	0	6	
Max torsional force	2.9491E-03	kip-ft	1	0	7		Max torsional force	2.6621E-02	kN-m	1	0	1	
Min torsional force	-2.9491E-03	kip-ft	1	0	7		Min torsional force	-3.9848E-03	kN-m	1	0	1	
Max demand/capacity ratio	9.0277E-02		1	0	4		Max demand/capacity ratio	8.9559E-02		1	0	4	
<b>Soil demands</b>							<b>Soil demands</b>						
Demand type	Value	Unit	Load case	Load comb.	File		Demand type	Value	Unit	Load case	Load comb.	File	
Max Zp soil force	2.8774E+01	kips	1	0	4		Max Zp soil force	1.2966E+02	kN	1	0	4	
Min Zp soil force	3.1141E+00	kips	1	0	8		Min Zp soil force	1.4081E+01	kN	1	0	8	
Max Xp soil force	3.6305E-02	kips	1	0	4		Max Xp soil force	1.5974E-01	kN	1	0	4	
Min Xp soil force	-3.6305E-02	kips	1	0	6		Min Xp soil force	-1.5977E-01	kN	1	0	6	
Max Yp soil force	6.0480E-02	kips	1	0	1		Max Yp soil force	2.6621E-01	kN	1	0	1	
Min Yp soil force	-6.0480E-02	kips	1	0	9		Min Yp soil force	-2.6621E-01	kN	1	0	7	
Max torsional soil force	4.3139E-04	kip-ft	1	0	1		Max torsional soil force	5.8379E-04	kN-m	1	0	1	
<b>File displacements</b>							<b>File displacements</b>						
Displacement type	Value	Unit	Load case	Load comb.	File		Displacement type	Value	Unit	Load case	Load comb.	File	
Max Z displacement	2.1193E-01	in	1	0	4		Max Z displacement	5.4791E-03	m	1	0	4	
Min Z displacement	1.6762E-01	in	1	0	8		Min Z displacement	4.3620E-03	m	1	0	8	
Max X displacement	1.7365E-03	in	1	0	4		Max X displacement	4.3622E-05	m	1	0	4	
Min X displacement	-1.7365E-03	in	1	0	6		Min X displacement	-4.3646E-05	m	1	0	6	
Max Y displacement	2.2885E-03	in	1	0	1		Max Y displacement	7.2526E-05	m	1	0	1	
Min Y displacement	-2.2885E-03	in	1	0	9		Min Y displacement	-7.2527E-05	m	1	0	7	
<b>Column demands</b>							<b>Column demands</b>						
Demand type	Value	Unit	Load case	Load comb.	Col.		Demand type	Value	Unit	Load case	Load comb.	Col.	
Max axial force	-4.7188E+02	kips	1	0	2		Max axial force	-2.0751E+03	kN	1	0	2	
Min axial force	-4.9045E+02	kips	1	0	1		Min axial force	-2.1578E+03	kN	1	0	1	
Max shear in 2 direction	1.2977E+01	kips	1	0	1		Max shear in 2 direction	5.7572E+01	kN	1	0	1	
Min shear in 2 direction	-1.2977E+01	kips	1	0	2		Min shear in 2 direction	-5.7572E+01	kN	1	0	2	
Max shear in 3 direction	1.2513E-10	kips	1	0	2		Max shear in 3 direction	3.2557E-06	kN	1	0	1	
Min shear in 3 direction	-5.2417E-10	kips	1	0	1		Min shear in 3 direction	-3.0528E-06	kN	1	0	2	
Max moment about 2 axis	4.8365E-08	kip-ft	1	0	1		Max moment about 2 axis	5.3492E-06	kN-m	1	0	1	
Min moment about 2 axis	3.6932E-08	kip-ft	1	0	2		Min moment about 2 axis	-1.2501E-05	kN-m	1	0	1	
Max moment about 3 axis	1.4255E+02	kip-ft	1	0	1		Max moment about 3 axis	1.9306E+02	kN-m	1	0	1	
Min moment about 3 axis	-1.4255E+02	kip-ft	1	0	2		Min moment about 3 axis	-1.9306E+02	kN-m	1	0	2	
Max torsional force	3.4443E-09	kip-ft	1	0	2		Max torsional force	2.7564E-06	kN-m	1	0	2	
Min torsional force	-3.4443E-09	kip-ft	1	0	2		Min torsional force	-2.7564E-06	kN-m	1	0	2	
<b>Pier cap demands</b>							<b>Pier cap demands</b>						
Demand type	Value	Unit	Load case	Load comb.			Demand type	Value	Unit	Load case	Load comb.		
Max axial force	5.5558E-01	kips	1	0			Max axial force	2.5006E+00	kN	1	0		
Min axial force	-1.2574E-10	kips	1	0			Min axial force	-1.6495E-10	kN	1	0		
Max shear in 2 direction	1.0540E+02	kips	1	0			Max shear in 2 direction	4.6886E+02	kN	1	0		
Min shear in 2 direction	-1.0540E+02	kips	1	0			Min shear in 2 direction	-4.6886E+02	kN	1	0		
Max shear in 3 direction	1.2032E-10	kips	1	0			Max shear in 3 direction	3.9941E-10	kN	1	0		
Min shear in 3 direction	-2.3045E-11	kips	1	0			Min shear in 3 direction	-2.0847E-07	kN	1	0		
Max moment about 2 axis	3.7111E-10	kip-ft	1	0			Max moment about 2 axis	3.7609E-07	kN-m	1	0		
Min moment about 2 axis	-2.6299E-10	kip-ft	1	0			Min moment about 2 axis	-3.8602E-07	kN-m	1	0		
Max moment about 3 axis	5.6508E+01	kip-ft	1	0			Max moment about 3 axis	7.6757E+01	kN-m	1	0		
Min moment about 3 axis	-4.1090E+02	kip-ft	1	0			Min moment about 3 axis	-5.5744E+02	kN-m	1	0		
Max torsional force	4.6818E-11	kip-ft	1	0			Max torsional force	7.5128E-08	kN-m	1	0		
Min torsional force	-4.6818E-11	kip-ft	1	0			Min torsional force	-7.5128E-08	kN-m	1	0		
<b>Bearing forces</b>							<b>Bearing forces</b>						
Bearing forces	Value	Unit	Load case	Bearing No.	Row		Bearing forces	Value	Unit	Load case	Bearing No.	Row	
Max  total Xb force	3.2319E+08	kips	1	N/A	N/A		Max  total Xb force	1.1829E+05	kN	1	N/A	N/A	
Corresponding total Yb force	-5.7487E+10	kips	1	N/A	N/A		Corresponding total Yb force	2.0232E-07	kN	1	N/A	N/A	
Max  total Yb force	5.7487E+10	kips	1	N/A	N/A		Max  total Yb force	2.0232E-07	kN	1	N/A	N/A	
Corresponding total Xb force	-3.2319E+08	kips	1	N/A	N/A		Corresponding total Xb force	-1.1829E-05	kN	1	N/A	N/A	
Max Xb force	1.2422E+01	kips	1	2	N/A		Max Xb force	5.5071E+01	kN	1	2	N/A	
Corresponding Yb force	5.3319E-11	kips	1	2	N/A		Corresponding Yb force	-3.2615E-06	kN	1	2	N/A	
Min Xb force	-1.2422E+01	kips	1	1	N/A		Min Xb force	-5.5071E+01	kN	1	1	N/A	
Corresponding Yb force	-6.2818E-10	kips	1	1	N/A		Corresponding Yb force	3.4638E-06	kN	1	1	N/A	
Max Yb force	5.3319E-11	kips	1	2	N/A		Max Yb force	3.4638E-06	kN	1	1	N/A	
Corresponding Xb force	1.2422E+01	kips	1	2	N/A		Corresponding Xb force	-5.5071E+01	kN	1	2	N/A	
Min Yb force	-6.2818E-10	kips	1	1	N/A		Min Yb force	-3.2615E-06	kN	1	2	N/A	
Corresponding Xb force	-1.2422E+01	kips	1	1	N/A		Corresponding Xb force	5.5071E+01	kN	1	2	N/A	
Max Zb force	-3.0838E+02	kips	1	1	N/A		Max Zb force	-1.3478E+03	kN	1	1	N/A	
Min Zb force	3.0838E+02	kips	1	2	N/A		Min Zb force	-1.3478E+03	kN	1	2	N/A	
Max moment about Xb	4.8148E-08	kip-ft	1	1	N/A		Max moment about Xb	4.9669E-06	kN-m	1	2	N/A	
Min moment about Xb	3.7110E-08	kip-ft	1	2	N/A		Min moment about Xb	-1.2425E-05	kN-m	1	1	N/A	
Max moment about Yb	4.6185E-01	kip-ft	1	1	N/A		Max moment about Yb	1.0039E+00	kN-m	1	1	N/A	
Min moment about Yb	-4.6185E-01	kip-ft	1	2	N/A		Min moment about Yb	-1.0117E+00	kN-m	1	2	N/A	
Max moment about Zb	3.0790E-09	kip-ft	1	1	N/A		Max moment about Zb	-2.3680E-06	kN-m	1	1	N/A	
Min moment about Zb	2.9388E-09	kip-ft	1	2	N/A		Min moment about Zb	-2.3806E-06	kN-m	1	2	N/A	

English

SI

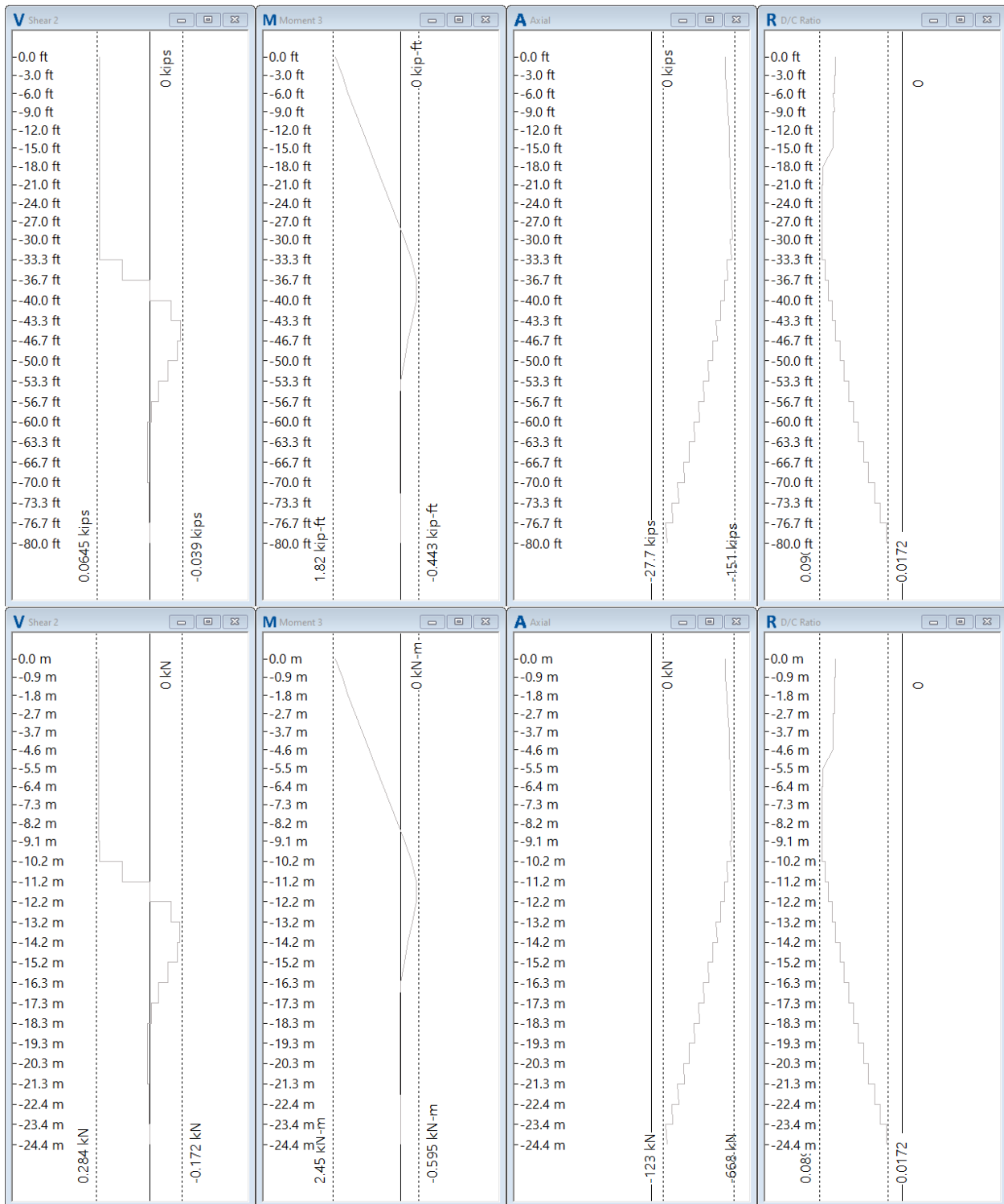


Figure 10.1 – Comparison of Pier 2 Pile Result Plots Between English (Top) and SI Units (Bottom) for Example 10

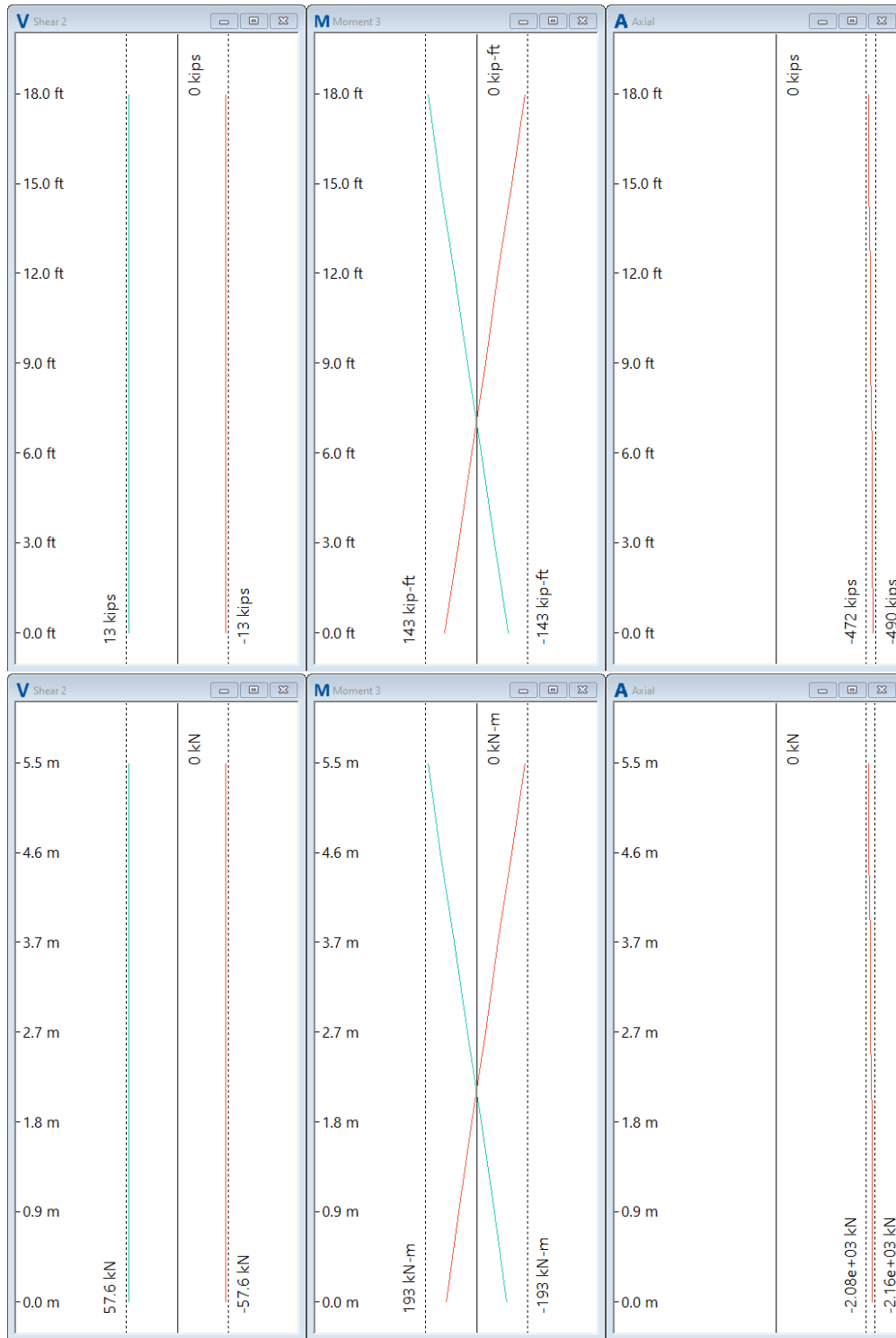


Figure 10.2 – Comparison of Pier 2 Pier Column Result Plots Between English (Top) and SI Units (Bottom) for Example 10



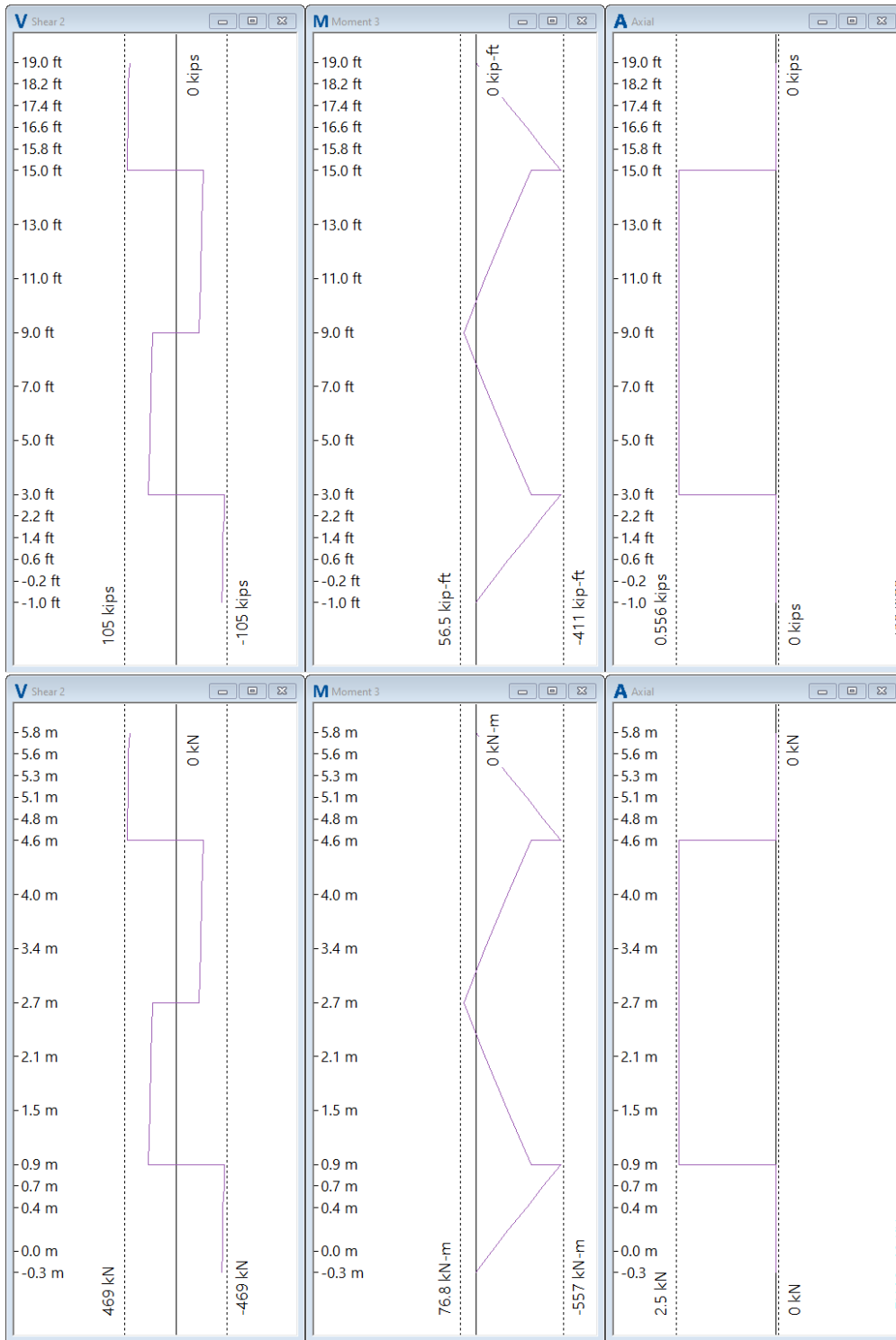
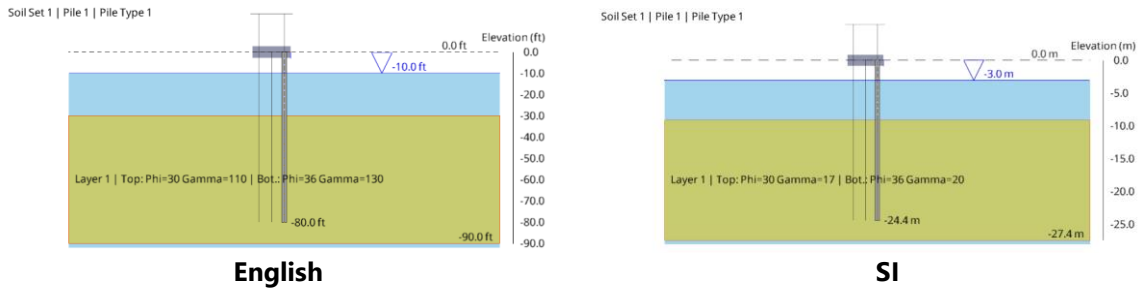


Figure 10.3 – Comparison of Pier 2 Pier Cap Result Plots Between English (Top) and SI Units (Bottom) for Example 10

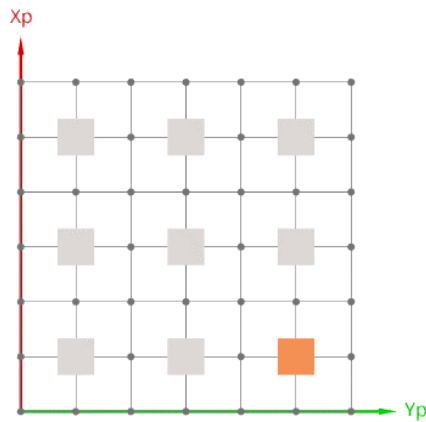
## Example 11: OPTS

**Problem Description:** Compare the FB-MultiPier output for a one pier two-span model in English and Metric units. Also compare plots of shear, moment, axial force, and demand to capacity ratio.

### Soil Elevation View (Typical):



### Pile Plan View (Typical):



**File(s):** USC\_Example\_11.in, SI\_Example\_11.in

Substructure 1								
Demand Type	English		SI		SI -> English		% Diff	
	Value	Units	Value	Units	Value	Units		
Pile Demands	Max axial force	-2.72E+01	kips	-1.21E+02	kN	-2.72E+01	kips	0.00%
	Min axial force	-1.51E+02	kips	-6.67E+02	kN	-1.50E+02	kips	0.00%
	Max shear in 2 direction	9.68E-02	kips	4.28E-01	kN	9.63E-02	kips	0.49%
	Min shear in 2 direction	-8.89E-02	kips	-3.96E-01	kN	-8.91E-02	kips	0.00%
	Max shear in 3 direction	1.07E-01	kips	4.71E-01	kN	1.06E-01	kips	1.05%
	Min shear in 3 direction	-1.07E-01	kips	-4.71E-01	kN	-1.06E-01	kips	0.00%
	Max moment about 2 axis	3.03E+00	kip-ft	4.06E+00	kN-m	3.00E+00	kip-ft	1.05%
	Min moment about 2 axis	-3.03E+00	kip-ft	-4.06E+00	kN-m	-3.00E+00	kip-ft	0.00%
	Max moment about 3 axis	2.35E+00	kip-ft	3.16E+00	kN-m	2.33E+00	kip-ft	0.87%
	Min moment about 3 axis	-1.26E+00	kip-ft	-1.68E+00	kN-m	-1.24E+00	kip-ft	0.00%
	Max torsional force	3.09E-03	kip-ft	4.18E-03	kN-m	3.08E-03	kip-ft	0.44%
	Min torsional force	-3.09E-03	kip-ft	-4.18E-03	kN-m	-3.08E-03	kip-ft	0.00%
Max demand/capacity ratio	9.01E-02	-	8.94E-02	-	8.94E-02	-	0.80%	
Soil Demands	Max Zp soil force	2.87E+01	kips	1.29E+02	kN	2.91E+01	kips	1.38%
	Min Zp soil force	3.10E+00	kips	1.40E+01	kN	3.15E+00	kips	1.61%
	Max Xp soil force	6.85E-02	kips	3.04E-01	kN	6.84E-02	kips	0.05%
	Min Xp soil force	-2.77E-02	kips	-1.23E-01	kN	-2.78E-02	kips	0.00%
	Max Yp soil force	6.01E-02	kips	2.65E-01	kN	5.95E-02	kips	1.06%
	Min Yp soil force	-6.01E-02	kips	-2.65E-01	kN	-5.95E-02	kips	0.00%
	Max torsional soil force	4.53E-04	kip-ft	6.12E-04	kN-m	4.51E-04	kip-ft	0.00%
Pile Displacements	Max Z displacement	2.12E-01	in.	5.47E-03	m	2.15E-01	in.	1.74%
	Min Z displacement	1.67E-01	in.	4.34E-03	m	1.71E-01	in.	2.39%
	Max X displacement	5.73E-03	in.	1.47E-04	m	5.79E-03	in.	1.00%
	Min X displacement	-5.40E-05	in.	-1.38E-06	m	-5.42E-05	in.	0.00%
	Max Y displacement	2.87E-03	in.	7.21E-05	m	2.84E-03	in.	1.07%
	Min Y displacement	-2.87E-03	in.	-7.21E-05	m	-2.84E-03	in.	0.00%
Column Demands	Max axial force	-4.68E+02	kips	-2.06E+03	kN	-4.63E+02	kips	0.00%
	Min axial force	-4.88E+02	kips	-2.15E+03	kN	-4.83E+02	kips	0.00%
	Max shear in 2 direction	1.36E+01	kips	6.05E+01	kN	1.36E+01	kips	0.34%
	Min shear in 2 direction	-1.33E+01	kips	-5.92E+01	kN	-1.33E+01	kips	0.00%
	Max shear in 3 direction	-2.91E-08	kips	-6.63E-09	kN	-1.49E-09	kips	0.00%
	Min shear in 3 direction	-3.21E-08	kips	-5.83E-08	kN	-1.31E-08	kips	0.00%
	Max moment about 2 axis	6.39E-07	kip-ft	1.73E-07	kN-m	1.28E-07	kip-ft	0.00%
	Min moment about 2 axis	5.92E-08	kip-ft	-1.48E-07	kN-m	-1.09E-07	kip-ft	0.00%
	Max moment about 3 axis	1.50E+02	kip-ft	2.03E+02	kN-m	1.50E+02	kip-ft	0.19%
	Min moment about 3 axis	-1.48E+02	kip-ft	-2.00E+02	kN-m	-1.47E+02	kip-ft	0.00%
	Max torsional force	7.19E-09	kip-ft	3.24E-08	kN-m	2.39E-08	kip-ft	0.00%
	Min torsional force	-7.19E-09	kip-ft	-3.24E-08	kN-m	-2.39E-08	kip-ft	0.00%
Pier Cap Demands	Max axial force	5.78E-01	kips	2.60E+00	kN	5.84E-01	kips	1.10%
	Min axial force	-8.15E-11	kips	-3.05E-10	kN	-6.85E-11	kips	0.00%
	Max shear in 2 direction	1.05E+02	kips	4.69E+02	kN	1.05E+02	kips	0.00%
	Min shear in 2 direction	-1.05E+02	kips	-4.69E+02	kN	-1.05E+02	kips	0.00%
	Max shear in 3 direction	2.03E-10	kips	2.83E-12	kN	6.37E-13	kips	0.00%
	Min shear in 3 direction	-1.34E-10	kips	-2.13E-09	kN	-4.78E-10	kips	0.00%
	Max moment about 2 axis	5.67E-09	kip-ft	5.46E-09	kN-m	4.03E-09	kip-ft	0.00%
	Min moment about 2 axis	-7.38E-11	kip-ft	-2.26E-09	kN-m	-1.67E-09	kip-ft	0.00%
	Max moment about 3 axis	5.13E+01	kip-ft	6.99E+01	kN-m	5.15E+01	kip-ft	0.42%
	Min moment about 3 axis	-4.11E+02	kip-ft	-5.57E+02	kN-m	-4.11E+02	kip-ft	0.00%
	Max torsional force	1.33E-10	kip-ft	7.04E-10	kN-m	5.19E-10	kip-ft	0.00%
	Min torsional force	-1.33E-10	kip-ft	-7.04E-10	kN-m	-5.19E-10	kip-ft	0.00%

Table 11.1 – Comparison of Max/Min Results Between English and SI Units for Example 11

# Results from FB-MultiPier Output File (USC\_Example\_11.out, SI\_Example\_11.out):

* SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *										* SUBSTRUCTURE 1 MAX/MIN RESPONSES FOR ALL LOAD CASES *													
<b>File demands</b>										<b>File demands</b>													
Demand type	Value	Unit	Load case	Load comb.	File	Demand type	Value	Unit	Load case	Load comb.	File	Demand type	Value	Unit	Load case	Load comb.	File	Demand type	Value	Unit	Load case	Load comb.	File
Max axial force (tension is +)	-2.7178E+01	kips	1	0	8	Max axial force (tension is +)	-1.2093E+02	kN	1	0	8	Max axial force	1.2946E+02	kN	1	0	6	Max axial force	1.4024E+01	kN	1	0	8
Min axial force	-1.5121E+02	kips	1	0	6	Min axial force	-6.6723E+02	kN	1	0	6	Min axial force	-6.6723E+02	kN	1	0	6	Min axial force	-6.6723E+02	kN	1	0	6
Max shear in 2 direction	9.6767E-02	kips	1	0	4	Max shear in 2 direction	4.2833E-01	kN	1	0	4	Max shear in 2 direction	4.2833E-01	kN	1	0	4	Max shear in 2 direction	-3.9635E-01	kN	1	0	4
Min shear in 2 direction	-8.8948E-02	kips	1	0	4	Min shear in 2 direction	-4.0617E+00	kN-m	1	0	9	Min shear in 2 direction	-4.0617E+00	kN-m	1	0	9	Min shear in 2 direction	4.7079E-01	kN	1	0	9
Max shear in 3 direction	1.0696E-01	kips	1	0	9	Max shear in 3 direction	4.7079E-01	kN	1	0	9	Max shear in 3 direction	4.7079E-01	kN	1	0	9	Max shear in 3 direction	-1.0696E-01	kips	1	0	3
Min shear in 3 direction	-1.0696E-01	kips	1	0	3	Min shear in 3 direction	-4.7079E-01	kN	1	0	3	Min shear in 3 direction	-4.7079E-01	kN	1	0	3	Min shear in 3 direction	-1.0696E-01	kips	1	0	3
Max moment about 2 axis	3.0274E+00	kip-ft	1	0	3	Max moment about 2 axis	4.0617E+00	kN-m	1	0	3	Max moment about 2 axis	4.0617E+00	kN-m	1	0	3	Max moment about 2 axis	3.0274E+00	kip-ft	1	0	9
Min moment about 2 axis	-3.0274E+00	kip-ft	1	0	9	Min moment about 2 axis	-4.0617E+00	kN-m	1	0	9	Min moment about 2 axis	-4.0617E+00	kN-m	1	0	9	Min moment about 2 axis	-3.0274E+00	kip-ft	1	0	3
Max moment about 3 axis	2.3513E+00	kip-ft	1	0	4	Max moment about 3 axis	3.1603E+00	kN-m	1	0	4	Max moment about 3 axis	3.1603E+00	kN-m	1	0	4	Max moment about 3 axis	2.3513E+00	kip-ft	1	0	4
Min moment about 3 axis	-1.2585E+00	kip-ft	1	0	6	Min moment about 3 axis	-1.6815E+00	kN-m	1	0	6	Min moment about 3 axis	-1.6815E+00	kN-m	1	0	6	Min moment about 3 axis	-1.2585E+00	kip-ft	1	0	6
Max torsional force	3.0935E-03	kip-ft	1	0	1	Max torsional force	4.1758E-03	kN-m	1	0	1	Max torsional force	4.1758E-03	kN-m	1	0	1	Max torsional force	3.0935E-03	kip-ft	1	0	1
Min torsional force	-3.0935E-03	kip-ft	1	0	1	Min torsional force	-4.1758E-03	kN-m	1	0	1	Min torsional force	-4.1758E-03	kN-m	1	0	1	Min torsional force	-3.0935E-03	kip-ft	1	0	1
Max demand/capacity ratio	9.0148E-02		1	0	6	Max demand/capacity ratio	8.9428E-02		1	0	6	Max demand/capacity ratio	8.9428E-02		1	0	6	Max demand/capacity ratio	9.0148E-02		1	0	6
<b>Soil demands</b>										<b>Soil demands</b>													
Demand type	Value	Unit	Load case	Load comb.	File	Demand type	Value	Unit	Load case	Load comb.	File	Demand type	Value	Unit	Load case	Load comb.	File	Demand type	Value	Unit	Load case	Load comb.	File
Max Zp soil force	2.8706E+01	kips	1	0	6	Max Zp soil force	1.2946E+02	kN	1	0	6	Max Zp soil force	1.2946E+02	kN	1	0	6	Max Zp soil force	2.8706E+01	kips	1	0	6
Min Zp soil force	3.1023E+00	kips	1	0	8	Min Zp soil force	1.4024E+01	kN	1	0	8	Min Zp soil force	1.4024E+01	kN	1	0	8	Min Zp soil force	3.1023E+00	kips	1	0	8
Max Xp soil force	6.8450E-02	kips	1	0	4	Max Xp soil force	3.0432E-01	kN	1	0	4	Max Xp soil force	3.0432E-01	kN	1	0	4	Max Xp soil force	6.8450E-02	kips	1	0	4
Min Xp soil force	-2.7670E-02	kips	1	0	4	Min Xp soil force	-1.2347E-01	kN	1	0	4	Min Xp soil force	-1.2347E-01	kN	1	0	4	Min Xp soil force	-2.7670E-02	kips	1	0	4
Max Yp soil force	6.0149E-02	kips	1	0	3	Max Yp soil force	2.6473E-01	kN	1	0	3	Max Yp soil force	2.6473E-01	kN	1	0	3	Max Yp soil force	6.0149E-02	kips	1	0	3
Min Yp soil force	-6.0149E-02	kips	1	0	9	Min Yp soil force	-2.6473E-01	kN	1	0	9	Min Yp soil force	-2.6473E-01	kN	1	0	9	Min Yp soil force	-6.0149E-02	kips	1	0	9
Max torsional soil force	4.5253E-04	kip-ft	1	0	1	Max torsional soil force	6.1177E-04	kN-m	1	0	1	Max torsional soil force	6.1177E-04	kN-m	1	0	1	Max torsional soil force	4.5253E-04	kip-ft	1	0	1
<b>File displacements</b>										<b>File displacements</b>													
Displacement type	Value	Unit	Load case	Load comb.	File	Displacement type	Value	Unit	Load case	Load comb.	File	Displacement type	Value	Unit	Load case	Load comb.	File	Displacement type	Value	Unit	Load case	Load comb.	File
Max Z displacement	2.1163E-01	in	1	0	6	Max Z displacement	5.4698E-03	m	1	0	6	Max Z displacement	5.4698E-03	m	1	0	6	Max Z displacement	2.1163E-01	in	1	0	6
Min Z displacement	1.6688E-01	in	1	0	8	Min Z displacement	4.3414E-03	m	1	0	8	Min Z displacement	4.3414E-03	m	1	0	8	Min Z displacement	1.6688E-01	in	1	0	8
Max X displacement	5.7328E-03	in	1	0	4	Max X displacement	1.4708E-04	m	1	0	4	Max X displacement	1.4708E-04	m	1	0	4	Max X displacement	5.7328E-03	in	1	0	4
Min X displacement	-5.4043E-05	in	1	0	4	Min X displacement	-1.3770E-06	m	1	0	4	Min X displacement	-1.3770E-06	m	1	0	4	Min X displacement	-5.4043E-05	in	1	0	4
Max Y displacement	2.8699E-03	in	1	0	3	Max Y displacement	7.2123E-05	m	1	0	3	Max Y displacement	7.2123E-05	m	1	0	3	Max Y displacement	2.8699E-03	in	1	0	3
Min Y displacement	-2.8699E-03	in	1	0	9	Min Y displacement	-7.2123E-05	m	1	0	9	Min Y displacement	-7.2123E-05	m	1	0	9	Min Y displacement	-2.8699E-03	in	1	0	9
<b>Column demands</b>										<b>Column demands</b>													
Demand type	Value	Unit	Load case	Load comb.	Col.	Demand type	Value	Unit	Load case	Load comb.	Col.	Demand type	Value	Unit	Load case	Load comb.	Col.	Demand type	Value	Unit	Load case	Load comb.	Col.
Max axial force	-4.6842E+02	kips	1	0	1	Max axial force	-2.0597E+03	kN	1	0	1	Max axial force	-2.0597E+03	kN	1	0	1	Max axial force	-4.6842E+02	kips	1	0	1
Min axial force	-4.8822E+02	kips	1	0	2	Min axial force	-2.1478E+03	kN	1	0	2	Min axial force	-2.1478E+03	kN	1	0	2	Min axial force	-4.8822E+02	kips	1	0	2
Max shear in 2 direction	1.3646E+01	kips	1	0	1	Max shear in 2 direction	6.0497E+01	kN	1	0	1	Max shear in 2 direction	6.0497E+01	kN	1	0	1	Max shear in 2 direction	1.3646E+01	kips	1	0	1
Min shear in 2 direction	-1.3348E+01	kips	1	0	2	Min shear in 2 direction	-5.9167E+01	kN	1	0	2	Min shear in 2 direction	-5.9167E+01	kN	1	0	2	Min shear in 2 direction	-1.3348E+01	kips	1	0	2
Max shear in 3 direction	-2.9129E-08	kips	1	0	1	Max shear in 3 direction	-6.6270E-09	kN	1	0	1	Max shear in 3 direction	-6.6270E-09	kN	1	0	1	Max shear in 3 direction	-2.9129E-08	kips	1	0	1
Min shear in 3 direction	-3.2102E-08	kips	1	0	2	Min shear in 3 direction	-5.8324E-08	kN	1	0	2	Min shear in 3 direction	-5.8324E-08	kN	1	0	2	Min shear in 3 direction	-3.2102E-08	kips	1	0	2
Max moment about 2 axis	6.3909E-07	kip-ft	1	0	2	Max moment about 2 axis	1.7341E-07	kN-m	1	0	2	Max moment about 2 axis	1.7341E-07	kN-m	1	0	2	Max moment about 2 axis	6.3909E-07	kip-ft	1	0	2
Min moment about 2 axis	5.6719E-09	kip-ft	1	0	2	Min moment about 2 axis	-1.4798E-07	kN-m	1	0	2	Min moment about 2 axis	-1.4798E-07	kN-m	1	0	2	Min moment about 2 axis	5.6719E-09	kip-ft	1	0	2
Max moment about 3 axis	1.5027E+02	kip-ft	1	0	1	Max moment about 3 axis	2.0336E+02	kN-m	1	0	1	Max moment about 3 axis	2.0336E+02	kN-m	1	0	1	Max moment about 3 axis	1.5027E+02	kip-ft	1	0	1
Min moment about 3 axis	-1.4767E+02	kip-ft	1	0	2	Min moment about 3 axis	-1.9980E+02	kN-m	1	0	2	Min moment about 3 axis	-1.9980E+02	kN-m	1	0	2	Min moment about 3 axis	-1.4767E+02	kip-ft	1	0	2
Max torsional force	7.1943E-09	kip-ft	1	0	1	Max torsional force	3.2375E-08	kN-m	1	0	1	Max torsional force	3.2375E-08	kN-m	1	0	1	Max torsional force	7.1943E-09	kip-ft	1	0	1
Min torsional force	-7.1943E-09	kip-ft	1	0	1	Min torsional force	-3.2375E-08	kN-m	1	0	1	Min torsional force	-3.2375E-08	kN-m	1	0	1	Min torsional force	-7.1943E-09	kip-ft	1	0	1
<b>Pier cap demands</b>										<b>Pier cap demands</b>													
Demand type	Value	Unit	Load case	Load comb.	Demand type	Value	Unit	Load case	Load comb.	Demand type	Value	Unit	Load case	Load comb.	Demand type	Value	Unit	Load case	Load comb.				
Max axial force	5.7784E-01	kips	1	0	Max axial force	2.5988E+00	kN	1	0	Max axial force	2.5988E+00	kN	1	0	Max axial force	5.7784E-01	kips	1	0				
Min axial force	-8.1487E-11	kips	1	0	Min axial force	-3.0489E-10	kN	1	0	Min axial force	-3.0489E-10	kN	1	0	Min axial force	-8.1487E-11	kips	1	0				
Max shear in 2 direction	1.0540E+02	kips	1	0	Max shear in 2 direction	4.6986E+02	kN	1	0	Max shear in 2 direction	4.6986E+02	kN	1	0	Max shear in 2 direction	1.0540E+02	kips	1	0				
Min shear in 2 direction	-1.0540E+02	kips	1	0	Min shear in 2 direction	-4.6986E+02	kN	1	0	Min shear in 2 direction	-4.6986E+02	kN	1	0	Min shear in 2 direction	-1.0540E+02	kips	1	0				
Max shear in 3 direction	2.0255E-10	kips	1	0	Max shear in 3 direction	2.8349E-12	kN	1	0	Max shear in 3 direction	2.8349E-12	kN	1	0	Max shear in 3 direction	2.0255E-10	kips	1	0				
Min shear in 3 direction	-1.3384E-10	kips	1	0	Min shear in 3 direction	-2.1281E-09	kN	1	0	Min shear in 3 direction	-2.1281E-09	kN	1	0	Min shear in 3 direction	-1.3384E-10	kips	1	0				
Max moment about 2 axis	5.6719E-09	kip-ft	1	0	Max moment about 2 axis	5.4604E-09	kN-m	1	0	Max moment about 2 axis	5.4604E-09	kN-m	1	0	Max moment about 2 axis	5.6719E-09	kip-ft	1	0				
Min moment about 2 axis	-7.3893E-11	kip-ft	1	0	Min moment about 2 axis	-2.2629E-09	kN-m	1	0	Min moment about 2 axis	-2.2629E-09	kN-m	1	0	Min moment about 2 axis	-7.3893E-11	kip-ft	1	0				
Max moment about 3 axis	5.1312E+01	kip-ft	1	0	Max moment about 3 axis	6.9862E+01	kN-m	1	0	Max moment about 3 axis	6.9862E+01	kN-m	1	0	Max moment about 3 axis	5.1312E+01	kip-ft	1	0				
Min moment about 3 axis	-4.1080E+02	kip-ft	1	0	Min moment about 3 axis	-5.5734E+02	kN-m	1	0	Min moment about 3 axis	-5.5734E+02	kN-m	1	0	Min moment about 3 axis	-4.1080E+02	kip-ft	1	0				
Max torsional force	1.3303E-10	kip-ft	1	0	Max torsional force	7.0432E-10	kN-m	1	0	Max torsional force	7.0432E-10	kN-m	1	0	Max torsional force	1.3303E-10	kip-ft	1	0				
Min torsional force	-1.3303E-10	kip-ft	1	0	Min torsional force	-7.0432E-10	kN-m	1	0	Min torsional force	-7.0432E-10	kN-m	1	0	Min torsional force	-1.3303E-10	kip-ft	1	0				
<b>Bearing forces</b>										<b>Bearing forces</b>													
(Max) total Xb force	2.9737E-01	kips	1	N/A	N/A	(Max) total Xb force	1.3312E+00	kN	1	N/A	N/A	(Max) total Xb force	1.3312E+00	kN	1	N/A	N/A	(Max) total Xb force	2.9737E-01	kips	1	N/A	N/A
Corresponding total Yb force	-6.1405E-08	kips	1	N/A	N/A	Corresponding total Yb force	-6.5288E-08	kN	1	N/A	N/A	Corresponding total Yb force	-6.5288E-08	kN	1	N/A	N/A	Corresponding total Yb force	-6.1405E-08	kips	1	N/A	N/A
(Max) total Yb force	6.1405E-08	kips	1	N/A	N/A	(Max) total Yb force	6.5288E-08	kN	1	N/A	N/A	(Max) total Yb force	6.5288E-08	kN	1	N/A	N/A	(Max) total Yb force	6.1405E-08	kips	1	N/A	N/A
Corresponding total Xb force	-2.9737E-01	kips	1	N/A	N/A	Corresponding total Xb force	-1.3312E+00	kN	1	N/A	N/A	Corresponding total Xb force	-1.3312E+00	kN	1	N/A	N/A	Corresponding total Xb force	-2.9737E-01	kips	1	N/A	N/A
Max Xb force	1.2770E+01	kips	1	2	N/A	Max Xb force	5.6567E+01	kN	1	2	N/A	Max Xb force	5.6567E+01	kN	1	2	N/A	Max Xb force					

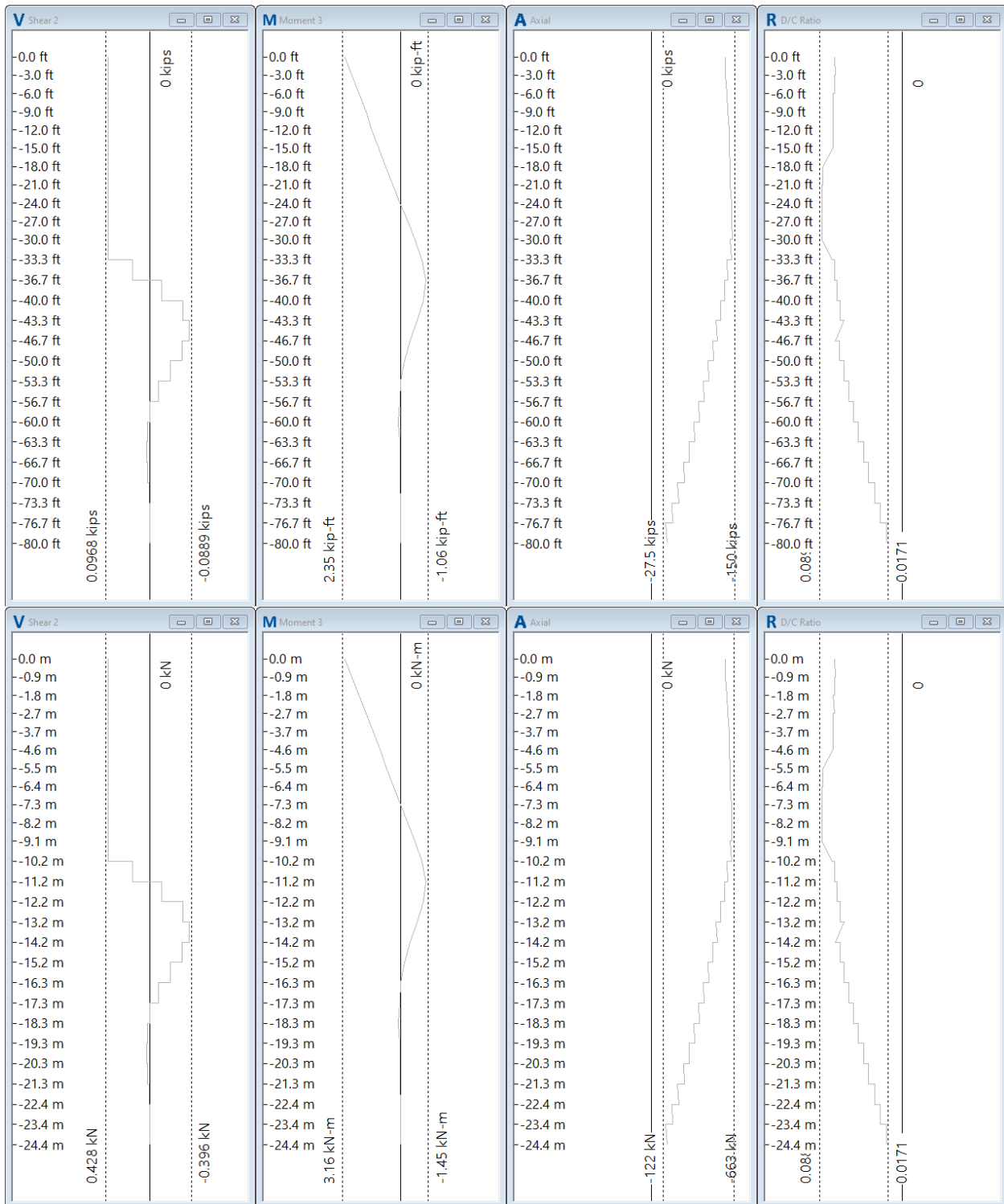


Figure 11.1 – Comparison of Pile Result Plots Between English (Top) and SI Units (Bottom) for Example 11

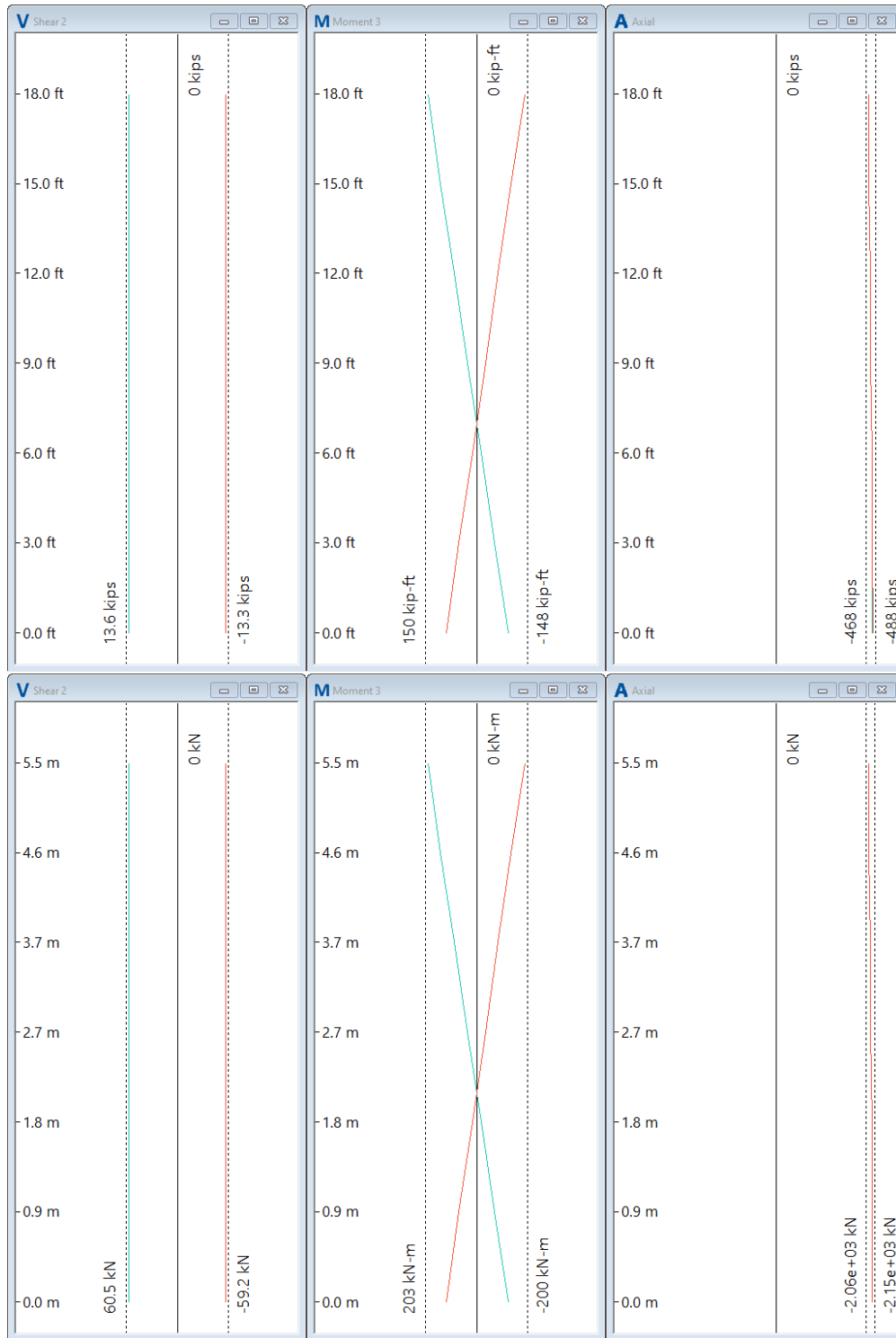


Figure 11.2 – Comparison of Pier Column Result Plots Between English (Top) and SI Units (Bottom) for Example 11

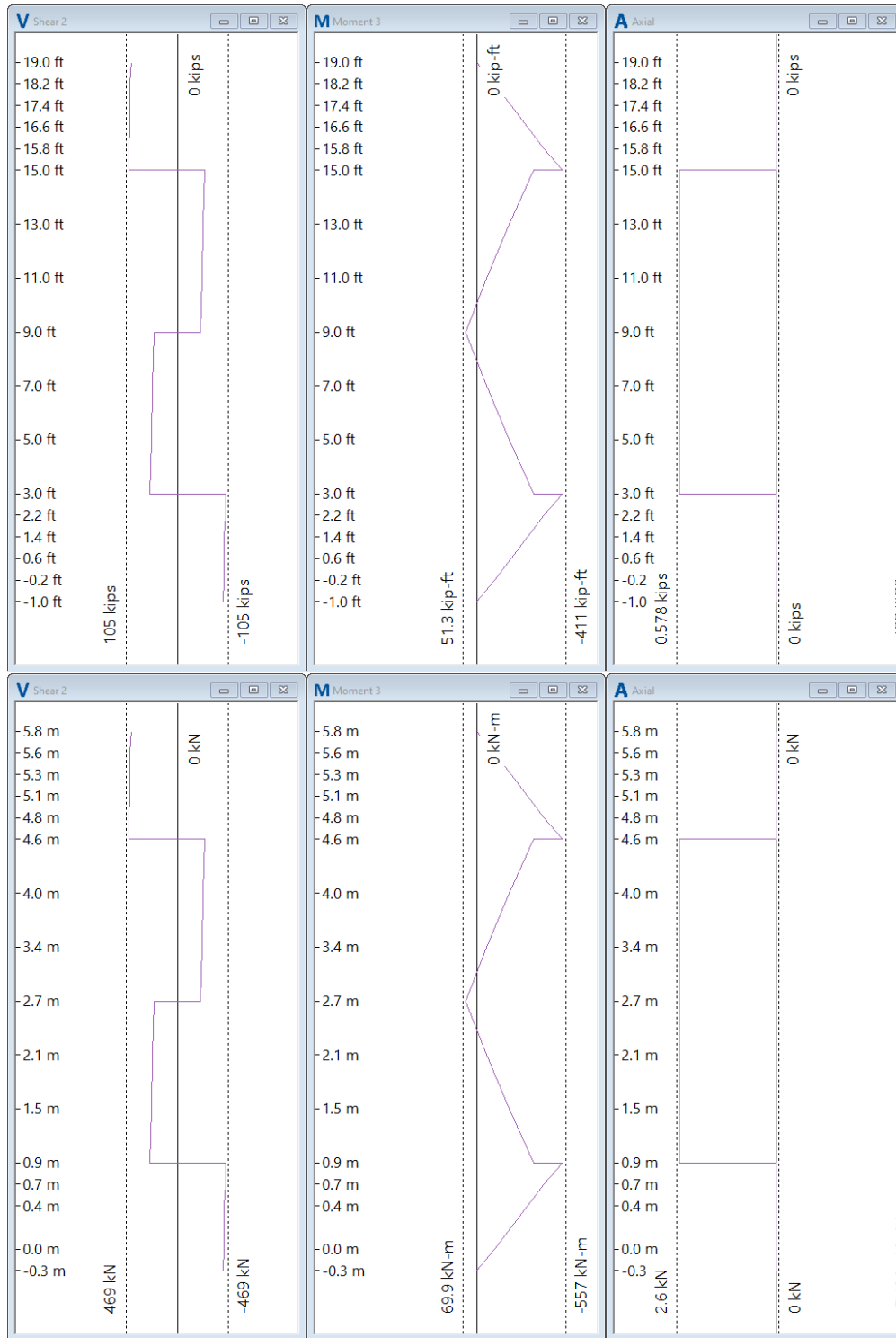


Figure 11.3 – Comparison of Pier Cap Result Plots Between English (Top) and SI Units (Bottom) for Example 11

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