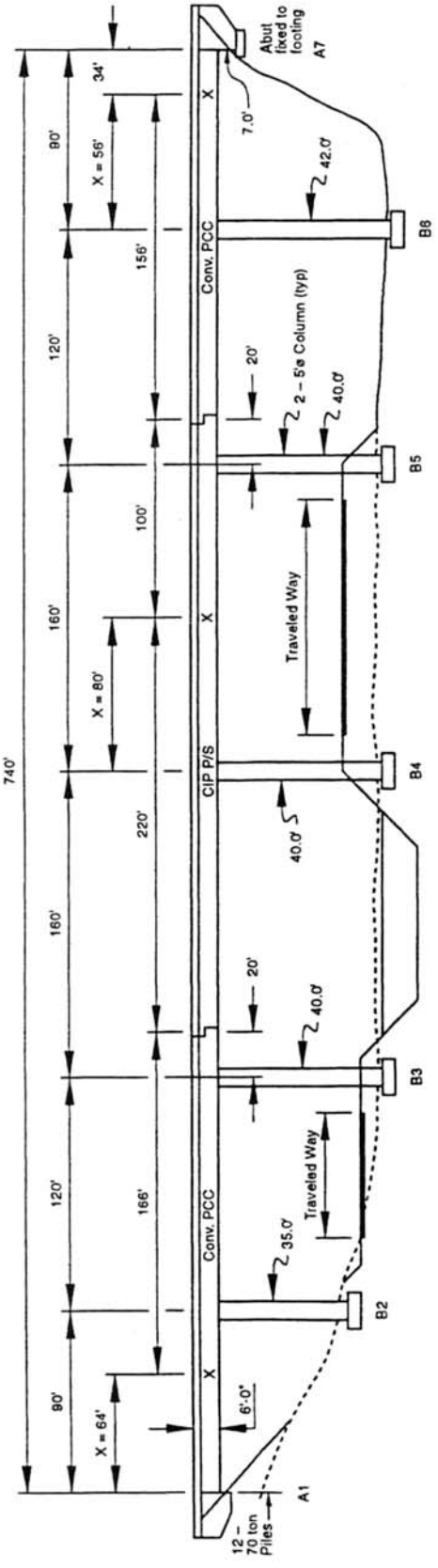
Attachment 1

Example No. 1

Calculation of Points of No Movement



	A1	B2	B3	B4	B5	B6	A7
I (Ft)^4	1.38	61.36	61.36	61.36	61.36	61.36	102
L (Ft)	5.50	35.0	40.0	40.0	40.0	42.0	7.0
P (kips) @ 1" side sway	1200	+ 618	+ 415	+ 415	+ 415	359	Will slide + 600
D (distance from 1st member of frame)	0	90	210	0	160	0	90
P × D / 100	0	+ 556	+ 872	0	+ 664	0	+ 540
	$X = \frac{\Sigma(P \times D)/100}{\Sigma P}(100) = \frac{1,428}{2,233}(100) = \underline{64'}$			$\frac{664}{830}(100) = \underline{80'}$		$\frac{540}{959}(100) = \underline{56'}$	
			Sum		Sum		Sum
			= 2,233		= 830		= 959
			= 1,428		= 664		= 540

Notes:
Width of Structure = 78'
Diameter of Column = 5'-0"
K/Pile @ 1" deflection = 100 kips
Point of No Movement = X
Refer to Properties/Piles Table

Assumptions:
1. Super str. inf. rigid
2. Columns fixed top and bottom
3. Abutment footing will slide @ a force equal to D.W.
4. E (piles) = 4×10^6 psi
E (columns) = 3×10^6 psi

Fixed/Fixed Condition

$P\,(Col.) = 12EI\,\frac{\Delta}{L^3}$

@ 1" defl. = $\frac{432\,I}{\left(\frac{L}{10}\right)^3}$

Pinned/Fixed Condition

$P\,(Col.) = 3EI\,\frac{\Delta}{L^3}$

@ 1" defl. = $\frac{108\,I}{\left(\frac{L}{10}\right)^3}$

D.W. Abut 7 = 600 k (assume linear up to 1" deflection)

$I\,(abut) = \frac{78}{12}(2.5)^3$
$= 102$