

Solpile

LATERALLY LOADED PILE ANALYSIS

Single pile in layered soil

ANALYSIS REPORT

Company	Solplan
Project Name	Solpile example
Generated	2026-10-19 10:19
Program	Solpile

Notes. Illustrative example for learning. Not a site-specific foundation design.

Table of Contents

1. Model Overview	3
2. Program Options & Settings	4
2.1 Options	4
3. Pile Sections	4
3.1 Pile Section Schedule	4
3.2 Circular pile — Elastic Section (Non-yielding)	4
4. Soil Materials & Layers	5
4.1 Soil Materials — Soft Clay (Matlock)	5
4.2 Soil Materials — Sand (Reese)	5
4.3 Soil Materials — Stiff Clay without Free Water (Reese)	5
4.4 Soil Layer Profile	5
5. Loading	6
5.1 Pile-head Load Cases	6
6. Special Analyses & LRFD	6
7. Validation & Warnings	6
8. Results — Load Case Summary	6
8.1 Load Case Summary	6
9. Analysis Charts	6
10. Generated p-y Curve Figure	8
11. Results — Response Profiles per Load Case	9
11.1 Load Case 1 — response profile	9
11.2 Load Case 2 — response profile	9
11.3 Load Case 3 — response profile	10

1. Model Overview

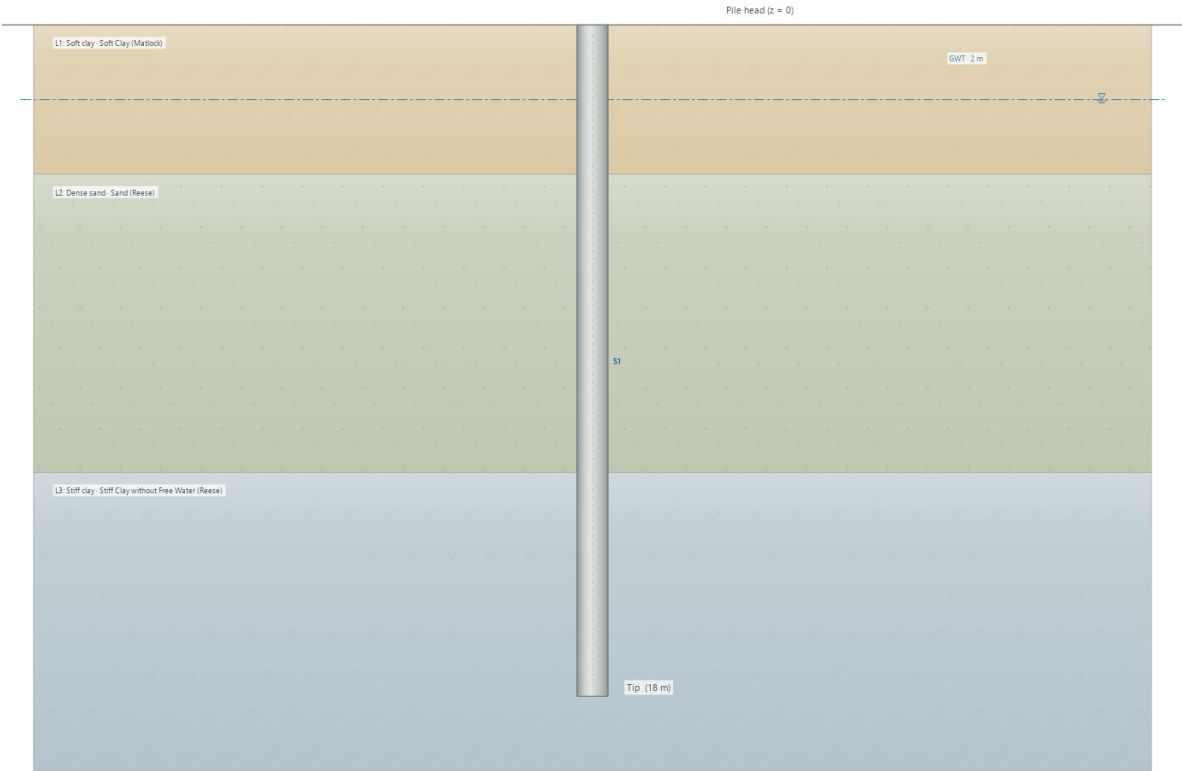


Figure 1. Two-dimensional pile and soil model overview

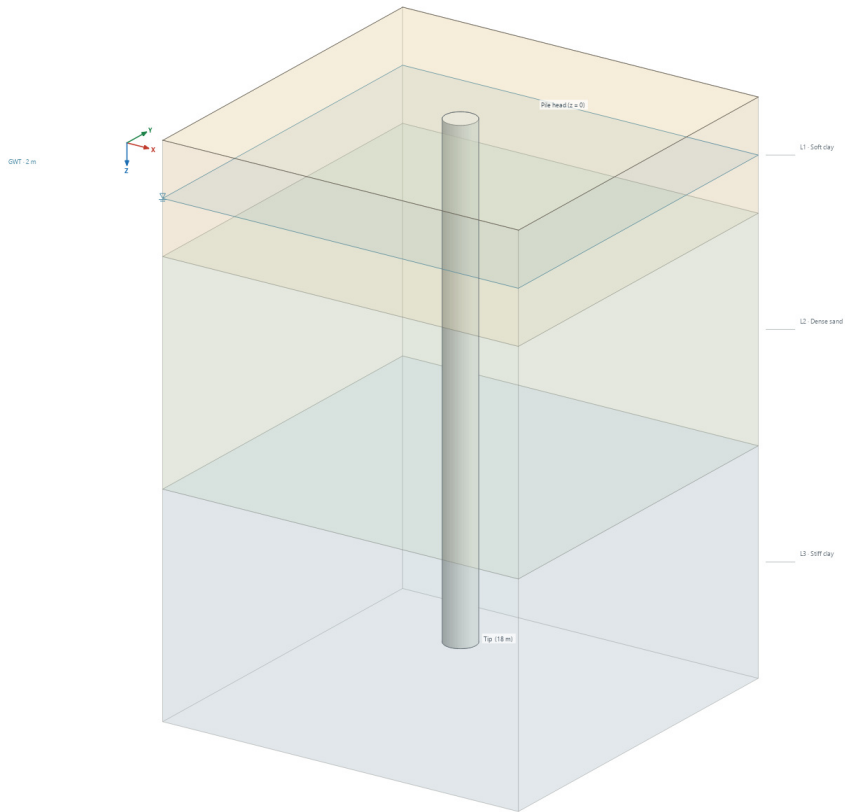


Figure 2. Three-dimensional pile and soil model overview

2. Program Options & Settings

2.1 Options

Option	Value
Analysis mode	Conventional Analysis
Unit system	SI
Loading type	Static loading
Pile increments	100
Max iterations	500
Convergence tolerance (m)	1e-05
Deflection limit (m)	2.54
P-Delta effects	yes
Shear deformation	no
Use load-test data	no
Extend p-y curves to maximum displacement	no
Layering correction (Georgiadis)	yes
Layering correction across same soil type	yes
Include batter/slope	no
Use p/y modifiers	no
Include tip shear	no
Include tip moment	no
Include side-resistance moment	no
Distributed load — shared	no
Distributed load — per load case	no
Soil movement — shared	no
Soil movement — per load case	no
Concentrated loads — shared	no
Concentrated loads — per load case	no
Variable pile length enabled	no
Stiffness matrix enabled	no
Pushover enabled	no
Buckling enabled	no
Shear demand enabled	no

3. Pile Sections

Total pile length (m): 18; pile head above ground (m): 0

3.1 Pile Section Schedule

Section	Type	Top (m)	Bottom (m)	Length (m)
Circular pile	Elastic Section (Non-yielding)	0	18	18

3.2 Circular pile — Elastic Section (Non-yielding)

Property	Value
Length of Section (m)	18
Structural Shape	Circular shape without void
Section Diameter (mm) — top → bottom	600 → 600
Auto-compute Area & Inertia from dimensions	yes
Area (mm²)	282743
Moment of Inertia (mm⁴) — top → bottom	6361725124 — 6361725124
Elastic Mod. (kPa)	28000000

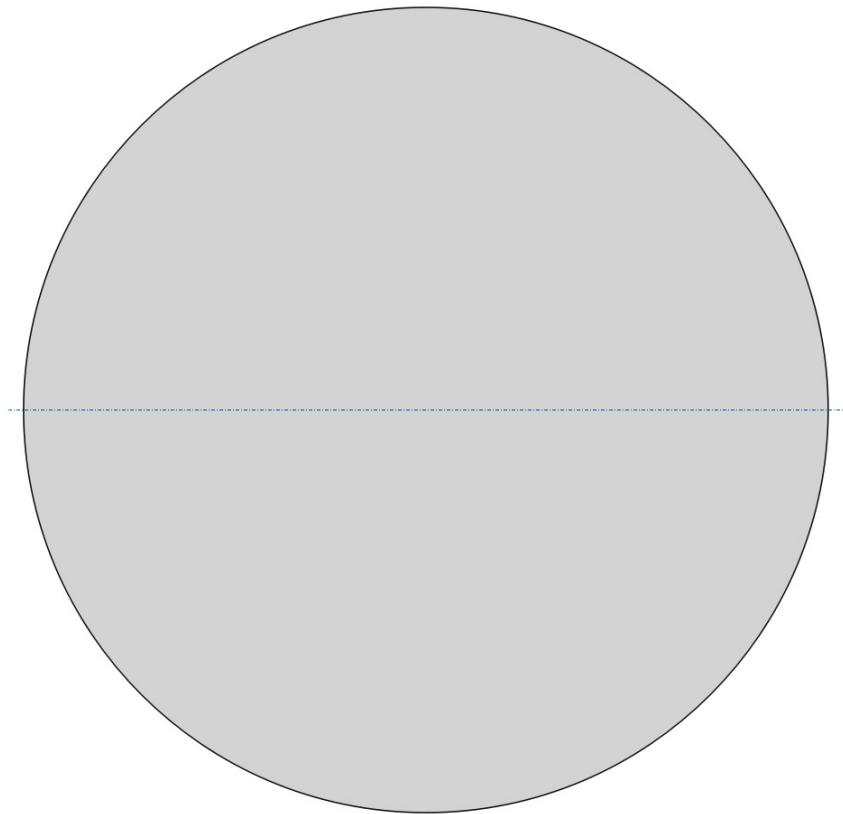


Figure 3. Cross-section of Circular pile

4. Soil Materials & Layers

4.1 Soil Materials — Soft Clay (Matlock)

Material	γ unsat (kN/m ³)	γ sat (kN/m ³)	Undrained shear strength, c_u (kPa)	Strain factor, ϵ_{s0}
Soft clay	17	19	35	0.01

4.2 Soil Materials — Sand (Reese)

Material	γ unsat (kN/m ³)	γ sat (kN/m ³)	Friction angle, ϕ' (°)	Subgrade modulus, k ($E_s = k \cdot x$) (kN/m ³)	Enhanced sand option	Wedge angle, α (°)	Earth pressure coefficient, K_0	Depth exponent of E_{py} , m	Diameter exponent of E_{py} , n
Dense sand	18	20	35	16000	no	0	0	0	0

4.3 Soil Materials — Stiff Clay without Free Water (Reese)

Material	γ unsat (kN/m ³)	γ sat (kN/m ³)	Undrained shear strength, c_u (kPa)	Strain factor, ϵ_{s0}
Stiff clay	19	20	110	0.005

4.4 Soil Layer Profile

Layer	Top (m)	Bottom (m)	Thickness (m)	Material	p-y model
Soft clay	0	4	4	Soft clay	Soft Clay (Matlock)
Dense sand	4	12	8	Dense sand	Sand (Reese)
Stiff clay	12	20	8	Stiff clay	Stiff Clay without Free Water (Reese)

Water table depth below ground (m): 2

5. Loading

5.1 Pile-head Load Cases

LC	Condition	Value 1	Value 2	Axial (kN)	Compute top y vs pile length	Run analysis
1	V + M	50 kN	0 kN-m	250	no	yes
2	V + M	100 kN	0 kN-m	250	no	yes
3	V + M	150 kN	0 kN-m	250	no	yes

6. Special Analyses & LRFD

No special analysis or LRFD result is configured for this project.

7. Validation & Warnings

No model-validation errors or warnings were found at export time.

8. Results — Load Case Summary

8.1 Load Case Summary

Case / Combination	Status	Iter	y top (m)	Slope top (rad)	M max (kN-m)	Depth Mmax (m)	V max (kN)	Depth Vmax (m)	Zero-defl. points
1	converged	13	0.0028182	-0.00115477	60.3897	2.34	50	0	6
2	converged	15	0.010233	-0.00343195	149.983	2.88	100	0	5
3	converged	15	0.0210107	-0.00641719	258.619	3.24	150	0	5

9. Analysis Charts

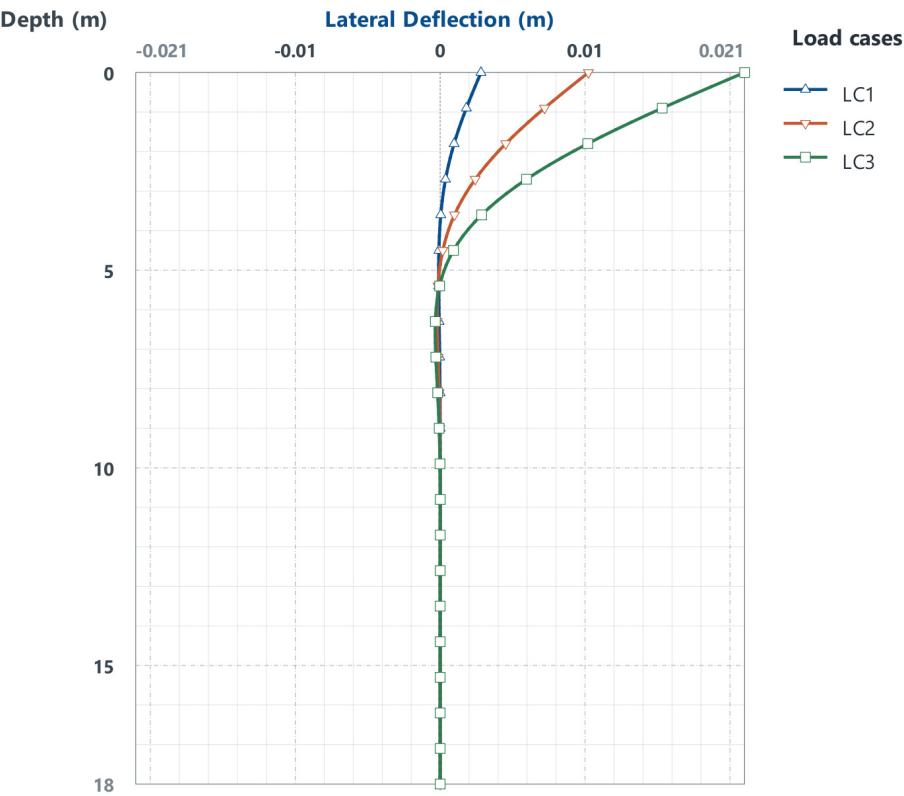


Figure 4. Lateral Deflection versus depth for the selected load cases

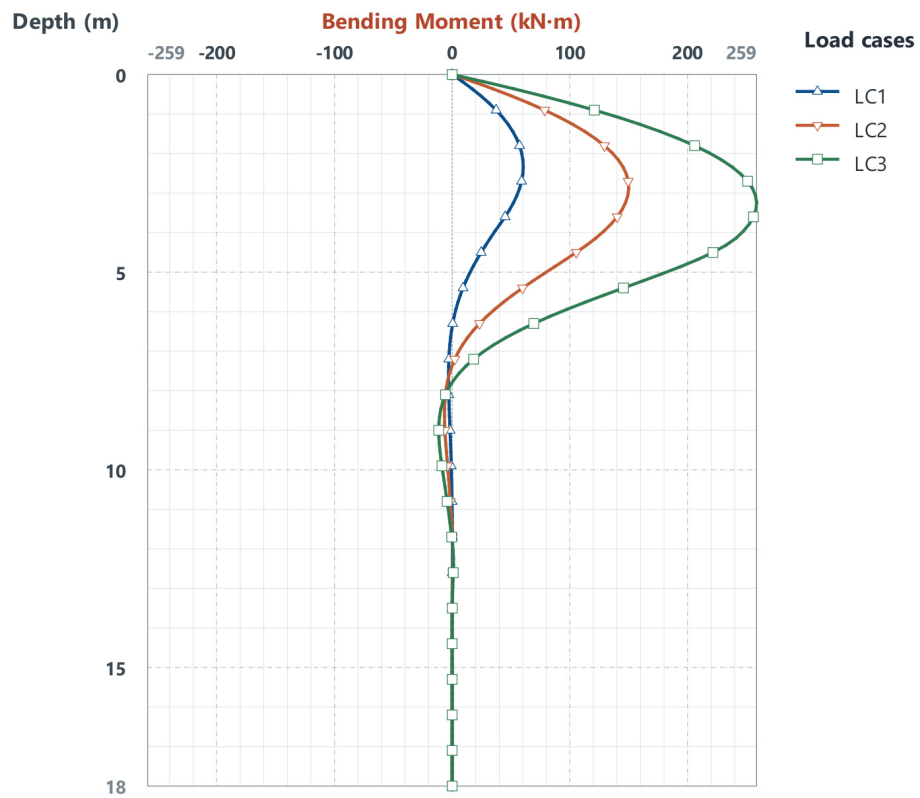


Figure 5. Bending Moment versus depth for the selected load cases

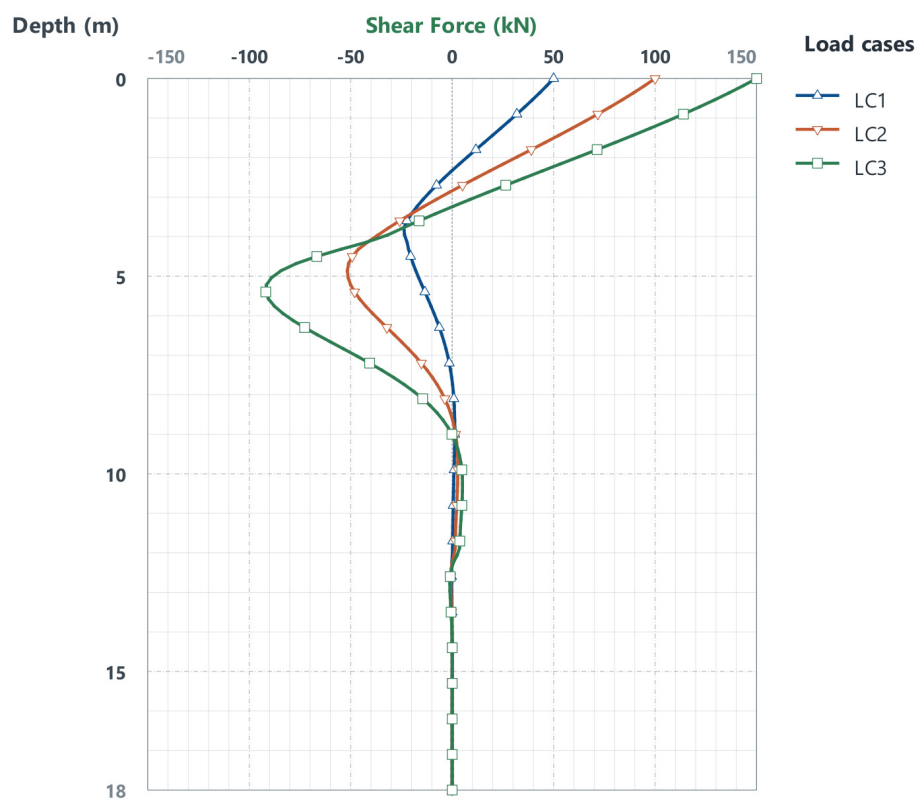


Figure 6. Shear Force versus depth for the selected load cases

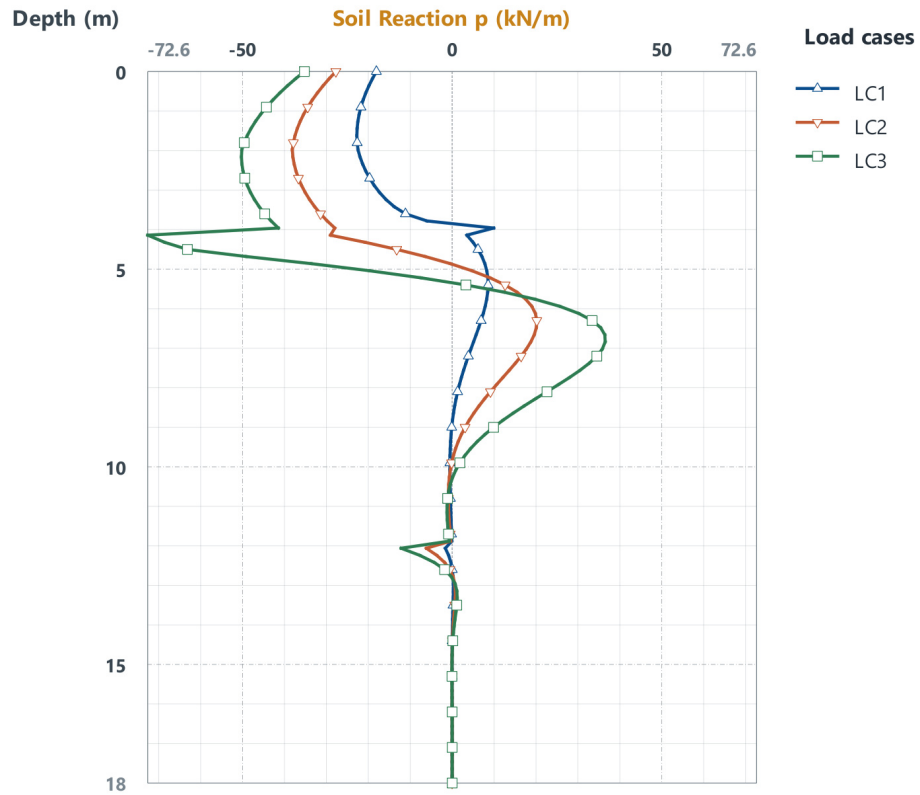


Figure 7. Soil Reaction p versus depth for the selected load cases

10. Generated p - y Curve Figure

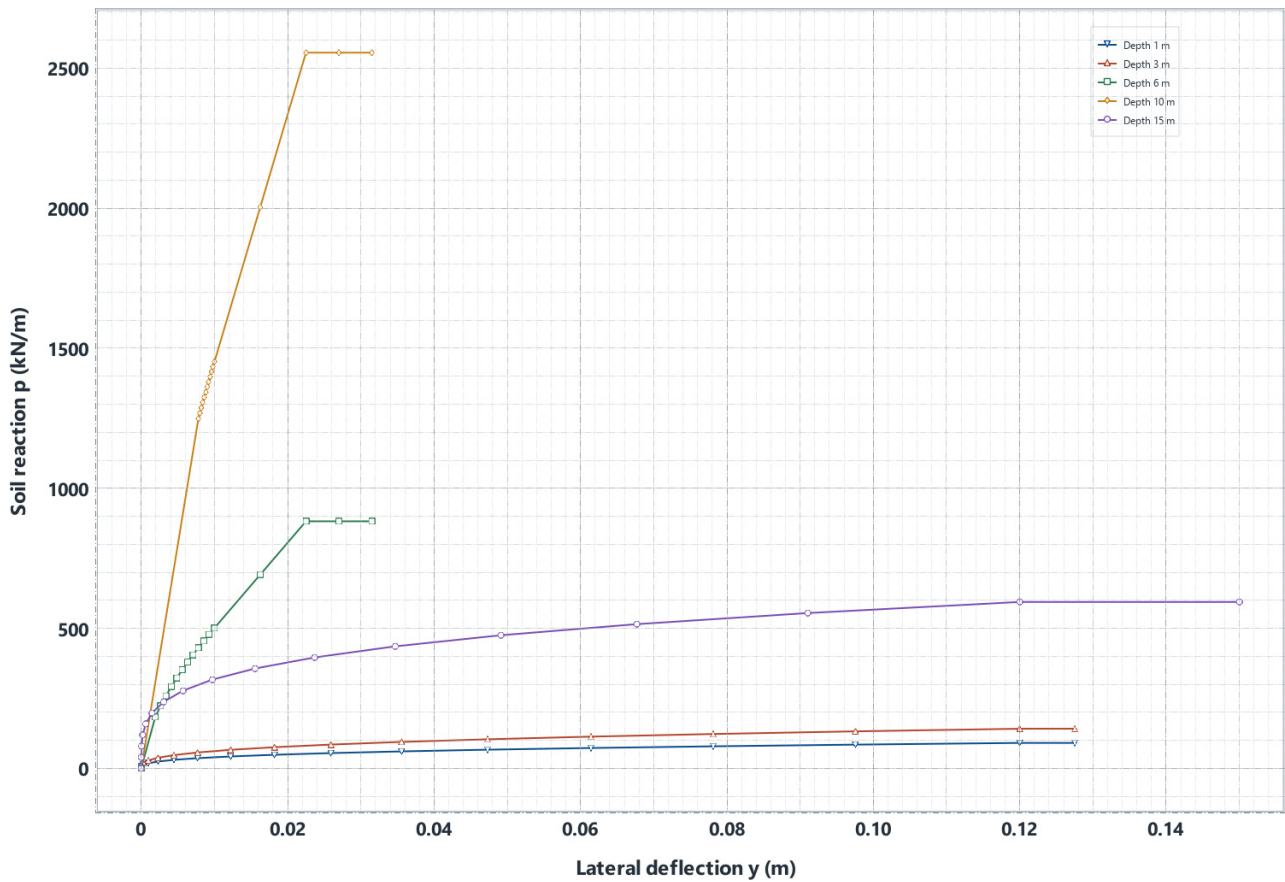


Figure 8. Generated p - y curves at depths 1, 3, 6, 10, 15 m

11. Results — Response Profiles per Load Case

11.1 Load Case 1 — response profile

Depth (m)	y (m)	Moment (kN-m)	Shear (kN)	Slope (rad)	Total stress (kPa)	Soil p (kN/m)
0	0.0028182	-2.38429e-12	50	-0.00115477	884.194	-18.0716
0.9	0.00180906	37.3721	31.8892	-0.00105374	2646.55	-21.7654
1.8	0.000963463	57.2548	11.679	-0.000807284	3584.16	-22.6593
2.7	0.000371549	58.9799	-7.68386	-0.00050654	3665.51	-19.6882
3.6	4.20437e-05	44.9882	-22.2501	-0.000238492	3005.7	-11.1454
4.5	-8.56076e-05	24.6646	-20.4708	-6.37638e-05	2047.3	6.16375
5.4	-9.93009e-05	9.23261	-13.4435	1.92779e-05	1319.58	8.57959
6.3	-6.85206e-05	0.472361	-6.28337	4.11716e-05	906.469	6.90688
7.2	-3.35682e-05	-2.77947	-1.41974	3.35715e-05	1015.27	3.86705
8.1	-1.01094e-05	-2.86051	0.837255	1.85089e-05	1019.09	1.31018
9	7.38858e-07	-1.80048	1.29532	6.57541e-06	969.1	-0.106396
9.9	3.37753e-06	-0.759696	0.950535	2.38685e-07	920.019	-0.535001
10.8	2.4088e-06	-0.116147	0.499092	-1.80734e-06	889.671	-0.41624
11.7	7.90464e-07	0.199624	0.245717	-1.50431e-06	893.608	-0.147975
12.6	-6.59711e-09	0.172435	-0.284328	-2.94098e-07	892.326	0.0326557
13.5	-4.20471e-08	0.00333869	-0.0707763	6.09293e-08	884.352	0.208133
14.4	-1.96645e-09	-0.00890934	0.0110977	1.88628e-08	884.614	0.00973394
15.3	2.10919e-09	-0.000666791	0.00434242	-2.17511e-09	884.226	-0.0104405
16.2	2.18355e-10	0.000432405	-0.000345093	-1.11798e-09	884.215	-0.00108086
17.1	-1.03246e-10	6.44402e-05	-0.000232992	5.64173e-11	884.197	0.000511068
18	5.90741e-12	0	-2.21205e-10	1.32794e-10	884.194	-2.92417e-05

11.2 Load Case 2 — response profile

Depth (m)	y (m)	Moment (kN-m)	Shear (kN)	Slope (rad)	Total stress (kPa)	Soil p (kN/m)
0	0.010233	-9.53714e-12	100	-0.00343195	884.194	-27.747
0.9	0.00720598	78.5514	71.789	-0.0032232	4588.45	-34.4572
1.8	0.00452603	129.319	38.9834	-0.00268605	6982.49	-37.881
2.7	0.00242295	149.577	5.08136	-0.00196905	7937.81	-36.6679
3.6	0.000989203	140.207	-25.8499	-0.00122562	7495.95	-31.4068
4.5	0.000183732	105.462	-49.236	-0.000596026	5857.45	-13.2287
5.4	-0.000146215	59.8798	-48.0514	-0.000178881	3707.95	12.633
6.3	-0.000200329	23.251	-32.1669	2.52483e-05	1980.64	20.1931
7.2	-0.000142866	2.21809	-15.1625	8.33536e-05	988.793	16.4582
8.1	-7.04967e-05	-5.70885	-3.6087	7.03268e-05	1153.41	9.13637
9	-2.138e-05	-6.13597	1.7026	3.84888e-05	1173.55	3.07872
9.9	7.69067e-07	-3.87057	2.82667	1.28209e-05	1066.72	-0.12182
10.8	5.30347e-06	-1.54142	2.22553	-6.19166e-07	956.883	-0.91644
11.7	2.56936e-06	0.126851	1.55323	-3.94372e-06	890.176	-0.480984
12.6	1.09895e-07	0.545587	-0.696001	-1.13836e-06	909.922	-0.543981
13.5	-1.29443e-07	0.0385582	-0.262832	1.37619e-07	886.012	0.640741
14.4	-1.292e-08	-0.0266483	0.0222353	6.76054e-08	885.451	0.063954
15.3	6.11526e-09	-0.00350071	0.0150824	-3.53619e-09	884.359	-0.0302706
16.2	1.0155e-09	0.00121044	-0.00034197	-3.76734e-09	884.251	-0.00502672
17.1	-2.7766e-10	0.000259971	-0.000783037	-2.30598e-11	884.206	0.00137441
18	-3.43866e-11	1.77643e-20	-1.09039e-09	3.39617e-10	884.194	0.000170214

11.3 Load Case 3 — response profile

Depth (m)	y (m)	Moment (kN-m)	Shear (kN)	Slope (rad)	Total stress (kPa)	Soil p (kN/m)
0	0.0210107	1.90743e-11	150	-0.00641719	884.194	-35.2537
0.9	0.015329	120.859	113.954	-0.0060987	6583.56	-44.2968
1.8	0.0101839	205.946	71.4068	-0.00525752	10596	-49.6129
2.7	0.00596058	250.993	26.3991	-0.00408664	12720.3	-49.4651
3.6	0.00286397	255.963	-16.3074	-0.00279025	12954.6	-44.7145
4.5	0.000917855	221.594	-66.6759	-0.00156517	11333.9	-63.1575
5.4	-3.79476e-05	145.554	-91.8422	-0.000628629	7748.1	3.27868
6.3	-0.000331303	69.3919	-72.7156	-9.28129e-05	4156.51	33.3954
7.2	-0.000299545	18.3022	-40.6538	0.000116917	1747.27	34.5076
8.1	-0.000174505	-5.68641	-14.5362	0.000139244	1152.35	22.6159
9	-6.86603e-05	-11.3813	-0.13308	9.09064e-05	1420.9	9.88708
9.9	-1.16097e-05	-8.73468	4.74215	3.83535e-05	1296.1	1.83898
10.8	6.31079e-06	-4.24943	4.76477	5.5753e-06	1084.58	-1.09051
11.7	4.61467e-06	-0.436409	3.74978	-5.8794e-06	904.774	-0.863867
12.6	3.64498e-07	0.960931	-0.959685	-2.27666e-06	929.509	-1.80427
13.5	-2.23285e-07	0.104507	-0.513765	1.70276e-07	889.122	1.10526
14.4	-3.15116e-08	-0.0449208	0.0223282	1.2943e-07	886.312	0.155982
15.3	1.0041e-08	-0.00798403	0.0283197	-1.85443e-09	884.571	-0.0497027
16.2	2.21292e-09	0.00192578	0.000377985	-6.93605e-09	884.285	-0.010954
17.1	-4.24967e-10	0.000531192	-0.00143908	-3.04103e-10	884.219	0.00210359
18	-1.29948e-10	1.77643e-19	-2.34304e-09	4.92872e-10	884.194	0.000643244