

RSPile 2018

Pile Capacity and Loading Analysis

**Axial Pile Analysis
Verification Manual**

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Introduction

This document contains a series of verification pile analysis problems that have been analyzed using *RSPile* version 2018 2.006. Verification test cases are derived from varying loading and soil parameters.

RSPile 2018 results are computed and checked against *TZPile 2014* and the comparisons are graphed in the results section of each problem.

For all examples, a short statement of the problem is given first, followed by a presentation of the analysis results. Full references cited in any of the verification tests are found at the end of the document.

It should be noted that the sign convention utilized by *RSPile 2018* and *TZPile 2014* for displacement graphs are inverses of each other and thus *RSPile 2018's* data has been adjusted to suit the latter's sign convention.

The *RSPile* verification files are located in the **RSPile 2018 Examples > Axial Materials Verifications**.

RSPile Verification Problem #1

Coyle Reese clay

Case 1

a. Problem Description

Problem 1, case 1 is an axially loaded pile in a uniform layer of Coyle Reese clay. Pile and soil properties are given in tables 1-1 and 1-2 below.

b. Material Properties

Table 1-1: Coyle Reese Clay Properties

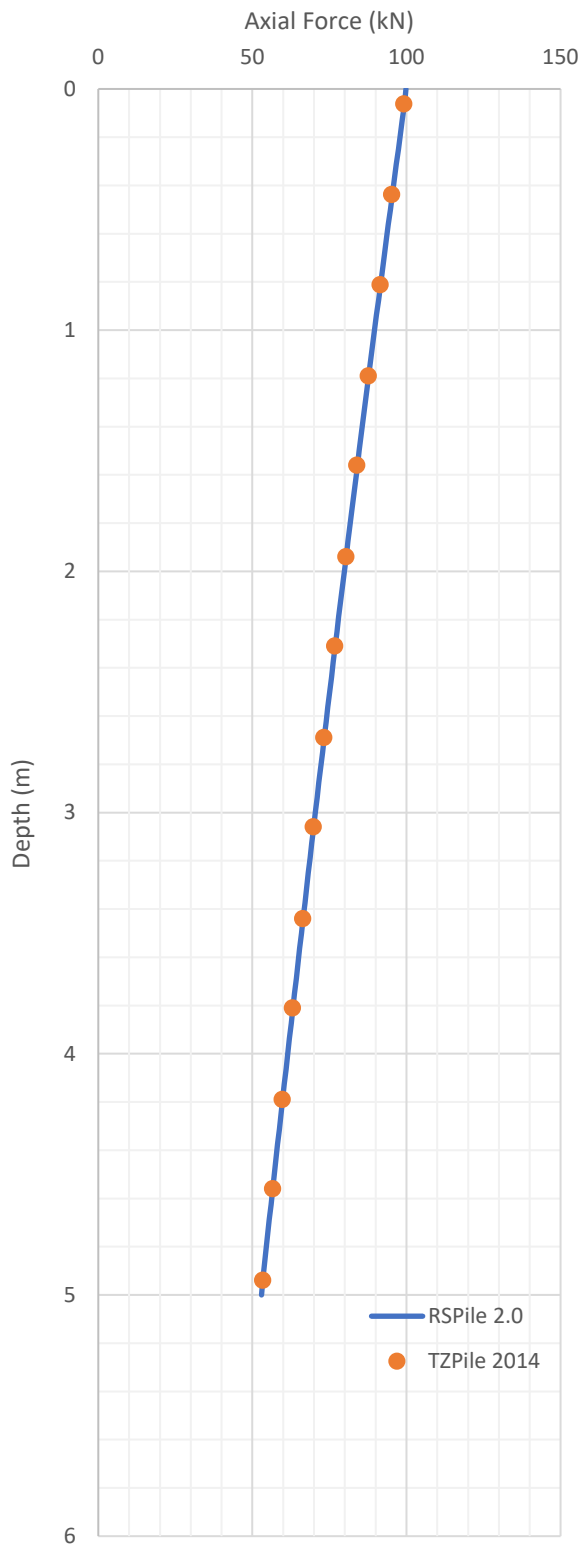
Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
E50	0.1
Shear Strength	25 kPa
Axially Loaded Piles	
Soil Type	Coyle and Reese clay
Ultimate Shear Resistance	200 kPa
Ultimate End Bearing Resistance	1,000,000 kPa
Soil Layer Depth	5 m

Table 1-2: Pile and Loading Properties

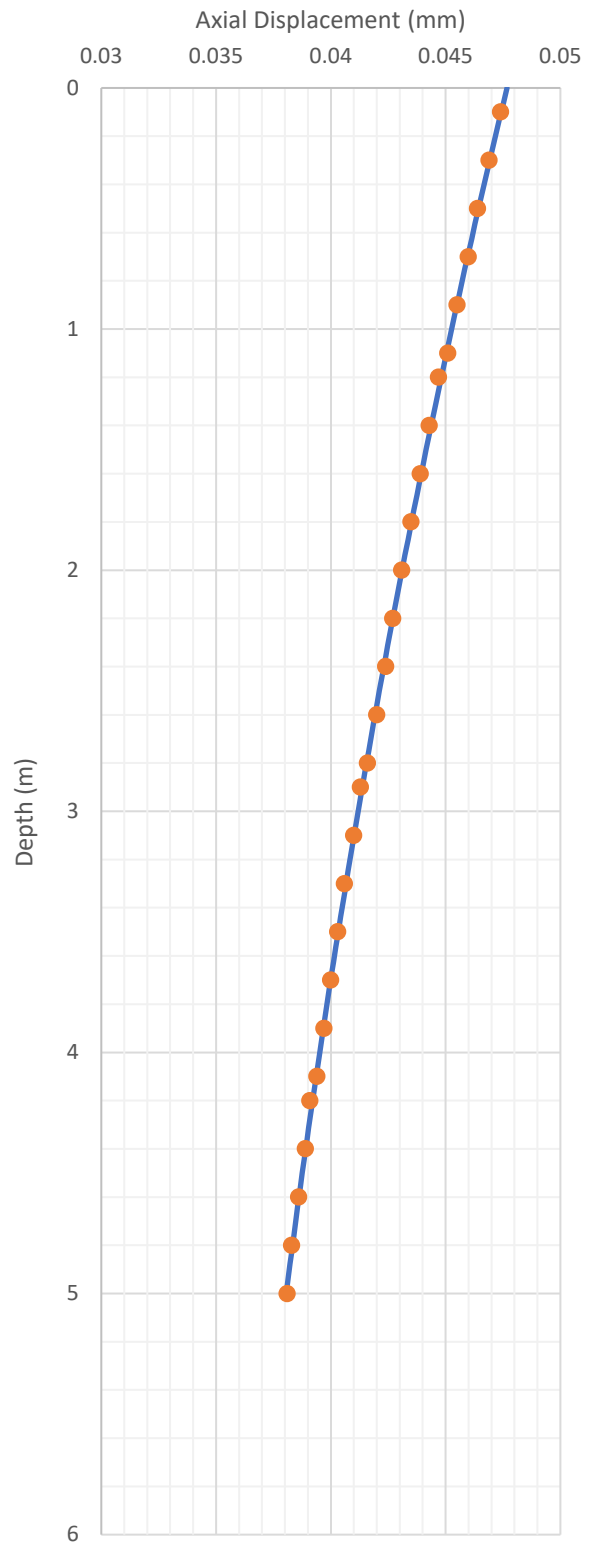
Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circular
Outer Diameter	0.5 m
Segments	40
Embedment Length	5 m
Axial Load	100 kN

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



Case 2

a. Problem Description

Problem 1, case 2 is an axially loaded pile in Coyle and Reese Clay. The soil properties vary with depth. Soil and pile properties are listed in tables 1-3 and 1-4 below.

b. Material Properties

Table 1-3: Coyle Reese Clay Properties

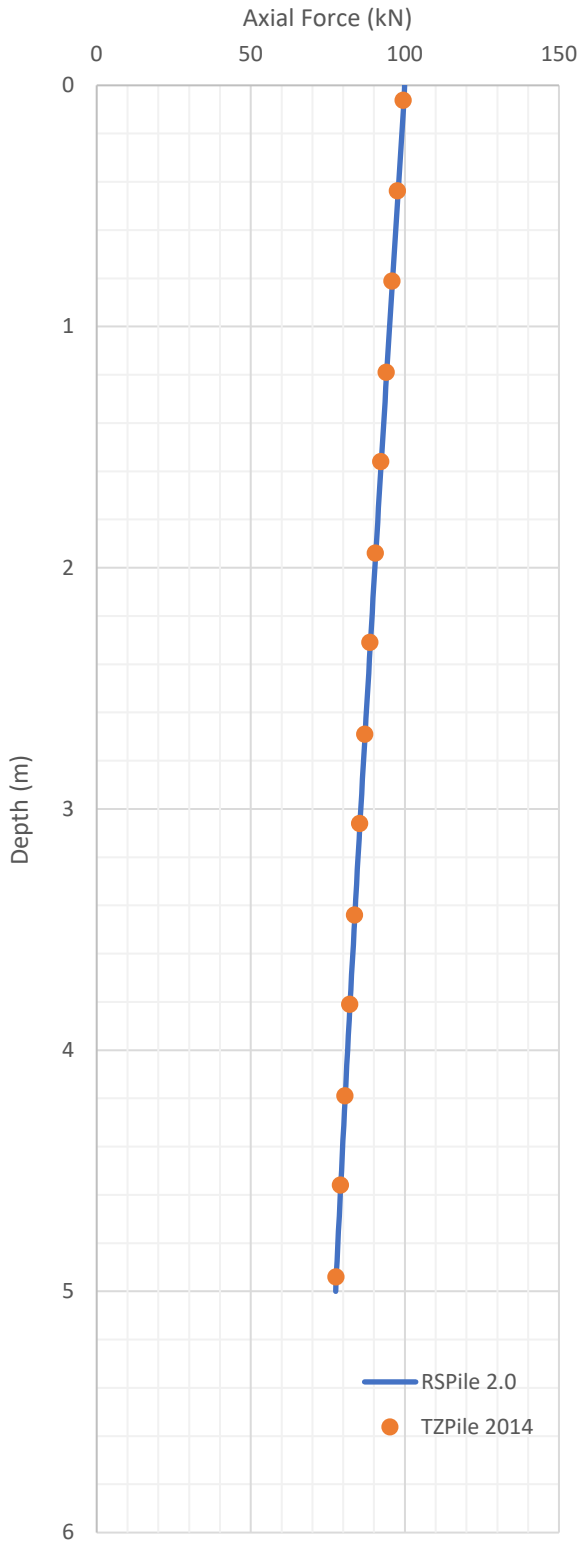
Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
E50	Top: 0.01 Bottom: 0.02
Shear Strength	Top: 20 kPa Bottom: 30 kPa
Axially Loaded Piles	
Soil Type	Coyle and Reese clay
Ultimate Shear Resistance	Top: 200 kPa Bottom: 300 kPa
Ultimate End Bearing Resistance	Top: 500,000 kPa Bottom: 1,000,000 kPa
Soil Layer Depth	5 m

Table 1-4: Pile and Loading Properties

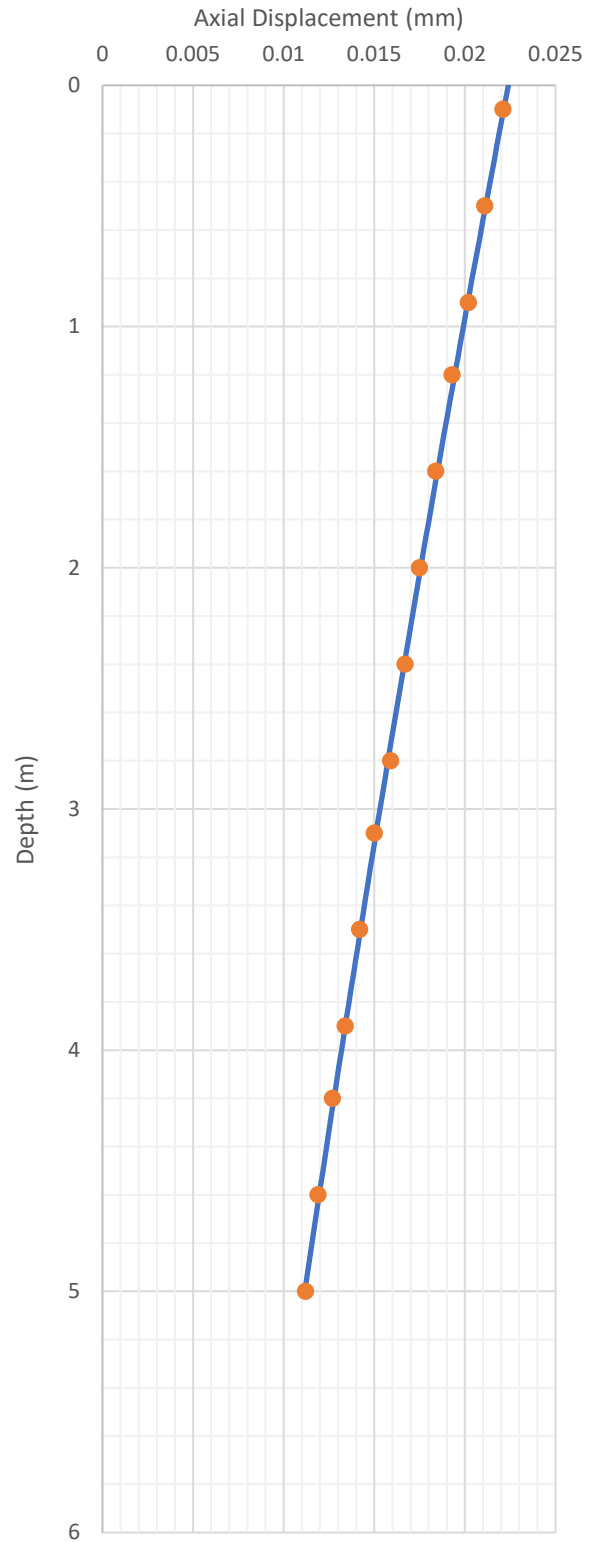
Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circular
Outer Diameter	0.5 m
Segments	40
Embedment Length	5 m
Axial Load	100 kN

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



Case 3

a. Problem Description

Problem 1, case 3 is an axially loaded pile in Coyle Reese clay. The soil and pile properties are given in imperial units and are listed in the tables below.

b. Material Properties

Table 14: Coyle Reese Clay Properties

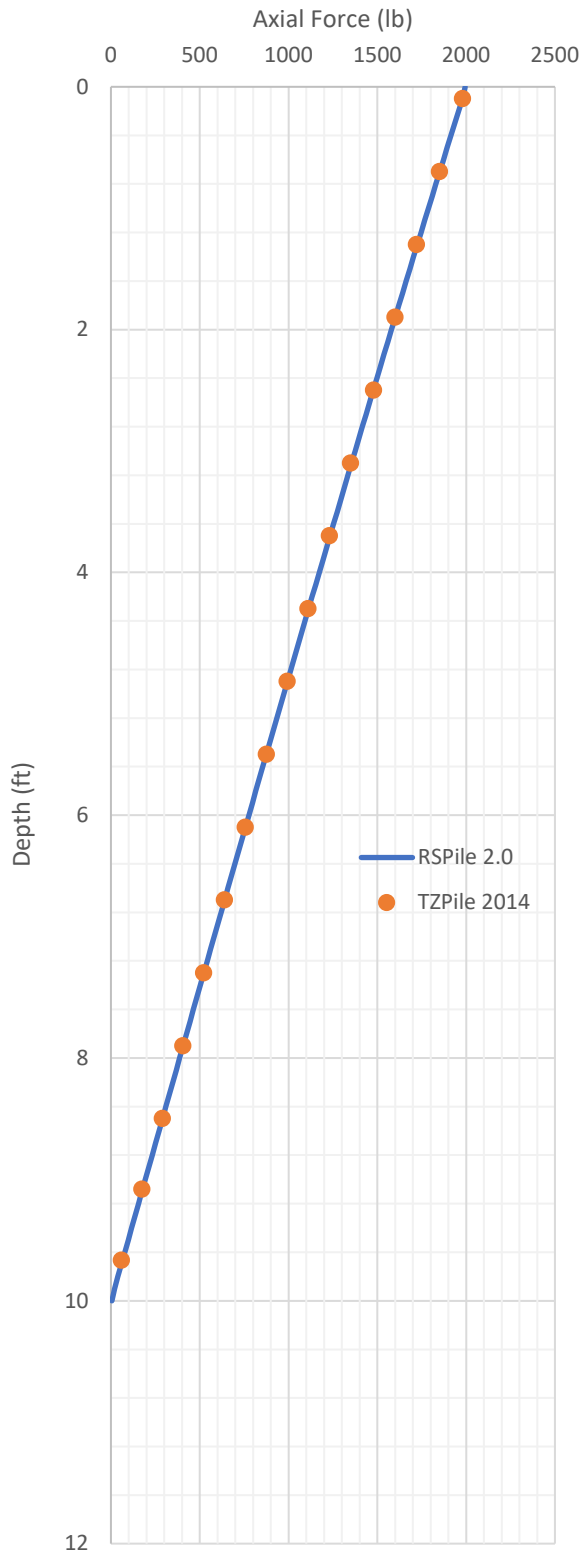
Parameter	Value
General Properties	
Unit Weight	100 lb/ft ³
E50	0.1
Shear Strength	500 psf
Axially Loaded Piles	
Soil Type	Coyle and Reese clay
Ultimate Shear Resistance	1000 psf
Ultimate End Bearing Resistance	1000 psf
Soil Layer Depth	10 ft

Table 1-5: Pile and Loading Properties

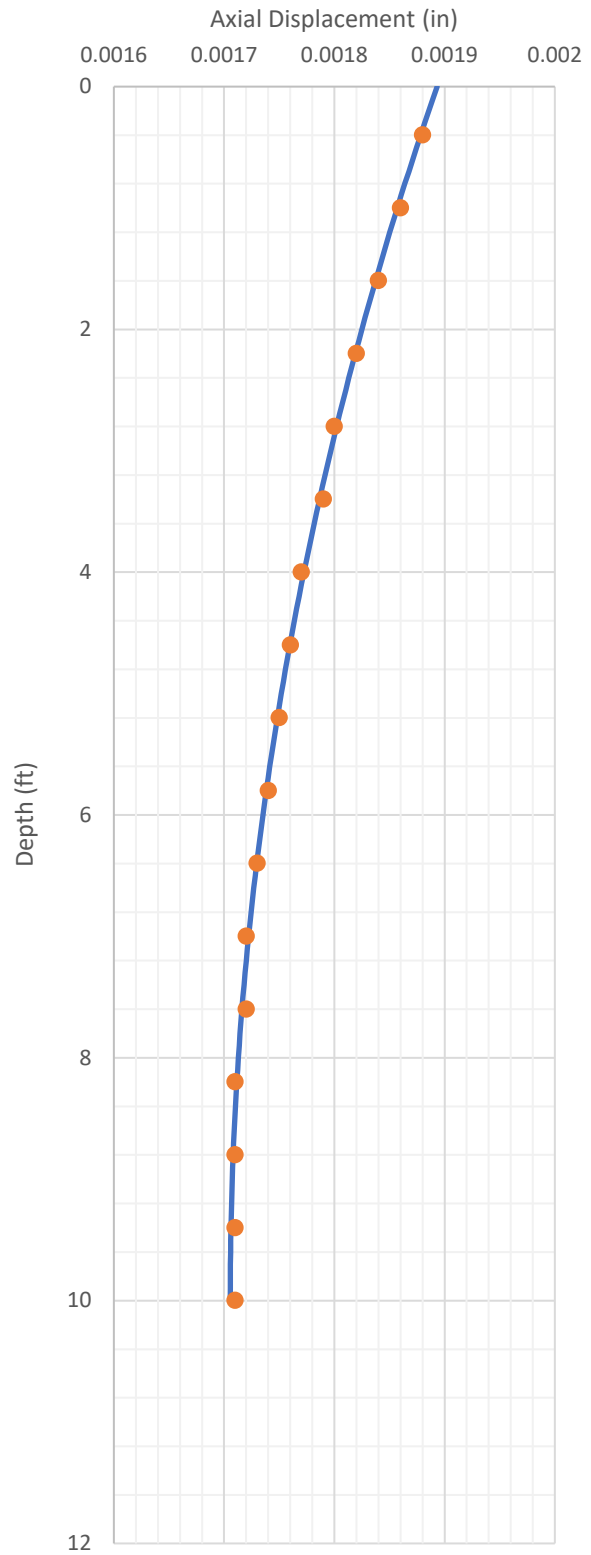
Parameter	Value
Young's Modulus (E)	200,000,000 psf
Cross Section	Circular
Outer Diameter	2 ft
Segments	50
Embedment Length	10 ft
Axial Load	2000 lb

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



RSPile Verification Problem #2

API Clay soil, imperial and metric units

Case 1

a. Problem Description

Problem 2, case 1 is an axially loaded pile located inside a single layer of API clay. Pile and soil properties are given in tables 2-1 and 2-2

b. Material Properties

Table 2-1: API Clay Properties

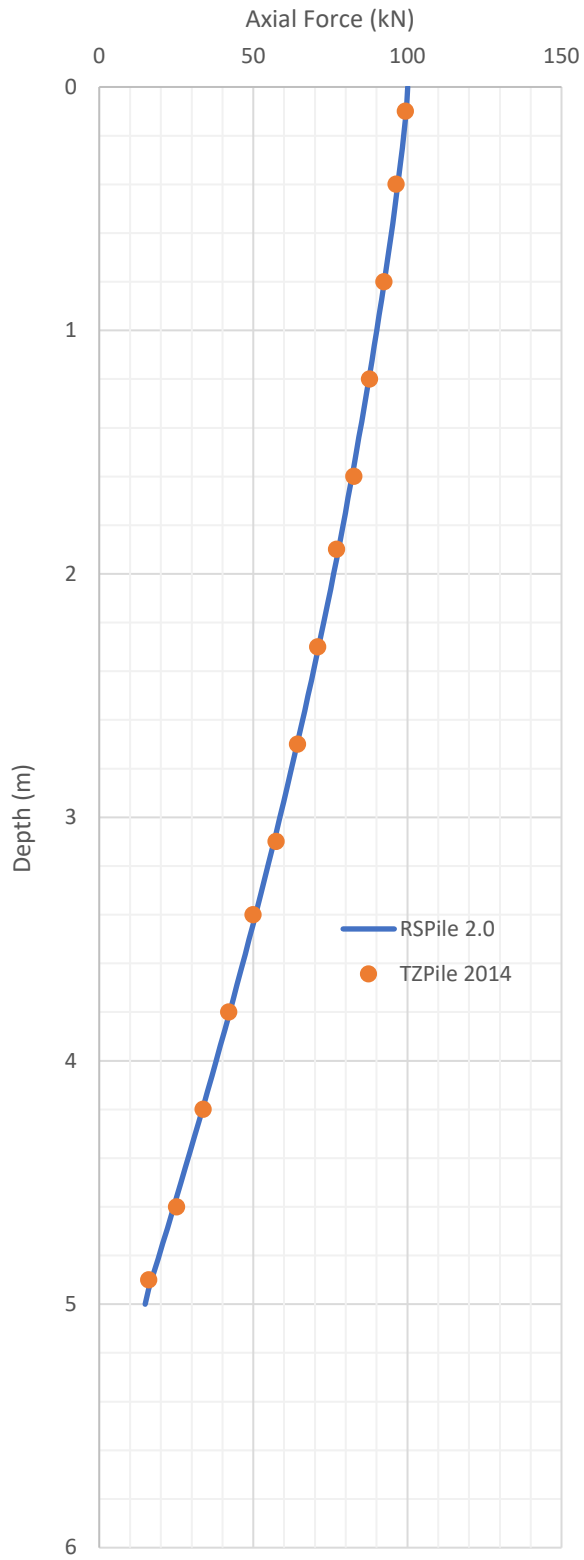
Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
Undrained Shear Strength	25 kPa
Axially Loaded Piles	
Soil Type	API Clay
Max Unit Skin Friction	1,000,000 kPa
Max Unit End Bearing Resistance	1,000,000 kPa
Remolded Shear Strength	20 kPa
Soil Layer Depth	5 m

Table 2-2: Pile and Loading Properties

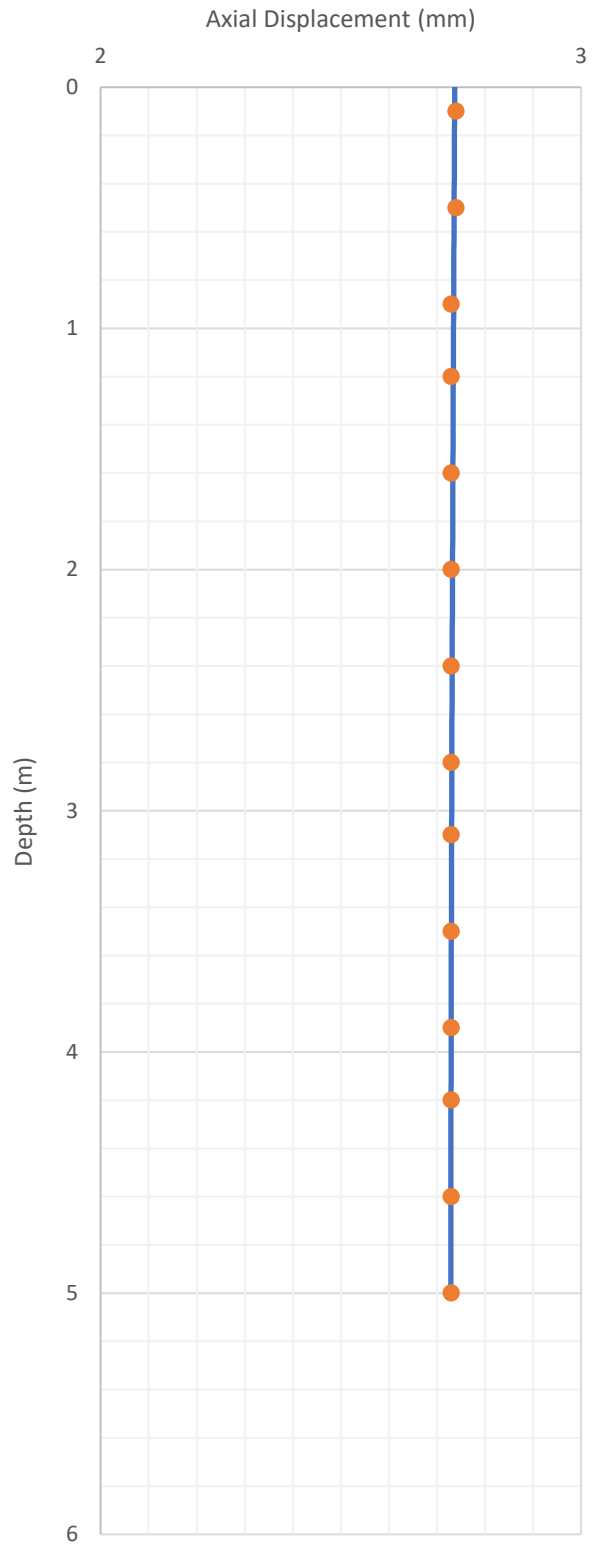
Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circular
Outer Diameter	0.5 m
Segments	40
Embedment Length	5 m
Axial Load	100 kN

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



Case 2

a. Problem Description

Problem 2, case 2 is an axially loaded pile in API clay. The properties are given in imperial units and are listed in the tables below.

b. Material Properties

Table 2-3: API Clay Properties

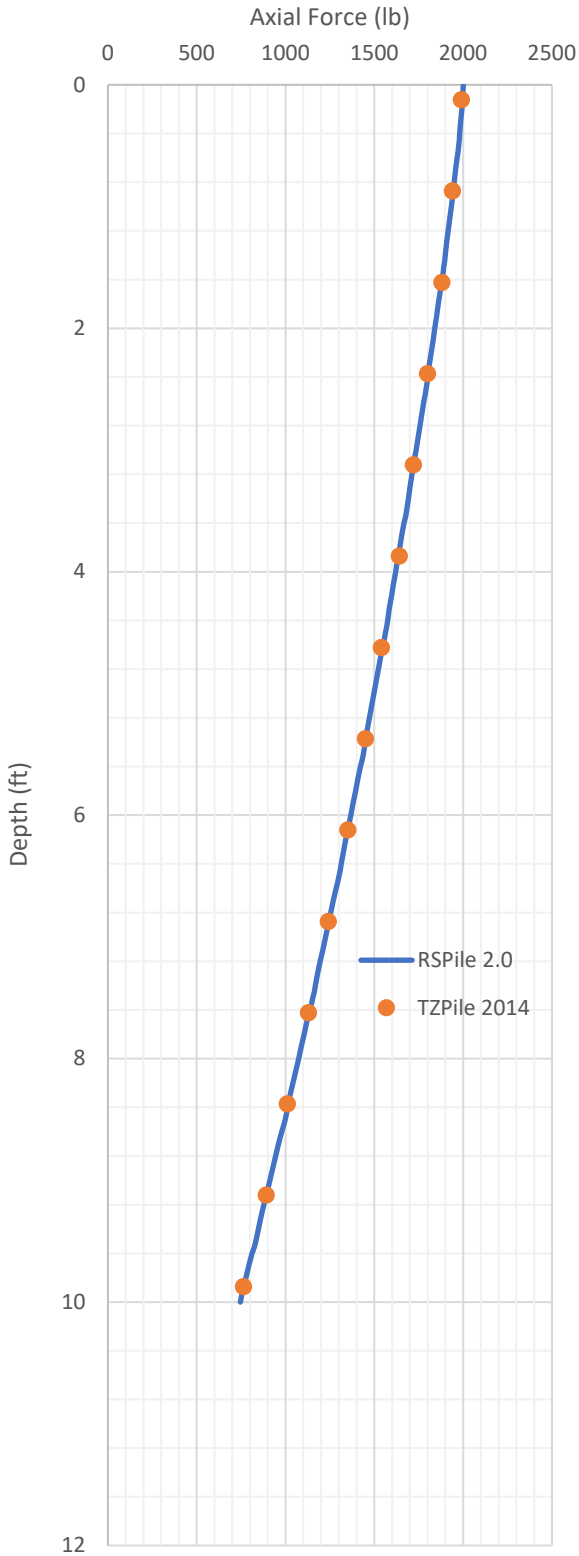
Parameter	Value
General Properties	
Unit Weight	100 lb/ft ³
Undrained Shear Strength	500 psf
Axially Loaded Piles	
Soil Type	API Clay
Max Unit Skin Friction	2,000,000 psf
MaxUnit End Bearing Resistance	2,000,000 psf
Remolded Shear Strength	400 psf
Soil Layer Depth	10 ft

Table 2-4: Pile and Loading Properties

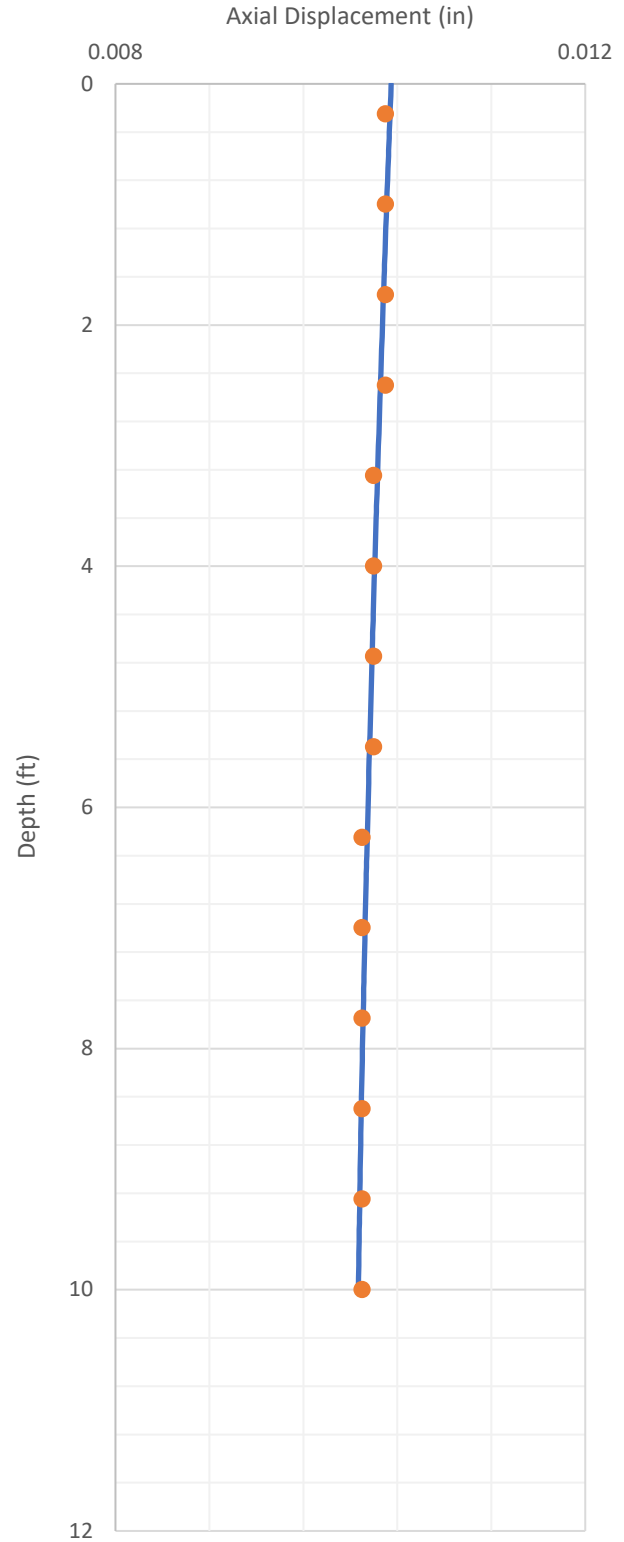
Parameter	Value
Young's Modulus (E)	200,000,000 psf
Cross Section	Circular
Outer Diameter	2 ft
Segments	50
Embedment Length	10 ft
Axial Load	2000 lb

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



Case 3

a. Problem Description

Problem 2, case 3 is an axially loaded pile embedded in API clay with properties varying from top to bottom of the soil layer. The soil and pile properties are listed in the tables below.

b. Material Properties

Table 2-5: API Clay Properties

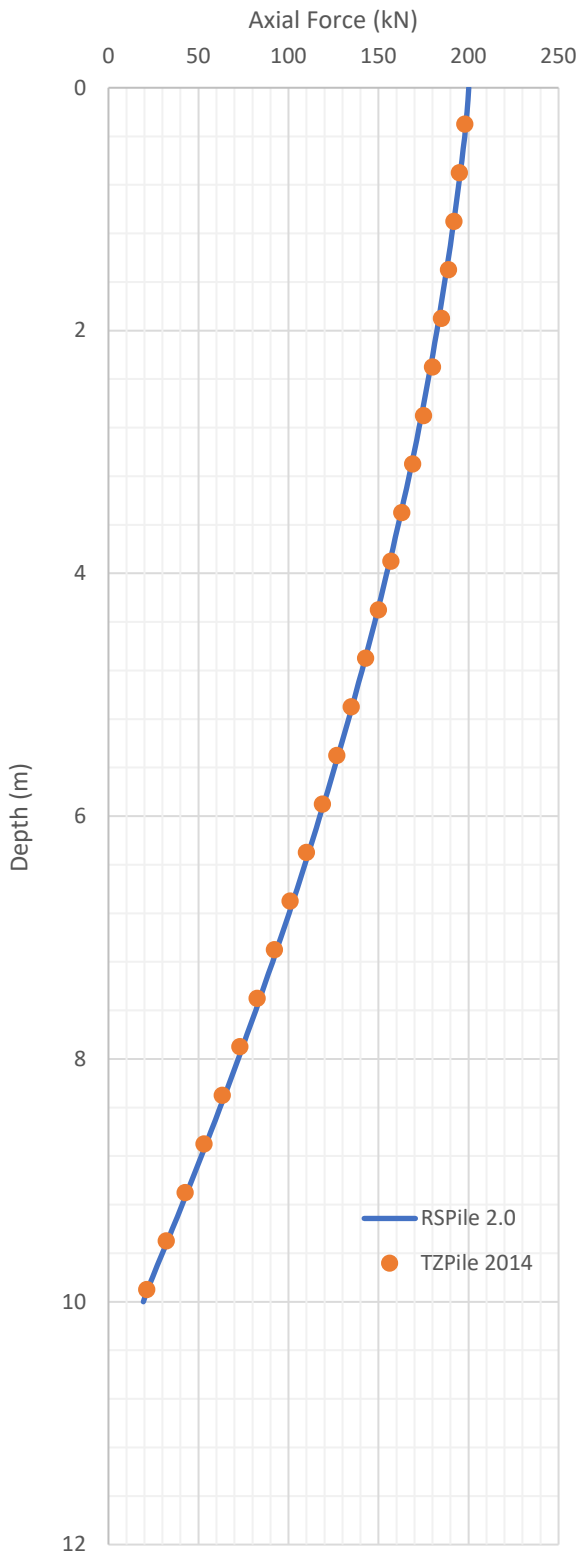
Parameter	Value
General Properties	
Unit Weight	Top: 15 kN/m ³ Bottom: 20 kN/m ³
Shear Strength	Top: 30 kPa Bottom: 40 kPa
Axially Loaded Piles	
Soil Type	API Clay
Max Unit Skin Friction	1,000,000 kPa
Max Unir End Bearing Resistance	1,000,000 kPa
Remolded Shear Strength	Top: 10 kPa Bottom: 15 kPa
Soil Layer Depth	10 m

Table 2-6: Pile and Loading Properties

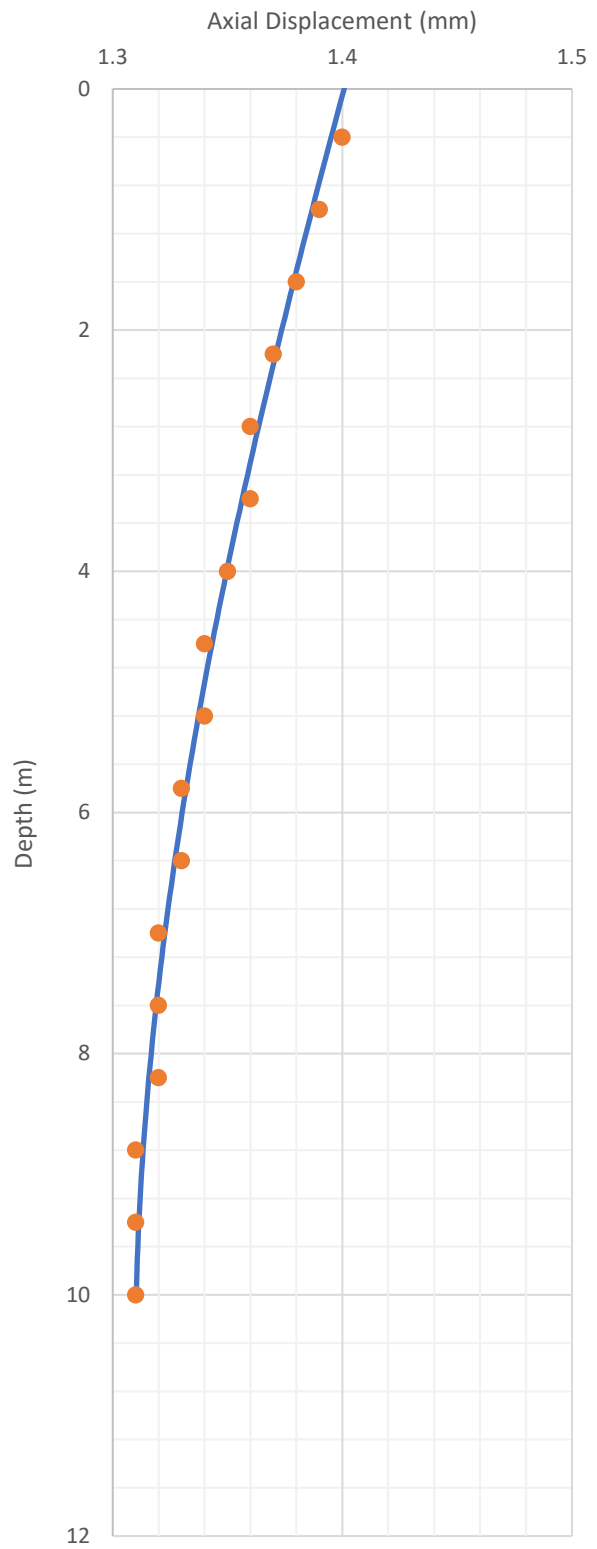
Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Pipe
Outer Diameter	0.5 m
Wall Thickness	0.05 m
Segments	50
Embedment Length	10 m
Axial Load	200 kN

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



Case 4

a. Problem Description

Problem 2, case 4 is an axially loaded pile in API clay. The T-Z and Q-Z curves are modified with multipliers. The soil and pile properties are listed in the tables below.

b. Material Properties

Table 2-7: API Clay Properties

Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
Undrained Shear Strength	25 kPa
Axially Loaded Piles	
Soil Type	API Clay
Max Unit Skin Friction	1,000,000 kPa
Max Unit End Bearing Resistance	1,000,000 kPa
Remolded Shear Strength	20 kPa
Soil Layer Depth	5 m

Table 2-8: TZ Multipliers

Depth (m)	Z Multiplier	T-Multiplier
2	1.1	0.5
4	1.2	0.8

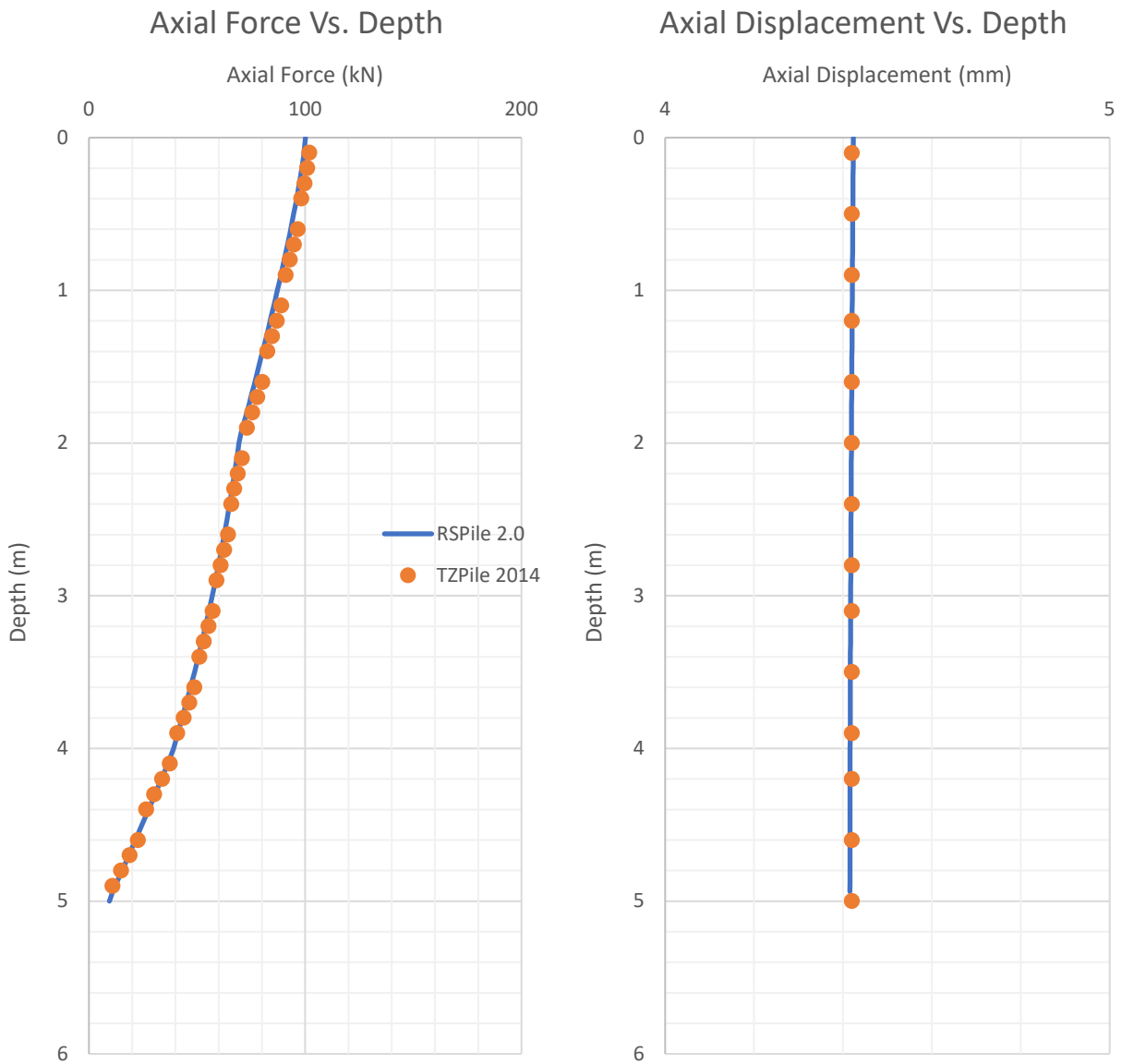
Table 2-9: QZ Multipliers

Z Multiplier	Q-Multiplier
1.5	0.6

Table 2-10: Pile and Loading Properties

Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circular
Outer Diameter	0.5 m
Segments	40
Embedment Length	5 m
Axial Load	100 kN

c. Results



Case 5

a. Problem Description

Problem 2, case 5 is an axially loaded pile in API clay. The soil properties vary from the top to the bottom of the soil layer. The soil and pile properties are listed in the tables below.

b. Material Properties

Table 2-11: API Clay Properties

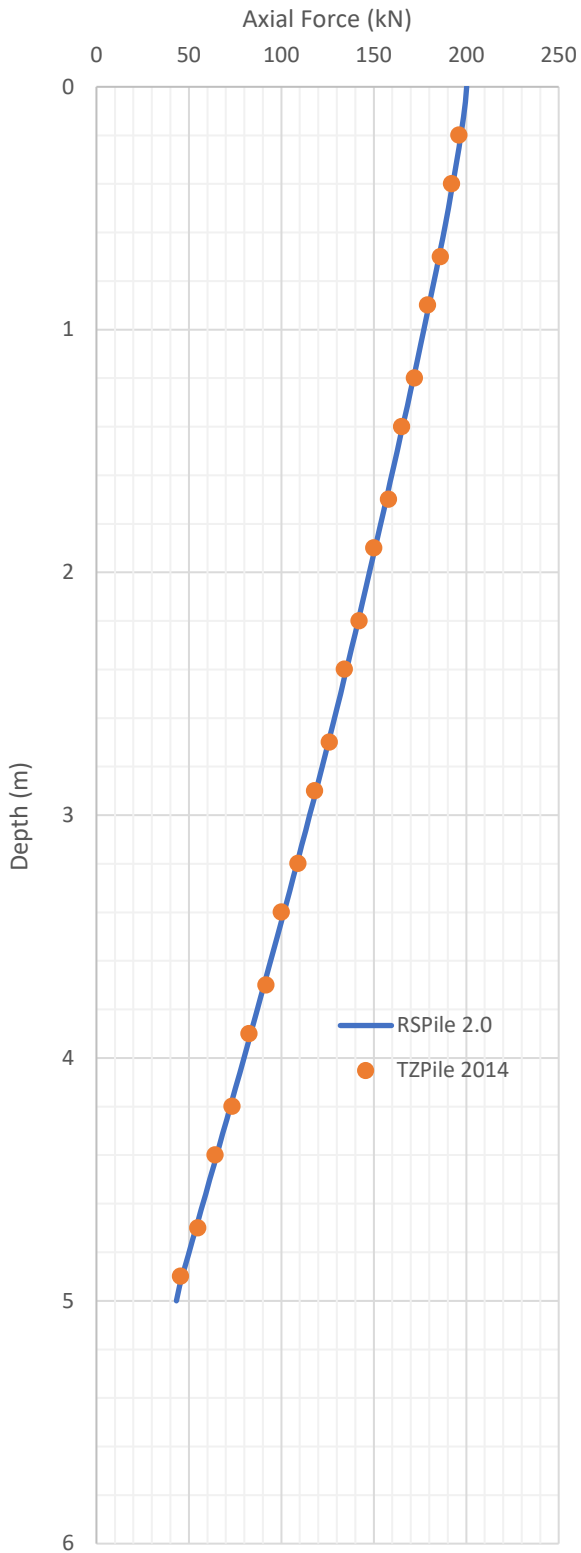
Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
Undrained Shear Strength	Top: 40 kPa Bottom: 20 kPa
Axially Loaded Piles	
Soil Type	API Clay
Max Unit Skin Friction	1,000,000 kPa
Ultimate End Bearing Resistance	1,000,000 kPa
Remolded Shear Strength	15 kPa
Soil Layer Depth	5 m

Table 2-12: Pile and Loading Properties

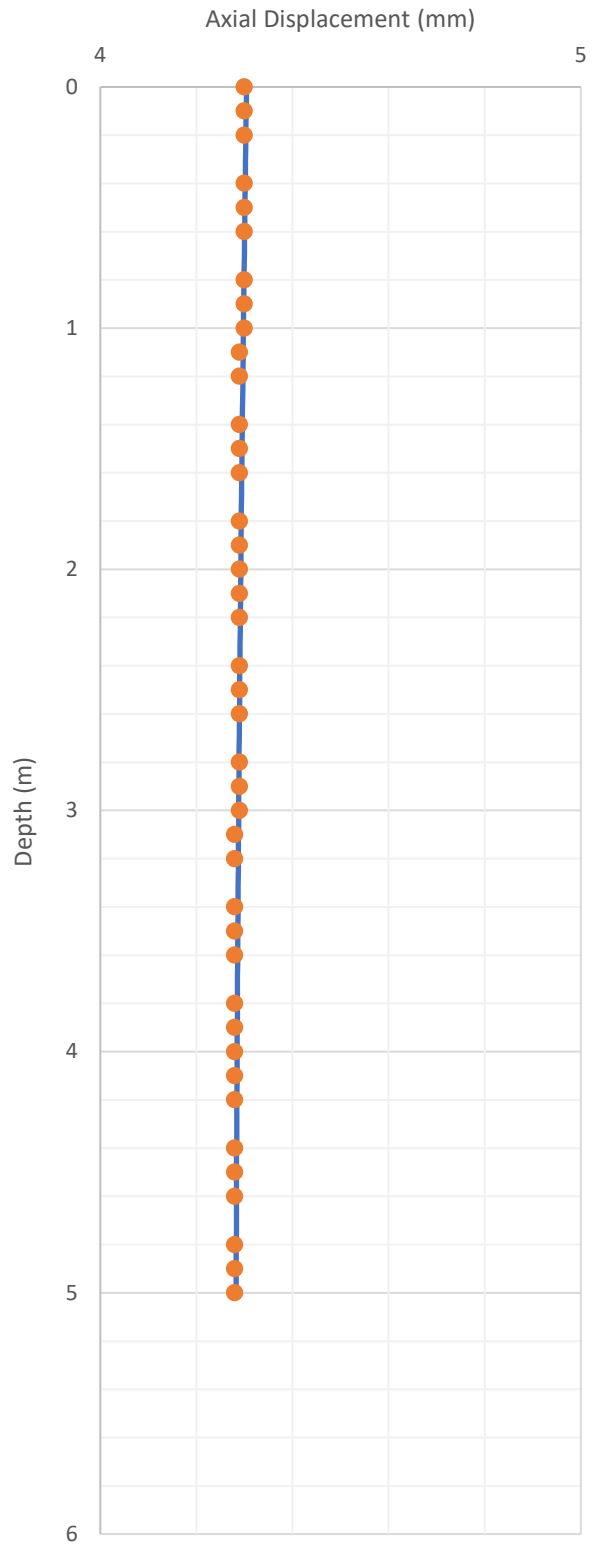
Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Pipe
Outer Diameter	1 m
Wall Thickness	0.05 m
Segments	40
Embedment Length	5 m
Axial Load	200 kN

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



RSPile Verification Problem #3

Drilled Clay, imperial and metric units

Case 1

a. Problem Description

Problem 3, case 1 is an axially loaded pile located inside a single layer of drilled clay. Pile and soil properties are given in tables 3-1 and 3-2

b. Material Properties

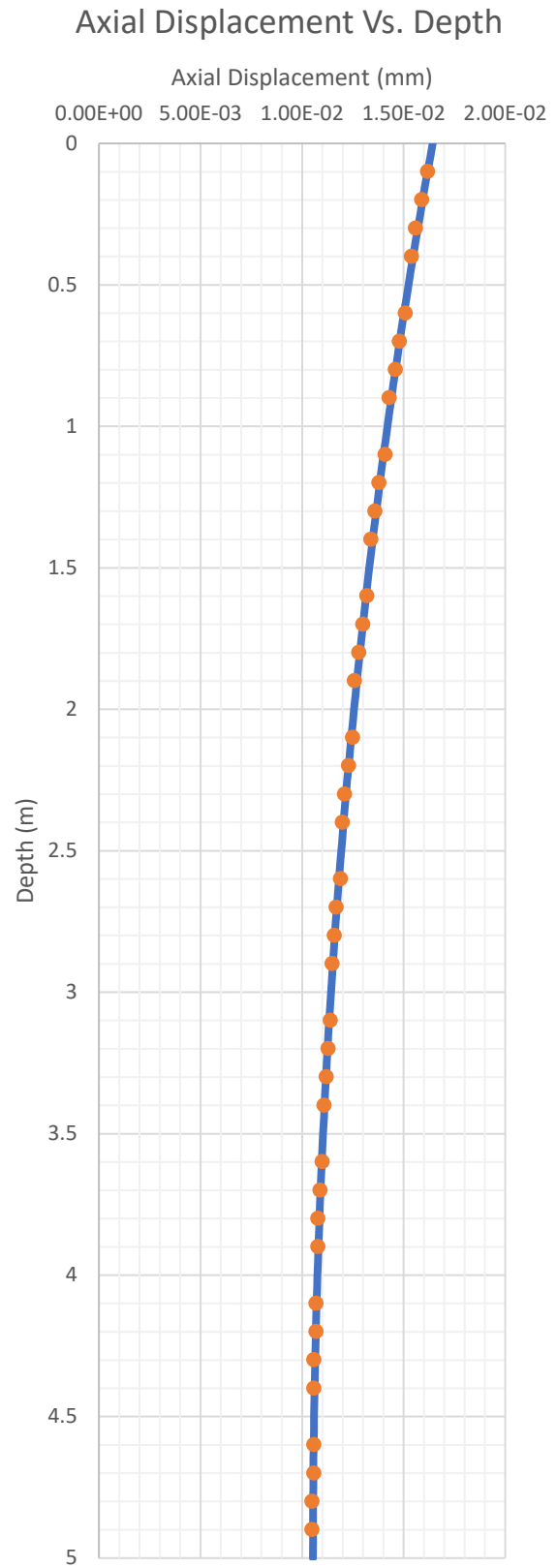
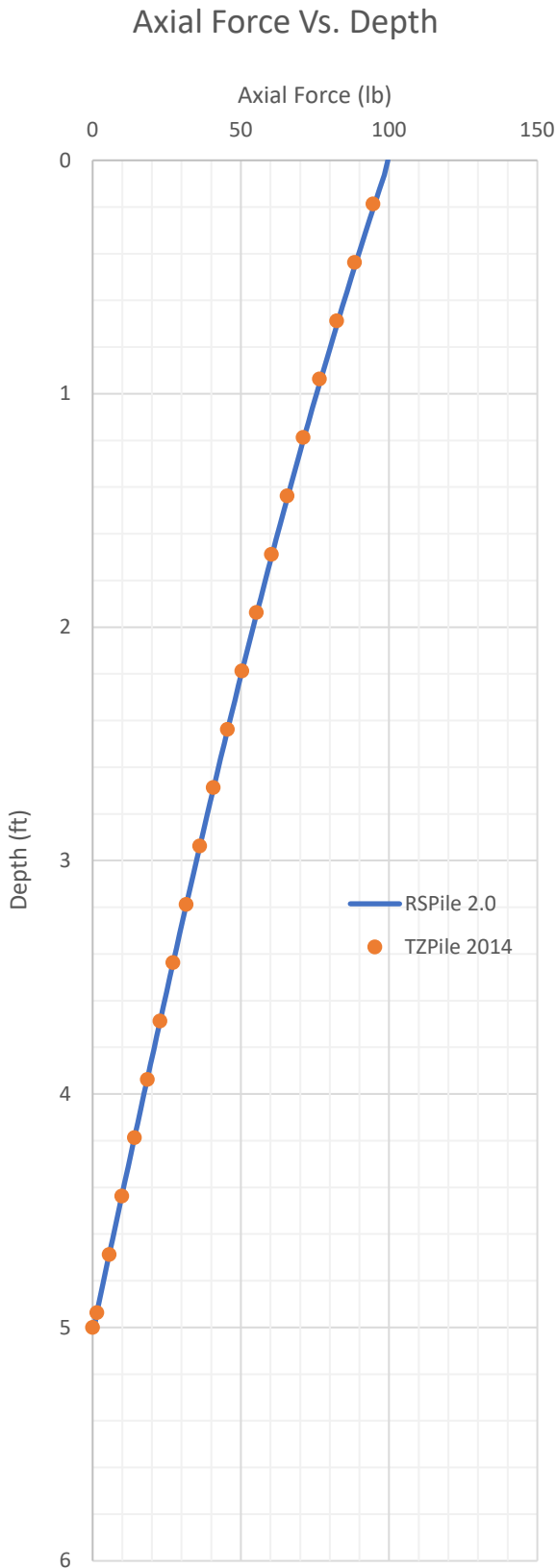
Table 3-1: Drilled Clay Properties

Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
Axially Loaded Piles	
Soil Type	Drilled Clay
Ultimate Shear Resistance	1,000 kPa
Ultimate End Bearing Resistance	1,000 kPa
Soil Layer Depth	5 m

Table 3-2: Pile and Loading Properties

Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circular
Outer Diameter	0.5 m
Segments	40
Embedment Length	5 m
Axial Load	100 kN

c. Results



Case 2

a. Problem Description

Problem 3, case 2 is an axially loaded pile located inside a single layer of drilled clay. Pile and soil properties are given in tables 3-3 and 3-4

b. Material Properties

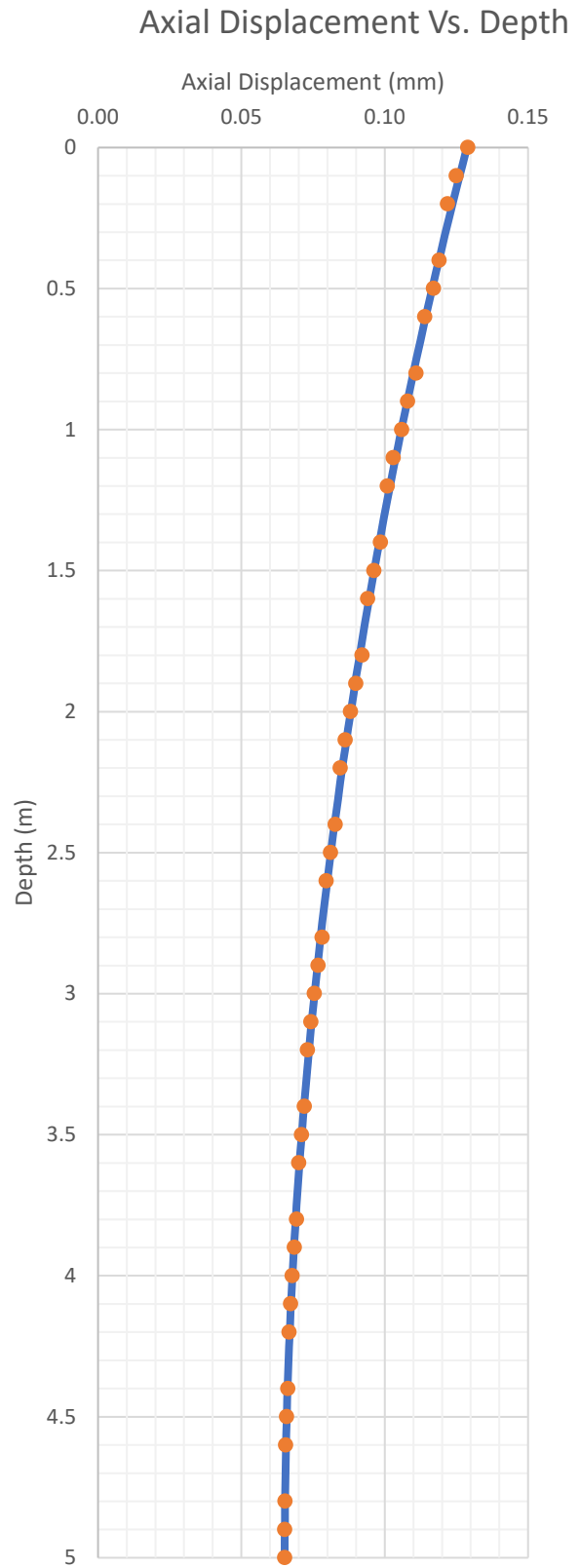
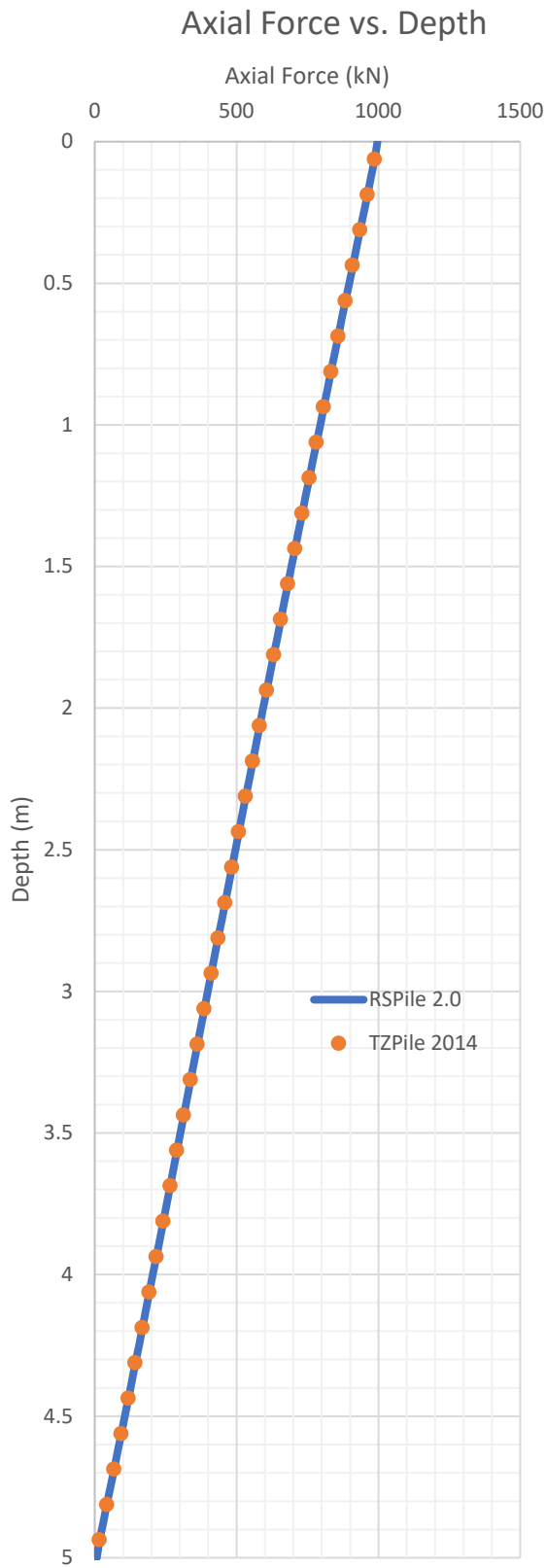
Table 3-3: Drilled Clay Properties

Parameter	Value
General Properties	Top
Unit Weight	15 kN/m ³
Axially Loaded Piles	
Soil Type	Drilled Clay
Ultimate Shear Resistance	Top: 1,000 kPa Bottom: 2,000 kPa
Ultimate End Bearing Resistance	Top: 1,000 kPa Bottom: 2,000 kPa
Soil Layer Depth	5 m

Table 3-4: Pile and Loading Properties

Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circular
Outer Diameter	0.5 m
Segments	40
Embedment Length	5 m
Axial Load	1000 kN

c. Results



Case 3

a. Problem Description

Problem 3, case 3 is an axially loaded pile located inside a single layer of drilled clay. Pile and soil properties are given in tables 3-5 and 3-6

b. Material Properties

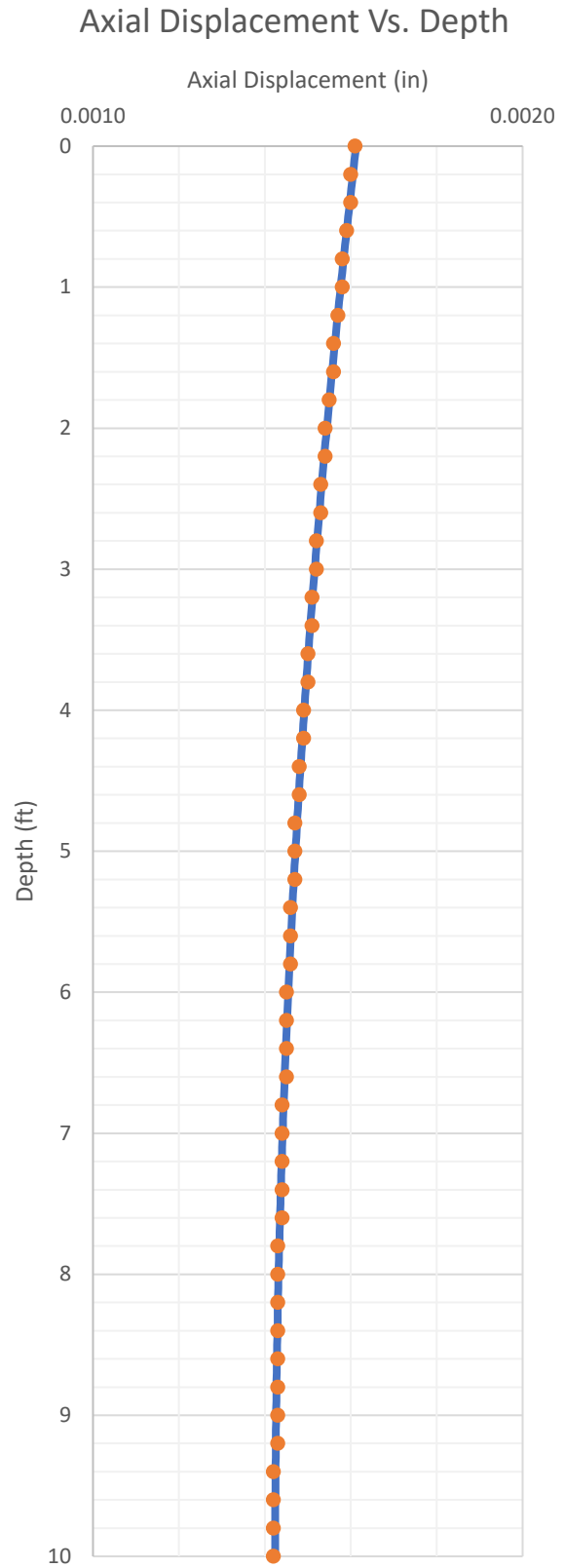
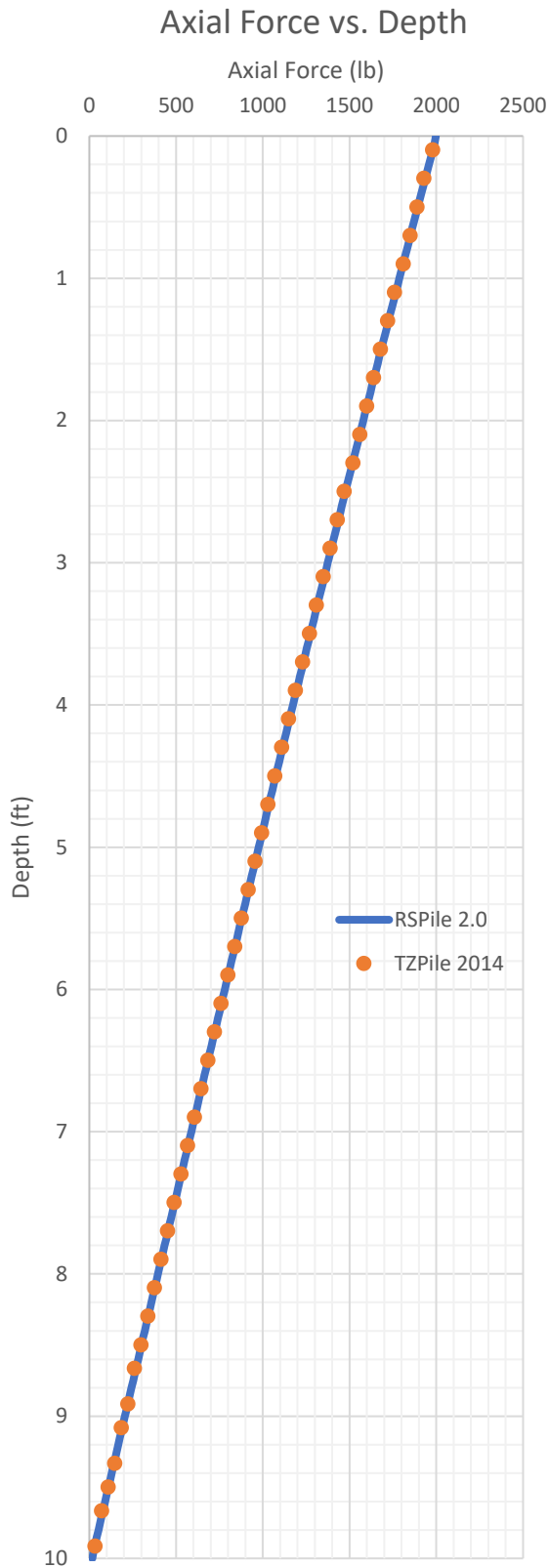
Table 3-5: Drilled Clay Properties

Parameter	Value
General Properties	
Unit Weight	100 lb/ft ³
Axially Loaded Piles	
Soil Type	Drilled Clay
Ultimate Shear Resistance	1,000 psf
Ultimate End Bearing Resistance	1,000 psf
Soil Layer Depth	10 ft

Table 3-6: Pile and Loading Properties

Parameter	Value
Young's Modulus (E)	200,000,000 psf
Cross Section	Circular
Outer Diameter	2 ft
Segments	40
Embedment Length	10 ft
Axial Load	2000 lb

c. Results



RSPile Verification Problem #4

Mosher sand

Case 1

a. Problem Description

Problem 3, case 1 is an axially loaded pile embedded in a uniform layer of Mosher sand soil. Properties are given in imperial units and are listed in tables 3-1 and 3-2 below.

b. Material Properties

Table 3-1: Mosher Sand Properties

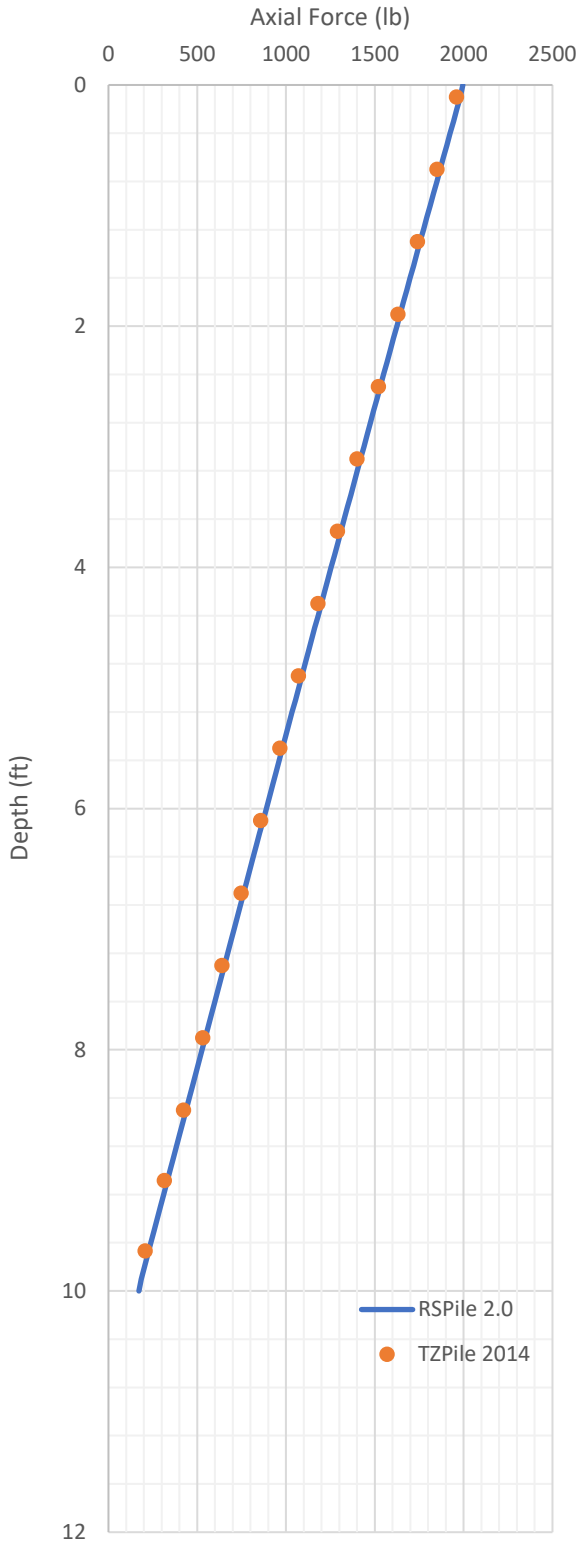
Parameter	Value
General Properties	
Unit Weight	100 lb/ft ³
Friction Angle	30 degrees
Axially Loaded Piles	
Soil Type	Mosher Sand
Ultimate Shear Resistance	1000 psf
Ultimate End Bearing Resistance	1000 psf
Soil Layer Depth	10 ft

Table 3-2: Pile and Loading Properties

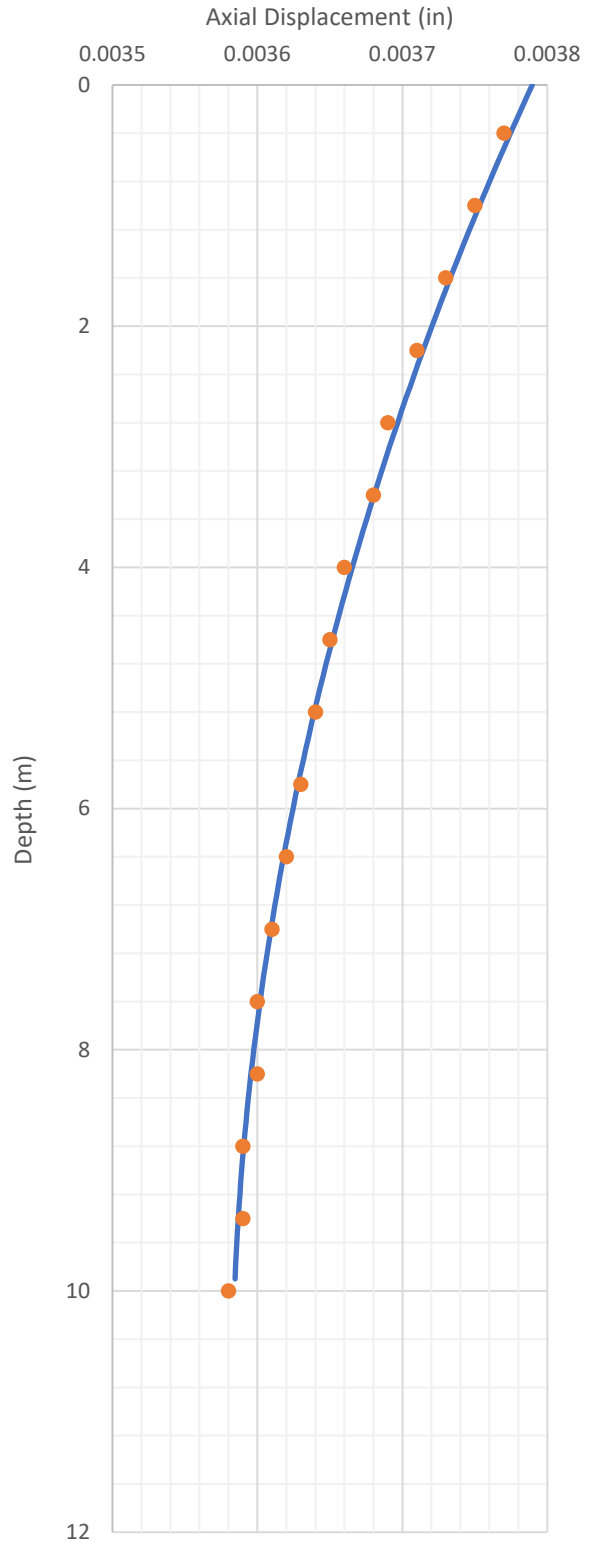
Parameter	Value
Young's Modulus (E)	200,000,000 psf
Cross Section	Circular
Outer Diameter	2 ft
Segments	50
Embedment Length	10 ft
Axial Load	2000 lb

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



Case 2

a. Problem Description

Problem 3, case 2 is an axially loaded pile in Mosher sand. The soil and pile properties are listed in the tables below.

b. Material Properties

Table 3-3: Mosher Sand Properties

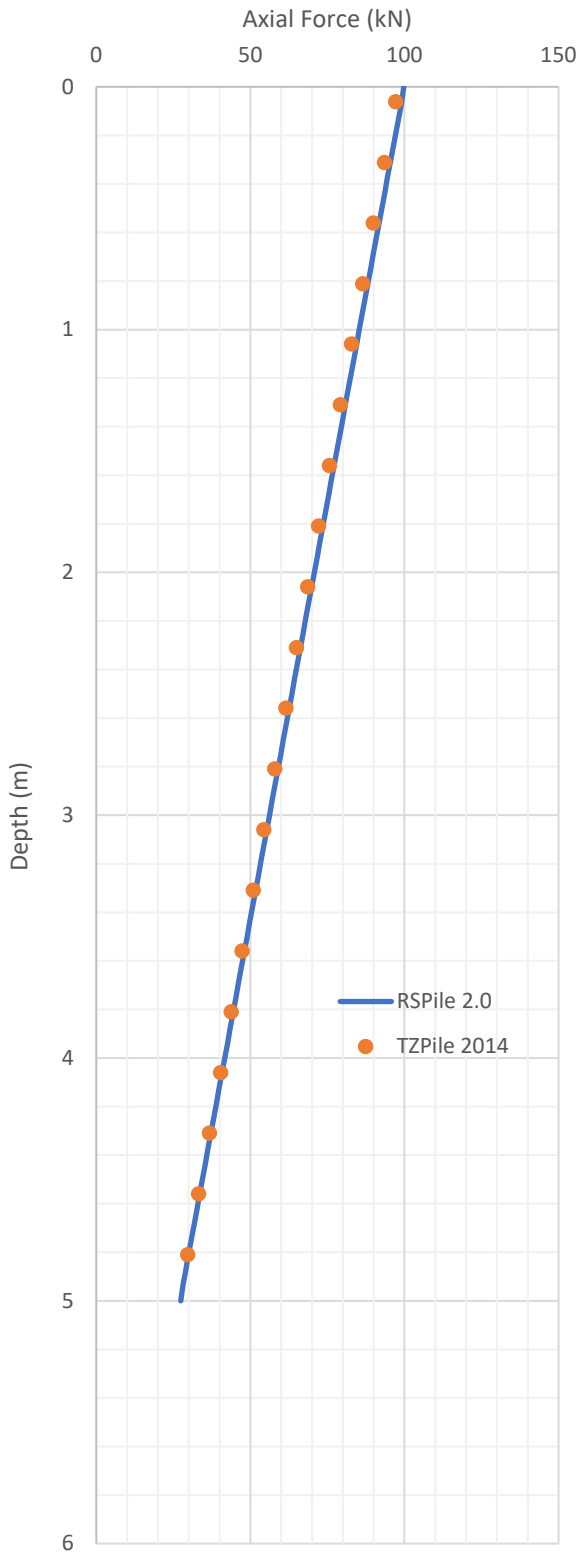
Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
Friction Angle	30 degrees
Axially Loaded Piles	
Soil Type	Mosher Sand
Max Unit Skin Friction	1000 kPa
Ultimate End Bearing Resistance	1000 kPa
Soil Layer Depth	5 m

Table 3-4: Pile and Loading Properties

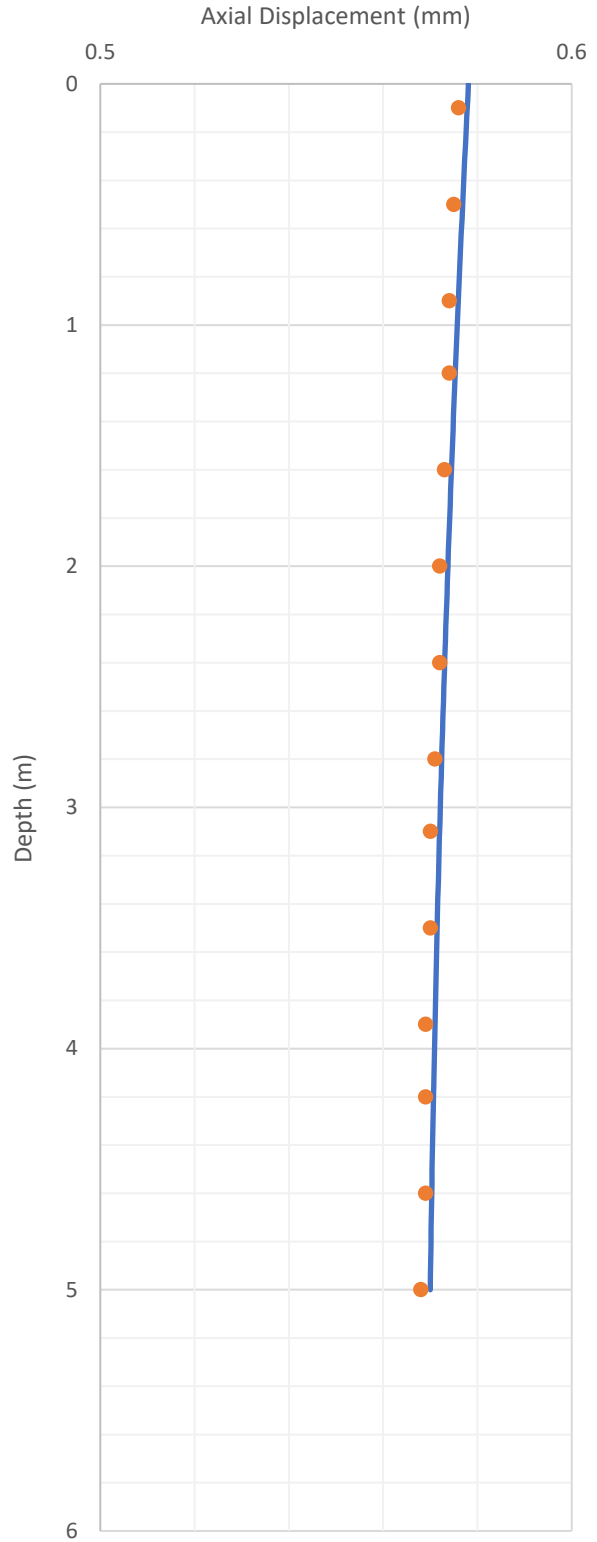
Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circular
Outer Diameter	0.5 m
Segments	40
Embedment Length	5 m
Axial Load	100 kN

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



Case 3

a. Problem Description

Problem 3, case 3 is an axially loaded pile in Mosher sand. Soil properties vary with depth. The soil and pile properties are listed in the tables below.

b. Material Properties

Table 3-5: Mosher Sand Properties

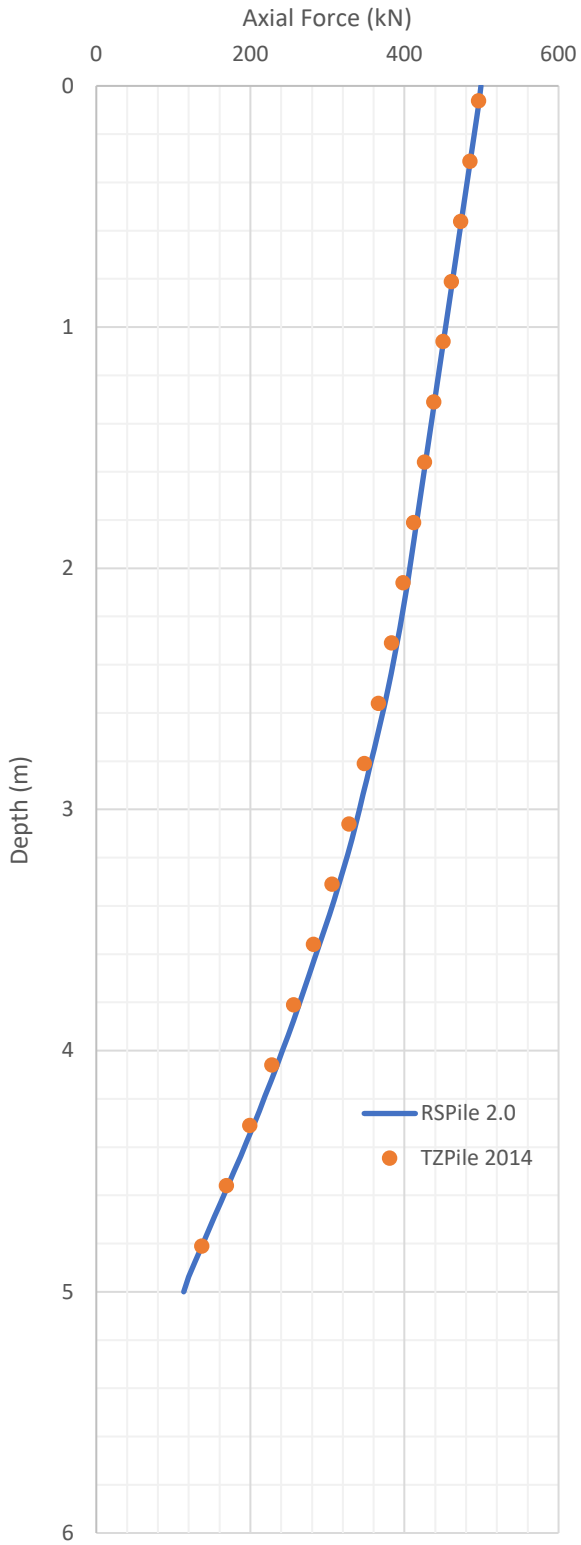
Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
Friction Angle	Top: 20 degrees Bottom: 40 degrees
Axially Loaded Piles	
Soil Type	Mosher Sand
Bearing Capacity Factor	0
Ultimate Shear Resistance	Top: 1000 kPa Bottom: 2000 kPa
Ultimate End Bearing Resistance	1000 kPa
Soil Layer Depth	5 m

Table 3-6: Pile and Loading Properties

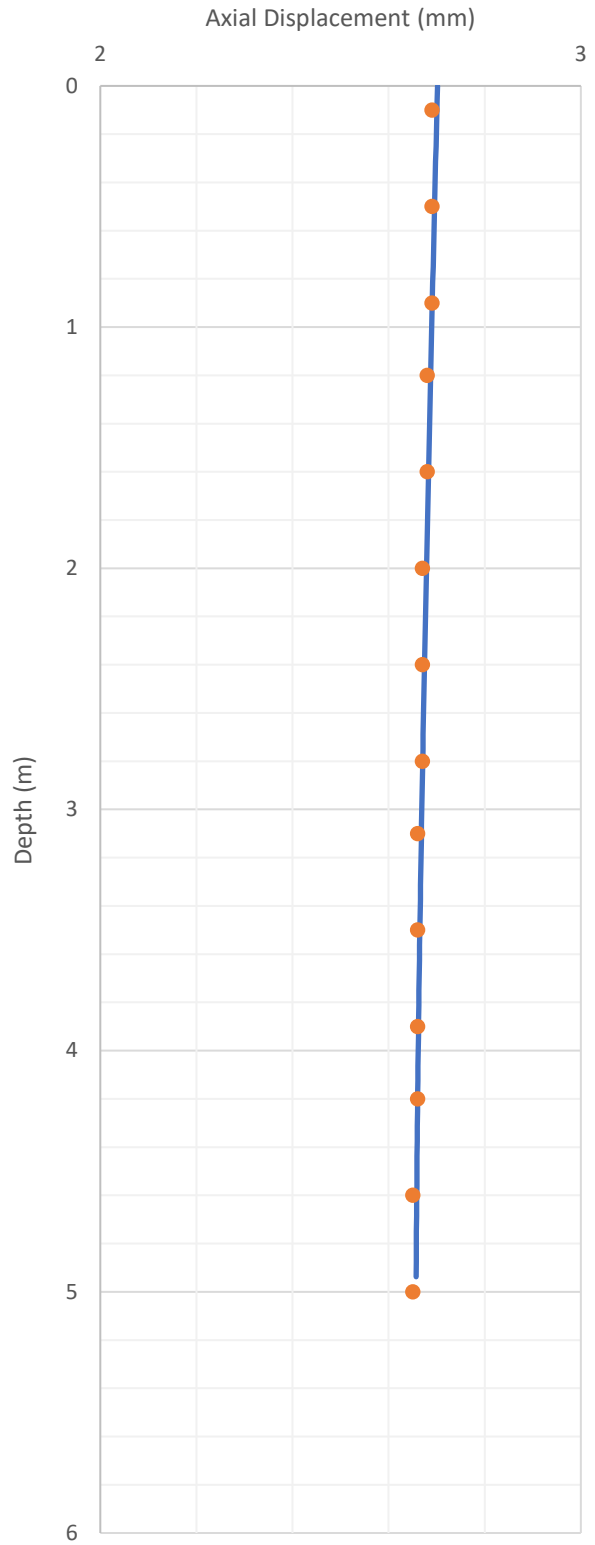
Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circular
Outer Diameter	0.5 m
Segments	40
Embedment Length	5 m
Axial Load	500 kN

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



RSPile Verification Problem #5

User Defined Soil

Case 1

a. Problem Description

Problem 4, case 1 is an axially loaded pile in a uniform layer of soil with user-defined T-Z and Q-Z curves. The curves, along with soil and pile properties, are listed in tables 4-1 to 4-4 below.

b. Material Properties

Table 4-1: User defined soil properties

Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
Axially Loaded Piles	
Soil Type	User Defined
Ultimate Unit Skin Friction	500 kPa
Ultimate End Bearing Resistance	500 kPa
Soil Layer Depth	5 m

Table 4-2: Load-transfer (t-z) curve for skin friction

Soil Displacement (m)	Unit Skin Friction (τ) / Ultimate Unit Skin Friction (τ_{ult})
0	0
0.0025	0.75
0.005	1

Table 4-3: Load-transfer (q-w) curve for end bearing resistance

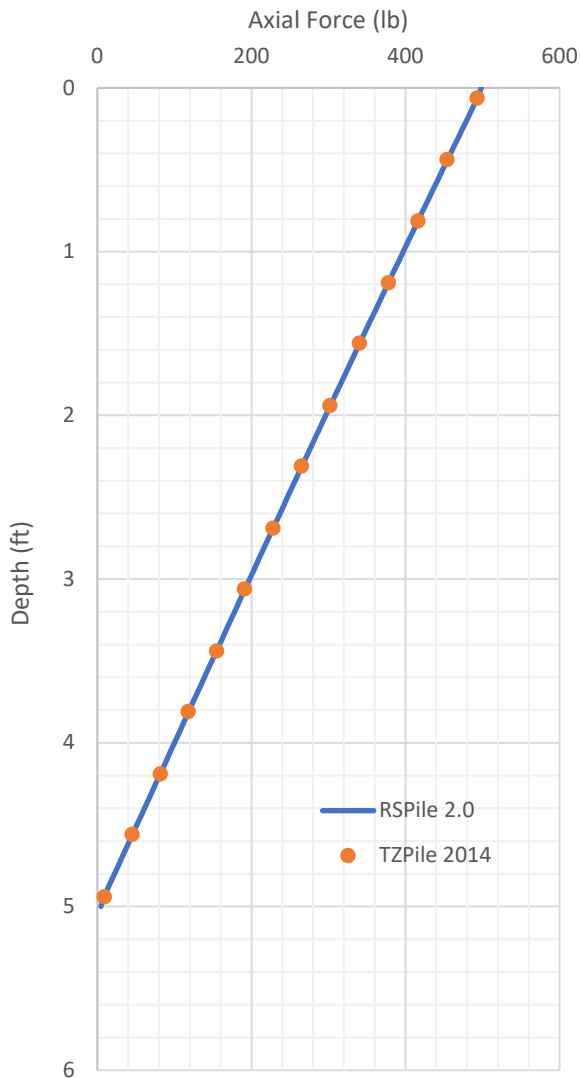
Soil Displacement (m)	Unit End Bearing Resistance (Q) / Ultimate End Bearing Resistance (Q_{ult})	End Force (kN)
0	0	0
0.01	0.75	73.6311
0.02	1	98.1748

Table 4-4: Pile and Loading Properties

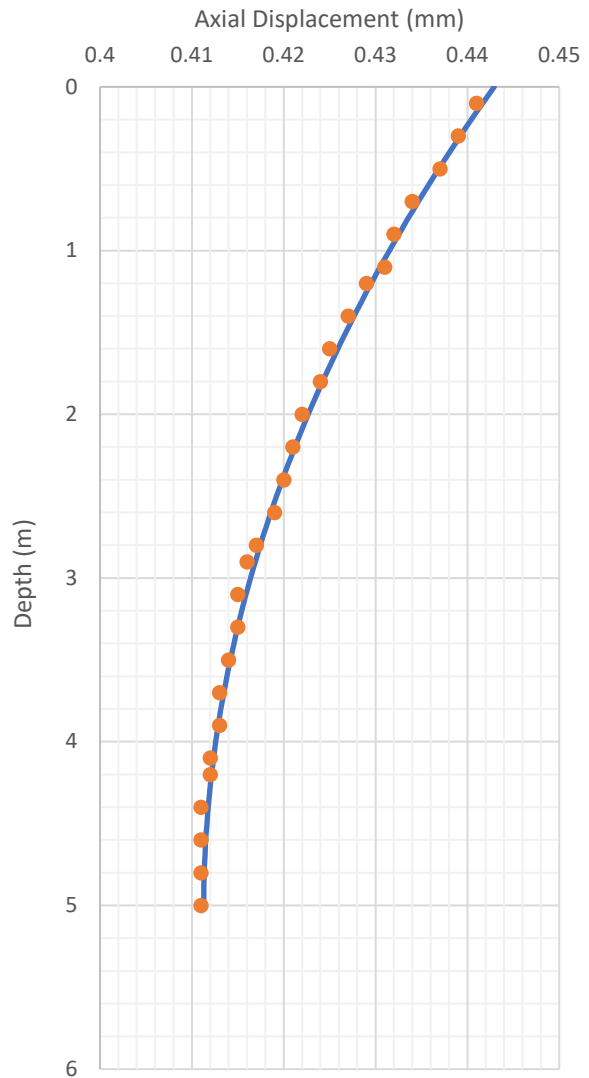
Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circular
Outer Diameter	0.5 m
Segments	40
Embedment Length	5 m
Axial Load	500 kN

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



Case 2

a. Problem Description

Problem 4, case 2 is an axially loaded pile in a uniform layer of soil with user-defined T-Z and Q-Z curves. The curves, along with soil and pile properties, are listed in tables 4-5 to 4-8 below.

b. Material Properties

Table 4-5: User defined soil properties

Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
Axially Loaded Piles	
Soil Type	User Defined
Ultimate Unit Skin Friction	500 kPa
Ultimate End Bearing Resistance	500 kPa
Soil Layer Depth	5 m

Table 4-6: Load-transfer (t-z) curve for skin friction

Soil Displacement (m)	Unit Skin Friction (τ) / Ultimate Unit Skin Friction (τ_{ult})
0	0
0.001	0.25
0.002	1

Table 4-7: Load-transfer (q-w) curve for end bearing resistance

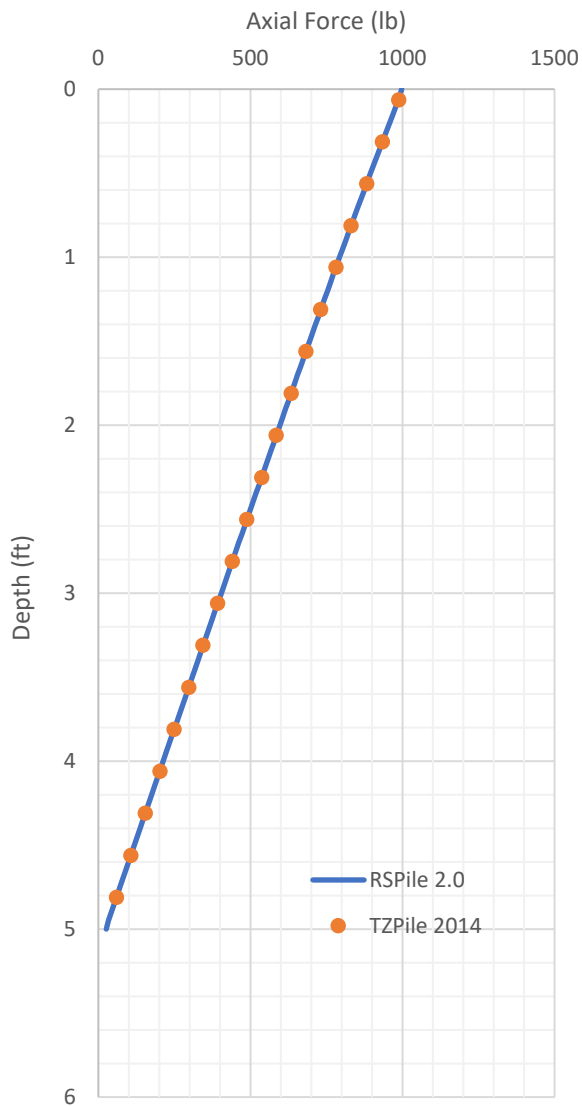
Soil Displacement (m)	Unit End Bearing Resistance (Q) / Ultimate End Bearing Resistance (Q_{ult})	End Force (kN)
0	0	0
0.001	0.25	24.5437
0.002	1	98.1748

Table 4-8: Pile and Loading Properties

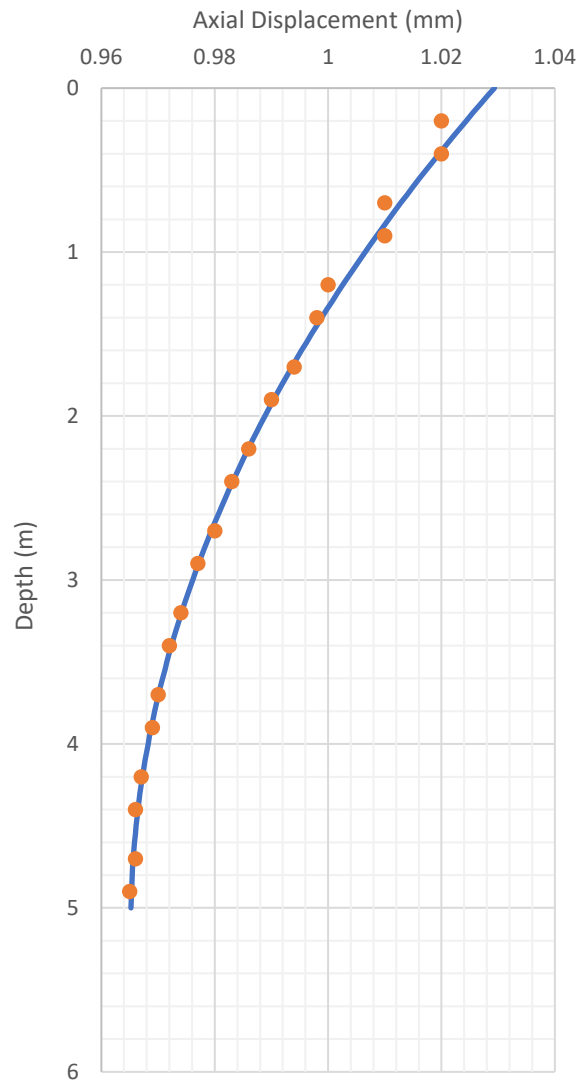
Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circular
Outer Diameter	0.5 m
Segments	40
Embedment Length	5 m
Axial Load	1000 kN

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



Case 3

a. Problem Description

Problem 4, case 3 is an axially loaded pile in a uniform layer of soil with user-defined T-Z and Q-Z curves. The curves, along with soil and pile properties, are listed in tables 4-9 to 4-12 below. This case will test Imperial units.

b. Material Properties

Table 4-9: User defined soil properties

Parameter	Value
General Properties	
Unit Weight	100 lb/ft ³
Axially Loaded Piles	
Soil Type	User Defined
Ultimate Unit Skin Friction	1000 psf
Ultimate End Bearing Resistance	10,000 psf
Soil Layer Depth	10 ft

Table 4-10: Load-transfer (t-z) curve for skin friction

Soil Displacement (ft)	Unit Skin Friction (τ) / Ultimate Unit Skin Friction (τ_{ult})
0	0
0.001	0.75
0.01	1

Table 4-11: Load-transfer (q-w) curve for end bearing resistance

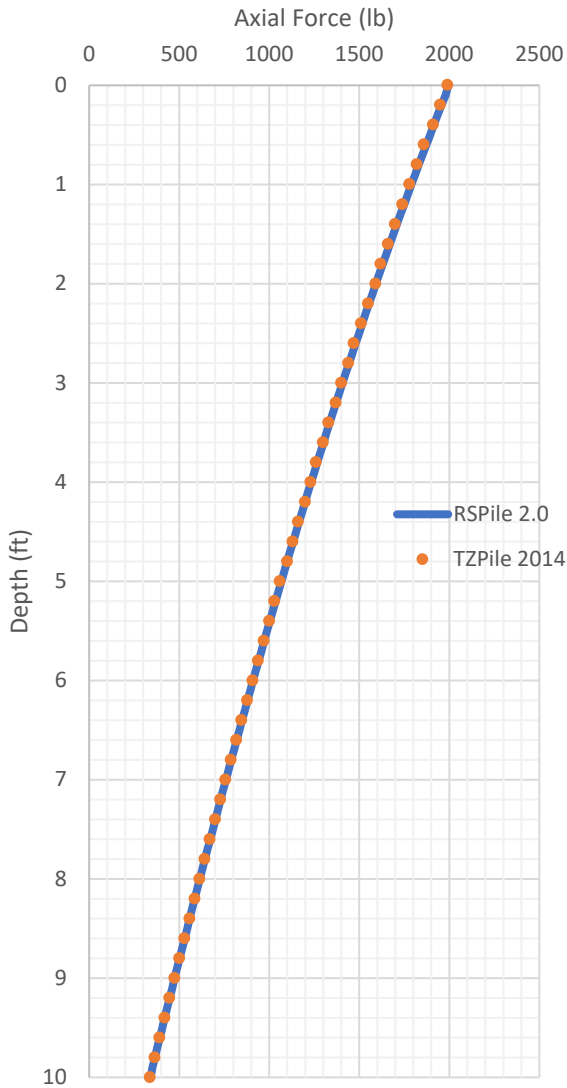
Soil Displacement (ft)	Unit End Bearing Resistance (Q) / Ultimate End Bearing Resistance (Q_{ult})
0	0
0.002	0.75
0.05	1

Table 4-12: Pile and Loading Properties

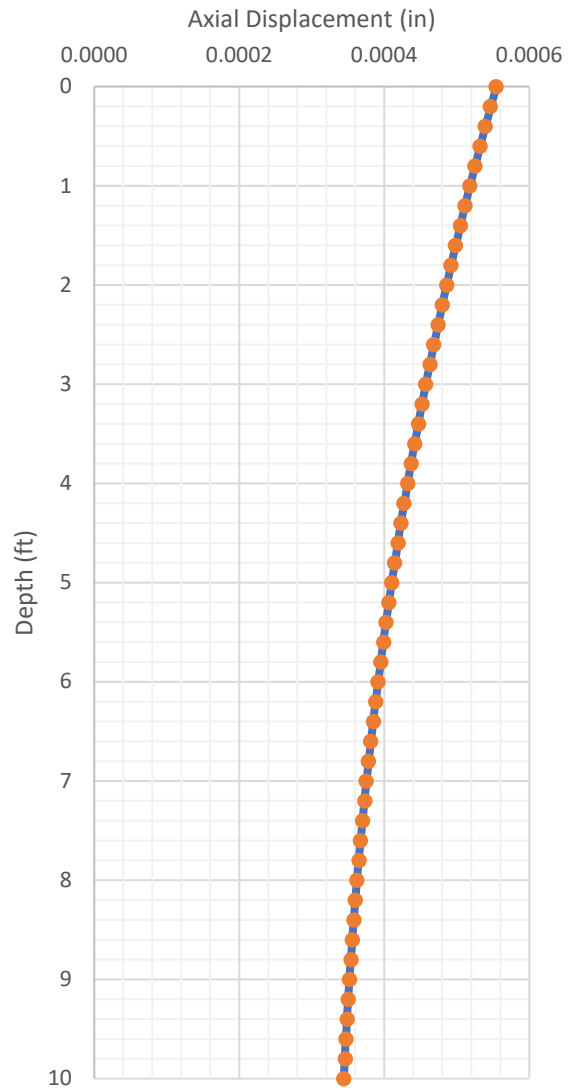
Parameter	Value
Young's Modulus (E)	200,000,000 psf
Cross Section	Circular
Outer Diameter	2 ft
Segments	50
Embedment Length	10 ft
Axial Load	2000 lb

c. Results

Axial Force vs. Depth



Axial Displacement Vs. Depth



Case 4

a. Problem Description

Problem 5, case 4 is an axially loaded pile in soil with user-defined T-Z and Q-W curves. The soil and pile properties are listed in the tables below.

b. Material Properties

Table 4-13: User defined soil properties

Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
Axially Loaded Piles	
Soil Type	User Defined
Ultimate Unit Skin Friction	5000 kPa
Ultimate End Bearing Resistance	10,000 kPa
Soil Layer Depth	5 m

Table 4-14: Load-transfer (t-z) curve for skin friction

Soil Displacement (m)	Unit Skin Friction (τ) / Ultimate Unit Skin Friction (τ_{ult})
0	0
0.005	1

Table 4-15: Load-transfer (q-w) curve for end bearing resistance

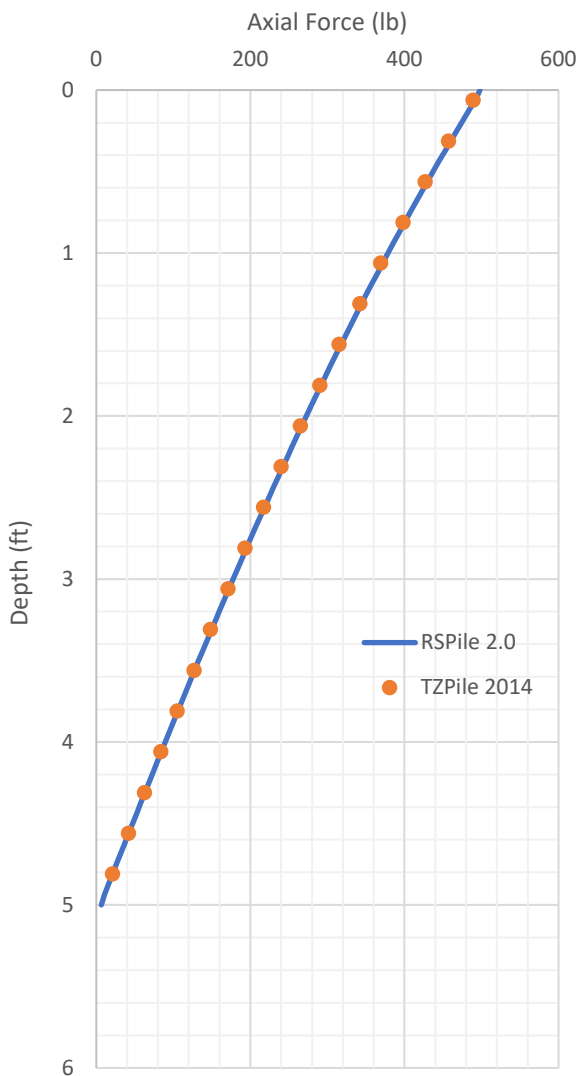
Soil Displacement (m)	Unit End Bearing Resistance (Q) / Ultimate End Bearing Resistance (Q_{ult})
0	0
0.02	1

Table 4-16: Pile and Loading Properties

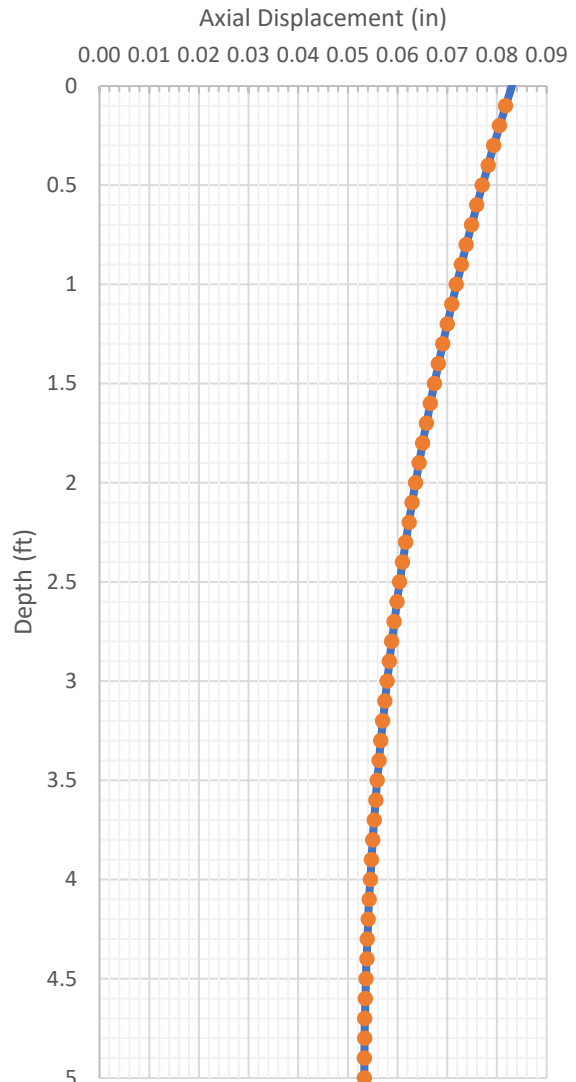
Parameter	Value
Young's Modulus (E)	200,000,000 psf
Cross Section	Circular
Outer Diameter	0.5 m
Segments	40
Embedment Length	5 m
Axial Load	500 kN

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



RSPile Verification Problem #6

Elastic Soil

Case 1

a. Problem Description

Problem 5, case 1 is an axially loaded pile in a uniform layer of soil with assumed elastic properties. The curves, along with soil and pile properties, are listed in tables 5-1 to 5-2 below.

b. Material Properties

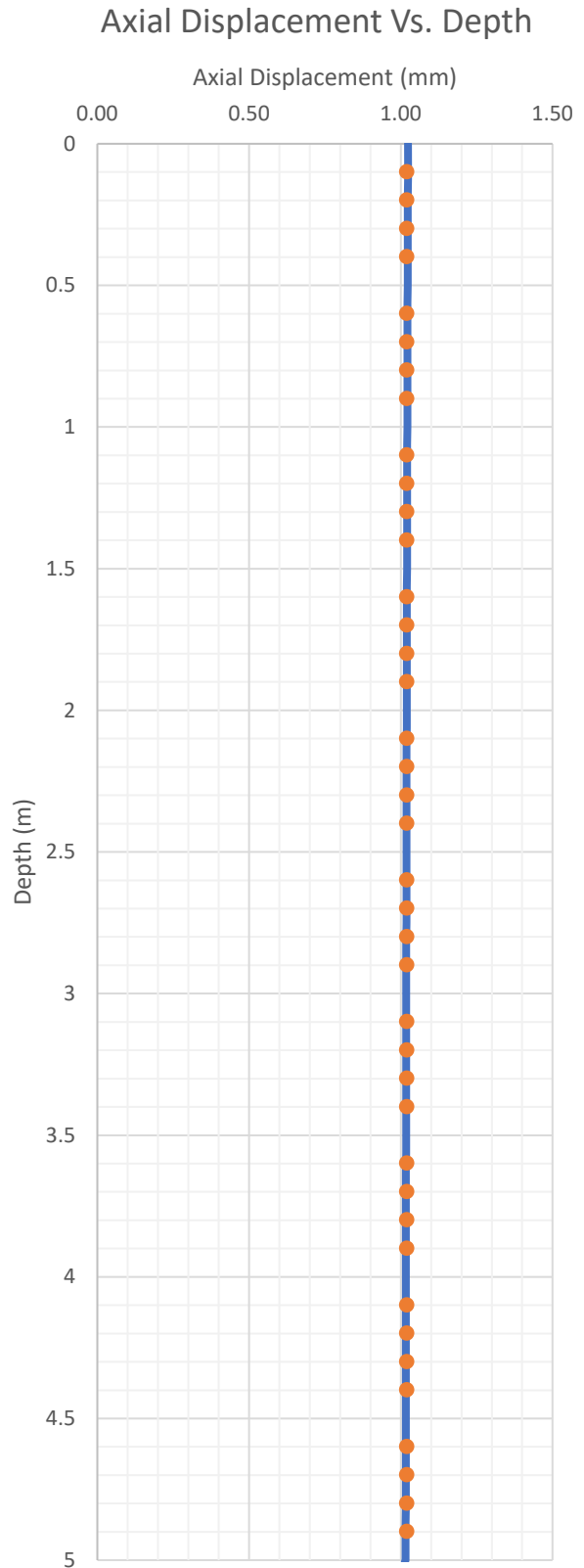
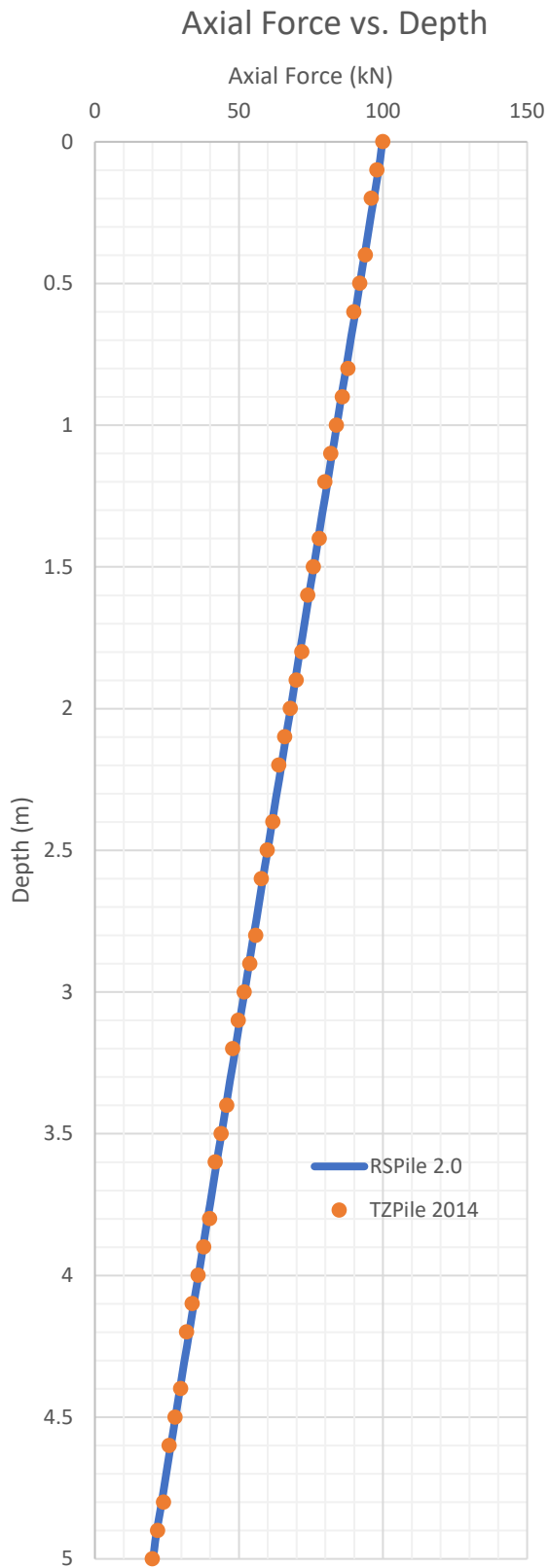
Table 5-1: Elastic soil properties

Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
Axially Loaded Piles	
Soil Type	Elastic
Skin Friction Stiffness	10,000 kPa/m
End Bearing Stiffness	100,000 kPa/m
Soil Layer Depth	5 m

Table 5-2: Pile and Loading Properties

Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circular
Outer Diameter	0.5 m
Segments	40
Embedment Length	5 m
Axial Load	100 kN

c. Results



Case 2

a. Problem Description

Problem 5, case 2 is an axially loaded pile in a uniform layer of soil with assumed elastic properties. The curves, along with soil and pile properties, are listed in tables 5-3 to 5-4 below. This case will test imperial units.

b. Material Properties

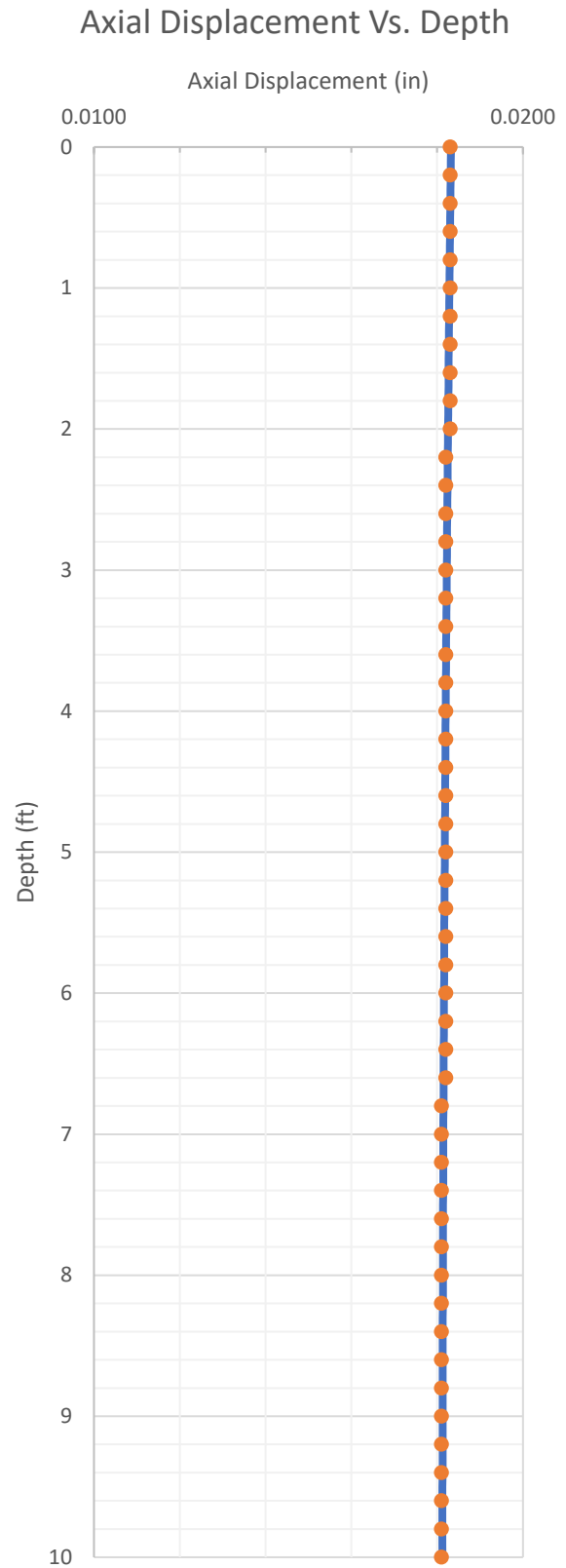
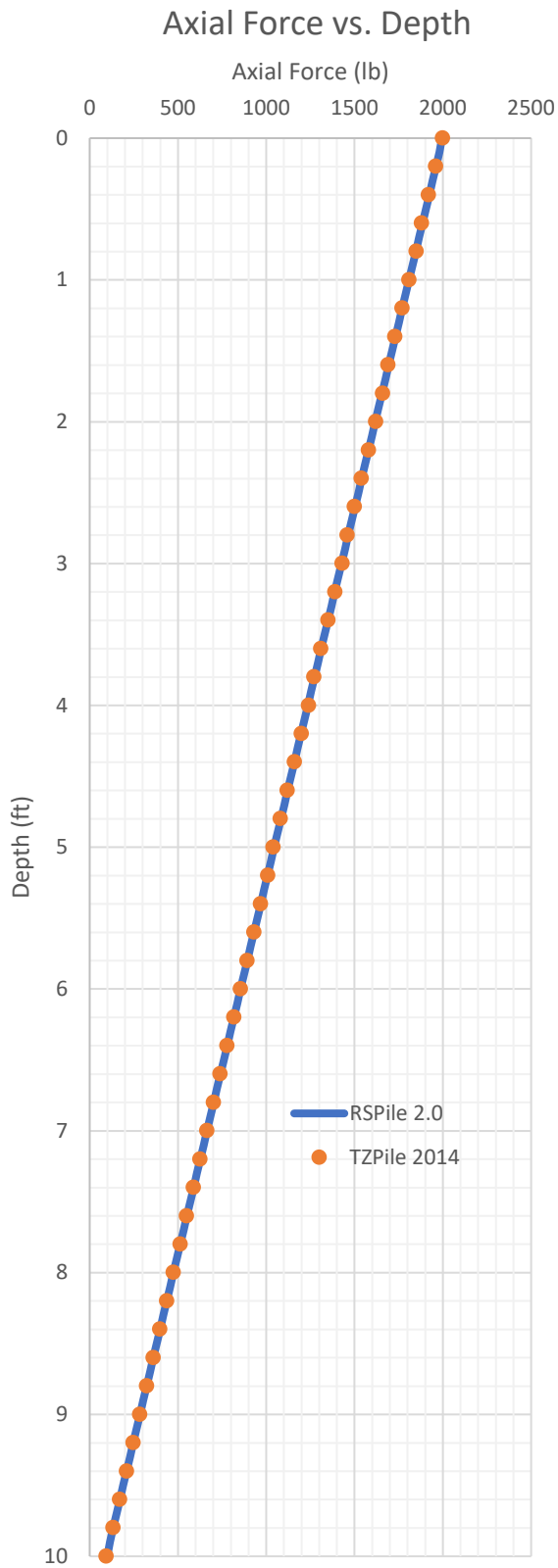
Table 5-3: Elastic soil properties

Parameter	Value
General Properties	
Unit Weight	100 lb/ft ³
Axially Loaded Piles	
Soil Type	Elastic
Skin Friction Stiffness	20,000 psf/ft
End Bearing Stiffness	20,000 psf/ft
Soil Layer Depth	10 ft

Table 5-4: Pile and Loading Properties

Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circular
Outer Diameter	2 ft
Segments	50
Embedment Length	10 ft
Axial Load	2000 lb

c. Results



RSPile Verification Problem #7

API Sand

Case 1

a. Problem Description

Problem 6, case 1 is an axially loaded pile in API sand. The pile and soil properties are listed below.

b. Material Properties

Table 5-1: API Sand Properties

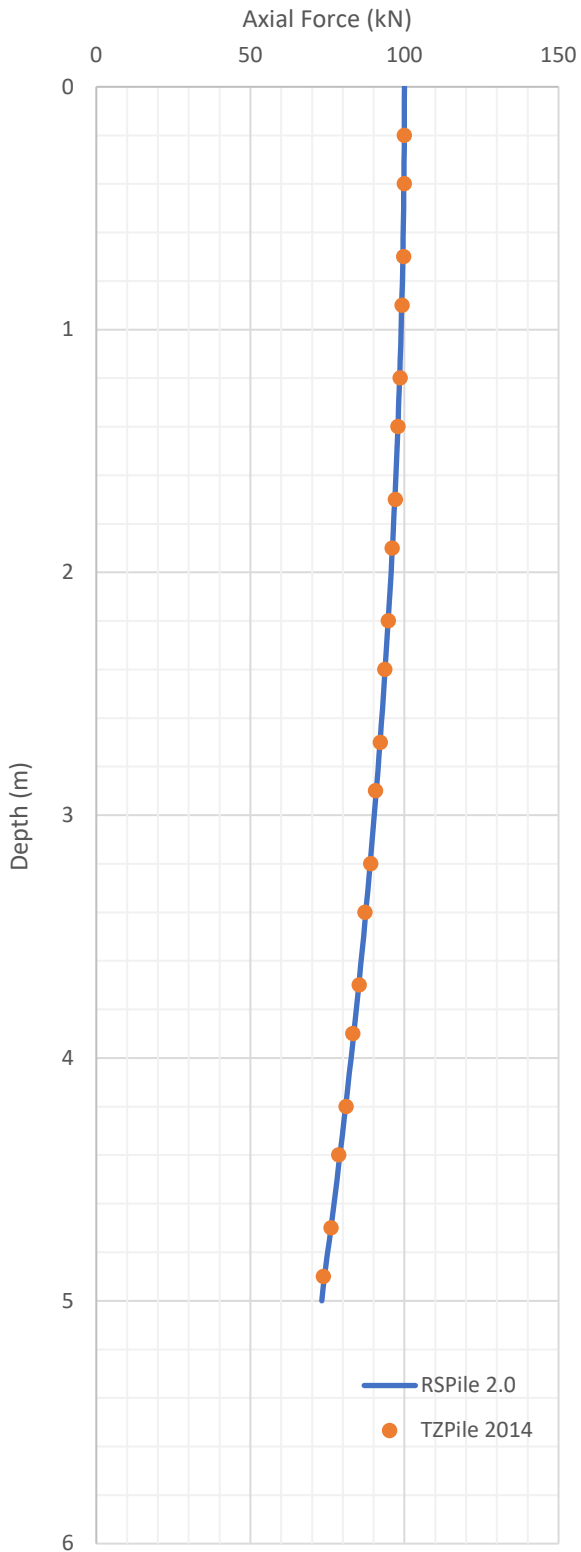
Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
Friction Angle	30 degrees
Axially Loaded Piles	
Soil Type	API Sand
Coefficient of Lateral Earth Pressure	1
Bearing Capacity Factor	40
Max Unit Skin Friction	1,000,000 kPa
Max End Bearing Resistance	1,000,000 kPa
Soil Layer Depth	5m

Table 5-2: Pile and Loading Properties

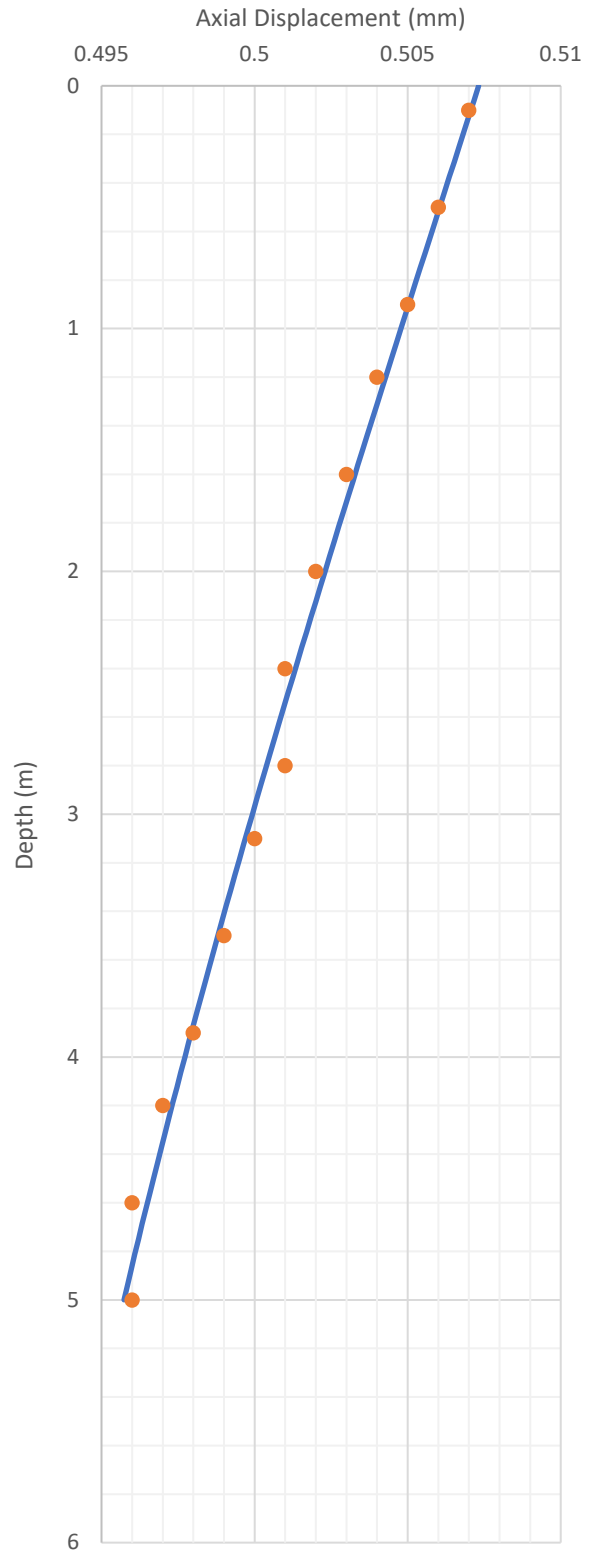
Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circular
Outer Diameter	0.5 m
Segments	40
Embedment Length	5 m
Axial Load	100 kN

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



Case 2

a. Problem Description

Problem 6, case 2 is an axially loaded pile in API sand. The soil properties vary with depth. The soil and pile properties are listed in the tables below.

b. Material Properties

Table 5-3: API Sand Properties

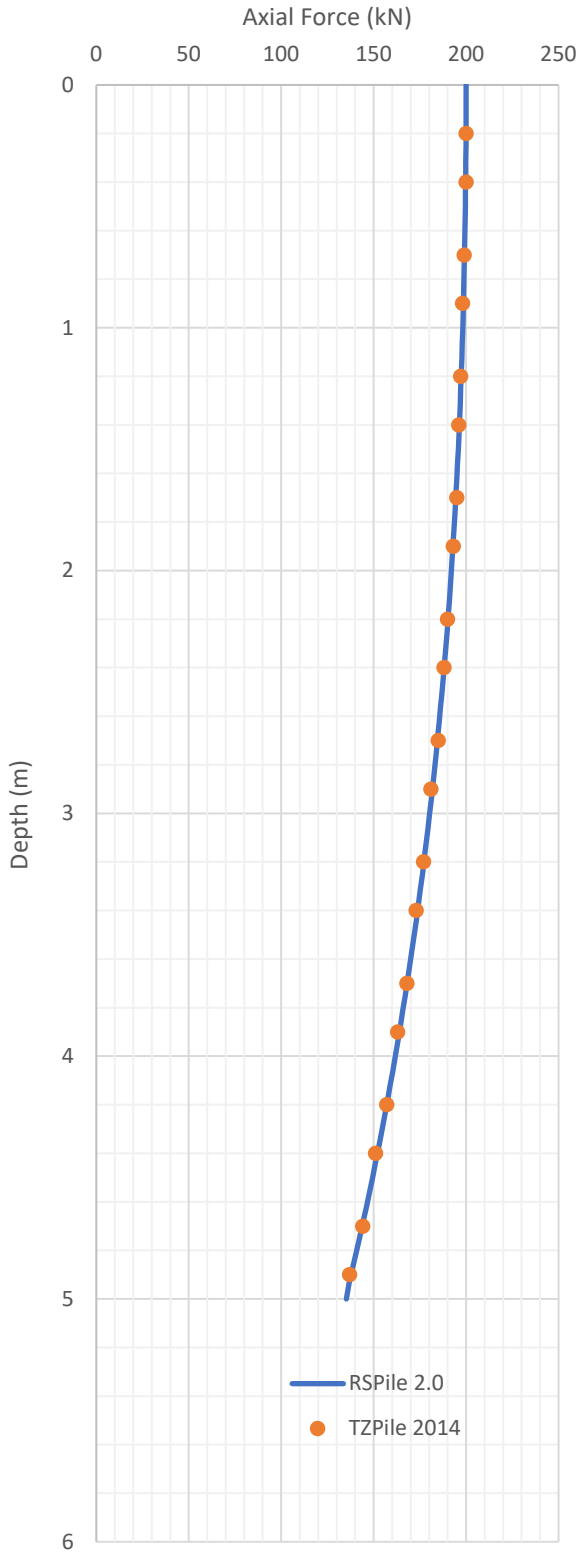
Parameter	Value
General Properties	
Unit Weight	20 kN/m ³
Friction Angle	Top: 20 degrees Bottom: 30 degrees
Axially Loaded Piles	
Soil Type	API Sand
Max Unit Skin Friction	1,000,000 kPa
Max Unit End Bearing Resistance	1,000,000 kPa
Coefficient of Lateral Earth Pressure	Top: 1 Bottom: 1.2
Bearing Capacity Factor	30
Soil Layer Depth	5m

Table 5-4: Pile and Loading Properties

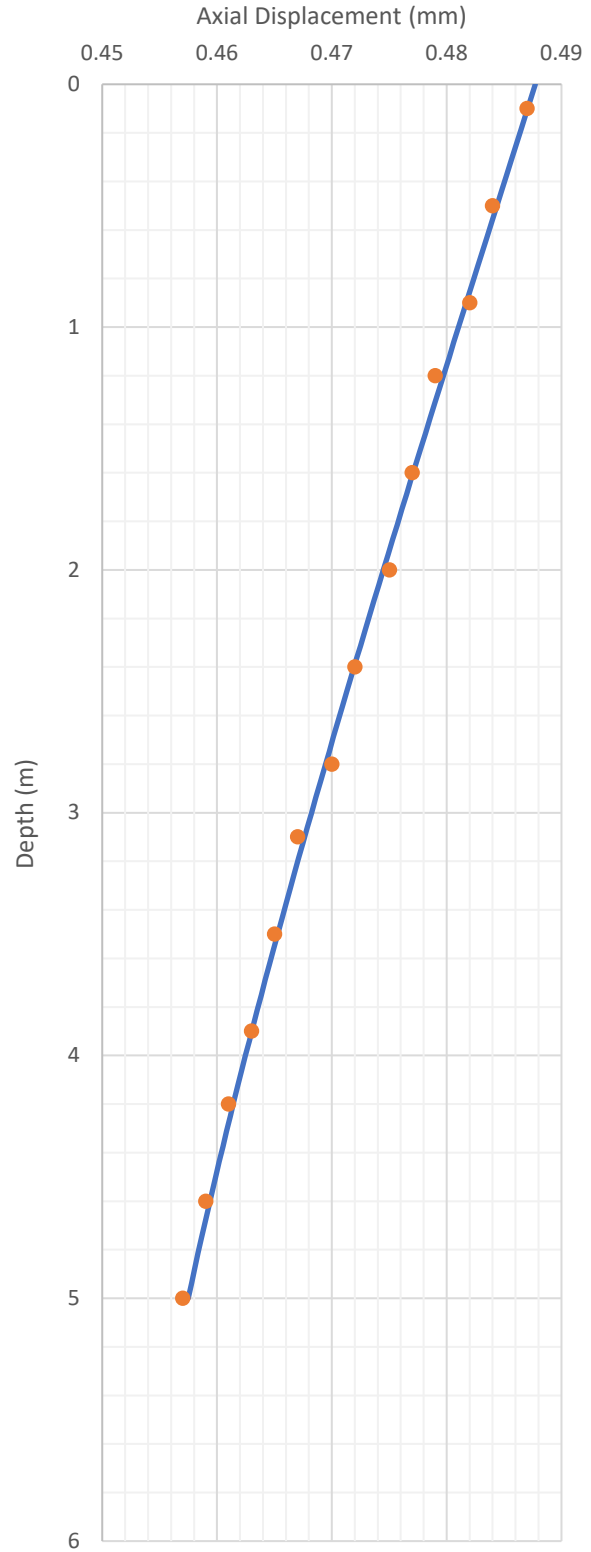
Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Pipe
Outer Diameter	1 m
Wall Thickness	0.05 m
Segments	40
Embedment Length	5 m
Axial Load	200 kN

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



Case 3

a. Problem Description

Problem 6, case 3 is an axially loaded pile in API sand. The soil and pile properties are listed in the tables below.

b. Material Properties

Table 5-5: API Sand Properties

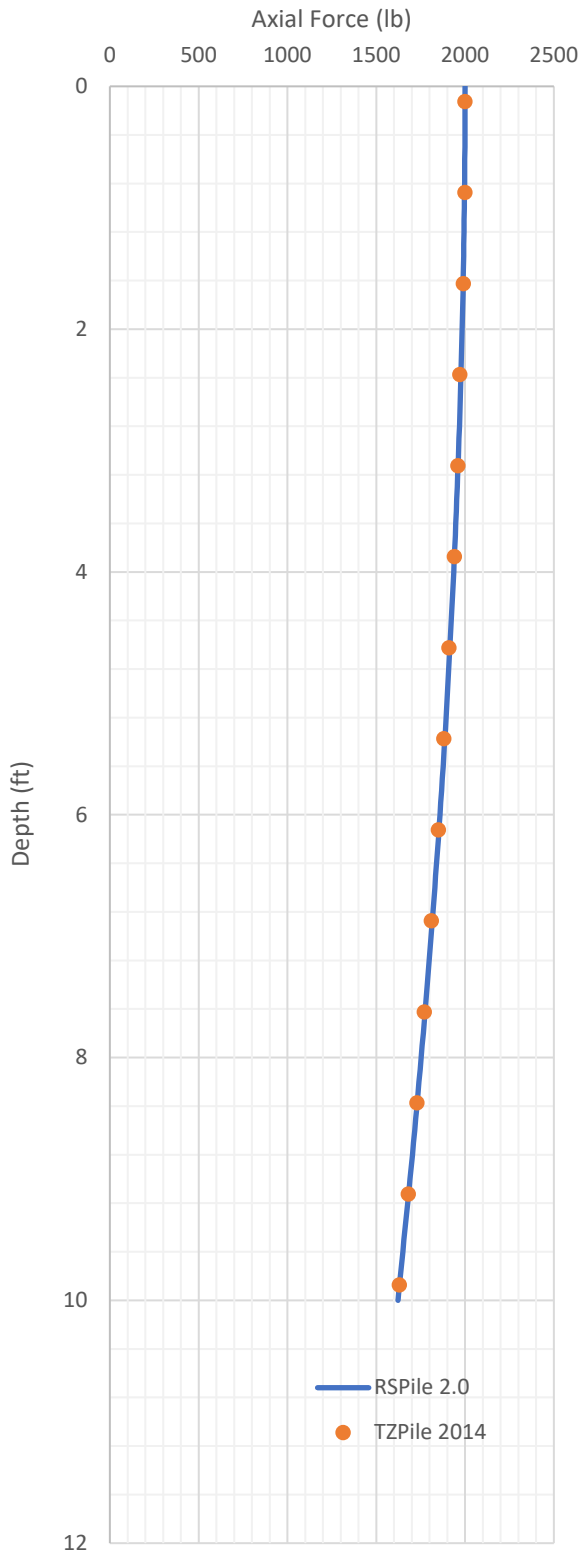
Parameter	Value
General Properties	
Unit Weight	100 lb/ft ³
Friction Angle	30 degrees
Axially Loaded Piles	
Soil Type	API Sand
Max Unit Skin Friction	2,000,000 psf
Max Unit End Bearing Resistance	2,000,000 psf
Coefficient of Lateral Earth Pressure	1
Bearing Capacity Factor	40
Soil Layer Depth	10 ft

Table 5-6: Pile and Loading Properties

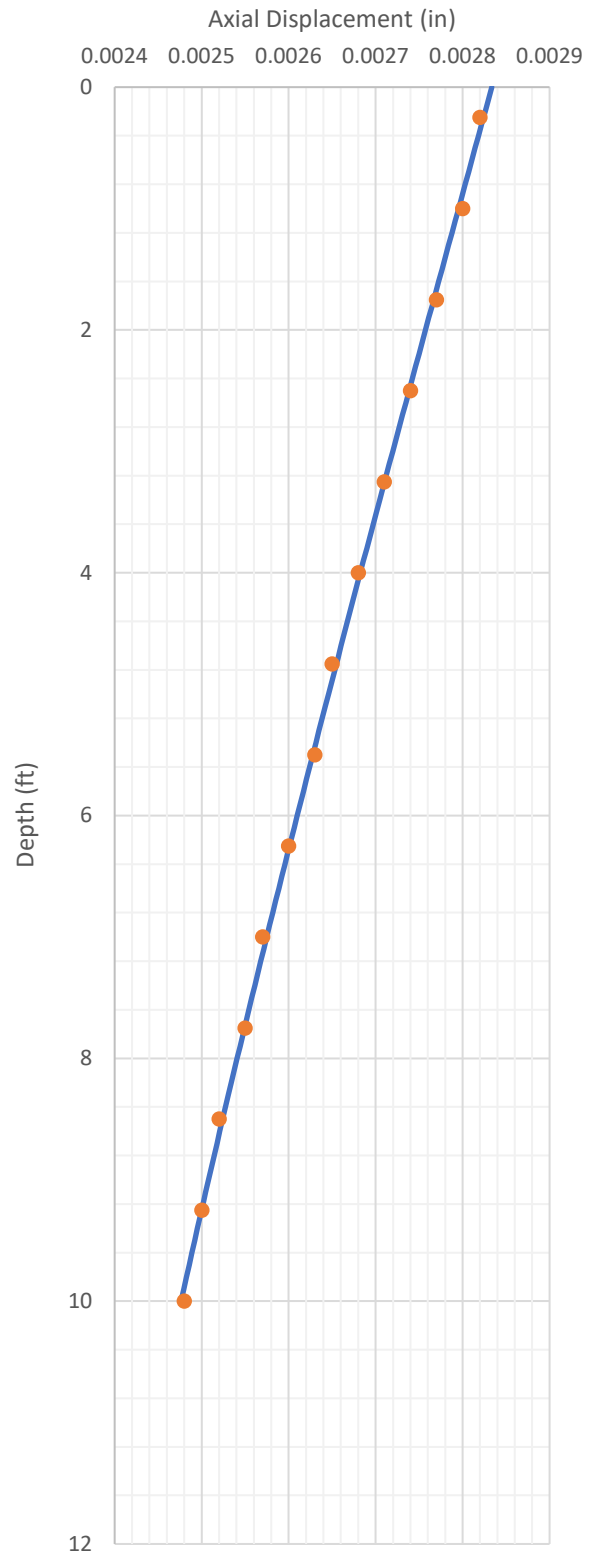
Parameter	Value
Young's Modulus (E)	200,000,000 psf
Cross Section	Circle
Outer Diameter	2 ft
Segments	50
Embedment Length	10 ft
Axial Load	2000 lb

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth



RSPile Verification Problem #8

Drilled Sand

Case 1

a. Problem Description

Problem 7, case 1 is an axially loaded pile in drilled sand. The pile and soil properties are listed below.

b. Material Properties

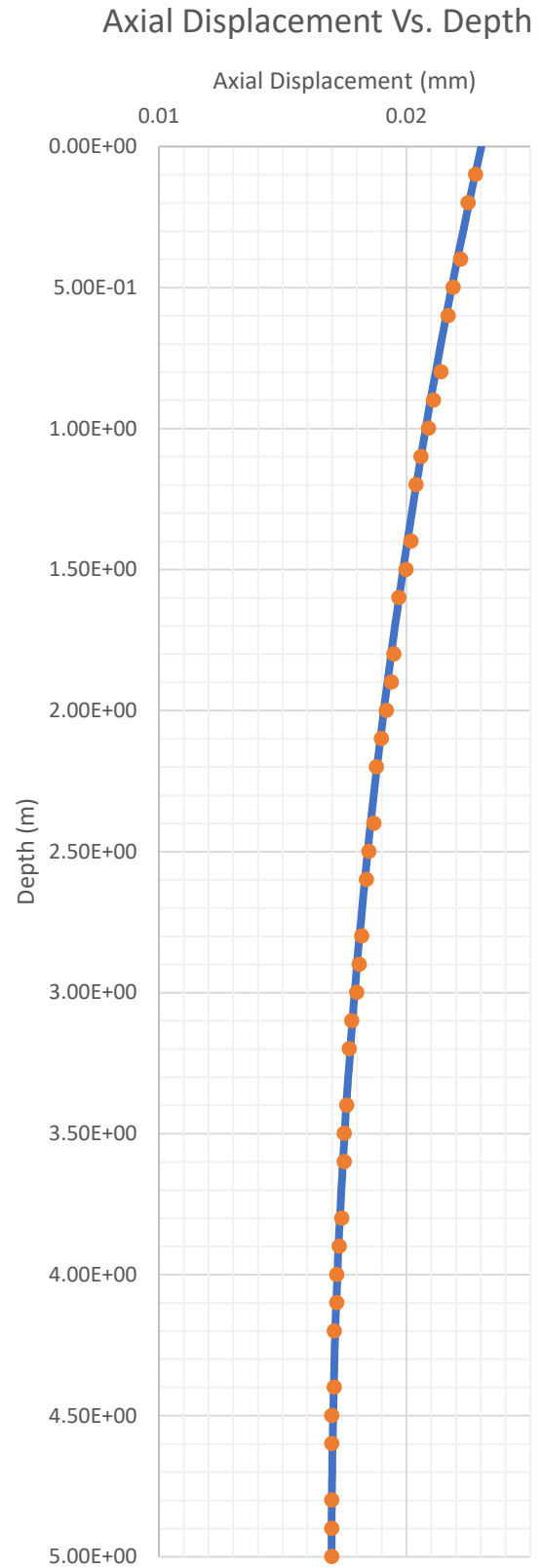
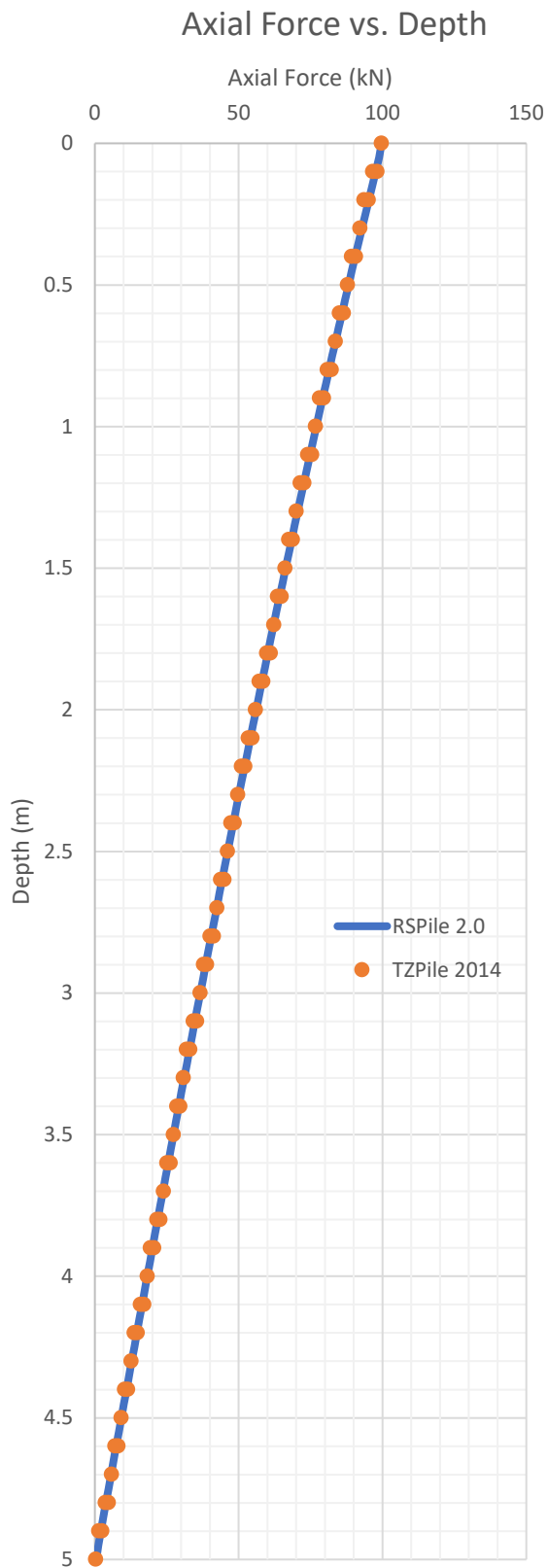
Table 7-1: Drilled Sand Properties

Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
Axially Loaded Piles	
Soil Type	Drilled Sand
Ultimate Shear Resistance	1000 kPa
Ultimate End Bearing Resistance	1000 kPa
Soil Layer Depth	5m

Table 7-2: Pile and Loading Properties

Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circle
Outer Diameter	0.5m
Segments	40
Embedment Length	5m
Axial Load	100 kN

c. Results



Case 2

a. Problem Description

Problem 7, case 2 is an axially loaded pile in drilled sand. The pile and soil properties are listed below. This case will test Imperial units.

b. Material Properties

Table 7-3: Drilled Sand Properties

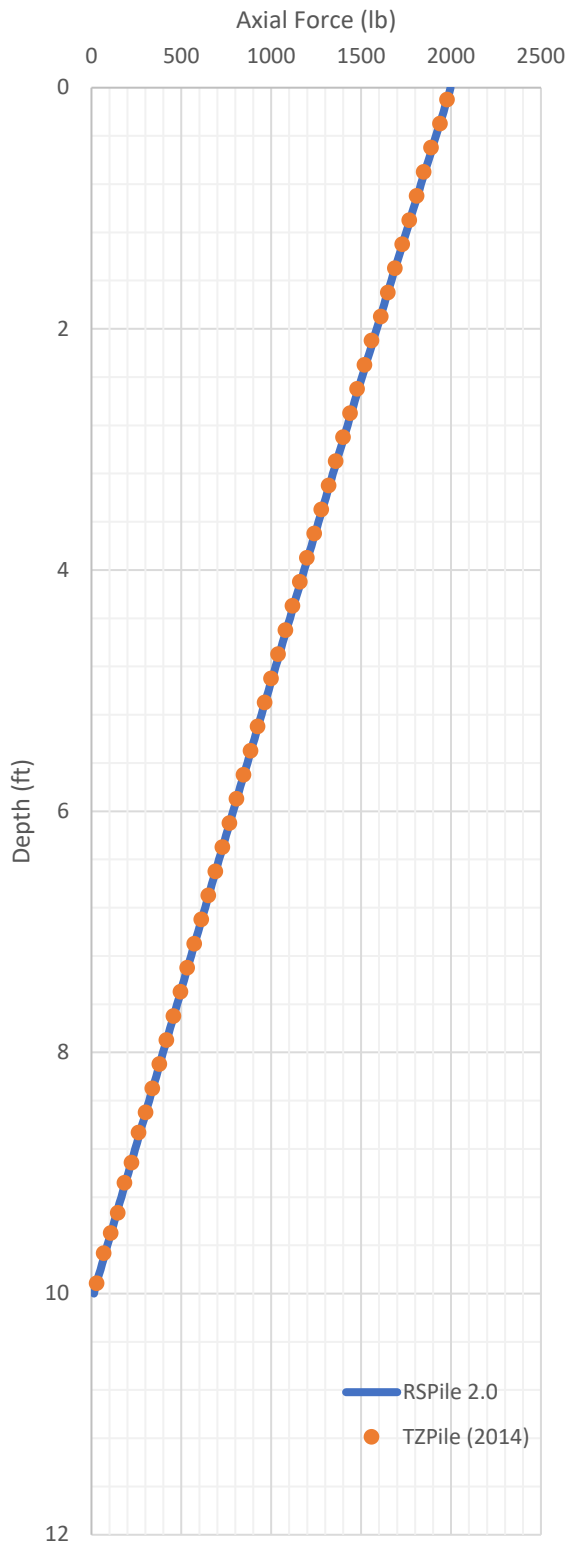
Parameter	Value
General Properties	
Unit Weight	100 lb/ft ³
Axially Loaded Piles	
Soil Type	Drilled Sand
Ultimate Shear Resistance	1000 psf
Ultimate End Bearing Resistance	1000 psf
Soil Layer Depth	10 ft

Table 7-4: Pile and Loading Properties

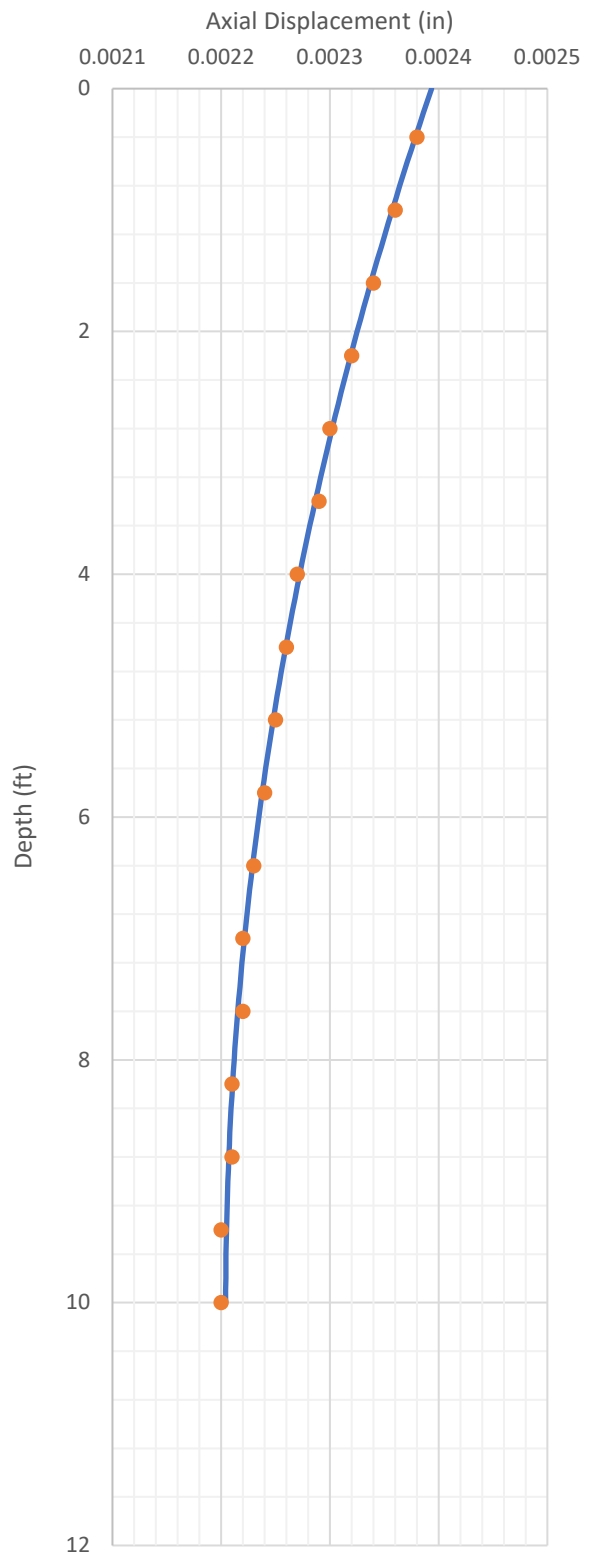
Parameter	Value
Young's Modulus (E)	200,000,000 psf
Cross Section	Circle
Outer Diameter	2 ft
Segments	50
Embedment Length	10 ft
Axial Load	2000 lb

c. Results

Axial Force vs. Depth



Axial Displacement Vs. Depth



Case 3

a. Problem Description

Problem 7, case 3 is an axially loaded pile in drilled sand. The pile and soil properties are listed below.

b. Material Properties

Table 7-3: Drilled Sand Properties

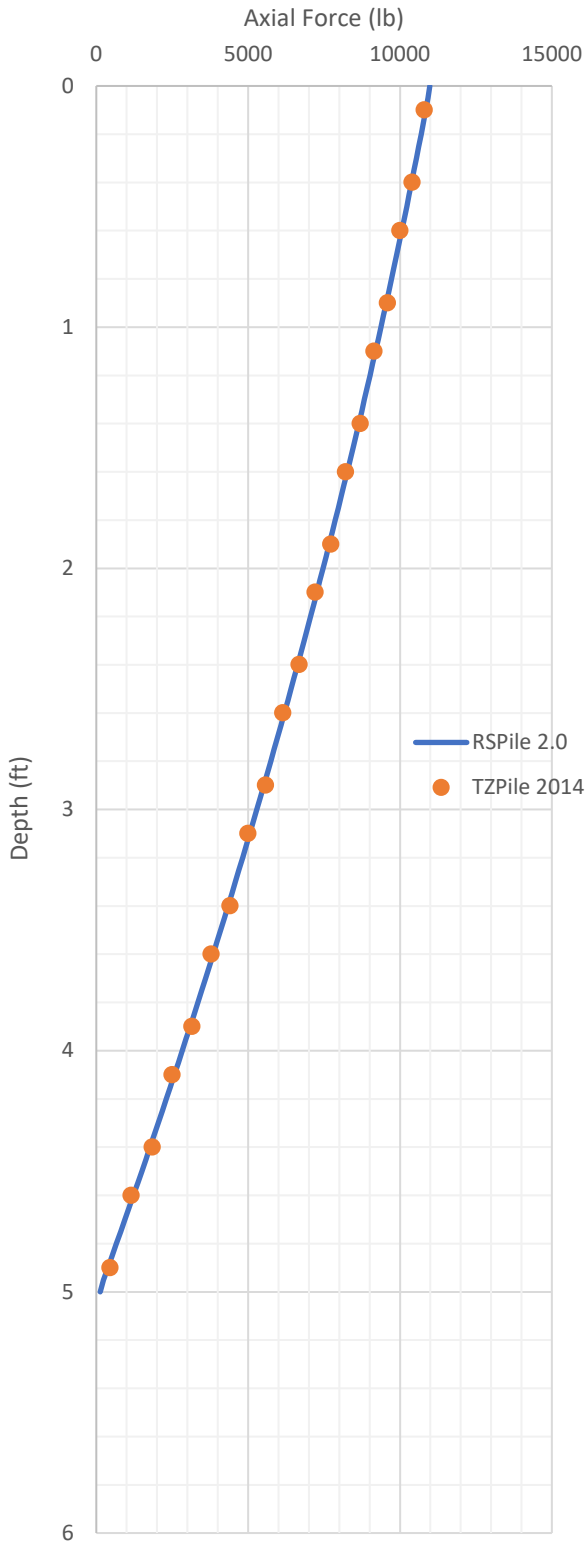
Parameter	Value
General Properties	
Unit Weight	15 kN/m ³
Axially Loaded Piles	
Soil Type	Drilled Sand
Ultimate Shear Resistance	Top: 1000 kPa Bottom: 2000 kPa
Ultimate End Bearing Resistance	Top: 1000 kPa Bottom: 2000 kPa
Soil Layer Depth	5 m

Table 7-4: Pile and Loading Properties

Parameter	Value
Young's Modulus (E)	200,000,000 kPa
Cross Section	Circle
Outer Diameter	0.5 m
Segments	40
Embedment Length	10 ft
Axial Load	11,000 kN

c. Results

Axial Force Vs. Depth



Axial Displacement Vs. Depth

