DASK 2026 Twin Towers
Floor Plan & Structural Layout

Structural Engineering Documentation

February 2026

1 Typical Floor Plan (Top View)

TOWER 2

LEGEND
- Shear Wall
- Core Zone
- Column Node
- Floor Brace
- Bridge Zone

CORE

GAP = 8 cm

BRIDGE

TOWER 1

CORE

16 cm

6
4
5
3.4
4
1.2
3
3.4
2
4
1

3   8   3.4 1.2 3.4   8   3

30 cm

A   B   C   D E   F   G   H

2 Grid Coordinates

| Direction	Grid Lines	Spacing (cm)
X-Direction	A, B, C, D, E, F, G, H	3 - 8 - 3.4 - 1.2 - 3.4 - 8 - 3
Y-Direction (per tower)	1, 2, 3, 4, 5, 6	4 - 3.4 - 1.2 - 3.4 - 4

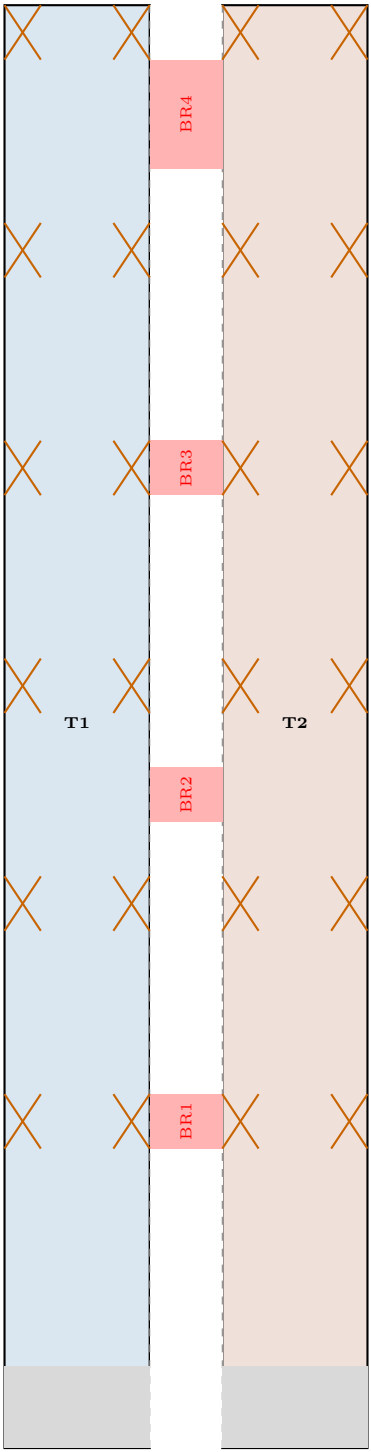# 3 Structural Summary

- **Tower Dimensions:** 30×16 cm each

- **Gap Between Towers:** 8 cm

- **Total Footprint:** 30×40 cm

- **Core Zone:** 1.2×1.2 cm at center

- **Building Height:** 159 m (27 floors)

- **Fundamental Period:** $T_1 = 0.0608$ s

- **Weight:** 3.357 kg

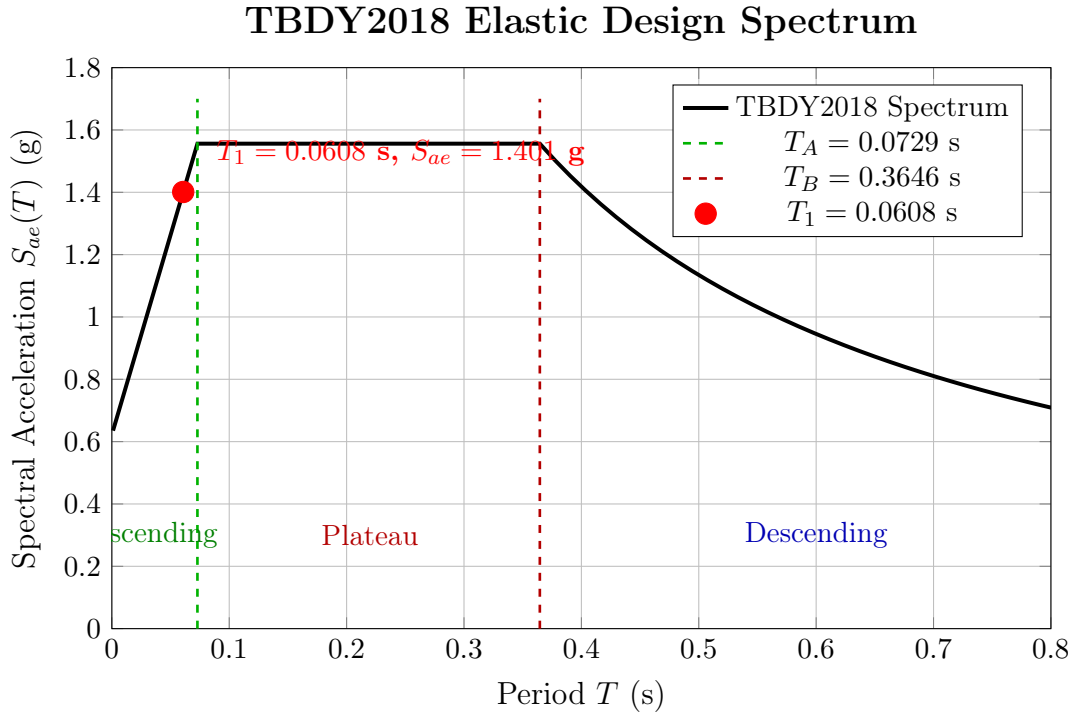# 4 Elevation Views

4.1 Front Elevation (Y = 0)

159 m

30 cm

FRONT ELEVATION

GROUND
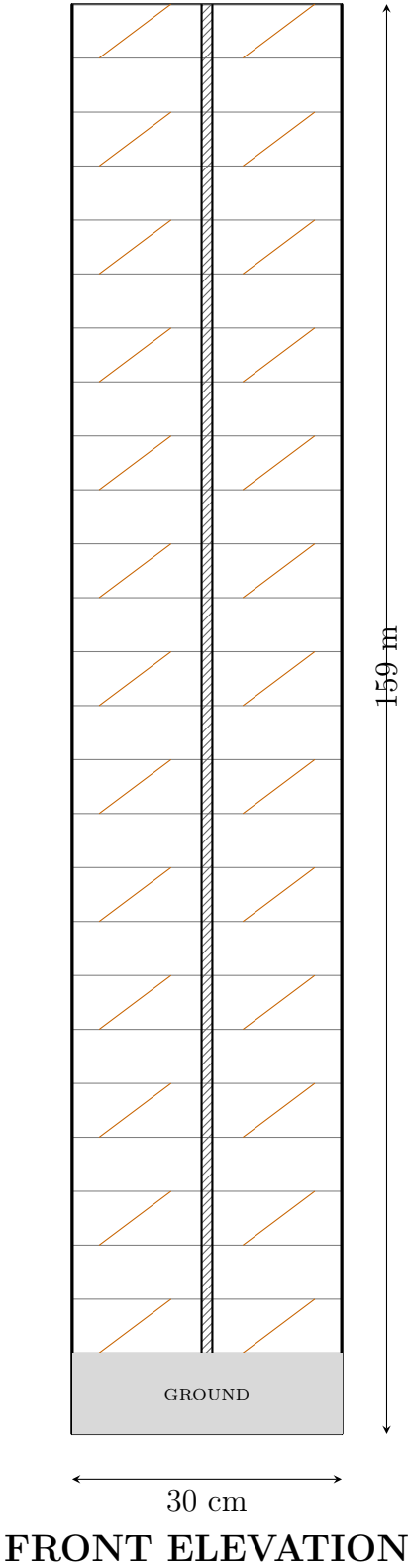
4.2 Side Elevation (X = 0)

BR4

BR3

T1   T2

BR2

BR1

16   8   16

40 cm

SIDE ELEVATION

5 TBDY2018 Design Spectrum

TBDY2018 Elastic Design Spectrum

5.1 Spectrum Parameters

Parameter	Value	Description
T_A	0.0729 s	Ascending $\rightarrow$ Plateau transition
T_B	0.3646 s	Plateau $\rightarrow$ Descending transition
S_{DS}	1.556 g	Short period design spectral acceleration
T_1	0.0608 s	Fundamental period of structure
$S_{ae}(T_1)$	1.401 g	Spectral acceleration at T_1

5.2 Design Region

Current Status: The structure is in the **ASCENDING** region ($T_1 < T_A$).

- This is the optimal region for seismic design.

- Lower spectral acceleration compared to plateau region.

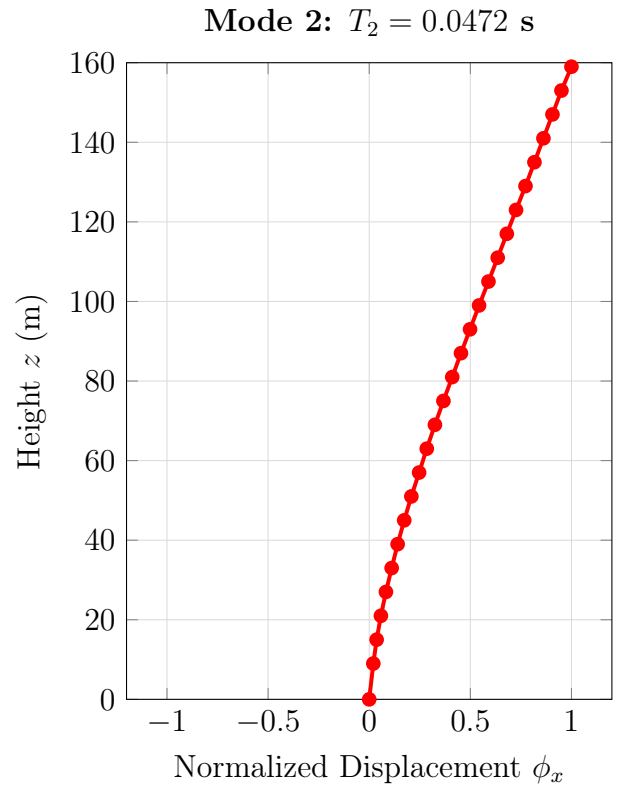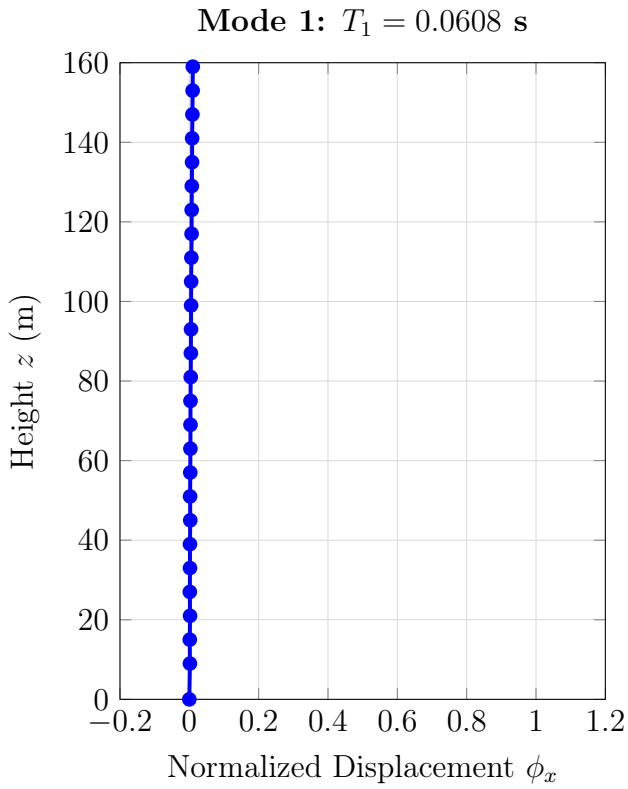- Margin to T_A: $0.0729 - 0.0608 = 0.0121$ s (16.6%)

Warning: Structures in the plateau region ($T_A \leq T \leq T_B$) experience maximum spectral acceleration, which can lead to critical design issues during earthquakes.

6 Modal Analysis Results
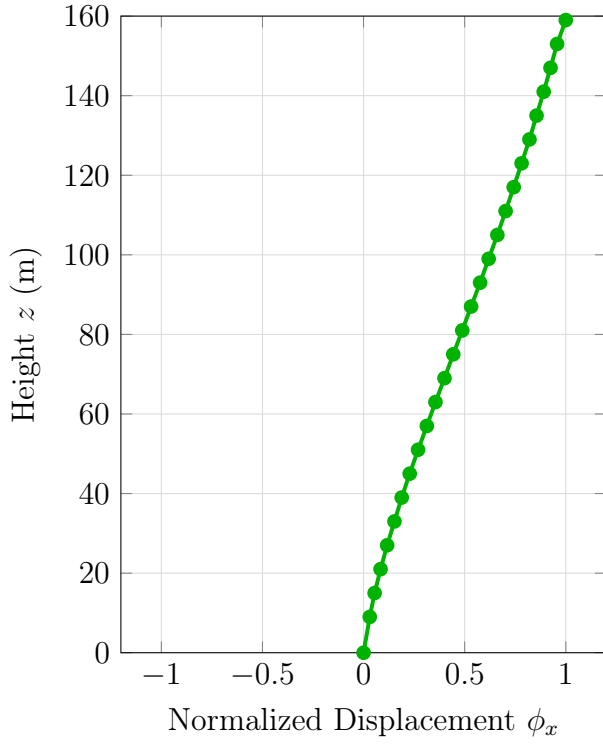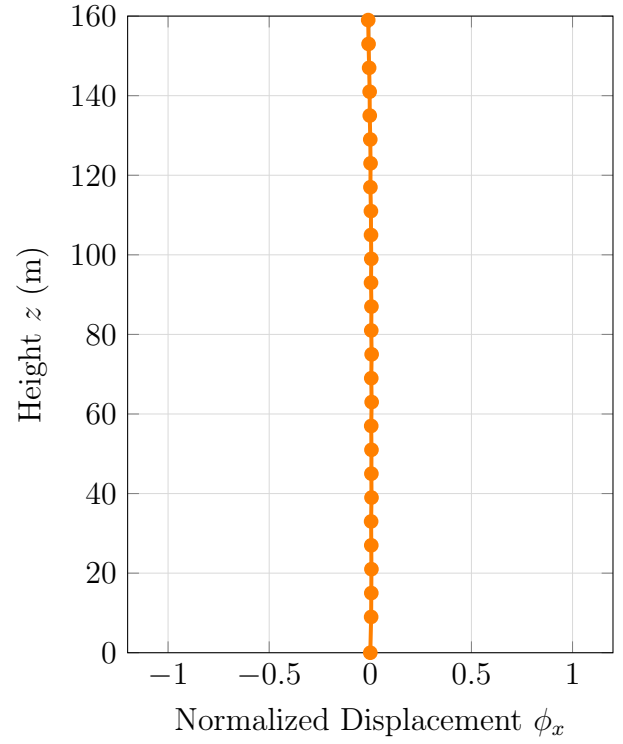
6.1 Natural Periods (Mode 1-7)

Modal Periods - OpenSeesPy Analysis
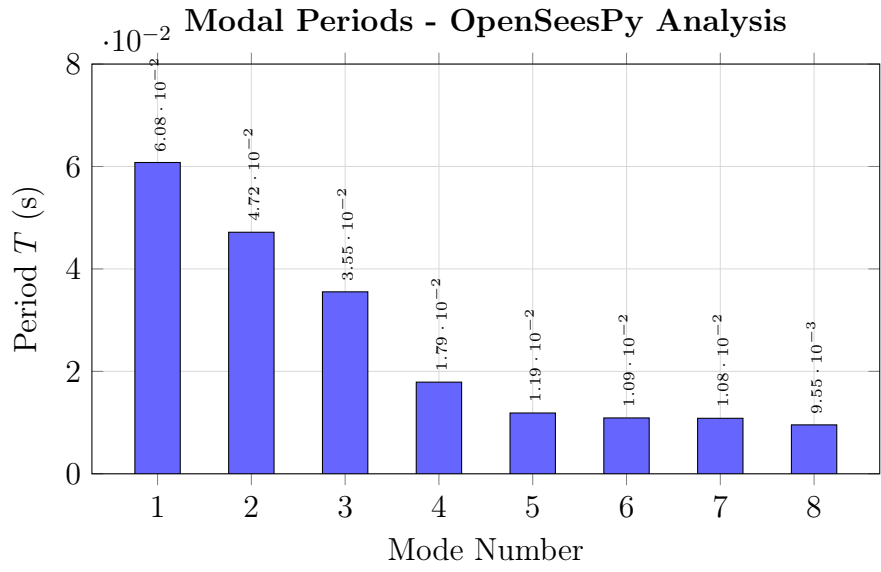
6.2 Mode Shape - Mode 1 (X-Direction)

Mode 1: $T_1 = 0.0608$ **s**

Mode 2: $T_2 = 0.0472$ **s**

6.3 Mode Shapes - Modes 3 & 4

Mode 3: $T_3 = 0.0355$ **s**

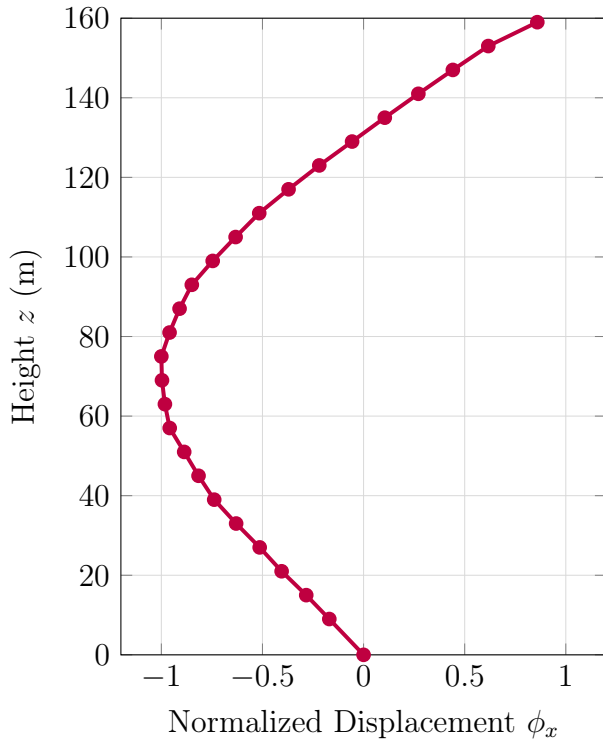**Mode 4:** $T_4 = 0.0179$ **s**

6.4 Mode Shapes - Modes 5 & 6

Mode 5: $T_5 = 0.0119$ **s**

Mode 6: $T_6 = 0.0109$ **s**

6.5   Mode Shapes - Modes 7 & 8

Mode 7: $T_7 = 0.0108$ **s**

Mode 8: $T_8 = 0.0096$ **s**
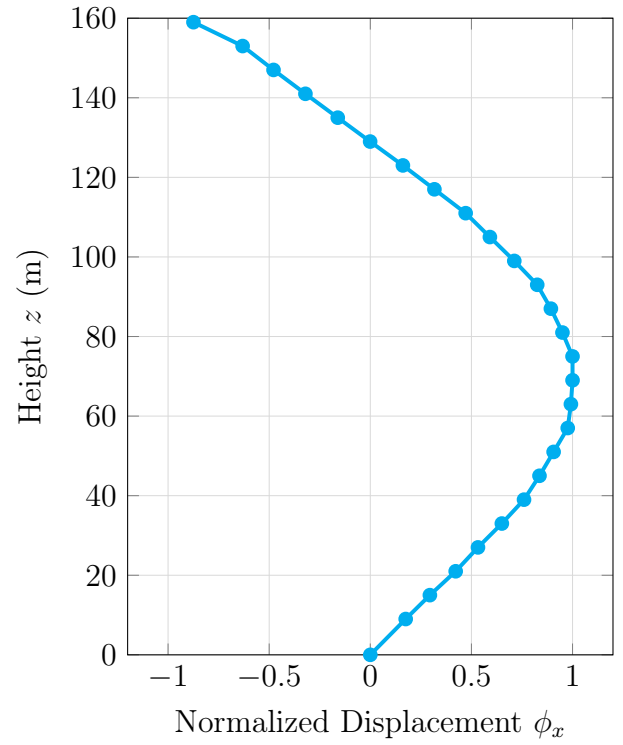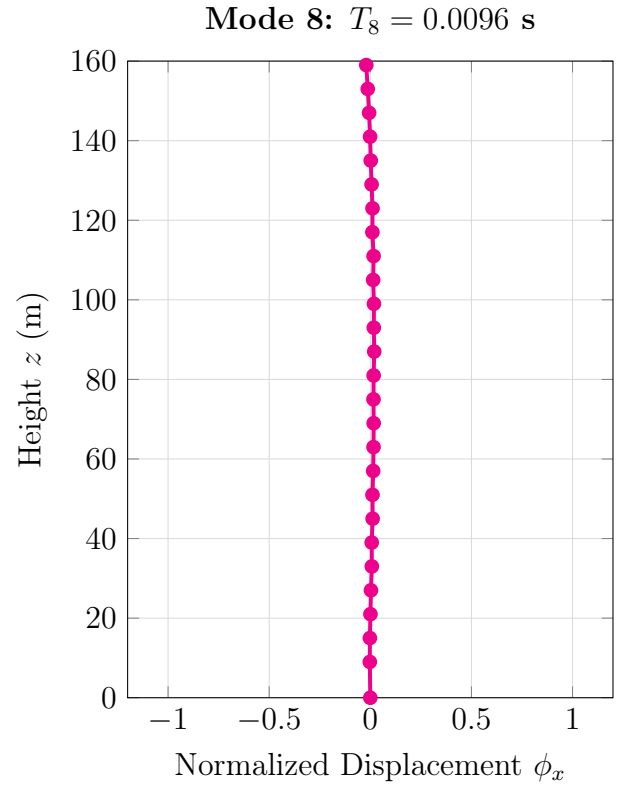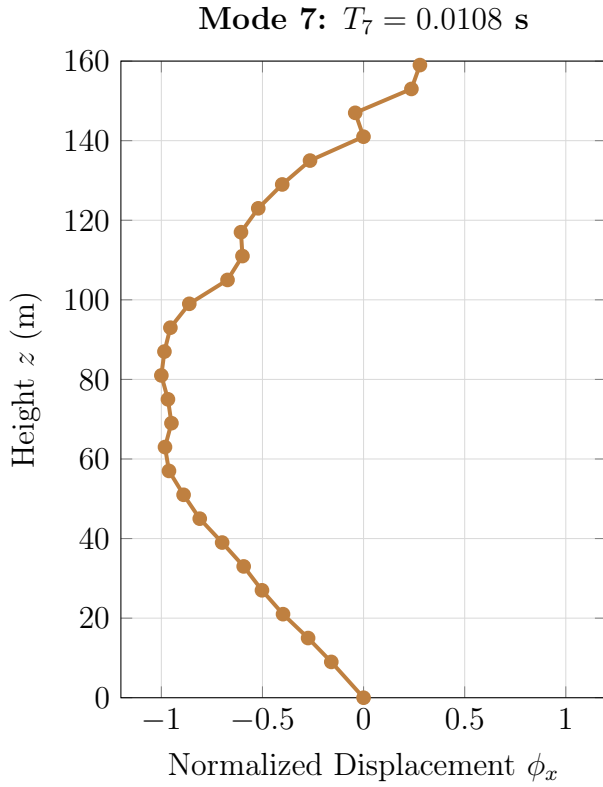
6.6   Modal Analysis Summary

Mode	Period (s)	Frequency (Hz)	Description
1	0.0608	16.45	1st Translation (X)
2	0.0472	21.20	1st Translation (Y)
3	0.0355	28.15	1st Torsion
4	0.0179	55.88	2nd Translation
5	0.0119	84.23	Higher Mode
6	0.0109	91.69	Higher Mode
7	0.0108	92.28	Higher Mode
8	0.0096	104.69	Higher Mode

Analysis Parameters:

- Software: OpenSeesPy (Python)

- Material: Balsa Wood ($E = 3500$ MPa, $\rho = 160$ kg/m^3)

- Section: 6×6 mm

- Total Mass: 15.02 kg (test loads at every 3 floors)