

OmikronKappa
Consulting



SANTACRUZ STATION

MUMBAI

Engineering beneath
a megacity

Omikron Kappa's contribution to one of
the most complex underground stations
of Mumbai Metro Line 3

Mumbai Metro Line 3 | Contract UG-05

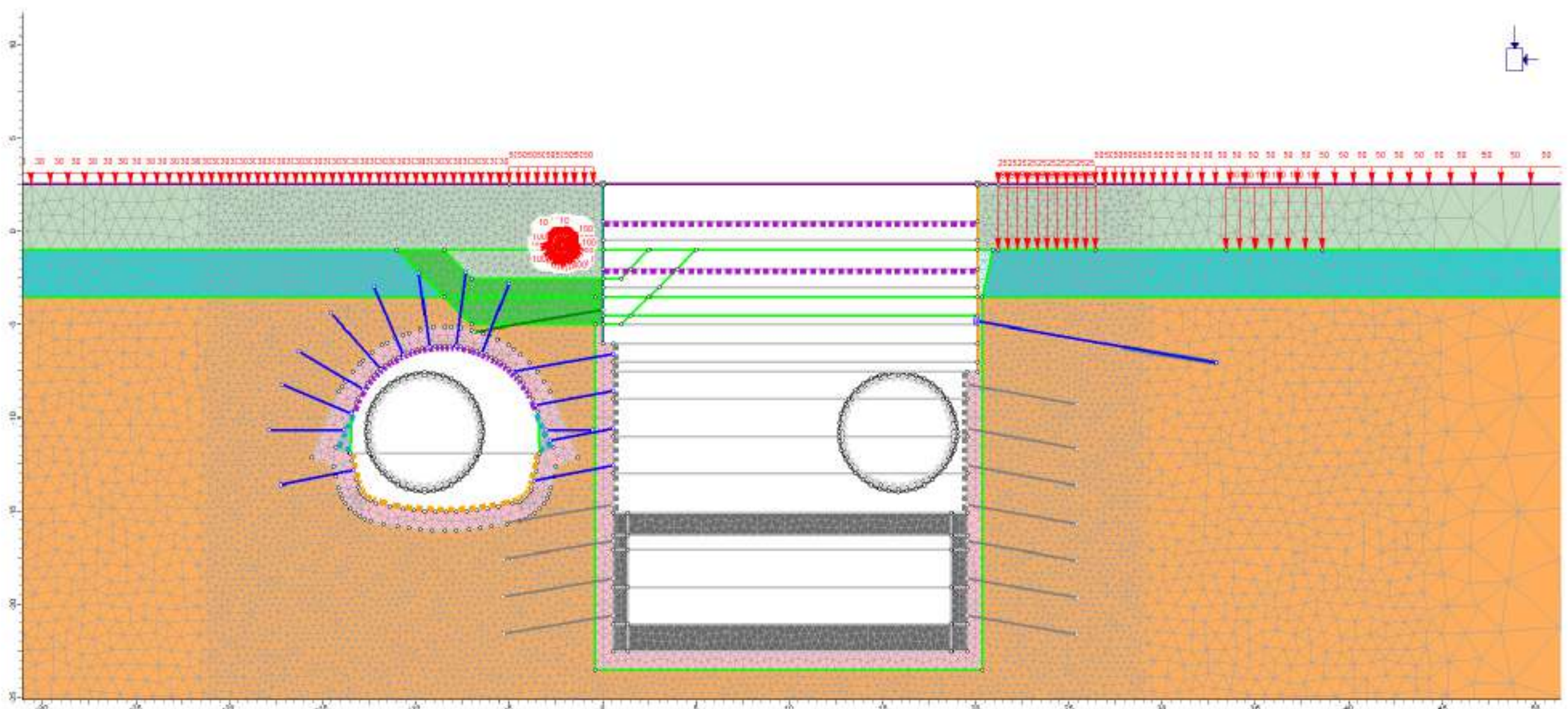
A MAJOR UNDERGROUND METRO PROJECT

PROJECT SCALE

Mumbai Metro Line 3 is a massive **33.5km underground corridor** featuring **27 stations** and complex metro infrastructure.

Omikron Kappa had a pivotal role as a major Designer, including preliminary & detailed design of **4 underground stations & interstation tunnels**.

The now **fully operational Santacruz Station** stands out as one of our **most intricate, multi-parametric challenges** to date.



ONE STATION. TWO INTERCONNECTED STRUCTURES.

STATION CONFIGURATION

A double interconnected structure:

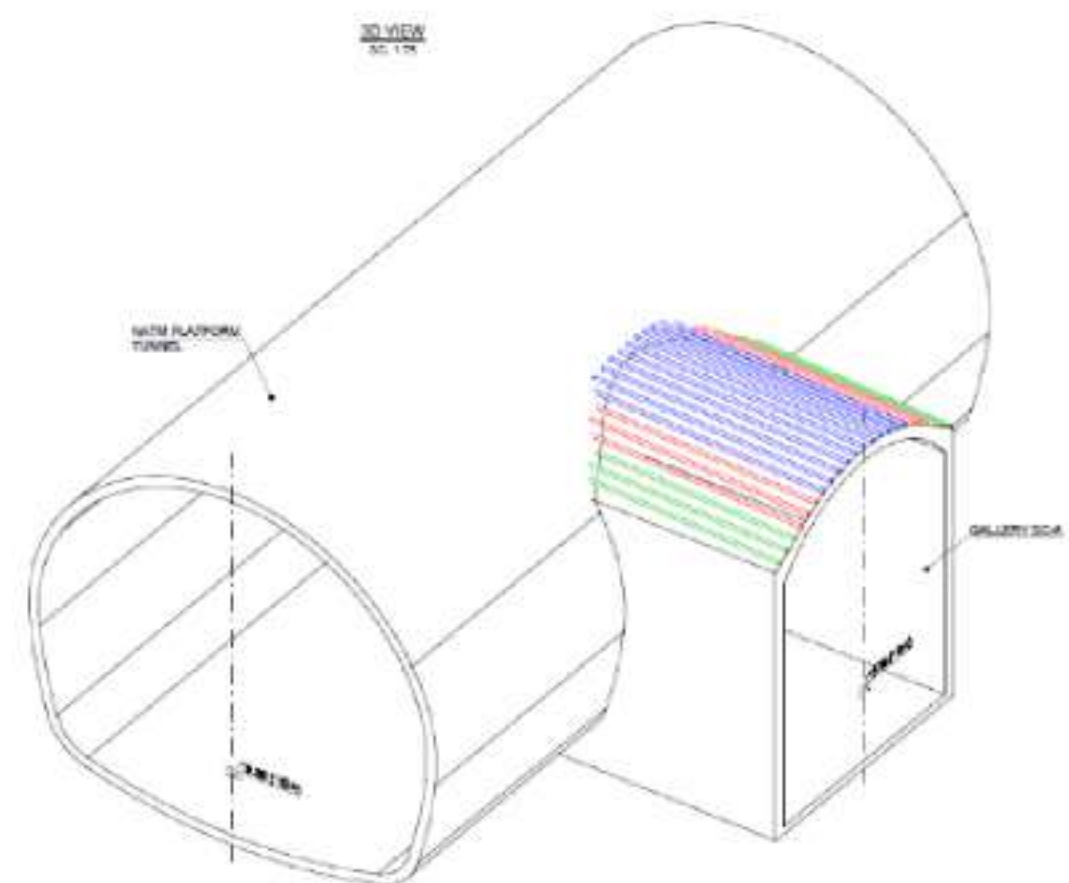
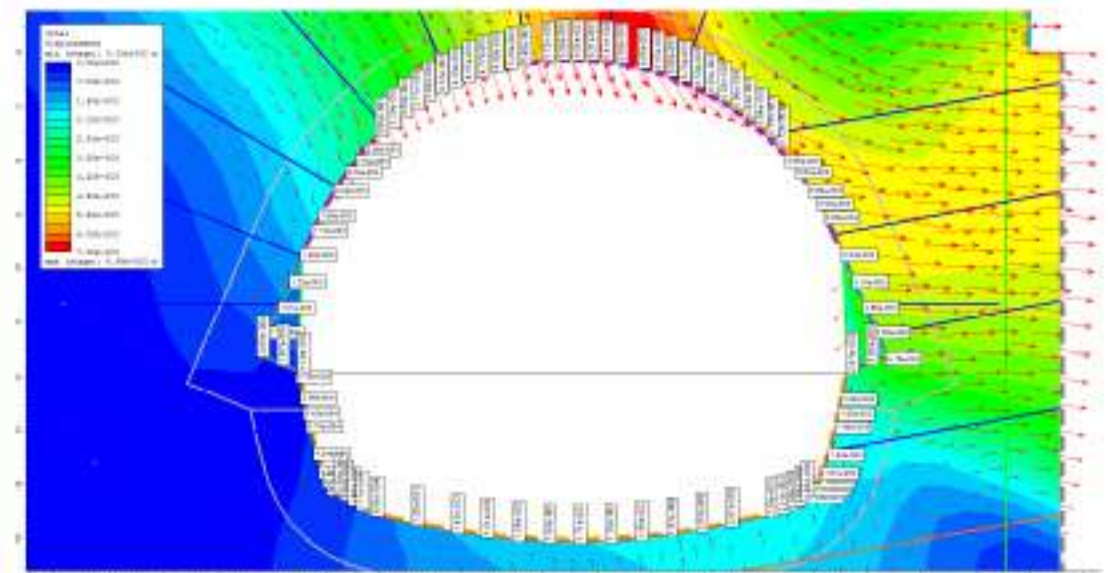
Main Station Box

Open-cut deep excavation 255m long x 20m wide x 20m deep, housing the first platform.

Parallel Large NATM Tunnel

10m wide x 9m height, housing the second platform.

Connected to main station through multiple connecting galleries of various shapes and dimensions, optimized for passenger flow and back-of-house services.



A HIGHLY COMPLEX SEQUENCE



CONSTRUCTION SEQUENCE

TBM tunnel on the NATM platform side bored prior to the NATM. The design addressed a **highly delicate and precise sequence**:

01 – Access

Established from the station's pit to the NATM platform side through a dedicated NATM cavern.

02 – Demolition & Preparation

Strategic demolition of segments and creation of a cavern for equipment approach/movement.

03 – NATM Advancement

Systematic segmental lining demolition, section widening and support installation.

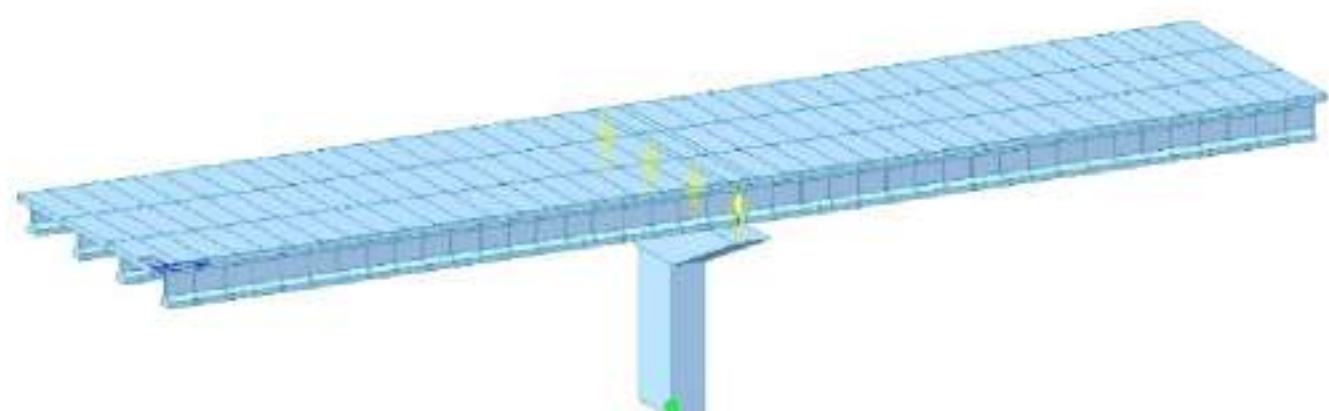
04 – Connectivity

NATM linked to main box via cross-passages.

A dense city environment under strict environmental rules required careful treatment, state-of-the-art computation and flawless co-ordination of design and construction.

To minimise ground movement and protect the flyover throughout construction, Omikron Kappa designed a:

Construction via **delicate steps to prevent any unacceptable impact or displacement** of foundations.



DESIGNING AROUND A 2.4-METRE WATER MAIN

WATER MAIN CHALLENGE

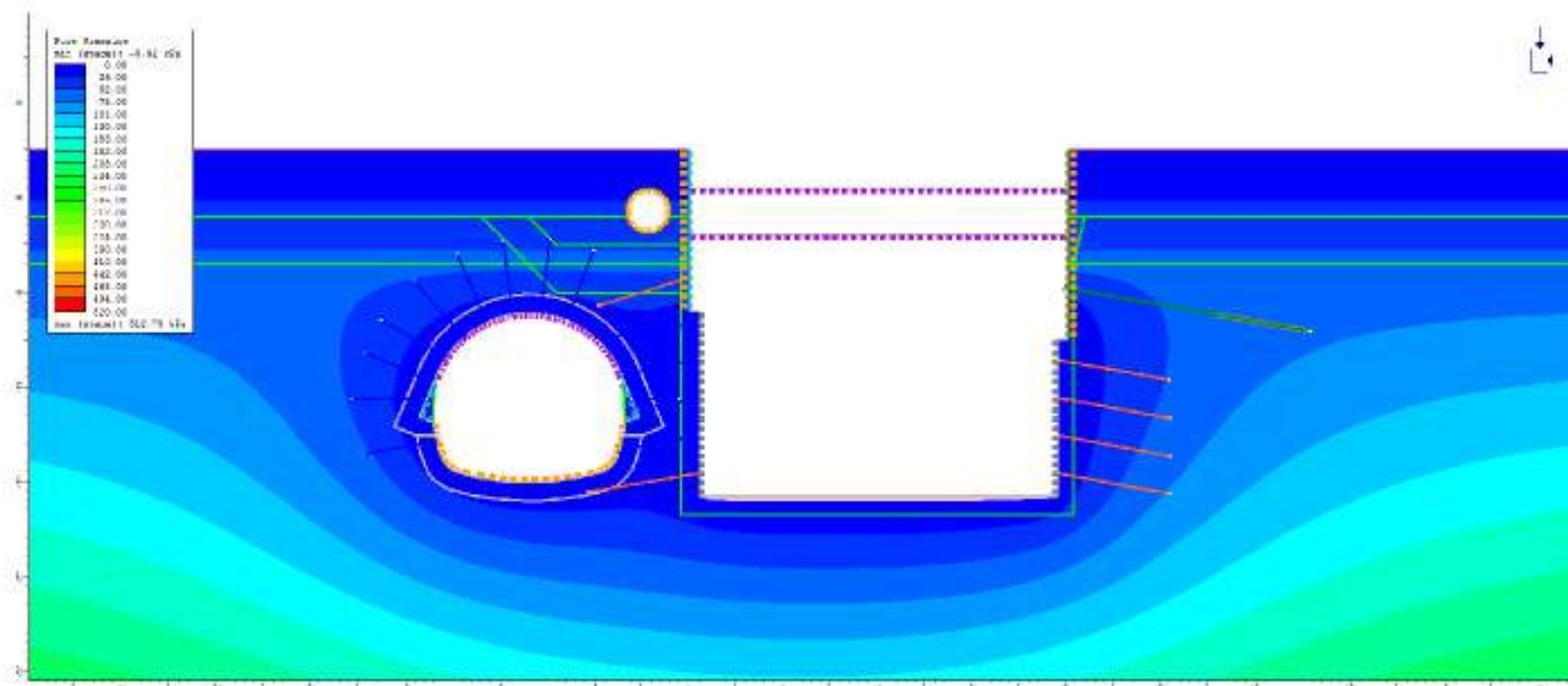
A major water main serving a large part of the city was located directly above the permanent cut-and-cover station box.

2,400 mm Water Main

Diverting the utility would have created significant risks, delays and construction challenges. Instead, the station box was shifted and slightly rotated to maintain a minimum clearance of:

600–650 mm

between the water main and the temporary support piles, successfully managing **excavation in very close vicinity to the utility.**



BRINGING IT ALL TOGETHER

ENGINEERING SOLUTIONS



The successful execution required orchestrating a highly complex framework of works and advanced solutions, including:

- **Strategic diversion of multiple existing utilities and heavy urban traffic.**
- **Advanced Retaining Systems:** high-stiffness secant pile walls, double-row micropile walls, heavy strut system, pre-stressed anchors and rockbolts.
- **Meticulous, detailed water level management.**
- **Safety through Detailed Monitoring:** based on a thoroughly thought-out and laid-out monitoring program and contingency plan designed by Omikron Kappa.

Every element was designed to manage risk through-out the excavation and construction process.



ENGINEERING FOR SAFER URBAN MOBILITY

THE OUTCOME

At Omikron Kappa, we take immense pride in delivering mega-infrastructure projects that serve the community.

Engineering a project of this scale is not just about overcoming technical complexities; it is about building a better, smoother and above all, safer daily life.

Today, the fully operational station serves thousands of passengers as part of Mumbai Metro Line 3.



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Engineering Complex
Infrastructure with Precision