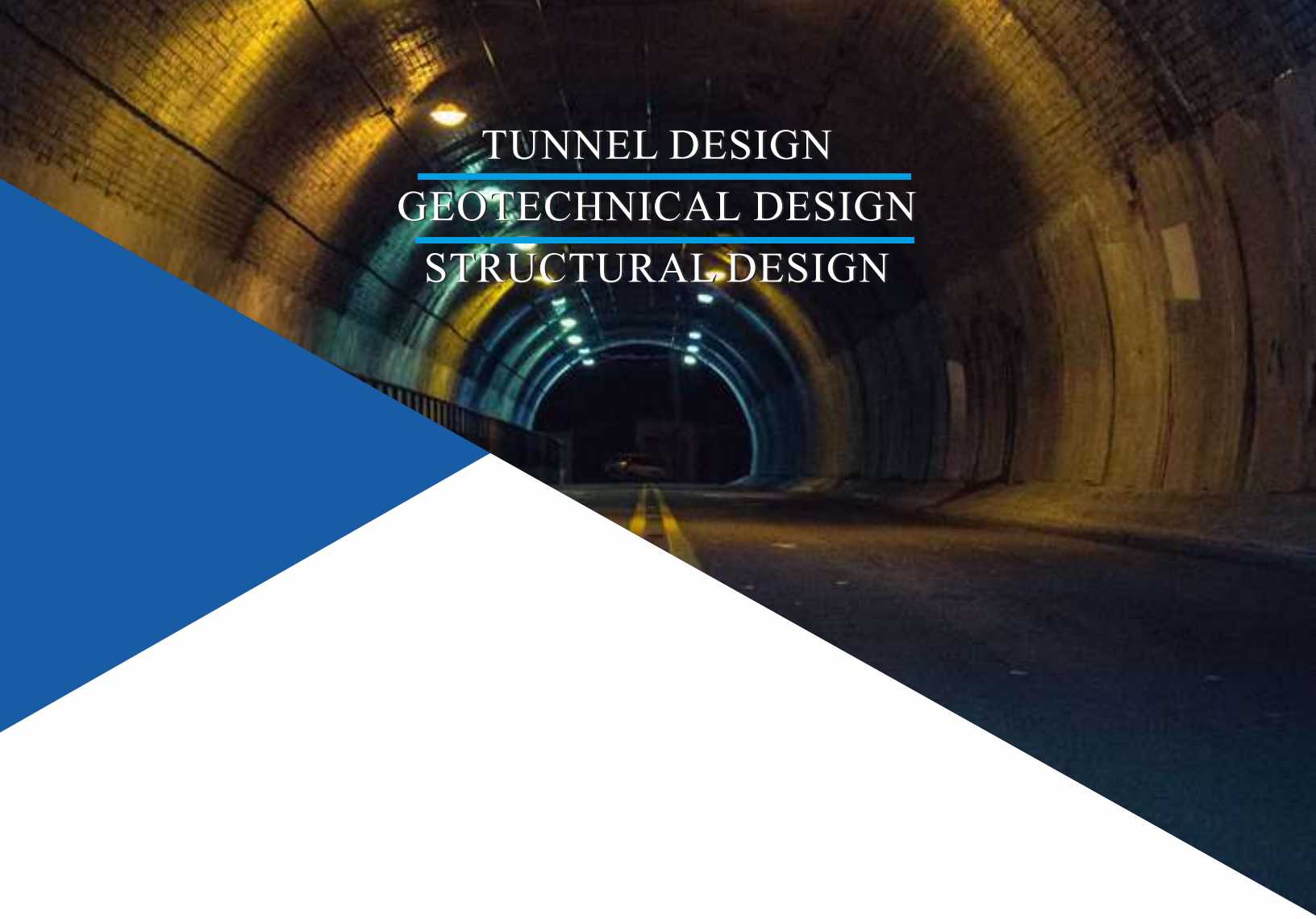
BOUW™
CONSULTANTS

AT BOUW, WE

INSPIRE INNOVATE CREATE

Delivering Value Through Engineering Excellence.

www.bouw.co.in



COMPANY OVERVIEW

Bouw Consultants™ is a leading engineering consultancy firm specializing in **Geotechnical, Tunnel, Structural, Highway, and Bridge Engineering**. We are committed to delivering innovative, sustainable, and cost-effective solutions tailored to the unique challenges of each project.

With a team of highly experienced professionals, we provide comprehensive services in design, analysis, and project management, ensuring seamless execution from concept to completion. Our expertise spans **NATM and TBM Tunneling, Underground & Elevated Metro Stations, Viaduct, Geotechnical Designs including Diaphragm Walls, Slope Stability, Ground Improvement, Foundation Engineering and Complex Infrastructure Development.**

At Bouw Consultants™, we prioritize **technical excellence, safety, and efficiency**, leveraging advanced engineering methodologies and cutting-edge technologies to optimize project outcomes. Our client-centric approach, backed by in-depth industry knowledge, makes us a trusted partner in shaping the future of infrastructure development.

At Bouw, we are up to any challenge.

OUR MISSION

We are here to bring innovation and inspired engineering to the world of tunnels and structural engineering. We are here to promote excellence in engineering. We are here to deliver timely, effective solutions that meet clients' requirements. We strive to offer our clients a wide array of solutions under one roof. Our best practices span attention to detail, ideating flexible solutions, complete confidentiality, and comprehensive plans.

OUR VISION

We aspire to stand out in the tunnel, geotechnics, and structural engineering consultancy segment. We aspire to be known as a one-stop-shop for a wide breadth of innovation-driven, reliable services.

OUR FOUNDER

Mr. Sanjoy Sanyal - CEng, MIE, MEng (NATM & TBM Tunnel) TU, Graz, BE- Civil. IIEST, Shibpur

Mr. Sanyal, is a seasoned Tunnel & Structural Expert with over 25 years of extensive experience. He holds a Master of Engineering degree in NATM from the University of Graz, Austria, and a Bachelor's degree in Civil Engineering from IIEST, Shibpur.

Mr. Sanyal's portfolio boasts complex assignments across urban and transport infrastructure, including metro rails, railways, highways, and buildings. Notable projects in his portfolio include the Riyadh Metro, Ahmedabad Metro, Mumbai Metro, Quazigund Banihal Tunnel, T10 Railway Tunnel (Manipur), Chennai Metro, Gurgaon Metro, Jammu Udhampur Rail Link Project, London Underground, and Kolkata Metro.

After dedicating over 20 years to the industry, Mr. Sanyal founded Bouw Consultants™ to provide cost-effective solutions to the Indian construction sector. Under his leadership, Bouw has undertaken prestigious projects such as the Mumbai Coastal Road Project, Surat Metro, Riyadh Metro, and the Delhi Vadodara Greenfield Project, Package 15.

Mr. Sanyal's expertise encompasses Prebid Engineering, Detailed Design, and DPR for railway, highway, and tunnel projects.

EXPERTISE

At Bouw, we deliver designs that address all key factors while remaining cost-effective and unique. Whether it's a tunnel or railways, Bouw has the capability to handle any challenging infrastructure project.

GEOTECHNICAL DESIGN

The success of any construction project hinges on meticulous geotechnical investigation planning. At Bouw Consultants™, we understand the inherent uncertainties in tunneling and the critical need to comprehend geology, soil, and rock characteristics.

Our team scientifically analyzes all necessary information, ensuring a thorough understanding of the subsurface conditions. We assess risks with extreme care, recommending comprehensive risk mitigation measures. Our flexible designs allow for adjustments and optimization based on actual ground conditions encountered during construction.

This approach not only ensures safety and stability but also enhances the efficiency and success of our projects. At Bouw, we are committed to providing reliable and adaptable geotechnical solutions that meet the highest standards of engineering excellence.

ACTIVITIES

- Geotechnical investigation planning
- Geotechnical interoperative report preparation
- Designing foundations such as shallow foundations, deep foundations (piles, caissons), and specialized foundations (micropiles, secant piles).
- Slope Stability Analysis & design
- Earth Retaining Structures such as designing retaining walls, diaphragm walls, soldier piles, and sheet piles to hold back earth and prevent soil movement.
- Ground Improvement such as Implementing techniques like soil stabilization, grouting, and compaction to enhance soil properties.
- Seepage and Settlement Analysis
- Soil-Structure Interaction
- Design of Anchors and Soil Nails
- Finite Element Method (FEM) Modeling

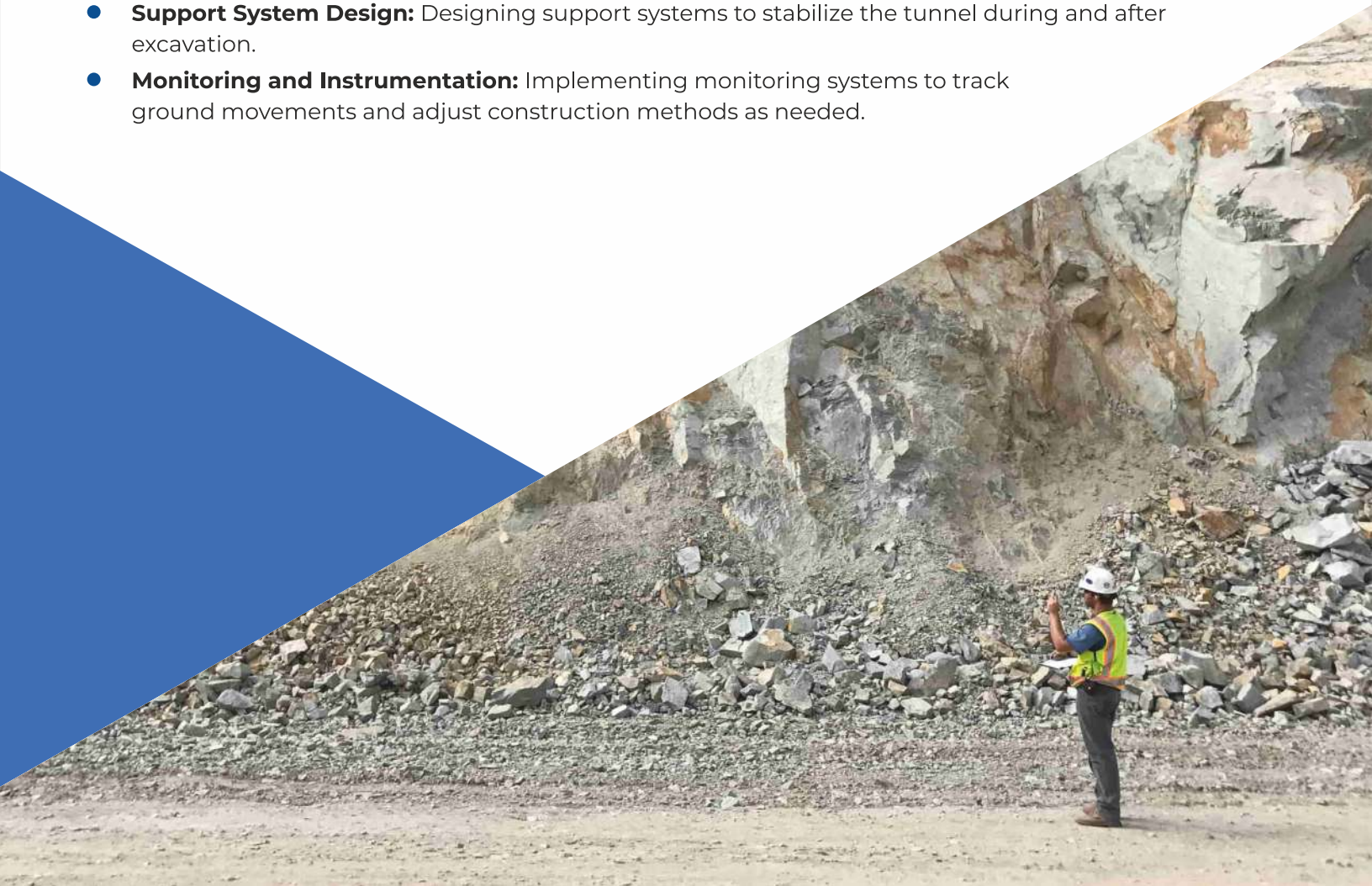
GEOLOGICAL SERVICES

involve the study and analysis of Earth's subsurface to understand its composition, structure, and processes. These services are crucial for various applications, including mineral exploration, environmental assessments, and construction projects. By conducting surveys, mapping geological features, and analyzing soil and rock samples, geologists provide valuable insights that inform decision-making and ensure the safety and success of projects.

ACTIVITIES

Geological services for tunnel projects involve a comprehensive analysis of subsurface conditions to ensure safe and efficient tunnel construction. These services include:

- **Subsurface Investigation:** Conducting detailed surveys and tests to gather data on soil, rock, and groundwater conditions.
- **Geological Mapping:** Creating maps of geological features to understand the terrain and identify potential challenges.
- **Rock and Soil Characterization:** Analyzing the properties of rock and soil to determine their behavior during excavation.
- **Groundwater Assessment:** Evaluating groundwater conditions to manage seepage and ensure dry construction conditions.
- **Hazard Identification:** Identifying geological hazards such as faults, landslides, and sinkholes that could impact the project.
- **Risk Mitigation:** Recommending measures to mitigate geological risks and ensure the safety of the construction process.
- **Support System Design:** Designing support systems to stabilize the tunnel during and after excavation.
- **Monitoring and Instrumentation:** Implementing monitoring systems to track ground movements and adjust construction methods as needed.



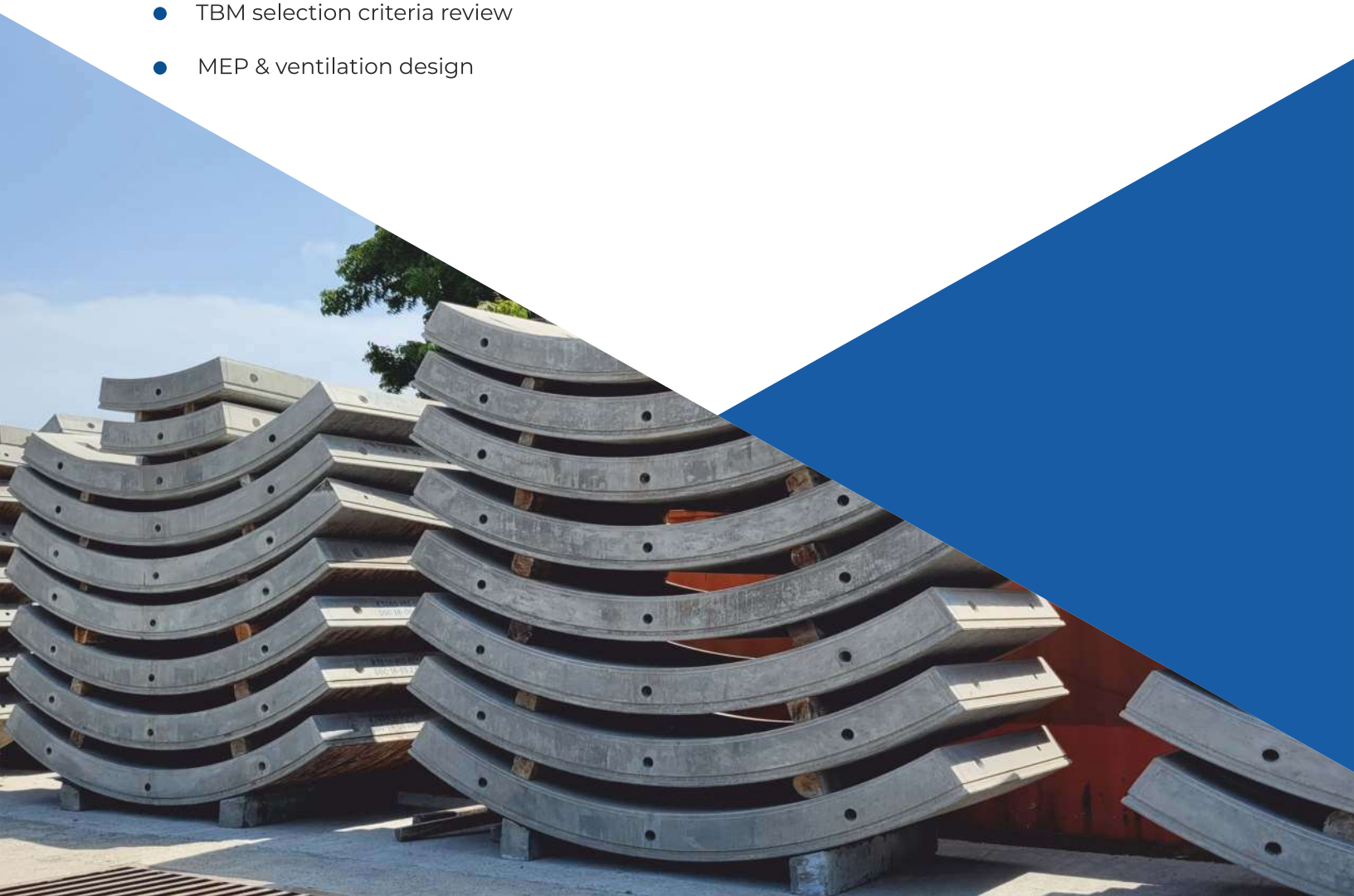
TBM TUNNELLING

Tunneling in inhabited urban precincts is associated with unique challenges. An urban environment typically can have a shallow ground cover, or soft ground conditions, or mixed ground. Roads crisscross urban areas beneath which lie extensive intricate networks of wet and dry utilities. Building foundations are sacrosanct. Abandoned foundations and buried structures are frequently encountered unknowns. While Tunneling, all these conditions, utilities, and structures must remain intact. Space constraints magnify this challenge.

Bouw is especially experienced in dealing with the soft ground conditions associated with low overburden. Bouw systematically identifies the relevant parameters and carries out numerical analysis using state-of-the-art finite element software like Plaxis 2D, considering the non-linear behavior of rock and soil medium. We always verify and reaffirm our design by a systematic process.

ACTIVITIES

- Segment lining design with conventional steel or steel fiber reinforcement
- Cross passage design & temporary structure for cross passage opening
- Settlement analysis & Building damage assessment
- Instrumentation & monitoring plan & specifications
- Segment damage assessment & mitigation
- TBM selection criteria review
- MEP & ventilation design



NATM/ CONVENTIONAL TUNNELLING

Conventional tunnels are typically constructed with the New Austrian Tunnelling Method (NATM), Norwegian Tunnelling Method (NTM), or the Sprayed Concrete Lining (SCL) Method. During Tunneling, different rock shapes, soil and rock conditions, and unknown geological structures can throw up challenges. Engineers must also deal with high groundwater pressure, geothermal gradients, squeezing fault zones, alignment, and high in situ stress. Such tunnels can pass through varying ground conditions-somewhere intensely jointed zones and somewhere soft ground conditions.

The uncertainties associated with designing deep tunnels require a clear understanding of tunnel types, tunnel behavior, and failure modes. Careful analysis, assessment, and risk mitigation measures are the key to successfully executing such projects in difficult terrains.

Bouw's expertise lies in evaluation of all the aspects of deep tunnels and preparing flexible, cost-effective designs with due consideration to the non-linearity in material behavior.

ACTIVITIES

- Alignment selection
- Excavation sequences/construction methods
- Primary / secondary lining design (with or without reinforcement, steel fiber)
- Assessment of recorded data and advice further action
- Instrumentation & monitoring plan & specifications
- Design of ground improvement requirements
- Rock bolt support with shotcrete
- MEP & ventilation design
- Tunnel portal design

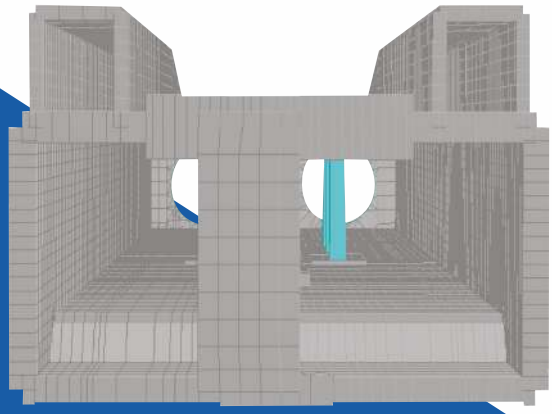
CUT AND COVER TUNNELLING

Cut and cover construction is well suited to shallow tunnels which can be economically excavated from the surface. Some disadvantages associated with this Tunneling method are the deep cutting of busy city streets; space constraints; and potential disruptions to citizens, existing utilities, and adjacent structures. Therefore, proposed construction schemes for cut and cover works must demonstrate that no adjacent structure will be adversely impacted and public disruptions will be minimal.

Bouw has the expertise to develop schemes that not only require less space but also ensure overall safety and robustness. With the help of realistic numerical modeling and analysis, Bouw comes up with cost-effective designs.

ACTIVITIES

- 2D/3D Modelling & Structural Analysis
- Excavation and Support Systems
- Diaphragm Wall Design
- Ground Improvement Techniques
- Waterproofing Solutions
- Utility Relocation Planning
- Instrumentation & Monitoring Plan
- Risk Assessment and Management
- Design of Running Cut and Cover Tunnel
- Design of Ramps
- Design for Permanent Station Structure



UNDERGROUND METRO STATION

At Bouw Consultants™, we specialize in designing underground metro stations that are efficient, safe, and sustainable. Our comprehensive design services encompass every aspect of the project lifecycle, ensuring robust and innovative solutions.

ACTIVITIES

- Conceptual Design
- Construction Methods
- Quantity & Cost Estimation
- Tendering Assistance
- Design Basis Report and Technical Report Preparation
- 3D/2D Analysis and Design
- Working Drawings Preparation
- Settlement Analysis
- Building Damage Assessment and Mitigation
- Instrumentation and Monitoring

ELEVATED METRO – STATION & VIADUCT

Planning an elevated station is not as simple as designing a building. This is simply because the elevated station is normally proposed over a busy road, hidden utilities, and a complicated structural form. Bouw has years of experience in handling various challenges. We can ensure the best possible economic design for you.

ACTIVITIES

- 2D/3D Modelling & Structural Analysis
- Design of foundation
- Design for permanent works for structure
- Design of steel structure for the roof
- Design Basis Report and Technical Report Preparation
- Quantity & Cost Estimation
- Tendering Assistance

HIGHWAY AND BRIDGES

At Bouw Consultants™, we offer a comprehensive range of design services for highways and bridges, ensuring that each project is executed with precision, safety, and sustainability in mind. We specialize in various types of bridges, including girder bridges, arch bridges, cable-stayed bridges, and more.

ACTIVITIES

- Highway geometric and pavement design
- Pre-stressed concrete / precast segmental bridges
- Railway steel bridges
- Launching schemes for precast girders/segments
- Earthwork and Grading
- Retaining Structures
- Drainage and Hydrology
- Environmental Impact Assessment
- Maintenance and Rehabilitation Planning

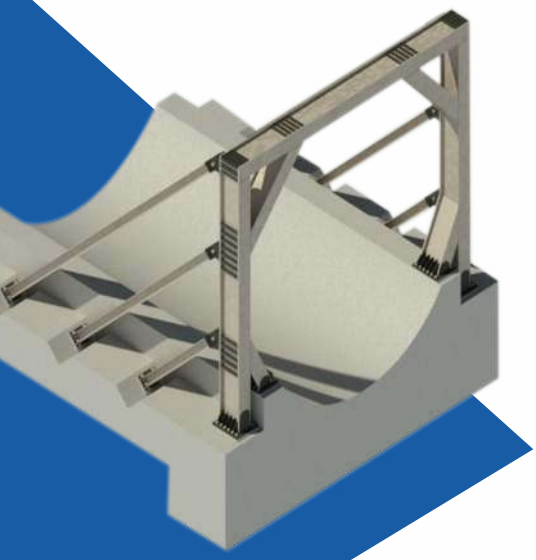
STRUCTURAL ANALYSIS AND DESIGN

At Bouw Consultants™, we provide comprehensive structural analysis and design services to ensure that all structures are safe, efficient, and sustainable. Our expertise spans a wide range of projects, from buildings and bridges to tunnels and underground structures.

ACTIVITIES

- 2D/3D Structural Modeling
- Finite Element Analysis (FEA)
- Load Analysis
- Material Selection and Specification
- Reinforcement Design
- Vibration Analysis
- Foundation Design
- Seismic Design
- Code Compliance
- Retrofitting and Rehabilitation
- Sustainability Assessments

Our structural analysis and design services combine advanced technology with expert knowledge to deliver safe, efficient, and innovative solutions for all your engineering needs.



TEMPORARY & ENBALING WORKS

Temporary works are an integral part of underground projects. They don't carry a permanent load, but simply help build a facility. However, they involve a significant cost. Designing temporary works necessitates an understanding of the interfaces between temporary and permanent structures. Bouw uses circular sections to reduce the cost of temporary works by 15 percent and provide more working space with longer spans.

ACTIVITIES

- TBM launching and retrial scheme
- Design of launching and retrieval shaft
- Design of TBM thrust frames/cradles/starter ring & support
- Design of Temporary Excavation Support - strutting system
- Design of Temporary Traffic Decking
- Design of sheet pile walls, slurry walls, secant piles, drilled and driven steel piles
- Instrumentation and monitoring

ELECTROMECHANICAL & VENTILATION DESIGN

Electromechanical and ventilation activities in geotechnical design involve the design and implementation of systems that ensure the safety, functionality, and comfort of underground structures.

ACTIVITIES

Electromechanical and ventilation activities are critical for ensuring the safety, functionality, and comfort of tunnel projects. Here are some key activities involved:

- **Ventilation System Design:** Creating ventilation systems to ensure proper air circulation, control smoke in case of fire, and maintain air quality within the tunnel.
- **Lighting Systems:** Designing adequate lighting to ensure visibility and safety for tunnel users.
- **Fire Detection and Suppression Systems:** Developing systems to detect and suppress fires, ensuring the safety of tunnel users and minimizing damage.
- **Electrical Systems:** Designing power distribution systems for tunnel lighting, ventilation, communication, and emergency systems.
- **Monitoring and Control Systems:** Integrating systems for real-time monitoring and control of tunnel operations, including ventilation, lighting, and safety systems.
- **Emergency Systems:** Implementing emergency communication and evacuation systems to ensure quick response in case of incidents.
- **Plumbing Systems:** Designing drainage systems to manage water ingress and prevent flooding within the tunnel.

WHY US ?

Why Choose Bouw Consultants?

- **Expertise:** Specializing in urban and transport infrastructure, including metro rails, railways, highways, tunnels, and buildings.
- **Proven Track Record:** Successful projects like Riyadh Metro, Surat Metro, Mumbai Metro, and DMRC.
- **Cost-Effective Solutions:** High-quality, budget-friendly designs.
- **Comprehensive Services:** From Prebid engineering to detailed design and DPR for various projects.
- **Adaptability:** Designs that adjust based on actual ground conditions.
- **Commitment to Excellence:** Reliable and adaptable geotechnical solutions.
- **Client-Centric Approach:** Tailored solutions with a focus on client satisfaction.

OUR PROJECTS

METRO

- Detailed Design of Cross Over for Mumbai Metro Line 3.
- Pre-Bid Engineering Services for Chennai Metro Rail Project, Phase 2 Pkg. CP30/UT01 & UT02.
- Comprehensive Shop Drawing Review for Riyadh Metro Package 1.
- Independent Checking Engineering Services for Riyadh Metro Package 1 (Line 1 & 2).
- Lead Design Checker for Tunnels & associated structures, Surat Metro Rail Project, PH-1/UG-2/PKG-CS3
- Pre-Bid Engineering Services for Elevated Viaduct & Metro Stations, Philippine Metro, CP S02 Package.
- Pre-Bid Engineering Services for Patna Metro, Contract PC-06, Corridor 1 of Phase-I.
- Sub-Consultancy Engineering Services for detail design of Temporary structures for UG Metro stations, Delhi Metro Phase IV.

GEOTECHNICAL DESIGN

- D-Wall Design Peer Review for Basement Excavation at SOBHA ALTIUS, Sector 108, Gurugram.
- Building Condition Survey and Damage Assessment Study for Royal Calcutta Turf Club
- Detailed Design Services for Construction of Riverside Retaining Wall & River Scour Protection Works. “The Valley Orchard” (TVO) in Panchkula, Haryana for DLF..

TUNNEL

- Design of Cut & Cover Tunnel, including Underground Technical Building for Mumbai Coastal Road Project.
- Proof Checking of Tunnel and Associated Structures for Bharat-Mala Pari-yojana (EPC Mode, PKG-2), DAAT Kali Tunnel, Dehradun.
- Proof Consultancy Services for Delhi-Vadodara Greenfield Alignment (NH-148N) under Bharat-Mala Pari-yojana in Rajasthan (EPC Mode).
- Pre-Bid Engineering Services for Aizawl Bypass Tunnel
- Pre-Bid Engineering Services for Shimla Bypass, Package I
- Consultancy Services for Preparation of Feasibility Study & Detailed Project Report for Pune Ring Road
  (URSE to Paud Road to Varve Bk, Western Part).
- Consultancy Services for Detailed Design of MEP & Ventilation Systems for 590m Twin Tunnel, Kangra Bypass Tunnel.
- Technical Due Diligence for Operation and Maintenance of 4-Laning of Quazigund to Banihal Section, including 8.45km Twin Tube Tunnels, on BOT (Annuity) Basis in Jammu & Kashmir.
- Consultancy Services for Preparation of Feasibility Study & Detailed Project Report for Pagote to Chowk Project.
- Pre-Bid Engineering Services for Kottavalasa-Koraput Doubling Railway Line Project.
- Consultancy Services for Preparation of Feasibility Report cum Detail Engineering report for NH 927A starting from Swaroopganj - Kotra- Kherwara from Km. 0/0 to 148/100, Dungarpur bypass km. 166/320 to 175/480 Talwara Bypass 248/780 to 251/660 and Banswara bypass 257/730 to 274/200 in the State of Rajasthan.
- Proposal of DPR for the Construction of Six lane Greenfield Highway starting from its Junction with NH-4B (New NH-348) near Pagote (Design km.0.0000) till its junction on NH-4B at Pagote (Design Km. 29.219) in the state of Maharashtra – ongoing (tunnel length 1.9km & 1.2km)

BRIDGE & HIGHWAYS

- Pre-bid Engineering services for Aizawl Bypass Tunnel.
- Pre-bid Engineering services for Shimla Bypass Package I.

TEMPORARY & ENBALING WORKS

- Temporary Formwork Design for Cast-in-Situ Concrete, Delhi–Meerut RRTS.
- Design of Temporary Structures for Cross Over, Mumbai Metro Line 3
- Sub-Consultancy for Detailed Design of Temporary Structures for Underground Metro Stations, Delhi Metro Phase IV
- Design of Temporary Works, Mumbai Coastal Road Project.
- Detailed Design Consultancy for Domestic. Terminal Building, Paro International Airport.
- Detailed Design Consultancy for RSETI Building, Sitamarhi, Bihar.
- Detailed Design Consultancy for Sheohar Building, Sitamarhi, Bihar.
- Detailed Design Consultancy for Temporary Staging and Strengthening, Park Hotel, New Delhi.

OUR CLIENTELS

Ayesa Ingeniería y Arquitectura, S.A.

Bureau Veritas

Lombardi Engineering Ltd.

Gülermak Ağır Sanayi İnşaat ve Taahhüt A.Ş.

Doğuş İnşaat ve Ticaret A.Ş.

Delhi Metro Rail Corporation Ltd.

China Railway Tunnel Group Co., Ltd.

Stup Consultants Pvt Ltd.

TPF Engineering Pvt Ltd.

Afcons Infrastructure Limited

Malibu Towne

International Center for Research on Women

APCO Infratech Pvt Ltd

Kalpataru Projects International Limited

LEA Associates

Rail Vikas Nigam Limited

Oriental Structural Engineers Private Limited

RINA

SAM India Builtwell Private Limited

SUCG Infrastructure India Pvt Ltd

DLF

SOBHA

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OUR SERVICES

- Prebid Engineering Services
- Postbid Engineering Services
- Proof Checking / Peer Checking Services
- Detailed Project Report (DPR) / Feasibility Study
- Geological Site Investigation
- Geotechnical Investigation
- Site Supervision Services
- Temporay & Enbaling Works Design

Please Scan QR Code For More Services and Details

Redefining **excellence in tunnel** engineering,
geotechnical design and **structure engineering** with innovative,
sustainable solutions.

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